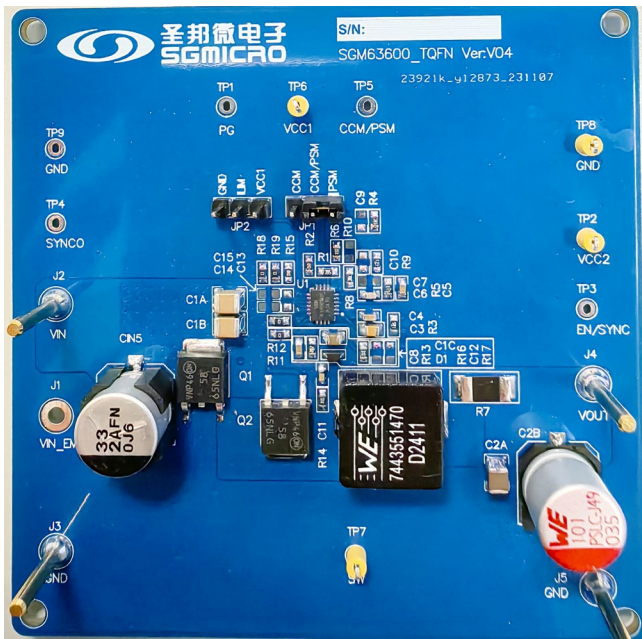


SGM63600 Demo Board Test Report

6V to 60V Input, 5V/7A Output

EVB Layout for SGM63600:

Top



Bottom

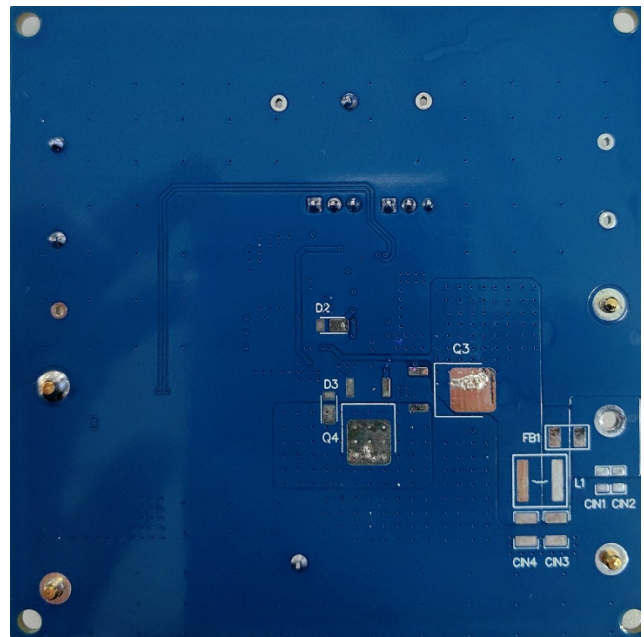


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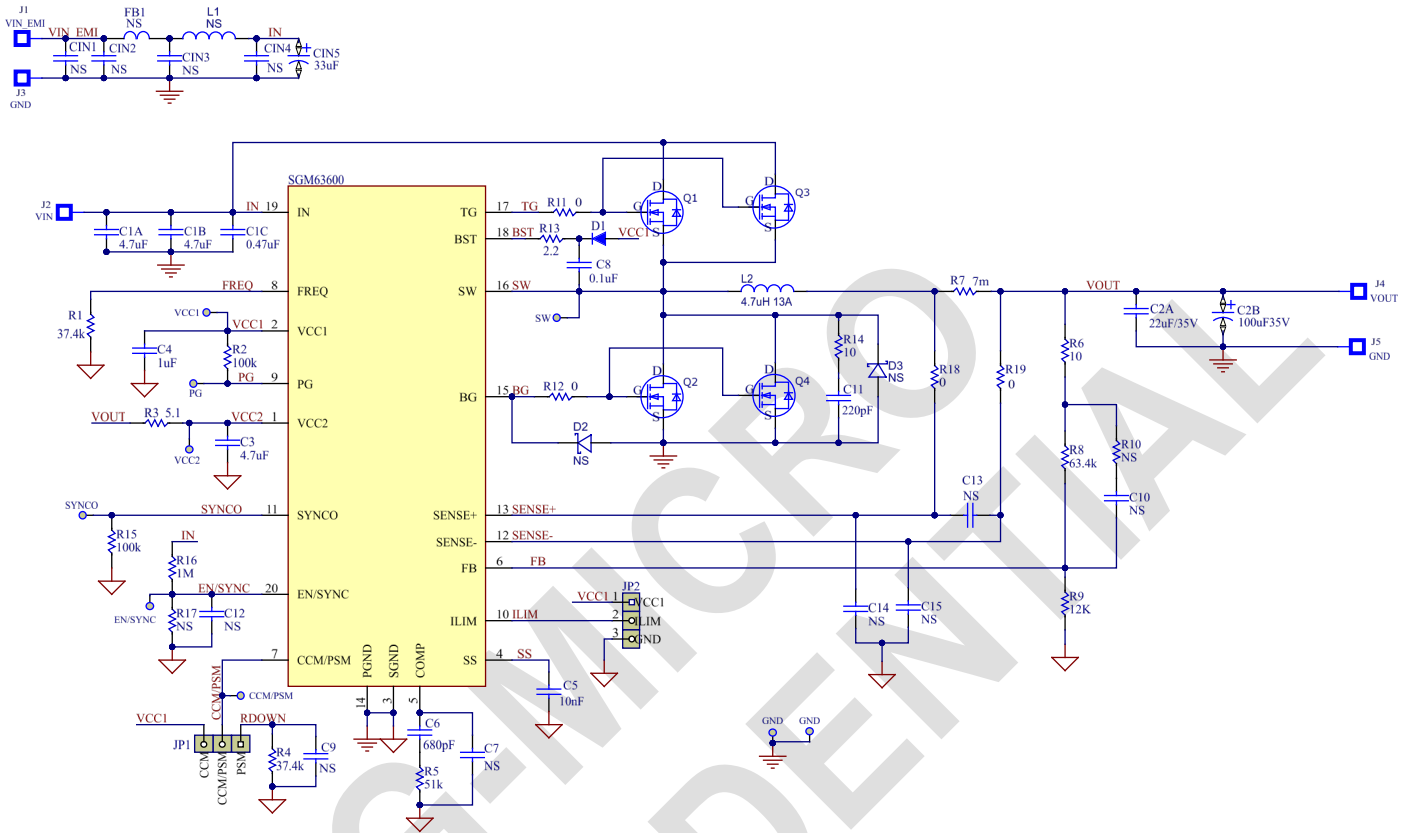
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1. Schematic and BOM List



Designator	Quantity	Value	Description	Footprint	Part Number	Manufacturer
CIN5	1	33 μ F	Aluminum Polymer Capacitor, 100V, D=10mm, L=10.2mm	SMD		
C2B	1	100 μ F	Aluminum Polymer Capacitor, 35V, D=10mm, L=10.2mm, ESR=20m Ω	SMD	875075661004	Wurth
C1A, C1B	2	4.7 μ F	Ceramic Cap, 100V, X7R	1210		
C1C	1	0.47 μ F	Ceramic Cap, 100V, X7R	0805		
C2A	1	22 μ F	Ceramic Cap, 50V, X5R	1210		
C3	1	4.7 μ F	Ceramic Cap, 16V, X7R	0805		
C4	1	1 μ F	Ceramic Cap, 16V, X7R	0603		
C5	1	10nF	Ceramic Cap, 50V, X7R	0603		
C6	1	680pF	Ceramic Cap, 25V, X7R	0603		
C7	NS					
C8	1	0.1 μ F	Ceramic Cap, 16V, X7R	0603		
C9, C10	NS					
C11	1	220pF	Ceramic Cap, 50V, C0G	0603		

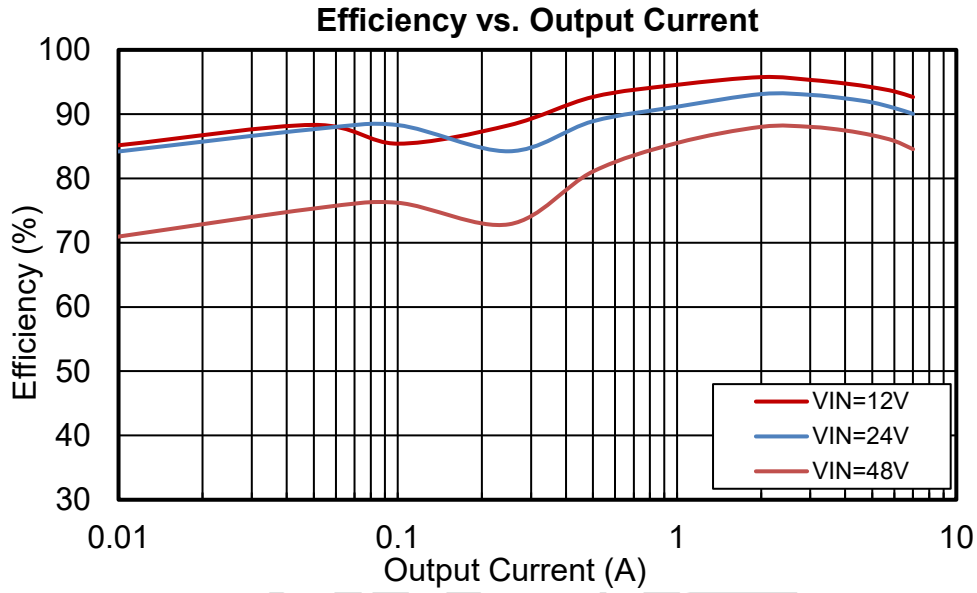
SGM63600

Demo Board Test Report

Designator	Quantity	Value	Description	Footprint	Part Number	Manufacturer
CIN1, CIN2 CIN3, CIN4	NS					
C12, C13, C14, C15	NS					
D1	1	Diode	Diode, 75V, 0.15A	SOD-323		
D2, D3	NS					
FB1	NS					
L1	NS					
L2	1	4.7 μ H	Inductor, 4.7 μ H, DCR=7m Ω , Is=15A, Ir=13A	SMD	7443551470	Würth
Q1, Q2	2	MOSFET	N-Channel MOSFET, 60V, 46A, 16m Ω	TO-252		
Q3, Q4	NS					
R1	1	37.4k	Film Resistor, 1%	0603		
R2	1	100k	Film Resistor, 1%	0603		
R3	1	5.1	Film Resistor, 1%	0603		
R4	1	37.4k	Film Resistor, 1%	0603		
R5	1	51k	Film Resistor, 1%	0603		
R6	NS					
R7	1	7m	Metal Plate Resistors, 1%, 1W	2512	580060763005	Würth
R8	1	63.4k	Film Resistor, 1%	0603		
R9	1	12k	Film Resistor, 1%	0603		
R10	NS					
R11, R12	2	0	Film Resistor, 5%	0603		
R13	1	2.2	Film Resistor, 1%	0603		
R14	1	10	Film Resistor, 1%	0603		
R15	1	100k	Film Resistor, 5%	0603		
R16	1	1M	Film Resistor, 1%	0603		
R17	NS					
R18, R19	2	0	Film Resistor, 5%	0603		
U1	1	SGM63600	Synchronous Step-Down Controller	QFN-20	SGM63600	SGMICRO

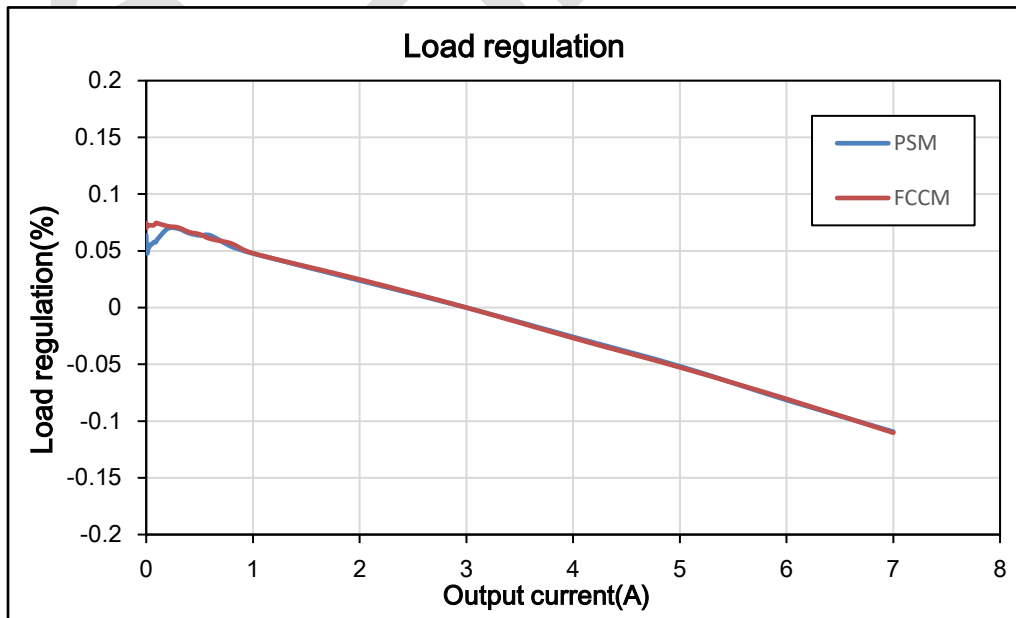
2. Efficiency

Test condition: $V_{IN}=12V/24V/48V$, $I_o=0.01A-7A$, PSM mode, measure the efficiency.



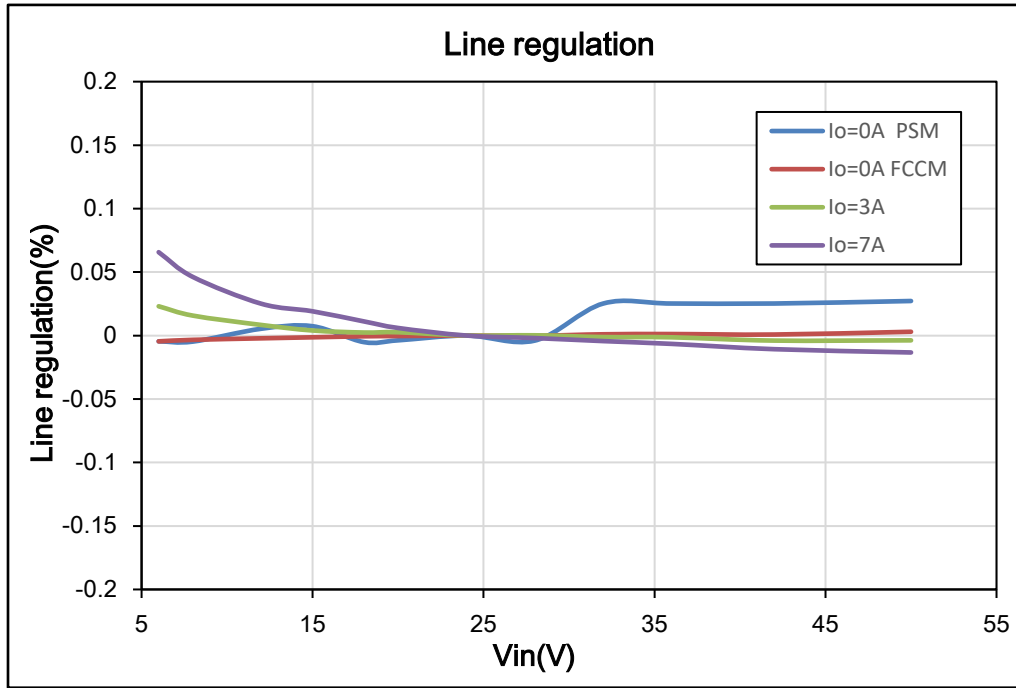
3. Load Regulation

Test condition: $V_{IN}=24V$, $I_o=0A-7A$, measure the load regulation.



4. Line Regulation

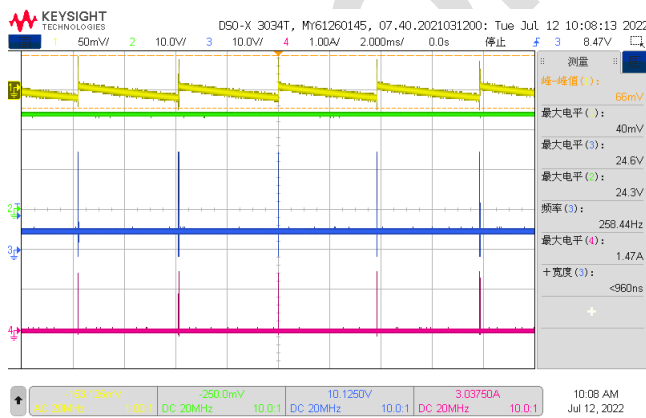
Test condition: $V_{IN}=6V-50V$, $I_O=0A/3A/7A$, measure the line regulation.



5. Output Voltage Ripple

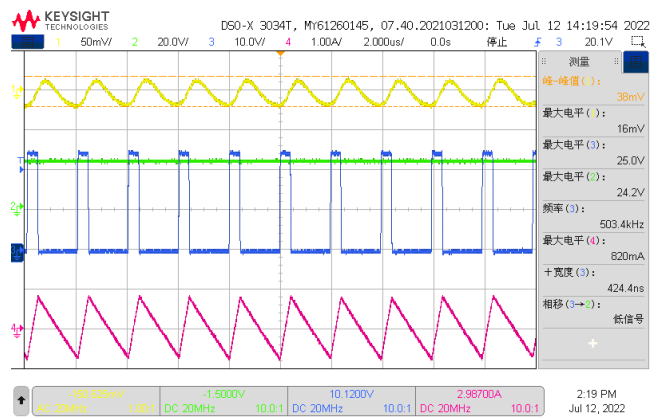
Test condition: $V_{IN}=24V$, $V_{OUT}=5V$.

$I_O=0A$, PSM

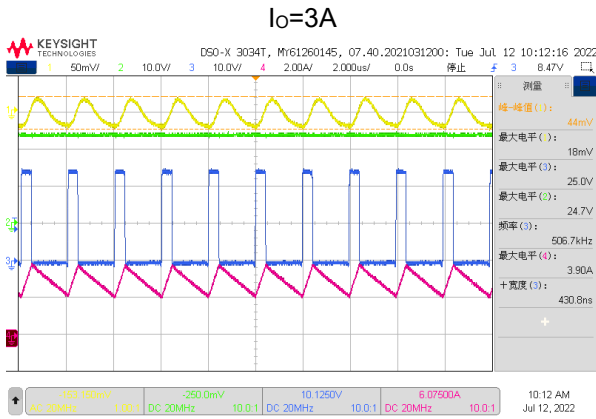


Ch1- V_{out}/AC , Ch2- V_{in} , Ch3- V_{sw} , Ch4- I_L

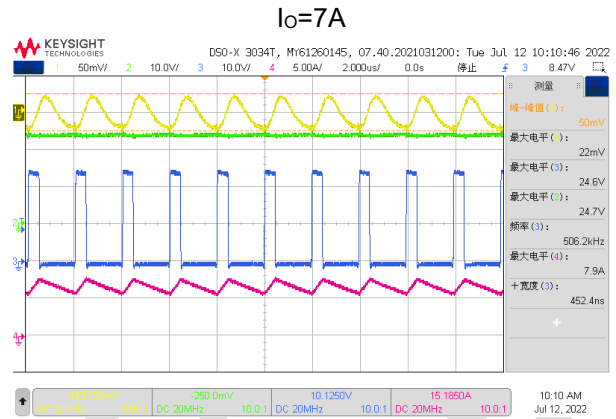
$I_O=0A$, FCCM



Ch1- V_{out}/AC , Ch2- V_{in} , Ch3- V_{sw} , Ch4- I_L



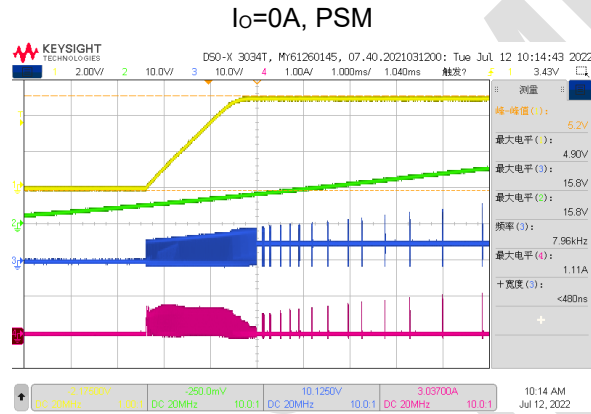
Ch1-V_{OUT}/AC, Ch2-V_{IN}, Ch3-V_{sw}, Ch4-I_L



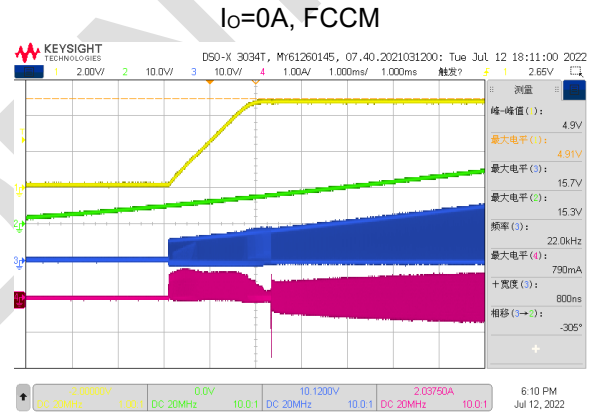
Ch1-V_{OUT}/AC, Ch2-V_{IN}, Ch3-V_{sw}, Ch4-I_L

6. V_{IN} power on/off

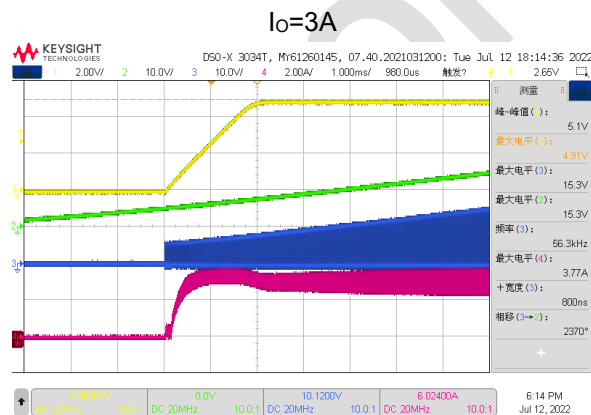
Test condition: V_{IN}=24V, V_{OUT}=5V, V_{IN} power on.



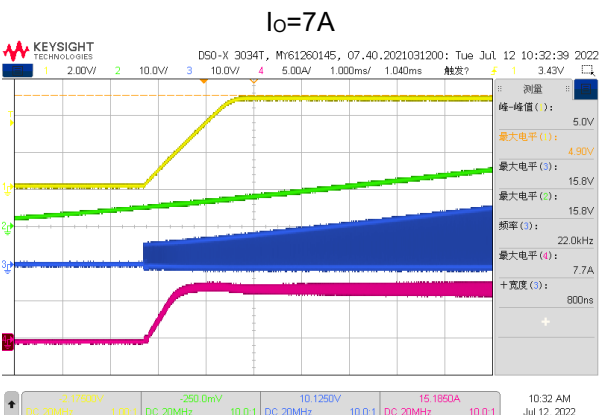
Ch1-V_{OUT}, Ch2-V_{IN}, Ch3-V_{sw}, Ch4-I_L



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



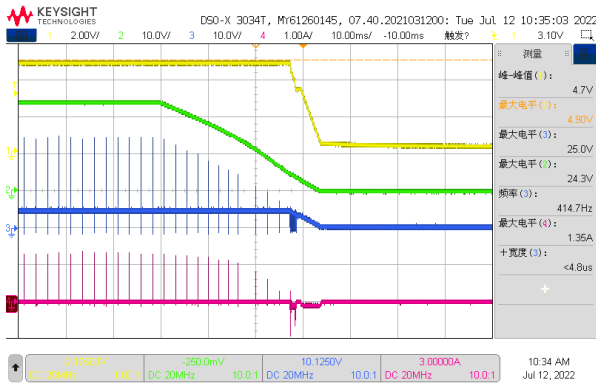
Ch1-V_{OUT}, Ch2-V_{IN}, Ch3-V_{sw}, Ch4-I_L



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

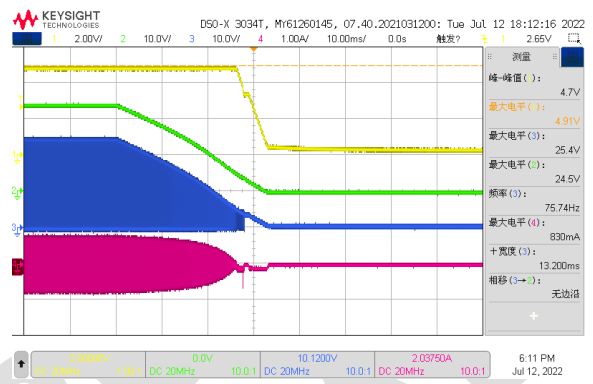
Test condition: $V_{IN}=24V$, $V_{OUT}=5V$, V_{IN} power off.

$I_o=0A$, PSM



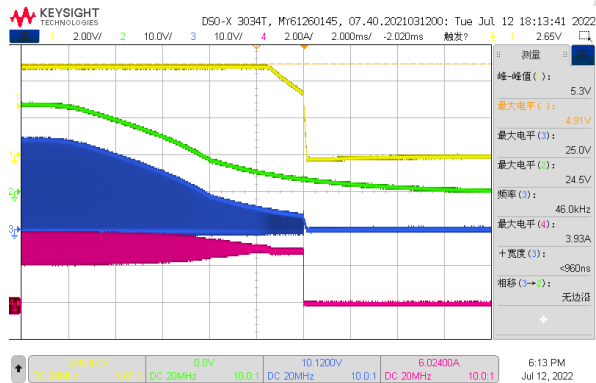
Ch1-V_{OUT}, Ch2-V_{IN}, Ch3-V_{sw}, Ch4-I_L

$I_o=0A$, FCCM



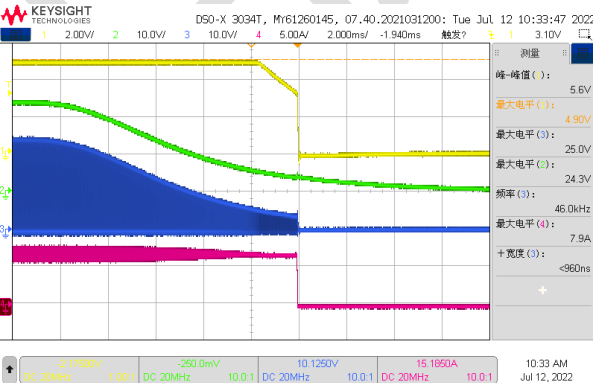
Ch1-V_{OUT}, Ch2-V_{IN}, Ch3-V_{sw}, Ch4-I_L

$I_o=3A$



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

$I_o=7A$

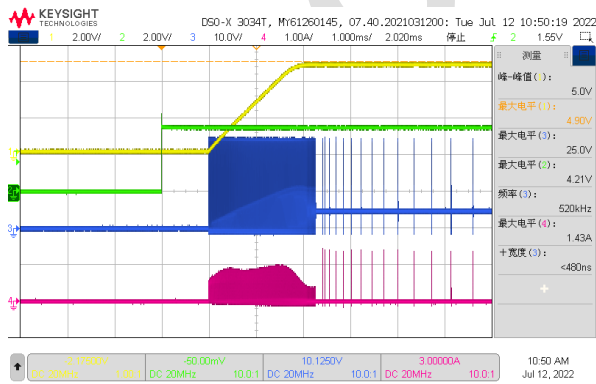


Ch1-V_{OUT}, Ch2-V_{IN}, Ch3-V_{sw}, Ch4-I_L

7. EN on/off

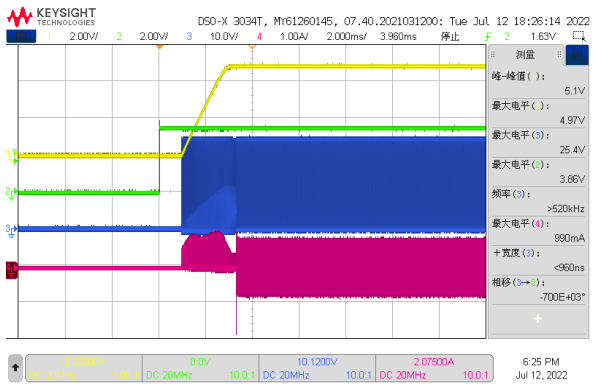
Test condition: $V_{IN}=24V$, $V_{OUT}=5V$, EN on.

$I_o=0A$, PSM

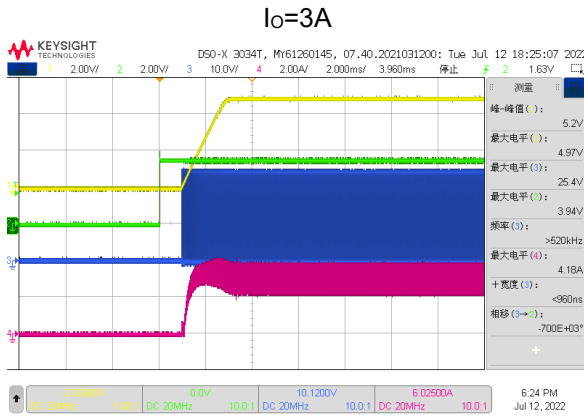


Ch1-V_{OUT}, Ch2-V_{EN}, Ch3-V_{sw}, Ch4-I_L

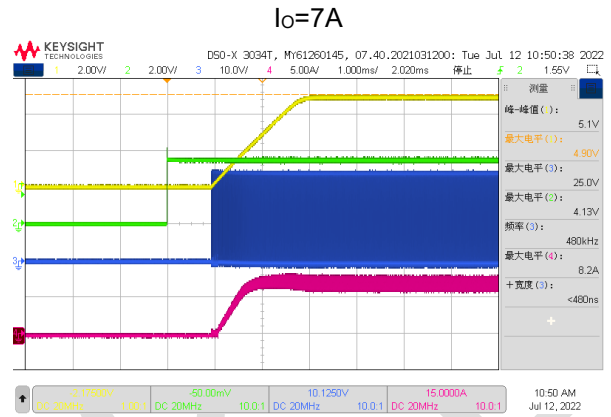
$I_o=0A$, FCCM



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

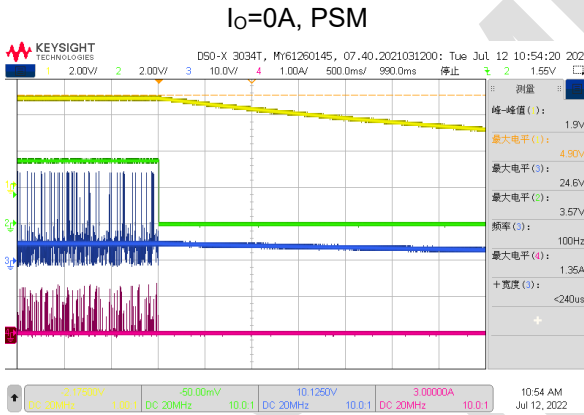


Ch1-V_{OUT}, Ch2-V_{EN}, Ch3-V_{sw}, Ch4-I_L

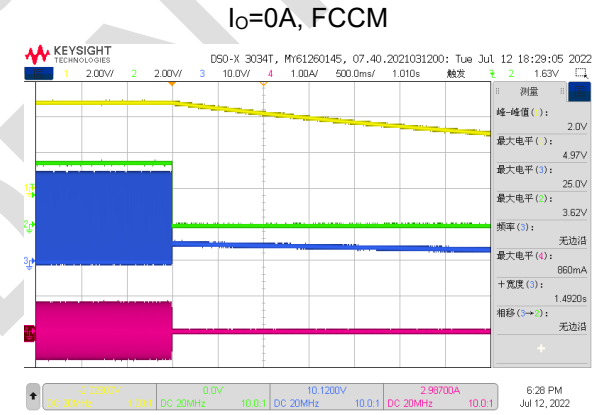


Ch1-V_{OUT}, Ch2-V_{EN}, Ch3-V_{sw}, Ch4-I_L

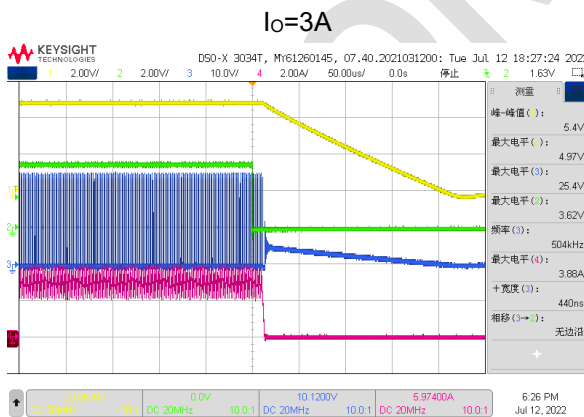
Test condition: V_{IN}=24V, V_{OUT}=5V, EN off.



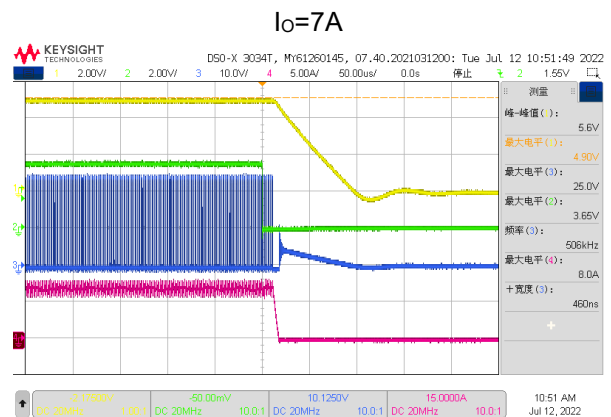
Ch1-V_{OUT}, Ch2-V_{EN}, Ch3-V_{sw}, Ch4-I_L



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



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

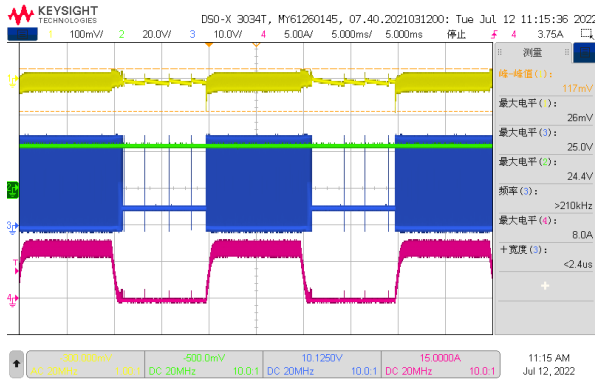


Ch1-V_{OUT}, Ch2-V_{EN}, Ch3-V_{sw}, Ch4-I_L

8. Load Transient

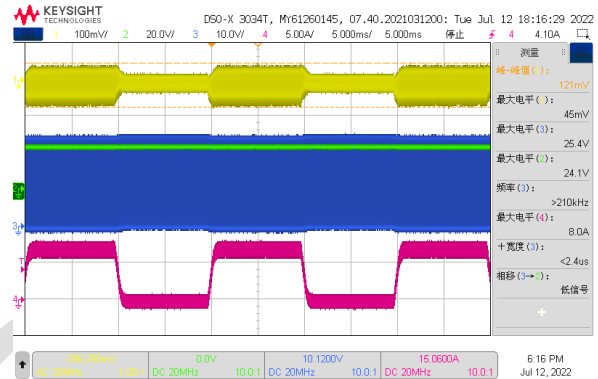
Test condition: $V_{IN}=24V$, $V_{OUT}=5V$, CCDH E-load slew rate is 2.5A/us.

$I_O=0A-7A-0A$, PSM



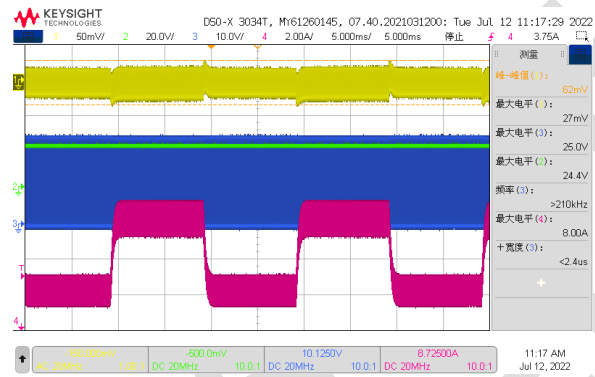
Ch1-V_{OUT}/AC, Ch2-V_{IN}, Ch3-V_{sw}, Ch4-I_L

$I_O=0A-7A-0A$, FCCM



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

$I_O=3A-7A-3A$

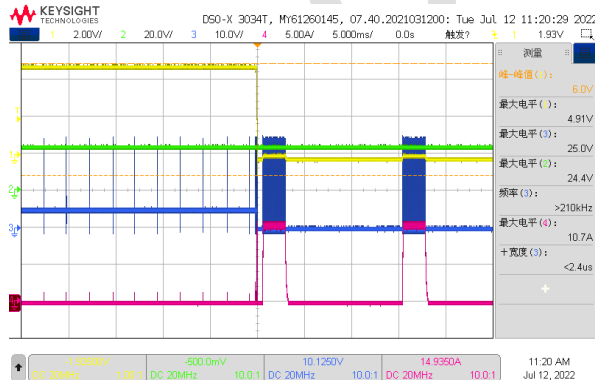


Ch1-V_{OUT}/AC, Ch2-V_{IN}, Ch3-V_{sw}, Ch4-I_L

9. SCP Entry/Recovery

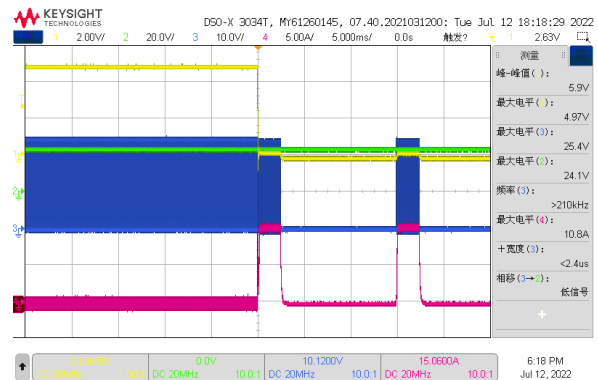
Test condition: $V_{IN}=24V$, $V_{OUT}=5V$, short V_O to GND, SCP entry

$I_O=0A$, PSM

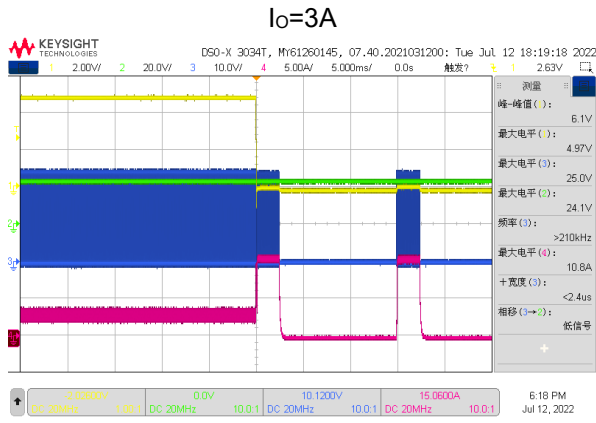


Ch1-V_{OUT}, Ch2-V_{IN}, Ch3-V_{sw}, Ch4-I_L

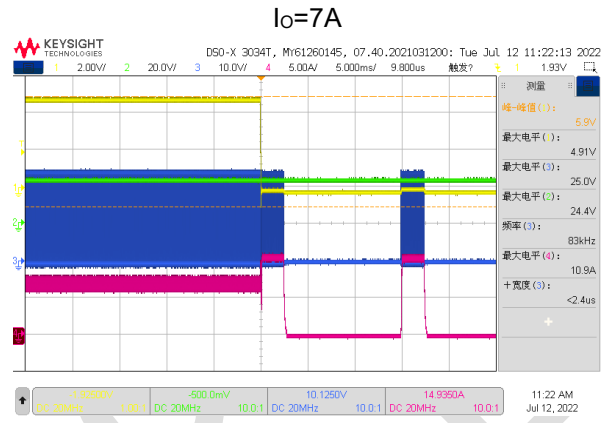
$I_O=0A$, FCCM



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



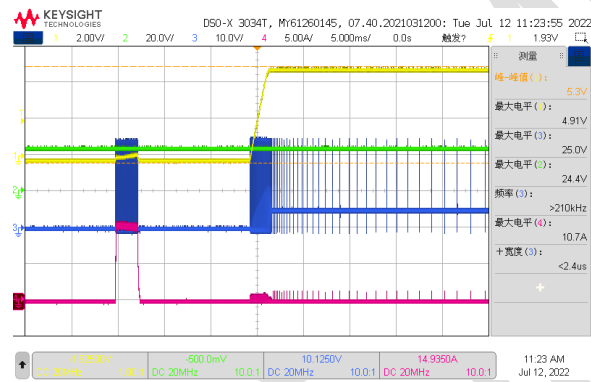
Ch1-V_{OUT}, Ch2-V_{IN}, Ch3-V_{sw}, Ch4-I_L



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

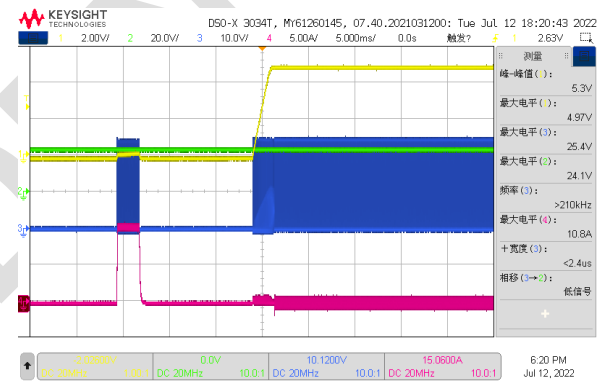
Test condition: V_{IN}=24V, V_O=5V, short V_O to GND, SCP recovery

I_o=0A, PSM



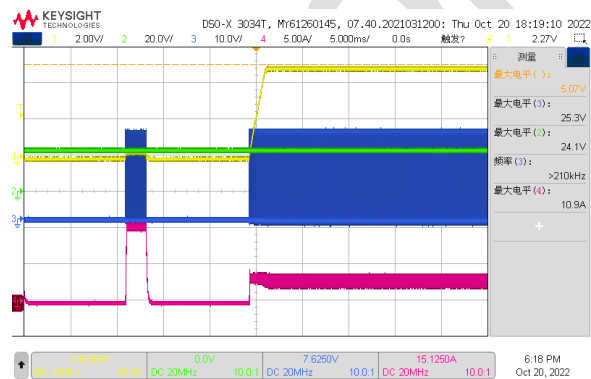
Ch1-V_{OUT}, Ch2-V_{IN}, Ch3-V_{sw}, Ch4-I_L

I_o=0A, FCCM



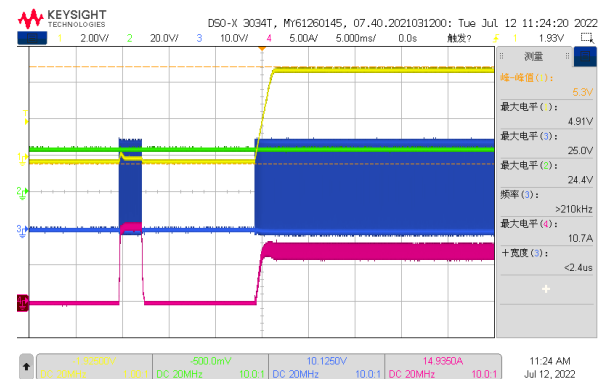
Ch1-V_{OUT}, Ch2-V_{IN}, Ch3-V_{sw}, Ch4-I_L

I_o=3A



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

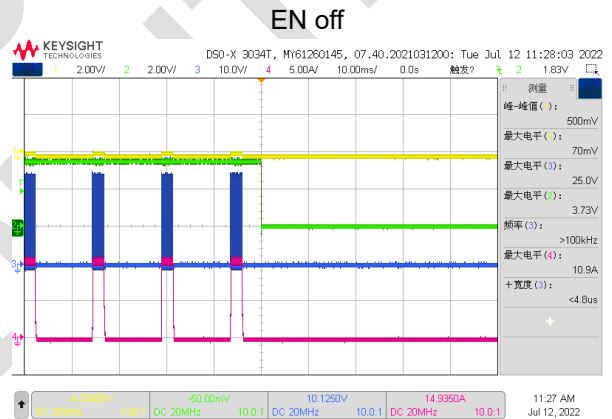
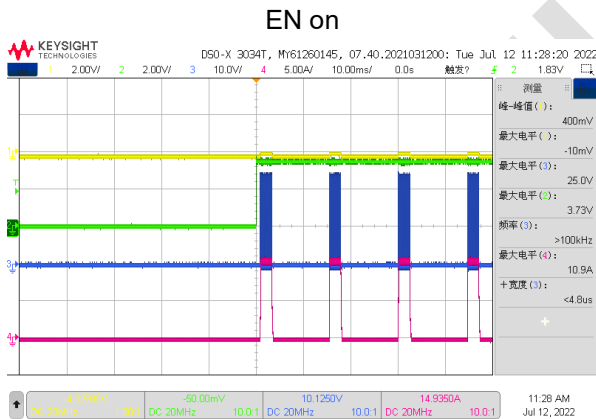
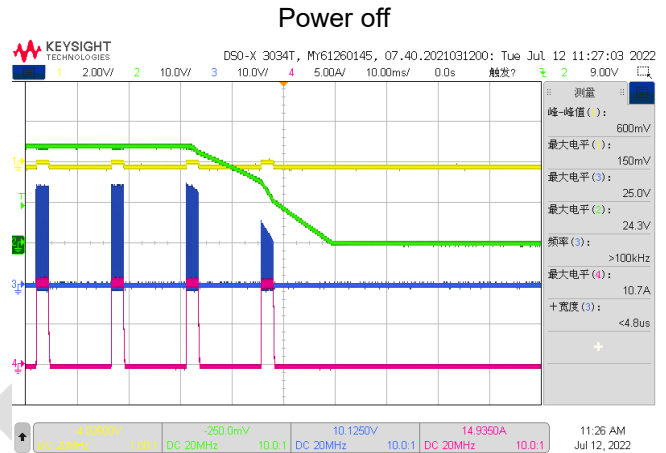
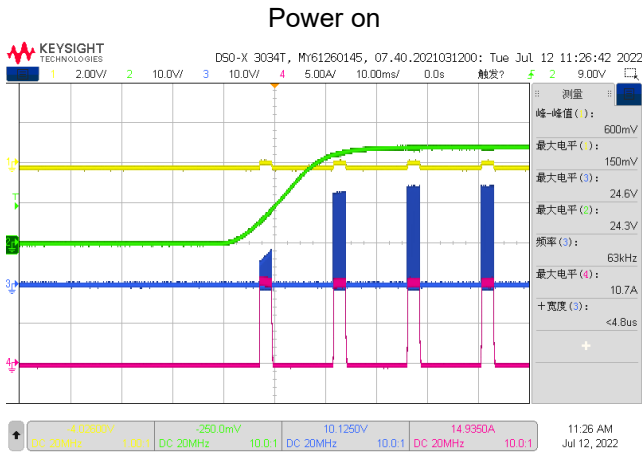
I_o=7A



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

10. SCP power/EN on/off

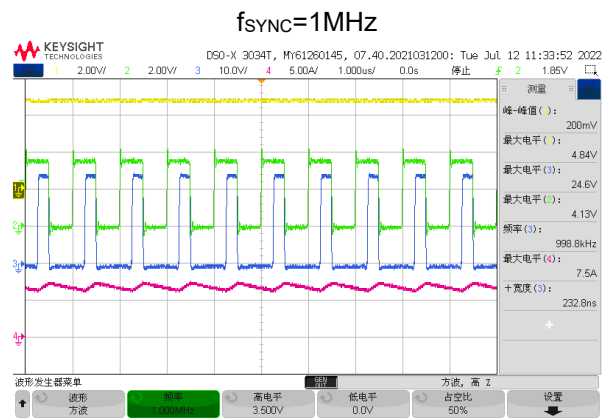
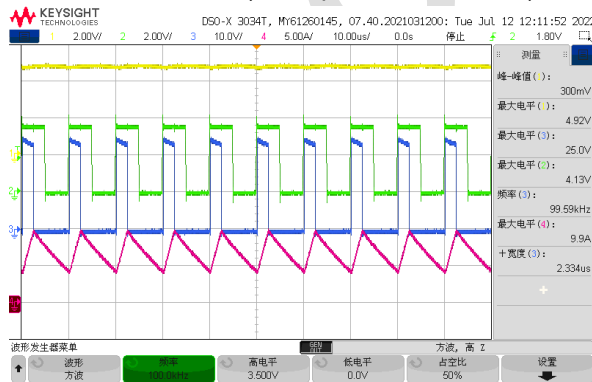
Test condition: $V_{IN}=24V$, $V_{OUT}=5V$, short V_O to GND



11. Synchronize to External Clock

Test condition: $V_{IN}=24V$, $V_{OUT}=5V$, $I_{OUT}=7A$. External SYNC signal amplitude is 3.5V.

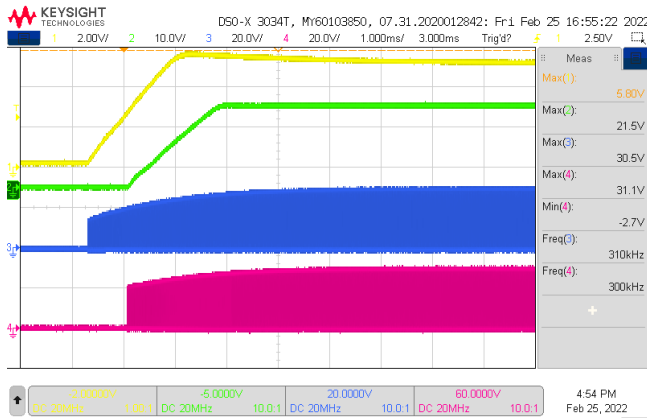
$f_{SYNC}=100kHz$, ($L=6.8\mu H$ and $R5=22k\Omega$)



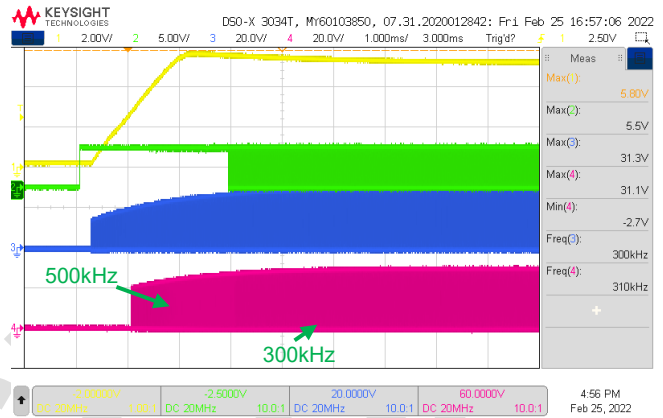
12. SYNC Function Between two Bucks

Test condition: $V_{IN1}=V_{IN2}=30V$, $V_{OUT1}=5V$, $V_{OUT2}=20V$, $R_{FREQ1}=63.9k\Omega(300kHz)$, $R_{FREQ2}=37.4k\Omega(500kHz)$. Remove the 20V rail EN pull up resistor, connect the 5V rail SYNCO pin to the 20V rail EN/SYNC pin.

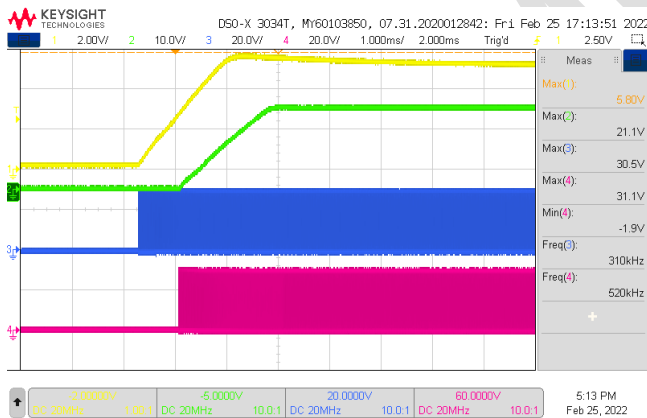
Vin Power on, I_{OUT1}=3A, I_{OUT2}=3A



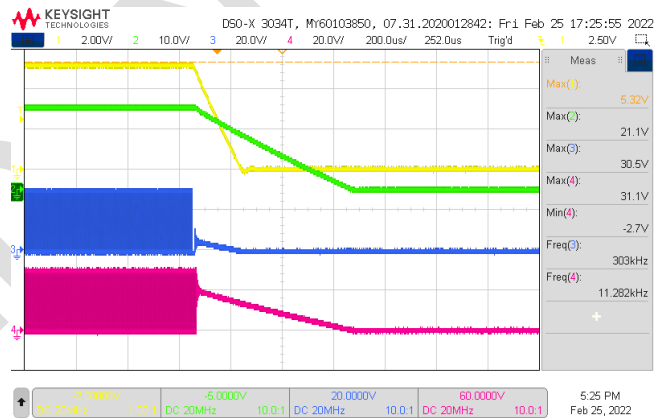
Vin Power on, I_{OUT1}=3A, I_{OUT2}=3A



EN on, I_{OUT1}=3A, I_{OUT2}=3A



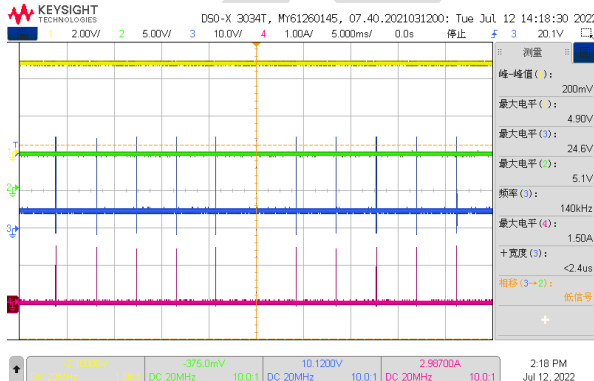
EN off, I_{OUT1}=3A, I_{OUT2}=3A



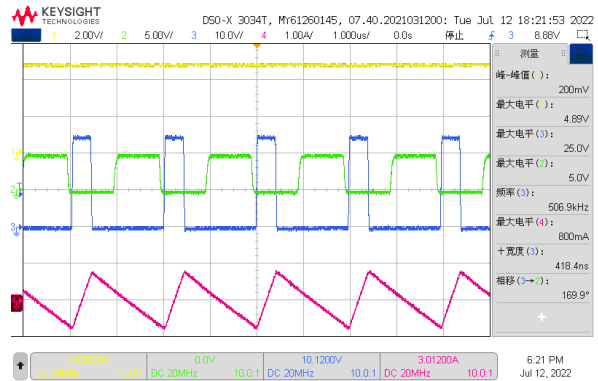
13. SYNCO Function

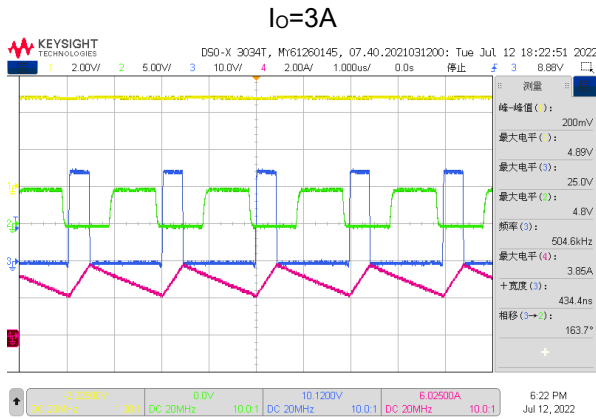
Test condition: $V_{IN}=24V$, $V_{OUT}=5V$, measure the SYNCO function.

I_o=0A, PSM

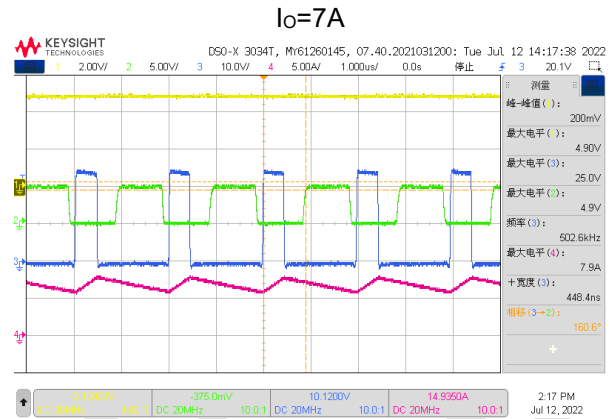


I_o=0A, FCCM





Ch1-V_{OUT}, Ch2-V_{SYNCO}, Ch3-V_{sw}, Ch4-I_L



Ch1-V_{OUT}, Ch2-V_{SYNCO}, Ch3-V_{sw}, Ch4-I_L

14. Thermal Test

Test condition: $V_{IN}=24V$, $V_{OUT}=5V$, PSM mode, measure the case temperature (T_c) rise with output current.

