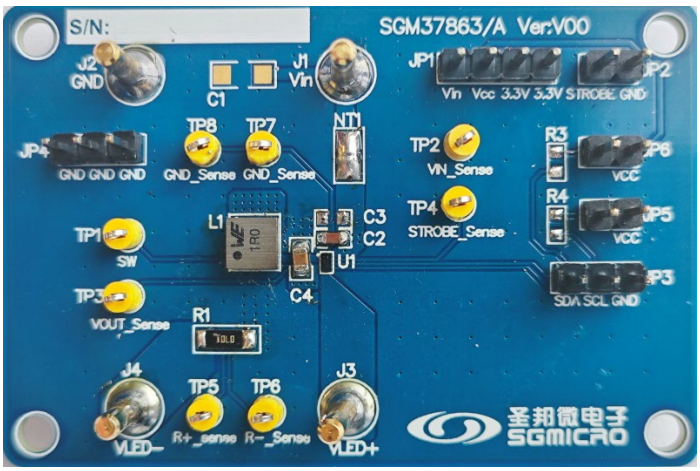
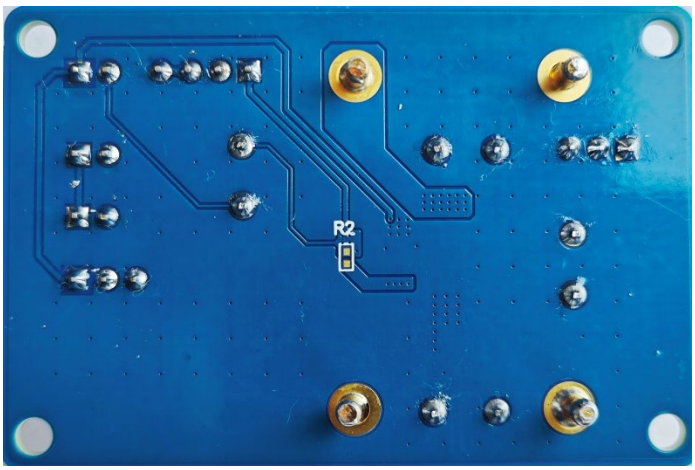
SGM37863 Demo Board Test Report

2.7V to 5.5V Input，1.5A Current Source Camera Flash LED Driver



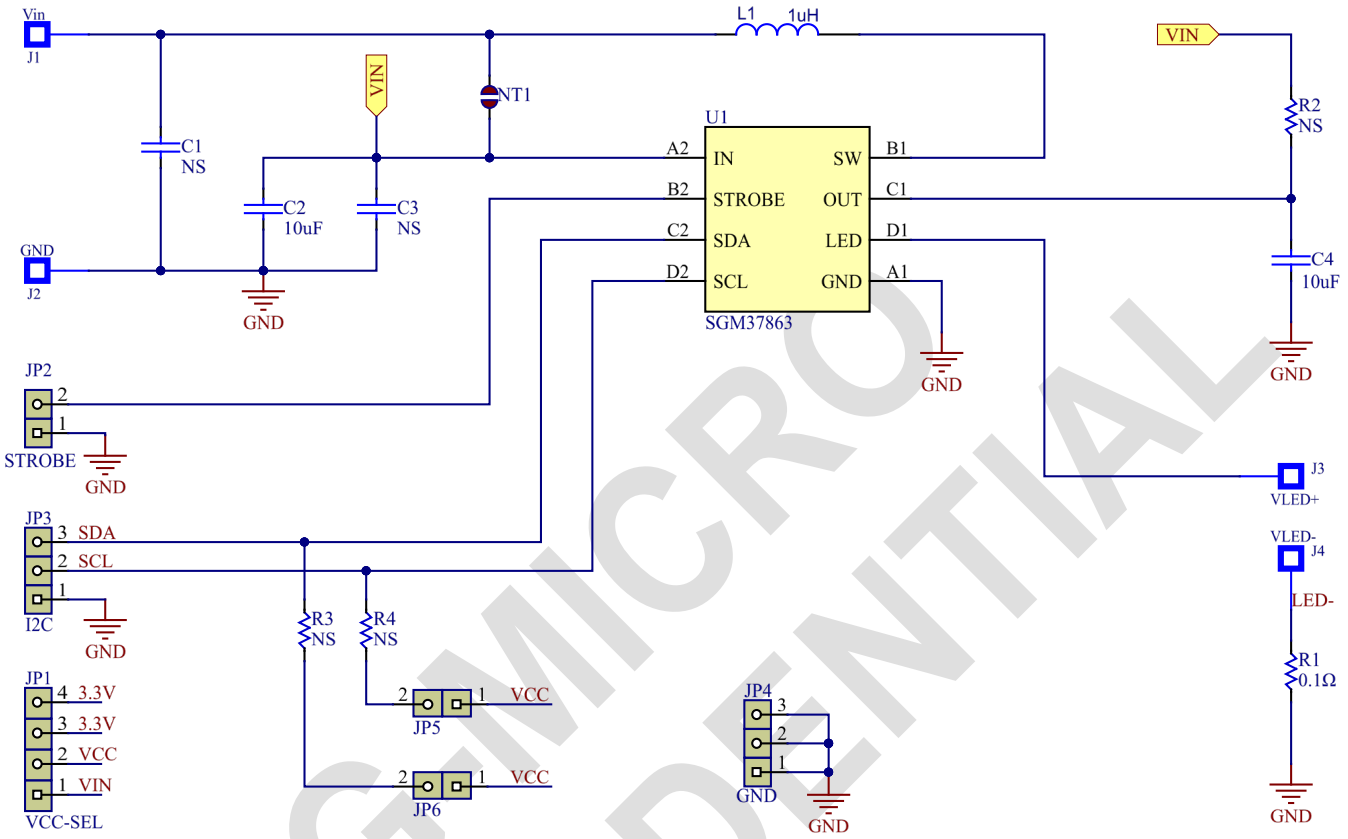
Top Layer



Bottom Layer

Table of Contents

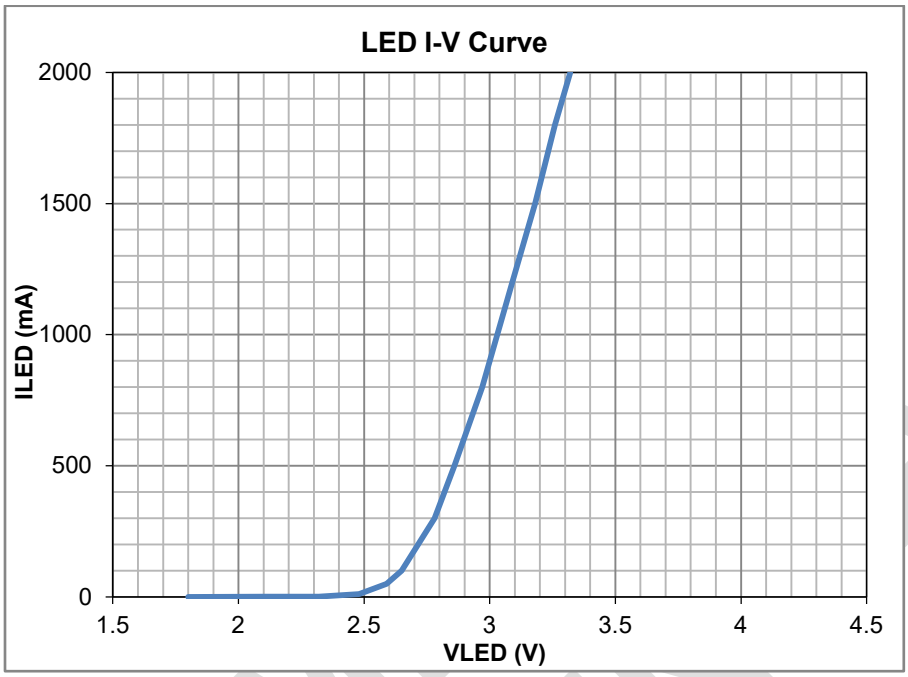
1. Schematic and BOM List



Item	Designator	QTY	Value	Description	Footprint	P/N	Manuf.
1	C1, C3	0	NS				
2	C2	1	10uF	Ceramic Capacitor, 10uF, 10V, ±10%, X7R	0603		
3	C4	1	10uF	Ceramic Capacitor, 10uF, 25V, ±10%, X5R	0805		
4	R1	1	10mΩ	Sense Resistor, 10mΩ, 1W, ±1%	1206		
5	R2, R3, R4	0	NS				
6	L1	1	1uH	Inductor, 1uH, Is=9.6A, Ir=7.4A, DCR=13.5mΩ	4040	74438357010	Wurth
7	NT1	0	-	SHORT	-		
8	U1	1	IC	1.5A Current Source Camera Flash LED Driver	WLCSP-0.8×1.5-8B	SGM37863	SGMICRO
Conclusion: Total 5 components							

Note:

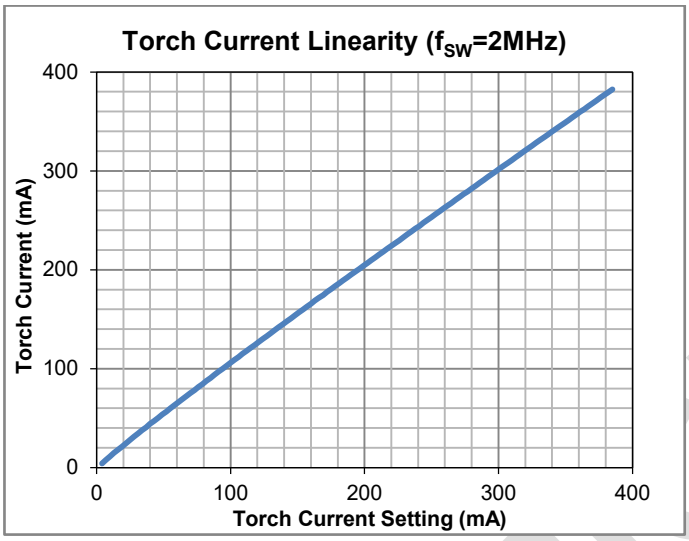
1. The I-V curves for the LEDs used in this report are shown below, unless otherwise noted.

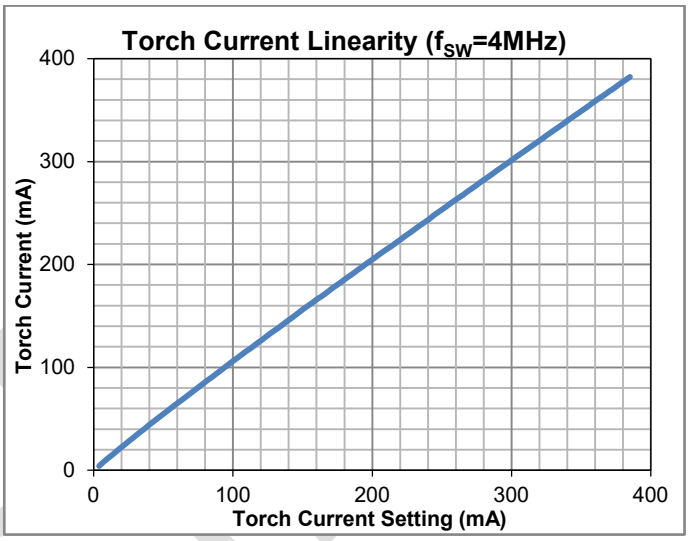


2. Test Item

2.1 LED Current Accuracy at Torch Mode

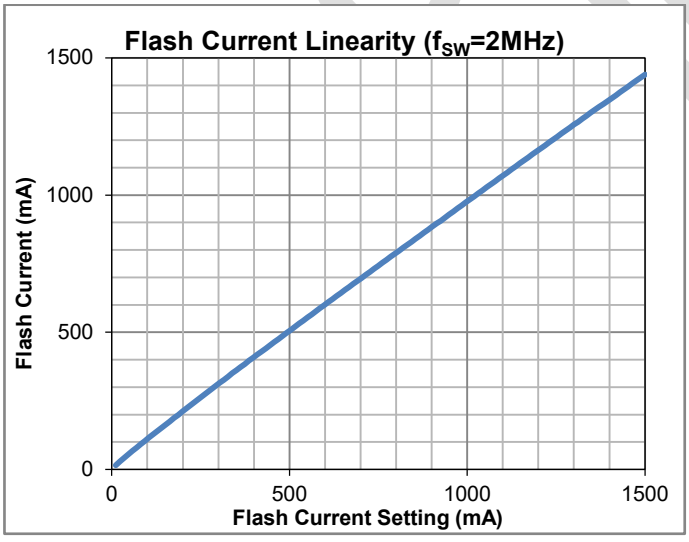
Test condition: V_{IN}=3.6V, enable Torch mode.

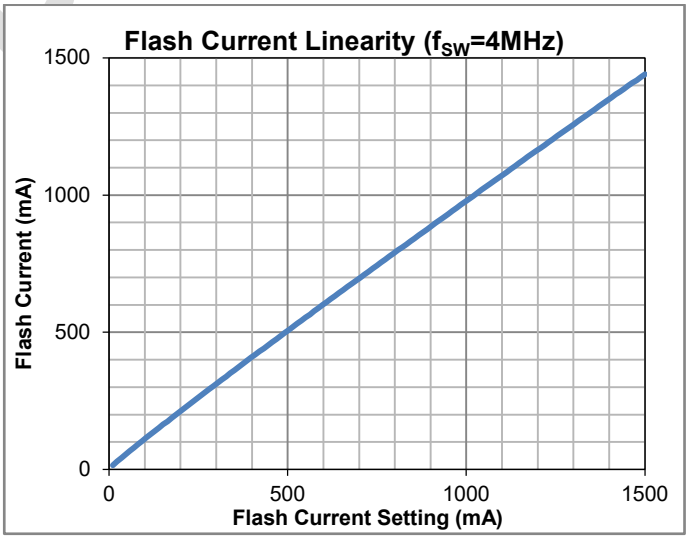




2.2 LED Current Accuracy at Flash Mode

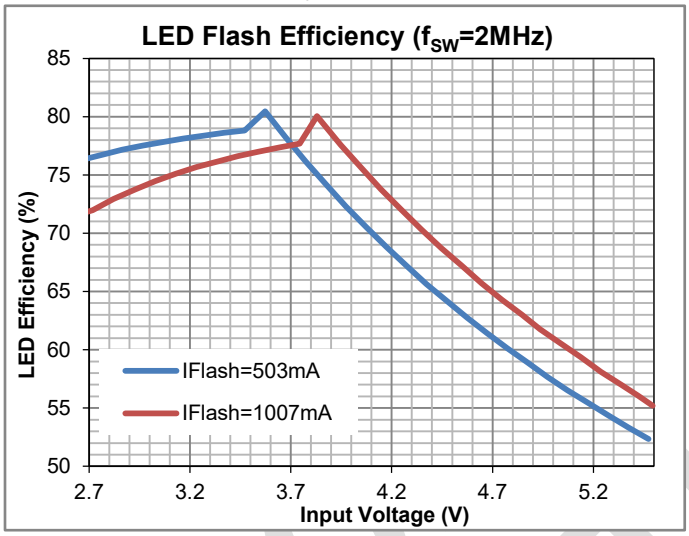
Test condition: V_{IN}=3.6V, enable Flash mode.



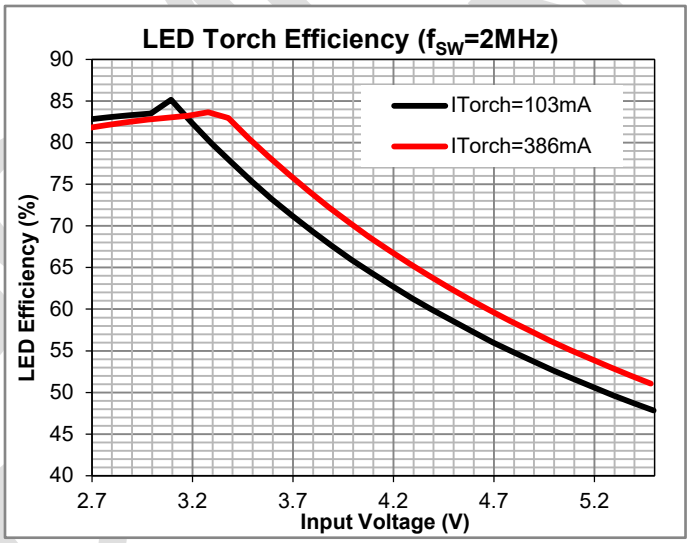


2.3 Efficiency

Test condition: Enable Flash mode, test the efficiency with different LED current and input voltage.



Test condition: Enable Torch mode, test the efficiency with different LED current and input voltage.



2.4 Torch Mode

2.4.1 Torch mode startup and shutdown

Test condition: V_{IN}=3.6V, I_{LED}=386mA, enable/disable torch mode by setting register bit.

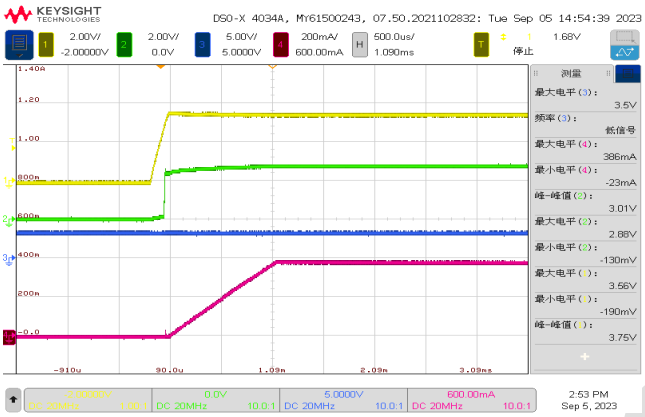


Fig-1: Torch mode startup (write LED_MODE[1:0]= 10). CH1-V_{OUT}, CH2-V_{LED}, CH3-V_{SW}, CH4-I_{LED}

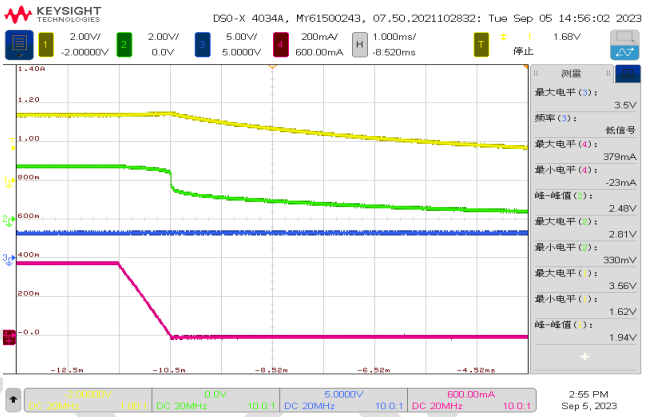


Fig-2: Torch mode shutdown (write LED_MODE[1:0]= 00). CH1-V_{OUT}, CH2-V_{LED}, CH3-V_{SW}, CH4-I_{LED}

2.4.2 Torch mode steady state

Test condition: I_{LED}=386mA, enable Torch mode.

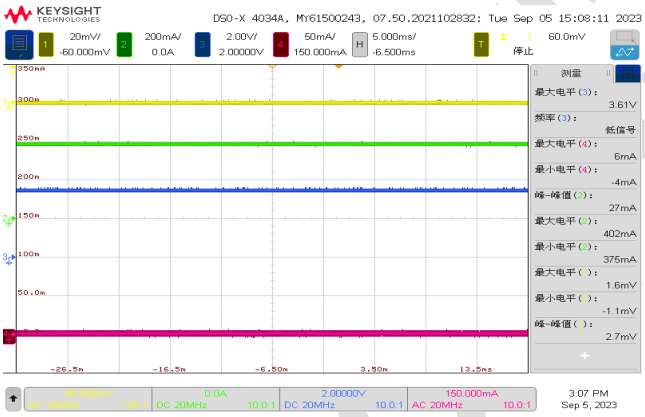


Fig-3: V_{IN}=3.6V, Torch steady state (Pass mode). CH1-V_{OUT}/AC, CH2- I_L, CH3-V_{SW}, CH4-I_{LED}/AC

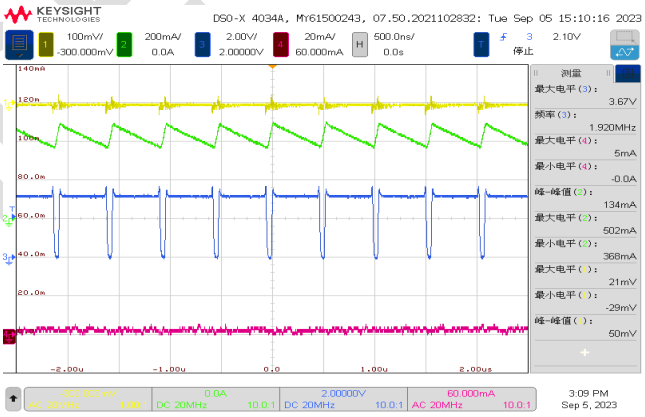


Fig-4: V_{IN}=3V, Torch steady state (Boost mode).. CH1-V_{OUT}/AC, CH2- I_L, CH3-V_{SW}, CH4-I_{LED}/AC

2.5 Flash Mode

2.5.1 Flash mode startup and shutdown

Test condition: I_{LED}=1.5A, enable/disable torch mode by setting register bit.

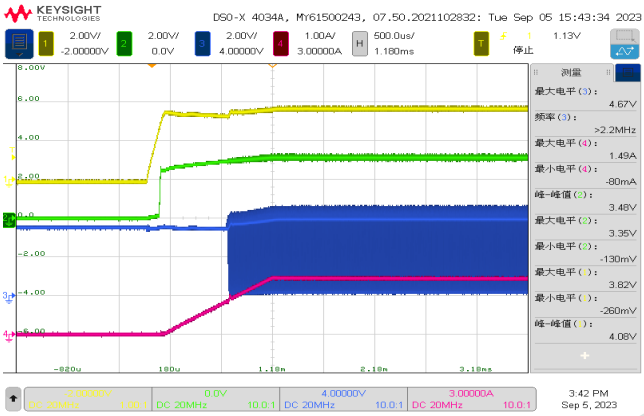


Fig-5: V_{IN}=3.6V, enable Flash (write LED_MODE[1:0]= 11). CH1-V_{OUT}, CH2-V_{LED}, CH3-V_{SW}, CH4-I_{LED}

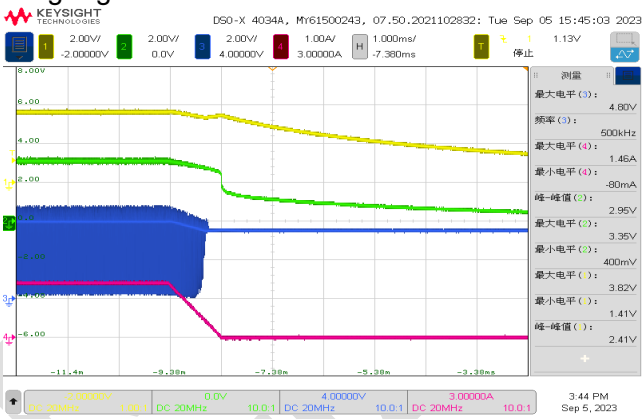


Fig-6: V_{IN}=3.6V, flash timeout shutdown (write LED_MODE[1:0]= 00) . CH1-V_{OUT}, CH2-V_{LED}, CH3-V_{SW}, CH4-I_{LED}

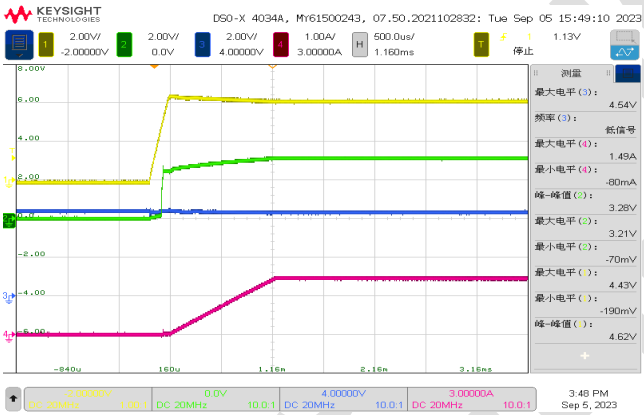


Fig-7: V_{IN}=4.5V, enable Flash (write LED_MODE[1:0]= 11). CH1-V_{OUT}, CH2-V_{LED}, CH3-V_{SW}, CH4-I_{LED}

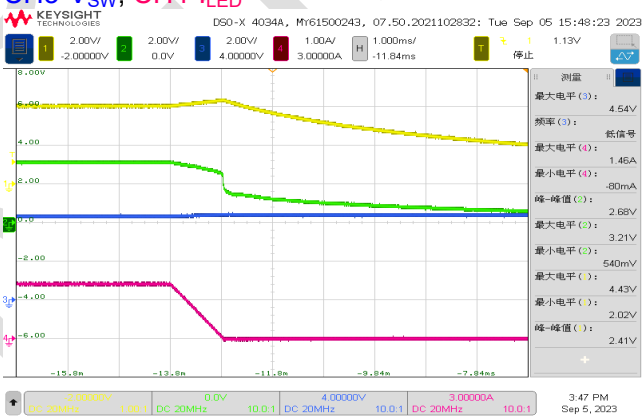


Fig-8: V_{IN}=4.5V, flash timeout shutdown (write LED_MODE[1:0]= 00). CH1-V_{OUT}, CH2-V_{LED}, CH3-V_{SW}, CH4-I_{LED}

2.5.2 Flash mode steady state

Test condition: I_{LED}=1.5A, enable Flash mode.

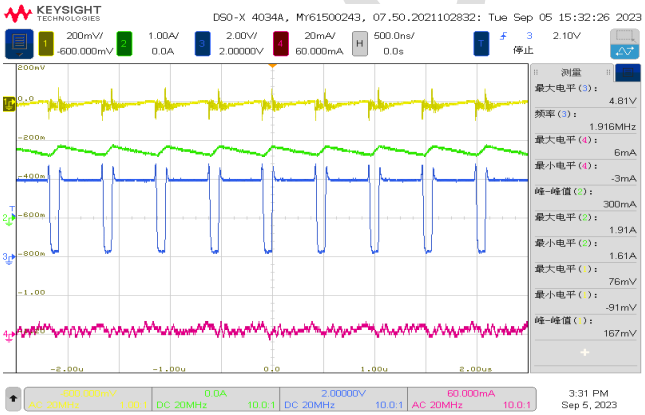


Fig-9: V_{IN}=3.6V (Boost mode).
CH1-V_{OUT}/AC, CH2- I_L, CH3-V_{SW}, CH4-I_{LED}/AC

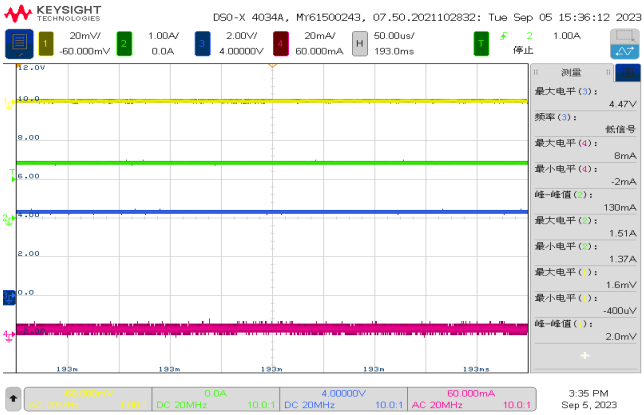


Fig-10: V_{IN}=3V (Pass mode).
CH1-V_{OUT}/AC, CH2- I_L, CH3-V_{SW}, CH4-I_{LED}/AC

2.6 IR Mode

Test condition: V_{IN}=3.6V, write LED_MODE[1:0]= 01, add cycle STROBE signals during IR mode (Level triggered).

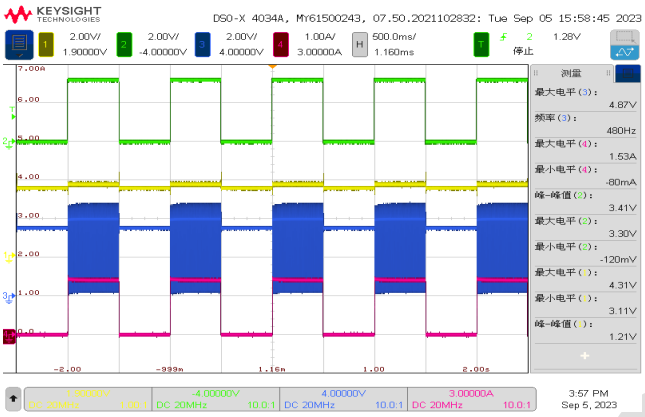


Fig-11: V_{IN}=3.6V, I_{LED} =1.5A, f_{STROBE}=1Hz, Flash time out = 600ms.
CH1-V_{OUT}, CH2-V_{STROBE}, CH3-V_{SW}, CH4-I_{LED}

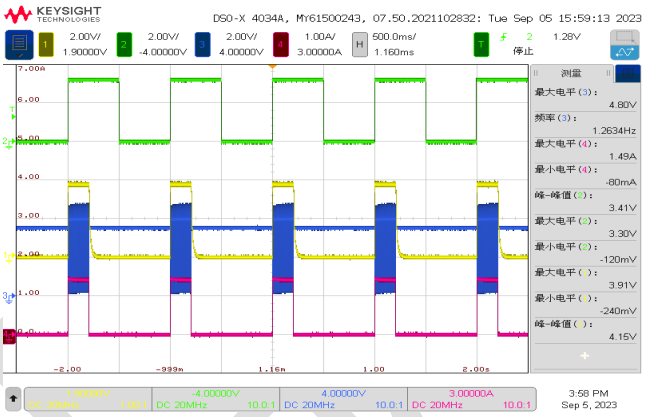


Fig-12: V_{IN}=3.6V, I_{LED} =1.5A f_{STROBE}=1Hz, Flash time out = 200ms.
CH1-V_{OUT}, CH2-V_{STROBE}, CH3-V_{SW}, CH4-I_{LED}

Test condition: V_{IN}=3.6V, write LED_MODE[1:0]= 01, add cycle STROBE signals during IR mode (Edge triggered).

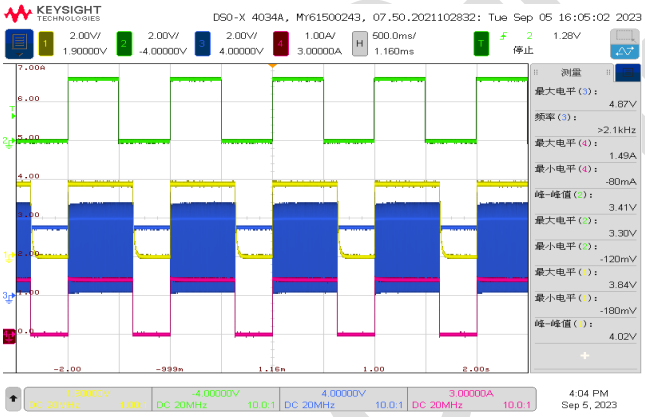


Fig-13: V_{IN}=3.6V, I_{LED} =1.5A, f_{STROBE}=1Hz, Flash time out = 600ms.
CH1-V_{OUT}, CH2-V_{STROBE}, CH3-V_{SW}, CH4-I_{LED}

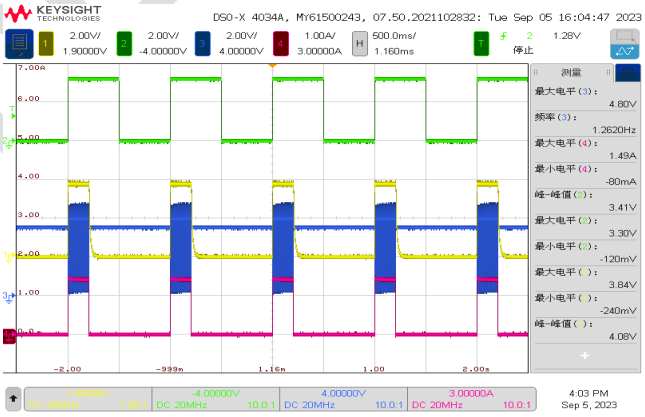


Fig-14: V_{IN}=3.6V, I_{LED} =1.5A f_{STROBE}=1Hz, Flash time out = 200ms.
CH1-V_{OUT}, CH2-V_{STROBE}, CH3-V_{SW}, CH4-I_{LED}

2.7 IVFM Function

Test condition: V_{IN}=3.6V with 0.33Ω resister, set I_{LED}=1A, IVFM=3.3V, enable Flash mode to check different IVFM modes.

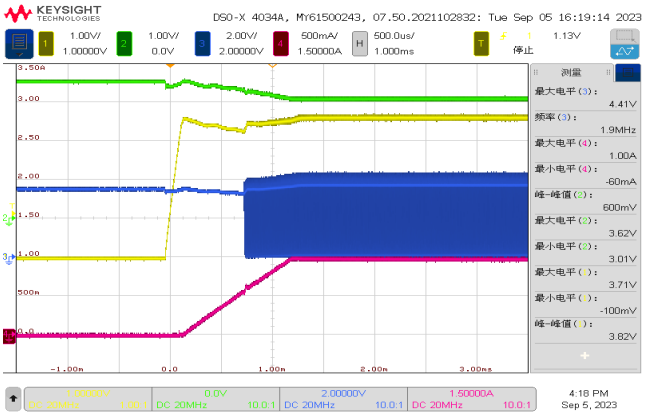


Fig-15: Disable IVFM.
CH1-V_{OUT}, CH2-V_{IN}, CH3-V_{SW}, CH4-I_{LED}

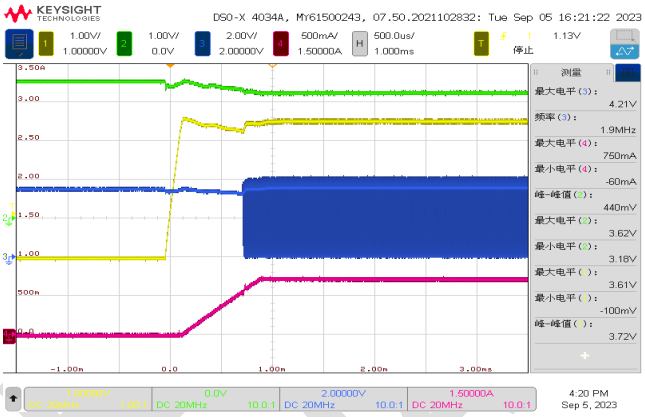


Fig-16: Enable IVFM.
CH1-V_{OUT}, CH2-V_{IN}, CH3-V_{SW}, CH4-I_{LED}

2.8 VOUT OVP

Test condition: LED open first, and then enable Torch mode to check OVP function.

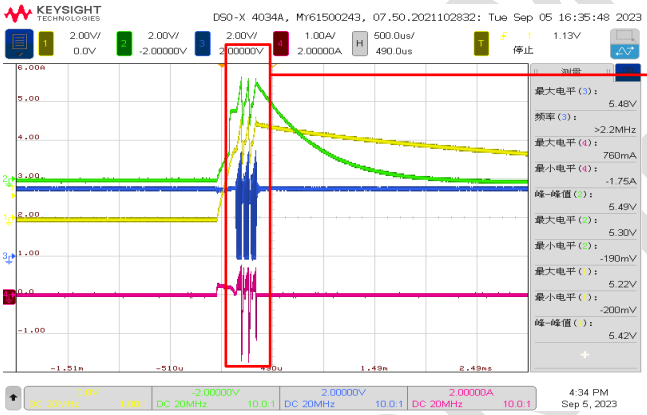


Fig-17: V_{IN}=3.6V, enable Torch mode when LED open.
CH1-V_{OUT}, CH2-V_{LED}, CH3-V_{SW}, CH4-I_L

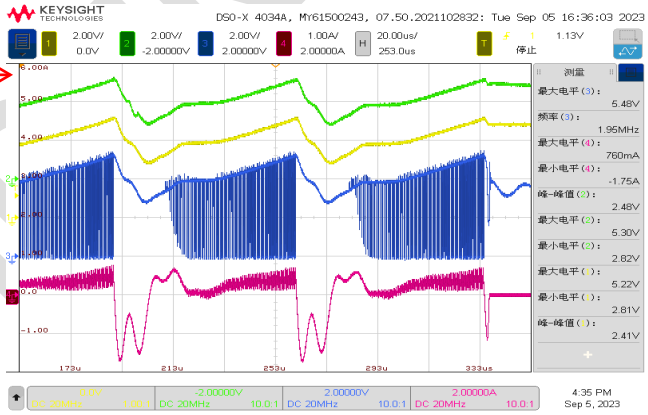


Fig-18: Zoom in V_{IN}=3.6V.
CH1-V_{OUT}, CH2-V_{LED}, CH3-V_{SW}, CH4-I_L

2.9 Current Limit (OCP)

Test condition: V_{IN}=3.2V, set I_{LED} =1.5A, enable Flash mode.

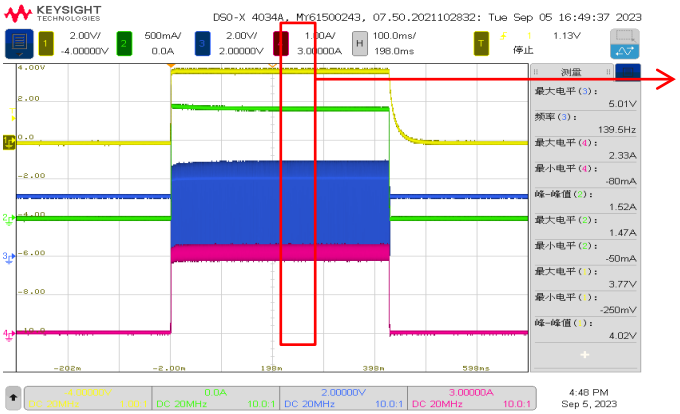


Fig-19: f_{SW}=2MHz, Current Limit=1.9A.
CH1-V_{OUT}, CH2-I_{LED}, CH3-V_{SW}, CH4-I_L

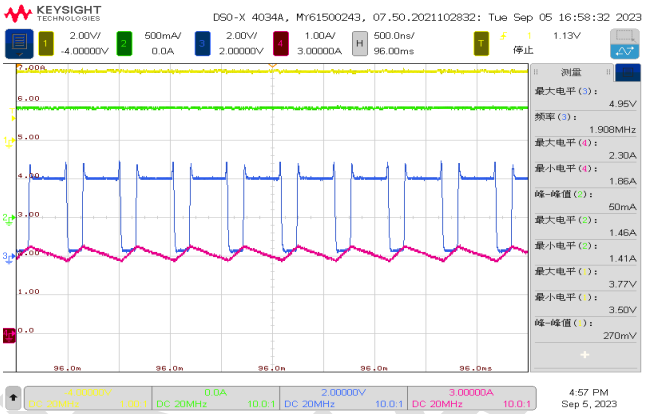


Fig-20: f_{SW}=2MHz, Current Limit=1.9A.
CH1-V_{OUT}, CH2-I_{LED}, CH3-V_{SW}, CH4-I_L

2.10 VOUT Short

Test condition: Short VOUT to GND during Torch/Flash mode.

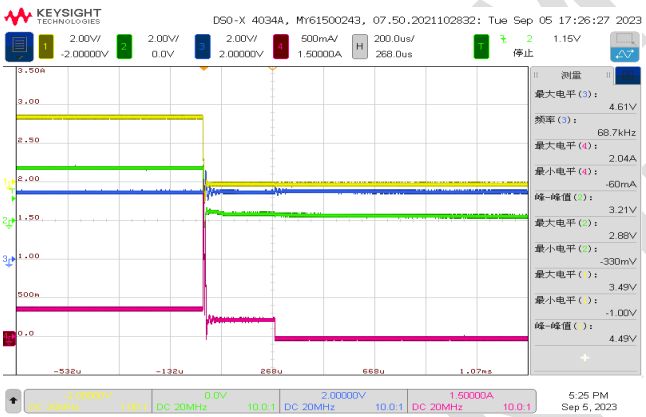


Fig-21: V_{IN}=3.6V, I_{LED} =386mA, Torch mode.
CH1-V_{OUT}, CH2-V_{LED}, CH3-V_{SW}, CH4-I_L

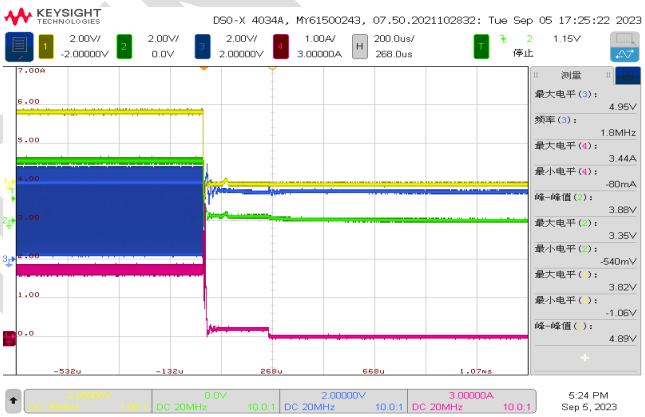


Fig-22: V_{IN}=3.6V, I_{LED}=1.5A, Flash mode.
CH1-V_{OUT}, CH2-V_{LED}, CH3-V_{SW}, CH4-I_L

2.11 LED Short

Test condition: Short VLED to GND during Torch/Flash mode.

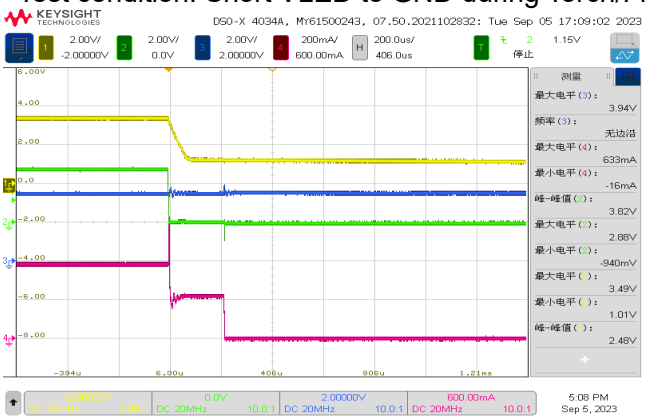


Fig-23: V_{IN}=3.6V, I_{LED}=386mA, Torch mode.
CH1-V_{OUT}, CH2-V_{LED}, CH3-V_{SW}, CH4-I_L

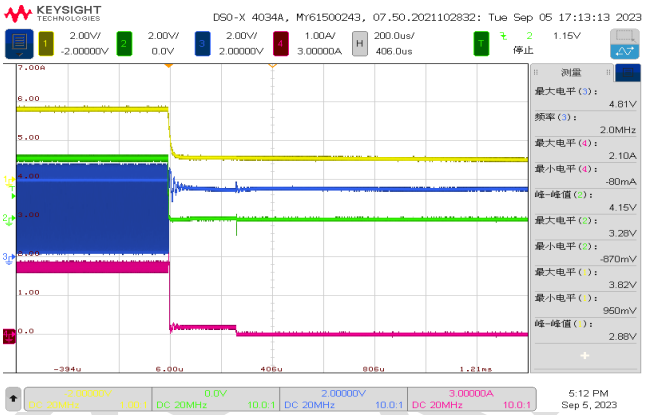


Fig-24: V_{IN}=3.6V, I_{LED}=1.5A, Flash mode.
CH1-V_{OUT}, CH2-V_{LED}, CH3-V_{SW}, CH4-I_L

2.12 Thermal Shutdown

Test condition: Hit the IC with hot gun during Torch/Flash mode.

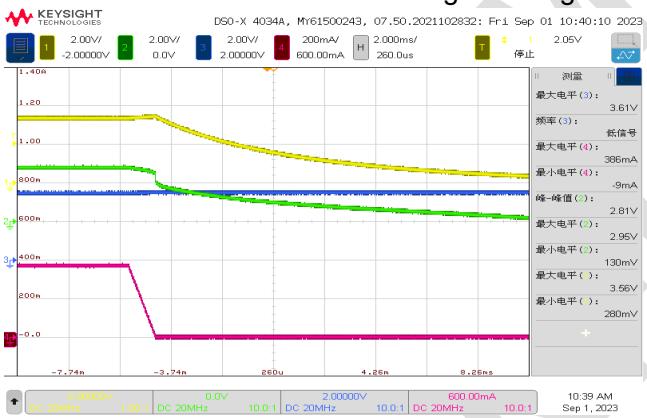


Fig-25: V_{IN}=3.6V, I_{LED}=386mA, Torch mode
CH1-V_{OUT}, CH2-V_{LED}, CH3-V_{SW}, CH4-I_{LED}

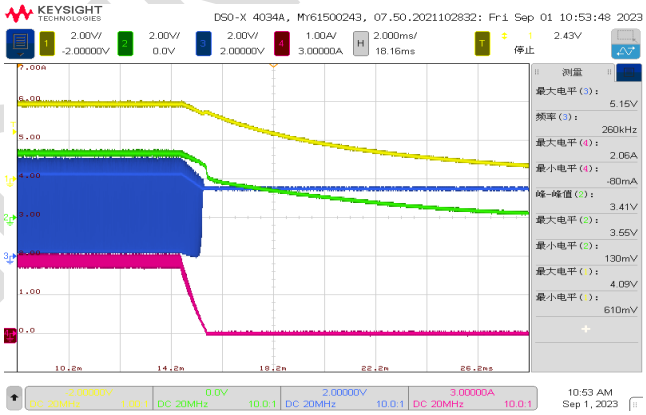


Fig-26: V_{IN}=3.6V, I_{LED}=1.5A, Flash mode
CH1-V_{OUT}, CH2-V_{LED}, CH3-V_{SW}, CH4-I_{LED}