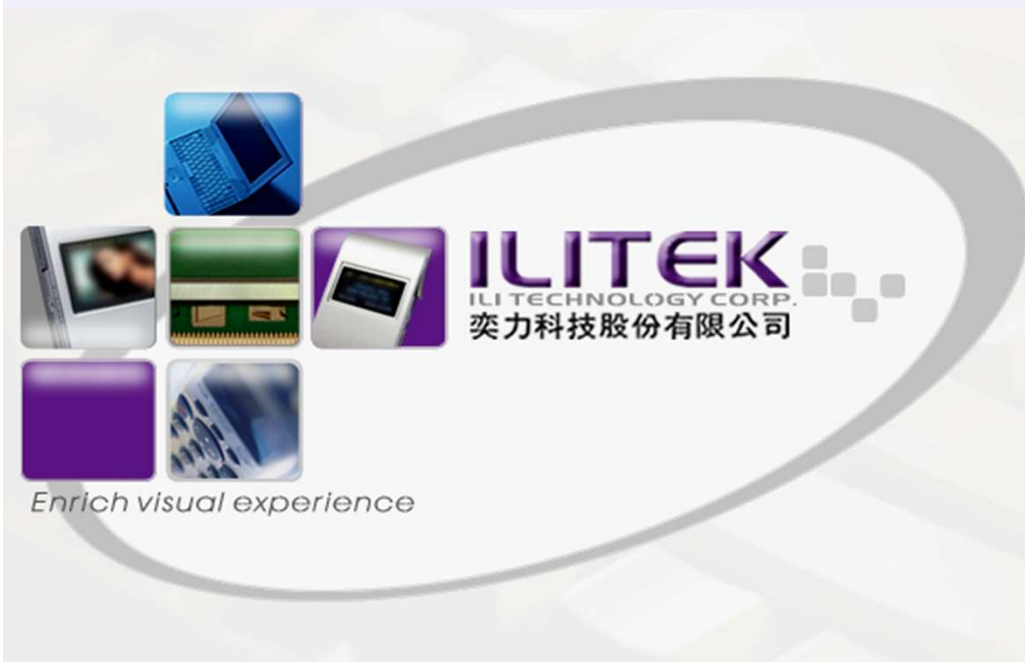


# ILI9882T+HSD10.51 For HQ Sleep in/Out abnormal display Analysis Report



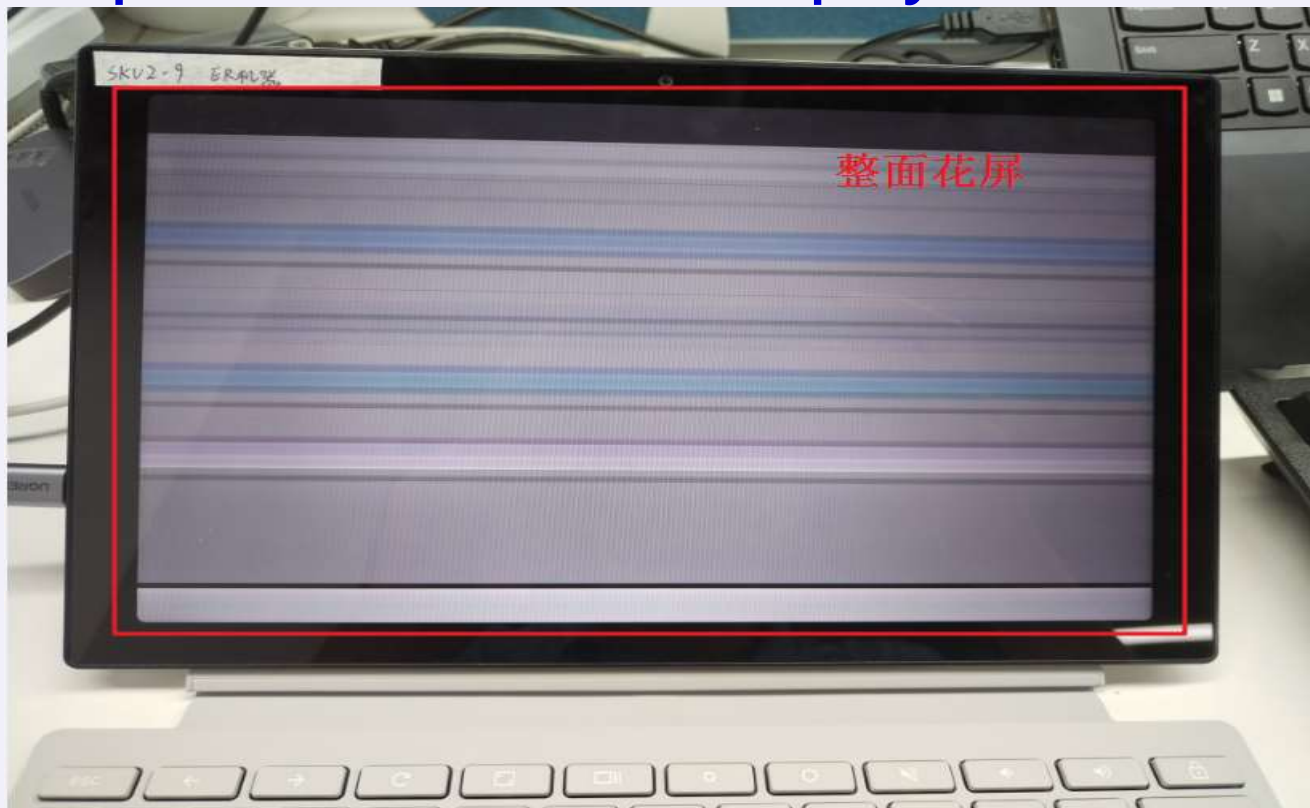
2023.08.01



# Sample Description

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- ❖ Customer : HQ
- ❖ LCM : ILI9882T+HSD10.51
- ❖ Abnormal phenomenon:
  - Sleep in/Out Abnormal Display



# Analysis-Code Comparison

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## ❖ NG & OK Code Comparison

- When abnormal conditions, the read back value of the register is the IC default value.

2023/7/26 14:19:04 22,687 字节 其它一切 ▾ ANSI ▾ UNIX NG花屏

Disable report

➡ (ili\_ddi\_reg\_read, 555): Read master ddi page = 0x01, reg = 0x00, data = 0x00,

└ (ili\_ddi\_reg\_read, 555): Read master ddi page = 0x01, reg = 0x01, data = 0x40,

(ili\_ddi\_reg\_read, 555): Read master ddi page = 0x01, reg = 0x02, data = 0x00,

(ili\_ddi\_reg\_read, 555): Read master ddi page = 0x01, reg = 0x03, data = 0x00,

➡ (ili\_ddi\_reg\_read, 555): Read master ddi page = 0x01, reg = 0x04, data = 0x00,

└ (ili\_ddi\_reg\_read, 555): Read master ddi page = 0x01, reg = 0x05, data = 0x40,

(ili\_ddi\_reg\_read, 555): Read master ddi page = 0x01, reg = 0x06, data = 0x00,

(ili\_ddi\_reg\_read, 555): Read master ddi page = 0x01, reg = 0x07, data = 0x00,

➡ (ili\_ddi\_reg\_read, 555): Read master ddi page = 0x01, reg = 0x08, data = 0x00,

└ (ili\_ddi\_reg\_read, 555): Read master ddi page = 0x01, reg = 0x09, data = 0x00,

(ili\_ddi\_reg\_read, 555): Read master ddi page = 0x01, reg = 0x0A, data = 0x00,

(ili\_ddi\_reg\_read, 555): Read master ddi page = 0x01, reg = 0x0B, data = 0x01,

(ili\_ddi\_reg\_read, 555): Read master ddi page = 0x01, reg = 0x0C, data = 0x00,

➡ (ili\_ddi\_reg\_read, 555): Read master ddi page = 0x01, reg = 0x0E, data = 0x00,

(ili\_ddi\_reg\_read, 555): Read master ddi page = 0x01, reg = 0x24, data = 0x00,

➡ (ili\_ddi\_reg\_read, 555): Read master ddi page = 0x01, reg = 0x25, data = 0x10,

(ili\_ddi\_reg\_read, 555): Read master ddi page = 0x01, reg = 0x26, data = 0x00,

(ili\_ddi\_reg\_read, 555): Read master ddi page = 0x01, reg = 0x27, data = 0x00,

2023/7/26 14:24:13 22,687 字节 其它一切 ▾ ANSI ▾ UNIX OK显示正常

Disable report

➡ (ili\_ddi\_reg\_read, 555): Read master ddi page = 0x01, reg = 0x00, data = 0x42,

└ (ili\_ddi\_reg\_read, 555): Read master ddi page = 0x01, reg = 0x01, data = 0x11,

(ili\_ddi\_reg\_read, 555): Read master ddi page = 0x01, reg = 0x02, data = 0x00,

(ili\_ddi\_reg\_read, 555): Read master ddi page = 0x01, reg = 0x03, data = 0x00,

➡ (ili\_ddi\_reg\_read, 555): Read master ddi page = 0x01, reg = 0x04, data = 0x01,

└ (ili\_ddi\_reg\_read, 555): Read master ddi page = 0x01, reg = 0x05, data = 0x11,

(ili\_ddi\_reg\_read, 555): Read master ddi page = 0x01, reg = 0x06, data = 0x00,

(ili\_ddi\_reg\_read, 555): Read master ddi page = 0x01, reg = 0x07, data = 0x00,

➡ (ili\_ddi\_reg\_read, 555): Read master ddi page = 0x01, reg = 0x08, data = 0x30,

└ (ili\_ddi\_reg\_read, 555): Read master ddi page = 0x01, reg = 0x09, data = 0x81,

(ili\_ddi\_reg\_read, 555): Read master ddi page = 0x01, reg = 0x0A, data = 0x71,

(ili\_ddi\_reg\_read, 555): Read master ddi page = 0x01, reg = 0x0B, data = 0x00,

(ili\_ddi\_reg\_read, 555): Read master ddi page = 0x01, reg = 0x0C, data = 0x00,

➡ (ili\_ddi\_reg\_read, 555): Read master ddi page = 0x01, reg = 0x0E, data = 0x1A,

(ili\_ddi\_reg\_read, 555): Read master ddi page = 0x01, reg = 0x24, data = 0x00,

➡ (ili\_ddi\_reg\_read, 555): Read master ddi page = 0x01, reg = 0x25, data = 0x00,

(ili\_ddi\_reg\_read, 555): Read master ddi page = 0x01, reg = 0x26, data = 0x00,

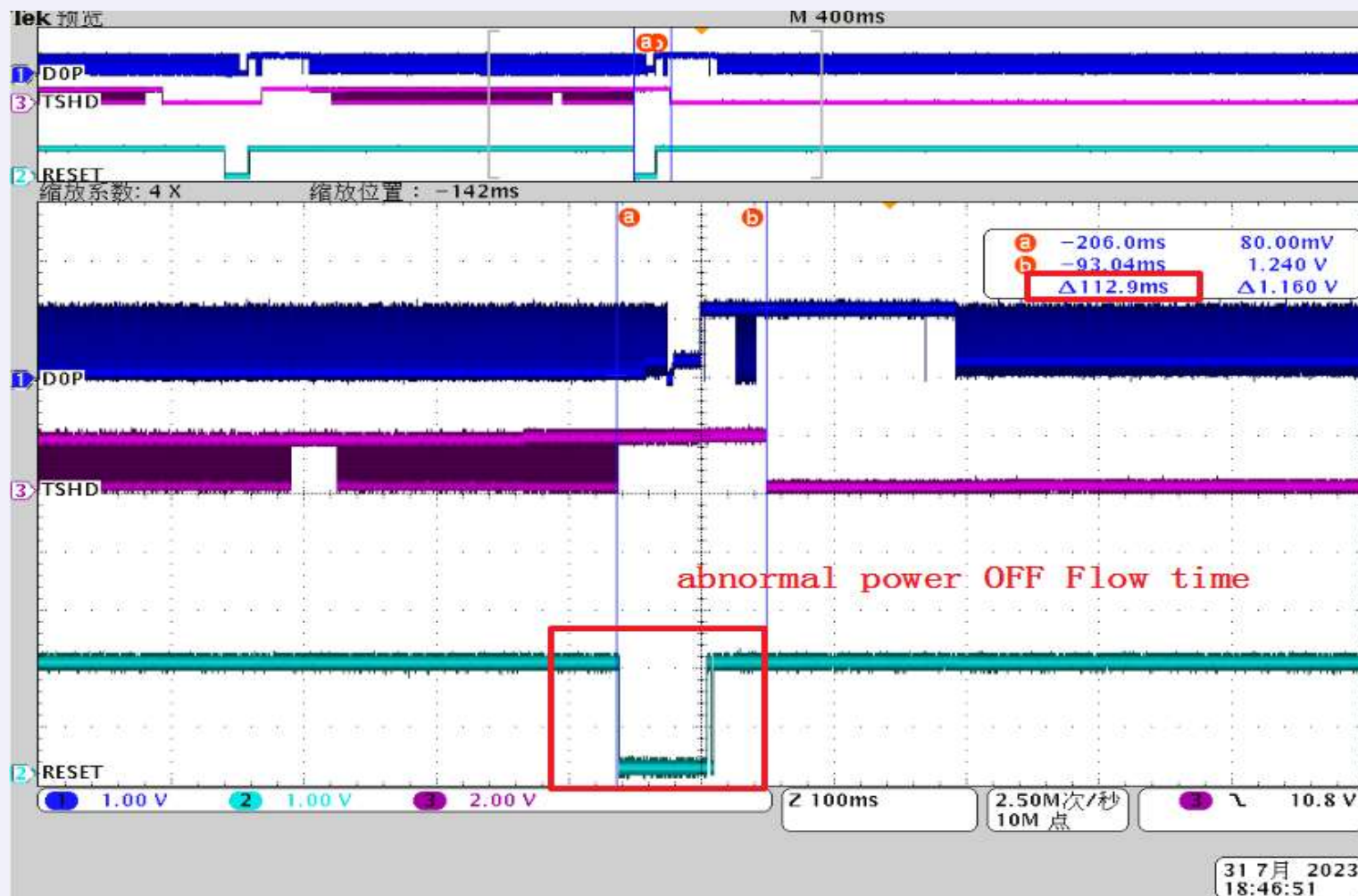
(ili\_ddi\_reg\_read, 555): Read master ddi page = 0x01, reg = 0x27, data = 0x00,



# Analysis-Waveform

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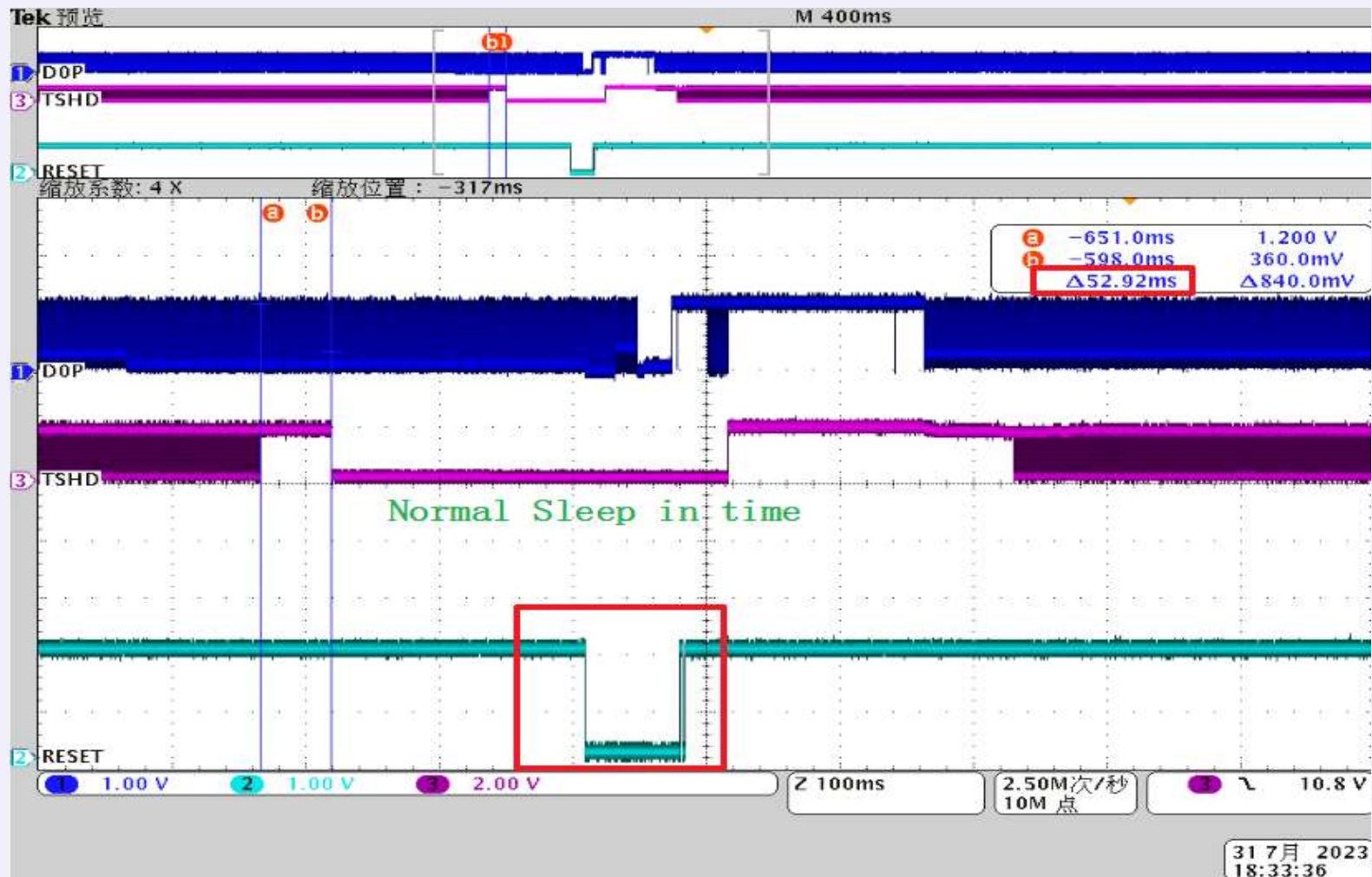
- ❖ Abnormal Display Waveform : Abnormal Power OFF Flow=112.9ms



# Analysis-Waveform

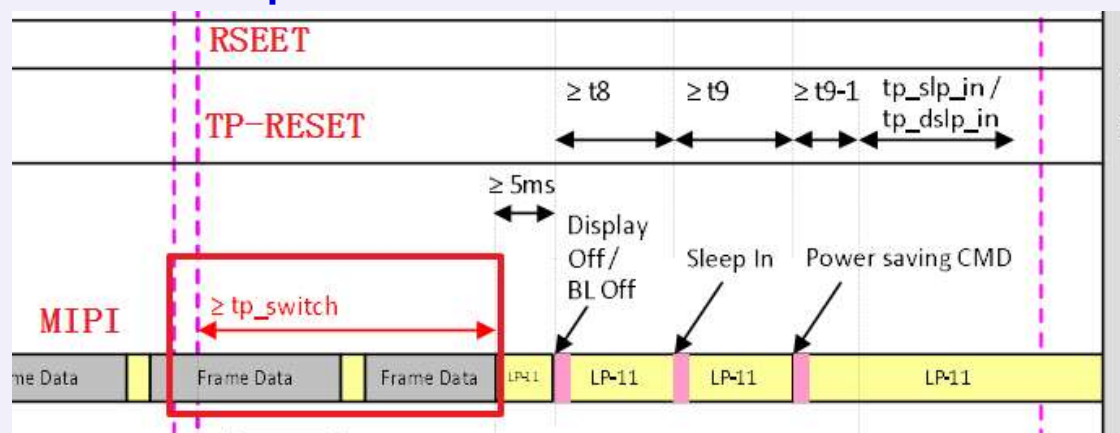
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- ❖ Normal display Waveform : Normal Sleep in Flow=52.92ms



# Root Cause

- ❖ When the OS wakes up, the screen is abnormal. Analyze the root causes:
  - Entering the suspend sequence, the host side needs to first notify the TP to enter the scan stop.

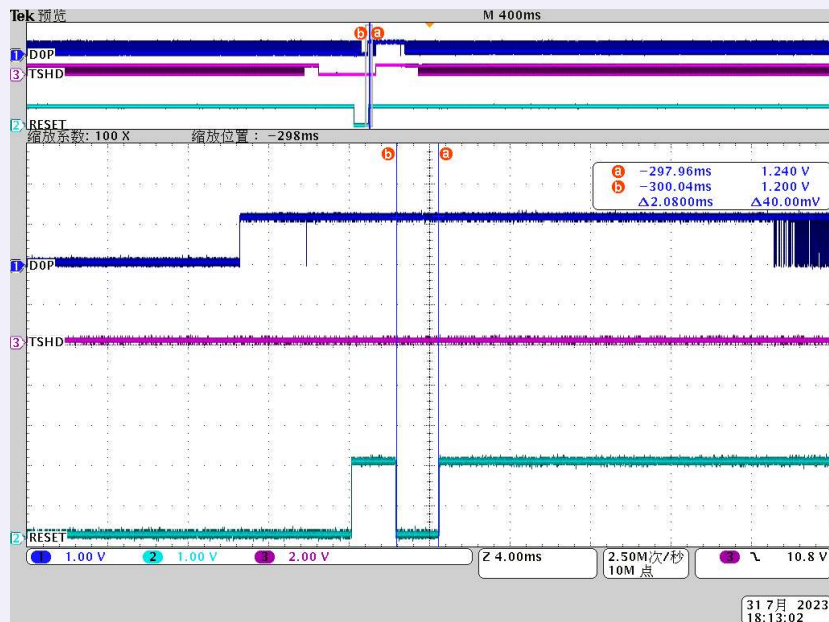


- When the suspend timing can't meet the spec , then 28/10 will not take effect.
- When the IC doesn't in sleep in mode , then reset function follow APO sequence.(Timing =120ms)
- In APO flow, IC cannot effectively execute MIPI command

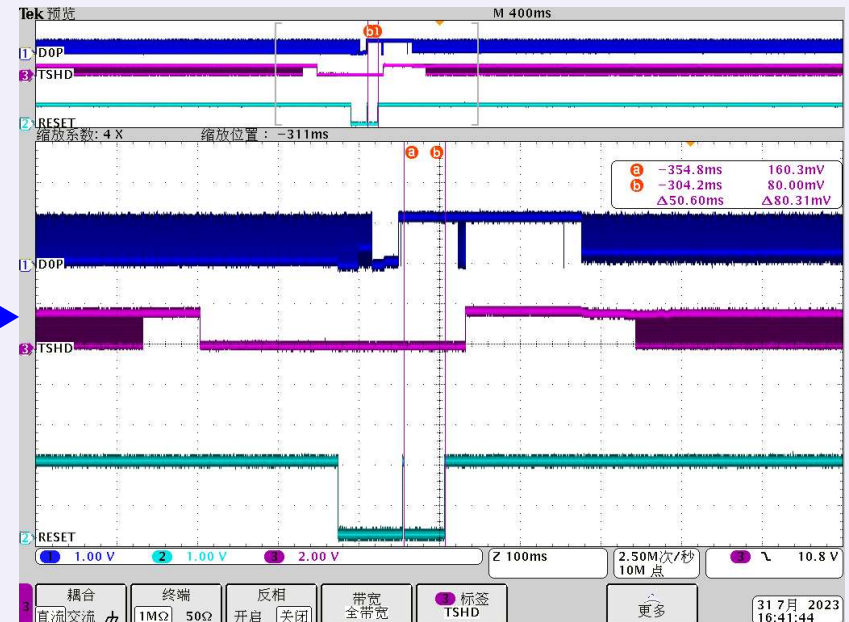
# Solution

- ❖ Entering the resume sequence, extend the reset timing from 2ms to 50ms to avoid APO flow.

before modification (2ms)



after modification (50ms)

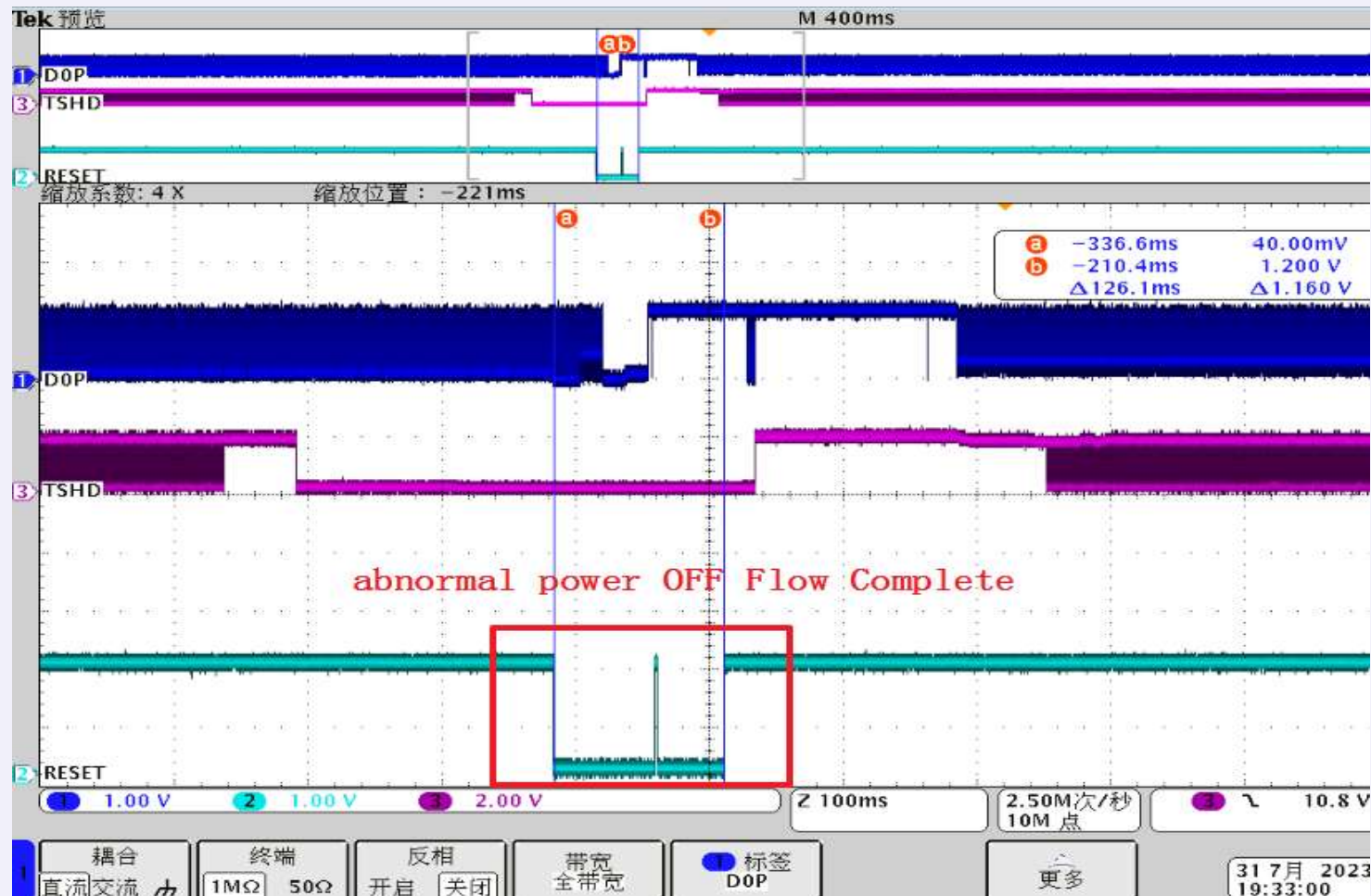




# Solution

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- ❖ Resume Waveform : Sleep out time=126.1ms > 120ms (Abnormal Power OFF Flow)

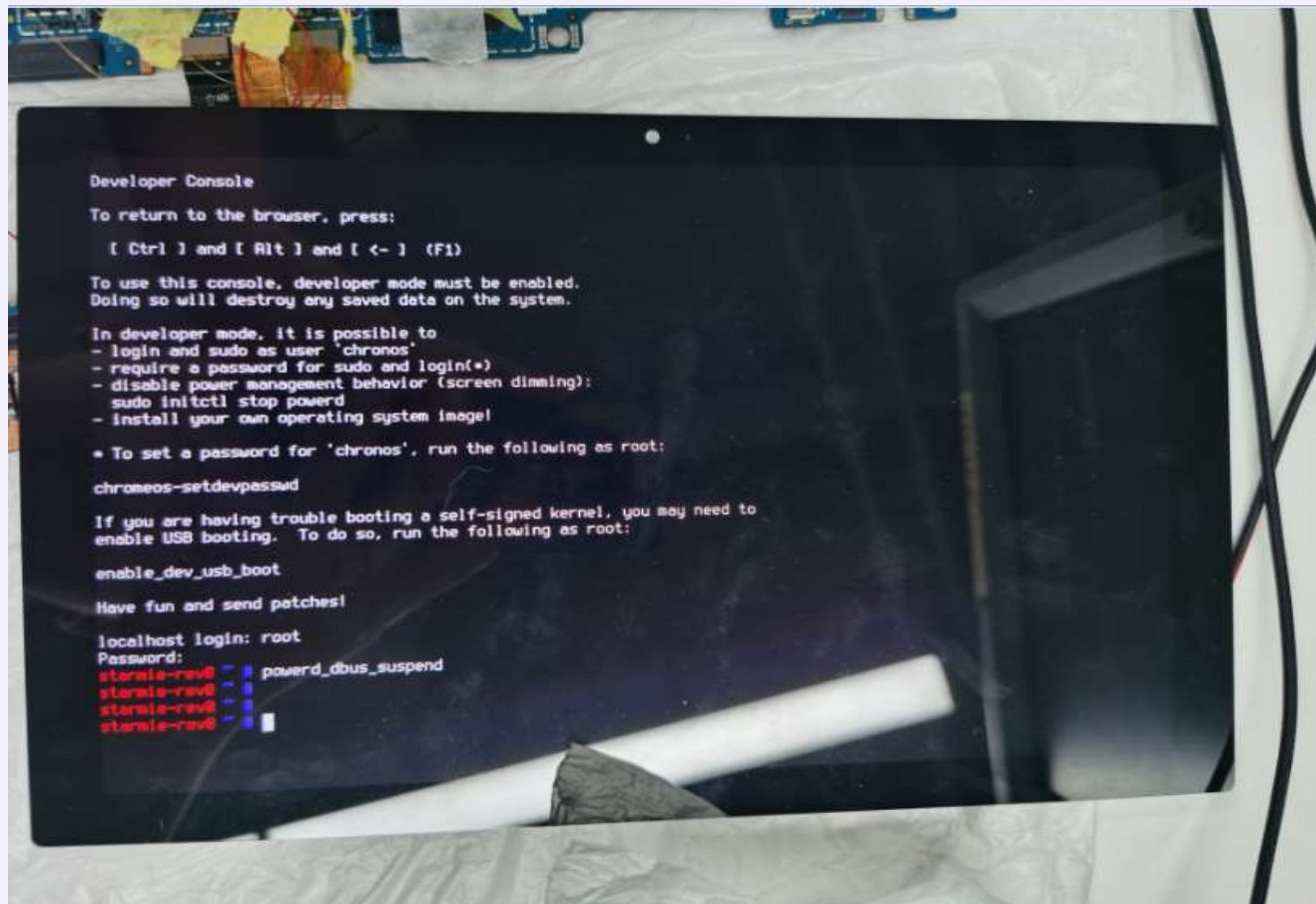




# Solution

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- ❖ After the solution was combined, the Sleep out NG display improved and returned to normal



# Summary

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- ❖ NG&OK Code Comparison : When abnormal conditions, the read back value of the register is the IC default value.
- ❖ The suspend timing can't meet the spec , then IC can't entering to sleep in mode.
- ❖ When the IC doesn't in sleep in mode , then reset function follow APO sequence.(Timing =120ms)
- ❖ Currently suspend to resume is only 112ms.
- ❖ Extend the reset timing from 2ms to 50ms to avoid APO flow.

# Thank you