

# i.MX 6UL EVK VDD\_ARM\_SOC\_IN Overshoot Issue

(Doc link: <https://community.nxp.com/t5/i-MX-Processors-Knowledge-Base/iMX6UL-VDD-ARM-SOC-IN-Overshoot-On-EVK/ta-p/1099926> )

Leo Pan

May, 2017



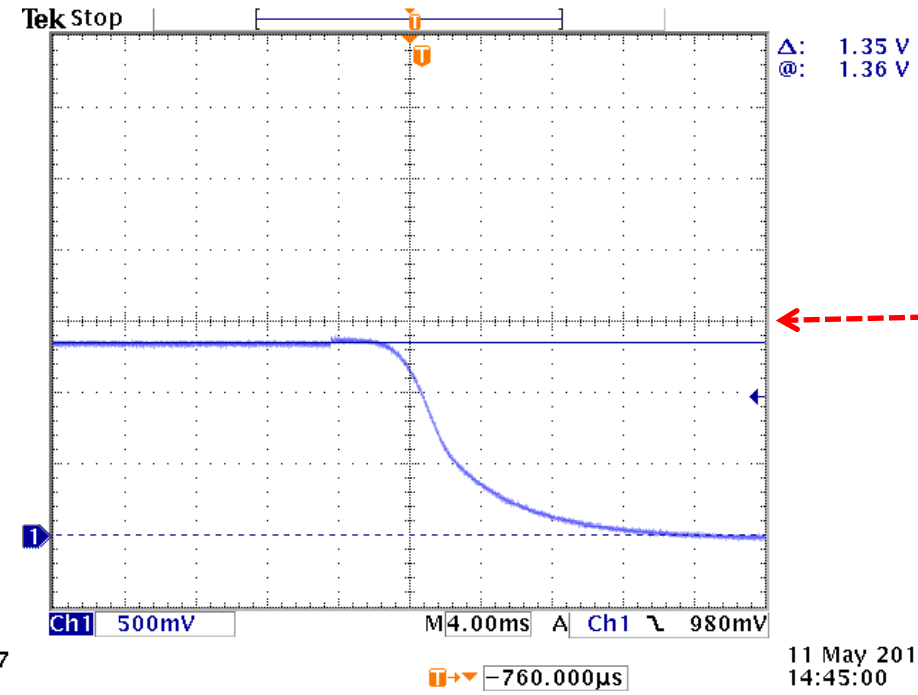
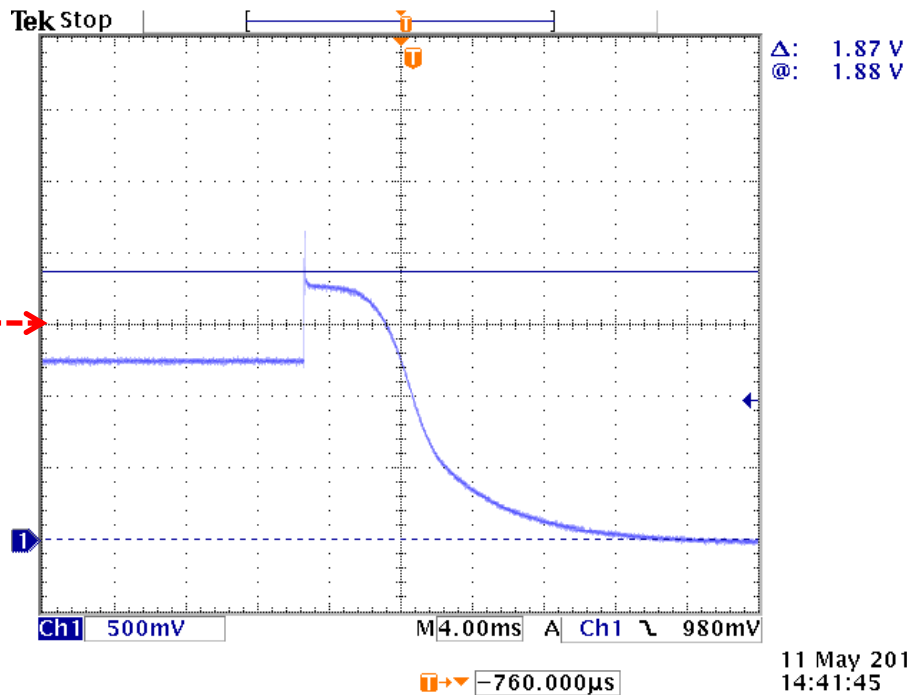
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# Issue Description

- **Board:** MCIMX6G2CVM EVK Board (SPF-28617)
- **Issue Description:**
  - Overshoot ( $> 1.8\text{V}$ ) is found on VDD\_ARM\_SOC\_IN when the EVK board is powered down by POWER BUTTON long pressed after the Linux kernel loaded. It would not happen if only U-Boot is run. The overshoot is out of i.MX6UL maximum rating.

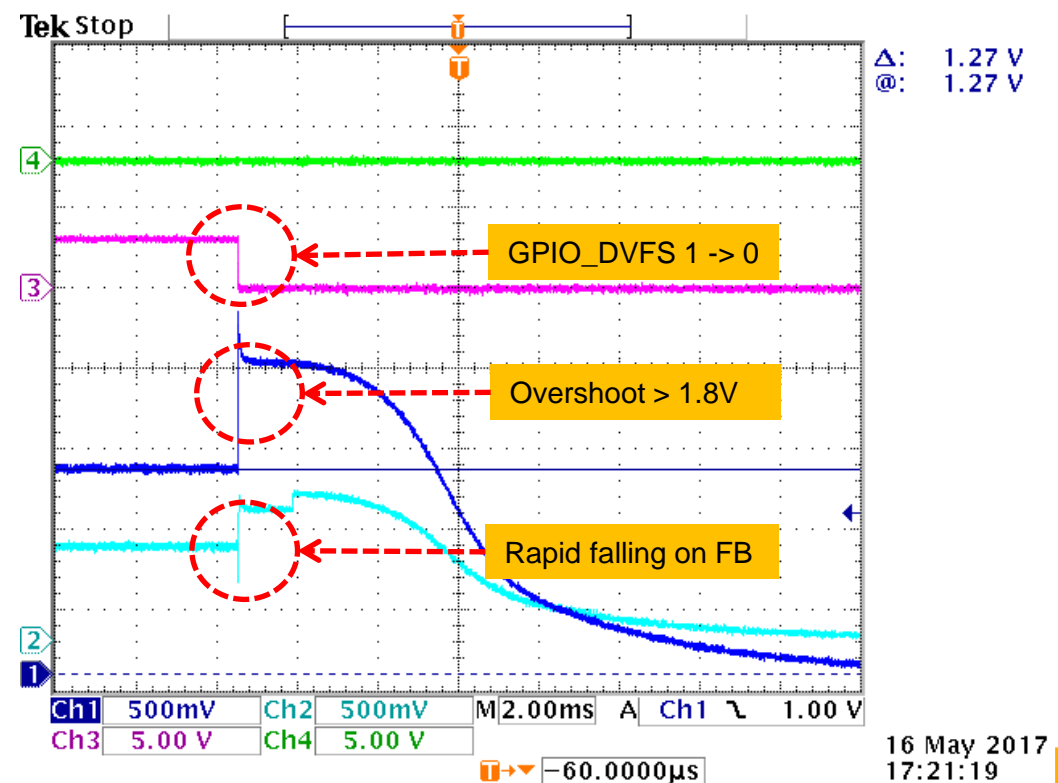
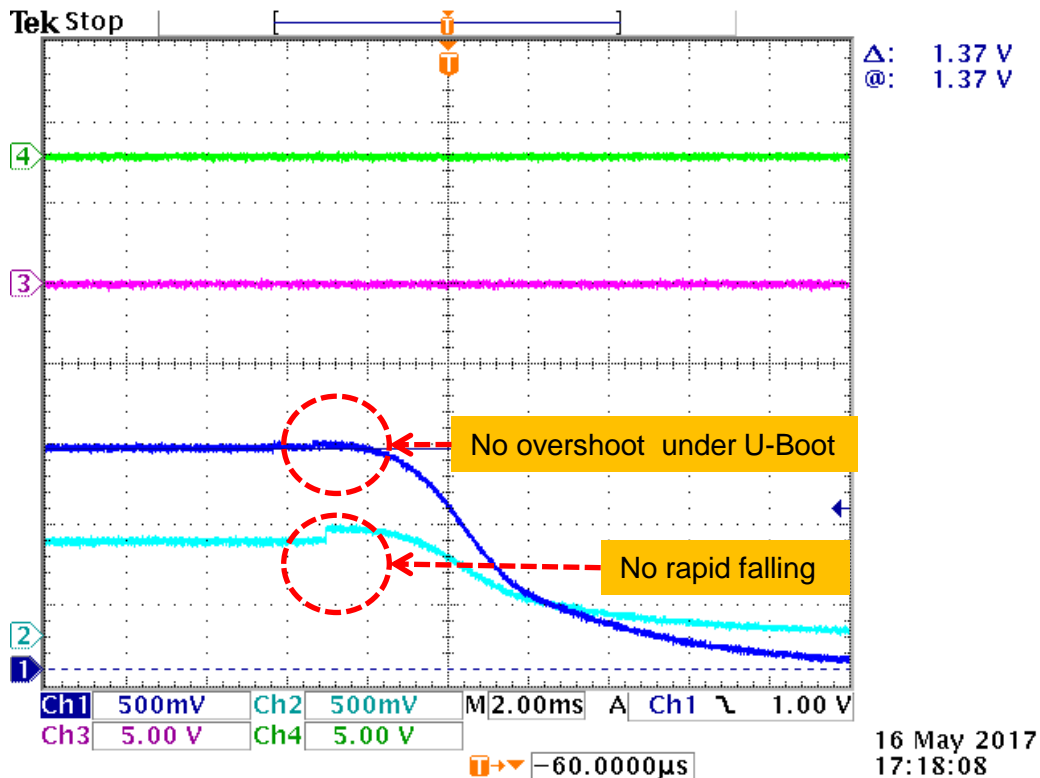




# Issue Analysis (Cont.)

## Waveforms on VDD\_ARM\_SOC\_IN, FB, GPIO\_DVFS and PMIC\_STBY\_REQ:

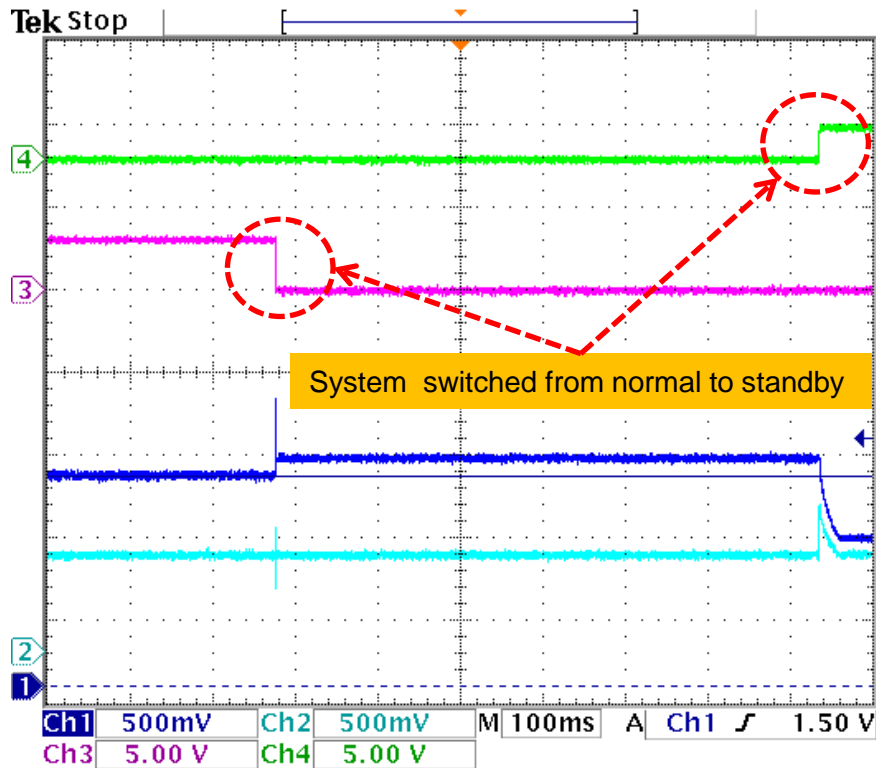
- VDD\_ARM\_SOC\_IN output voltage is (1.37V@PMIC\_STBY\_REQ = 0, GPIO\_DVFS = 0) under U-Boot.
- VDD\_ARM\_SOC\_IN output voltage is (1.27V@PMIC\_STBY\_REQ = 0, GPIO\_DVFS = 1) when Linux kernel is run.
- When GPIO\_DVFS is changed from 1 to 0, overshoot happens because of rapid falling on FB.



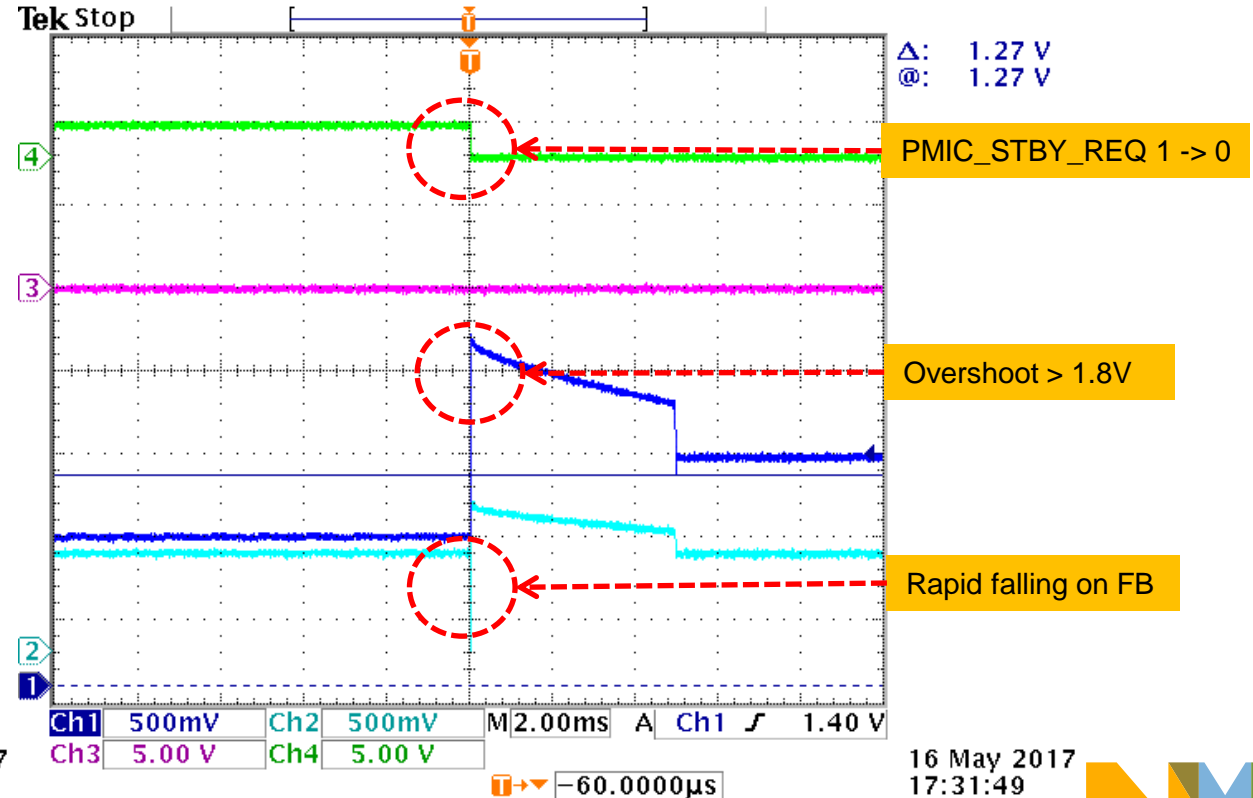
# Issue Analysis (Cont.)

## Waveforms on VDD\_ARM\_SOC\_IN, FB, GPIO\_DVFS and PMIC\_STBY\_REQ:

- VDD\_ARM\_SOC\_IN output voltage is (1.37V@PMIC\_STBY\_REQ = 0, GPIO\_DVFS = 0) under U-Boot.
- VDD\_ARM\_SOC\_IN output voltage is (0.93V@PMIC\_STBY\_REQ = 1, GPIO\_DVFS = 0) when the system is standby.
- When PMIC\_STBY\_REQ is changed from 1 to 0, overshoot happens also because of rapid falling on FB.



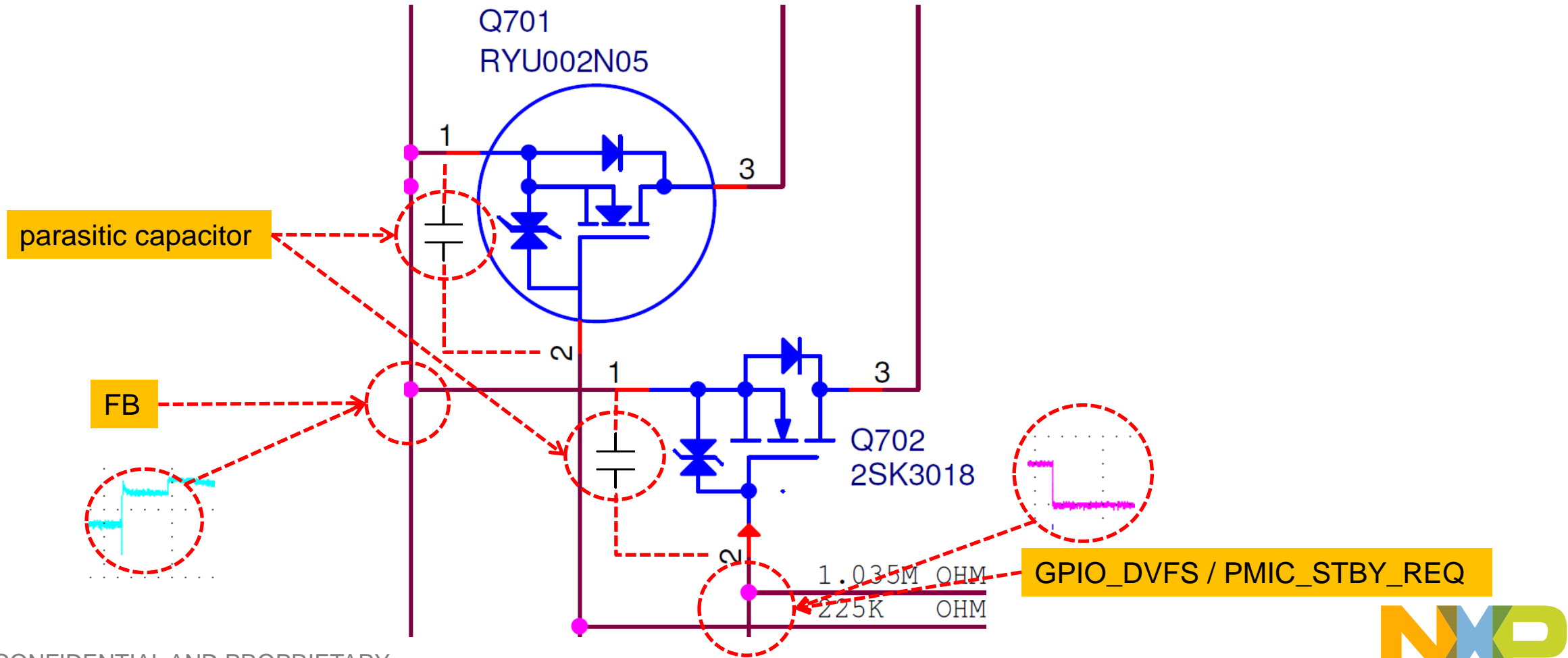
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# Root Cause

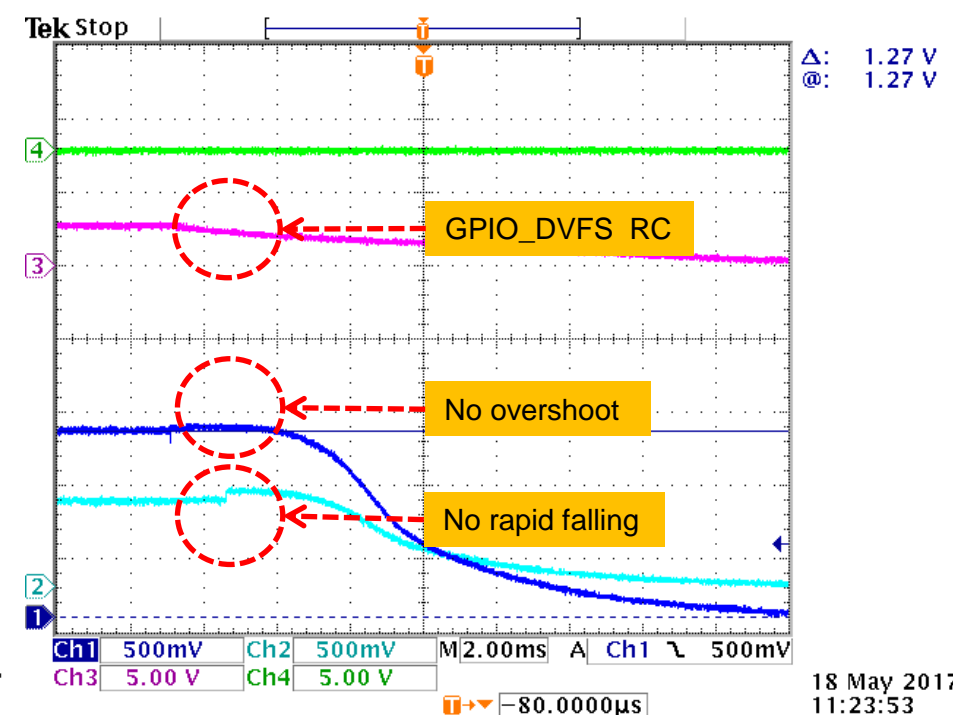
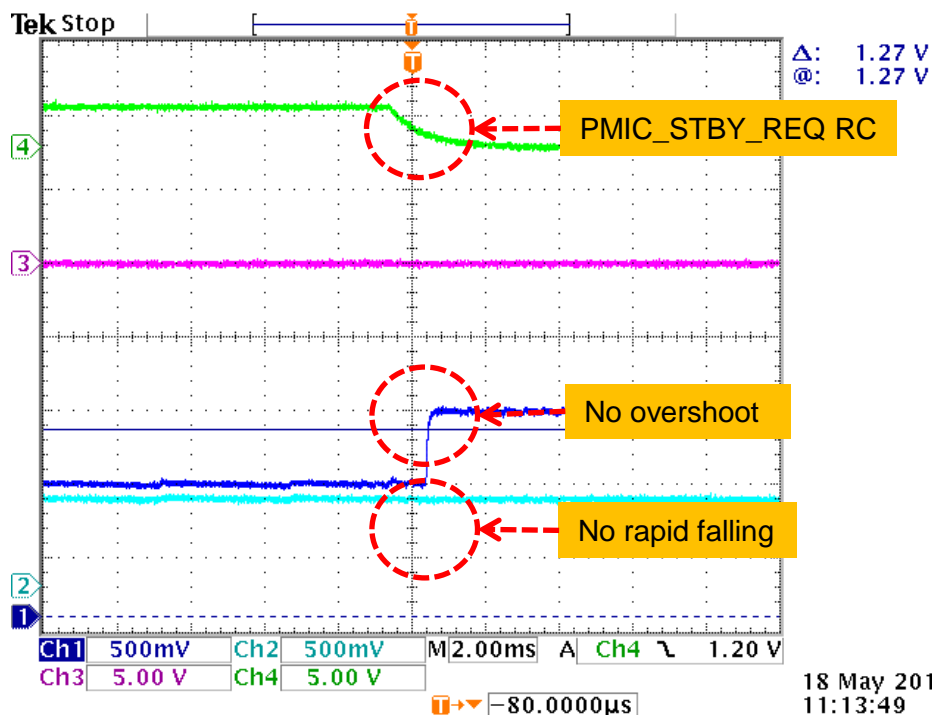
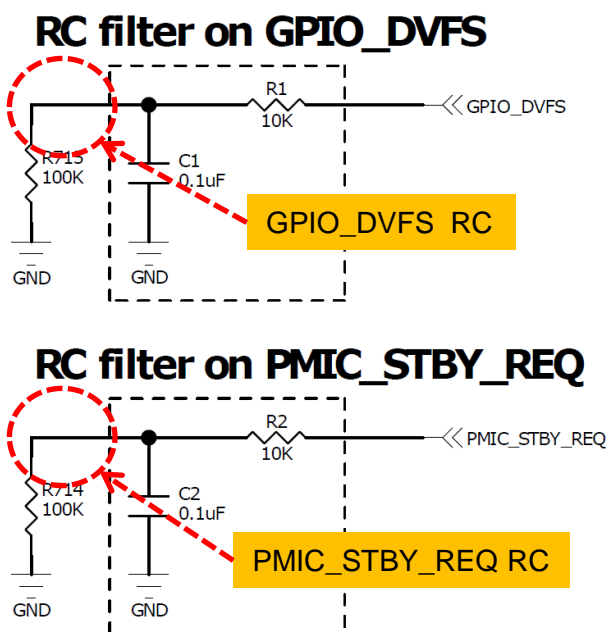
Rapid falling (1 -> 0) of GPIO\_DVFS/PMIC\_STBY\_REQ will be coupled to FB via the parasitic capacitor between Gate pin and Source pin of the N-FET and cause the overshoot on VDD\_ARM\_SOC\_IN.



# Solution

Add RC filter on the Gate pin of the N-FET to eliminate the rapid falling on it.

With this RC filter, VDD\_ARM\_SOC\_IN needs more time to recover its output level, hence it might need one more millisecond additional delay in software.



CH1(blue): VDD\_ARM\_SOC\_IN, CH2(cyan): FB, CH3(pink): GPIO\_DVFS RC, CH4(green): PMIC\_STBY\_REQ RC



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