POWER DCB

Gate-input-signal-improve

2018/07/09 Romeo

Impedance & noise

- **A high impedance circuit is generally more sensitive to noise. this is because a small current (external noise) induced on a high impedance circuit (I times Z) results in higher noise voltage. In contrast, the induced noise on a low Z circuit is generally smaller (I times Z).**

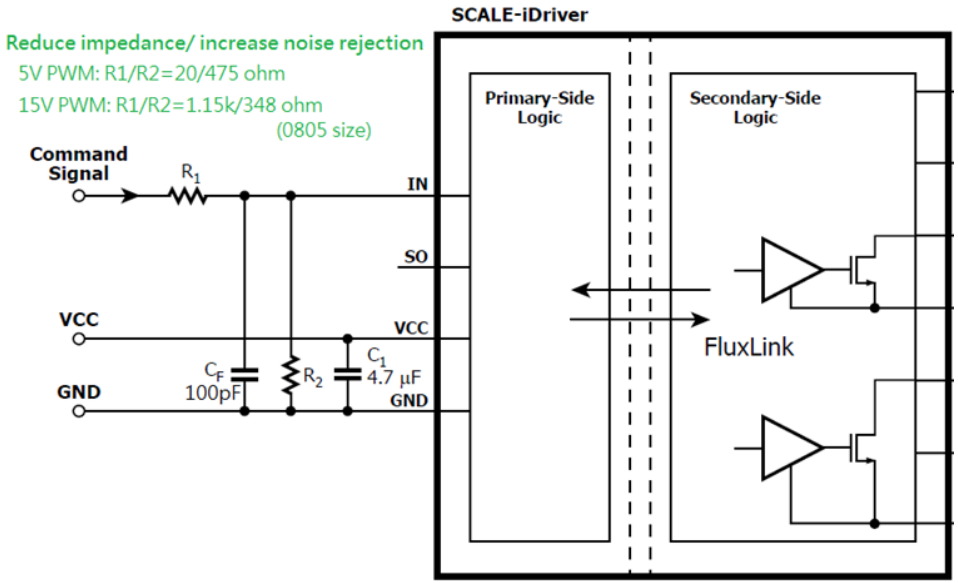
- **You can model a capacitive coupling between a noise source and your circuit with 3 elements.**
  - a voltage source (the noise source)
  - a capacitor (the capacitive coupling)
  - a resistor (the input impedance of your circuit)

- **If the resistor has a small value, you won't get much voltage at the input of your circuit. If the resistor has a big value (high impedance), the voltage will be much higher.**

Reduce impedance & noise

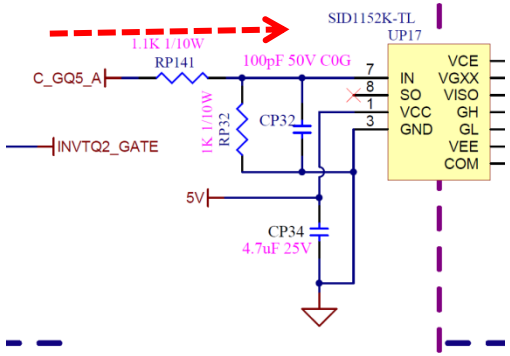
- **A opto-coupler driver has 6mA to 10mA LED input current during the IGBT on-state**

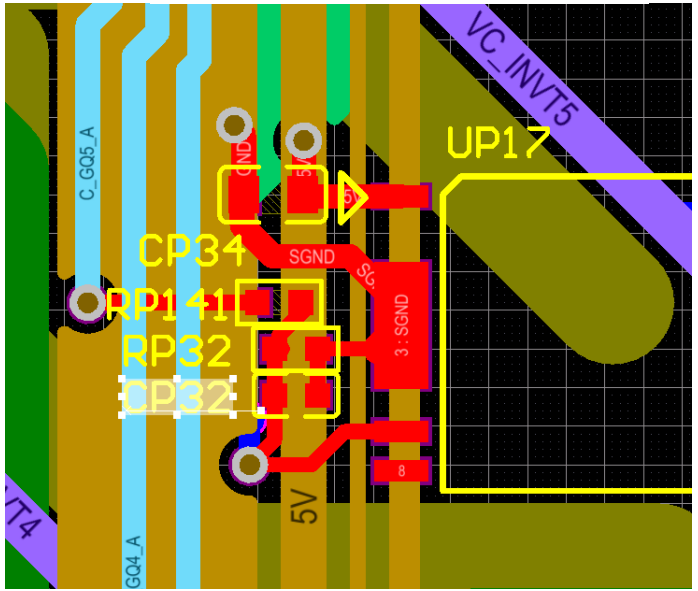
- **Reduce impedance to increase noise rejection capacity as traditional opto-coupler driver circuit For different command signal level**
  - Assume input PWM command is 5V.
    - I_{in} = 5 / (20 +475) ~ 10mA
- **or**
  - Assume input PWM command is 15V.
    - I_{in} = 15 / (1.15k + 348) ~ 10mA



Optimize PWM input layout

- **Optimize CP32 and RP32 layout position to close to UP17**
  - A voltage divider RP141/RP32 is placed as close as possible to the gate driver (IN pin)
    - PWM input signal should go through RP141 ➔ RP32➔CP32 ; then finally go into the IN pin of Scale-idriver.
    - The minimum distance between the voltage divider RP141/RP32 and the gate driver is essential to avoid inductive coupling on the PCB layout.





Minimum pulse suppression for IN

- **Scale-2 gate drivers with electrical interface feature very fast signal propagation delays of typically <90ns. This includes a minimum pulse suppression time of 35ns. To avoid false gate switching caused by potential EMI, the input IN may be equipped with addition filter.**