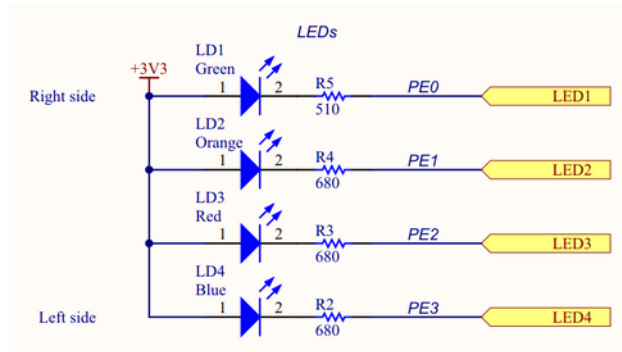
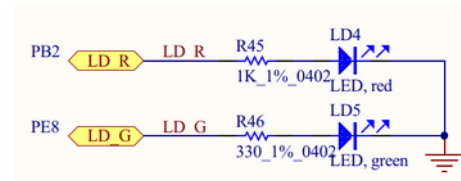


## LED pins and drive for STM32F412GDISCOVERY and STM32L476GDISCOVERY

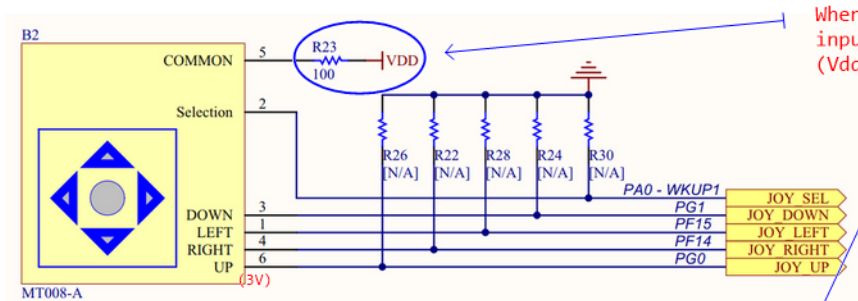


Open-drain drive for F412

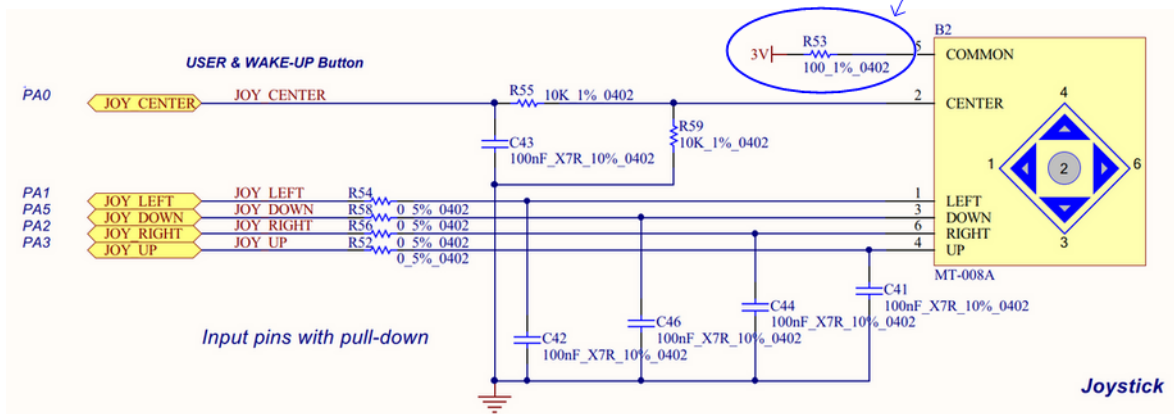


Push-pull drive for L476

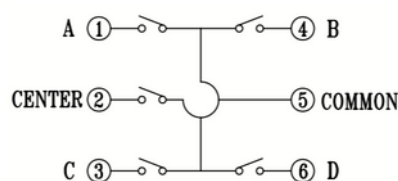
## Joystick circuits and pins for STM32F412GDISCOVERY and STM32L476GDISCOVERY



Circuit and pins for F412. Internal pull down is not needed, but it can be used. Key bouncing can be an issue due to lack of filtering. (We did not experience this issue; the filtering circuits may be there---they are just not shown.)



Circuit and pins for L476. Internal pull down is needed. Key debouncing is not needed due to low-pass filter provided the RC circuit, like R54 and C42 for the LEFT key.



Schematics for the Joystick.