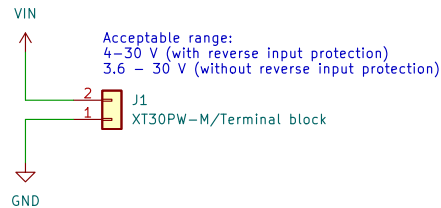
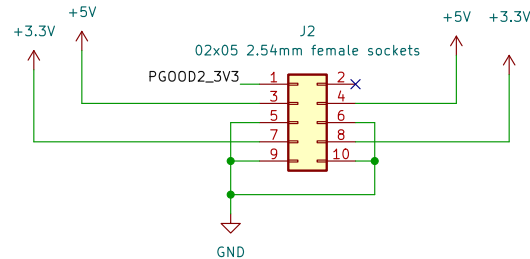


4–30 V input connector



MCU node (Orion) power connector



Input capacitor
 $IRMS = I_{LOAD}/2 = 6\text{ A} / 2 = 3\text{ A}$
Output capacitor:
Max overshoot (VSOAR)
 $L = 2.2\text{ }\mu\text{H}$

BUCK 1:

$V_{OUT} = 5\text{ V}$
 $C_{OUT} = 22\text{ }\mu\text{F} + 22\text{ }\mu\text{F} = 44\text{ }\mu\text{F}$
 $I_{LOAD,max} = 3.5\text{ A}$
 $V_{SOAR} = I_{LOAD,max} \times 2 \times L / (2 \times C_{OUT} \times V_{OUT})$
 $= 61.25\text{ mV}$

BUCK 2:

$V_{OUT} = 3.3\text{ V}$
 $C_{OUT} = 22\text{ }\mu\text{F}$
 $I_{LOAD,max} = 2\text{ A}$
 $V_{SOAR} = I_{LOAD,max} \times 2 \times L / (2 \times C_{OUT} \times V_{OUT})$
 $= 60.61\text{ mV}$

Inductor selection:

$\eta = 90\%$ (efficiency)
 $f_{sw} = 2.1\text{ MHz}$
 $V_{IN} = 29\text{ V}$

BUCK 1

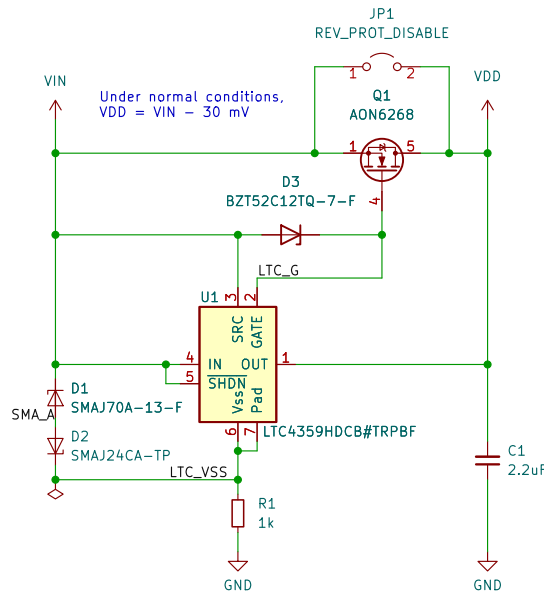
$I_{OUT} = 3.5\text{ A}$
 $V_{OUT} = 5\text{ V}$
 $D = V_{OUT}/(V_{IN,max} \times \eta) = 0.154$ (duty cycle)
 $L_{MIN} = (V_{IN} - V_{OUT}) \times D / (f_{sw} \times I_{OUT} \times L_{IR})$
 $= 1.68\text{ }\mu\text{H}$

BUCK 2

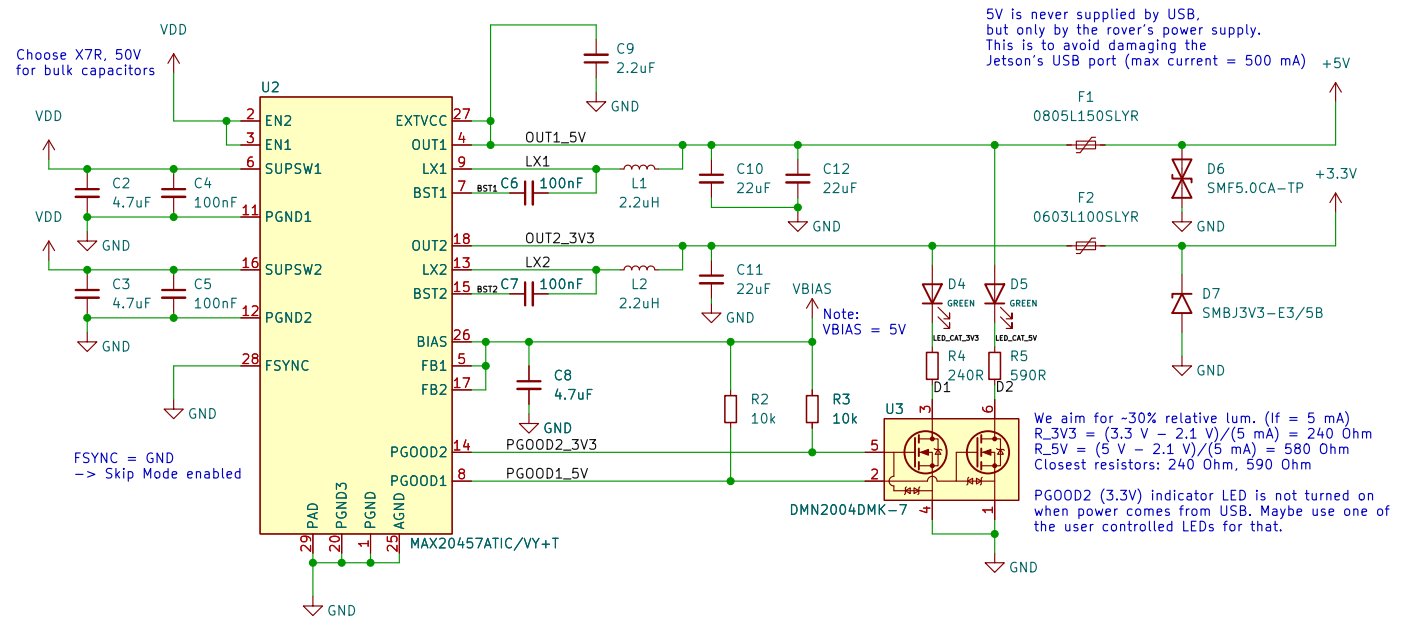
$I_{OUT} = 2\text{ A}$
 $V_{OUT} = 3.3\text{ V}$
 $D = V_{OUT}/(V_{IN,max} \times \eta) = 0.102$ (duty cycle)
 $L_{MIN} = (V_{IN} - V_{OUT}) \times D / (f_{sw} \times I_{OUT} \times L_{IR})$
 $= 1.94\text{ }\mu\text{H}$

We choose $L = 2.2\text{ }\mu\text{H}$

Reverse input protection



3.3V / 5V Dual–channel switching regulator



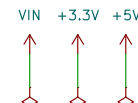
Mounting holes



Logo



Power flags



Author: Vincent Nguyen

EPFL Xplore

Sheet: /

File: orion_power.kicad_sch

Title: 3.3V/5V Dual–channel Switching Regulator

Size: A4

Date:

KiCad E.D.A. kicad (6.0.8)

Rev:

Id: 1/1