

PCB layout:  
all decoupling caps as close as pins as possible!  
PMID cap is the most critical. You can add additional small 0.01–0.1uF closest possible

Figure 46: Layout Example Diagram

Legend:  
Top layer  
2nd layer (PGND)  
via  
PGND PGND on Top layer

Figure 46: Layout Example Diagram

Simple PSU input selection method for buck (from higher to lower voltage):

- adapter plugged in – highest priority
- USB source plugged in – when adapter has no voltage
- battery only – when no other source
- delivers power from battery to USB host
- distinguishes VBUS delivering power to host?

Inductors:  
Coilcraft XFL4020-152ME  
Murata FDV0530S-H-1R5M

Resistor selection:  
R2 = 180 kΩ  
→ 1.8 V → R1 = 470KΩ  
→ 2.5 V → R1 = 750 kΩ  
→ 3.3 V → R1 = 1 MΩ  
→ 5 V → R1 = 1.6M Ω

calc:  
R1 = (Vout/Vfb - 1) x R2  
Vfb = 500mV  
R2=R1/(Vout/Vfb - 1)

PSU for eDP lane LCD  
PSU for CPU, GPU, etc → 3.3V or 5V

TPS63020 2-3A buck boost converter  
cannot be paralleled directly! Use diode summer  
Vin: 2.5 V to 5.5 V  
Vout: 5.5V max  
DSJ Package 14-Pin VSON with Exposed Thermal Pad  
Output currents can go to 2 A in boost mode  
and to 4 A in buck mode

Texas Instruments BQ24193  
4.00 mm x 4.00 mm QFN-24 Package  
High Efficiency 4.5-A Switch Mode Charger

Input Current Limit: 100 mA, 150 mA, 500 mA,  
900 mA, 1.2 A, 1.5 A, 2 A and 3 A

- 3.9-V to 17-V Input Operating Voltage Range (12V / 4A)  
– supports all kinds of adapter with Input Voltage DPM Regulation  
– this is default buck mode
- USB OTG 5 V at 1.3 A Synchronous Boost Converter Operation at VBUS  
– this is boost mode → OTG

In Battery mode REGN stays off to minimize the quiescent current.  
Battery powers VSYS via internal BATFET switched on.  
When the DC source plugs in, the bq24193 checks the input source voltage to turn on REGN LDO and all the bias circuits. It also checks the input current limit before starts the buck converter.  
The REGN LDO supplies internal bias circuits as well as the HSFET and LSFET gate drive.  
The LDO also provides bias rail to TS1/TS2 external resistors.  
The pull-up rail of STAT can be connected to REGN as well.

PSEL, OTG pins relate to 1.5A 5V USB adapter  
If the portable device is attached to a charging port,  
it is allowed to draw up to 1.5 A (with PSEL to 0V)

The bq24193 sets input current limit through PSEL and OTG pins.  
If PSEL pin is LOW limit is 3A.  
ILIM resistor:  
265 for 2A max  
357 for 1.5A max

After the input current limit is set, the converter is enabled  
and the HSFET and LSFET (between VBUS via PMID as input  
and SW as output) VSYS and PGND start switching.  
If battery charging is disabled, BATFET turns off.  
Otherwise, BATFET stays on to charge the battery.

PSEL: Power source selection input. High indicates USB host source  
and Low indicates an adapter source.  
INT: open-drain Interrupt Output. The INT pin sends active low,  
256-μs pulse to host to report charger device status and fault.  
OTG: USB current limit selection pin during buck mode, and  
active high enable pin during boost mode.  
/PG – power good (low means OK – green led on)  
STAT – status led (high means OK – red led off)

Power Supply Unit with battery charger,  
double fixed voltage buck/ boost units  
and stereo power amplifier

Sheet: /

File: BalthazarPSU.sch

Title:

Size: A4  
KiCad E.D.A. kicad (5.1.5)-3

Date:

Rev:

Id: 1/1

Sheet: /		D
File: BalthazarPSU.sch		
<b>Title:</b>		
Size: A4	Date:	<b>Rev:</b>
KiCad E.D.A. kicad (5.1.5)-3		Id: 1/1