

# Internals

## Power

1. STANDBY\_3V3 - Always on (manual switch), supplied from MAX1837EUT33 regulator (VCC 5V -> 3.3V)
  - system MCU
    - VCC
    - USB port
    - I2C pullup
    - Reset pullup
  - RTC
  - FUSB302BMPX (USB-C with power delivery)
  - Qwiic I2C
  - Power rails latch (enables other power domains)
  - SYSTL UART 1 connector (keyboard)
  - W25Q32JVSS (Flash?)
2. VCC 5V - Supplied from charger
  - MAX1837EUT33 (4.5V - 24V -> 3.3V) provides STANDBY\_3V3
  - TPS5450DDAR when enabled via power latch provides 5V rail
  - TPS5450DDAR when enabled via power latch provides 3.3V rail
  - LM2830XQMF/NOPB when enabled via power latch provides 1.1V rail
3. USB\_VBUS - Power from USB-C port 1 (PD port)
  - VCHG Power to charger
4. +5V - Enabled via latch
  - AP22815A Power distribution switch; when enabled it powers USB\_VBUS so any connected USB device for port 1 (PD port)
  - TLV320AIC3100 Audio codec for speaker and headphones
  - USB port 2 VBUS
  - TPD12S521 HDMI port
  - SoM (CPU card)
  - TUSB8041 USB Hub
  - Keyboard USB power
  - (not connected) Internal USB port for flashing SYS MCU (Receptacle) - this is via do not populate (DNP) resistor so it is not connected to +5V
5. +3V3 - Enabled via latch
  - TXS0108EPW level shifter for modem (+1V8 -> +3V3)
  - MicroSD card slot
  - TPD12S521 HDMI port
  - IMX Reset pullup

- DAC I2C pullup (audio)
  - IMX Uart pullup
  - NCV1117ST18T3G 3.3V -> 1.8V (1V8 supply)
  - Ethernet LED
  - USB Hub
  - M2 connectors
  - M2 phone modem
  - MIPI-DSI Display connector
6. +1V1 - Enabled via latch
    - USBH\_1V1 USB Hub
  7. +1V8 - Powered from +3V3 rail by TLV1117-18 (or ON SEMI NCV1117ST18T3G)
    - MIPI-DSI Display connector
    - TXS0108EPW level shifter for modem (+1V8 -> +3V3)
    - MicroSD card slot
    - TLV320AIC3100 Audio codec for speaker and headphones

#### Summary:

- Main power from batteries/charger or USB-C comes on VCC 5V.
- Standby 3.3V power is regulated from the VCC 5V and is supplied to many components including charger (not used), system MCU, keyboard MCU (via UART connector), power latch, real time clock, USB-C PD chip.
- Power latch is used to enable other rails: 5V, 3.3V (both regulate VCC 5V) and 1.1V (from 3.3V).
- The 5V power is used many chips, USB power, SoM power, internal USB to keyboard.
- The 3.3V power may chips and is used for SoM UART and I2C audio chip pullups.
- The 1.1V is used only for USB Hub.
- There is also 1.8V supply that regulates from 3.3V for display, modem, MicroSD card and audio.

# Interfaces

## Qwiic

- Internal connector
- Powered with 3.3 standby power
- I2C to the SYS MCU (SDA0/GPIO0, SCL0/GPIO1)

#### Pinout:

1. GND
2. 3.3V (standby)
3. SDA (RP2040 SDA0/GPIO0)

#### 4. SCL (RP2040 SCL0/GPIO1)

On SDA0/SCL0 we also have two chips on charger board and PD chip FUSB302BMPX.

## SoM Serial Connector

- [Documentation](#)

They both go to the SoM card and depending on the type of card used they can be used to access boot output.

- Connector J16 - 6 pins sticking out between SYSCTL and speaker connectors
- 3.3V
- Pins left to right; assuming that the ports of the motherboard are on the right:
  1. S2 GND, connect to GND of your adapter
  2. S2 UART2\_RXD, connect to TX of your adapter
  3. S2 UART2\_TXD, connect to RX of your adapter
  4. S1 GND, connect to GND of your adapter
  5. S1 UART1\_RXD, connect to TX of your adapter
  6. S1 UART1\_TXD, connect to RX of your adapter
- Processor module card:
  - RK3588 S1 @ 1500000 baud
  - i.MX 8M Plus S2 @ 115200 baud
  - RCM4-BPi/A311D S2 @ 115200 baud

## Serial Wire Debug (SWD) on SYS MCU

On test pads:

- SWC -> TP6
- SWD -> TP5

## Internal connections

### SYS MCU

- I2C - SDA0/GPIO0, SCL0/GPIO1; 3.3V STANDBY
  - Qwiic
  - Charger board:
    - MAX17320G20+ - Battery Fuel Gauge

- MP2650 - 5A Buck or Boost Charger
  - UART1 TX/GPIO4, RX/GPIO5
    - Keyboard
  - UART2 TX/GPIO12, RX/GPIO13
    - SoM as UART3\_TXD/RXD -> UART0\_TX/RX\_M2
  - USB
    - RUD+/USB\_DP, XUD+/USB\_DM - Got to SoM but can go to internal USB-C port for direct flashing depending on USBSEL/J21 jumpers
    - This is accessible from Linux as ACM UART and can be used to see debug messages from MCU and issue commands (if support is compiled in)
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