It's just a USB2-HS hub.
It has leds and per port power switching though,

Power Input

power_input

File: power_input.kicad_sch

upstream-config-leds

File: upstream-config-leds.kicad_sch

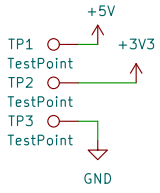
Upstream, hub config

downstream-port-power

File: downstream-port-power.kicad_sch

Downstream

H1 MountingHole
H2 MountingHole
H3 MountingHole
H4 MountingHole



github.com/karlp/hubbish
one up, one down
three double ports for test targets w/ user usb
intended for controlling libopencm3 regression test boards

Sheet: /
File: hubbish-rev2.kicad_sch

Title: Hubbish: Cascading per port controllable USB hub

Size: A4	Date: 2019-12-03	**Rev:**
KiCad E.D.A. kicad 6.0.5-2.fc34		Id: 1/4

usb A MALE for plugging directly into an upstream
+
usb b micro for cable connecting as top level

GNDPWR

PWR_FLAG

J2
USB_A male UP

VBUS_UP

UP+
UP−

U2 NUP4202

As a HUB, all shields together,
and grounded at one point.
As per SMSC AN 15.17

R1 330

C2 .1uF

J3
USB_B_Micro (up)

CFG straps
011: EEPROM
101: defaults+dyn+led=usb
100: defaults+dyn 2

R7 10k
R5 10k
R3 10k
R8 10k
R6 10k
R4 10k

D1 EEPROM
D2 default

CFG_SEL0−EE_SCL
CFG_SEL1
CFG_SEL2
CFG_SEL1_A
R10 330

Near CDD33CR (24)

C7 1uF
C8 .1uF
C9 1uF
C10 .1uF
C11 .1uF
C12 .1uF
C14 .1uF
C16 .1uF
C18 .1uF

C6 2.2uF
R13 100k
R14 100k
VBUS_DET

USB2517

VDD33CR
VDD33PLL
VDDA33
VDDA33
VDDA33
VDDA33
VDD33

VBUS_DET
USBDM_UP
USBDP_UP
SUSP_IND/LOCAL_PWR/NON_REM0
SDA/SMBDATA/NON_REM1
SCL/SMBCLK/CFG_SEL0
HS_IND/CFG_SEL1
CFG_SEL2
XTAL1/CLKIN
XTAL2
RESET
VSS

~LED_B1−/BOOST0
~LED_B2−/BOOST1
~LED_B3−/GANG_EN
~LED_B4
~LED_B5
~LED_B6
~LED_B7

~LED_A1−/PRT_SWP1
~LED_A2−/PRT_SWP2
~LED_A3−/PRT_SWP3
~LED_A4−/PRT_SWP4
~LED_A5−/PRT_SWP5
~LED_A6−/PRT_SWP6
~LED_A7−/PRT_SWP7

VDD18PLL
VDD18
RBIAS
TEST

U3A

R11 10k
LOCAL_PWR
EE_SDA

Y1 24MHz
C4 33pF
C5 33pF
R12 1M
xtal1
xtal2

R9 100k
JP1 Jumper_2_Open
C3 .1uF
RESET

Connect for EEP programming
(holds hub in reset)

Speed indicator leds,
not usb standard

LED_A1
LED_A2
LED_A3
LED_A4
LED_A5
LED_A6
LED_A7

R16 330 LA_1−3
R17 330 LA_2−4
R18 330 LA_3−1
R19 330 LA_4−2
R20 330 LA_5−DS
R21 330 LA_6−5
R22 330 LA_7−6

VDD18PLL
VDD18
C13 1uF
C15 .1uF
C17 1uF
C19 .1uF
R15 12k
RBIAS

D3 SM400x
LED_DRIVE

D4 LTST−C295KGKRKT
D5 LTST−C295KGKRKT
D6 LTST−C295KGKRKT
D7 LTST−C295KGKRKT
D8 LTST−C295KGKRKT
D9 LTST−C295KGKRKT
D10 LTST−C295KGKRKT

LA_3−1
LA_4−2
LA_1−3
LA_2−4
LA_6−5
LA_7−6
LA_5−DS

J1
Conn_01x03_Male
Programming header
for EEPROM

EE_SDA
CFG_SEL0−EE_SCL

U1
2k i2c eeprom

R2 DNP 10k
If you're using EEPROM, CFG_SEL0 covers this

C1 .1uF

Optional, pin straps cover everything but usb device serial!
(EEPROM allows port renumbering though)

TODO

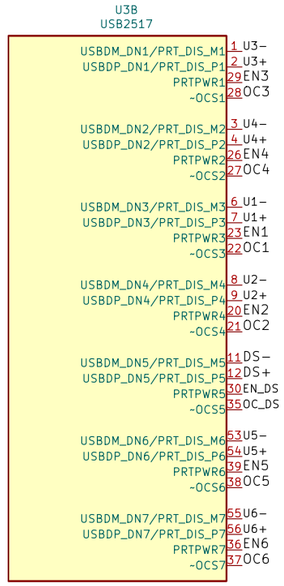
JP2
Jumper_2_Open
VBUS_UP
+5V

If you are self powered, you won't have
any power to switch for the ports.
Place a chicken jumper if you really want to do that.
I can't see how the SMSC eval board worked in self powered?!

Sheet: /upstream−config−leds/
File: upstream−config−leds.kicad_sch

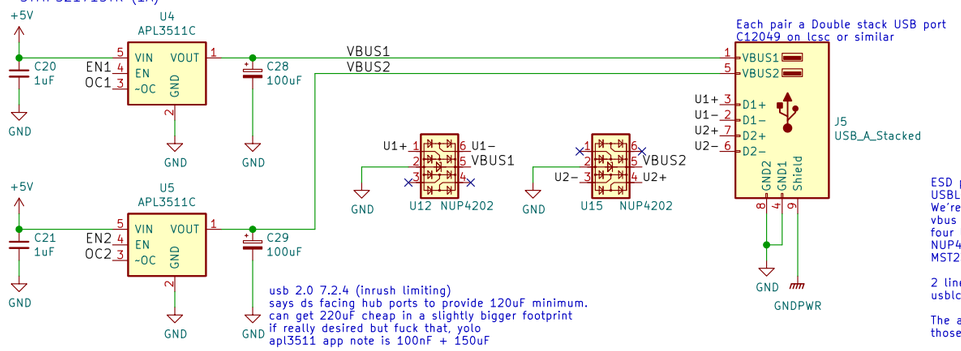
Title:

Size: A3 | Date: | **Rev:**
KiCad E.D.A. kicad 6.0.5−2.fc34 | Id: 2/4



Port numbering is wonky, but made the layout nice.
If you want nice numbers, place the eeprom and
use the port map registers.

APL3511C is 1A, if you want more power, APL3511A is 2A limited
Pin Compatible:
Diodes AP22811AW5 (2A) (W5 is case, sot23, A is active high)
Diodes AP2171DWG and AP2171WG (1A) (W is case)
STMPS2171STR (1A)



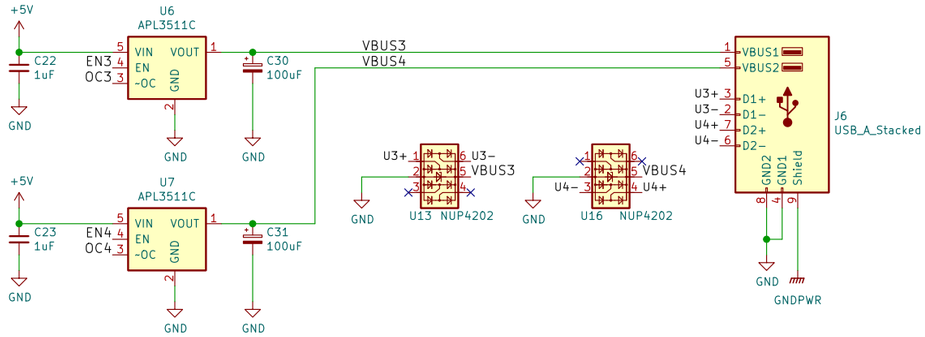
Each pair a Double stack USB port
C12049 on lcsc or similar

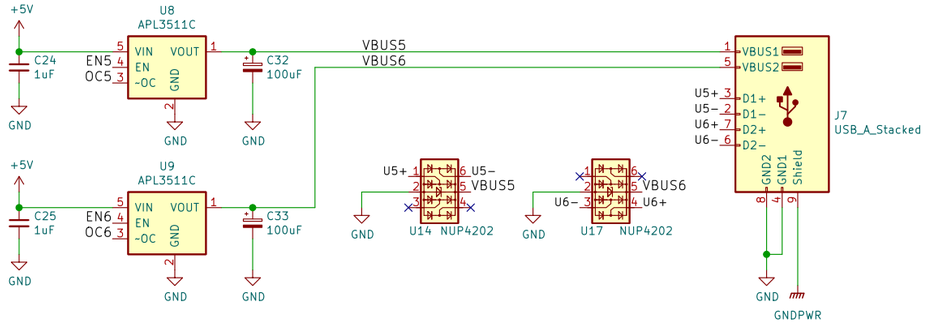
usb 2.0 7.2.4 (inrush limiting)
says ds facing hub ports to provide 120uF minimum.
can get 220uF cheap in a slightly bigger footprint
If really desired but fuck that, yolo
apl3511 app note is 100nF + 150uF

ESD protection, _per port_
USBLC6-2 is "perfect" but there's cheaper 4 line variants.
We're going to "waste" the four line variants, so we can have separate
vbus though, This is cheaper and easy routing.
four line versions.
NUP4202 or USBLC6-4xx or CS0809 (western)
MST236A05[45]xx or SESRV05-4 or CEST236LC5 or SRV05-4 (eastern)

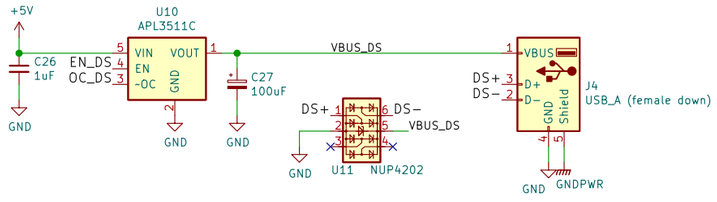
2 line version
usblc6-2xx (western)

The alternative 2 line versions are prtr5v02u and nup2202 but
those require a different pcb layout, with no -where near as many interchangeable pieces





Downstream port for cascading to another hub
Power switching as well, because why not!



Sheet: /downstream-port-power/		
File: downstream-port-power.kicad_sch		
Title:		
Size: A3	Date:	**Rev:**
KiCad E.D.A. kicad 6.0.5-2.fc34		Id: 3/4

6-24V DC input.
6 DS ports * 1A * 5V = ~30W supply
Regulated 5V output is provided back out on pins.
If you're adventurous you can supply there instead...

Vds >= 30V, Imax >= 8A or so

Q1
Si4435

PWR_RAW

PWR_FLAG

+VDC

D11
SMF24A

D12
BZT52B12

PolProtG

R23
10k

Iz is 5mA, to be "12V" in spec, but Vr is 8V,
with only 0.1uA, So for _this_ purpose, of preventing
the Vgs limit of 20V being exceeded, a large resistor
is fine.
15V, 200uA => 15k
24V, 200uA => 60k
10k is probably just fine...

Conn_01x06
J8

5.08mm pluggable
WJ2EDGRC-5.08-6P or
Phoenix MSTBA
fatter than needed, but good for
fat fingers and low v drop

+5V

D13
DF2S6.2FS,L3M

We want a low breakdown voltage here,
"normal" 5V tvs diodes will protect too late
Must breakdown at ~6V to even have a _chance_

Need as much as 460mA at 3.3V for 7xHS ports enabled!

U19
SE5120ST33

C41
10uF

C44
10uF

AP1509/XL1509 are "sexy"
but just use a SOT223-standard linear.
(but not xxx1117! too much power waste!)

U18
SiC437AED

jumper to disable?

EN
VIN
VIN
VDD
VDRV
GL
MODE2
MODE1
PGOOD
VOUT
SW
FB
BOOT
PHASE
AGND
AGND
PGND
PGND

C34
22uF/30V+

C35
22uF/30V+

C36
.1uF

C37
1uF

C38
4.7uF

R24
DNP

R26
DNP

R25
100k

R27
499k

L1
1.5uH

R29
22k

R30
3k

C39
.1uF

R28
2.2

C40
100uF

C42
100uF

C43
22uF/6.3V

C45
22uF/6.3V

Yes, no net tie.
See the datasheet, they want a single pour connecting
them, even though they talk about splitting the ground
plane on inner/lower layers for isolation...

mode1: 100k for 500kHz, 200k for 750kHz, 500k for 1MHz
mode2: 100k for OCP at 9.7A, 200k for OCP at 14A, 500k for OCP at 18A.

Mode1 to ground: skip, to vdd:forced ccm
Mode2 to ground: Softstart=3ms, to vdd, 6ms

Conclusion: default SS 3ms, skip mode, 1MHz, OCP at 9.7A

Sheet: /power_input/
File: power_input.kicad_sch

Title:

Size: A4 | Date: | **Rev:**
KiCad E.D.A. kicad 6.0.5-2.fc34 | Id: 4/4