U1 — USB_CONNEC

Pin	Name
1	VCC
2	D-
3	D+
4	GND
5	GND
6	GND

Sheet: usb_hub

USB_HOST_5V
USB_HOST_DM
USB_HOST_DP

USB_SL1_5V
USB_SL1_DP
USB_SL1_DM

USB_SL2_5V
USB_SL2_DP
USB_SL2_DM

USB_SL3_5V
USB_SL3_DP
USB_SL3_DM

USB_SL4_5V
USB_SL4_DP
USB_SL4_DM

USB_SL1_nOVR
USB_SL2_nOVR
USB_SL3_nOVR
USB_SL4_nOVR

MON_DIG5
MON_DIG6
MON_DIG7

File: usb_hub.sch

Sheet: monitoring

VBUS
D+
D-

File: monitoring.sch

USB2_SL1_5V
USB2_SL1_DP
USB2_SL1_DM

MON_DIG1
MON_DIG2
MON_DIG3
MON_DIG4

Sheet: usb_hub2

USB1_SL1_5V
USB1_SL1_DP
USB1_SL1_DM

USB_SL2_5V
USB_SL2_DP
USB_SL2_DM
USB1_SL2_5V
USB1_SL2_DP
USB1_SL2_DM

USB_SL3_5V
USB_SL3_DP
USB_SL3_DM
USB1_SL3_5V
USB1_SL3_DP
USB1_SL3_DM

USB_SL4_5V
USB_SL4_DP
USB_SL4_DM
USB1_SL4_5V
USB1_SL4_DP
USB1_SL4_DM

USB_SL1_nOVR
USB_SL2_nOVR
USB_SL3_nOVR
USB_SL4_nOVR

USB_HOST_5V
USB_HOST_DP
USB_HOST_DM

File: usb_hub.sch

U4 — R-535.0PA

Pin	Name		Pin	Name
2	VIN		9	VOUT
3	VIN		10	VOUT
4	VIN		11	VOUT(AUTOSENSE)
5	GND		12	VOUT-ADJ
6	GND		1	ON/OFF
7	GND		8	GND

C1 47uF   C2 100nF   D1 12V TVS   C3 100uF

MON_DIG12
MON_DIG11
MON_DIG10
MON_DIG9
MON_DIG8

EXT_SYNC1
EXT_SYNC2
EXT_SYNC3
EXT_SYNC4
CLK_RQ_SIG

R1 2k R2 2k R3 2k R4 2k R5 2k R6 2k

+3.3V

D2 3.3V TVS   D3 3.3V TVS   D4 3.3V TVS   D5 3.3V TVS   D6 3.3V TVS   D7 3.3V TVS

U5 — MAX1685

C4 100nF

Pin	Name		Pin	Name
3	IN		13	LX
2	AIN		14	LX
15	SHDN		12	BOOT
4	CVL		10	ILIM/SS
11	STBY		8	CC
9	SYNC/PWM		6	REF
7	FB			
16	PGND			
5	AGND			

L1 10uH   +3.3V

C11 47uF   C5 100nF   C6 1uF   D7 MBRS340T3G   C7 100nF   C8 10nF   C9 100nF   C10 47uF

SLOT 1 — U8 (TE-8-1393640-3)
USB1_SL4_DM
USB1_SL4_DP
nCLK_10M
CLK_10M
USB1_SL4_5V
+12V
EXT_SYNC1
EXT_SYNC2
EXT_SYNC3
EXT_SYNC4
CLK_RQ_SIG

SLOT 2 — U7 (TE-8-1393640-3)
USB1_SL3_DM
USB1_SL3_DP
nCLK_10M
CLK_10M
USB1_SL3_5V
+12V
EXT_SYNC1
EXT_SYNC2
EXT_SYNC3
EXT_SYNC4
CLK_RQ_SIG

SLOT 3 — U3 (TE-8-1393640-3)
USB1_SL2_DM
USB1_SL2_DP
nCLK_10M
CLK_10M
USB1_SL2_5V
+12V
EXT_SYNC1
EXT_SYNC2
EXT_SYNC3
EXT_SYNC4
CLK_RQ_SIG

SLOT 4 — U2 (TE-8-1393640-3)
USB1_SL1_DM
USB1_SL1_DP
nCLK_10M
CLK_10M
USB1_SL1_5V
+12V
EXT_SYNC1
EXT_SYNC2
EXT_SYNC3
EXT_SYNC4
CLK_RQ_SIG

SLOT 5 — U6 (TE-8-1393640-3)
USB2_SL1_DM
USB2_SL1_DP
nCLK_10M
CLK_10M
USB2_SL1_5V
+12V
EXT_SYNC1
EXT_SYNC2
EXT_SYNC3
EXT_SYNC4
CLK_RQ_SIG

J2 — USB_CONNEC

+5V   C53 100uF

Pin	Name
1	VCC
2	D-
3	D+
4	GND
5	GND
6	GND

U25 — CUBIEBOARD
1, 2, 3, 4

J1 — MOLEX_0015244745
VCC 1, 2, 3, 4

C12 100nF   C13 100nF   +3.3V

U9 — FOX924B
Pin	Name
4	VCC	OUT	3
2	GND	NC	1

U10 — SN65LVDM176DGK
Pin	Name		Pin	Name
3	DE	Vcc	8
4	D	A	6
2	R	B	7
1	nRE	GND	5

R32 100

CLK_10M
nCLK_10M
CLK_RQ_SIG
CLK_10M
nCLK_10M

J1001 HOLE J1002 HOLE J1003 HOLE J1004 HOLE J1005 HOLE J1006 HOLE J1007 HOLE J1008 HOLE J1009 HOLE J1010 HOLE J1011 HOLE J1012 HOLE J1013 HOLE J1014 HOLE J1015 HOLE J1016 HOLE J1017 HOLE J1018 HOLE J1019 HOLE J1020 HOLE J1021 HOLE J1022 SLIDER SLIDER

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File: small_rack.sch
Sheet: /
Title: Small Rack 5 slots
Size: A3   Date: 23 oct 2013   Rev: 1.0
KiCad E.D.A. eeschema (2013-07-07 BZR 4022)-stable   Id: 1/4

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This is a KiCad electronic schematic diagram titled "Small Rack 5 slots" (usb_hub.sch), showing a USB hub circuit built around a CY7C65631-56LTXC USB hub controller (U12), a TPS2044BDR power switch (U11), and multiple USBLC6-2 ESD protection devices (U13-U17).

Main components and labels visible:

- **U12** CY7C65631-56LTXC — USB hub controller with pins:
  - 45 SELFPWR, 46 RESET, 35 nGREEN[1], 36 nAMBER[1], 37 nGREEN[2], 38 nAMBER[2], 41 nGREEN[3], 42 nAMBER[3], 43 nGREEN[4], 44 nAMBER[4], 48 SPI_CLK, 49 SPI_SD, 25 SPI_CS, 26 VBUSPOWER, 18 D+, 17 D-, 21 XIN, 22 XOUT
  - VCC pins: 3, 7, 11, 15, 19, 23, 27, 33, 39, 55
  - 29 nPWR[1], 31 nPWR[2], 54 nPWR[3], 52 nPWR[4], 30 nOVR[1], 32 nOVR[2], 53 nOVR[3], 51 nOVR[4]
  - 14 DD+[1], 13 DD-[1], 10 DD+[2], 9 DD-[2], 6 DD+[3], 5 DD-[3], 2 DD+[4], 1 DD-[4]
  - GND pins: 4, 8, 12, 16, 20, 24, 28, 34, 40, 47, 50, 56, 57, EP

- **U11** TPS2044BDR — power switch:
  - 3 nEN1, 4 nEN2, 7 nEN3, 8 nEN4, 16 nOC1, 13 nOC2, 12 nOC3, 9 nOC4
  - 2 IN1, 6 IN2, 15 OUT1, 14 OUT2, 11 OUT3, 10 OUT4, 5 GND, 1 GND

- **U13, U14, U16, U17** USBLC6-2 — each with GND, VBUS, I/O1, I/O2
- **U15** USBLC6-2 — with GND, VBUS, I/O1, I/O2

- **U13** → USB_SL1_DP, USB_SL1_DM
- **U14** → USB_SL2_DP, USB_SL2_DM
- **U16** → USB_SL3_DP, USB_SL3_DM
- **U17** → USB_SL4_DP, USB_SL4_DM

Power nets: +3.3V, +5V

Resistors: R6 100k, R7 15k, R8 15k, R9 15k, R10 15k, R11 15k, R12 15k, R13 15k, R14 15k, R15 15k, R16 15k, R17 15k, R18 100k

Capacitors: C14 100nF, C39 100nF, C15 100nF, C16 2.2uF, C17 12pF, C18 12pF, C46 100nF, C21 100nF, C22 100nF, C23 100nF, C51 100nF, C19 100uF, C20 10nF, C24 100uF, C25 10nF, C26 100uF, C27 10nF, C28 100uF, C29 10nF

Crystal: X1 24MHz

Signal labels: USB_HOST_5V, USB_HOST_DM, USB_HOST_DP, USB_5V_1, USB_5V_2, USB_5V_3, USB_5V_4, USB_SL1_5V, USB_SL2_5V, USB_SL3_5V, USB_SL4_5V, USB_SL1_nOVR, USB_SL2_nOVR, USB_SL3_nOVR, USB_SL4_nOVR

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File: usb_hub.sch
Sheet: /usb_hub2/
Title: Small Rack 5 slots
Size: A4   Date: 23 oct 2013   **Rev: 1.0**
KiCad E.D.A. eeschema (2013-07-07 BZR 4022)-stable   Id: 2/4

U19 — CY7C65631-56LTXC

Left side pins:
- 45 SELFPWR
- 46 RESET
- 35 nGREEN[1]
- 36 nAMBER[1]
- 37 nGREEN[2]
- 38 nAMBER[2]
- 41 nGREEN[3]
- 42 nAMBER[3]
- 43 nGREEN[4]
- 44 nAMBER[4]
- 48 SPI_CLK
- 49 SPI_SD
- 25 SPI_CS
- 26 VBUSPOWER
- 18 D+
- 17 D−
- 21 XIN
- 22 XOUT

Top pins: VCC (3, 7, 11, 15, 19, 23, 27, 33, 39, 55)

Bottom pins: GND (4, 8, 12, 16, 20, 24, 28, 34, 40, 47, 50, 56, 57) EP

Right side pins:
- 29 nPWR[1]
- 31 nPWR[2]
- 54 nPWR[3]
- 52 nPWR[4]
- 30 nOVR[1]
- 32 nOVR[2]
- 53 nOVR[3]
- 51 nOVR[4]
- 14 DD+[1]
- 13 DD−[1]
- 10 DD+[2]
- 9 DD−[2]
- 6 DD+[3]
- 5 DD−[3]
- 2 DD+[4]
- 1 DD−[4]

U18 TPS2044BDR
- 3 nEN1
- 4 nEN2
- 7 nEN3
- 8 nEN4
- 16 nOC1
- 13 nOC2
- 12 nOC3
- 9 nOC4
- 2 IN1
- 6 IN2
- 15 OUT1
- 14 OUT2
- 11 OUT3
- 10 OUT4
- 5 GND
- 1 GND

Nets: USB_5V_1, USB_5V_2, USB_5V_3, USB_5V_4
USB_SL1_5V, USB_SL2_5V, USB_SL3_5V, USB_SL4_5V

U20 USBLC6−2
GND VBUS, I/O1 I/O1, I/O2 I/O2 — USB_SL1_DP, USB_SL1_DM

U21 USBLC6−2
GND VBUS, I/O1 I/O1, I/O2 I/O2 — USB_SL2_DP, USB_SL2_DM

U23 USBLC6−2
GND VBUS, I/O1 I/O1, I/O2 I/O2 — USB_SL3_DP, USB_SL3_DM

U24 USBLC6−2
GND VBUS, I/O1 I/O1, I/O2 I/O2 — USB_SL4_DP, USB_SL4_DM

U22 USBLC6−2
GND VBUS, I/O1 I/O1, I/O2 I/O2
USB_HOST_5V, USB_HOST_DM, USB_HOST_DP

Resistors: R19 100k, R20 15k, R29 15k, R30 15k, R31 100k
R21 15k, R22 15k, R23 15k, R24 15k, R25 15k, R26 15k, R27 15k, R28 15k

Capacitors: C30 100nF, C48 100nF, C31 100nF
C32 2.2uF, C33 12pF, C34 12pF
C50 100nF, C37 100nF, C38 100nF, C47 100nF, C52 100nF
C35 100uF, C36 10nF, C40 100uF, C41 10nF
C42 100uF, C43 10nF, C44 100uF, C45 10nF

Crystal: X2 24MHz

Power: +3.3V, +5V

Nets: USB_SL1_nOVR, USB_SL2_nOVR, USB_SL3_nOVR, USB_SL4_nOVR

USB_5V_1, USB_5V_2, USB_5V_3, USB_5V_4 (decoupling)

Power supply rails

+12V +5V +3.3V +5VP

R34 14k R35 30k R36 10k R50 30k

R37 2k R38 30k R39 10k R51 10k

MON_AN4
MON_AN6
MON_AN5
MON_AN1

Digital monitor lines

MON_DIG1	MON_PB4
MON_DIG2	MON_AN10
MON_DIG3	MON_AN9
MON_DIG4	MON_PD4
MON_DIG5	MON_AN7
MON_DIG6	MON_PC7
MON_DIG7	MON_PC6
MON_DIG8	MON_PD5
MON_DIG9	MON_PD3
MON_DIG10	MON_PD2
MON_DIG11	MON_PB0
MON_DIG12	MON_PE6
	MON_PB2
	MON_PB1

R46 2k R47 2k
LED D9 LED D10

U28 ATMEGA32U4

Pin	Left signal	Function
18	I2C_SCL	PD0_(OC0B/SCL/INT0)
19	I2C_SDA	PD1_(SDA/INT1)
20	MON_PD2	PD2_(RXD1/INT2)
21	MON_PD3	PD3_(TXD1/INT3)
25	MON_PD4	PD4_(ICP1/ADC8)
22	MON_PD5	PD5_(XCK1/nCTS)
26	MON_AN9	PD6_(T1/nOC4D/ADC9)
27	MON_AN10	PD7_(T0/OC4D/ADC10)
41	MON_AN0	PF0_(ADC0)
40	MON_AN1	PF1_(ADC1)
39	MON_AN4	PF4_(ADC4/TCK)
38	MON_AN5	PF5_(ADC5/TMS)
37	MON_AN6	PF6_(ADC6/TDO)
36	MON_AN7	PF7_(ADC7/TDI)
7	VBUSD	VBus
4	D+	D+
3	D-	D-

R44 22
R45 22

Top power pins: 2 UVcc, 14 Vcc, 34 Vcc, 24 AVcc, 44 AVcc (+5VP)

FB1 FILTER
C56 100nF C57 100nF
R40 4k7 R41 4k7 (+3.3VP)

Pin	Right signal	Function
13	nRESET	
33	PE2_(nHWB)	
8	(SS/PCINT0)_PB0	MON_PB0
9	(PCINT1/SCLK)_PB1	MON_PB1
10	(PDI/PCINT2/MOSI)_PB2	MON_PB2
11	(PD0/PCINT3/MISO)_PB3	MON_PB3
28	(PCINT4/ADC11)_PB4	MON_PB4
29	(PCINT5/OC1A/nOC4B/ADC12)_PB5	MON_PB5
30	(PCINT6/OC1B/OC4B/ADC13)_PB6	MON_PB6
12	(PCINT7/OC0A/OC1C/nRTS)_PB7	MON_PB7
31	(OC3A/nOC4A)_PC6	MON_PC6
32	(ICP3/CLK0/OC4A)_PC7	MON_PC7
1	(INT.6/AIN0)_PE6	MON_PE6
17	XTAL1	
16	XTAL2	

R42 30k R43 30k (+5VP)
K1 CONN_3 1 2 3

X3 16MHz
C58 18pF C59 18pF

Bottom pins: 5 UGnd, 15 GND, 23 GND, 35 GND, 43 GND, 42 UCap, AREF (+3.3V6)

C60 100nF C61 100nF C62 100nF (+5VP)
C63 1uF C64 100nF (+3.3VP)

U26 NCP1117

+12V 3 IN OUT 2 +5VP R33 4k7
1 GND HP 4
C49 10uF C54 10uF
LED D8

U27 LM73-0

+3.3VP
C55 100nF
3	VDD	SMBCLK	4 → I2C_SCL
1	ADDR	SMBDAT	6 → I2C_SDA
2	GND	nALERT	5

Monitoring system (notes box)

Monitoring system
Input digital:
  - 6x over current (USB lines)
  - 4x synchronization lines
  - 1x clock request signal
Input analog:
  - 12V current sense
  - +12V
  - +5V
  - +5V LDO
  - +3.3V
Output digital:
  - 3.3V ok
  - 5V ok
On connector:
  - RGB LED for status
  - R LED for over temp

P1 CONN_8

+3.3VP
Pin	Signal
1	
2	
3	I2C_SCL
4	I2C_SDA
5	MON_PB5
6	MON_PB6
7	MON_PB7
8	MON_PB3

C67 100nF (+3.3VP)

U29 ACS713

+5VP +12V VCC
C65 100nF
1	IP+	VCC	8
2	IP+	Viout	7
3	IP-	FILTER	
4	IP-	GND	5

R48 10k → MON_AN0
R49 10k
C66 100nF

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