Lab Power Supply Control Board
Rev 10

U5A — STM32F103RCT6, 48K Ram, 497-9033-ND, stm32f103rbt6

Pin connections (left side): PC13 (2), PC14 (3), PC15 (4), PD0 (5) 8MH_XTAL_IN, PD1 (6), NRST (7), PC0 (8), PC1 (9), PC2 (10), PC3 (11), PA0 (14) VIN_CHK, PA1 (15) I_Sample, PA2 (16) UART_TX_2, PA3 (17) UART_RX_2, PA4 (20) SPI_NSS_1, PA5 (21) SPI_SCK_1, PA6 (22), PA7 (23) SPI_MOSI_1, PC4 (24), PC5 (25), PB0 (26) /INT, PB1 (27) OUTPUT_LED, PB2/BOOT1 (28) D/C_OLED, PB10 (29) /RST_OLED, PB11 (30)

Pin connections (right side): PB9 (62) /RST_MCP23017, PB8 (61) /CAP_T_INT, BOOT0 (60), PB7 (59) I2C_SDA, PB6 (58) I2C_SCL, PB5 (57), PB4 (56) Spare2, PB3 (55) Spare1, PD2 (54), PC12 (53) DEBUG_LED, PC11 (52) OC_LED, PC10 (51), PA15 (50), PA14/SWCLK (49) TCK/SWDCLK, PA13/SWDIO (46) TMS/SWDIO, PA12 (45) USBDP, PA11 (44) USBDM, PA10 (43), PA9 (42), PA8 (41), PC9 (40), PC8 (39), PC7 (38), PC6 (37), PB15 (36) MEM2_LED, PB14 (35) MEM1_LED, PB13 (34) Current_Limit, PB12 (33) OUTPUT_ENB

U5B — stm32f103rbt6

Left pins: VBAT (1), VDDA (13), VDD (19), VDD (32), VDD (48), VDD (64)
Right pins: VSSA (12), VSS (63), VSS (47), VSS (31), VSS (18)

FB2 — BLM18RK601SN1D

Caps near U5B: C17 10µF 0603 16V, C18 0.1µF 0603 50V, C22 10µF 0603 16V, C23 0603 0.1µF 50V, C24 0603 0.1µF 50V, C25 0603 0.1µF 50V, C26 0603 0.1µF 50V

4.7uF must be near VDD_3, pin 64

LEDs (top left)
- R32 0603 330 → LED3 → OC_LED
- R26 0603 330 → LED2 → DEBUG_LED → T2

3V3 supplies

R25 100K 0603 → BOOT1

X1 — XC3029CT-ND, 8.0000MHZ
- VDD (4), Out (3) 8MH_XTAL_IN, Tri-state (1), GND (2)
- OSC_OUT
- C19 0603 0.1µF 50V
- GND

3V3

UART_TX, UART_RX

NRST

BOOT2 — R34 100K 0603

CN5 — Mini-USB RA Type B, A107788-ND
- VBUS (1), D- (2), D+ (3), NC (4), GND (5)
- R35 20 0603 → USBDM
- R36 20 0603 → USBDP
- C29 33pF 50V 0603, C30 33pF 50V 0603
- GND

High speed pull R
R47 0603 1.5k
3V3

JTAG / Debug
- R29 100 0603 TCK/SWDCLK
- R30 100 0603 TMS/SWDIO

P2 — jtag_debug
- Pins 1-10
- C21 0603 0.1µF 50V
- NRST
- GND
- 3V3
- R31 20k 0603 → UP_RST
- C28 1.0µF 0603 10V
- GND

U6 — TPS3808G33, PWR_ON_RESET
- /RST (1), GND (2), /MR (3), VDD (6), SENSE (5), CT (4)
- NRST
- R38 51K 0603
- C33 0603 0.1µF 50V
- 3V3
- /MR
- GND

LED indicators
- MEM1_LED R3 1.0k 0603 → LED4 → GND
- MEM2_LED R4 1.0k 0603 → LED5 → GND
- OUTPUT_LED R13 1.0k 0603 → LED6 → GND

U8 — AT42QT1070, I2C_Adr: 0x1B
- VDD (1), MODE (2), SDA (3), /RESET (4), /Change (5), SCL (6), KEY6 (7)
- VSS (14), KEY0 (13), KEY1 (12), KEY2 (11), KEY3 (10), KEY4 (9), KEY5 (8)
- R54 5.1k 0603
- C43 0.1µF 50V
- 3V3
- GND
- I2C_SDA, I2C_SCL, /CAP_T_INT

- R51 0603 5.1k → CS2 → SENSE/GND → **MEM1** — Cap_Sense_Pad
- R52 0603 5.1k → CS3 → SENSE/GND → **MEM2** — Cap_Sense_Pad
- R53 0603 5.1k → CS4 → SENSE/GND → **OUTPUT_ENB** — Cap_Sense_Pad
- GND

ALTIUM

Lab Power Supply Control Board
Rev 10

OLED Display

U2 — 256X64 OLED Graphic — NHD-3.12-25664UCxx

Pin	Signal
1	VSS
2	VDD
3	NC
4	D/C — D/C_OLED
5	R/W
6	E
7	D0/SCK — SPI_SCK
8	D1/SDIN — SPI_MOSI_1
9	D2
10	D3
11	D4
12	D5
13	D6
14	D7
15	NC
16	/RES — /RST_OLED
17	/CS — SPI_NSS_1
18	NC
19	BS1
20	BS0

3V3 200 ma Max
C4 0.1µF 50V C2 10uF 16V C3 10uF 16V 0603
R48 5.1k 0603
GND

Regulator Brd Connector

CN1 — Header 8X2A

Spare2	1	9	I2C_SCL
5V0 — Spare1	2	10	I2C_SDA
I_Sample	3	11	Current_Limit
	4	12	OUTPUT_ENB
+VIN_SW	5	13	+VIN_SW
	6	14	
	7	15	
	8	16	

GND

Voltage Adj

3V3
R5 10k 0603 R7 10k 0603 R6 10k 0603
S1
R41 10k 0603 V_ENC_A
R43 10k 0603 V_ENC_B
R42 10k 0603 V_ENC_SW
A C B F2 S2 / F1 S1
rotary encoder
C36 0.1µF 50V 0603 C37 0.1µF 50V 0603
C40 0.1µF 50V 0603
GND

U1 — mcp23017

Pin	Signal		Pin	Signal
1	GPB0	GPA7	28	
2	GPB1	GPA6	27	CAP_T_INT
3	GPB2	GPA5	26	I_ENC_SW
4	GPB3	GPA4	25	I_ENC_B
5	GPB4	GPA3	24	I_ENC_A
6	GPB5	GPA2	23	V_ENC_SW
7	GPB6	GPA1	22	V_ENC_B
8	GPB7	GPA0	21	V_ENC_A
9	VDD	INTA	20	/INT
10	VSS	INTB	19	
11	NC	/RST	18	/RST_MCP23017
12	SCL	A2	17	
13	SDA	A1	16	
14	NC	A0	15	

3V3
R8 5.1k 0603 R11 5.1k 0603
C1 0.1µF 50V
R9 5.1k 0603 R10 5.1k 0603
I2C_SCL   I2C_Adr: 0x??
I2C_SDA
GND

Current Adj

3V3
R14 10K 0603 R16 10K 0603 R15 10k 0603
S5
R27 10K 0603 I_ENC_A
R28 10K 0603 I_ENC_B
R45 10k 0603 I_ENC_SW
A C B F2 S2 / F1 S1
rotary encoder
C27 0.1µF 50V 0603 C31 0.1µF 50V 0603
C39 0.1µF 50V 0603
GND

Power Connector

100k R17 0603
CN4 — Header 5X2A

	1	6
	2	7
	3	8
	4	9
	5	10

J1 Jack banana_jack1   J2 Jack banana_jack1
50V C6 0.1µF   C5 10µF 0603 16V
GND

CN2
PJ-050AH 24VDC 5A
F1 3 AMPS?? 2920L500/16MR 507-1489-1-ND
R46 51k 0603
Q1 DMP3099L-7 30V, 3A DMP3099L-7DICT-ND
C7 10µF 25V 0603
NFZ2MSM301SN10L FB1 300 Ohm @ 100MHz, 0806 490-14481-1-ND
C11 0.1µF 50V 0603
+VIN
C8 0.1µF 50V 0603 C9 10µF 25V 0603
Q2 DMP3099L-7 30V, 3A
R1 5.1k 0603
R23 10k 0603
+VIN_SW
C12 10µF 25V 0603 C13 0.1µF 50V 0603
VIN_CHK
+VIN_SW
U10 TPS62173DSGT 296-29865-1-ND

Pin	Signal
2	VIN SW 7
3	EN VOS 6
	PG 8
9	PAD FB 5
4	AGND
	PGND

L1 2.2uH 587-3226-1-ND
R18 100K 0603
C10 22uF
5V0
C35 0.1µF 50V 0603
U4 LD1117S33TR 497-1242-1-ND
VIN VOUT TAB / GND
C14 10µF 16V 0603
3V3
C15 0.1µF 50V 0603 R21 1K 0603 3V3
LED1 G
GND

+VIN
U3 TPS7B6933QDCYRQ1 296-43891-1-ND
VIN VOUT / GND PAD
C34 0.1µF 50V 0603
C16 10µF 16V 0603 C41 0.1µF 50V 0603
GND GND

PWR On Touch Switch
U7 AT42QT1012
OUT TIME / VSS VDD / SNSK SNS
R49 0603 1M
R2 10k 0603
Q3 MMBT3904
R12 27k 0603
R37 1k 0603
C32 10µF 50V 0603
C42 6.8nF 50V 0603
R50 5.1k 0603
CS1 SENSE / GND Cap_Sense_Pad
GND

GND1 GND
GND2 GND
GND3 GND

20

1

U2

Top View

T2

NewHaven Display NHD-3.12-25664UCxx

S1

LED3

Current Limit

Voltage

S5

+

J2

Current

J1

LED1

LED5

LED4

LED6

CS1

CS3

CS2

CS4

ON/OFF

Mem2

Mem1

Output

GND2

GND3

Description	Designator	LibRef	Manufacturer	Manufacturer	Quantity	Supplier 1	Supplier Curr	Supplier Ord	Supplier Part	Supplier Stoc	Supplier
Test Point WI	BOOT1, BOO	TestPoint-PC-W			2	Digi-Key			36-5002-ND		
0.1uF 0603 5	C1, C4, C6, C	CAP CER 0.1UF 50V 10% X7R 0603			27	Digi-Key			399-5089-1-ND, 311-1343-1-ND		
10UF 0603 16	C2, C3, C5, C	CAP CER 10UF 16V 20% X5R 0603			10	Digi-Key			490-7201-1-ND		
CAP CER 22U	C10	CMP-001-0737-02			1						
1uF 0603 10V	C28	CAP CER 1UF 10V 10% X5R 0603			1	Digi-Key			399-3118-1-ND		
CAP CER 33P	C29, C30	CMP-007-0143-08			2						
Header, 8-Pin	CN1	CMP-001-0325-01			1						
Power Barrel	CN2	CMP-001-0507-01			1						
Header, 5-Pin	CN4	CMP-001-0310-01			1						
Mini-USB RA	CN5	CMP-001-0449-01			1						
	CS1, CS2, CS	Cap_Sense_Pad			4						
PTC RESET F	F1	CMP-001-0852-01			1						
40 OHM 0805	FB1	FERRITE 40 OHM 1.5A 0805			1	Digi-Key			240-2389-1-ND		
FERRITE 120	FB2	FERRITE BEAD 120 OHM 0603 1LN			1	Digi-Key			445-2170-1-ND		
	J1, J2	banana_jack1			2						
FIXED IND 2.	L1	CMP-001-0772-02			1						
0603 SMD LE	LED1, LED2,	0603 LED			6						
	P2	jtag_debug			1						
DMP3099L-7	Q1, Q2	DMP3099L-7			2	Digi-Key			DMP3099L-7DICT-ND		
MMBT3904 N	Q3	MMBT3904			1	Digi-Key			MMBT3904WT1GOSCT-ND		
4.7K 0603	R1, R2, R5, R	RES 4.7K OHM 1/10W 5% 0603 SMD			23	Digi-Key			P4.7KGCT-ND		
1.0K 0603	R3, R4, R13,	RES 1K OHM 1% 1/10W 0603			10	Digi-Key			RMCF0603FT1K00CT-ND		
100K 0603	R18, R25, R3	RES 100K OHM 1% 1/10W 0603			3	Digi-Key			311-100KHRCT-ND		
100 0603	R29, R30	RES 100 OHM 1% 1/10W 0603 2017			2	Digi-Key			541-2975-1-ND		
10K 0603	R31	RES 10K OHM 1/10W 1% 0603 SMD			1	Digi-Key			P10.0KHCT-ND		
Res Thick Film	R35, R36	CMP-001-0711-04			2						
RES 1.54K OH	R47	CMP-007-0337-12			1						
ERJ3EKF510	R51, R52, R5	CMP-001-0749-04			4						
	S1, S5	rotary encoder			2						
I2C 16 bit Exp	U1	mcp23017			1						
	U2	OLED Display			1						
TPS7B6933Q	U3	R-78E5.0-0.5			1						
3.3 volt fixed	U4	LD1117S33			1	Digi-Key			497-1242-1-ND		
stm32f103rbt	U5	stm32f103rbt6			1						
TPS3808G33	U6	TPS3808G33			1						