Table of Content

PAGE	COMPONENT/ FUNCTION
001	INDEX
002	BLOCK_DIAGRAM
003	EFUSE_AND_REGULATOR
004	COMMUNICATION
005	CURRENT_SOURCE
006	SWITCHING

NANORACK LASER

Schematic V1.0.0

Space CiinTech

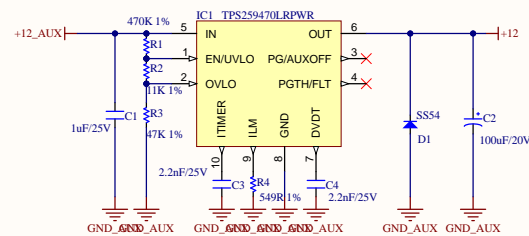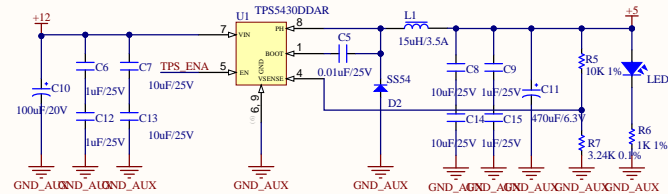|	
Project: BEE-PC1	Sub-system: NANORACK_LASER.PrjPcb
Design by: Hung Nguyen D.	Sheet title: INDEX.SchDoc
Checked by: Bao Bui Q.	Document No: 1
Approved by: Vu Pham	Revision: V1.0.0

Sheet 1 of 7
Size: A3
Date: 10/3/2024

Block diagram:

- 12V_AUX, GND_AUX, VBUS, GND_BUS, I2C_LASER (input block)
- I2C ISOLATOR — ADUM1250 (VBUS, 5V)
- EFUSE — TPS259470
- Regulator 5V — TPS5430DDAR
- 32x LD/PD
- 2 x I2C 16bit expander — MCP23017T-E/SS
- ADC — ADS1015BQDGSRQ1
- DAC — MCP47CVB22-E/UN
- I2C 4bit expander — PCA9536
- Matrix FET (PNP) — AO3401
- OPAMP — OPA340
- FET (NPN) — AO3400
- 1 x ADC: Current Monitor
- LATCH

EFUSE

IC1 TPS259470LRPWR

+12_AUX
470K 1%
R1
R2
R3
47K 1%
11K 1%
C1
1uF/25V
C3
2.2nF/25V
R4
549R 1%
C4
2.2nF/25V

IN — OUT
EN/UVLO — PG/AUXOFF
OVLO — PGTH/FLT
ITIMER ILM GND DVDT

+12
SS54
D1
C2
100uF/20V

GND_AUX GND_AUX GND_AUX GND_AUX GND_AUX GND_AUX

EFUSE

REGULATOR

U1 TPS5430DDAR

+12
C6
1uF/25V
C7
10uF/25V
C10
100uF/20V
C12
1uF/25V
C13
10uF/25V
TPS_ENA

VIN PH
BOOT
EN
GND VSENSE

L1
15uH/3.5A
C5
0.01uF/25V
SS54
D2

C8
10uF/25V
C14
10uF/25V
C9
1uF/25V
C15
1uF/25V
C11
470uF/6.3V

+5
R5
10K 1%
LED1
R6
1K 1%
R7
3.24K 0.1%

GND_AUX GND_AUX GND_AUX GND_AUX GND_AUX GND_AUX GND_AUX GND_AUX GND_AUX

REGULATOR

$$SR\left(\frac{V}{ms}\right) = \frac{V_{IN}(V)}{t_R(ms)}$$

$$C_{dVdt}(pF) = \frac{2000}{SR\left(\frac{V}{ms}\right)}$$

$$I_{INRUSH}(mA) = SR(V/ms) \times C_{OUT}(uF)$$

$$R_{LIM}(\Omega) = \frac{3334}{I_{LIM}(A)}$$

$$R_2 = \frac{R_1 \times 1{,}221}{V_{OUT} - 1{,}221}$$

Project: BEE-PC1
Sub-system: NANORACK_LASER.PrjPcb

Design by: Hung Nguyen D.
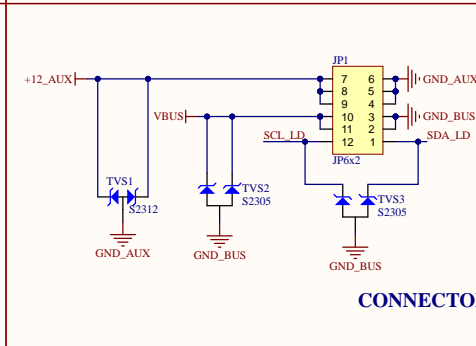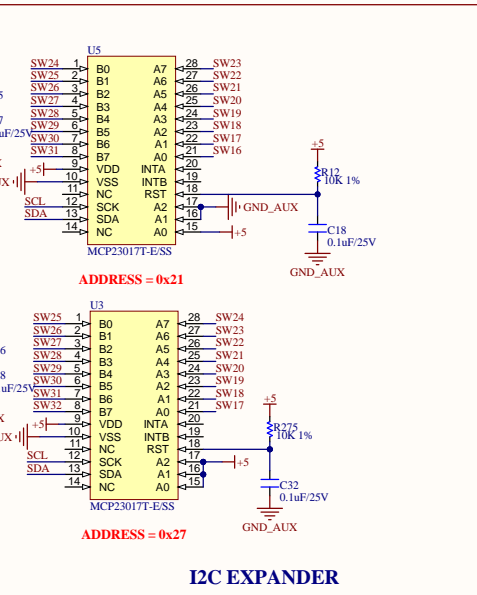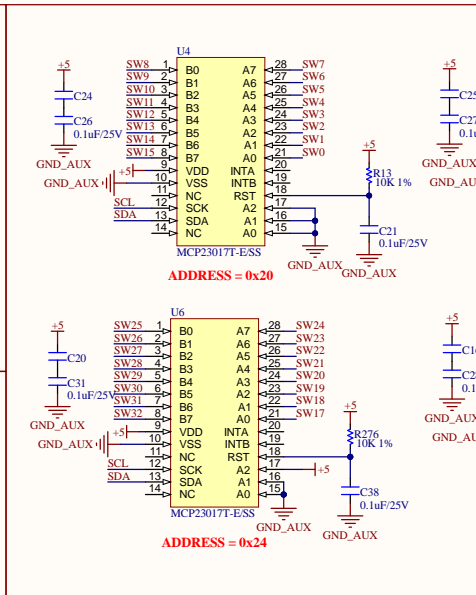Sheet title: EFUSE_AND_REGULATOR.SchDoc
Sheet 3 of 7

Checked by: Bao Bui Q.
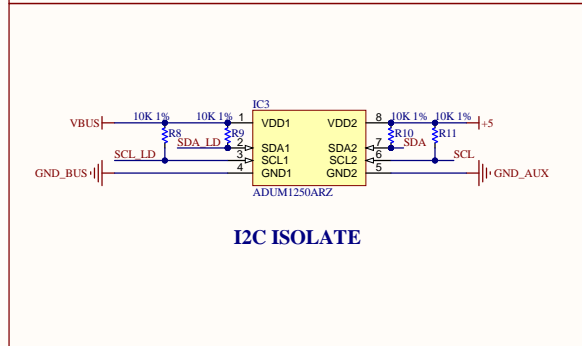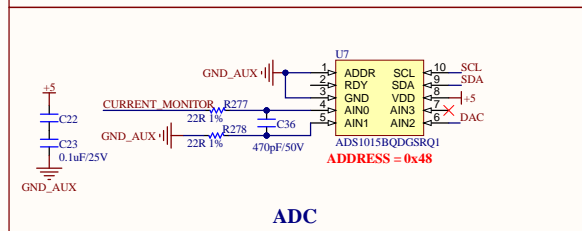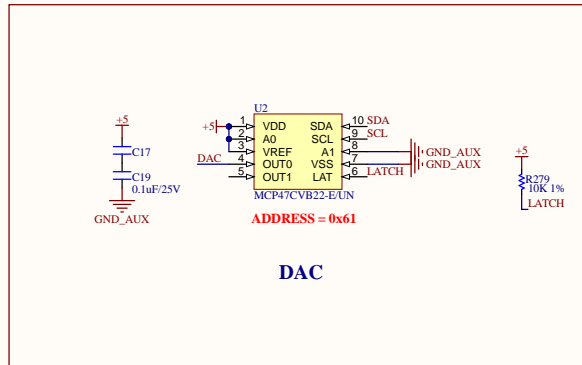Document No: 3
Size: A3

Approved by: Vu Pham
Revision: V1.0.0
Date: 10/4/2024

DAC

U2 — MCP47CVB22-E/UN
VDD, A0, VREF, OUT0, OUT1, SDA, SCL, A1, VSS, LAT, LATCH
C17, C19 0.1uF/25V
R279 10K 1%
GND_AUX
ADDRESS = 0x61

ADC

U7 — ADS1015BQDGSRQ1
ADDR, RDY, GND, AIN0, AIN1, SCL, SDA, VDD, AIN3, AIN2
CURRENT_MONITOR, R277 22R 1%, R278 22R 1%, C36 470pF/50V
C22, C23 0.1uF/25V
GND_AUX
ADDRESS = 0x48

I2C ISOLATE

IC3 — ADUM1250ARZ
VDD1, SDA1, SCL1, GND1, VDD2, SDA2, SCL2, GND2
VBUS, 10K 1% R8, 10K 1% R9, SDA_LD, SCL_LD, 10K 1% R10, 10K 1% R11, SDA, SCL
GND_BUS, GND_AUX

I2C EXPANDER

U4 — MCP23017T-E/SS — **ADDRESS = 0x20**
B0–B7, A0–A7, VDD, VSS, NC, SCK, SDA, NC, INTA, INTB, RST, A2, A1, A0
SW8, SW9, SW10, SW11, SW12, SW13, SW14, SW15
SW7, SW6, SW5, SW4, SW3, SW2, SW1, SW0
SCL, SDA
C24, C26 0.1uF/25V, C21 0.1uF/25V
R13 10K 1%
GND_AUX

U5 — MCP23017T-E/SS — **ADDRESS = 0x21**
SW24, SW25, SW26, SW27, SW28, SW29, SW30, SW31
SW23, SW22, SW21, SW20, SW19, SW18, SW17, SW16
C25, C27 0.1uF/25V, C18 0.1uF/25V
R12 10K 1%
GND_AUX

U6 — MCP23017T-E/SS — **ADDRESS = 0x24**
SW25, SW26, SW27, SW28, SW29, SW30, SW31, SW32
SW24, SW23, SW22, SW21, SW20, SW19, SW18, SW17
C20, C31 0.1uF/25V, C38 0.1uF/25V
R276 10K 1%
GND_AUX

U3 — MCP23017T-E/SS — **ADDRESS = 0x27**
SW25, SW26, SW27, SW28, SW29, SW30, SW31, SW32
SW24, SW23, SW22, SW21, SW20, SW19, SW18, SW17
C16, C28 0.1uF/25V, C32 0.1uF/25V
R275 10K 1%
GND_AUX

CONNECTOR

JP1 / JP6x2
+12_AUX, VBUS, SCL_LD, SDA_LD
GND_AUX, GND_BUS
TVS1 S2312, TVS2 S2305, TVS3 S2305
GND_AUX, GND_BUS
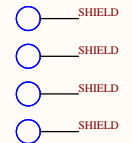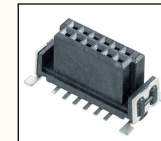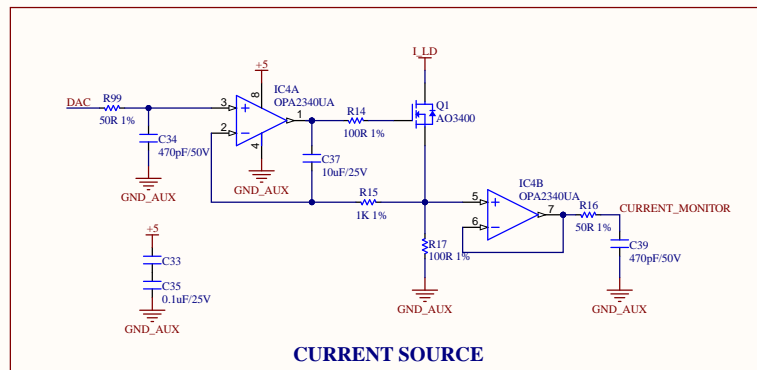
Harwin Inc. M55-6001242R
- ELECTRICAL:
  CURRENT RATING: 1.2A/CONTACT
  VOLTAGE RATING: 100V/CONTACT
- ENVIRONMENTAL:
  TEMPERATURE RANGE: -55°C TO +125°C
- PHYSICAL:
  PITCH-MATING: 0.050" (1.27mm)
- MATING:
  Board to board
  MAX CURRENT: 0.7A/CONTACT
  Harwin Inc. M55-7001242R

SHIELD, SHIELD, SHIELD, SHIELD

IC2 — PCA9536DGKR
P0, P1, P2, GND, VCC, SDA, SCL, P3
LATCH, SDA, SCL
C29, C30 0.1uF/25V
GND_AUX
ADDRESS = 0x41

CURRENT SOURCE

DAC R99 50R 1%
C34 470pF/50V
GND_AUX

+5
IC4A OPA2340UA
R14 100R 1%
C37 10uF/25V
GND_AUX

I_LD
Q1 AO3400

R15 1K 1%
R17 100R 1%
GND_AUX

+5
C33
C35 0.1uF/25V
GND_AUX

IC4B OPA2340UA
R16 50R 1%
CURRENT_MONITOR
C39 470pF/50V
GND_AUX