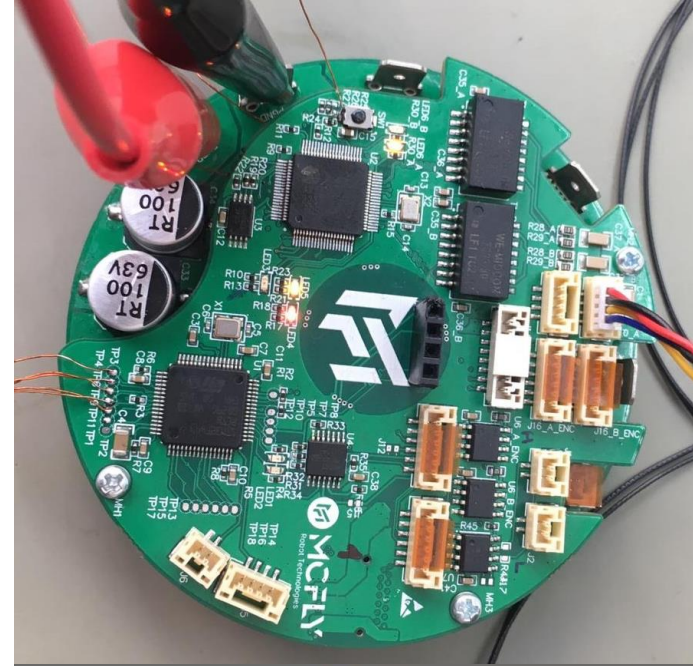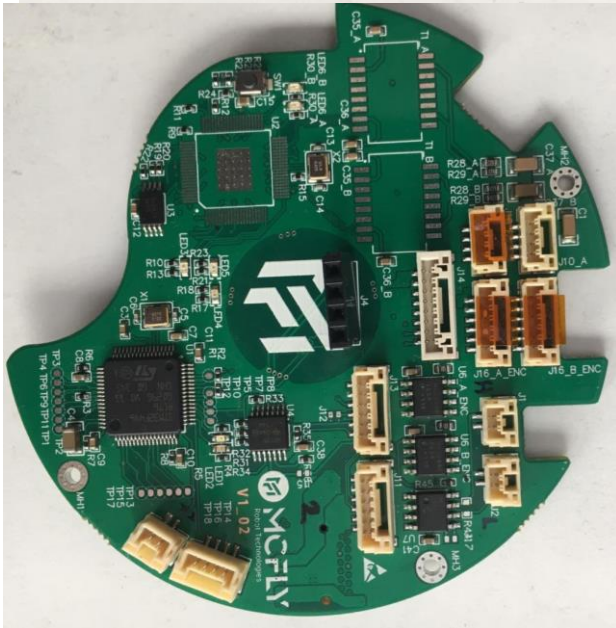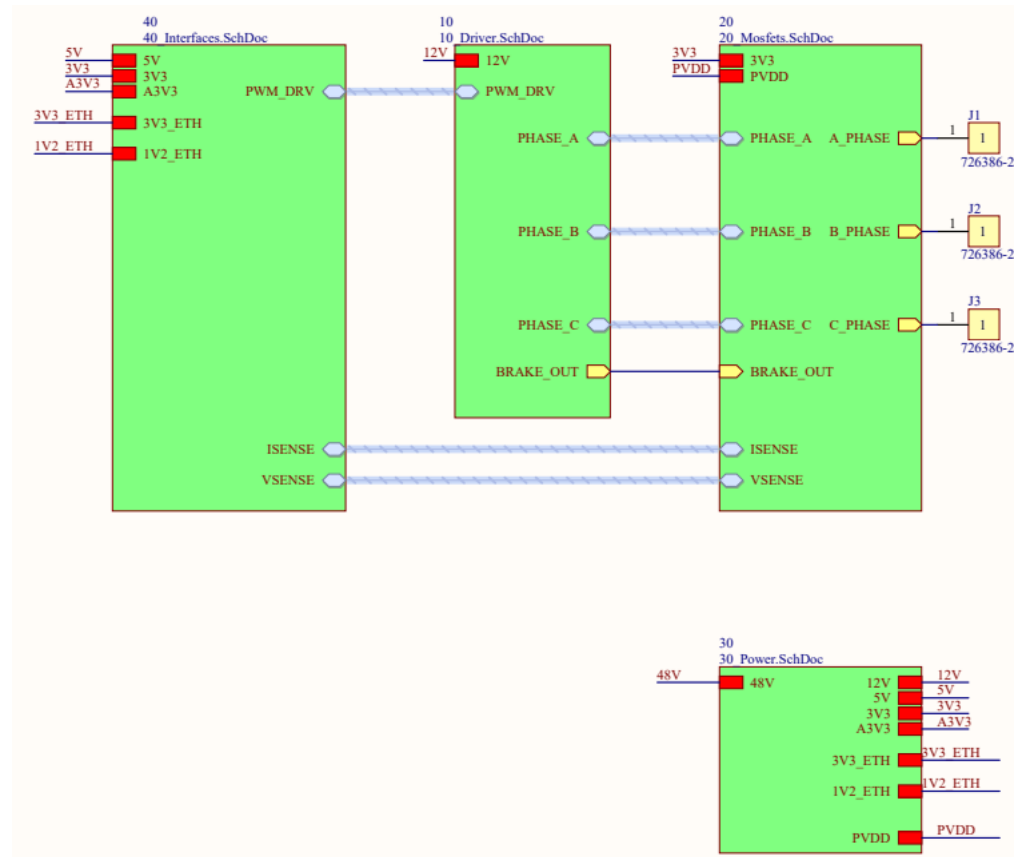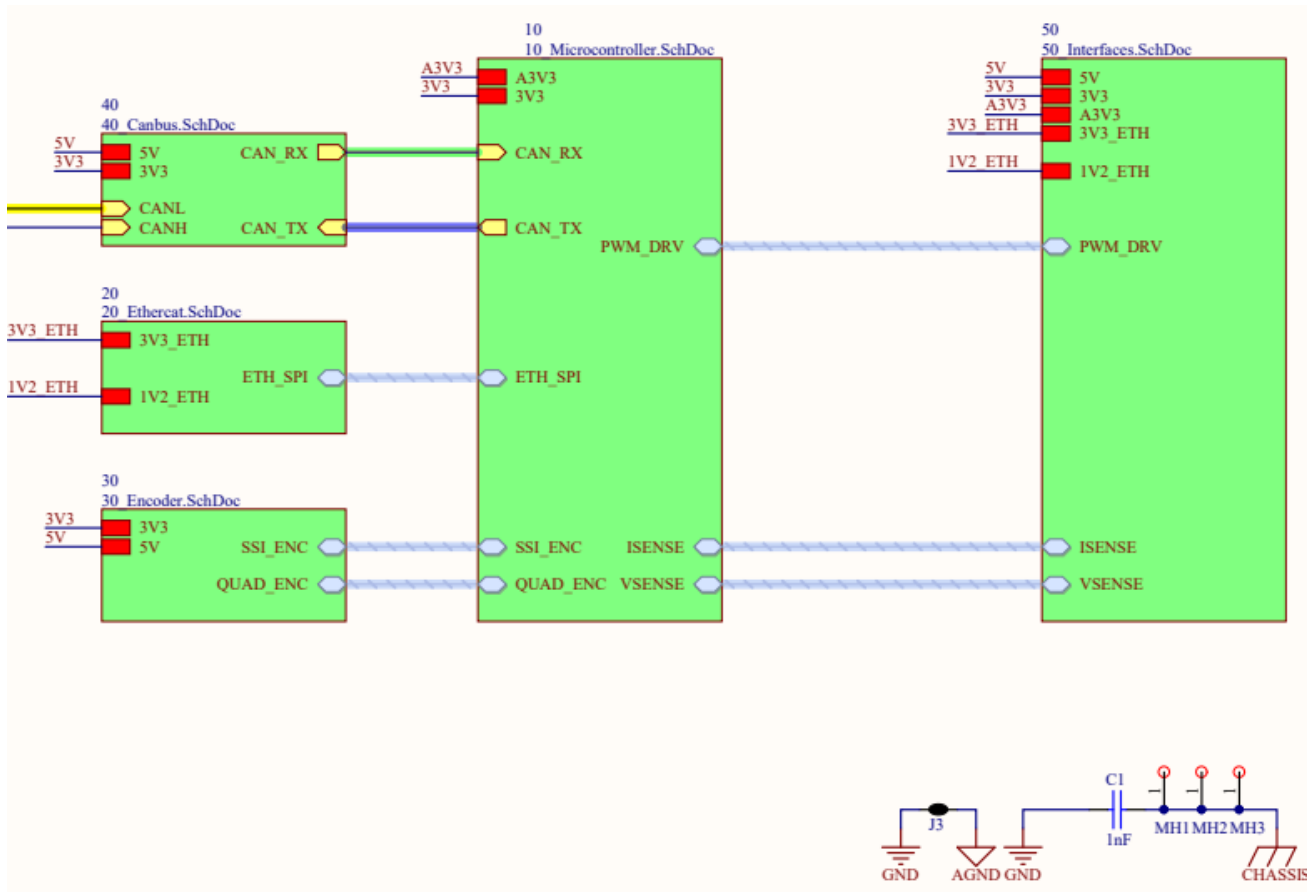# My Projects

When I was working at McFly Robot, I designed the 3 phases BLDC motor driver
This company works on Collaboration robots. I have been working since October 2022.

40
40_Canbus.SchDoc

5V
3V3

5V
3V3
CAN_RX
CANL
CANH
CAN_TX

10
10_Microcontroller.SchDoc

A3V3
3V3

A3V3
3V3
CAN_RX
CAN_TX
PWM_DRV

ETH_SPI

SSI_ENC   ISENSE
QUAD_ENC   VSENSE

20
20_Ethercat.SchDoc

3V3_ETH
1V2_ETH

3V3_ETH
1V2_ETH
ETH_SPI

30
30_Encoder.SchDoc

3V3
5V

3V3
5V
SSI_ENC
QUAD_ENC

50
50_Interfaces.SchDoc

5V
3V3
A3V3
3V3_ETH
1V2_ETH

5V
3V3
A3V3
3V3_ETH
1V2_ETH

PWM_DRV

ISENSE
VSENSE

40
40_Interfaces.SchDoc

5V
3V3
A3V3

5V
3V3
A3V3

3V3_ETH
1V2_ETH

3V3_ETH
1V2_ETH

PWM_DRV

PHASE_A

PHASE_B

PHASE_C
BRAKE_OUT

ISENSE
VSENSE

10
10_Driver.SchDoc

12V   12V

PWM_DRV

PHASE_A

PHASE_B

PHASE_C
BRAKE_OUT

ISENSE
VSENSE

20
20_Mosfets.SchDoc

3V3
PVDD

3V3
PVDD

PHASE_A   A_PHASE
PHASE_B   B_PHASE
PHASE_C   C_PHASE

J1
1
726386-2

J2
1
726386-2

J3
1
726386-2

30
30_Power.SchDoc

48V   48V

12V   12V
5V   5V
3V3   3V3
A3V3   A3V3
3V3_ETH 3V3_ETH
1V2_ETH 1V2_ETH

PVDD   PVDD

C1
1nF

J3

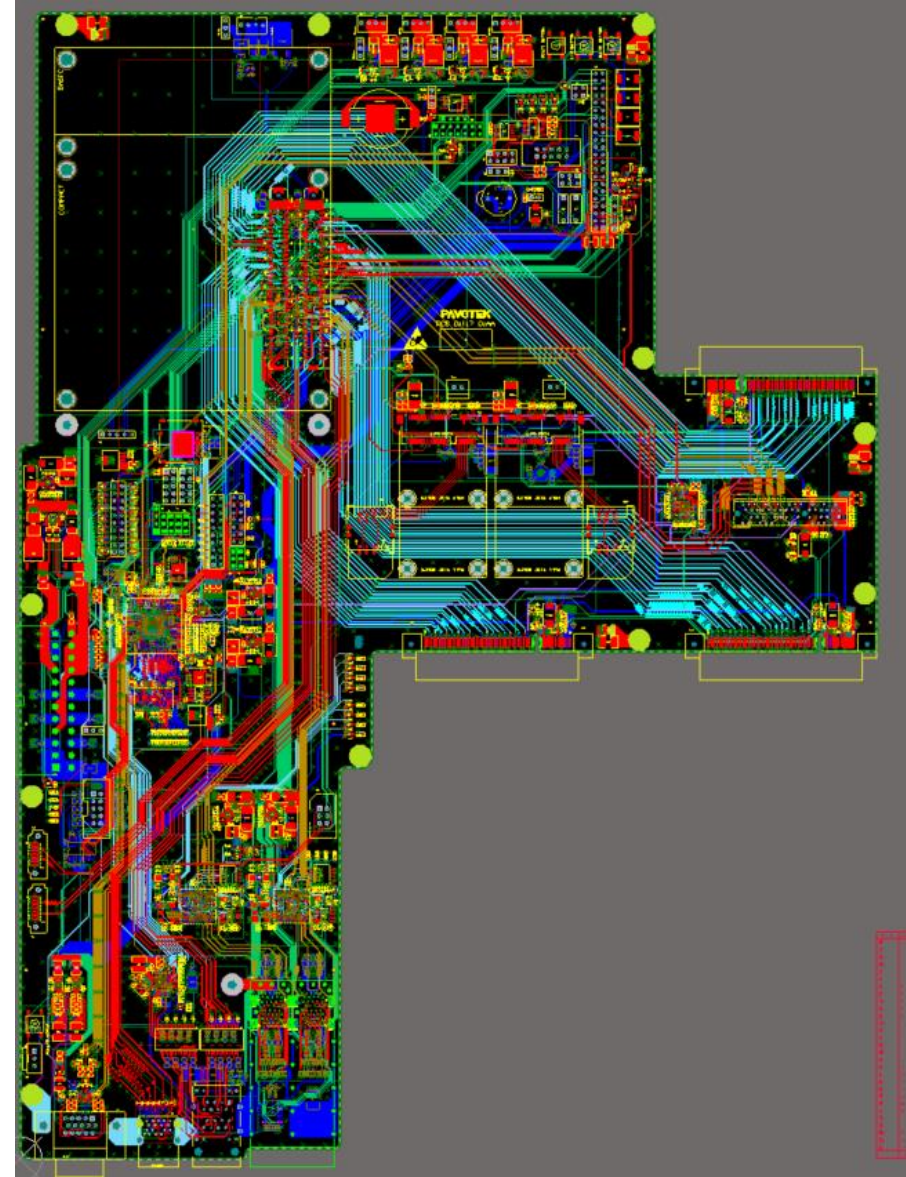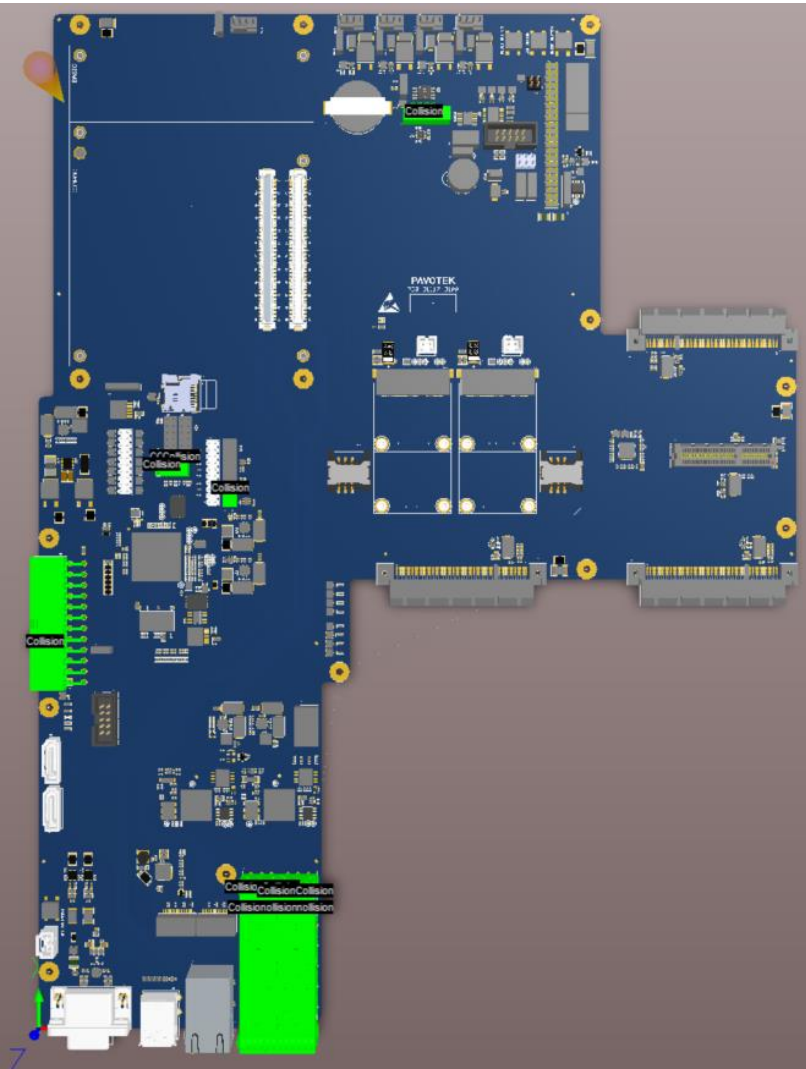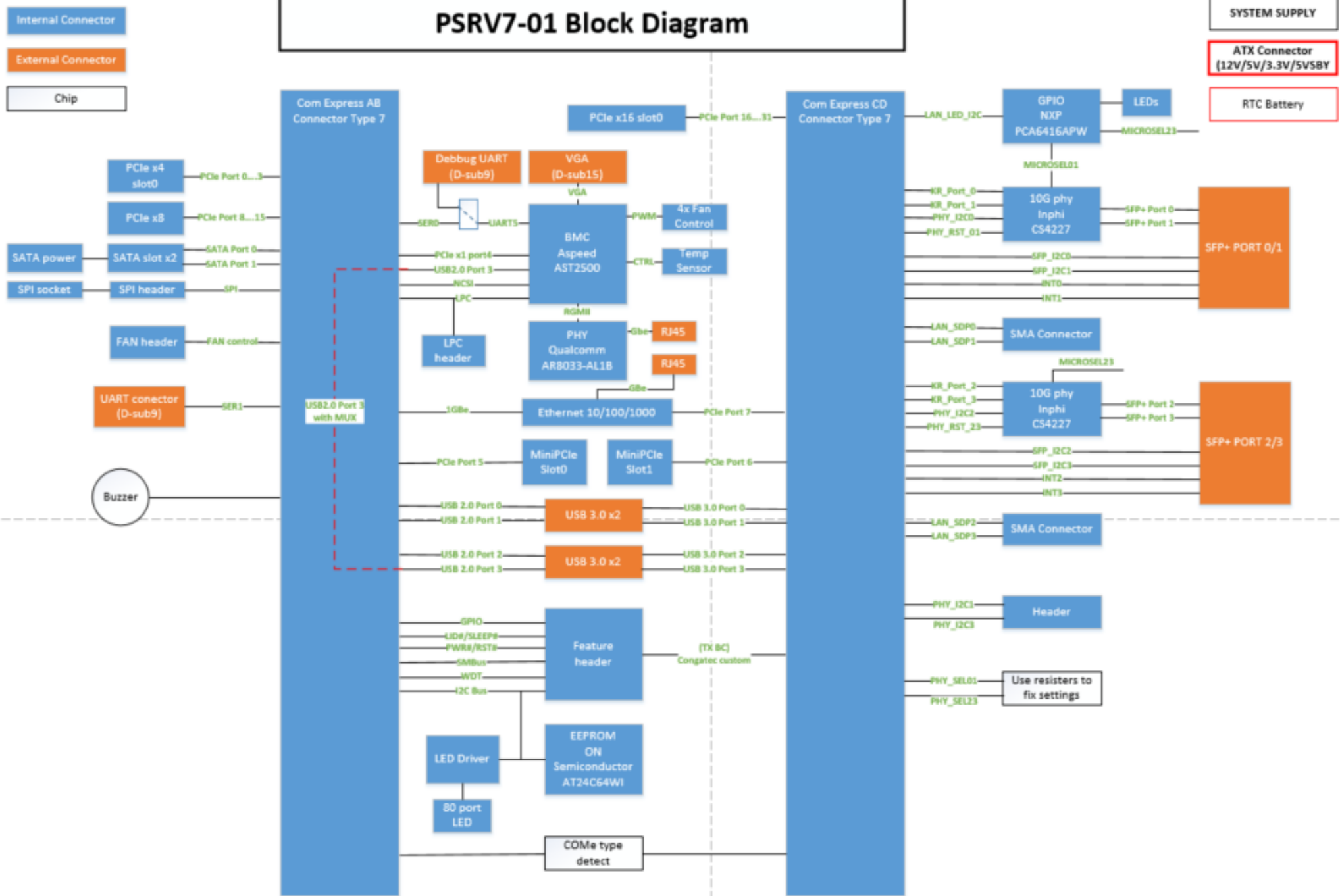GND   AGND GND

MH1 MH2 MH3

CHASSIS

- These cards are designed to drive BLDC motors used in Collaborative Robots.
- This project is a 2 cards design. These cards are MCU and Power cards.
- These PCBs have 4 layers. I used Altium Designer for Sch and PCB.
- I designed the MCU and peripherals, Gate driver and MOSFET, Ethercat IC, Incremental Encoder, and Canbus.
- I used STM32 Microcontroller. This card contained I²C, SPI, EtherCAT, CAN, and UART communication protocol.
- I used an Inline Current amplifier and Temperature Sense.
- I design Buck regulator and Over Current protection IC.
- I did buck converter topologies Analysis and Design with PSIM.
- I did Electronic tests, Functional Tests, EMC, and EMI testing.

**When I was working at PAVOTEK, I designed Server Motherboard with Intel CPU Modules (Xeon and Atom).**
This company works on Military products.I worked for 2 years and 2 months.

PSRV7-01 Block Diagram

Internal Connector

External Connector

Chip

SYSTEM SUPPLY

ATX Connector (12V/5V/3.3V/5VSBY)

RTC Battery

Com Express AB Connector Type 7

Com Express CD Connector Type 7

PCIe x16 slot0 — PCIe Port 16....31

GPIO NXP PCA6416APW — LEDs

LAN_LED_I2C

MICROSEL23

MICROSEL01

PCIe x4 slot0 — PCIe Port 0....3

PCIe x8 — PCIe Port 8....15

Debbug UART (D-sub9)

VGA (D-sub15)

VGA

KR_Port_0
KR_Port_1
PHY_I2C0
PHY_RST_01

10G phy Inphi CS4227 — SFP+ Port 0 / SFP+ Port 1

SATA power — SATA slot x2 — SATA Port 0 / SATA Port 1

SER0 — UART5

PWM — 4x Fan Control

BMC Aspeed AST2500

SPI socket — SPI header — SPI

PCIe x1 port6
USB2.0 Port 3
NCSI
LPC

CTRL — Temp Sensor

SFP_I2C0
SFP_I2C1
INT0
INT1

SFP+ PORT 0/1

RGMII

FAN header — FAN control

LPC header

PHY Qualcomm AR8033-AL1B — Gbe — RJ45

LAN_SDP0
LAN_SDP1

SMA Connector

MICROSEL23

UART conector (D-sub9) — SER1

USB2.0 Port 3 with MUX

GBe — RJ45

1GBe — Ethernet 10/100/1000 — PCIe Port 7

KR_Port_2
KR_Port_3
PHY_I2C2
PHY_RST_23

10G phy Inphi CS4227 — SFP+ Port 2 / SFP+ Port 3

Buzzer

PCIe Port 5 — MiniPCIe Slot0 / MiniPCIe Slot1 — PCIe Port 6

SFP_I2C2
SFP_I2C3
INT2
INT3

SFP+ PORT 2/3

USB 2.0 Port 0
USB 2.0 Port 1

USB 3.0 x2 — USB 3.0 Port 0 / USB 3.0 Port 1

LAN_SDP2
LAN_SDP3

SMA Connector

USB 2.0 Port 2
USB 2.0 Port 3

USB 3.0 x2 — USB 3.0 Port 2 / USB 3.0 Port 3

GPIO
LID#/SLEEP#
PWR#/RST#
SMBus
WDT
I2C Bus

Feature header

(TX BC) Congatec custom

PHY_I2C1
PHY_I2C3

Header

PHY_SEL01
PHY_SEL23

Use resisters to fix settings

LED Driver

EEPROM ON Semiconductor AT24C64WI
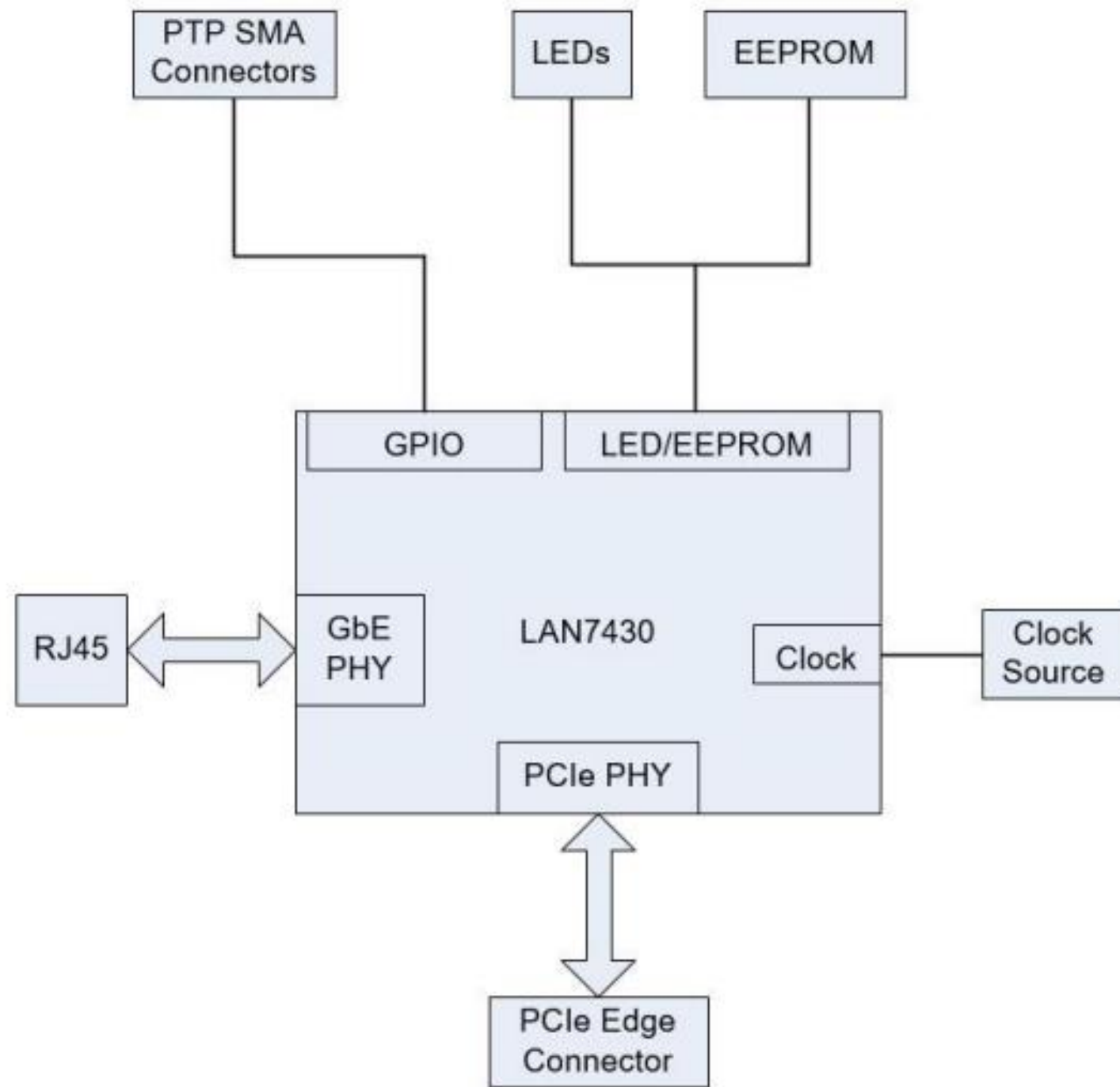
80 port LED

COMe type detect

- This card is designed for Server Systems.
- This card has 14 layers. I used Altium Designer for Sch and PCB.
- I designed some parts of this project. I designed the MCU and peripherals part, COM Express Type 7 CPU Connector part, Power Part, PCIe Express slots, RGMII Ethernet parts, and some High-Speed Layouts.
- I have an opinion on RAM CPU communication and Board Management Controller. I design this part Schematic but I don't design a Layout.
- This card contained I²C(EEPROM) and SPI(BIOS Flash) communication protocol.
- I used Current Balancing Controller, Temperature Sense,
- I design Buck regulator and Over Current protection IC.
- I did buck converter topologies Analysis and Design with PSIM.
- I did Electronic tests, Functional Tests, EMC, and EMI testing.
- I prepared production documents like BOM, GERBER, and NC Drill Files.
- I chose the Military Grade and Space Grade electronic component.
- I used Lab equipment Multimeter, oscilloscope, power supply, signal generator, etc.
- I writing Interface Control Document, User Manuel, Datasheet, Test Procedure Document

When I work is PAVOTEK, I designed PCIe to 8 port 1 Gbps Ethernet Card for Server Systems
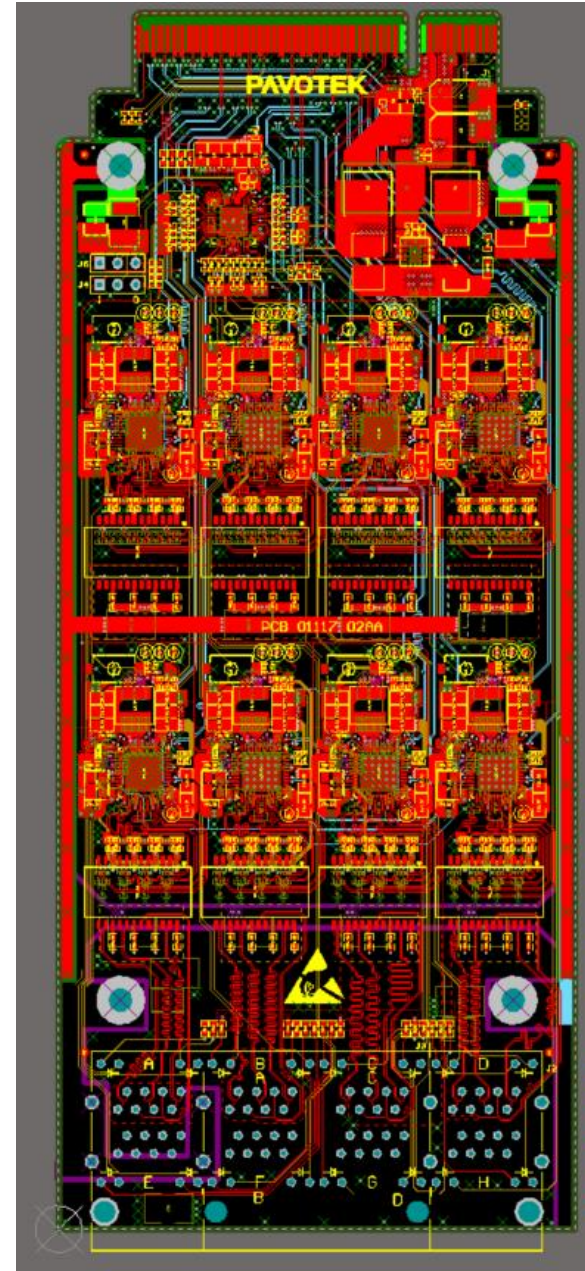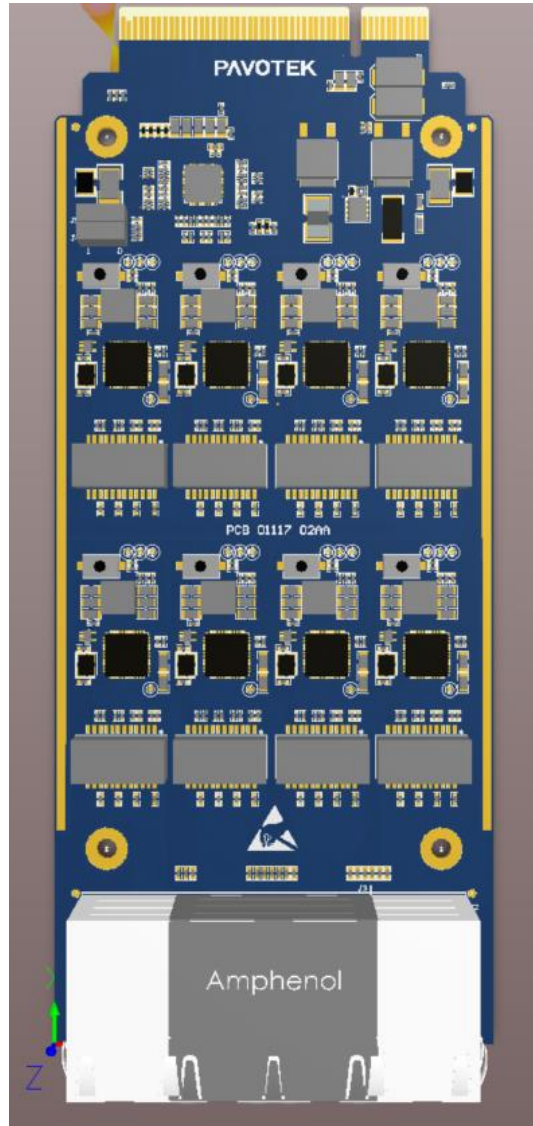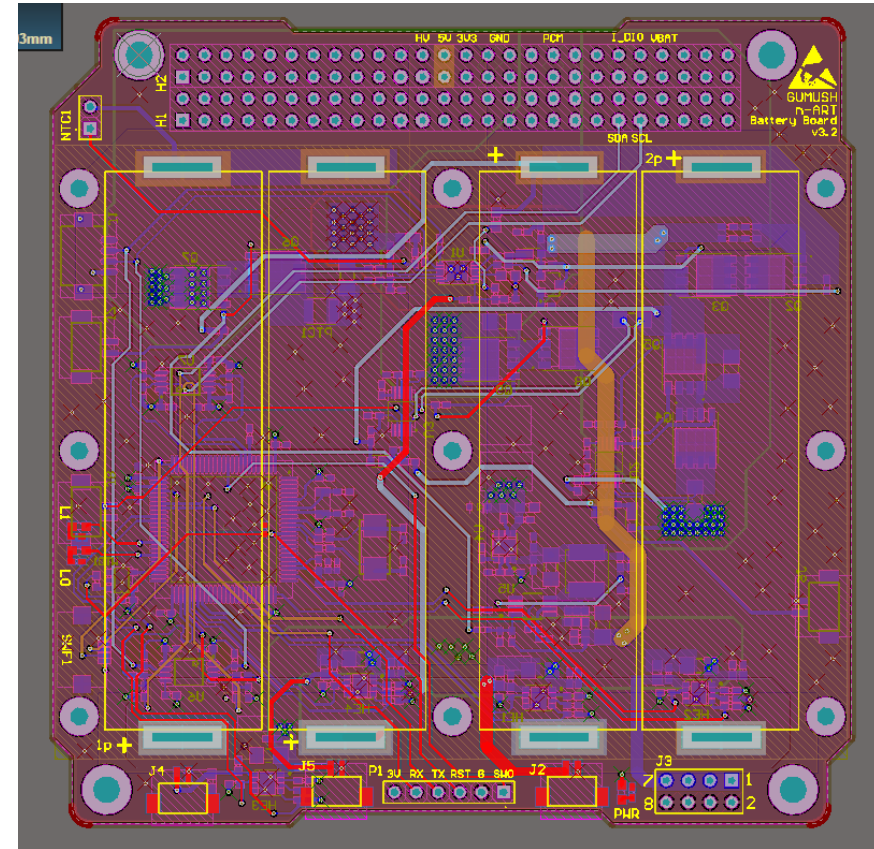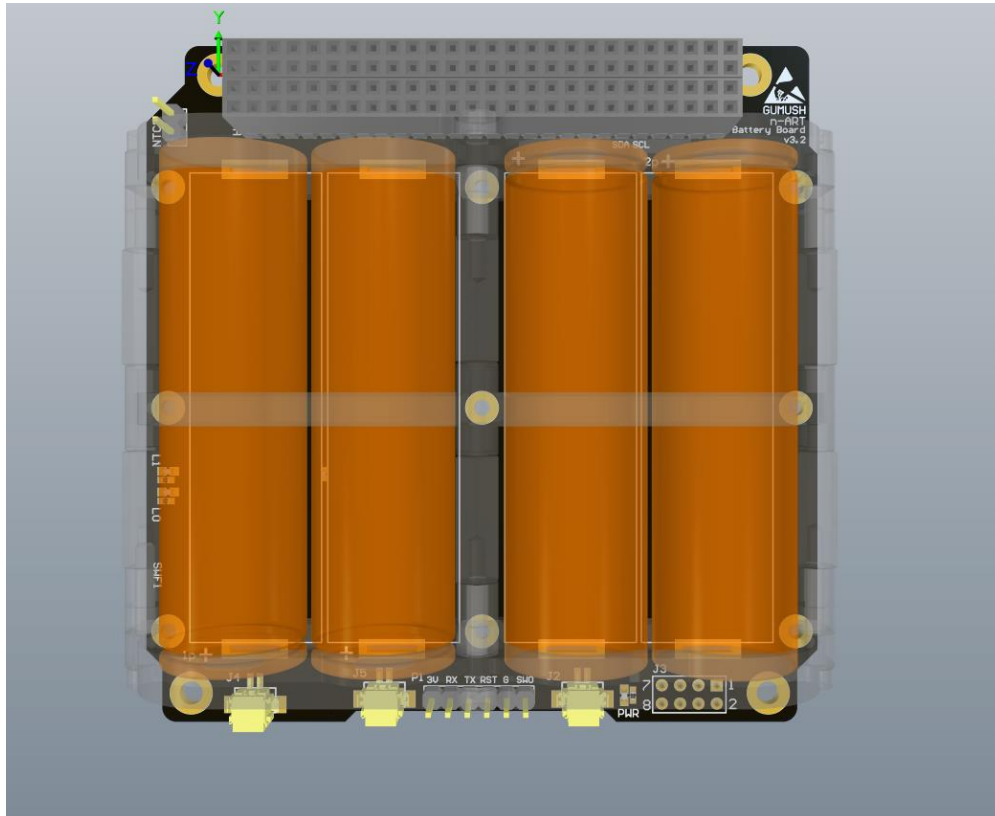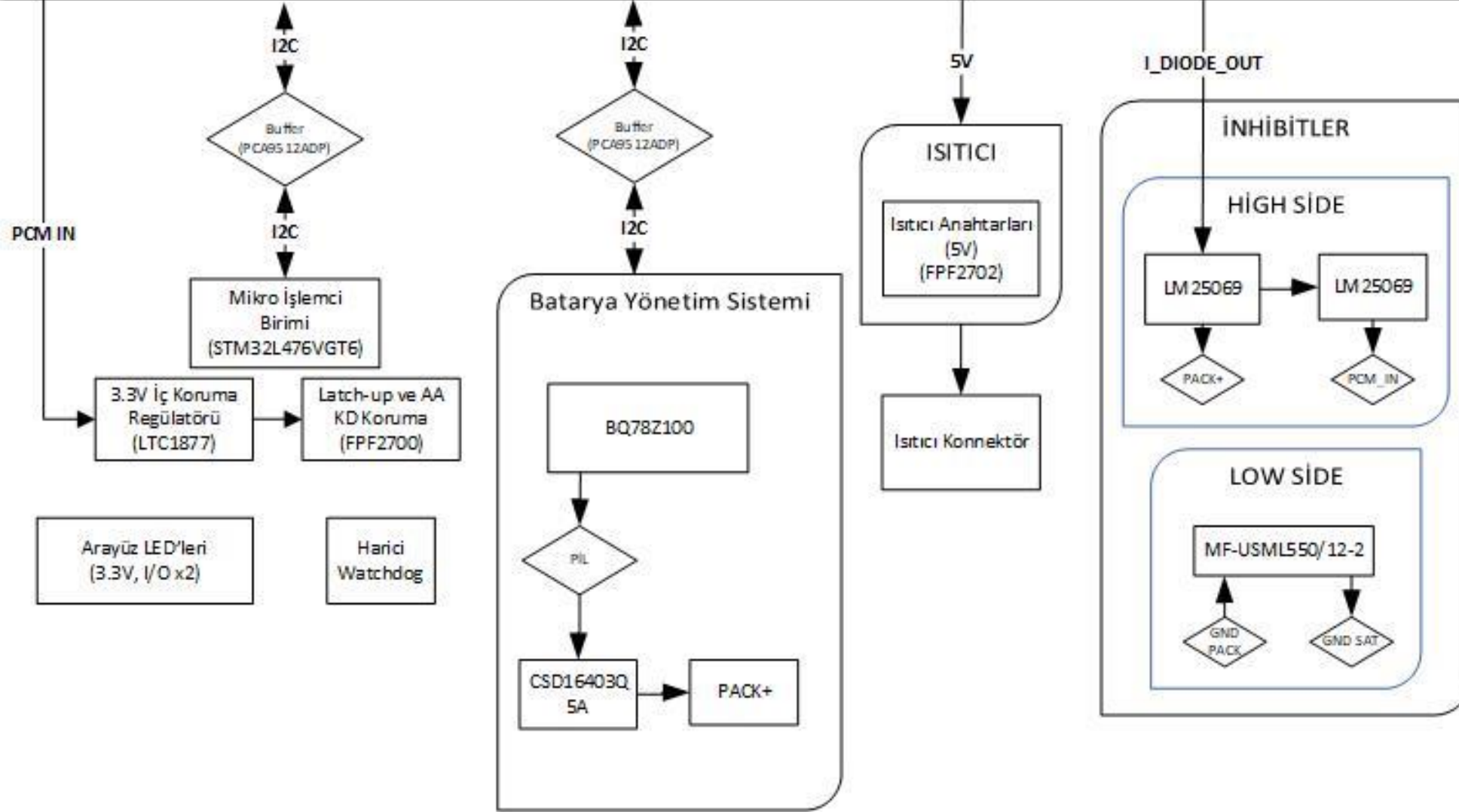
- This card is designed for Server Systems.
- This card has 8 layers. I used Altium Designer for Sch and PCB.
- I designed the Ethernet PHY part, Clock Buffer part, and 1 Gbps Ethernet Part.
- I used Current Balancing Controller, Temperature Sense,
- I didn't use the Power regulator. Because this card takes power from the PCIe connector.
- I did Electronic tests, Functional Tests, EMC, and EMI testing.
- I prepared production documents like BOM, GERBER, and NC Drill Files.
- I chose the Military Grade and Space Grade electronic component.
- I used Lab equipment Multimeter, oscilloscope, power supply, signal generator, etc.
- I writing Interface Control Document, User Manuel, Datasheet, Test Procedure Document

When I was working at Gumush Aerospace, I designed Battery Management Systems based on Lithium-ion batteries for Cubesats.
This company works on Cubesat satellites.I worked for 1 year and 8 months.

PC104 KONNEKTÖRÜ

I2C

I2C

5V

I_DIODE_OUT

Buffer
(PCA9512ADP)

Buffer
(PCA9512ADP)

İNHİBİTLER

ISITICI

PCM IN

I2C

I2C

Isıtıcı Anahtarları
(5V)
(FPF2702)

HIGH SİDE

Mikro İşlemci
Birimi
(STM32L476VGT6)

LM 25069

LM 25069

PACK+

PCM_IN

3.3V İç Koruma
Regülatörü
(LTC1877)

Latch-up ve AA
KD Koruma
(FPF2700)

Batarya Yönetim Sistemi

Isıtıcı Konnektör

BQ78Z100

LOW SİDE

Arayüz LED'leri
(3.3V, I/O x2)

Harici
Watchdog

PİL

MF-USML550/12-2

GND
PACK

GND SAT

CSD16403Q
5A
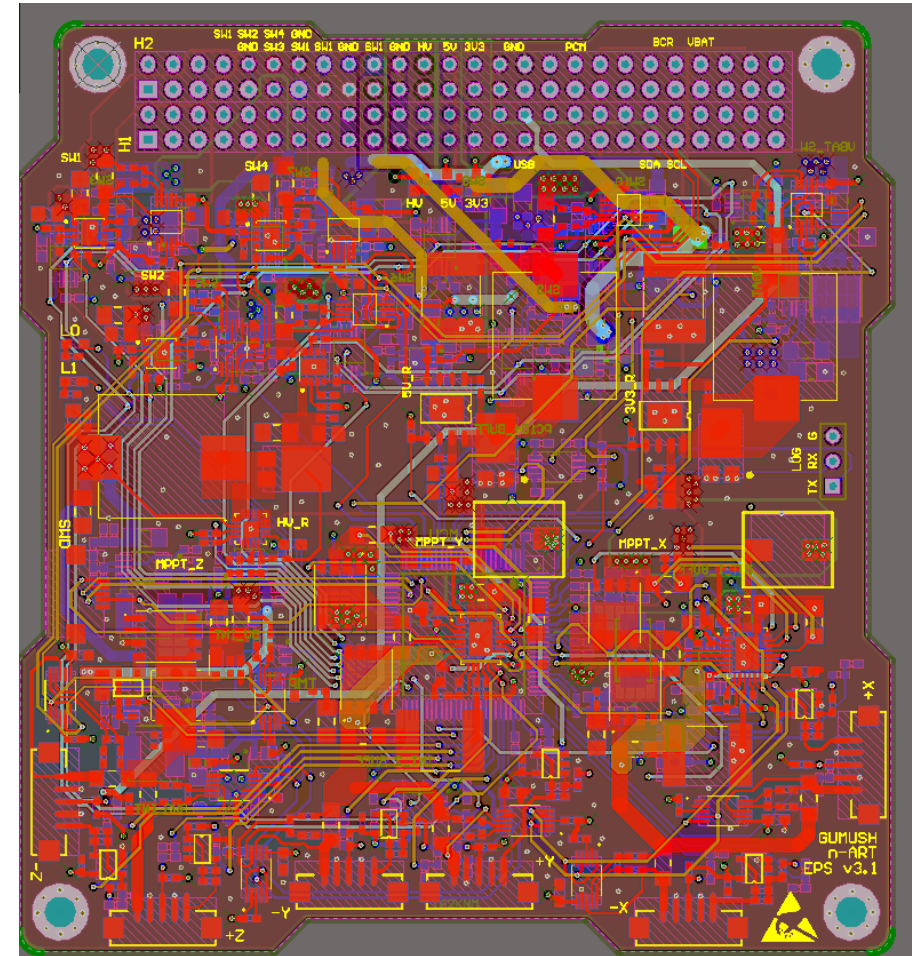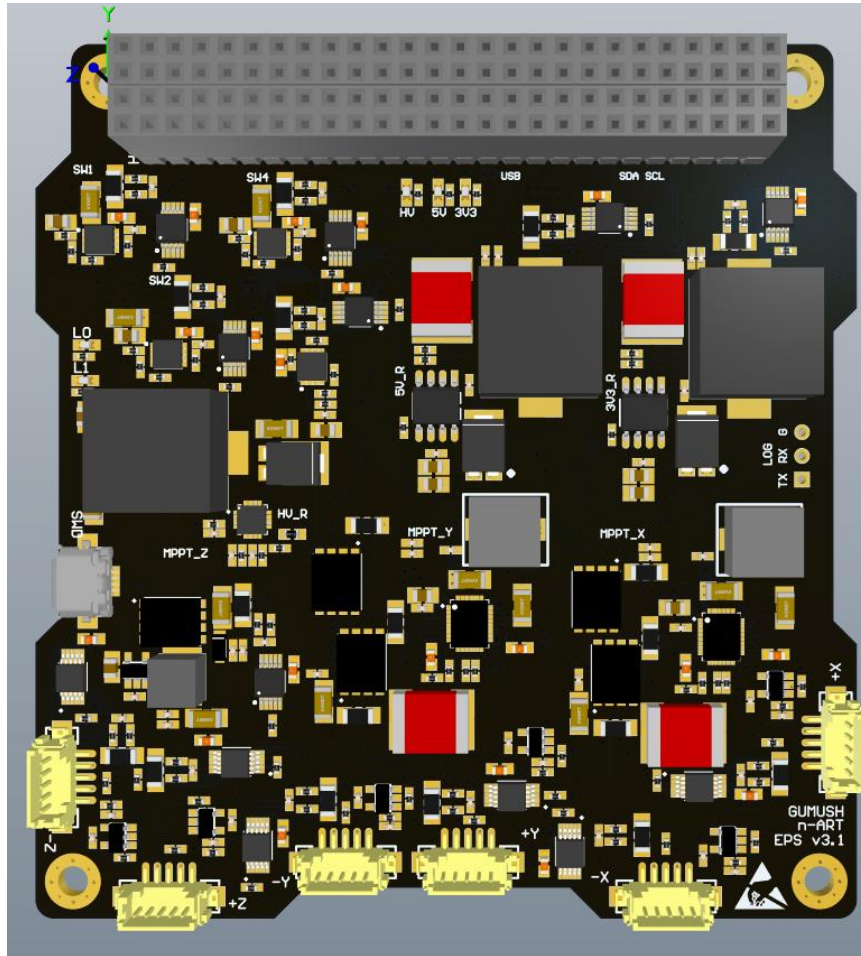
PACK+

N-ART
BAT

- This card provides storage of energy from the solar panel in the battery.
- This card has 6 layers. I used Altium Designer for Sch and PCB.
- I designed some parts of this project. I designed the MCU and peripherals part, Power Part, Battery Management Part, Battery Heater part, and PC104 connector part.
- I have an opinion on Inhibit but I didn't design this part.
- I used STM32 Microcontroller. This card contained I^2C and UART communication protocol.
- I used Battery management ICs, High Side Current and Voltage Sense INA, Over-Current Protection Load Switches, Temperature Sense, Watchdog Timer, and an I2C buffer.
- I design Buck regulator and Over Current protection IC.

When I was working at Gumush Aerospace, I designed Electronics Power System for CubeSat

PC104 CONNECTOR

I2C — BCR OUT — 3.3V, 5V, 28V, VBAT — PCM IN

I2C Buffer (PCA9512ADP)

I2C

Microcontroller Unit (STM32L476VGT6)

PCM IN

USB Charge

3.3V Int. Protection Regulator (LTC1877) → **Latch-up and OC SC Protection (TPS2553)**

5V Int. Protection Regulator (LTC1877) → **Latch-up and OC SC Protection (FPF2700)**

Battery Charge (MPPT) Regulators
- X Axis (LTC4162EUFD-L41)
- Y Axis (LTC4162EUFD-L41)
- Z Axis (TPS2819)

BUS Regulators and Power Switchs
- 3.3V (TPS5450-EP)
- 5V (TPS5450-EP)
- 28V (TPS55340MRTETEP)
- Power Switchs (3.3V, 5V, 28V) (FPF2702)
- Power Switch (VBat) (LM25069)

Interface LEDs (3.3V, 5V, 28V, I/O x2)

Temperature Sensor

Int. I2C Buffer (PCA9512ADP)

External Watchdog

18V 5V

Panel Temperature Measurement

Panel Light Measurement

Solar Arrays Connectors

n-ART
EPS

- This card provides the power requirements of the Cube satellite's subsystems.
- This card has 8 layers. I used Altium Designer for Sch and PCB.
- I designed some parts of this project. I designed the MCU and peripherals part, Power Part, and PC104 connector part.
- I have an opinion on Battery Charge Regulators (MPPT) and Solar Arrays. But I didn't design this part.
- I used STM32 Microcontroller. This card contained I²C and UART communication protocol.
- I used High Side Current and Voltage Sense INA, Over-Current Protection Load Switches, Temperature Sense, Watchdog Timer, and an I2C buffer.
- I design Buck and Boost regulator and Over Current protection IC.
- I did buck and boost converter topologies Analysis and Design with PSIM.
- I did Electronic tests, Functional Tests, EMC, and EMI testing.
- I prepared production documents like BOM, GERBER, and NC Drill Files.
- I chose the Military Grade and Space Grade electronic component.
- I used Lab equipment Multimeter, oscilloscope, power supply, signal generator, etc.
- I writing Interface Control Document, User Manuel, Datasheet, Test Procedure Document

When I was working at Ozone Healt, Generator control card
This company works on biomedical systems. I worked for 2 years and 1 month.

İSLEMCİ KISMI

FİLTRE DEVRESİ

TRAFO-TÜP SÜRME DEVRESİ

ROTARY ENCODER

BUTON KISMI

TRANSİSTÖR TETİKLEME KISMI
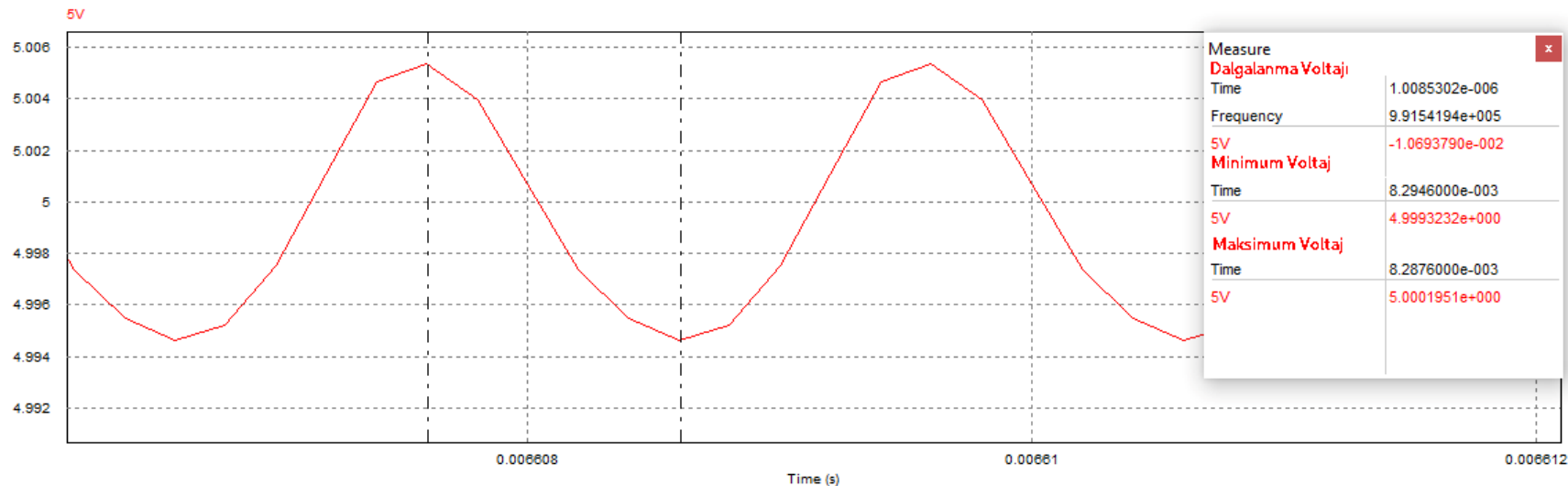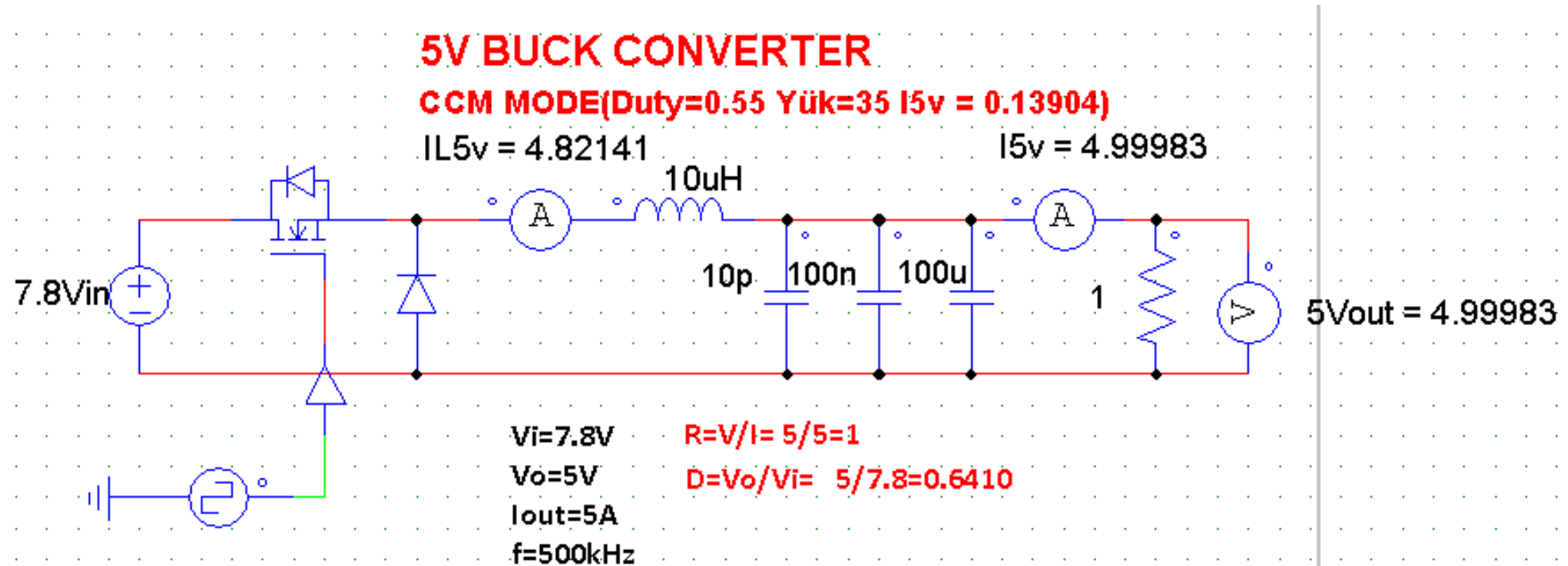
LCD KISMI

- This card is designed for a device that produces ozone gas.
- This card has 2 layers. I used Proteus and Altium for Sch and PCB.
- I designed the MCU and peripherals, Digital Output, High Voltage transformer Driver, and LCD.
- This card contained I²C for LCD.
- I design Buck regulator and Over Current protection IC.
- I did buck converter topologies Analysis and Design with PSIM.

For all projects

- I used Jira Software for work tracking.
- I used Proteus and Altium electronics design tools for an electronic card.
- Analysis and Design of Dc/Dc ConverterTopologies (Buck, Boots), Flyback with PSIM and LTSpice simulation tools.
- I used Microchip and ARM Cortex M4 32-Bit Microcontroller based applications that contains CANbus, I²C, SPI, UART/, USB, ADC, DAC Peripherals.
- I prepared production documents like BOM and GERBERi NC Drill Files.
- I chose the Military Grade, Space Grade, and Automotive Grade electronic components.
- I used Lab equipment Multimeter, oscilloscope, power supply, signal generator, etc.
- I did Electronic Tests, Functional Tests, Analysis, Examinations, and Design reviews.
- I writing Interface Control Document, User Manuel, Datasheet, Test Procedure Document

5V Buck Converter

5V BUCK CONVERTER
CCM MODE(Duty=0.55 Yük=35 I5v = 0.13904)

IL5v = 4.82141

I5v = 4.99983

10uH

7.8Vin

10p   100n   100u

1

5Vout = 4.99983

Vi=7.8V   R=V/I= 5/5=1
Vo=5V   D=Vo/Vi: 5/7.8=0.6410
Iout=5A
f=500kHz

Measure	
Dalgalanma Voltajı	
Time	1.0085302e-006
Frequency	9.9154194e+005
5V	-1.0693790e-002
Minimum Voltaj	
Time	8.2946000e-003
5V	4.9993232e+000
Maksimum Voltaj	
Time	8.2876000e-003
5V	5.0001951e+000

28V Boost Converter

28V BOOST CONVERTER

CCM MODE(Duty=0.69 Yük=267 I28V=0.11393)

IL28v = 3.09395   10uH   I28v = 1.00131

7.8Vin   10u   4.7u   100p   28   28Vout = 28.03676

Vi=7.8V   R=V/I= 28/1=28
Vo=28V
Iout=1A   D=1-(Vİ/Vç)=0.7214
f=500kHz

Measure		
Dalgalanma Voltajı		
Time		1.3898193e-006
Frequency		7.1951798e+005
28V		-9.3772361e-002
Minimum Voltaj		
Time		7.6514000e-003
28V		2.7941486e+001
Maksimum Voltaj		
Time		7.6540000e-003
28V		2.8036699e+001