SERVICE MANUAL

notebook

P970EN

Notebook Computer

P970EN

Service Manual

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HDMI™
HIGH-DEFINITION MULTIMEDIA INTERFACE

About this Manual

This manual is intended for service personnel who have completed sufficient training to undertake the maintenance and inspection of personal computers.

It is organized to allow you to look up basic information for servicing and/or upgrading components of the ***P970EN*** series notebook PC.

The following information is included:

Chapter 1, Introduction, provides general information about the location of system elements and their specifications.
Chapter 2, Disassembly, provides step-by-step instructions for disassembling parts and subsystems and how to upgrade elements of the system.

Appendix A, Part Lists
Appendix B, Schematic Diagrams
Appendix C, Updating the FLASH ROM BIOS

IMPORTANT SAFETY INSTRUCTIONS

Follow basic safety precautions, including those listed below, to reduce the risk of fire, electric shock and injury to persons when using any electrical equipment:

1. Do not use this product near water, for example near a bath tub, wash bowl, kitchen sink or laundry tub, in a wet basement or near a swimming pool.
2. Avoid using a telephone (other than a cordless type) during an electrical storm. There may be a remote risk of electrical shock from lightning.
3. Do not use the telephone to report a gas leak in the vicinity of the leak.
4. Use only the power cord and batteries indicated in this manual. Do not dispose of batteries in a fire. They may explode. Check with local codes for possible special disposal instructions.
5. This product is intended to be supplied by a Listed Power Unit as follows:

- AC Input of 100 - 240V, 50 - 60Hz, DC Output of 19.5V, 9.23A (**180** Watts) minimum AC/DC Adapter.

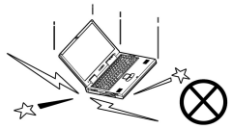
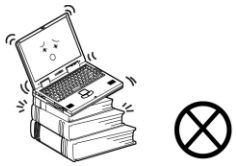
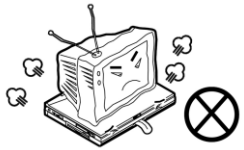
FCC Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:
This device may not cause harmful interference.
This device must accept any interference received, including interference that may cause undesired operation.

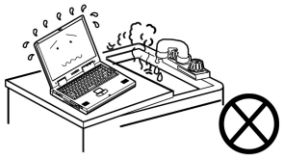
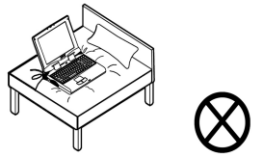
Instructions for Care and Operation

The notebook computer is quite rugged, but it can be damaged. To prevent this, follow these suggestions:

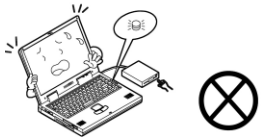
1. **Don't drop it, or expose it to shock.** If the computer falls, the case and the components could be damaged.

Do not expose the computer to any shock or vibration.	*Do not place it on an unstable surface.*	*Do not place anything heavy on the computer.*
		

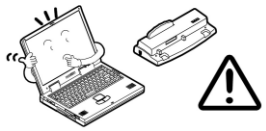
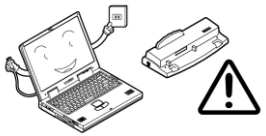
2. **Keep it dry, and don't overheat it.** Keep the computer and power supply away from any kind of heating element. This is an electrical appliance. If water or any other liquid gets into it, the computer could be badly damaged.

Do not expose it to excessive heat or direct sunlight.	*Do not leave it in a place where foreign matter or moisture may affect the system.*	*Don't use or store the computer in a humid environment.*	*Do not place the computer on any surface which will block the vents.*
			

3. **Follow the proper working procedures for the computer**. Shut the computer down properly and don't forget to save your work. Remember to periodically save your data as data may be lost if the battery is depleted.

Do not turn off the power until you properly shut down all programs.	*Do not turn off any peripheral devices when the computer is on.*	*Do not disassemble the computer by yourself.*	*Perform routine maintenance on your computer.*
			

4. **Avoid interference.** Keep the computer away from high capacity transformers, electric motors, and other strong magnetic fields. These can hinder proper performance and damage your data.
5. **Take care when using peripheral devices**.

Use only approved brands of peripherals.	*Unplug the power cord before attaching peripheral devices.*
	

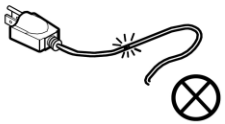
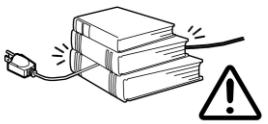
Power Safety

The computer has specific power requirements:

- Only use a power adapter approved for use with this computer.
- Your AC adapter may be designed for international travel but it still requires a steady, uninterrupted power supply. If you are unsure of your local power specifications, consult your service representative or local power company.
- The power adapter may have either a 2-prong or a 3-prong grounded plug. The third prong is an important safety feature; do not defeat its purpose. If you do not have access to a compatible outlet, have a qualified electrician install one.
- When you want to unplug the power cord, be sure to disconnect it by the plug head, not by its wire.
- Make sure the socket and any extension cord(s) you use can support the total current load of all the connected devices.
- Before cleaning the computer, make sure it is disconnected from any external power supplies.

Power Safety Warning

Before you undertake any upgrade procedures, make sure that you have turned off the power, and disconnected all peripherals and cables (including telephone lines and power cord). It is advisable to also remove your battery in order to prevent accidentally turning the machine on.

Do not plug in the power cord if you are wet.	*Do not use the power cord if it is broken.*	*Do not place heavy objects on the power cord.*
		

Battery Precautions

- Only use batteries designed for this computer. The wrong battery type may explode, leak or damage the computer.
- Do not continue to use a battery that has been dropped, or that appears damaged (e.g. bent or twisted) in any way. Even if the computer continues to work with a damaged battery in place, it may cause circuit damage, which may possibly result in fire.
- Recharge the batteries using the notebook's system. Incorrect recharging may make the battery explode.
- Do not try to repair a battery pack. Refer any battery pack repair or replacement to your service representative or qualified service personnel.
- Keep children away from, and promptly dispose of a damaged battery. Always dispose of batteries carefully. Batteries may explode or leak if exposed to fire, or improperly handled or discarded.
- Keep the battery away from metal appliances.
- Affix tape to the battery contacts before disposing of the battery.
- Do not touch the battery contacts with your hands or metal objects.

Battery Guidelines

The following can also apply to any backup batteries you may have.

- If you do not use the battery for an extended period, then remove the battery from the computer for storage.
- Before removing the battery for storage charge it to 60% - 70%.
- Check stored batteries at least every 3 months and charge them to 60% - 70%.

Battery Disposal

The product that you have purchased contains a rechargeable battery. The battery is recyclable. At the end of its useful life, under various state and local laws, it may be illegal to dispose of this battery into the municipal waste stream. Check with your local solid waste officials for details in your area for recycling options or proper disposal.

Caution

Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Discard used battery according to the manufacturer's instructions.

Battery Level

Click the battery icon  in the taskbar to see the current battery level and charge status. A battery that drops below a level of 10% will not allow the computer to boot up. Make sure that any battery that drops below 10% is recharged within one week.

Related Documents

You may also need to consult the following manual for additional information:

User's Manual on CD/DVD

This describes the notebook PC's features and the procedures for operating the computer and its ROM-based setup program. It also describes the installation and operation of the utility programs provided with the notebook PC.

System Startup

1. Remove all packing materials.
2. Place the computer on a stable surface.
3. Insert the battery and make sure it is locked in position.
4. Securely attach any peripherals you want to use with the computer (e.g. keyboard and mouse) to their ports.
5. **When first setting up the computer use the following procedure** (as to safeguard the computer during shipping, the battery will be locked to not power the system until first connected to the AC/DC adapter and initially set up as below):
   - Attach the AC/DC adapter cord to the DC-In jack on the left of the computer, then plug the AC power cord into an outlet, and connect the AC power cord to the AC/DC adapter and **leave it there for 6 seconds or longer**.
   - Remove the adapter cord from the computer's DC-In jack, and then plug it back in again; the battery will now be unlocked.
6. Use one hand to raise the lid/LCD to a comfortable viewing angle (do not exceed 130 degrees); use the other hand (as illustrated in Figure 1) to support the base of the computer (**Note**: **Never** lift the computer by the lid/LCD).
7. Press the power button to turn the computer "on".

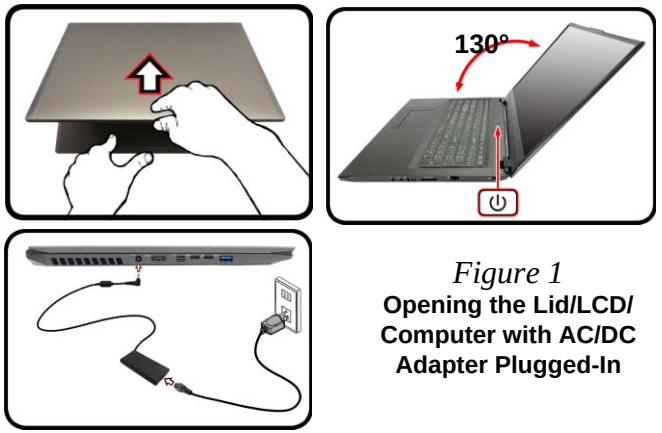
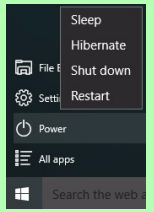


Figure 1
Opening the Lid/LCD/ Computer with AC/DC Adapter Plugged-In

Shut Down

Note that you should always shut your computer down by choosing the **Shut down** command in ***Windows*** (see below). This will help prevent hard disk or system problems.

1. Click the Start Menu icon.
2. Click the **Power** item.
3. Choose **Shut Down** from the menu.



Contents

Chapter 1: Introduction

Overview

This manual covers the information you need to service or upgrade the ***P970EN*** series notebook computer. Information about operating the computer (e.g. getting started, and the *Setup* utility) is in the *User's Manual*. Information about drivers (e.g. VGA & audio) is also found in the *User's Manual*. The manual is shipped with the computer.

Operating systems (e.g. *Windows 10*, etc.) have their own manuals as do application softwares (e.g. word processing and database programs). If you have questions about those programs, you should consult those manuals.

The ***P970EN*** series notebook is designed to be upgradeable. See ***Disassembly on page 2 - 1*** for a detailed description of the upgrade procedures for each specific component. Please take note of the warning and safety information indicated by the "  " symbol.

The balance of this chapter reviews the computer's technical specifications and features.

Specifications

Latest Specification Information

The specifications listed here are correct at the time of sending them to the press. Certain items (particularly processor types/speeds) may be changed, delayed or updated due to the manufacturer's release schedule. Check with your service center for more details.

CPU Speed & Computer in DC Mode

Note that when the computer is in DC mode (powered by the battery only) the CPU may not run at full speed. This is a design feature implemented in order to protect the battery.

Processor Options

i7-8750H (2.20GHz)

9MB Smart Cache, **14nm**, DDR4-2666MHz, TDP 45W

Core Logic

Intel® HM370 Express Chipset

LCD Options

17.3" (43.94cm), 16:9, FHD (1920x1080)

BIOS

128Mb SPI Flash ROM

INSYDE BIOS

Memory

Dual Channel DDR4

Two 260 Pin SO-DIMM Sockets

Supporting **DDR4 2666MHz** Memory Modules

Memory Expandable from **8GB** (**minimum**) up to **64GB** (**maximum**)

Compatible with 4GB, 8GB, 16GB or 32GB Modules

(The real memory operating frequency depends on the FSB of the processor.)

Security

Security (Kensington® Type) Lock Slot

BIOS Password

Intel PTT for Systems Without TPM Hardware

(**Factory Option**) TPM 2.0

(**Factory Option**) Fingerprint Reader Module

Video Adapter Options

Microsoft Hybrid Graphics Mode or Discrete Graphics Mode

Supports up to 4 Active Displays

Supports NVIDIA Surround View via HDMI x 1 and MiniDP x 1 and Display Port over Type-C x 1

Intel Integrated GPU

Intel® UHD Graphics 630

Dynamic Frequency

Intel Dynamic Video Memory Technology

Microsoft DirectX®12 Compatible

NVIDIA® Discrete GPU

NVIDIA® GeForce GTX 2080 with Max-Q

8GB GDDR6 Video RAM

Microsoft DirectX®12 Compatible

Supports GPU Overclocking

Pointing Device

(**Factory Option**) Built-in Touchpad ((with Microsoft PTP Multi Gesture & Scrolling Functionality)

Or

(**Factory Option**) Built-In Secure Pad (with Microsoft PTP Multi Gesture & Scrolling Functionality)

Keyboard

Full Size **Standard Full Color** LED Keyboard (with numeric keypad)

Or

(**Factory Option**) Full Size **Full Color "Per Key"** LED Keyboard (with numeric keypad)

Storage

One changeable 2.5" (6cm) **7.0mm (h) SATA** (Serial) Hard Disk Drive/Solid State Drive (SSD)

(**Factory Option**) **One** M.2 2280 **SATA** Solid State Drive (SSD)

Or

(**Factory Option**) **Two PCIe Gen3 x4** M.2 2280 SSDs supporting RAID level 0/1

Audio

High Definition Audio Compliant Interface

S/PDIF Digital Output

Two Speakers

Sound BlasterX® Pro-Gaming 360°

Built-In Array Microphone

Communication

1.0M HD PC Camera Module

Built-In 10/100/1000Mb Base-TX Ethernet LAN

WLAN/ Bluetooth M.2 Modules:

(**Factory Option**) Intel® Dual Band Wireless-AC 9260 Wireless LAN (**802.11ac**) + Bluetooth

(**Factory Option**) Intel® Dual Band Wireless-AC 9560 Wireless LAN (**802.11ac**) + Bluetooth

(**Factory Option**) Intel® Dual Band Wireless-AC 9462 Wireless LAN (**802.11ac**) + Bluetooth

(**Factory Option**) Qualcomm® Atheros Killer™ Wireless-AC 1550i Wireless LAN (**802.11ac**) + Bluetooth

Card Reader

Embedded Multi-In-1 Push-Push Card Reader

MMC (MultiMedia Card) / RS MMC

SD (Secure Digital) / Mini SD / SDHC/ SDXC

M.2 Slots

Slot 1 for **Combo WLAN and Bluetooth** Module

Slot 2 for **SATA** or **PCIe Gen3 x4 SSD**

Slot 3 for **PCIe Gen3 x4 SSD**

Interface

One USB 3.1 Gen 2 Type-C Port*

**The maximum amount of current supplied by USB Type-C ports is 500mA (USB 2.0)/900mA (USB 3.1).*

One DisplayPort 1.3 over USB 3.1 Gen 2 Type-C Port

Two USB 3.0 (USB 3.1 Gen 1) Type-A Ports (Including one AC/DC Powered USB Port)

One Mini DisplayPort 1.3

One HDMI-Out Port

One 2-In-1 Audio Jack (Microphone and S/PDIF Optical)

One 2-In-1 Audio Jack (Headphone and Microphone)

One RJ-45 LAN Jack

One DC-In Jack

USB 3.1 Gen 2

Note that when a single USB device is plugged in to a USB 3.1 Gen 2 port the data transfer speed will be 10Gbps, however when two devices are plugged in to both USB 3.1 Gen 2 ports, this bandwidth will be shared between the ports.

Environmental Spec

Temperature

Operating: 5°C - 35°C

Non-Operating: -20°C - 60°C

Relative Humidity

Operating: 20% - 80%

Non-Operating: 10% - 90%

Power

Embedded 4-Cell Polymer Battery Pack, 62WH

Full Range AC/DC Adapter

AC Input: 100 - 240V, 50 - 60Hz

DC Output: 19.5V, 9.23A (**180W**)

Dimensions & Weight

398.6mm (w) * 268mm (d) * 19.9mm (h)

2.5kg (Barebone with 62WH Battery)

External Locator - Top View with LCD Panel Open

Figure 1
Top View

1. PC Camera
2. *PC Camera LED
   **When the PC camera is in use, the LED will be illuminated.*
3. Built-In Array Microphone
4. LCD
5. Power Button
6. Keyboard
7. Touchpad & Buttons
8. Fingerprint Sensor (**Optional**)

External Locator - Front & Right Side Views

FRONT VIEW

Figure 2
Front View

1. LED Indicator

RIGHT SIDE VIEW

Figure 3
Right Side View

1. Microphone-In Jack
2. Headphone & S/PDIF Combo Jack
3. USB 3.0 (USB 3.1 Gen 1) Port
4. Multi-in-1 Card Reader
5. RJ-45 LAN Jack
6. Security Lock Slot

External Locator - Left Side & Rear View

Figure 4
Left Side View

1. Vent
2. DC-In Jack
3. HDMI-Out Port
4. Mini DisplayPort
5. DisplayPort 1.3 over USB 3.1 Gen 2 Type-C Port
6. USB 3.1 Gen 2 Type-C Port
7. Powered USB 3.0 Port

LEFT SIDE VIEW

Figure 5
Rear View

1. Vent

REAR VIEW

External Locator - Bottom View

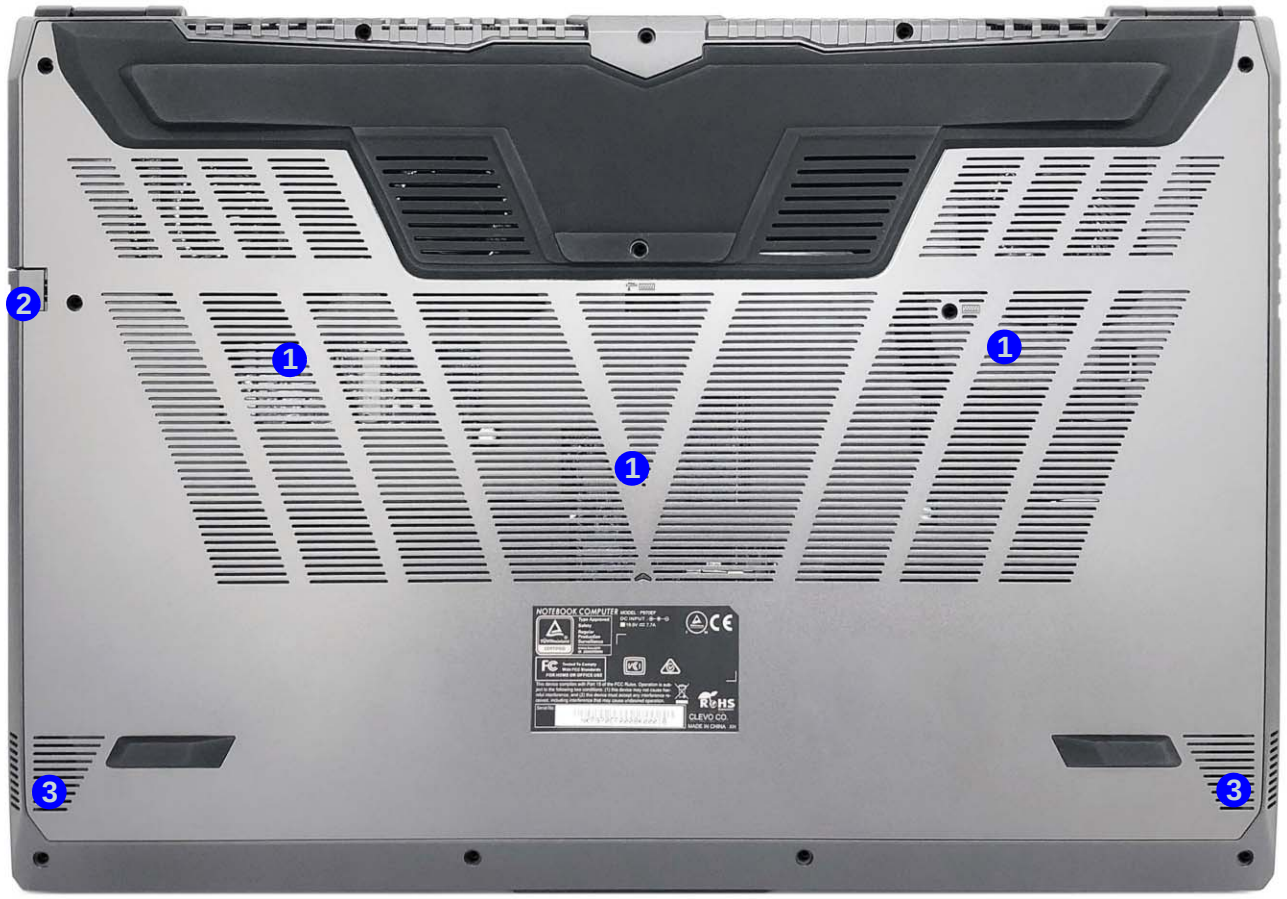


Figure 6
Bottom View

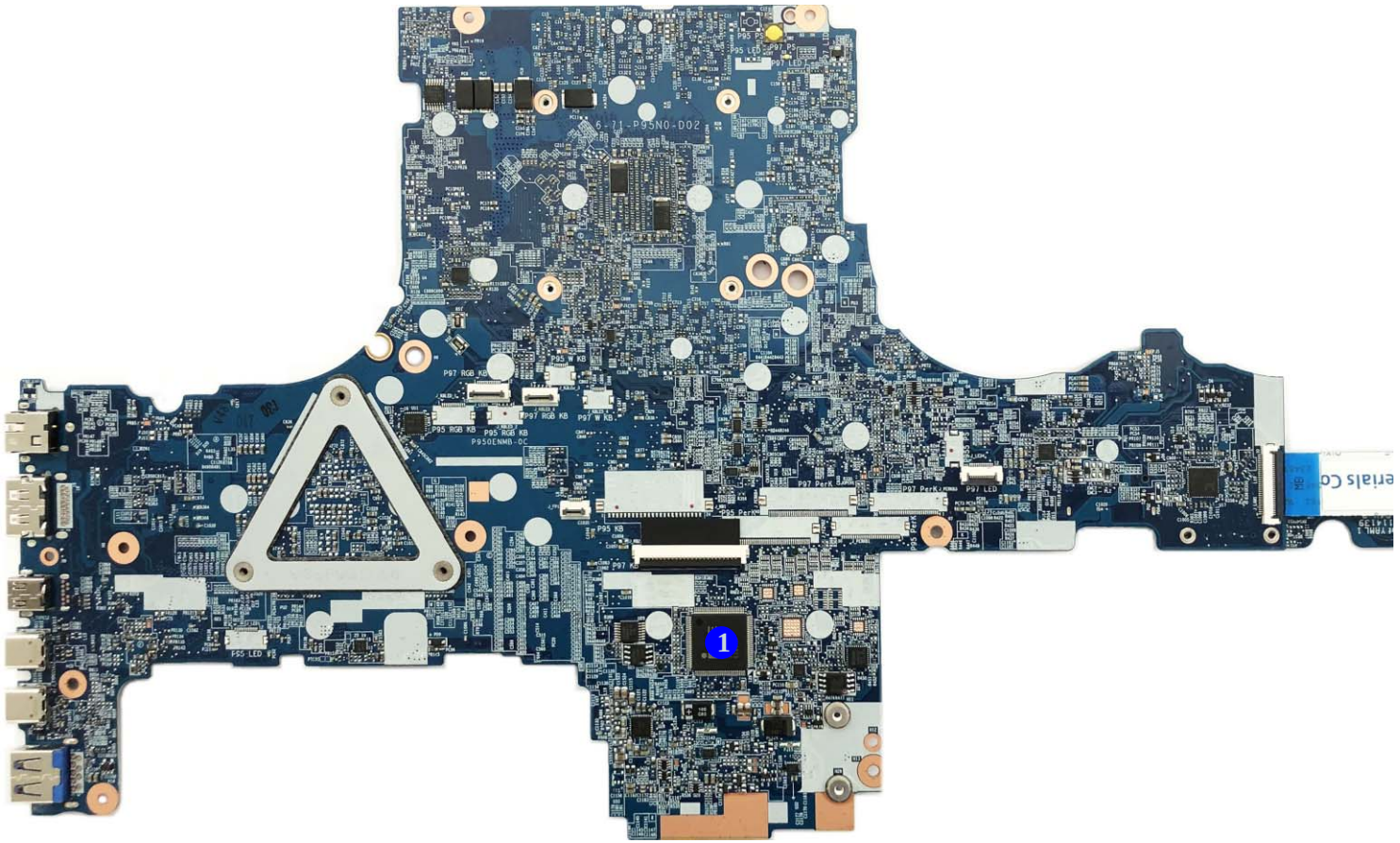
1. Vent
2. RJ-45 LAN Jack
3. Speakers

Overheating

To prevent your computer from overheating, make sure nothing blocks any vent while the computer is in use.

Mainboard Overview - Top (Key Parts)

Figure 7
Mainboard Top Key Parts



1. KBC-ITE IT8587

Mainboard Overview - Bottom (Key Parts)

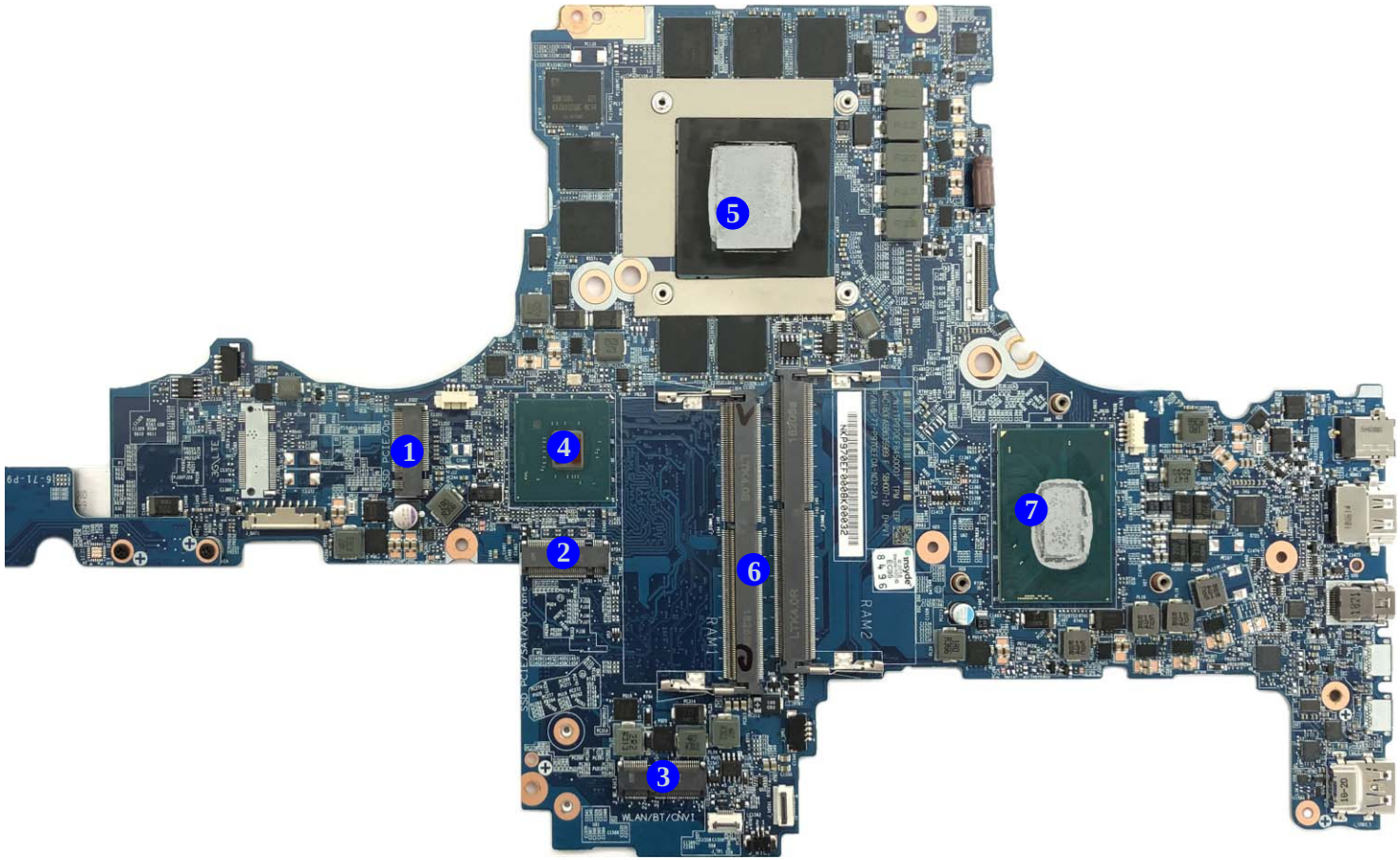


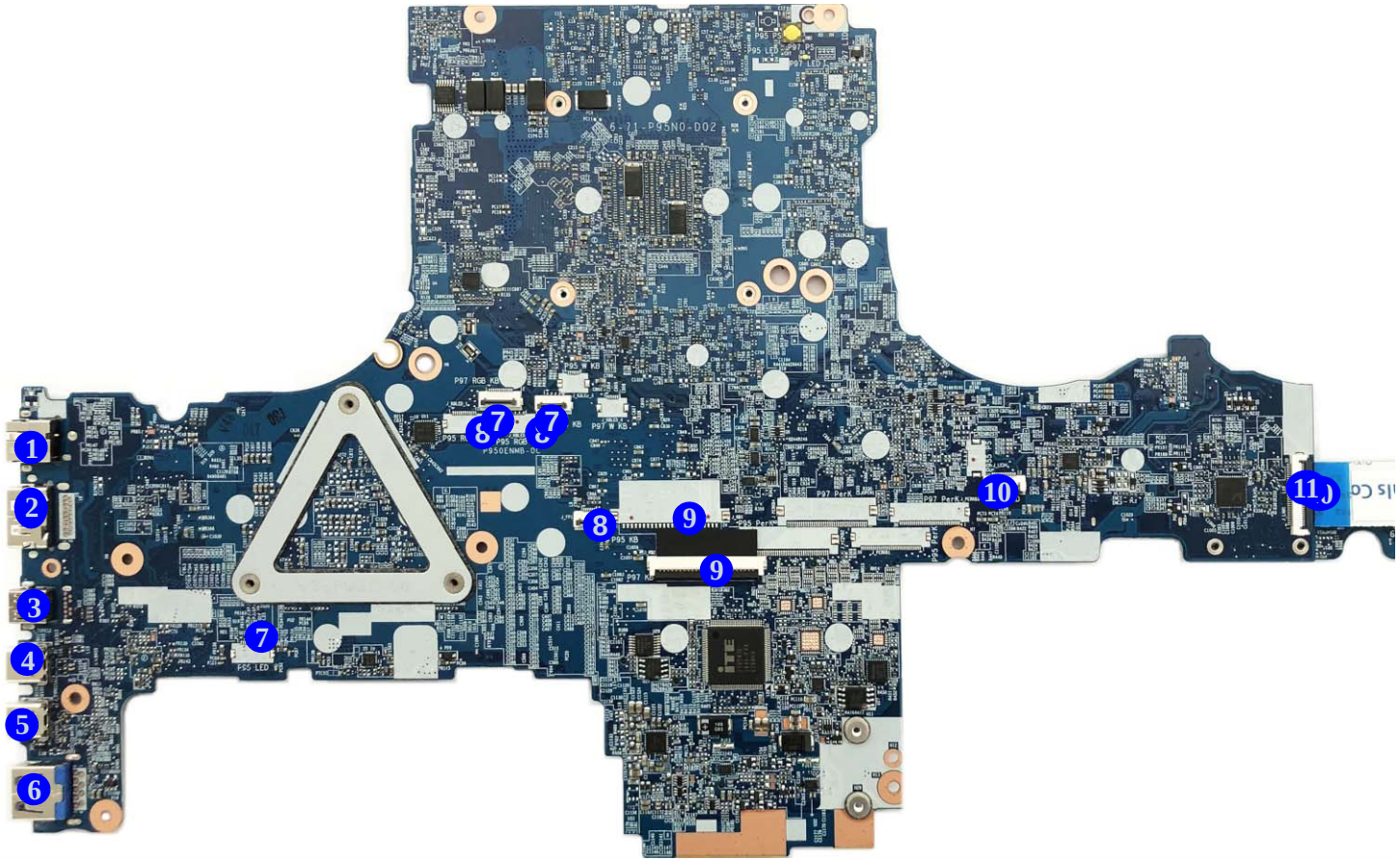
Figure 8
Mainboard Bottom Key Parts

1. Mini-Card Connector (M.2 SATA Module)
2. Mini-Card Connector (M.2 PCIE/SATA SSD Module)
3. Mini-Card Connector (WLAN Module)
4. PCH
5. GPU
6. Memory Slots DDR4 SO-DIMM
7. CPU

Mainboard Overview - Top (Connectors)

Figure 9
Mainboard Top Connectors

1. DC-In Jack
2. HDMI Port
3. Mini DisplayPort
4. DisplayPort 1.3 over USB 3.1 Gen 2 Type-C Port
5. USB 3.1 Gen 2 Type-C Port
6. Powered USB 3.0 Port
7. LED KB Connector
8. TP FP Connector
9. Keyboard Cable Connector
10. LED Board Connector
11. LAN Board Connector



Mainboard Overview - Bottom (Connectors)

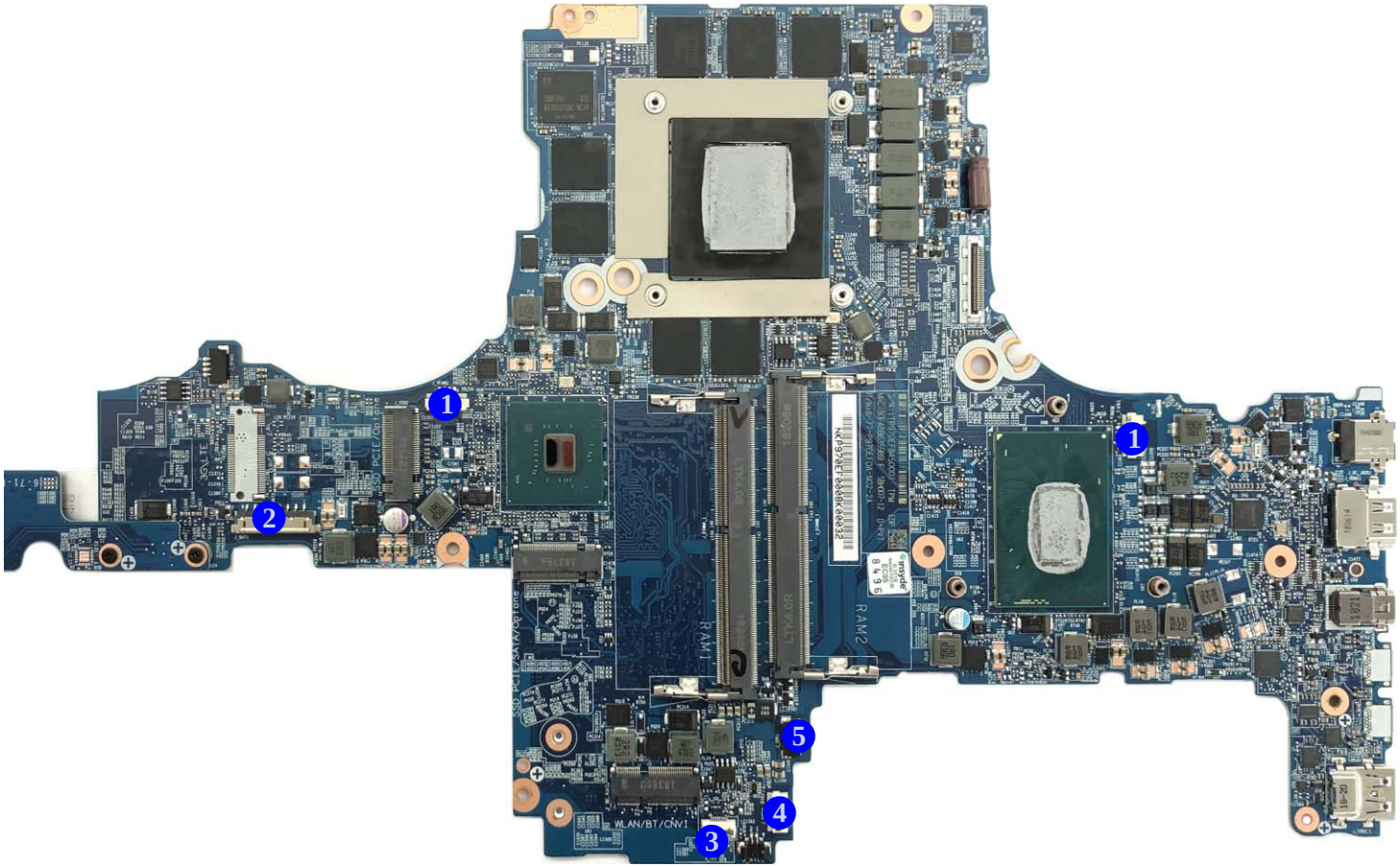


Figure 10
Mainboard Bottom Connectors

1. Fan Connector
2. Battery Connector
3. Touchpad Cable Connector
4. HDD Connector
5. Speaker Connector

Chapter 2: Disassembly

Overview

This chapter provides step-by-step instructions for disassembling the ***P970EN*** series notebook's parts and subsystems. When it comes to reassembly, reverse the procedures (unless otherwise indicated).

We suggest you completely review any procedure before you take the computer apart.

Procedures such as upgrading/replacing the RAM, optical device and hard disk are included in the User's Manual but are repeated here for your convenience.

To make the disassembly process easier each section may have a box in the page margin. Information contained under the figure # will give a synopsis of the sequence of procedures involved in the disassembly procedure. A box with a lists the relevant parts you will have after the disassembly process is complete. **Note**: The parts listed will be for the disassembly procedure listed ONLY, and not any previous disassembly step(s) required. Refer to the part list for the previous disassembly procedure. The amount of screws you should be left with will be listed here also.

A box with a will also provide any possible helpful information. A box with a contains warnings.

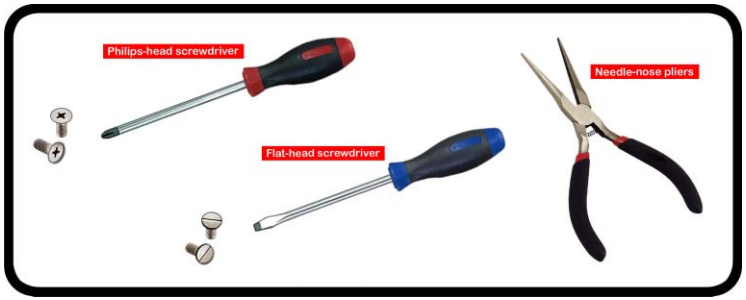
An example of these types of boxes are shown in the sidebar.

NOTE: All disassembly procedures assume that the system is turned **OFF**, and disconnected from any power supply (the battery is removed too).

Maintenance Tools

The following tools are recommended when working on the notebook PC:

- M3 Philips-head screwdriver
- M2.5 Philips-head screwdriver (magnetized)
- M2 Philips-head screwdriver
- Small flat-head screwdriver
- Pair of needle-nose pliers
- Anti-static wrist-strap



Connections

Connections within the computer are one of four types:

Locking collar sockets for ribbon connectors	To release these connectors, use a small flat-head screwdriver to gently pry the locking collar away from its base. When replacing the connection, make sure the connector is oriented in the same way. The pin1 side is usually not indicated.
Pressure sockets for multi-wire connectors	To release this connector type, grasp it at its head and gently rock it from side to side as you pull it out. Do not pull on the wires themselves. When replacing the connection, do not try to force it. The socket only fits one way.
Pressure sockets for ribbon connectors	To release these connectors, use a small pair of needle-nose pliers to gently lift the connector away from its socket. When replacing the connection, make sure the connector is oriented in the same way. The pin1 side is usually not indicated.
Board-to-board or multi-pin sockets	To separate the boards, gently rock them from side to side as you pull them apart. If the connection is very tight, use a small flat-head screwdriver - use just enough force to start.

Maintenance Precautions

The following precautions are a reminder. To avoid personal injury or damage to the computer while performing a removal and/or replacement job, take the following precautions:

1. **Don't drop it**. Perform your repairs and/or upgrades on a stable surface. If the computer falls, the case and other components could be damaged.
2. **Don't overheat it**. Note the proximity of any heating elements. Keep the computer out of direct sunlight.
3. **Avoid interference**. Note the proximity of any high capacity transformers, electric motors, and other strong magnetic fields. These can hinder proper performance and damage components and/or data. You should also monitor the position of magnetized tools (i.e. screwdrivers).
4. **Keep it dry**. This is an electrical appliance. If water or any other liquid gets into it, the computer could be badly damaged.
5. **Be careful with power**. Avoid accidental shocks, discharges or explosions.
   - Before removing or servicing any part from the computer, turn the computer off and detach any power supplies.
   - When you want to unplug the power cord or any cable/wire, be sure to disconnect it by the plug head. Do not pull on the wire.
6. **Peripherals** – Turn off and detach any peripherals.
7. **Beware of static discharge**. ICs, such as the CPU and main support chips, are vulnerable to static electricity. Before handling any part in the computer, discharge any static electricity inside the computer. When handling a printed circuit board, do not use gloves or other materials which allow static electricity buildup. We suggest that you use an anti-static wrist strap instead.
8. **Beware of corrosion**. As you perform your job, avoid touching any connector leads. Even the cleanest hands produce oils which can attract corrosive elements.
9. **Keep your work environment clean**. Tobacco smoke, dust or other air-born particulate matter is often attracted to charged surfaces, reducing performance.
10. **Keep track of the components**. When removing or replacing any part, be careful not to leave small parts, such as screws, loose inside the computer.

Power Safety Warning

Before you undertake any upgrade procedures, make sure that you have turned off the power, and disconnected all peripherals and cables (including telephone lines and power cord). It is advisable to also remove your battery in order to prevent accidentally turning the machine on.

Cleaning

Do not apply cleaner directly to the computer, use a soft clean cloth.

Do not use volatile (petroleum distillates) or abrasive cleaners on any part of the computer.

(For Computer Models Supplied with Light Blue Cleaning Cloth) Some computer models in this series come supplied with a light blue cleaning cloth. To clean the computer case with this cloth follow the instructions below.

- Power off the computer and peripherals.
- Disconnect the AC/DC adapter from the computer.
- Use a little water to dampen the cloth slightly.
- Clean the computer case with the cloth.
- Dry the computer with a dry cloth, or allow it time to dry before turning on.
- Reconnect the AC/DC adapter and turn the computer on.

Disassembly Steps

The following table lists the disassembly steps, and on which page to find the related information. **PLEASE PERFORM THE DISASSEMBLY STEPS IN THE ORDER INDICATED.**

To remove the Keyboard:

1. Remove the keyboard *page 2 - 5*

To remove the Battery:

1. Remove the keyboard *page 2 - 5*
2. Remove the battery *page 2 - 6*

To remove the HDD:

1. Remove the keyboard *page 2 - 5*
2. Remove the battery *page 2 - 6*
3. Remove the HDD *page 2 - 8*

To remove the System Memory:

1. Remove the keyboard *page 2 - 5*
2. Remove the battery *page 2 - 6*
3. Remove the system memory *page 2 - 10*

To remove and install the M.2 SSD:

1. Remove the keyboard *page 2 - 5*
2. Remove the battery *page 2 - 6*
3. Remove the M.2 SSD-1 *page 2 - 11*
4. Remove the M.2 SSD-2 *page 2 - 12*

To remove the Wireless LAN Module:

1. Remove the keyboard *page 2 - 5*
2. Remove the battery *page 2 - 6*
3. Remove the WLAN *page 2 - 13*

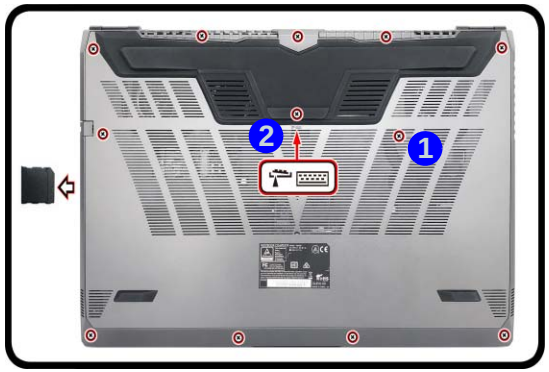
To remove the CCD Module:

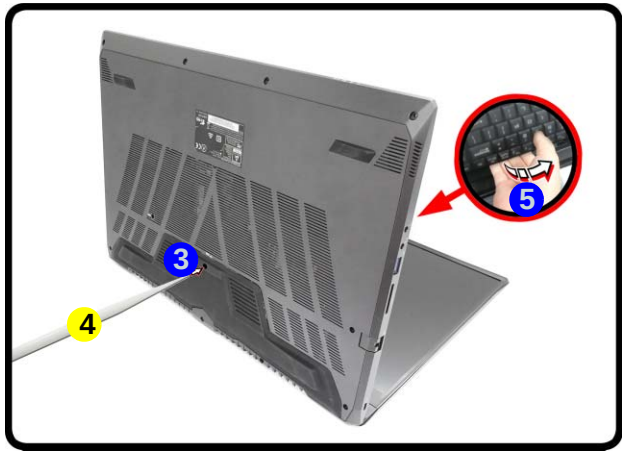
1. Remove the keyboard *page 2 - 5*
2. Remove the battery *page 2 - 6*
3. Remove the CCD module *page 2 - 15*

Removing the Keyboard

1. Turn **off** the computer, turn it over.
2. Remove screws 1 - 2 from the bottom of the computer.
3. Open it up with the LCD on a flat surface before pressing at point 3 to release the keyboard module (use the special eject stick 4 to do this) while releasing the keyboard in the direction of the arrow 5 as shown (***Figure 1a***).
4. Carefully lift the keyboard 6 up, being careful not to bend the keyboard ribbon cable 7. Disconnect the keyboard ribbon cable 7 from the locking collar socket by using a flat-head screwdriver to pry the locking collar pins 8 away from the base (***Figure 1b***).
5. Carefully lift the keyboard 6 off the computer (***Figure 1c***).

a.





b.

c.

Figure 1
Keyboard Removal

a. Remove the screws from the bottom of the computer and then eject the keyboard using a special eject stick to push the keyboard out while releasing the keyboard as shown.
b. Lift the keyboard up and disconnect the keyboard ribbon cable from the locking collar socket.
c. Remove the keyboard.

Re-inserting the Keyboard

When re-inserting the keyboard firstly, align the keyboard tabs at the bottom of the keyboard with the slots in the case.

4. Eject Stick
6. Keyboard

- 2 Screws

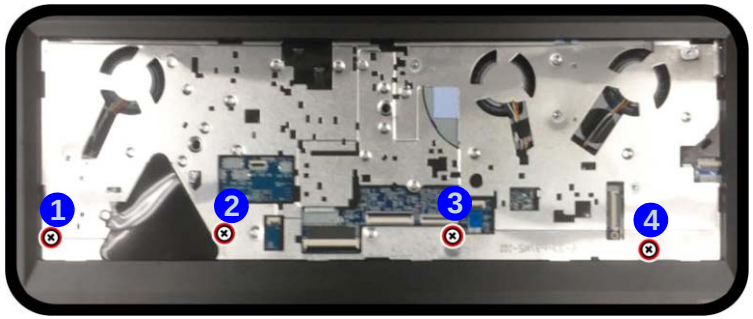
Figure 2
Battery Removal

a. Remove the screws.
b. Remove the SD cover and screws.
c. Remove the bottom case.

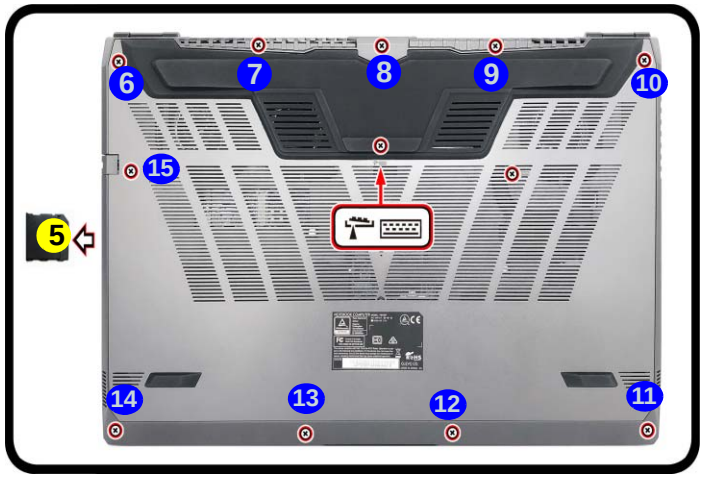
Removing the Battery

1. Turn the computer **off**, and remove the keyboard (*page 2 - 5*).
2. Remove screws 1 - 4 (*Figure 2a*).
3. Remove the SD card cover 5 and screws 6 - 15 (*Figure 2b*).
4. Carefully lift the bottom case 16 up in the direction of the arrow at point 17 - 18 and remove it (*Figure 2c*).

a.



b.



c.

5. SD Card Cover
16. Bottom Case

- 14 Screws

5. The battery will be visible at point 19 on the computer (*Figure 3d*).
6. Carefully disconnect the cable 20, then remove screws 21 - 22 (*Figure 3e*).
7. Lift the battery 23 off the computer (*Figure 3f*).
8. Reverse the process to install a new battery (do not forget to replace all the screws and bottom cover).

Figure 3
Battery Removal (cont'd.)

d. Locate the battery.
e. Disconnect the cable and remove the screws.
f. Lift the battery off the computer.

d.

f.

e.

23. Battery

- 2 Screws

Removing the Hard Disk Drive

The hard disk drive can be taken out to accommodate other 2.5" serial (SATA) hard disk drives with a height of 7mm (h). Follow your operating system's installation instructions, and install all necessary drivers and utilities (as outlined in **Chapter 4 of the User's Manual**) when setting up a new hard disk.

Figure 4
HDD Assembly Removal

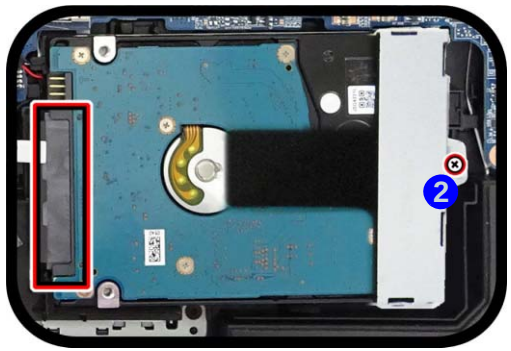
a. Locate the HDD.
b. Remove the screw.

Hard Disk Disassembly Process

1. Turn **off** the computer, and remove the battery (***page 2 - 6***).
2. The HDD will be visible at point 1 on the mainboard (***Figure 4a***).
3. Remove screws 2 from the HDD assembly (***Figure 4b***).

a.

b.



6. Hard Disk

- 1 Screw

HDD System Warning

New HDD's are blank. Before you begin make sure:

You have backed up any data you want to keep from your old HDD.

You have all the CD-ROMs and FDDs required to install your operating system and programs.

If you have access to the internet, download the latest application and hardware driver updates for the operating system you plan to install. Copy these to a removable medium.

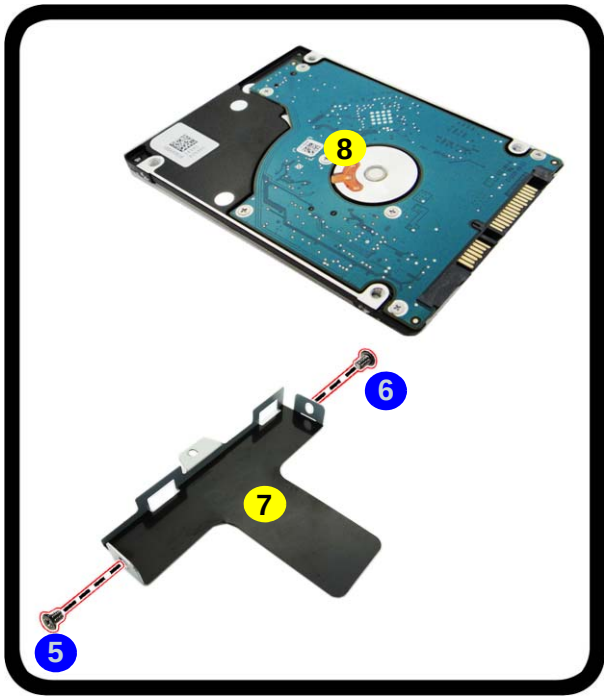
4. Slightly lift and pull the hard disk out.
5. Lift the hard disk assembly 3 out of the bay 4 (*Figure 5c*).
6. Remove screws 5 - 6 and bracket 7 from the hard disk 8 (*Figure 5d*).
7. Reverse the process to install a new hard disk (do not forget to replace the screws).

Figure 5
HDD Assembly Removal (cont'd.)

c. Slide and pull the HDD assembly out of the bay.
d. Remove the screws and bracket from the HDD.

c.

d.



3. HDD Assembly
7. HDD Bracket
8. HDD

- 2 Screws

Figure 6
RAM Module Removal

a. The RAM modules will be visible at point 1 on the mainboard.
b. Pull the release latches.
c. Remove the module.

Contact Warning

Be careful not to touch the metal pins on the module's connecting edge. Even the cleanest hands have oils which can attract particles, and degrade the module's performance.

4. RAM Module

Removing the System Memory (RAM)

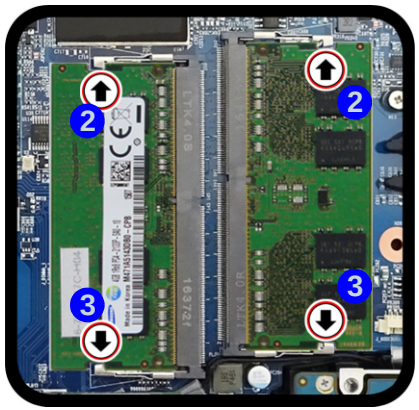
The computer has four memory sockets for 260 pin Small Outline Dual In-line Memory Modules (SO-DIMM) supporting DDR4 Up to 2400 MHz. The main memory can be expanded up to 64GB. The total memory size is automatically detected by the POST routine once you turn on your computer.

Memory Upgrade Process

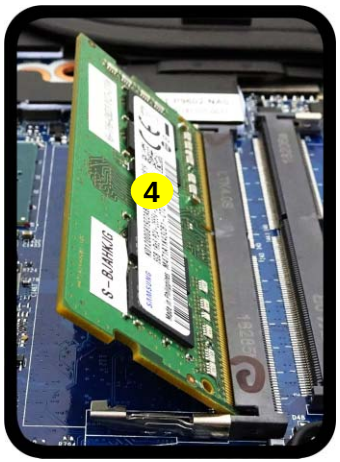
1. Turn **off** the computer, turn it over, remove the battery (*page 2 - 6*).
2. The RAM-2 modules will be visible at point 1 on the mainboard (*Figure 6a*).
3. Gently pull the two release latches (2 & 3) on the sides of the memory socket in the direction indicated by the arrows (*Figure 6b*). The RAM module 4 will pop-up (*Figure 6c*), and you can then remove it.
4. Pull the latches to release the second module if necessary.
5. Insert a new module holding it at about a 30° angle and fit the connectors firmly into the memory slot.
6. The module will only fit one way as defined by its pin alignment. Make sure the module is seated as far into the slot as it will go. DO NOT FORCE IT; it should fit without much pressure.
7. Press the module in and down towards the mainboard until the slot levers click into place to secure the module.
8. Replace the bottom cover and the screws (see *page 2 - 6*).
9. Restart the computer to allow the BIOS to register the new memory configuration as it starts up.

a.

b.



c.



Removing the M.2 SSD Module

M.2 SSD-1 Removal Procedure

1. Turn **off** the computer, turn it over, remove the battery (*page 2 - 6*).
2. The M.2 SSD module will be visible at point 1 on the mainboard (*Figure 7a*).
3. Remove the screw 2 (*Figure 7b*).
4. The M.2 SSD module 3 (*Figure 7c*) will pop-up, and you can remove it from the computer.
5. Reverse the process to install a new module (do not forget to replace the screws and thermal pad).

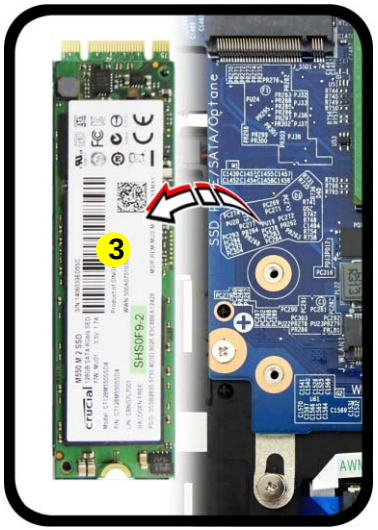
Figure 7
M.2 SSD-1 Module Removal

a. Locate the M.2 SSD.
b. Remove the screw.
c. The M.2 SSD module will pop up.

a.

b.

c.



3.M2 SSD Module

- 1 Screw

Figure 8
M.2 SSD-2 Module Removal

a. Locate the M.2 SSD.
b. Remove the screw.
c. The M.2 SSD module will pop up.

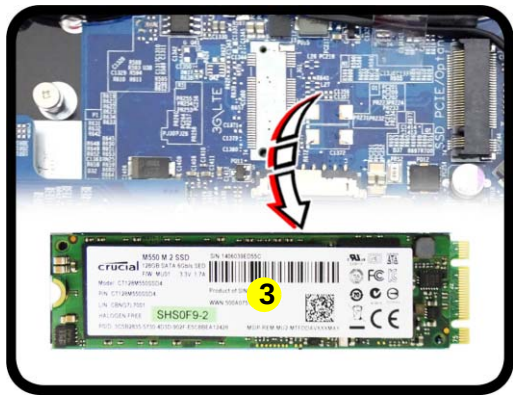
M.2 SSD-2 Removal Procedure

1. Turn **off** the computer, turn it over, remove the battery (***page 2 - 6***).
2. The M.2 SSD module will be visible at point 1 on the mainboard (***Figure 8a***).
3. Remove the screw 2 (***Figure 8b***).
4. The M.2 SSD module 3 (***Figure 8c***) will pop-up, and you can remove it from the computer.
5. Reverse the process to install a new module (do not forget to replace the screws and thermal pad).

a.

b.

c.



3.M2 SSD Module

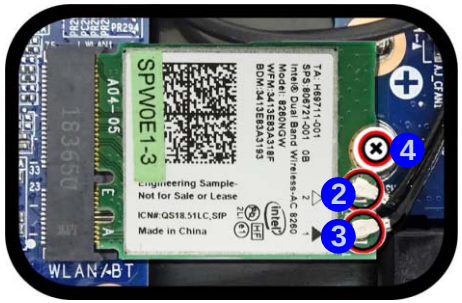
- 1 Screw

Removing the Wireless LAN Module

1. Turn **off** the computer, turn it over, remove the battery (*page 2 - 6*).
2. The Wireless LAN module will be visible at point 1 on the mainboard (*Figure 9a*).
3. Carefully disconnect the cables 2 & 3, and then remove the screw 4 (*Figure 9b*)
4. The Wireless LAN module 5 (*Figure 9c*) will pop-up, and you can remove it from the computer.

a.

b.



c.

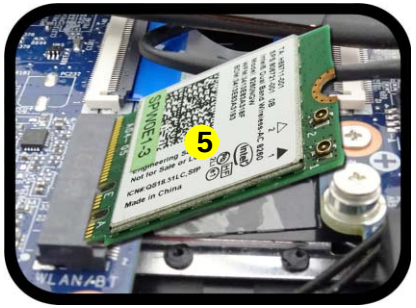


Figure 9
Wireless LAN Module Removal

a. Locate the WLAN.
b. Disconnect the cables and remove the screw.
c. The WLAN module will pop up.

Note: Make sure you reconnect the antenna cable to the "1 + 2" socket (*Figure 9b*).

5.Wireless LAN Module

- 1 Screw

Wireless LAN, Combo Module Cables

Note that the cables for connecting to the antennae on WLAN, WLAN & Bluetooth Combo modules are not labelled. The cables/covers (each cable will have either a black or transparent cable cover) are color coded for identification as outlined in the table below.

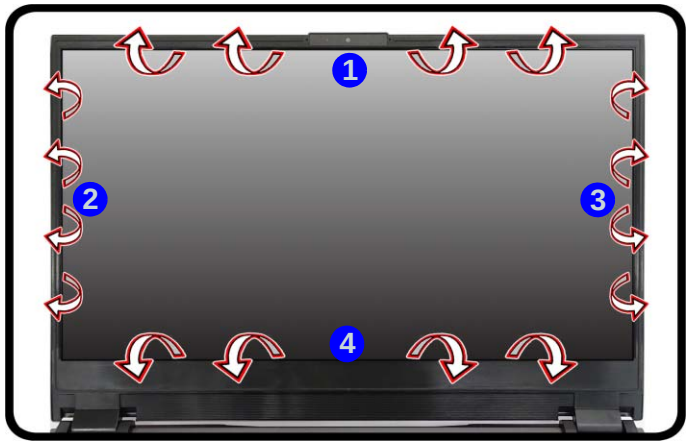
Module Type	Antenna Type	Cable Color	Cable Cover Type
WLAN/WLAN & Bluetooth Combo	WM 1	Black	Transparent
	WM 2	Black	White

Cable 1 is usually connected to antenna 1 on the module, and cable 2 to antenna 2.

Removing the CCD

1. Turn **off** the computer, turn it over to remove the battery (*page 2 - 6*).
2. Lay the computer down on a flat surface with the top case up forming a 130 degree angle.
3. Carefully run your fingers around the inner frame of the LCD panel to lift at points 1 - 4 as indicated by the arrows (*Figure 10a*).
4. Remove the LCD front cover 5 (*Figure 10b*).

a.



b.

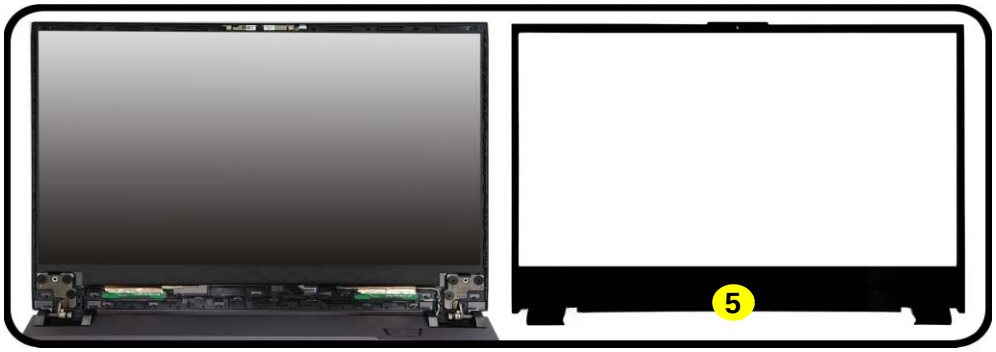


Figure 10
CCD Removal

a. Remove rubber and screws and then carefully release the inner frame of the LCD panel at the points indicated by the arrows.
b. Remove the LCD front cover.

9. LCD Front Cover

- 2 Screws

Figure 11
CCD Removal (cont'd)

c. Disconnect the cable from the locking collar socket.
d. Remove the CCD module.

5. Disconnect the cable 6 from the locking collar socket by using a flat-head screwdriver to pry the locking collar pins 7 away from the base (***Figure 11c***).
6. Remove the CCD module 8 (***Figure 11d***).
7. Reverse the process to install a new CCD module.

c.

d.

11. CCD Module

Appendix A:Part Lists

This appendix breaks down the ***P970EN*** series notebook's construction into a series of illustrations. The component part numbers are indicated in the tables opposite the drawings.

Note: This section indicates the *manufacturer's* part numbers. Your organization may use a different system, so be sure to cross-check any relevant documentation.

Note: Some assemblies may have parts in common (especially screws). However, the part lists DO NOT indicate the total number of duplicated parts used.

Note: Be sure to check any update notices. The parts shown in these illustrations are appropriate for the system at the time of publication. Over the product life, some parts may be improved or re-configured, resulting in *new* part numbers.

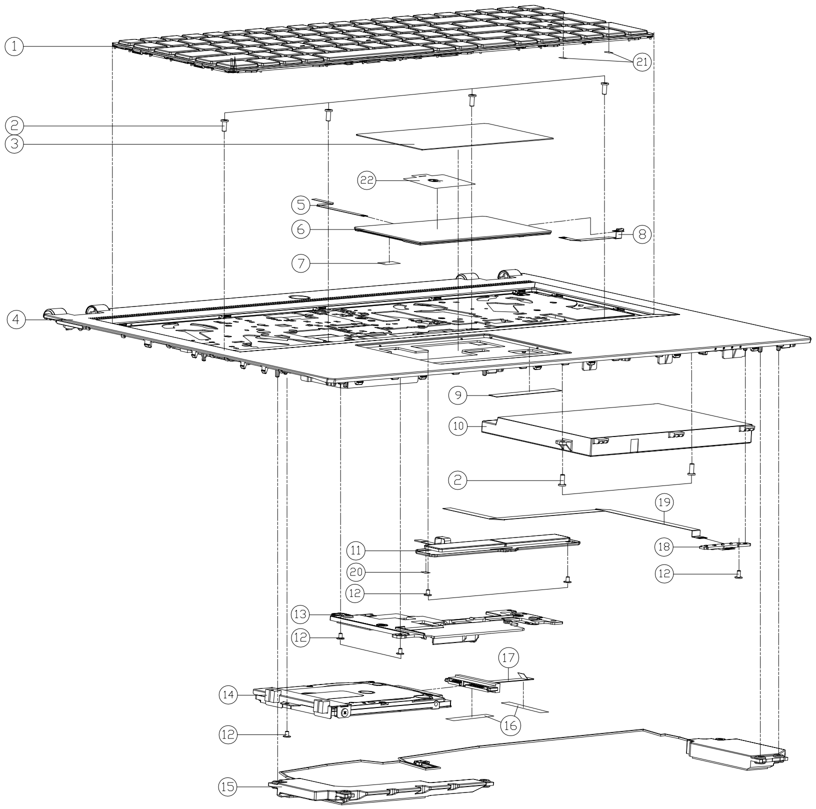
Part List Illustration Location

The following table indicates where to find the appropriate part list illustration.

Table A - 1
Part List Illustration Location

Part	
Top	*page A - 3*
Bottom	*page A - 4*
Main Board	*page A - 5*
HDD	*page A - 6*
LCD	*page A - 7*

Top

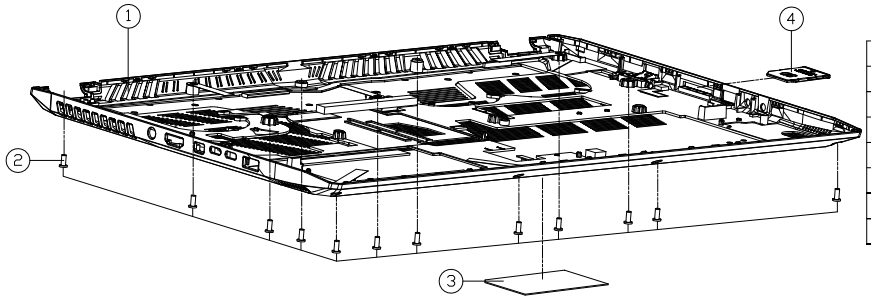


ITEM	PART NAME	PART NO	REMARK
1	LED PER KEY KB USA CVM17L23US.J4301 PA70ES BLACK GAMING SILVER LINING PRINTING ISOLATION WITH WIN10 KEY + K/B FRAME	6-80-PA7E0-012-1	
1	MULTI BL KB USA CVM15F23US.J430D N850HK1 BLACK GAMING SILVER LINING PRINTING ISOLATION WITH WIN10 KEY + K/B FRAME (MODIFY BRIGHTNESS)	6-80-N8500-011-1	
2	.SCREW M2.5*6L K BZ ICT NY	6-35-82125-6RA	
3	TP MYLAR AG32 FOR P970EN	6-40-P97N2-020	FOR (W/O FP(GAMMA TOUCH PAD))
4	TOP CASE MODULE P970EN (BLASTER PRINTING)	6-39-P97N2-012-B	
4	TOP CASE MODULE FOR P970EC (BLASTER PRINTING)	6-39-P9702-010-B	
5	FFC TP TO MB L=74.5 3.3V 6P P970EN(QX)	6-43-P97N0-032	
6	GAMMA SECURE PAD SYNAPTICS TM-P3449-002 I2C+PS2 (107.6*61MM)(HW:920-003606-04REV1)/MP FW(PR2864695)/WHQL P960EN	6-49-P95N3-022	FOR (W/FP(GAMMA SECURE PAD))
6	GAMMA TOUCH PAD SYNAPTICS TM-P3487-002 I2C+PS2 (106.8*60.2MM) WHQL P950EN	6-49-P95N3-011	FOR (W/O FP(GAMMA TOUCH PAD))
7	TAPE MYLAR TRANSPARENT (20*10*0.05) P180HM	6-40-P1803-020	
8	FFC TP TO MB L=65.5 3.3V 8PIN P970EN(QX)	6-43-P97N0-022	
9	GASKET 70*5*0.1T P970EN	6-47-00190-703	
10	BAT.P S LI 15.2V/4.08AH/62WH PSE 4S1P GETAC/VEKEN (POLYMER) BP-P970-41/3960VK/62WH	6-87-P95NS-62B00	
11	FUNCTION KEY FOR CLICK BUTTON MODULE W/O FINGER ADD PAINT P650RE6	6-23-KP65R-024	
12	.SCREW M2*3L KI NI ICT NY (DD=Ø4.0,DT=0.8)	6-35-B1120-3RD	
13	HDD HOLDER MODULE P970EN	6-42-P97NJ-102	
14	W/HDD ASS'Y P950HR	6-79-P950HR0J-010	
14	W/O HDD ASS'Y P950HR	6-79-P950HR0J-020	
15	(PRE-PROCESS) SPEAKER+SPONGE P970EN	6-78-P970EN02-010	
16	TAPE MYLAR (C),MYLAR M550J	6-40-M55J2-030	
17	HDD CON(351005-100)+PCB+W/CABLE (FFC CABLE 52MM) P950HP6	6-23-FP950-010	
18	FRONT LED BOARD V2.0 P950EN	6-77-P95N4-D02	
19	FFC LED TO MB L=232.5 3.3V 12P P970EN(QX)	6-43-P97N0-042	
20	CLICK MODULE FPC MYLAR 8*5*0.4T P970EN	6-40-P97N2-060	
21	ACETATE CLOTH 5*8*0.35 NB55TK1	6-47-NB552-010	
22	GAMMA SECURE PAD FINGER PRINT STICKER FOR P95/P6/P7	6-45-P95N8-D10	FOR (W/ FP(GAMMA TOUCH PAD))

Figure A - 1
Top

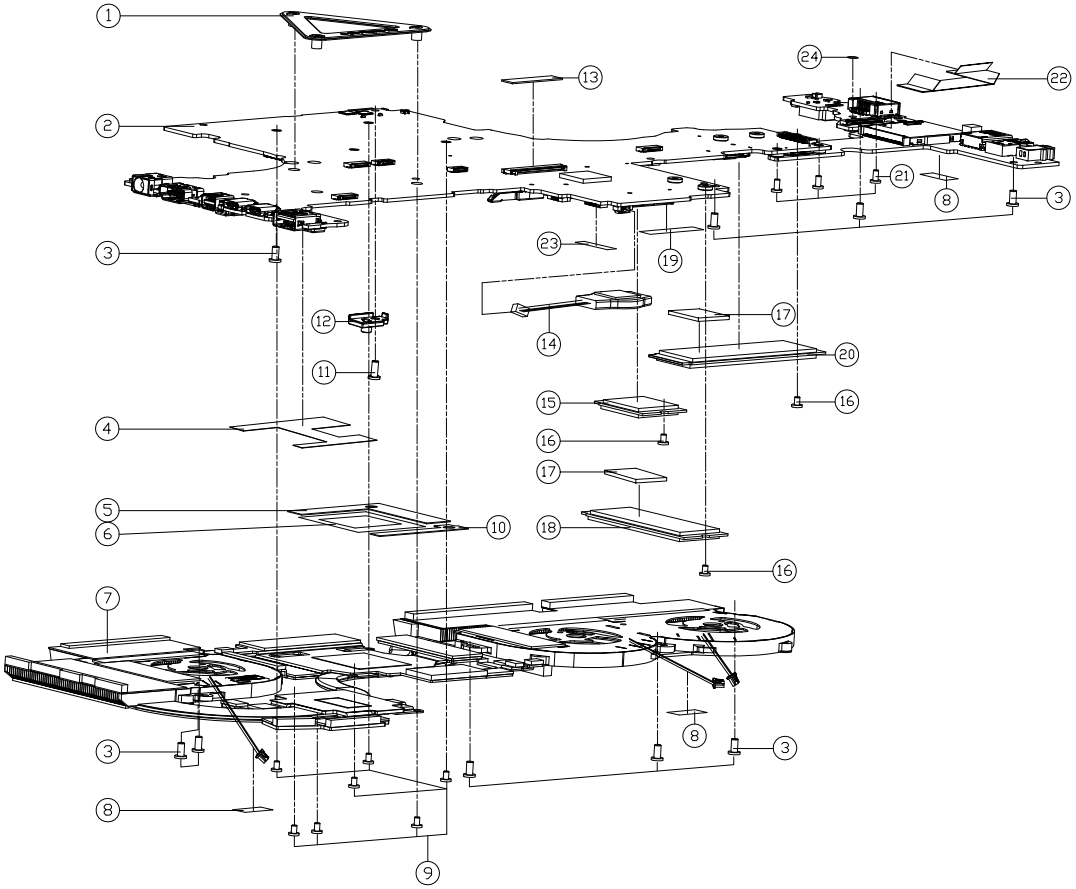
Bottom

Figure A - 2
Bottom



ITEM	PART NAME	PART NO	REMARK
1	BOTTOM CASE MODULE P970EN (MP)	6-39-P97N3-012	
2	.SCREW M2.5*6L K BZ ICT NY	6-35-82125-6RA	
3	PRODUCT LABEL FOR P970EF (CHANGE RATING)	6-45-P970EF03-011	
3	PRODUCT LABEL FOR P970ED (CHANGE RATING)	6-45-P970ED03-011	
3	PRODUCT LABEL FOR P970EN (CHANGE RATING)	6-45-P970EN03-011	
3	PRODUCT LABEL FOR P970EC	6-45-P970EC03-010	
4	DUMMY 3IN1 NON PUSH TYPE PC+ABS (C7230P-7010EX(CHANGE) W970SUW	6-42-W9708-011	

Main Board

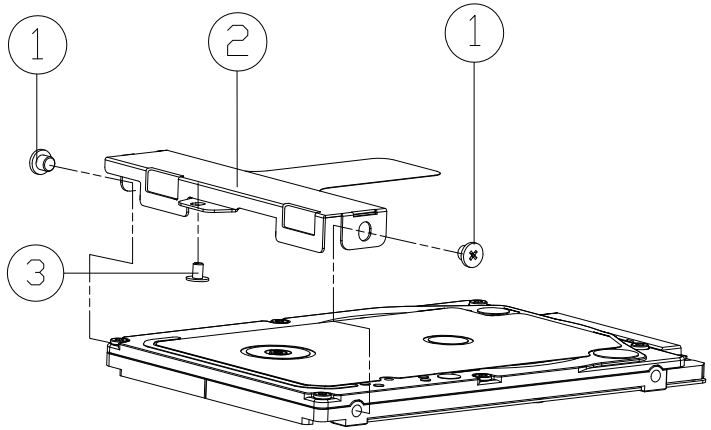


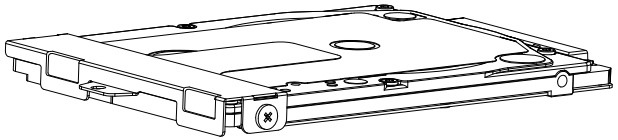
ITEM	PART NAME	PART NO	REMARK
1	CPU SUPPORTER MODULE P950EN	6-33-P95NS-100	
2	[illegible]	6-77-P970EF0A-N02-2A	
2	[illegible]	6-77-P970EF0A-N02-3A	
2	[illegible]	6-77-P970ED0A-N02-3A	
2	[illegible]	6-77-P970ENGA-N02-A	
3	SCREW M2.5*4L (D=4.6,T=0.8) KI NI ICT NY	6-35-B1125-4RA	
4	MB AL-MYLAR+PET P950ED	6-40-P95N2-D10	
5	ABSORBER 52*43*0.3T HAFS-TE30 P950HR	6-47-P9502-011	
6	N08E GI CHIP MYLAR PET (37.5*37.5*0.1) P950ED	6-40-P95NS-D10	FOR P970ED/EF
6	N08E-G3 CHIP MYLAR PET (37.5*37.5*0.1) P750TM	6-40-P75FS-010	FOR P970EN
7	CPU & GPU HEATSINK MODULE P960EN	6-31-P9602-NA2	
8	TAPE MYLAR TRANSPARENT (20*10*0.05) P180HM	6-40-P1803-020	
9	SCREW M2*3L KI NI ICT NY (DD=#4.0,DT=0.8)	6-35-B1120-3RD	
10	ABSORBER 50*9*0.3T HAFS-TE30 P950HR	6-47-P9502-021	
11	SCREW M2.5*6L K BZ ICT NY	6-35-82125-6RA	
12	MB SCREW BKT ZA-5 P970EN	6-33-P97N2-011	
13	KB CONNECTOR MYLAR 25*6.5*0.5T FR83 N130BU	6-40-N1303-011	
14	[illegible]	6-23-22015-TE0	
15	[illegible]	6-88-P75FF-4210	OPTION
15	[illegible]	6-88-N24GF-4200	OPTION
15	[illegible]	6-88-N24GF-4220	OPTION
15	[illegible]	6-88-P95EF-4200	OPTION
16	SCREW M2*2L KI NI ICT NY (DD=#5 ,T=0.5)	6-35-B1120-2R0	
17	THERMAL PAD MA500 (17.3*17.3*2.75T)MM N750BU	6-48-N7503-010	
18	[illegible]	6-85-D5116-Z02	OPTION
18	[illegible]	6-85-D511T-S00	OPTION
18	[illegible]	6-85-D511T-Z00	OPTION
18	[illegible]	6-85-D515B-H02	OPTION
18	[illegible]	6-85-D51R6-101	OPTION
18	[illegible]	6-85-D51R6-Z03	OPTION
18	[illegible]	6-85-D51R6-S09	OPTION
18	[illegible]	6-85-D515B-W01	OPTION
18	[illegible]	6-85-D515B-S08	OPTION
18	[illegible]	6-85-D51R6-H05	OPTION
18	[illegible]	6-85-D51R6-K00	OPTION
19	TAPE MYLAR (A),MYLAR M550J	6-40-M55J2-010	
20	[illegible]	6-85-D5116-Z02	OPTION
20	[illegible]	6-85-D511T-S00	OPTION
20	[illegible]	6-85-D515B-H02	OPTION
20	[illegible]	6-85-D51R6-Z03	OPTION
20	[illegible]	6-85-D51R6-S09	OPTION
20	[illegible]	6-85-D515B-W01	OPTION
20	[illegible]	6-85-D515B-S08	OPTION
20	[illegible]	6-85-D51R6-H05	OPTION
20	[illegible]	6-85-D51R6-K00	OPTION
21	SCREW M2*4L KI BZ ICT NY	6-35-B6120-4RA	
22	FFC LAN TO MB L=75.5 5V 30P P970ENGOO	6-43-P97N0-012	
23	TAPE MYLAR (C),MYLAR M550J	6-40-M55J2-030	
24	WASHER(Φ6*Φ3*0.4T MM)(MYLAR)	6-37-02000-612	

Figure A - 3
Main Board

HDD

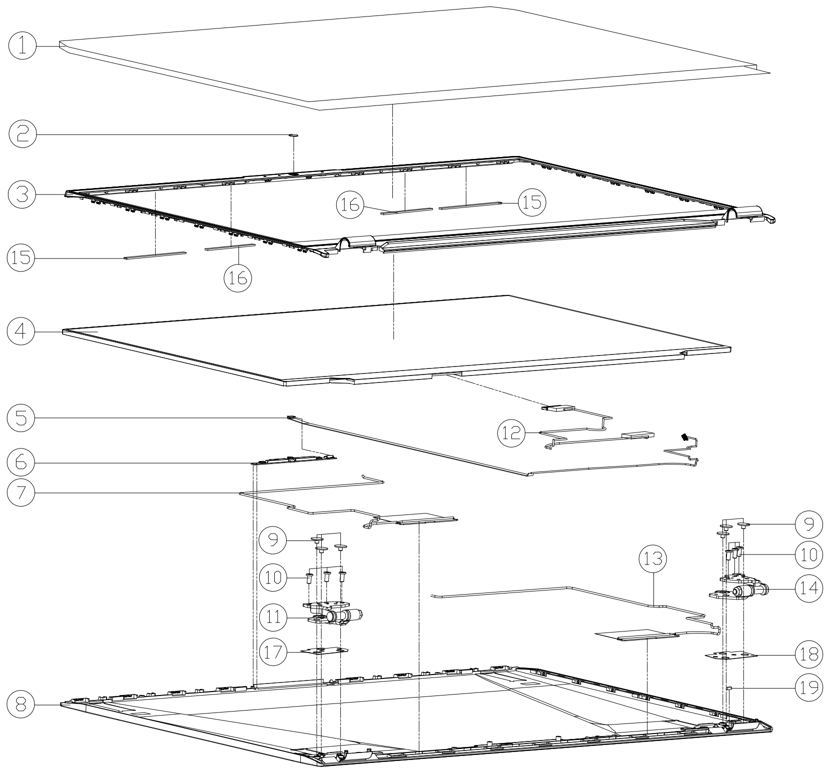
Figure A - 4
HDD





ITEM	PART NAME	PART NO	REMARK
1	SCREW M3*3.0L KI NI ICT NY	6-35-B1130-3R5	
2	HDD BKT 7MM SECC T=0.5 N250LU	6-33-N250J-011	
3	SCREW M2*3L KI BZ ICT NY (DD=ø4.5,DT=0.4)	6-35-B6120-3RD	

LCD



ITEM	PART NAME	PART NO	REMARK
1	LCD PROTECT MYLAR BOPP NB70TJ1	6-40-NB708-010	
2	CCD LENS PMMA (DIAMETER 3.6MM) (MP1) P970EN	6-42-P97N1-011	
3	LCD FRONT COVER (MP1) MODULE P970EN	6-39-P97N1-012	
4	LCD N17.3" FHD/WVA/N7/NON GT/EDP AU B173HAN04.2 (H/W:0A) LED 3.5MM	6-50-NBB35-G020	
4	LCD N17.3" FHD/WVA/144HZ/SW G-SYNC/N7/NON GT/EDP AU B173HAN04.0 (H/W:0A) 3.5MM	6-50-NBB35-G120	
4	LCD N17.3" FHD/WVA/144HZ/SW G-SYNC/N7/NON GT/ EDP BOE NV173FHM-N44 LED 3.5MM	6-50-NBB35-Z120	
4	LCD N17.3" FHD/IPS/144HZ/SW G-SYNC/N7/NON GT/EDP LG LP173WFG-SPB1 3.5MM	6-50-NBB35-L120	
5	CCD CABLE L=500MM 30V 8PIN (HT) PB50EF	6-43-PB50T-011-1	
6	UVC CAMERA BISON FIX(RGB) BNH419VXB-000 1M HD OV9734 N150ZU FW0601 W/WHITE-LED W/2D-MIC(NARROW BORDER WITH FFC)	6-88-N15ZC-4900	OPTION
6	UVC CAMERA CHICONY FIX(RGB) CNFH382100392OLH 1M HD OV9734 N150ZU FW5404 W/WHITE-LED W/2D-MIC(NARROW BORDER WITH FFC)	6-88-N15ZC-5100	OPTION
7	ANTENNA (SLOT) IPEX4 WLAN WGT WL1 PCB DL 2.4G/5G L= 500MM P970EN	6-23-7P97N-010	
8	LCD BACK COVER (MP1) MODULE P970EN	6-39-P97N1-022	
9	SCREW M2.5*2.5L KI BK/Z ICT NY(ø8,T=0.6)	6-35-B6125-2R5	
10	.SCREW M2.5*6L K BZ ICT NY	6-35-82125-6RA	
11	LCD HINGE L (MP1) P970EN	6-33-P97N1-1L2	
12	WIRE CABLE FOR EDP FHD 300MM (I) 19V 30PIN (HL/LW CON:LV03130-212-HF) N850HJ	6-43-N85H1-021-N	
12	WIRE CABLE FOR EDP 4K 300MM (I) 19V 30PIN (CMI/HLS CON:HLX09002-HF) N850HJ	6-43-N85H1-010-2S	
13	ANTENNA (SLOT) IPEX4 WLAN WGT WL2 PCB DR 2.4G/5G L= 600MM P970EN	6-23-7P97N-020	
14	LCD HINGE R (MP1) P970EN	6-33-P97N1-1R2	
15	LCD MYLAR (46*1.5*0.5T) DS-5 P970EN	6-47-P97N1-0A0	
16	LCD MYLAR (35*1.5*0.5T) DS-5 P970EN	6-47-P97N1-0B0	
17	UP CONDUCTIVE CLOTH L HINGE P970EN	6-47-P97N1-0D0	
18	UP CONDUCTIVE CLOTH R HINGE P970EN	6-47-P97N1-0C0	
19	LCD RUBBER (5.5*1.9*2.1T) GARY P970EN	6-47-P97N1-040	

Figure A - 5
LCD

Appendix B: Schematic Diagrams

This appendix has circuit diagrams of the ***P970EN*** notebook's PCB's. The following table indicates where to find the appropriate schematic diagram.

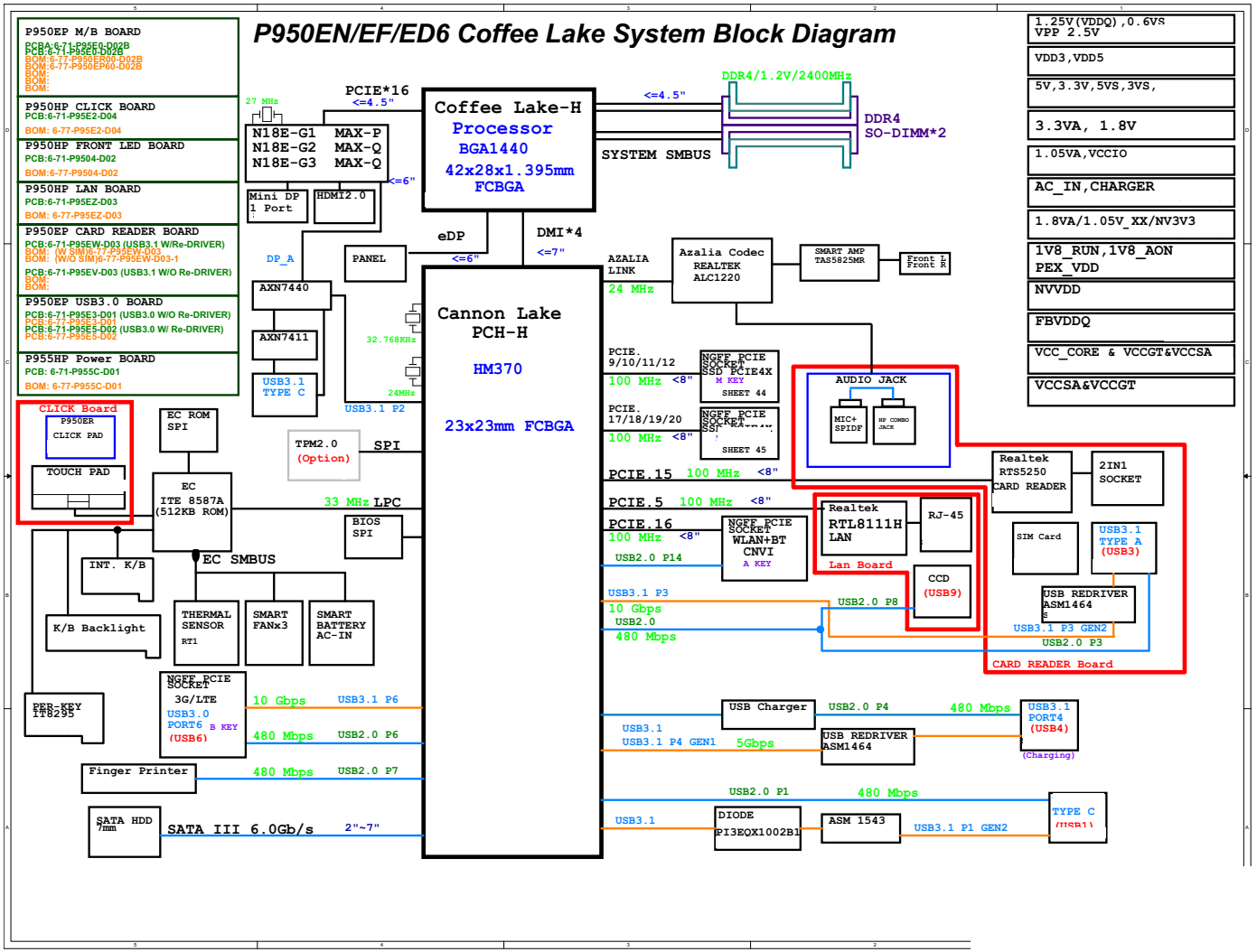
Table B - 1
SCHEMATIC DIAGRAMS

Version Note

The schematic diagrams in this chapter are based upon version 6-7P-P95N7-001. If your mainboard (or other boards) are a later version, please check with the Service Center for updated diagrams (if required).

System Block Diagram

Sheet 1 of 83
System Block Diagram

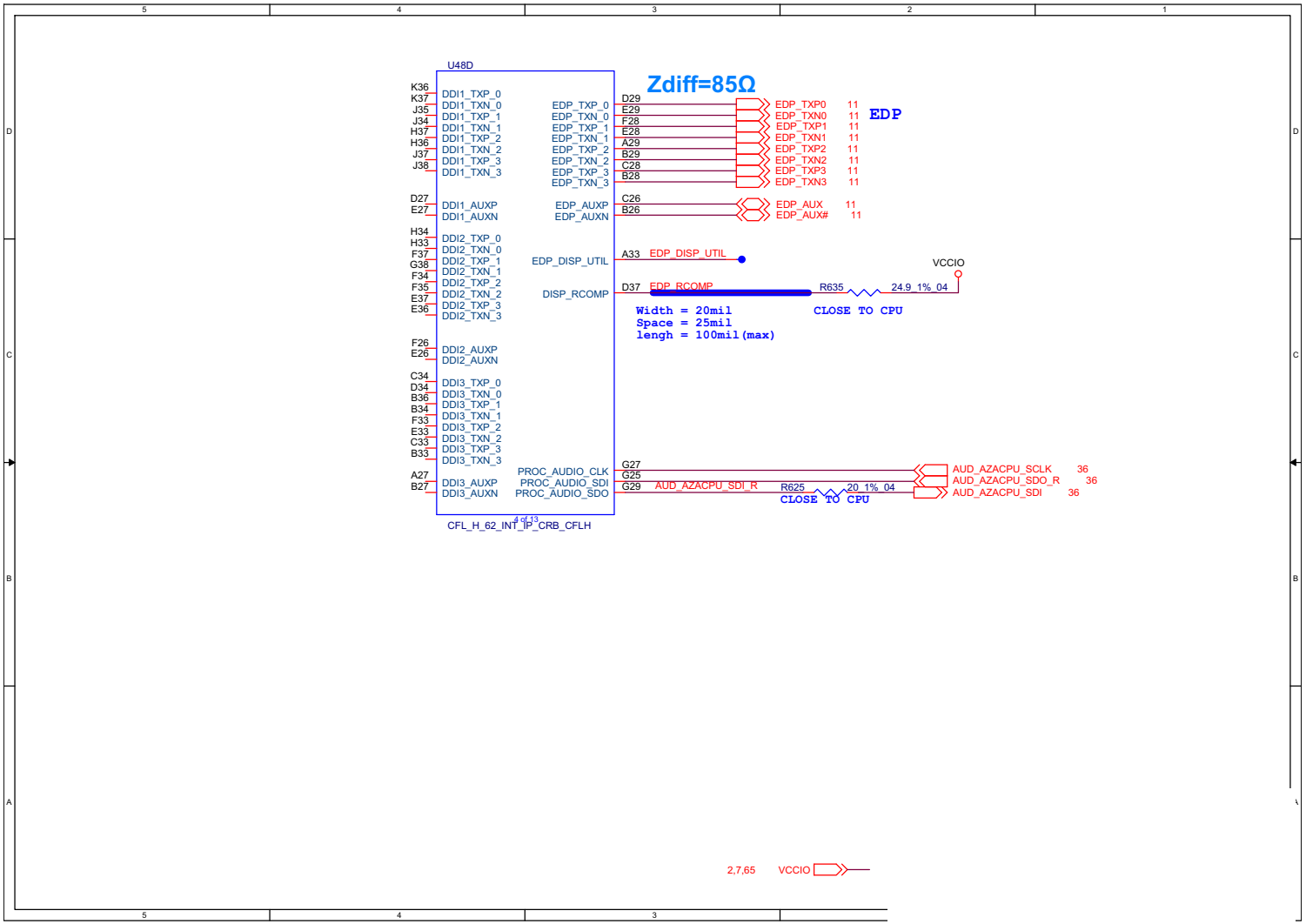


Processor 1/7

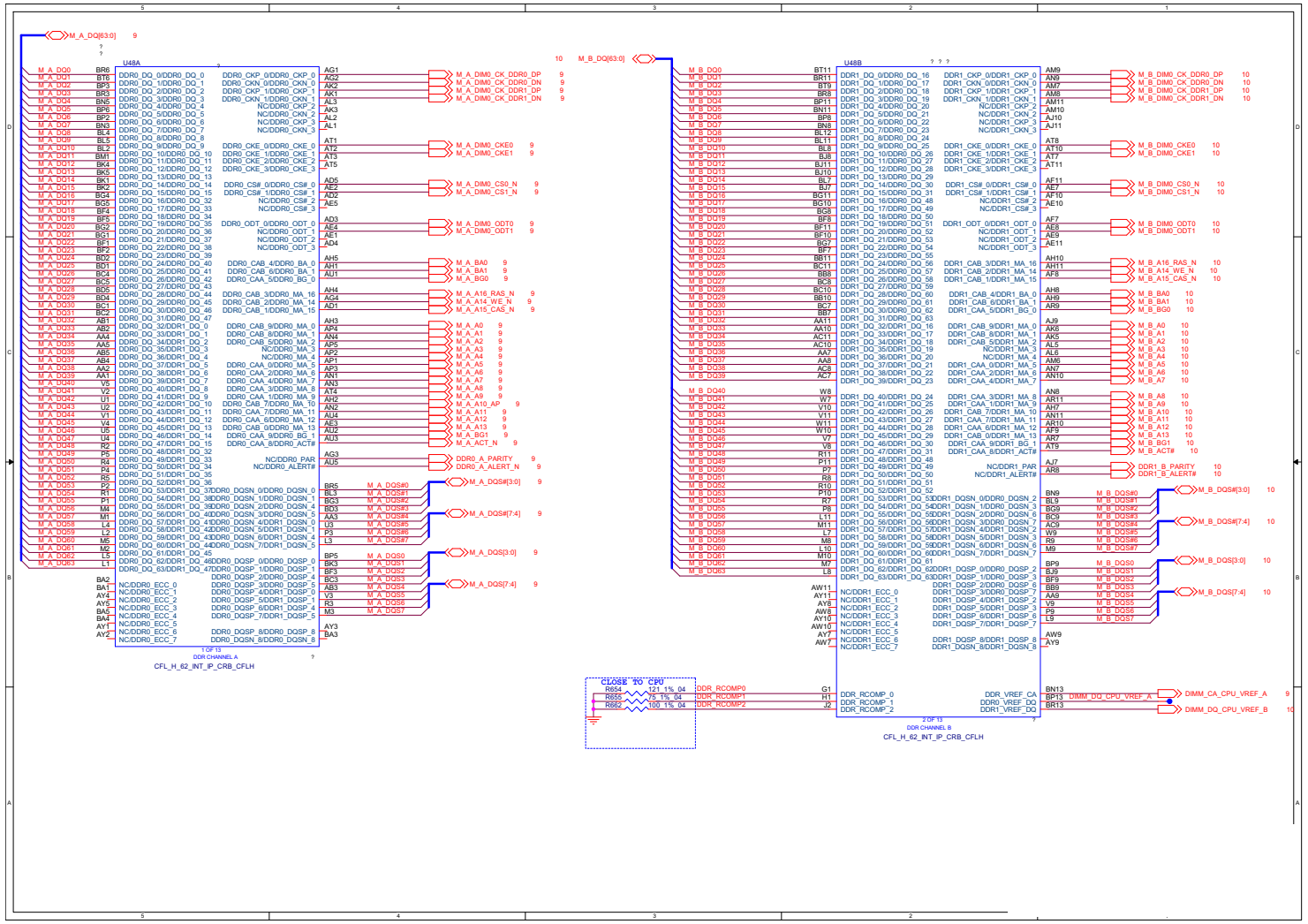
Sheet 2 of 83
Processor 1/7

Processor 2/7

Sheet 3 of 83
Processor 2/7



Processor 3/7



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Processor 3/7

B.Schematic Diagrams

Processor 4/7

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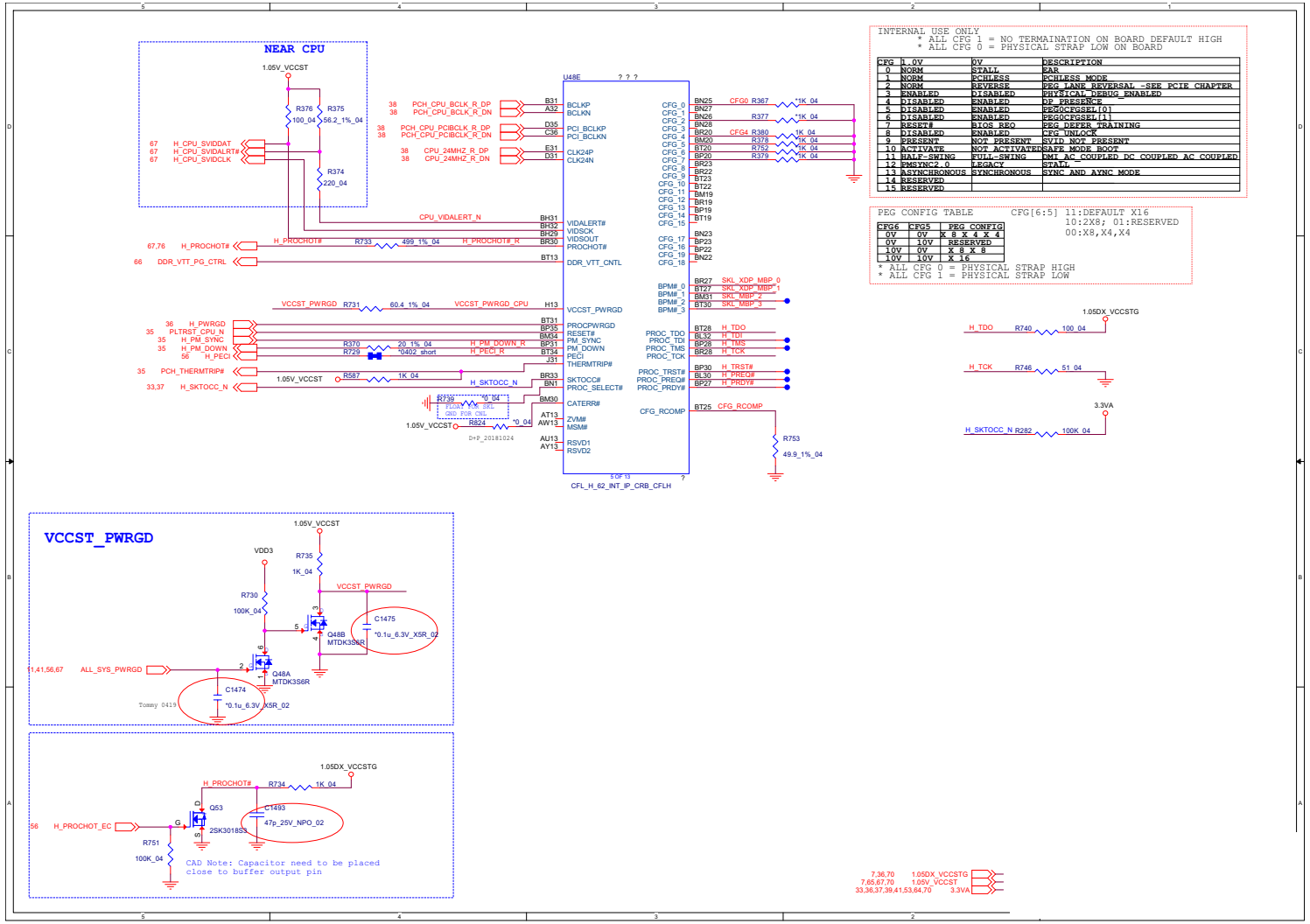
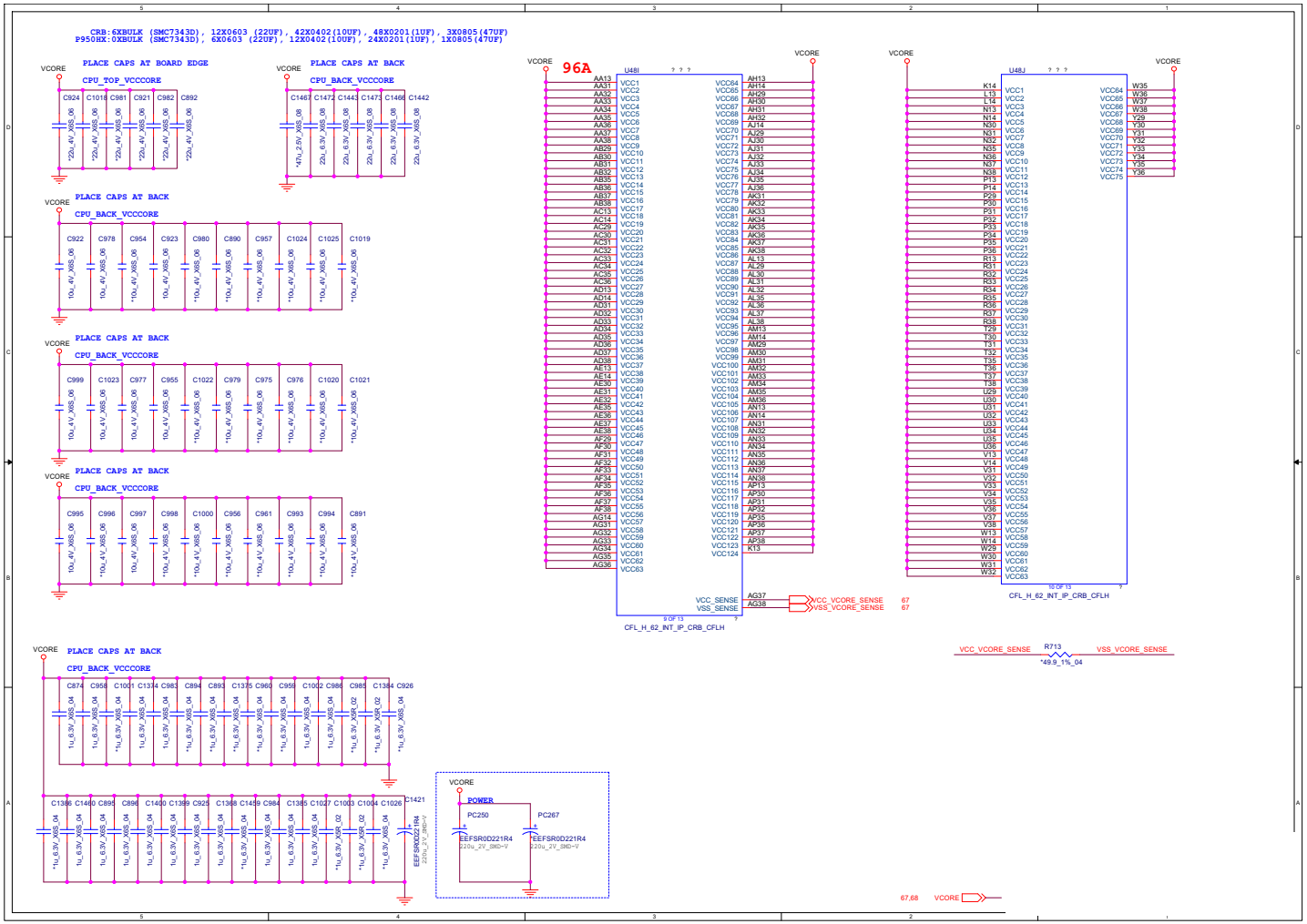
Processor 4/7



Processor 5/7



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Processor 5/7

Processor 6/7

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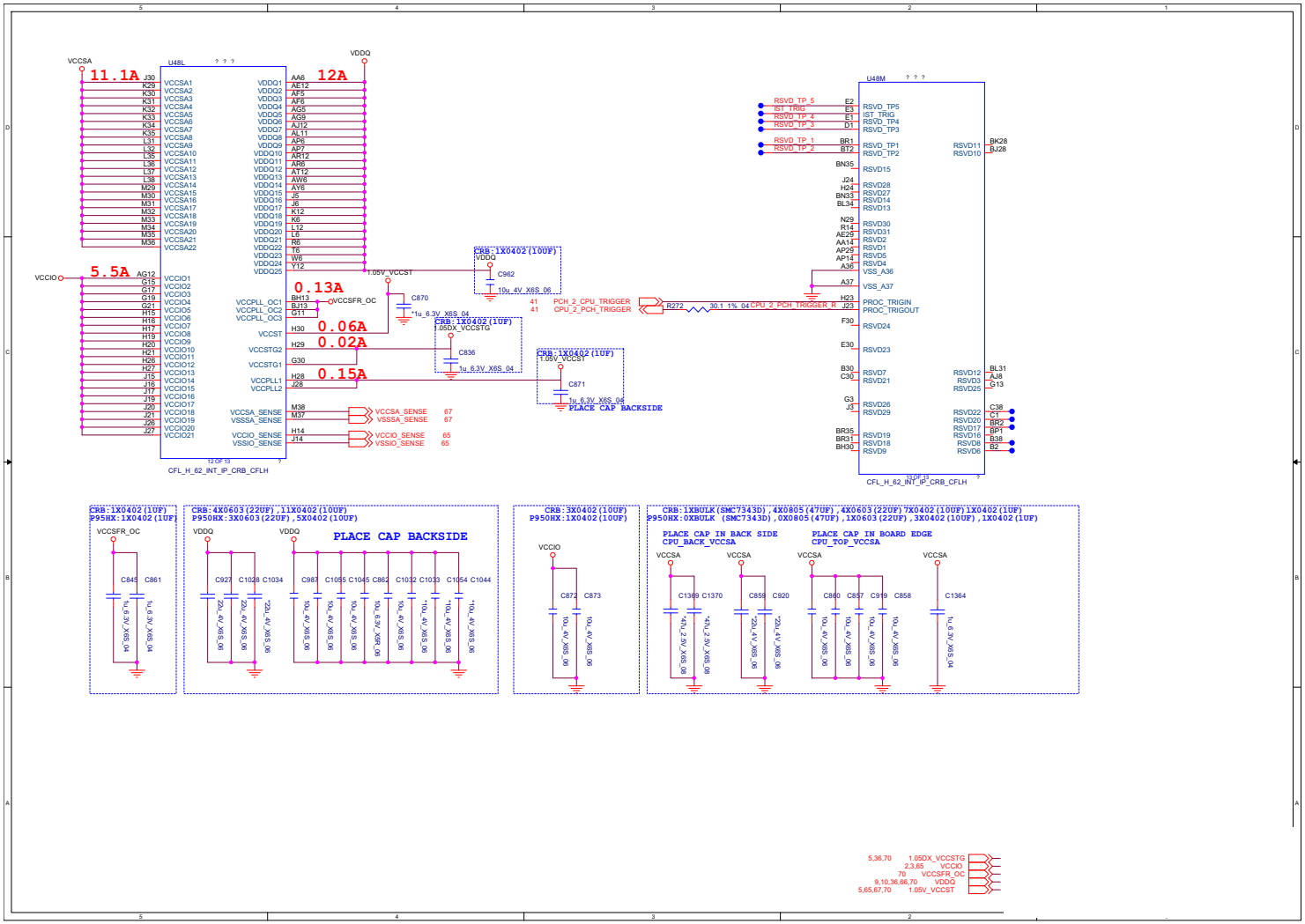
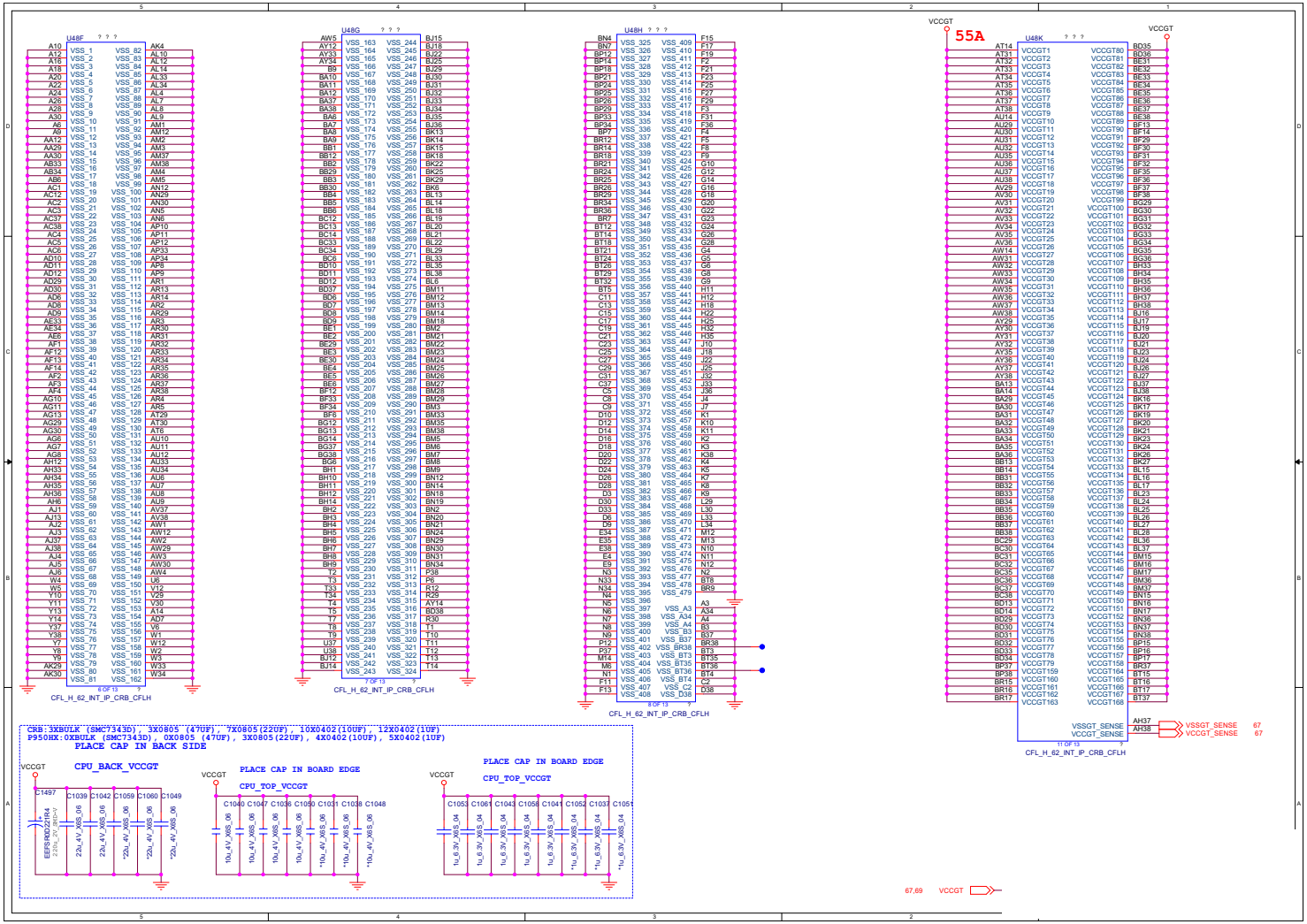
Processor 6/7



Processor 7/7



Sheet 8 of 83
Processor 7/7

B.Schematic Diagrams

DDR4 CHA SO-DIMM_0

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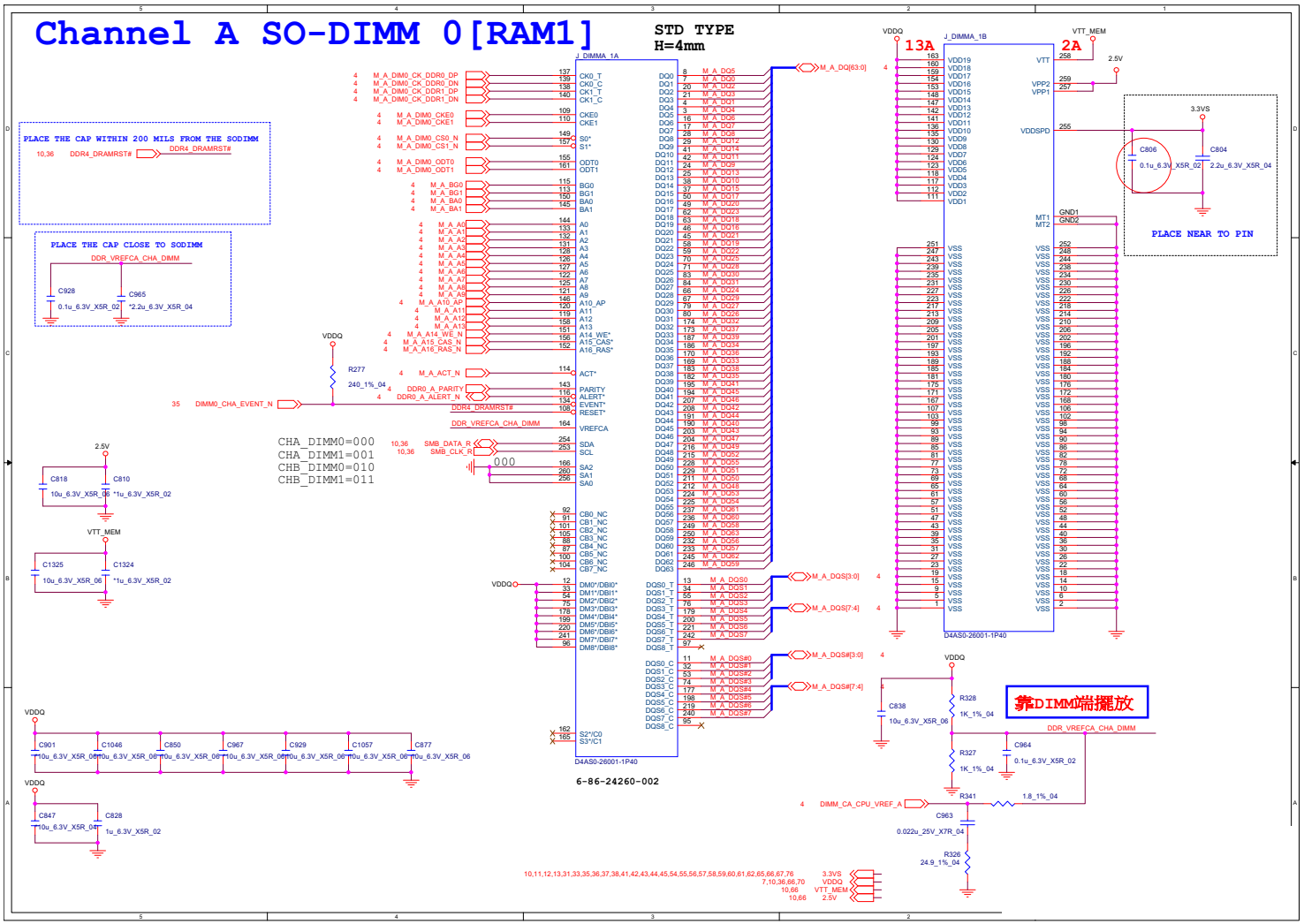
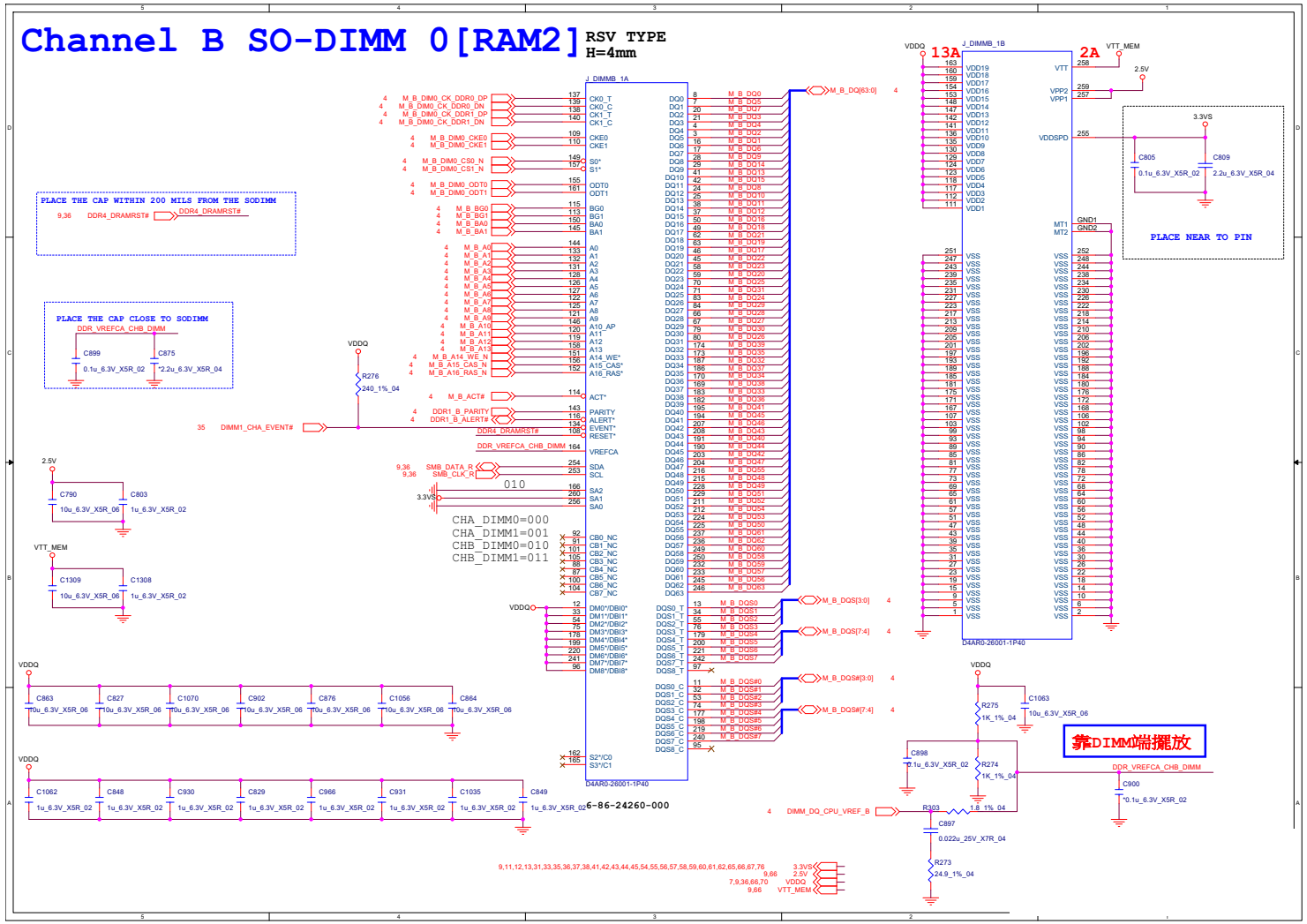
DDR4 CHA SO-DIMM_0



DDR4 CHB SO-DIMM_0



Sheet 10 of 83
DDR4 CHB SO-DIMM_0

Panel, Inverter

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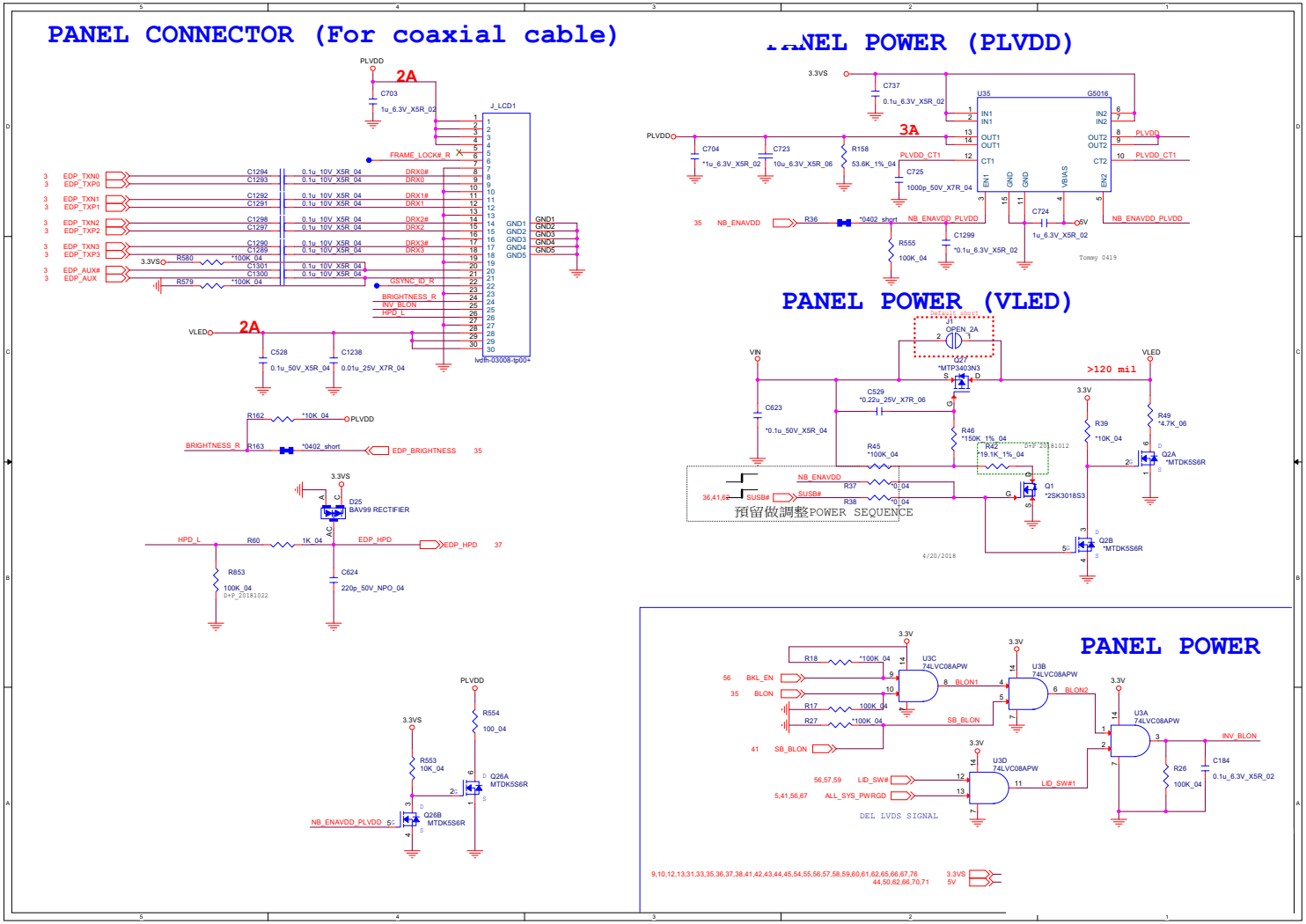
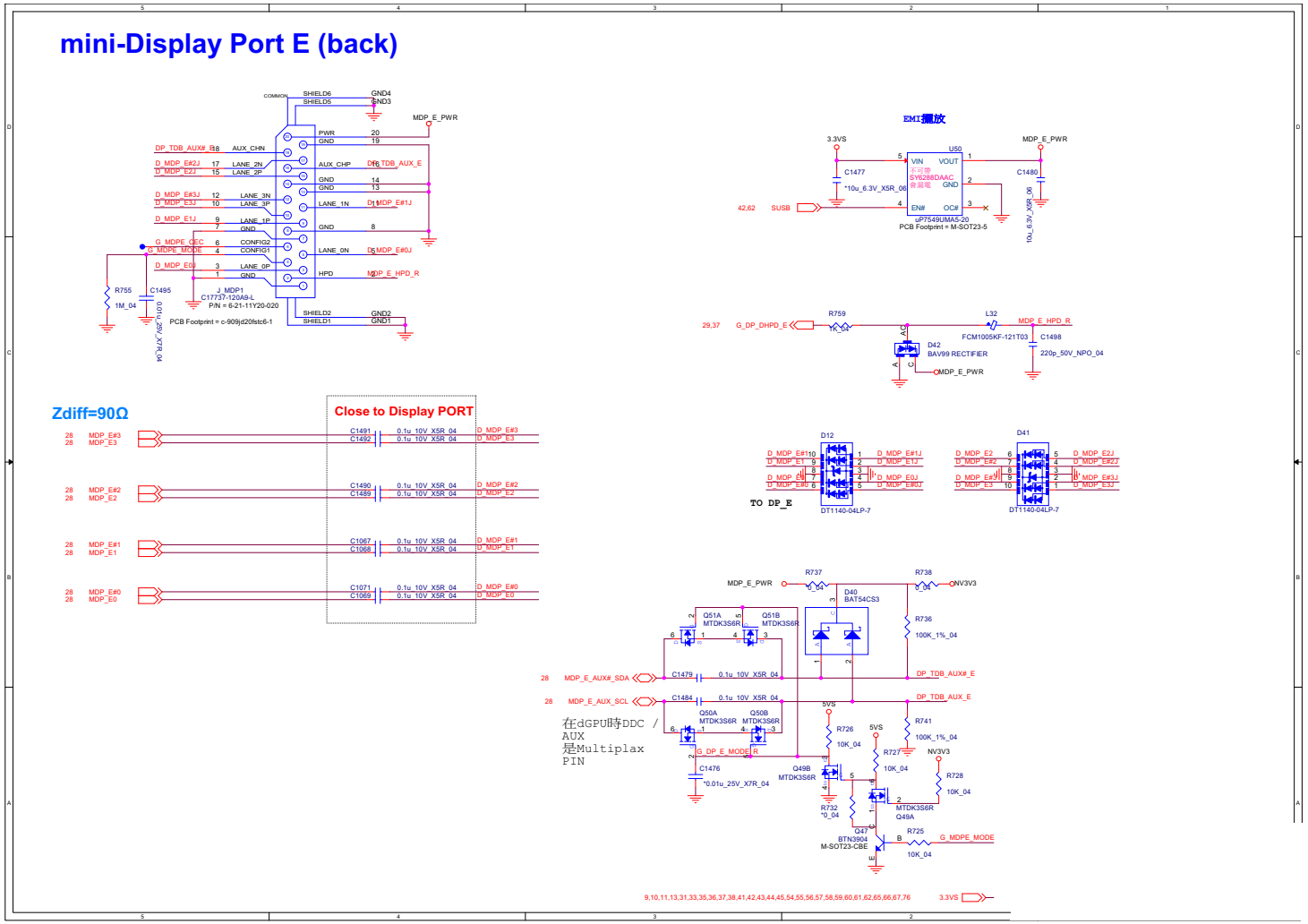
Panel, Inverter



Mini DP Port



Sheet 12 of 83
Mini DP Port

HDMI Connector

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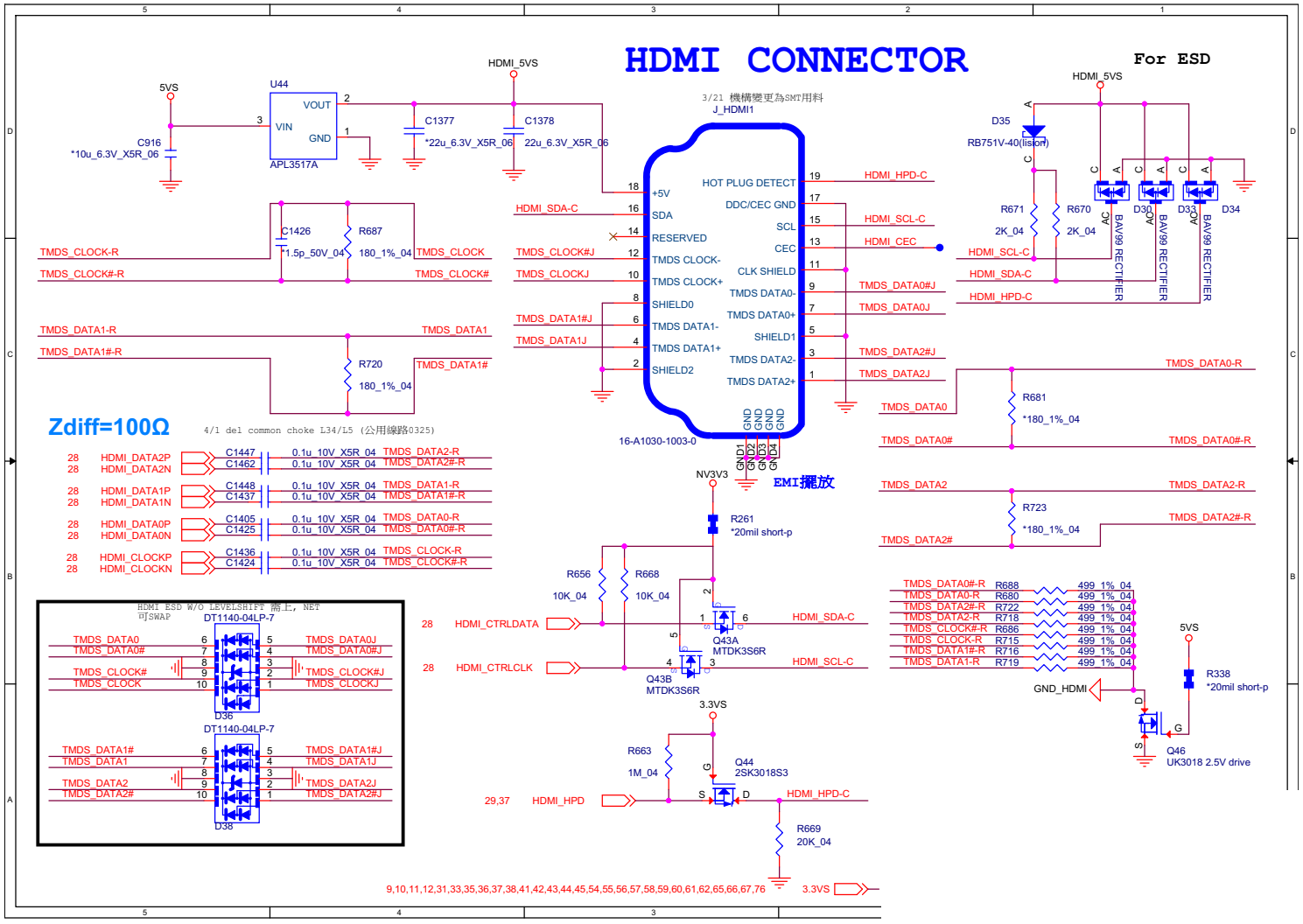
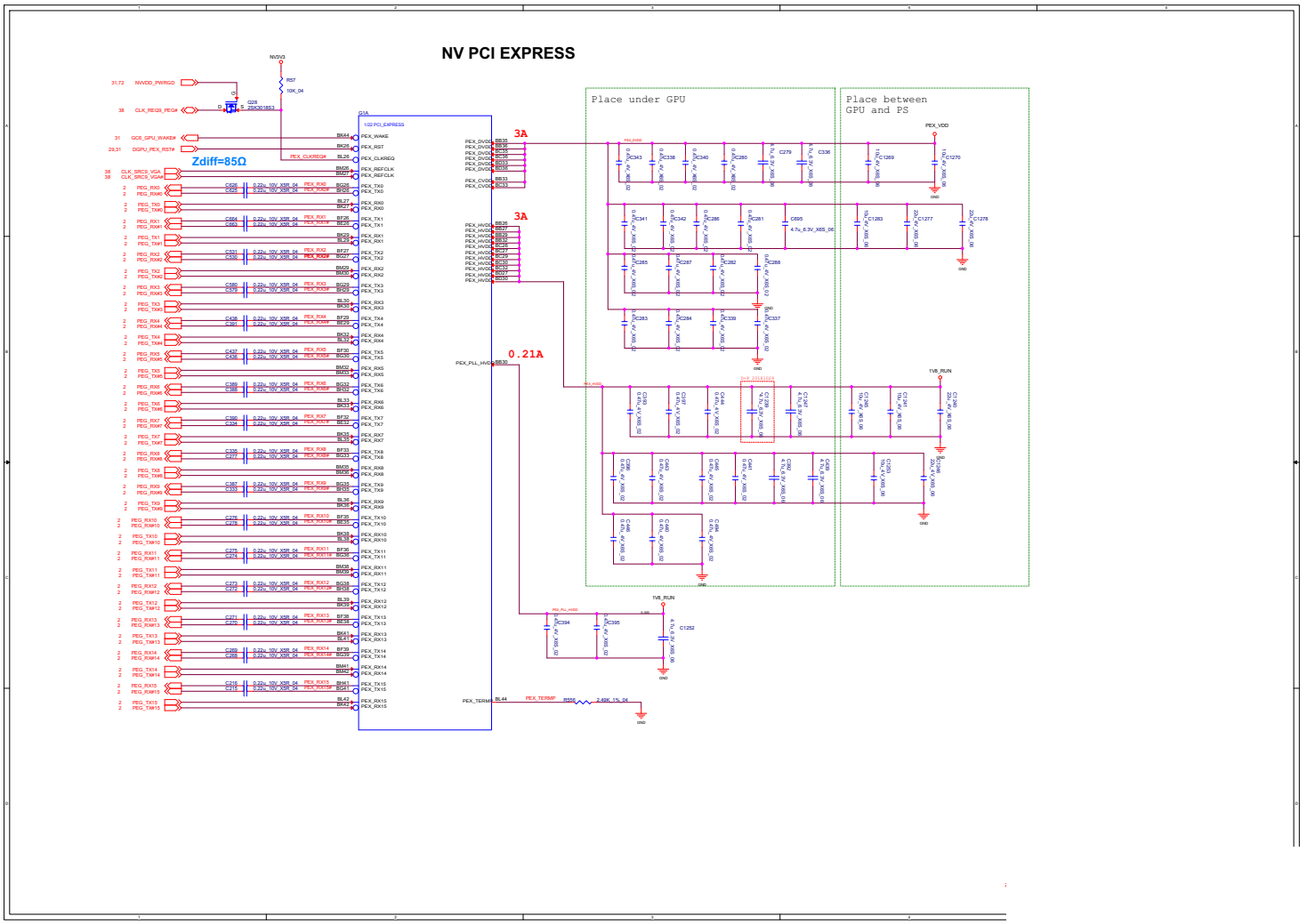
HDMI Connector



VGA PCI Express



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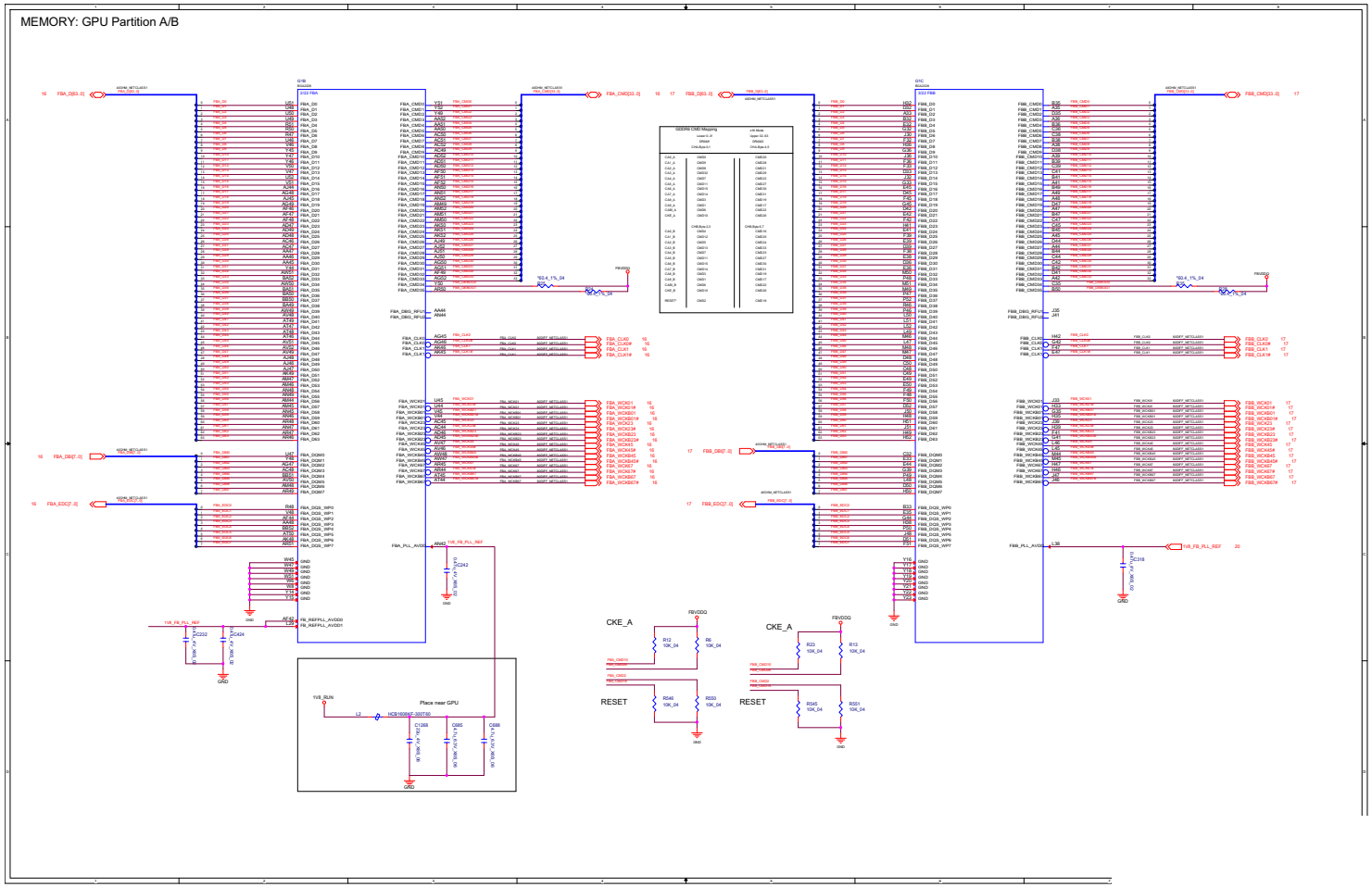
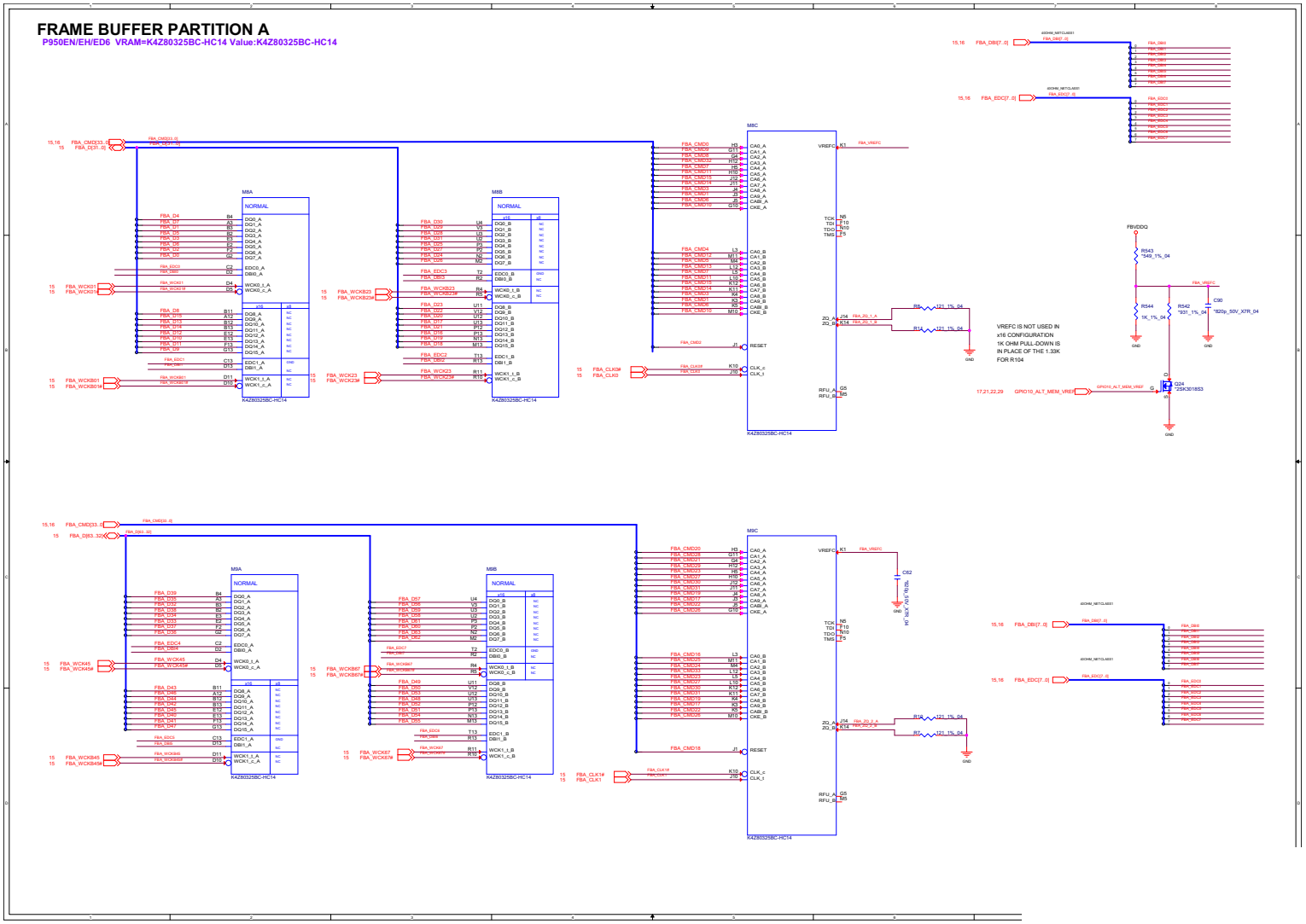
VGA PCI Express

GPU Frame Buffer Partition

Sheet 15 of 83
GPU Frame Buffer Partition



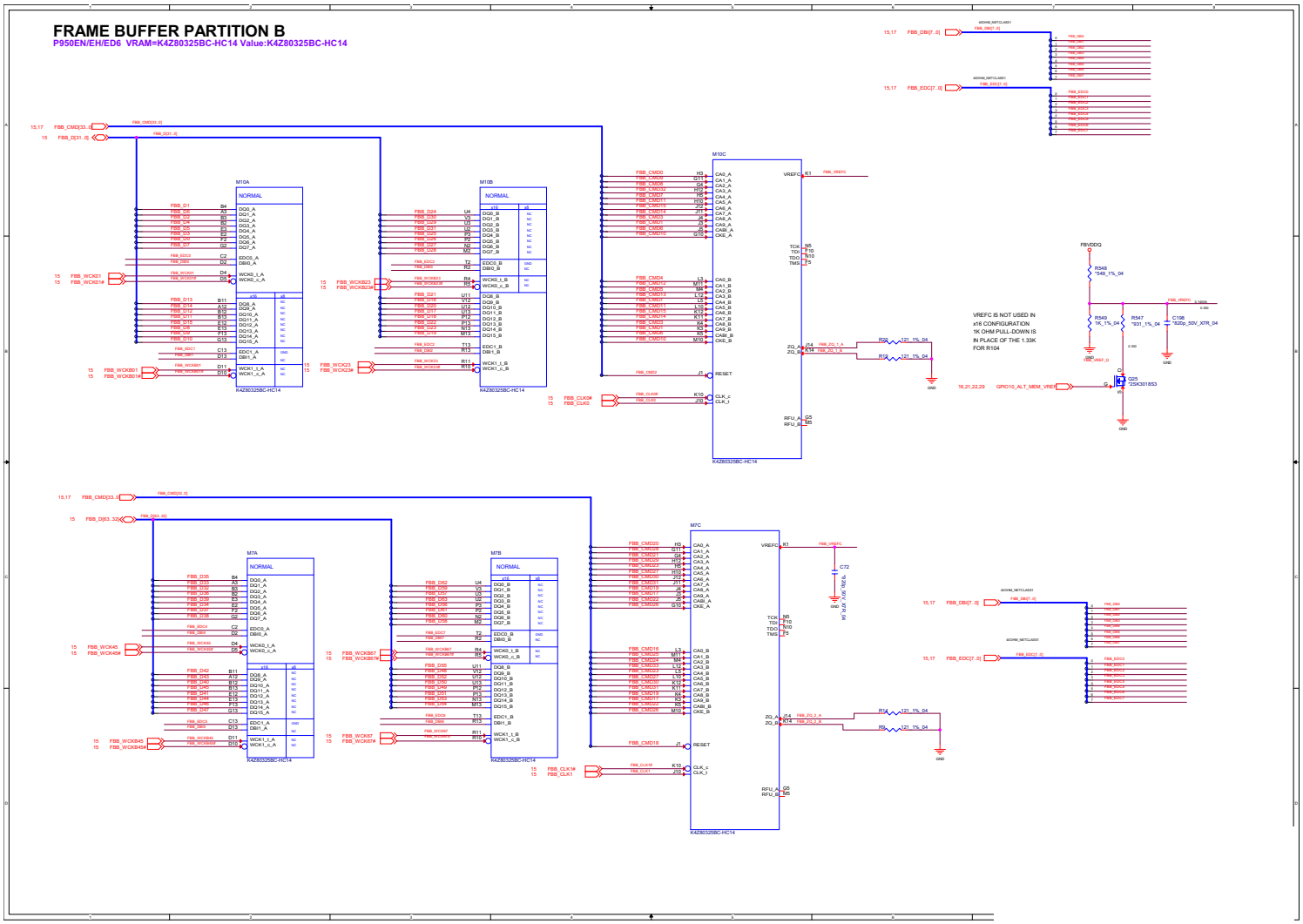
Frame Buffer Partition A



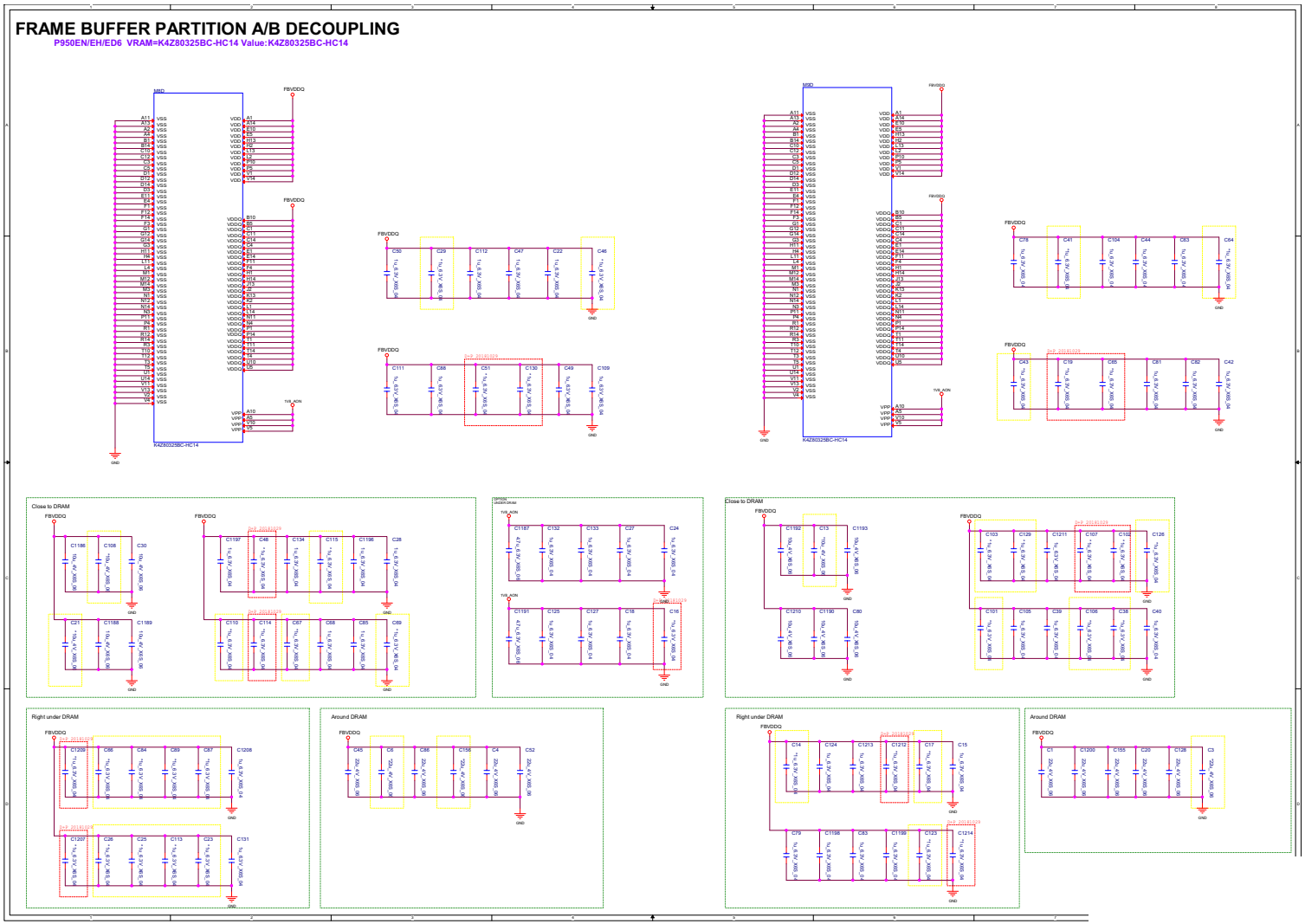
Sheet 16 of 83
Frame Buffer
Partition A

Frame Buffer Partition B

Sheet 17 of 83
Frame Buffer
Partition B



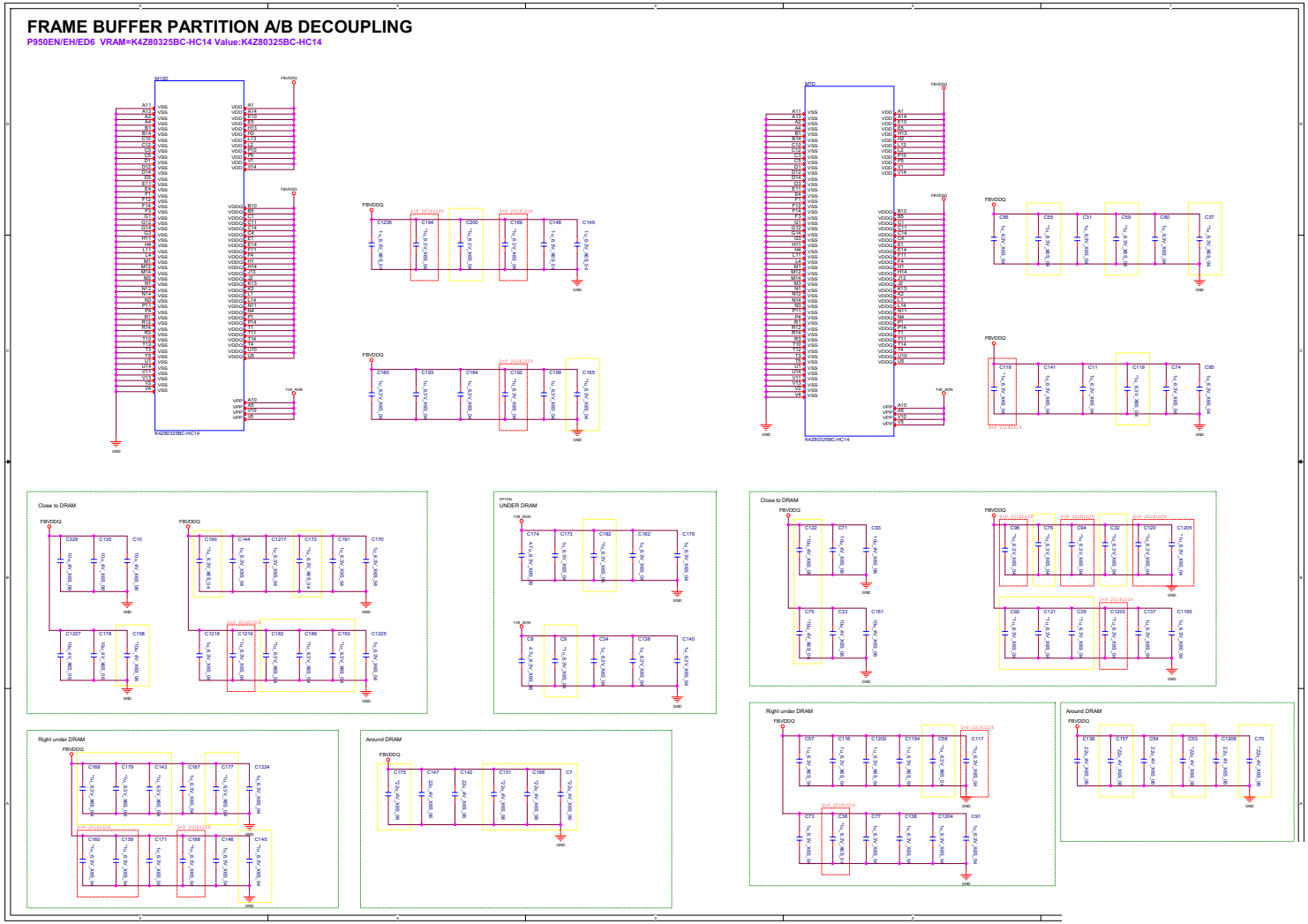
Frame Buffer Partition A_B



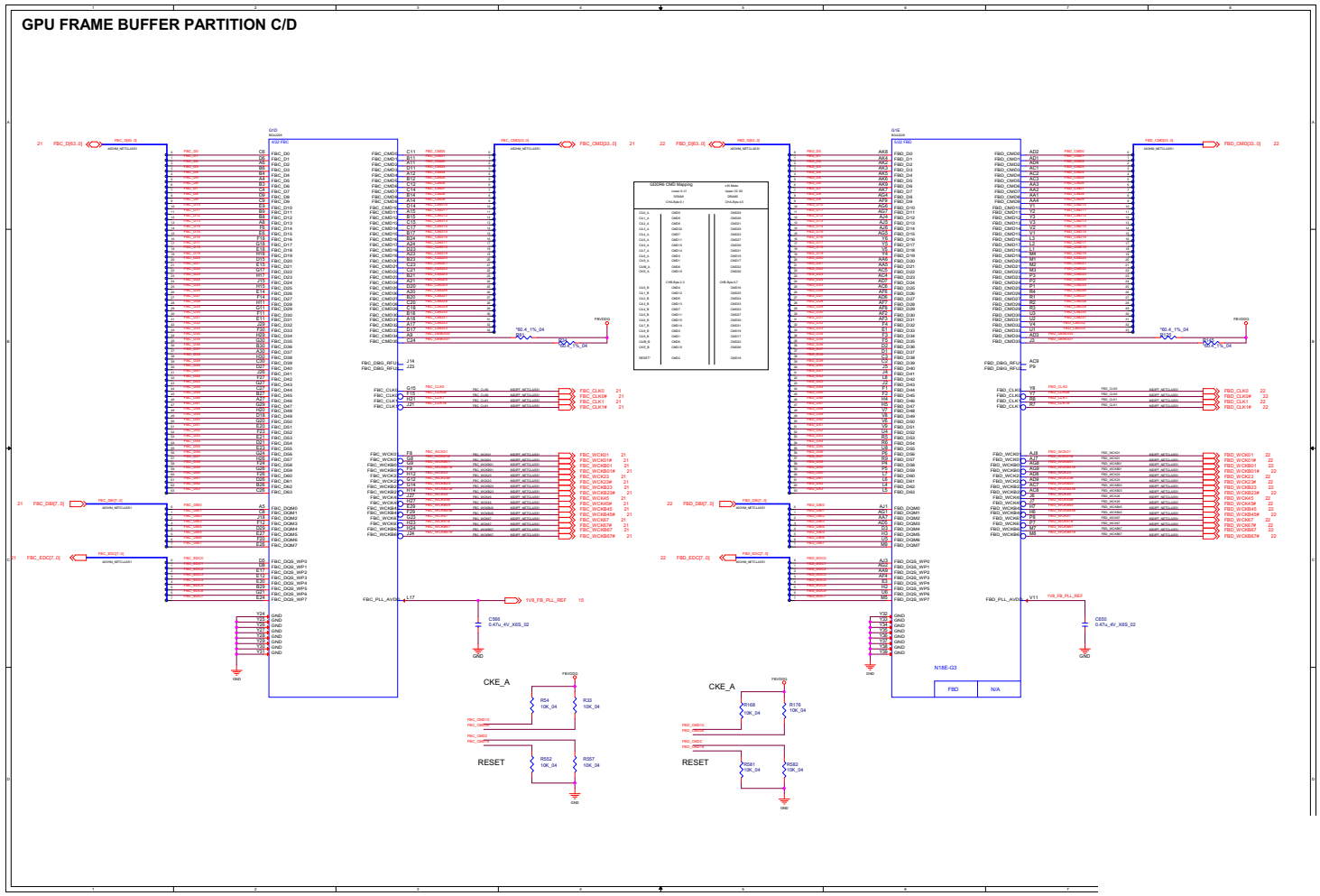
Sheet 18 of 83
Frame Buffer
Partition A_B

Frame Buffer Partition A_B

Sheet 19 of 83
Frame Buffer
Partition A_B



GPU Frame Buffer Partition



Sheet 20 of 83
GPU Frame Buffer Partition

Frame Buffer Partition C

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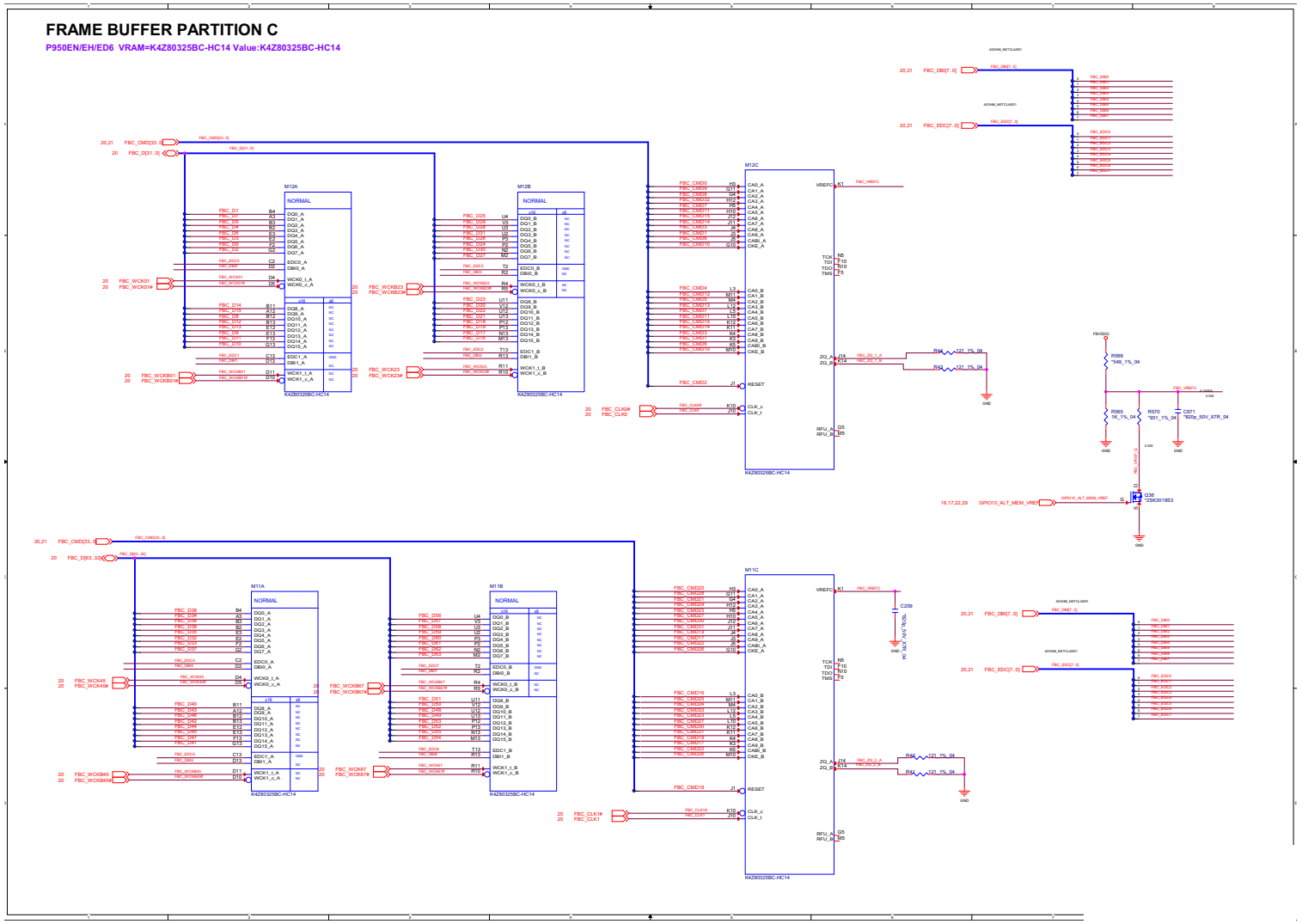
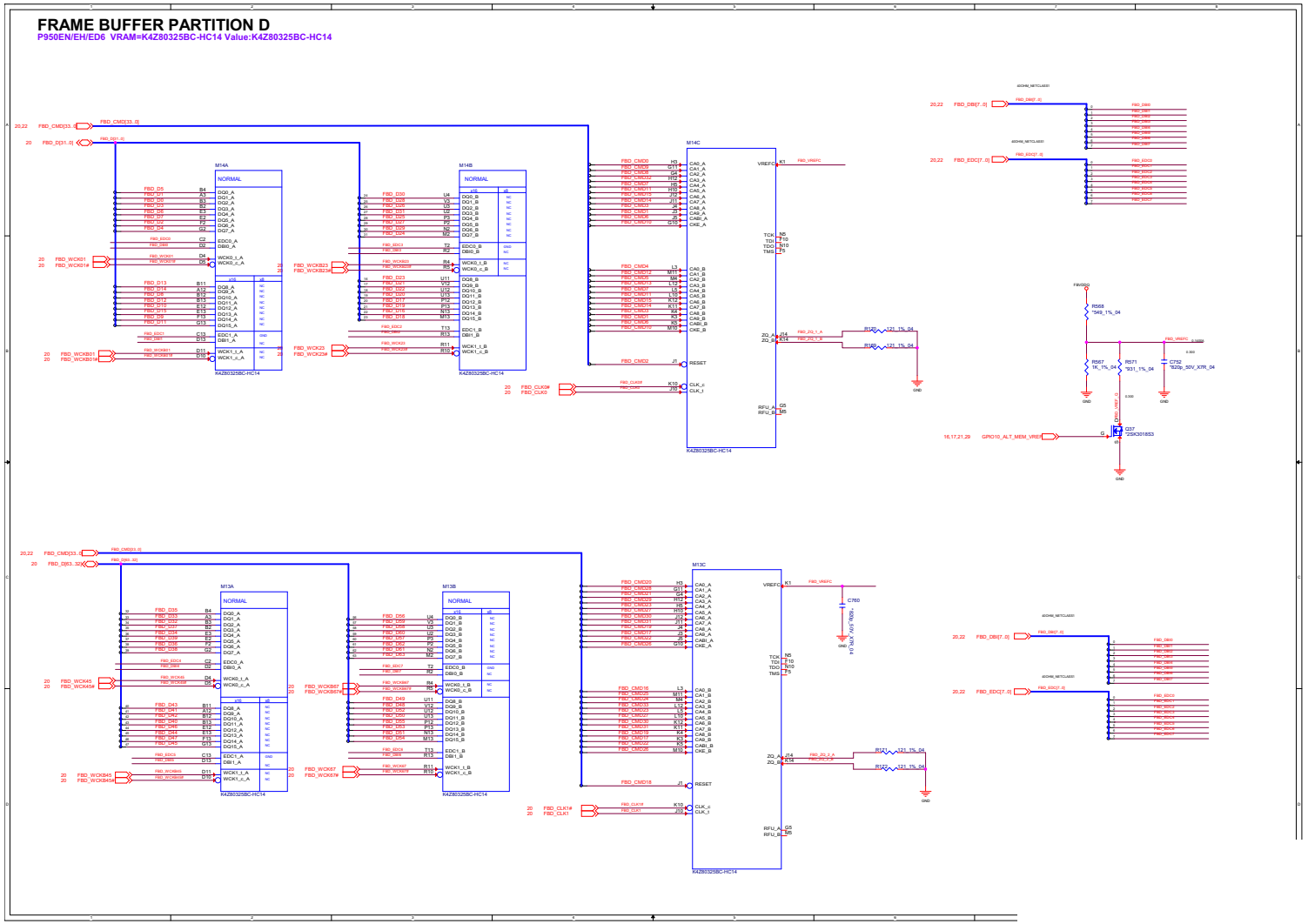
Frame Buffer Partition C



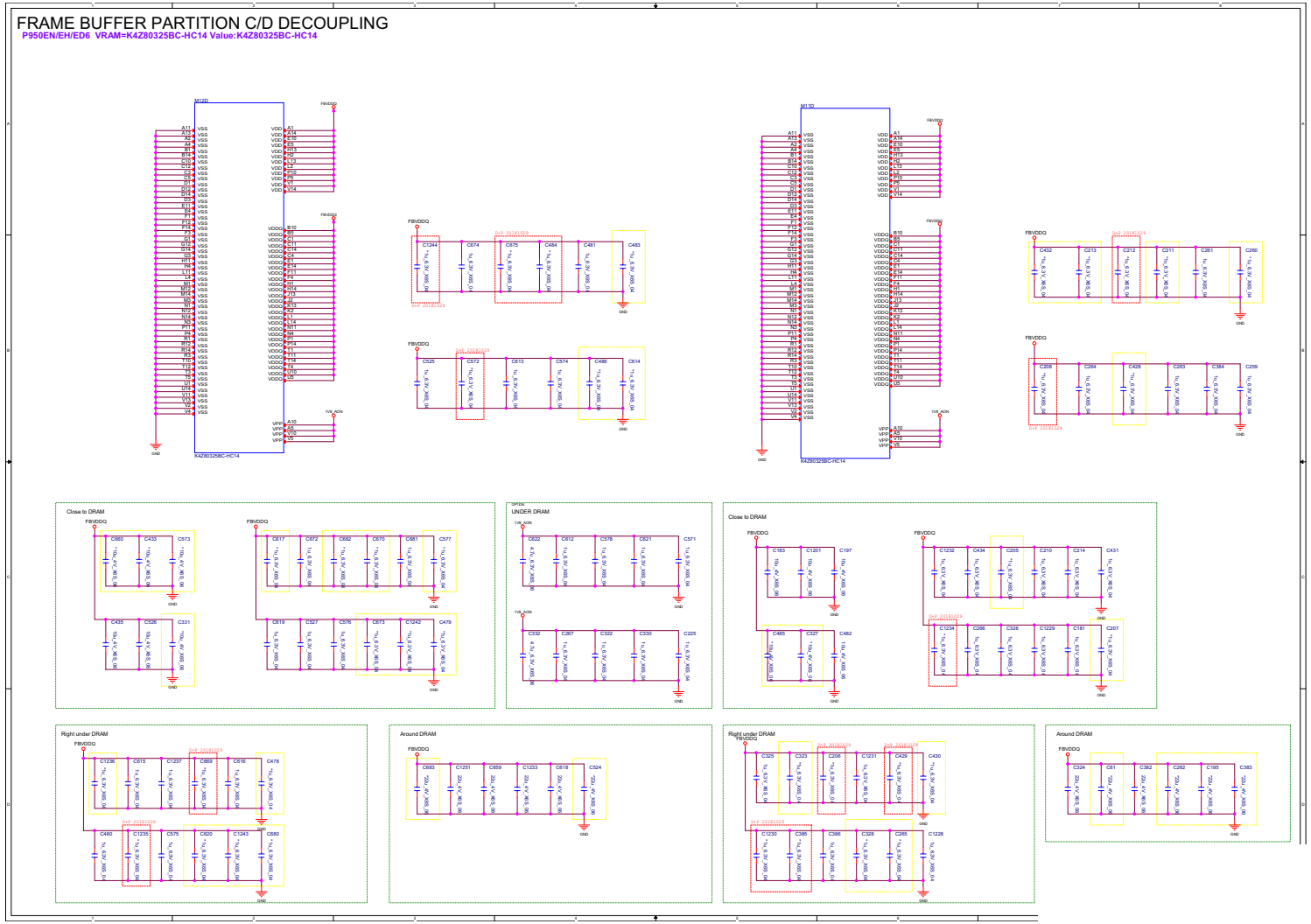
Frame Buffer Partition D



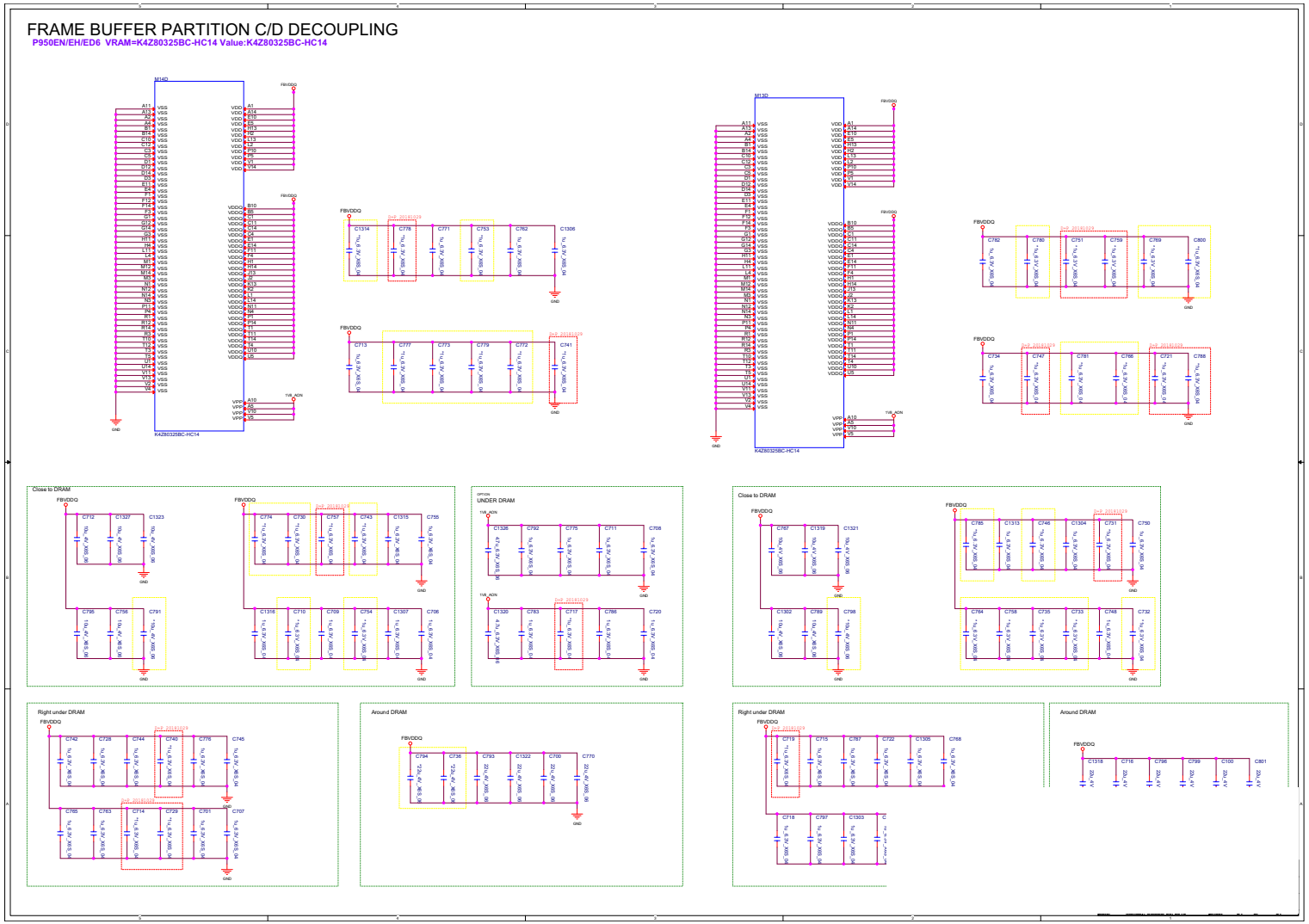
Sheet 22 of 83
Frame Buffer Partition D

Frame Buffer Partition C_D

Sheet 23 of 83
Frame Buffer
Partition C_D



Frame Buffer Partition C_D



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Frame Buffer
Partition C_D

GPU Decoupling 1

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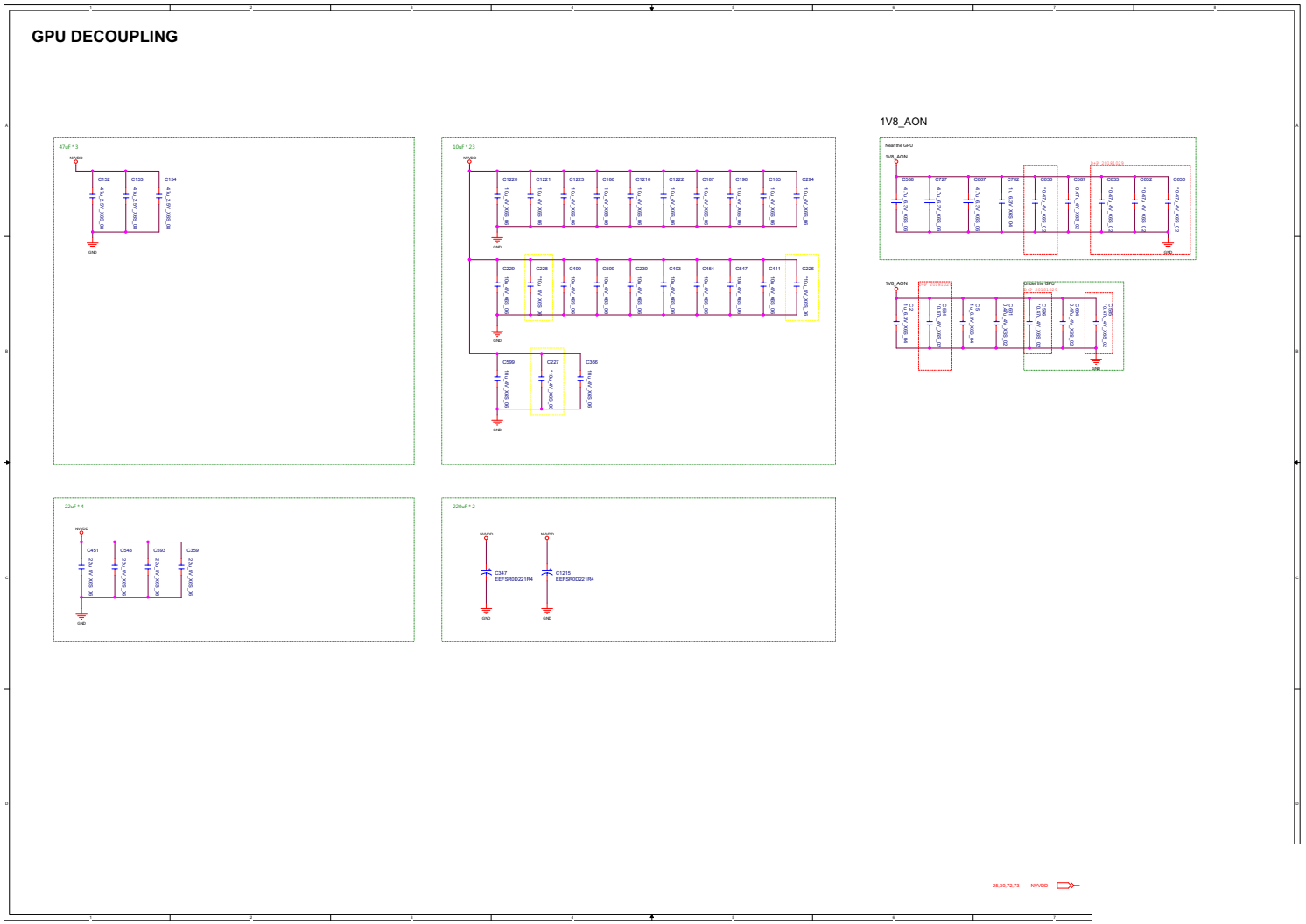
GPU Decoupling 1

GPU Decoupling 2



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GPU Decoupling 2

Straps and XTAL

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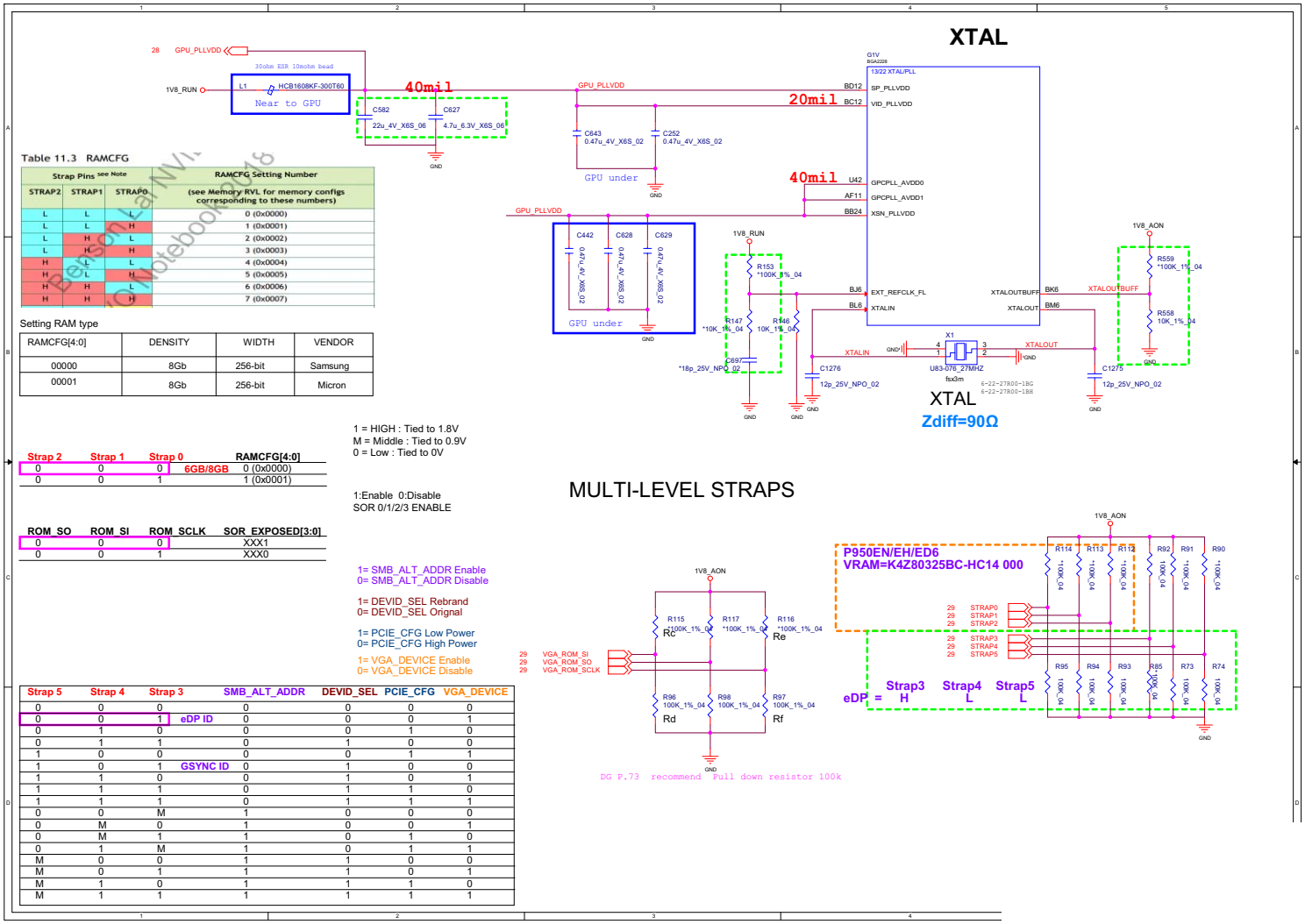
Straps and XTAL

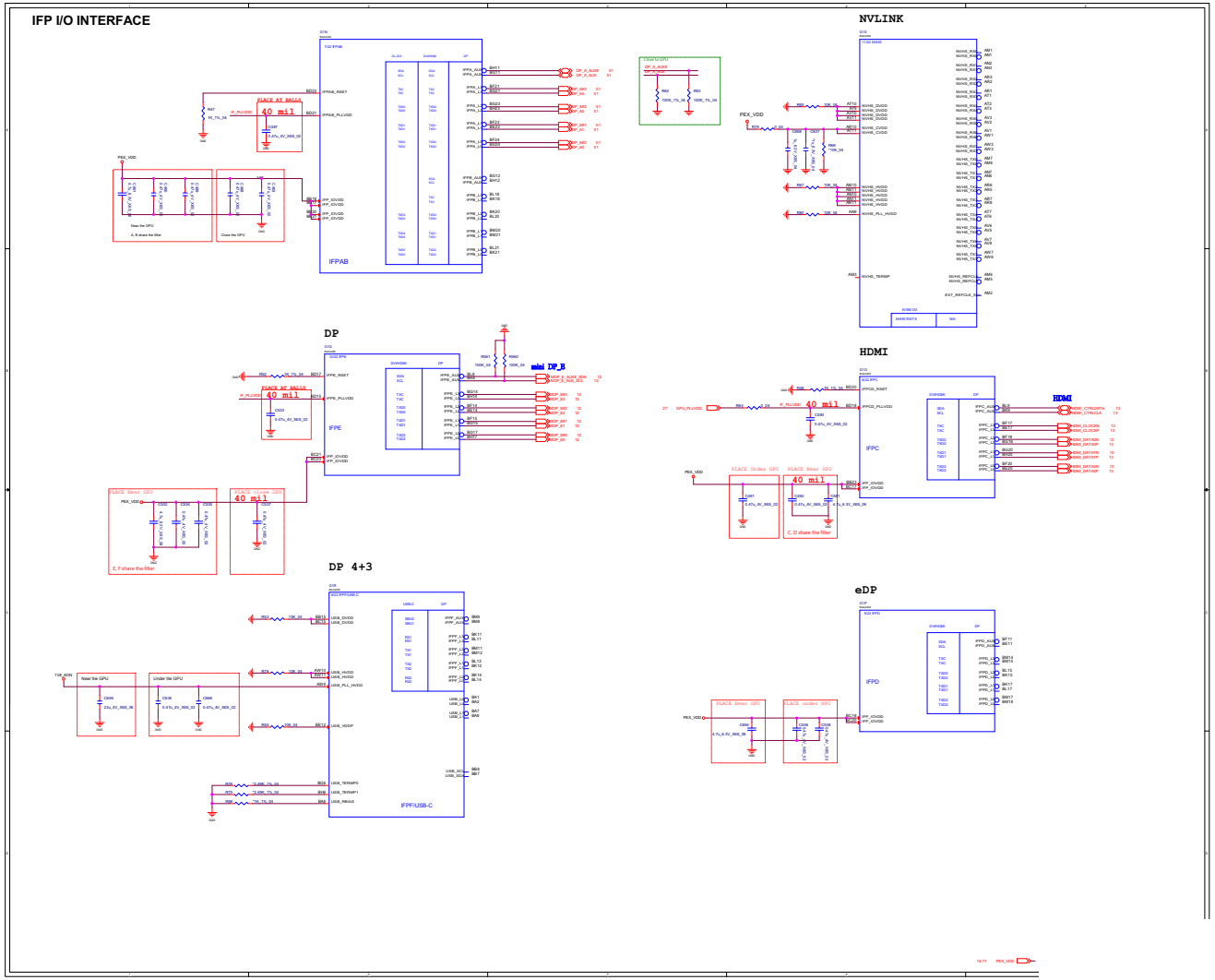


Strap 2	Strap 1	Strap 0		RAMCFG[4:0]
0	0	0	6GB/8GB	0 (0x0000)
0	0	1		1 (0x0001)

ROM_SO	ROM_SI	ROM_SCLK	SOR_EXPOSED[3:0]
0	0	0	XXX1
0	0	1	XXX0

Strap 5	Strap 4	Strap 3		SMB_ALT_ADDR	DEVID_SEL	PCIE_CFG	VGA_DEVICE
0	0	0		0	0	0	0
0	0	1	eDP ID	0	0	0	1
0	1	0		0	0	1	0
0	1	1		0	1	0	0
1	0	0		0	0	1	1
1	0	1	GSYNC ID	0	1	0	0
1	1	0		0	1	0	1
1	1	1		0	1	1	0
1	1	1		0	1	1	1
0	0	M		1	0	0	0
0	M	0		1	0	0	1
0	M	1		1	0	1	0
0	1	M		1	0	1	1
M	0	0		1	1	0	0
M	0	1		1	1	0	1
M	1	0		1	1	1	0
M	1	1		1	1	1	1

IFP I/O Interface



Sheet 28 of 83
IFP I/O Interface

Misc - GPIO, I2C and ROM

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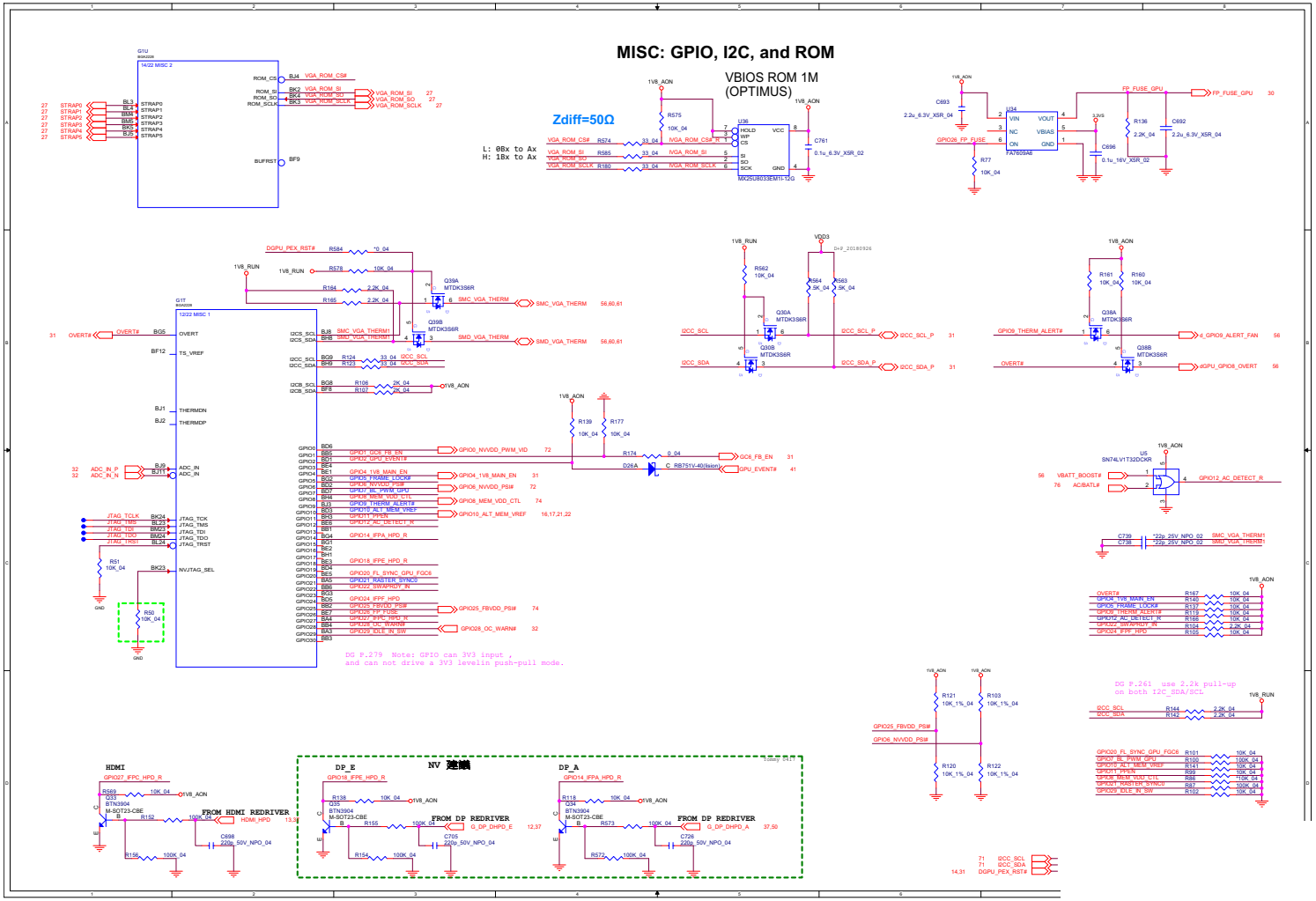
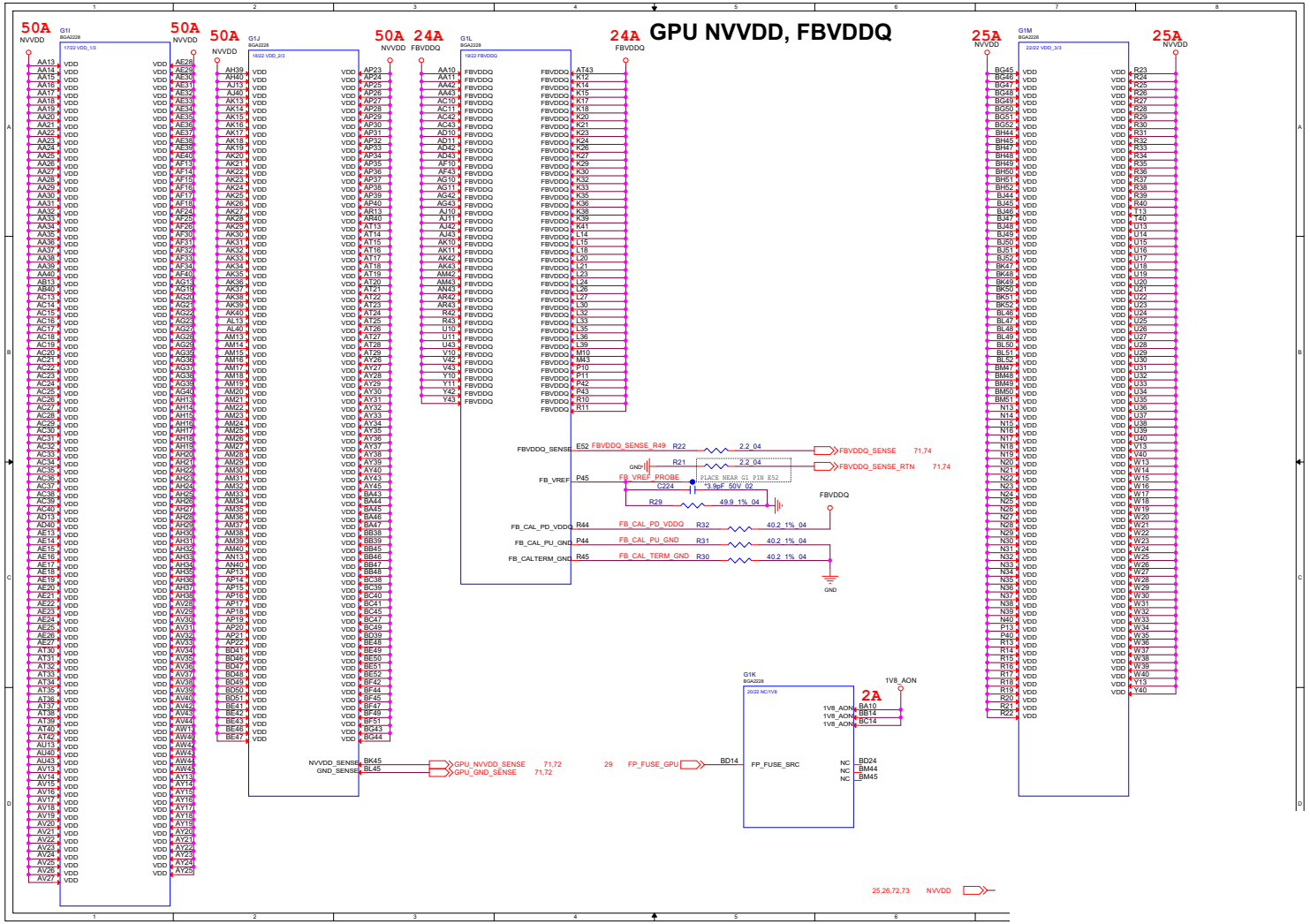
Misc - GPIO, I2C and ROM



GPU NVVDD, FBVDDQ



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GPU NVVDD, FBVDDQ

GPU GND & Sequence

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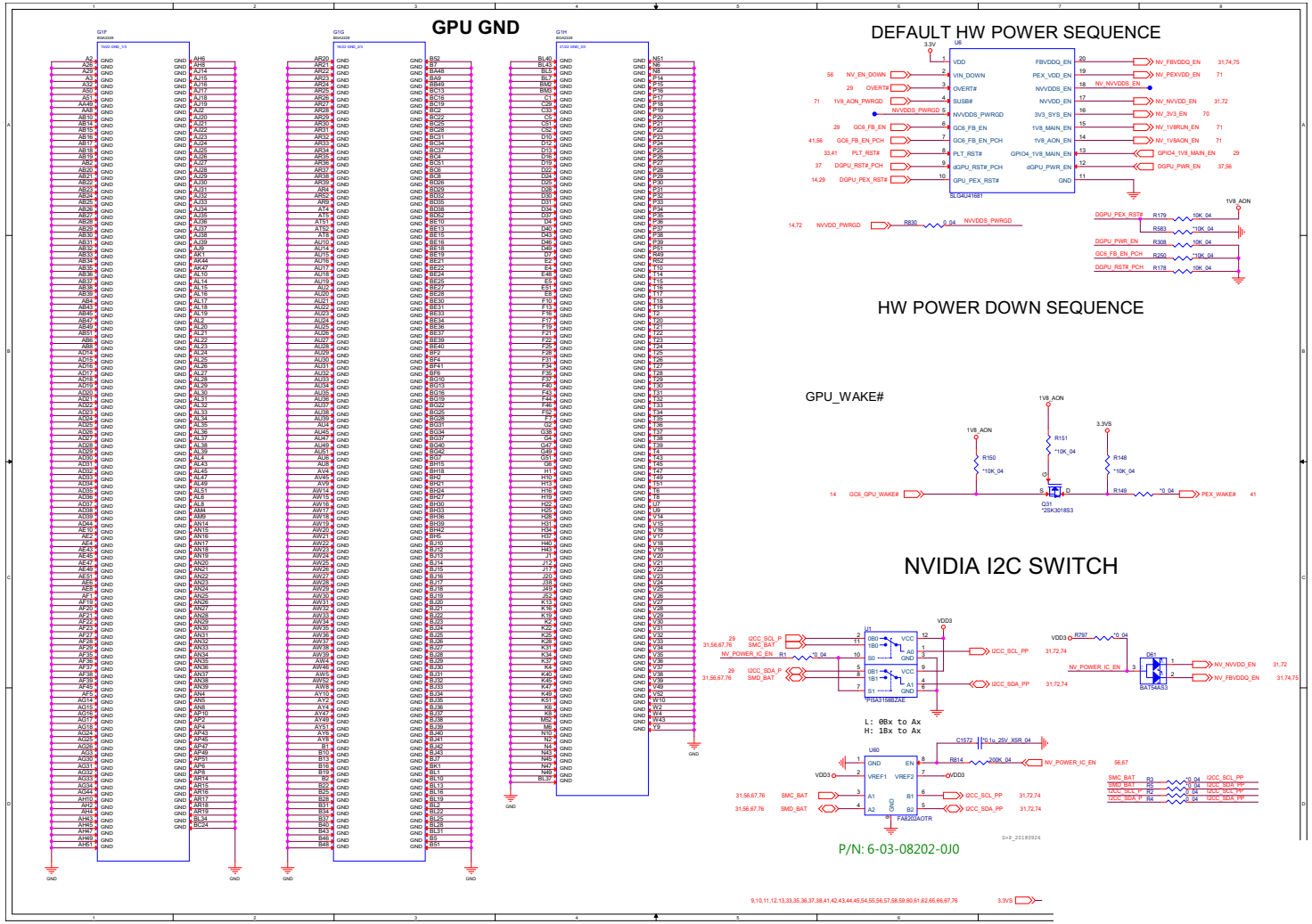
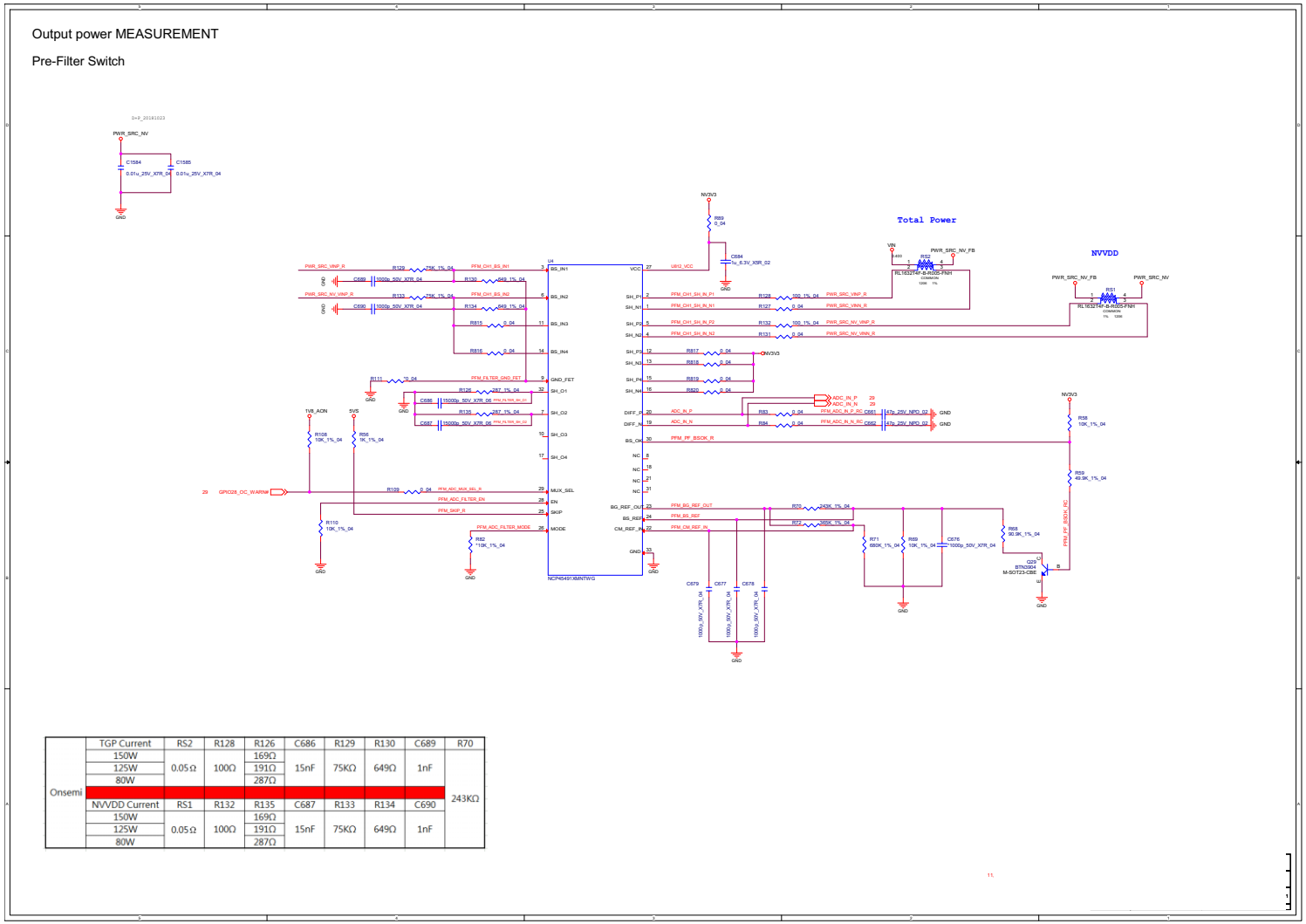
GPU GND & Sequence



Output Power Measurement



	TGP Current	RS2	R128	R126	C686	R129	R130	C689	R70
Onsemi	150W	0.05Ω	100Ω	169Ω	15nF	75KΩ	649Ω	1nF	243KΩ
	125W			191Ω					
	80W			287Ω					
	NVVDD Current	RS1	R132	R135	C687	R133	R134	C690	
	150W	0.05Ω	100Ω	169Ω	15nF	75KΩ	649Ω	1nF	
	125W			191Ω					
	80W			287Ω					

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Output Power Measurement

PCH 1/9

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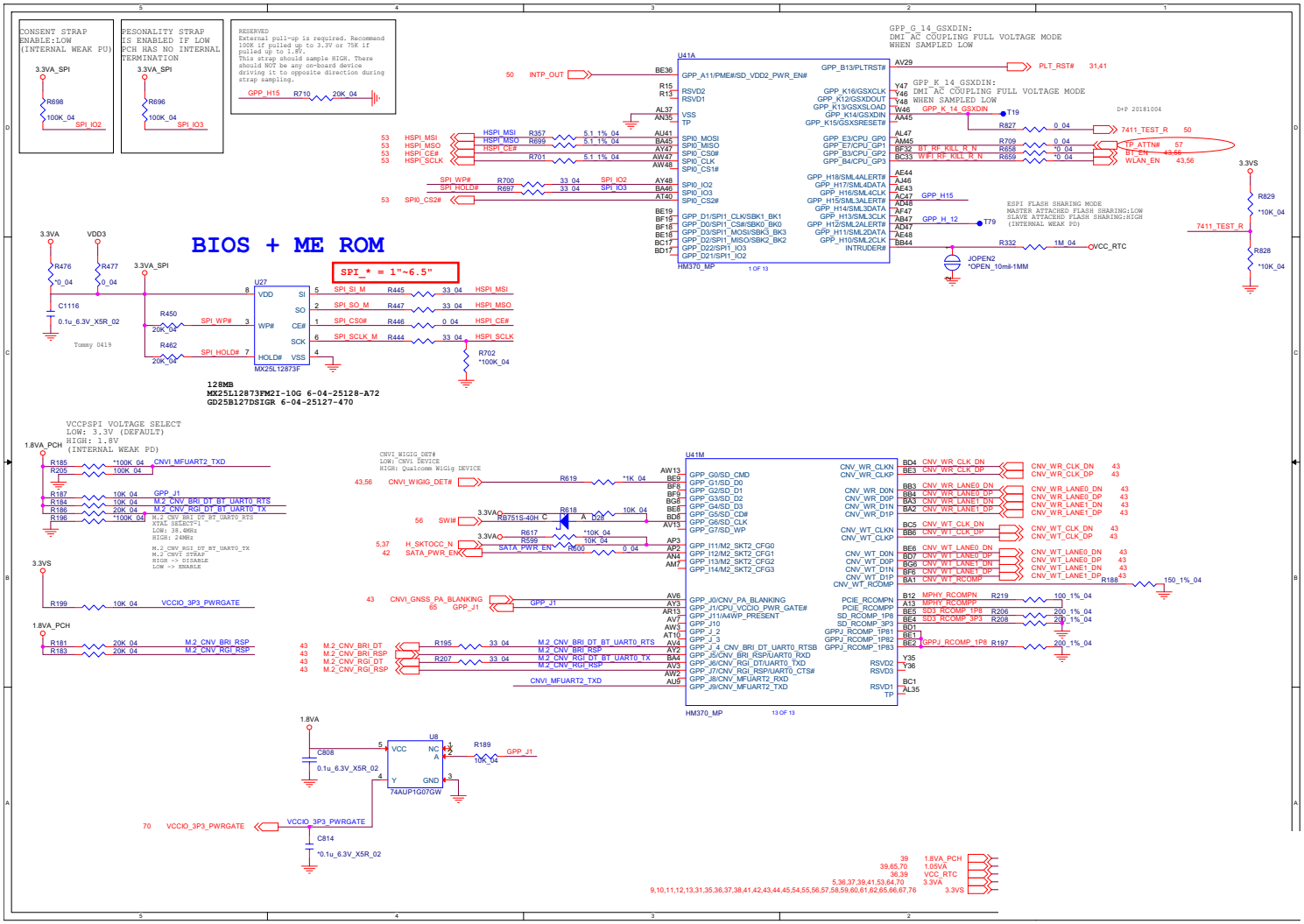
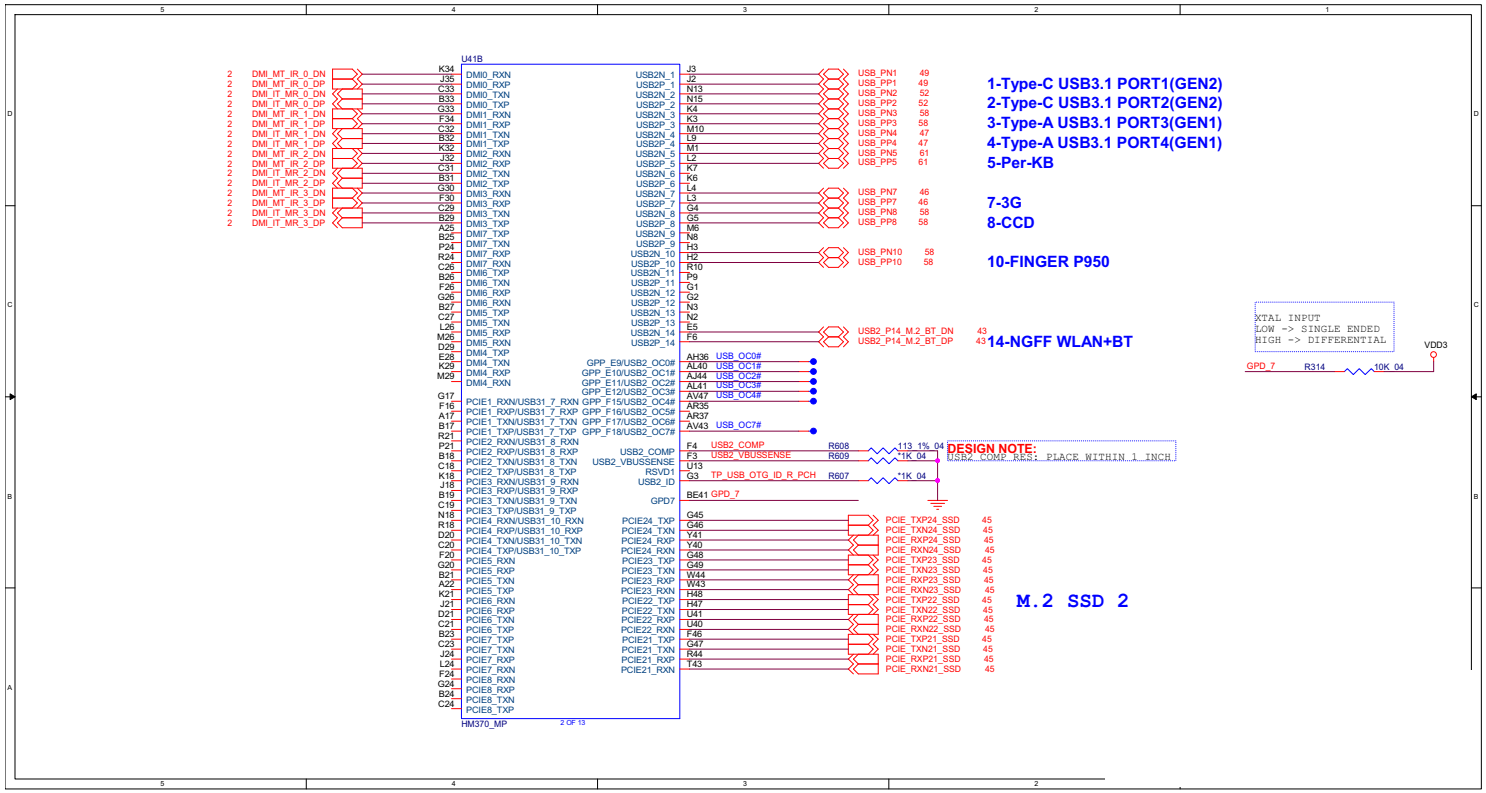
PCH 1/9



PCH 2/9



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PCH 2/9

B.Schematic Diagrams

PCH 3/9

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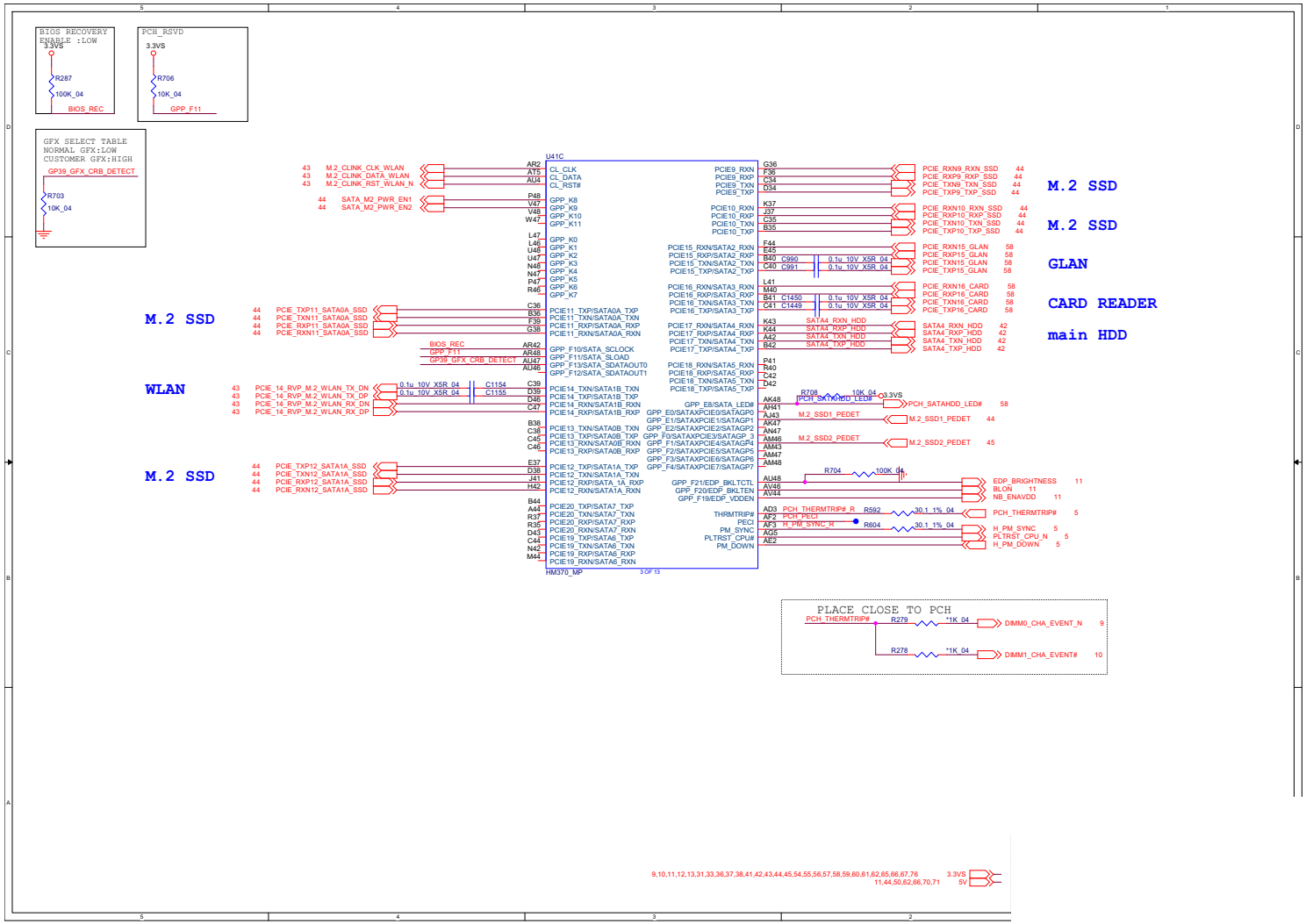
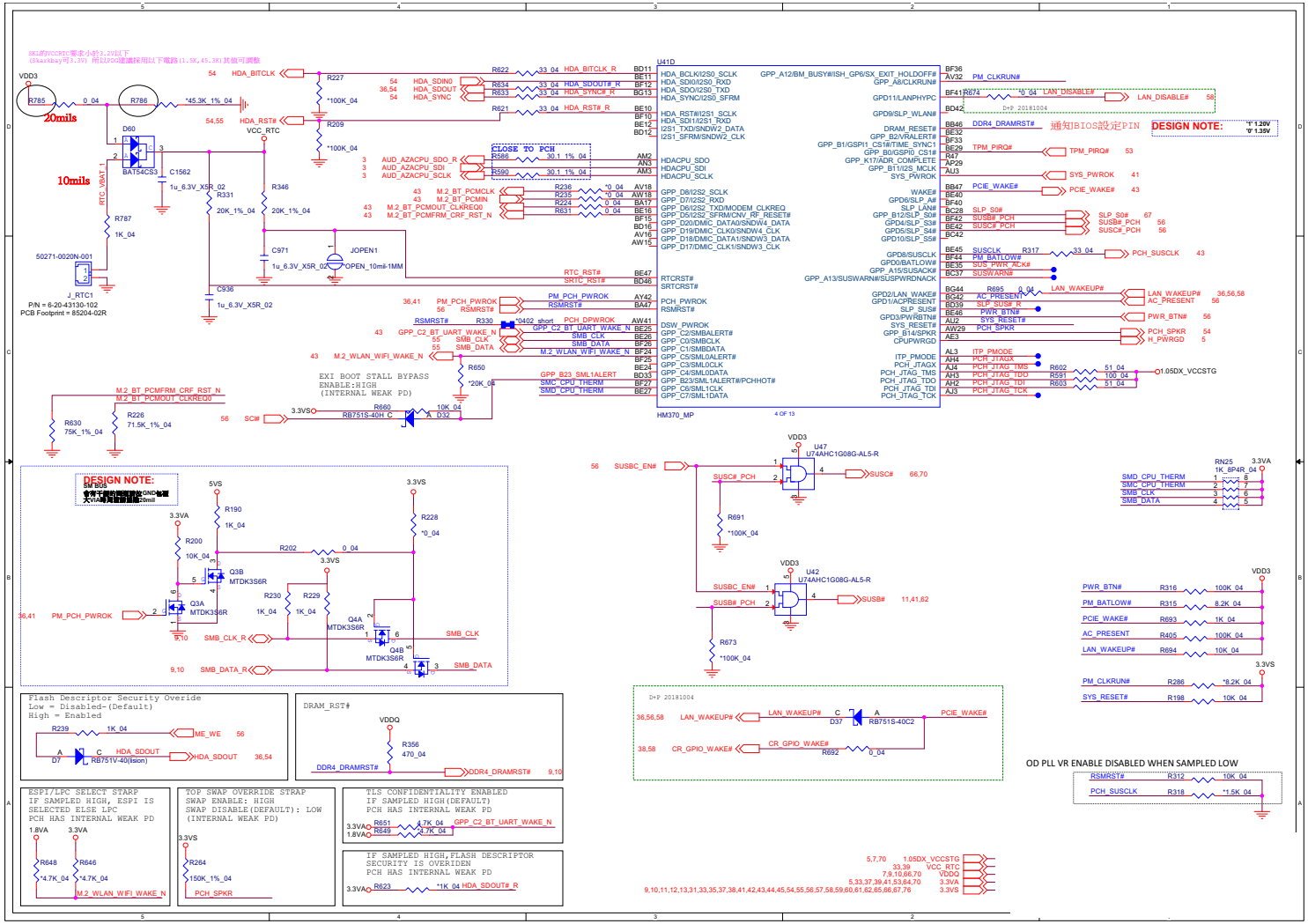
PCH 3/9



PCH 4/9



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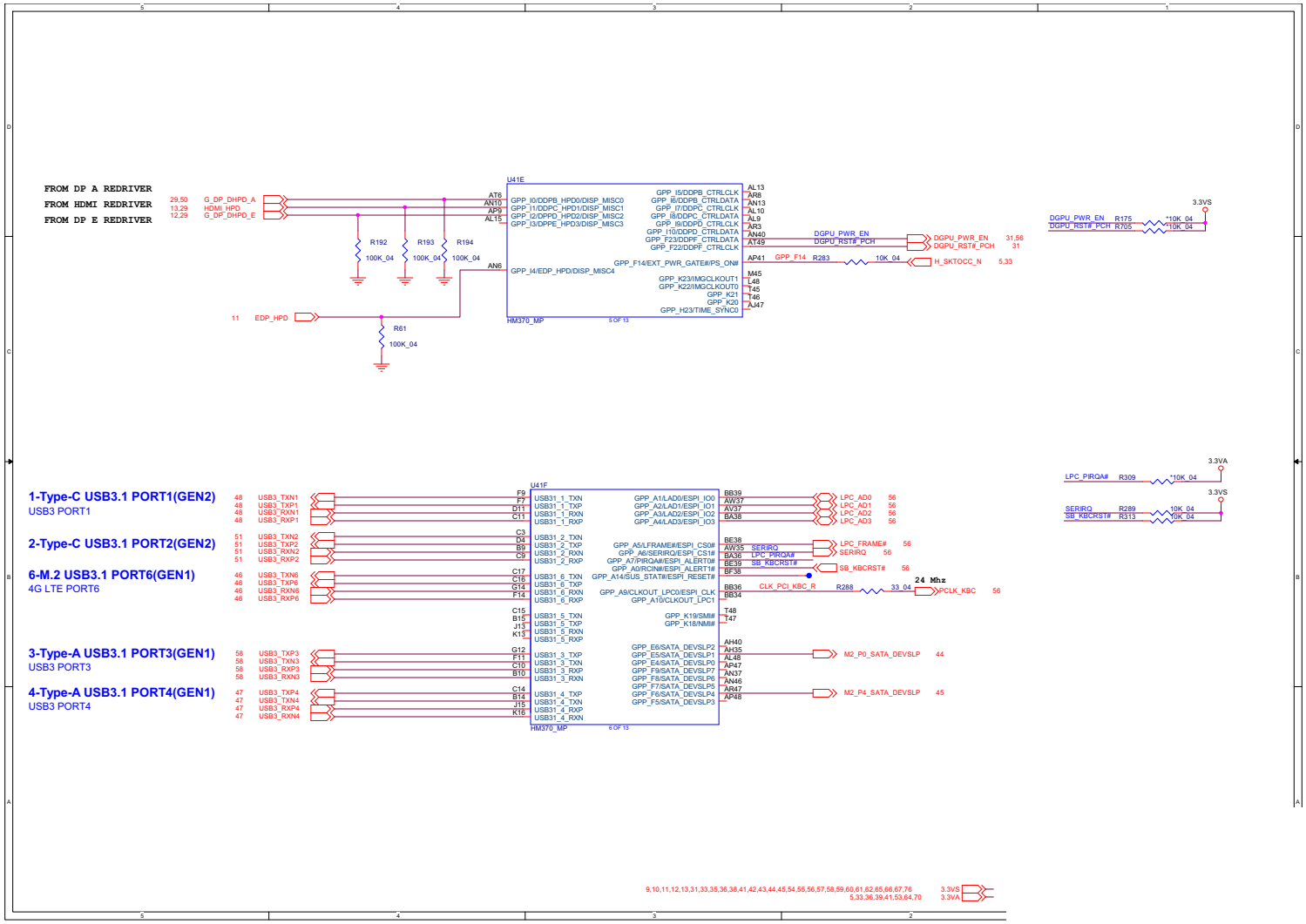
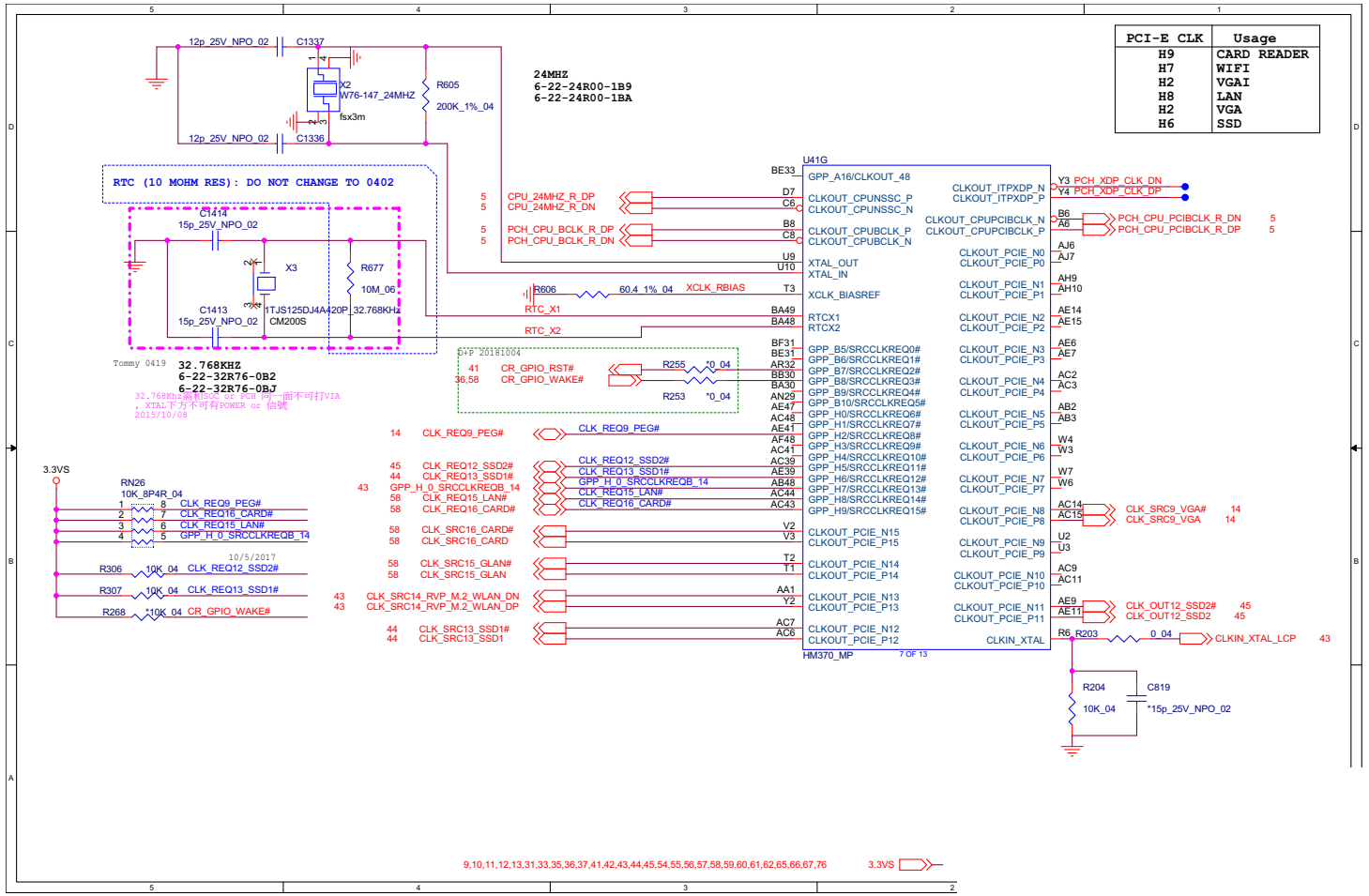
PCH 4/9

PCH 5/9

Sheet 37 of 83
PCH 5/9



PCH 6/9



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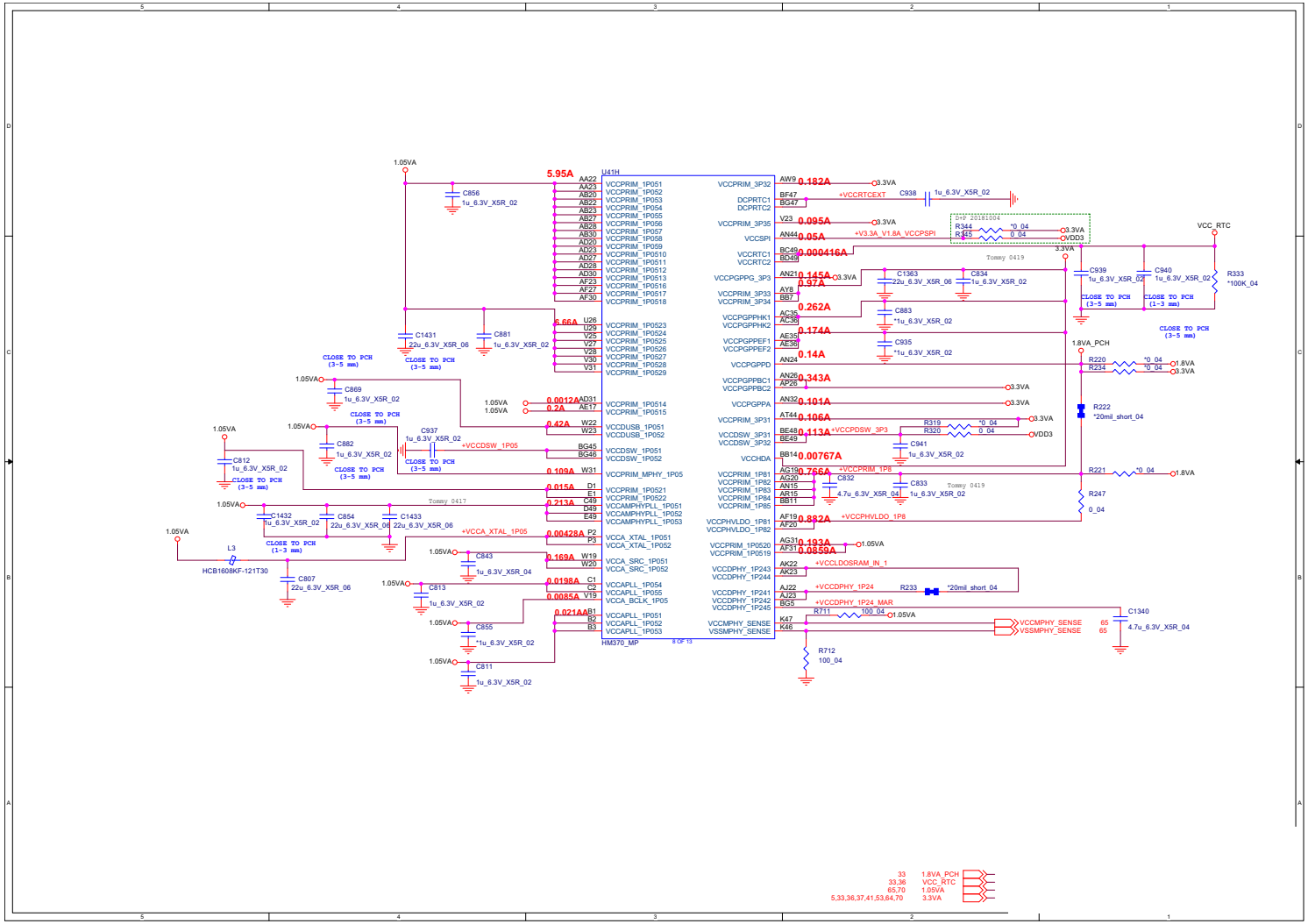
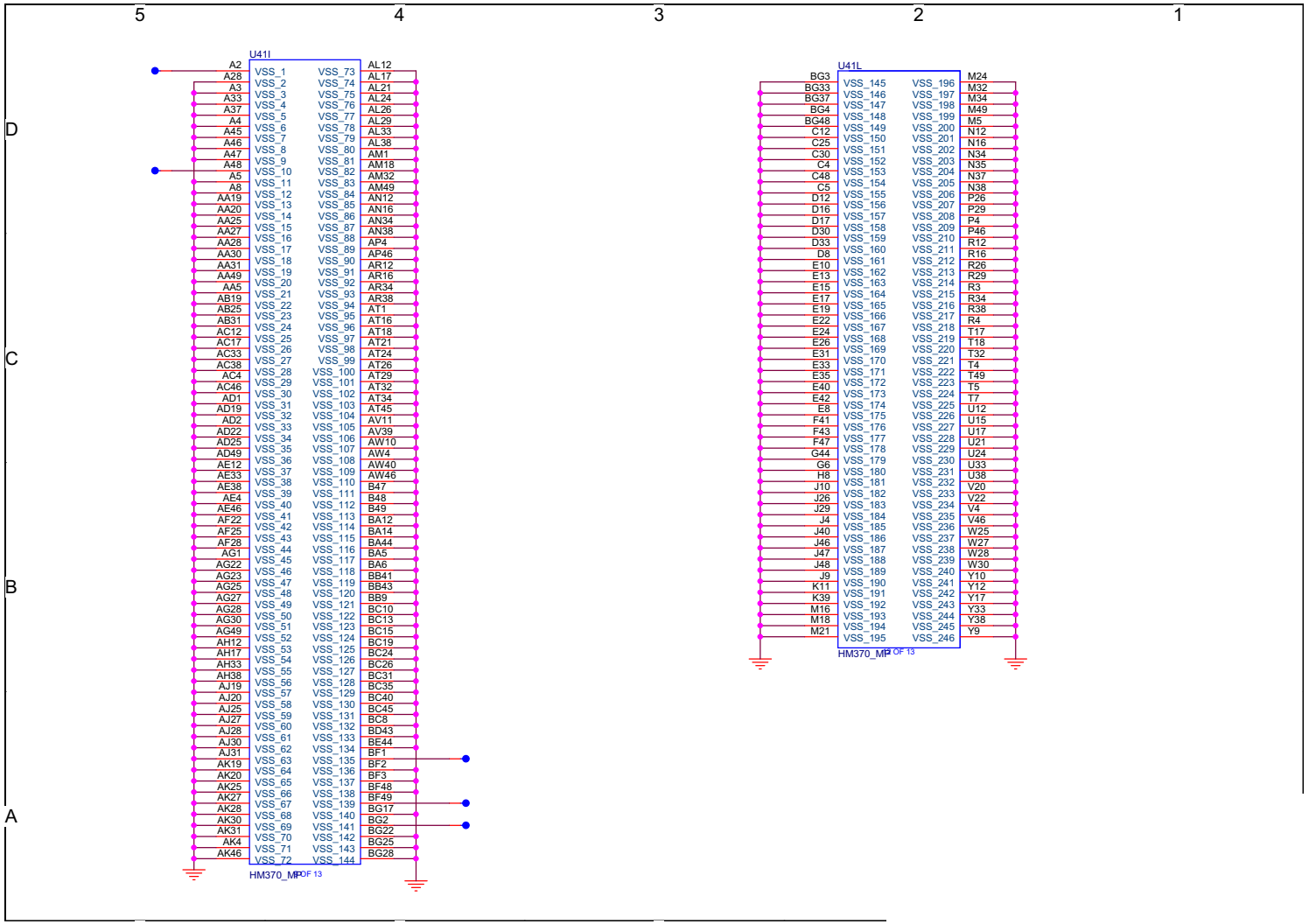
PCH 6/9

PCH 7/9

Sheet 39 of 83
PCH 7/9



PCH 8/9



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PCH 8/9

PCH 9/9

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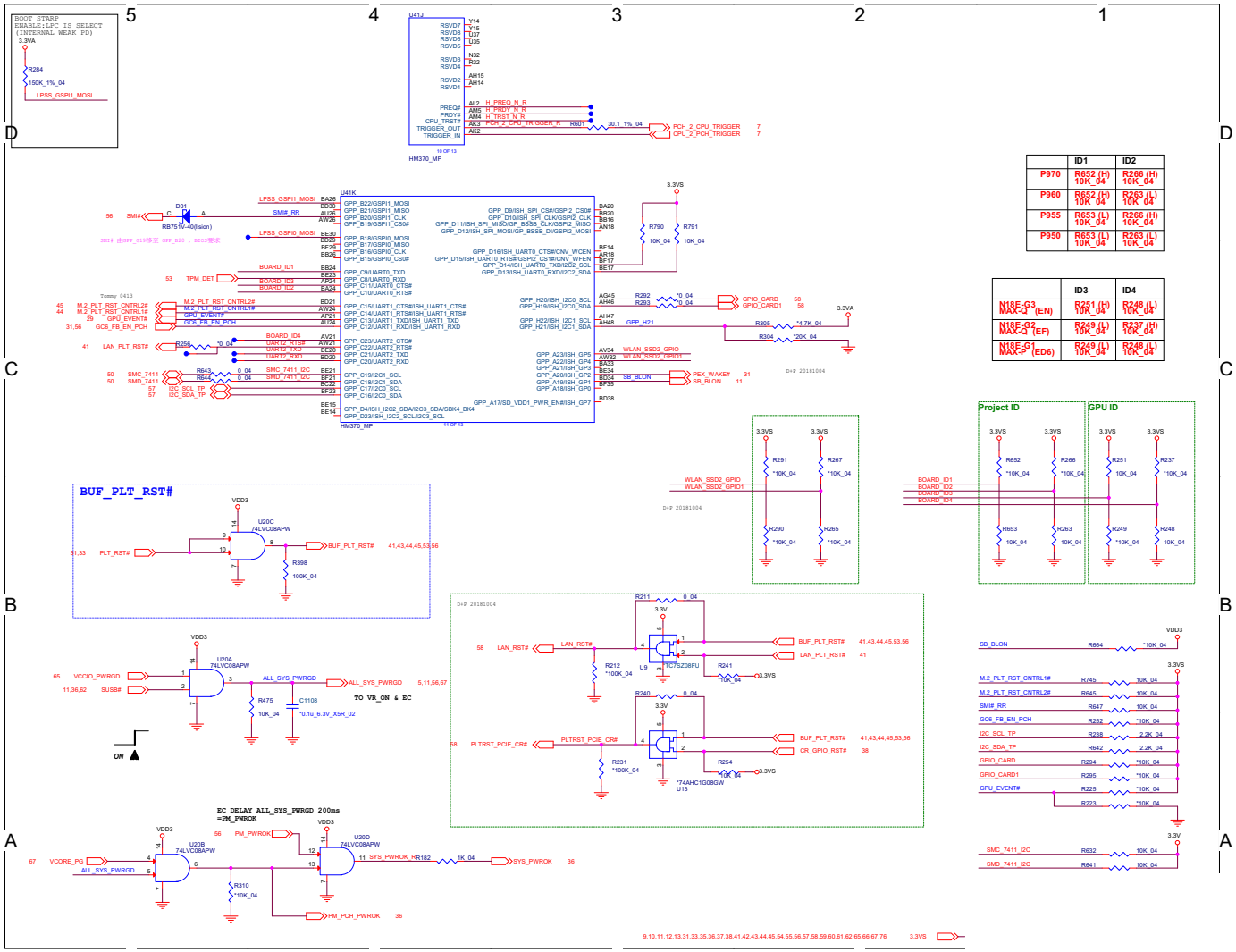
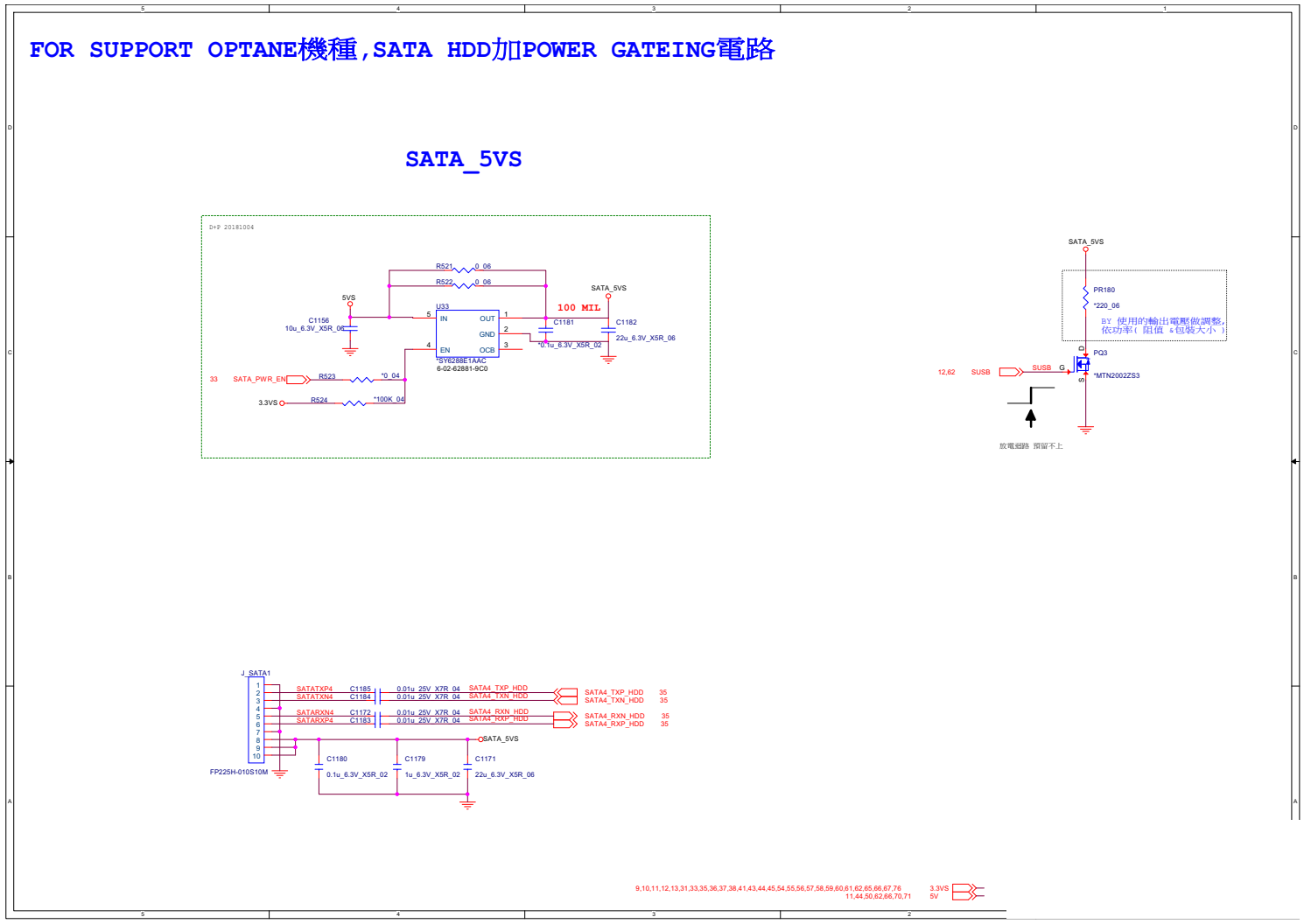
PCH 9/9



HDD, SATA Port



Sheet 42 of 83
HDD, SATA Port

M.2 WLAN+BT

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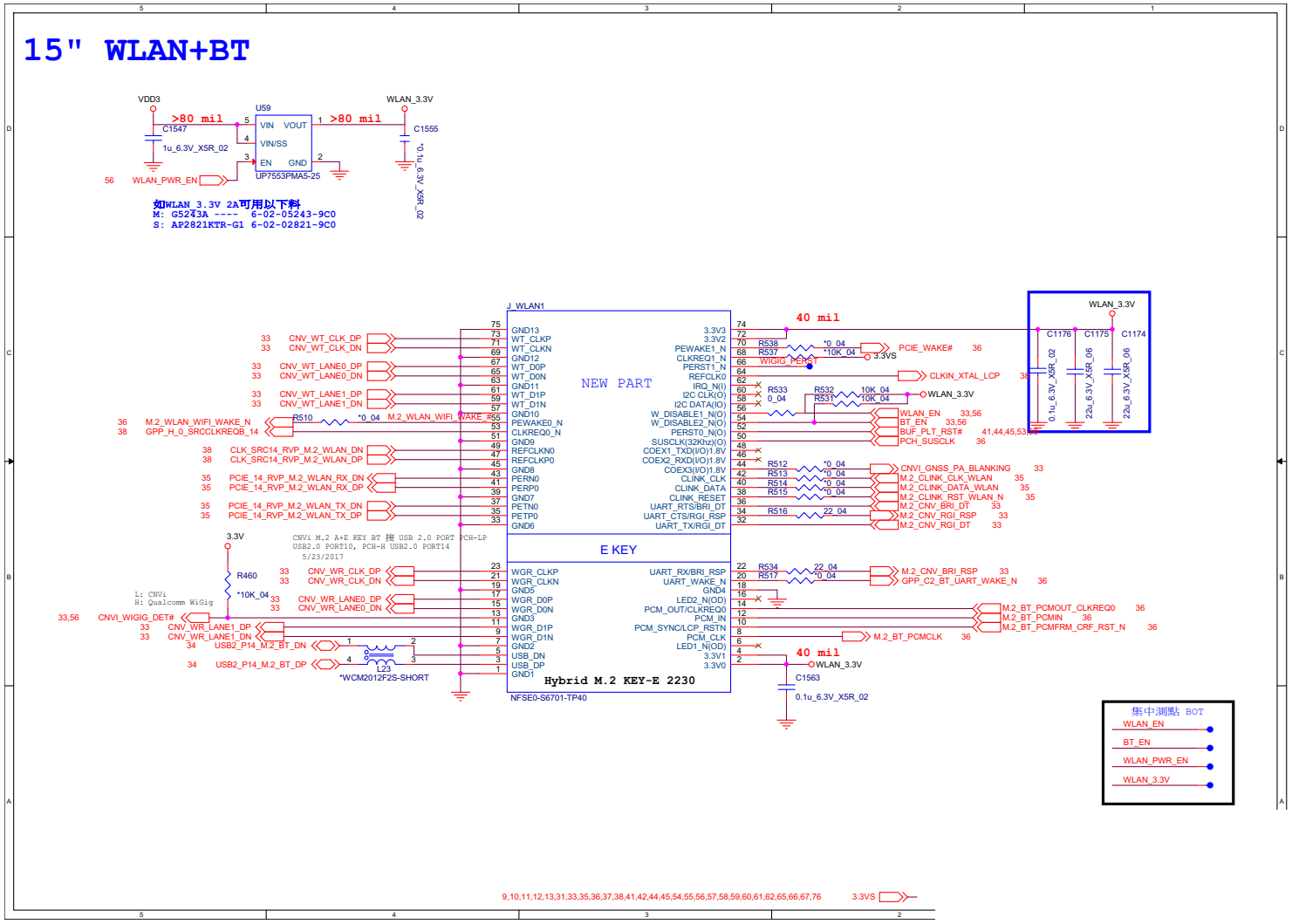
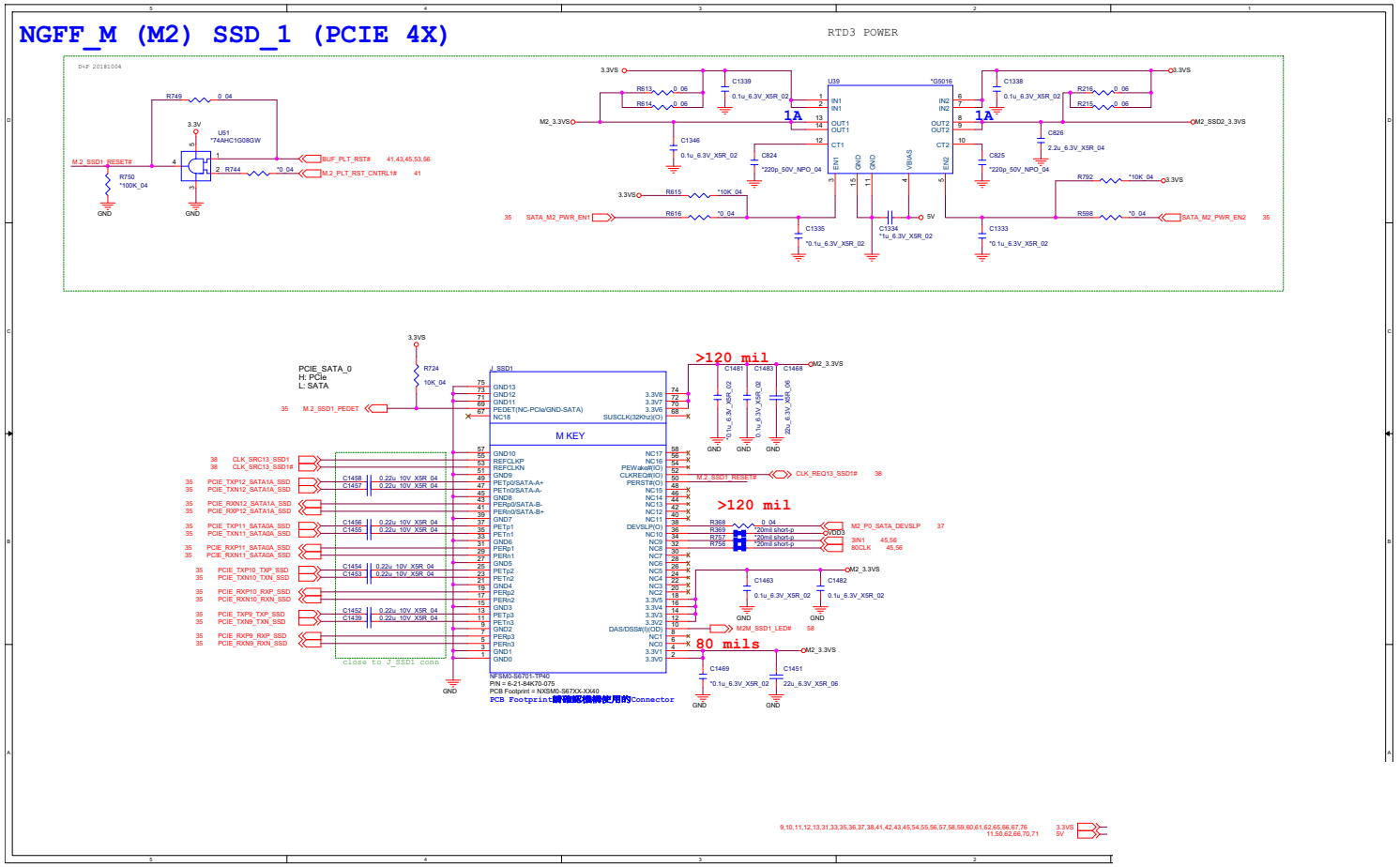
M.2 WLAN+BT



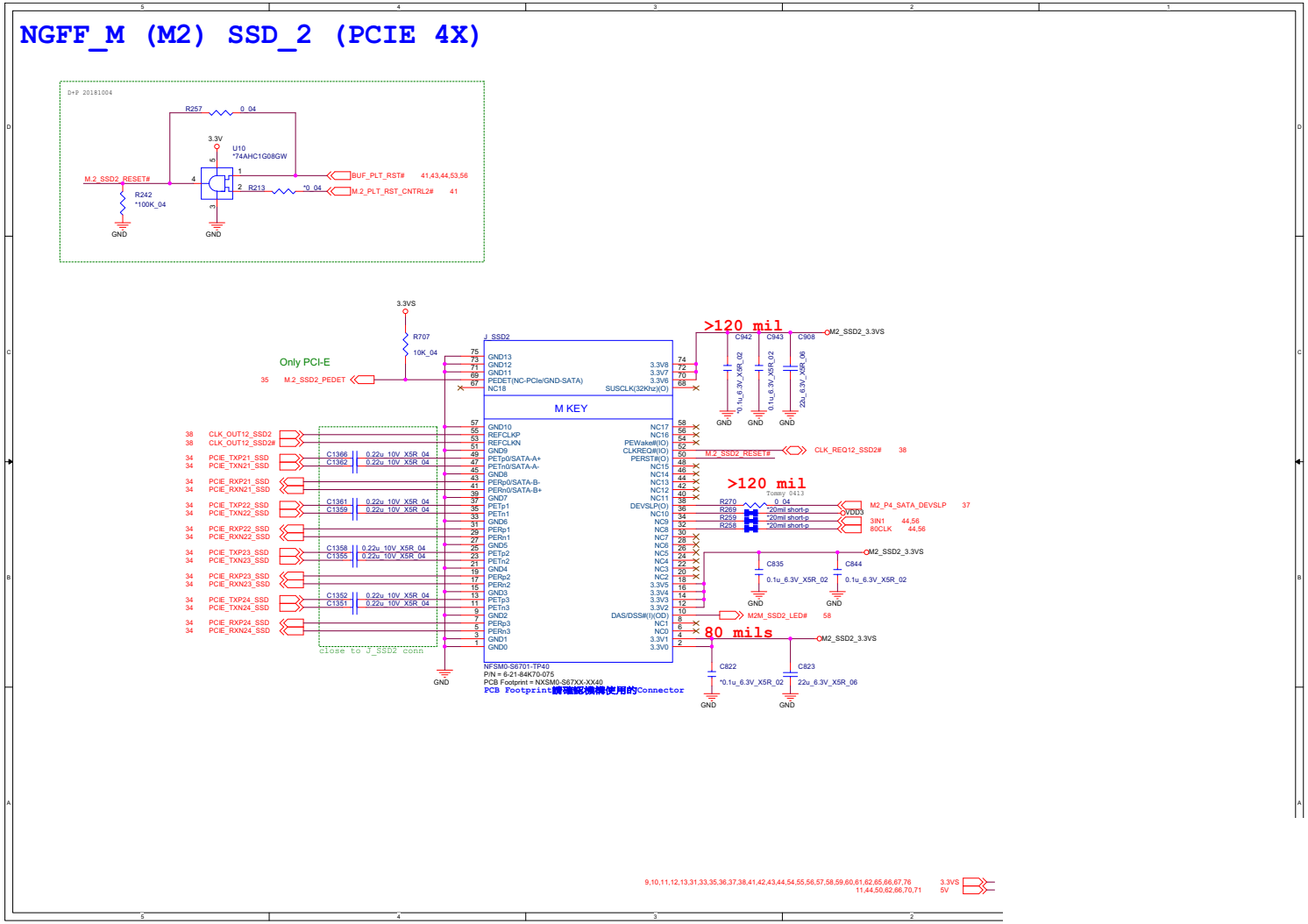
M.2 NGFF_M SSD1



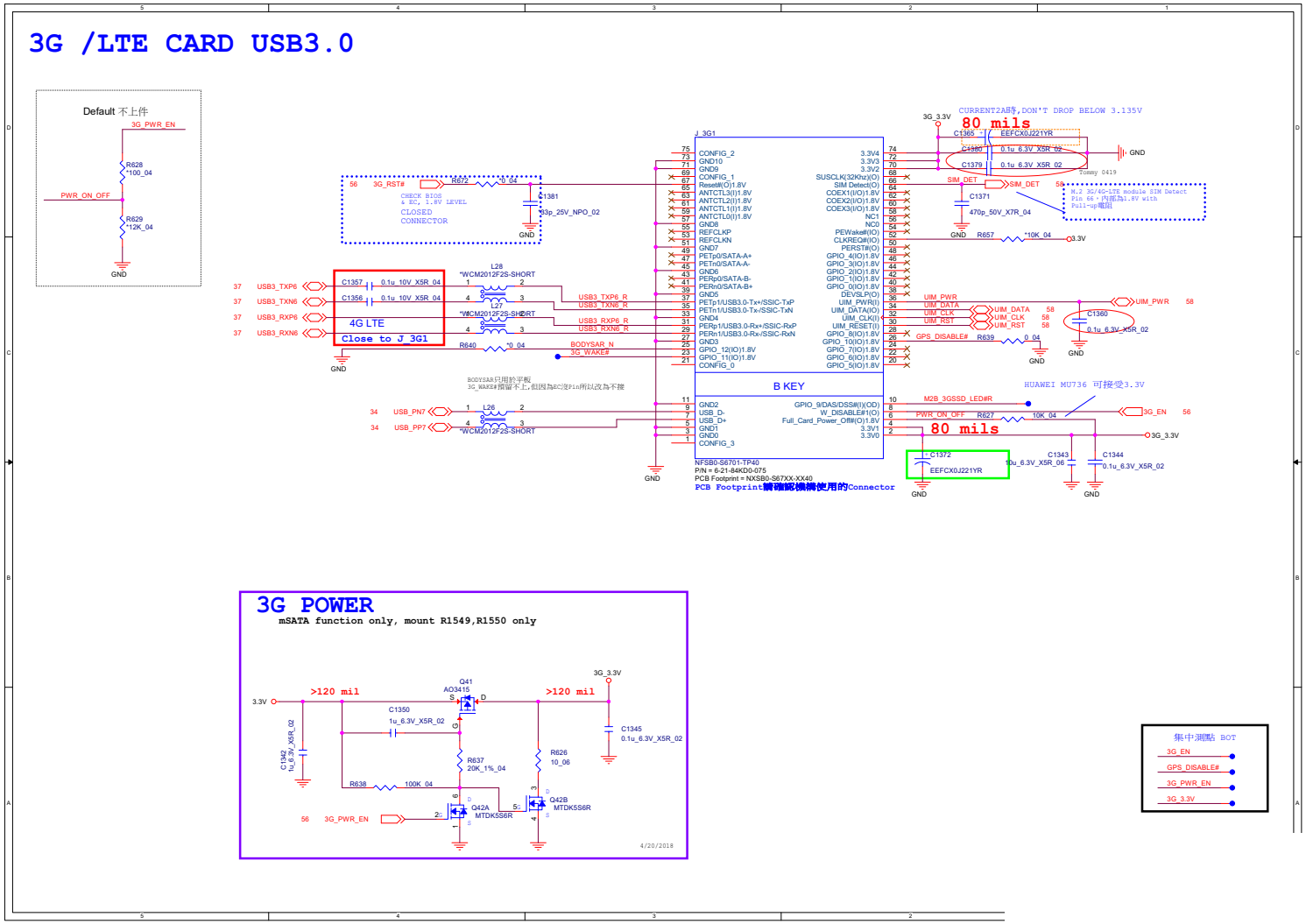
Sheet 44 of 83
M.2 NGFF_M SSD1

M.2 NGFF_M SSD2

Sheet 45 of 83
M.2 NGFF_M SSD2



M.2 3G/LTE, SIM



Sheet 46 of 83
M.2 3G/LTE, SIM

USB Charger

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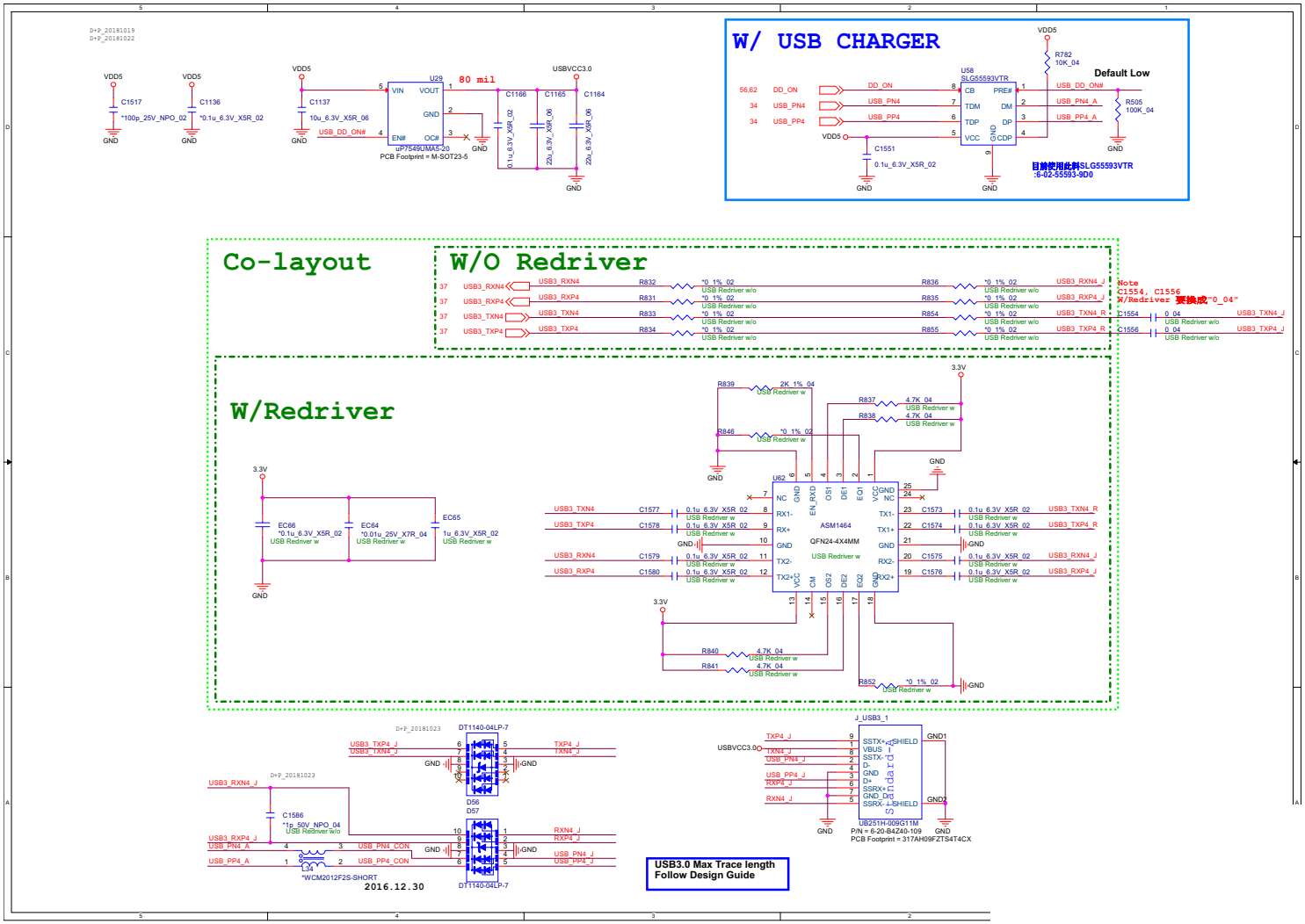
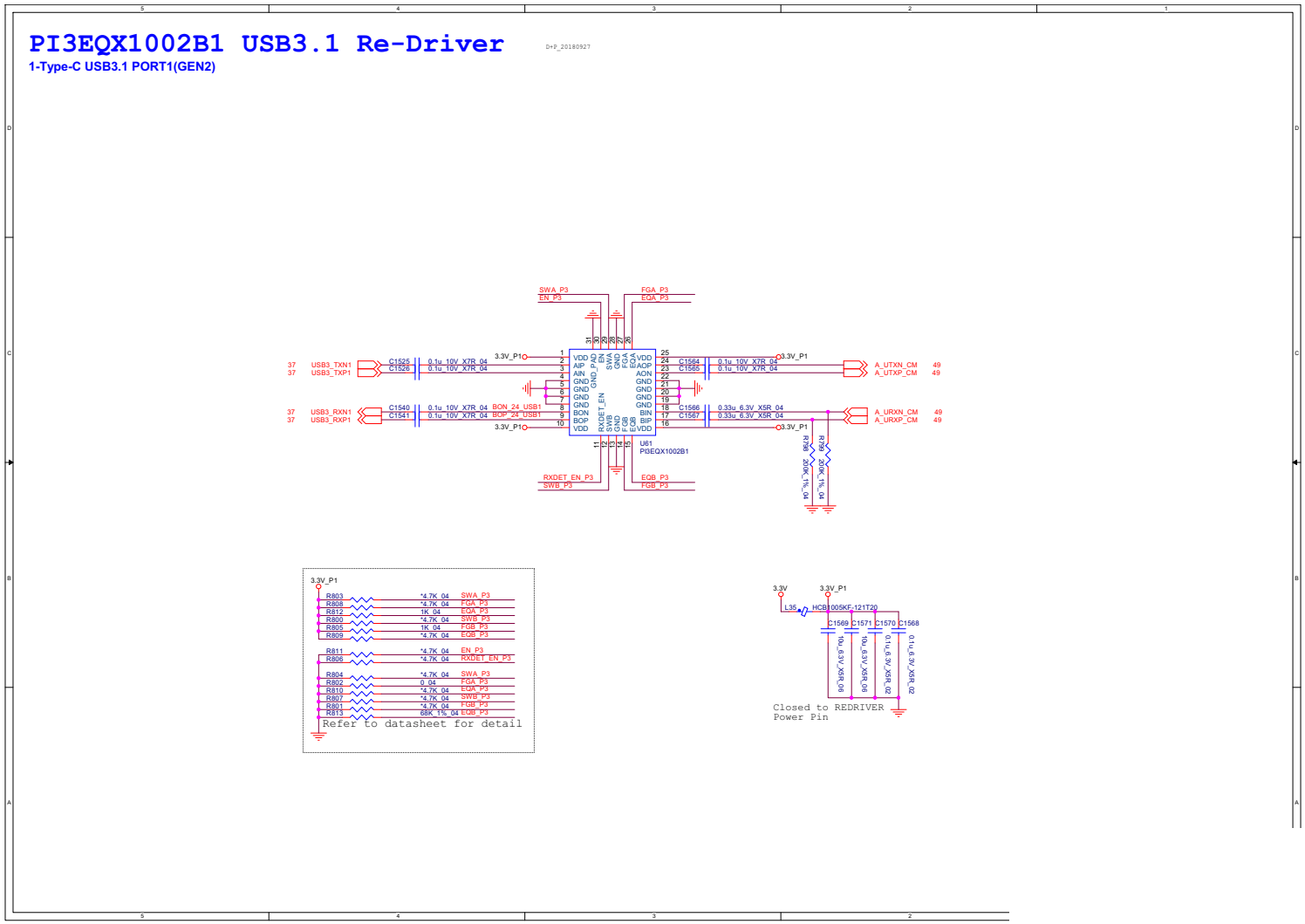
USB Charger



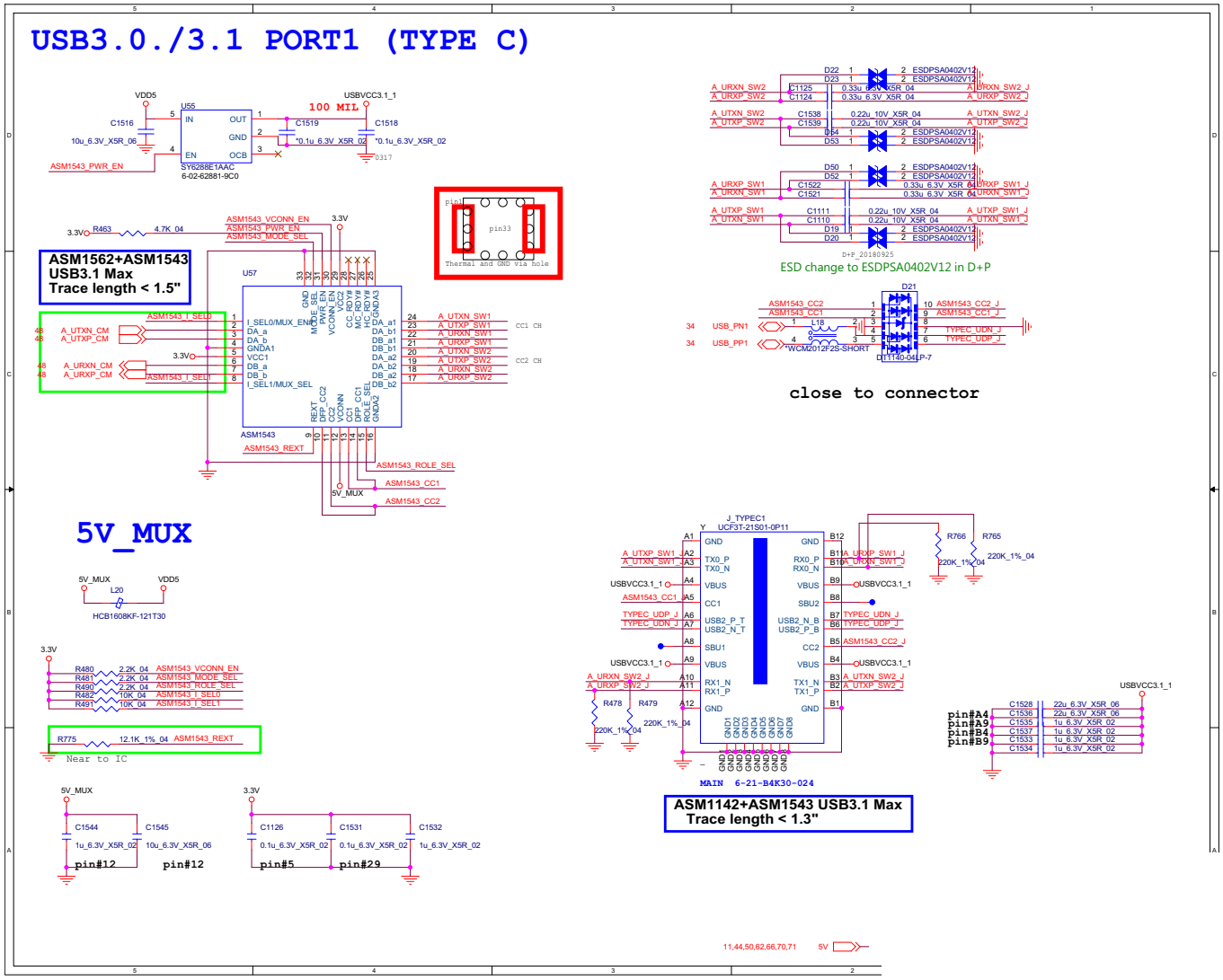
USB Redriver



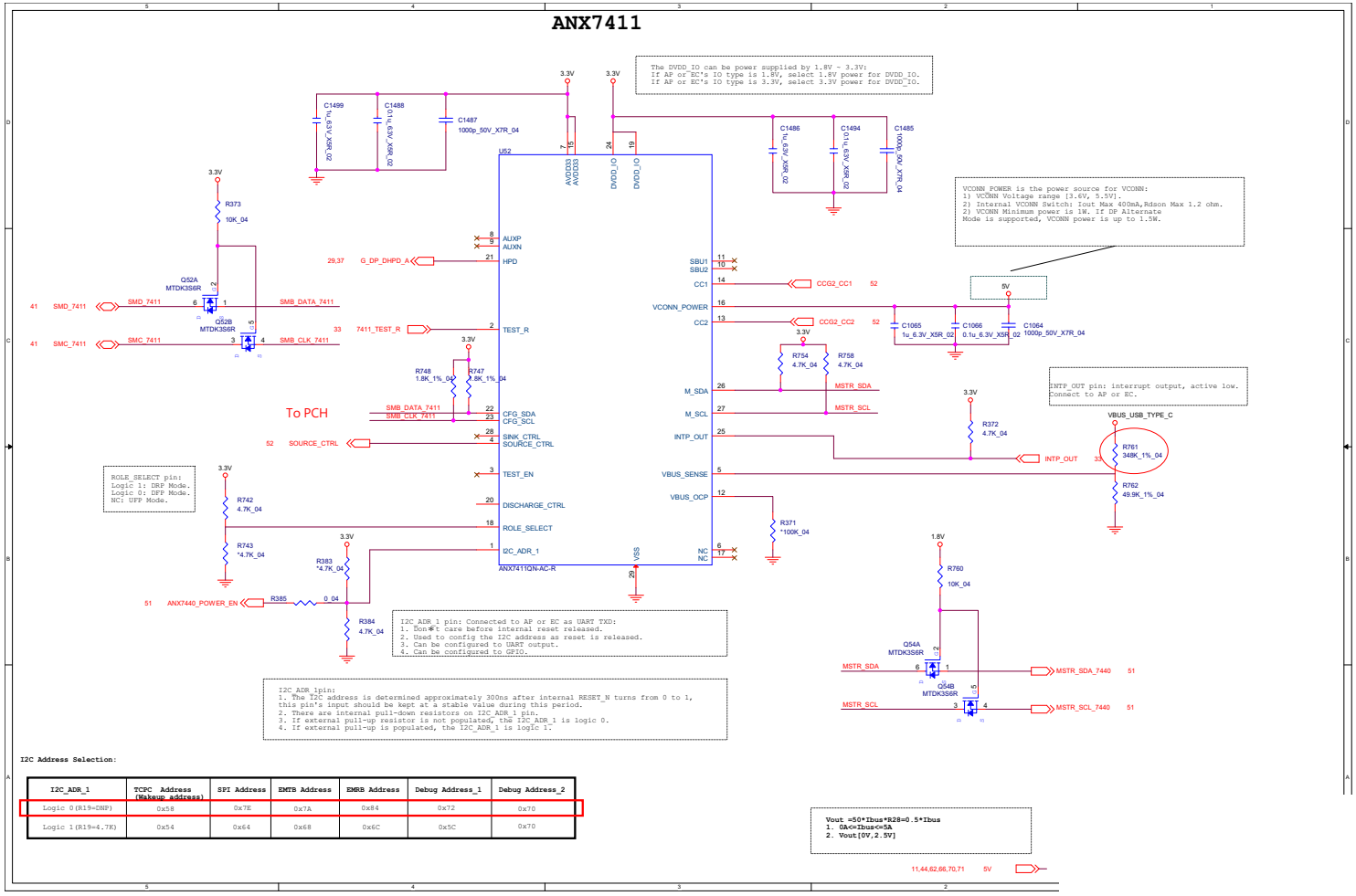
Sheet 48 of 83
USB Redriver

ASM1543

Sheet 49 of 83
ASM1543



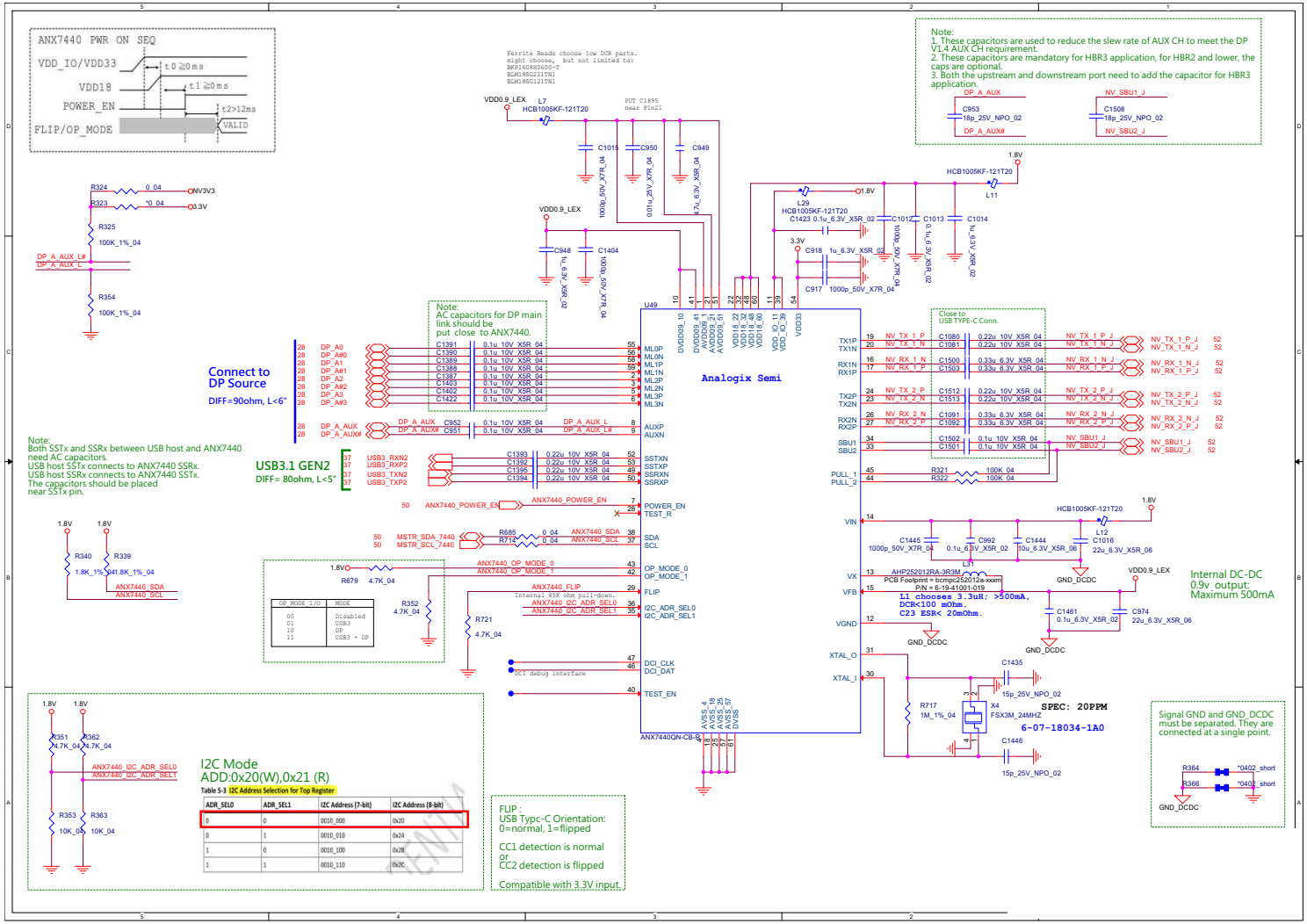
PD Controller ANX7411



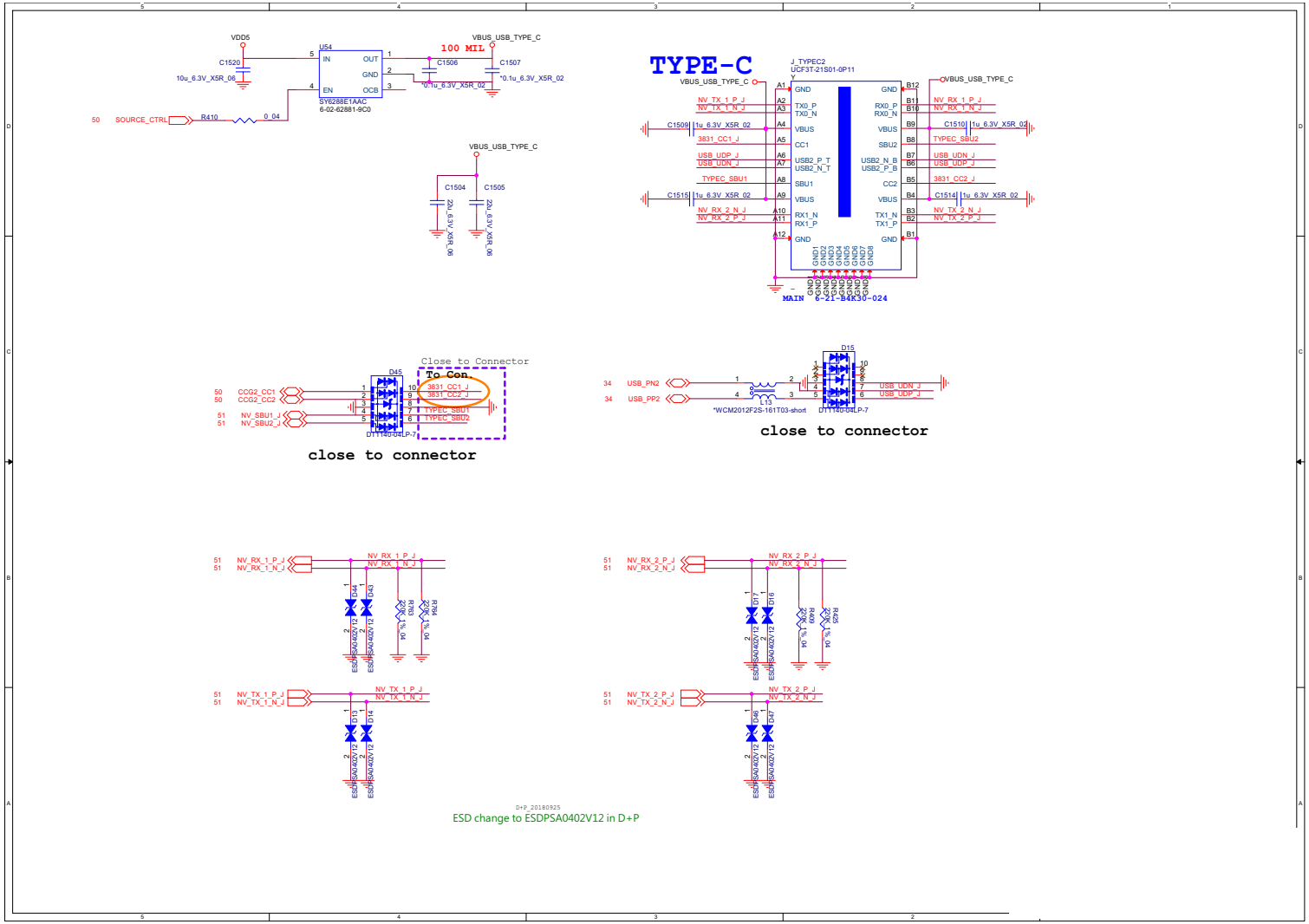
Sheet 50 of 83
PD Controller
ANX7411

USB Type-C

Sheet 51 of 83
USB Type-C



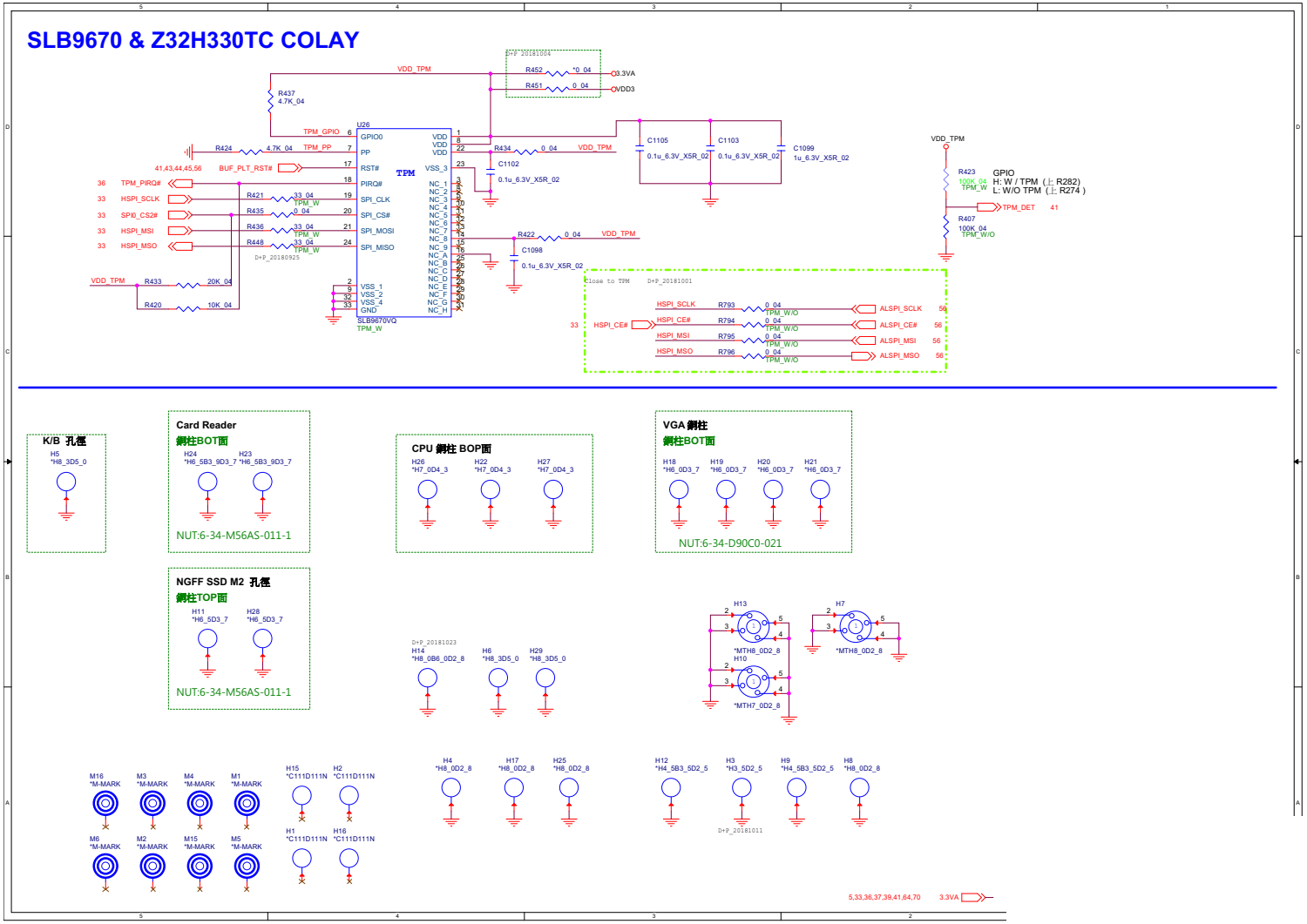
DP+USB Type-C



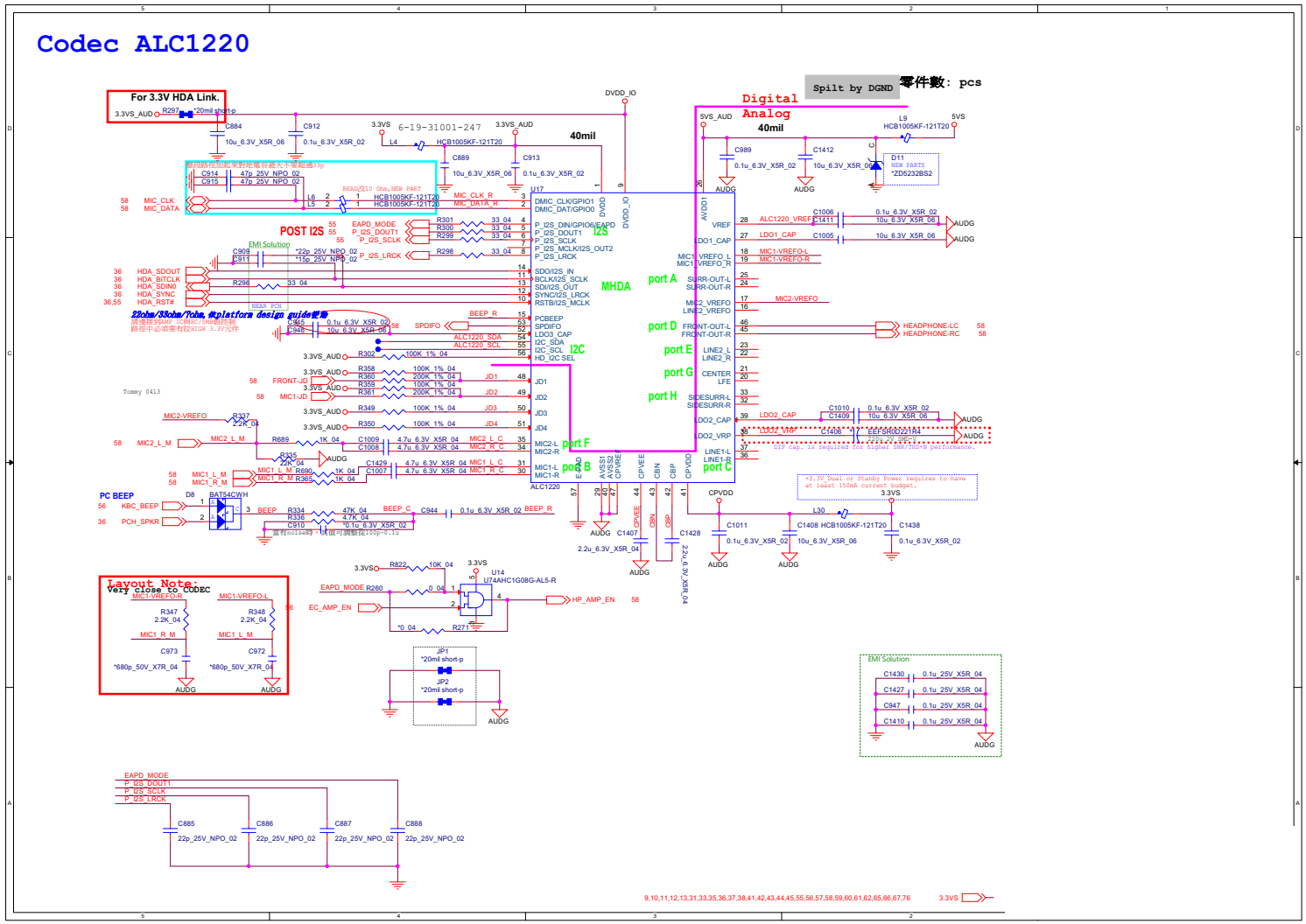
Sheet 52 of 83
DP+USB Type-C

TPM, Screw

Sheet 53 of 83
TPM, Screw



Audio Codec



Sheet 54 of 83
Audio Codec

Smart AMP

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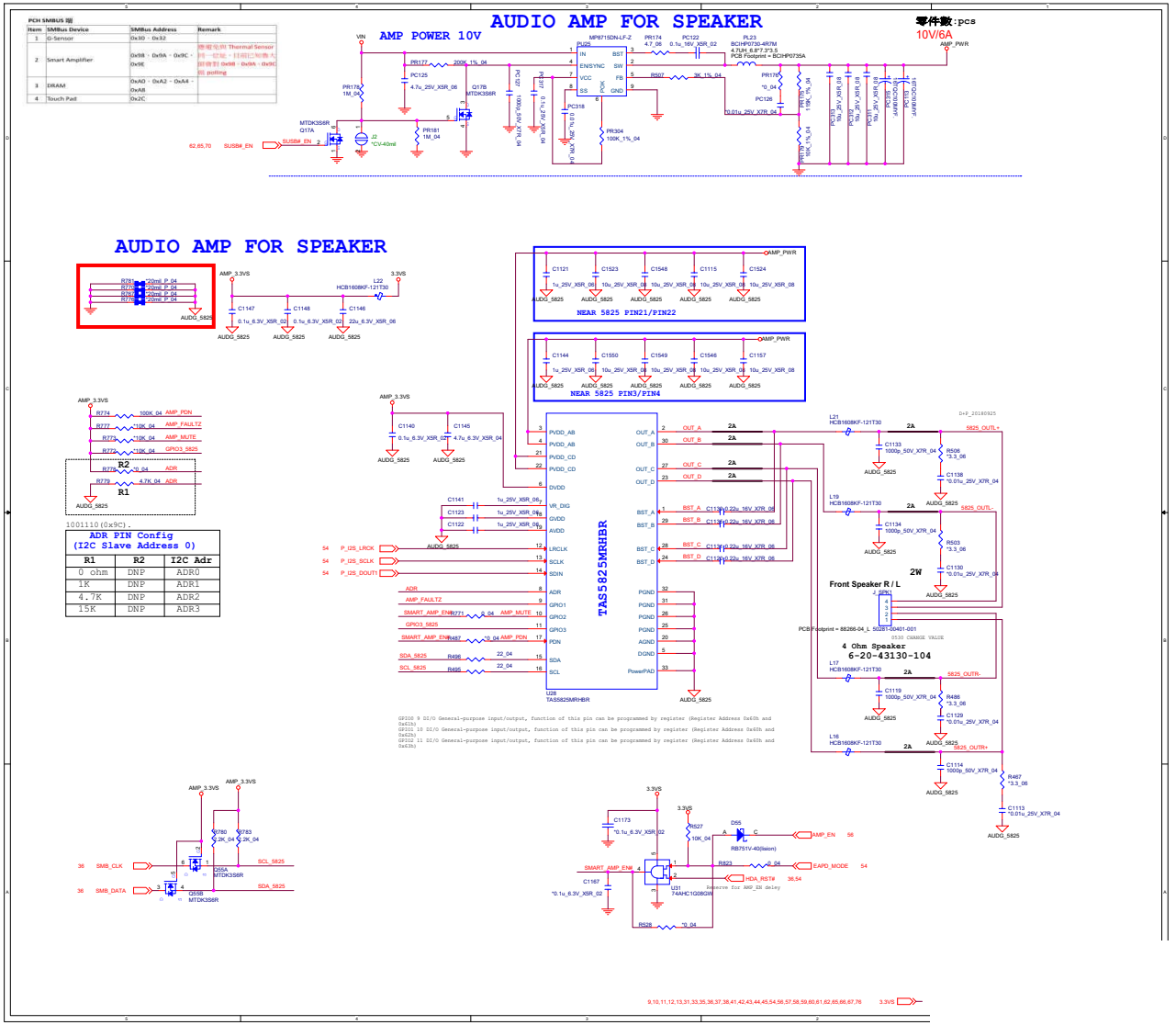
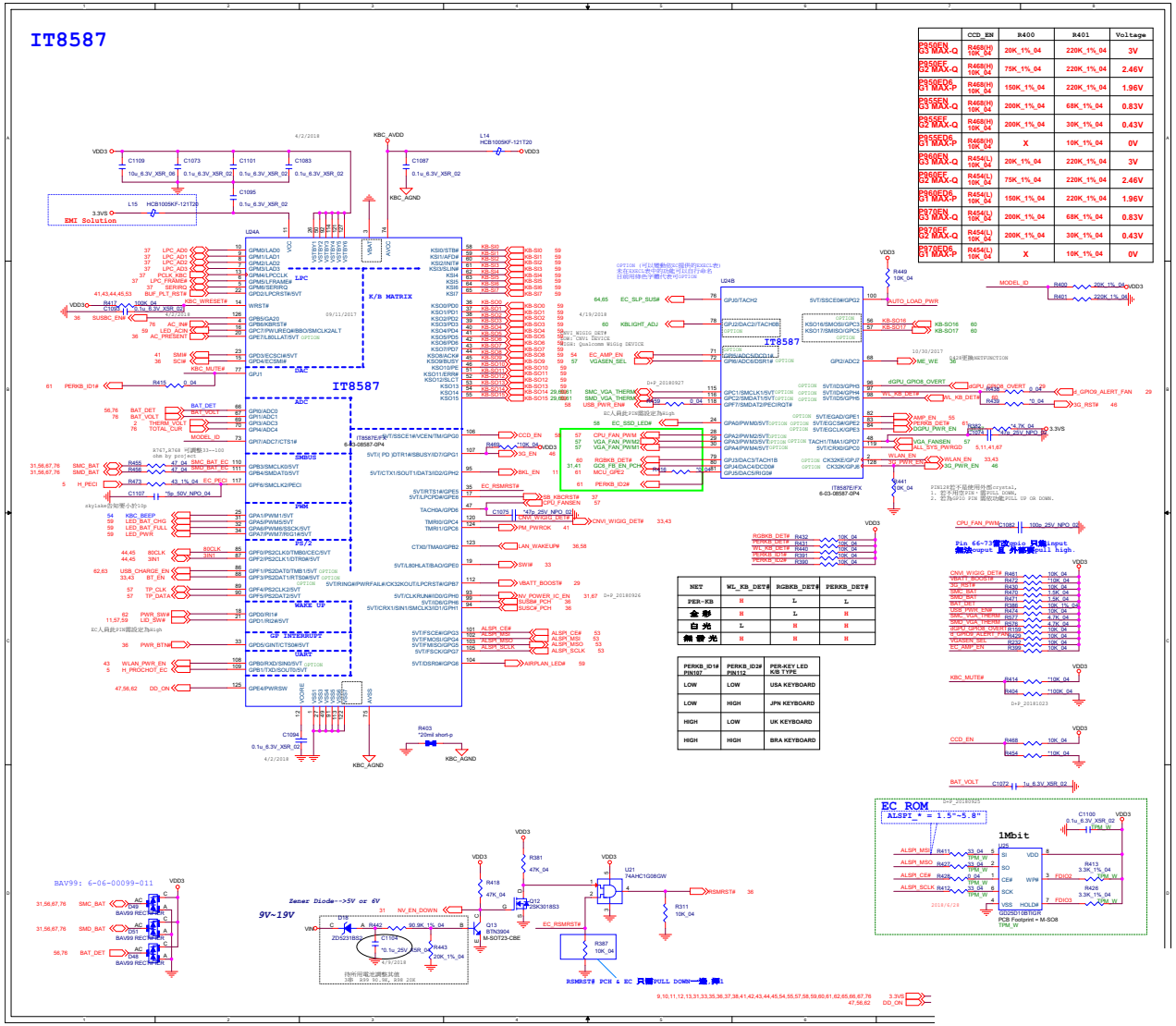
Smart AMP



KBC IT8587



	CCD_EN	R400	R401	Voltage
P650EN G3 MAX-Q	R468(H) 10K_04	20K_1%_04	220K_1%_04	3V
P650EF G2 MAX-Q	R468(H) 10K_04	75K_1%_04	220K_1%_04	2.46V
P650ED6 G1 MAX-P	R468(H) 10K_04	150K_1%_04	220K_1%_04	1.96V
P655EN G3 MAX-Q	R468(H) 10K_04	200K_1%_04	68K_1%_04	0.83V
P655EF G2 MAX-Q	R468(H) 10K_04	200K_1%_04	30K_1%_04	0.43V
P655ED6 G1 MAX-P	R468(H) 10K_04	X	10K_1%_04	0V
P960EN G3 MAX-Q	R454(L) 10K_04	20K_1%_04	220K_1%_04	3V
P960EF G2 MAX-Q	R454(L) 10K_04	75K_1%_04	220K_1%_04	2.46V
P960ED6 G1 MAX-P	R454(L) 10K_04	150K_1%_04	220K_1%_04	1.96V
P970EN G3 MAX-Q	R454(L) 10K_04	200K_1%_04	68K_1%_04	0.83V
P970EF G2 MAX-Q	R454(L) 10K_04	200K_1%_04	30K_1%_04	0.43V
P970ED6 G1 MAX-P	R454(L) 10K_04	X	10K_1%_04	0V

NET	WL_KB_DET#	RGBKB_DET#	PERKB_DET#
PER-KB	H	L	L
全 彩	H	L	H
白 光	L	H	H
無 背 光	H	H	H

PERKB_ID1# PIN107	PERKB_ID2# PIN112	PER-KEY LED KB TYPE
LOW	LOW	USA KEYBOARD
LOW	HIGH	JPN KEYBOARD
HIGH	LOW	UK KEYBOARD
HIGH	HIGH	BRA KEYBOARD

VGA Fan, TP

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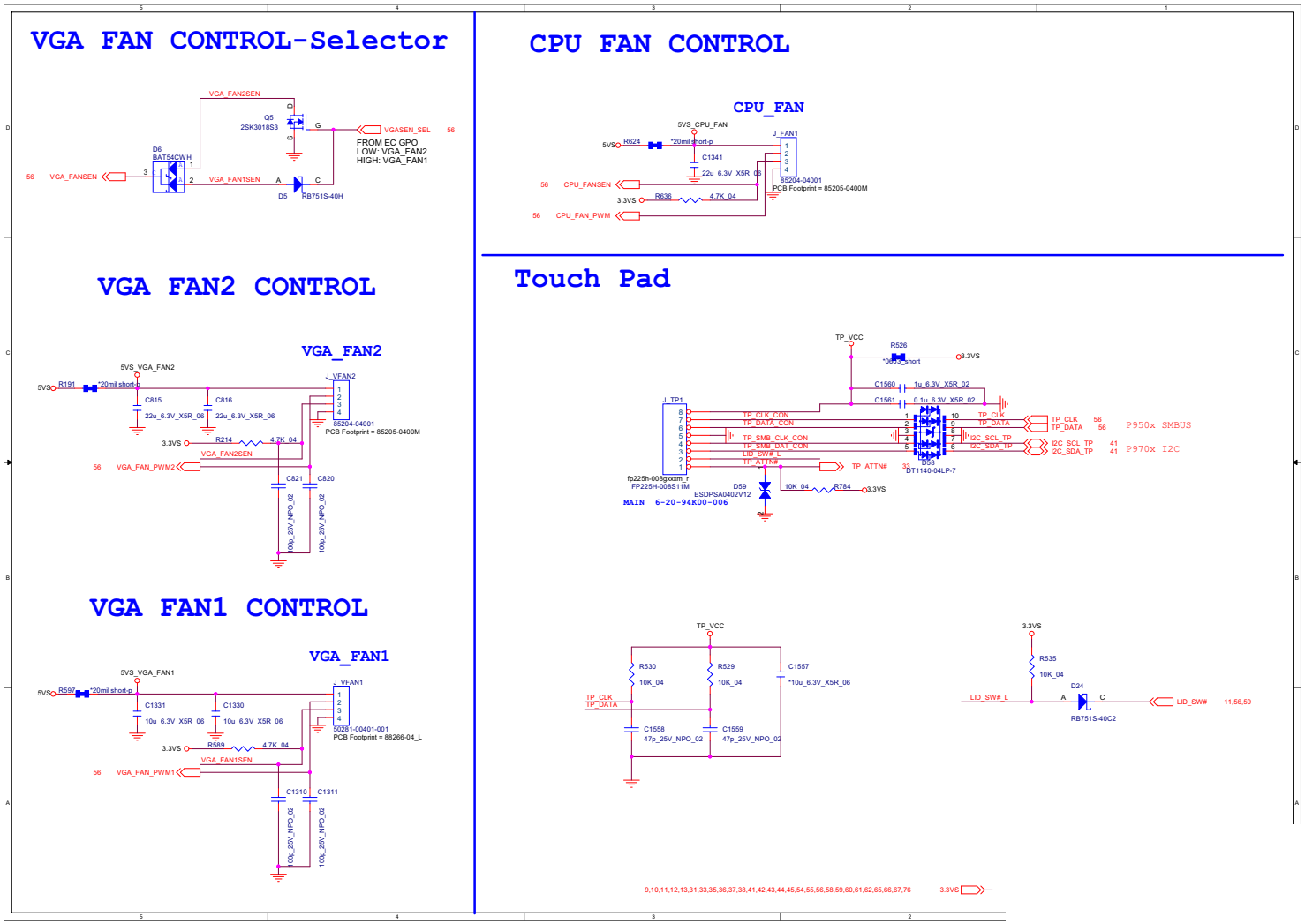
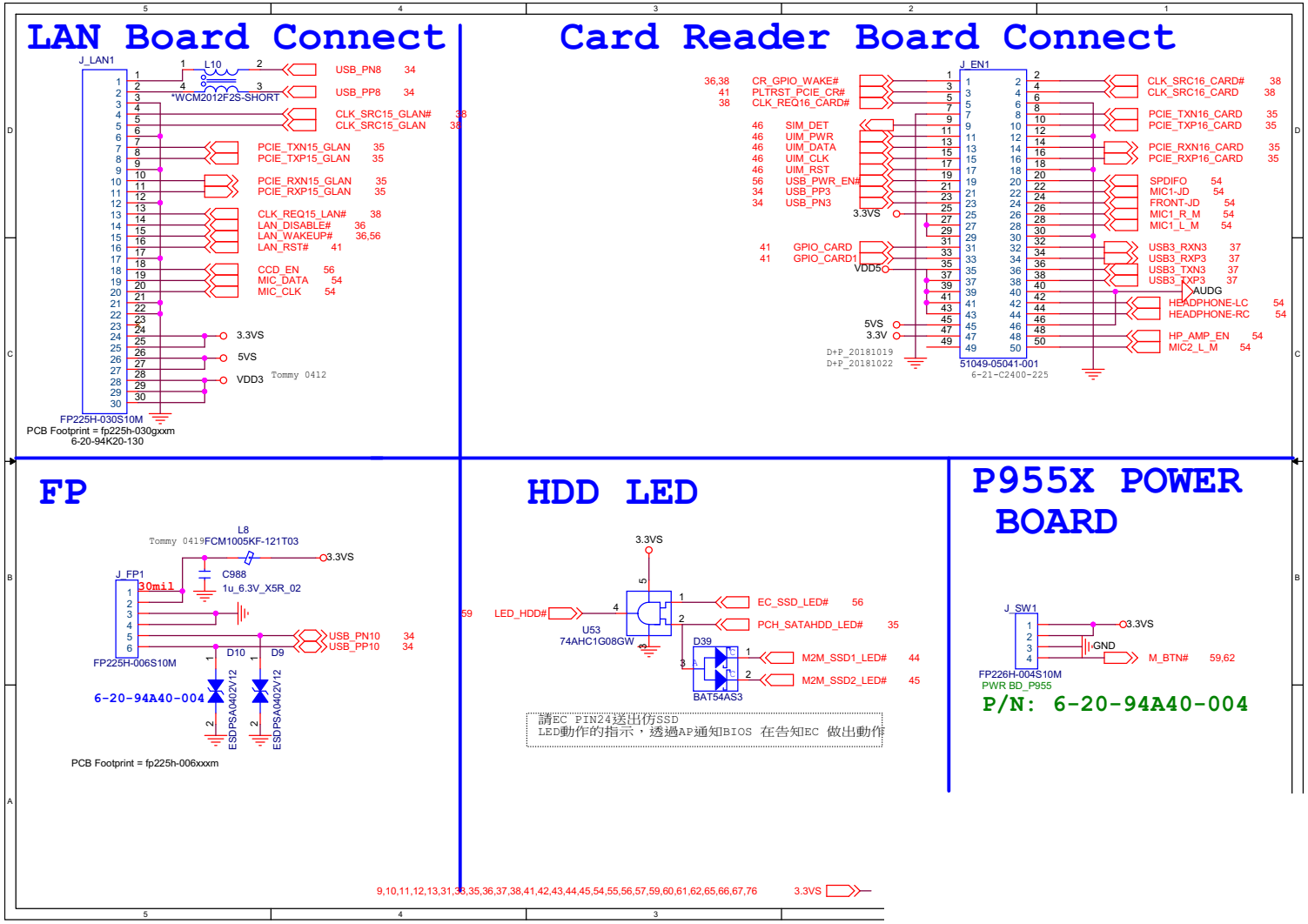
VGA Fan, TP



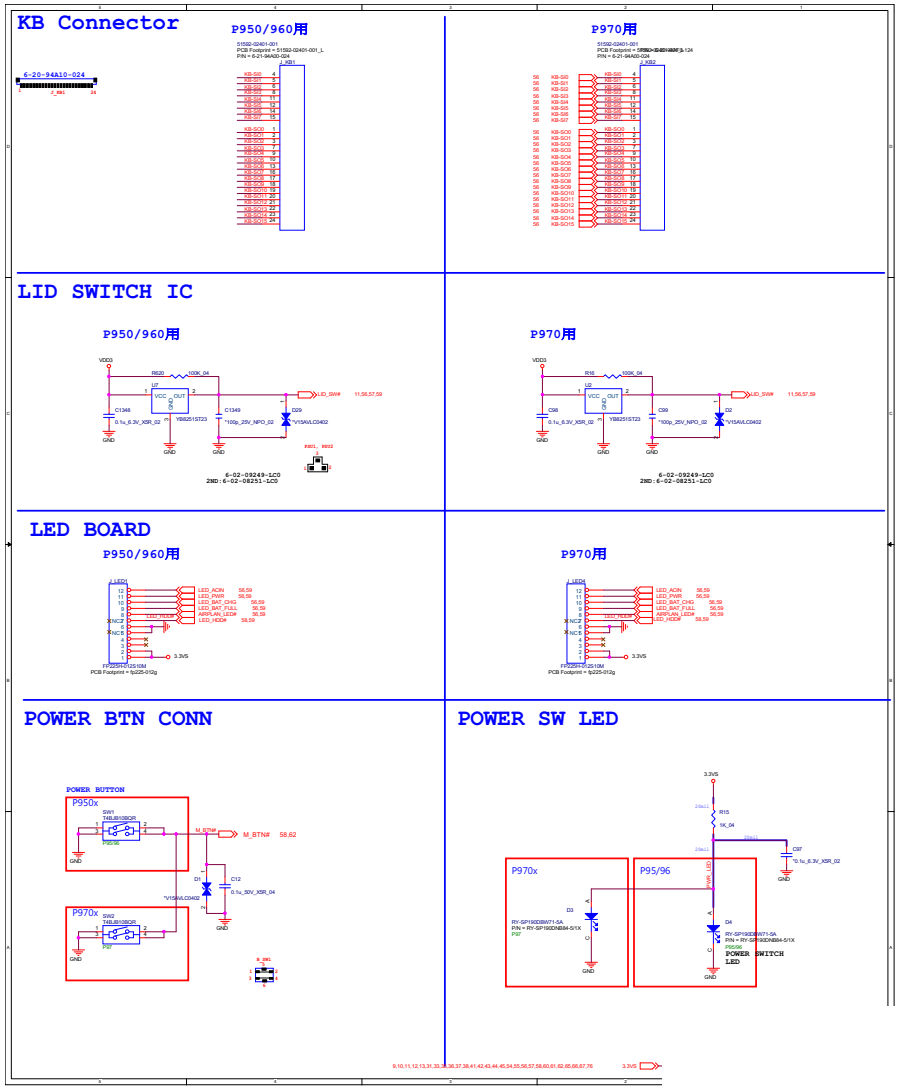
Connector



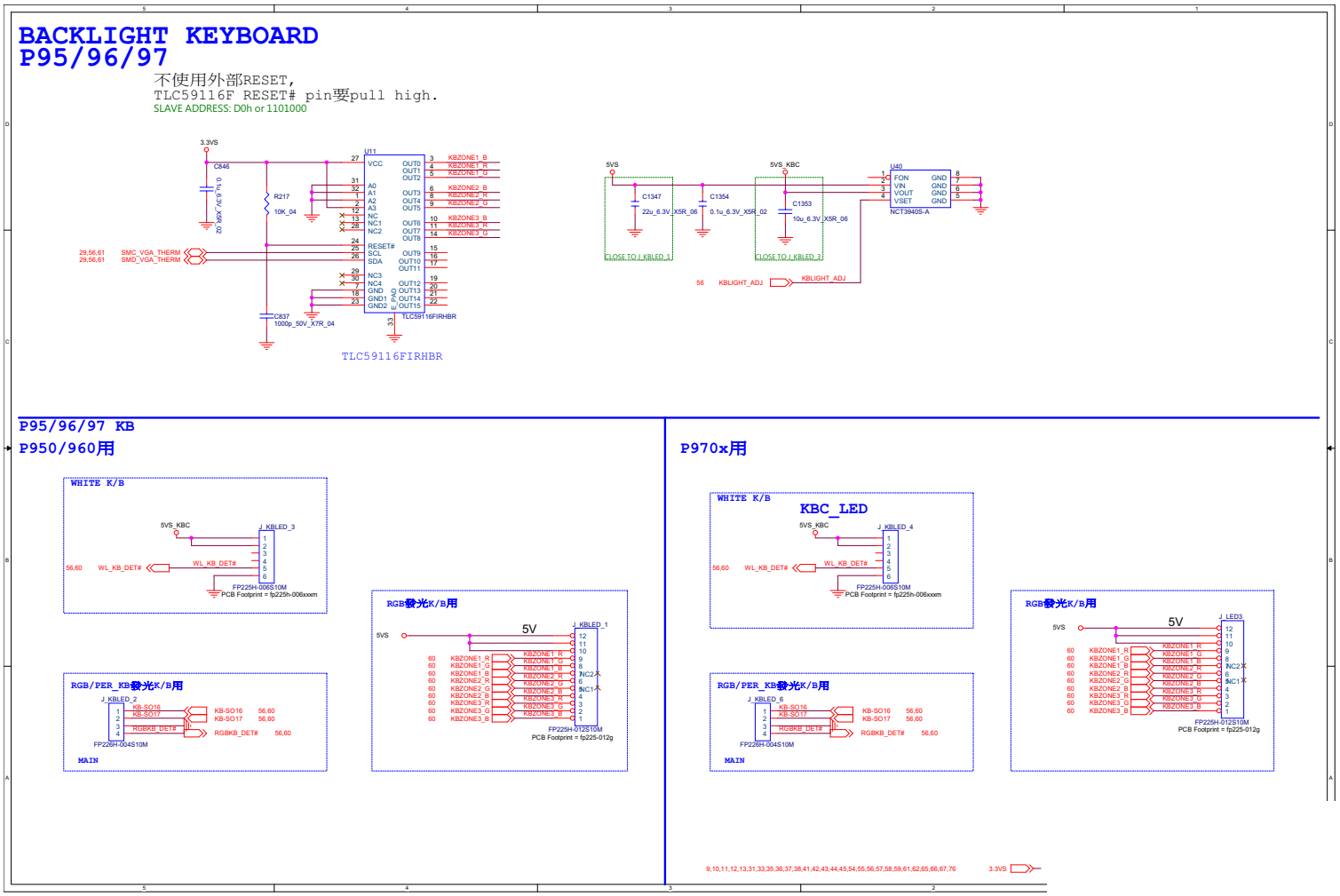
Sheet 58 of 83
Connector

KB, LID, LED, Power

Sheet 59 of 83
KB, LID, LED, Power



Backlight KB



Sheet 60 of 83
Backlight KB

LED KB

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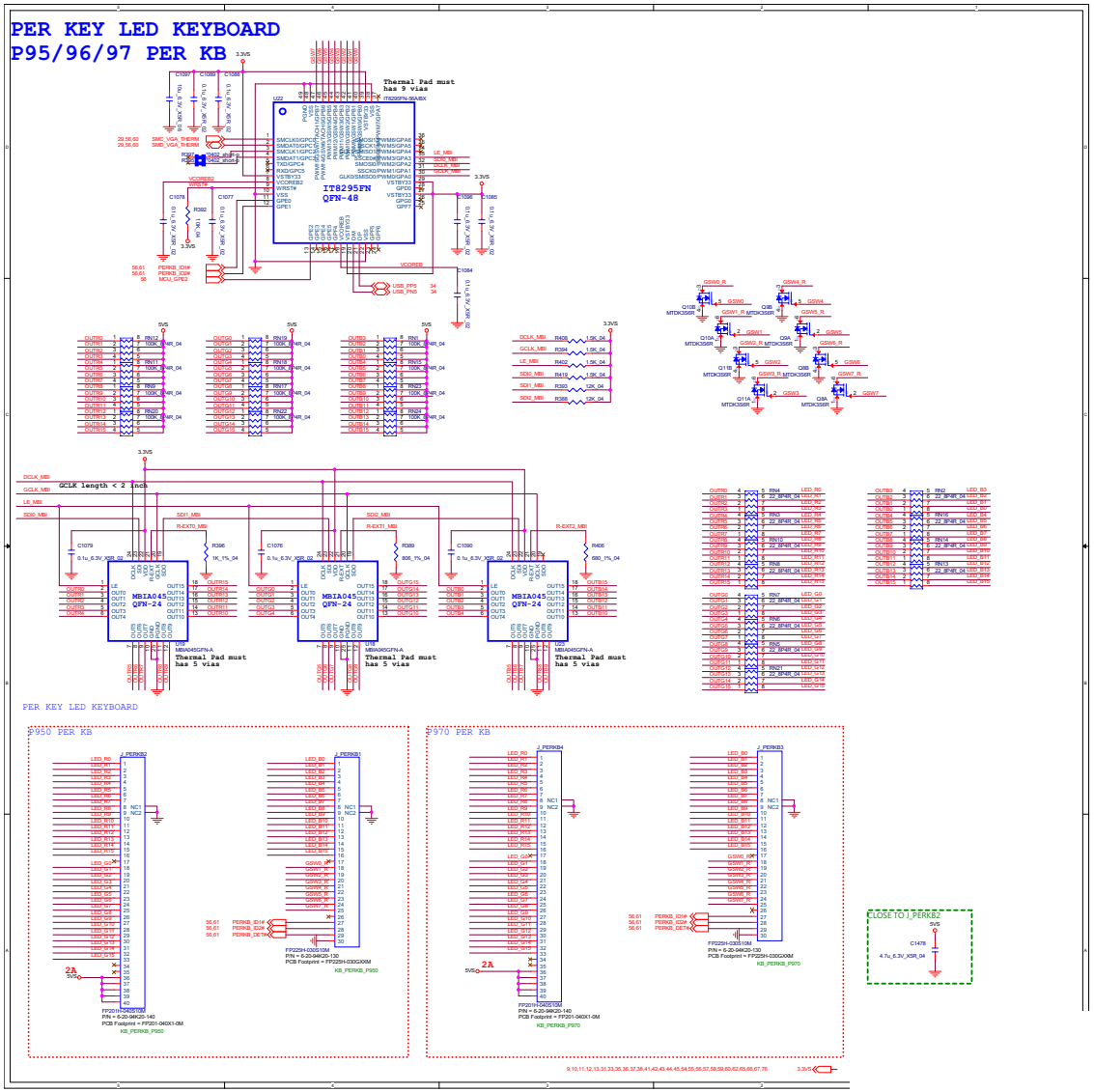
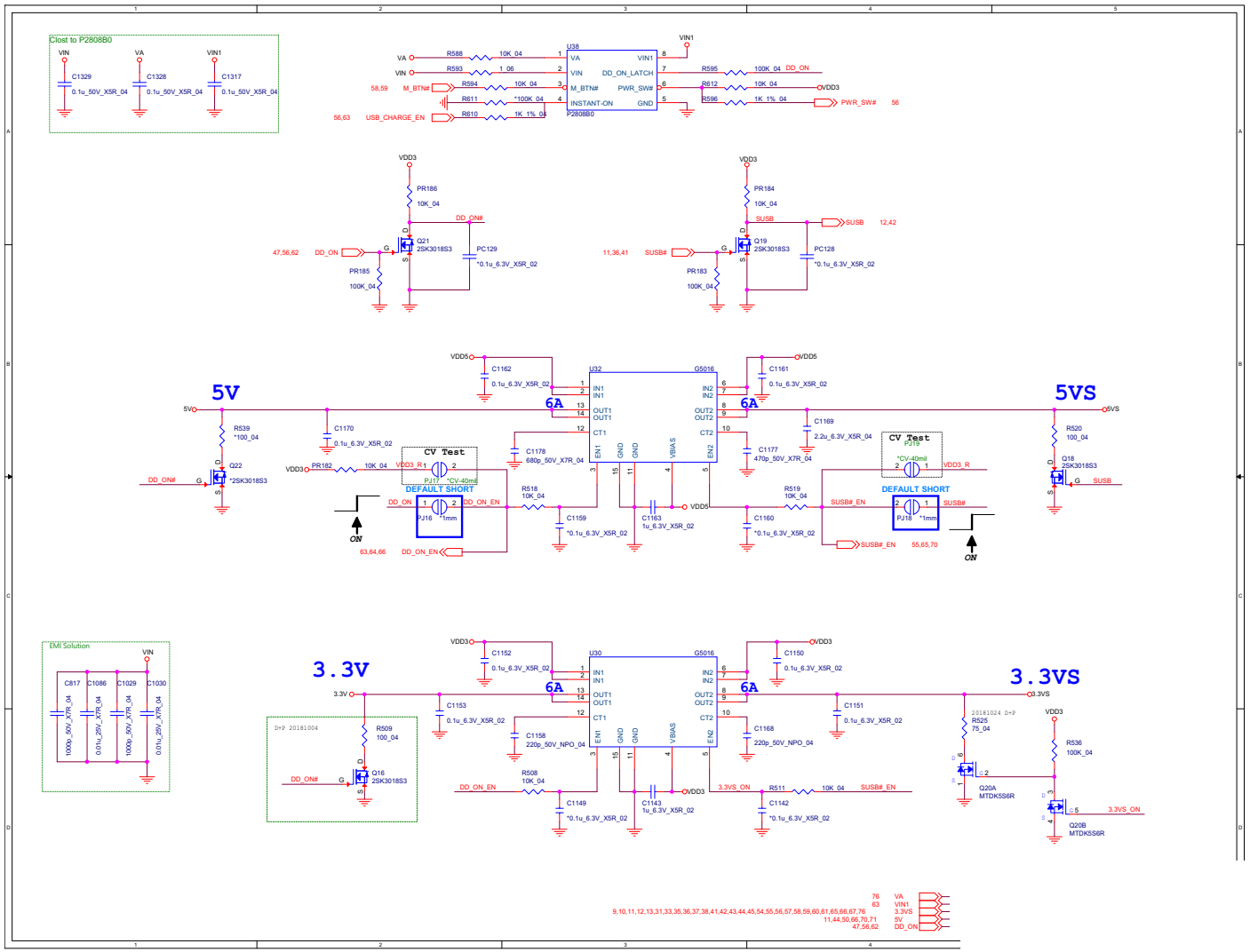
LED KB



5V, 5VS, 3.3V, 3.3VS



Sheet 62 of 83
5V, 5VS, 3.3V, 3.3VS

VDD3, VDD5

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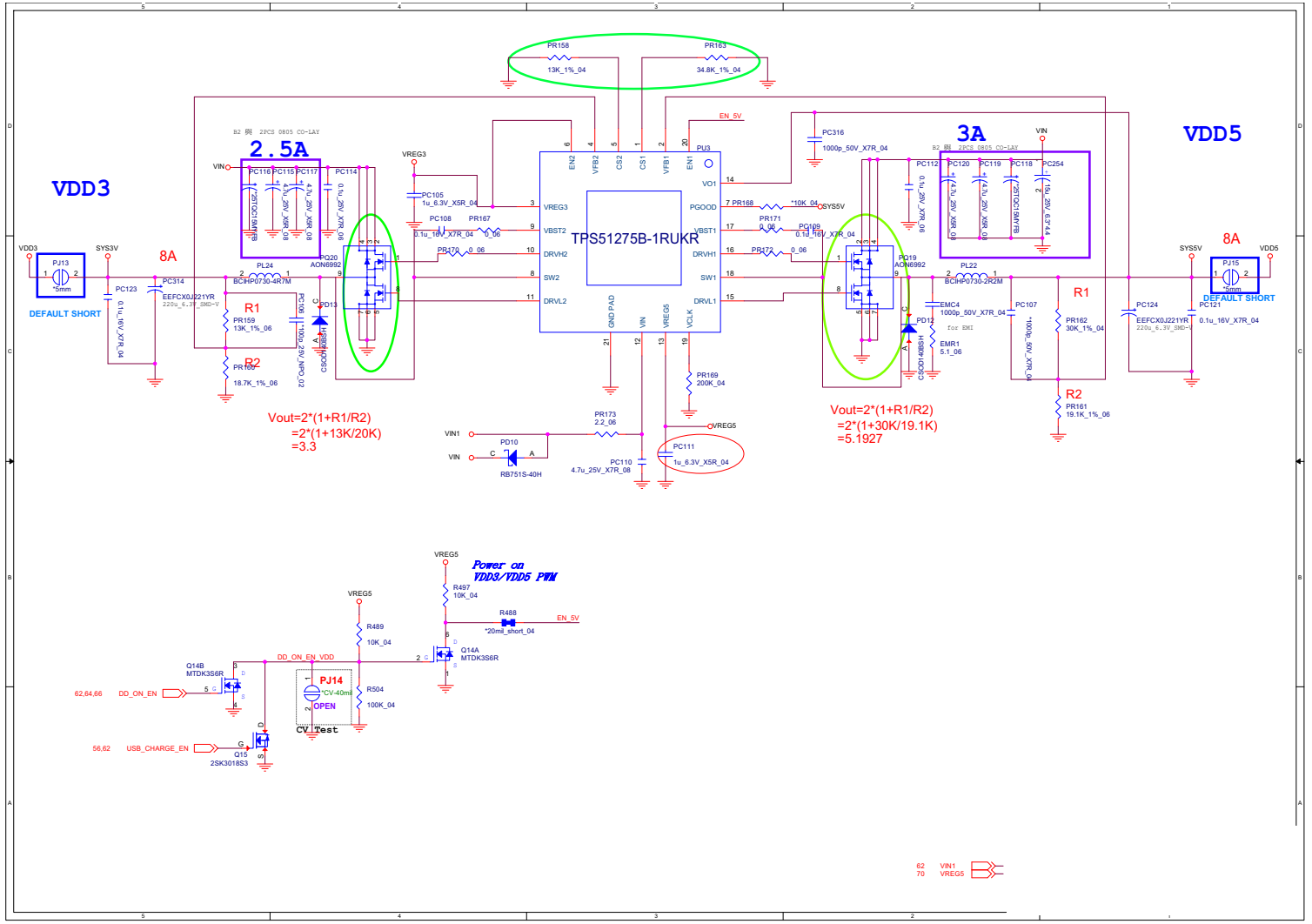
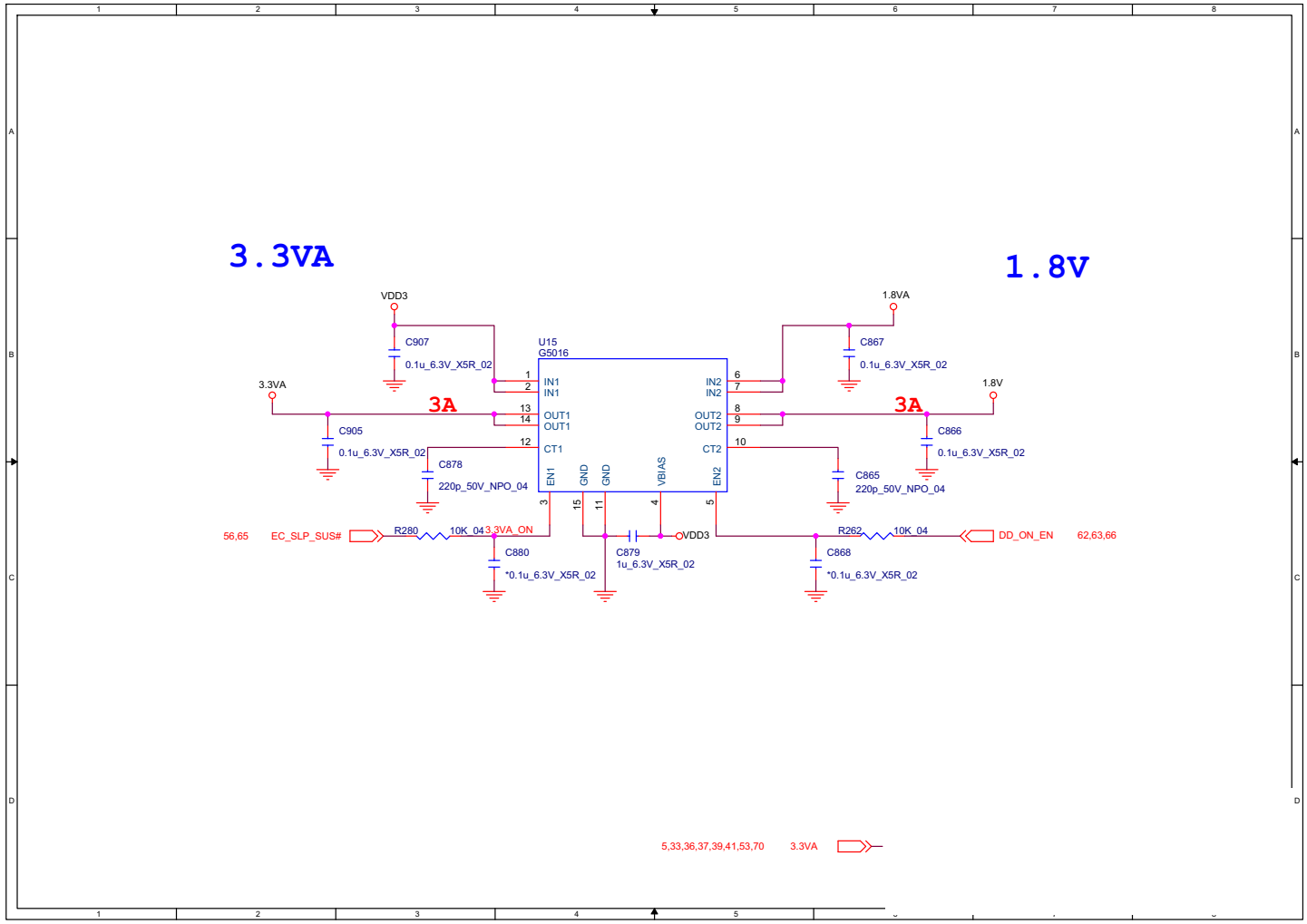
VDD3, VDD5



3.3VA, 1.8V



Sheet 64 of 83
3.3VA, 1.8V

1.05VA, VCCIO

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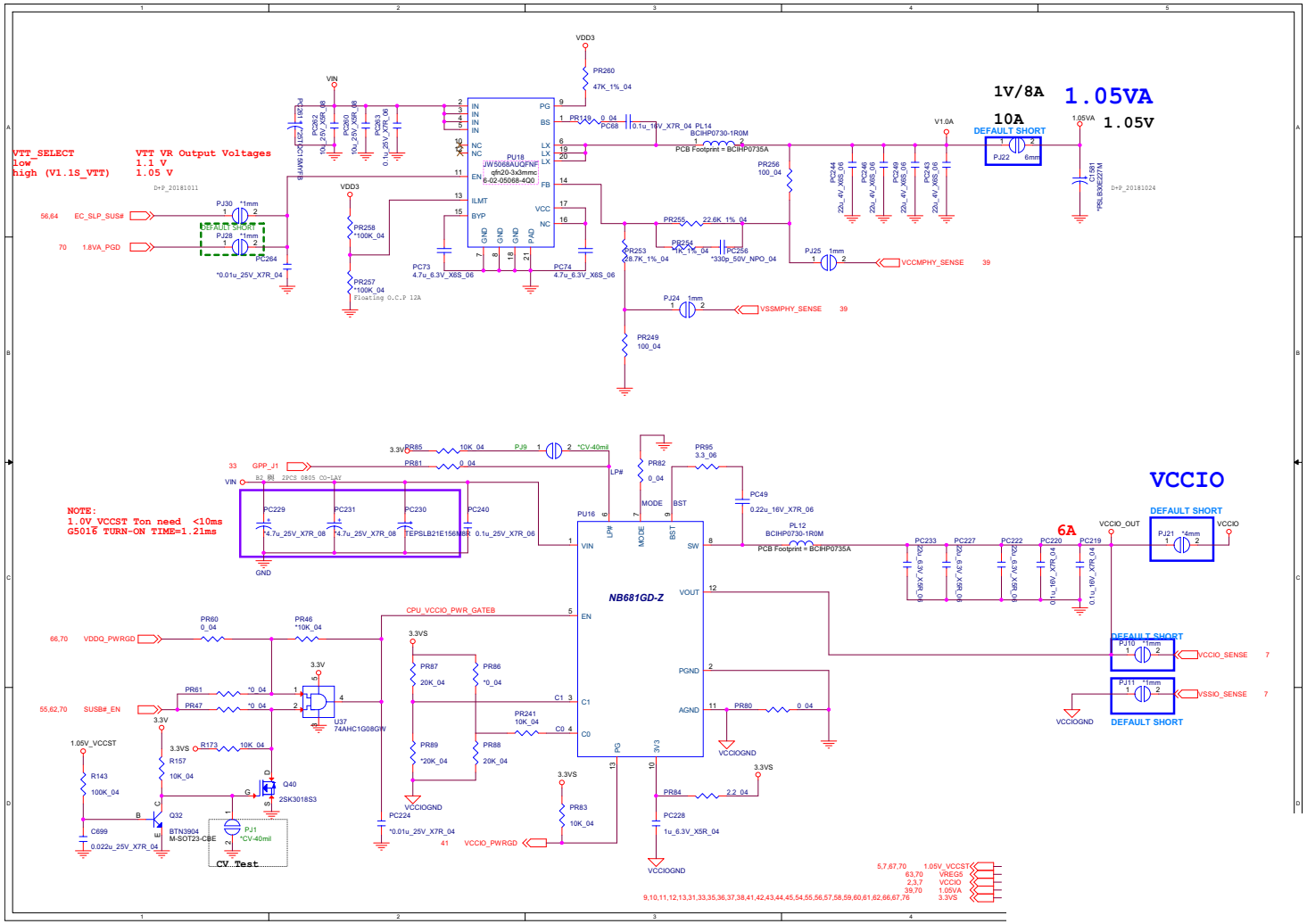
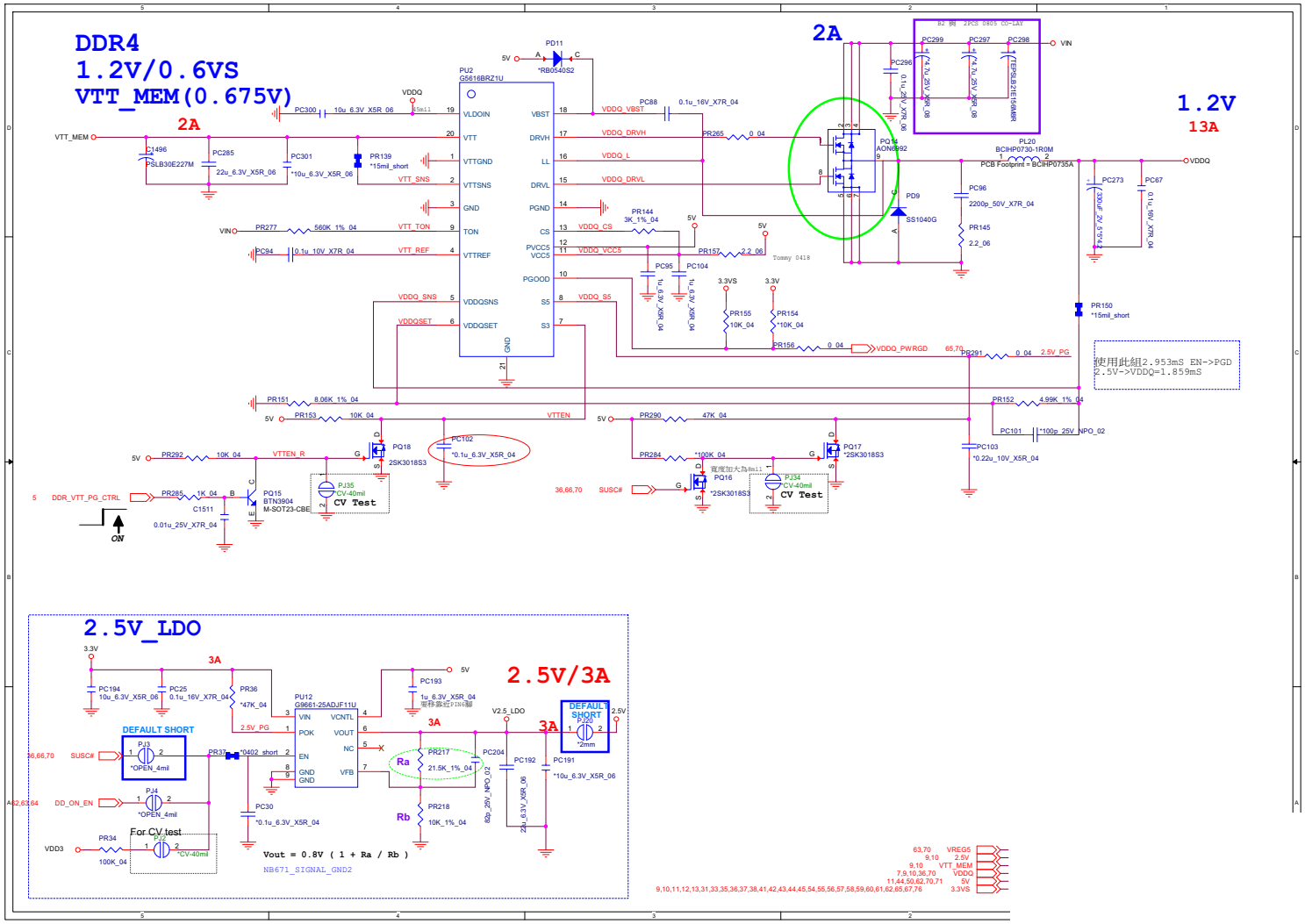
1.05VA, VCCIO



DDR 1.2V, 0.6VS



Sheet 66 of 83
DDR 1.2V, 0.6VS

RT3601EA, VCore

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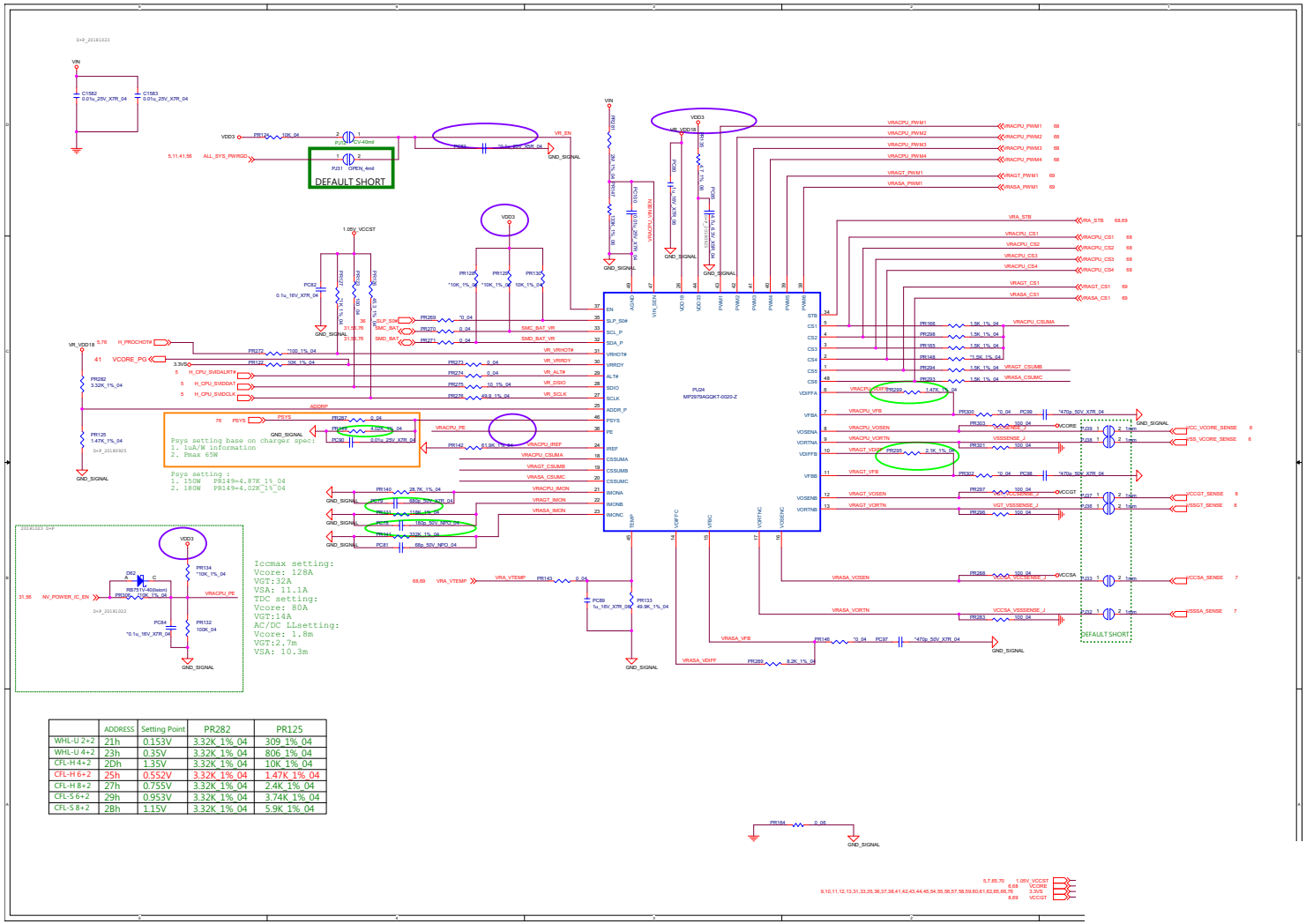
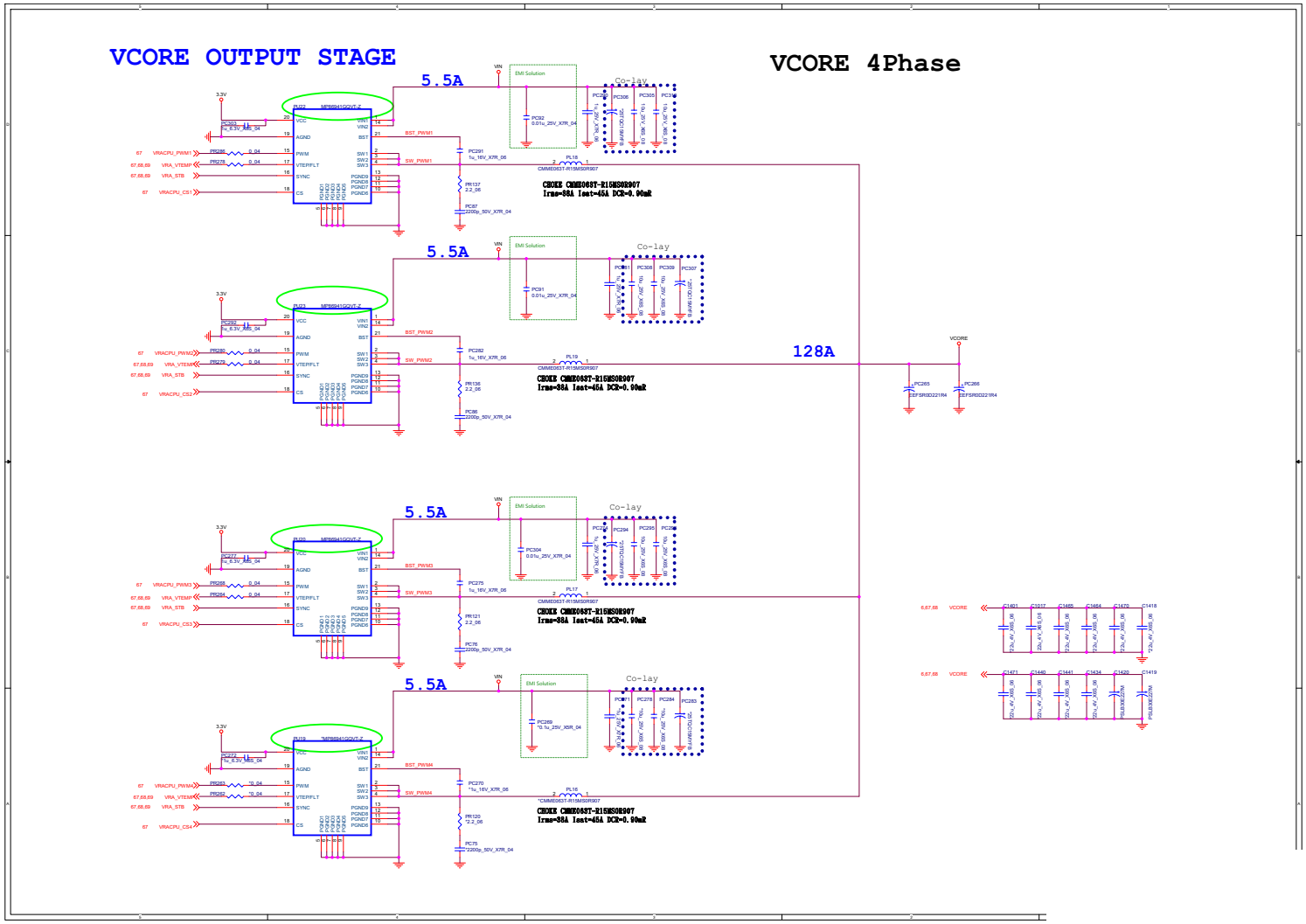
RT3601EA, VCore



	ADDRESS	Setting Point	PR282	PR125
WHL-U 2+2	21h	0.153V	3.32K_1%_04	309_1%_04
WHL-U 4+2	23h	0.35V	3.32K_1%_04	806_1%_04
CFL-H 4+2	2Dh	1.35V	3.32K_1%_04	10K_1%_04
CFL-H 6+2	25h	0.552V	3.32K_1%_04	1.47K_1%_04
CFL-H 8+2	27h	0.755V	3.32K_1%_04	2.4K_1%_04
CFL-S 6+2	29h	0.953V	3.32K_1%_04	3.74K_1%_04
CFL-S 8+2	2Bh	1.15V	3.32K_1%_04	5.9K_1%_04

VCore Output



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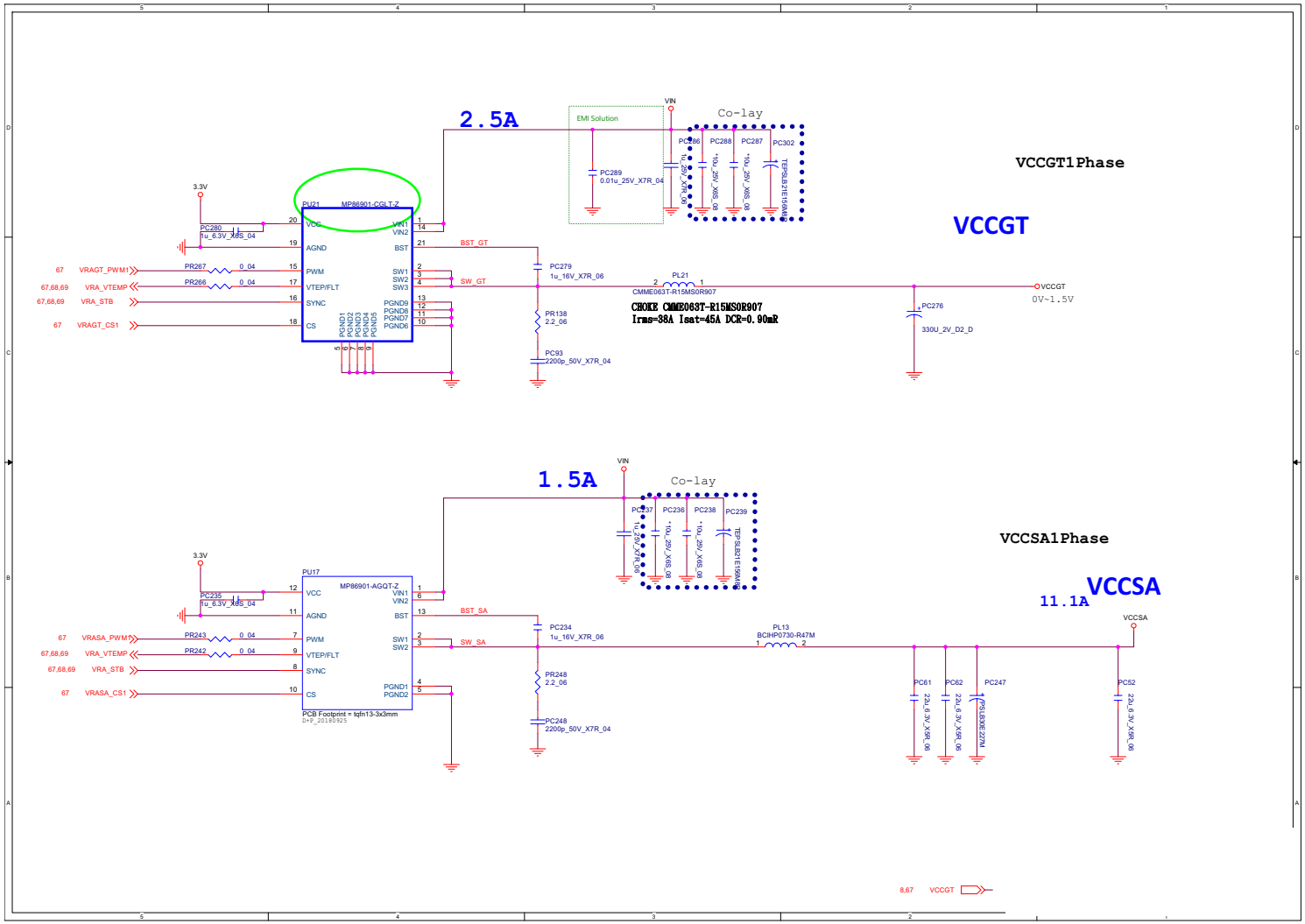
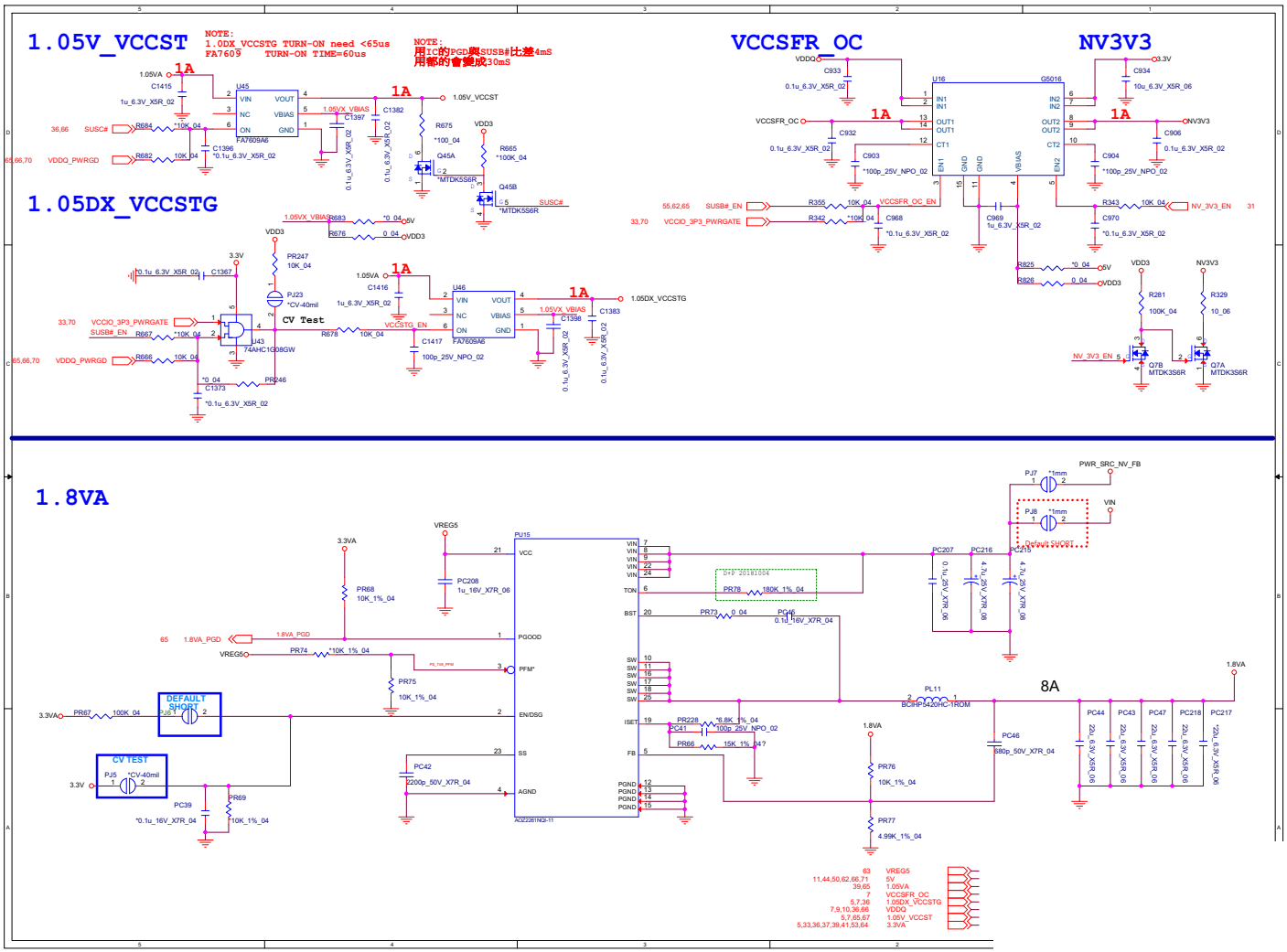
VCore Output

VVC In/Out, VCCGT, 2.5V

Sheet 69 of 83
VCC In/Out,
VCCGT, 2.5V



1.8VA/1.05V_XX, NV3V3



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1.8VA/1.05V_XX, NV3V3

PEX_VDD, 1V8_RUN/AON

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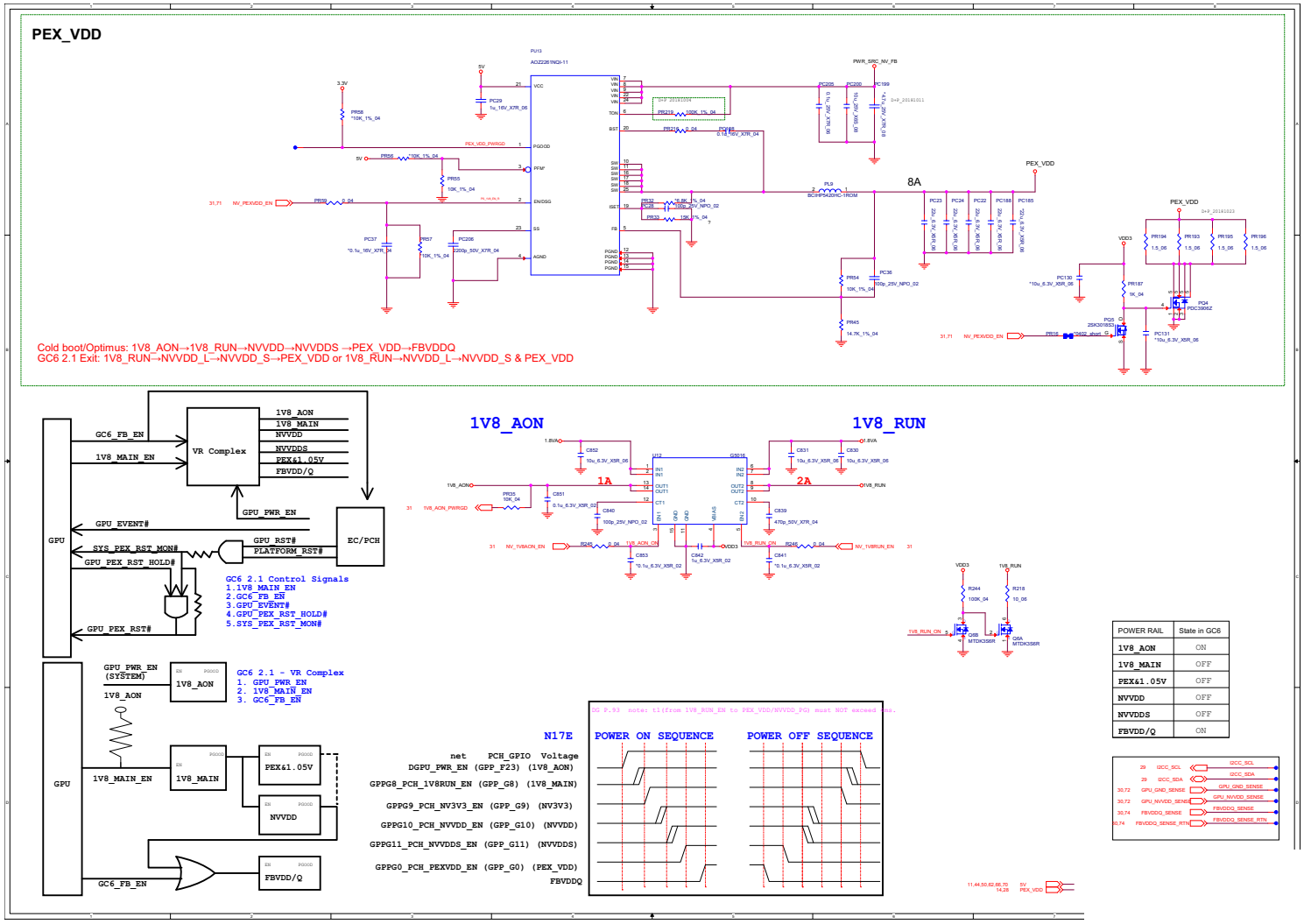
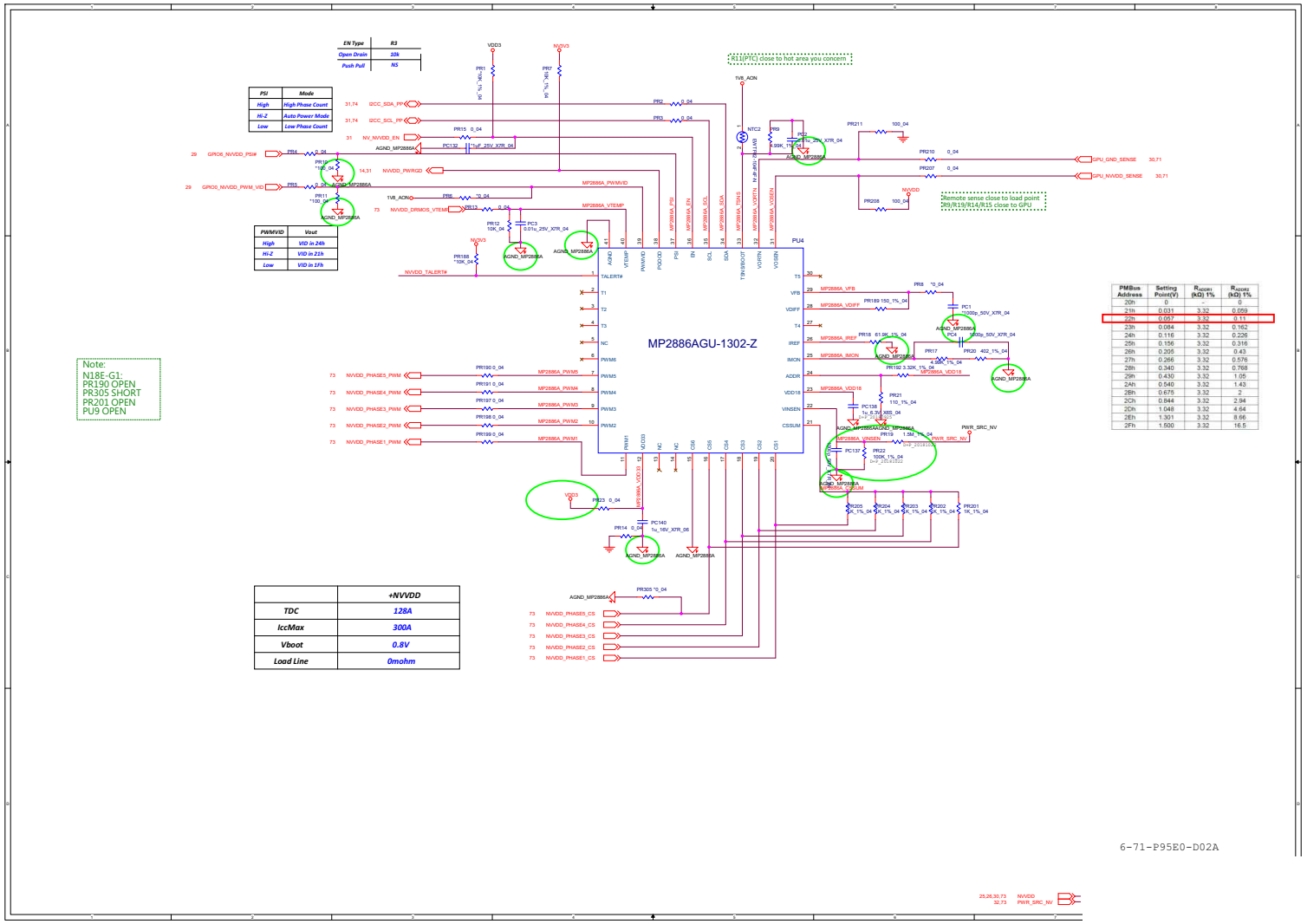
PEX_VDD,
1V8_RUN/AON



NVVDD 1



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NVVDD 1

NVVDD 2

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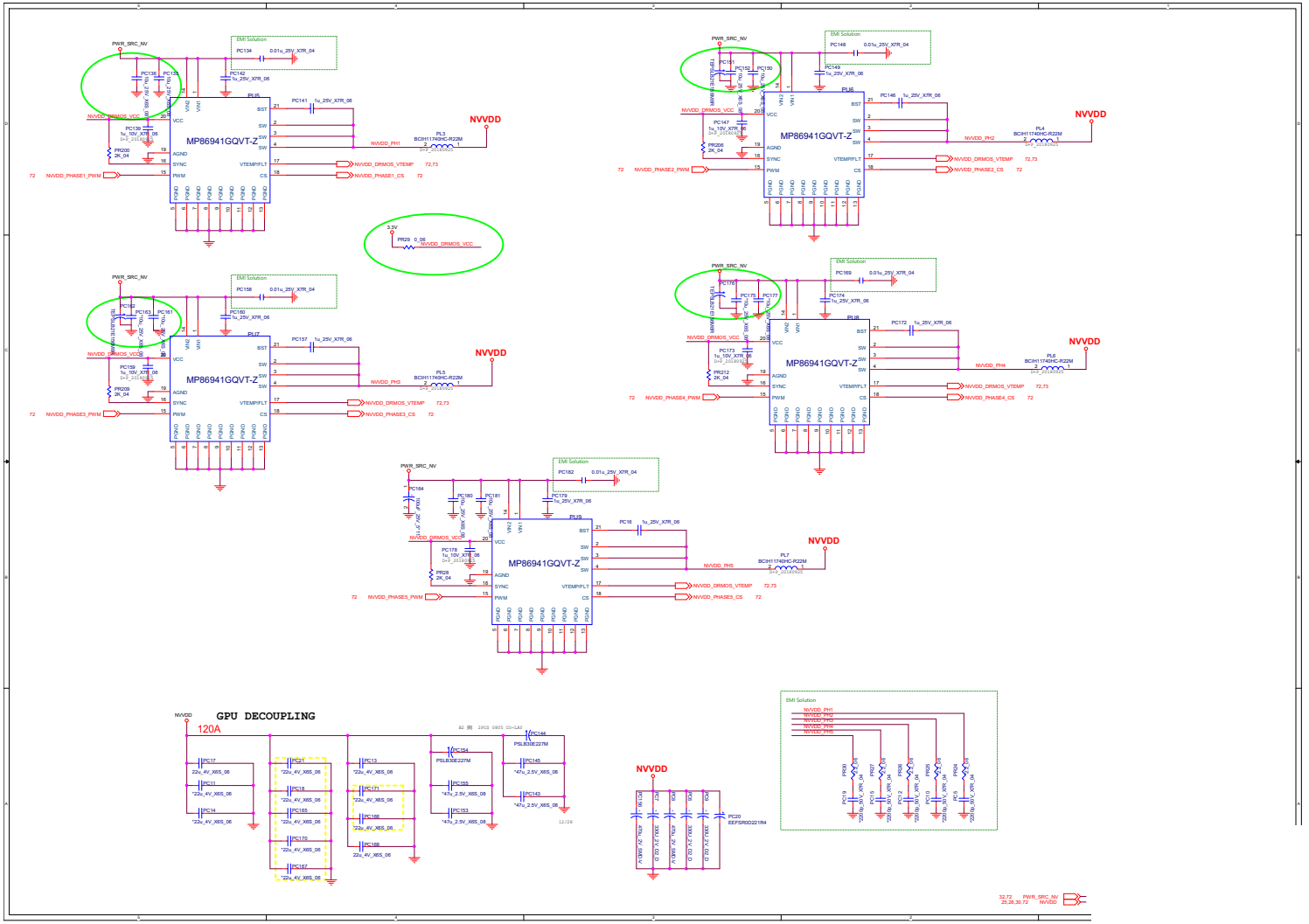
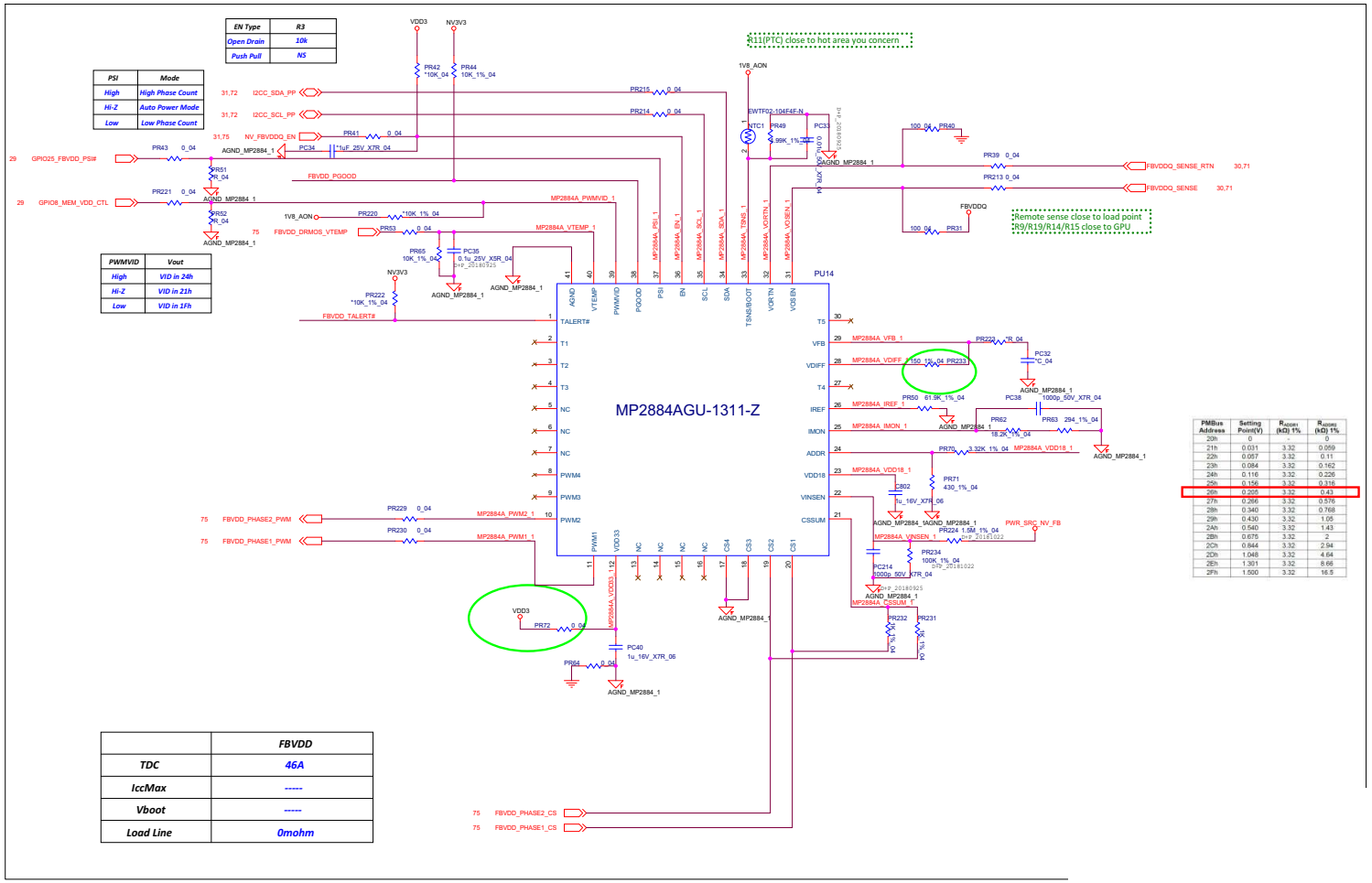
NVVDD 2



FBVDD 1



EN Type	R3
Open Drain	10k
Push Pull	NS

PSI	Mode
High	High Phase Count
Hi-Z	Auto Power Mode
Low	Low Phase Count

PWMVID	Vout
High	VID in 24h
Hi-Z	VID in 21h
Low	VID in 1Fh

	FBVDD
TDC	46A
IccMax	-----
Vboot	-----
Load Line	0mohm

PMBus Address	Setting Point(V)	R_{ADDR1} (kΩ) 1%	R_{ADDR2} (kΩ) 1%
20h	0	-	0
21h	0.031	3.32	0.059
22h	0.057	3.32	0.11
23h	0.084	3.32	0.162
24h	0.116	3.32	0.226
25h	0.156	3.32	0.316
26h	0.205	3.32	0.43
27h	0.266	3.32	0.576
28h	0.340	3.32	0.768
29h	0.430	3.32	1.05
2Ah	0.540	3.32	1.43
2Bh	0.675	3.32	2
2Ch	0.844	3.32	2.94
2Dh	1.048	3.32	4.64
2Eh	1.301	3.32	8.66
2Fh	1.500	3.32	16.5

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FBVDD 1

FBVDD 2

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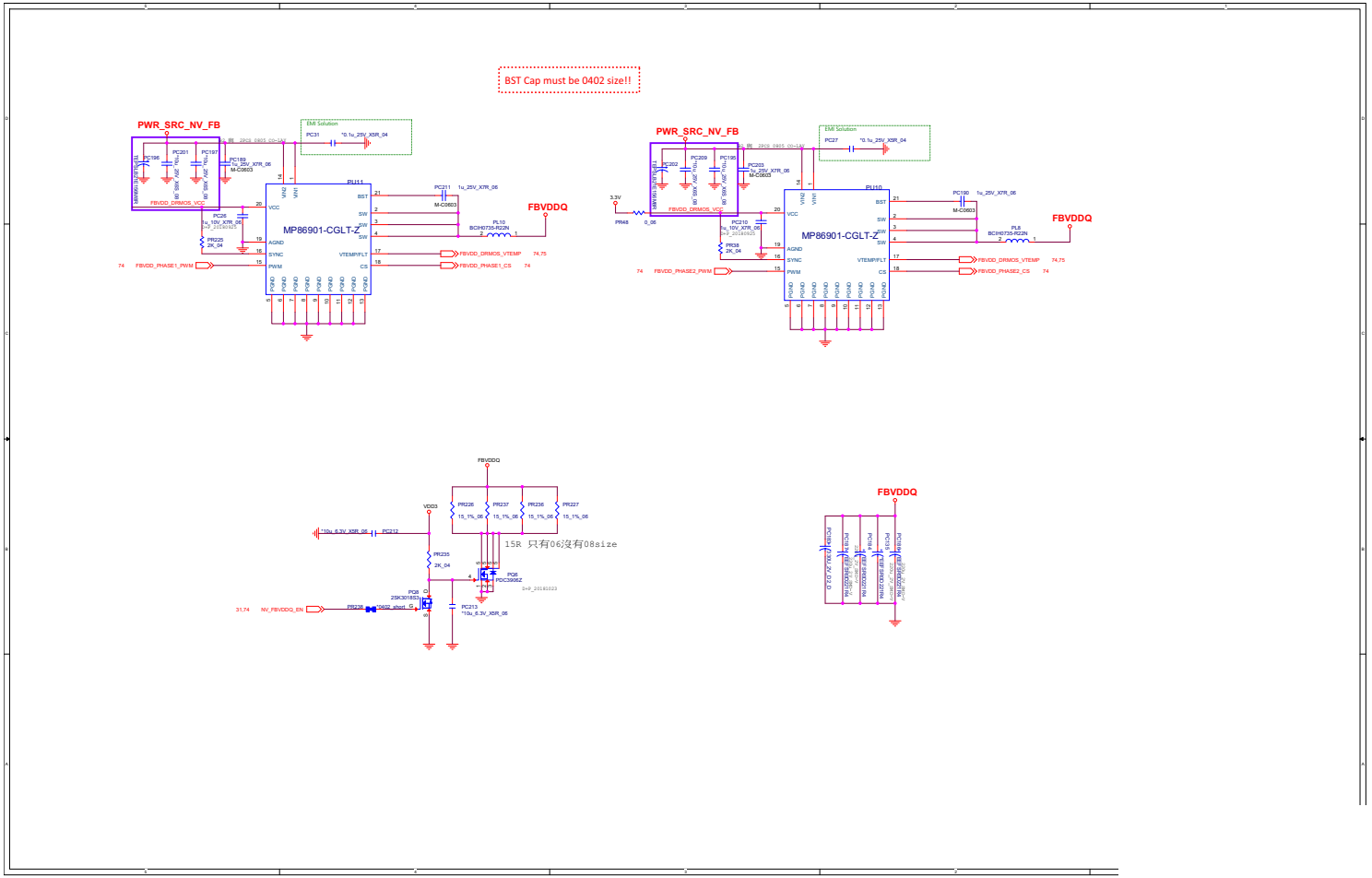
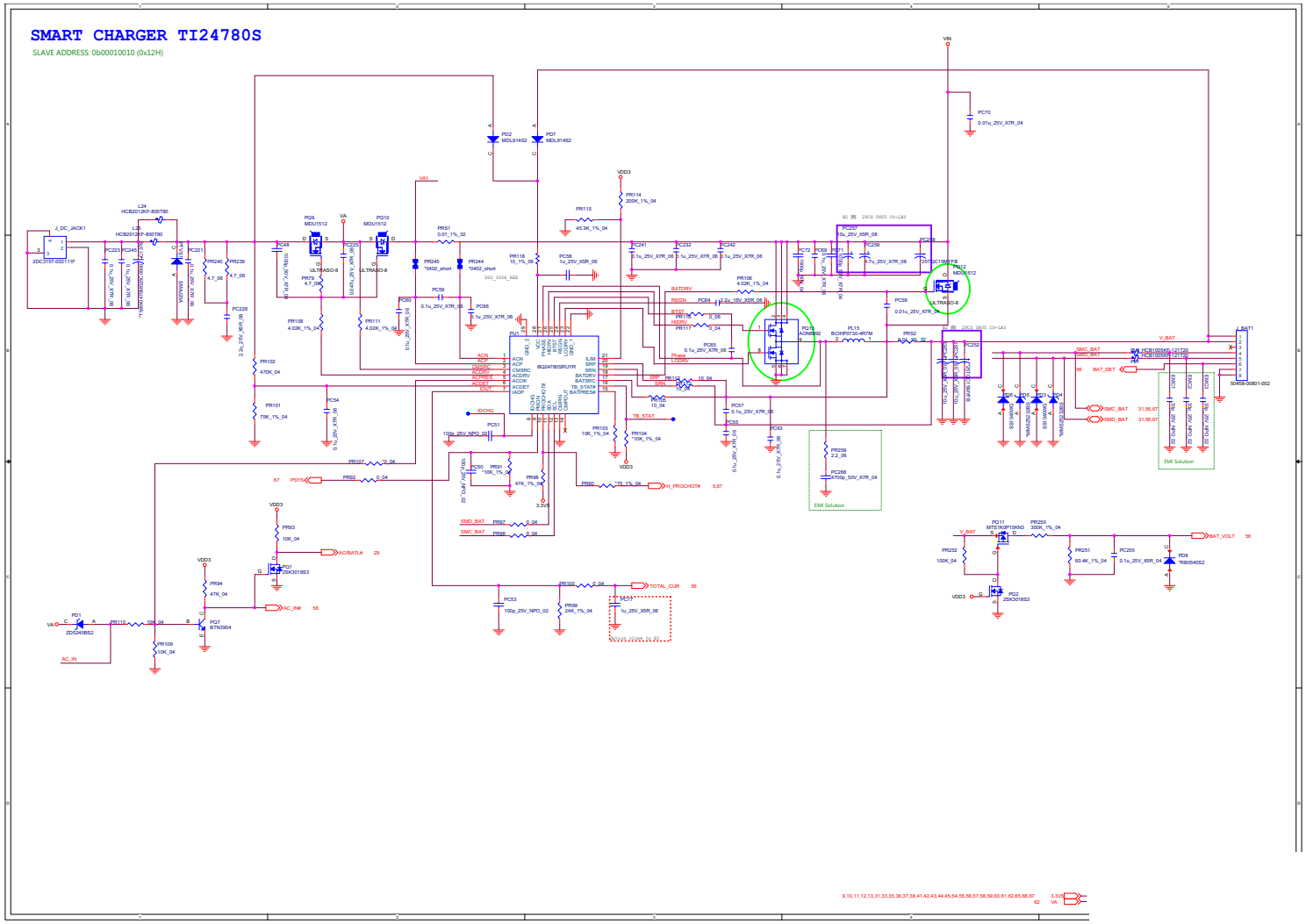
FBVDD 2



AC-In, Charger



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AC-In, Charger

LED Board

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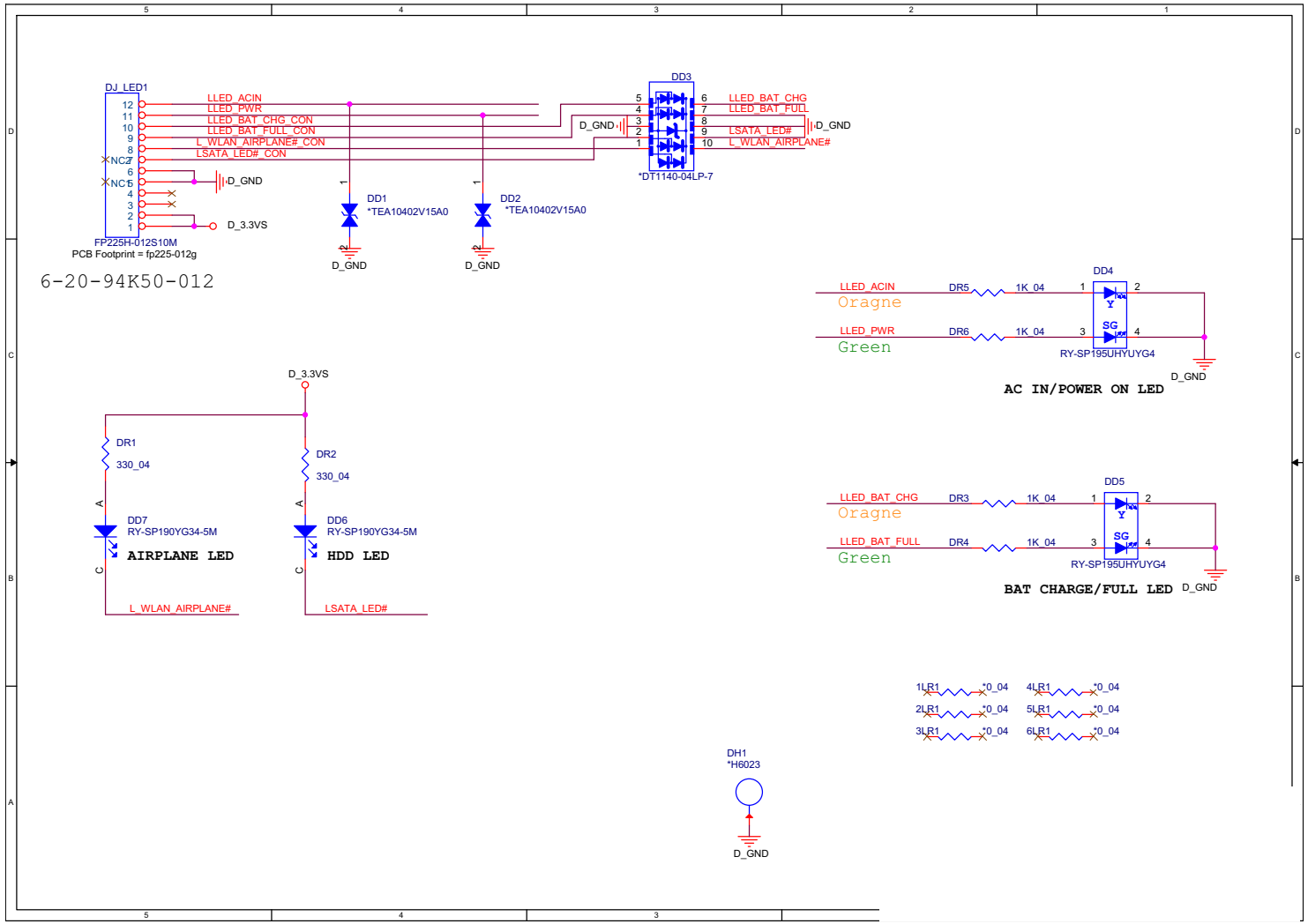
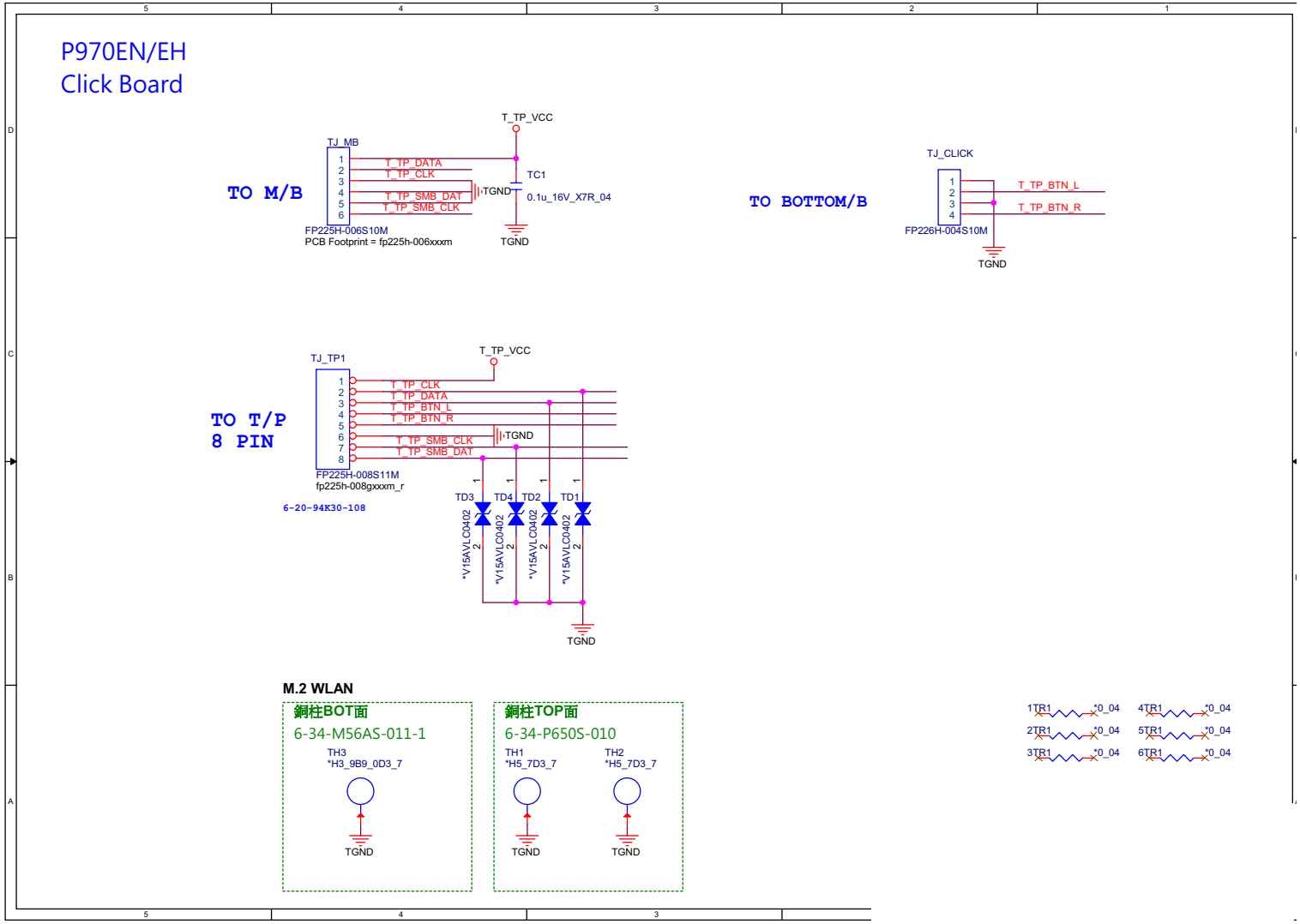
LED Board



Click Board



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Click Board

Reader Board P95

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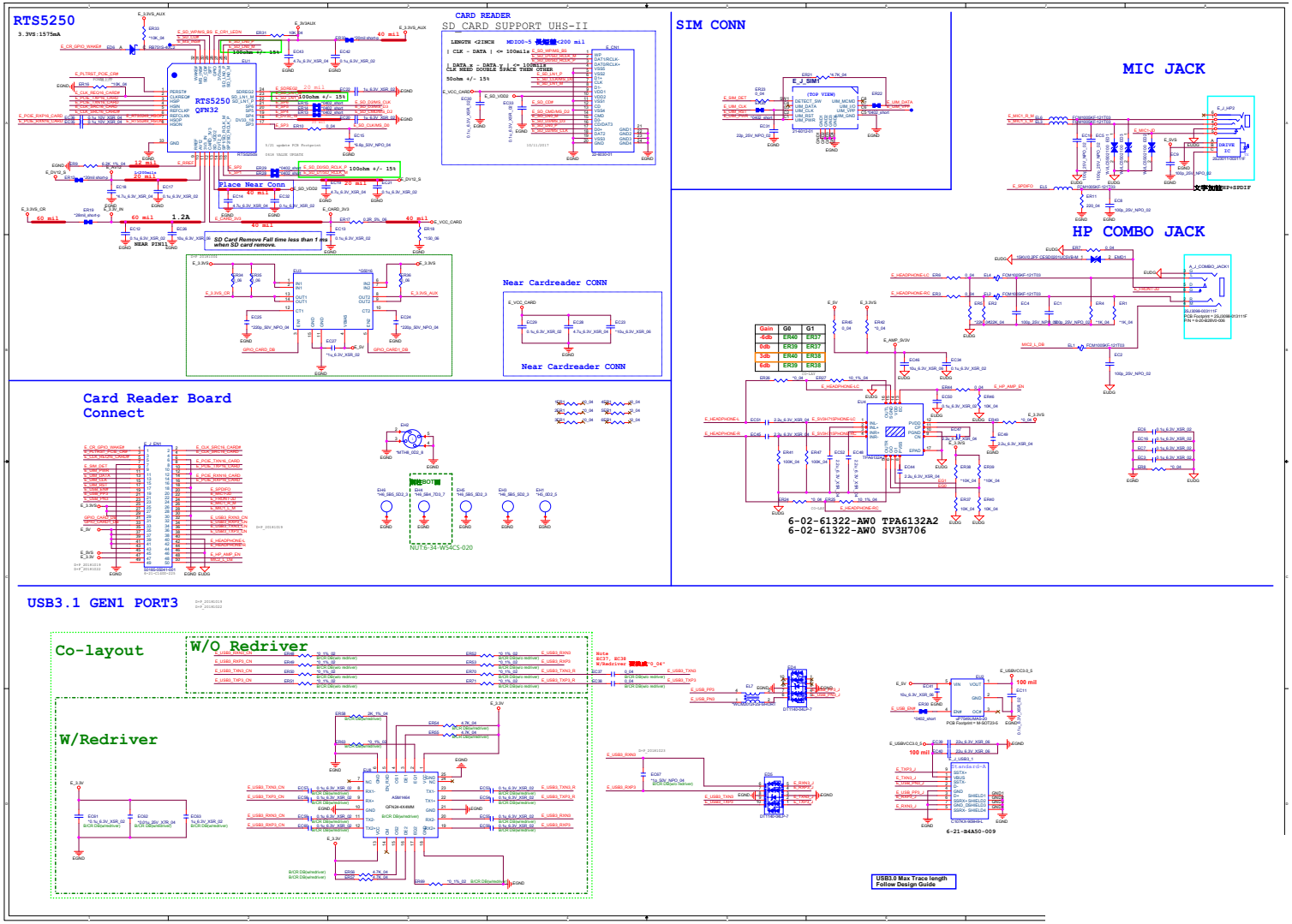
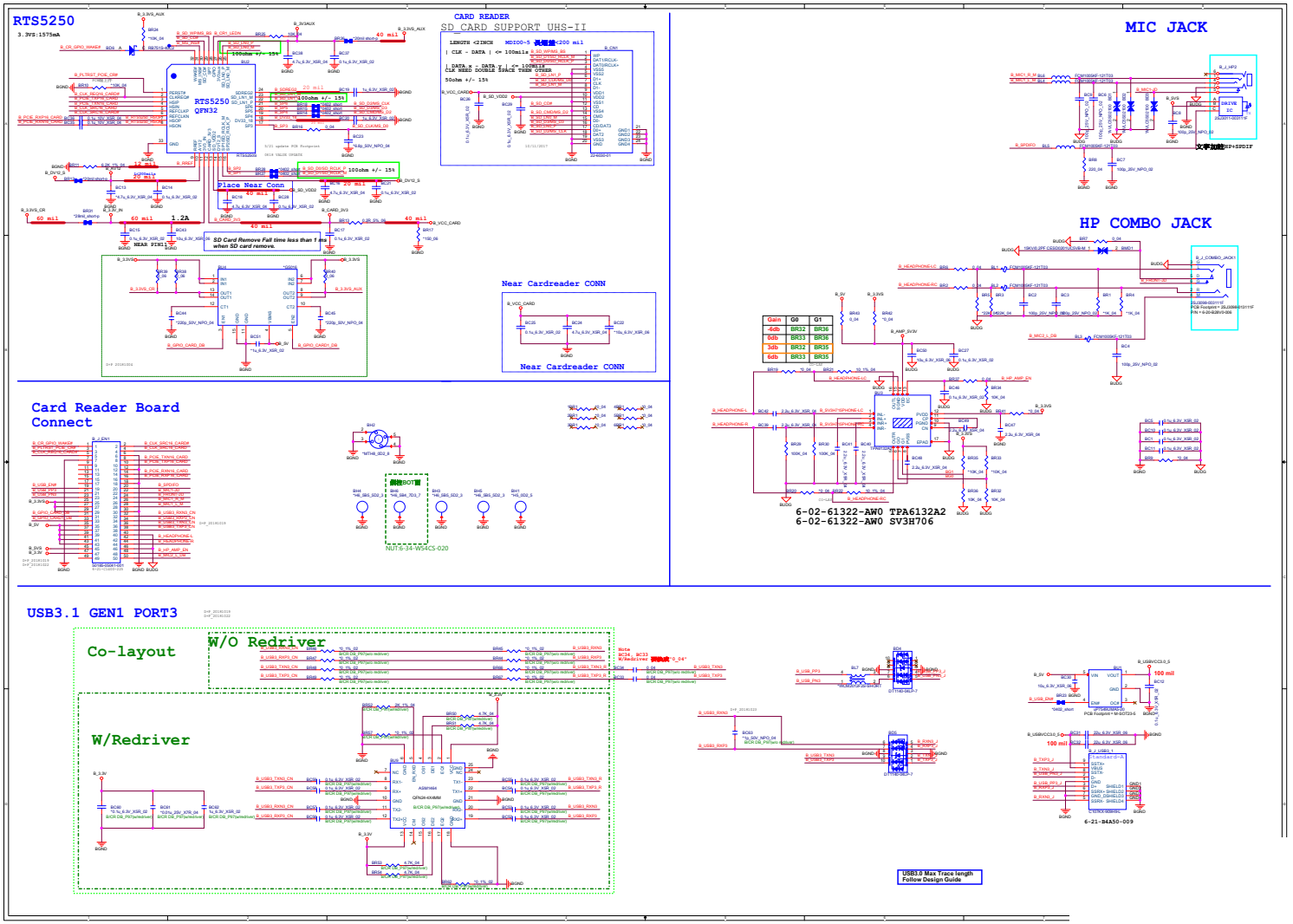
Reader Board P95



Reader Board P97



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Reader Board P97

LAN Board

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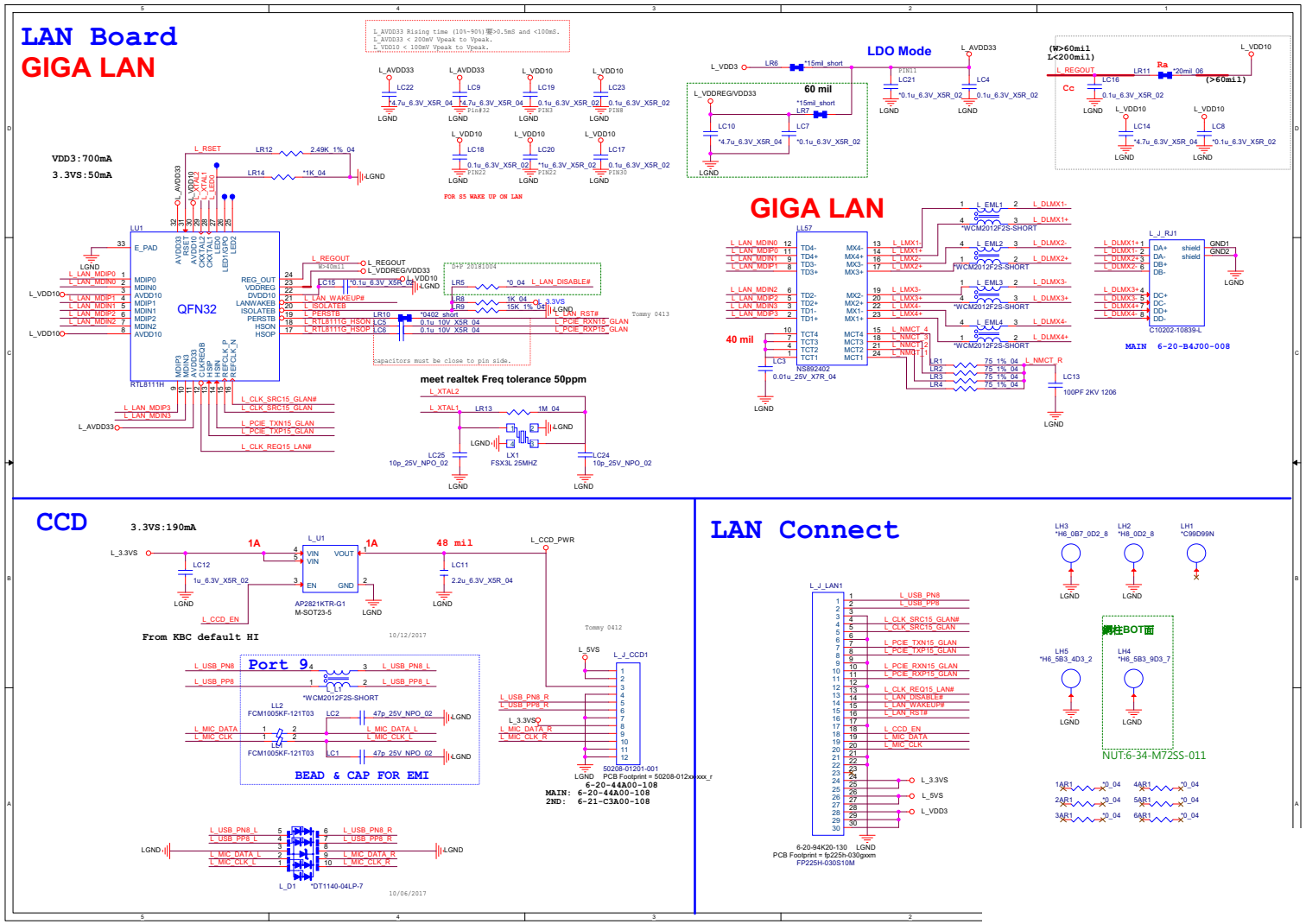
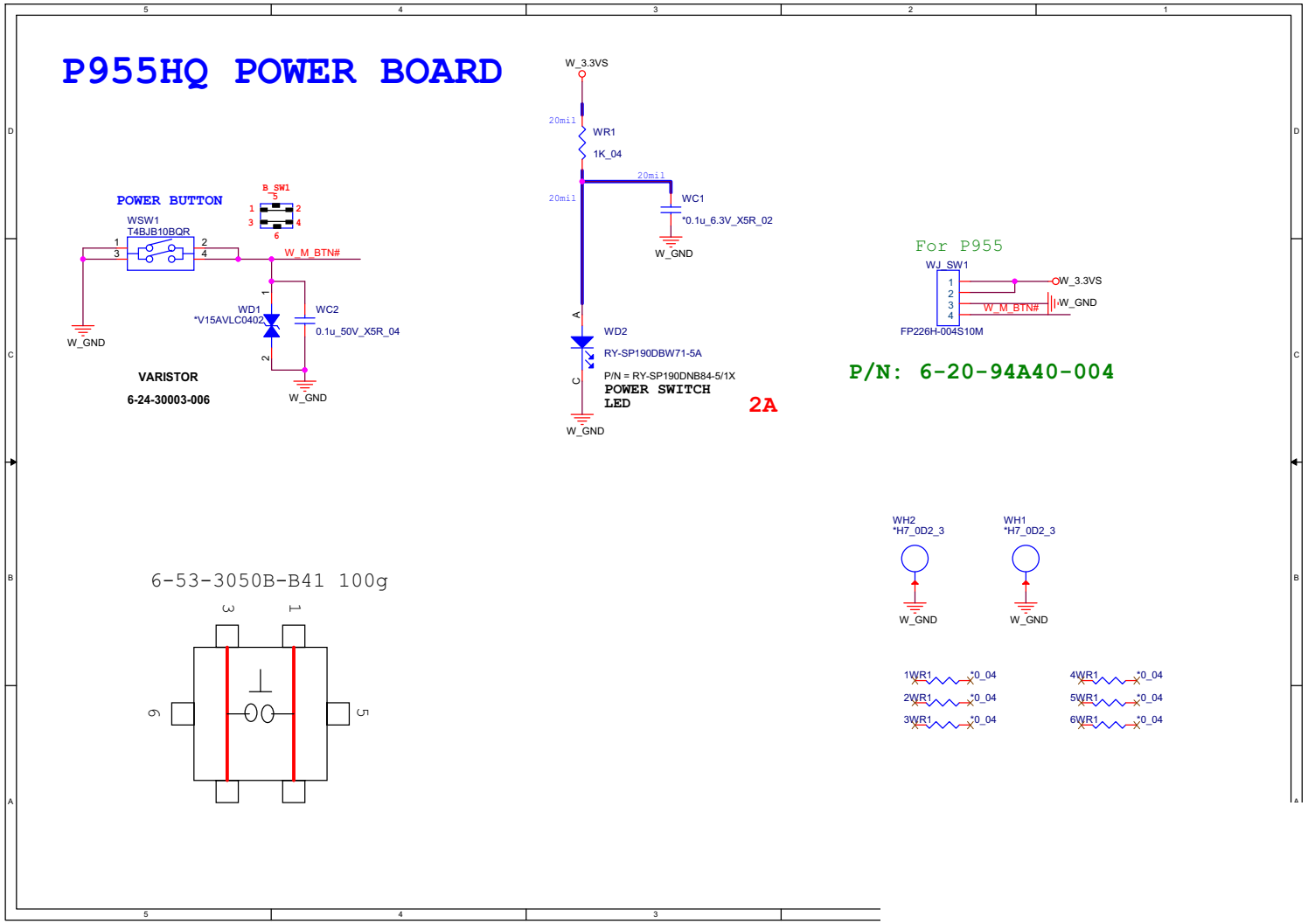
LAN Board



Power Board



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Power Board

Power Sequence

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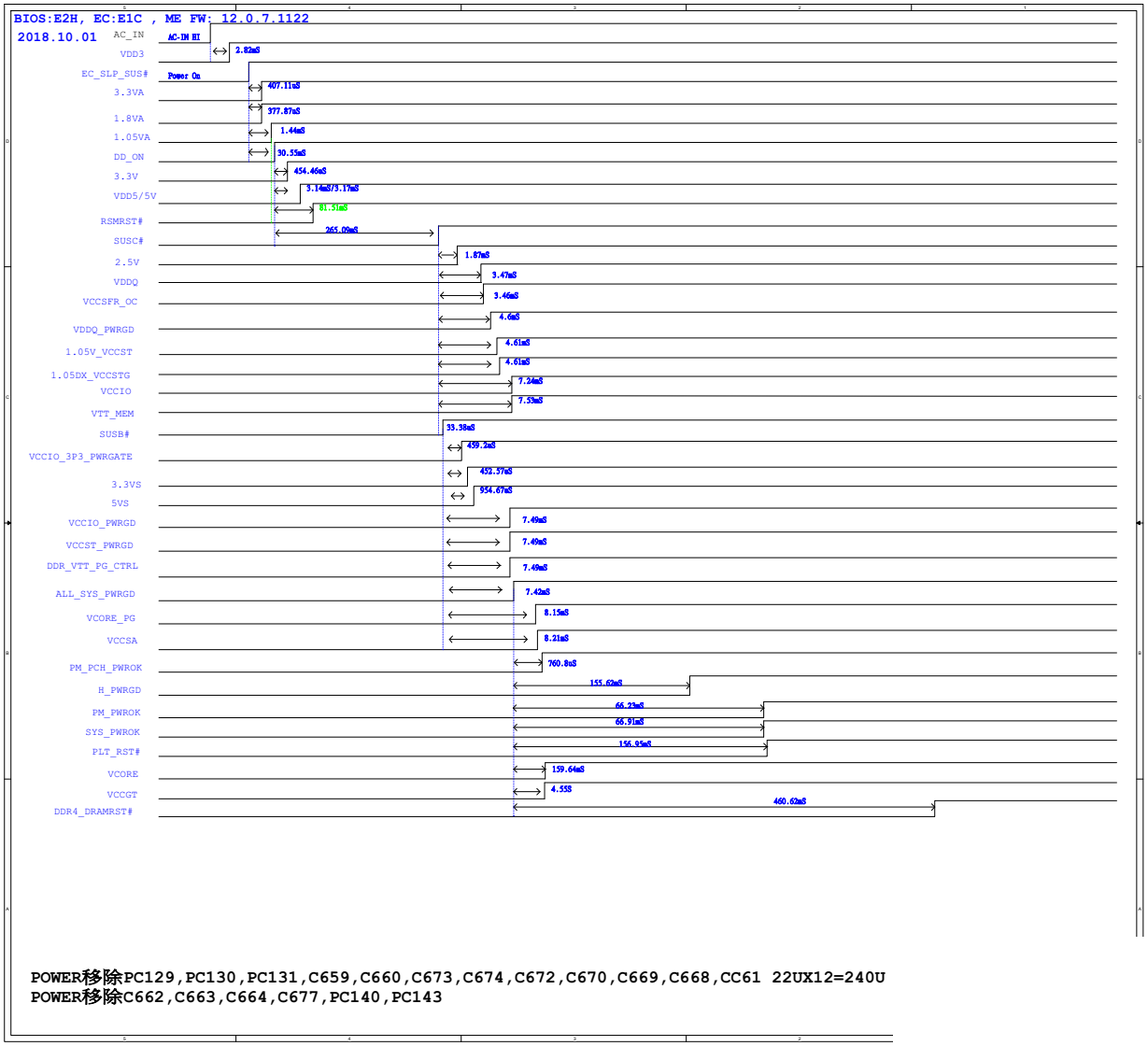
Power Sequence



POWER移除PC129,PC130,PC131,C659,C660,C673,C674,C672,C670,C669,C668,CC61 22UX12=240U
POWER移除C662,C663,C664,C677,PC140,PC143