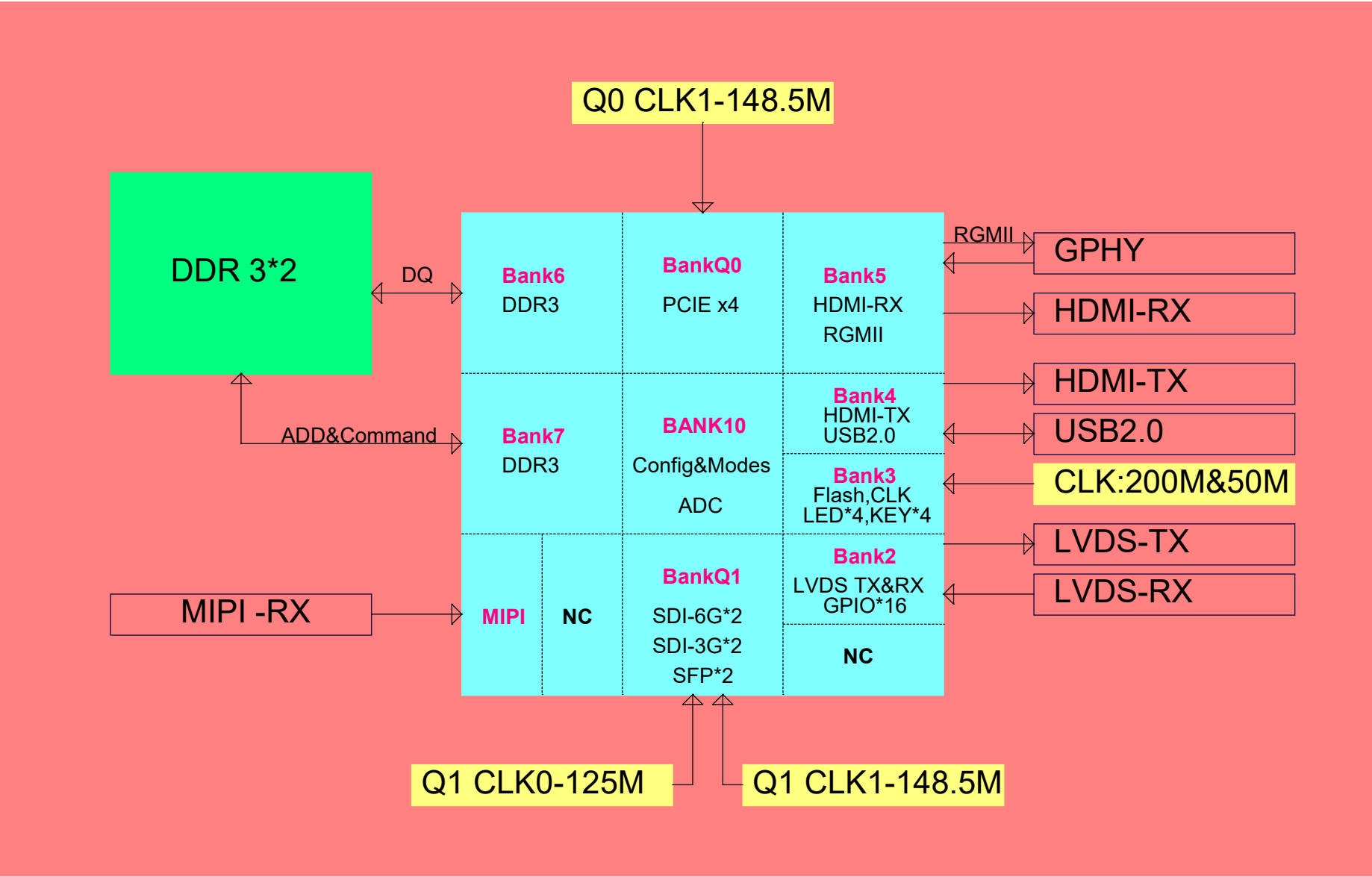
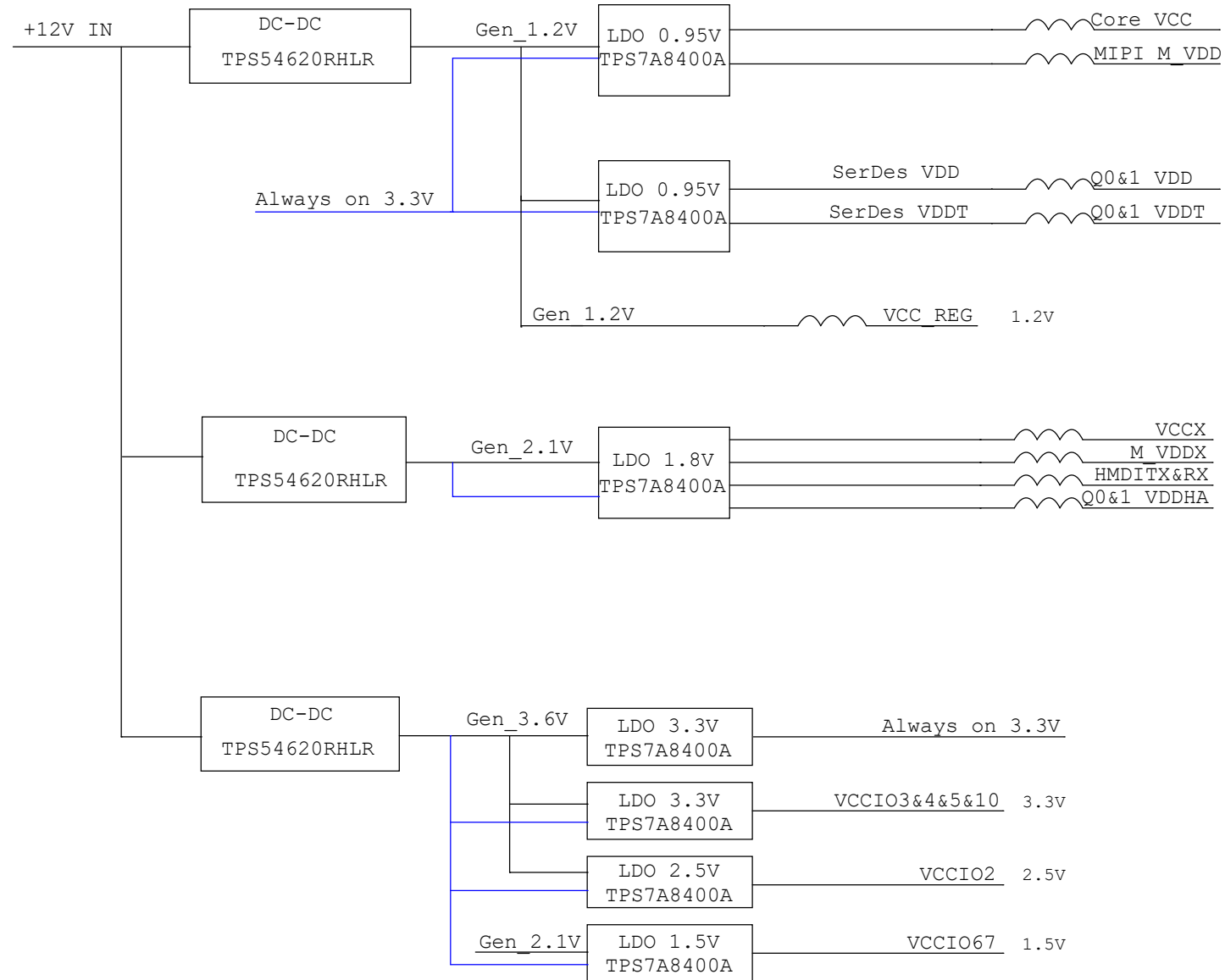




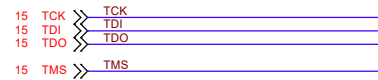
# Power Tree



Always on 3.3V MIPI座

|                        |                             |               |
|------------------------|-----------------------------|---------------|
| Title                  |                             |               |
| DK_GW5AST-LV138FPG676A |                             |               |
| Size                   | Document Number             | Rev           |
| A3                     | Power tree                  | V2.1          |
| Date:                  | Tuesday, September 09, 2025 | Sheet 2 of 25 |

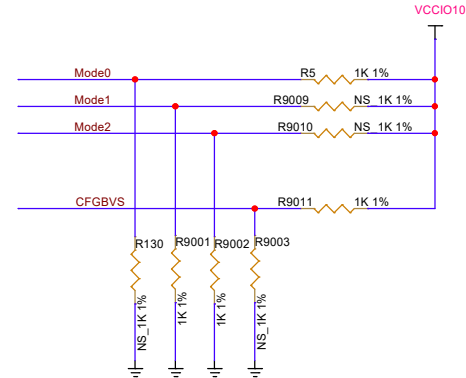
## Jtag



## MSPI



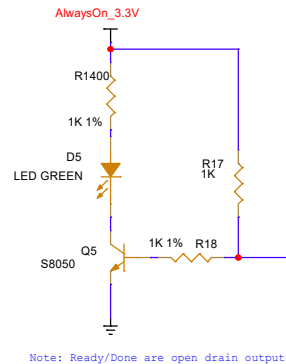
## ModeS



MODE[2:0]:  
JTAG:XXX/101  
MSPI:001✓  
SSPI:010  
Master SERIAL:000  
Slave SERIAL:111  
Master CPU:100  
Slave CPU:110

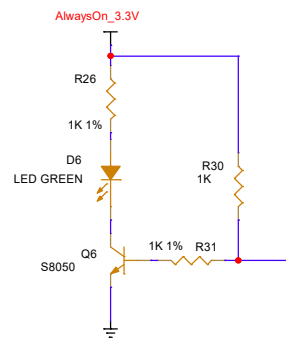
CFGBVS=1, BANK3&4&10=3.3V Or 2.5V

## Ready

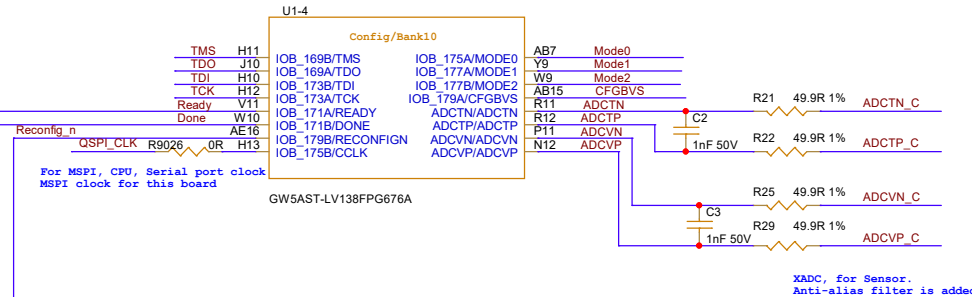
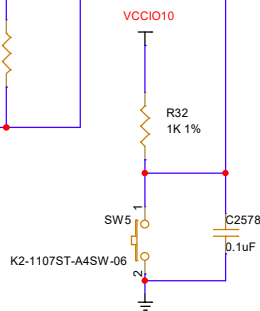


Note: Ready/Done are open drain output

## Done

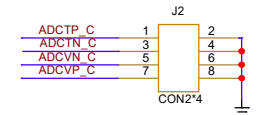


## Reconfig



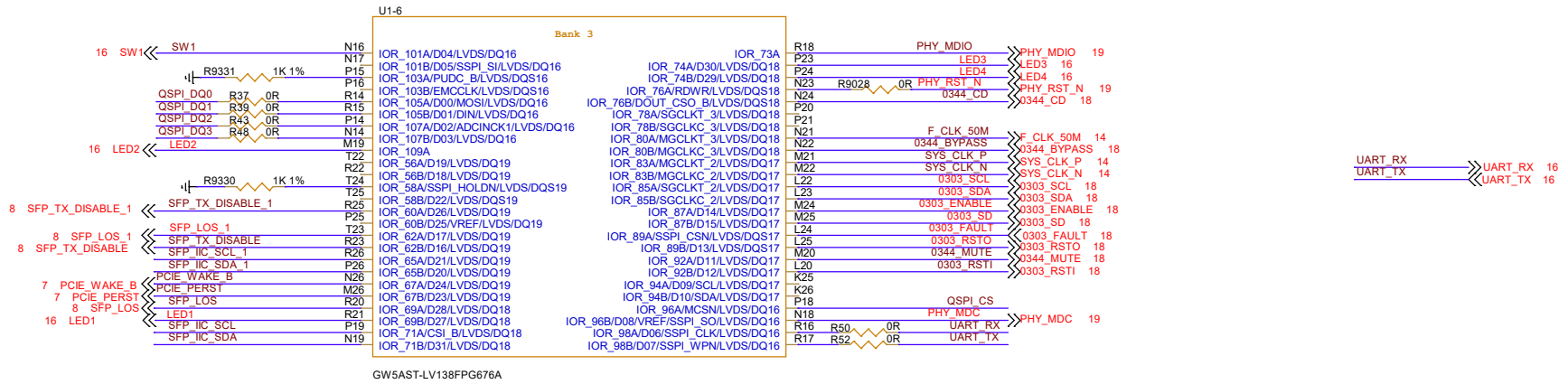
XADC, for Sensor.  
Anti-alias filter is added

## XADC Header

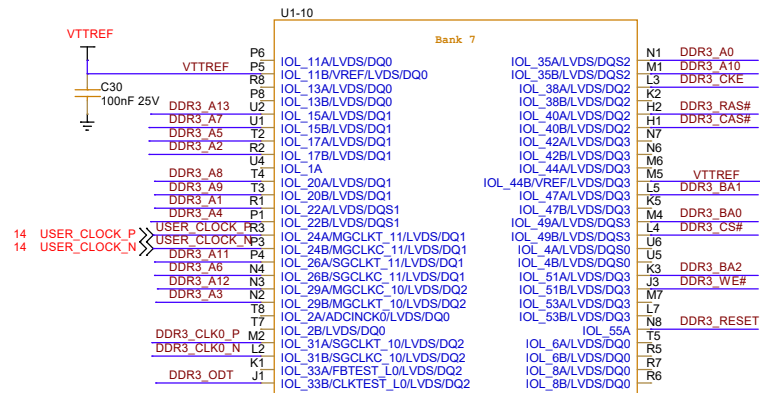


|                        |                             |               |
|------------------------|-----------------------------|---------------|
| Title                  |                             |               |
| DK_GW5AST-LV138FPG676A |                             |               |
| Size                   | Document Number             | Rev           |
| A3                     | Bank10_Cfg_Modes_Jtag_ADC   | V2.1          |
| Date:                  | Tuesday, September 09, 2025 | Sheet 3 of 25 |

```
MSPI, GPIO, SERIAL, I2C
```

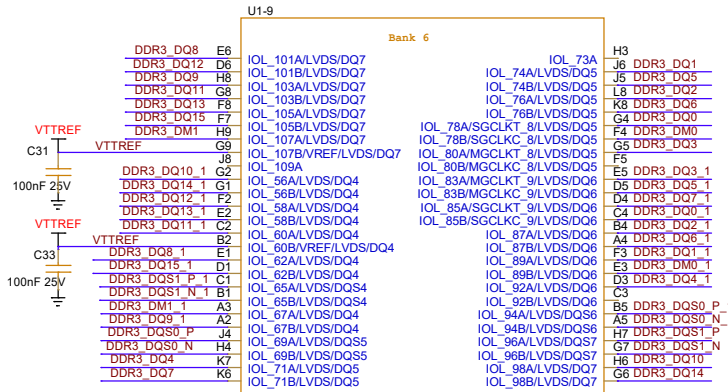


DDR3\*2

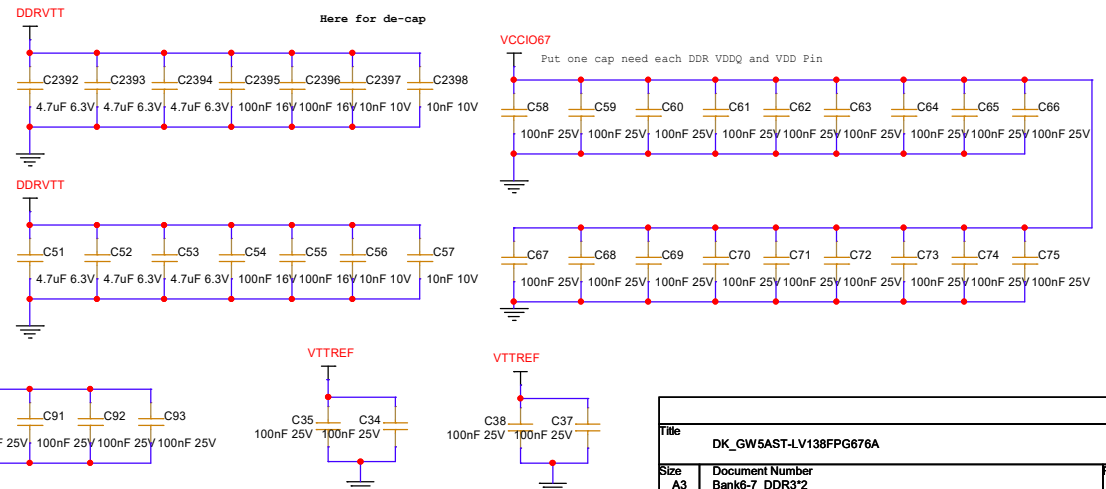
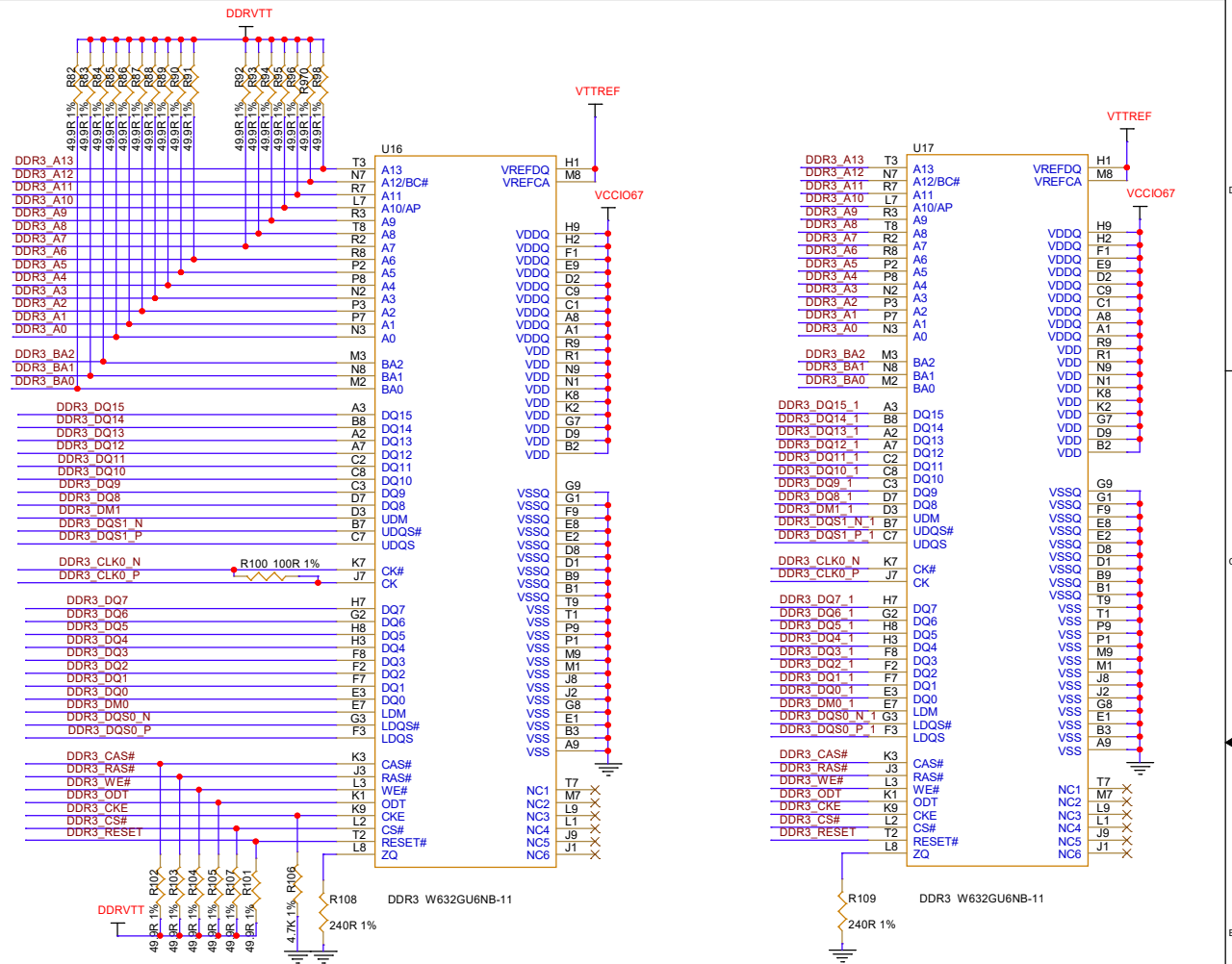
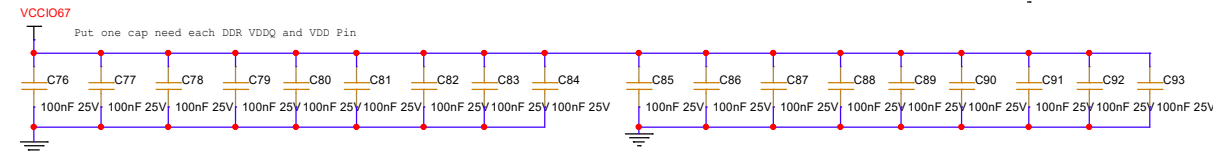
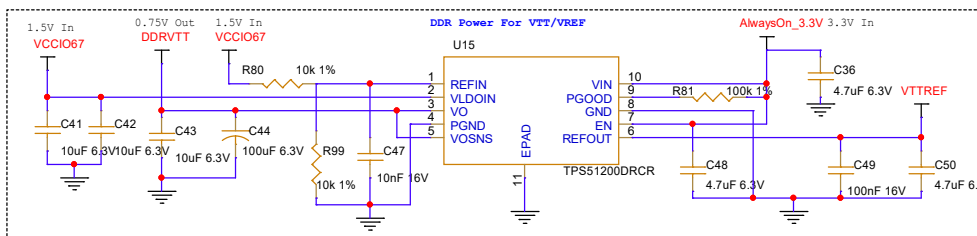


GW5AST-LV138FPG676A

J8/F5/E3/H3 is NC in HW-A7-AC701



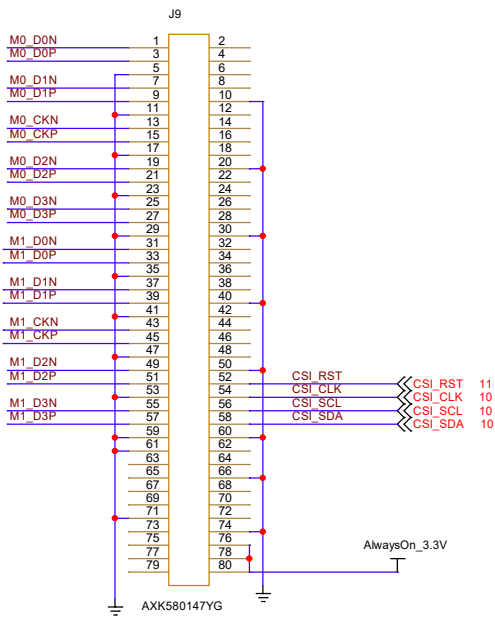
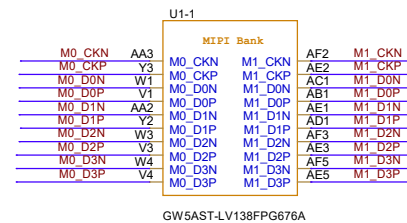
GW5AST-LV138FPG676A



|                        |                                  |       |             |
|------------------------|----------------------------------|-------|-------------|
| Title                  |                                  |       |             |
| DK_GW5AST-LV138FPG676A |                                  |       |             |
| Size<br>A3             | Document Number<br>Bak6-7_DDR3*2 |       | Rev<br>V2.1 |
| Date:                  | Tuesdav, September 09, 2025      | Sheet | 5 of 25     |

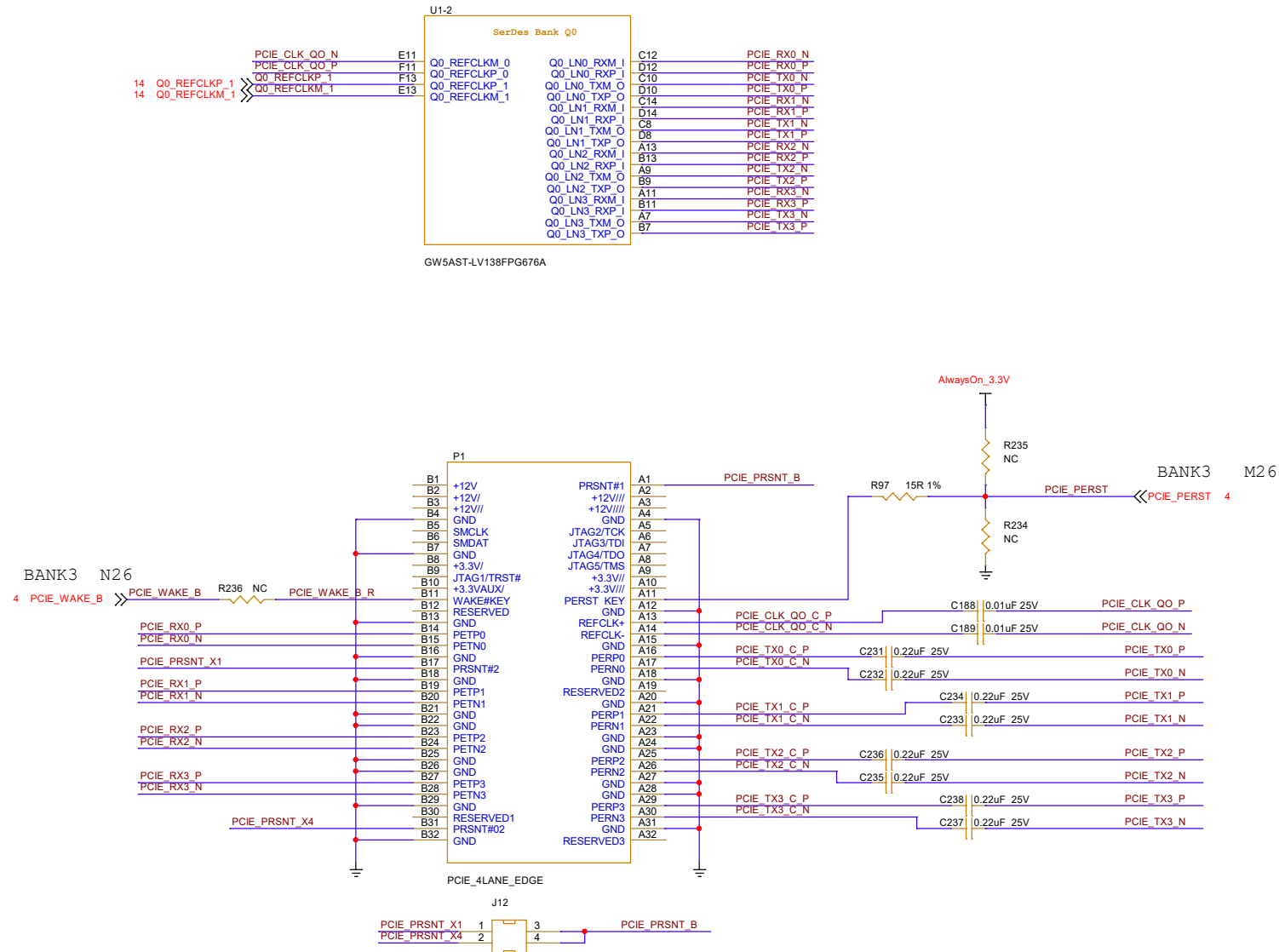
MIPI

MIPI bank is for MIPI RX hard macro.  
As the board is for characterization purpose, SMA connector is used.  
MIPI bank only have SMA connectors. Length match rules:  
1. M0/M1 length match for each intra group  
2. M0 and M1 inter group lenght match is nice to have



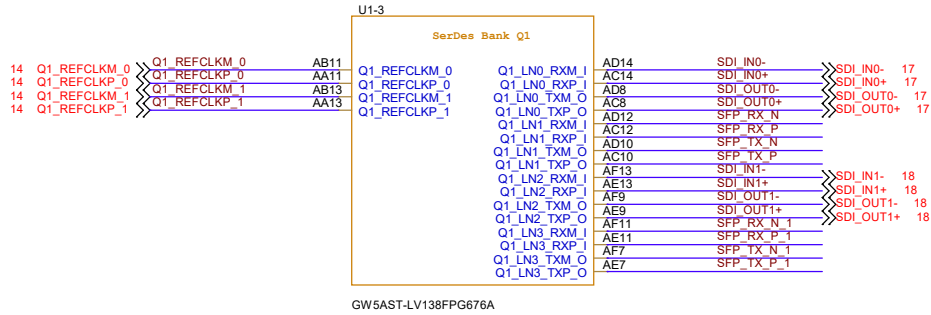
## PCIe

SerDes to SMP pin order could be swapped.

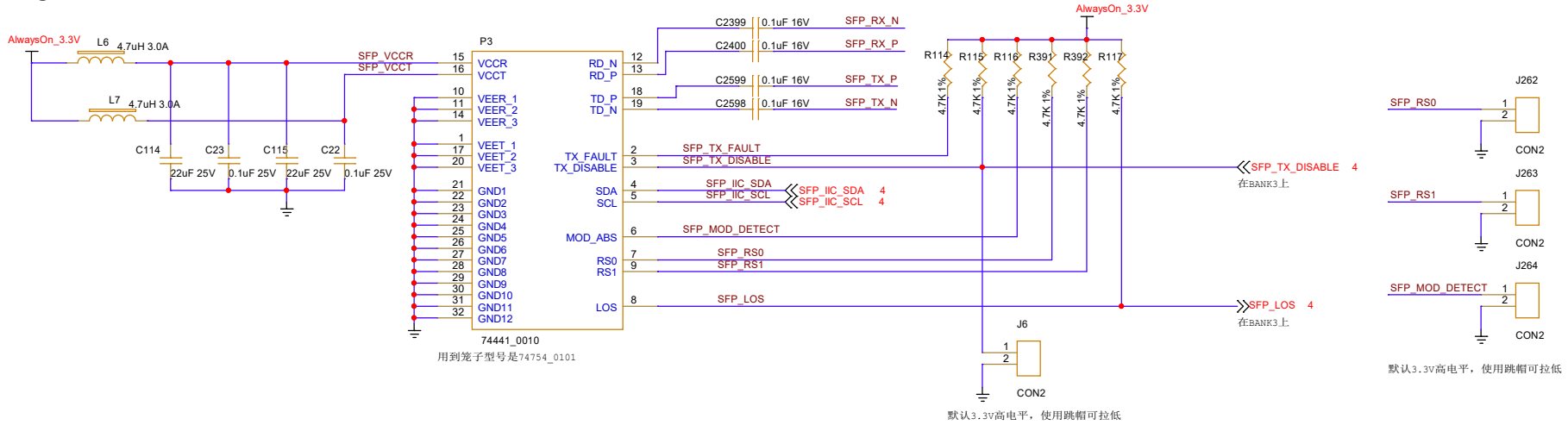


|                                 |                                |               |             |
|---------------------------------|--------------------------------|---------------|-------------|
|                                 |                                |               |             |
| Title<br>DK_GW5AST-LV138FPG676A |                                |               |             |
| Size<br>A3                      | Document Number<br>BankQ0_PcIe |               | Rev<br>V2.1 |
| Date:                           | Tuesday, September 09, 2025    | Sheet 7 of 25 |             |

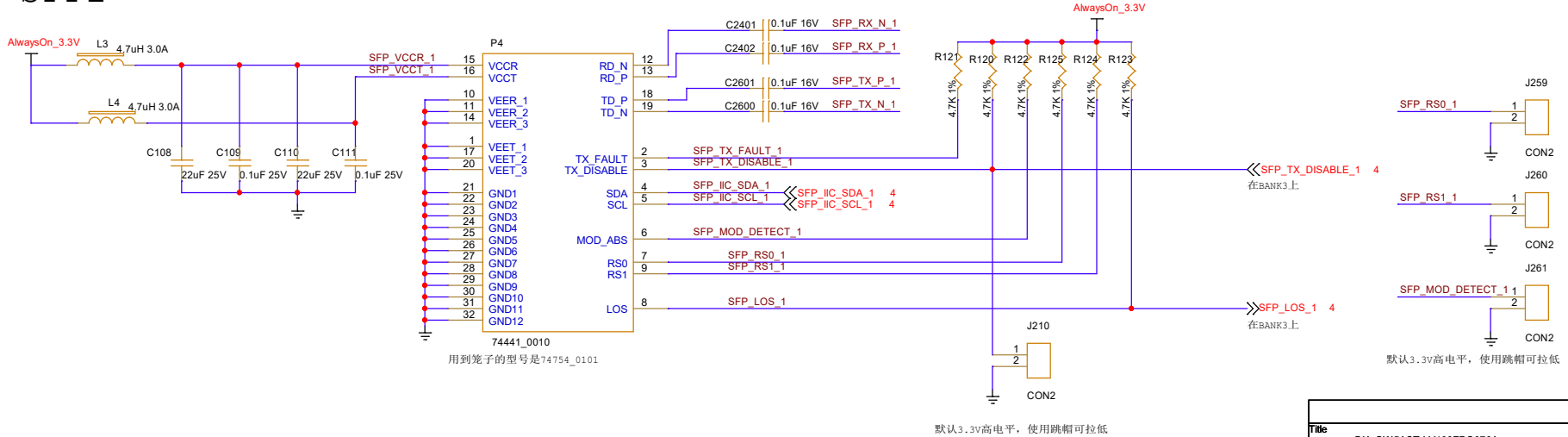
# SFP\*2



## SFP1

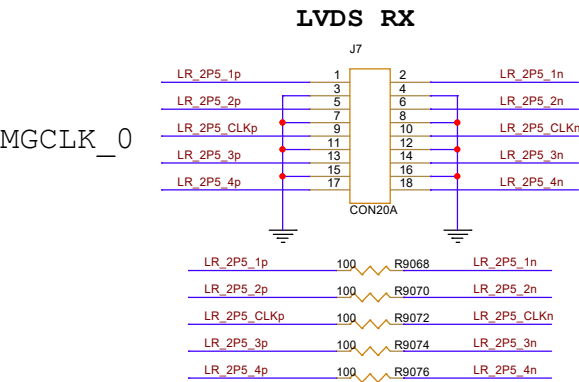
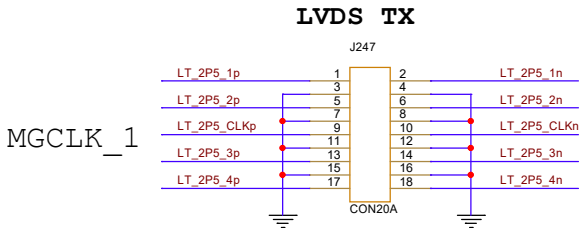
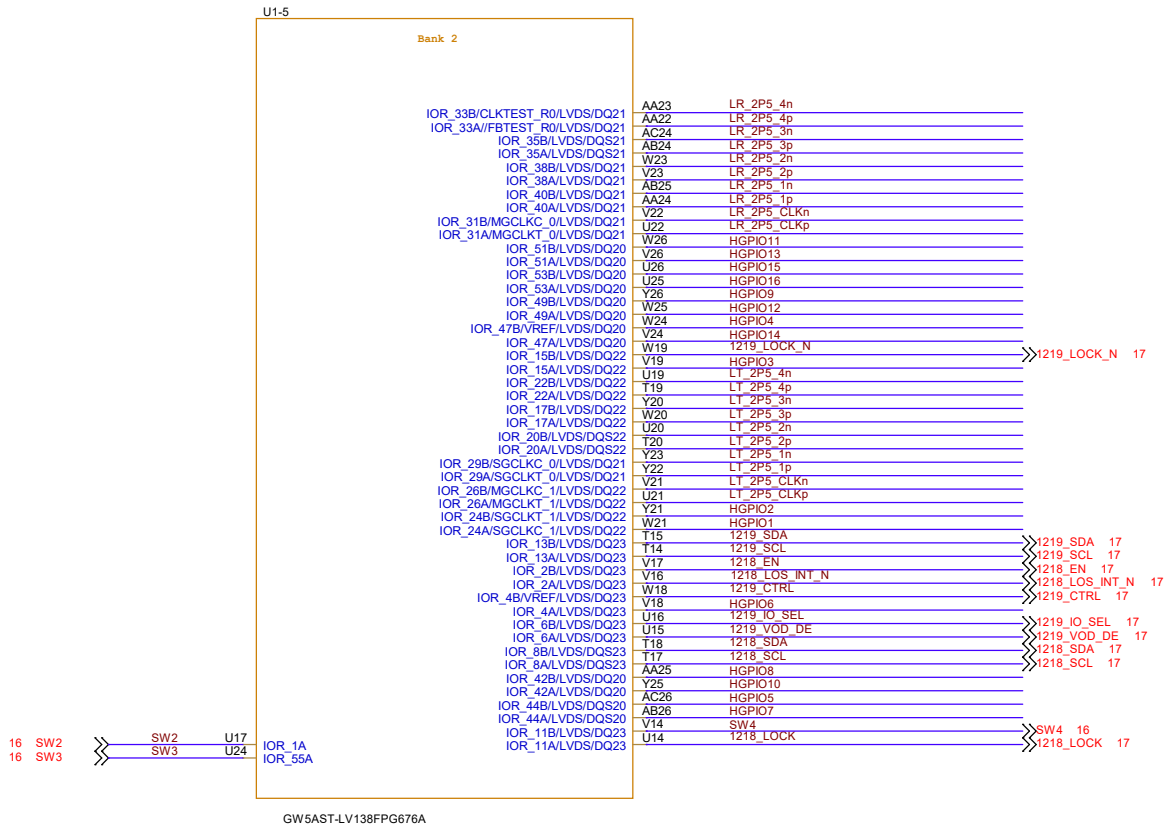


## SFP2



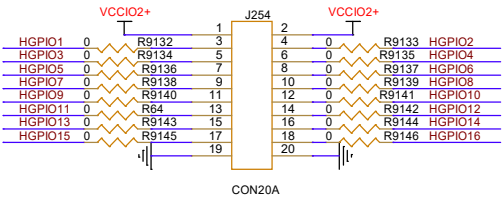
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|-------|-----------------------------|-----------------|------------------------|
| Title |                             |                 | DK_GW5AST-LV138FPG676A |
| Size  | A3                          | Document Number | BankQ1_SFP1-2          |
| Date: | Tuesday, September 09, 2025 | Sheet           | 8 of 25                |
| Rev   | V2.1                        |                 |                        |

LVDS TX/RX



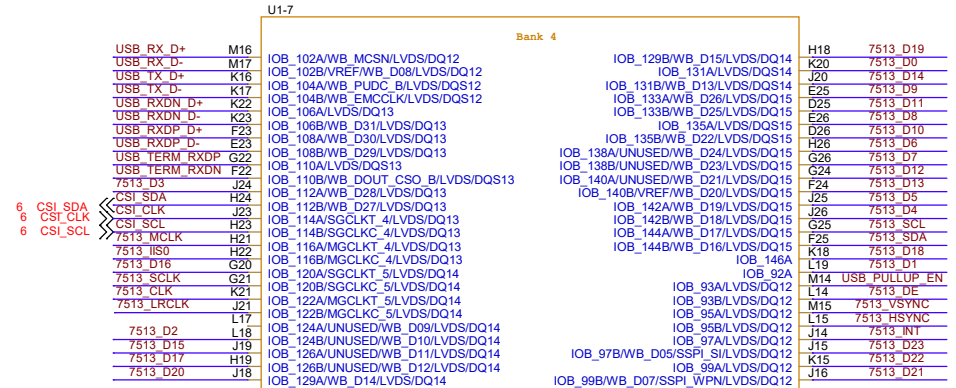
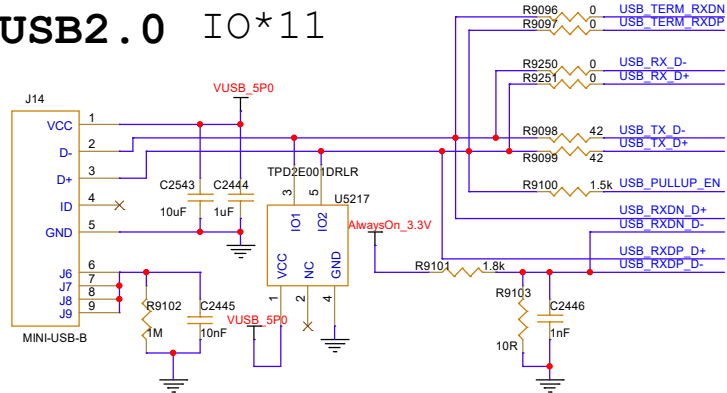
Close to FPGA

2.5V IO



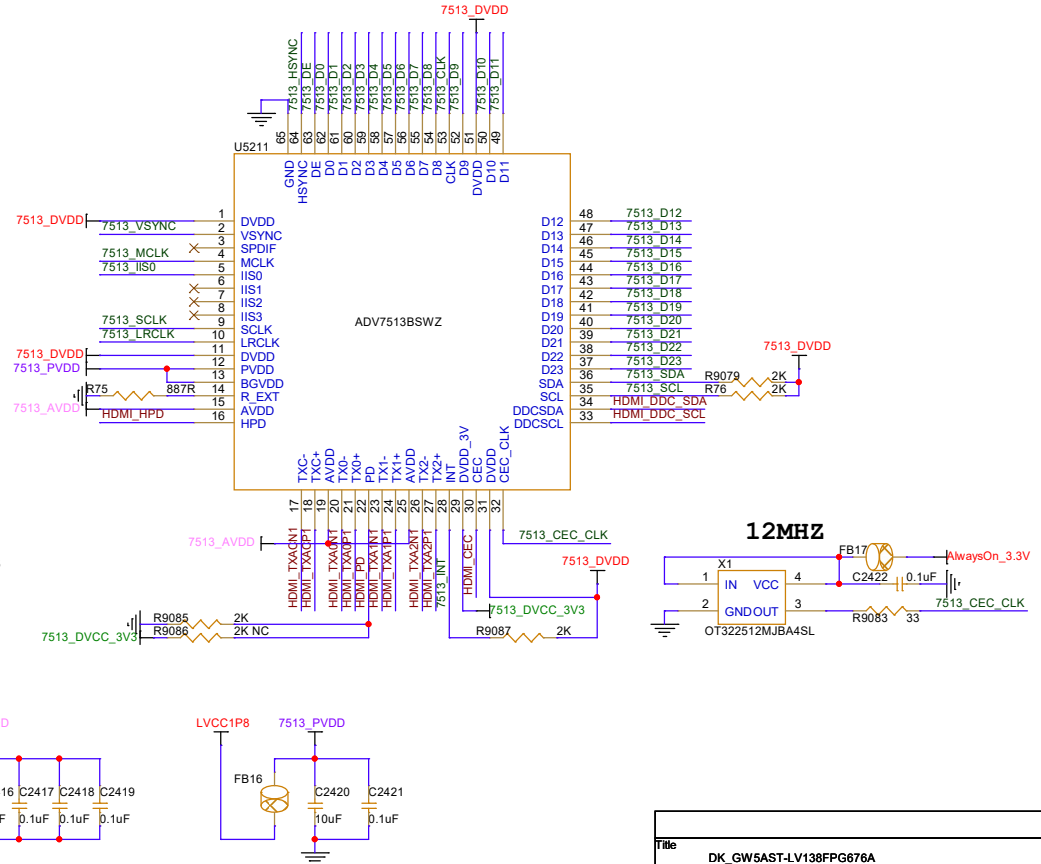
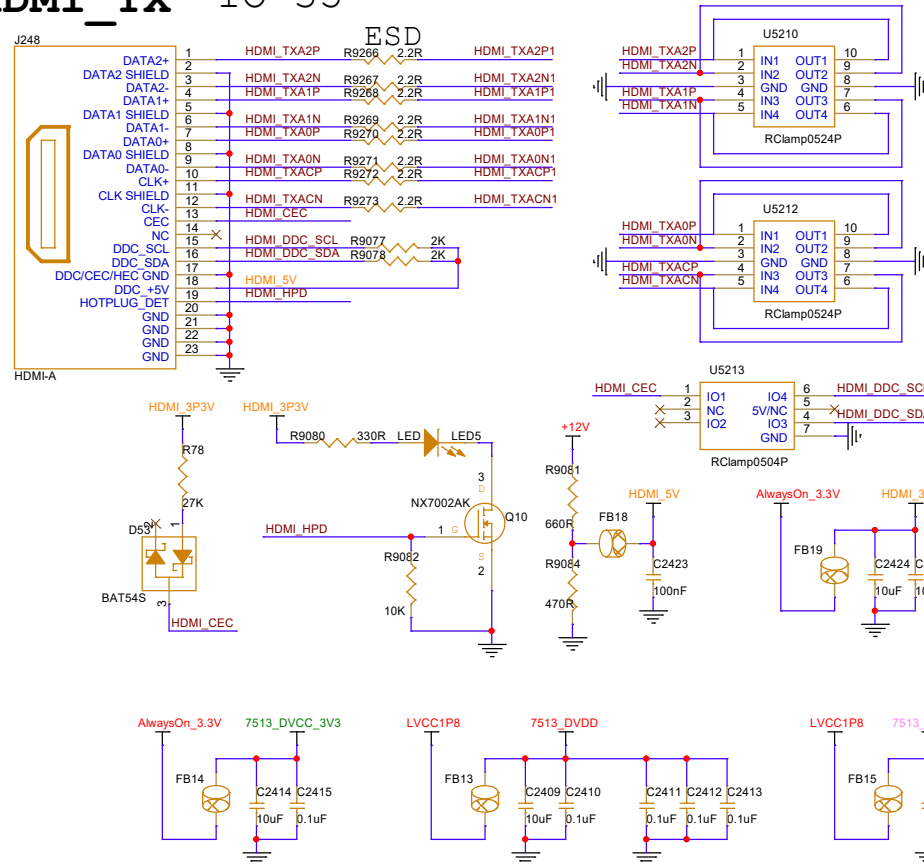
# HDMI-TX/USB2.0

## USB2.0 IO\*11

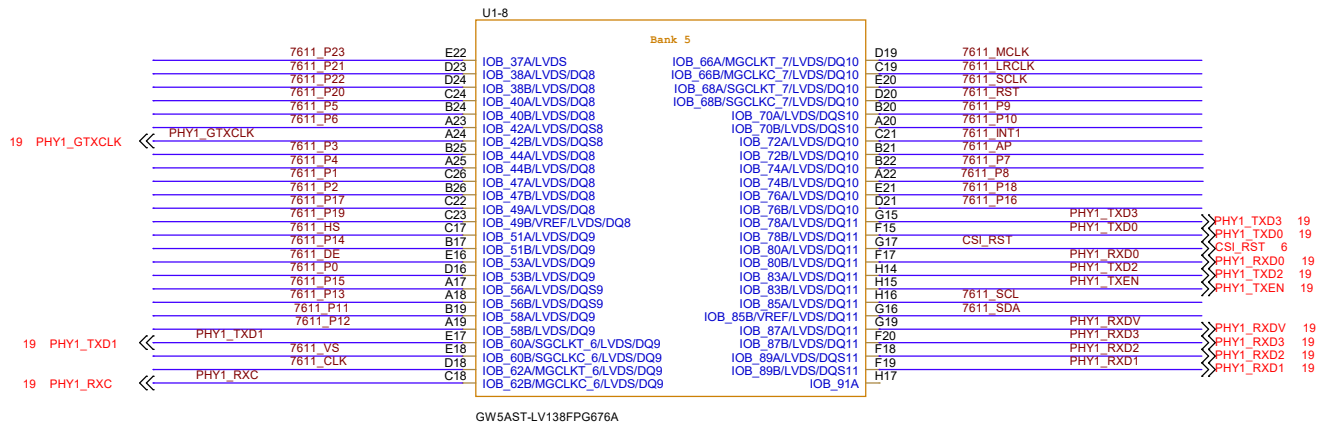


GW5AST-LV138FPG676A

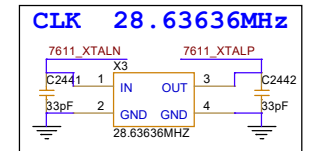
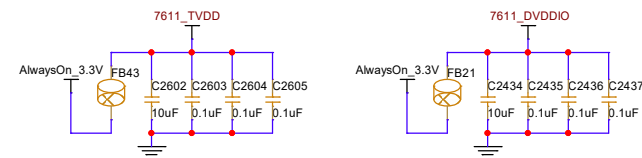
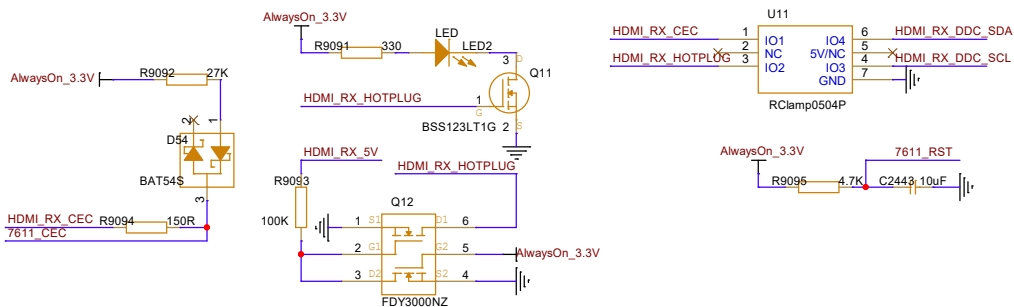
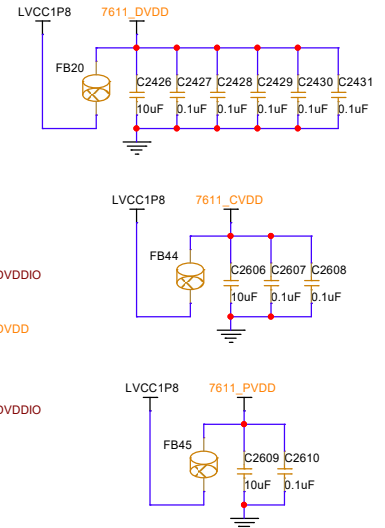
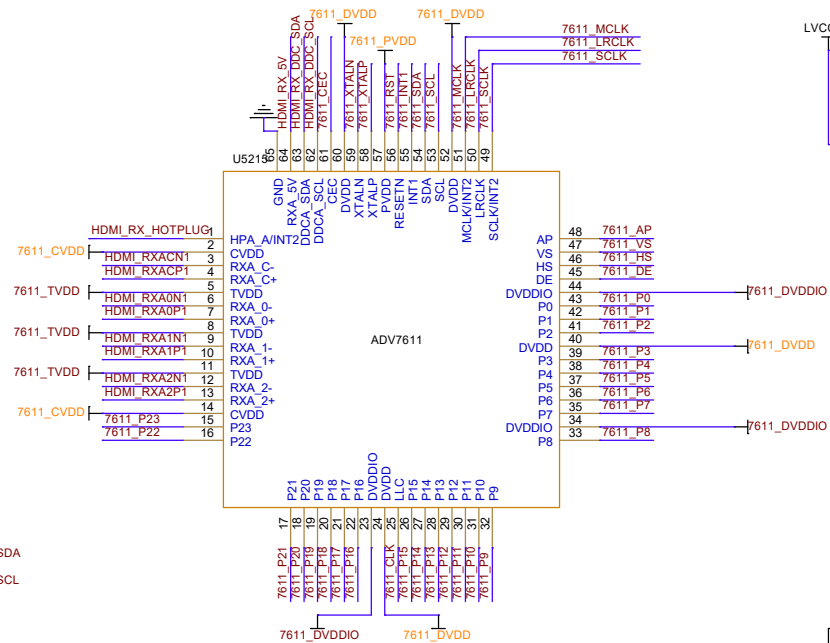
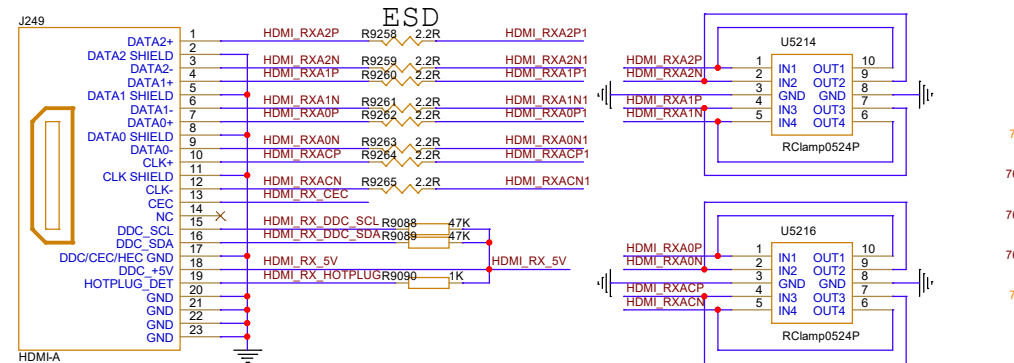
## HDMI\_TX IO\*35



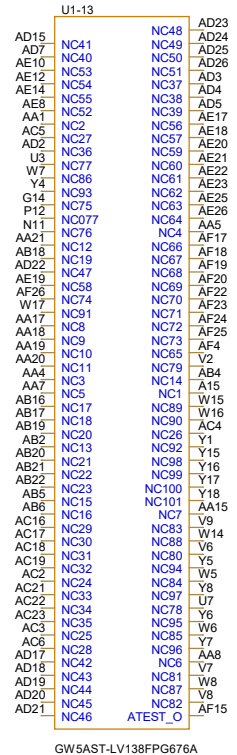
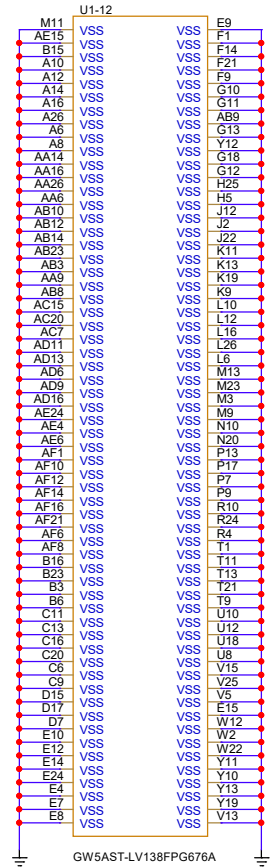
## HDMI-RX



## HDMI\_RX IO\*36

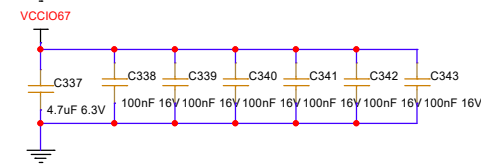
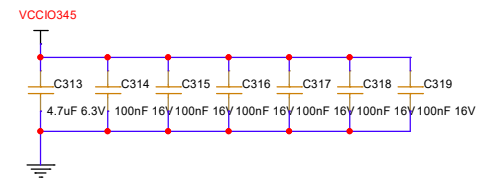
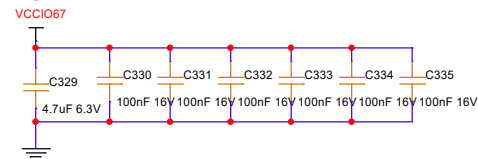
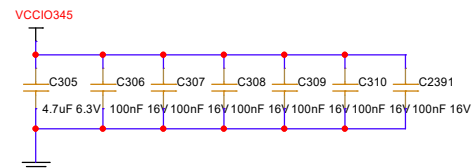
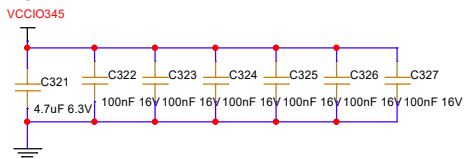
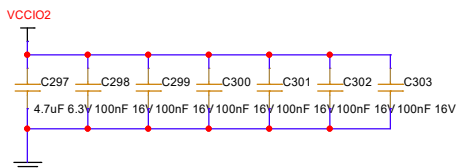
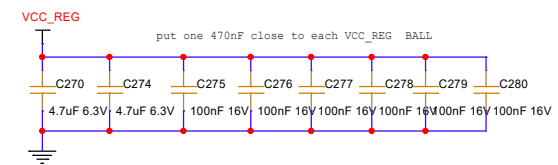
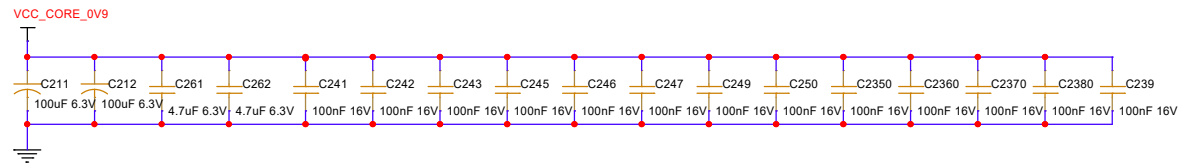
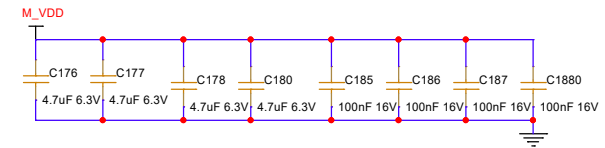
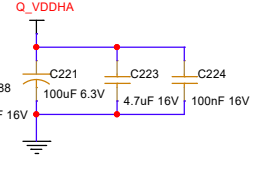
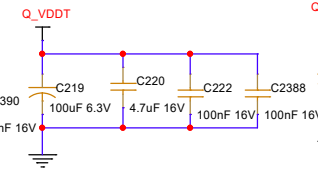
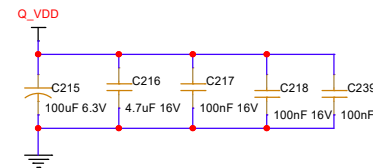
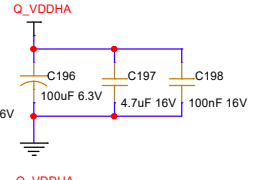
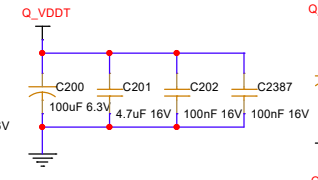
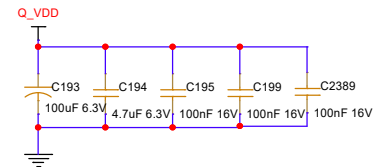
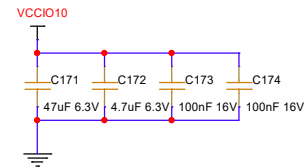
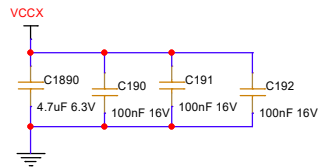
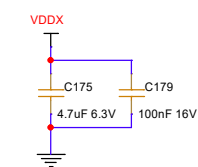
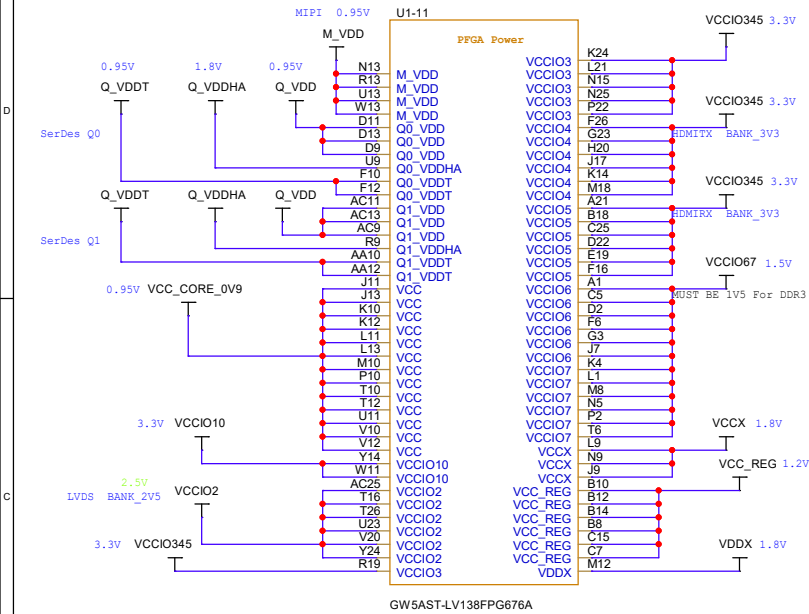


GND&NC



## FPGA POWER

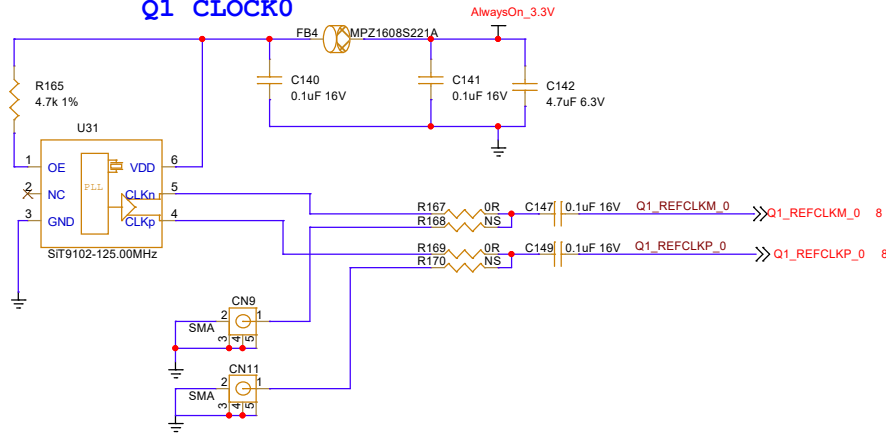
Put decap here



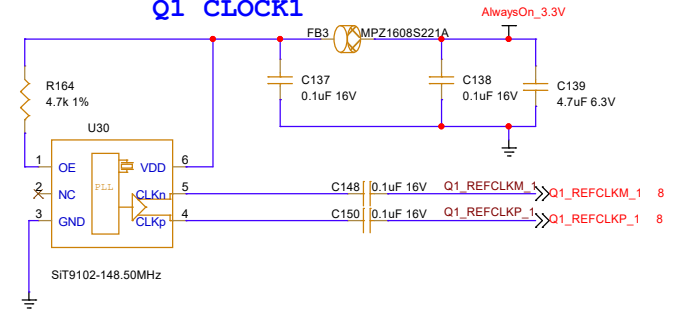
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| Title<br>DK_GW5AST-LV138FPG676A |                               |       |             |
| Size<br>A3                      | Document Number<br>FPGA_POWER |       | Rev<br>V2.1 |
| Date:                           | Tuesday, September 09, 2025   | Sheet | 13 of 25    |

# CLOCK

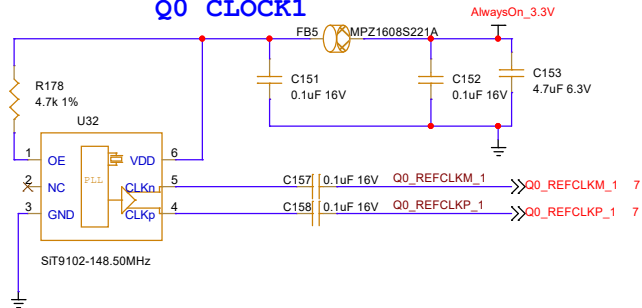
## Q1 CLOCK0



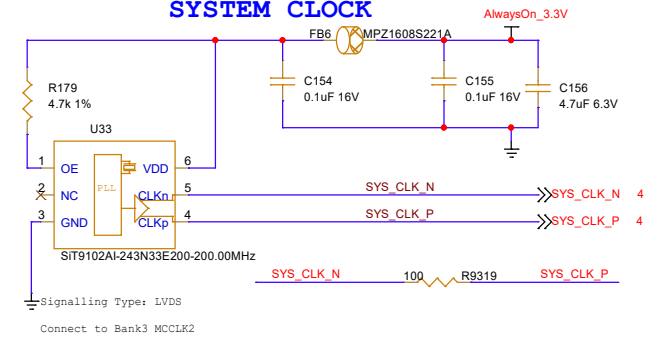
## Q1 CLOCK1



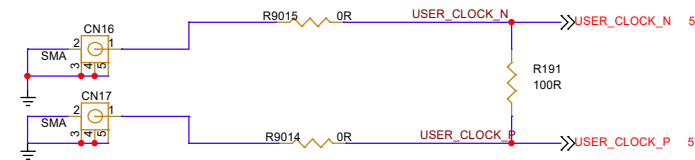
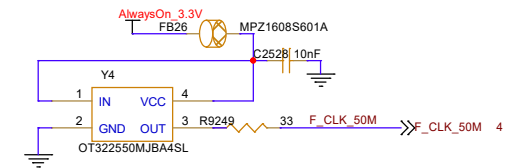
## Q0 CLOCK1



## SYSTEM CLOCK



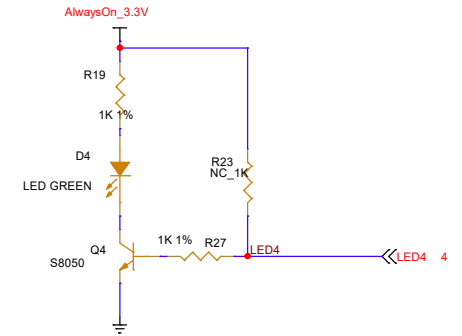
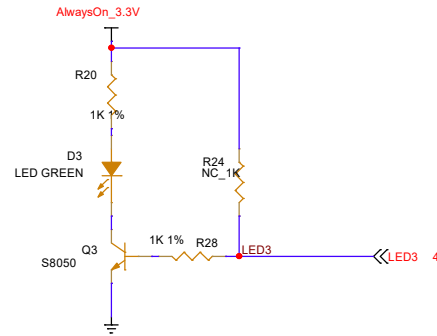
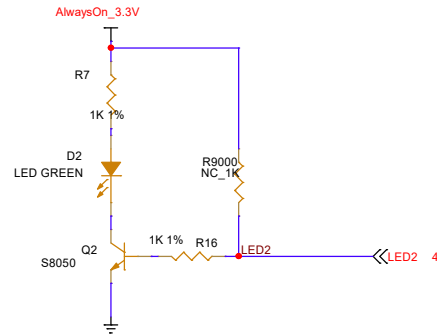
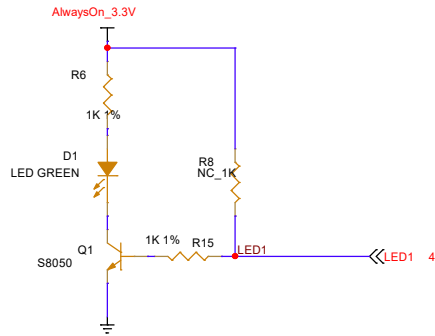
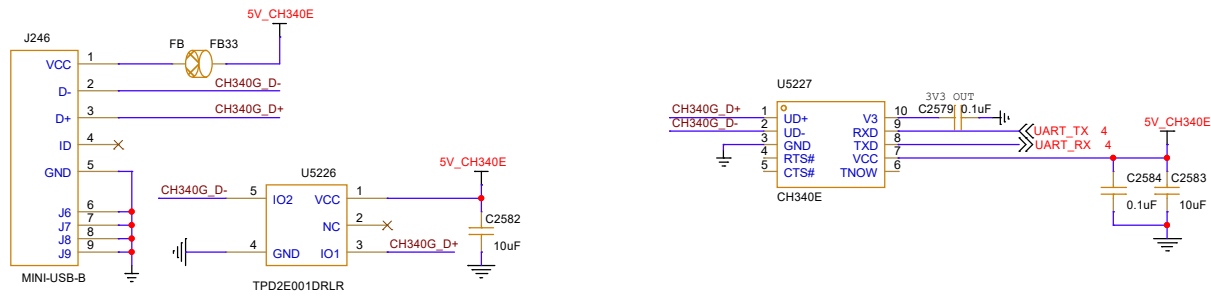
## 50M-GCLK



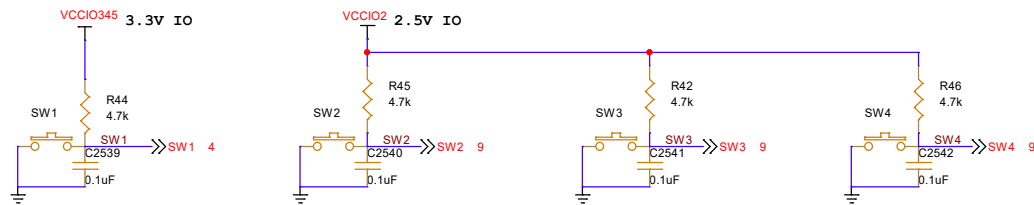
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|-------|-----------------------------|-----------------|------------------------|
| Title |                             |                 | DK_GW5AST-LV138FPG676A |
| Size  | A3                          | Document Number | CLOCK                  |
| Rev   | V2.1                        |                 |                        |
| Date: | Tuesday, September 09, 2025 | Sheet           | 14 of 25               |



# USB-UART

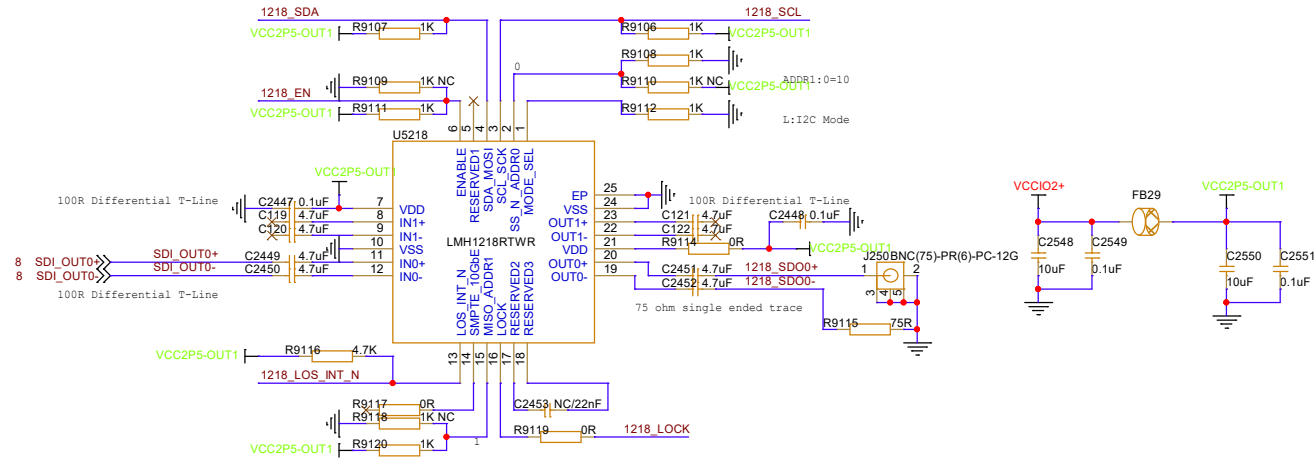


# KEY\*4



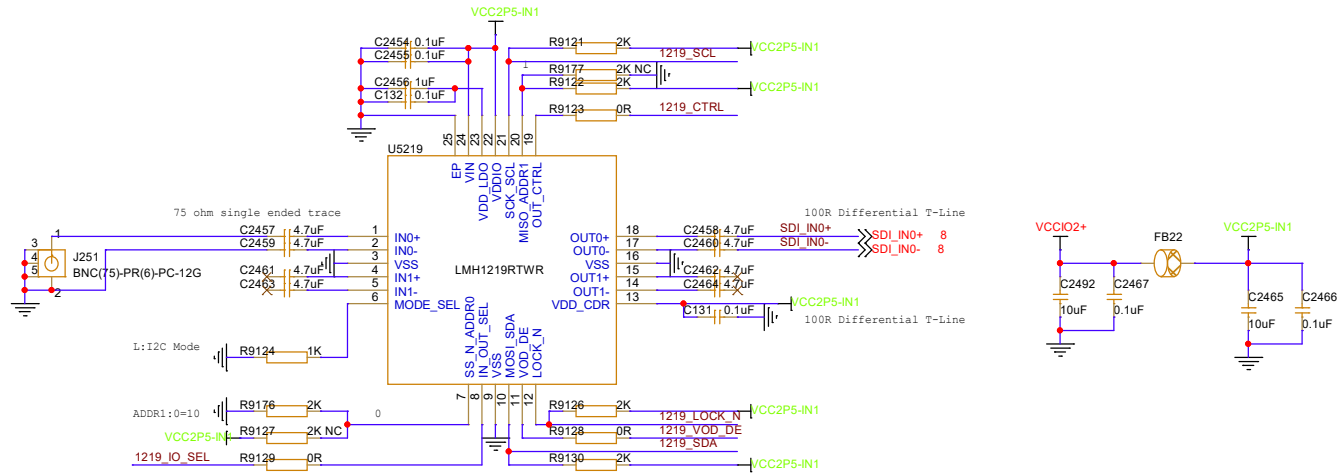
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|------------------------|-----------------------------|----------------|
| Title                  |                             |                |
| DK_GW5AST-LV138FPG676A |                             |                |
| Size                   | Document Number             | Rev            |
| A3                     | USB-UART_LED_KEY            | V2.1           |
| Date:                  | Tuesday, September 09, 2025 | Sheet 16 of 25 |

## SDI-OUT-6G



1218\_SDA << 1218\_SDA 9  
1218\_SCL << 1218\_SCL 9  
1218\_EN << 1218\_EN 9  
1218\_LOS\_INT\_N << 1218\_LOS\_INT\_N 9  
1218\_LOCK << 1218\_LOCK 9

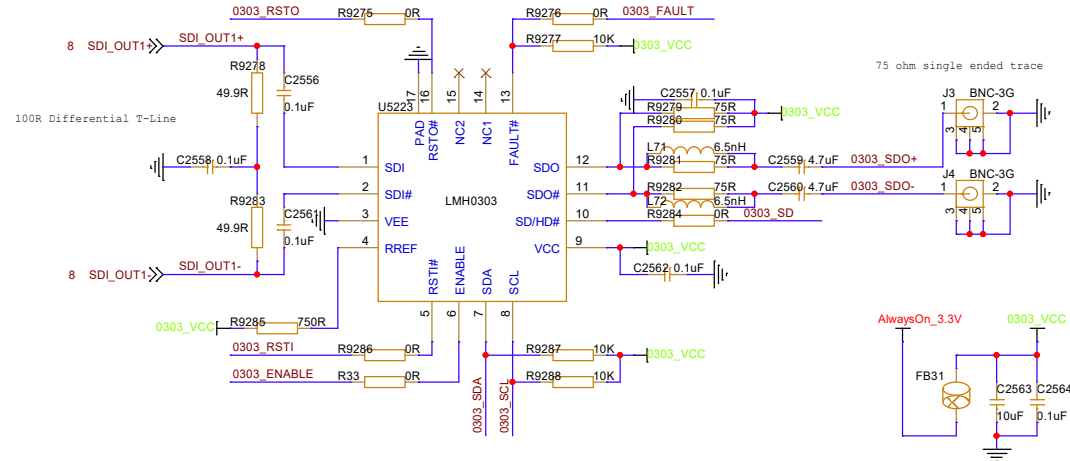
## SDI-IN-6G



1219\_SDA << 1219\_SDA 9  
1219\_SCL << 1219\_SCL 9  
1219\_IO\_SEL << 1219\_IO\_SEL 9  
1219\_CTRL << 1219\_CTRL 9  
1219\_LOCK\_N << 1219\_LOCK\_N 9  
1219\_VOD\_DE << 1219\_VOD\_DE 9

|                        |                             |                |
|------------------------|-----------------------------|----------------|
| File                   |                             |                |
| DK_GW5AST-LV138FPG676A |                             |                |
| Size                   | Document Number             | Rev            |
| A3                     | SDI-OUT/IN-12G              | V2.1           |
| Date:                  | Tuesday, September 09, 2025 | Sheet 17 of 25 |

|             |               |
|-------------|---------------|
| 0303_SCL    | 0303_SCL 4    |
| 0303_SDA    | 0303_SDA 4    |
| 0303_FAULT  | 0303_FAULT 4  |
| 0303_SD     | 0303_SD 4     |
| 0303_ENABLE | 0303_ENABLE 4 |
| 0303_RST1   | 0303_RST1 4   |
| 0303_RST0   | 0303_RST0 4   |



```

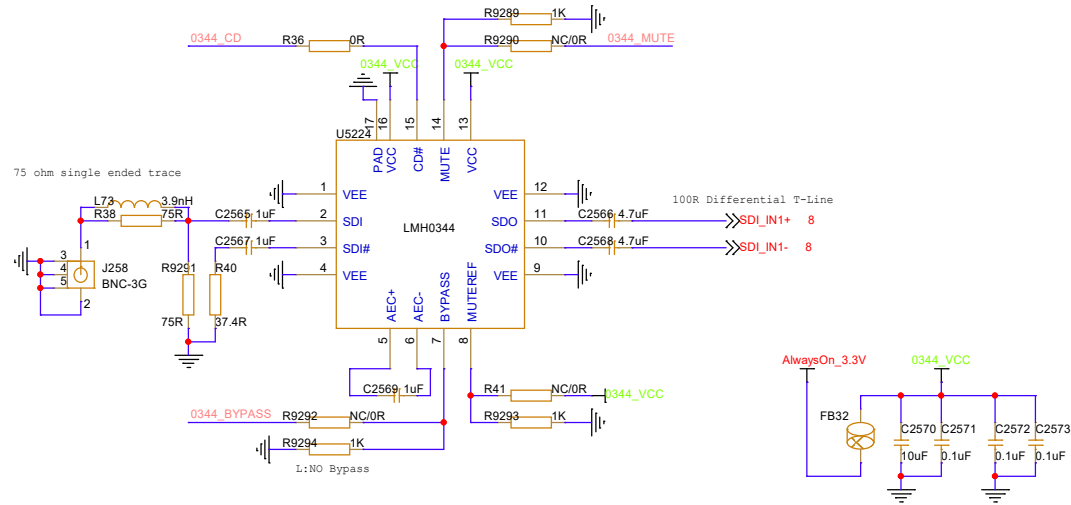
0344_BYPASS
0344_MUTE
0344_CD

```

```

0344_BYPASS 4
0344_MUTE 4
0344_CD 4

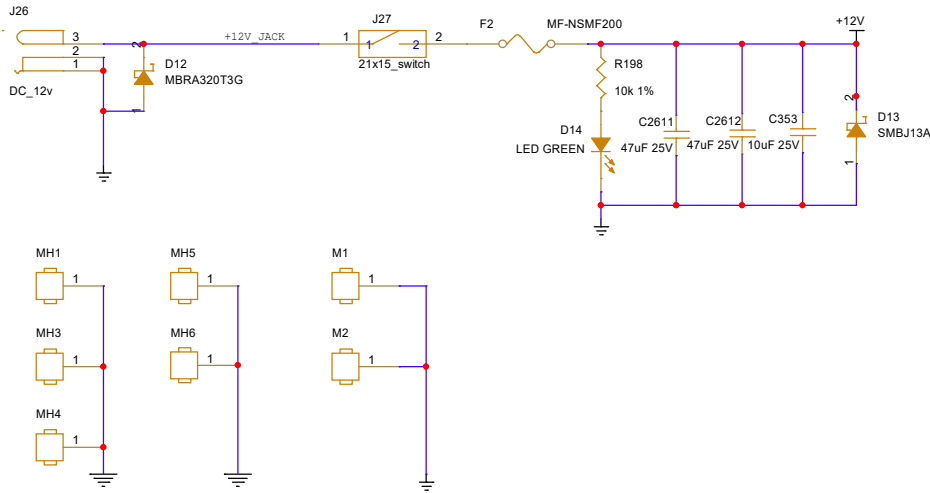
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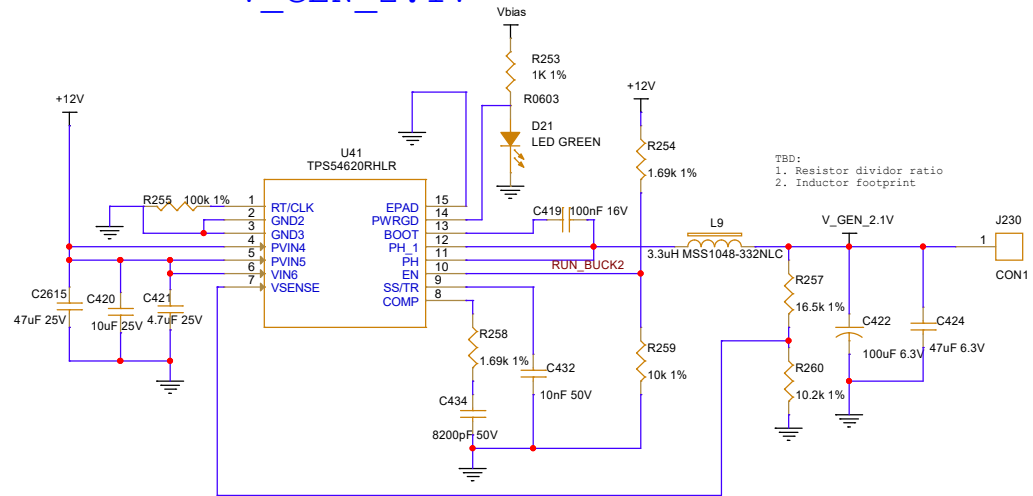
|                                 |                                   |                |             |
|---------------------------------|-----------------------------------|----------------|-------------|
|                                 |                                   |                |             |
| Title<br>DK_GW5AST-LV138FPG676A |                                   |                |             |
| Size<br>A3                      | Document Number<br>SDI-OUT/7IN-3G |                | Rev<br>V2.1 |
| Date:                           | Tuesday, September 09, 2025       | Sheet 18 of 25 |             |



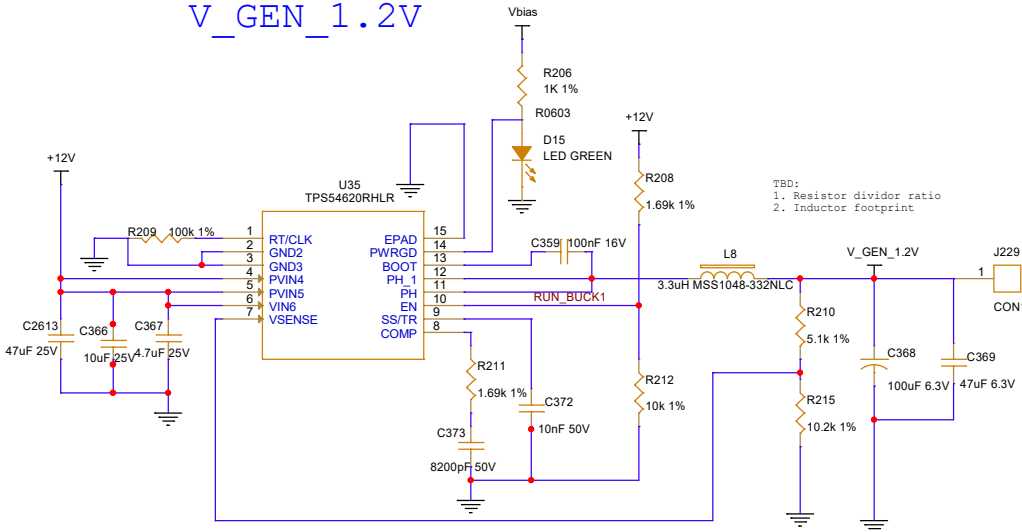
12V Power Supply



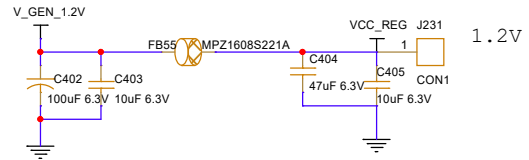
V\_GEN\_2.1V



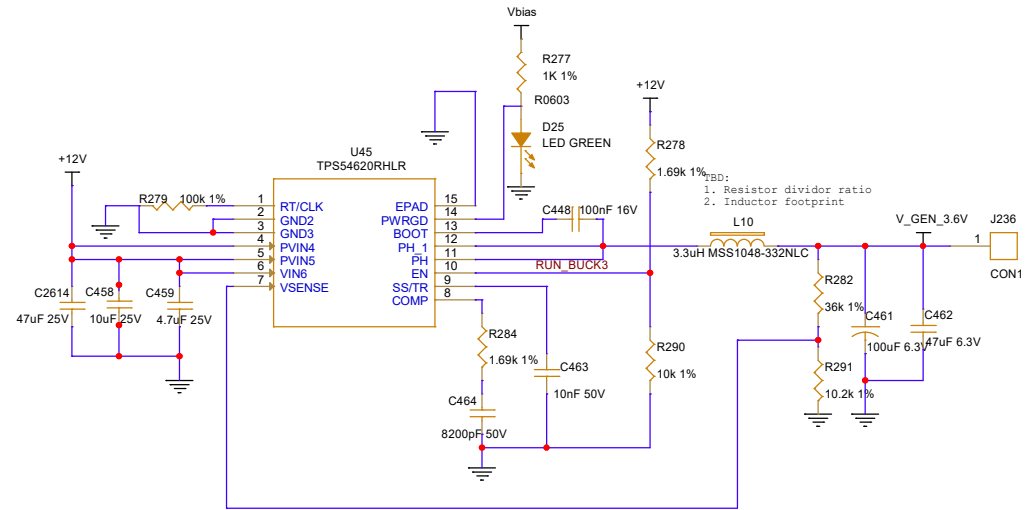
V\_GEN\_1.2V



VCC\_REG

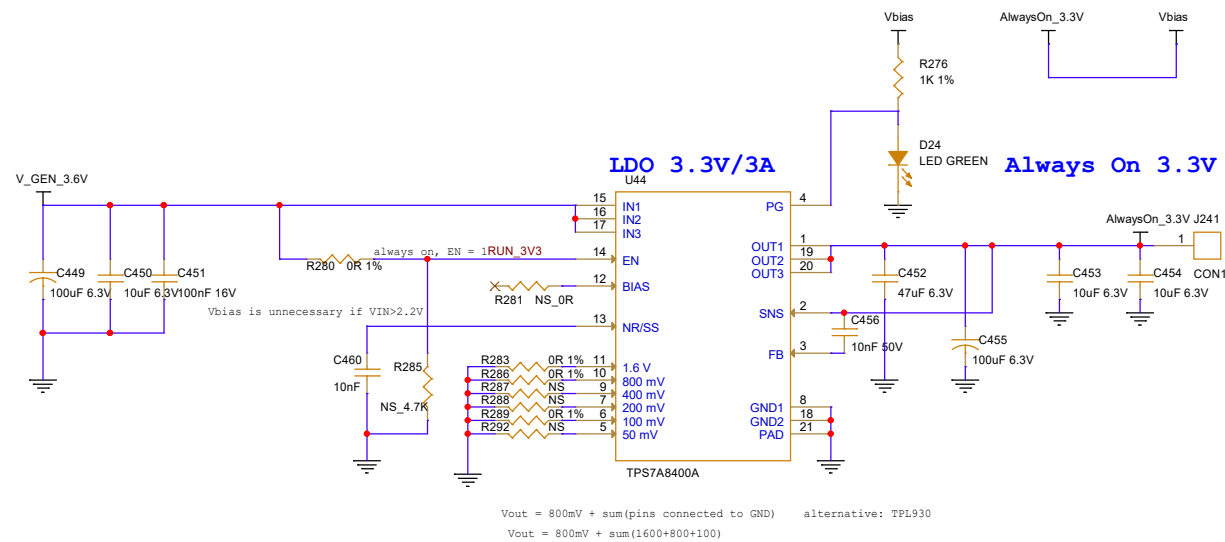


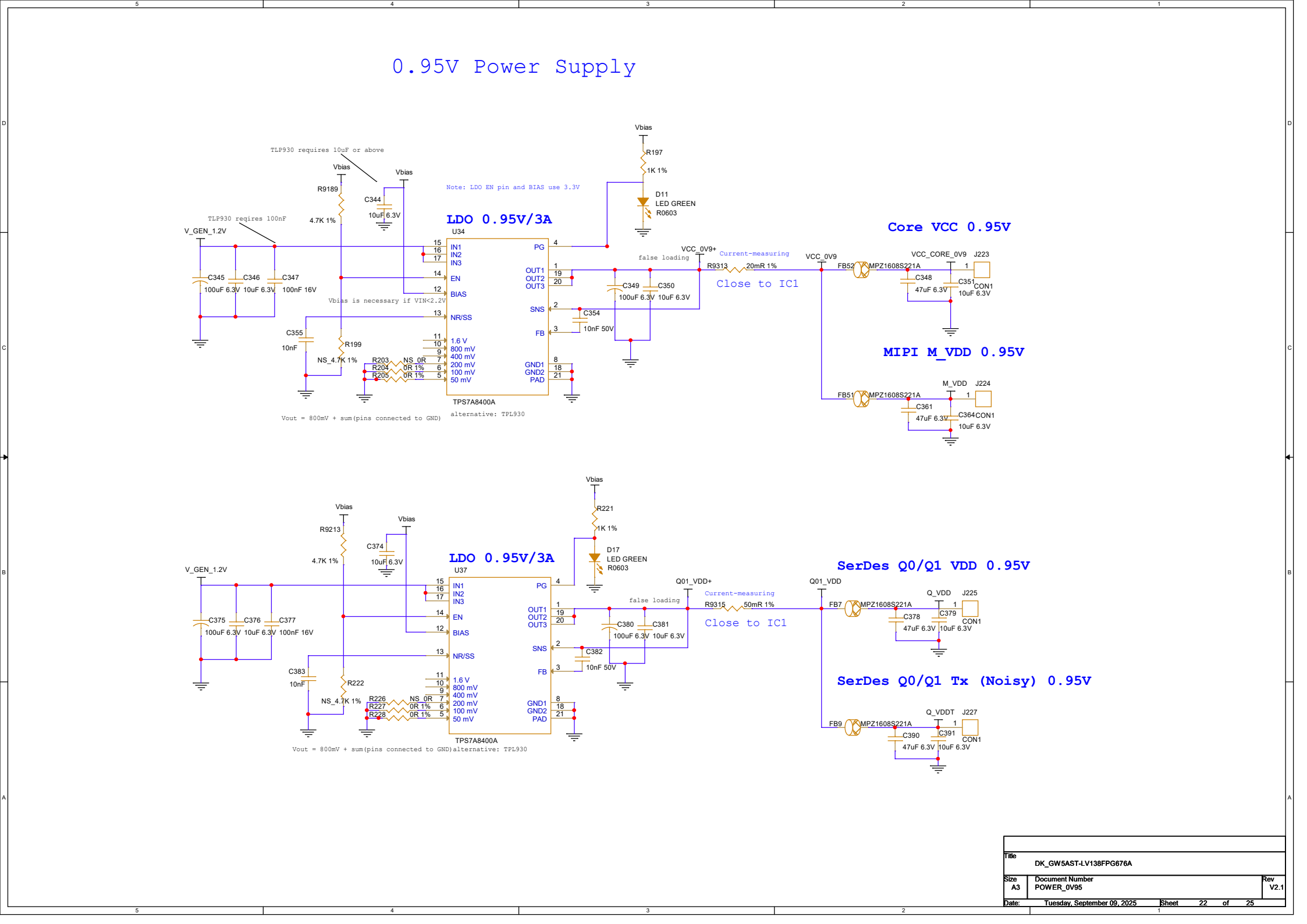
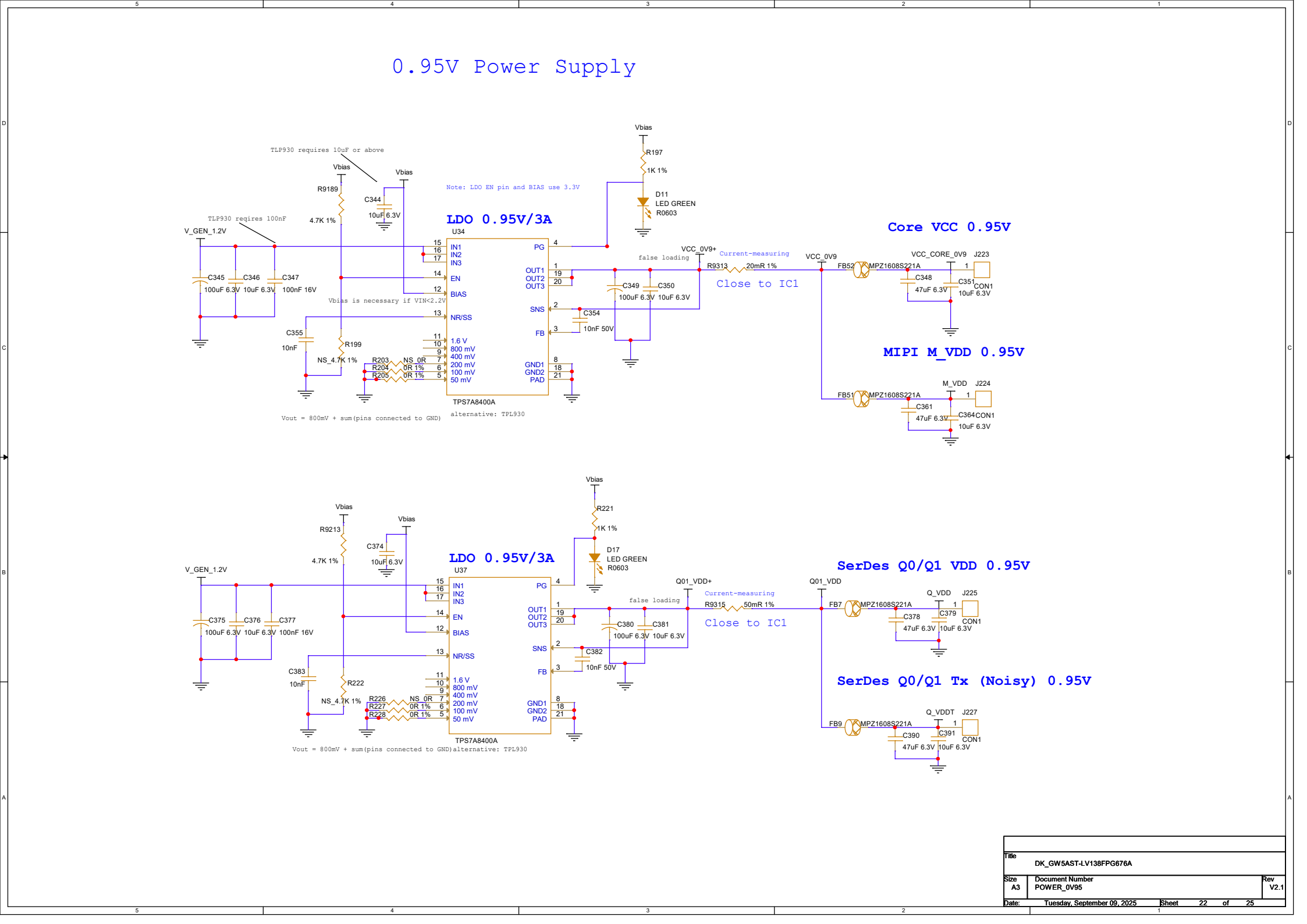
V\_GEN\_3.6V



|                        |                             |       |          |
|------------------------|-----------------------------|-------|----------|
| Title                  |                             |       |          |
| DK_GW5AST-LV138FPG676A |                             |       |          |
| Size                   | Document Number             |       | Rev      |
| A3                     | POWERIN_1V2_2V1_3V6         |       | V2.1     |
| Date:                  | Tuesday, September 09, 2025 | Sheet | 20 of 25 |

Provide 3.3V Bias Always On LDO



[illegible]

0.95V Power Supply

**LDO 0.95V/3A**  
U34

Note: LDO EN pin and BIAS use 3.3V

V<sub>GEN</sub> 1.2V

TLP930 requires 100nF

TLP930 requires 10uF or above

V<sub>bias</sub>

R9189 4.7K 1%

C344 10uF 6.3V

C345 100uF 6.3V

C346 10uF 6.3V

C347 100nF 16V

C355 10nF

R199 NS 4.7K 1%

R203 NS 0R 1%

R204 0R 1%

R205 0R 1%

TPS7A8400A

alternative: TPL930

V<sub>out</sub> = 800mV + sum(pins connected to GND)

1.6 V  
800 mV  
400 mV  
200 mV  
100 mV  
50 mV

PG 4

OUT1 19

OUT2 20

OUT3 21

EN 14

BIAS 12

NR/SS 13

SNS 2

FB 3

GND1 8

GND2 18

PAD 21

V<sub>bias</sub>

R197 1K 1%

D11 LED GREEN R0603

VCC\_0V9+ false loading

Current-measuring R9313 20mR 1%

VCC\_0V9

Close to IC1

C349 100uF 6.3V

C350 10uF 6.3V

C354 10nF 50V

Core VCC 0.95V

VCC\_CORE\_0V9 J223

C348 47uF 6.3V

C351 10uF 6.3V

MIPI M\_VDD 0.95V

M\_VDD J224

C361 47uF 6.3V

C364 10uF 6.3V

**LDO 0.95V/3A**  
U37

V<sub>GEN</sub> 1.2V

C375 100uF 6.3V

C376 10uF 6.3V

C377 100nF 16V

C383 10nF

R9213 4.7K 1%

C374 10uF 6.3V

TPS7A8400A

alternative: TPL930

V<sub>out</sub> = 800mV + sum(pins connected to GND)

1.6 V  
800 mV  
400 mV  
200 mV  
100 mV  
50 mV

PG 4

OUT1 19

OUT2 20

OUT3 21

EN 14

BIAS 12

NR/SS 13

SNS 2

FB 3

GND1 8

GND2 18

PAD 21

V<sub>bias</sub>

R221 1K 1%

D17 LED GREEN R0603

Q01\_VDD+ false loading

Current-measuring R9315 50mR 1%

Q01\_VDD

Close to IC1

C380 100uF 6.3V

C381 10uF 6.3V

C382 10nF 50V

SerDes Q0/Q1 VDD 0.95V

Q\_VDD J225

C378 47uF 6.3V

C379 10uF 6.3V

SerDes Q0/Q1 Tx (Noisy) 0.95V

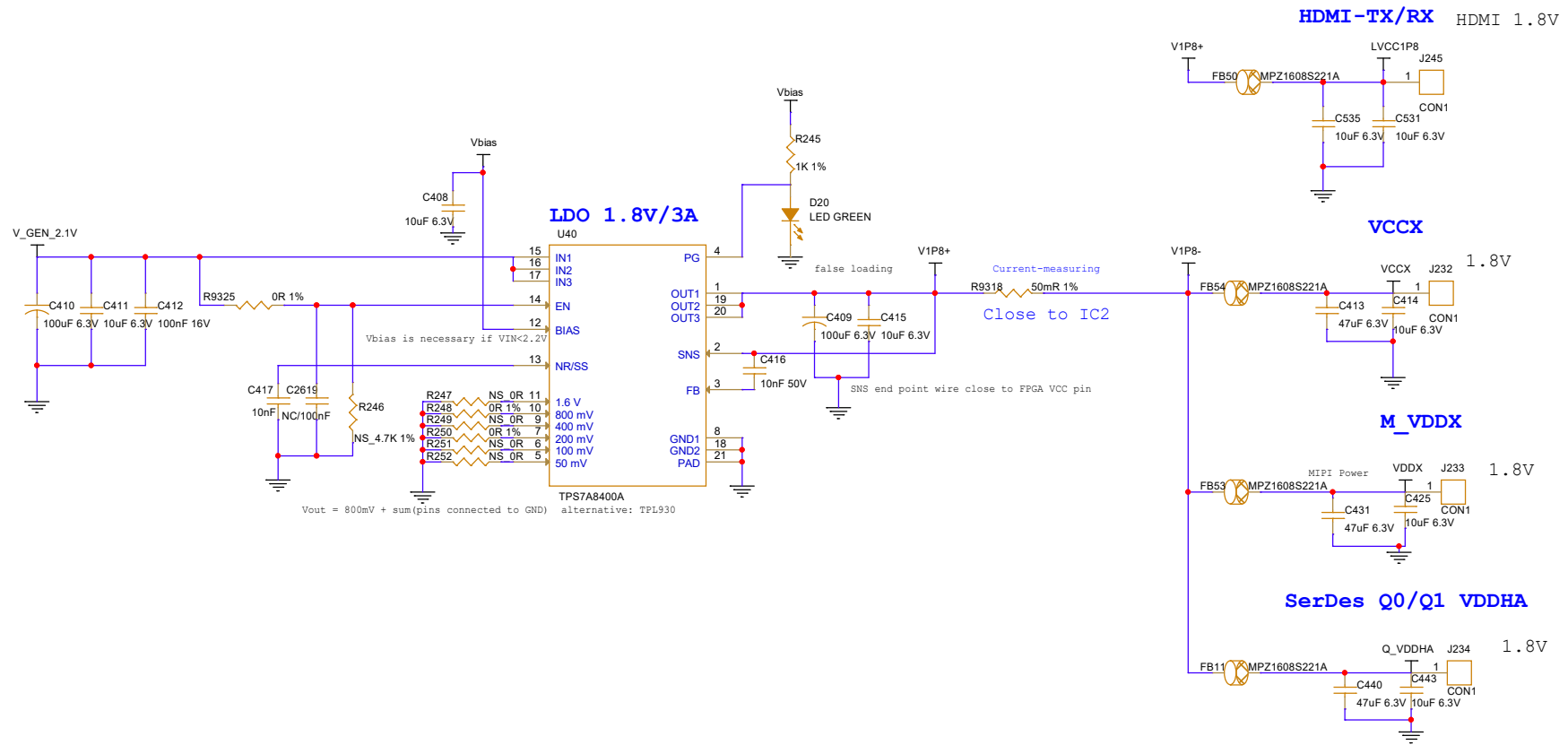
Q\_VDDT J227

C390 47uF 6.3V

C391 10uF 6.3V

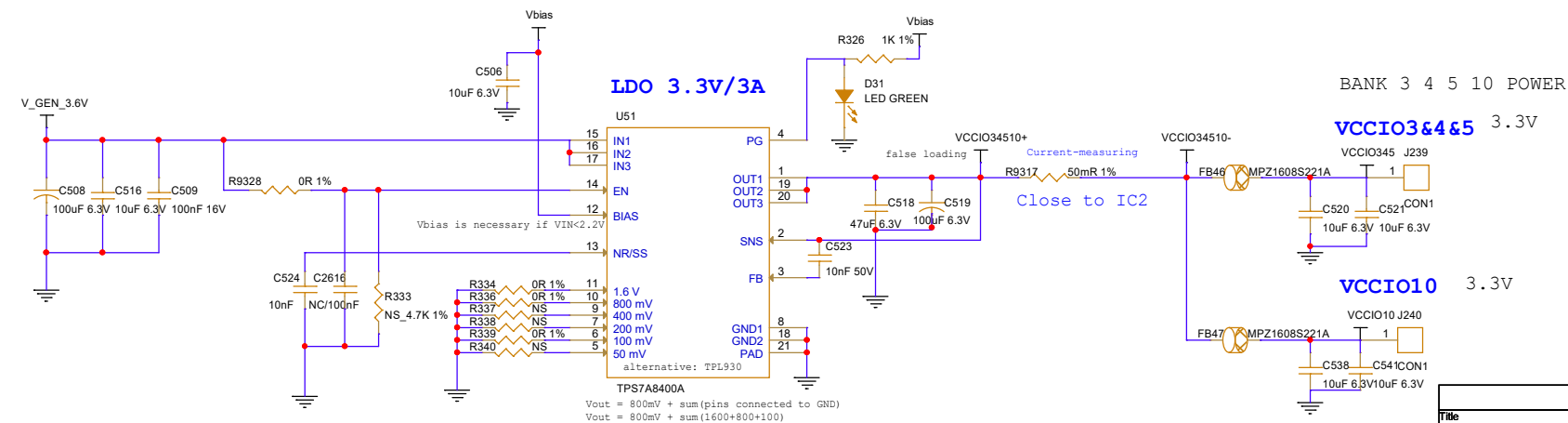
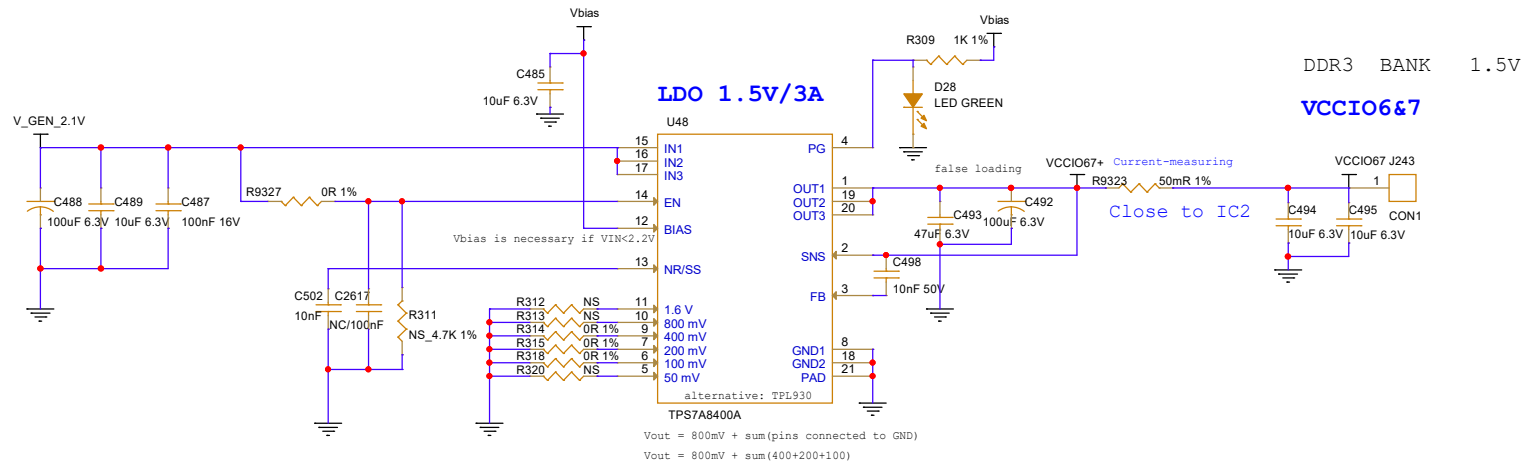
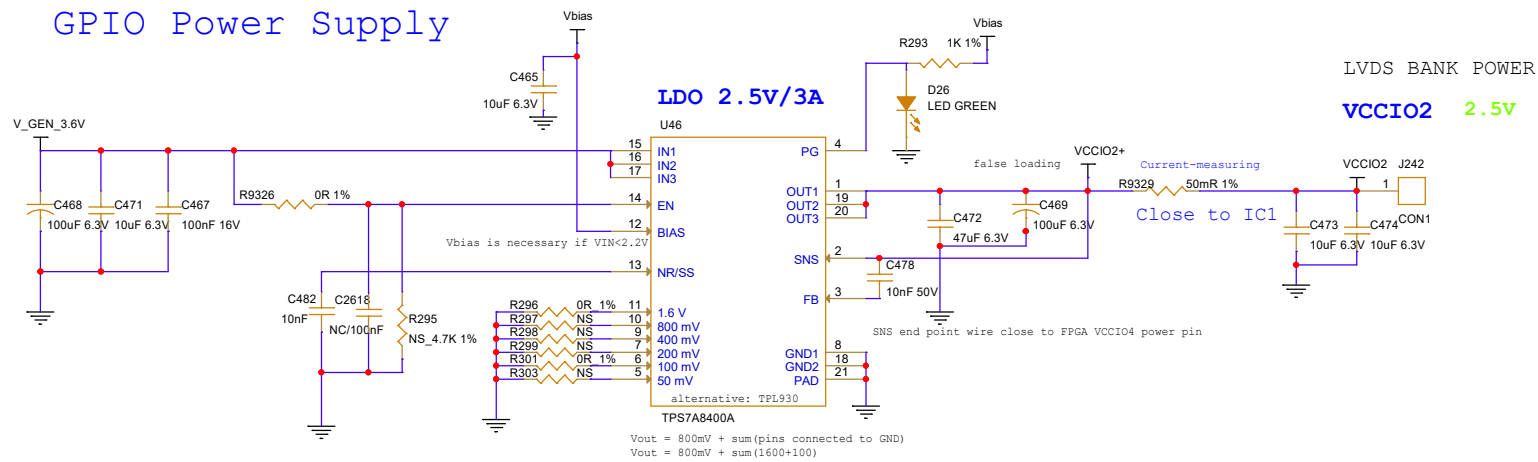
| Title                  |                             |                |
|------------------------|-----------------------------|----------------|
| DK_GW5AST-LV138FPG676A |                             |                |
| Size                   | Document Number             | Rev            |
| A3                     | POWER_0V95                  | V2.1           |
| Date:                  | Tuesday, September 09, 2025 | Sheet 22 of 25 |

## 1.8V Power Supply



|                                 |                                  |       |             |
|---------------------------------|----------------------------------|-------|-------------|
|                                 |                                  |       |             |
| Title<br>DK_GW5AST-LV138FPG676A |                                  |       |             |
| Size<br>A3                      | Document Number<br>POWER_IV2_IV8 |       | Rev<br>V2.1 |
| Date:                           | Tuesday, September 09, 2025      | Sheet | 23 of 25    |

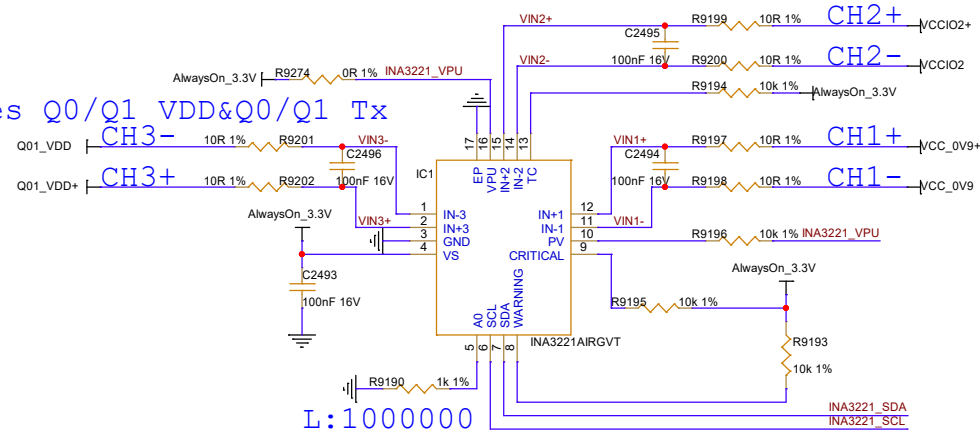
# GPIO Power Supply



|                        |                             |                |
|------------------------|-----------------------------|----------------|
| Title                  |                             |                |
| DK_GW5AST-LV138FPG676A |                             |                |
| Size                   | Document Number             | Rev            |
| A3                     | POWER_GPIO_2V5_1V5_3V3      | V2.1           |
| Date:                  | Tuesday, September 09, 2025 | Sheet 24 of 25 |

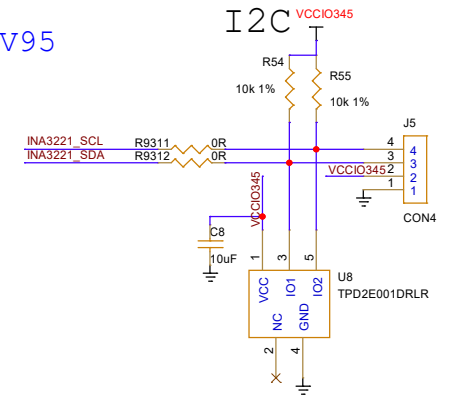
# Current-measuring\*3CH

CH3:SerDes Q0/Q1 VDD&Q0/Q1 Tx



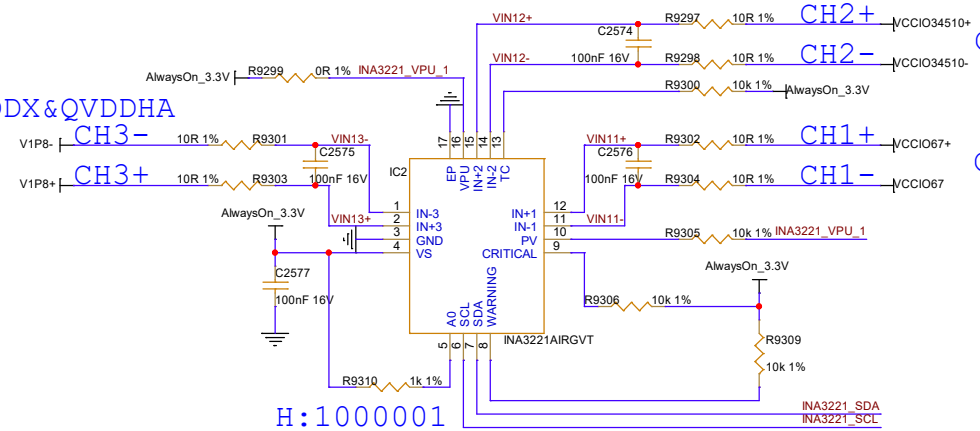
CH2:VCCIO2-2.5V

CH1:VCC\_CORE\_0V95



# Current-measuring\*3CH

CH3:VCCX&VDDX&QVDDHA



CH2:VCCIO34510-3.3V

CH1:VCCIO67-DDR1.5V

|                        |                             |                |
|------------------------|-----------------------------|----------------|
| Title                  |                             |                |
| DK_GW5AST-LV138FPG676A |                             |                |
| Size                   | Document Number             | Rev            |
| A3                     | Current_Det_INA3221         | V2.1           |
| Date:                  | Tuesday, September 09, 2025 | Sheet 25 of 25 |