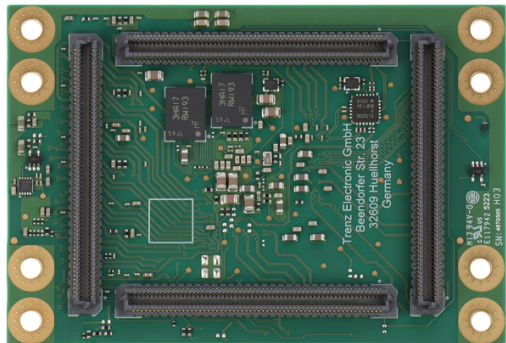
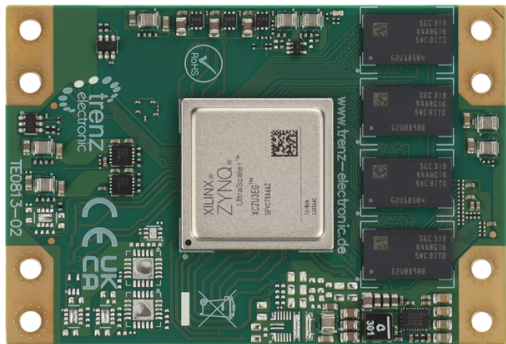
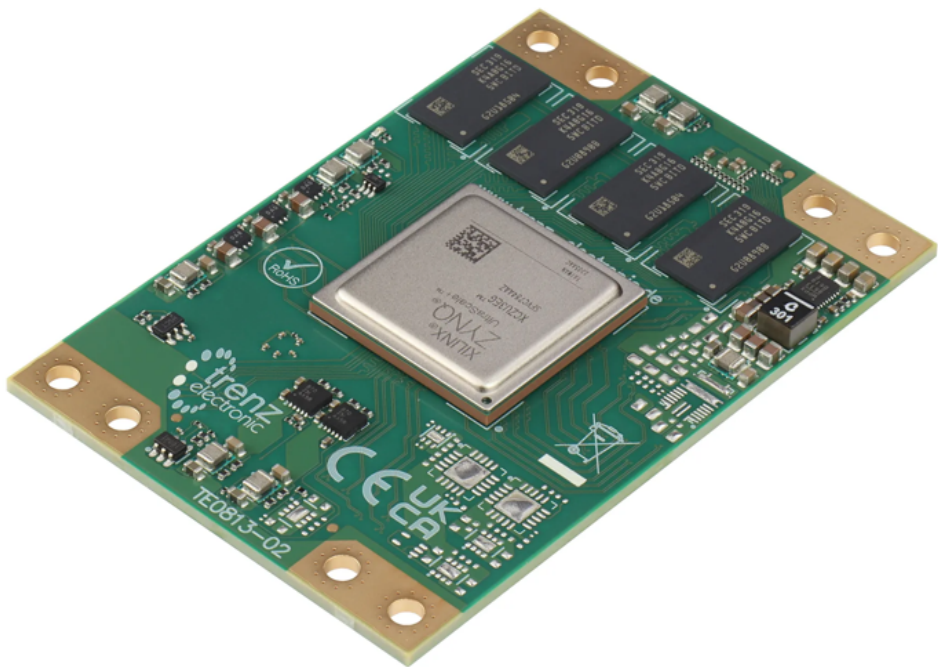




Regarding the usage of our schematics and alike documentation for Trenz module TE0813.

Project is protected under copyright and we strongly and strictly prohibit the reverse engineering or recreation, even if the design is just adapted or modified.

TE0813 is protected under such right and in case of plagiarism we will have to do anything necessary in order to protect our assets.

Schematics and other handouts serve for informational purposes only!

|                  |            |
|------------------|------------|
| Drawn by         | ED         |
| Checked by       | MR         |
| Assembly variant | 4AE71-A    |
| Created by       | ED         |
| Modified by      | ED         |
| Modified at      | 2023-05-17 |



|                                        |                                  |              |
|----------------------------------------|----------------------------------|--------------|
| Title: TE0813 - Legal Notices          |                                  |              |
| A4                                     | Number: TE0813 4AE71-A           | Rev. 02      |
| Date: 04.05.2026                       | Copyright: Trenz Electronic GmbH | Page 1 of 30 |
| Filename: Legal Notices Modules.SchDoc |                                  |              |



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A

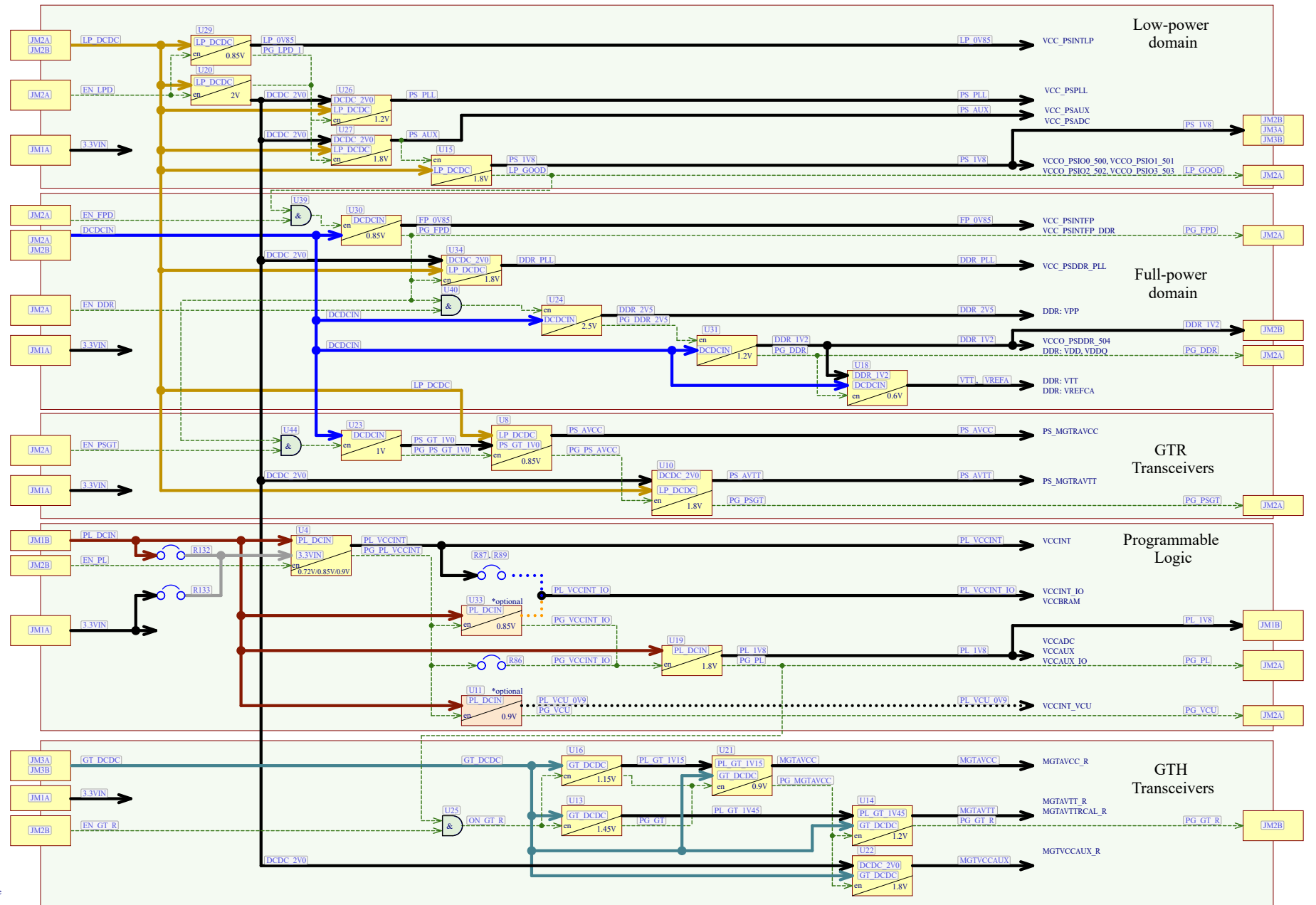
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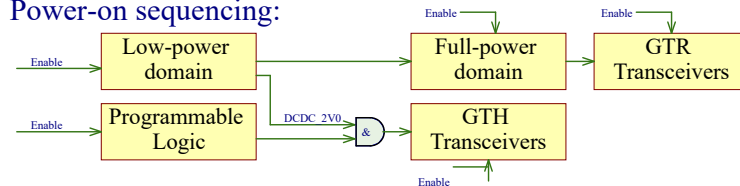
D

| REV | DATE    | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |    |
|-----|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| -01 | 2021-05 | Initial revision                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | VT |
|     | 2022-03 | Added Table with Supported Voltage Ranges                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |    |
|     | 2022-05 | Changed DCDC U4 TPS548A28 to MPQ8633BGLE-Z<br>Changed C92 100nF to 1nF                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |    |
|     | 2022-11 | Added additional Info about Voltage Range                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |    |
| -02 | 2023-07 | 1. Change DCDC U11 from EN6347Q1 to MPM3860GQW-Z and adapted according circuits.<br>2. Connected DDR4-TEN signals together for U2, U3, U9, and U12 and pulled them low via 499 Ohm resistor R131.<br>Added a testpoint TP3 for DDR4-TEN.<br>3. Changed voltage rail from 1.35 V to 1.45 V via adapting voltage divider resistors R33 and R38 and changed according voltage rail name PL_GT_1V35 to PL_GT_1V45.<br>4. Changed voltage rail from 1.05 V to 1.15 V via adaption voltage divider resistors R44 and R46 and changed according rail name PL_GT_1V05 to PL_GT_1V15.<br>5. Added diode D2 between U41 pin 3 net MR and voltage rail 3.3VIN.<br>6. Connected enable signal for U11 and U33 from "3.3VIN" to "PG_PL_VCCINT".<br>7. Added capacitors C137, C147, and C148 for VTT voltage rail.<br>8. Added resistors R132 (default: not fitted) and R133 to supply U4 VCC either from "PL_DCIN" or from "3.3VIN".<br>9. Change resistor R92 from 4.22 kOhm to 9.09 kOhm to set current limit to nearly 14.5 A for U4.<br>10. Added remote sense option:<br>10.1 R134 for U30<br>10.2 R135 for U29<br>10.3 R136 for U31<br>11. Added decoupling capacitors:<br>11.1 C210 and C211 for U5.<br>11.2 C190 for U7.<br>11.3 C198, C199, and C213 for U8.<br>11.4 C153, C170...172 for U9<br>11.5 C196 C197, and C212 for U10.<br>11.6 C156 and C157 for U12<br>11.7 C207 and C208 for U14.<br>11.8 C189 for U17.<br>11.9 C149...152, C205, and C206 for U18<br>11.10 C209 and C217 for U21.<br>11.11 C214...216 for U22.<br>11.12 C154 and C155 for U24<br>11.13 C188 and C191 for U26.<br>11.14 C187 and C195 for U27.<br>11.15 C203 and C204 for U34.<br>11.16 C201 for U39.<br>11.17 C202 for U40.<br>11.18 C178 for U41.<br>11.19 C200 for U44.<br>12. Added testpoints TP4, TP19, TP26.<br>13. Added UKCA logo.<br>14. Change 100 nF capacitors C135 and C136 from 6.3 V to 25 V for BOM optimization. | ED |

</

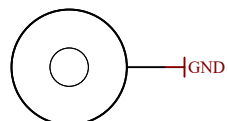


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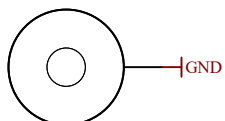


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| A3                                    | Number: <b>TE0813 4AE71-A</b>    | Rev. <b>02</b> |
| Datum: 2021-01-19                     | Copyright: Trenz Electronic GmbH | Page 4 of 30   |
| Filename: <b>Power_Diagram.SchDoc</b> |                                  |                |

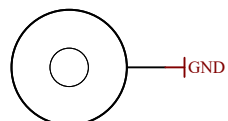
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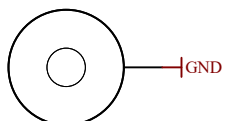
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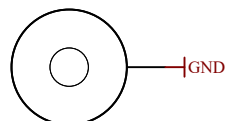
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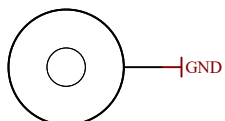
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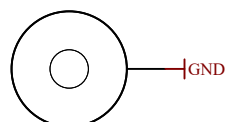
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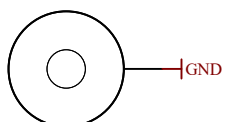
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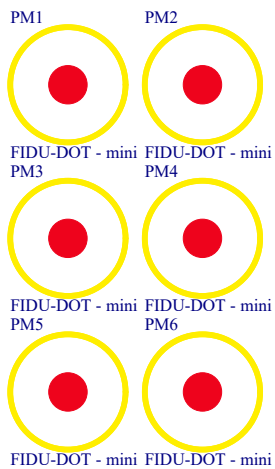
Mount.Hole 3.2mm für Unterlegscheibe



Mount.Hole 3.2mm für Unterlegscheibe



Mount.Hole 3.2mm für Unterlegscheibe



UKCA1

UKCA Logo on Top Overlay

UKCA-TOPOVERLAY

CE1

CE Logo on Top Overlay

CE-TOPOVERLAY

MECH1

TE Address Overlay

LOGO ADDRESS

LOGO1

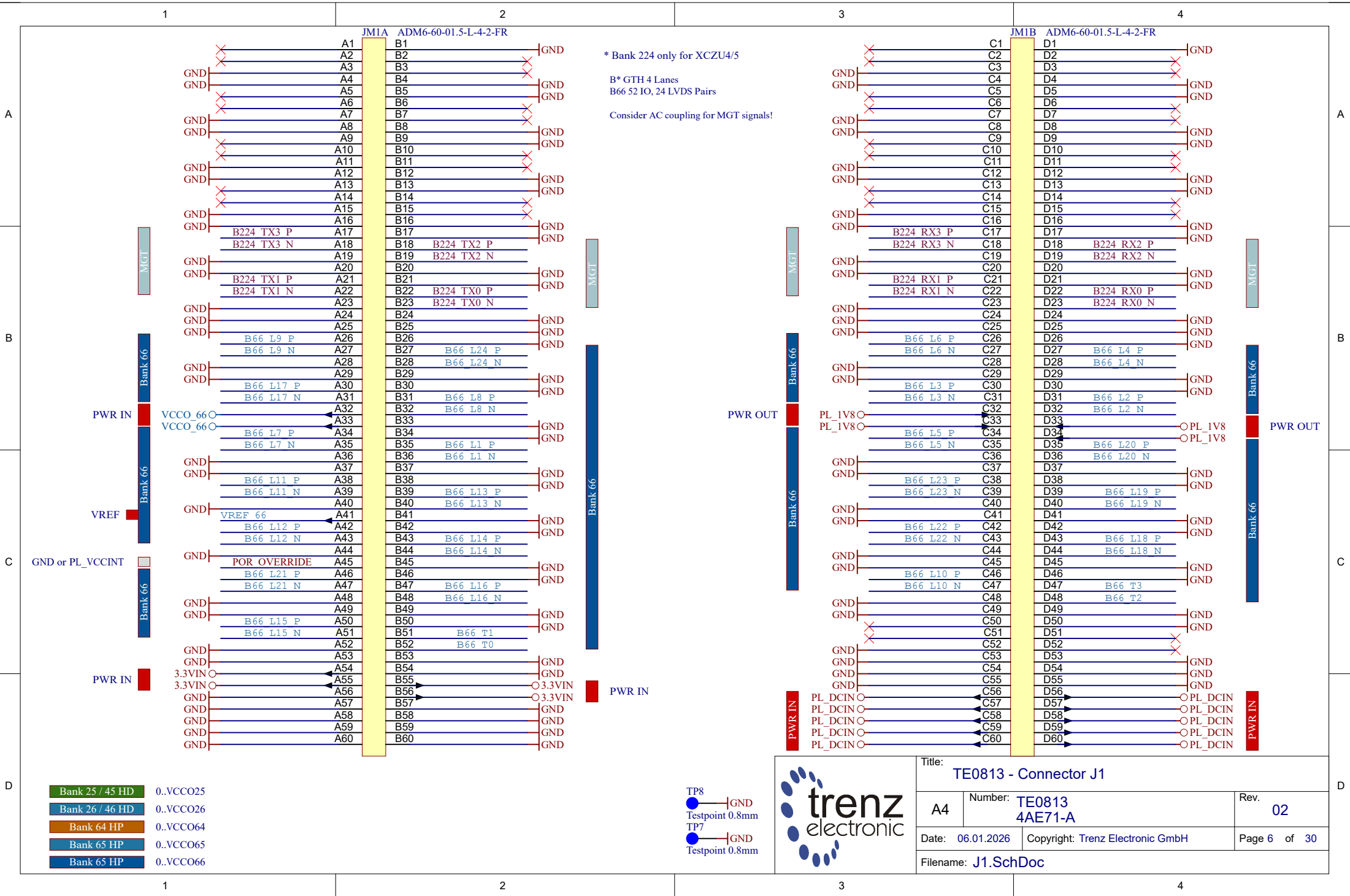
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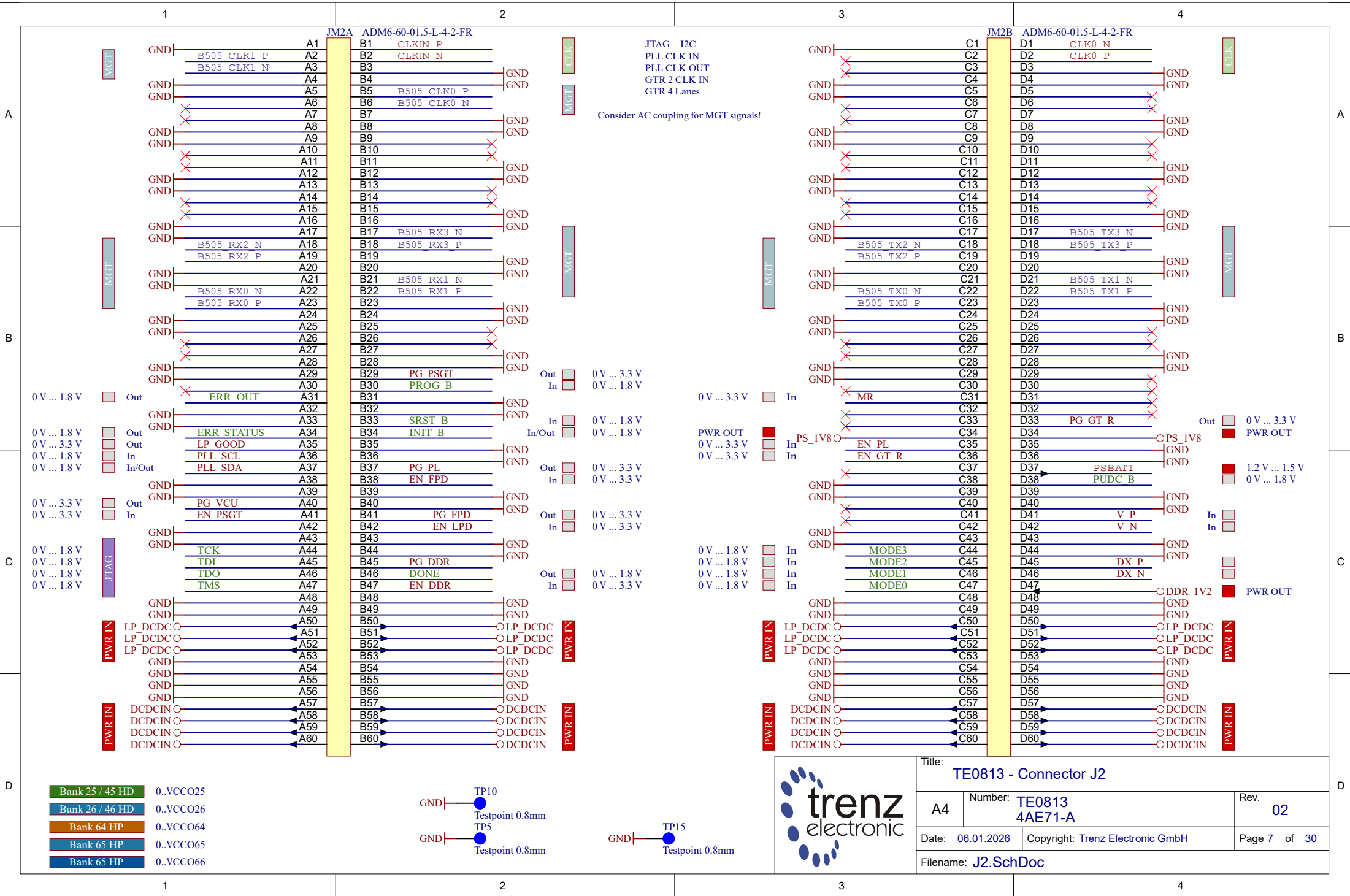
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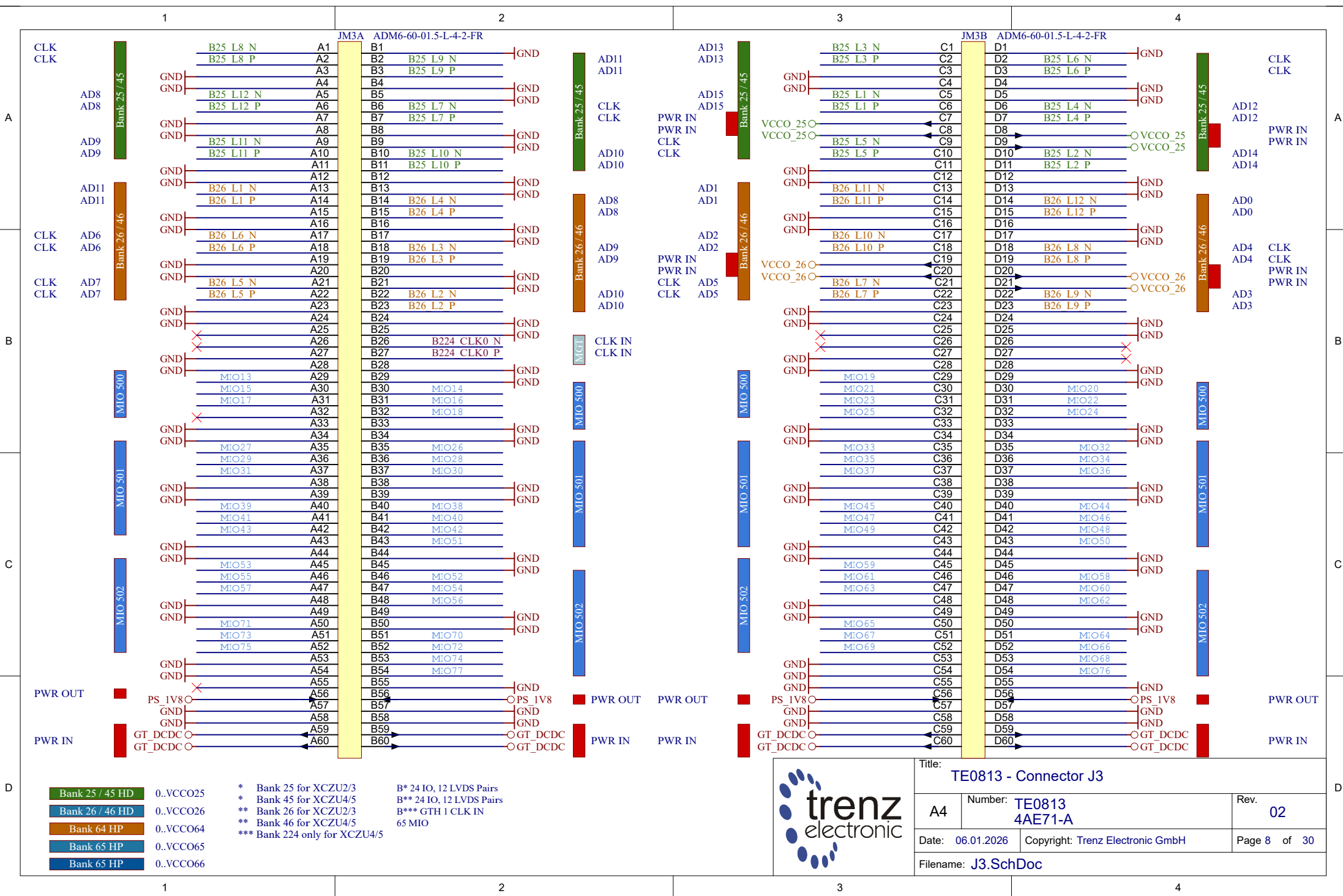
Serial  
Serial  
Serialnumber 6,3 x 6.3mm

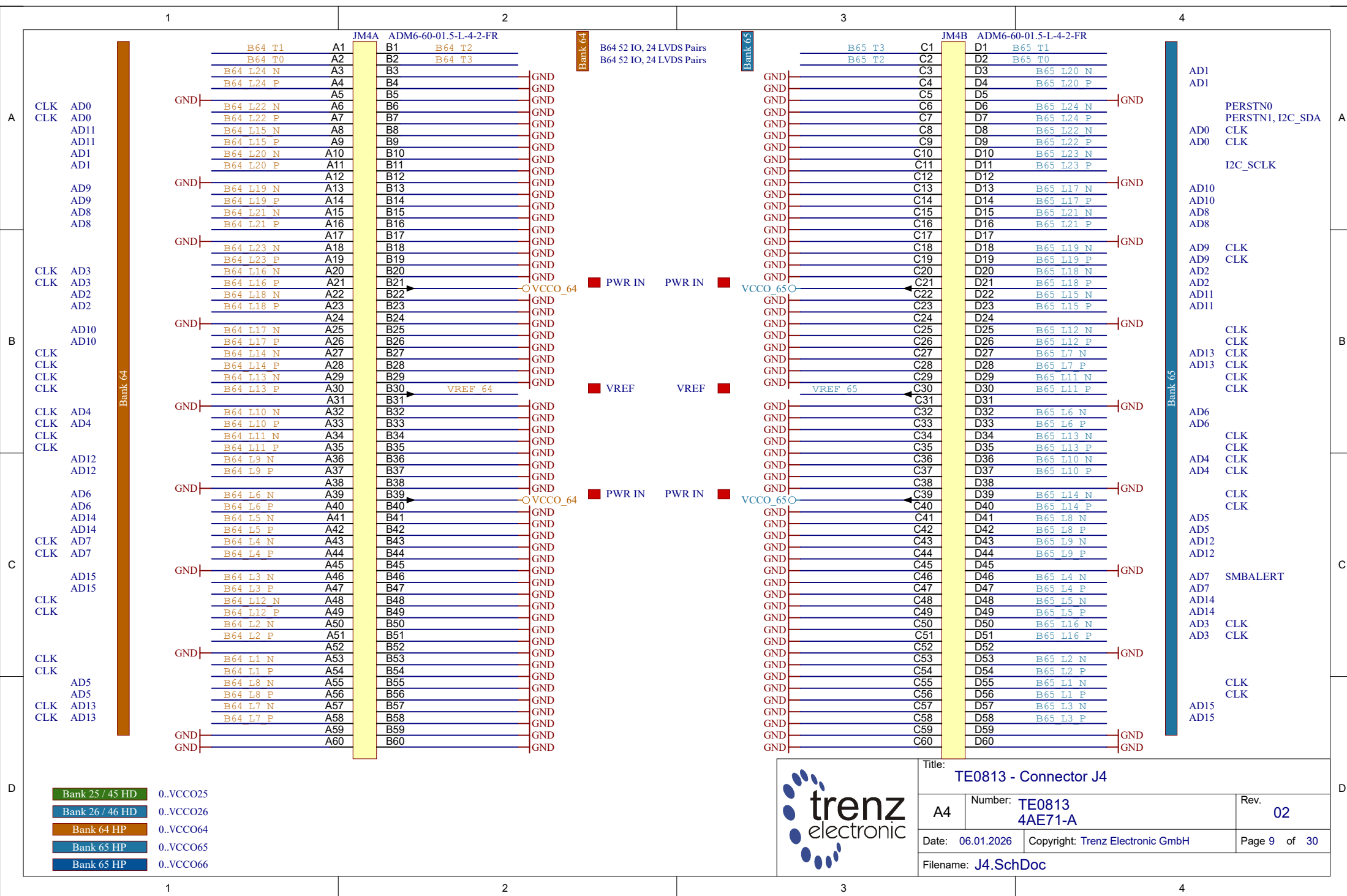


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| Title: TE0813           |                                  |              |
| A4                      | Number: TE0813<br>4AE71-A        | Rev. 02      |
| Date: 06.01.2026        | Copyright: Trenz Electronic GmbH | Page 5 of 30 |
| Filename: TE0813.SchDoc |                                  |              |







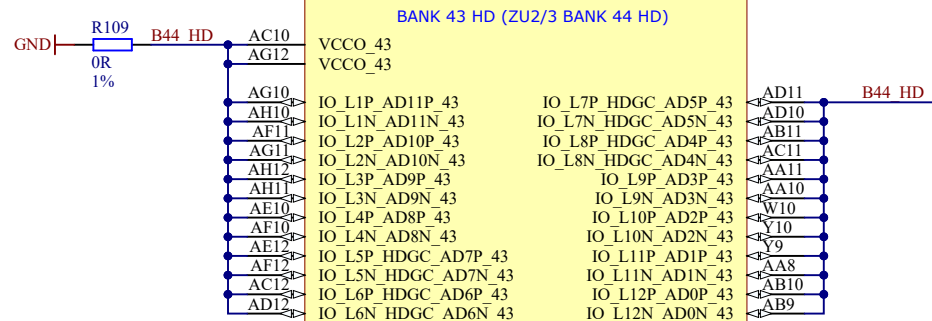
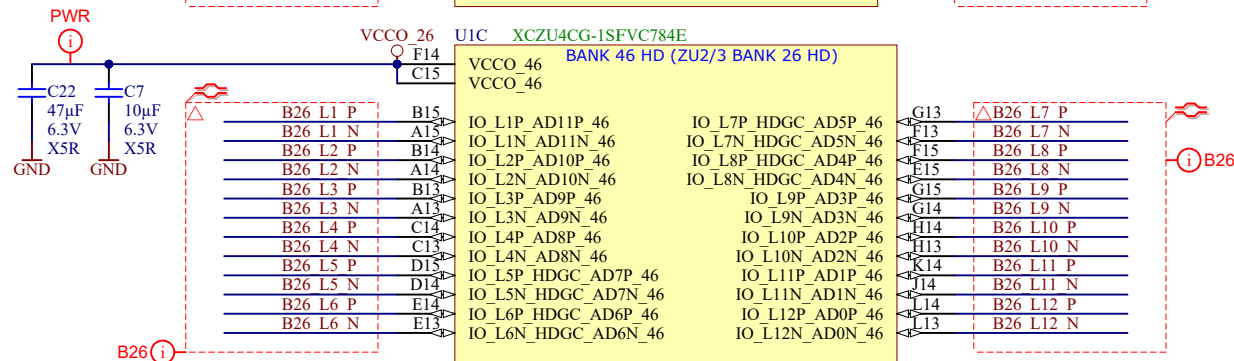
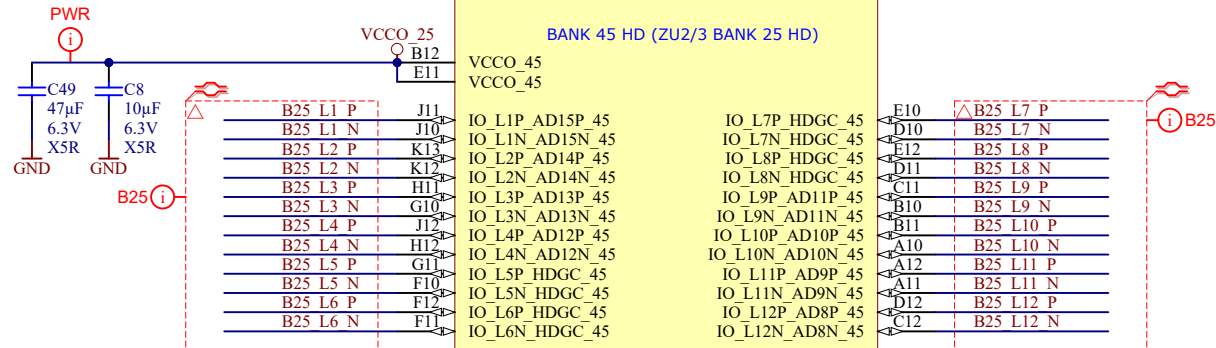
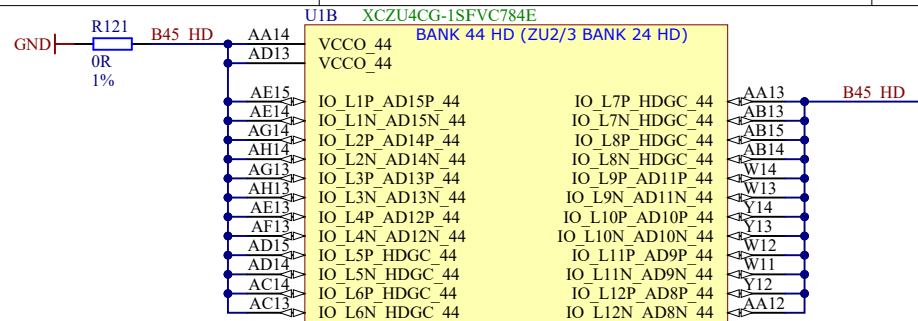


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|                          |                                  |         |               |
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| Date: 06.01.2026         | Copyright: Trenz Electronic GmbH |         | Page 10 of 30 |
| Filename: B_HD.SchDoc    |                                  |         |               |

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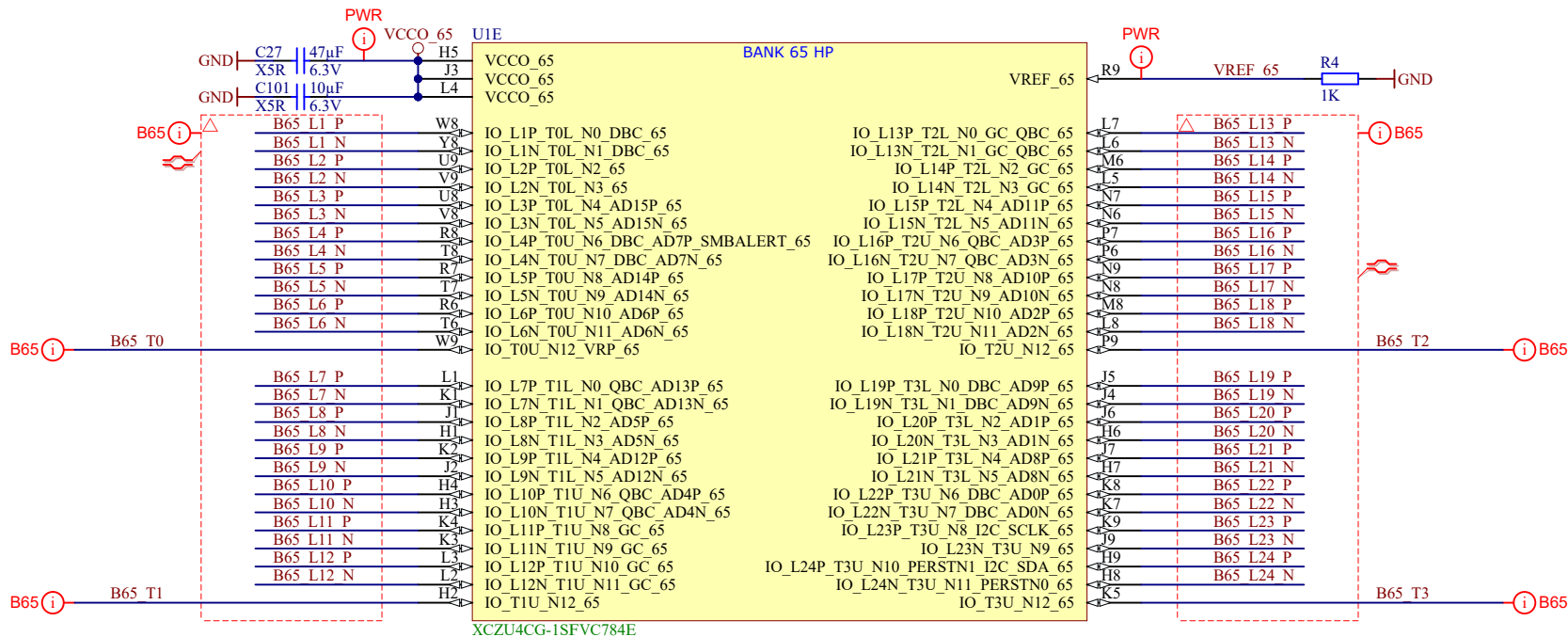
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| Title: TE0813 - B65  |                                  |               |
| A4                   | Number: TE0813 4AE71-A           | Rev. 02       |
| Date: 06.01.2026     | Copyright: Trenz Electronic GmbH | Page 13 of 30 |
| Filename: B65.SchDoc |                                  |               |

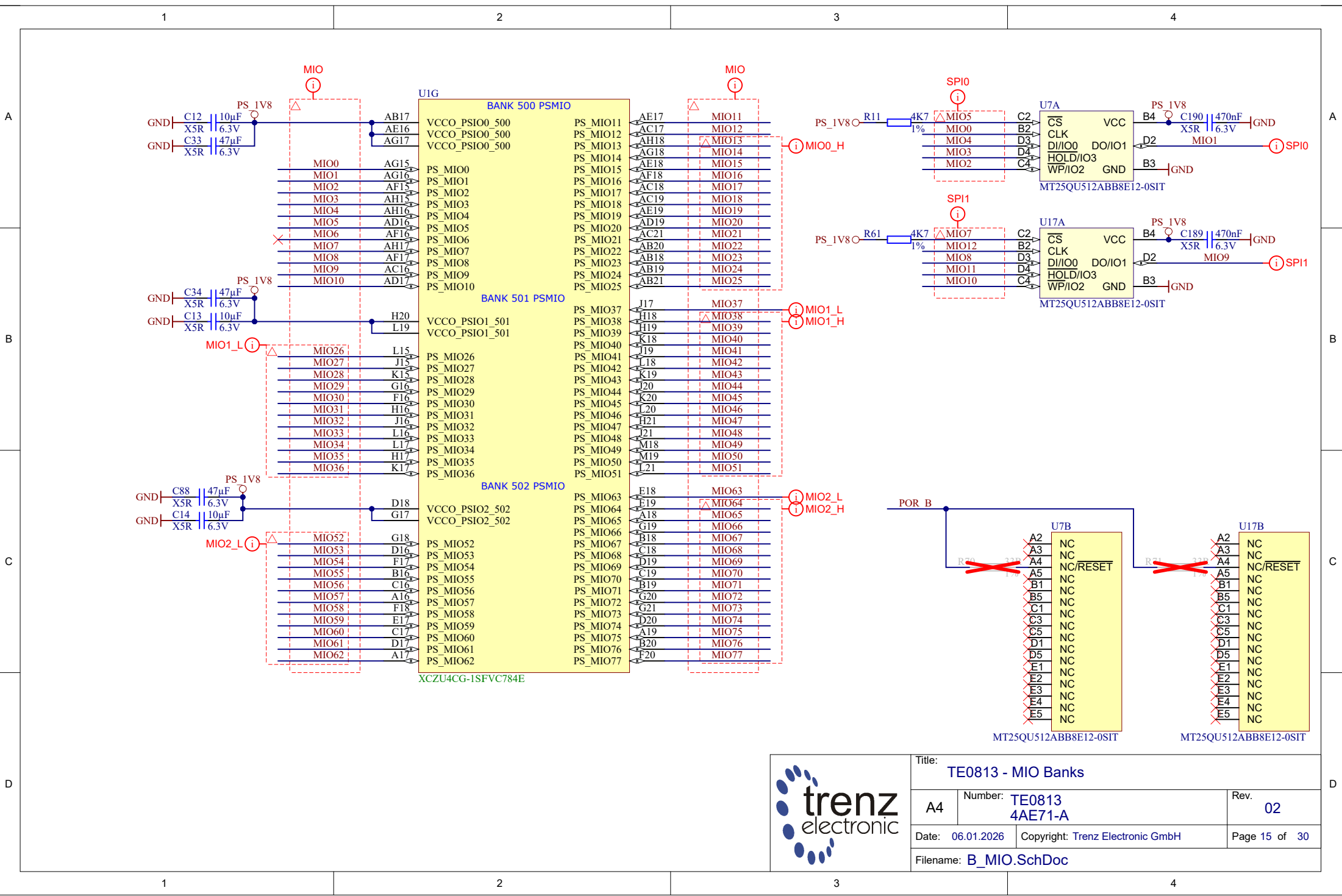
1

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A

A

B

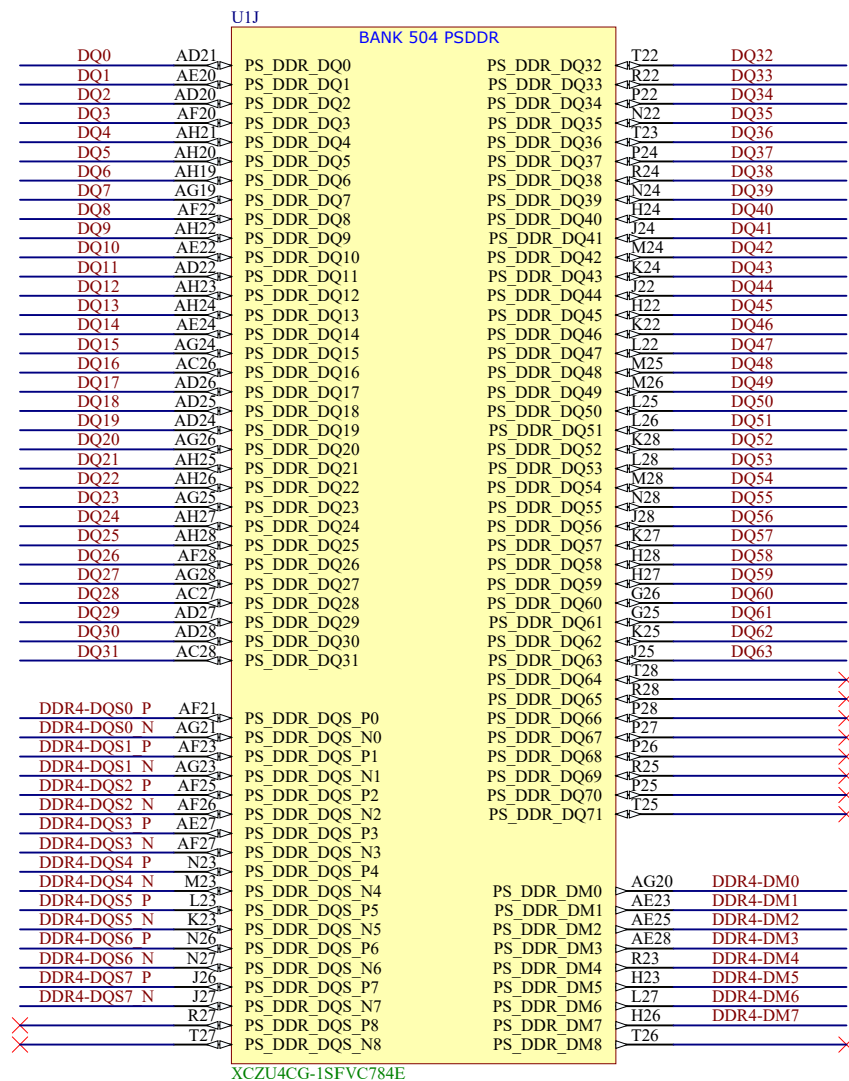
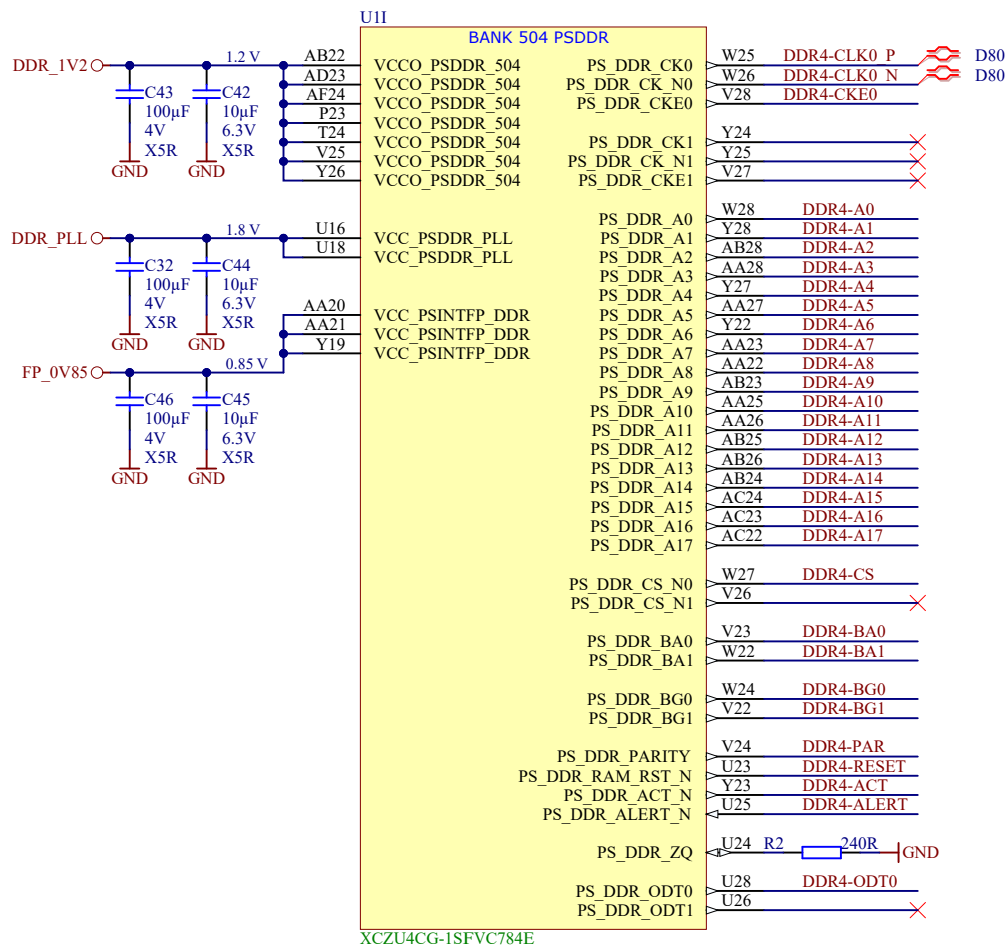
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C

C

D

D



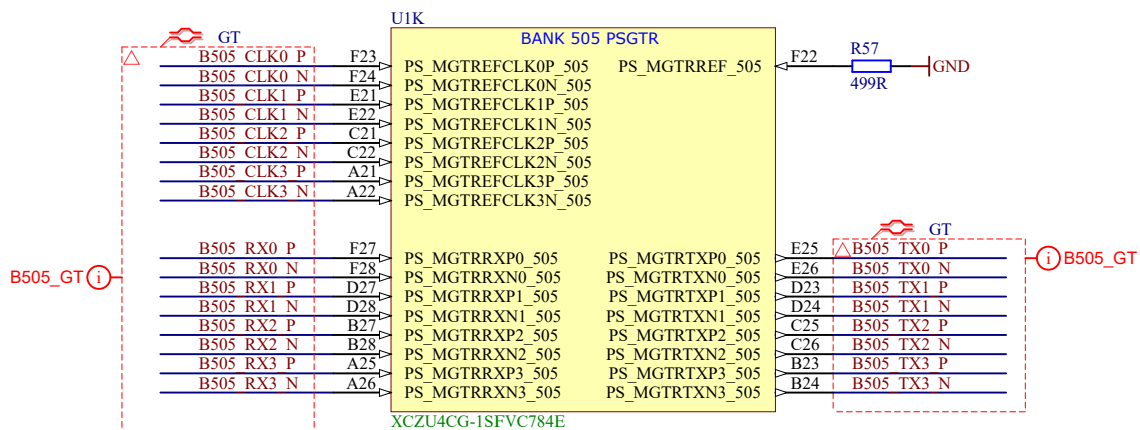
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| A4                      | Number: TE0813 4AE71-A           | Rev. 02       |
| Date: 06.01.2026        | Copyright: Trenz Electronic GmbH | Page 16 of 30 |
| Filename: PS_DDR.SchDoc |                                  |               |

1

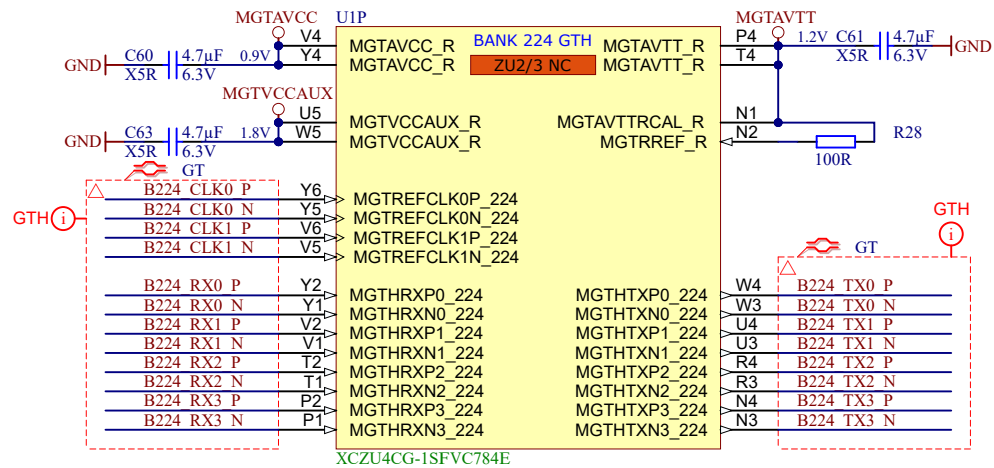
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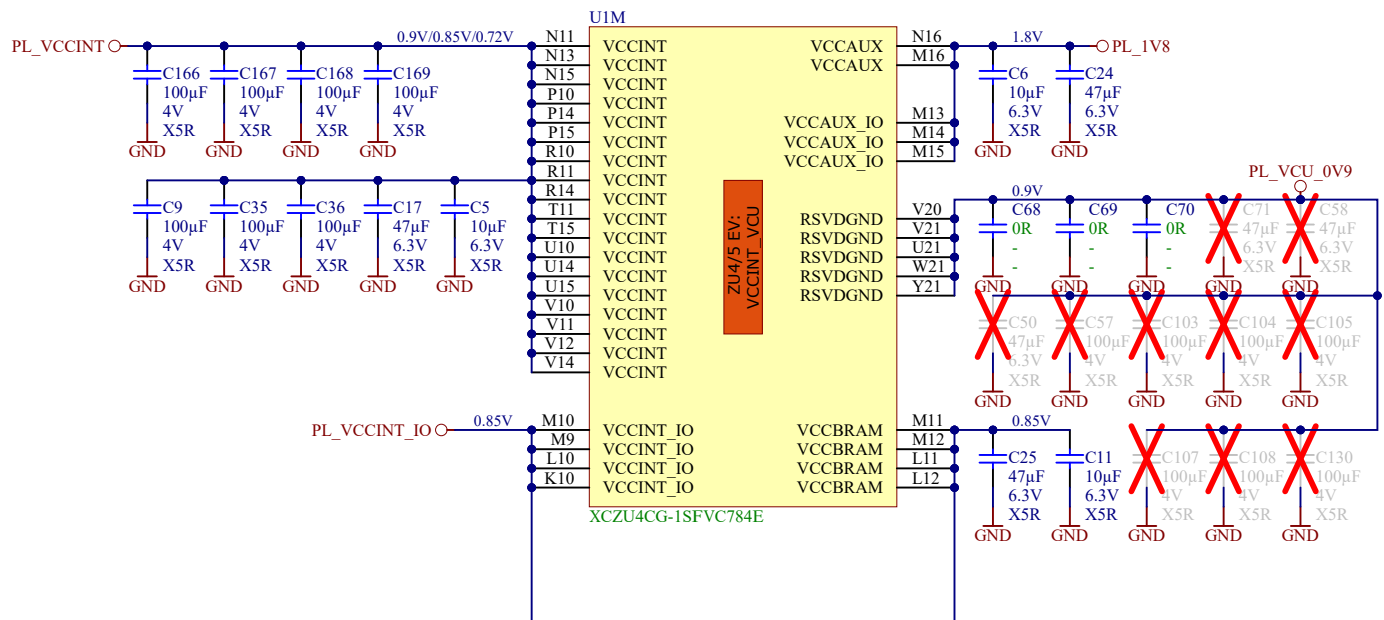


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|                                                                                       | A4                       | Number: TE0813<br>4AE71-A        | Rev. 02       |
|                                                                                       | Date: 06.01.2026         | Copyright: Trenz Electronic GmbH | Page 17 of 30 |
|                                                                                       | Filename: B_PS_GT.SchDoc |                                  |               |
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|                                                                                       |  |                                  |         |
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|                                                                                       |  | A4 Number: TE0813 4AE71-A        | Rev. 02 |
| Date: 06.01.2026                                                                      |  | Copyright: Trenz Electronic GmbH |         |
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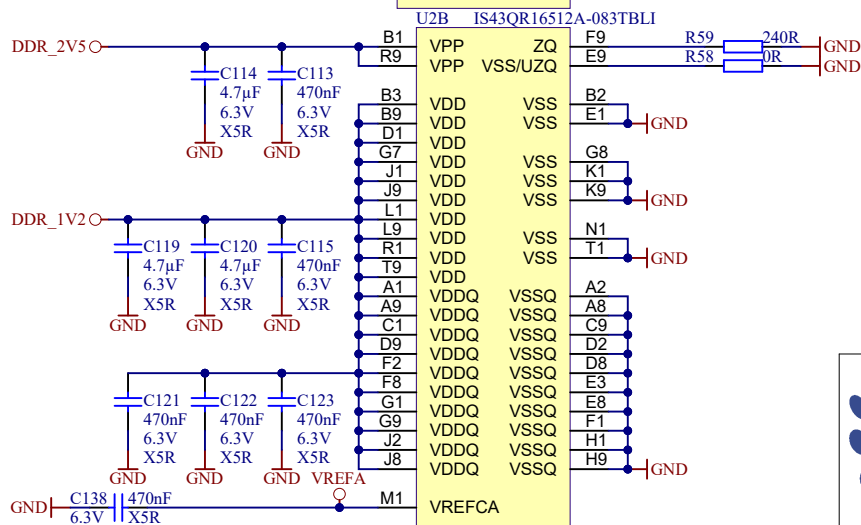
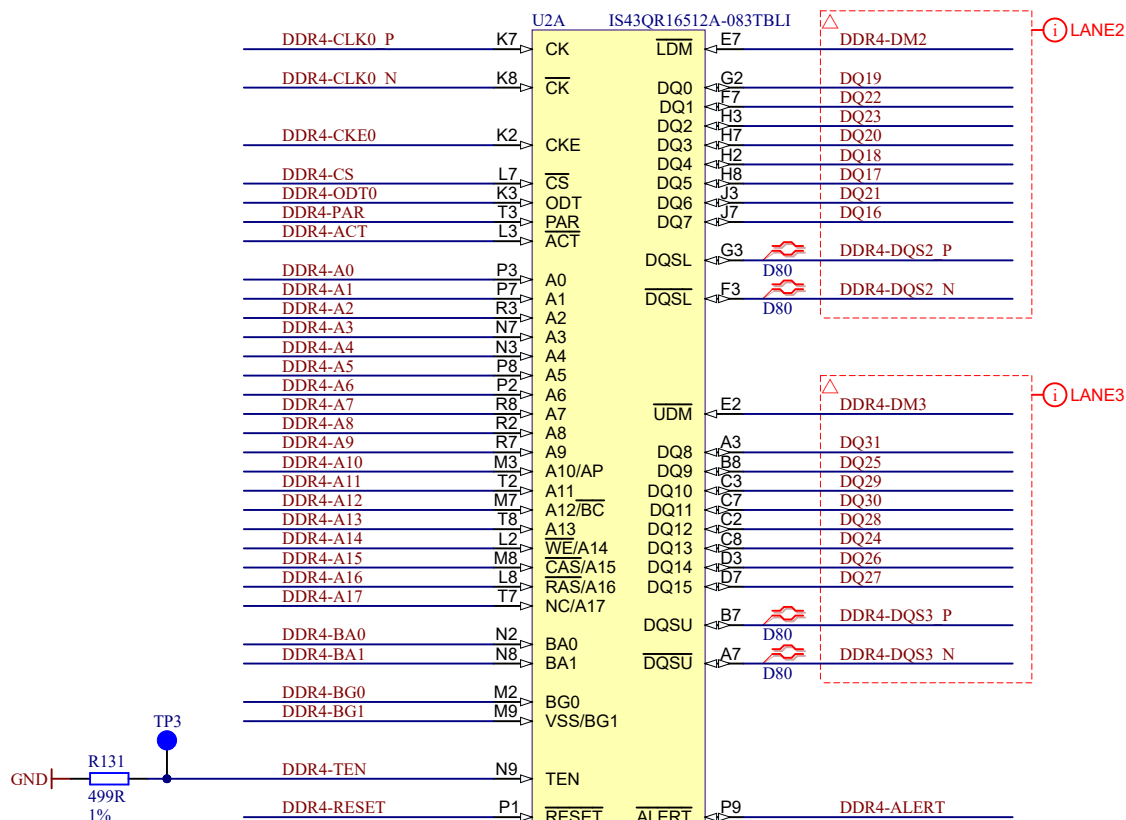


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|                            |                                  |               |
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| Date: 06.01.2026           | Copyright: Trenz Electronic GmbH | Page 21 of 30 |
| Filename: DDR4-RAM.SchDoc  |                                  |               |

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A

A

B

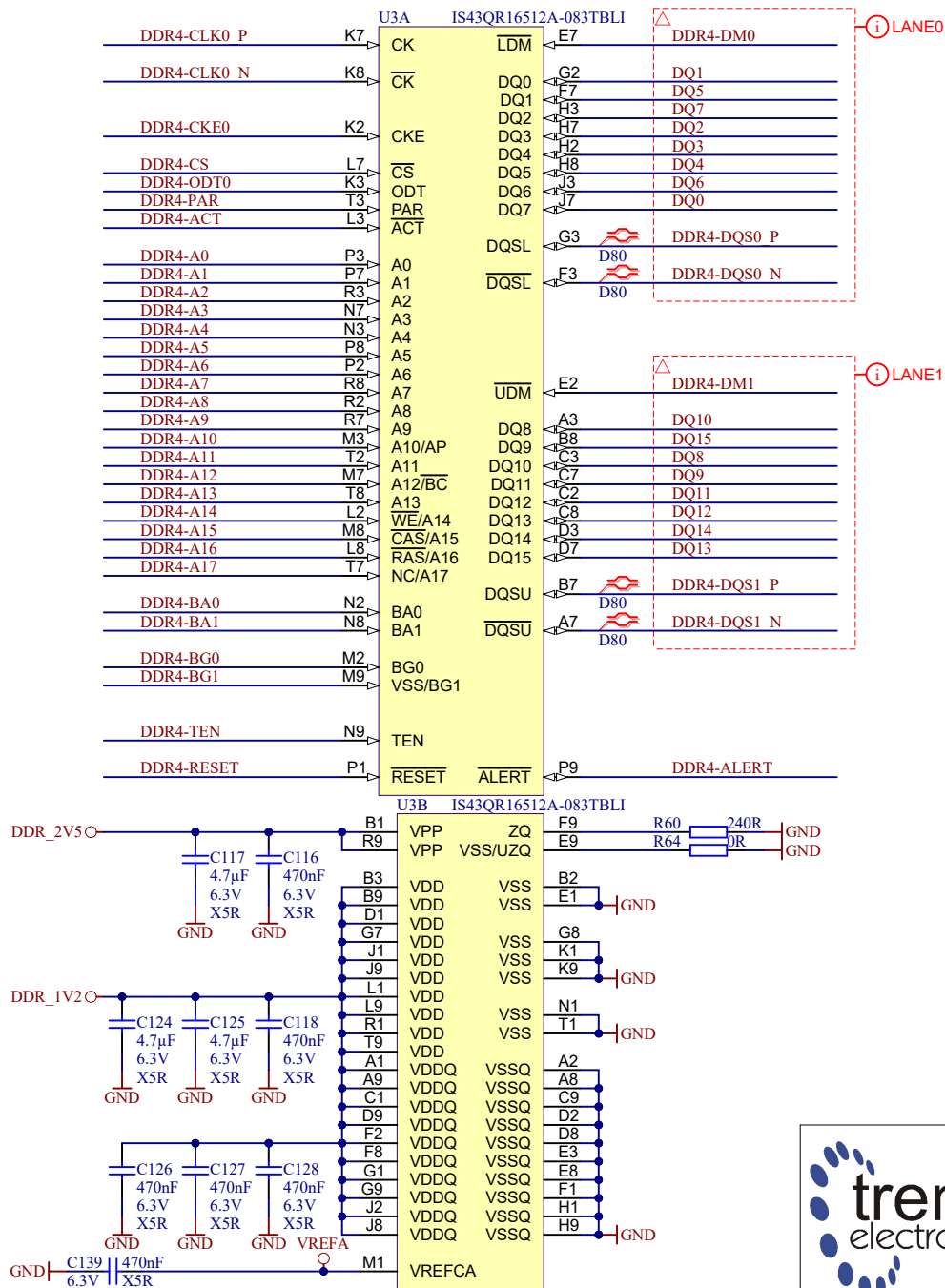
B

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D

D



|                             |                                  |               |
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| Date: 06.01.2026            | Copyright: Trenz Electronic GmbH | Page 22 of 30 |
| Filename: DDR4-RAM_2.SchDoc |                                  |               |

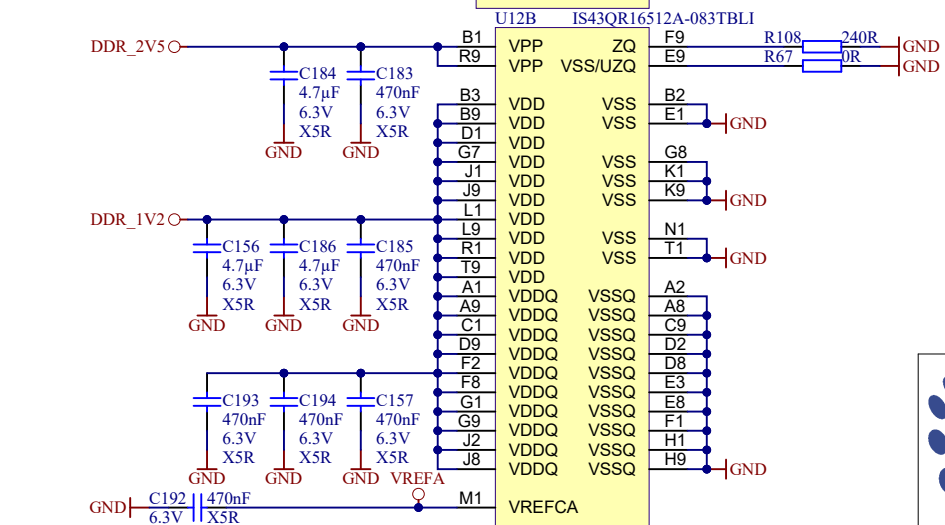
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2

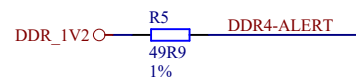
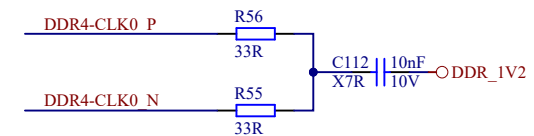
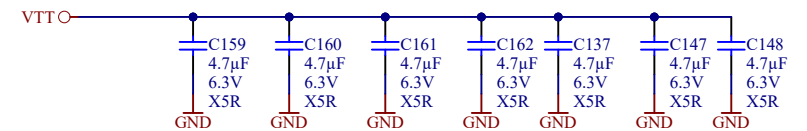
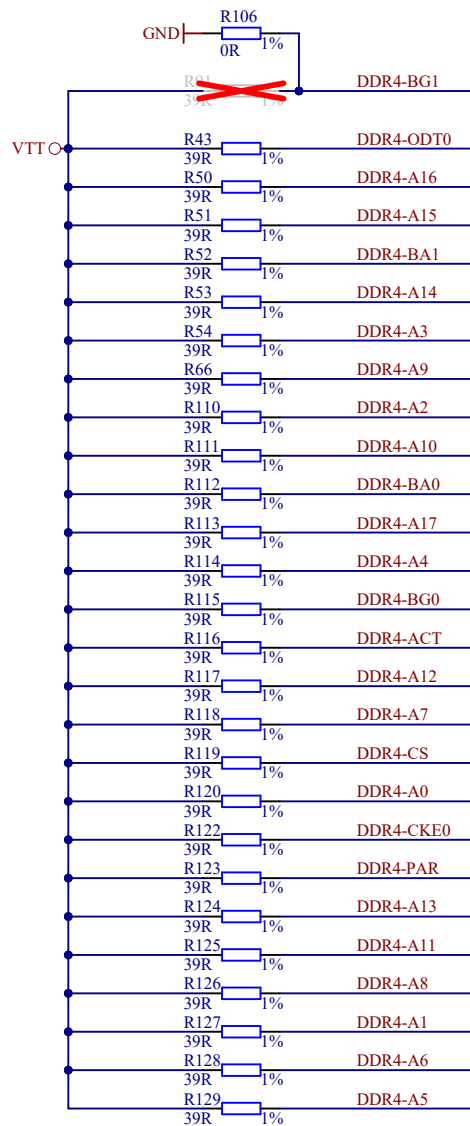
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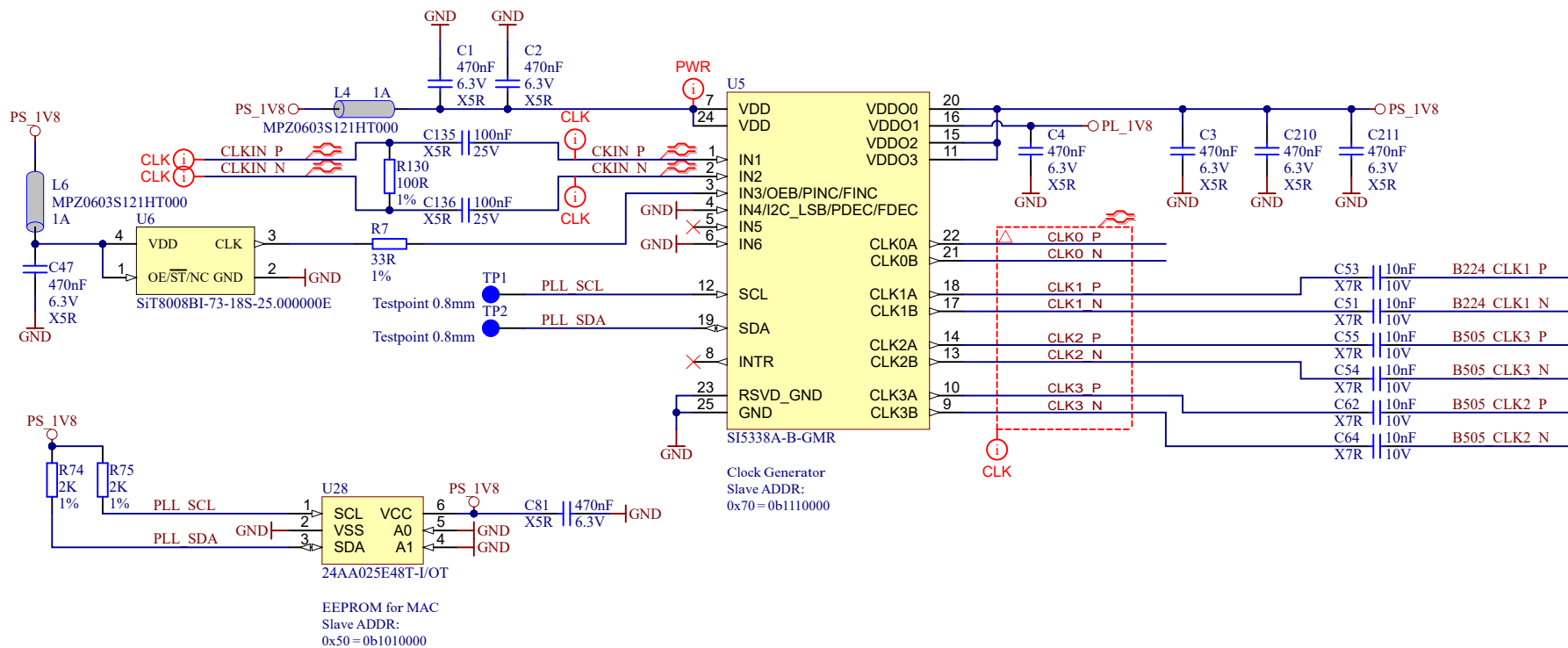




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|                                                                                       | A4                         | Number: TE0813<br>4AE71-A        | Rev. 02       |
|                                                                                       | Date: 06.01.2026           | Copyright: Trenz Electronic GmbH | Page 25 of 30 |
|                                                                                       | Filename: DDR4-TERM.SchDoc |                                  |               |

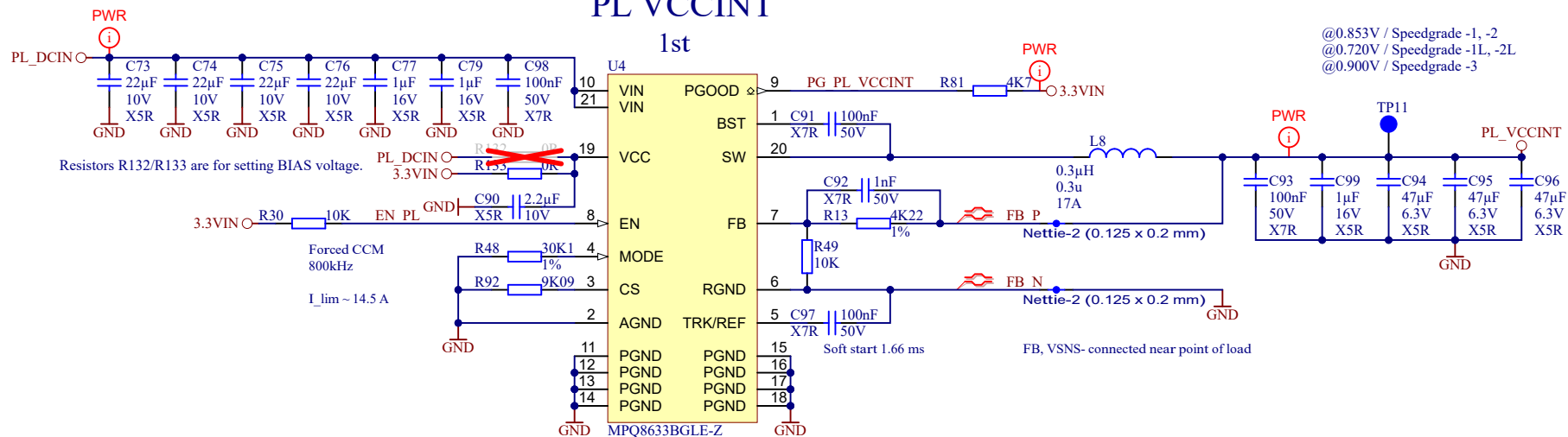


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| Date: 06.01.2026       | Copyright: Trenz Electronic GmbH | Page 26 of 30 |
| Filename: Clock.SchDoc |                                  |               |

U4 can be TPS548A28RWW or MPQ8633BGLE-Z which is up to Trenz Electronic GmbH.

## PL VCCINT

1st



| FPGA Speedgrade | R13       | R49     | PL_VCCINT |
|-----------------|-----------|---------|-----------|
| -1LI            | 2 kOhm    | 10 kOhm | 0.720 V   |
| -2LE            | 2 kOhm    | 10 kOhm | 0.720 V   |
| -1              | 4.22 kOhm | 10 kOhm | 0.853 V   |
| -2              | 4.22 kOhm | 10 kOhm | 0.853 V   |
| -3E             | 10 kOhm   | 20 kOhm | 0.900 V   |

U4 pin compatible with

- TPS548B28 (20A)
- TPS548A28 (15A)
- TPS54JA20 (12A)



|        |                  |
|--------|------------------|
| Title: | TE0813 - POWER_1 |
|--------|------------------|

|    |                           |
|----|---------------------------|
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|----|---------------------------|

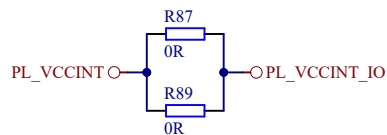
Date: 06.01.2026 Copyright: Trenz Electronic GmbH

Filename: POWER.SchDoc

|      |    |
|------|----|
| Rev. | 02 |
|------|----|

Page 27 of 30

Remove R87/89 when -1L1/2LE FPGA is used

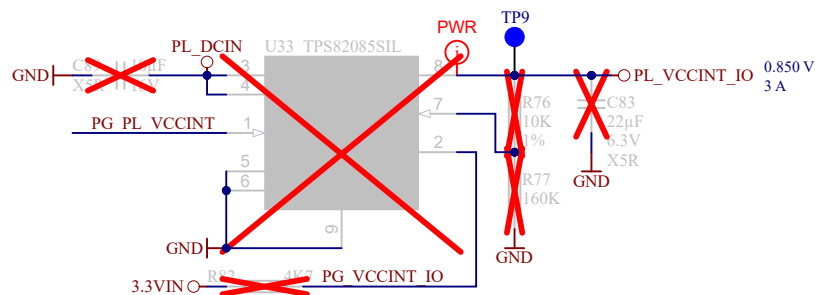


Remove R86 when -1L1/2LE FPGA is used

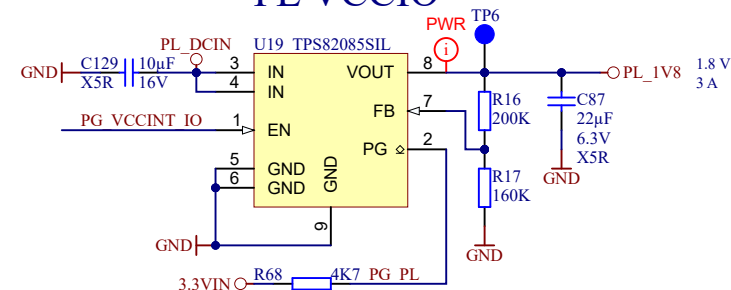


## VCCINT\_IO & VCCBRAM

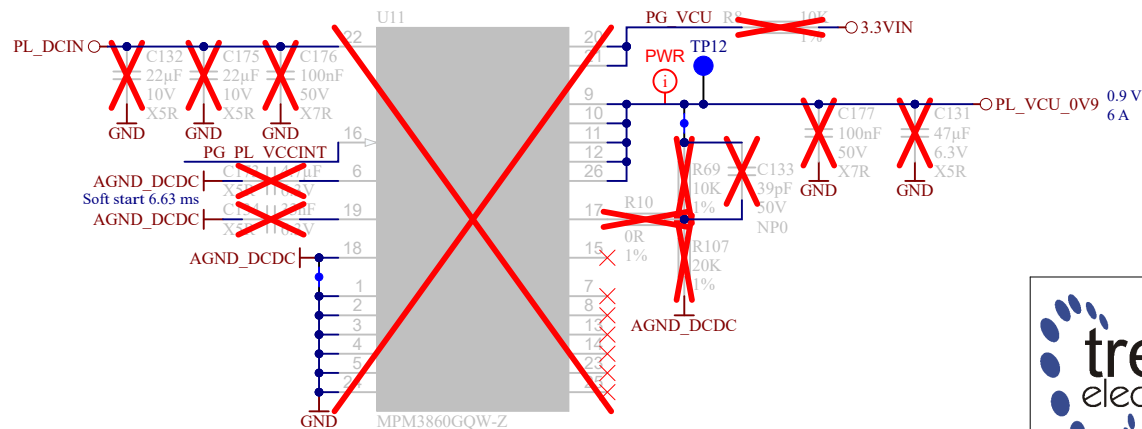
Add U33 when -1L1/2LE FPGA is used



## PL VCCIO

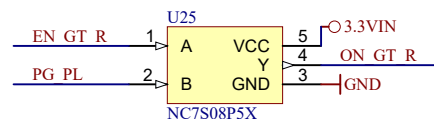
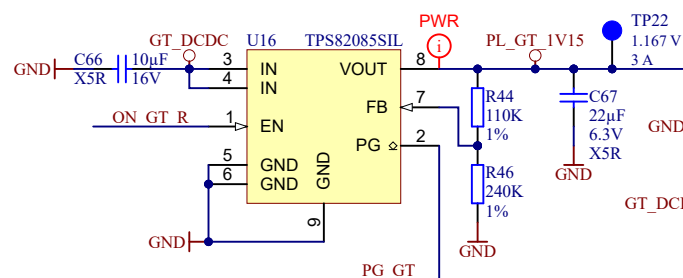
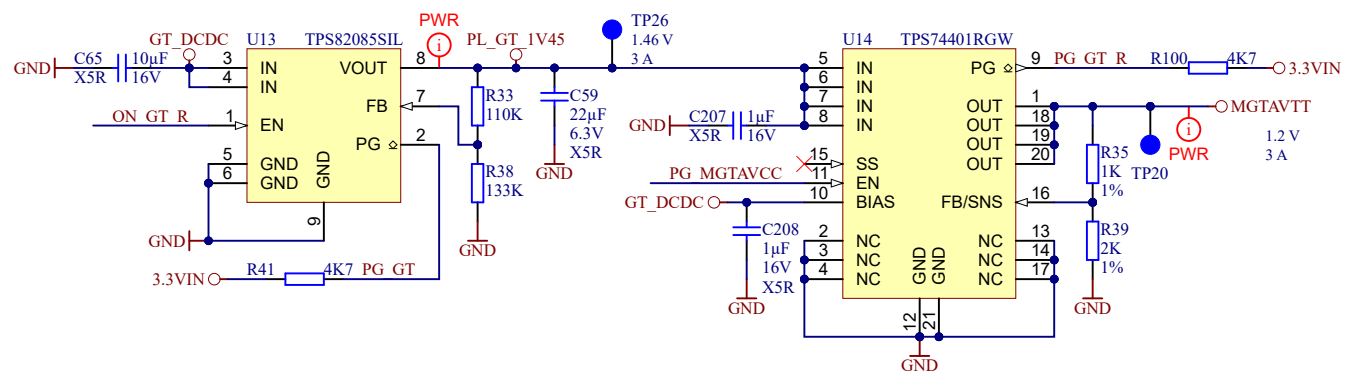
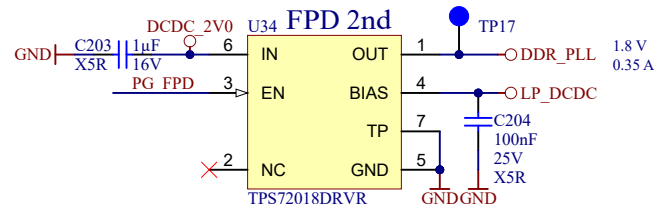
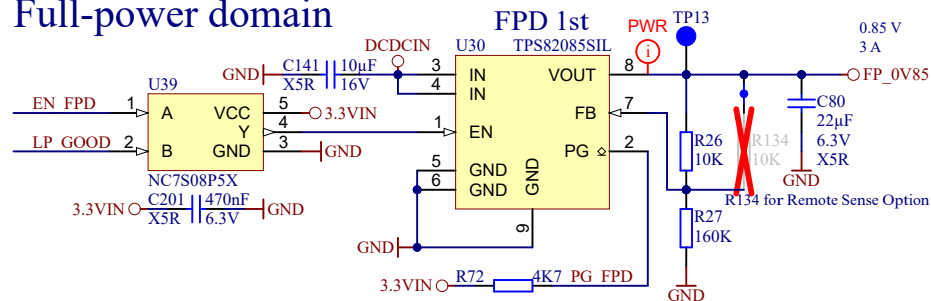


## VCU

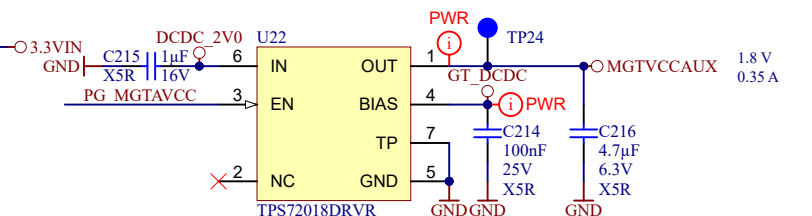
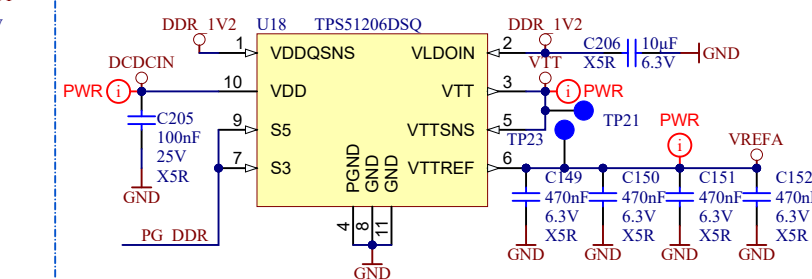
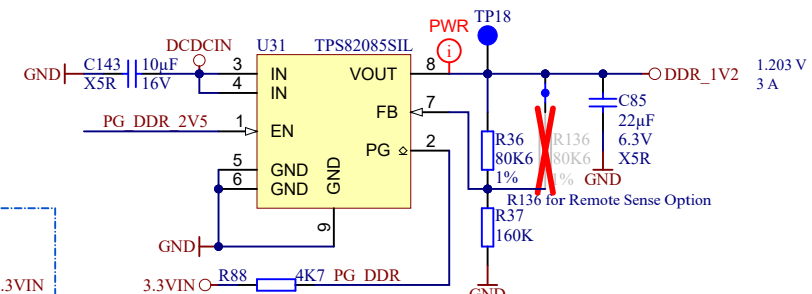
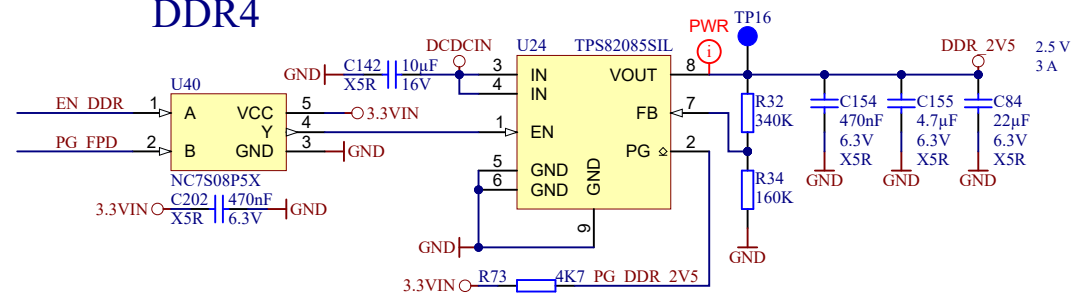


|                          |                                  |               |
|--------------------------|----------------------------------|---------------|
| Title: TE0813 - POWER_2  |                                  |               |
| A4                       | Number: TE0813 4AE71-A           | Rev. 02       |
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| Filename: POWER_1.SchDoc |                                  |               |

# Full-power domain



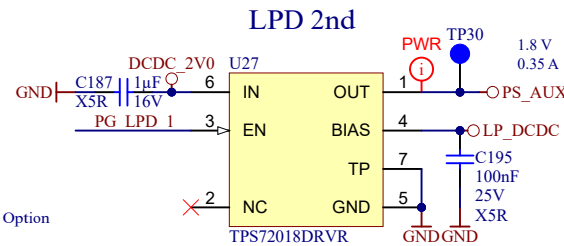
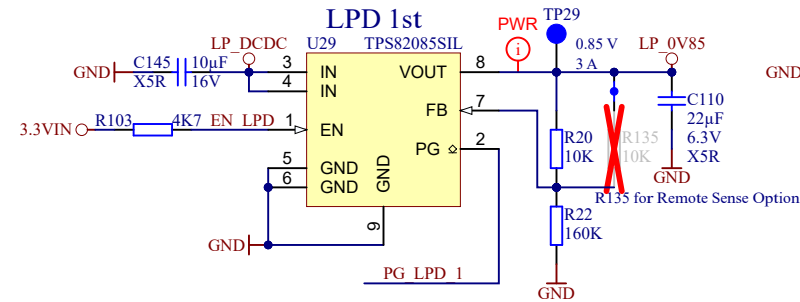
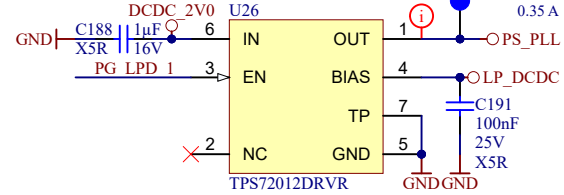
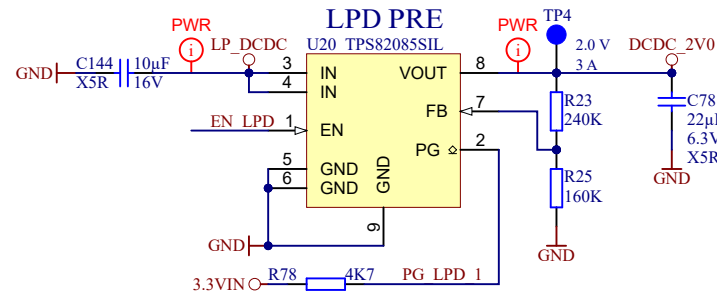
# DDR4



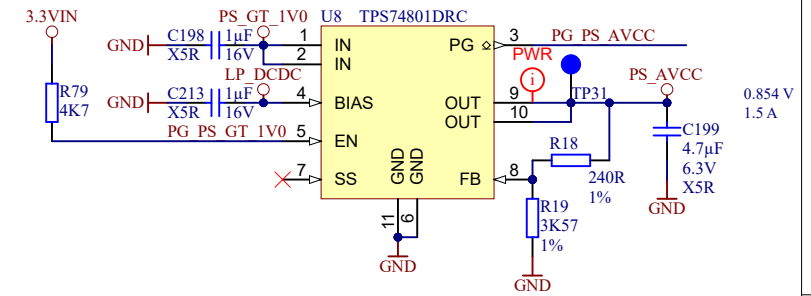
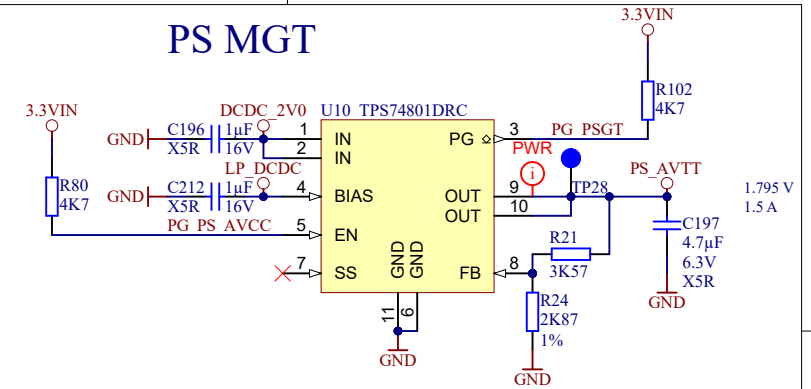
PL MGT

|                          |                                  |               |
|--------------------------|----------------------------------|---------------|
| Title: TE0813 - POWER_3  |                                  |               |
| A4                       | Number: TE0813 4AE71-A           | Rev. 02       |
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| Filename: POWER_2.SchDoc |                                  | Page 29 of 30 |

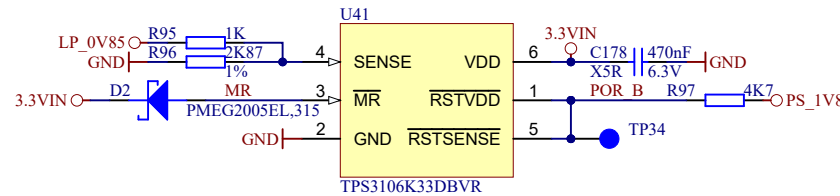
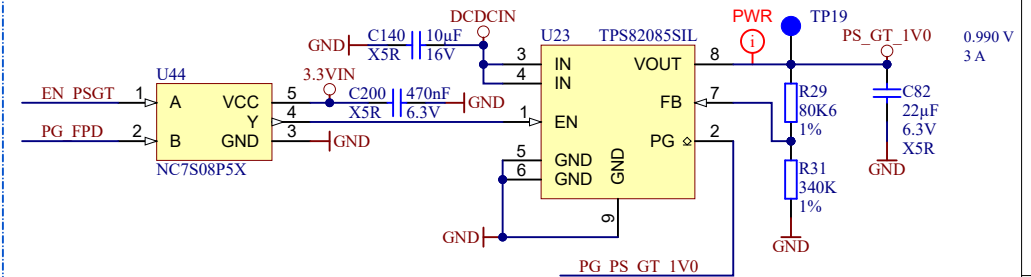
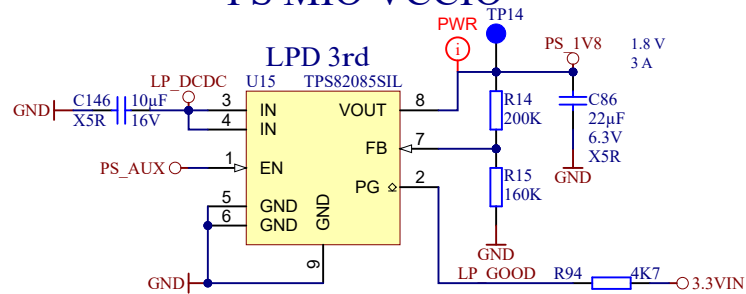
## Low-power domain



## PS MGT



## PS MIO VCCIO



| Net Name | Voltage Rail | Low Detect |
|----------|--------------|------------|
| LP_0V85  | 0.85 V       | 0.743 V    |
| 3.3VIN   | 3.3 V        | 2.941 V    |



|                          |                                  |               |
|--------------------------|----------------------------------|---------------|
| Title: TE0813 - POWER_4  |                                  |               |
| A4                       | Number: TE0813 4AE71-A           | Rev. 02       |
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| Filename: POWER_3.SchDoc |                                  |               |