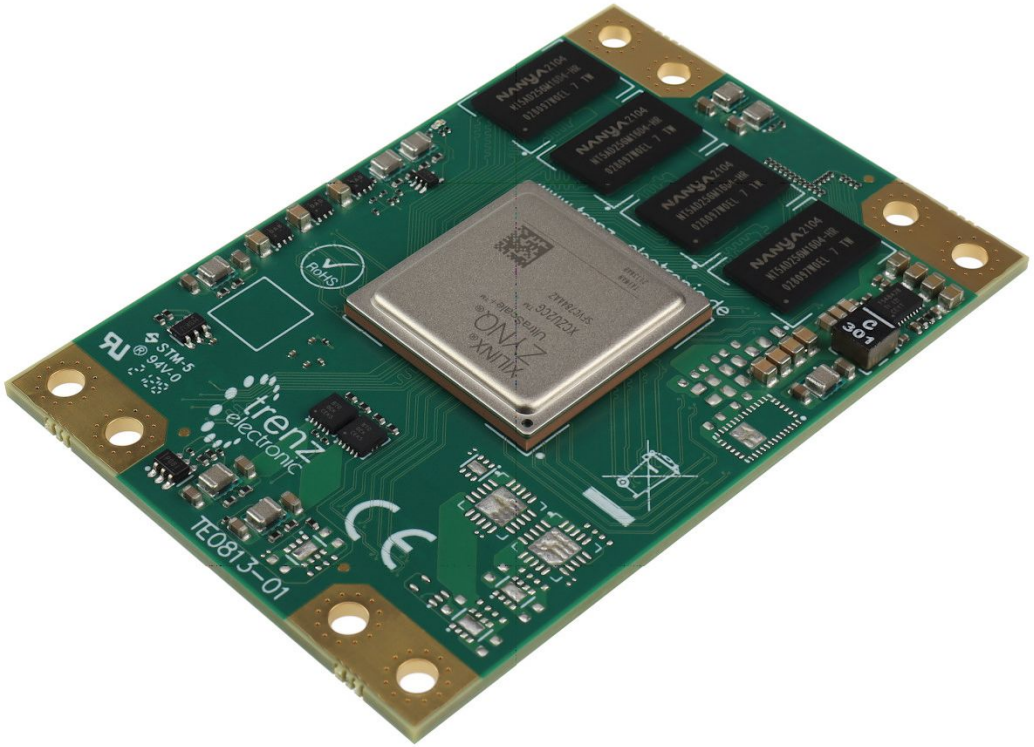

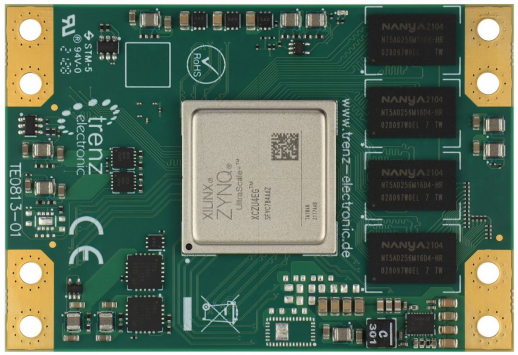

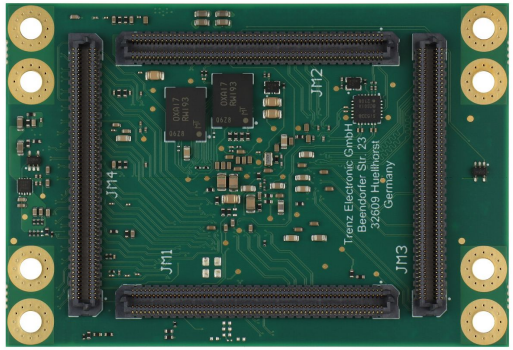

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Project is protected under copyright and we strongly and strictly prohibit the reverse engineering or recreation,
even if the design is just adapted or modified.
TE0813 is protected under such right and in case of plagiarism we will have to do anything necessary in order to protect our assets.
Schematics and other handouts serve for informational purposes only!

Drawn by	ED
Checked by	MR
Assembly variant	3AE81-A
Created by	ED
Modified by	ED
Modified at	2023-05-17

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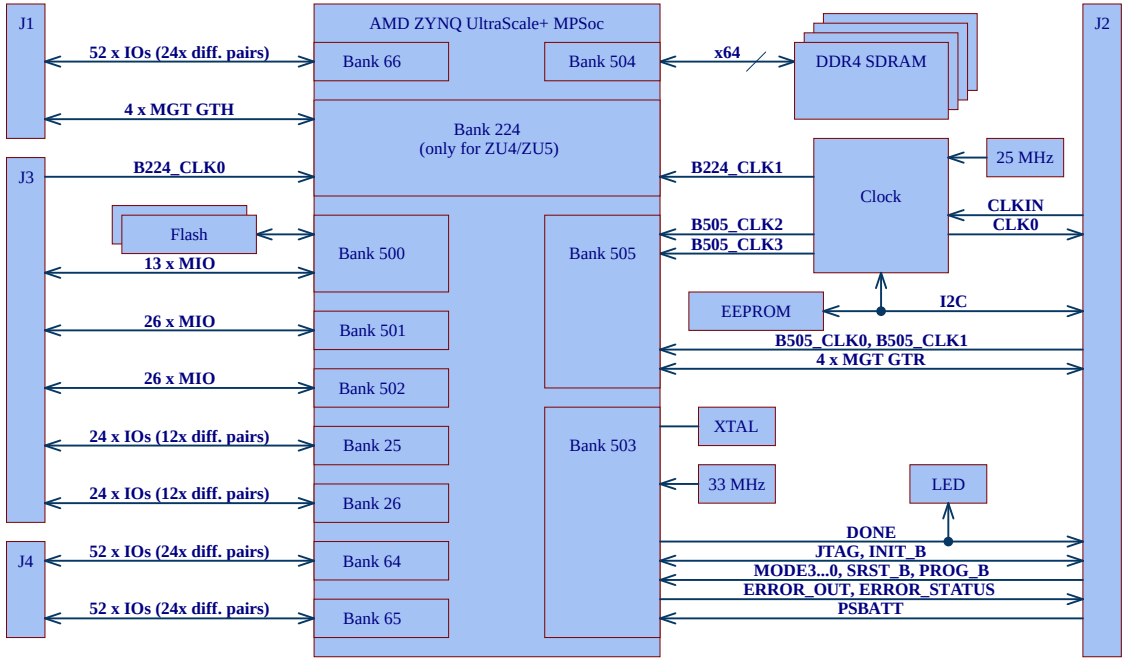
Title: TE0813 - Legal Notices

A4	Number: TE0813 3AE81-A	Rev. 02
Date: 17.07.2023	Copyright: Trenz Electronic GmbH	Page 1 of 30
Filename: Legal Notices Modules.SchDoc		



Supported Voltage Ranges:

Power Rail	Direction	Range	Tolerance	Description	Note
3.3VIN	IN	3.3V	+/- 5 %	Micromodule Power	Management voltage rail, supplied by power rail
PL_DCIN	IN	3.3V	+/- 5 %	Micromodule Power	Programmable Logic, supplied by power rail
LP_DCDC	IN	3.3V	+/- 3 %	Micromodule Power	Low-Power Domain, supplied by power rail
GT_DCDC	IN	3.3V	+/- 3 %	Micromodule Power	GTH Transceiver, supplied by power rail
DCDCIN	IN	3.3V	+/- 5 %	Micromodule Power	Full-Power Domain and GTR, supplied by power rail
VCCO_64	IN	1.0 V - 1.8 V	+/- 3 %	HP IO Bank 64	Supplied by external power rail via B2B connector
VCCO_65	IN	1.0 V - 1.8 V	+/- 3 %	HP IO Bank 65	Supplied by external power rail via B2B connector
VCCO_66	IN	1.0 V - 1.8 V	+/- 3 %	HP IO Bank 66	Supplied by external power rail via B2B connector
VCCO_25	IN	1.2 V - 3.3 V	+/- 3 %	HD IO Bank 25	Supplied by external power rail via B2B connector
VCCO_26	IN	1.2 V - 3.3 V	+/- 3 %	HD IO Bank 26	Supplied by external power rail via B2B connector
PSBATT	IN	1.2 V - 1.5 V	-	RTC / BBRAM	Supplied by external power rail via B2B connector
PL_1V8	OUT	1.8 V	+/- 3 %	Power for Carrier	Micromodule: Programmable Logic
PS_1V8	OUT	1.8 V	+/- 3 %	Power for Carrier	Micromodule: Processing System
DDR_1V2	OUT	1.2 V	+/- 3 %	Power for Carrier	Micromodule: PS DDR I/O Supply

I2C Address:

Device	I2C ADDR	Note
PLL U5	0x70	-
EEPROM U28	0x50	-

TE0813 | DDR4-TERM | ZU_PS_POWER | ZU_POWER

POWER | POWER_1 | POWER_2 | POWER_3

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Title: TE0813 - System Overview			
A4	Number: TE0813 3AE81-A		Rev. 02
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Filename: TE0813-Overview.SchDoc			

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 Changed C92 100nF to 1nF	
	2022-11	Added additional Info about Voltage Range	
-02	2023-07	1. Change DCDC U11 from EN6347QI to MPM3860GQW-Z and adapted according circuits. 2. Connected DDR4-TEN signals together for U2, U3, U9, and U12 and pulled them low via 499 Ohm resistor R131. Added a testpoint TP3 for DDR4-TEN. 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. 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. 5. Added diode D2 between U41 pin 3 net MR and voltage rail 3.3VIN. 6. Connected enable signal for U11 and U33 from "3.3VIN" to "PG_PL_VCCINT". 7. Added capacitors C137, C147, and C148 for VTT voltage rail. 8. Added resistors R132 (default: not fitted) and R133 to supply U4 VCC either from "PL_DCIN" or from "3.3VIN". 9. Change resistor R92 from 4.22 kOhm to 9.09 kOhm to set current limit to nearly 14.5 A for U4. 10. Added remote sense option: 10.1 R134 for U30 10.2 R135 for U29 10.3 R136 for U31 11. Added decoupling capacitors: 11.1 C210 and C211 for U5. 11.2 C190 for U7. 11.3 C198, C199, and C213 for U8. 11.4 C153, C170...172 for U9 11.5 C196 C197, and C212 for U10. 11.6 C156 and C157 for U12 11.7 C207 and C208 for U14. 11.8 C189 for U17. 11.9 C149...152, C205, and C206 for U18 11.10 C209 and C217 for U21. 11.11 C214...216 for U22. 11.12 C154 and C155 for U24 11.13 C188 and C191 for U26. 11.14 C187 and C195 for U27. 11.15 C203 and C204 for U34. 11.16 C201 for U39. 11.17 C202 for U40. 11.18 C178 for U41. 11.19 C200 for U44. 12. Added testpoints TP4, TP19, TP26. 13. Added UKCA logo. 14. Change 100 nF capacitors C135 and C136 from 6.3 V to 25 V for BOM optimization.	ED

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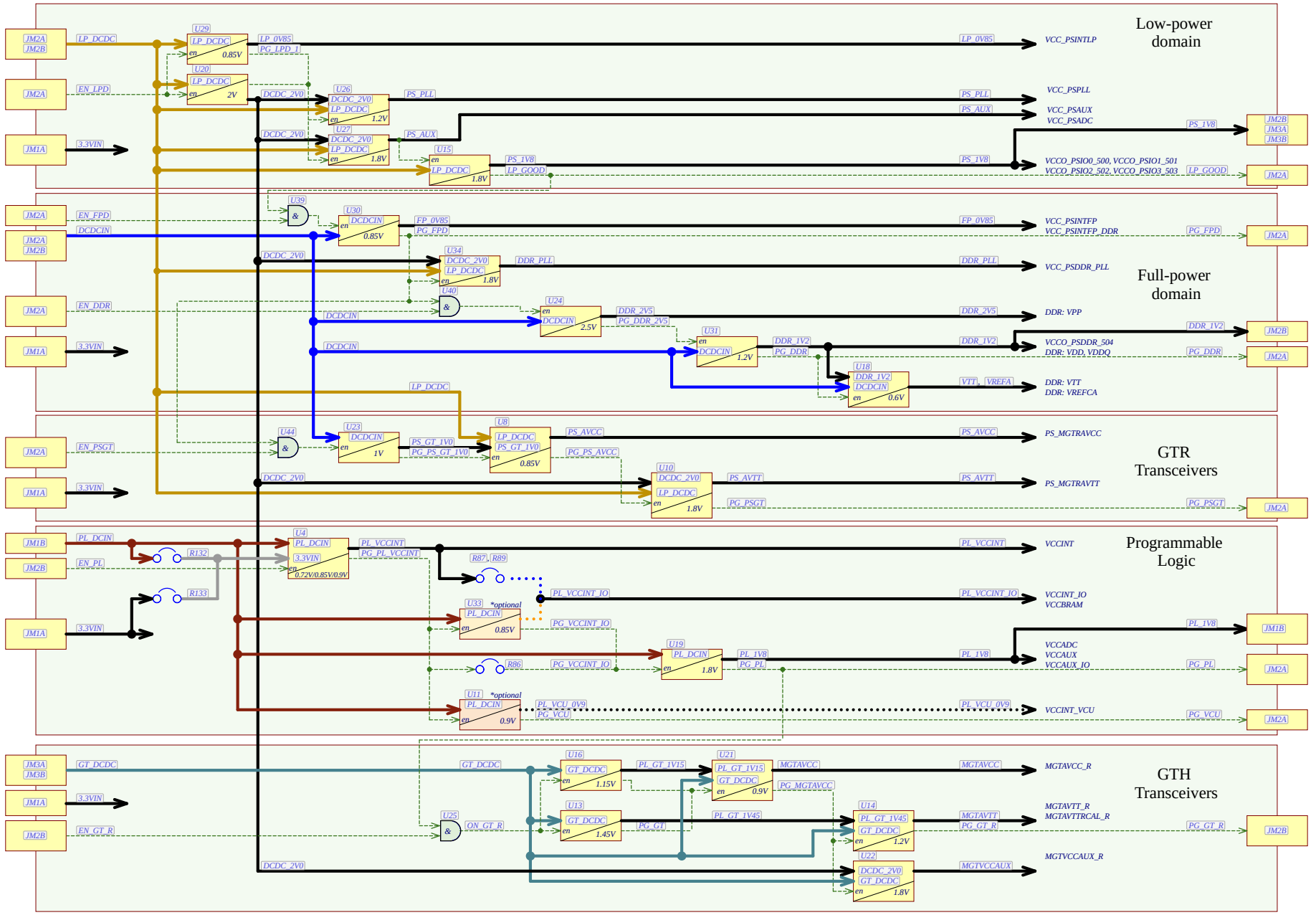
Title: TE0813 - Revision History			
A4	Number: TE0813 3AE81-A		Rev. 02
Date: 17.07.2023	Copyright: Trenz Electronic GmbH		Page 3 of 30
Filename: Revision Changes.SchDoc			



Net name

Power bus

Control signal

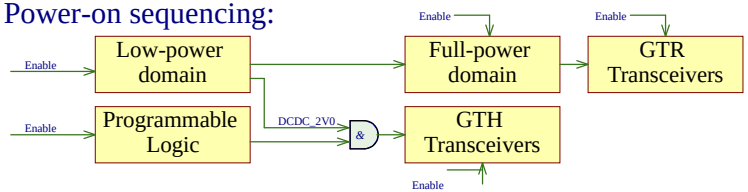
Power bus in FPGA speedgrade -1/-2/-3 assembly variants

Power bus in FPGA speedgrade -1L/-2L assembly variants (low power)

Optional power converter

Logic AND gate

Power-on sequencing:



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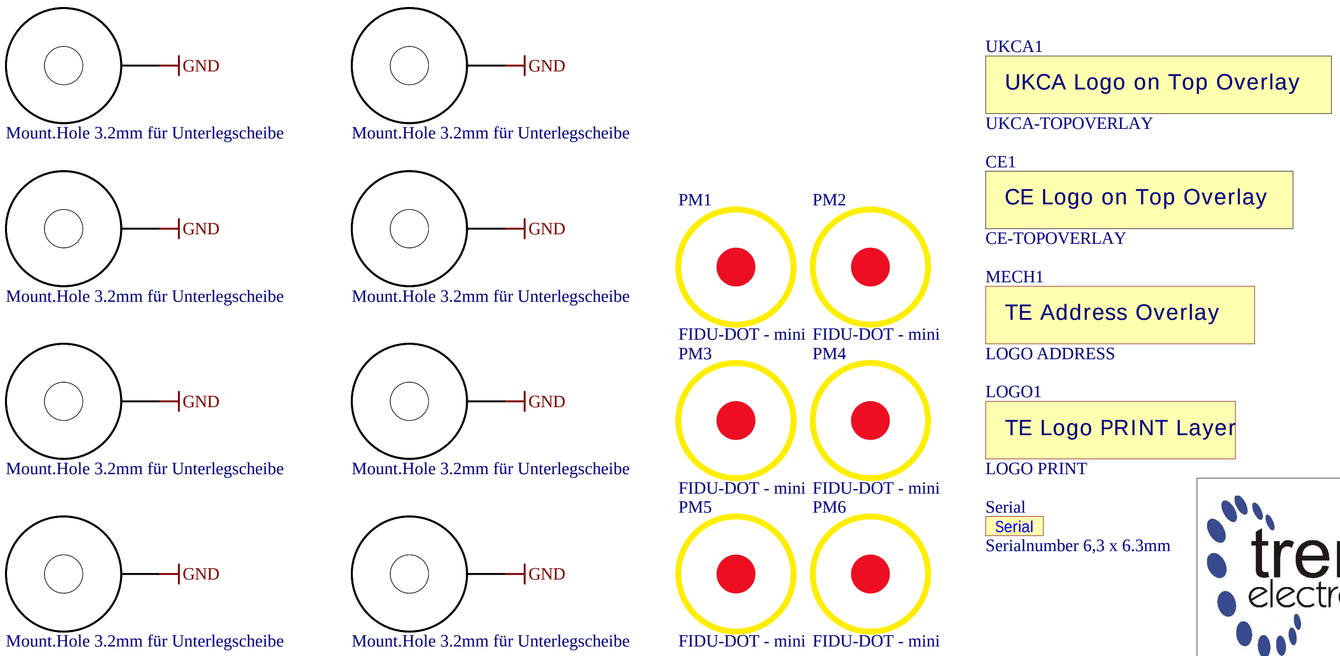
Datum: 2021-01-19	Copyright:Trenz Electronic GmbH	Page 4 of 30
Filename: Power_Diagram.SchDoc		

Special notes:



Title: TE0813		
A4	Number: TE0813 3AE81-A	Rev. 02
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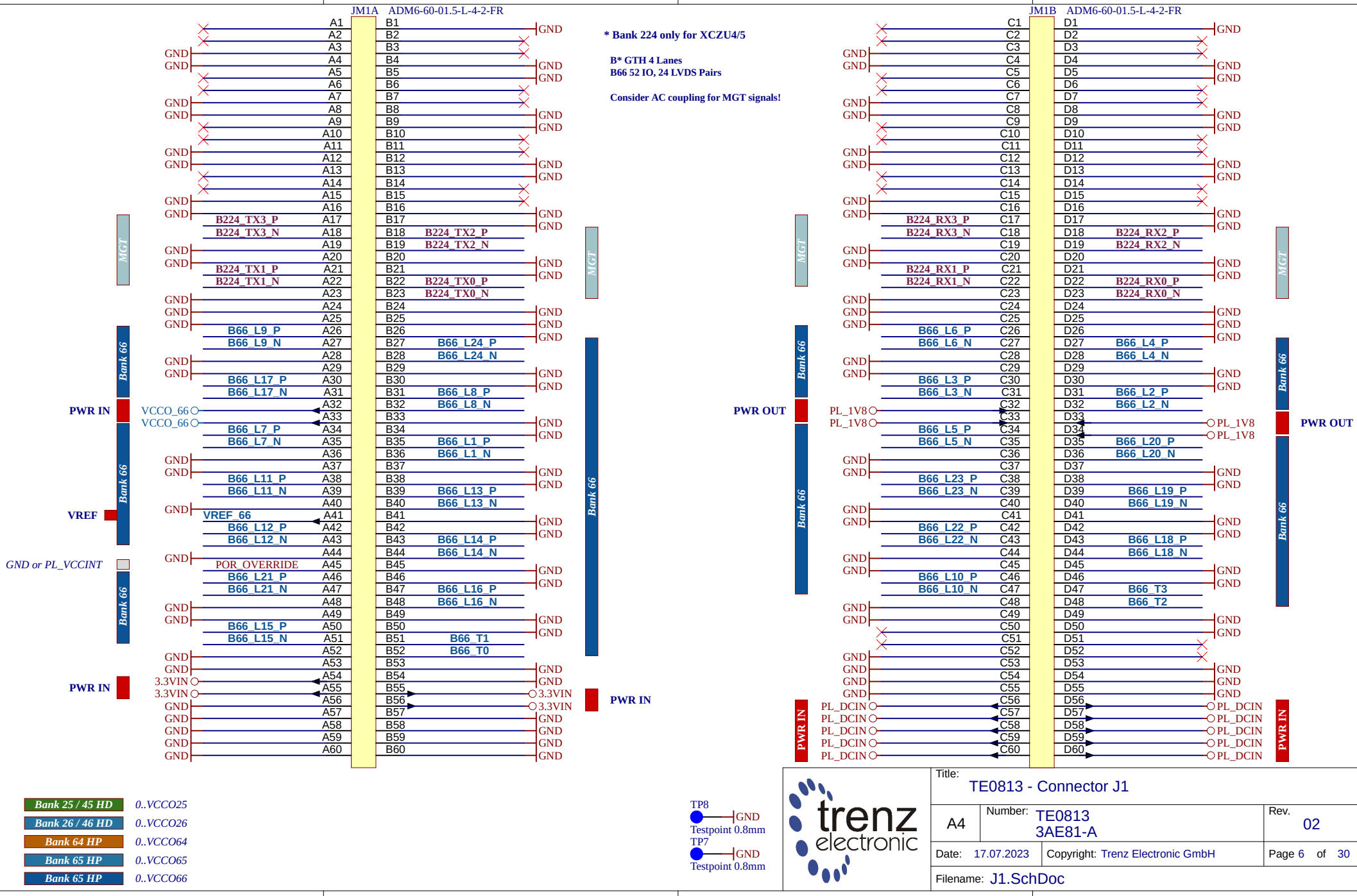
Filename: TE0813.SchDoc		


JM1A ADM6-60-01.5-L-4-2-FR
JM1B ADM6-60-01.5-L-4-2-FR
* Bank 224 only for XCZU4/5
B* GTH 4 Lanes
B66 52 IO, 24 LVDS Pairs
Consider AC coupling for MGT signals!
MGT
Bank 66
PWR IN
PWR OUT
VREF
GND or PL_VCCINT
B224_TX3_P
B224_TX3_N
B224_TX2_P
B224_TX2_N
B224_TX1_P
B224_TX1_N
B224_TX0_P
B224_TX0_N
B224_RX3_P
B224_RX3_N
B224_RX2_P
B224_RX2_N
B224_RX1_P
B224_RX1_N
B224_RX0_P
B224_RX0_N
B66_L9_P
B66_L9_N
B66_L17_P
B66_L17_N
B66_L7_P
B66_L7_N
B66_L11_P
B66_L11_N
B66_L12_P
B66_L12_N
B66_L21_P
B66_L21_N
B66_L15_P
B66_L15_N
B66_L24_P
B66_L24_N
B66_L8_P
B66_L8_N
B66_L1_P
B66_L1_N
B66_L13_P
B66_L13_N
B66_L14_P
B66_L14_N
B66_L16_P
B66_L16_N
B66_T1
B66_T0
B66_L6_P
B66_L6_N
B66_L4_P
B66_L4_N
B66_L3_P
B66_L3_N
B66_L2_P
B66_L2_N
B66_L5_P
B66_L5_N
B66_L20_P
B66_L20_N
B66_L23_P
B66_L23_N
B66_L19_P
B66_L19_N
B66_L22_P
B66_L22_N
B66_L18_P
B66_L18_N
B66_L10_P
B66_L10_N
B66_T3
B66_T2
VCCO_66
VREF_66
POR_OVERRIDE
3.3VIN
PL_1V8
PL_DCIN
GND
Bank 25 / 45 HD 0..VCCO25
Bank 26 / 46 HD 0..VCCO26
Bank 64 HP 0..VCCO64
Bank 65 HP 0..VCCO65
Bank 65 HP 0..VCCO66
TP8 GND Testpoint 0.8mm
TP7 GND Testpoint 0.8mm
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Title: TE0813 - Connector J1
A4
Number: TE0813 3AE81-A
Rev. 02
Date: 17.07.2023
Copyright: Trenz Electronic GmbH
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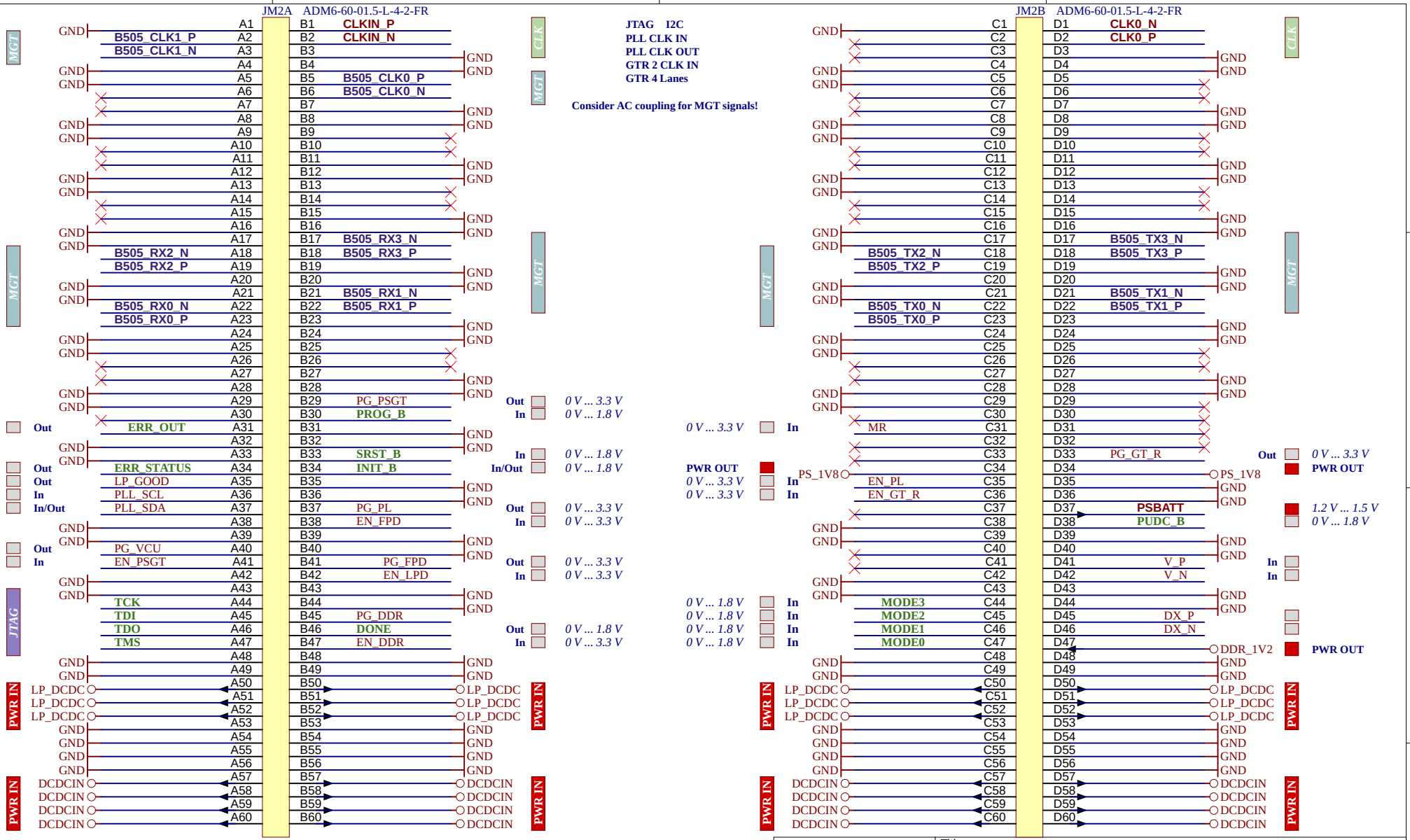
Filename: J1.SchDoc



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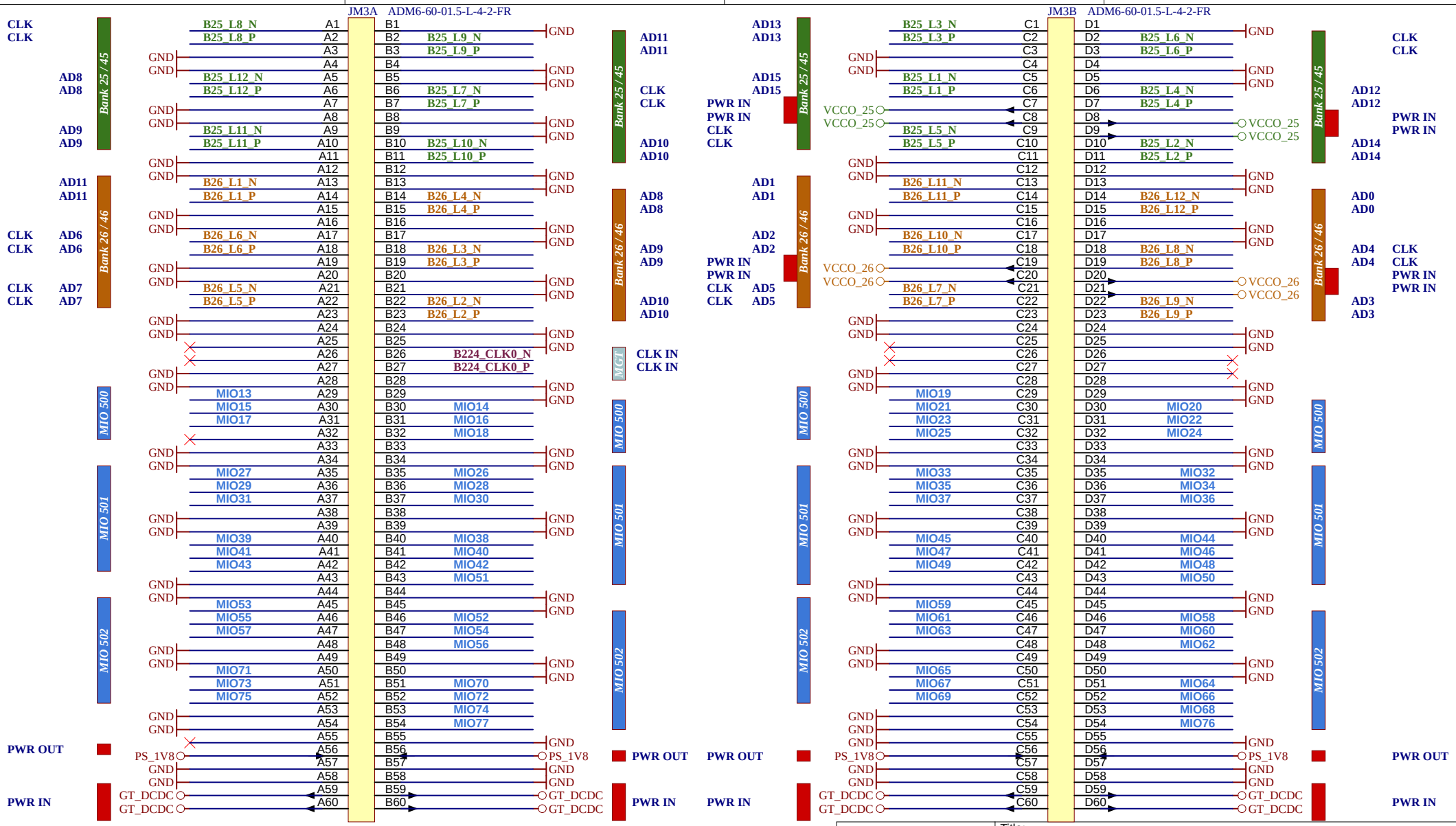
A4	Number: TE0813 3AE81-A		Rev. 02
Date: 17.07.2023	Copyright: Trenz Electronic GmbH		Page 7 of 30
Filename: J2.SchDoc			



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Title: TE0813 - Connector J3			
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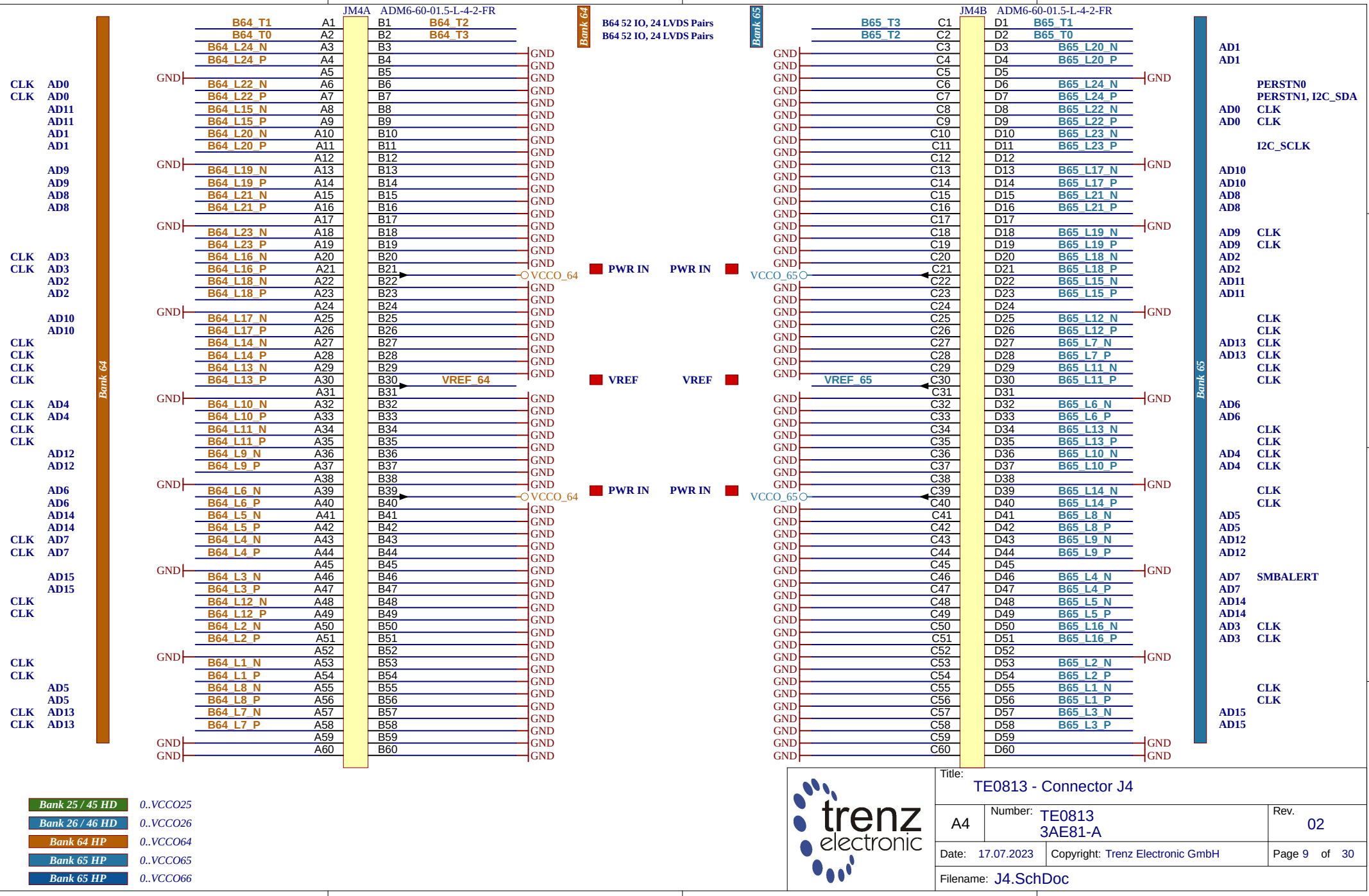
Date: 17.07.2023	Copyright: Trenz Electronic GmbH		Page 8 of 30
Filename: J3.SchDoc			



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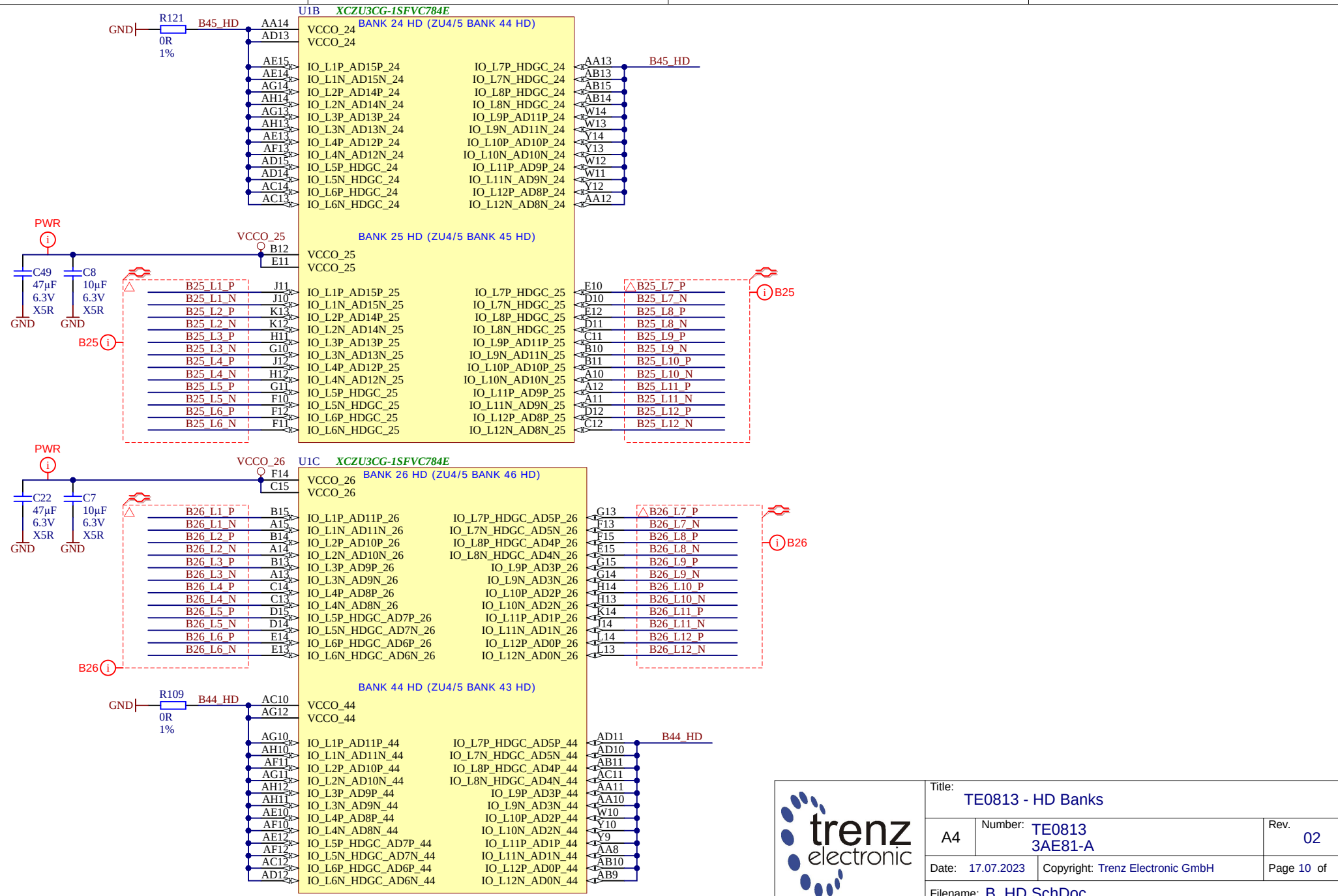
	Rev. 02
Date: 17.07.2023	Copyright: Trenz Electronic GmbH
	Page 9 of 30
Filename:	J4.SchDoc



Title:	TE0813 - HD Banks
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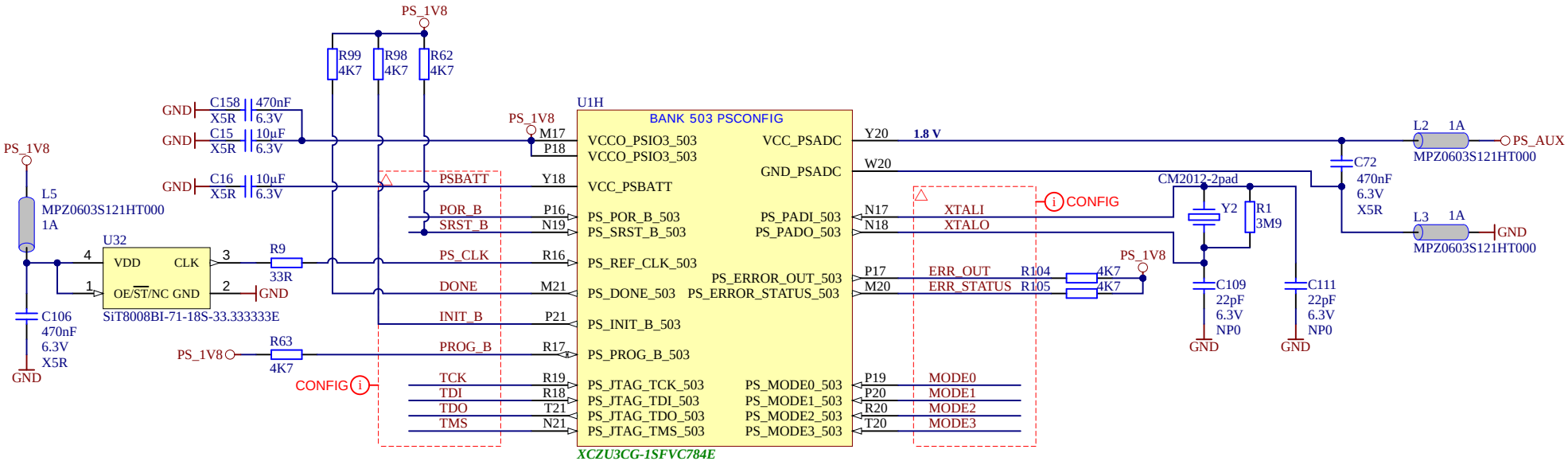
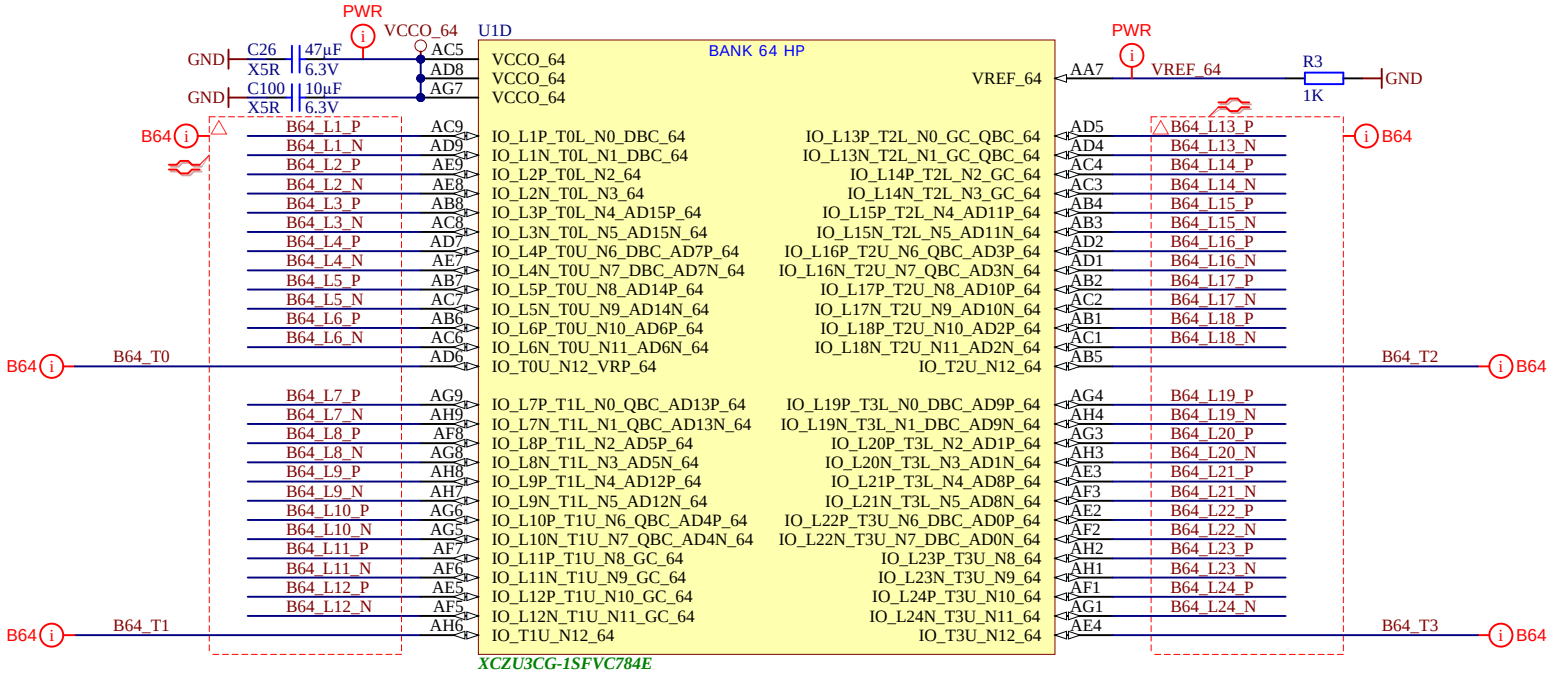
Rev.	02
Date: 17.07.2023	Copyright: Trenz Electronic GmbH
Page 10 of 30	
Filename:	B_HD.SchDoc



trenz electronic	Title: TE0813 - Config		
	A4	Number: TE0813 3AE81-A	Rev. 02
	Date: 17.07.2023	Copyright: Trenz Electronic GmbH	Page 11 of 30
	Filename: CONFIG.SchDoc		



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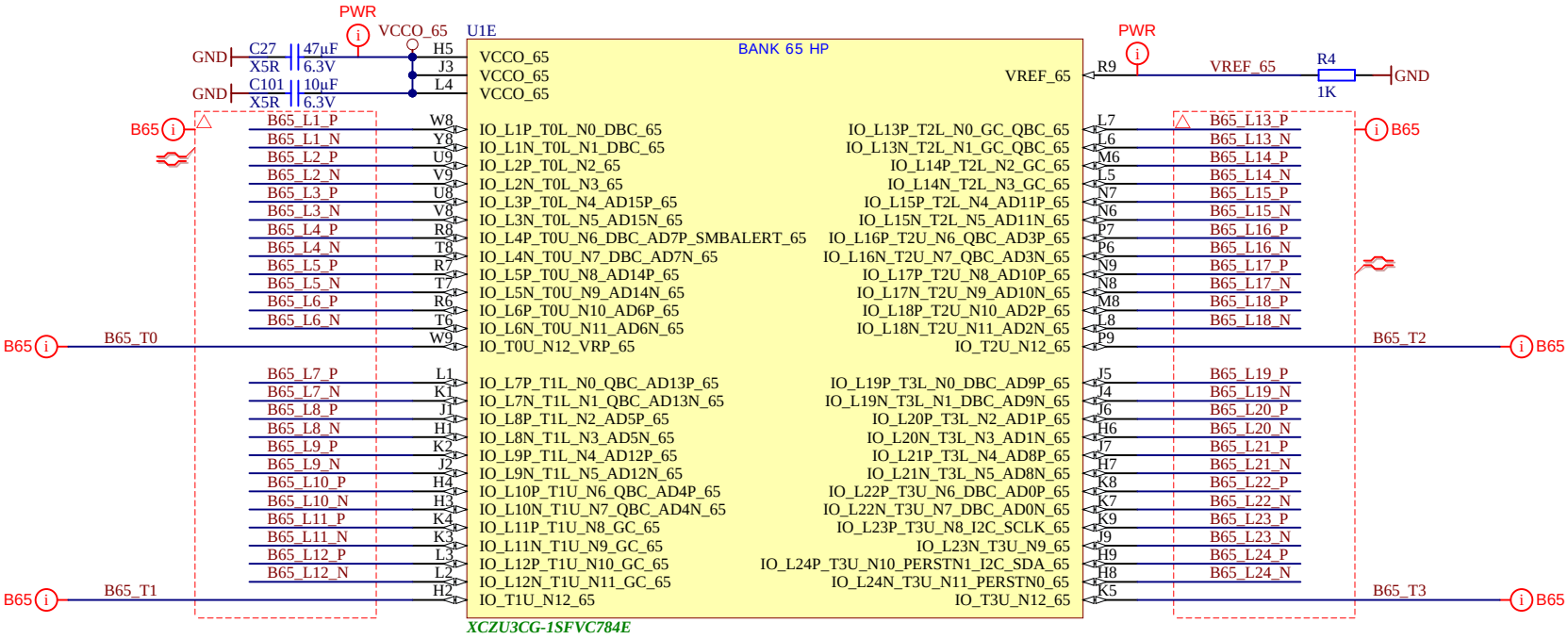
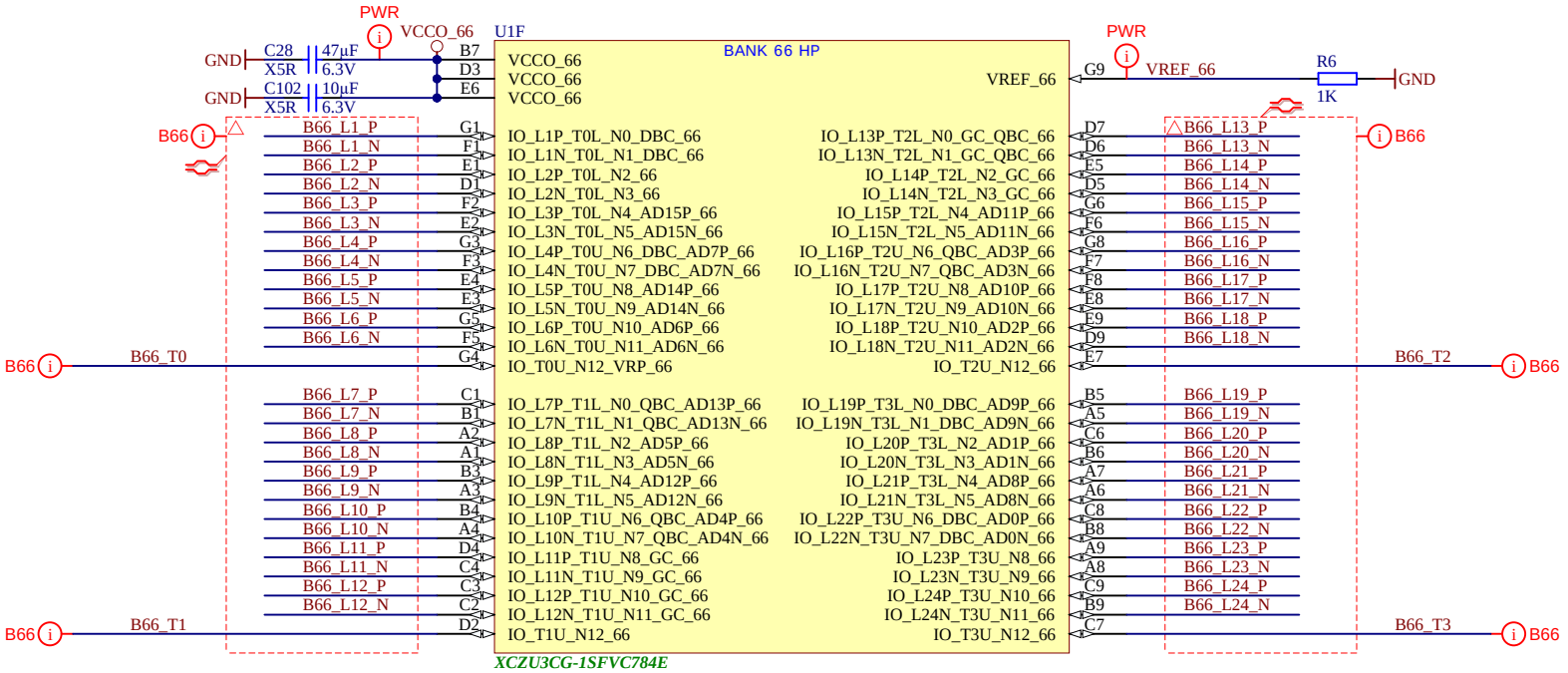
Date: 17.07.2023	Copyright: Trenz Electronic GmbH		Page 12 of 30
Filename: B64.SchDoc			

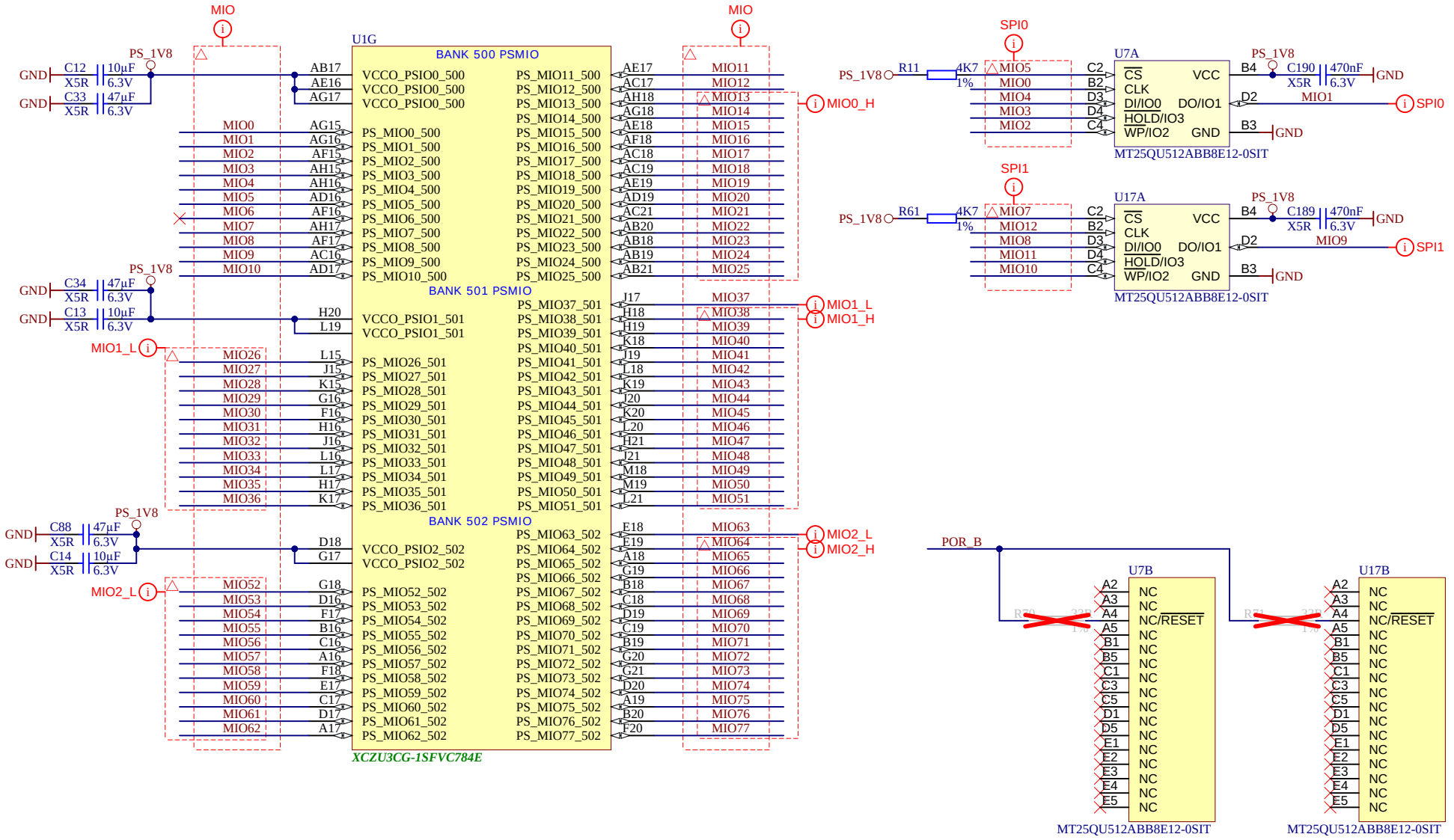


trenz electronic	Title: TE0813 - B65		
A4	Number: TE0813 3AE81-A		Rev. 02
Date: 17.07.2023	Copyright: Trenz Electronic GmbH		Page 13 of 30
Filename: B65.SchDoc			



B7				D7	B66_L13_P
D3				D6	B66_L13_N
E6				E5	B66_L14_P
G1	IO_L1P_T0L_N0_DBC_66	IO_L13P_T2L_N0_GC_QBC_66		D5	B66_L14_N
F1	IO_L1N_T0L_N1_DBC_66	IO_L13N_T2L_N1_GC_QBC_66		G6	B66_L15_P
E1	IO_L2P_T0L_N2_66	IO_L14P_T2L_N2_GC_66		F6	B66_L15_N
D1	IO_L2N_T0L_N3_66	IO_L14N_T2L_N3_GC_66		G8	B66_L16_P
F2	IO_L3P_T0L_N4_AD15P_66	IO_L15P_T2L_N4_AD11P_66		F7	B66_L16_N
E2	IO_L3N_T0L_N5_AD15N_66	IO_L15N_T2L_N5_AD11N_66		F8	B66_L17_P
G3	IO_L4P_T0U_N6_DBC_AD7P_66	IO_L16P_T2U_N6_QBC_AD3P_66		E8	B66_L17_N
F3	IO_L4N_T0U_N7_DBC_AD7N_66	IO_L16N_T2U_N7_QBC_AD3N_66		E9	B66_L18_P
E4	IO_L5P_T0U_N8_AD14P_66	IO_L17P_T2U_N8_AD10P_66		D9	B66_L18_N
E3	IO_L5N_T0U_N9_AD14N_66	IO_L17N_T2U_N9_AD10N_66			
G5	IO_L6P_T0U_N10_AD6P_66	IO_L18P_T2U_N10_AD2P_66			
F5	IO_L6N_T0U_N11_AD6N_66	IO_L18N_T2U_N11_AD2N_66			
G4	IO_T0U_N12_VRP_66	IO_T2U_N12_66		E7	
C1	IO_L7P_T1L_N0_QBC_AD13P_66	IO_L19P_T3L_N0_DBC_AD9P_66		B5	B66_L19_P
B1	IO_L7N_T1L_N1_QBC_AD13N_66	IO_L19N_T3L_N1_DBC_AD9N_66		A5	B66_L19_N
A2	IO_L8P_T1L_N2_AD5P_66	IO_L20P_T3L_N2_AD1P_66		C6	B66_L20_P
A1	IO_L8N_T1L_N3_AD5N_66	IO_L20N_T3L_N3_AD1N_66		B6	B66_L20_N
B3	IO_L9P_T1L_N4_AD12P_66	IO_L21P_T3L_N4_AD8P_66		A7	B66_L21_P
A3	IO_L9N_T1L_N5_AD12N_66	IO_L21N_T3L_N5_AD8N_66		A6	B66_L21_N
B4	IO_L10P_T1U_N6_QBC_AD4P_66	IO_L22P_T3U_N6_DBC_AD0P_66		C8	B66_L22_P
A4	IO_L10N_T1U_N7_QBC_AD4N_66	IO_L22N_T3U_N7_DBC_AD0N_66		B8	B66_L22_N
D4	IO_L11P_T1U_N8_GC_66	IO_L23P_T3U_N8_66		A9	B66_L23_P
C4	IO_L11N_T1U_N9_GC_66	IO_L23N_T3U_N9_66		A8	B66_L23_N
C3	IO_L12P_T1U_N10_GC_66	IO_L24P_T3U_N10_66		C9	B66_L24_P
C2	IO_L12N_T1U_N11_GC_66	IO_L24N_T3U_N11_66		B9	B66_L24_N
D2	IO_T1U_N12_66	IO_T3U_N12_66		C7	

Title: TE0813 - B66			
A4	Number: TE0813 3AE81-A		Rev. 02
Date: 17.07.2023	Copyright: Trenz Electronic GmbH		Page 14 of 30
Filename: B66.SchDoc			


U1G
BANK 500 PSMIO
BANK 501 PSMIO
BANK 502 PSMIO
XCZU3CG-1SFVC784E
MIO
PS_1V8
GND
C12 10µF X5R 6.3V
C33 47µF X5R 6.3V
C34 47µF X5R 6.3V
C13 10µF X5R 6.3V
C88 47µF X5R 6.3V
C14 10µF X5R 6.3V
MIO0_H
MIO1_L
MIO1_H
MIO2_L
MIO2_H
SPI0
SPI1
R11 4K7 1%
R61 4K7 1%
U7A
U17A
MT25QU512ABB8E12-0SIT
C190 470nF X5R 6.3V
C189 470nF X5R 6.3V
POR_B
U7B
NC/RESET
Title: TE0813 - MIO Banks
A4
Number: TE0813 3AE81-A
Rev. 02
Date: 17.07.2023
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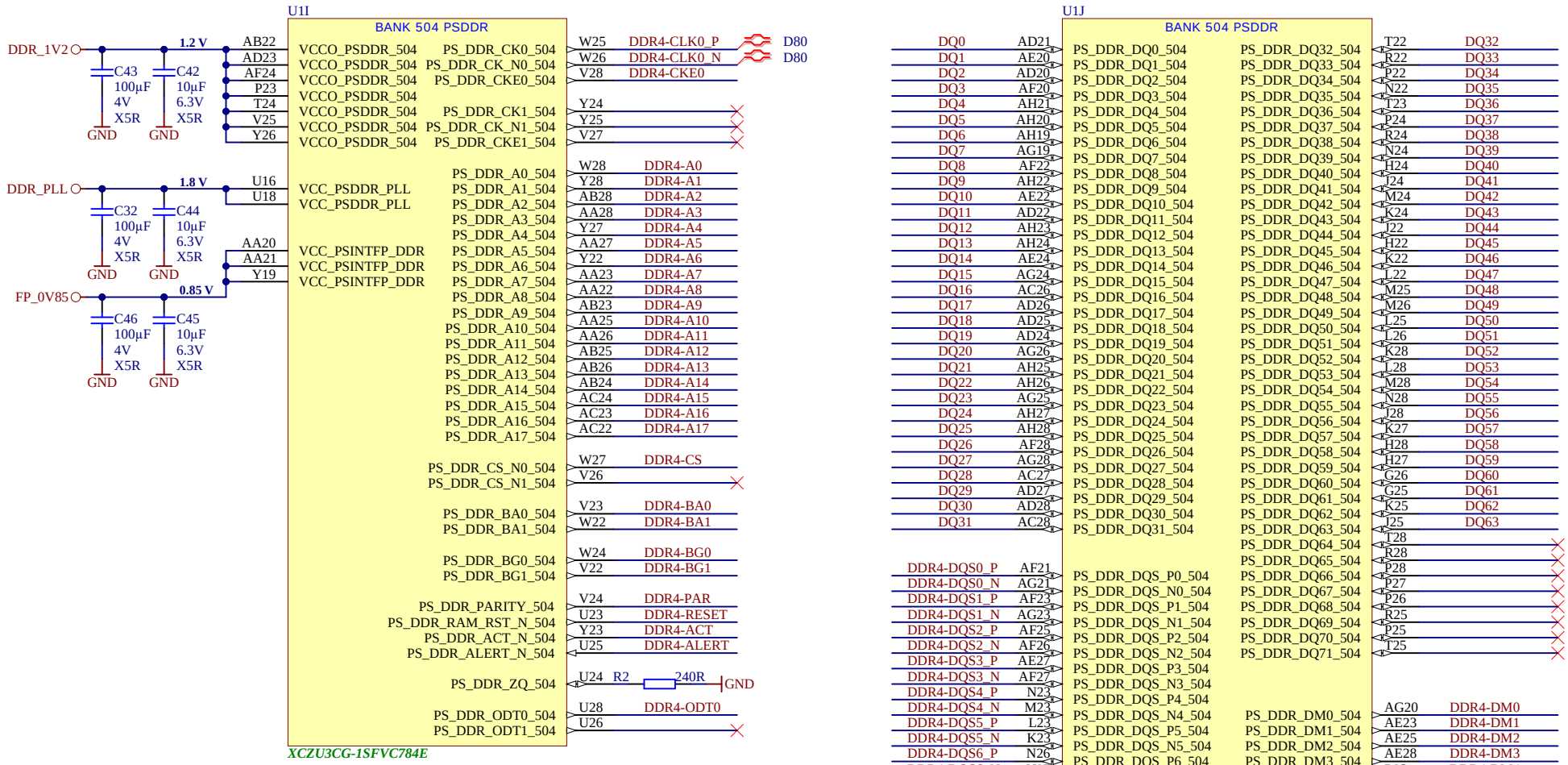
Filename: B_MIO.SchDoc



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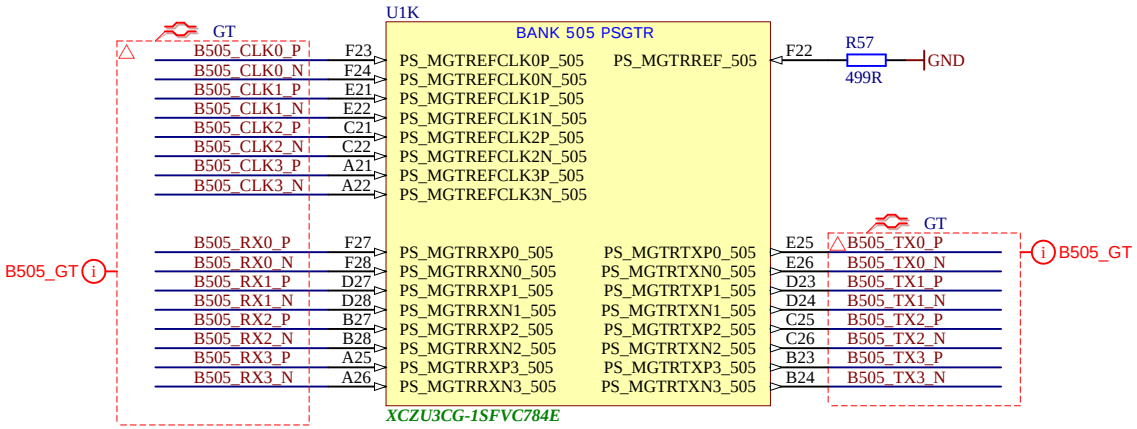
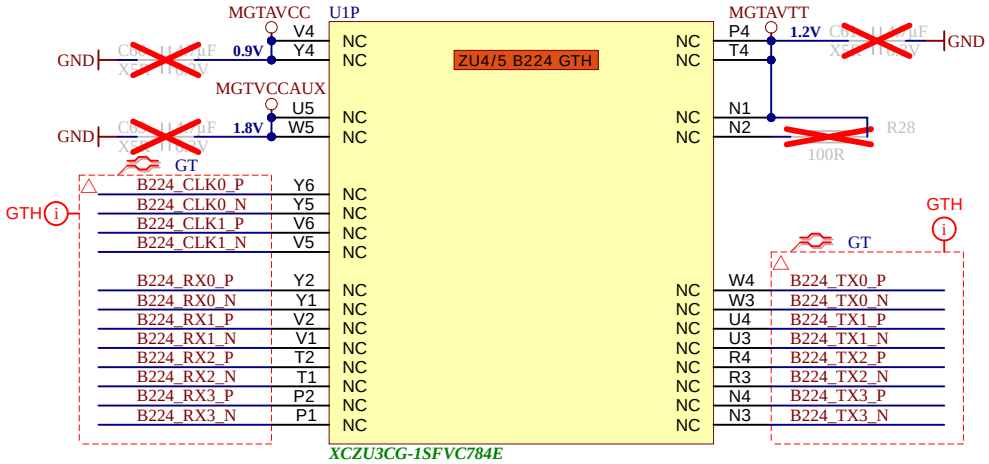
Title: TE0813 - PS_DDR			
A4	Number: TE0813 3AE81-A		Rev. 02
Date: 17.07.2023	Copyright: Trenz Electronic GmbH		Page 16 of 30
Filename: PS_DDR.SchDoc			



trenz electronic	Title: TE0813 - PS_GT		
A4	Number: TE0813 3AE81-A		Rev. 02
Date: 17.07.2023	Copyright: Trenz Electronic GmbH		Page 17 of 30
Filename: B_PS_GT.SchDoc			



trenz electronic	Title: TE0813 - B224 - GTH		
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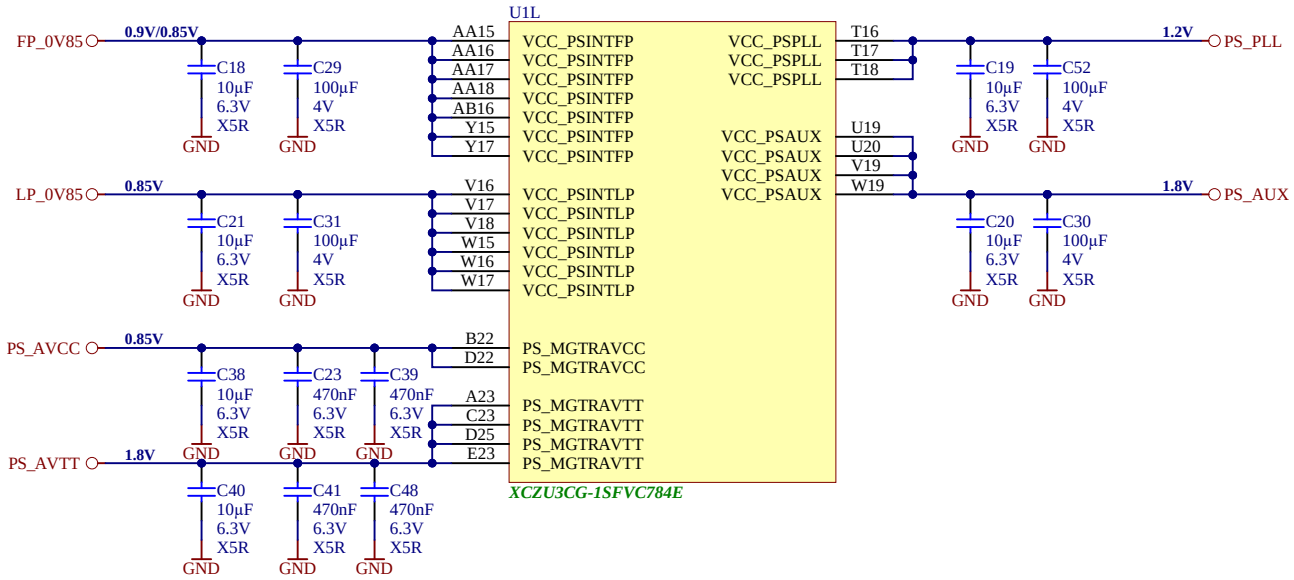
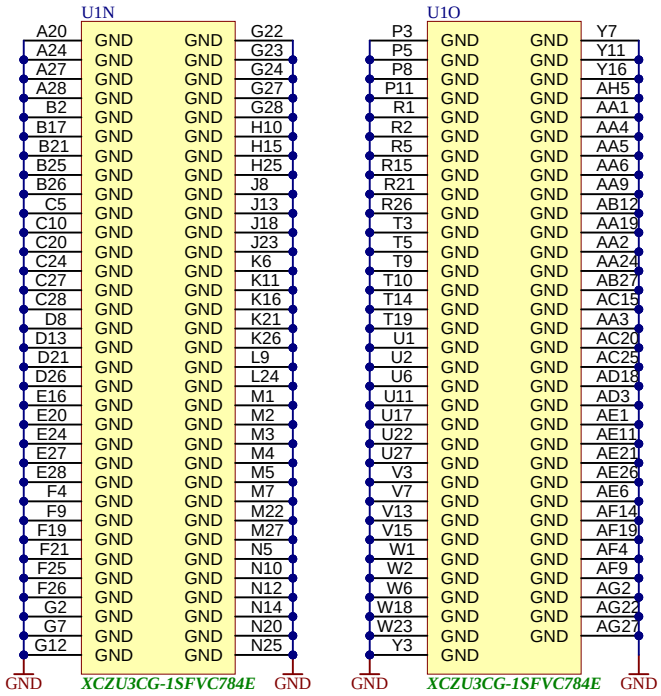
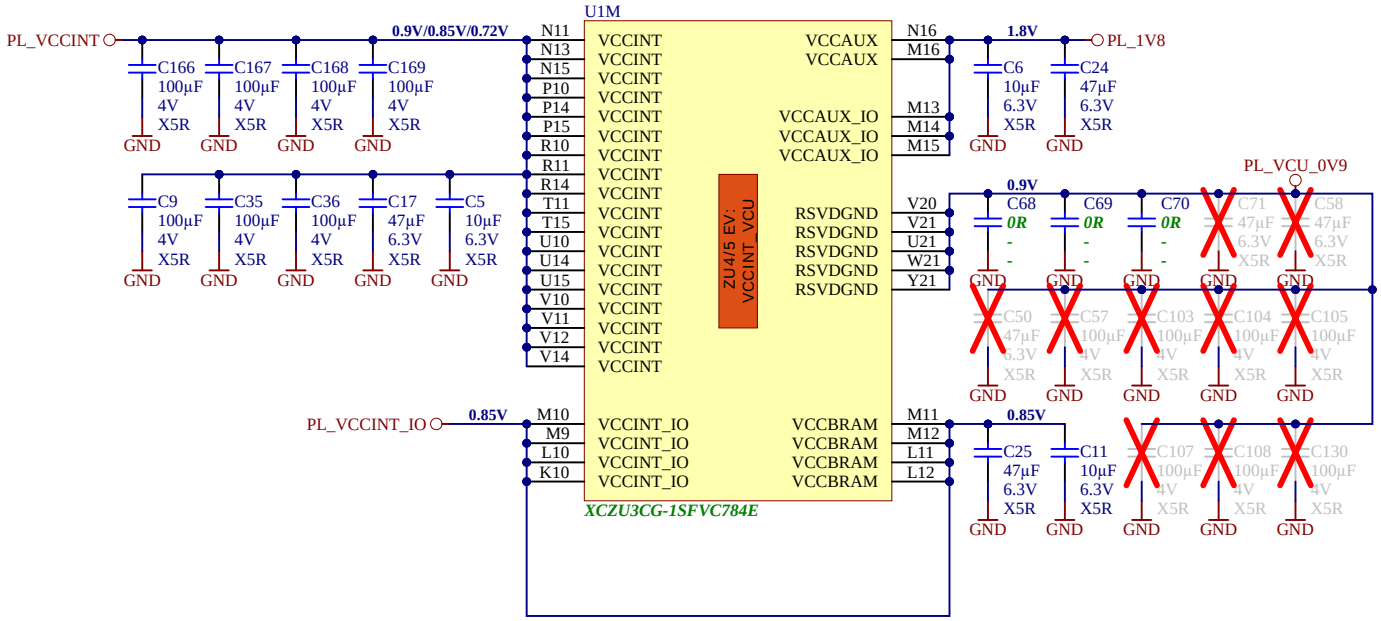
	Date: 17.07.2023	Copyright: Trenz Electronic GmbH	Page 18 of 30
	Filename: B_GT.SchDoc		

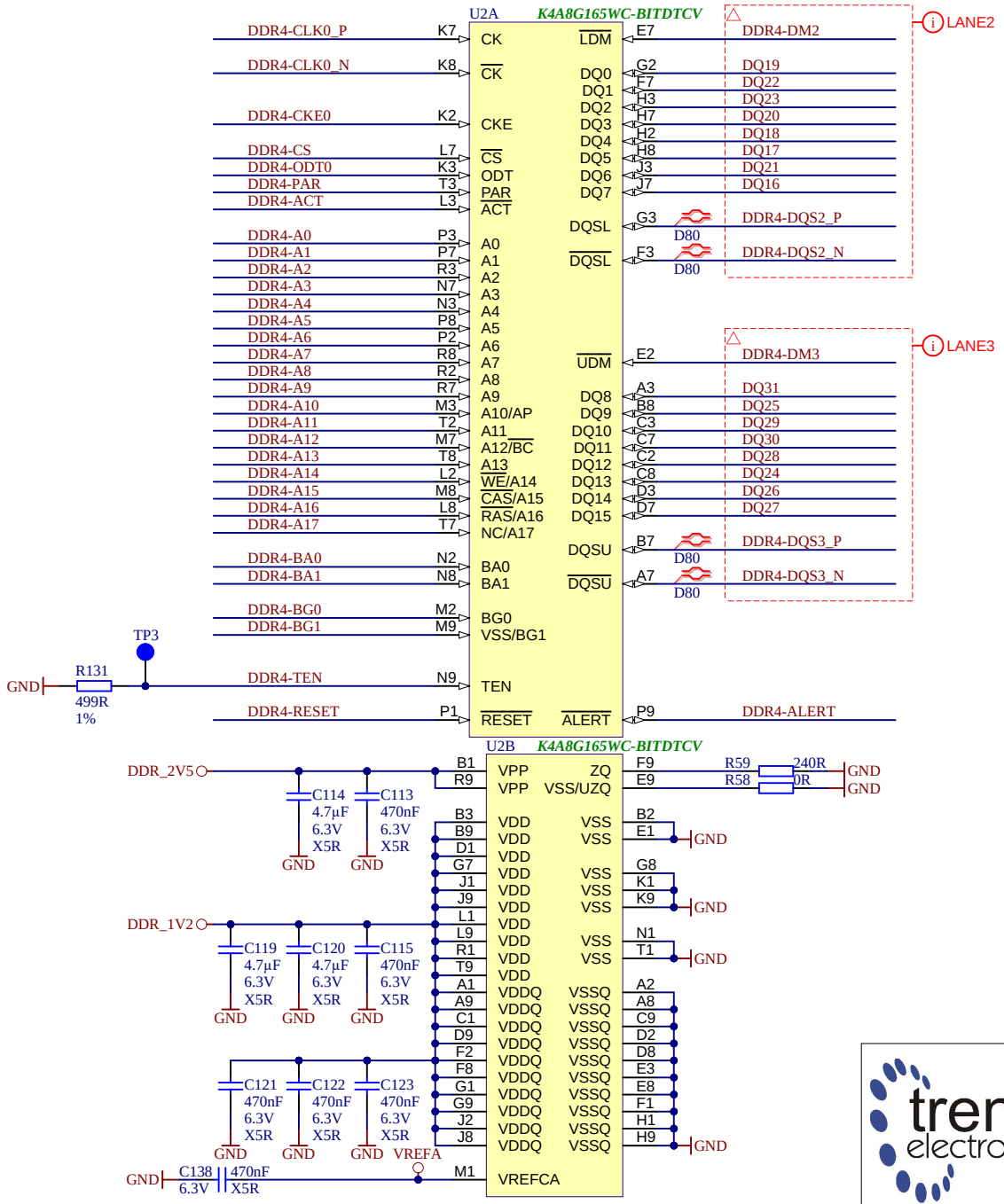


trenz electronic	Title: TE0813 - ZU_PS_POWER		
A4	Number: TE0813 3AE81-A		Rev. 02
Date: 17.07.2023	Copyright: Trenz Electronic GmbH		Page 19 of 30
Filename: ZU_PS_POWER.SchDoc			

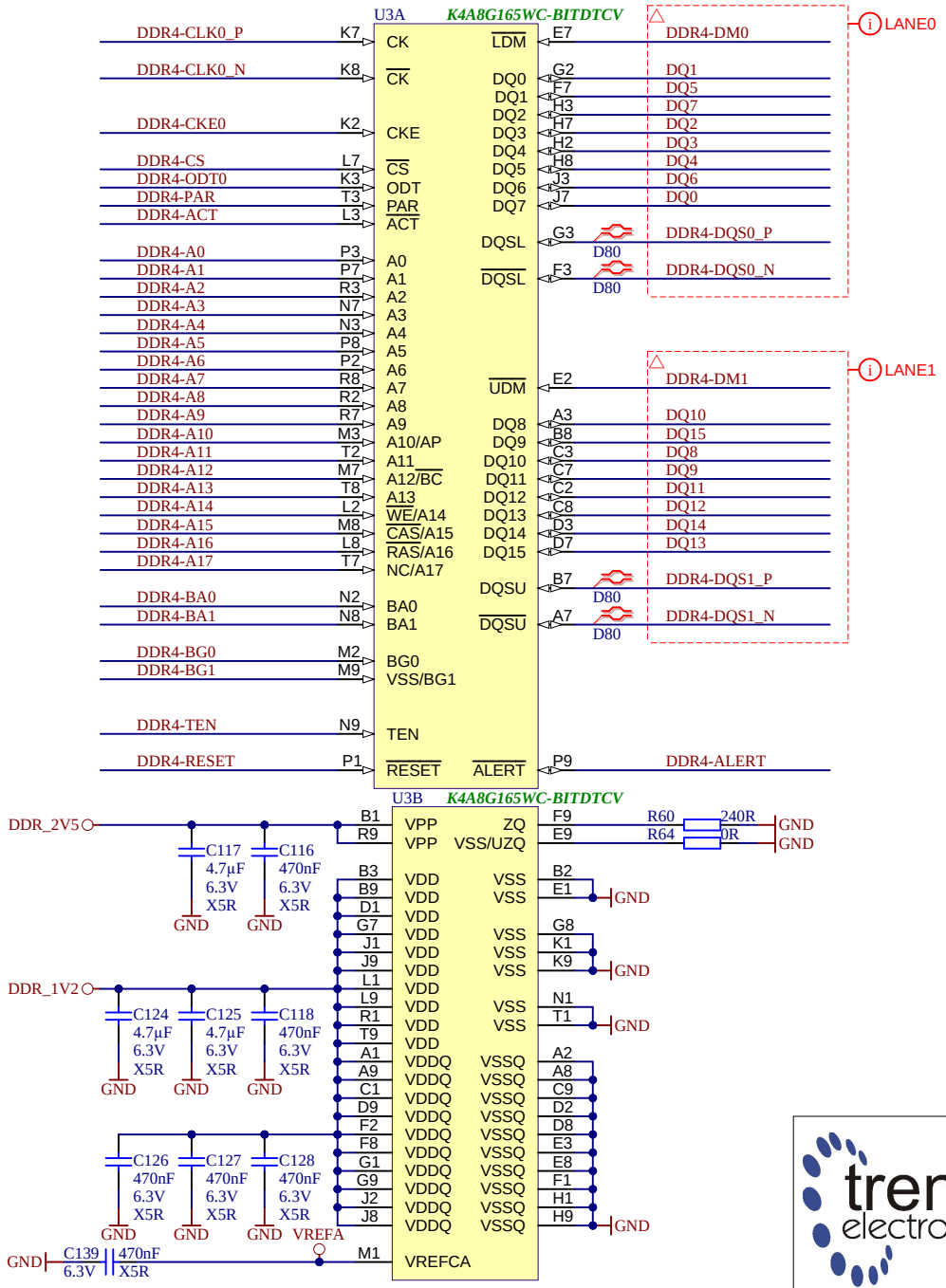




trenz electronic	Title: TE0813 - ZU_POWER		
	A4	Number: TE0813 3AE81-A	Rev. 02
	Date: 17.07.2023	Copyright: Trenz Electronic GmbH	Page 20 of 30
	Filename: ZU_POWER.SchDoc		



Title: TE0813 - DDR4_1_RAM			
A4	Number: TE0813 3AE81-A		Rev. 02
Date: 17.07.2023	Copyright: Trenz Electronic GmbH		Page 21 of 30
Filename: DDR4-RAM.SchDoc			



trenz electronic	Title: TE0813 - DDR4_2_RAM		
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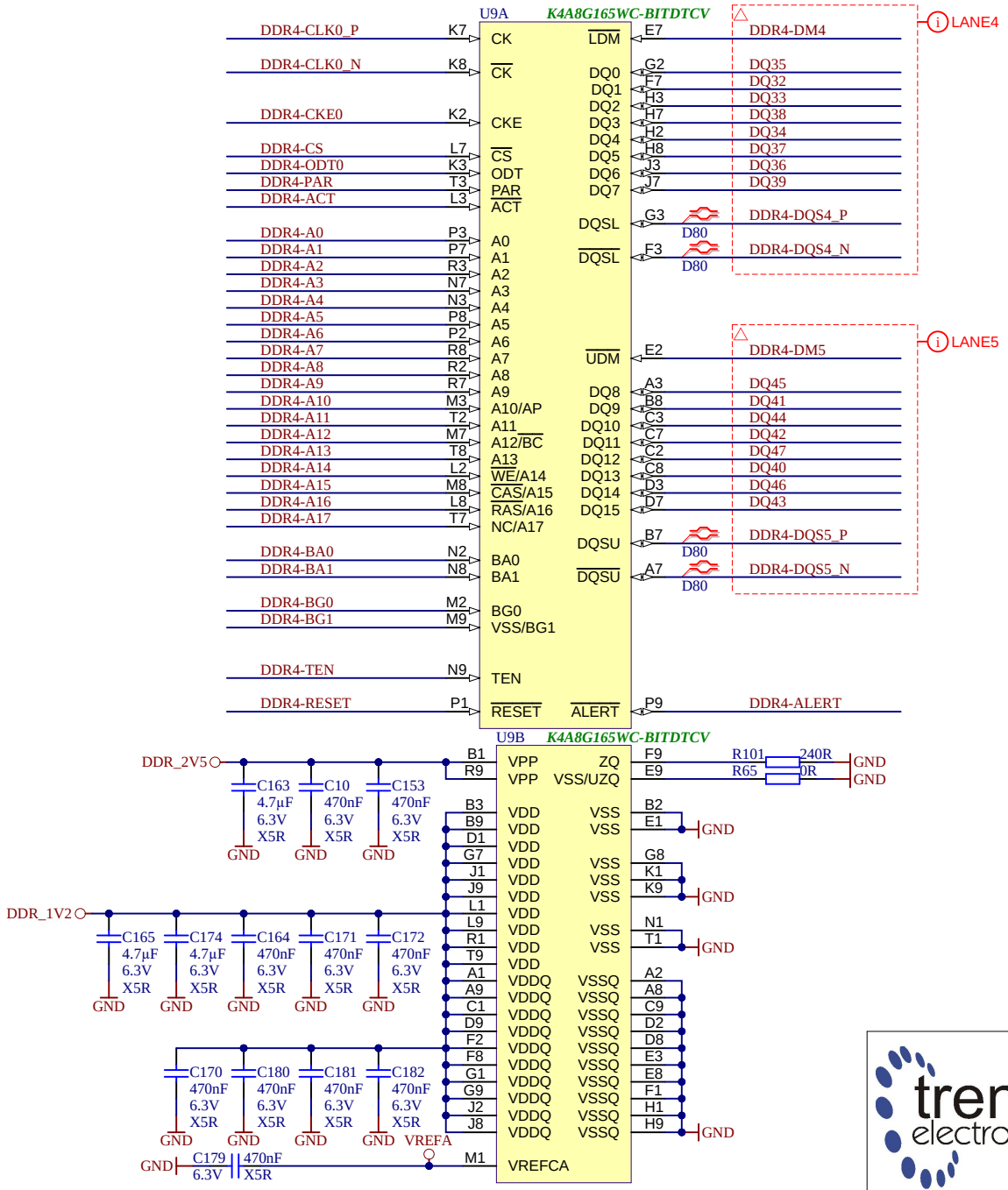
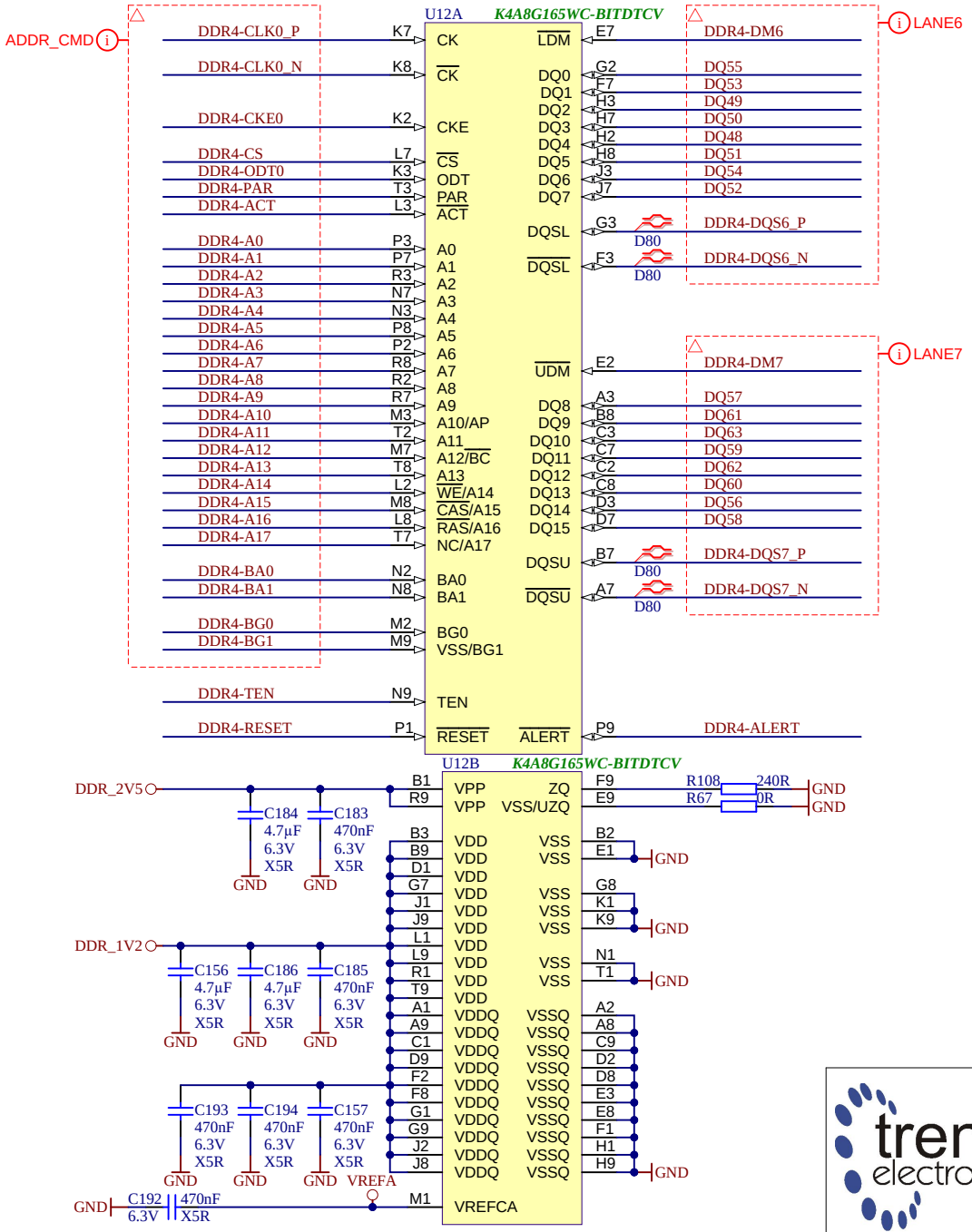
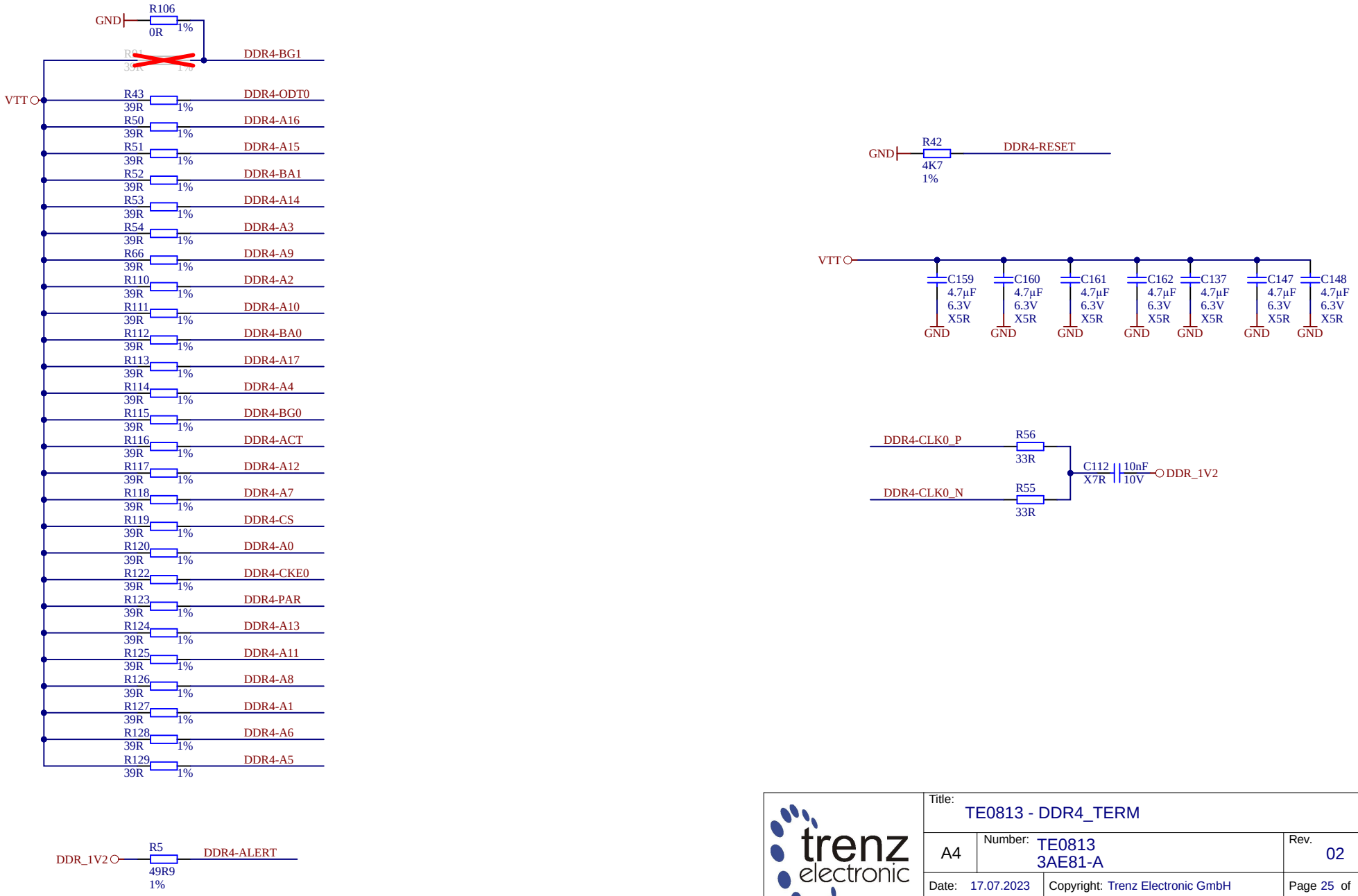
	Date: 17.07.2023	Copyright: Trenz Electronic GmbH	Page 22 of 30
	Filename: DDR4-RAM_2.SchDoc		



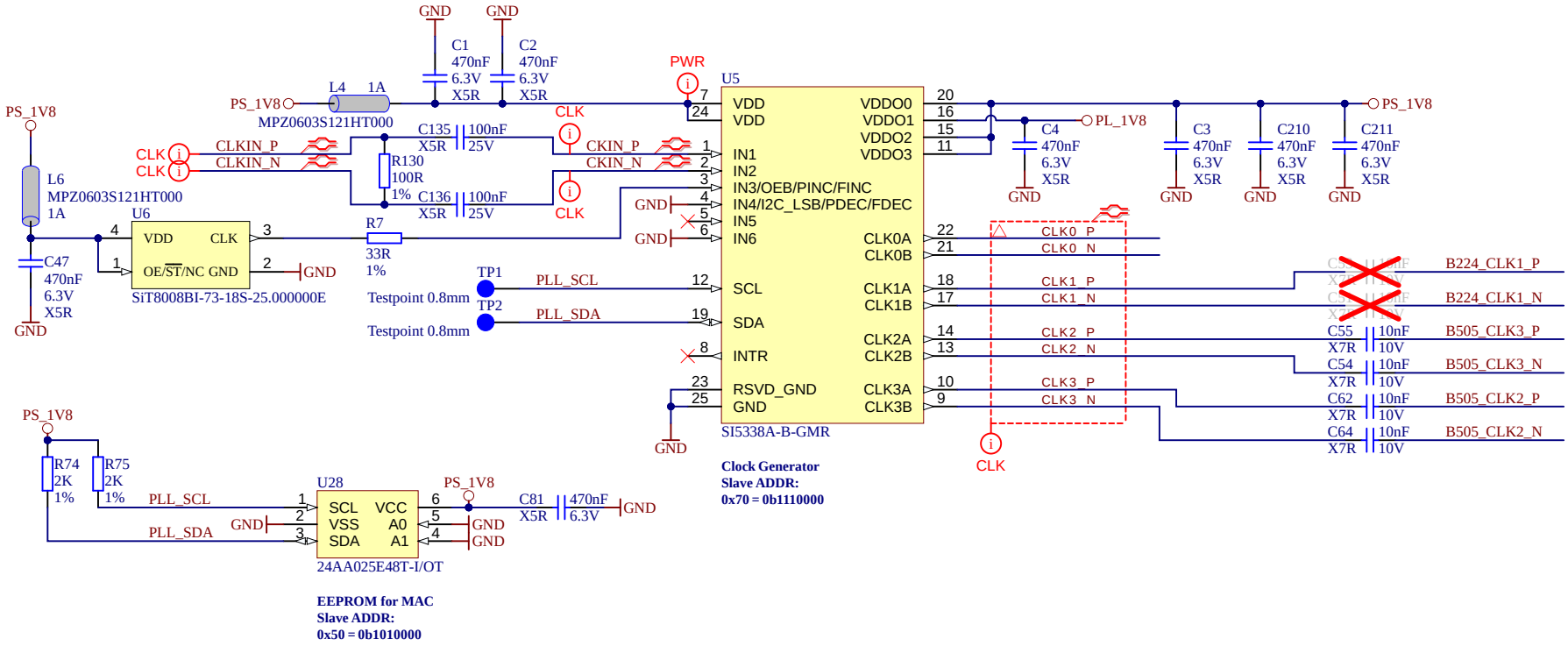
trenz electronic	Title: TE0813 - DDR4_3_RAM		
	A4	Number: TE0813 3AE81-A	Rev. 02
	Date: 17.07.2023	Copyright: Trenz Electronic GmbH	Page 23 of 30
	Filename: DDR4-RAM_3.SchDoc		



trenz electronic	Title: TE0813 - DDR4_4_RAM		
	A4	Number: TE0813 3AE81-A	Rev. 02
	Date: 17.07.2023	Copyright: Trenz Electronic GmbH	Page 24 of 30
	Filename: DDR4-RAM_4.SchDoc		



Title: TE0813 - DDR4_TERM			
A4	Number: TE0813 3AE81-A		Rev. 02
Date: 17.07.2023	Copyright: Trenz Electronic GmbH		Page 25 of 30
Filename: DDR4-TERM.SchDoc			

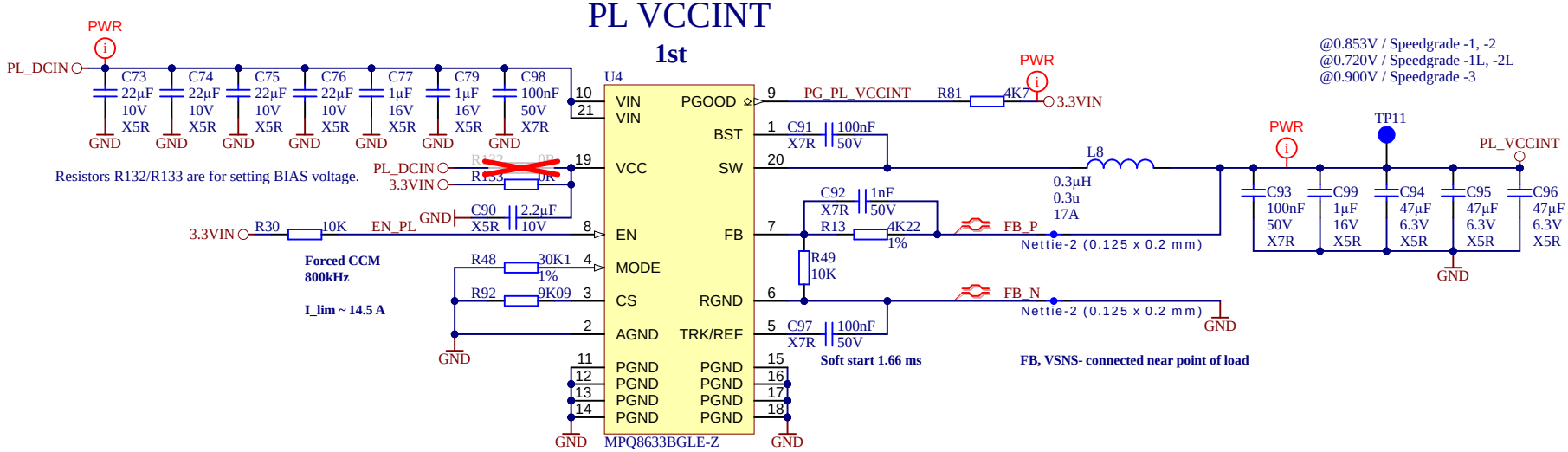


trenz electronic	Title: TE0813 - CLOCK		
	A4	Number: TE0813 3AE81-A	Rev. 02
	Date: 17.07.2023	Copyright: Trenz Electronic GmbH	Page 26 of 30
	Filename: Clock.SchDoc		

U4 can be TPS548A28RWWR 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)

trenz electronic	Title: TE0813 - POWER_1		
A4	Number: TE0813 3AE81-A		Rev. 02
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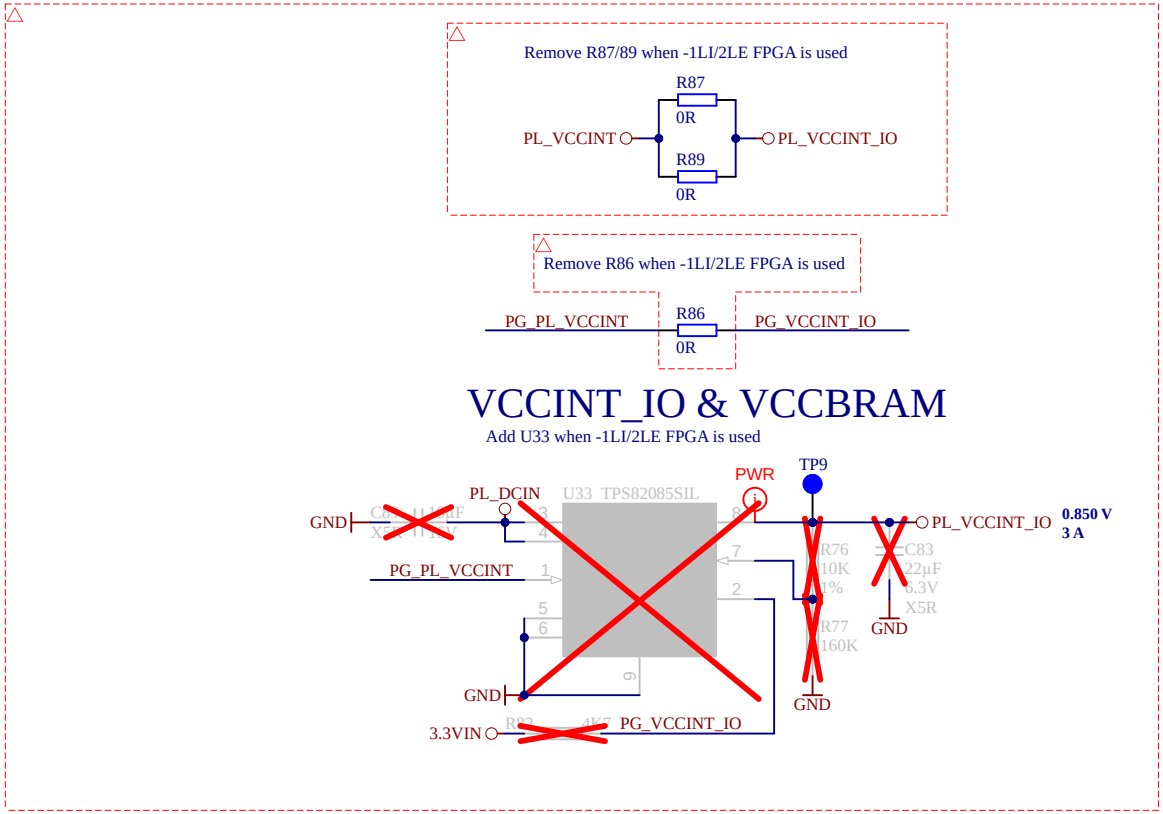
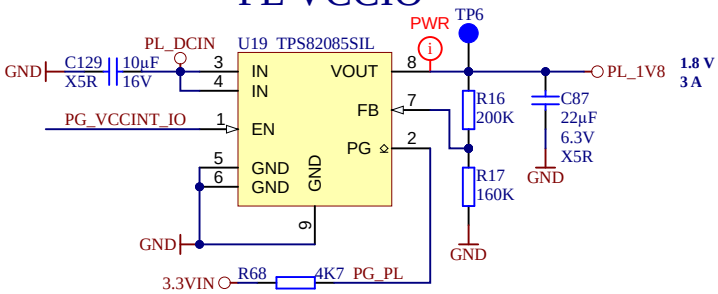
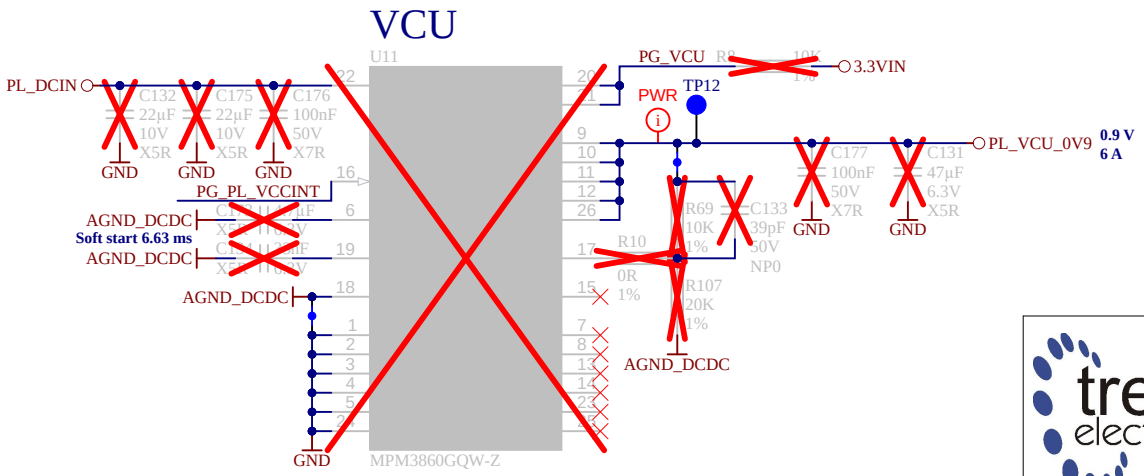
Filename: POWER.SchDoc			







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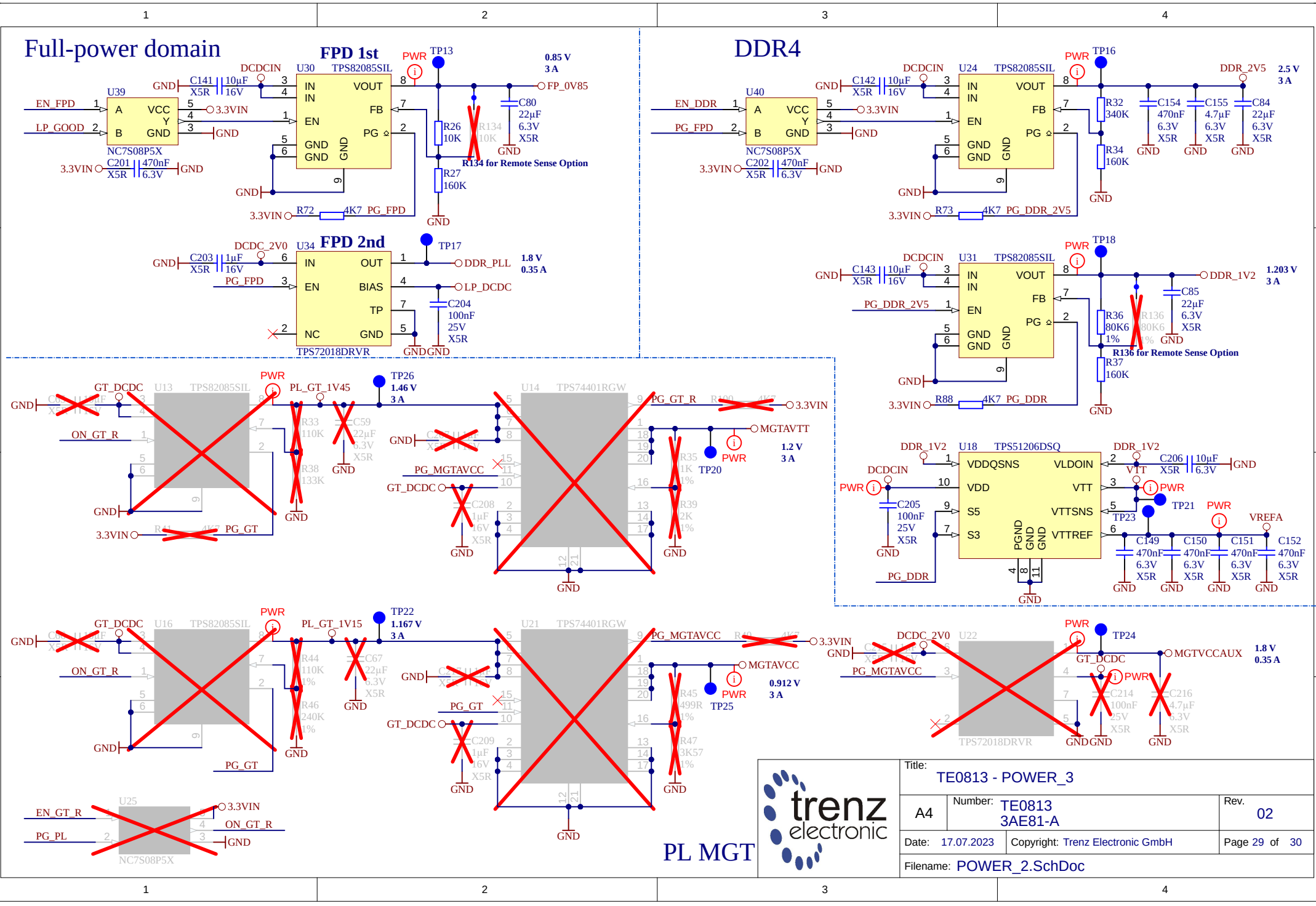
Title: TE0813 - POWER_2			
A4	Number: TE0813 3AE81-A		Rev. 02
Date: 17.07.2023	Copyright: Trenz Electronic GmbH		Page 28 of 30
Filename: POWER_1.SchDoc			


Full-power domain
FPD 1st
FPD 2nd
DDR4
PL MGT
U39 NC7S08P5X
U30 TPS82085SIL
U34 TPS72018DRVR
U40
U24 TPS82085SIL
U31 TPS82085SIL
U18 TPS51206DSQ
U13 TPS82085SIL
U14 TPS74401RGW
U16 TPS82085SIL
U21 TPS74401RGW
U22
U25 NC7S08P5X
TP13
TP16
TP17
TP18
TP20
TP21
TP22
TP23
TP24
TP25
TP26
0.85 V 3 A
1.8 V 0.35 A
2.5 V 3 A
1.203 V 3 A
1.46 V 3 A
1.2 V 3 A
1.167 V 3 A
0.912 V 3 A
R134 for Remote Sense Option
R136 for Remote Sense Option
Title: TE0813 - POWER_3
A4
Number: TE0813 3AE81-A
Rev. 02
Date: 17.07.2023
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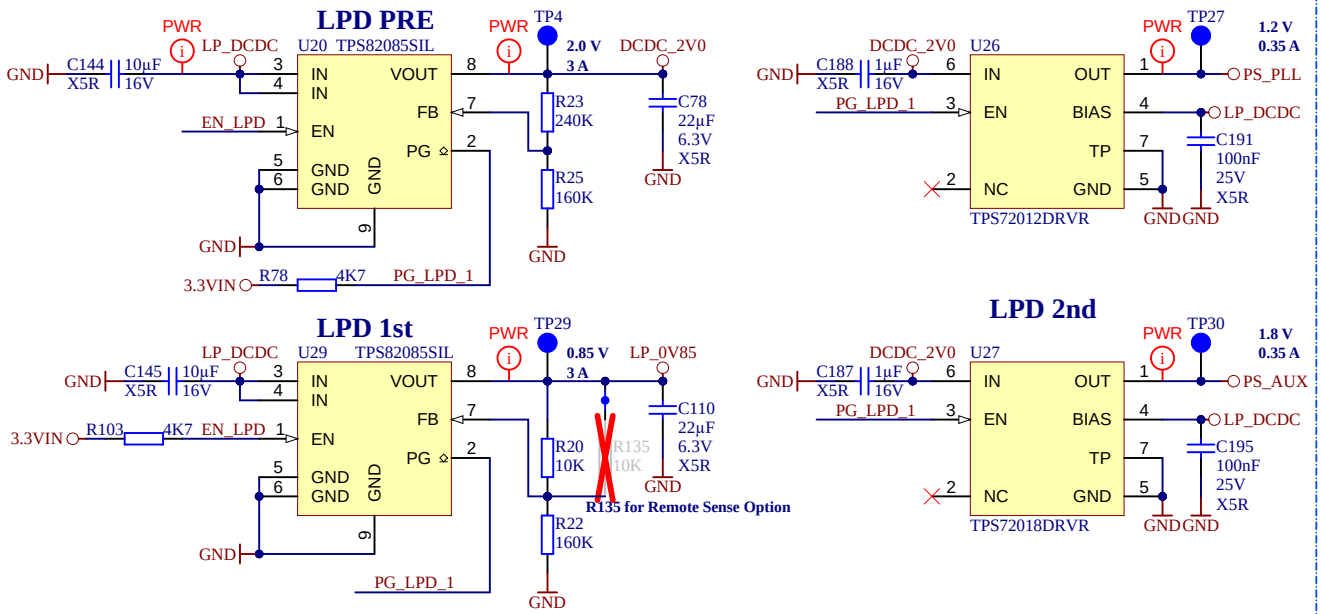
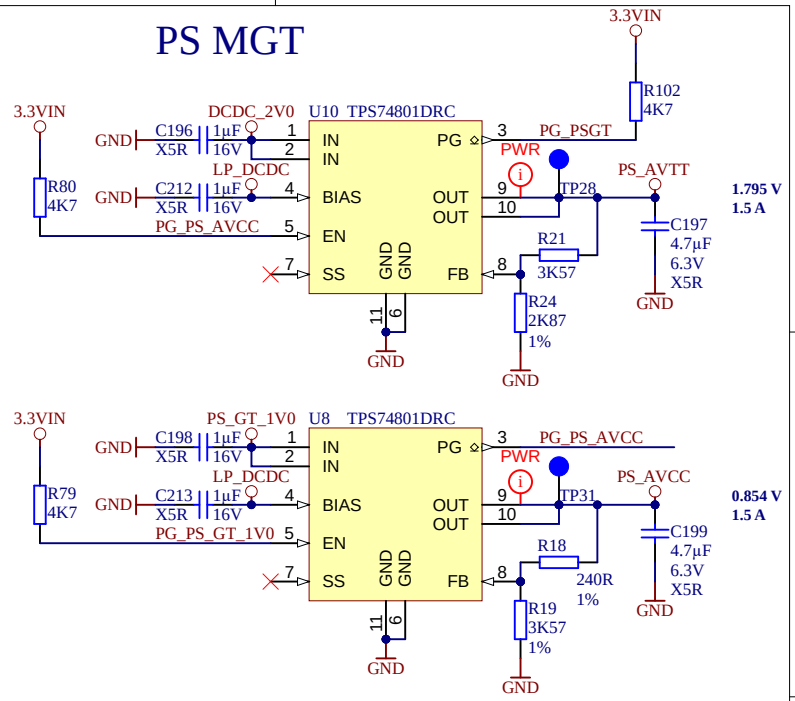
Filename: POWER_2.SchDoc
trenz electronic

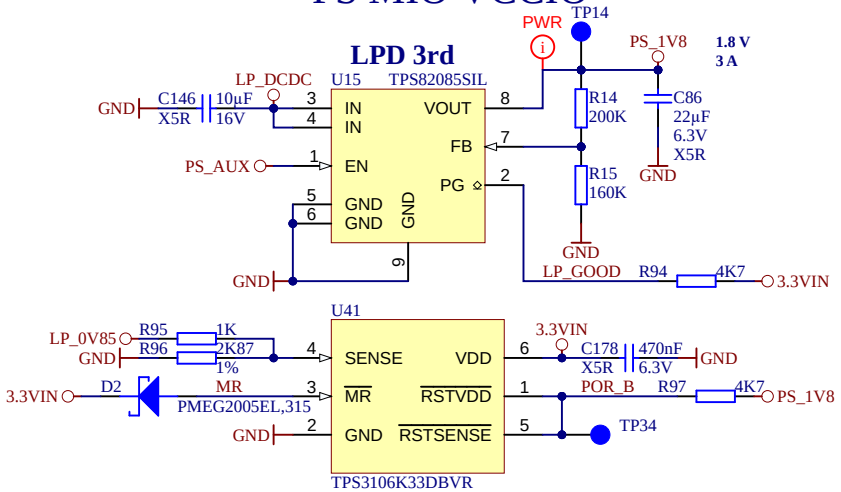
Low-power domain



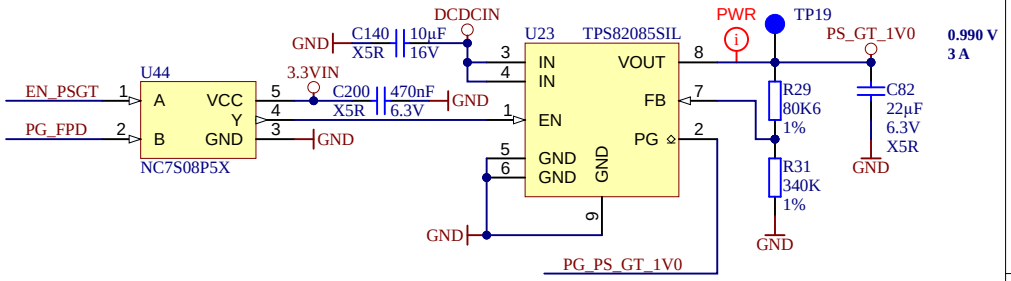
PS MGT



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



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Title: TE0813 - POWER_4		
A4	Number: TE0813 3AE81-A	Rev. 02
Date: 17.07.2023	Copyright: Trenz Electronic GmbH	Page 30 of 30
Filename: POWER_3.SchDoc		