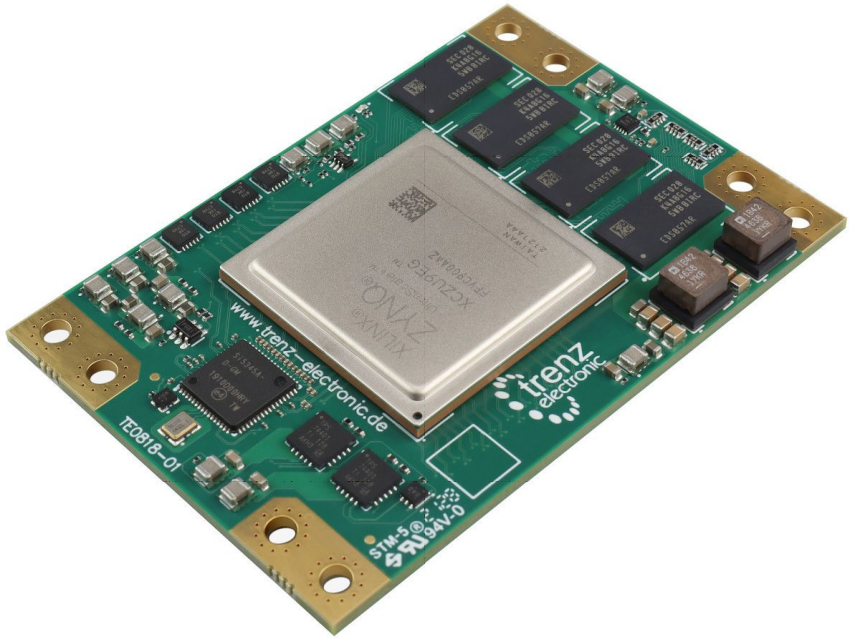

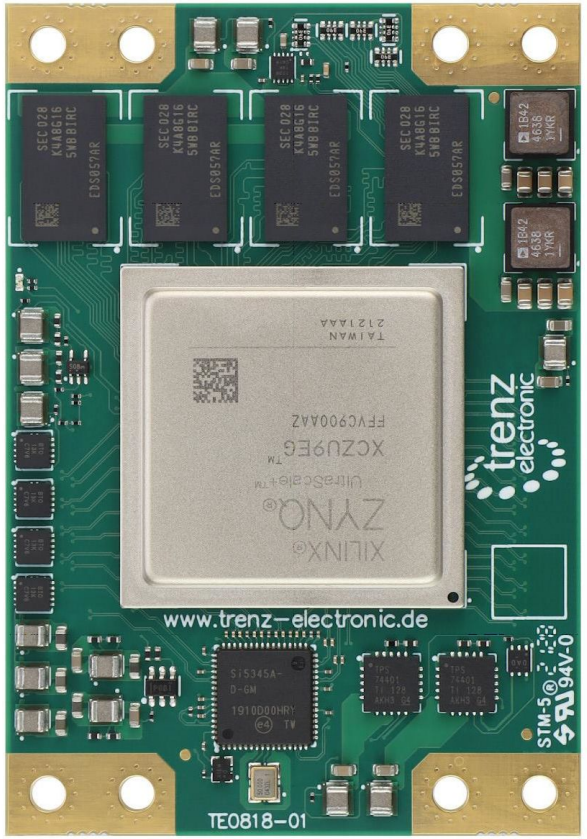

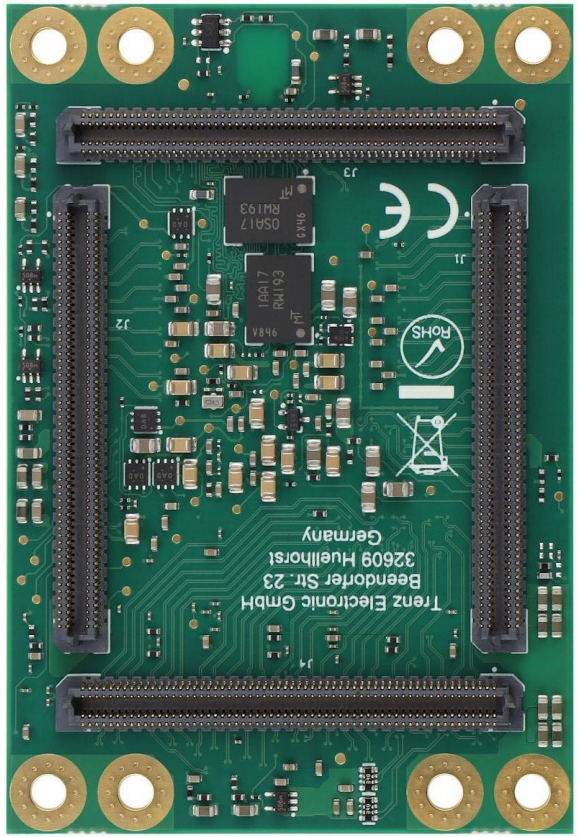

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Project is protected under copyright and we strongly and strictly prohibit the reverse engineering or recreation, even if the design is just adapted or modified.

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Schematics and other handouts serve for informational purposes only!

trenz electronic	Title: TE0818 - Legal Notices		
	A4	Number: TE0818 BBE81-A	Rev. 02
	Date: 19.09.2023	Copyright: Trenz Electronic GmbH	Page 1 of 31
	Filename: Legal Notices Modules.SchDoc		

REV	DATE	Description	
-01	2021-05	Initial revision	VT
-02	2023-10	1. Added capacitors C178, C187, C188, C189 (470nF) to VTT net. 2. Added U18/ U37 compensation network: R119, C190, C191. R118 is optional jumper and is installed when using the internal compensation network. External compensation network is used by default. 3. Connected all DDR4 TEN pins together and pulled them down with resistor R120 and added testpoint TP23. 4. Added testpoints TP25, TP27, TP29, TP35, TP37... TP79. 5. Changed capacitor C112 size from 0402 to 0201 and voltage rating from 16 V to 10 V. 6. Changed ferrid beads from MPZ0603S121HT000 to BLM15PX800SZ1D for L1, L2, L3, L4, L5, and L7. 7. Changed ferrid beads from MPZ1608S221A to BLM15PX800SZ1D for L6 and L8. 8. Added diode D2 between U41 pin 3 net MR and voltage rail 3.3VIN. 9. Modified trace length. 10. Updated documentation overviews.	VY/ED
-02a	2023-10-12	1. Changed inductors L1... L8 from BLM15PX800SZ1D to BLM15PX800SN1D.	ED

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Title: TE0818 - Revision History

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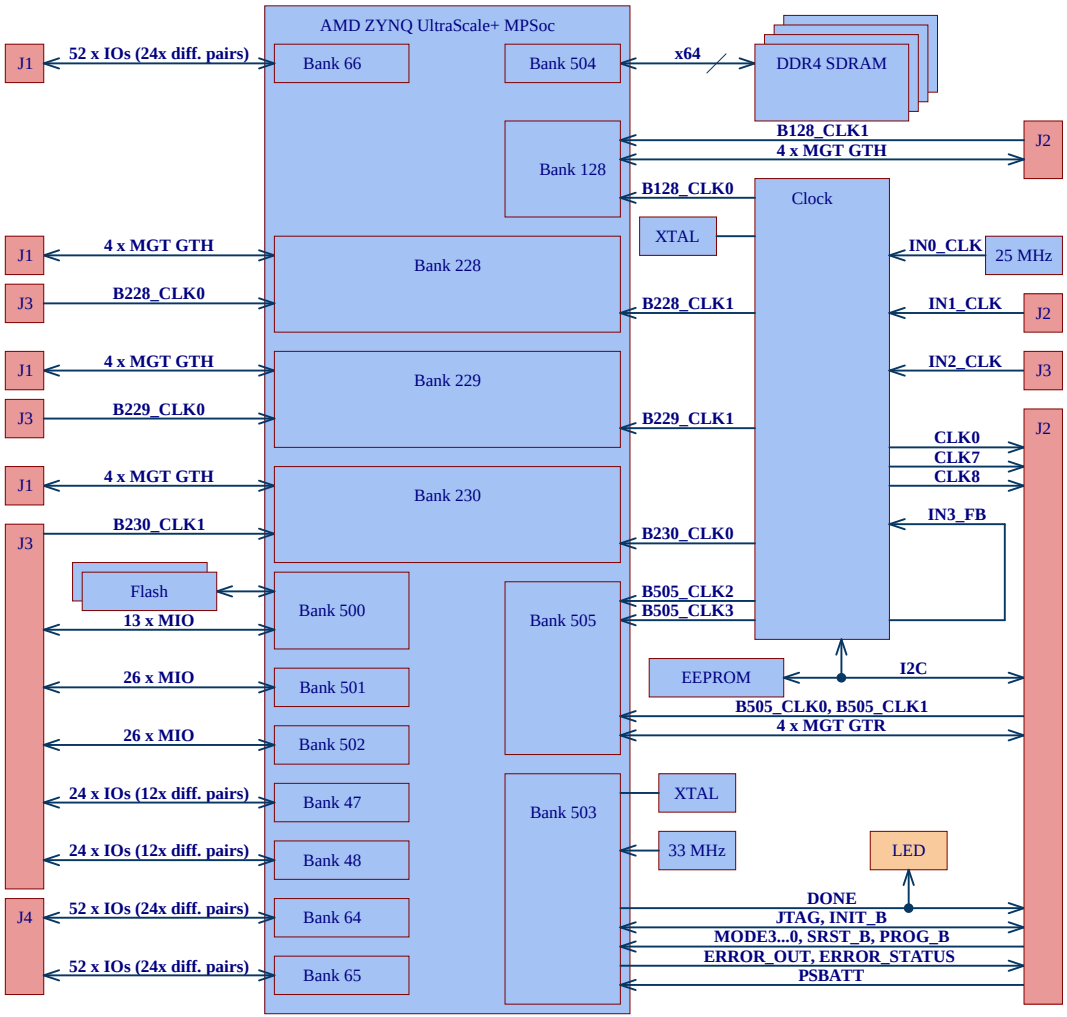

Supported Voltage Ranges:

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_47	IN	1.2 V - 3.3 V	+/- 3 %	HD IO Bank 47	Supplied by external power rail via B2B connector
VCCO_48	IN	1.2 V - 3.3 V	+/- 3 %	HD IO Bank 48	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
PLL_3V3	IN	3.3 V	+/- 3 %	Power for PLL	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	0x69	-
EEPROM U4	0x50	-

Legend:

- B2B Connector
- LED Interface
- On-board Components

TE0818	ZU_POWER	POWER	POWER_3
DDR4-TERM	ZU_PS_POWER	POWER_2	POWER_4

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Title: TE0818 - System Overview

A4	Number: TE0818 BBE81-A	Rev. 02
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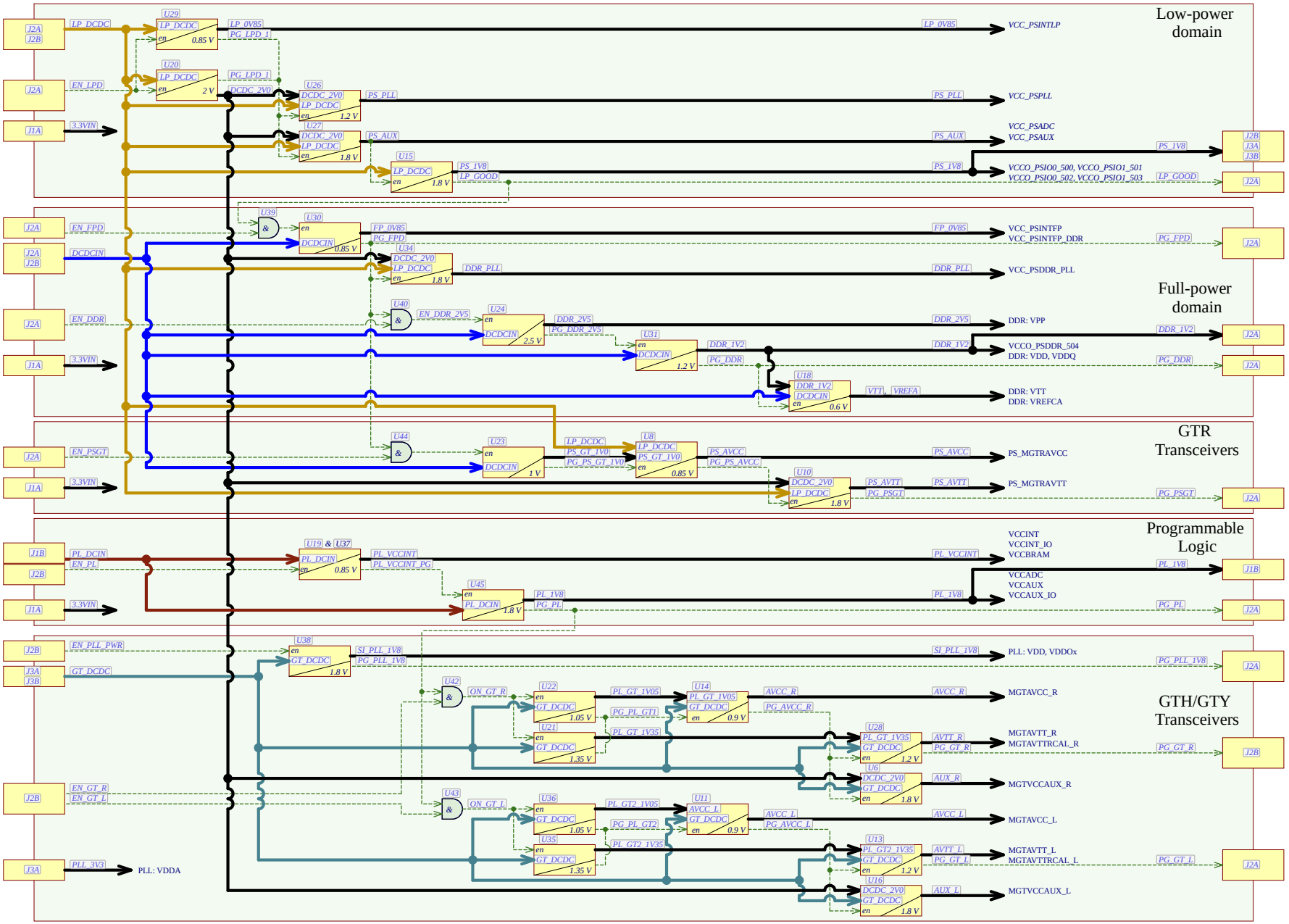
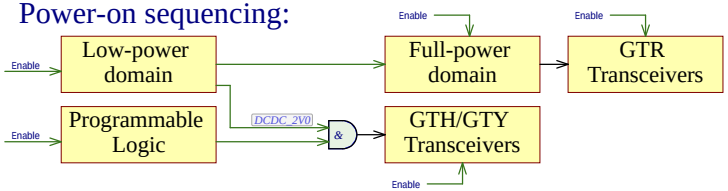


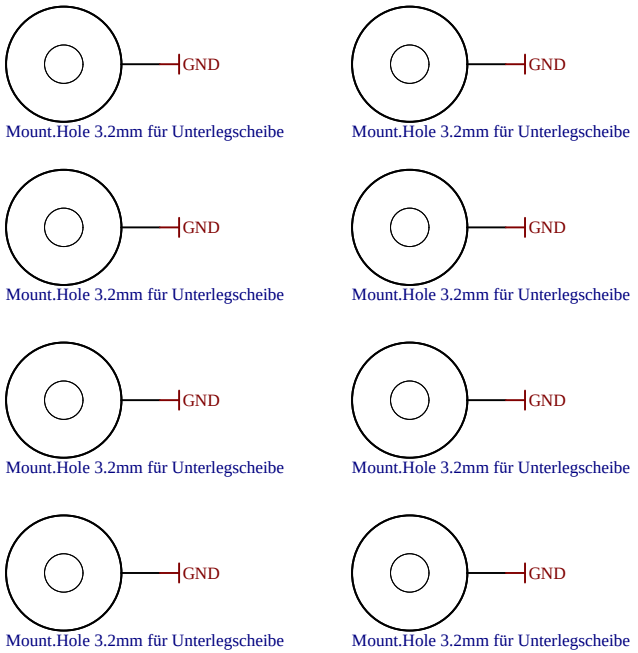
Power-on sequencing:



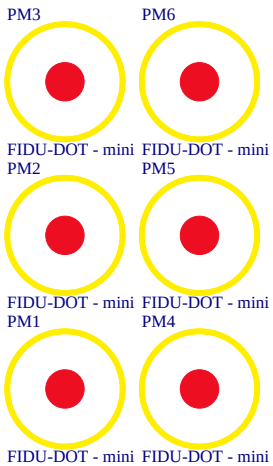
EN_GT_R — Net name
Power bus
Control signal
PL_DCIN 0.9V — Power converter
& — Logic AND gate

Title: TE0818 - Power Diagram			
A3	Nummer: TE0818 BBE81-A		Rev. 02
Datum: 19.09.2023	Copyright:Trenz Electronic GmbH		Page 4 of 31
Filename: Power_Diagram.SchDoc			

Special notes:



Serial
Serial
Serialnumber 6,3 x 6.3mm
LOGO1
TE Logo PRINT Layer
LOGO PRINT
MECH1
TE Address Overlay
LOGO ADDRESS
CE
CE Logo on Top Overlay
CE-TOPOVERLAY
RoHS
RoHS Logo on Top Overlay
RoHS-TOPOVERLAY
WEEE
WEEE Logo on Top Overlay
WEEE-TOPOVERLAY



Design drawn by:	ED
Checked by:	VY
Assembly variant:	BBE81-A
Created by:	ED
Modified by:	ED
Modified at:	2023-09-20

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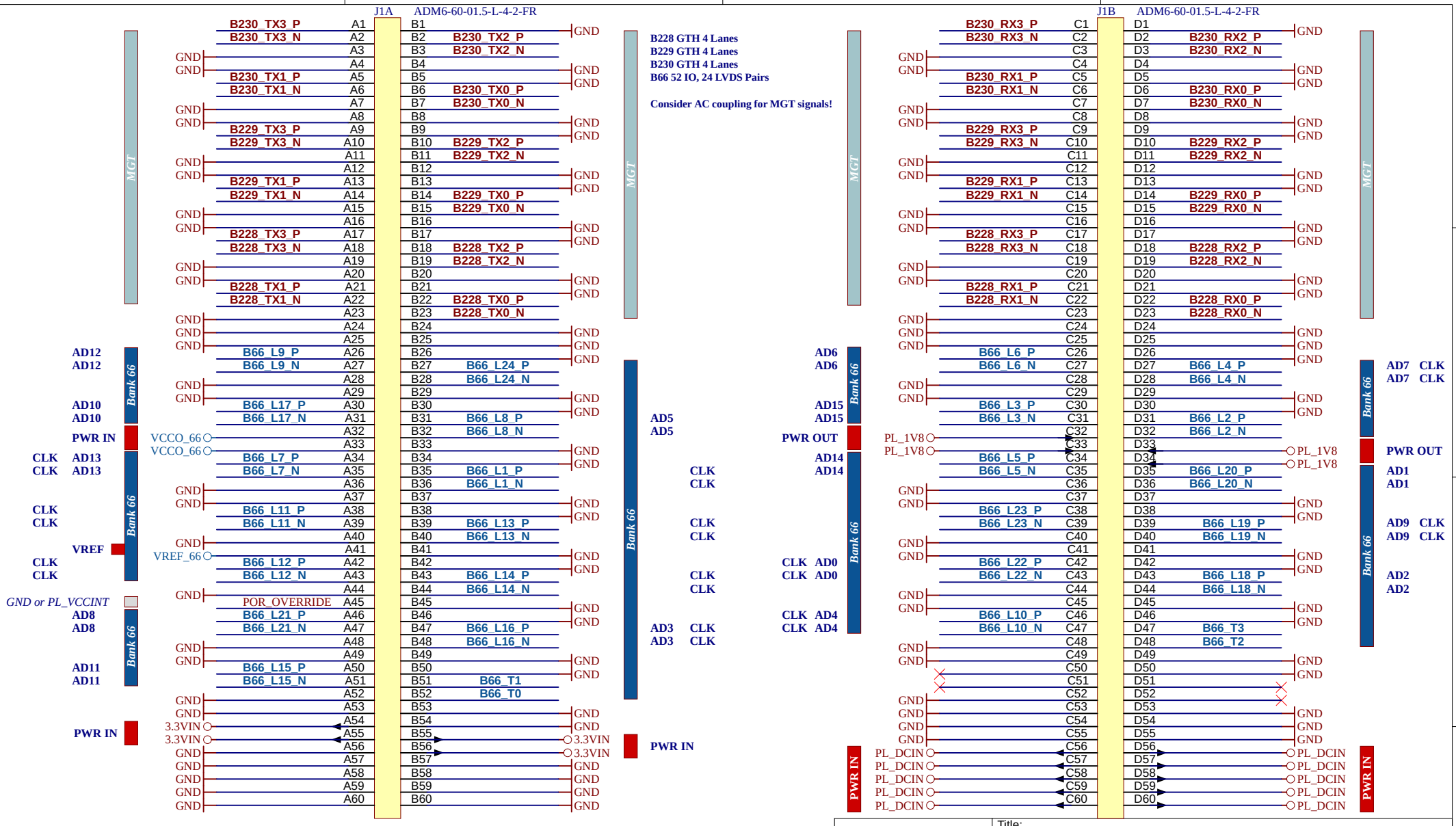
Title: TE0818		
A4	Number: TE0818 BBE81-A	Rev. 02
Date: 26.09.2023	Copyright: Trenz Electronic GmbH	Page 5 of 31
Filename: TE0818.SchDoc		


J1A ADM6-60-01.5-L-4-2-FR
J1B ADM6-60-01.5-L-4-2-FR
B230_TX3_P A1 B1
B230_TX3_N A2 B2 B230_TX2_P GND
A3 B3 B230_TX2_N
GND GND A4 B4
GND GND B230_TX1_P A5 B5
B230_TX1_N A6 B6 B230_TX0_P
A7 B7 B230_TX0_N
GND GND A8 B8
GND GND B229_TX3_P A9 B9
B229_TX3_N A10 B10 B229_TX2_P
A11 B11 B229_TX2_N
GND GND A12 B12
GND GND B229_TX1_P A13 B13
B229_TX1_N A14 B14 B229_TX0_P
A15 B15 B229_TX0_N
GND GND A16 B16
GND GND B228_TX3_P A17 B17
B228_TX3_N A18 B18 B228_TX2_P
A19 B19 B228_TX2_N
GND GND A20 B20
GND GND B228_TX1_P A21 B21
B228_TX1_N A22 B22 B228_TX0_P
A23 B23 B228_TX0_N
GND GND A24 B24
GND GND A25 B25
GND GND B66_L9_P A26 B26
B66_L9_N A27 B27 B66_L24_P
A28 B28 B66_L24_N
GND GND A29 B29
GND GND B66_L17_P A30 B30
B66_L17_N A31 B31 B66_L8_P
VCCO_66 VCCO_66 A32 B32 B66_L8_N
A33 B33
GND GND B66_L7_P A34 B34
B66_L7_N A35 B35 B66_L1_P
A36 B36 B66_L1_N
GND GND A37 B37
GND GND B66_L11_P A38 B38
B66_L11_N A39 B39 B66_L13_P
A40 B40 B66_L13_N
GND VREF_66 A41 B41
GND GND B66_L12_P A42 B42
B66_L12_N A43 B43 B66_L14_P
A44 B44 B66_L14_N
GND POR_OVERRIDE A45 B45
GND GND B66_L21_P A46 B46
B66_L21_N A47 B47 B66_L16_P
A48 B48 B66_L16_N
GND GND A49 B49
GND GND B66_L15_P A50 B50
B66_L15_N A51 B51 B66_T1
A52 B52 B66_T0
GND GND A53 B53
GND GND A54 B54
3.3VIN 3.3VIN A55 B55 3.3VIN
A56 B56 3.3VIN
GND GND A57 B57
GND GND A58 B58
GND GND A59 B59
GND GND A60 B60
MGT
Bank 66
AD12 AD12
AD10 AD10
PWR IN
CLK AD13 CLK AD13
CLK CLK
VREF
CLK CLK
GND or PL_VCCINT
AD8 AD8
AD11 AD11
PWR IN
B228 GTH 4 Lanes
B229 GTH 4 Lanes
B230 GTH 4 Lanes
B66 52 IO, 24 LVDS Pairs
Consider AC coupling for MGT signals!
AD5 AD5
CLK CLK
CLK CLK
CLK CLK
AD3 CLK AD3 CLK
PWR IN
AD6 AD6
AD15 AD15
PWR OUT
AD14 AD14
CLK AD0 CLK AD0
CLK AD4 CLK AD4
PWR IN
B230_RX3_P C1 D1
B230_RX3_N C2 D2 B230_RX2_P GND
C3 D3 B230_RX2_N
GND GND C4 D4
GND GND B230_RX1_P C5 D5
B230_RX1_N C6 D6 B230_RX0_P
C7 D7 B230_RX0_N
GND GND C8 D8
GND GND B229_RX3_P C9 D9
B229_RX3_N C10 D10 B229_RX2_P
C11 D11 B229_RX2_N
GND GND C12 D12
GND GND B229_RX1_P C13 D13
B229_RX1_N C14 D14 B229_RX0_P
C15 D15 B229_RX0_N
GND GND C16 D16
GND GND B228_RX3_P C17 D17
B228_RX3_N C18 D18 B228_RX2_P
C19 D19 B228_RX2_N
GND GND C20 D20
GND GND B228_RX1_P C21 D21
B228_RX1_N C22 D22 B228_RX0_P
C23 D23 B228_RX0_N
GND GND C24 D24
GND GND C25 D25
GND GND B66_L6_P C26 D26
B66_L6_N C27 D27 B66_L4_P
C28 D28 B66_L4_N
GND GND C29 D29
GND GND B66_L3_P C30 D30
B66_L3_N C31 D31 B66_L2_P
PL_1V8 PL_1V8 C32 D32 B66_L2_N
C33 D33 PL_1V8
B66_L5_P C34 D34 PL_1V8
B66_L5_N C35 D35 B66_L20_P
C36 D36 B66_L20_N
GND GND C37 D37
GND GND B66_L23_P C38 D38
B66_L23_N C39 D39 B66_L19_P
C40 D40 B66_L19_N
GND GND C41 D41
GND GND B66_L22_P C42 D42
B66_L22_N C43 D43 B66_L18_P
C44 D44 B66_L18_N
GND GND C45 D45
GND GND B66_L10_P C46 D46
B66_L10_N C47 D47 B66_T3
C48 D48 B66_T2
GND GND C49 D49
GND GND C50 D50
C51 D51
GND C52 D52
GND GND C53 D53
GND GND C54 D54
GND GND C55 D55
GND C56 D56
PL_DCIN PL_DCIN C57 D57 PL_DCIN
PL_DCIN PL_DCIN C58 D58 PL_DCIN
PL_DCIN PL_DCIN C59 D59 PL_DCIN
PL_DCIN C60 D60 PL_DCIN
MGT
Bank 66
AD7 CLK AD7 CLK
PWR OUT
AD1 AD1
AD9 CLK AD9 CLK
AD2 AD2
PWR IN
Bank 47 HD 0..VCCO47
Bank 48 HD 0..VCCO48
Bank 64 HP 0..VCCO64
Bank 65 HP 0..VCCO65
Bank 66 HP 0..VCCO66
GND TP8
PL_DCIN TP7
TP37
3.3VIN TP68
3.3VIN TP69
trenz electronic
Title: TE0818 - Connector J1
A4
Number: TE0818 BBE81-A
Rev. 02
Date: 26.09.2023
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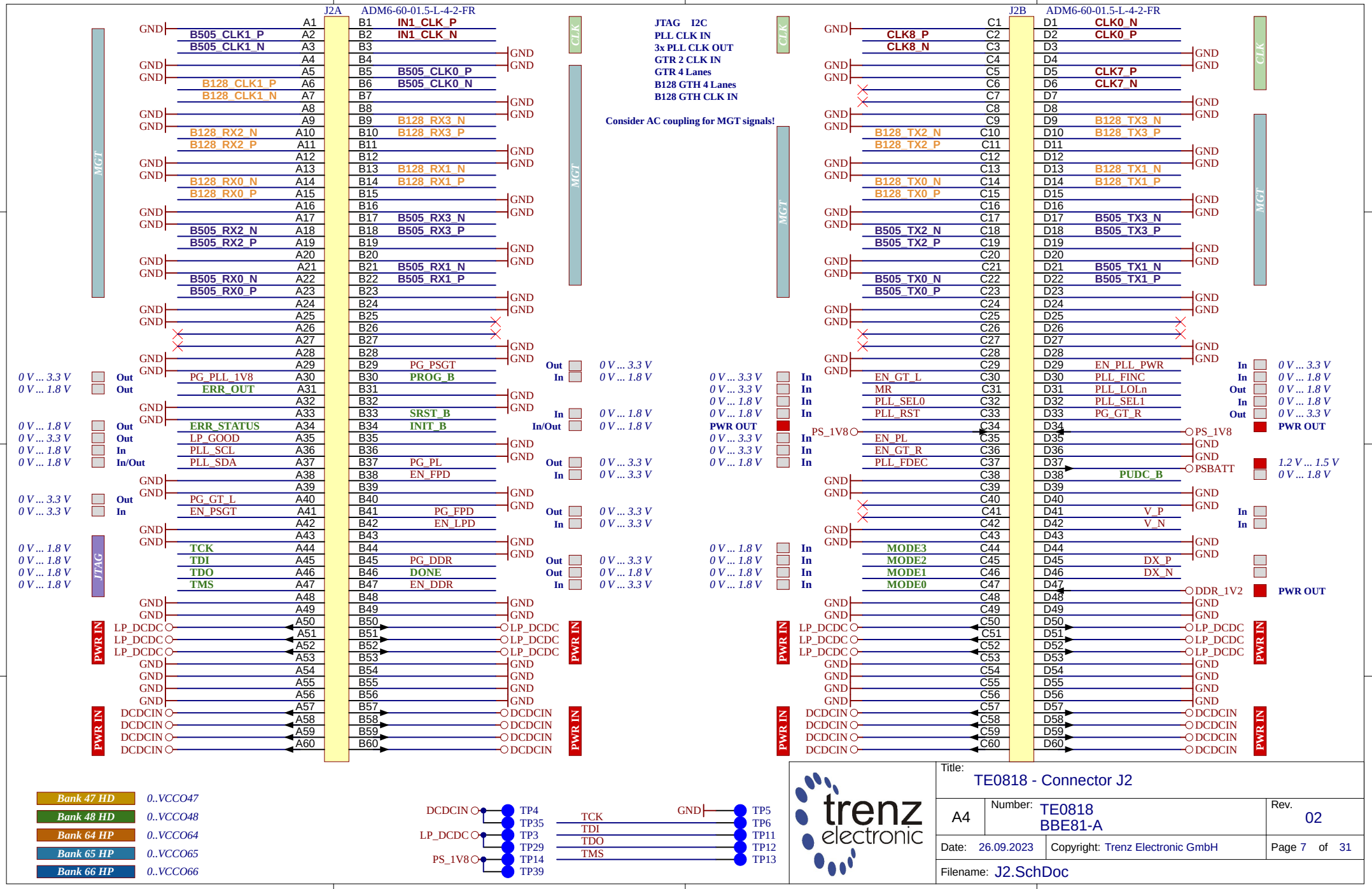
Filename: J1.SchDoc


J2A
ADM6-60-01.5-L-4-2-FR
J2B
ADM6-60-01.5-L-4-2-FR
JTAG I2C
PLL CLK IN
3x PLL CLK OUT
GTR 2 CLK IN
GTR 4 Lanes
B128 GTH 4 Lanes
B128 GTH CLK IN
Consider AC coupling for MGT signals!
Bank 47 HD 0..VCCO47
Bank 48 HD 0..VCCO48
Bank 64 HP 0..VCCO64
Bank 65 HP 0..VCCO65
Bank 66 HP 0..VCCO66
Title: TE0818 - Connector J2
A4
Number: TE0818 BBE81-A
Rev. 02
Date: 26.09.2023
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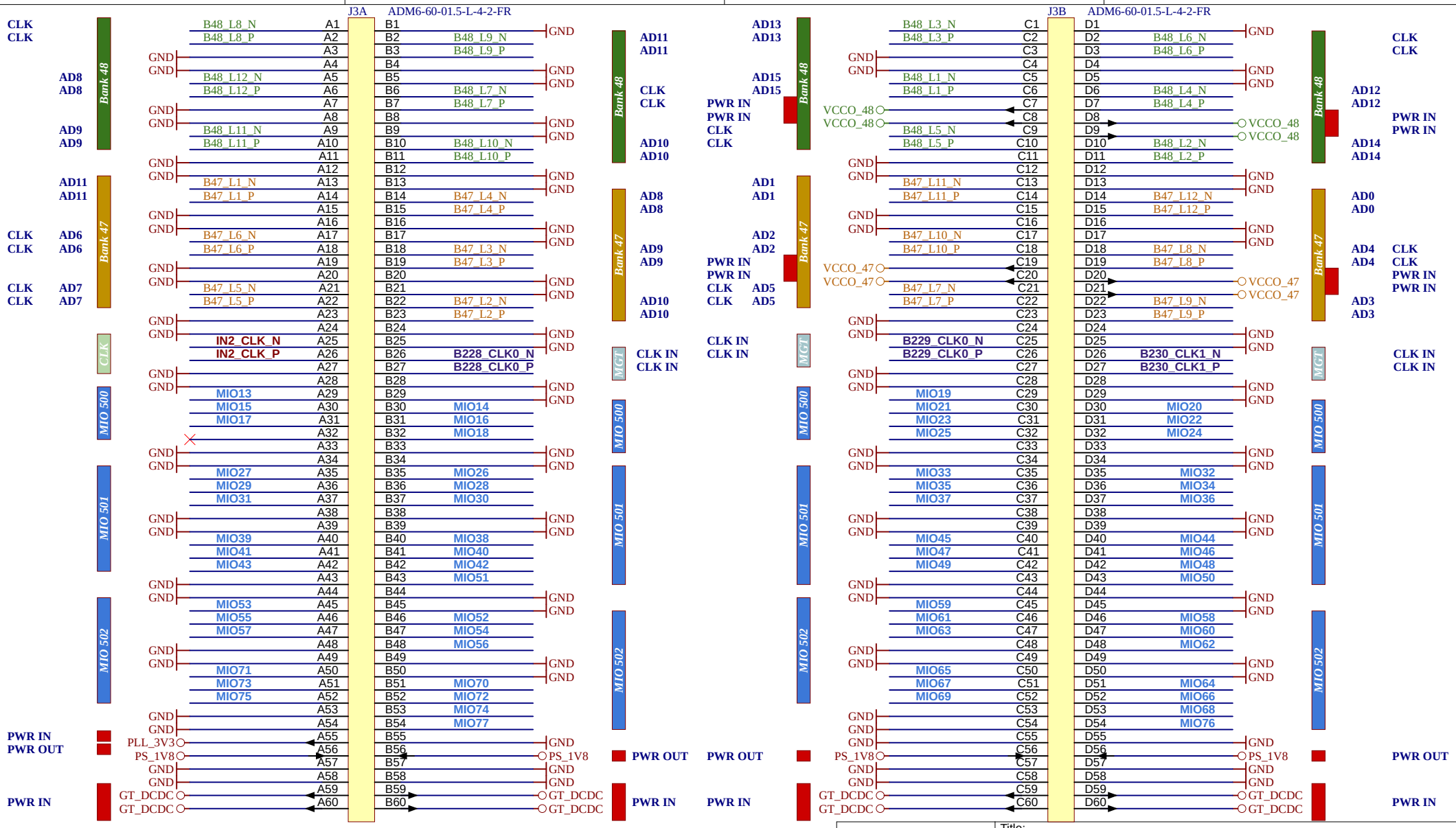
Filename: J2.SchDoc


J3A ADM6-60-01.5-L-4-2-FR
J3B ADM6-60-01.5-L-4-2-FR
Bank 48
Bank 47
CLK
MGT
MIO 500
MIO 501
MIO 502
B48_L8_N B48_L8_P B48_L12_N B48_L12_P B48_L11_N B48_L11_P B47_L1_N B47_L1_P B47_L6_N B47_L6_P B47_L5_N B47_L5_P
B48_L3_N B48_L3_P B48_L1_N B48_L1_P B48_L5_N B48_L5_P B47_L11_N B47_L11_P B47_L10_N B47_L10_P B47_L7_N B47_L7_P
B48_L9_N B48_L9_P B48_L7_N B48_L7_P B48_L10_N B48_L10_P B47_L4_N B47_L4_P B47_L3_N B47_L3_P B47_L2_N B47_L2_P
B48_L6_N B48_L6_P B48_L4_N B48_L4_P B48_L2_N B48_L2_P B47_L12_N B47_L12_P B47_L8_N B47_L8_P B47_L9_N B47_L9_P
IN2_CLK_N IN2_CLK_P B228_CLK0_N B228_CLK0_P B229_CLK0_N B229_CLK0_P B230_CLK1_N B230_CLK1_P
MIO13 MIO15 MIO17 MIO27 MIO29 MIO31 MIO39 MIO41 MIO43 MIO53 MIO55 MIO57 MIO71 MIO73 MIO75
MIO14 MIO16 MIO18 MIO26 MIO28 MIO30 MIO38 MIO40 MIO42 MIO51 MIO52 MIO54 MIO56 MIO70 MIO72 MIO74 MIO77
MIO19 MIO21 MIO23 MIO25 MIO33 MIO35 MIO37 MIO45 MIO47 MIO49 MIO59 MIO61 MIO63 MIO65 MIO67 MIO69
MIO20 MIO22 MIO24 MIO32 MIO34 MIO36 MIO44 MIO46 MIO48 MIO50 MIO58 MIO60 MIO62 MIO64 MIO66 MIO68 MIO76
PLL_3V3 PS_1V8 GT_DCDC VCCO_48 VCCO_47 GND
PWR IN PWR OUT CLK IN AD0 AD1 AD2 AD3 AD4 AD5 AD7 AD8 AD9 AD10 AD11 AD12 AD13 AD14 AD15
Bank 47 HD 0..VCCO47
Bank 48 HD 0..VCCO48
Bank 64 HP 0..VCCO64
Bank 65 HP 0..VCCO65
Bank 66 HP 0..VCCO66
B47 24 IO, 12 LVDS Pairs
B48 24 IO, 12 LVDS Pairs
B228 GTH CLK IN
B229 GTH CLK IN
B230 GTH CLK IN
65 MIO
PLL CLK IN
GND GT_DCDC TP10 TP38 TP9
trenz electronic
Title: TE0818 - Connector J3
A4
Number: TE0818 BBE81-A
Rev. 02
Date: 26.09.2023
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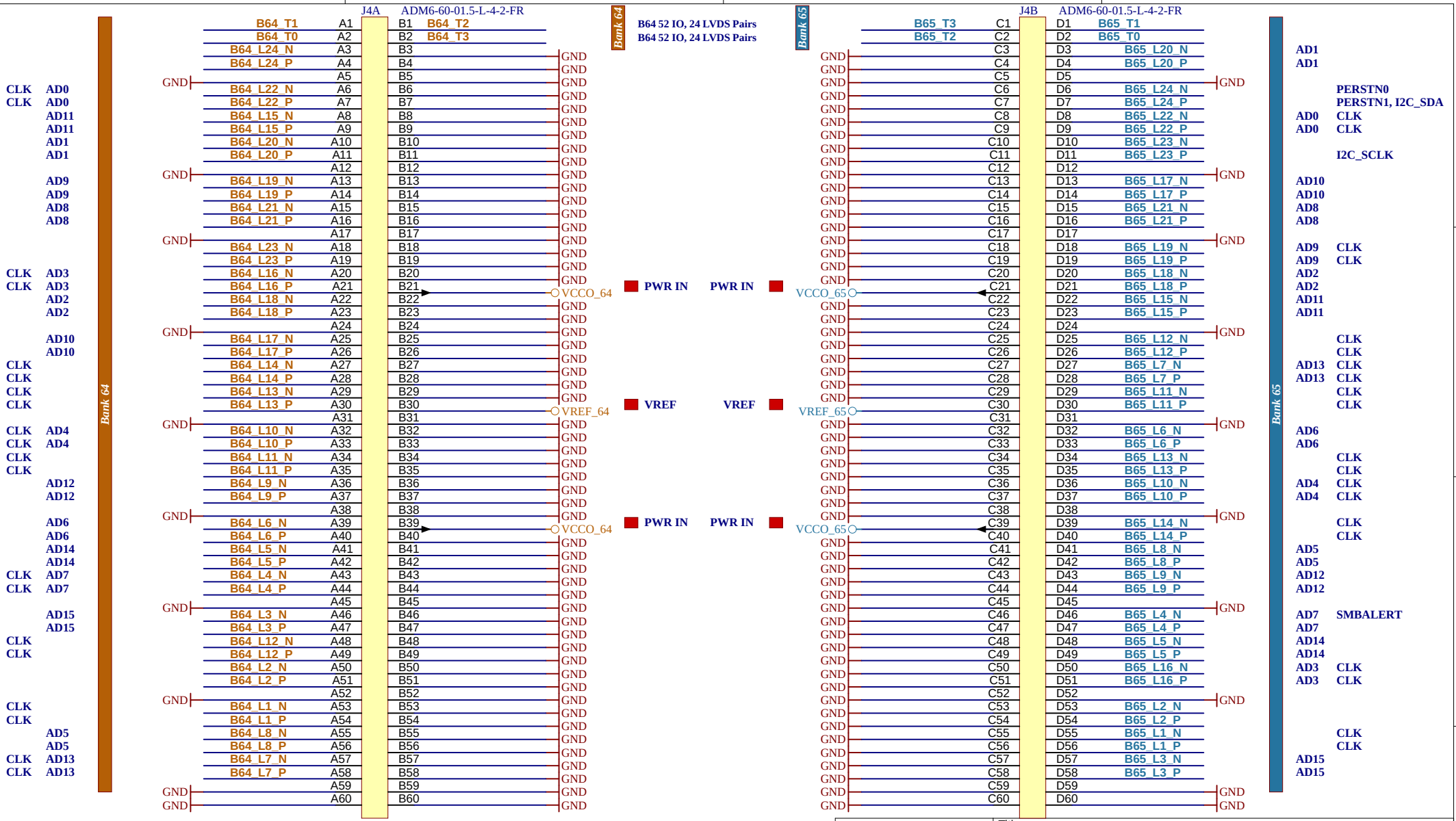
Filename: J3.SchDoc



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A4	Number: TE0818 BBE81-A	Rev. 02
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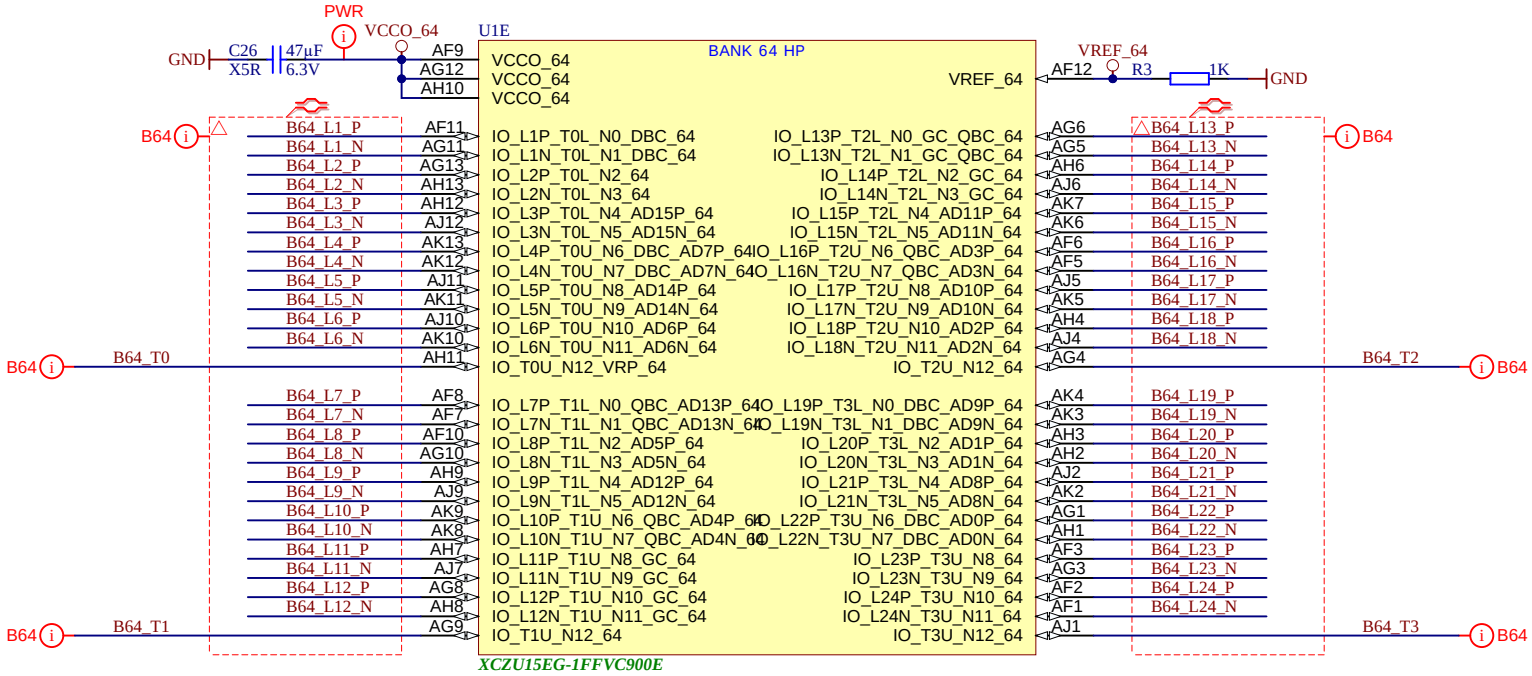
trenz electronic	Title: TE0818 - HD Bank		
A4	Number: TE0818 BBE81-A		Rev. 02
Date: 26.09.2023	Copyright: Trenz Electronic GmbH		Page 10 of 31
Filename: B_HD.SchDoc			



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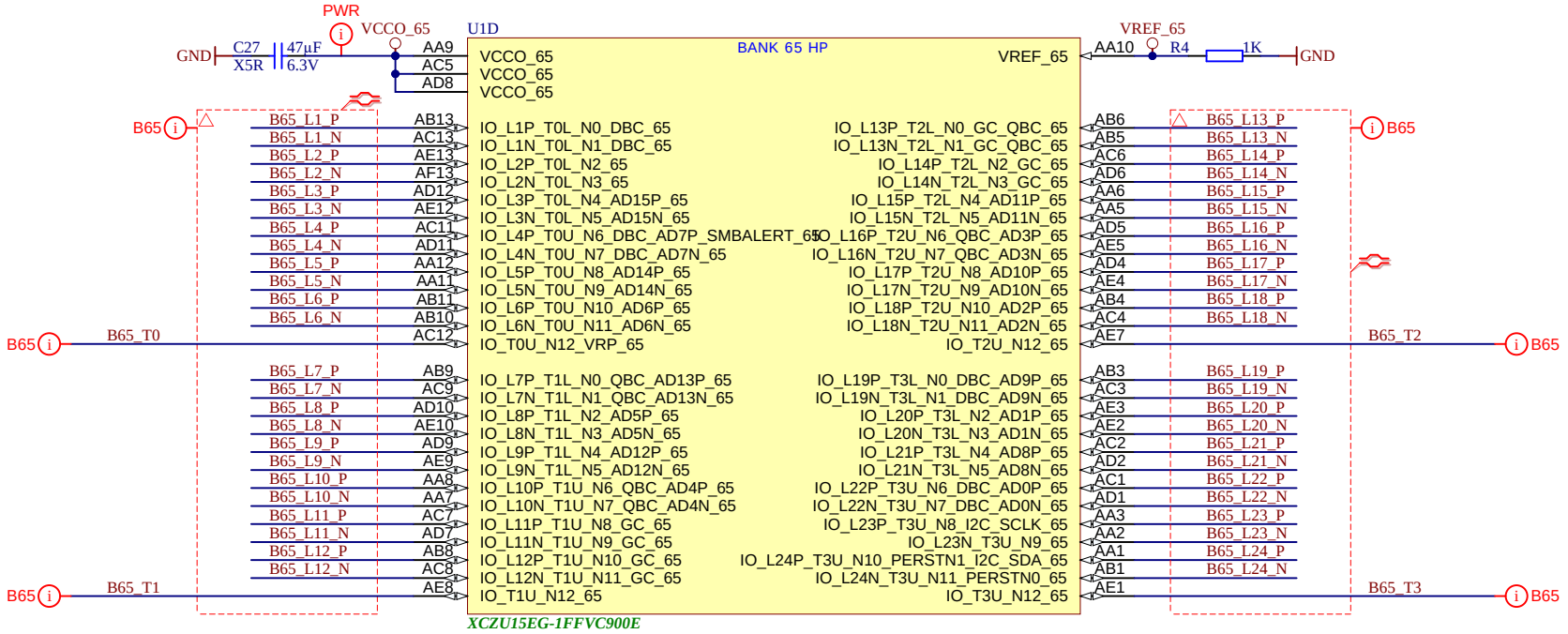
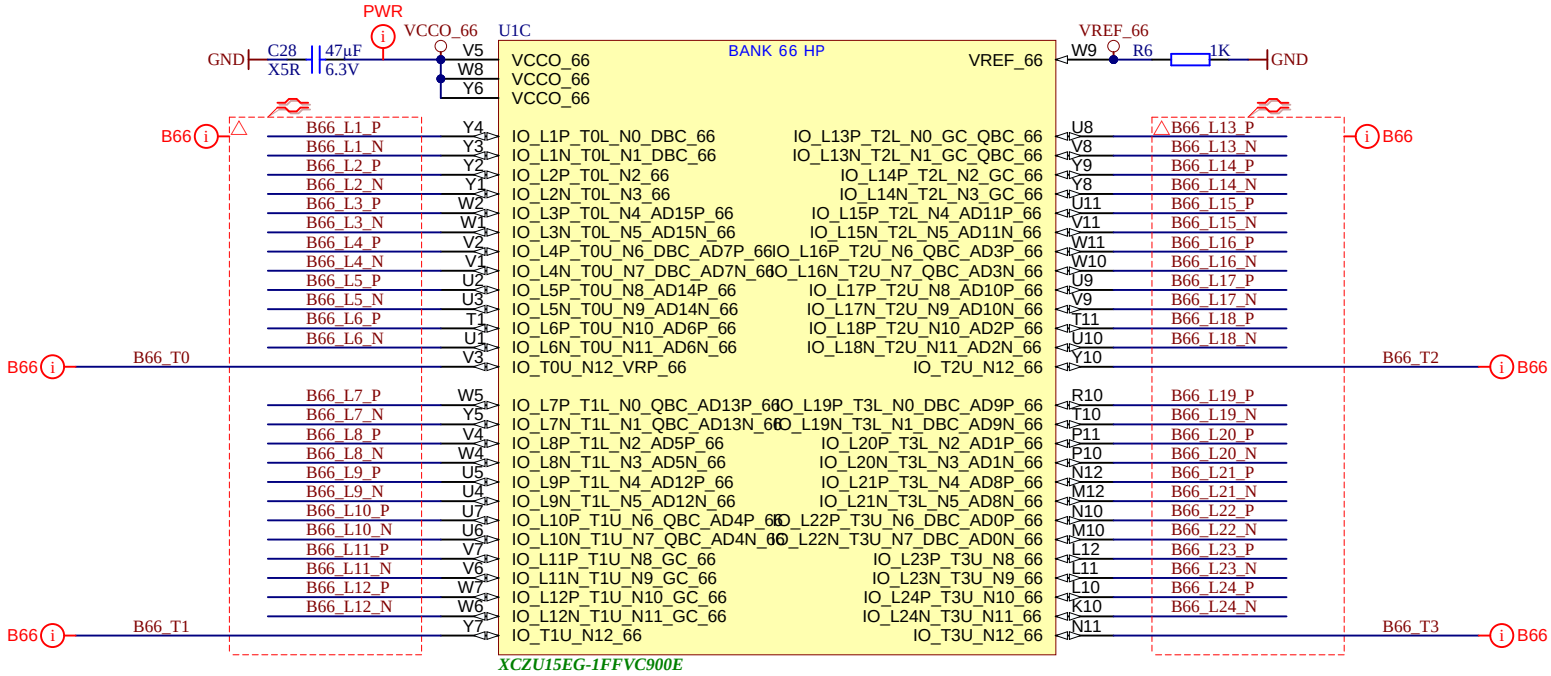
Date: 26.09.2023	Copyright: Trenz Electronic GmbH		Page 11 of 31
Filename: B64.SchDoc			



trenz electronic	Title: TE0818 - HP Bank 2		
A4	Number: TE0818 BBE81-A		Rev. 02
Date: 26.09.2023	Copyright: Trenz Electronic GmbH		Page 12 of 31
Filename: B65.SchDoc			



trenz electronic	Title: TE0818 - HP Bank 3		
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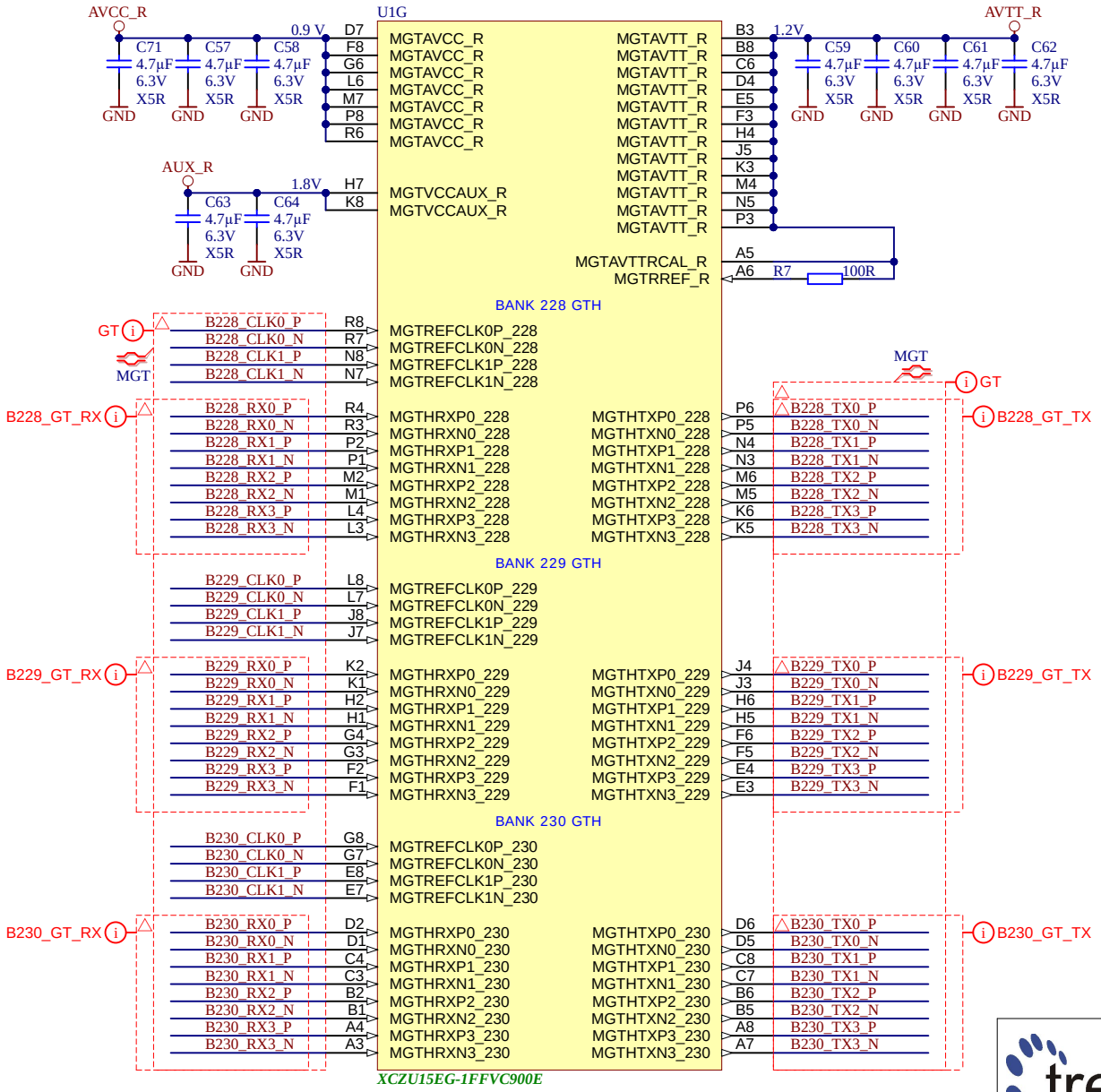
Date: 26.09.2023	Copyright: Trenz Electronic GmbH		Page 13 of 31
Filename: B66.SchDoc			



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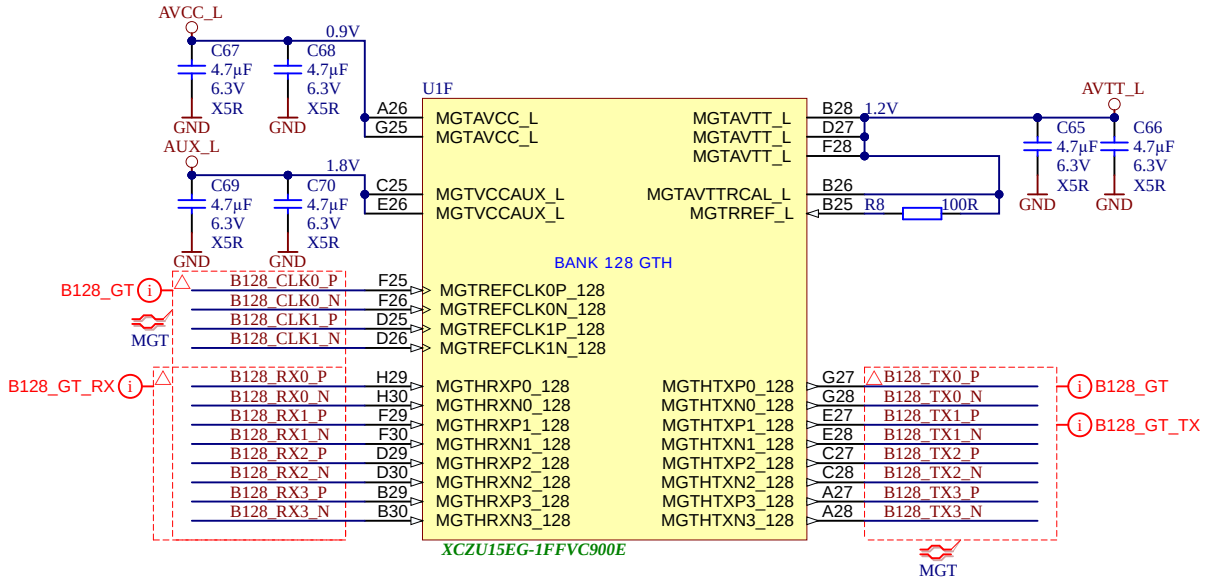
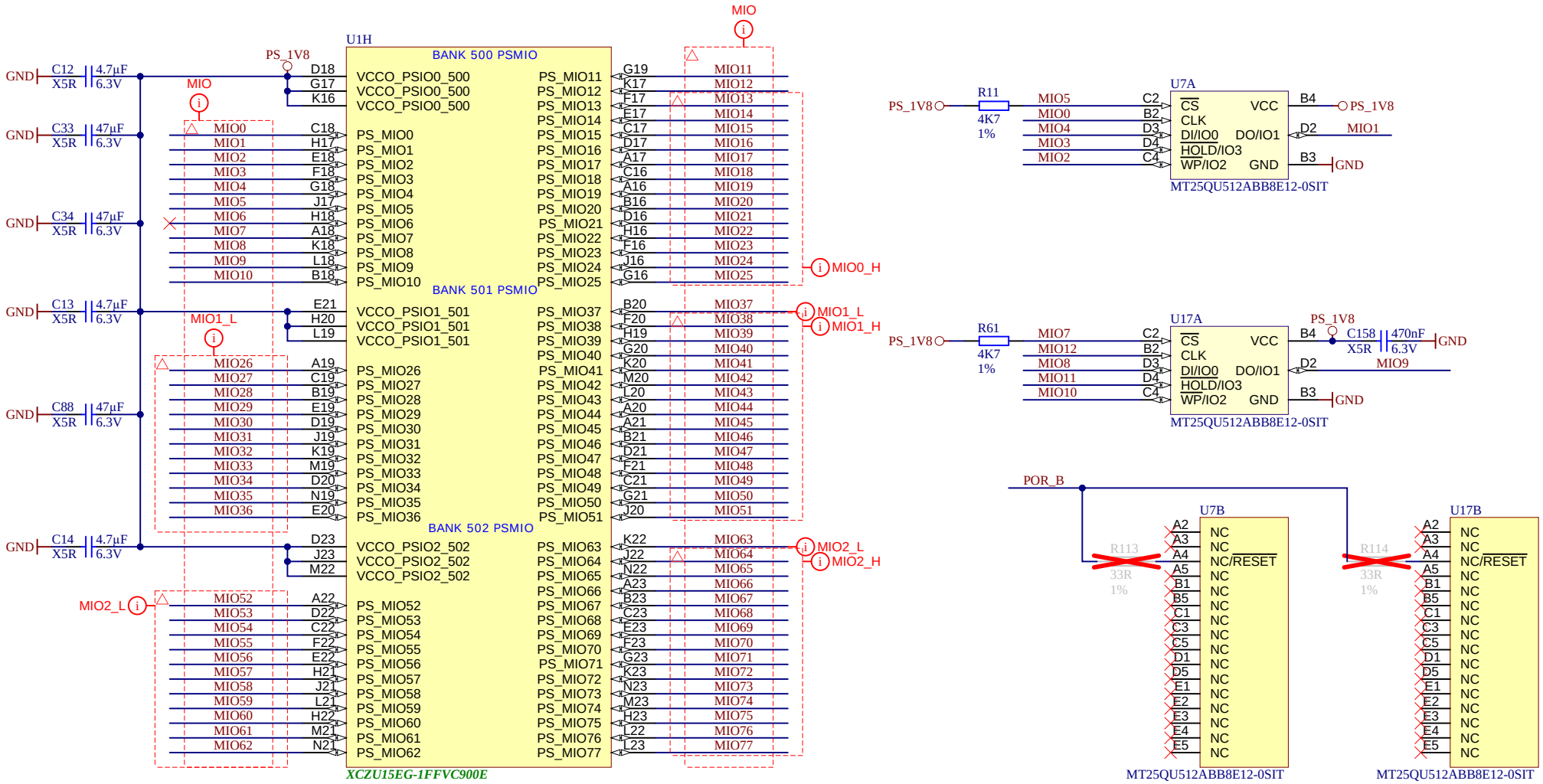
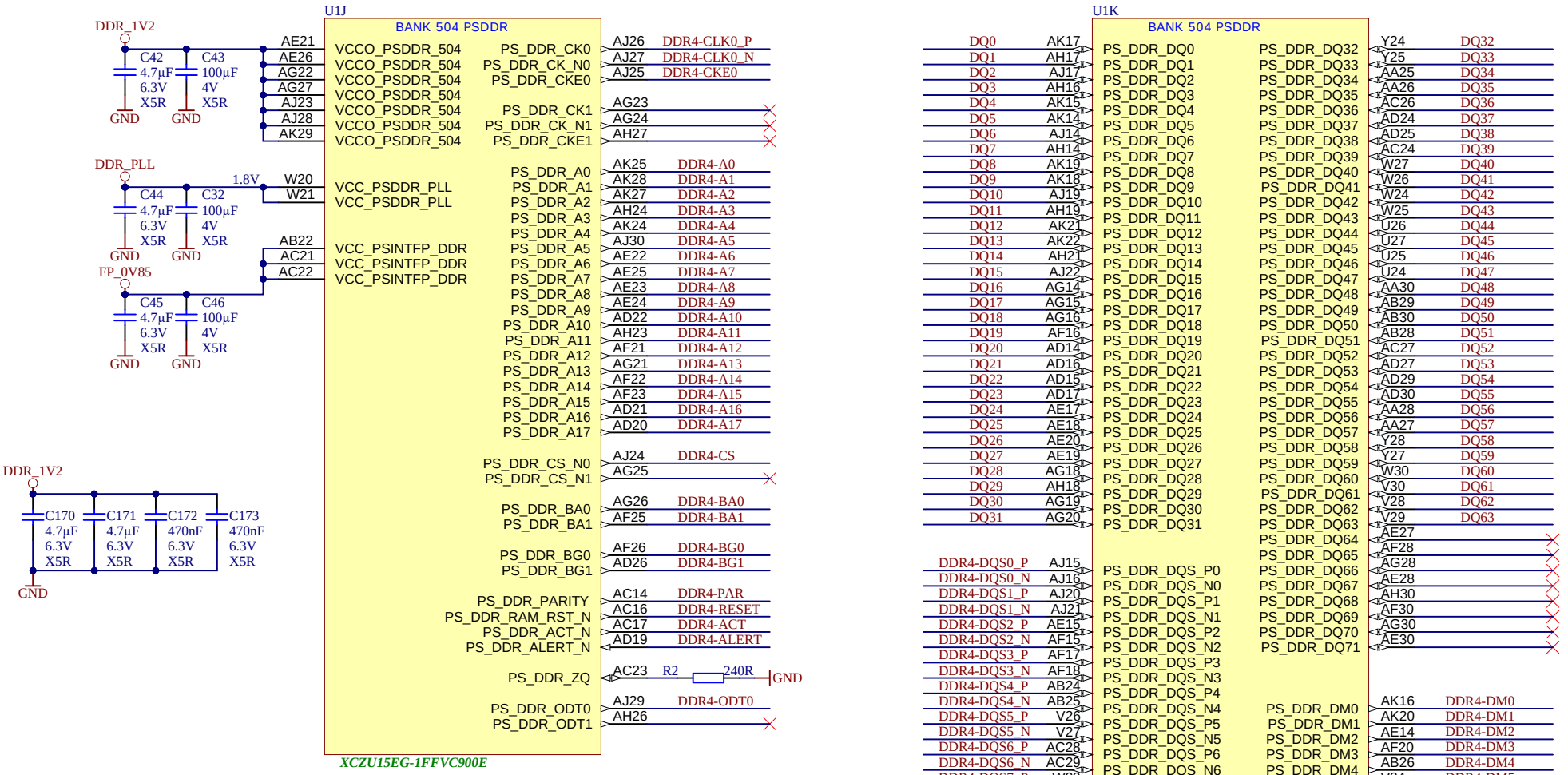
A4	Number: TE0818 BBE81-A		Rev. 02
Date: 26.09.2023	Copyright: Trenz Electronic GmbH		Page 14 of 31
Filename: B_GT.SchDoc			



trenz electronic	Title: TE0818 - GTH Bank 2		
A4	Number: TE0818 BBE81-A		Rev. 02
Date: 26.09.2023	Copyright: Trenz Electronic GmbH		Page 15 of 31
Filename: B_GT_2.SchDoc			



Title: TE0818 - MIO Banks			
A4	Number: TE0818 BBE81-A		Rev. 02
Date: 26.09.2023	Copyright: Trenz Electronic GmbH		Page 16 of 31
Filename: B_MIO.SchDoc			



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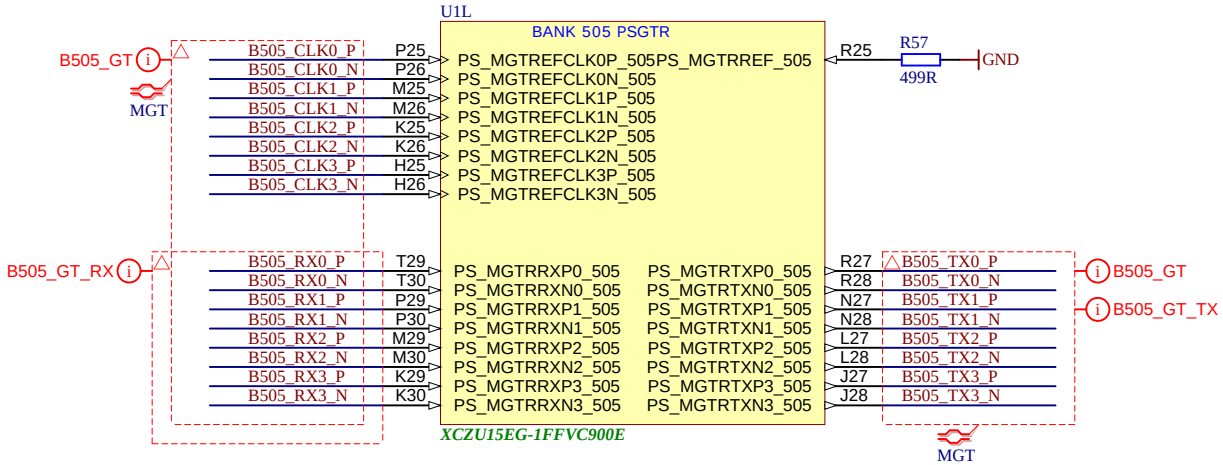
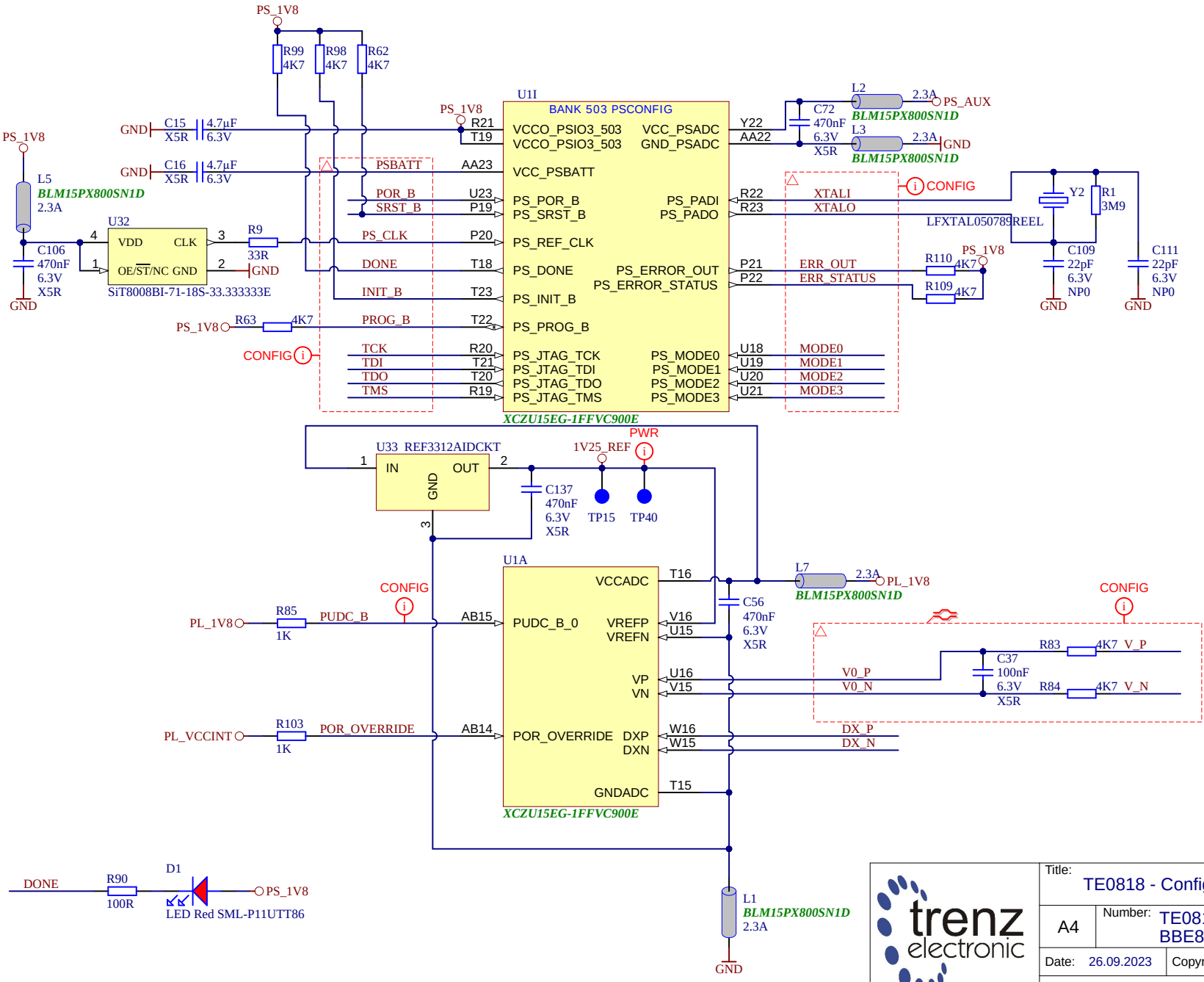
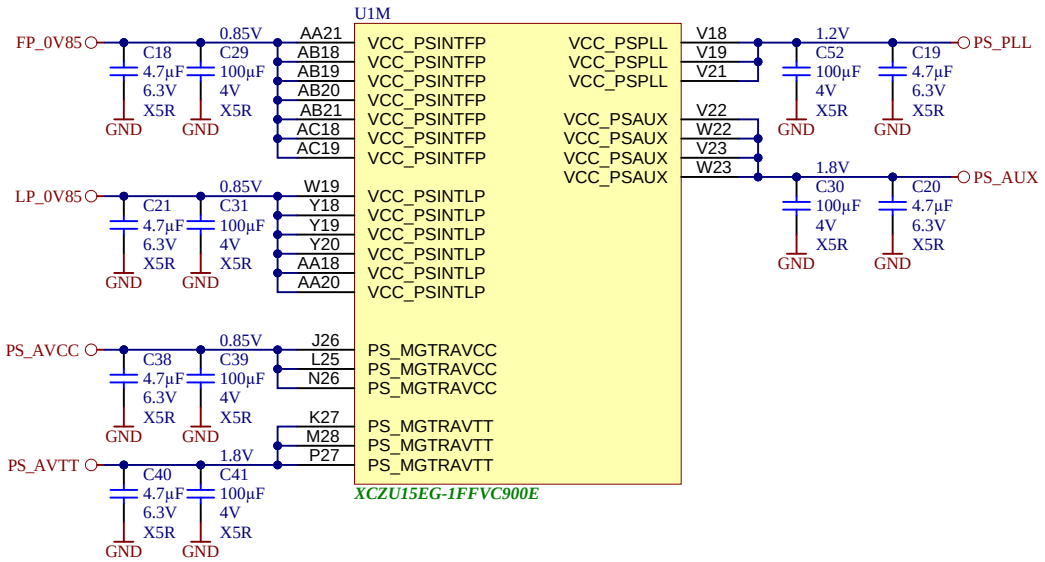
Title: TE0818 - PS DDR		
A4	Number: TE0818 BBE81-A	Rev. 02
Date: 26.09.2023	Copyright: Trenz Electronic GmbH	Page 17 of 31
Filename: PS_DDR.SchDoc		



trenz electronic	Title: TE0818 - PS GT		
A4	Number: TE0818 BBE81-A		Rev. 02
Date: 26.09.2023	Copyright: Trenz Electronic GmbH		Page 18 of 31
Filename: B_PS_GT.SchDoc			



Title: TE0818 - Config			
A4	Number: TE0818 BBE81-A		Rev. 02
Date: 26.09.2023	Copyright: Trenz Electronic GmbH		Page 19 of 31
Filename: CONFIG.SchDoc			



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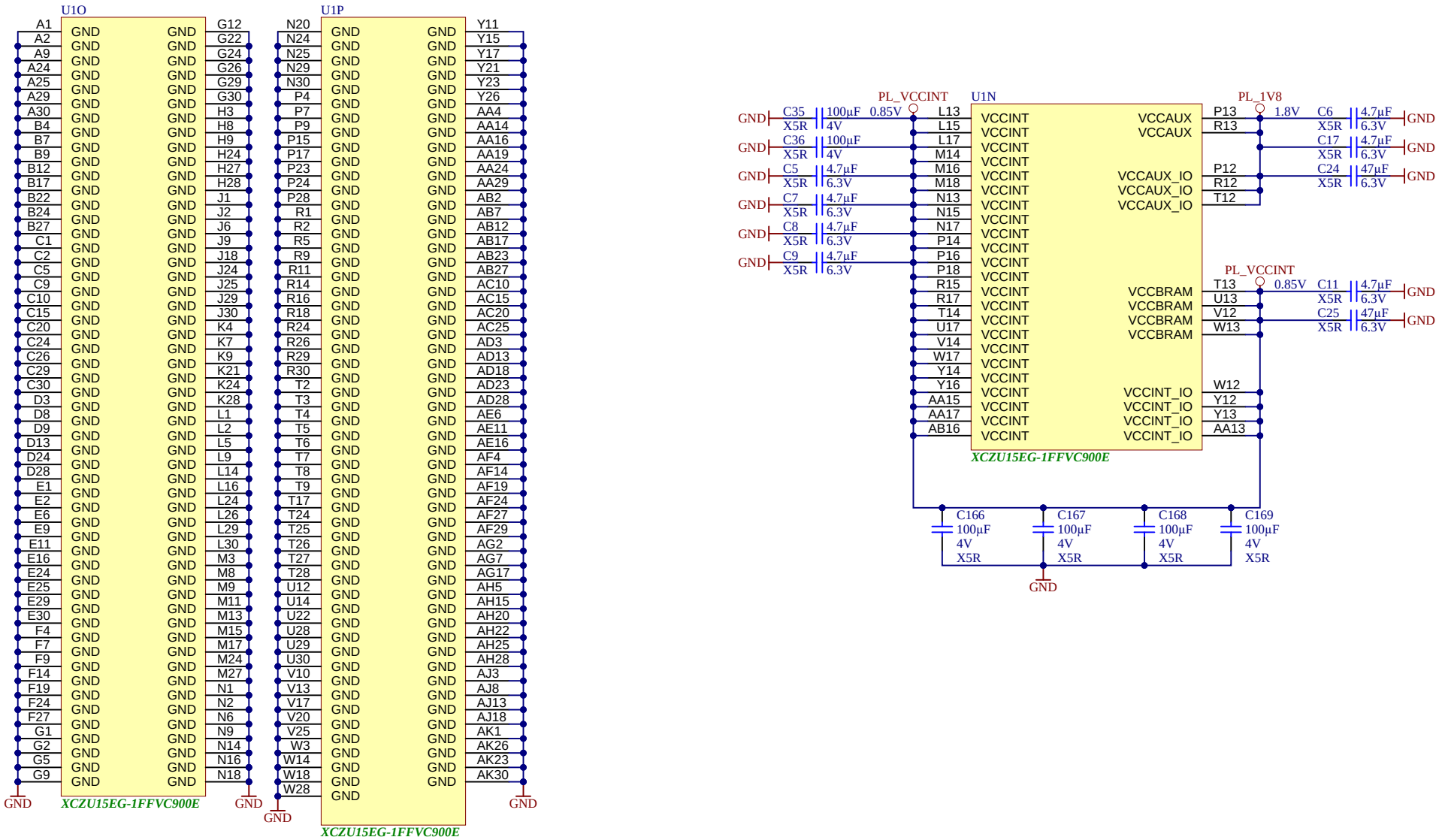
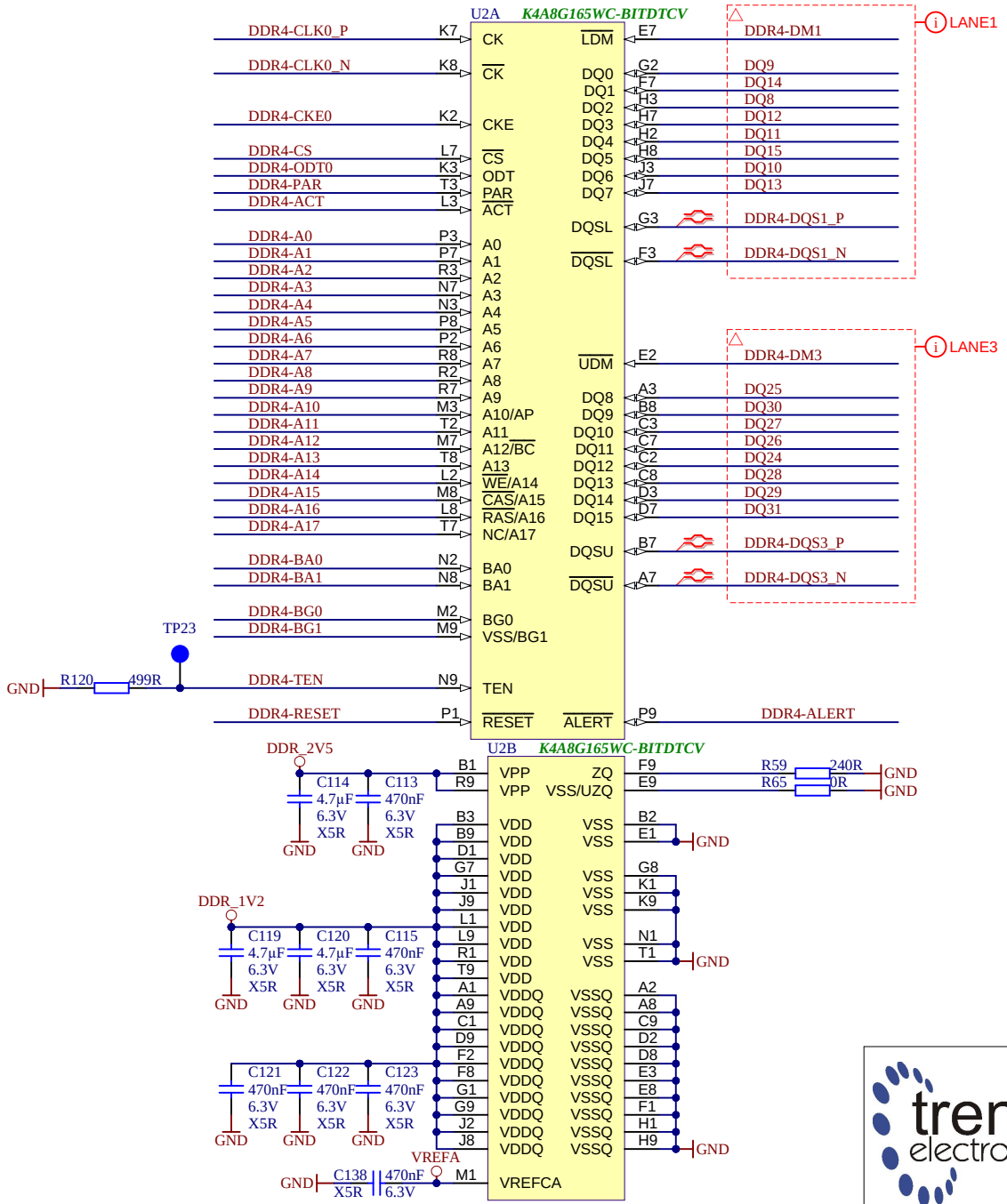
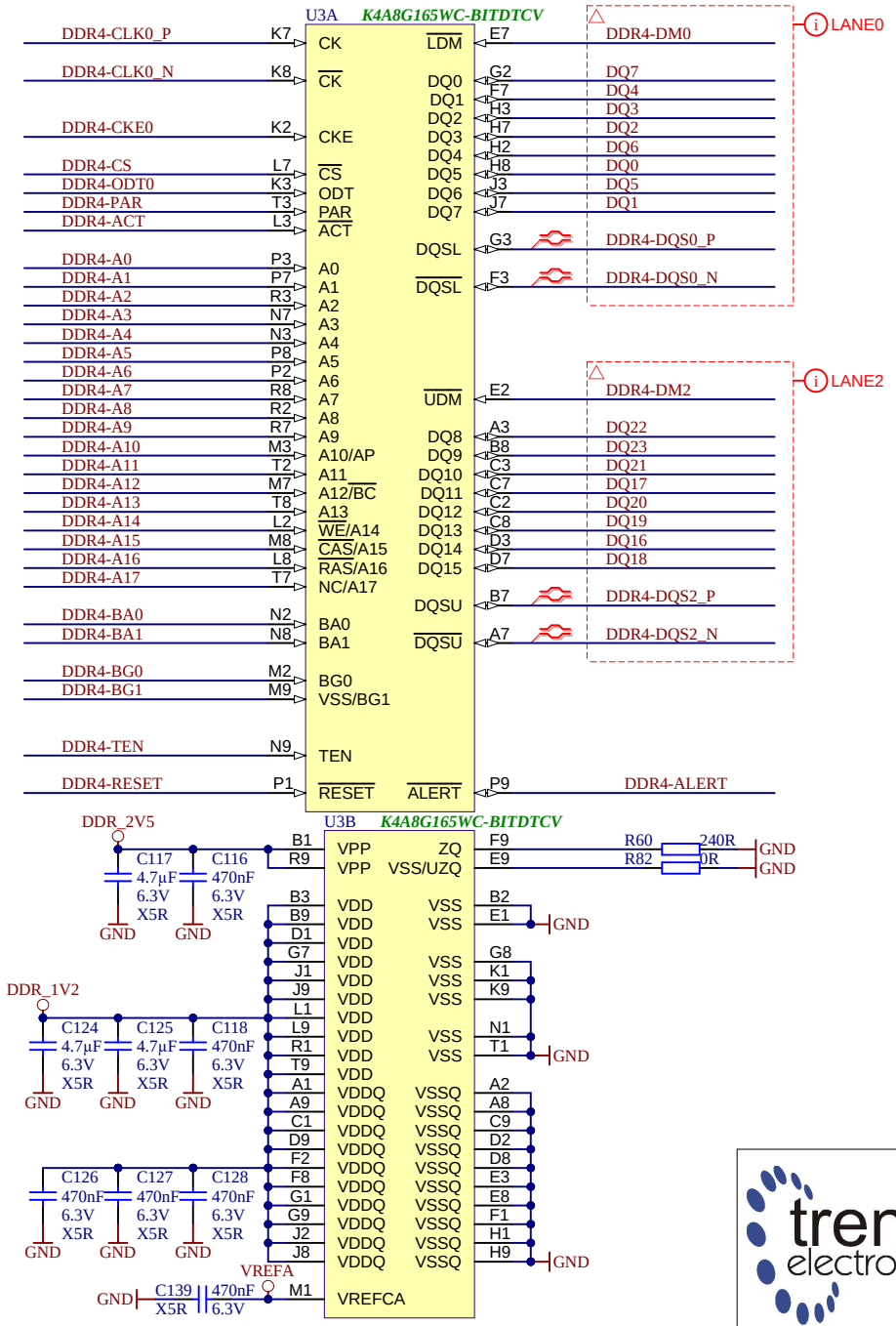
Title: TE0818 - PS Power		
A4	Number: TE0818 BBE81-A	Rev. 02
Date: 26.09.2023	Copyright: Trenz Electronic GmbH	Page 20 of 31
Filename: ZU_PS_POWER.SchDoc		



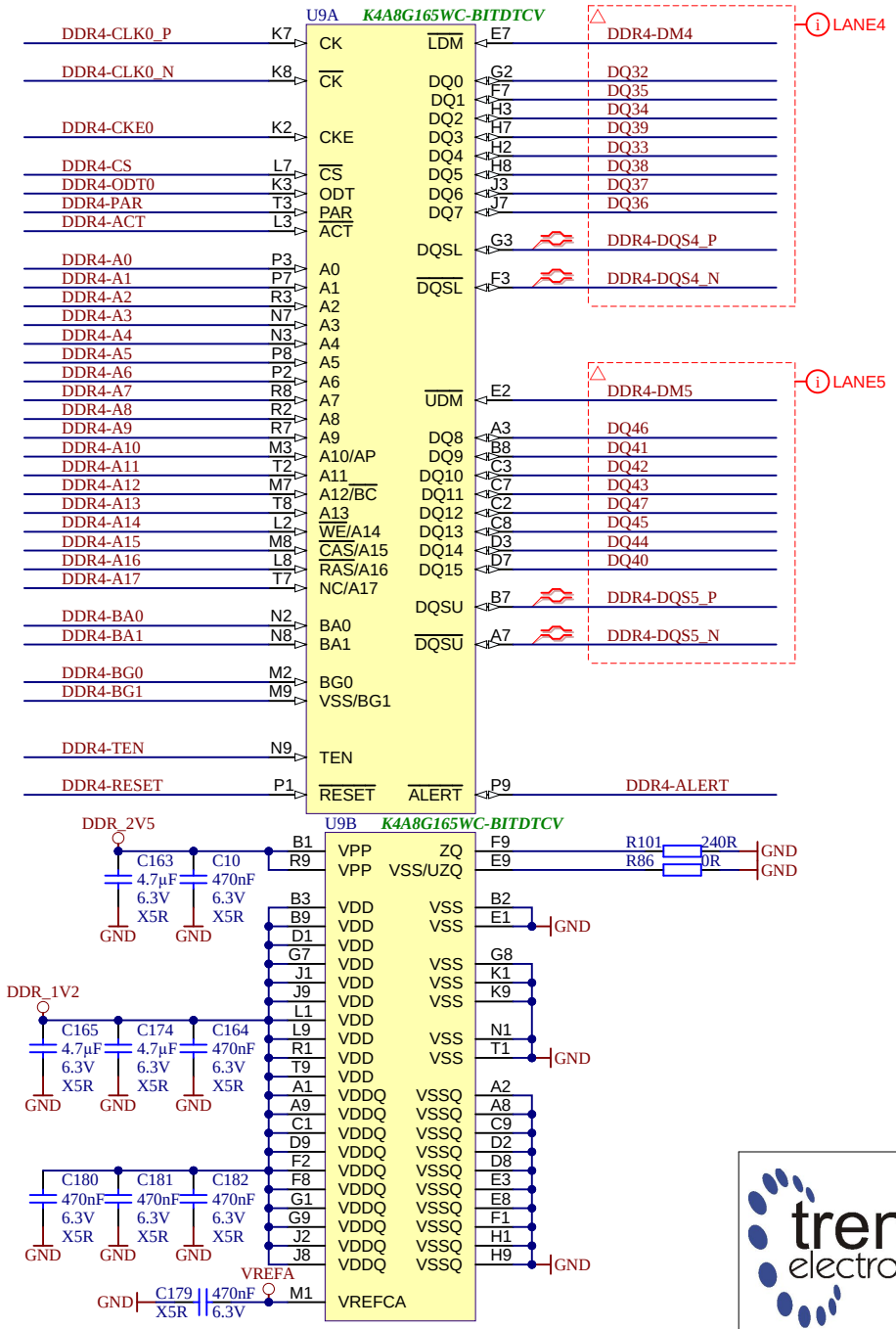
Title: TE0818 - PL Power			
A4	Number: TE0818 BBE81-A		Rev. 02
Date: 26.09.2023	Copyright: Trenz Electronic GmbH		Page 21 of 31
Filename: ZU_POWER.SchDoc			



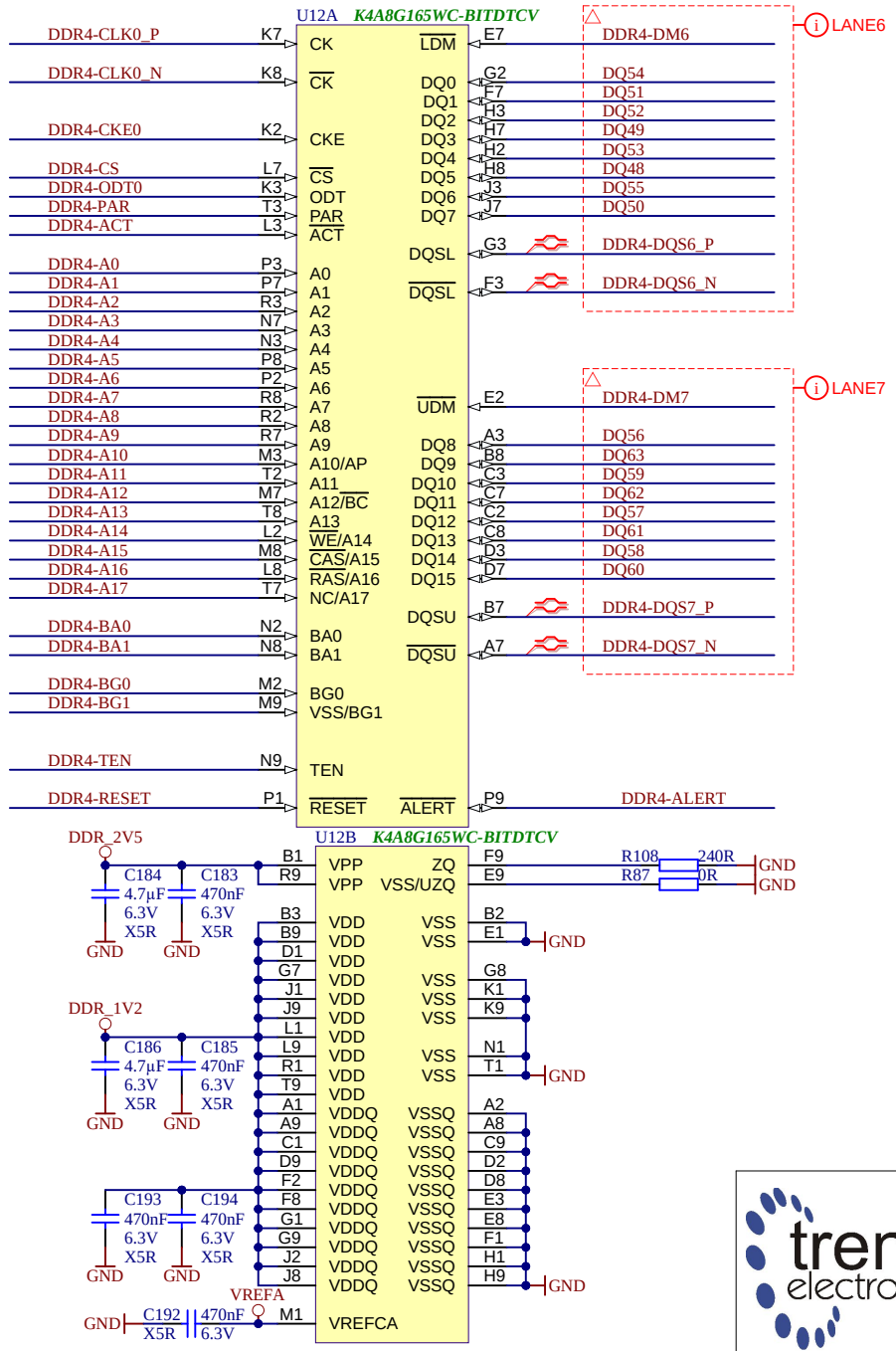
Title: TE0818 - DDR4 RAM 1			
A4	Number: TE0818 BBE81-A		Rev. 02
Date: 26.09.2023	Copyright: Trenz Electronic GmbH		Page 22 of 31
Filename: DDR4-RAM.SchDoc			



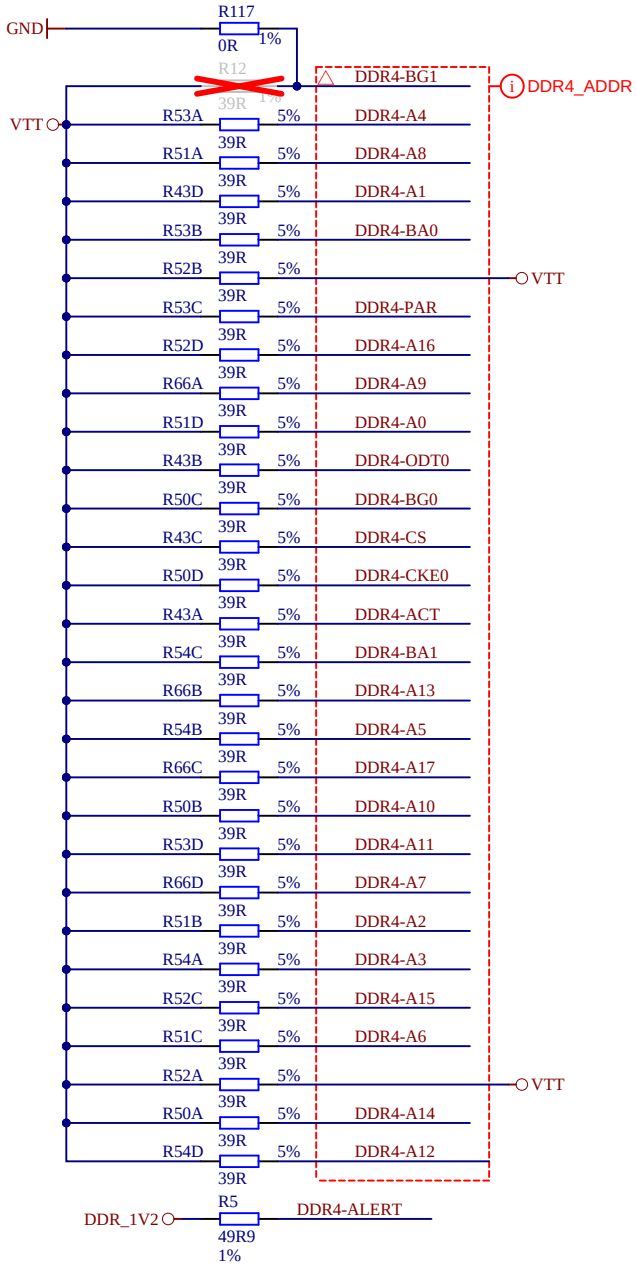
trenz electronic	Title: TE0818 - DDR4 RAM 2		
	A4	Number: TE0818 BBE81-A	Rev. 02
	Date: 26.09.2023	Copyright: Trenz Electronic GmbH	Page 23 of 31
	Filename: DDR4-RAM_2.SchDoc		

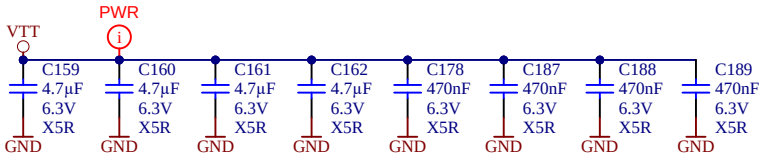


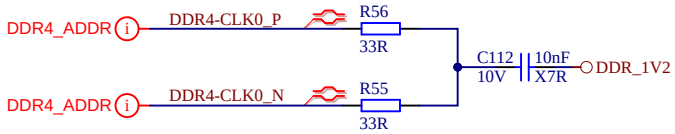
trenz electronic	Title: TE0818 - DDR4 RAM 3		
A4	Number: TE0818 BBE81-A		Rev. 02
Date: 26.09.2023	Copyright: Trenz Electronic GmbH		Page 24 of 31
Filename: DDR4-RAM_3.SchDoc			



Title: TE0818 - DDR4 RAM 4			
A4	Number: TE0818 BBE81-A		Rev. 02
Date: 26.09.2023	Copyright: Trenz Electronic GmbH		Page 25 of 31
Filename: DDR4-RAM_4.SchDoc			







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Title: TE0818 - DDR4 Termination		
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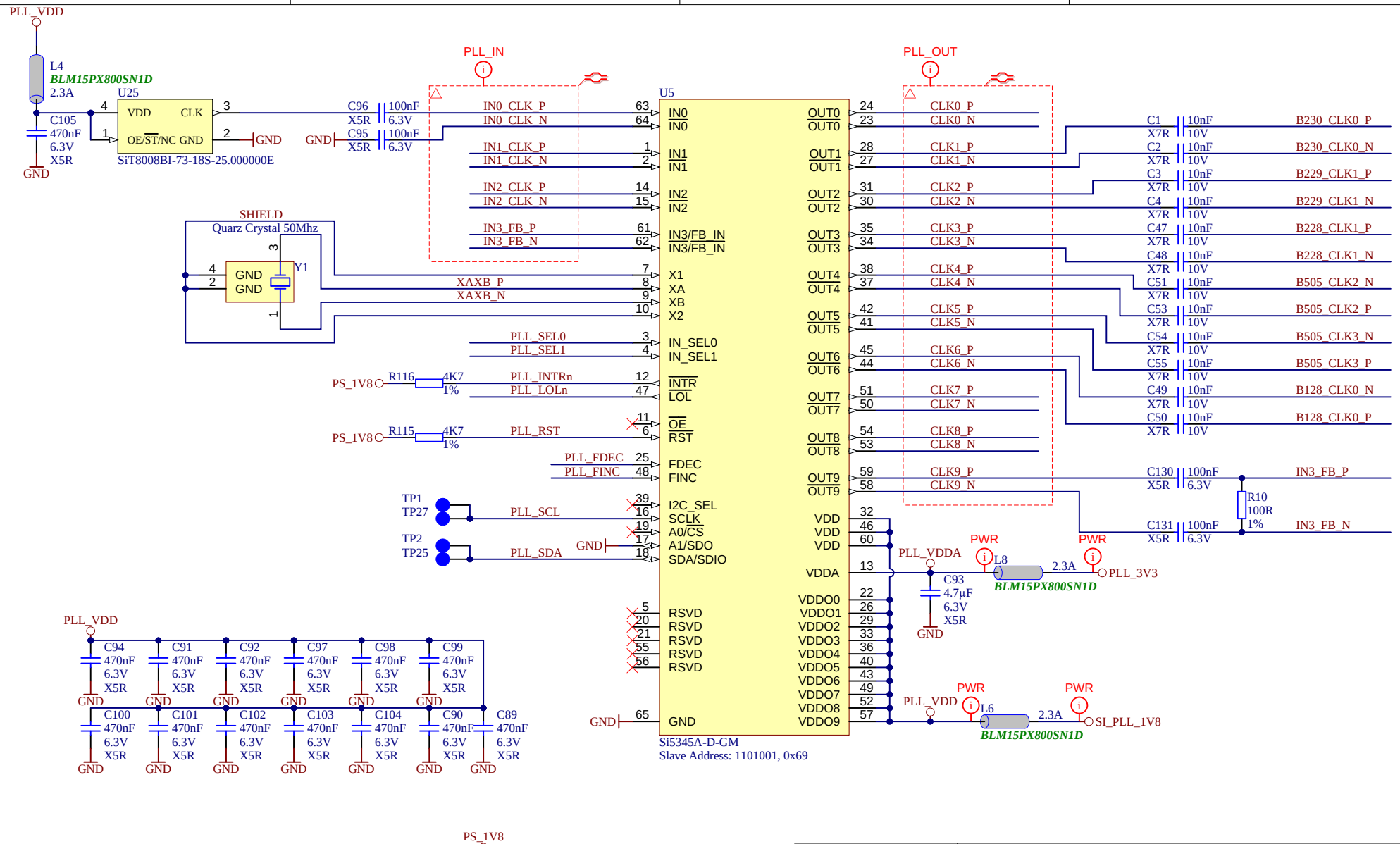
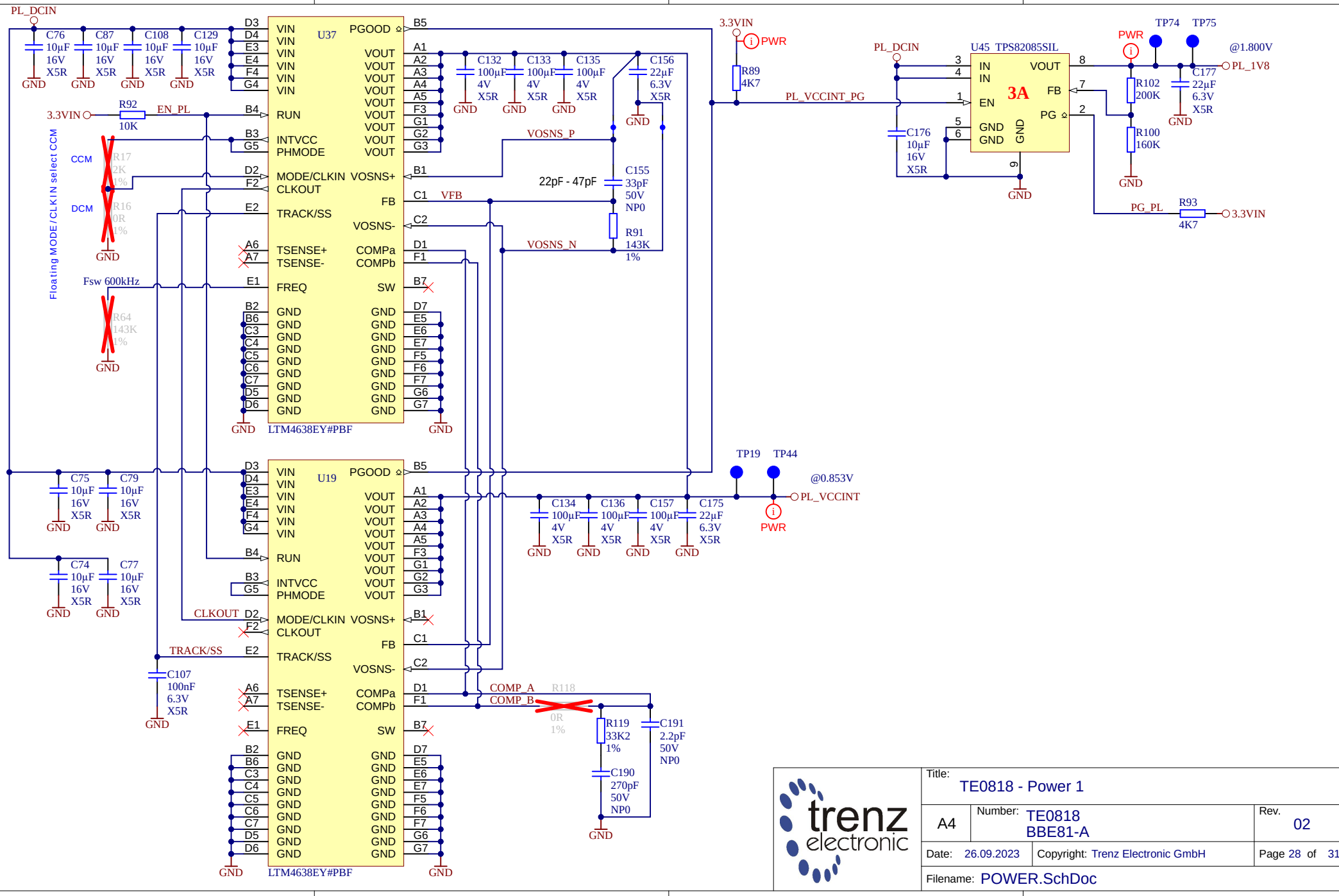
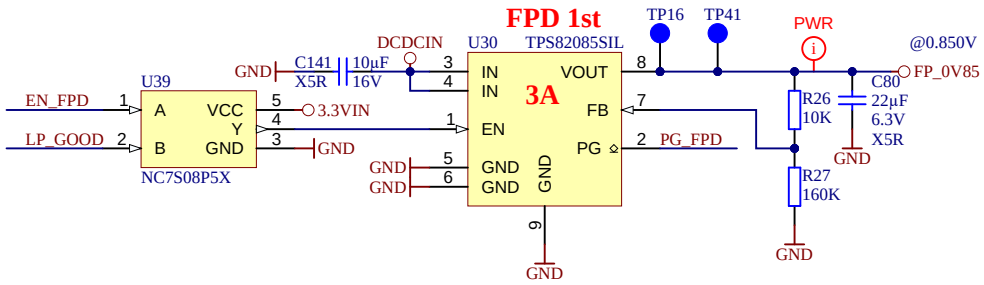
Date: 26.09.2023	Copyright: Trenz Electronic GmbH	Page 26 of 31
Filename: DDR4-TERM.SchDoc		

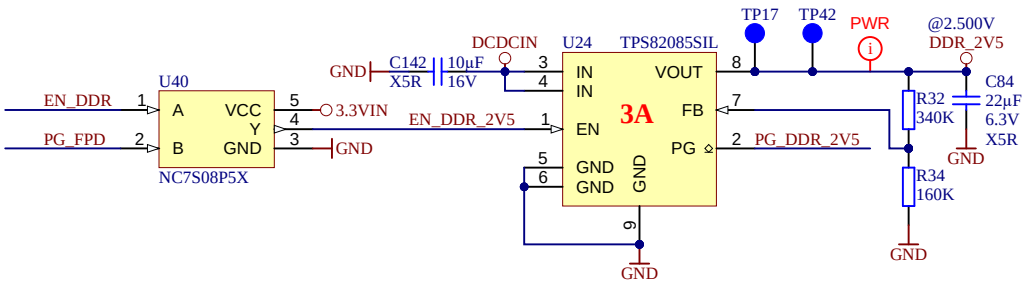


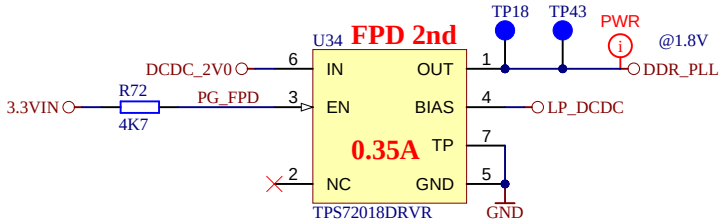
trenz electronic	Title: TE0818 - Clock		
	A4	Number: TE0818 BBE81-A	Rev. 02
	Date: 26.09.2023	Copyright: Trenz Electronic GmbH	Page 27 of 31
	Filename: Clock.SchDoc		

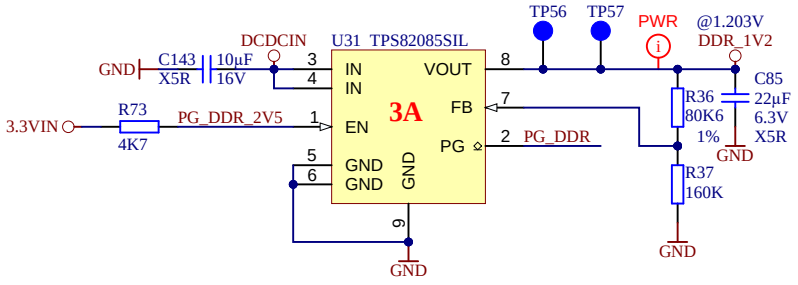


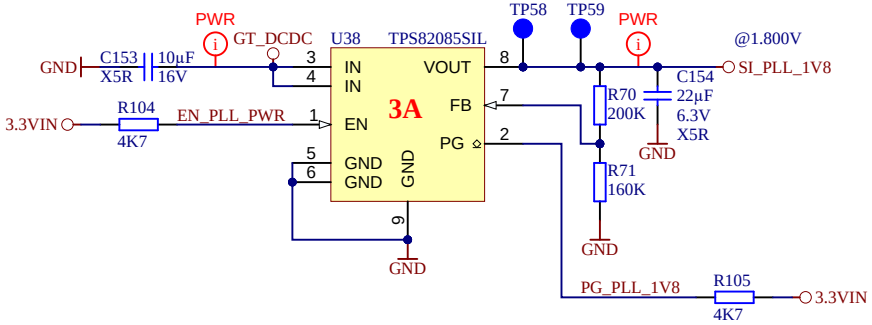
Title: TE0818 - Power 1			
A4	Number: TE0818 BBE81-A		Rev. 02
Date: 26.09.2023	Copyright: Trenz Electronic GmbH		Page 28 of 31
Filename: POWER.SchDoc			

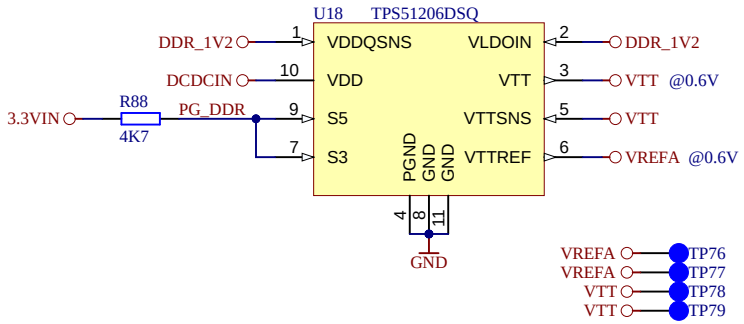




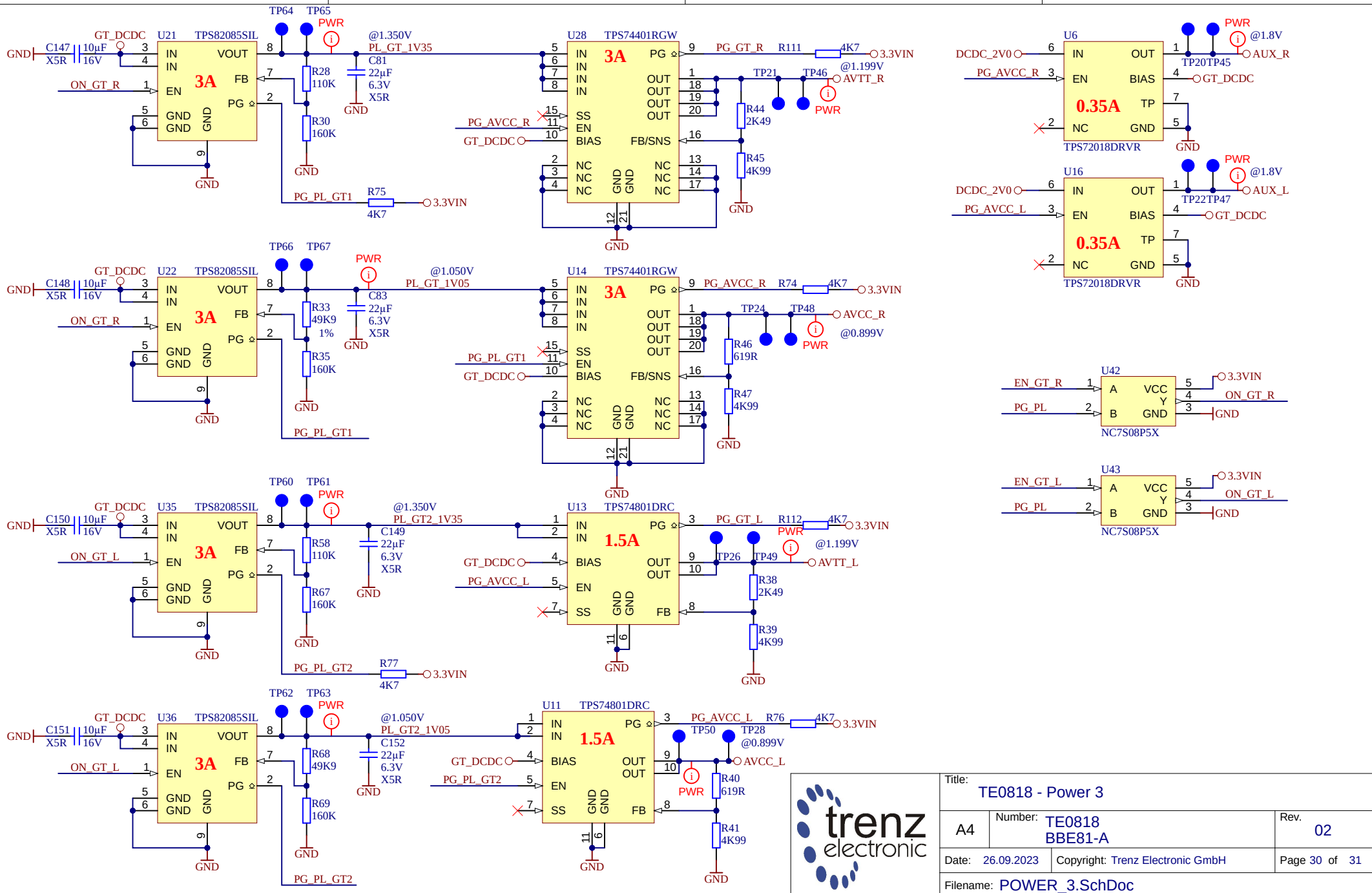




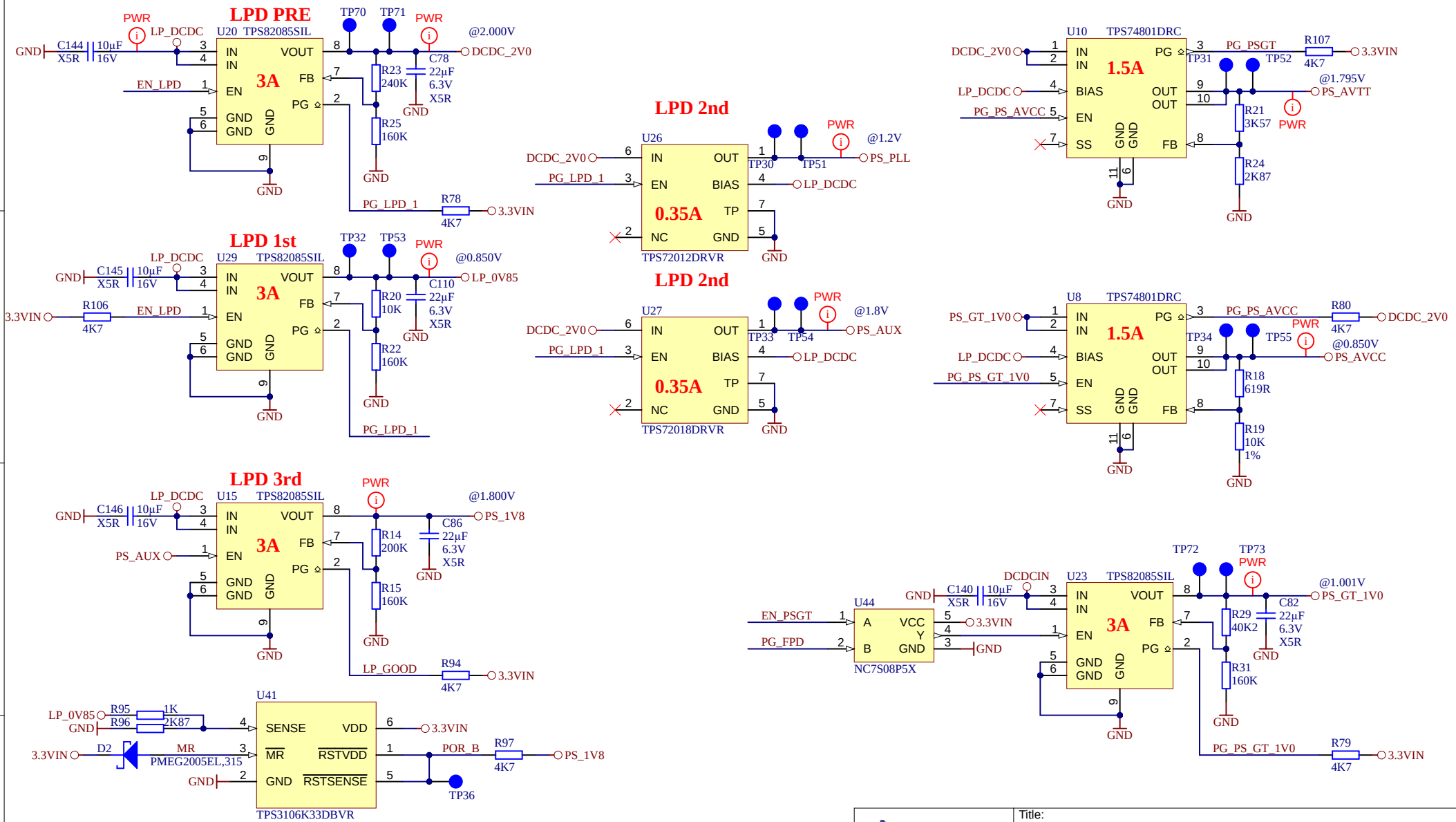




trenz electronic	Title: TE0818 - Power 2		
	A4	Number: TE0818 BBE81-A	Rev. 02
	Date: 26.09.2023	Copyright: Trenz Electronic GmbH	Page 29 of 31
	Filename: POWER_2.SchDoc		



Title: TE0818 - Power 3			
A4	Number: TE0818 BBE81-A		Rev. 02
Date: 26.09.2023	Copyright: Trenz Electronic GmbH		Page 30 of 31
Filename: POWER_3.SchDoc			



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: TE0818 - Power 4		
A4	Number: TE0818 BBE81-A	Rev. 02
Date: 26.09.2023	Copyright: Trenz Electronic GmbH	Page 31 of 31
Filename: POWER_4.SchDoc		