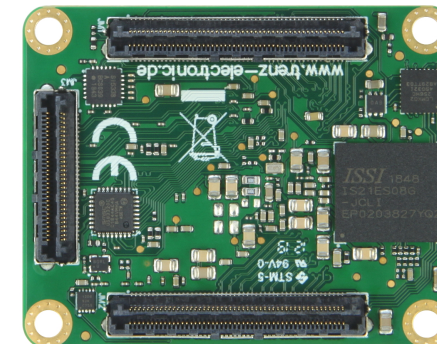




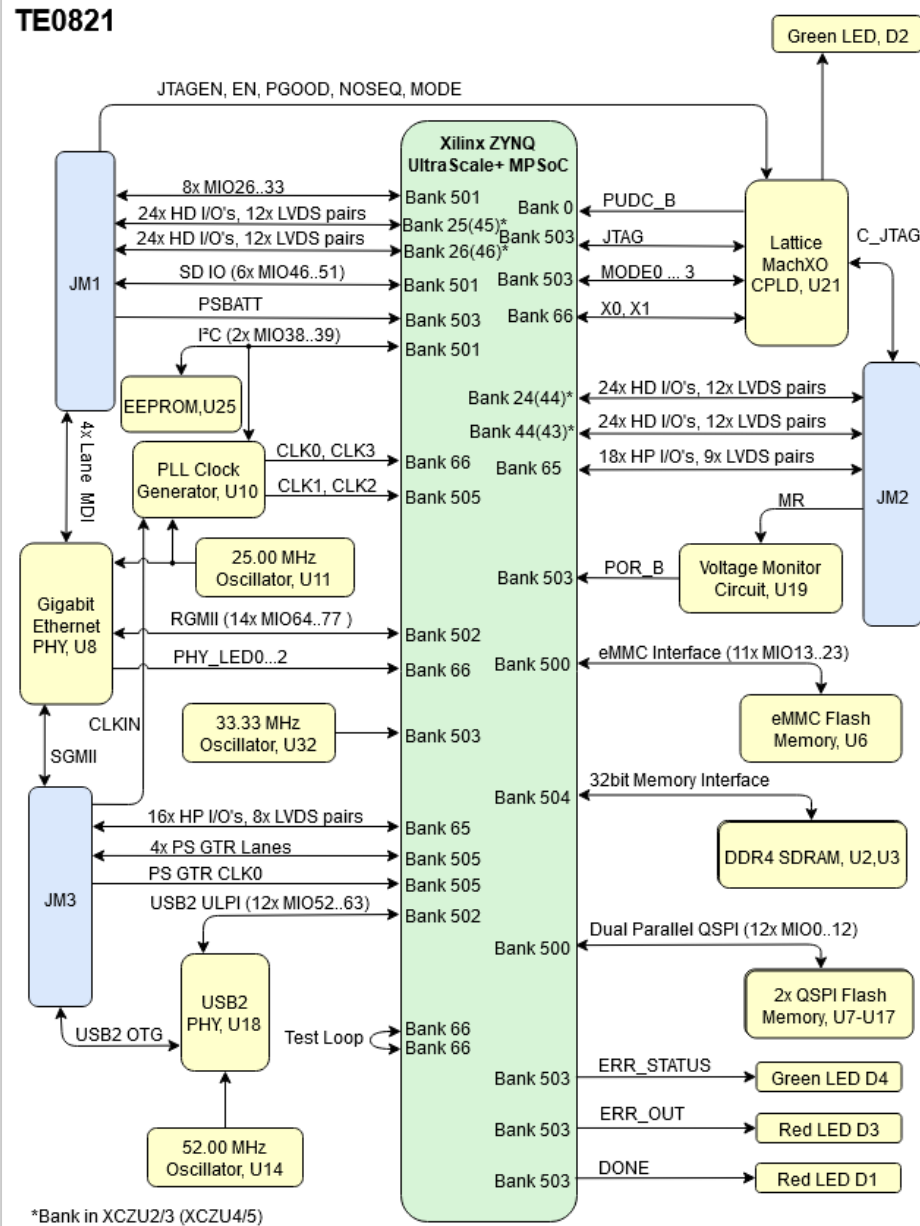
Regarding the usage of our schematics and alike documentation for Trenz module TE0821.

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. TE0821 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!

	Title: Module TE0821		
	A4	Number: TE0821 3BI91ND	Rev. 01
	Date: 14.08.2020	Copyright: Trenz Electronic GmbH / TT	Page 1 of 24
	Filename: Legal Notices Modules.SchDoc		

TE0821



	Title: Module TE0821 - System Overview		
	A4	Number: TE0821 3BI91ND	Rev. 01
	Date: 18.01.2022	Copyright: 2015 Trenz Electronic GmbH	Page 2 of 24
	Filename: TE0821-Overview.SchDoc		

1

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4

U_USB-PHY
USB-PHY.SchDoc

U_ETH-PHY
ETH-PHY.SchDoc

U_B_HD
B_HD.SchDoc

U_B64
B64.SchDoc

U_B65
B65.SchDoc

U_B66
B66.SchDoc

U_CONFIG
CONFIG.SchDoc

U_B_MIO
B_MIO.SchDoc

U_B_PS_GT
B_PS_GT.SchDoc

U_CLK
CLK.SchDoc

U_Overview
TE0821-Overview.SchDoc

U_LN
Legal Notices Modules.SchDoc

U_B2B-Connectors
B2B-Connectors.SchDoc

U_B2B-Connectors_2
B2B-Connectors_2.SchDoc

U_eMMC
eMMC.SchDoc

U_PS_DDR
PS_DDR.SchDoc

U_ZU_POWER
ZU_POWER.SchDoc

U_ZU_PS_POWER
ZU_PS_POWER.SchDoc

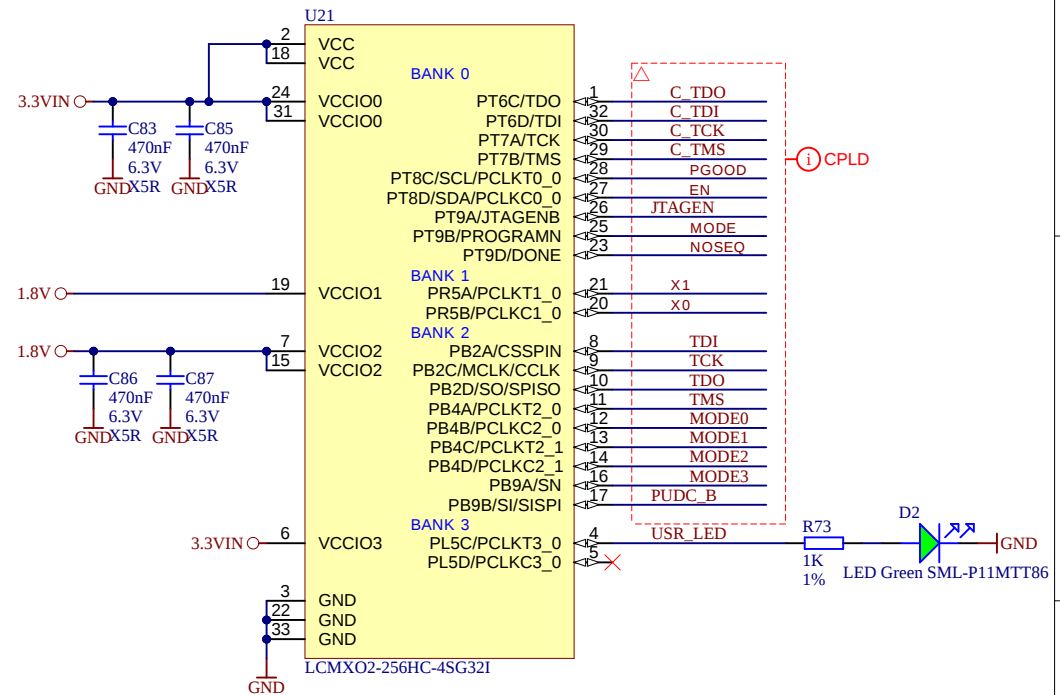
U_DDR4-RAM_2
DDR4-RAM_2.SchDoc

U_DDR4-RAM
DDR4-RAM.SchDoc

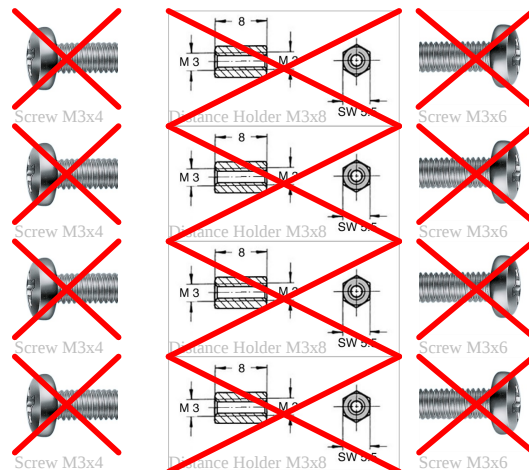
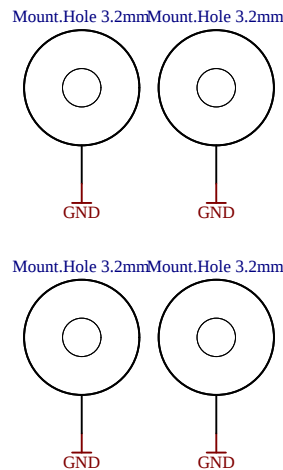
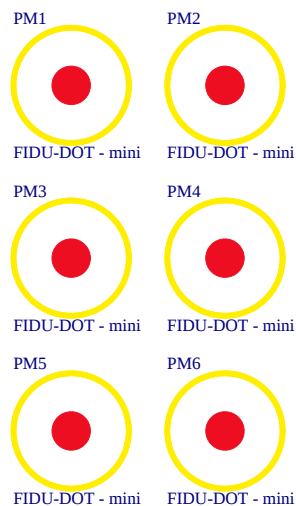
U_POWER
POWER.SchDoc

U_POWER_1
POWER_1.SchDoc

U_Revision_changes
Revision Changes.SchDoc



Serial
Serial
Serialnumber 6,3 x 6,3mm



Special notes:

Based on variant 3BE91ND with FPGA replacement
Component RC0201FR-0710KL removed

Title: Module TE0821		
A4	Number: TE0821 3BI91ND	Rev. 01
Date: 20.02.2019	Copyright: 2015 Trenz Electronic GmbH	Page 3 of 24
Filename: TE0821.SchDoc		

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2

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4

A

A

B

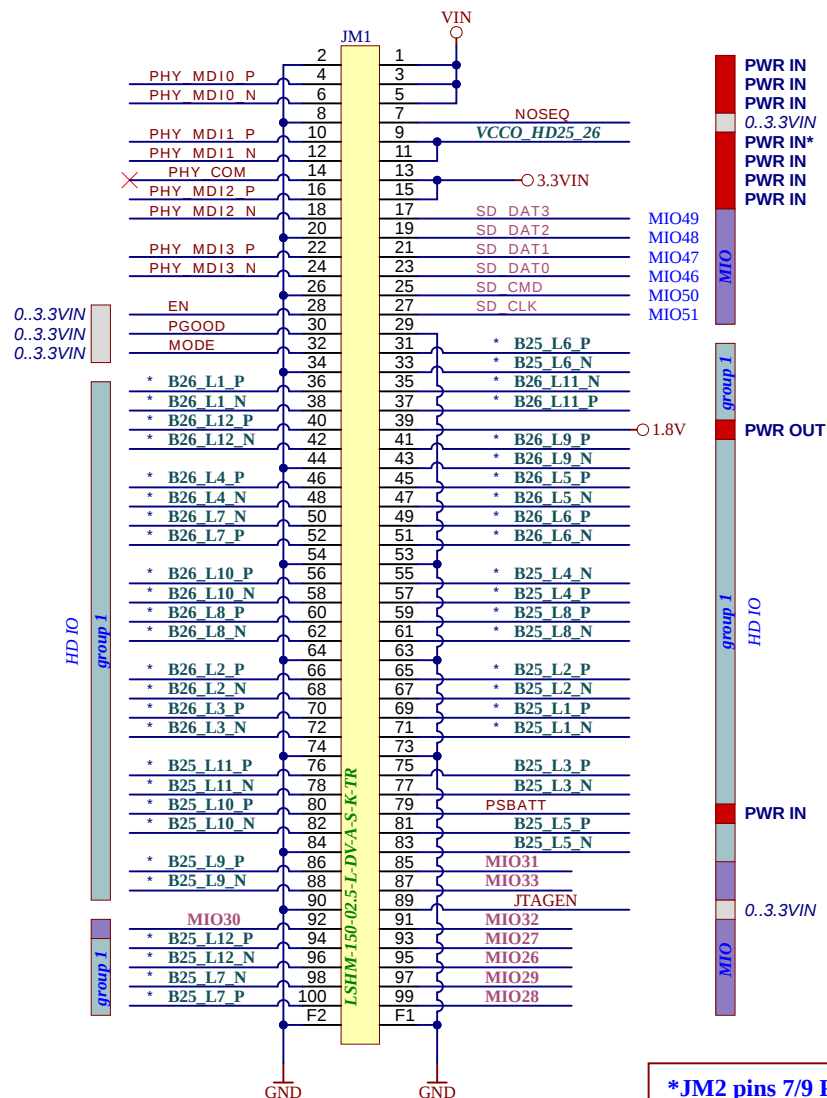
B

C

C

D

D



VCCO_HD25_26	0..3.3V
VCCO_HD24_44	0..3.3V
VCCO_65	0..1.8V
MIO	0..3.3V
group 1	0..VCCO_HD25_26
group 4	0..VCCO_HD24_44
group 3	0..VCCO_65

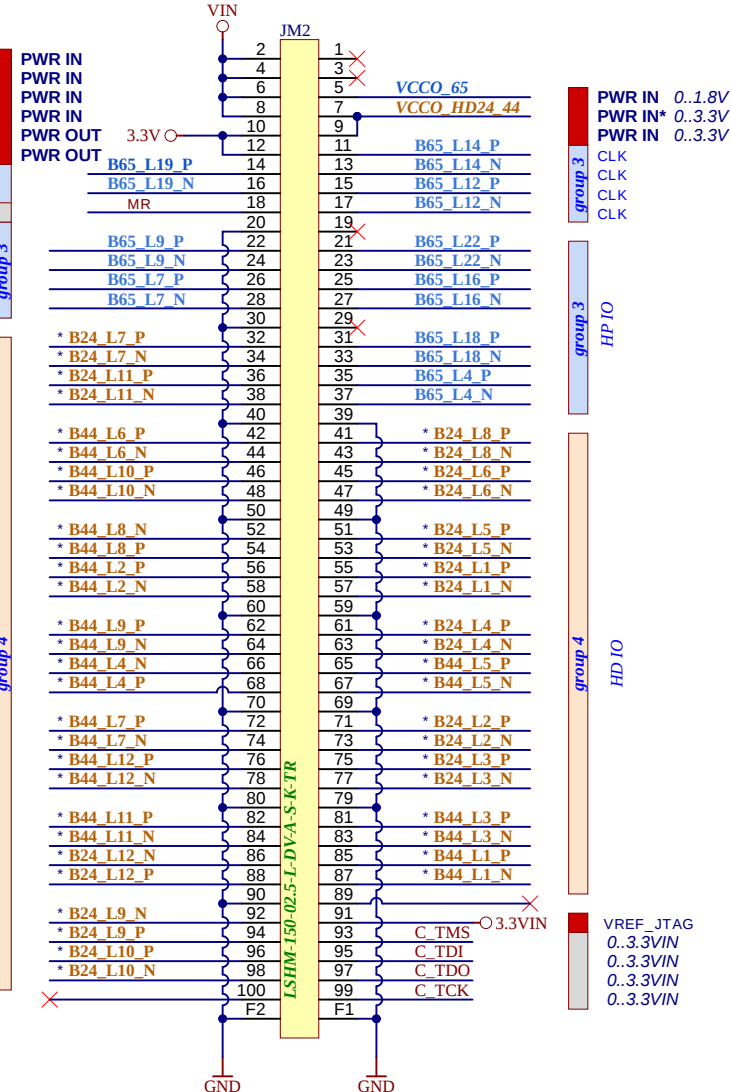
B24(HD) 24 IO, 12 LVDS Pairs
B25(HD) 24 IO, 12 LVDS Pairs
B26(HD) 24 IO, 12 LVDS Pairs
B44(HD) 24 IO, 12 LVDS Pairs

B65(HP) 34 IO, 17 LVDS Pairs

MIO501 8 IO, 3.3V
MIO501 6 IO, SD Card Ready, 3.3V
ETH MDI Copper

Net names are given for XCZU2/3 FPGA

- * Bank 44 is Bank 43 in XCZU4/5
- * Bank 24 is Bank 44 in XCZU4/5
- * Bank 25 is Bank 45 in XCZU4/5
- * Bank 26 is Bank 46 in XCZU4/5



*JM2 pins 7/9 POWER OUTPUTS when R6 fitted



*JM1 pins 9/11 POWER OUTPUTS when R89 fitted



Title: Module TE0821 - B2B Connectors		
A4	Number: TE0821 3BI91ND	Rev. 01
Date: 04.07.2019	Copyright: 2015 Trenz Electronic GmbH	Page 4 of 24
Filename: B2B-Connectors.SchDoc		

1

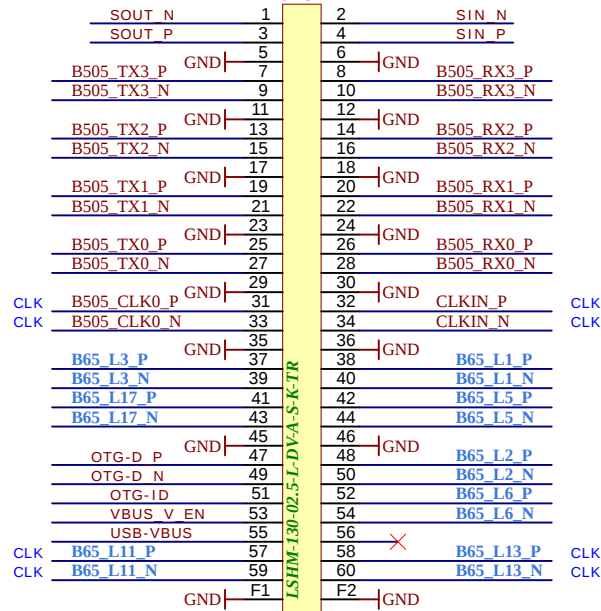
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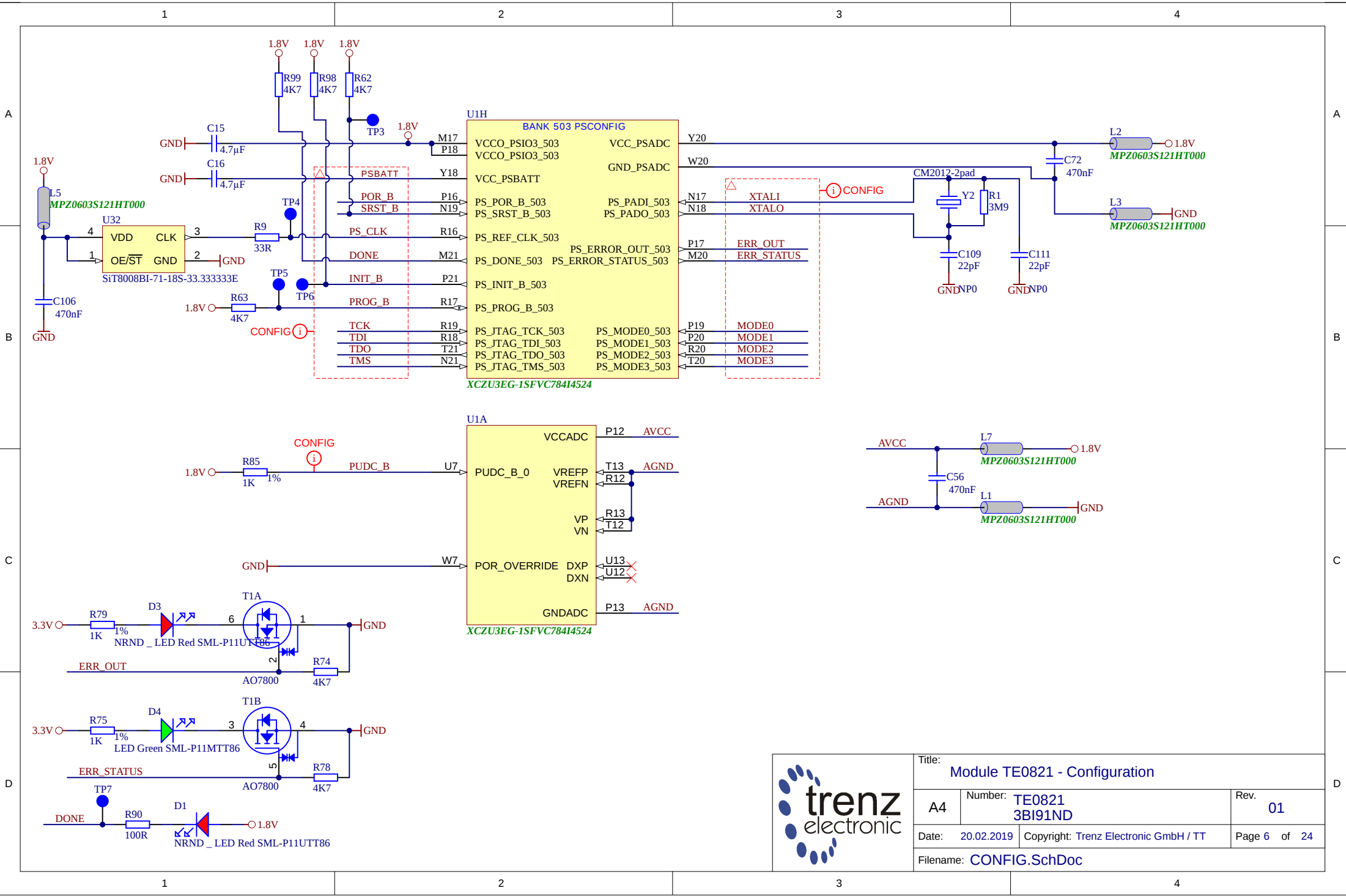
4

USB OTG
ETH SGMII
PS_GTR 4 Lanes
PS_GTR CLK IN
PLL CLK IN

JM3



Title: Module TE0821 - B2B Connectors			
A4	Number: TE0821 3BI91ND		Rev. 01
Date: 20.02.2019	Copyright: 2015 Trenz Electronic GmbH		Page 5 of 24
Filename: B2B-Connectors_2.SchDoc			



Title: Module TE0821 - Configuration		
A4	Number: TE0821 3BI91ND	Rev. 01
Date: 20.02.2019	Copyright: Trenz Electronic GmbH / TT	Page 6 of 24
Filename: CONFIG.SchDoc		

1

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U1C

VCCO_HD25_26

F14

C15

BANK 26 HD (ZU4/5 BANK 46 HD)

VCCO_26

VCCO_26

B26

B26 L1 P
B26 L1 N
B26 L2 P
B26 L2 N
B26 L3 P
B26 L3 N
B26 L4 P
B26 L4 N
B26 L5 P
B26 L5 N
B26 L6 P
B26 L6 N

B15
A15
B14
A14
B13
A13
C14
C13
D15
D14
E14
E13

IO_L1P_AD11P_26
IO_L1N_AD11N_26
IO_L2P_AD10P_26
IO_L2N_AD10N_26
IO_L3P_AD9P_26
IO_L3N_AD9N_26
IO_L4P_AD8P_26
IO_L4N_AD8N_26
IO_L5P_HDGC_AD7P_26
IO_L5N_HDGC_AD7N_26
IO_L6P_HDGC_AD6P_26
IO_L6N_HDGC_AD6N_26

IO_L7P_HDGC_AD5P_26
IO_L7N_HDGC_AD5N_26
IO_L8P_HDGC_AD4P_26
IO_L8N_HDGC_AD4N_26
IO_L9P_AD3P_26
IO_L9N_AD3N_26
IO_L10P_AD2P_26
IO_L10N_AD2N_26
IO_L11P_AD1P_26
IO_L11N_AD1N_26
IO_L12P_AD0P_26
IO_L12N_AD0N_26

G13
F13
F15
E15
G15
G14
H14
H13
K14
J14
L14
L13

B26 L7 P
B26 L7 N
B26 L8 P
B26 L8 N
B26 L9 P
B26 L9 N
B26 L10 P
B26 L10 N
B26 L11 P
B26 L11 N
B26 L12 P
B26 L12 N

B26

BANK 44 HD (ZU4/5 BANK 43 HD)

VCCO_44

VCCO_44

VCCO_HD24_44

AC10

AG12

C136
22µF
GND

B44

B44 L1 P
B44 L1 N
B44 L2 P
B44 L2 N
B44 L3 P
B44 L3 N
B44 L4 P
B44 L4 N
B44 L5 P
B44 L5 N
B44 L6 P
B44 L6 N

AG10
AH10
AF11
AG11
AH12
AH11
AE10
AF10
AE12
AF12
AC12
AD12

IO_L1P_AD11P_44
IO_L1N_AD11N_44
IO_L2P_AD10P_44
IO_L2N_AD10N_44
IO_L3P_AD9P_44
IO_L3N_AD9N_44
IO_L4P_AD8P_44
IO_L4N_AD8N_44
IO_L5P_HDGC_AD7P_44
IO_L5N_HDGC_AD7N_44
IO_L6P_HDGC_AD6P_44
IO_L6N_HDGC_AD6N_44

IO_L7P_HDGC_AD5P_44
IO_L7N_HDGC_AD5N_44
IO_L8P_HDGC_AD4P_44
IO_L8N_HDGC_AD4N_44
IO_L9P_AD3P_44
IO_L9N_AD3N_44
IO_L10P_AD2P_44
IO_L10N_AD2N_44
IO_L11P_AD1P_44
IO_L11N_AD1N_44
IO_L12P_AD0P_44
IO_L12N_AD0N_44

AD11
AD10
AB11
AC11
AA11
AA10
W10
Y10
Y9
AA8
AB10
AB9

B44 L7 P
B44 L7 N
B44 L8 P
B44 L8 N
B44 L9 P
B44 L9 N
B44 L10 P
B44 L10 N
B44 L11 P
B44 L11 N
B44 L12 P
B44 L12 N

B44

U1B

XCZU3EG-1SFVC78414524

BANK 24 HD (ZU4/5 BANK 44 HD)

VCCO_24

VCCO_24

VCCO_HD24_44

AA14

AD13

B24

B24 L1 P
B24 L1 N
B24 L2 P
B24 L2 N
B24 L3 P
B24 L3 N
B24 L4 P
B24 L4 N
B24 L5 P
B24 L5 N
B24 L6 P
B24 L6 N

AE15
AE14
AG14
AH14
AG13
AH13
AE13
AF13
AD15
AD14
AC14
AC13

IO_L1P_AD15P_24
IO_L1N_AD15N_24
IO_L2P_AD14P_24
IO_L2N_AD14N_24
IO_L3P_AD13P_24
IO_L3N_AD13N_24
IO_L4P_AD12P_24
IO_L4N_AD12N_24
IO_L5P_HDGC_24
IO_L5N_HDGC_24
IO_L6P_HDGC_24
IO_L6N_HDGC_24

IO_L7P_HDGC_24
IO_L7N_HDGC_24
IO_L8P_HDGC_24
IO_L8N_HDGC_24
IO_L9P_AD11P_24
IO_L9N_AD11N_24
IO_L10P_AD10P_24
IO_L10N_AD10N_24
IO_L11P_AD9P_24
IO_L11N_AD9N_24
IO_L12P_AD8P_24
IO_L12N_AD8N_24

AA13
AB13
AB15
AB14
W14
W13
Y14
Y13
W12
W11
Y12
AA12

B24 L7 P
B24 L7 N
B24 L8 P
B24 L8 N
B24 L9 P
B24 L9 N
B24 L10 P
B24 L10 N
B24 L11 P
B24 L11 N
B24 L12 P
B24 L12 N

B24

BANK 25 HD (ZU4/5 BANK 45 HD)

VCCO_25

VCCO_25

VCCO_HD25_26

B12

E11

C140
22µF
GND

B25

B25 L1 P
B25 L1 N
B25 L2 P
B25 L2 N
B25 L3 P
B25 L3 N
B25 L4 P
B25 L4 N
B25 L5 P
B25 L5 N
B25 L6 P
B25 L6 N

J11
J10
K13
K12
H11
G10
H12
H11
G11
F11
F12
F11

IO_L1P_AD15P_25
IO_L1N_AD15N_25
IO_L2P_AD14P_25
IO_L2N_AD14N_25
IO_L3P_AD13P_25
IO_L3N_AD13N_25
IO_L4P_AD12P_25
IO_L4N_AD12N_25
IO_L5P_HDGC_25
IO_L5N_HDGC_25
IO_L6P_HDGC_25
IO_L6N_HDGC_25

IO_L7P_HDGC_25
IO_L7N_HDGC_25
IO_L8P_HDGC_25
IO_L8N_HDGC_25
IO_L9P_AD11P_25
IO_L9N_AD11N_25
IO_L10P_AD10P_25
IO_L10N_AD10N_25
IO_L11P_AD9P_25
IO_L11N_AD9N_25
IO_L12P_AD8P_25
IO_L12N_AD8N_25

E10
D10
E12
D11
C11
B10
B11
A10
A12
A11
D12
C12

B25 L7 P
B25 L7 N
B25 L8 P
B25 L8 N
B25 L9 P
B25 L9 N
B25 L10 P
B25 L10 N
B25 L11 P
B25 L11 N
B25 L12 P
B25 L12 N

B25



Title:

Module TE0821 - HD Banks

A4

Number: TE0821
3BI91ND

Rev.

01

Date:

20.02.2019

Copyright: Trenz Electronic GmbH / TT

Page 7 of 24

Filename: B_HD.SchDoc

1

2

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4

1

2

3

4

A

A

B

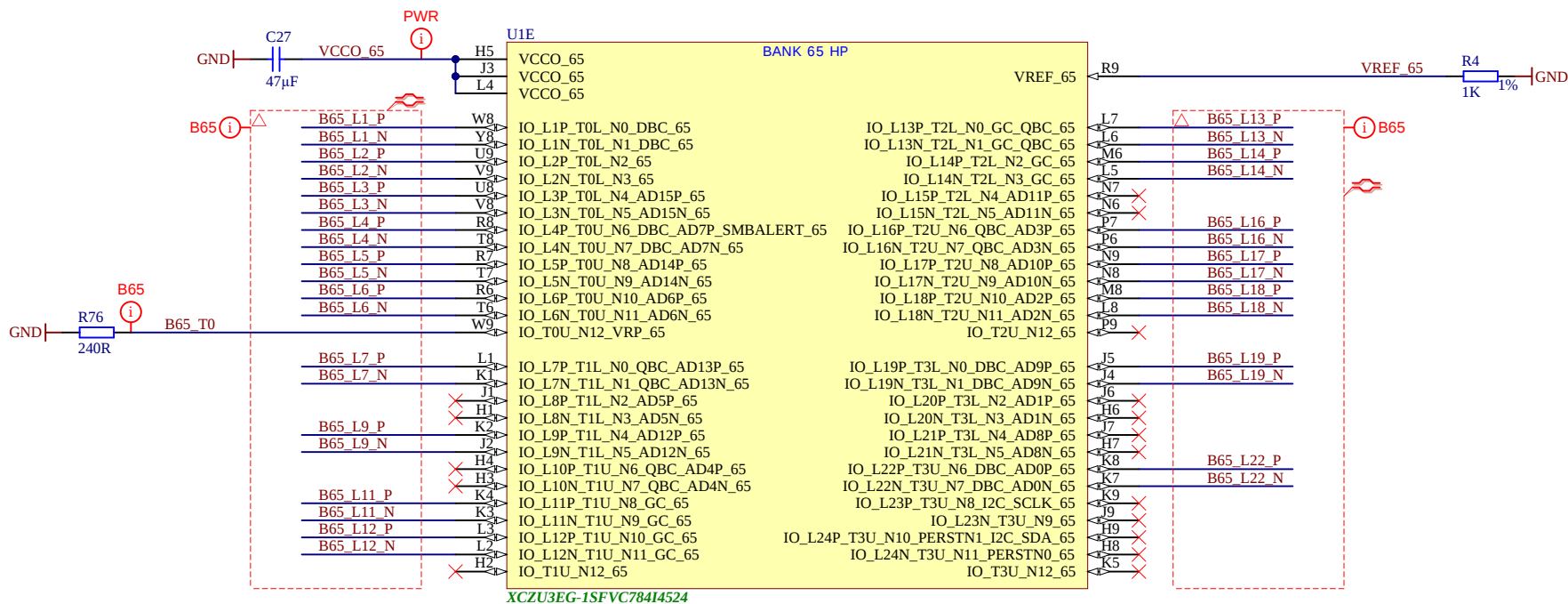
B

C

C

D

D



Title: Module TE0821 - B65			
A4	Number: TE0821 3BI91ND		Rev. 01
Date: 20.02.2019	Copyright: Trenz Electronic GmbH / TT		Page 9 of 24
Filename: B65.SchDoc			

1

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1

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3

4

A

A

B

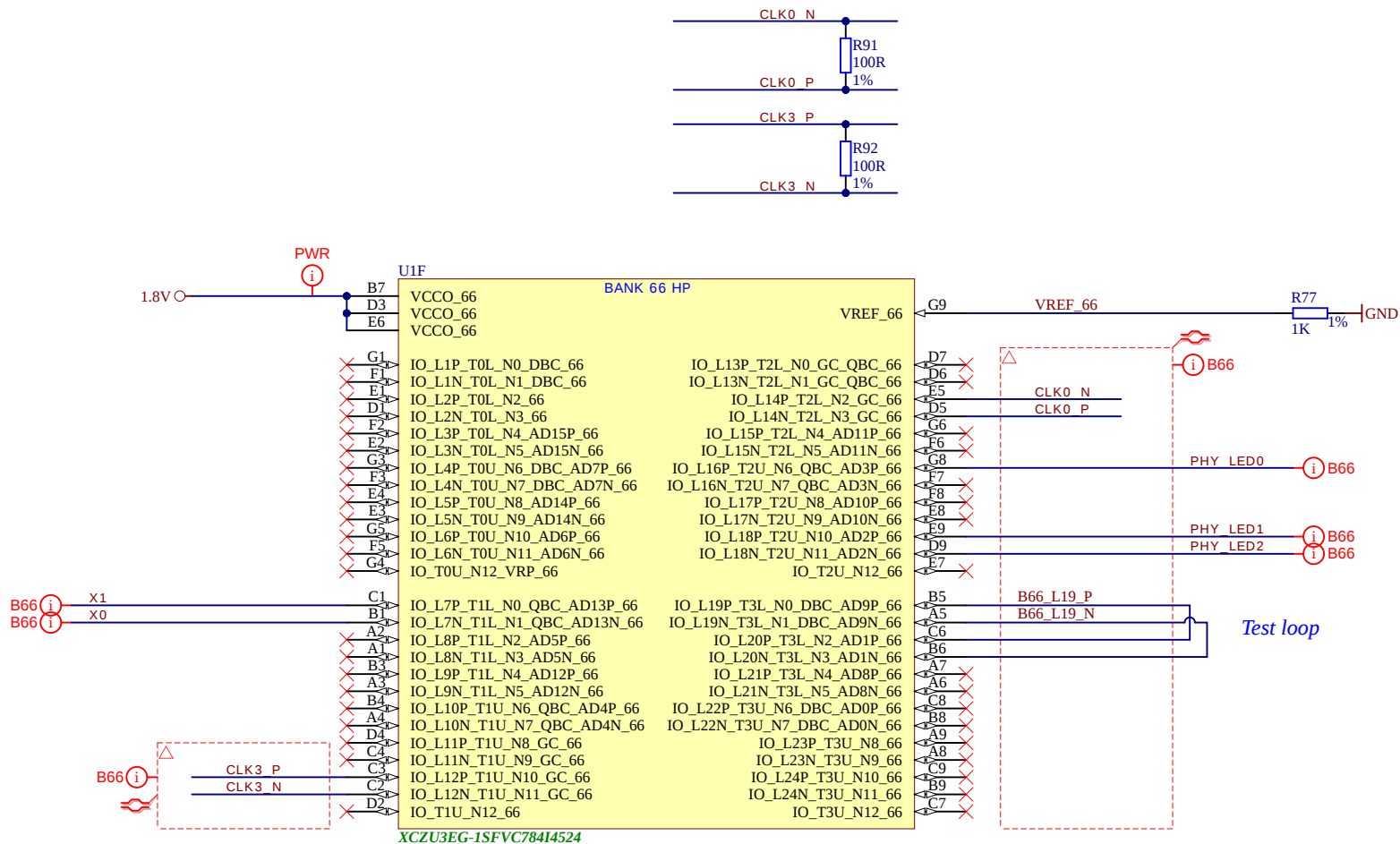
B

C

C

D

D



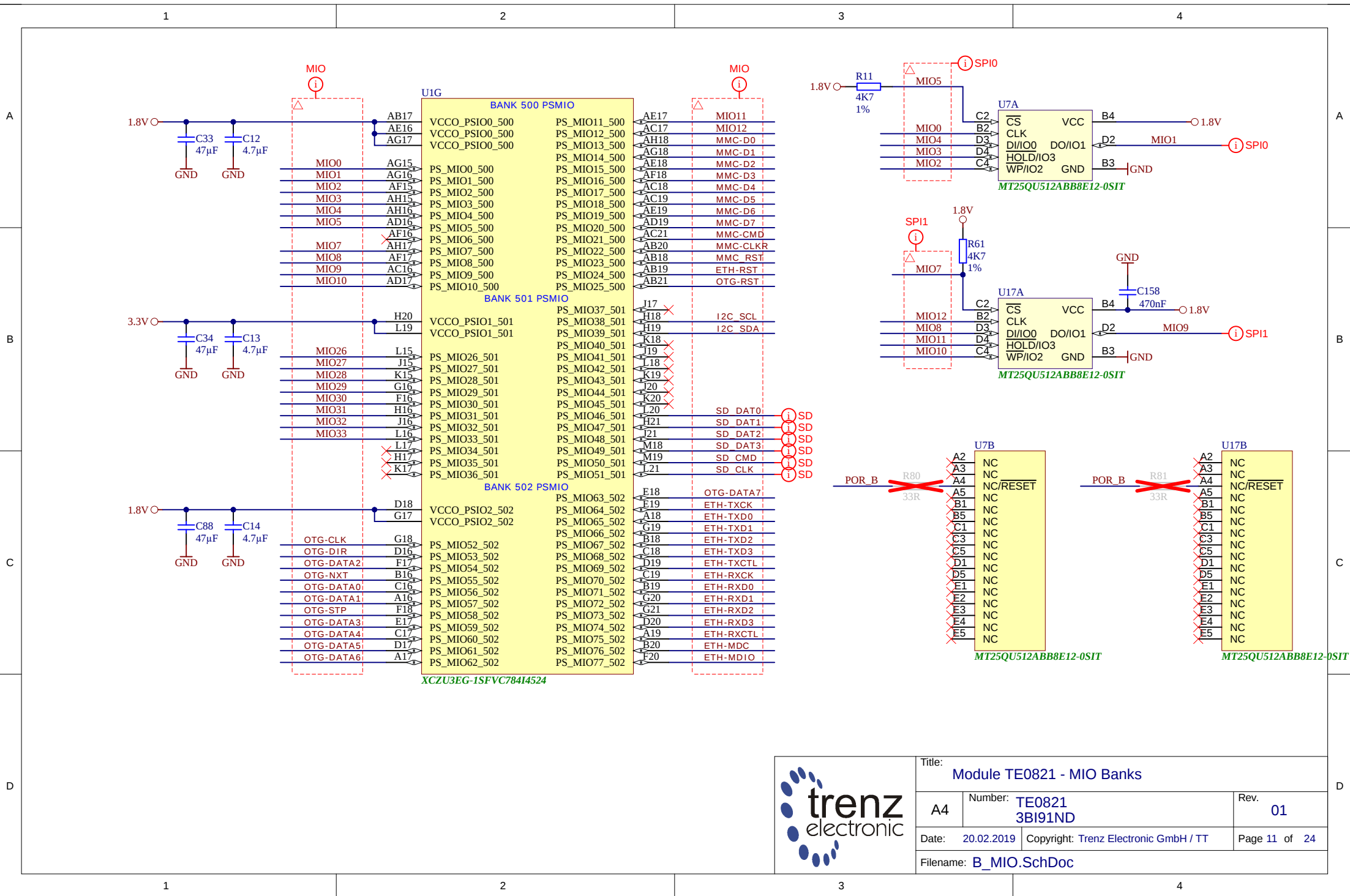
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A4	Number: TE0821 3BI91ND		Rev. 01
Date: 20.02.2019	Copyright: Trenz Electronic GmbH / TT		Page 10 of 24
Filename: B66.SchDoc			

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1

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4

A

A

B

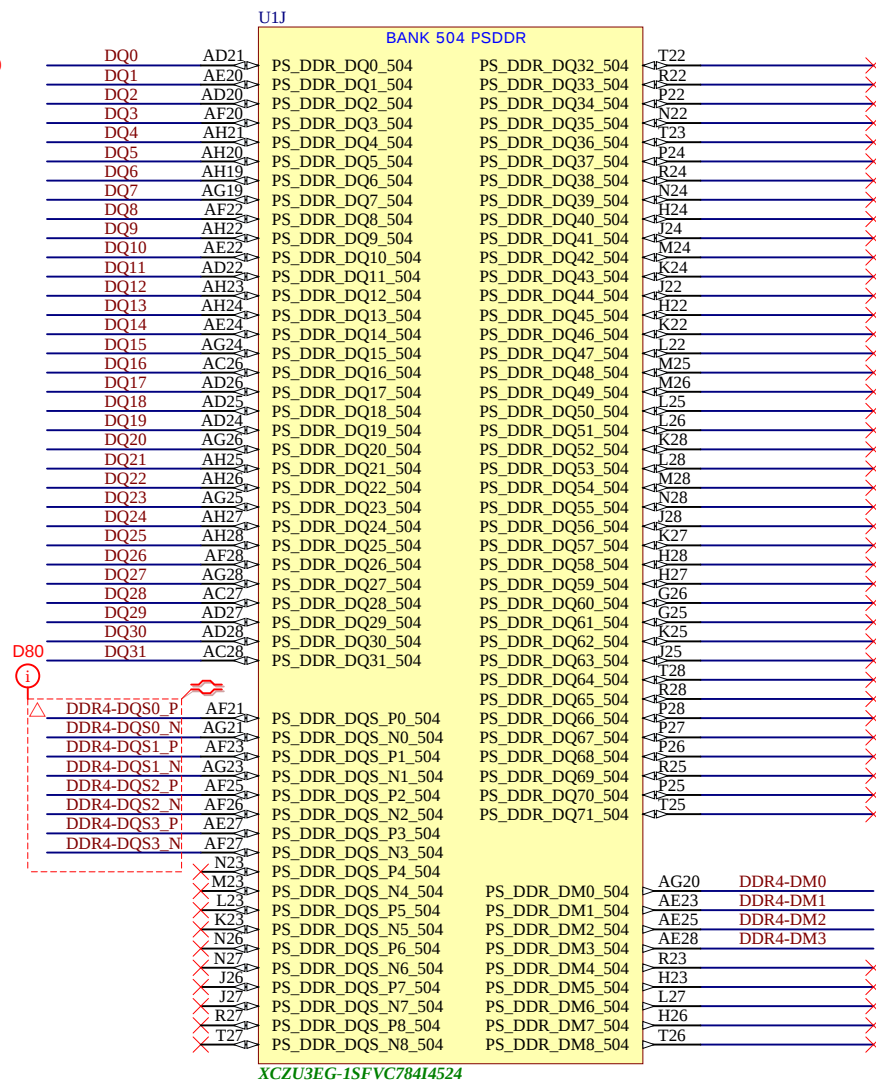
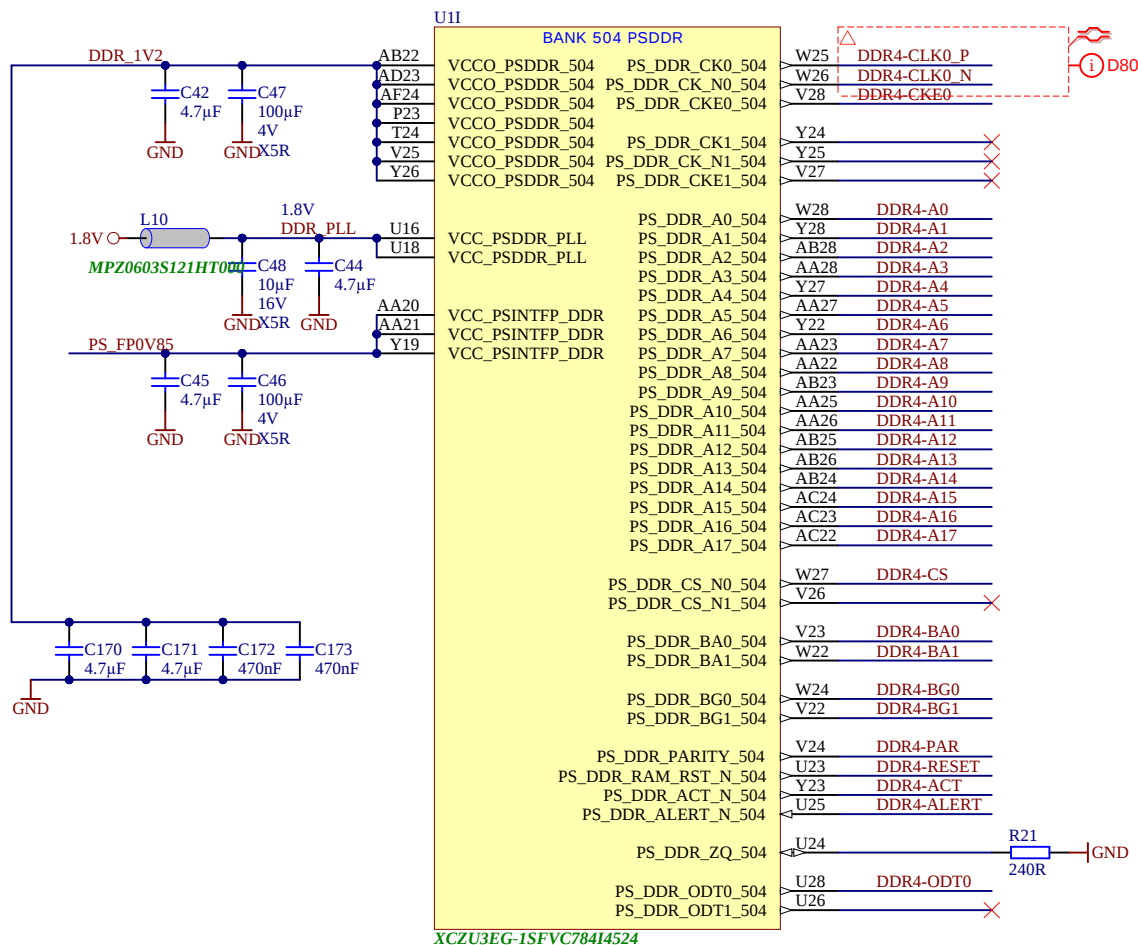
B

C

C

D

D



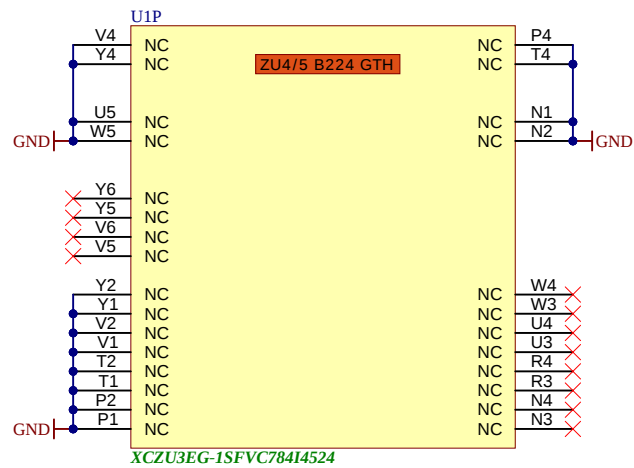
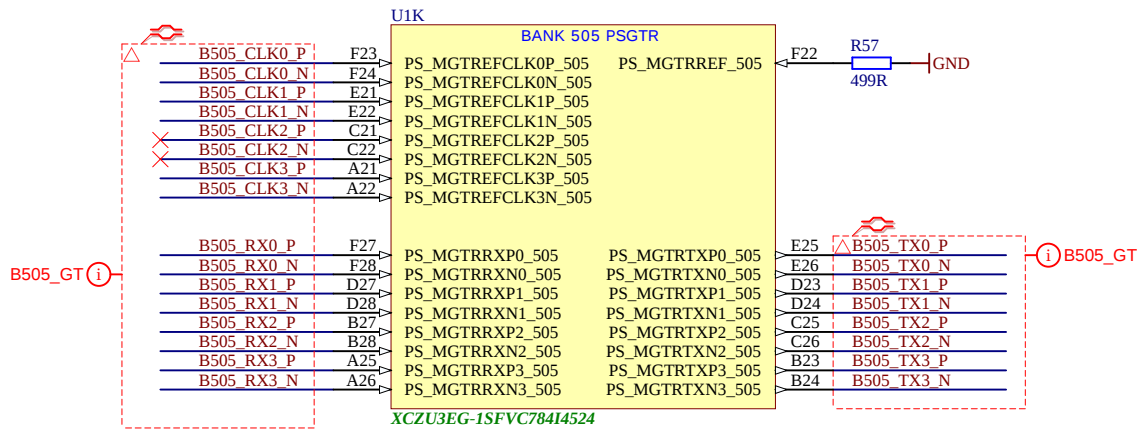
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A4	Number: TE0821 3BI91ND		Rev. 01
Date: 20.02.2019	Copyright: Trenz Electronic GmbH / TT		Page 12 of 24
Filename: PS_DDR.SchDoc			

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		Title: Module TE0821 - PS MGT	
		A4 Number: TE0821 3BI91ND	Rev. 01
Date: 20.02.2019		Copyright: Trenz Electronic GmbH / TT	
Filename: B_PS_GT.SchDoc		Page 13 of 24	

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A

A

B

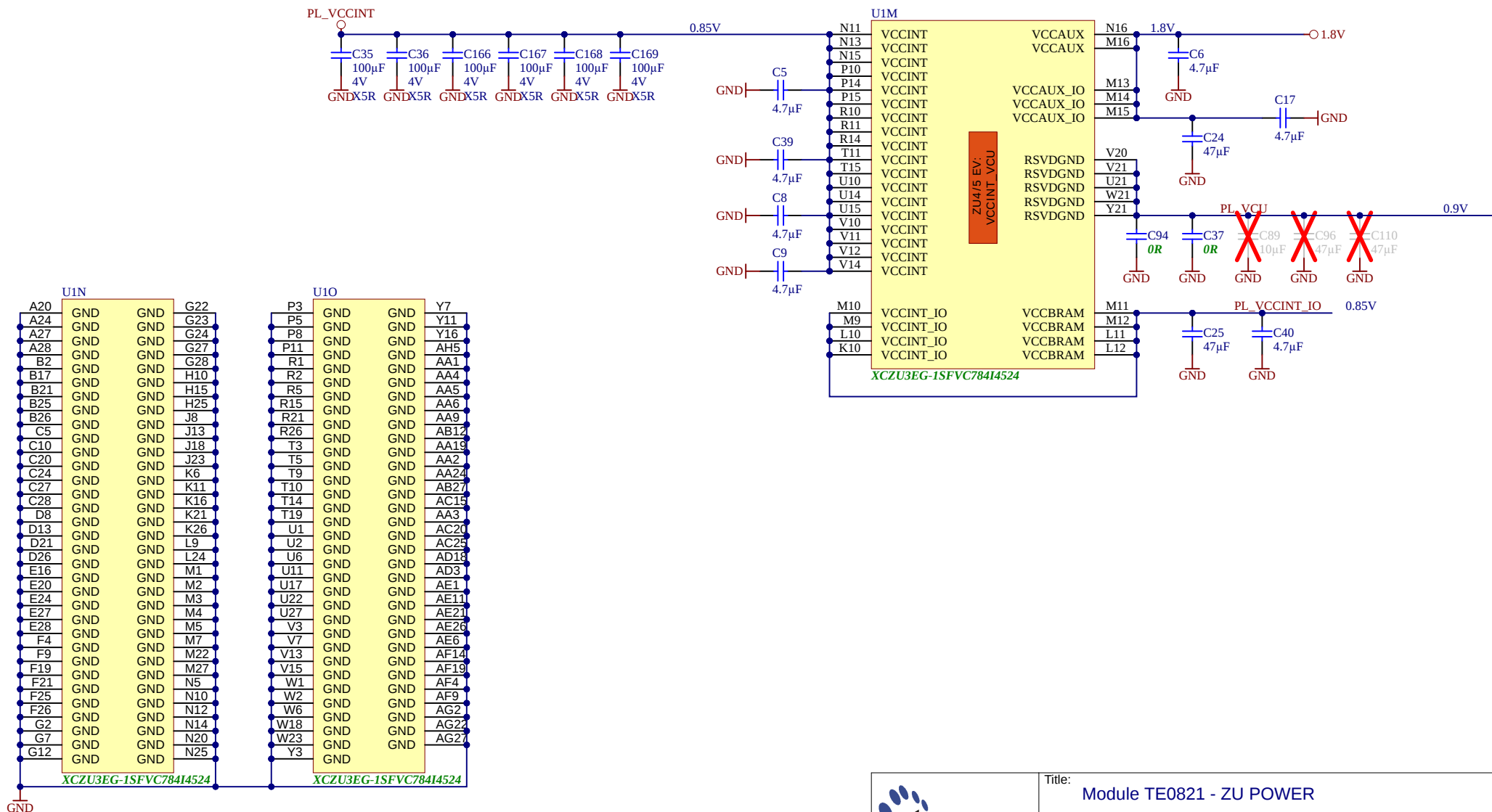
B

C

C

D

D



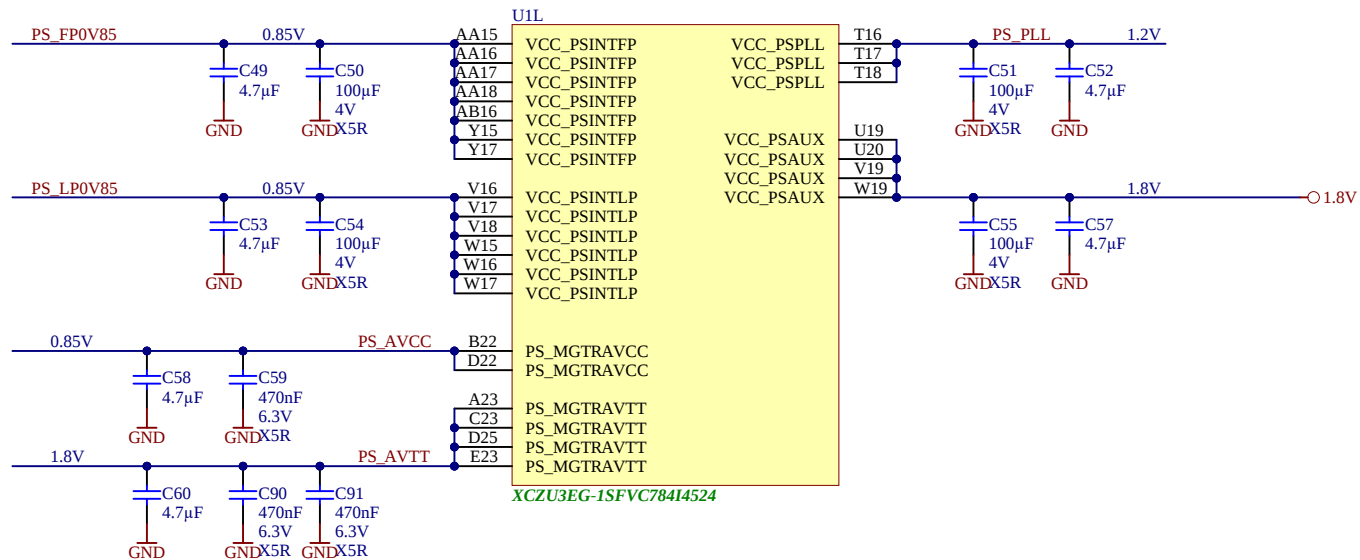
	Title: Module TE0821 - ZU POWER	
	A4	Rev. 01
Date: 20.02.2019	Number: TE0821 3BI91ND	Page 14 of 24
Filename: ZU_POWER.SchDoc		

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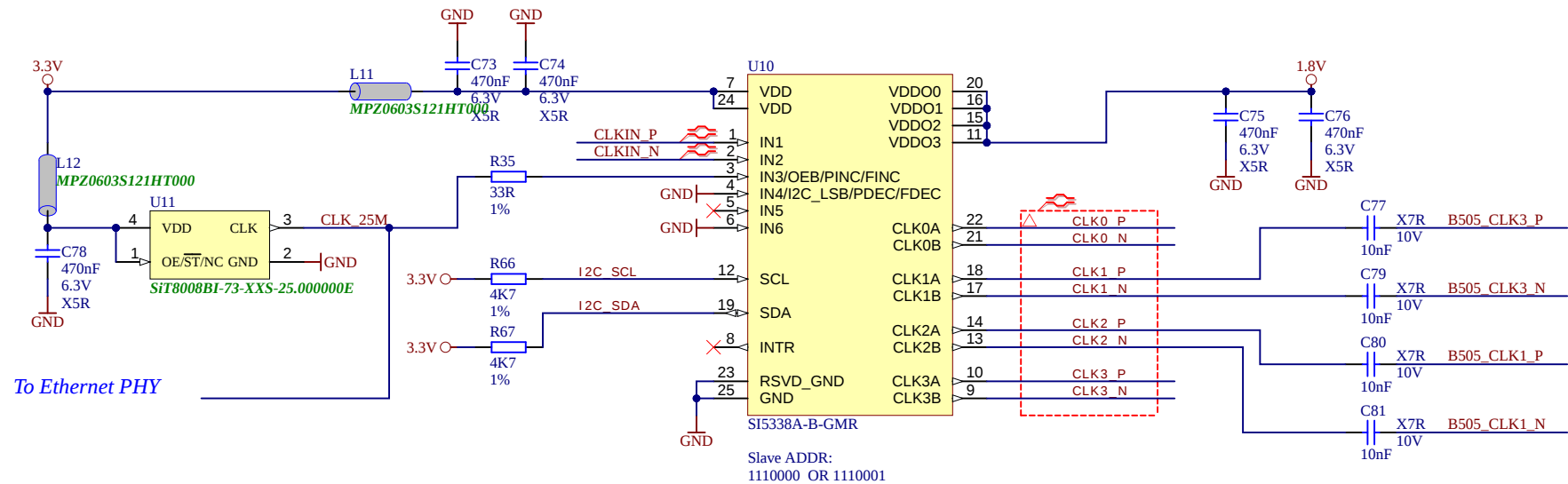
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		Title: Module TE0821 - ZU PS POWER	
		A4 Number: TE0821 3BI91ND	Rev. 01
Date: 20.02.2019		Copyright: Trenz Electronic GmbH / TT	
Filename: ZU_PS_POWER.SchDoc		Page 15 of 24	



		Title: Module TE0821 - CLK	
		A4 Number: TE0821 3BI91ND	Rev. 01
Date: 20.02.2019		Copyright: 2015 Trenz Electronic GmbH	
Filename: CLK.SchDoc		Page 16 of 24	

1

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A

A

B

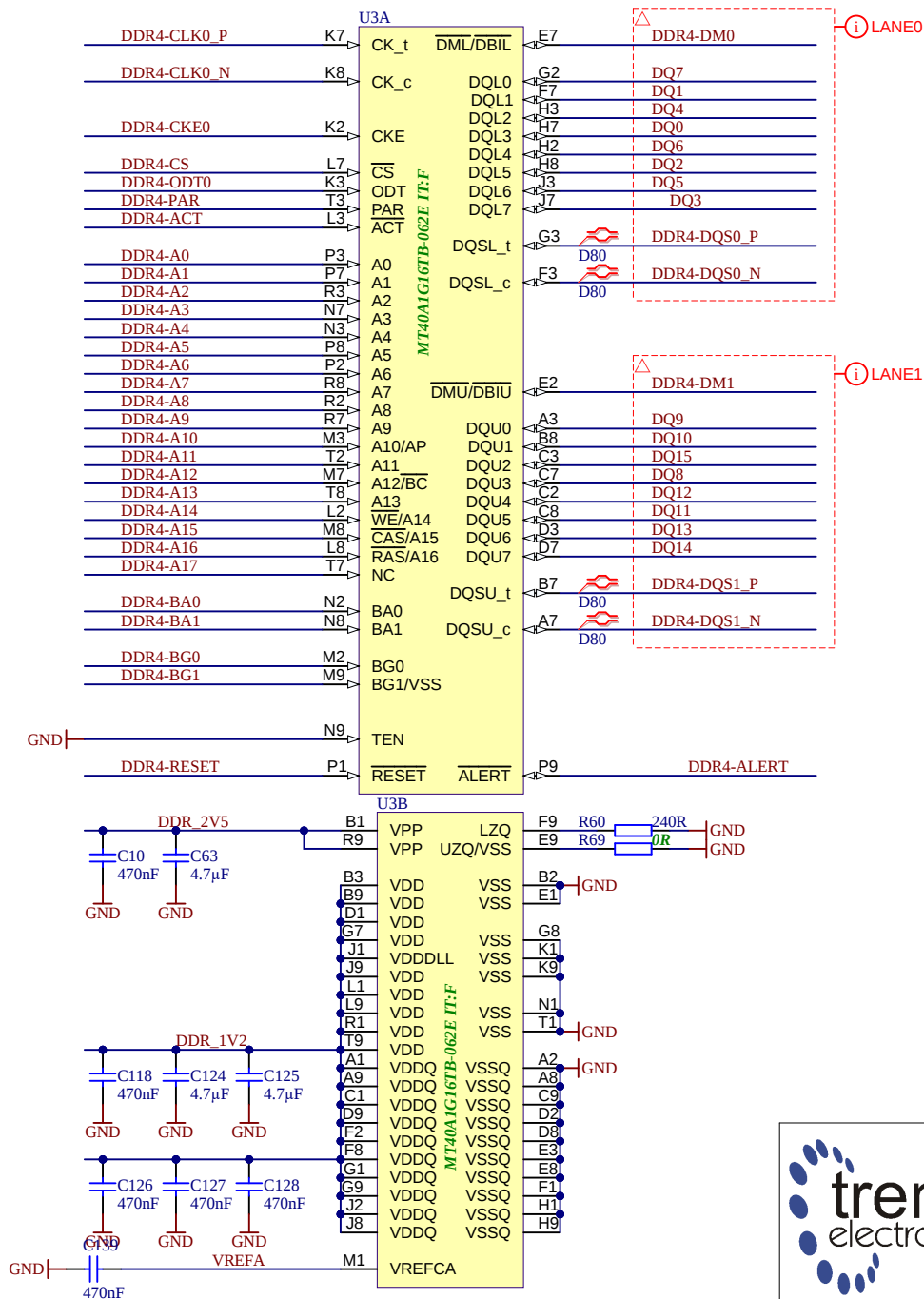
B

C

C

D

D



Title: Module TE0821 - DDR4 RAM2		
A4	Number: TE0821 3BI91ND	Rev. 01
Date: 20.02.2019	Copyright: Trenz Electronic GmbH / TT	Page 18 of 24
Filename: DDR4-RAM_2.SchDoc		

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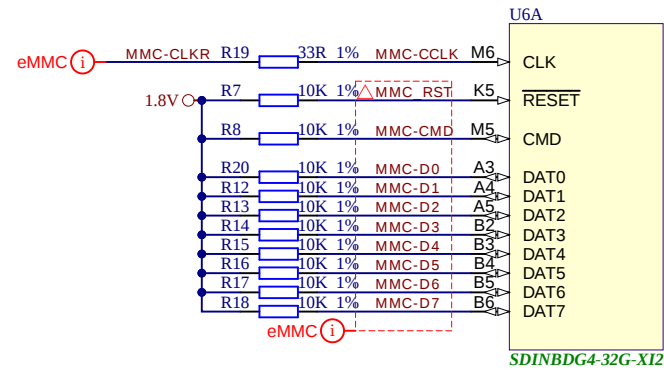
3

4

U6D

A1	NC	NC	H2
A2	NC	NC	H3
A8	NC	NC	H12
A9	NC	NC	H13
A10	NC	NC	H14
A11	NC	NC	J1
A12	NC	NC	J2
A13	NC	NC	J3
A14	NC	NC	J12
B1	NC	NC	J13
B7	NC	NC	J14
B8	NC	NC	K1
B9	NC	NC	K2
B10	NC	NC	K3
B11	NC	NC	K12
B12	NC	NC	K13
B13	NC	NC	K14
B14	NC	NC	L1
C1	NC	NC	L2
C3	NC	NC	L3
C7	NC	NC	L12
C8	NC	NC	L13
C9	NC	NC	L14
C10	NC	NC	M1
C11	NC	NC	M2
C12	NC	NC	M3
C13	NC	NC	M7
C14	NC	NC	M8
D1	NC	NC	M9
D2	NC	NC	M10
D3	NC	NC	M11
D4	NC	NC	M12
D12	NC	NC	M13
D13	NC	NC	M14
D14	NC	NC	N1
E1	NC	NC	N3
E2	NC	NC	N6
E3	NC	NC	N7
E12	NC	NC	N8
E13	NC	NC	N9
E14	NC	NC	N10
F1	NC	NC	N11
F2	NC	NC	N12
F3	NC	NC	N13
F12	NC	NC	N14
F13	NC	NC	P1
F14	NC	NC	P2
G1	NC	NC	P8
G2	NC	NC	P9
G12	NC	NC	P11
G13	NC	NC	P12
G14	NC	NC	P13
H1	NC	NC	P14

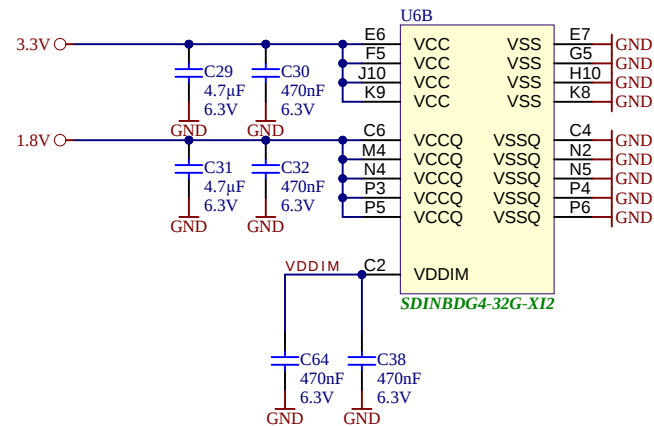
SDINBDG4-32G-X12



U6C

A6	RFU/VSS
A7	RFU
C5	RFU/NC
E5	RFU
E8	RFU
E9	RFU
F10	RFU
F10	RFU
G3	RFU/NC
G10	RFU
H5	RFU/DS
J5	RFU/VSS
K6	RFU
K7	RFU
K10	RFU
P7	RFU/NC
P10	RFU

SDINBDG4-32G-X12



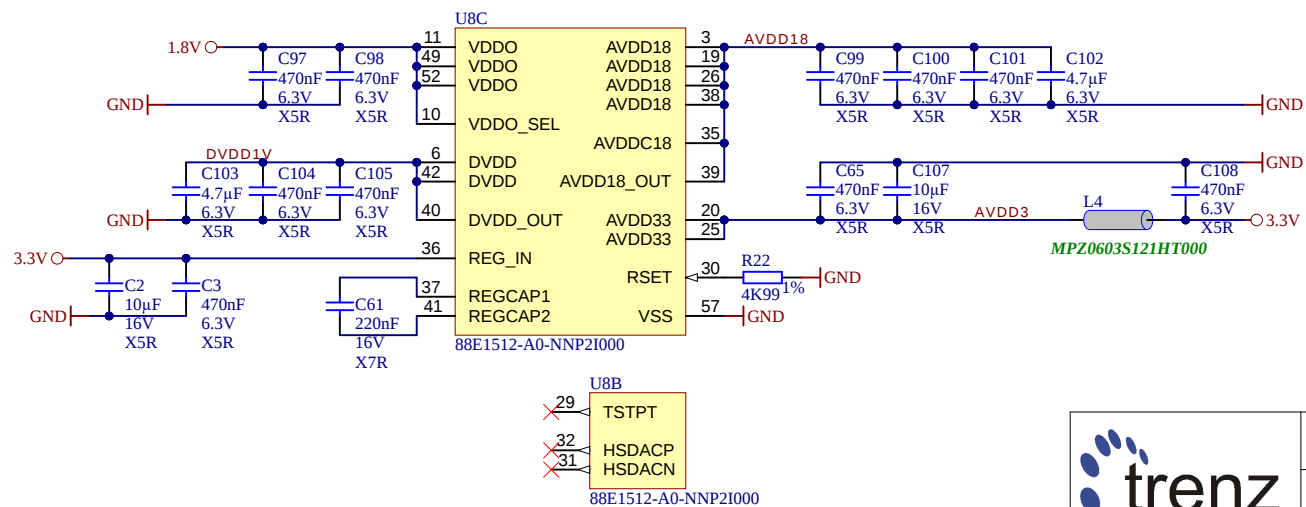
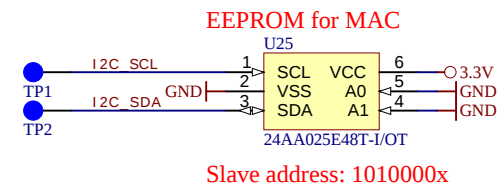
Title: Module TE0821 - eMMC		
A4	Number: TE0821 3BI91ND	Rev. 01
Date: 20.02.2019	Copyright: Trenz Electronic GmbH / TT	Page 19 of 24
Filename: eMMC.SchDoc		

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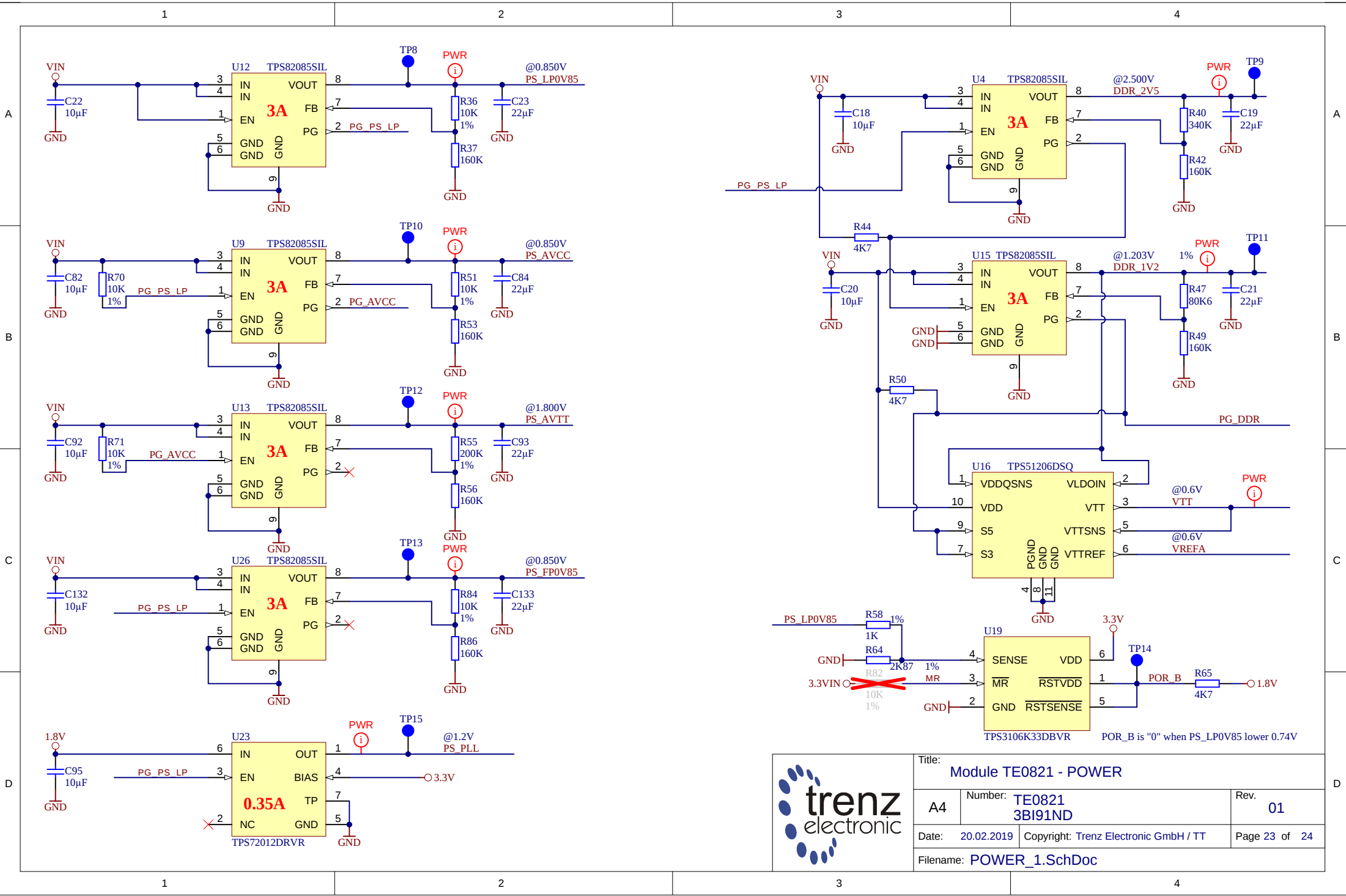
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Title: Module TE0821 - Ethernet PHY			
A4	Number: TE0821 3BI91ND	Rev. 01	
Date: 20.02.2019	Copyright: 2015 Trenz Electronic GmbH		Page 20 of 24
Filename: ETH-PHY.SchDoc			



Title: Module TE0821 - POWER		
A4	Number: TE0821 3BI91ND	Rev. 01
Date: 20.02.2019	Copyright: Trenz Electronic GmbH / TT	Page 23 of 24
Filename: POWER_1.SchDoc		

1

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3

4

Revision 01a (01.07.2020):

1. VY: R38 value was changed to 20K (was: 40K2) to set VCU 0.9V

Revision 01b (29.10.2020):

1. VY: Updated Block diagram

(07.02.2024):
2. OT: R82 set to not fitted

A

A

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B

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C

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D



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