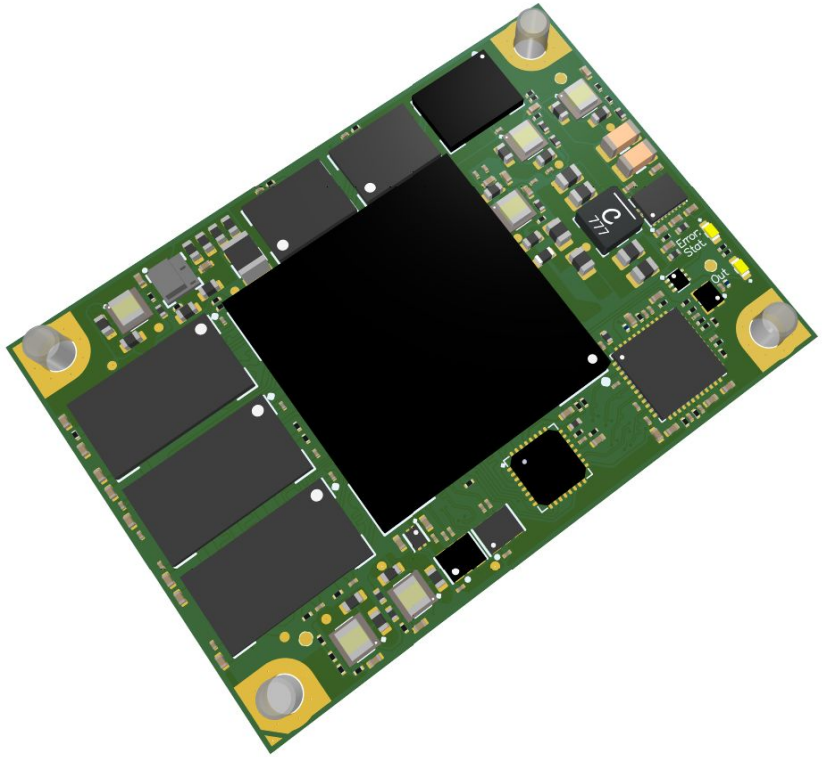
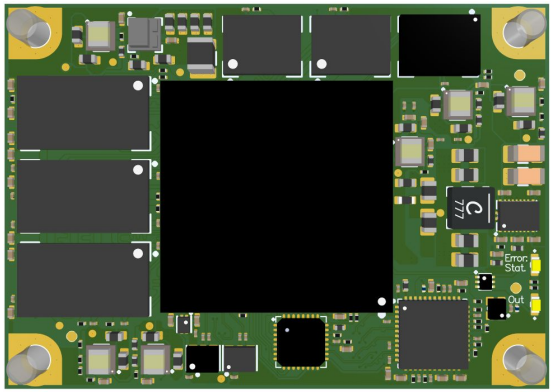
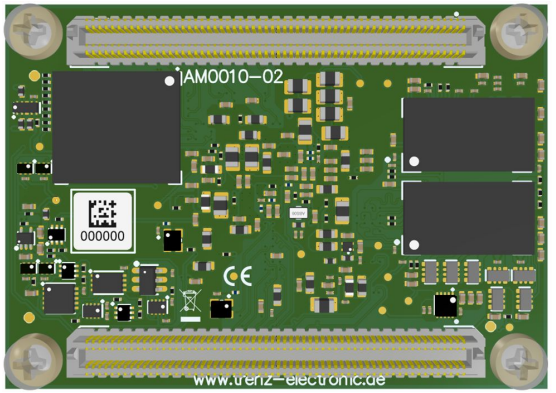






Regarding the usage of our schematics and alike documentation for Trenz module AM0010.

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. AM0010 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!

trenz electronic	Title: AM0010 – Legal Notices Modules		
A4	Number: Legal Notices Modules 4BE21MA		Rev. 02
Date: 22.07.2022	Copyright: Trenz Electronic GmbH		Page 1 of 30
Filename: Legal Notices Modules.SchDoc			

U_B2B_Connector_1
B2B_Connector_1.SchDoc

U_B2B_Connector_2
B2B_Connector_2.SchDoc

U_MPSoC
MPSoC.SchDoc

U_DDR4-RAM
DDR4-RAM.SchDoc

U_DDR4-RAM_2
DDR4-RAM_2.SchDoc

U_DDR4-RAM_3
DDR4-RAM_3.SchDoc

U_DDR4-RAM_4
DDR4-RAM_4.SchDoc

U_DDR4-RAM_5
DDR4-RAM_5.SchDoc

U_DDR4-CAPS
DDR4-CAPS.SchDoc

U_DDR4-TERM
DDR4-TERM.SchDoc

U_ETHPHY
ETHPHY.SchDoc

U_USBPHY
USBPHY.SchDoc

U_eMMC
eMMC.SchDoc

U_MISC
MISC.SchDoc

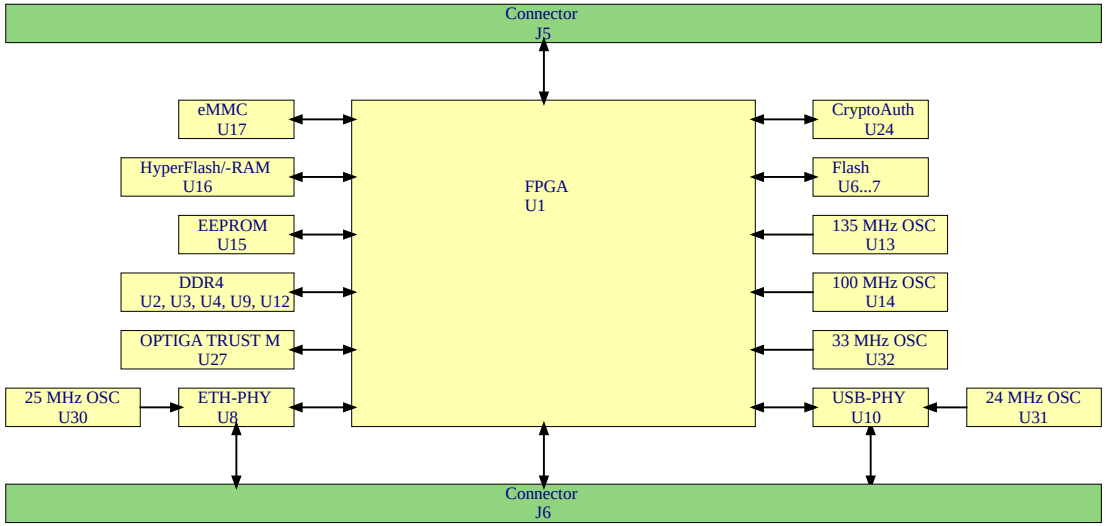
U_POWER_1
POWER_1.SchDoc

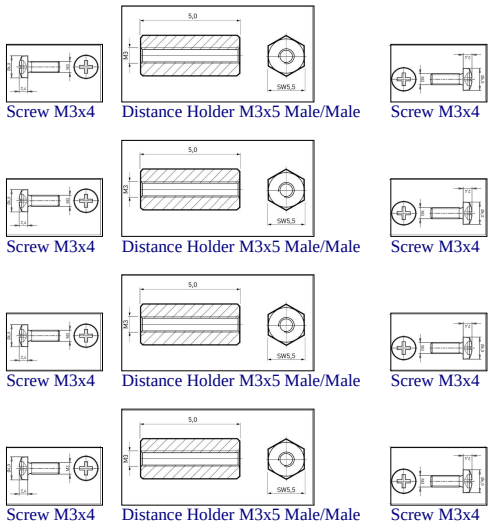
U_POWER_2
POWER_2.SchDoc

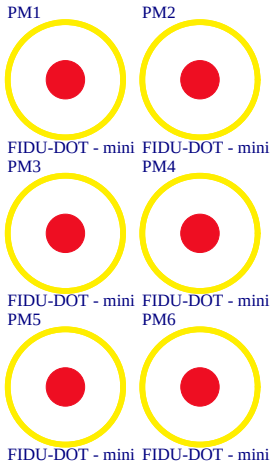
U_REV_CH
Revision_Changes.SchDoc

U_Legal_Notices_Modules
Legal Notices Modules.SchDoc

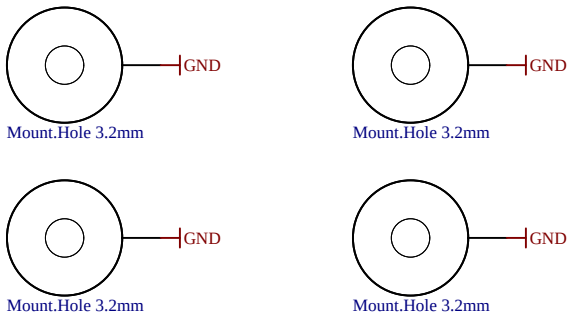
Special notes:







Serial
Serial
Serialnumber 6,3 x 6.3mm



UKCA
UKCA Logo on Top Overlay
UKCA-TOPOVERLAY

Assembly variant	4BE21MA
Created by	ED
Modified by	ED
Modified at	16.11.21
SVN Revision	588

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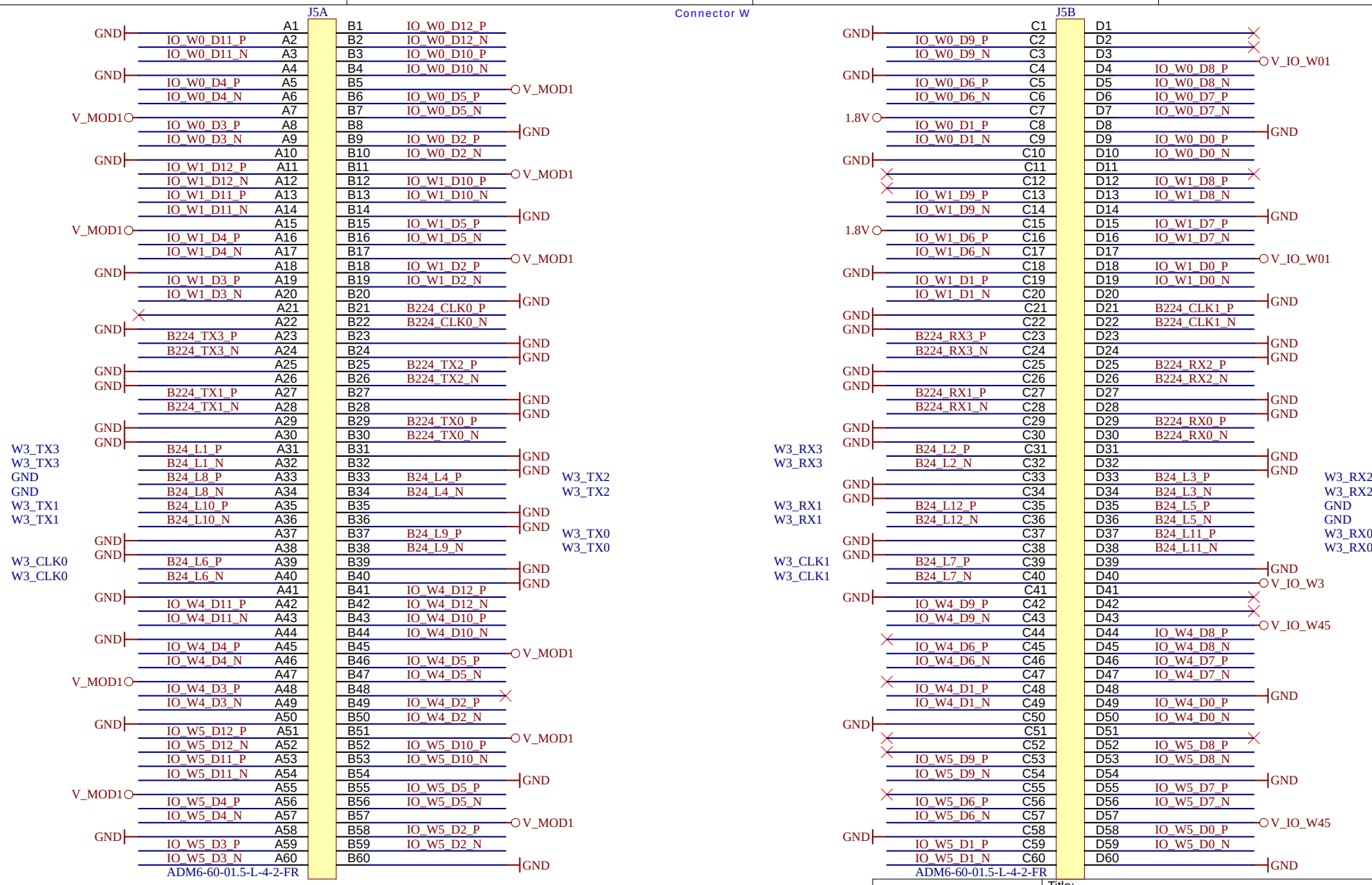
Title: AM0010		
A4	Number: AM0010 4BE21MA	Rev. 02
Date: 22.07.2022	Copyright: Trenz Electronic GmbH	Page 2 of 30
Filename: AM0010.SchDoc		



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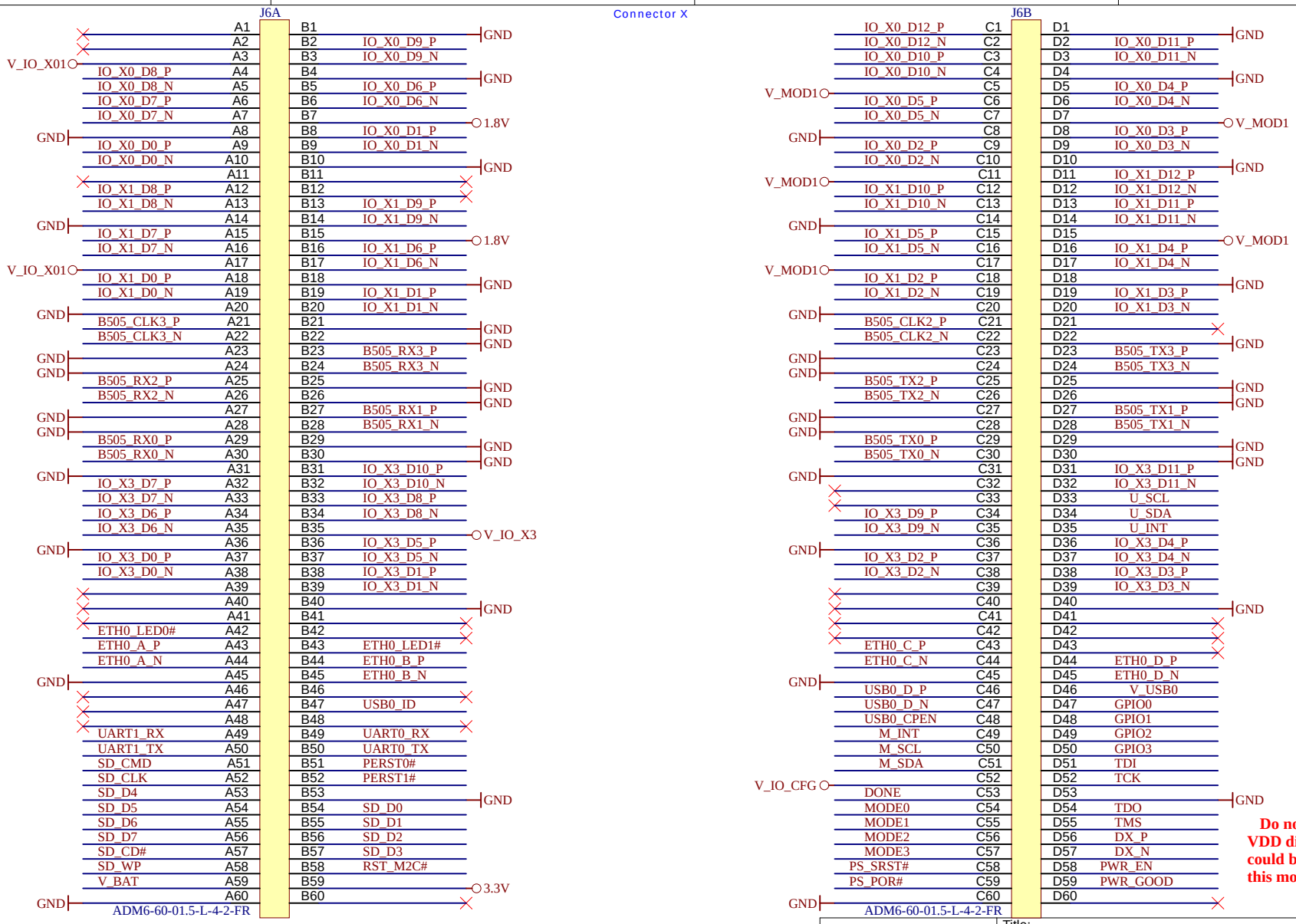
Date: 22.07.2022	Copyright: Trenz Electronic GmbH		Page 3 of 30
Filename: B2B_Connector_1.SchDoc			



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Title: AM0010 – B2B_Connector_2		
A4	Number: B2B_Connector_2 4BE21MA	Rev. 02
Date: 22.07.2022	Copyright: Trenz Electronic GmbH	Page 4 of 30
Filename: B2B_Connector_2.SchDoc		

U_B64
B64.SchDoc

U_B65
B65.SchDoc

U_B66
B66.SchDoc

U_B_HD
B_HD.SchDoc

U_B_MIO
B_MIO.SchDoc

U_PS_DDR
PS_DDR.SchDoc

U_B_PS_GT
B_PS_GT.SchDoc

U_B_GT
B_GT.SchDoc

U_CONFIG
CONFIG.SchDoc

U_ZU_POWER
ZU_POWER.SchDoc

U_ZU_PS_POWER
ZU_PS_POWER.SchDoc

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Title: AM0010 – MPSoC		
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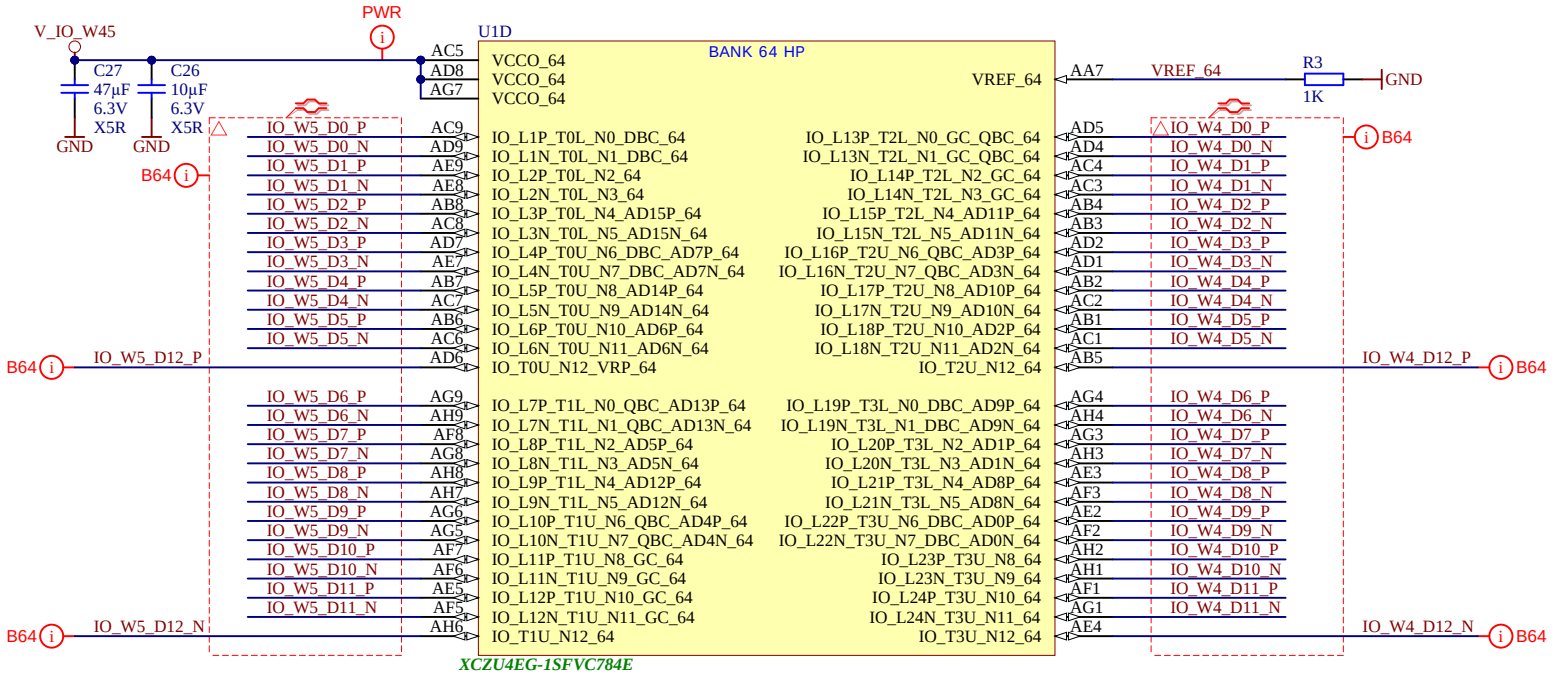
Date: 22.07.2022	Copyright: Trenz Electronic GmbH	Page 5 of 30
Filename: MPSoC.SchDoc		



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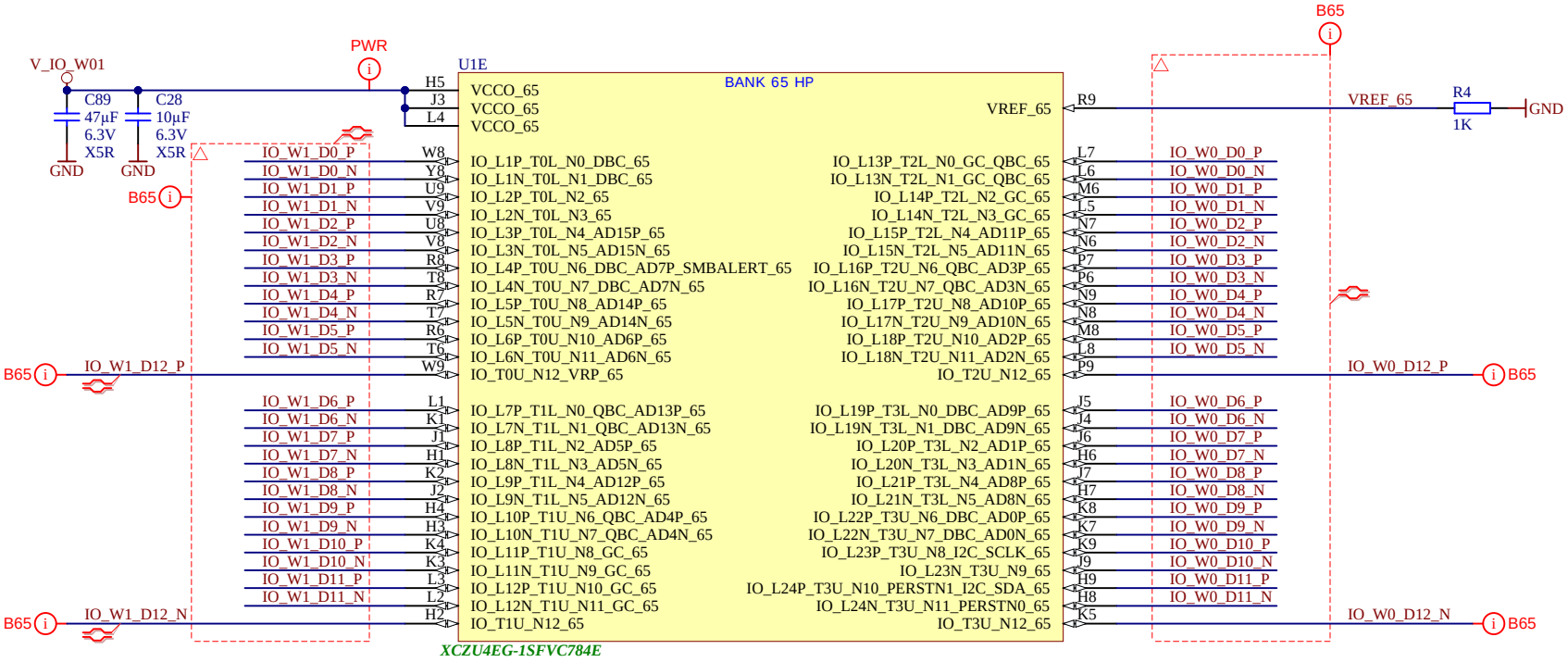
Date: 22.07.2022	Copyright: Trenz Electronic GmbH		Page 6 of 30
Filename: B64.SchDoc			



trenz electronic	Title: AM0010 – B65		
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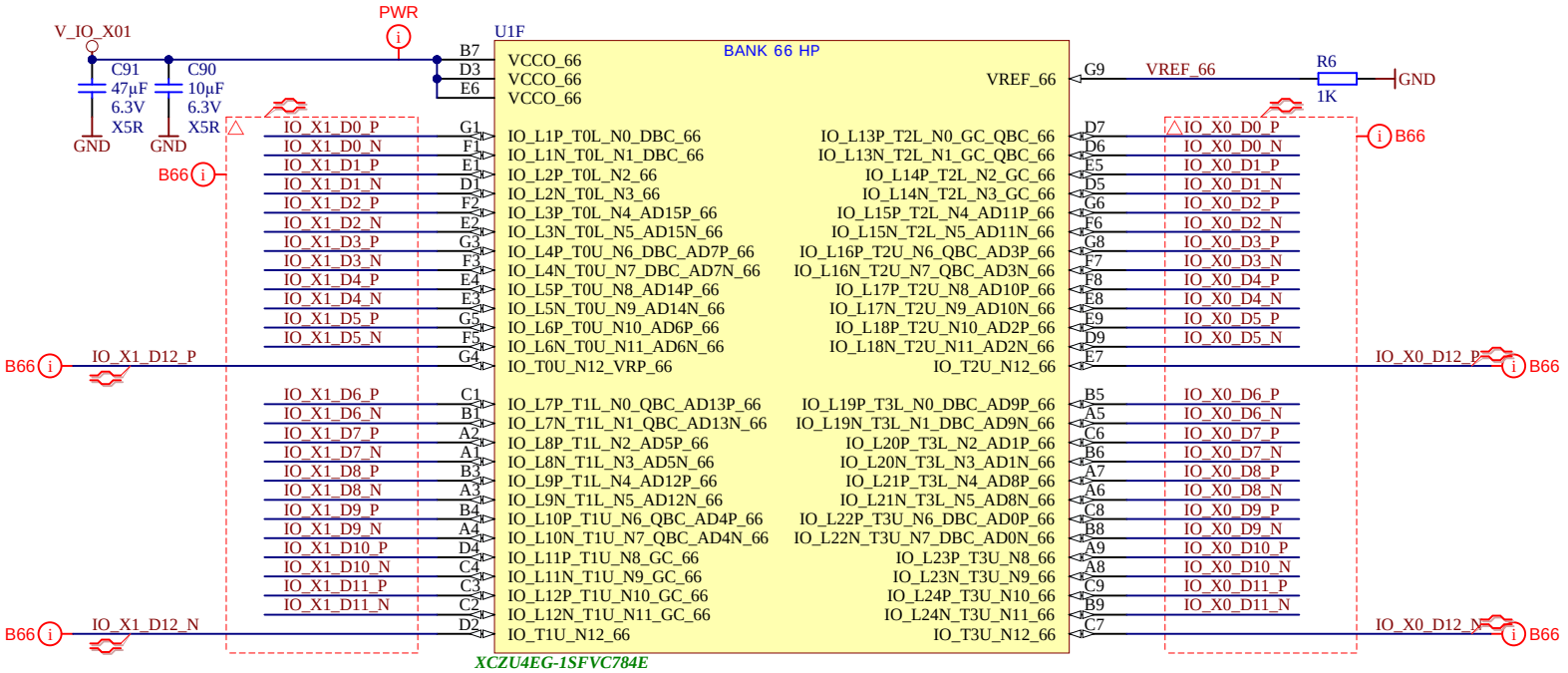
Date: 22.07.2022	Copyright: Trenz Electronic GmbH		Page 7 of 30
Filename: B65.SchDoc			



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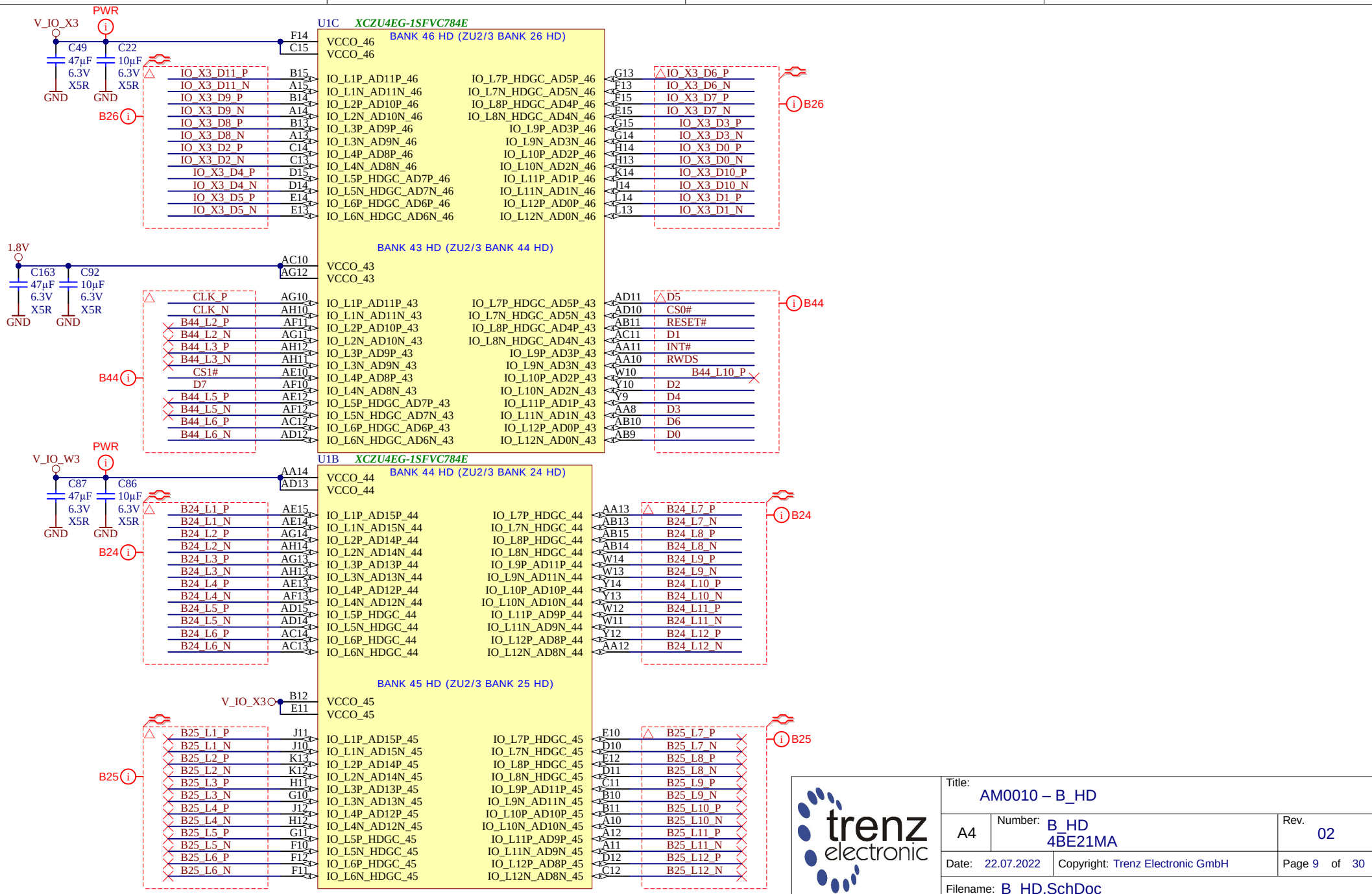
Date: 22.07.2022	Copyright: Trenz Electronic GmbH		Page 8 of 30
Filename: B66.SchDoc			


U1C XCZU4EG-1SFVC784E
BANK 46 HD (ZU2/3 BANK 26 HD)
BANK 43 HD (ZU2/3 BANK 44 HD)
U1B XCZU4EG-1SFVC784E
BANK 44 HD (ZU2/3 BANK 24 HD)
BANK 45 HD (ZU2/3 BANK 25 HD)
V_IO_X3
V_IO_W3
1.8V
PWR
GND
B26
B44
B24
B25
Title: AM0010 – B_HD
A4
Number: B_HD 4BE21MA
Rev. 02
Date: 22.07.2022
Copyright: Trenz Electronic GmbH
Page 9 of 30
Filename: B_HD.SchDoc
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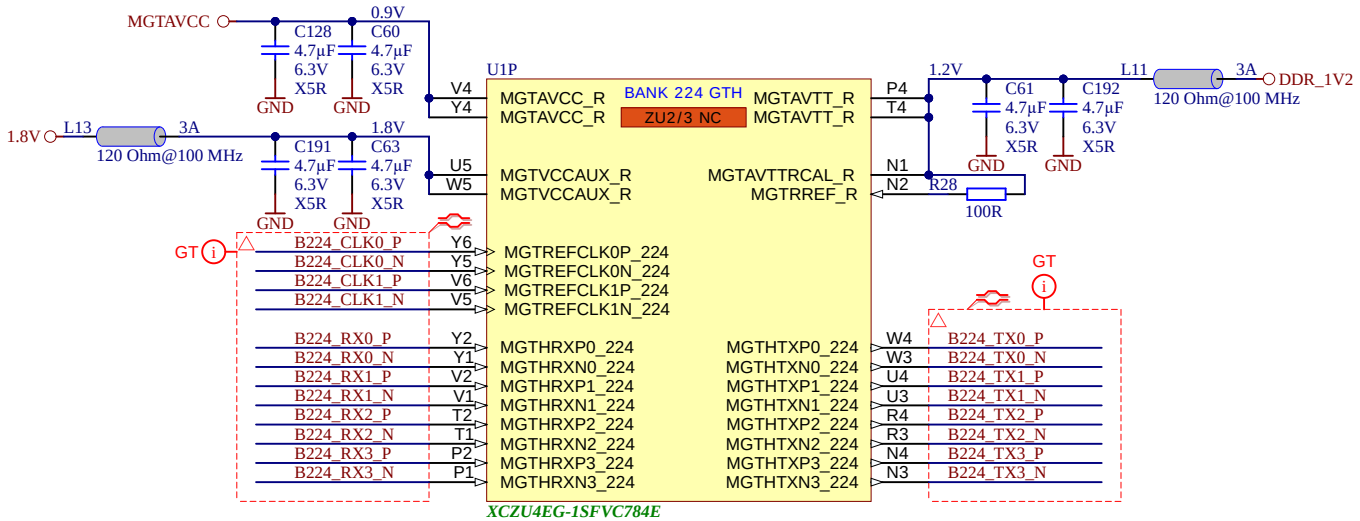

trenz electronic	Title: AM0010 – B_GT		
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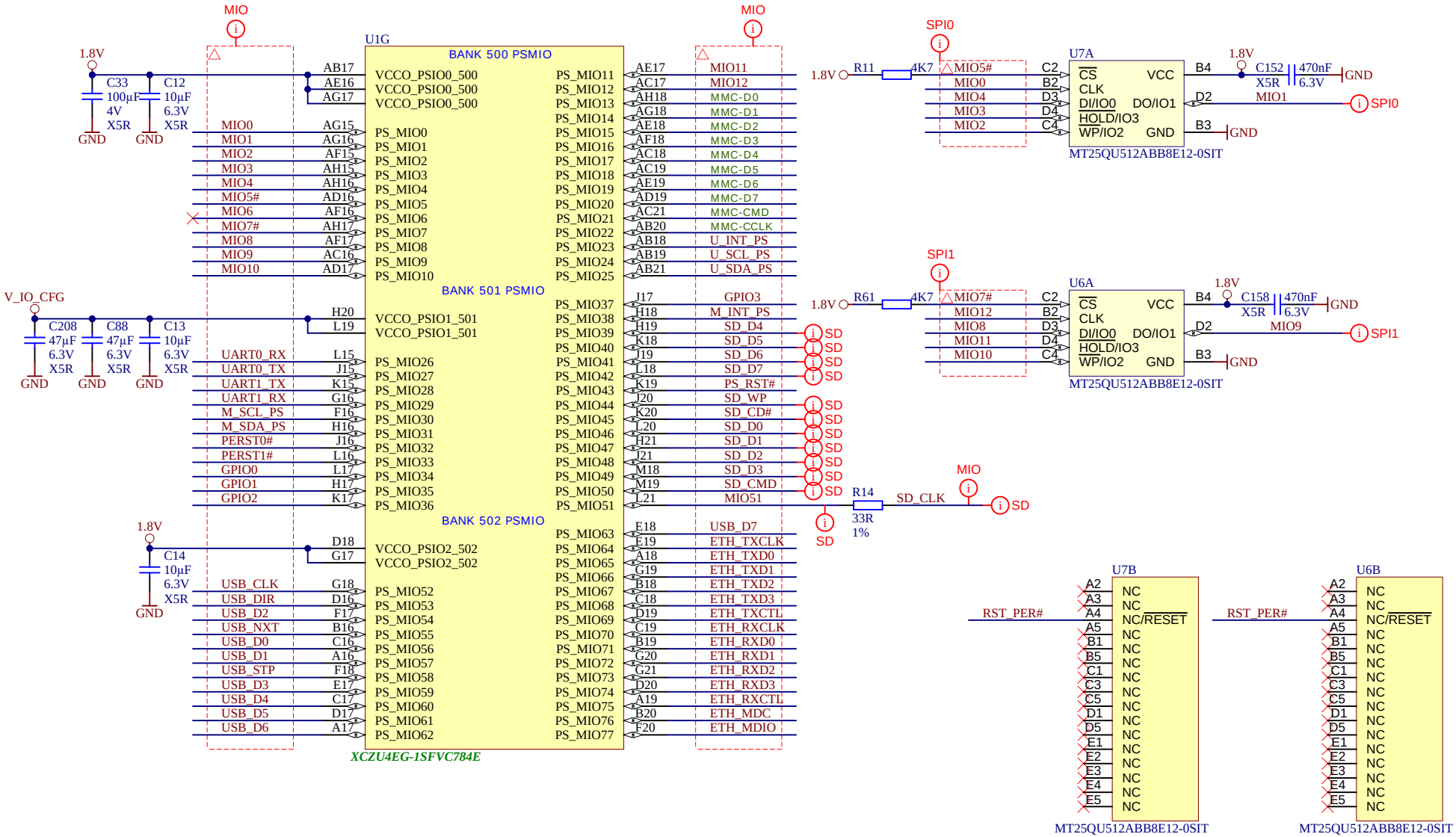
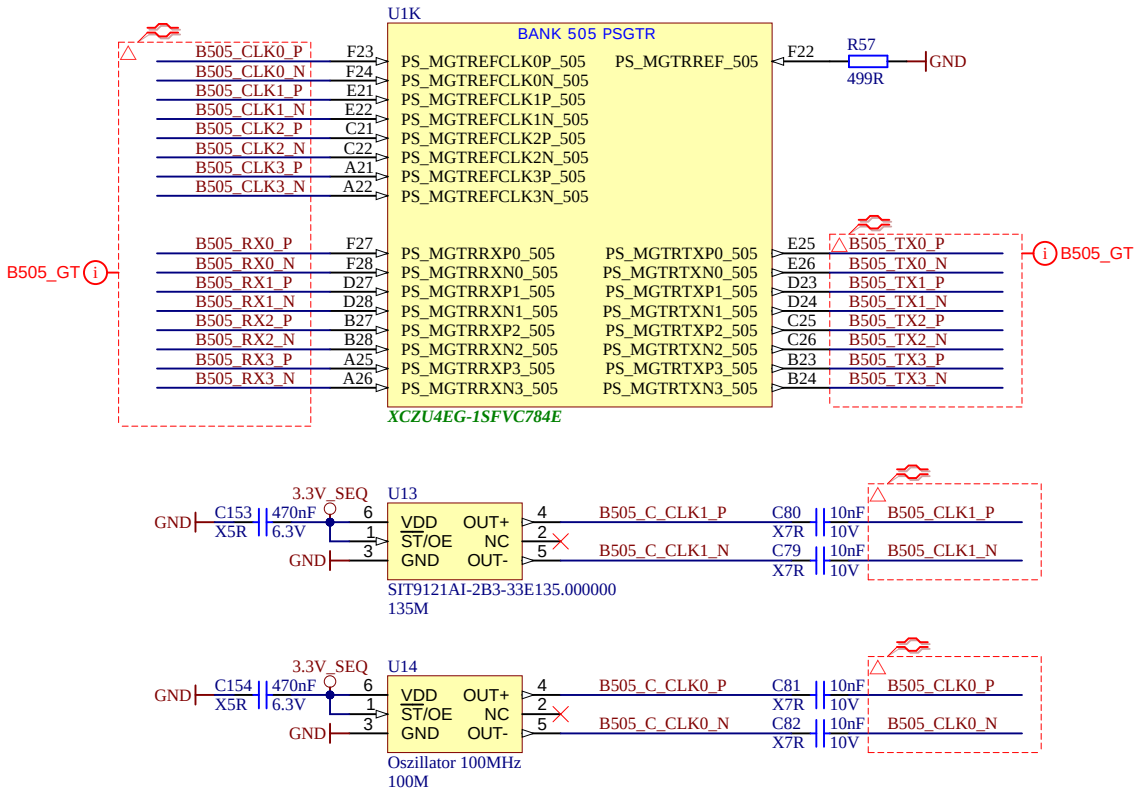
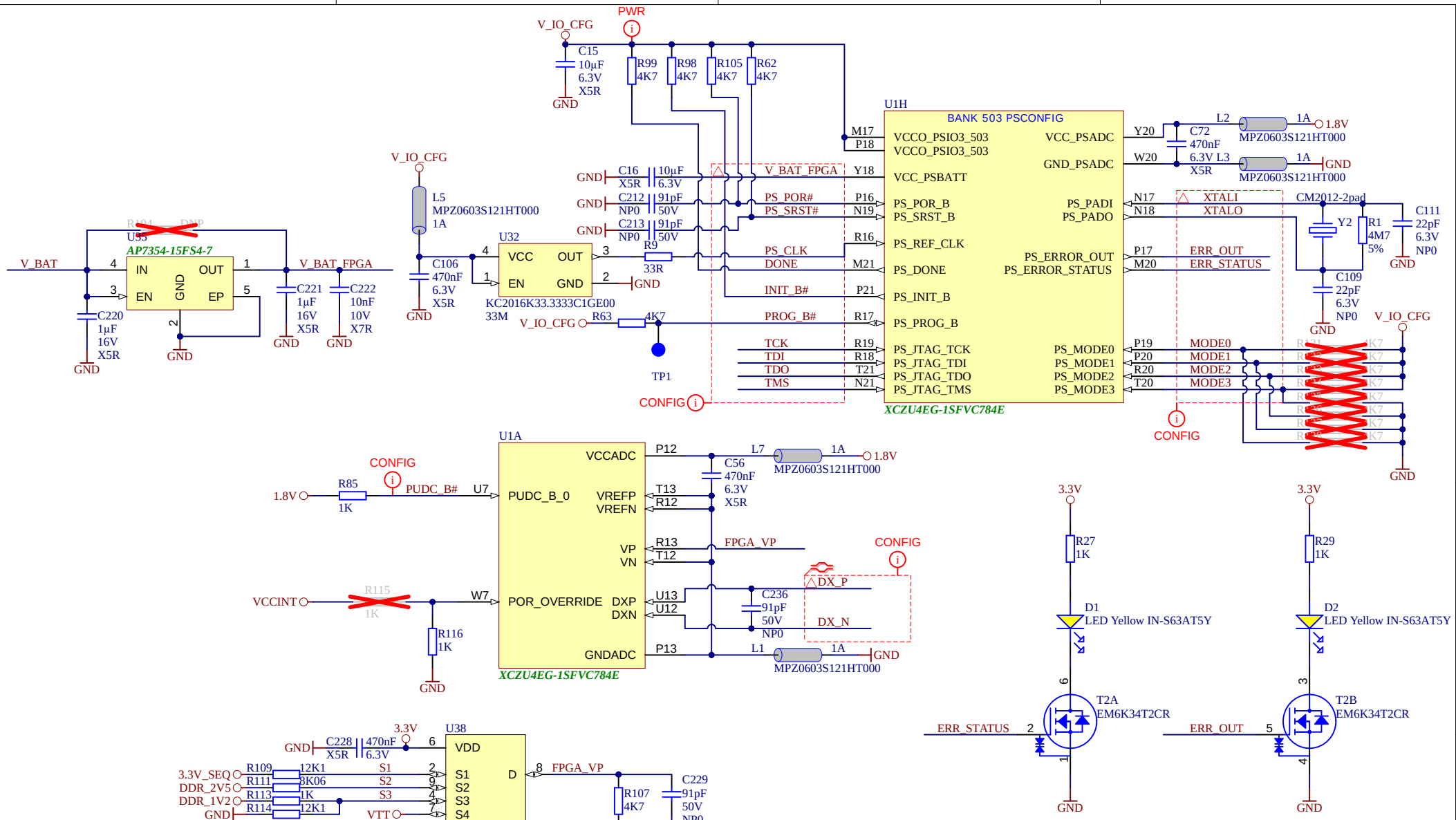
	Date: 22.07.2022	Copyright: Trenz Electronic GmbH	Page 10 of 30
	Filename: B_GT.SchDoc		



Title: AM0010 – B_MIO		
A4	Number: B_MIO 4BE21MA	Rev. 02
Date: 22.07.2022	Copyright: Trenz Electronic GmbH	Page 11 of 30
Filename: B_MIO.SchDoc		



Title: AM0010 – B_PS_GT			
A4	Number: B_PS_GT 4BE21MA		Rev. 02
Date: 22.07.2022	Copyright: Trenz Electronic GmbH		Page 12 of 30
Filename: B_PS_GT.SchDoc			



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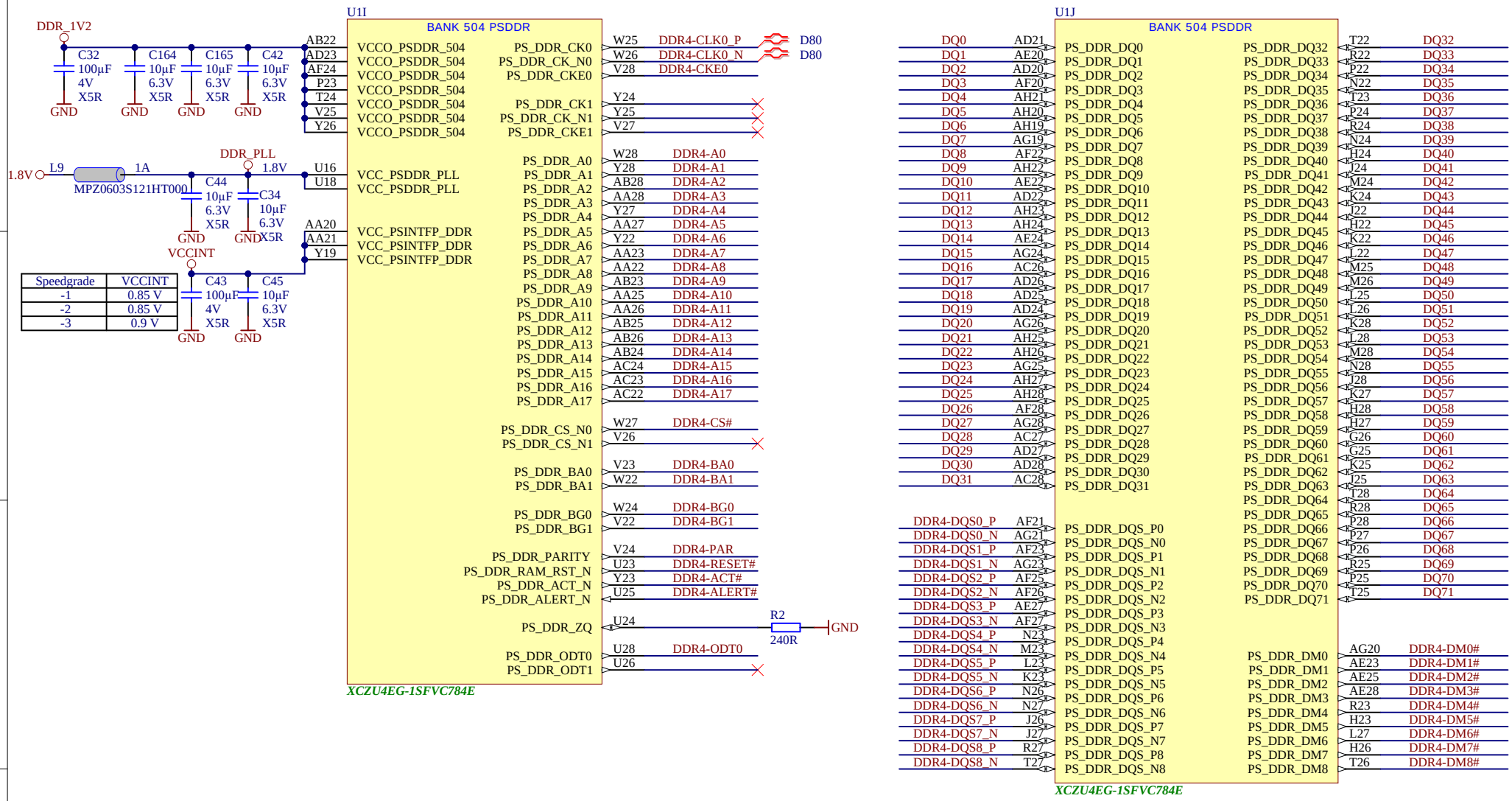
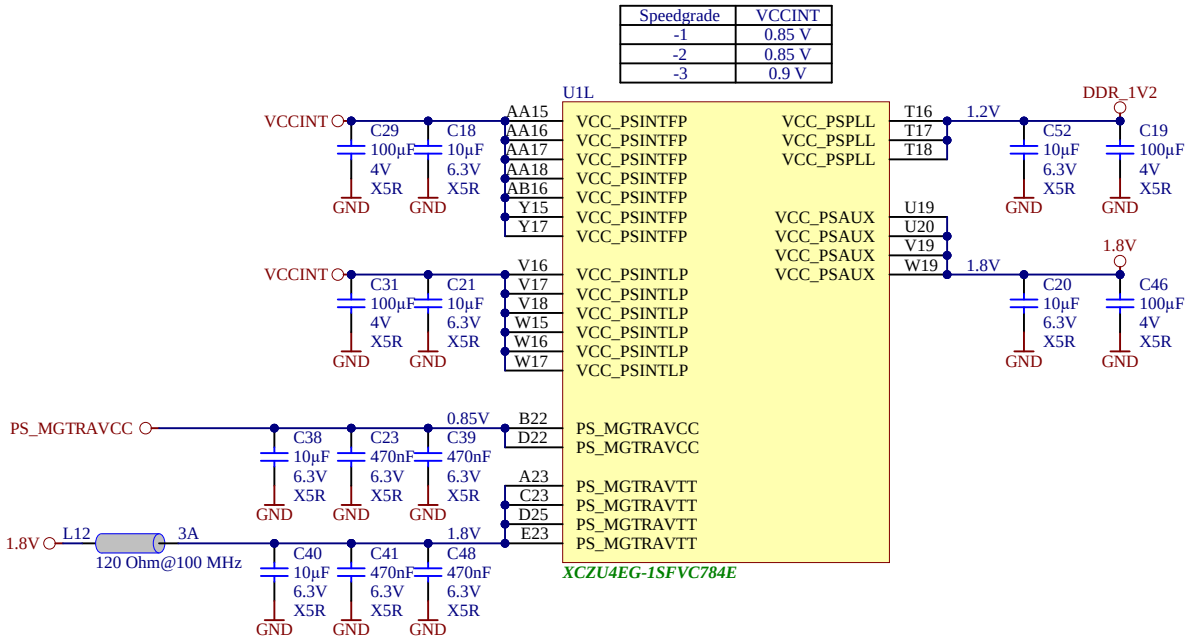
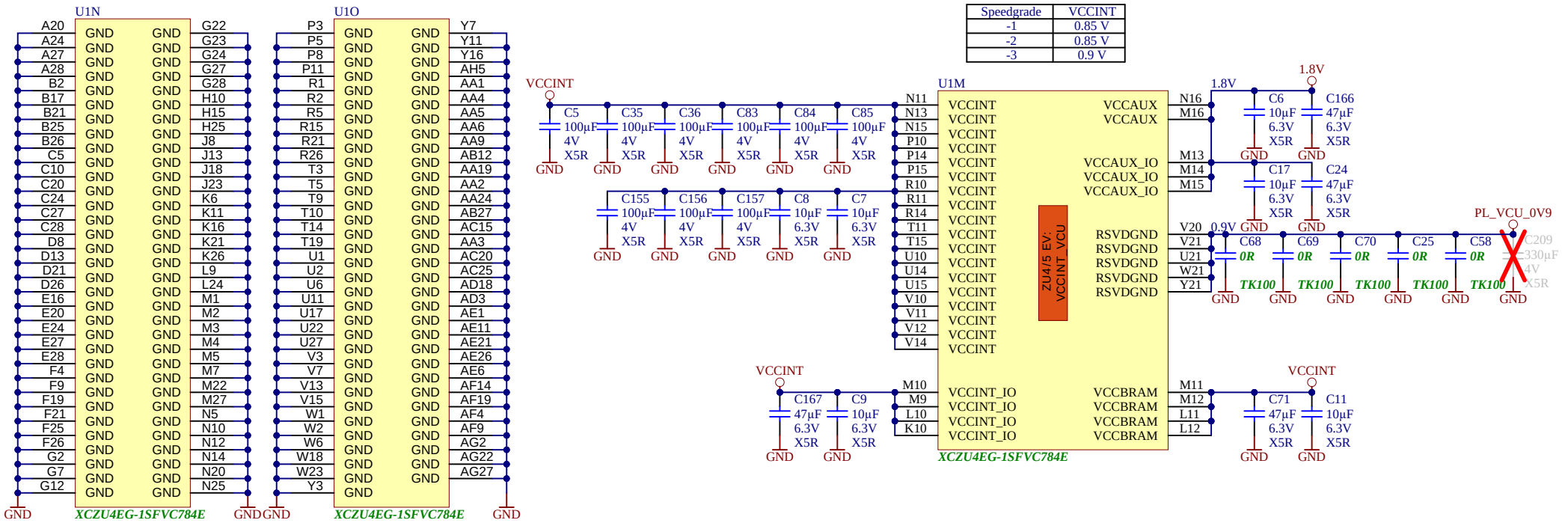
Title: AM0010 – CONFIG			
A4	Number: CONFIG 4BE21MA		Rev. 02
Date: 22.07.2022	Copyright: Trenz Electronic GmbH		Page 13 of 30
Filename: CONFIG.SchDoc			



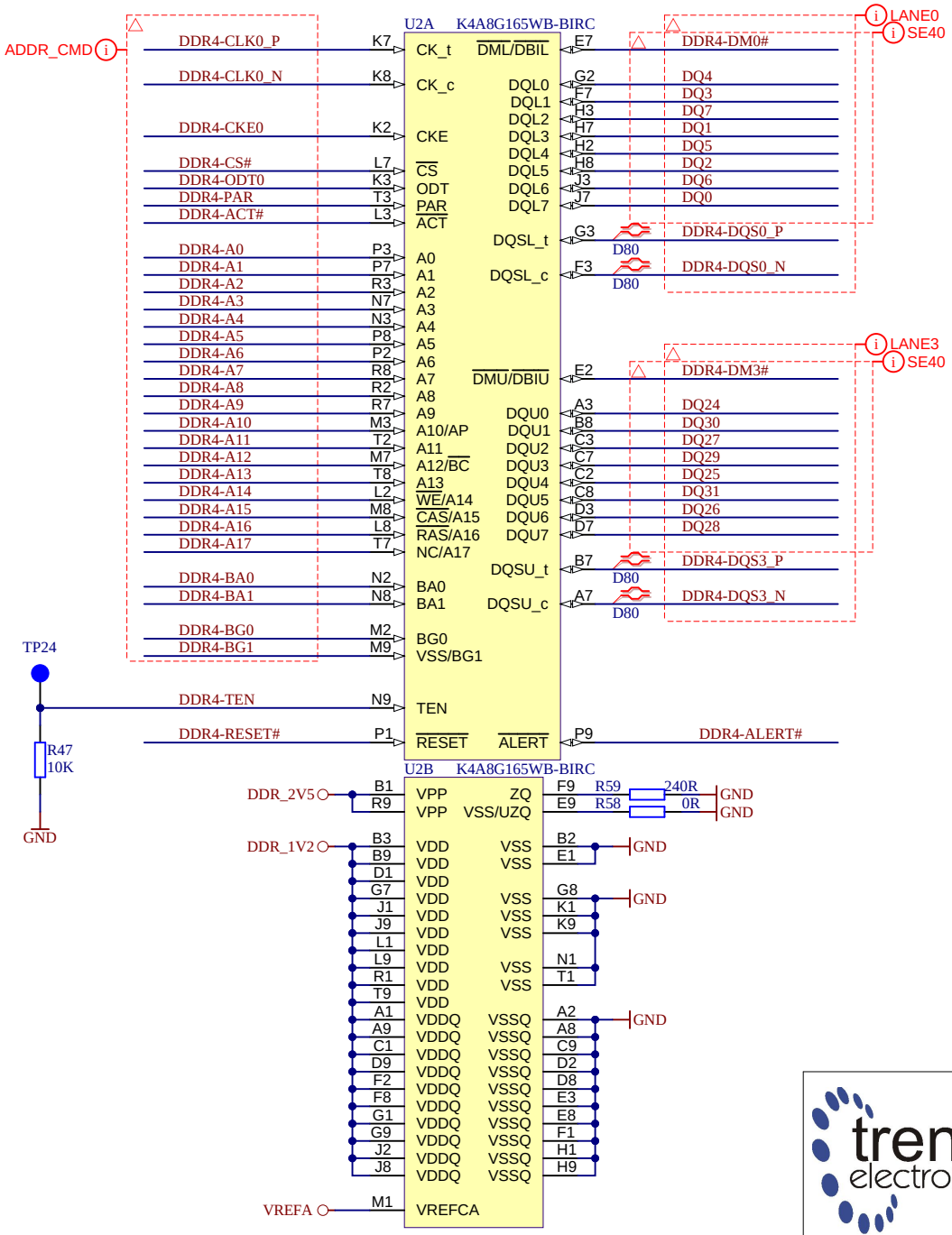
trenz electronic	Title: AM0010 – PS_DDR		
A4	Number: PS_DDR 4BE21MA		Rev. 02
Date: 22.07.2022	Copyright: Trenz Electronic GmbH		Page 14 of 30
Filename: PS_DDR.SchDoc			



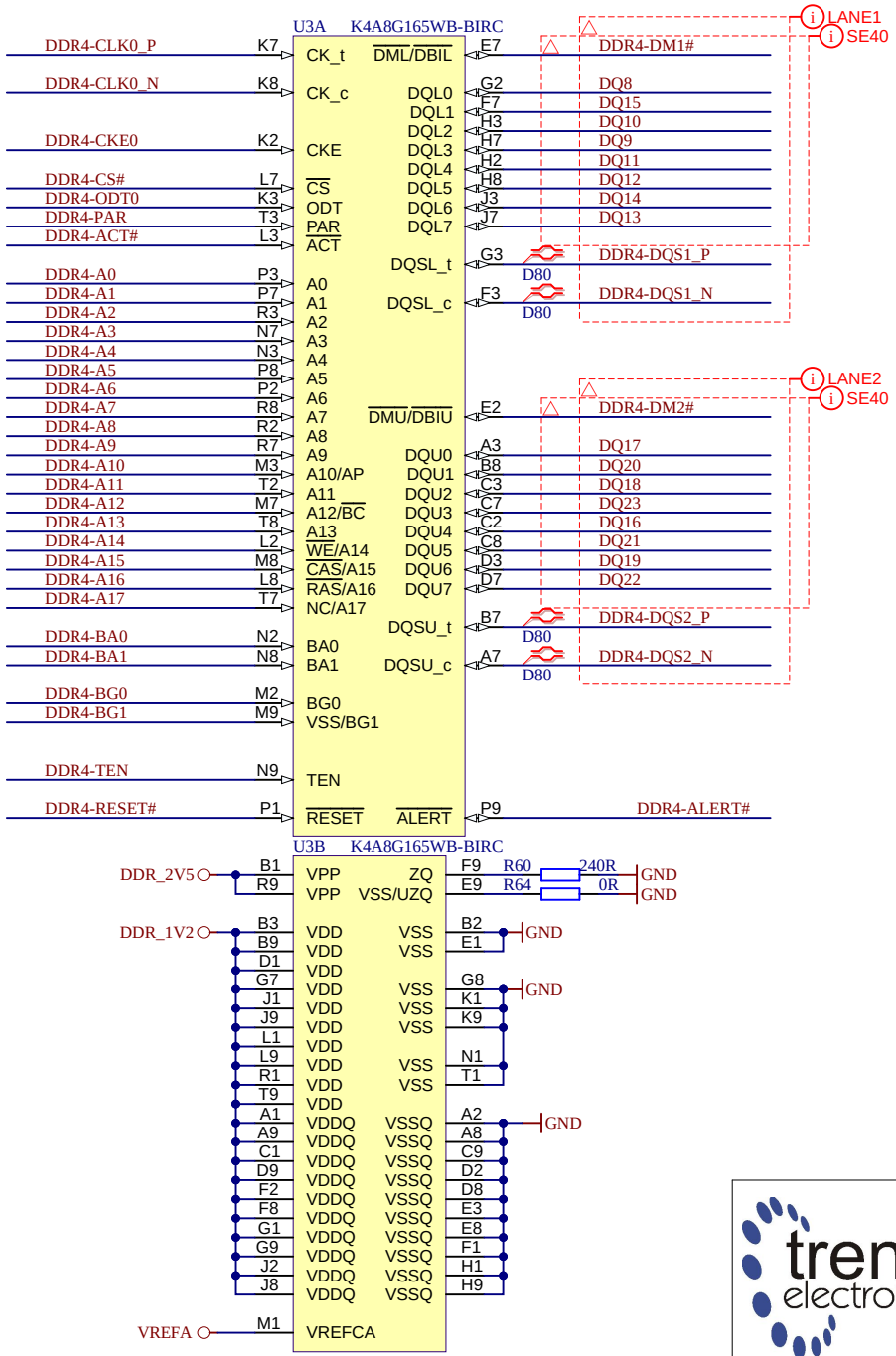
Title:	AM0010 – ZU_PS_POWER		
A4	Number: ZU_PS_POWER 4BE21MA		Rev. 02
Date: 22.07.2022	Copyright: Trenz Electronic GmbH		Page 15 of 30
Filename: ZU_PS_POWER.SchDoc			



trenz electronic	Title: AM0010 – ZU_POWER	
A4	Number: ZU_POWER 4BE21MA	Rev. 02
Date: 22.07.2022	Copyright: Trenz Electronic GmbH	Page 16 of 30
Filename: ZU_POWER.SchDoc		



trenz electronic	Title: AM0010 – DDR4-RAM		
	A4	Number: DDR4-RAM 4BE21MA	Rev. 02
	Date: 22.07.2022	Copyright: Trenz Electronic GmbH	Page 17 of 30
	Filename: DDR4-RAM.SchDoc		



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Title: AM0010 – DDR4-RAM_2		
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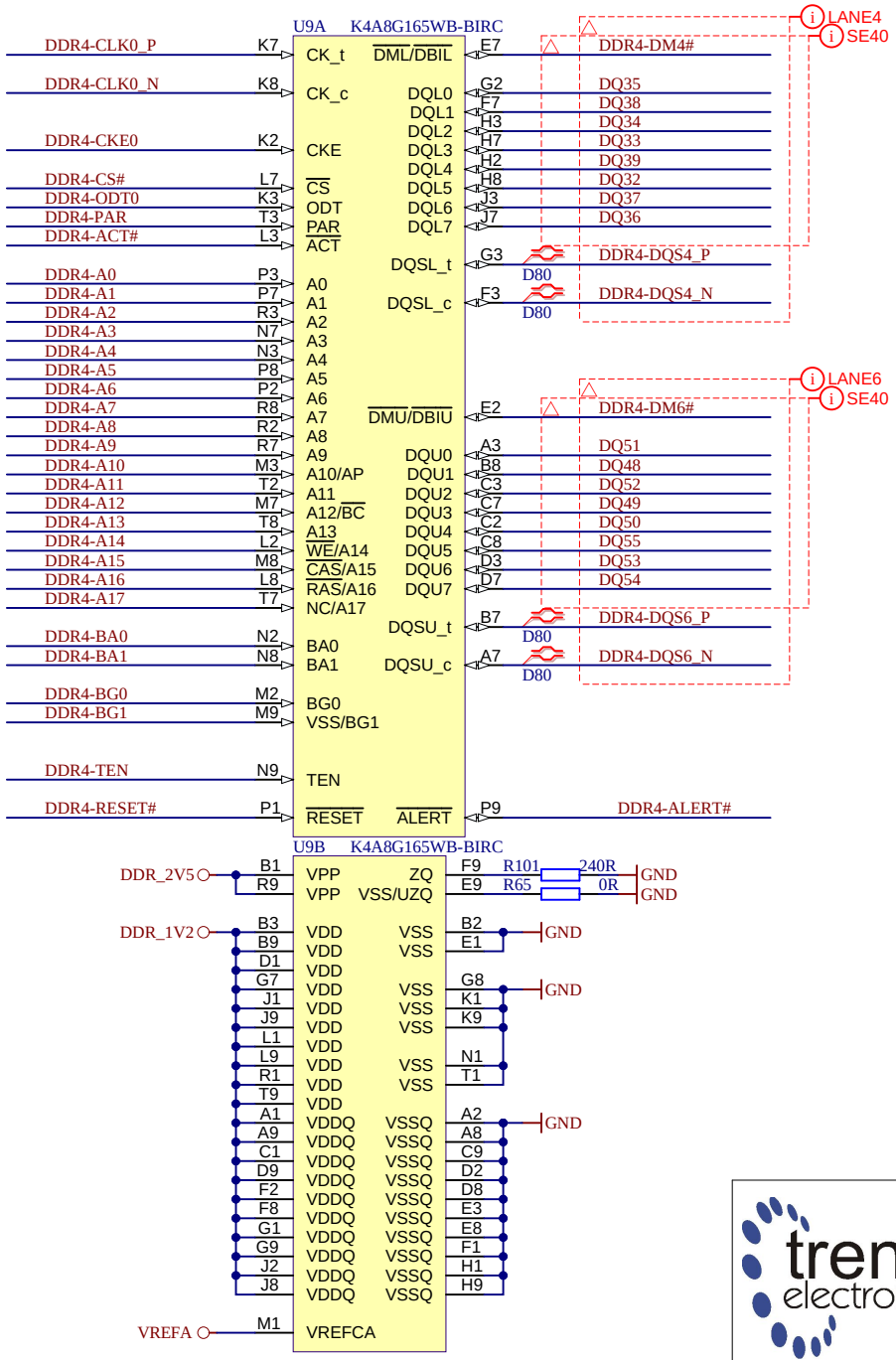
Date: 22.07.2022	Copyright: Trenz Electronic GmbH	Page 18 of 30
Filename: DDR4-RAM_2.SchDoc		


U9A K4A8G165WB-BIRC
DDR4-CLK0_P K7 CK_t
DDR4-CLK0_N K8 CK_c
DDR4-CKE0 K2 CKE
DDR4-CS# L7 CS
DDR4-ODT0 K3 ODT
DDR4-PAR T3 PAR
DDR4-ACT# L3 ACT
DDR4-A0 P3 A0
DDR4-A1 P7 A1
DDR4-A2 R3 A2
DDR4-A3 N7 A3
DDR4-A4 N3 A4
DDR4-A5 P8 A5
DDR4-A6 P2 A6
DDR4-A7 R8 A7
DDR4-A8 R2 A8
DDR4-A9 R7 A9
DDR4-A10 M3 A10/AP
DDR4-A11 T2 A11
DDR4-A12 M7 A12/BC
DDR4-A13 T8 A13
DDR4-A14 L2 WE/A14
DDR4-A15 M8 CAS/A15
DDR4-A16 L8 RAS/A16
DDR4-A17 T7 NC/A17
DDR4-BA0 N2 BA0
DDR4-BA1 N8 BA1
DDR4-BG0 M2 BG0
DDR4-BG1 M9 VSS/BG1
DDR4-TEN N9 TEN
DDR4-RESET# P1 RESET
DML/DBIL E7 DDR4-DM4#
DQL0 G2 DQ35
DQL1 F7 DQ38
DQL2 H3 DQ34
DQL3 H7 DQ33
DQL4 H2 DQ39
DQL5 H8 DQ32
DQL6 J3 DQ37
DQL7 J7 DQ36
DQSL_t G3 DDR4-DQS4_P
DQSL_c F3 DDR4-DQS4_N
D80
D80
LANE4
SE40
DMU/DBIU E2 DDR4-DM6#
DQU0 A3 DQ51
DQU1 B8 DQ48
DQU2 C3 DQ52
DQU3 C7 DQ49
DQU4 C2 DQ50
DQU5 C8 DQ55
DQU6 D3 DQ53
DQU7 D7 DQ54
DQSU_t B7 DDR4-DQS6_P
DQSU_c A7 DDR4-DQS6_N
D80
D80
LANE6
SE40
ALERT P9 DDR4-ALERT#
U9B K4A8G165WB-BIRC
DDR_2V5 B1 R9 VPP
VPP
ZQ F9 R101 240R GND
VSS/UZQ E9 R65 0R GND
DDR_1V2 B3 B9 D1 G7 J1 J9 L1 L9 R1 T9 VDD
VDD
VSS B2 E1 GND
G8 K1 K9 N1 T1 GND
A1 A9 C1 D9 F2 F8 G1 G9 J2 J8 VDDQ
VSSQ A2 A8 C9 D2 D8 E3 E8 F1 H1 H9 GND
VREFA M1 VREFCA
trenz electronic
Title: AM0010 – DDR4-RAM_3
A4
Number: DDR4-RAM_3 4BE21MA
Rev. 02
Date: 22.07.2022
Copyright: Trenz Electronic GmbH
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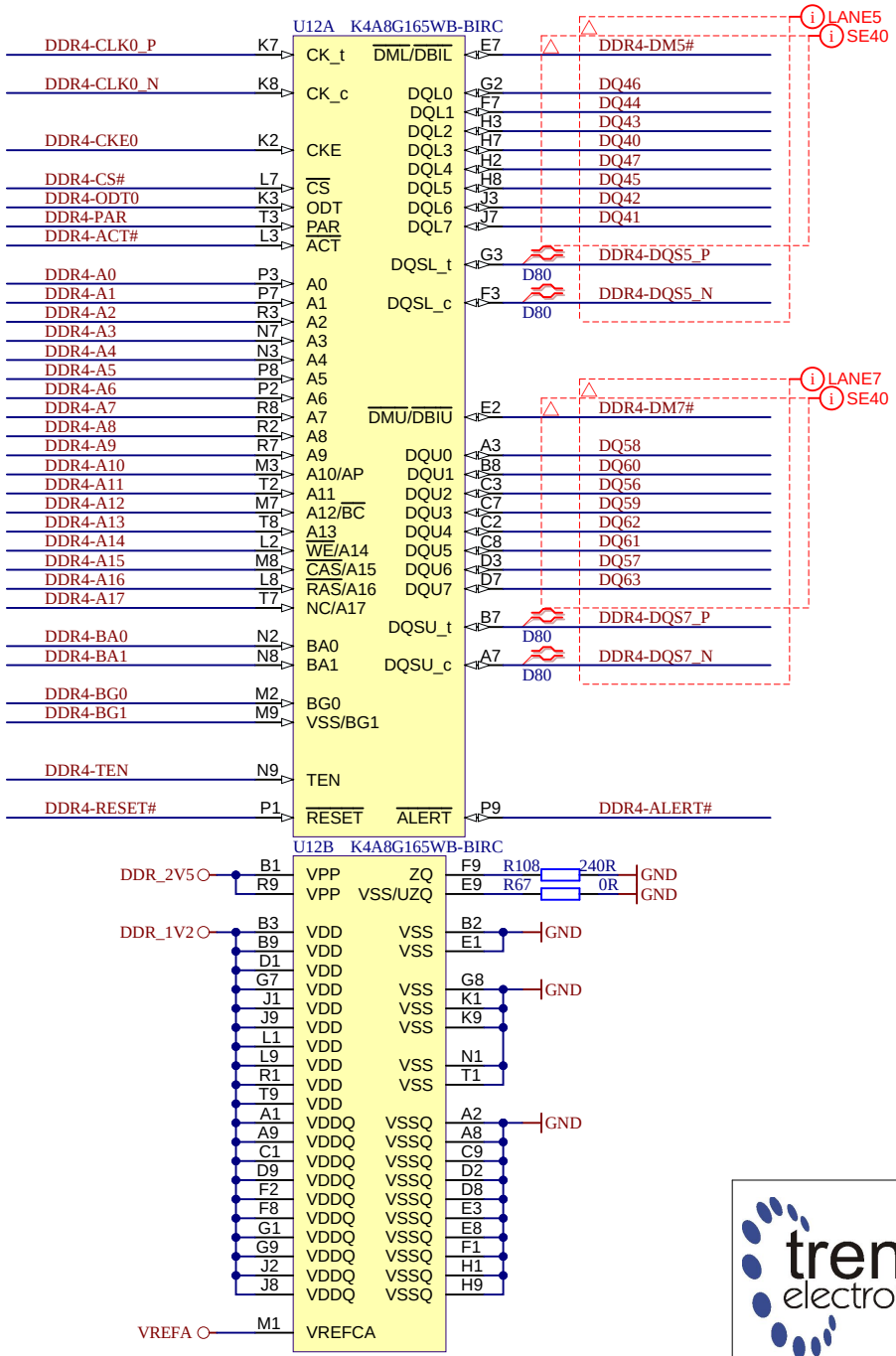
Filename: DDR4-RAM_3.SchDoc



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Title: AM0010 – DDR4-RAM_4		
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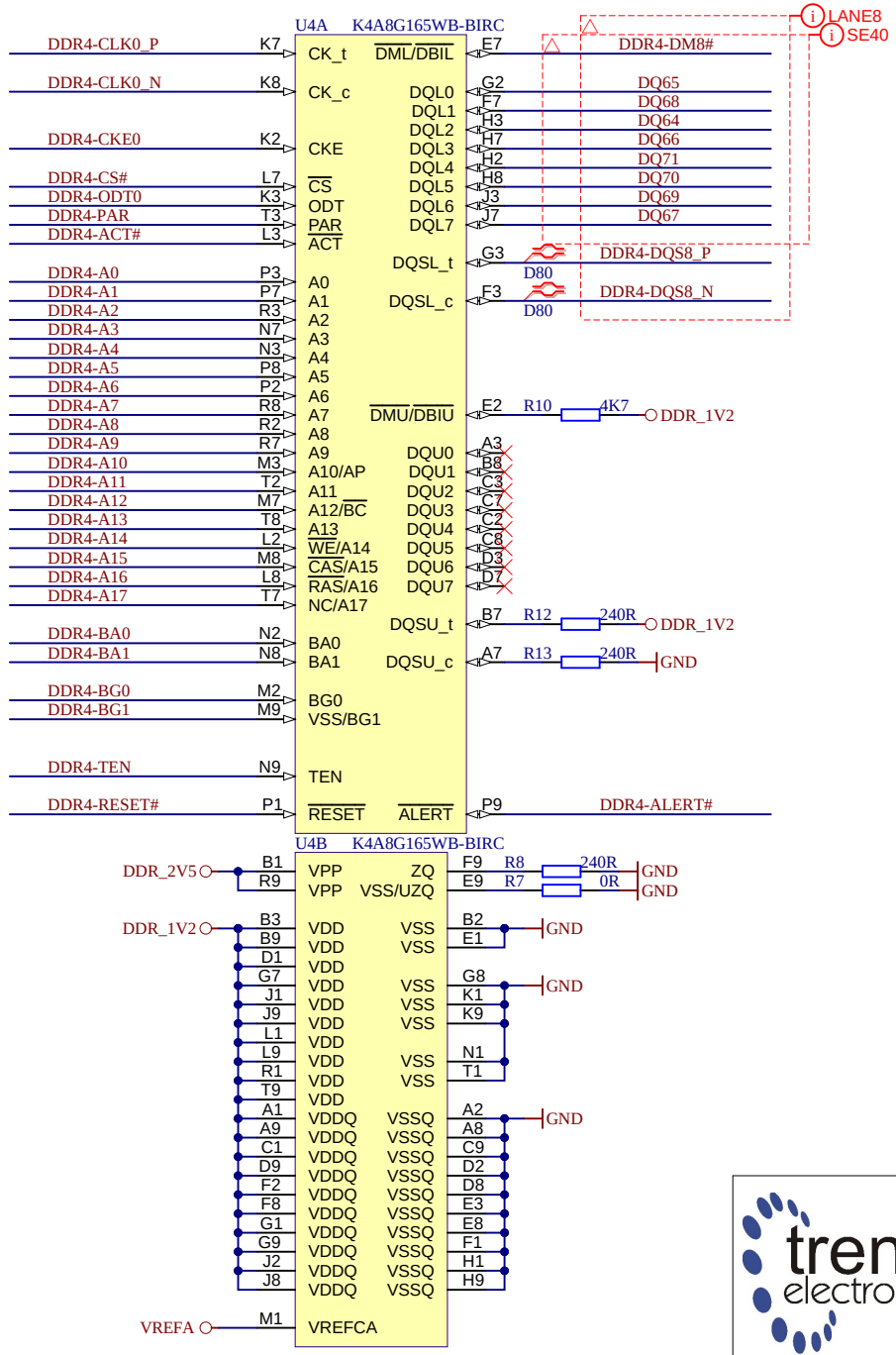
Date: 22.07.2022	Copyright: Trenz Electronic GmbH	Page 20 of 30
Filename: DDR4-RAM_4.SchDoc		



trenz electronic	Title: AM0010 – DDR4-RAM_5		
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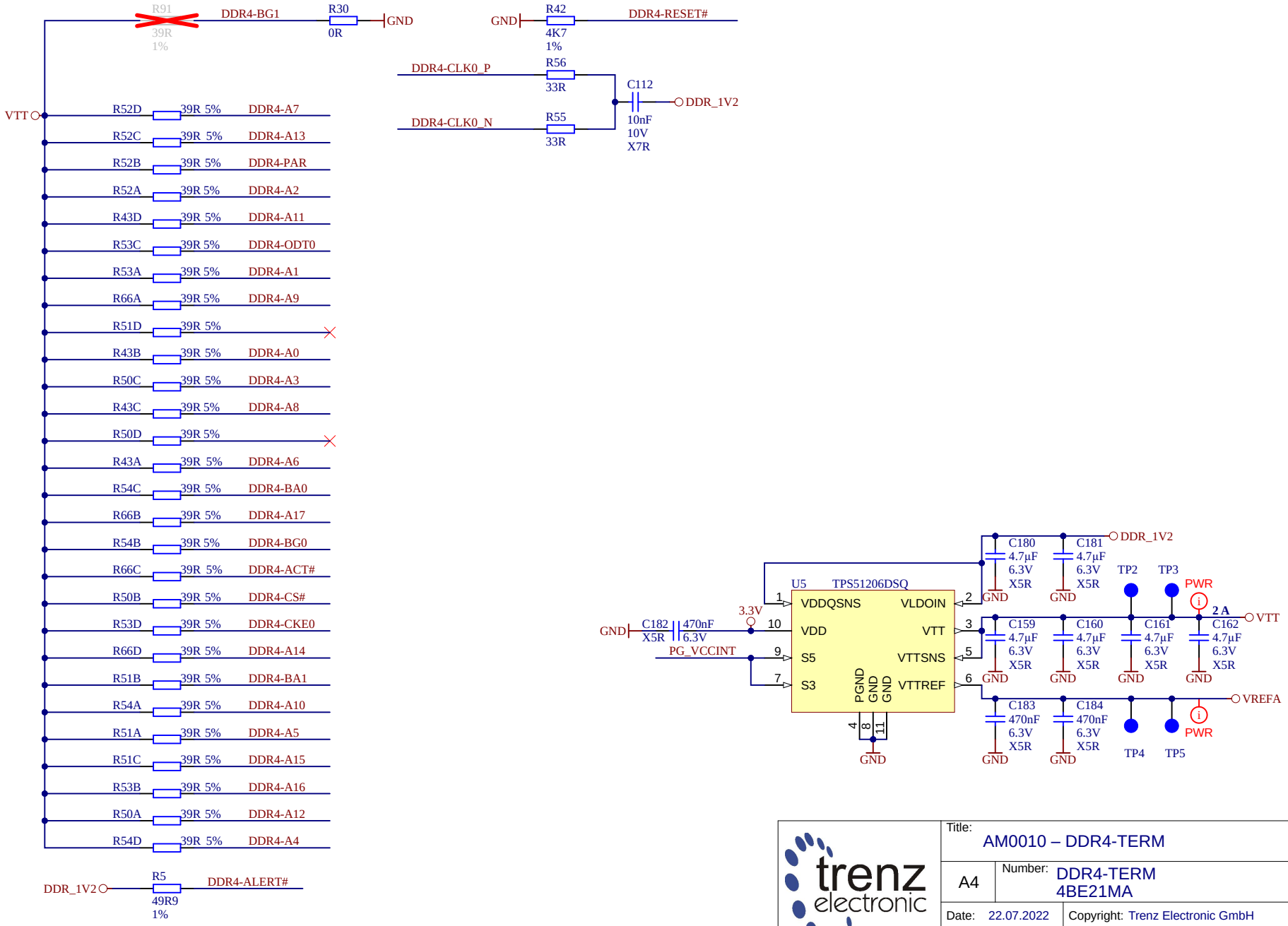
Date: 22.07.2022	Copyright: Trenz Electronic GmbH		Page 21 of 30
Filename: DDR4-RAM_5.SchDoc			



trenz electronic	Title: AM0010 – DDR4-TERM		
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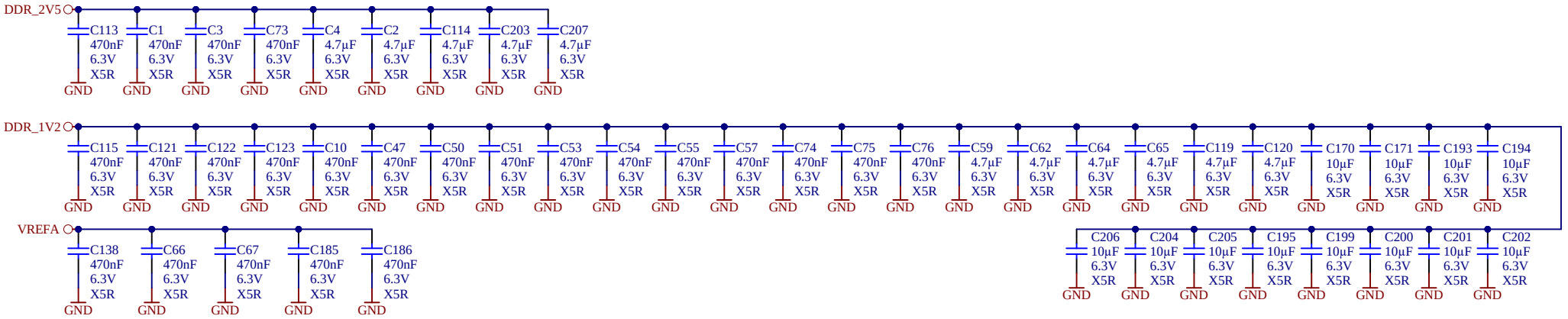
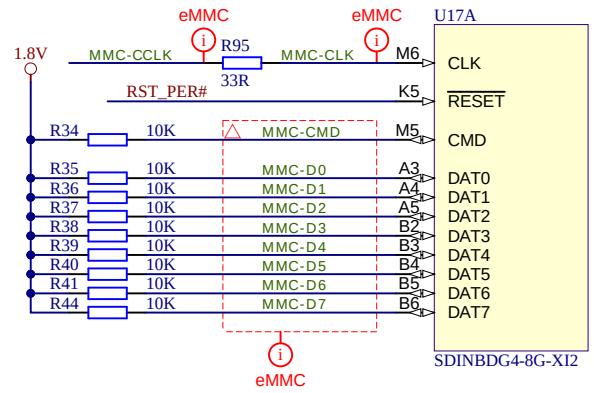
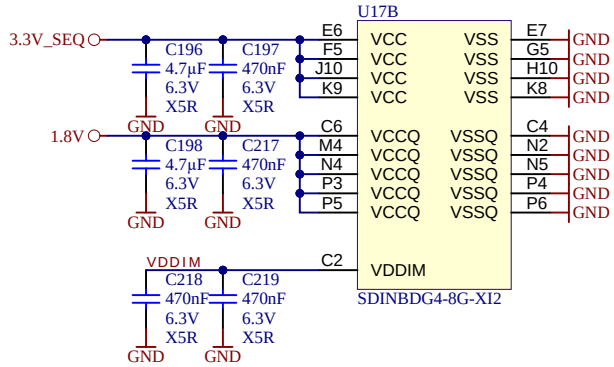
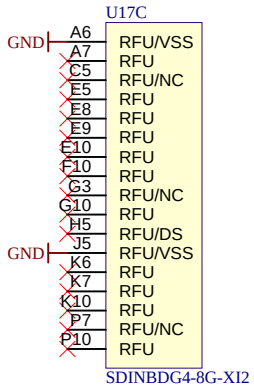
Date: 22.07.2022	Copyright: Trenz Electronic GmbH		Page 22 of 30
Filename: DDR4-TERM.SchDoc			

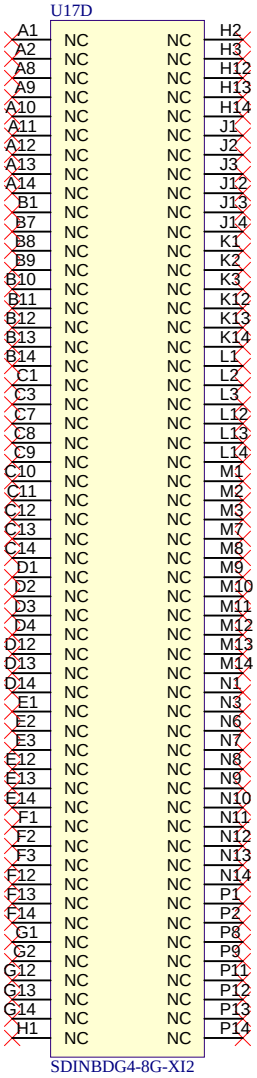


trenz electronic	Title: AM0010 – DDR4-CAPS		
A4	Number: DDR4-CAPS 4BE21MA		Rev. 02
Date: 22.07.2022	Copyright: Trenz Electronic GmbH		Page 23 of 30
Filename: DDR4-CAPS.SchDoc			

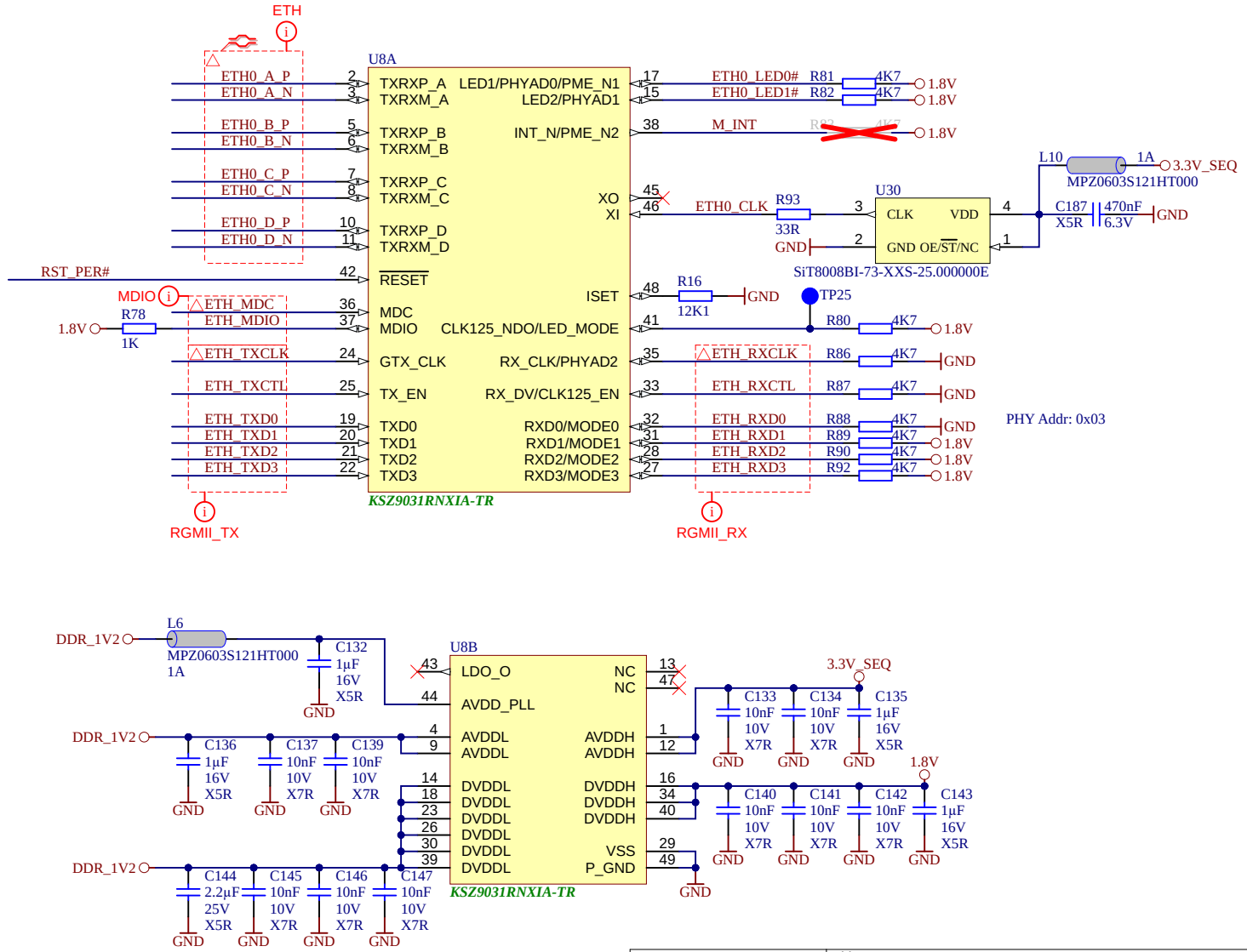








trenz electronic	Title: AM0010 – eMMC		
A4	Number: eMMC 4BE21MA		Rev. 02
Date: 22.07.2022	Copyright: Trenz Electronic GmbH		Page 24 of 30
Filename: eMMC.SchDoc			


ETH
U8A
ETH0_A_P
ETH0_A_N
ETH0_B_P
ETH0_B_N
ETH0_C_P
ETH0_C_N
ETH0_D_P
ETH0_D_N
TXRXP_A
TXRXM_A
TXRXP_B
TXRXM_B
TXRXP_C
TXRXM_C
TXRXP_D
TXRXM_D
RESET
MDC
MDIO
GTX_CLK
TX_EN
TXD0
TXD1
TXD2
TXD3
LED1/PHYAD0/PME_N1
LED2/PHYAD1
INT_N/PME_N2
XO
XI
ISET
CLK125_NDO/LED_MODE
RX_CLK/PHYAD2
RX_DV/CLK125_EN
RXD0/MODE0
RXD1/MODE1
RXD2/MODE2
RXD3/MODE3
KSZ9031RNXIA-TR
ETH0_LED0#
ETH0_LED1#
M_INT
ETH0_CLK
R81
R82
R83
R93
33R
U30
CLK
VDD
GND OE/ST/NC
SiT8008BI-73-XXS-25.000000E
L10
MPZ0603S121HT000
3.3V_SEQ
C187
X5R
470nF
6.3V
RST_PER#
MDIO
R78
1K
R16
12K1
TP25
R80
ETH_MDC
ETH_MDIO
ETH_TXCLK
ETH_TXCTL
ETH_TXD0
ETH_TXD1
ETH_TXD2
ETH_TXD3
ETH_RXCLK
ETH_RXCTL
ETH_RXD0
ETH_RXD1
ETH_RXD2
ETH_RXD3
R86
R87
R88
R89
R90
R92
PHY Addr: 0x03
RGMII_TX
RGMII_RX
L6
C132
C136
C137
C139
C144
C145
C146
C147
U8B
LDO_O
AVDD_PLL
AVDDL
DVDDL
NC
AVDDH
DVDDH
VSS
P_GND
C133
C134
C135
C140
C141
C142
C143
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Title: AM0010 – ETHPHY
A4
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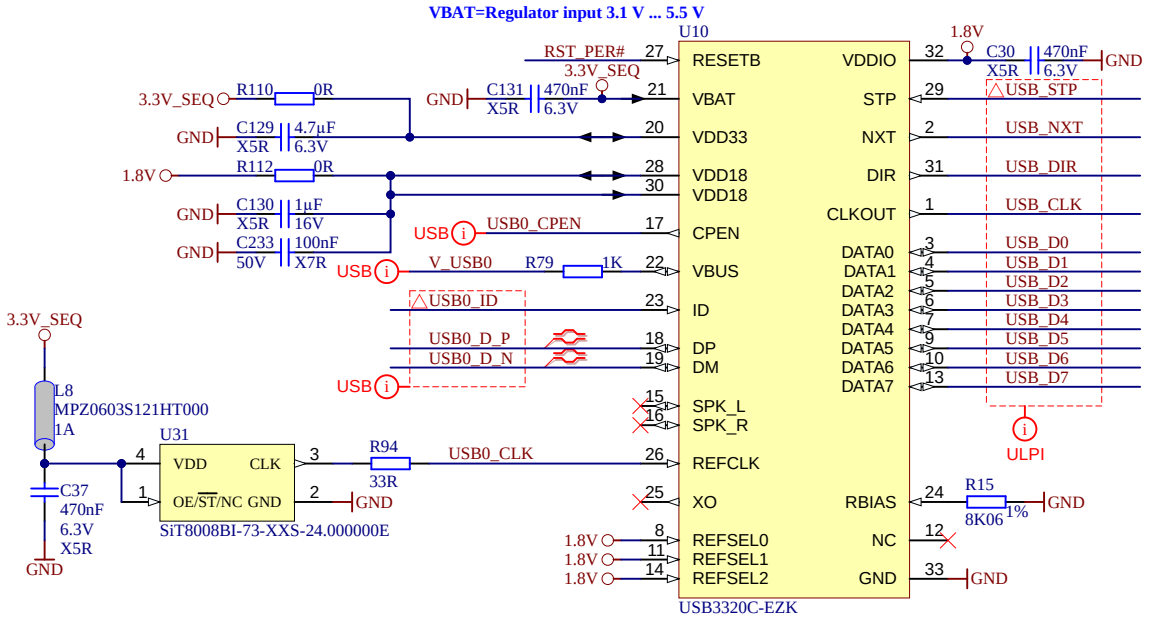
Modify variants!

	USB3320	USB3340
R110	0R	DNP
R112	0R	DNP
C129	4.7 µF	1 µF
C233	0.1 µF	1 µF



trenz electronic	Title: AM0010 – USBPHY		
A4	Number: USBPHY 4BE21MA		Rev. 02
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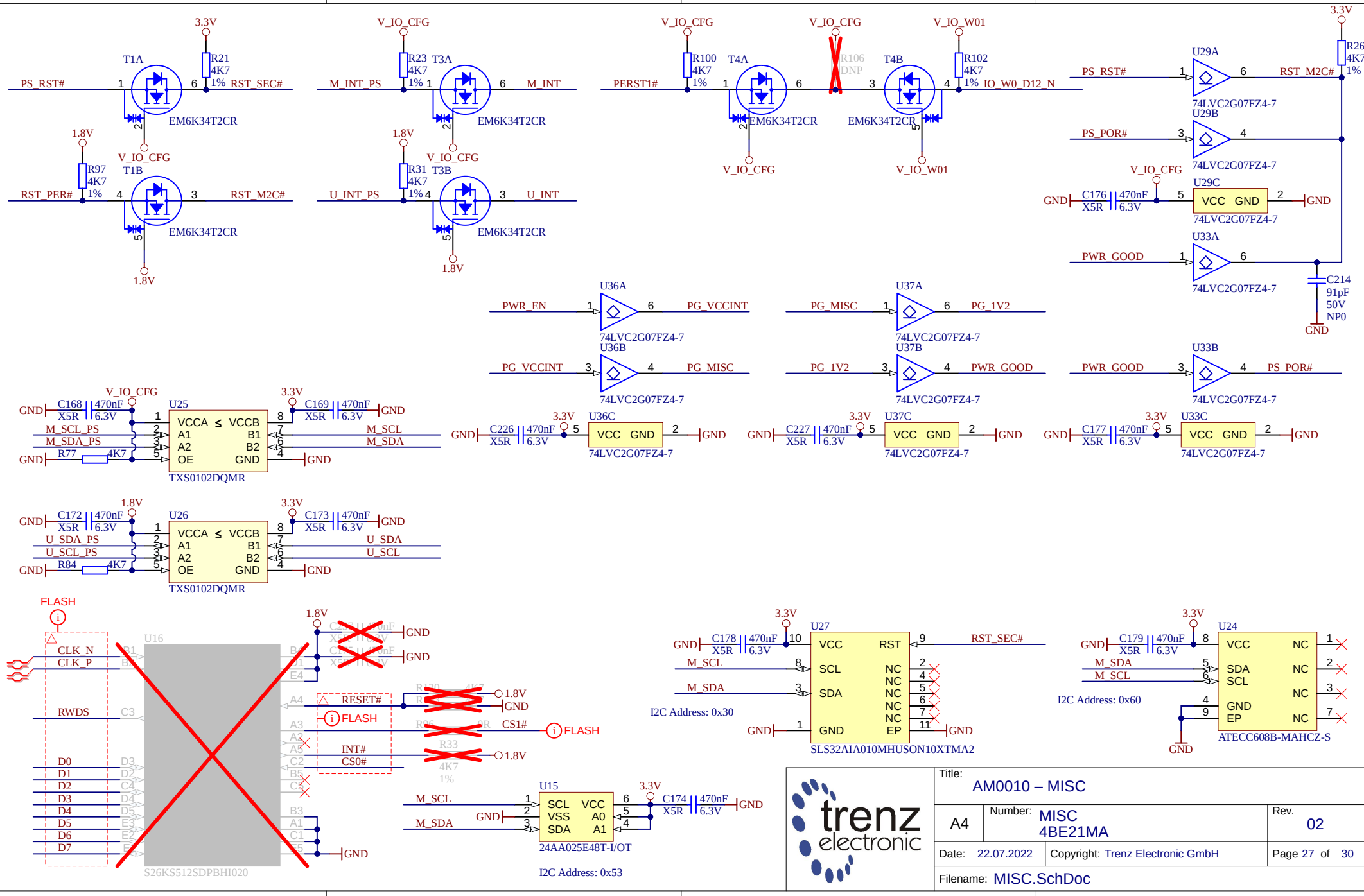

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Title: AM0010 – MISC			
A4	Number: MISC 4BE21MA		Rev. 02
Date: 22.07.2022	Copyright: Trenz Electronic GmbH		Page 27 of 30
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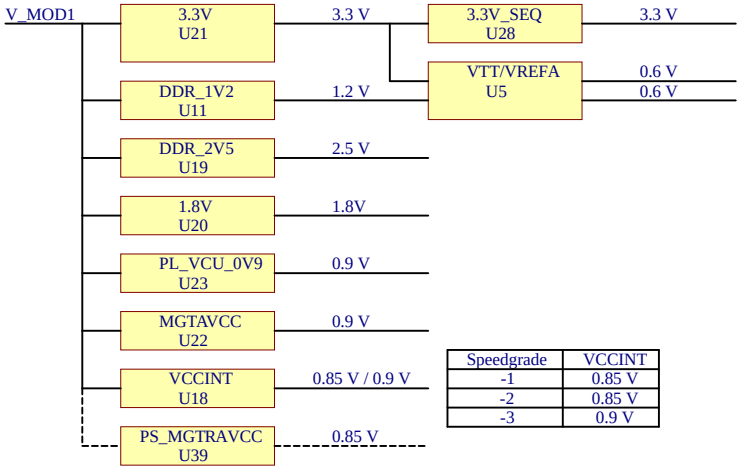
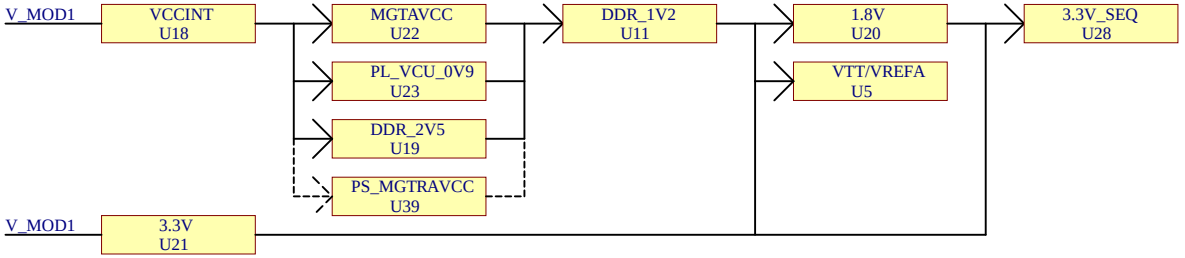
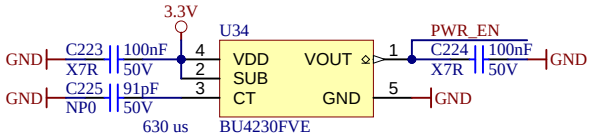
Power Supply Structure

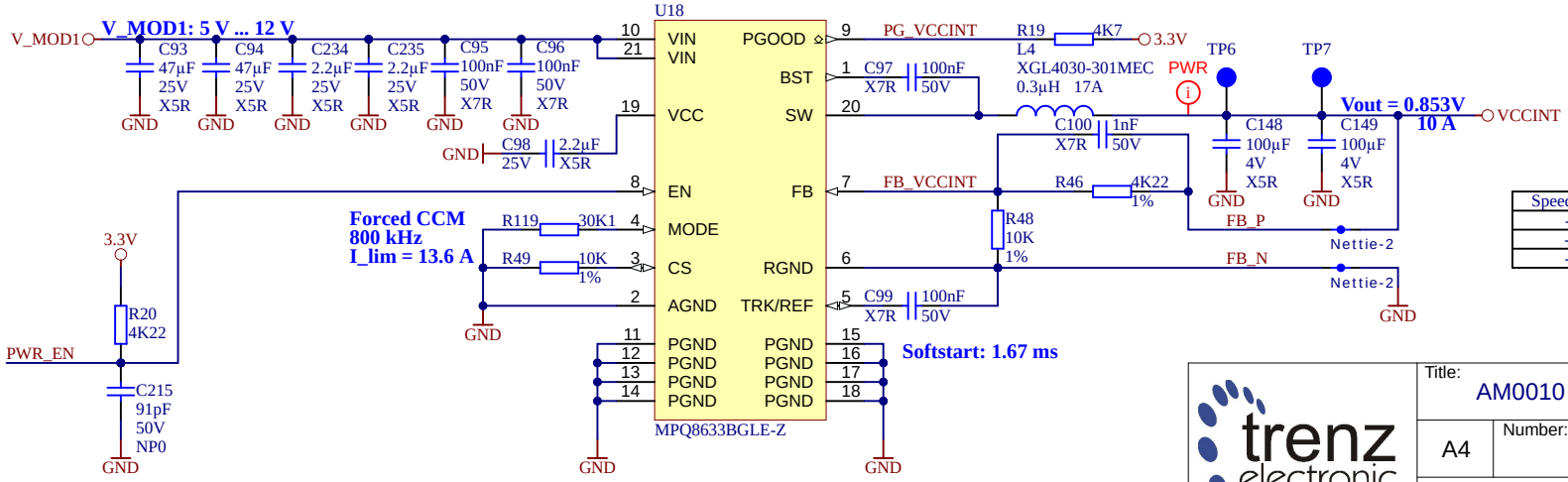


Speedgrade	VCCINT
-1	0.85 V
-2	0.85 V
-3	0.9 V

Power Supply Sequencing







Speedgrade	R46	R48	C100	VCCINT
-1	4K22	10K	1 nF	0.853 V
-2	4K22	10K	1 nF	0.853 V
-3	10K	20K	680 pF	0.900 V

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Title: AM0010 – POWER_1		
A4	Number: POWER_1 4BE21MA	Rev. 02
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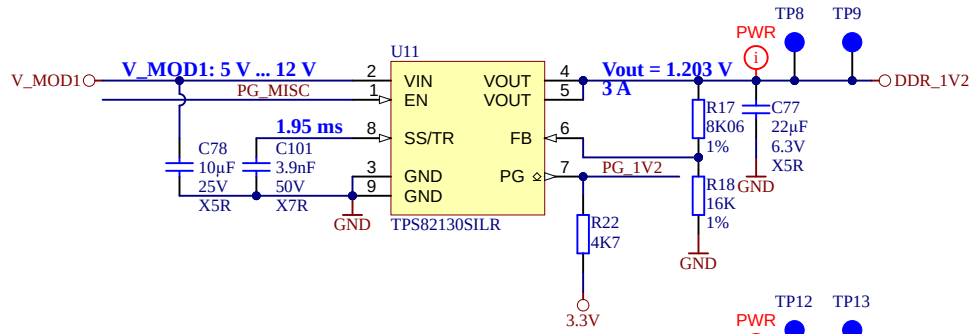
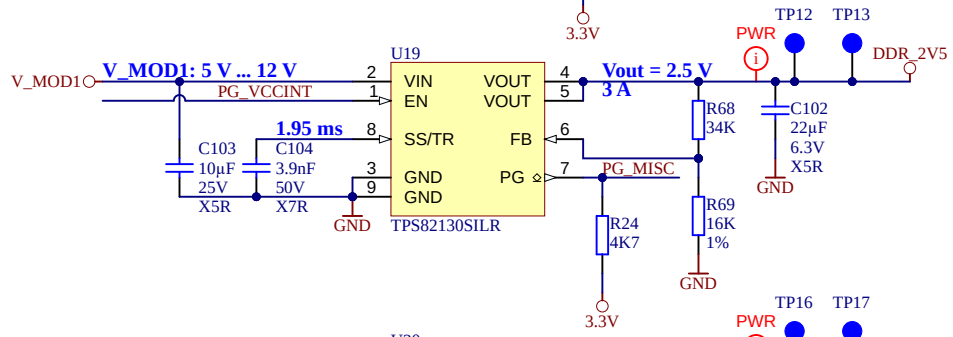
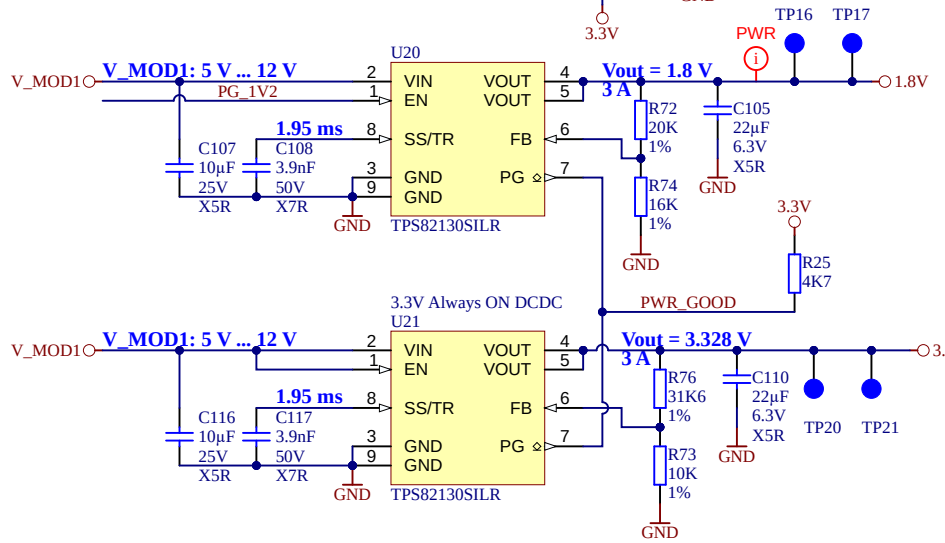
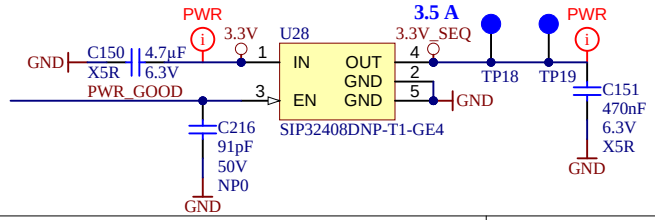
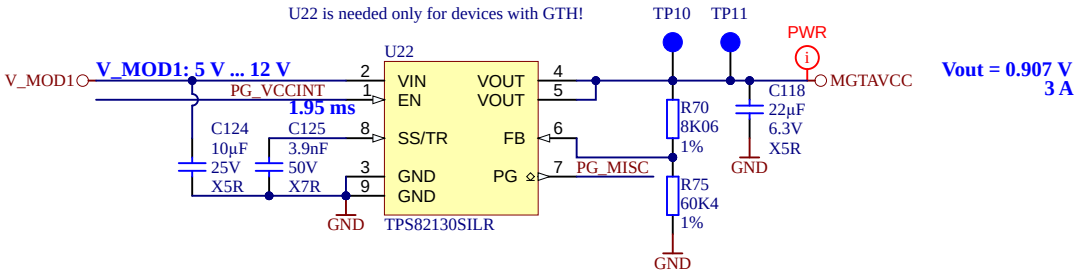
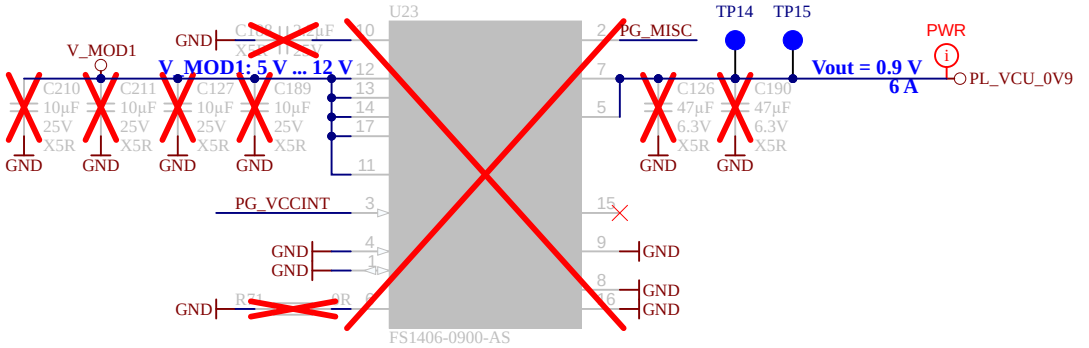








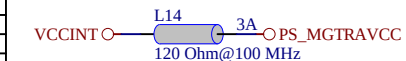




Modify variants!

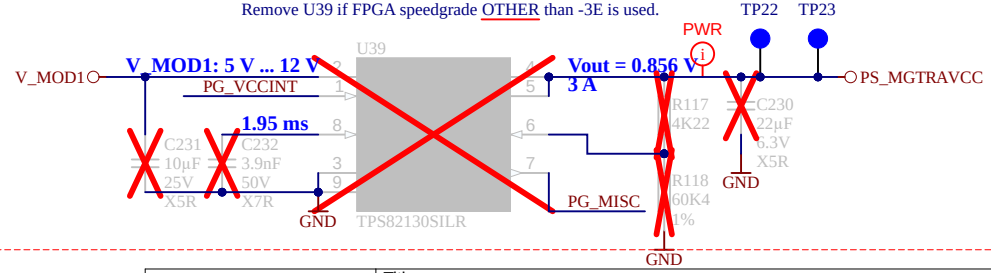
Speedgrade	L14	VCCINT
-1	L14	0.85 V
-2	L14	0.85 V
-3	DNP	0.9 V

Remove L14 when FPGA speedgrade -3E is used



Vout_max= 0.876V (+3%)
Vout_nom= 0.85V
Vout_min= 0.833V (-2%)

Remove U39 if FPGA speedgrade OTHER than -3E is used.



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Title: AM0010 – POWER_2		
A4	Number: POWER_2 4BE21MA	Rev. 02
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REV	Description	
-01	Initial revision	AL/ED
-02	1. Added VRM U39 (C230...2, R117...8) to supply PS_MGTRAVCC in case of speed grade -3E SoC.	MST/DSC
	2. Added L14 in case of speed grade -1 or -2 SoC.	MST/DSC
	3. Replaced VRM U18 by MPQ8633BGLE-Z.	MST/DSC
	4. Updated power supply structure and sequencing.	MST/DSC
	5. Added testpoint (TP24) and pull down resistor (R47) to connected TEN inputs (N9) of DDR4 RAM chips (U2...4, U9, U12).	MST/DSC
	6. Updated pictures at "Legal Notices Modules.SchDoc".	MST/DSC
	7. Removed R32.	ED
	8. Changed R68 from 21K5 to 34K.	ED
	9. Changed R69 from 10K to 16K.	ED
	10. Changed R72 from 27K to 20K.	ED
	11. Changed R74 from 21K5 to 16K.	ED
	12. Changed R76 from 21K5 to 31K6.	ED
	13. Changed R73 from 10K 0201 to 10K 0402.	ED
	14. Removed R45.	ED
	15. Set HyperRAM/Flash (U16, C175, R103, R96) as optional (not assembled).	ED
	16. Changed R20 from 4K7 0201 to 4K22 0402.	ED
	17. Changed C98 from 10 nF 0201 to 2.2 µF 0402.	ED
	18. Added C234 and C235.	ED
	19. Changed C99 from 91 nF to 100 nF.	ED
	20. Changed C97 from 100 nF 25 V to 100 nF 50V.	ED
	21. Changed U10 from USB3340 to USB3320.	ED
	22. Changed C129 from 1 µF to 4.7 µF.	ED
	23. Added capacitor C236.	ED
	24. Added pull-up resistor R120.	ED
	25. Changed U16 RFU pins B5 and C5 from GND connection to floating.	ED
	26. Added pull-up/down resistor option for MODE3...0 pins (R121...R128).	ED
	27. Added testpoint TP25.	ED
	28. Added UKCA logo.	ED
	29. Added capacitor C237.	ED
	30. Swapped schematic sheet numbers 21 and 22.	ED
	31. Changed capacitors C95, C96, C223, C224, and C233 from 100 nF 25 V X5R to 50 V X7R.	ED
	32. Changed ferrid beads L11...L13 from MPZ1608S221A to BLM18SG121TN1D.	ED

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Title: AM0010 – Revision_Changes		
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