GPU: 8800GT - G92-270-A2
MEM:512M 8x 16MX32-HYNIX H5RS5223CFR
NVVDD:CHL8228-IR3598-DIRECT_FET
FBVDD:CHL8228-IRF3598-DIRECT_FET

mem impedance 40ohm
vga signals 75ohm
diffpairs 100ohm

TIMELINE

 9.2.2014--Initial concept
10.2.2014--CORE/MEM symbol+package,PCI-E
11.2.2014--Frame Buffer A/B/C/D
13.2.2014--FBA mem/NVVDD
14.2.2014--FBB/FBC/FBD
16.2.2014--IFPAB/IFPCD
20.2.2014--DACA/DACC/MIOA/MIOB
22.2.2014--POWER_I
 2.3.2014--POWER_II

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88GTEE
3.3.2014 13:01:41
Sheet: 1/50

PCI-Express_GPU

1/24 PCI-Express

TXX0_P/3.3B — C1 0.1uF — TXX0_N/3.2B — C2 0.1uF — AM11 PEX_TX0_P — AM10 PEX_TX0_N
RX0_P/3.3B — RX0_N/3.4B — C3 0.1uF — AP9 PEX_RX0_P — AP10 PEX_RX0_N
TXX1_P/3.3B — C4 0.1uF — TXX1_N/3.2B — AN10 PEX_TX1_P — AN11 PEX_TX1_N
RX1_P/3.3B — RX1_N/3.4B — C5 0.1uF — AR10 PEX_RX1_P — AR11 PEX_RX1_N
TXX2_P/3.3B — C6 0.1uF — TXX2_N/3.2B — AN12 PEX_TX2_P — AM12 PEX_TX2_N
RX2_P/3.3B — RX2_N/3.4B — C7 0.1uF — AT11 PEX_RX2_P — AT12 PEX_RX2_N
TXX3_P/3.3C — C8 0.1uF — TXX3_N/3.2C — AL12 PEX_TX3_P — AK12 PEX_TX3_N
RX3_P/3.3B — RX3_N/3.4B — C9 0.1uF — AP12 PEX_RX3_P — AP13 PEX_RX3_N
TXX4_P/3.3C — C10 0.1uF — TXX4_N/3.2C — AM14 PEX_TX4_P — AM13 PEX_TX4_N
RX4_P/3.3C — RX4_N/3.4C — C11 0.1uF — AR13 PEX_RX4_P — AR14 PEX_RX4_N
TXX5_P/3.3C — C12 0.1uF — TXX5_N/3.2C — AN13 PEX_TX5_P — AN14 PEX_TX5_N
RX5_P/3.3C — RX5_N/3.4C — C13 0.1uF — AT14 PEX_RX5_P — AT15 PEX_RX5_N
TXX6_P/3.3C — C14 0.1uF — TXX6_N/3.2C — AN15 PEX_TX6_P — AM15 PEX_TX6_N
RX6_P/3.3C — RX6_N/3.4C — C15 0.1uF — AP15 PEX_RX6_P — AP16 PEX_RX6_N
TXX7_P/3.3C — C16 0.1uF — TXX7_N/3.2C — AL15 PEX_TX7_P — AK15 PEX_TX7_N
RX7_P/3.3C — RX7_N/3.4C — C17 0.1uF — AR16 PEX_RX7_P — AR17 PEX_RX7_N
TXX8_P/3.3D — C18 0.1uF — TXX8_N/3.2D — AM16 PEX_TX8_P — AN16 PEX_TX8_N
RX8_P/3.3D — RX8_N/3.4D — C19 0.1uF — AT17 PEX_RX8_P — AT18 PEX_RX8_N
TXX9_P/3.3D — C20 0.1uF — TXX9_N/3.2D — AN17 PEX_TX9_P — AN18 PEX_TX9_N
RX9_P/3.3D — RX9_N/3.4D — C21 0.1uF — AP18 PEX_RX9_P — AP19 PEX_RX9_N
TXX10_P/3.3D — C22 0.1uF — TXX10_N/3.2D — AM18 PEX_TX10_P — AM17 PEX_TX10_N
RX10_P/3.3D — RX10_N/3.4D — C23 0.1uF — AR19 PEX_RX10_P — AR20 PEX_RX10_N
TXX11_P/3.3D — C24 0.1uF — TXX11_N/3.2D — AL18 PEX_TX11_P — AK18 PEX_TX11_N
RX11_P/3.3D — RX11_N/3.4D — C25 0.1uF — AT20 PEX_RX11_P — AT21 PEX_RX11_N
TXX12_P/3.3D — C26 0.1uF — TXX12_N/3.2E — AM19 PEX_TX12_P — AN19 PEX_TX12_N
RX12_P/3.3D — RX12_N/3.4D — C27 0.1uF — AP21 PEX_RX12_P — AP22 PEX_RX12_N
TXX13_P/3.3E — C28 0.1uF — TXX13_N/3.2E — AN20 PEX_TX13_P — AN21 PEX_TX13_N
RX13_P/3.3E — RX13_N/3.4E — C29 0.1uF — AR22 PEX_RX13_P — AR23 PEX_RX13_N
TXX14_P/3.3E — C30 0.1uF — TXX14_N/3.2E — AM21 PEX_TX14_P — AM20 PEX_TX14_N
RX14_P/3.3E — RX14_N/3.4E — C31 0.1uF — AT23 PEX_RX14_P — AT24 PEX_RX14_N
TXX15_P/3.3E — C32 0.1uF — TXX15_N/3.2E — AL21 PEX_TX15_P — AK21 PEX_TX15_N
RX15_P/3.3E — RX15_N/3.4E — AR24 PEX_RX15_P — AR25 PEX_RX15_N

PEX_IOVDD: AH21, AJ21, AH22, AJ22, AH23, AJ23

0.5A — PEX_VDD/4.5E — C37 0.1uF, C38 0.022uF, C39 1uF, C40 1uF, C41 4.7uF, C42 4.7uF — GND

PEX_IOVDDQ: AH16, AF17, AH17, AF18, AH18, AF19, AH19, AE20, AF20, AH20, AJ20

2A — PEX_VDD/4.5E — C33 0.1uF, C34 0.1uF, C35 1uF, C36 1uF, C43 4.7uF, C44 10uF — GND

PEX_RST — AR9 — PEX_RST/3.2B

PEX_REFCLK_P — AK10 — PEX_REFCLK_P/3.3B
PEX_REFCLK_N — AL10 — PEX_REFCLK_N/3.2B

PEX_TEST_PLL_CLK_OUT_P — AM9
PEX_TEST_PLL_CLK_OUT_N — AN9 — R1

RFU: AK19, AK20

PEX_PLLAVDD: AE15
PEX_PLLVDD: AE17 — L1 — PEX_VDD/4.5E — C45 0.1uF, C46 1uF, C47 4.7uF, C48 4.7uF — GND, GND

PEX_PLLAGND: AF15
PEX_PLLDGND: AE16 — GND

_P
_N
DIFFPAIR 100ohm imp

C(1-32,46)--X5R/10V/10%
C(33-40,45)--X7R/16V/10%
C(41-44,47-48)--X5R/6.3V/20%

R1--5%

L1--10nH/300mA

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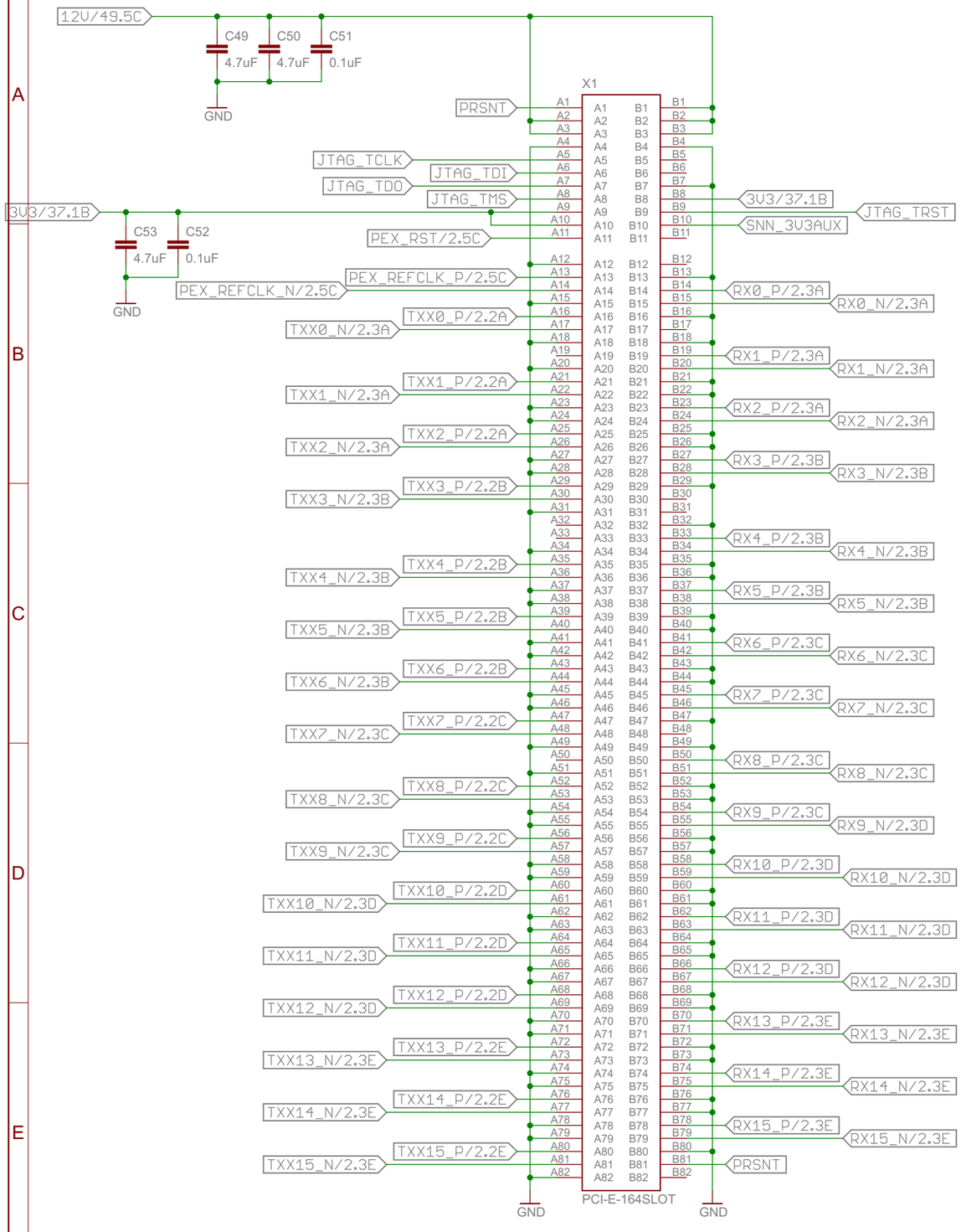
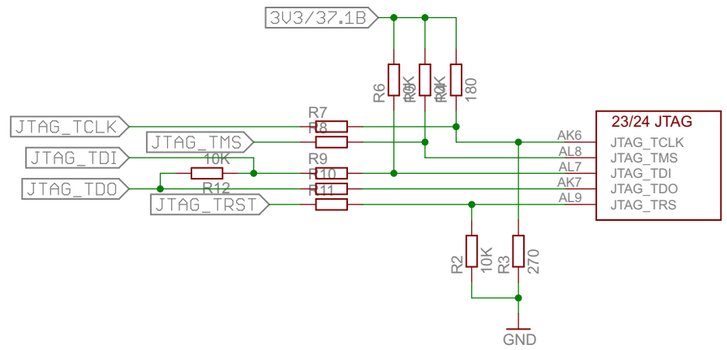
3.3.2014 13:01:41	
Sheet: 2/50	

PCI-Express_Connector





C(49-50)--X7R/16V/20%
C(51-52)--X7R/16V/10%
C(53)--X5R/6.3V/20%

DUDA	88GTEE
	3.3.2014 13:01:41
	Sheet: 3/50

Frame Buffer A

2/24 MEM_A

CMD-ADDR MAPPING
CMD1 RAS*
CMD10 CAS*
CMD11 WE*
CMD8 CS0*
CMD7 BA2
CMD19 A<0>
CMD25 A<1>
CMD22 0A<2>
CMD24 0A<3>
CMD0 0A<4>
CMD2 0A<5>
CMD4 1A<2>
CMD6 1A<3>
CMD5 1A<4>
CMD13 1A<5>
CMD21 A<6>
CMD16 A<7>
CMD23 A<8>
CMD20 A<9>
CMD17 A<10>
CMD9 A<11>
CMD12 BA0
CMD3 BA1
CMD18 CKE
CMD15 RST

FBAD[0..63]
FBADQM[0..7]
FBADQS_RN[0..7]
FBADQS_WP[0..7]
FBA_CMD[0..25]

FBVDD/5.1E
FBVDD/5.1E
PEX_VDD/6.5E
GND

R13 40.2
R16 604
R17 1K3
C59 0.1uF
C54 0.1uF
C55 0.1uF
C56 1uF
C57 4.7uF
C58 4.7uF
L2

R(13-14,16-17)--1%
R(15)--5%

C(54-55)--X7R/16V/10%
C(56,59)--X5R/10V/10%
C(57-58)--X5R/6.3V/20%

L2--BEAD/220/2A

DUDA	88GTEE
	3.3.2014 13:01:41
	Sheet: 4/50

Frame Buffer B

3/24 MEM_B

CMD-ADDR MAPPING
CMD1 RAS*
CMD10 CAS*
CMD11 WE*
CMD8 CS0*
CMD7 BA2
CMD19 A<0>
CMD25 A<1>
CMD22 0A<2>
CMD24 0A<3>
CMD0 0A<4>
CMD2 0A<5>
CMD4 1A<2>
CMD6 1A<3>
CMD5 1A<4>
CMD13 1A<5>
CMD21 A<6>
CMD16 A<7>
CMD23 A<8>
CMD20 A<9>
CMD17 A<10>
CMD9 A<11>
CMD12 BA0
CMD3 BA1
CMD18 CKE
CMD15 RST

R(18-21)--1%
R(15,22)--5%

C(60)--X5R/10U/10%

DUDA	88GTEE
	3.3.2014 13:01:41
	Sheet: 5/50

Frame Buffer C

4/24 MEM_C

FBCD0	C18	FBCD0	
FBCD1	C17	FBCD1	
FBCD2	A17	FBCD2	
FBCD3	B16	FBCD3	
FBCD4	C14	FBCD4	
FBCD5	A16	FBCD5	
FBCD6	C15	FBCD6	
FBCD7	A14	FBCD7	
FBCD8	A18	FBCD8	
FBCD9	A19	FBCD9	
FBCD10	B19	FBCD10	
FBCD11	B18	FBCD11	
FBCD12	B21	FBCD12	
FBCD13	C19	FBCD13	
FBCD14	B22	FBCD14	
FBCD15	C21	FBCD15	
FBCD16	E15	FBCD16	
FBCD17	D16	FBCD17	
FBCD18	D17	FBCD18	
FBCD19	G16	FBCD19	
FBCD20	E16	FBCD20	
FBCD21	E14	FBCD21	
FBCD22	G13	FBCD22	
FBCD23	D13	FBCD23	
FBCD24	A22	FBCD24	
FBCD25	C22	FBCD25	
FBCD26	C23	FBCD26	
FBCD27	A23	FBCD27	
FBCD28	A24	FBCD28	
FBCD29	C24	FBCD29	
FBCD30	C25	FBCD30	
FBCD31	B24	FBCD31	
FBCD32	C28	FBCD32	
FBCD33	B27	FBCD33	
FBCD34	C27	FBCD34	
FBCD35	B28	FBCD35	
FBCD36	C29	FBCD36	
FBCD37	A29	FBCD37	
FBCD38	B30	FBCD38	
FBCD39	A30	FBCD39	
FBCD40	E31	FBCD40	
FBCD41	E28	FBCD41	
FBCD42	D28	FBCD42	
FBCD43	F29	FBCD43	
FBCD44	F30	FBCD44	
FBCD45	D33	FBCD45	
FBCD46	D32	FBCD46	
FBCD47	D31	FBCD47	
FBCD48	G27	FBCD48	
FBCD49	F25	FBCD49	
FBCD50	G26	FBCD50	
FBCD51	D26	FBCD51	
FBCD52	G29	FBCD52	
FBCD53	G28	FBCD53	
FBCD54	E27	FBCD54	
FBCD55	F28	FBCD55	
FBCD56	A34	FBCD56	
FBCD57	C32	FBCD57	
FBCD58	B34	FBCD58	
FBCD59	C33	FBCD59	
FBCD60	C31	FBCD60	
FBCD61	B31	FBCD61	
FBCD62	A31	FBCD62	
FBCD63	C30	FBCD63	

FBCD[0..63]

FBCDQM0	C16	FBCDQM0	
FBCDQM1	C20	FBCDQM1	
FBCDQM2	G14	FBCDQM2	
FBCDQM3	C26	FBCDQM3	
FBCDQM4	A28	FBCDQM4	
FBCDQM5	D29	FBCDQM5	
FBCDQM6	D27	FBCDQM6	
FBCDQM7	B33	FBCDQM7	

FBCDQM[0..7]

FBCDQS_RN0	B15	FBCDQS_RN0	
FBCDQS_RN1	A21	FBCDQS_RN1	
FBCDQS_RN2	D14	FBCDQS_RN2	
FBCDQS_RN3	B25	FBCDQS_RN3	
FBCDQS_RN4	A27	FBCDQS_RN4	
FBCDQS_RN5	E30	FBCDQS_RN5	
FBCDQS_RN6	E25	FBCDQS_RN6	
FBCDQS_RN7	A33	FBCDQS_RN7	

FBCDQS_RN[0..7]

FBCDQS_WP0	A15	FBCDQS_WP0	
FBCDQS_WP1	A20	FBCDQS_WP1	
FBCDQS_WP2	E13	FBCDQS_WP2	
FBCDQS_WP3	A25	FBCDQS_WP3	
FBCDQS_WP4	A26	FBCDQS_WP4	
FBCDQS_WP5	D30	FBCDQS_WP5	
FBCDQS_WP6	E26	FBCDQS_WP6	
FBCDQS_WP7	A32	FBCDQS_WP7	

FBCDQS_WP[0..7]

FBC_CMD0	F18	FBC_CMD0	FBC_CMD[0..25]
FBC_CMD1	H20	FBC_CMD1	
FBC_CMD2	E18	FBC_CMD2	
FBC_CMD3	E20	FBC_CMD3	
FBC_CMD4	D23	FBC_CMD4	
FBC_CMD5	G24	FBC_CMD5	
FBC_CMD6	D24	FBC_CMD6	
FBC_CMD7	G23	FBC_CMD7	
FBC_CMD8	D20	FBC_CMD8	
FBC_CMD9	E22	FBC_CMD9	
FBC_CMD10	J21	FBC_CMD10	
FBC_CMD11	E21	FBC_CMD11	
FBC_CMD12	G20	FBC_CMD12	
FBC_CMD13	F22	FBC_CMD13	
FBC_CMD14	H21		
FBC_CMD15	E17	FBC_CMD15	
FBC_CMD16	E19	FBC_CMD16	
FBC_CMD17	D21	FBC_CMD17	
FBC_CMD18	E23	FBC_CMD18	
FBC_CMD19	F19	FBC_CMD19	
FBC_CMD20	E24	FBC_CMD20	
FBC_CMD21	G21	FBC_CMD21	
FBC_CMD22	G19	FBC_CMD22	
FBC_CMD23	G25	FBC_CMD23	
FBC_CMD24	G18	FBC_CMD24	
FBC_CMD25	G22	FBC_CMD25	
FBC_CMD26	G17		
FBC_CMD27	F15		
FBC_CMD28	G15		

FBC_CLK0_P	H17	FBC_CLK0_P/16.1D	
FBC_CLK0_N	J16	FBC_CLK0_N/16.1D	
FBC_CLK1_P	J24	FBC_CLK1_P/18.1B	
FBC_CLK1_N	H23	FBC_CLK1_N/18.1B	

RFU	H24		
RFU	J25		
FBC_DEBUG	H16	R24 10K	FBVDD/7.4D

FBC_PLLVDD	J11		
FBC_PLLVDD	H13		
FBC_PLLAVDD	J12		
FBC_PLLGND	J13		

FBC_PLLVDD → L3 → PEX_VDD/33.3C

C61 0.1uF, C62 0.1uF, C63 1uF, C64 4.7uF, C65 4.7uF — all to GND

CMD-ADDR MAPPING
CMD1 RAS*
CMD10 CAS*
CMD11 WE*
CMD8 CS0*
CMD7 BA2
CMD19 A<0>
CMD25 A<1>
CMD22 0A<2>
CMD24 0A<3>
CMD0 0A<4>
CMD2 0A<5>
CMD4 1A<2>
CMD6 1A<3>
CMD5 1A<4>
CMD13 1A<5>
CMD21 A<6>
CMD16 A<7>
CMD23 A<8>
CMD20 A<9>
CMD17 A<10>
CMD9 A<11>
CMD12 BA0
CMD3 BA1
CMD18 CKE
CMD15 RST

R(24)--5%

C(61-63)--X7R/16V/10%
C(64-65)--X5R/6.3V/20%

L3--BEAD/220/2A

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88GTEE	
3.3.2014 13:01:41	
Sheet: 6/50	

Frame Buffer D

5/24 MEM_D

FBDD0	H3	FBDD0	
FBDD1	J3	FBDD1	
FBDD2	J1	FBDD2	
FBDD3	J2	FBDD3	
FBDD4	M3	FBDD4	
FBDD5	K3	FBDD5	
FBDD6	L3	FBDD6	
FBDD7	M1	FBDD7	
FBDD8	H1	FBDD8	
FBDD9	G3	FBDD9	
FBDD10	G1	FBDD10	
FBDD11	G2	FBDD11	
FBDD12	F3	FBDD12	
FBDD13	E1	FBDD13	
FBDD14	D1	FBDD14	
FBDD15	D2	FBDD15	
FBDD16	P4	FBDD16	
FBDD17	N7	FBDD17	
FBDD18	M7	FBDD18	
FBDD19	N5	FBDD19	
FBDD20	P5	FBDD20	
FBDD21	R7	FBDD21	
FBDD22	T7	FBDD22	
FBDD23	P7	FBDD23	
FBDD24	C1	FBDD24	
FBDD25	C5	FBDD25	
FBDD26	C2	FBDD26	
FBDD27	B4	FBDD27	
FBDD28	A3	FBDD28	
FBDD29	B3	FBDD29	
FBDD30	C4	FBDD30	
FBDD31	C3	FBDD31	
FBDD32	A8	FBDD32	
FBDD33	C6	FBDD33	
FBDD34	C7	FBDD34	
FBDD35	A7	FBDD35	
FBDD36	C8	FBDD36	
FBDD37	C9	FBDD37	
FBDD38	A9	FBDD38	
FBDD39	B9	FBDD39	
FBDD40	E12	FBDD40	
FBDD41	E9	FBDD41	
FBDD42	F9	FBDD42	
FBDD43	G10	FBDD43	
FBDD44	D10	FBDD44	
FBDD45	G12	FBDD45	
FBDD46	F12	FBDD46	
FBDD47	D11	FBDD47	
FBDD48	F4	FBDD48	
FBDD49	E4	FBDD49	
FBDD50	D4	FBDD50	
FBDD51	D5	FBDD51	
FBDD52	D8	FBDD52	
FBDD53	E7	FBDD53	
FBDD54	D7	FBDD54	
FBDD55	D9	FBDD55	
FBDD56	B13	FBDD56	
FBDD57	C11	FBDD57	
FBDD58	A13	FBDD58	
FBDD59	C13	FBDD59	
FBDD60	A11	FBDD60	
FBDD61	A10	FBDD61	
FBDD62	B10	FBDD62	RFU H10
FBDD63	C10	FBDD63	RFU L11

FBDD[0..63]

FBDDQM0	K2	FBDDQM0	FBD_DEBUG N8
FBDDQM1	E3	FBDDQM1	
FBDDQM2	N4	FBDDQM2	
FBDDQM3	D3	FBDDQM3	
FBDDQM4	B7	FBDDQM4	
FBDDQM5	G11	FBDDQM5	
FBDDQM6	F5	FBDDQM6	
FBDDQM7	C12	FBDDQM7	

FBDDQM[0..7]

FBDDQS_RN0	K1	FBDDQS_RN0	
FBDDQS_RN1	F2	FBDDQS_RN1	
FBDDQS_RN2	R6	FBDDQS_RN2	
FBDDQS_RN3	A4	FBDDQS_RN3	
FBDDQS_RN4	B6	FBDDQS_RN4	
FBDDQS_RN5	E10	FBDDQS_RN5	
FBDDQS_RN6	E6	FBDDQS_RN6	FBD_PLLVDD H11
FBDDQS_RN7	A12	FBDDQS_RN7	

FBDDQS_RN[0..7]

FBDDQS_WP0	L1	FBDDQS_WP0	
FBDDQS_WP1	F1	FBDDQS_WP1	FBD_PLLGND H12
FBDDQS_WP2	R5	FBDDQS_WP2	
FBDDQS_WP3	A5	FBDDQS_WP3	
FBDDQS_WP4	A6	FBDDQS_WP4	
FBDDQS_WP5	E11	FBDDQS_WP5	
FBDDQS_WP6	D6	FBDDQS_WP6	
FBDDQS_WP7	B12	FBDDQS_WP7	

FBDDQS_WP[0..7]

FBD_CMD0	M6	FBD_CMD0	
FBD_CMD1	G5	FBD_CMD1	
FBD_CMD2	L7	FBD_CMD2	
FBD_CMD3	K5	FBD_CMD3	
FBD_CMD4	J10	FBD_CMD4	
FBD_CMD5	G8	FBD_CMD5	
FBD_CMD6	F8	FBD_CMD6	
FBD_CMD7	G6	FBD_CMD7	
FBD_CMD8	H6	FBD_CMD8	
FBD_CMD9	F6	FBD_CMD9	
FBD_CMD10	K8	FBD_CMD10	
FBD_CMD11	L5	FBD_CMD11	
FBD_CMD12	H4	FBD_CMD12	
FBD_CMD13	G4	FBD_CMD13	
FBD_CMD14	K9		
FBD_CMD15	L4	FBD_CMD15	
FBD_CMD16	K4	FBD_CMD16	
FBD_CMD17	K7	FBD_CMD17	
FBD_CMD18	G7	FBD_CMD18	
FBD_CMD19	J4	FBD_CMD19	
FBD_CMD20	F7	FBD_CMD20	
FBD_CMD21	J5	FBD_CMD21	
FBD_CMD22	J6	FBD_CMD22	
FBD_CMD23	H7	FBD_CMD23	
FBD_CMD24	L8	FBD_CMD24	
FBD_CMD25	J7	FBD_CMD25	
FBD_CMD26	M5		
FBD_CMD27	H9		
FBD_CMD28	G9		

FBD_CMD[0..25]

FBD_CLK0_P	L9	FBD_CLK0_P/20.2B	
FBD_CLK0_N	M9	FBD_CLK0_N/20.2B	
FBD_CLK1_P	J9	FBD_CLK1_P/22.1B	
FBD_CLK1_N	J8	FBD_CLK1_N/22.1B	

R23 10K

N8 — FBVDD/8.1C

H12 — GND

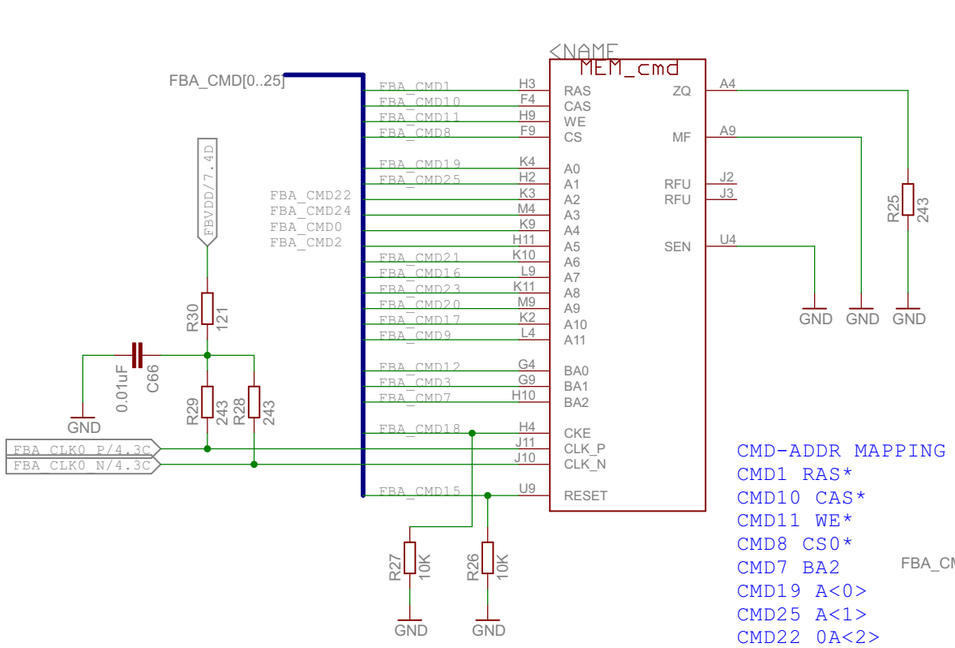
CMD-ADDR MAPPING
CMD1 RAS*
CMD10 CAS*
CMD11 WE*
CMD8 CS0*
CMD7 BA2
CMD19 A<0>
CMD25 A<1>
CMD22 0A<2>
CMD24 0A<3>
CMD0 0A<4>
CMD2 0A<5>
CMD4 1A<2>
CMD6 1A<3>
CMD5 1A<4>
CMD13 1A<5>
CMD21 A<6>
CMD16 A<7>
CMD23 A<8>
CMD20 A<9>
CMD17 A<10>
CMD9 A<11>
CMD12 BA0
CMD3 BA1
CMD18 CKE
CMD15 RST

R(23)--5%

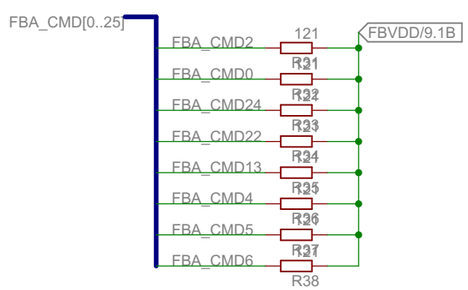
DUDA

88GTEE	
3.3.2014 13:01:41	
Sheet: 7/50	

FBA-LOW32B




```
CMD-ADDR MAPPING
CMD1 RAS*
CMD10 CAS*
CMD11 WE*
CMD8 CS0*
CMD7 BA2
CMD19 A<0>
CMD25 A<1>
CMD22 0A<2>
CMD24 0A<3>
CMD0 0A<4>
CMD2 0A<5>
CMD4 1A<2>
CMD6 1A<3>
CMD5 1A<4>
CMD13 1A<5>
CMD21 A<6>
CMD16 A<7>
CMD23 A<8>
CMD20 A<9>
CMD17 A<10>
CMD9 A<11>
CMD12 BA0
CMD3 BA1
CMD18 CKE
CMD15 RST
```



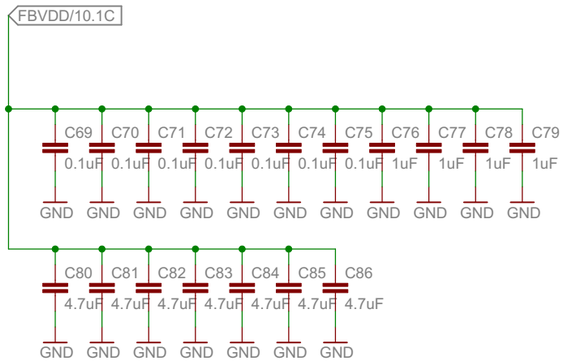

```
MEM PIN SWITCH MIRROR
MF LOGIC STATE
     HIGH LOW
RAS# H10 H3
CAS# F9 F4
WE# H4 H9
CS# F4 F9
CKE H9 H4
A0  K9 K4
A1  H11 H2
A2  K10 K3
A3  M9 M4
A4  K4 K9
A5  H2 H11
A6  K3 K10
A7  L4 L9
A8  K2 K11
A9  M4 M9
A10 K11 K2
A11 L9 L4
BA0 G9 G4
BA1 G4 G9
BA2 H3 H10
```

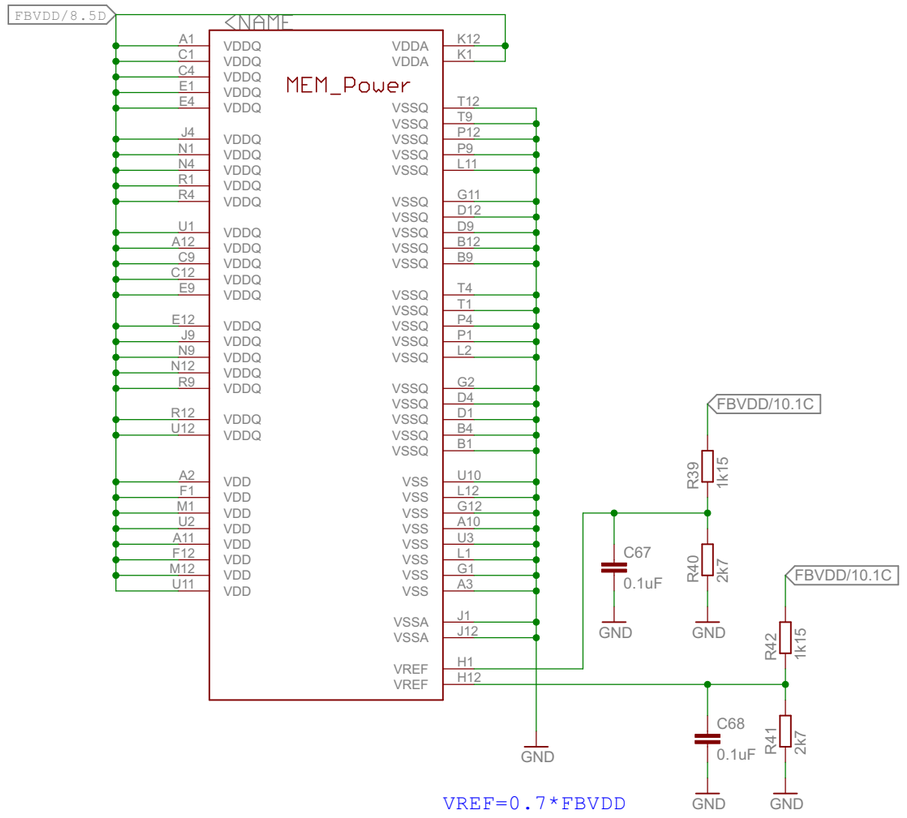
R(25-27)--1%
R(28-38)--5%

C(66)--X7R/16V/10%

DUDA	88GTEE
	3.3.2014 13:01:41
	Sheet: 8/50

FBA-LOW32B-Power



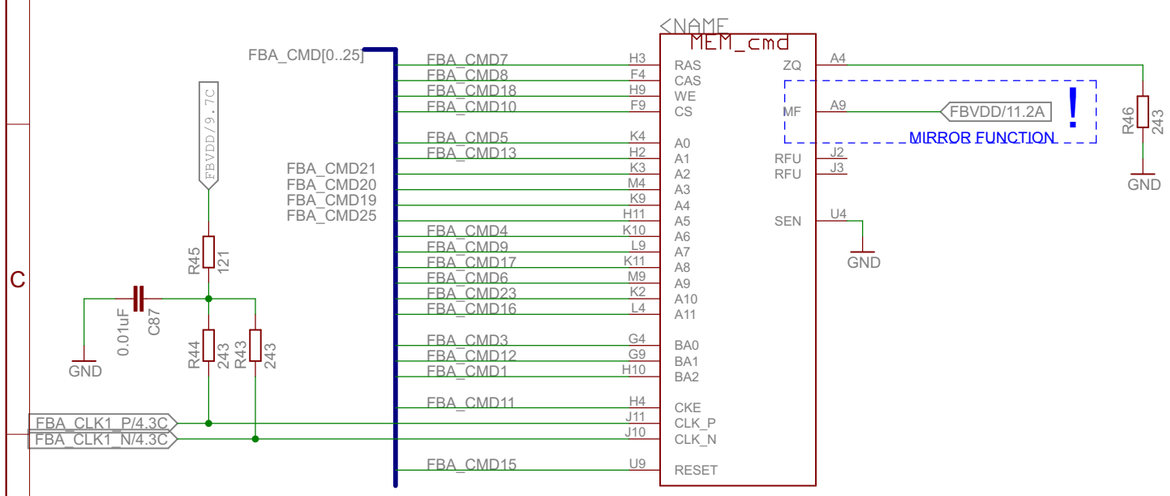


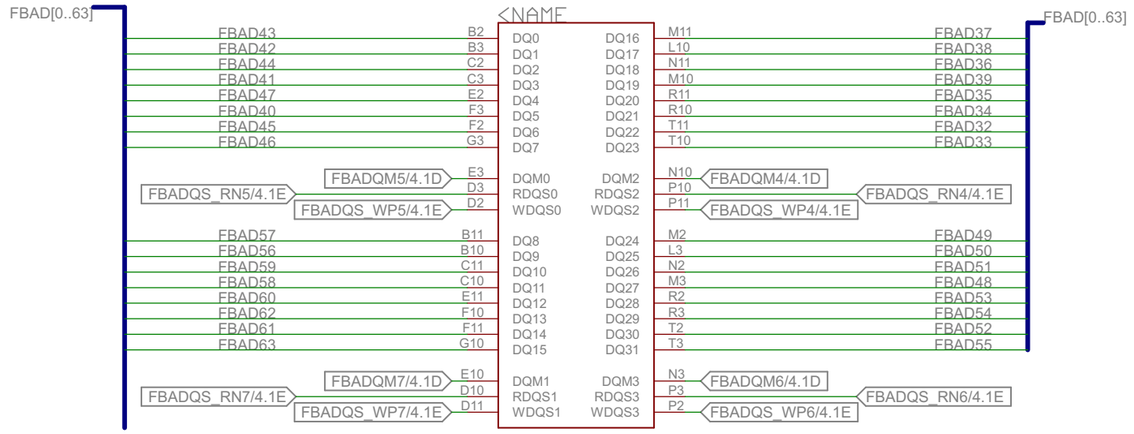
R(39-42)--1%

C(67-75)--X5R/10V/10%
C(76-85)--X5R/6.3V/10%

DUDA	88GTEE
	3.3.2014 13:01:41
	Sheet: 9/50

FBA-HIGH32B






```
CMD-ADDR MAPPING
CMD1 RAS*
CMD10 CAS*
CMD11 WE*
CMD8 CS0*
CMD7 BA2
CMD19 A<0>
CMD25 A<1>
CMD22 0A<2>
CMD24 0A<3>
CMD0 0A<4>
CMD2 0A<5>
CMD4 1A<2>
CMD6 1A<3>
CMD5 1A<4>
CMD13 1A<5>
CMD21 A<6>
CMD16 A<7>
CMD23 A<8>
CMD20 A<9>
CMD17 A<10>
CMD9 A<11>
CMD12 BA0
CMD3 BA1
CMD18 CKE
CMD15 RST
```

```
MEM PIN SWITCH MIRROR
MF LOGIC STATE
     HIGH LOW
RAS# H10 H3
CAS# F9 F4
WE# H4 H9
CS# F4 F9
CKE H9 H4
A0  K9 K4
A1  H11 H2
A2  K10 K3
A3  M9 M4
A4  K4 K9
A5  H2 H11
A6  K3 K10
A7  L4 L9
A8  K2 K11
A9  M4 M9
A10 K11 K2
A11 L9 L4
BA0 G9 G4
BA1 G4 G9
BA2 H3 H10
```

R(46)--1%
R(43-45)--5%

C(87)--X7R/16V/10%

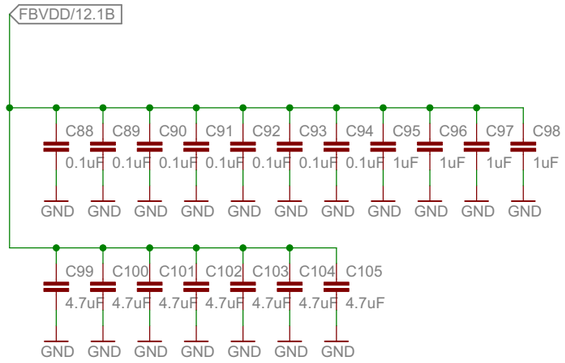
DUDA

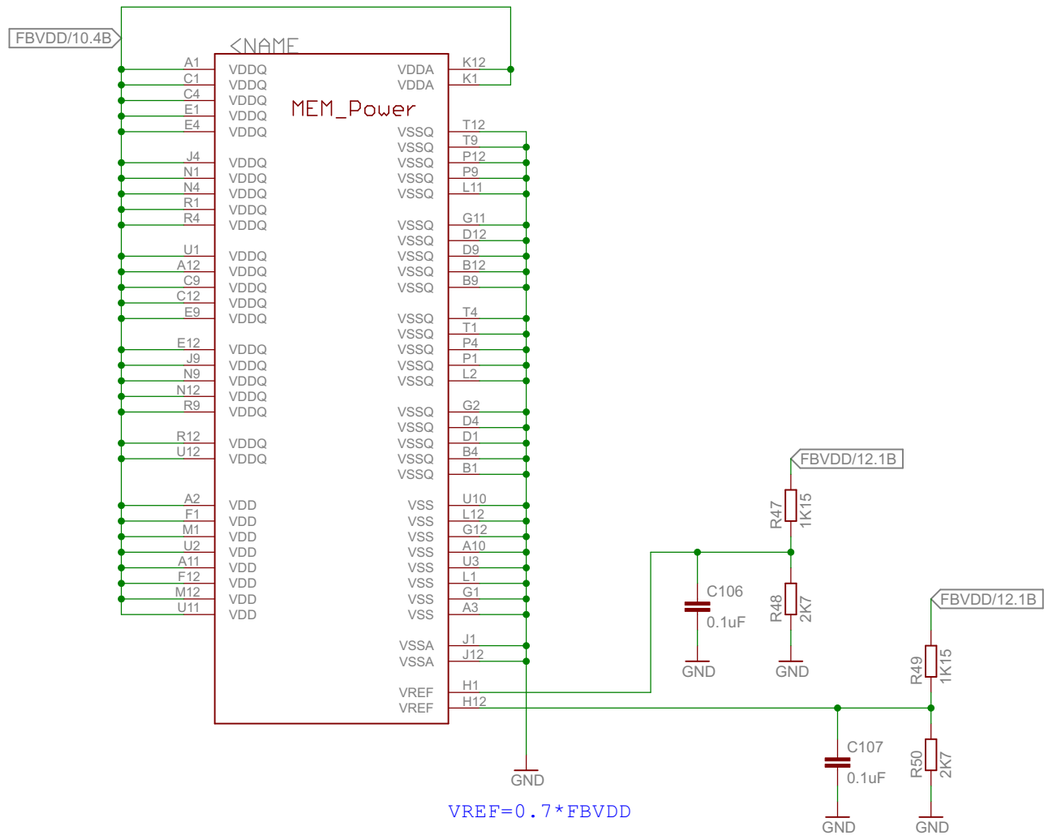
88GTEE

3.3.2014 13:01:41

Sheet: 10/50

FBA-HIGH32B-Power



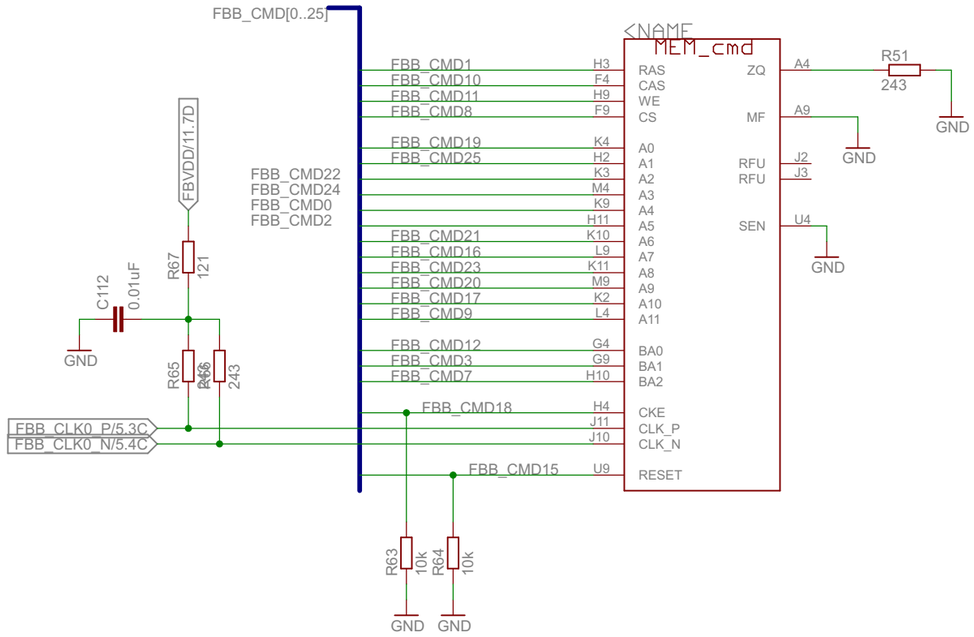


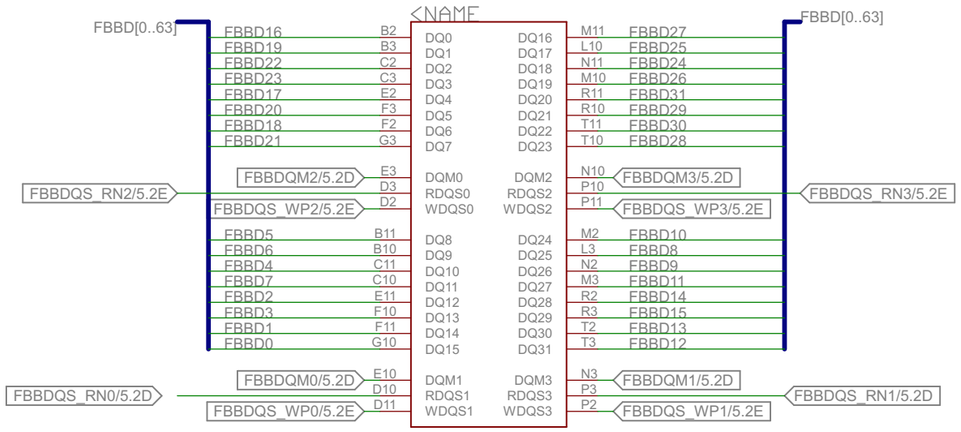
R(47-50)--1%

C(88-94,106-107)--X5R/10V/10%
C(95-105)--X5R/6.3V/10%

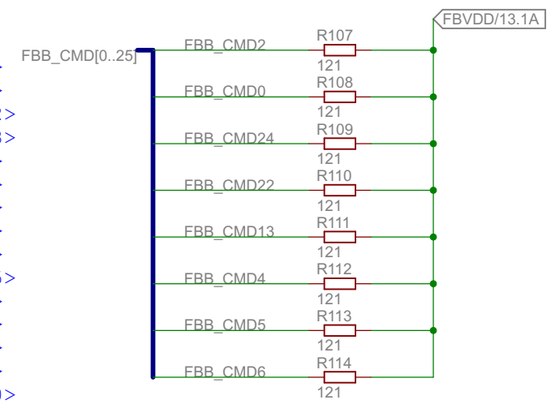
DUDA	88GTEE
	3.3.2014 13:01:41
	Sheet: 11/50

FBB-LOW32B





CMD-ADDR MAPPING
CMD1 RAS*
CMD10 CAS*
CMD11 WE*
CMD8 CS0*
CMD7 BA2
CMD19 A<0>
CMD25 A<1>
CMD22 0A<2>
CMD24 0A<3>
CMD0 0A<4>
CMD2 0A<5>
CMD4 1A<2>
CMD6 1A<3>
CMD5 1A<4>
CMD13 1A<5>
CMD21 A<6>
CMD16 A<7>
CMD23 A<8>
CMD20 A<9>
CMD17 A<10>
CMD9 A<11>
CMD12 BA0
CMD3 BA1
CMD18 CKE
CMD15 RST



MEM PIN SWITCH MIRROR
MF LOGIC STATE
HIGH LOW
RAS# H10 H3
CAS# F9 F4
WE# H4 H9
CS# F4 F9
CKE H9 H4
A0 K9 K4
A1 H11 H2
A2 K10 K3
A3 M9 M4
A4 K4 K9
A5 H2 H11
A6 K3 K10
A7 L4 L9
A8 K2 K11
A9 M4 M9
A10 K11 K2
A11 L9 L4
BA0 G9 G4
BA1 G4 G9
BA2 H3 H10

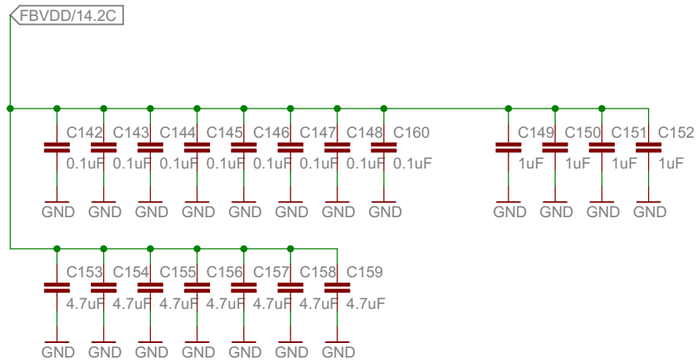
R(51,63-64)--1%
R(65-67)--5%

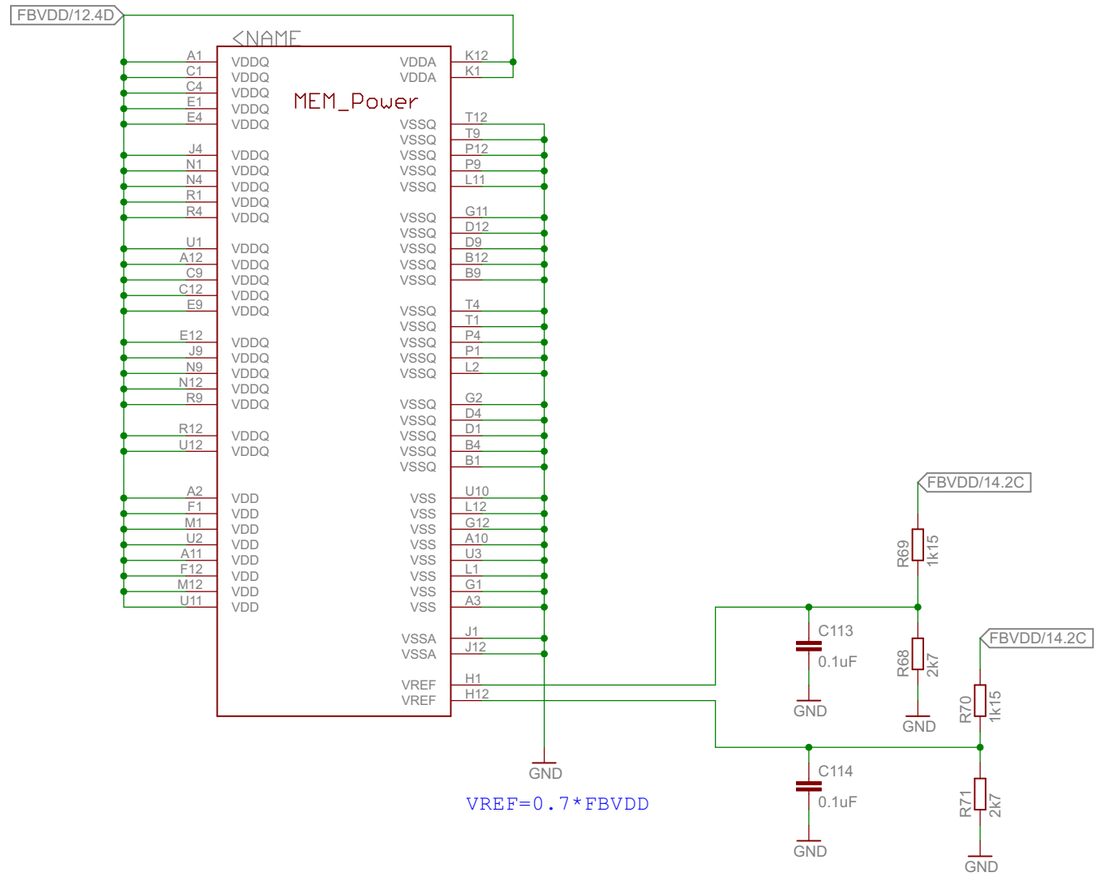
C(112)--X7R/16V/10%

DUDA

88GTEE
3.3.2014 13:01:41
Sheet: 12/50

FBB-L0W32B-Power



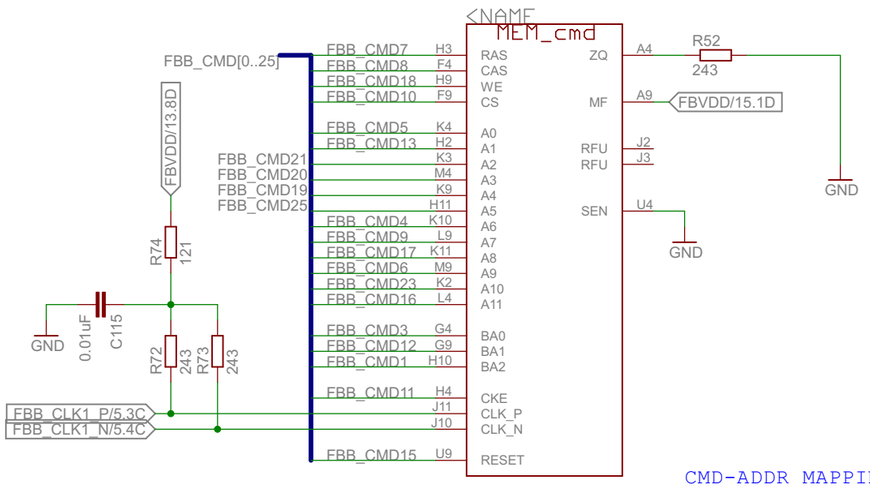


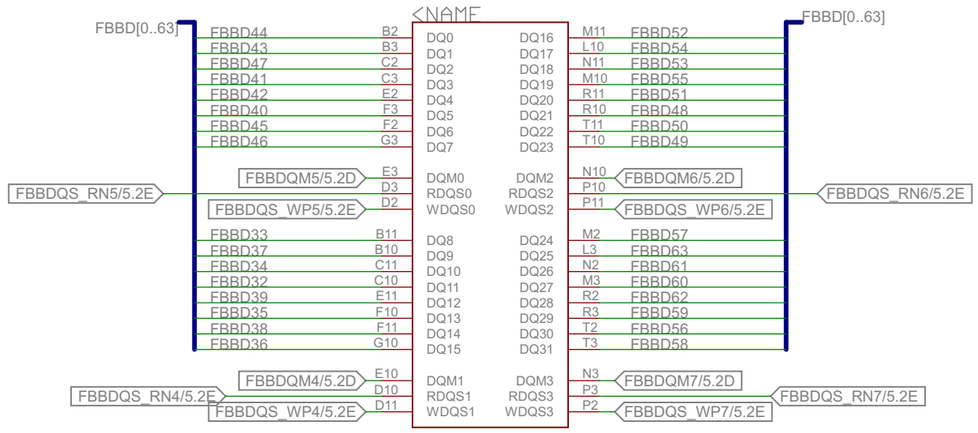
R(68-71)--1%

RC(113-114)--X5R/10V/10%

DUDA	88GTEE
	3.3.2014 13:01:41
	Sheet: 13/50

FBB-HIGH32B





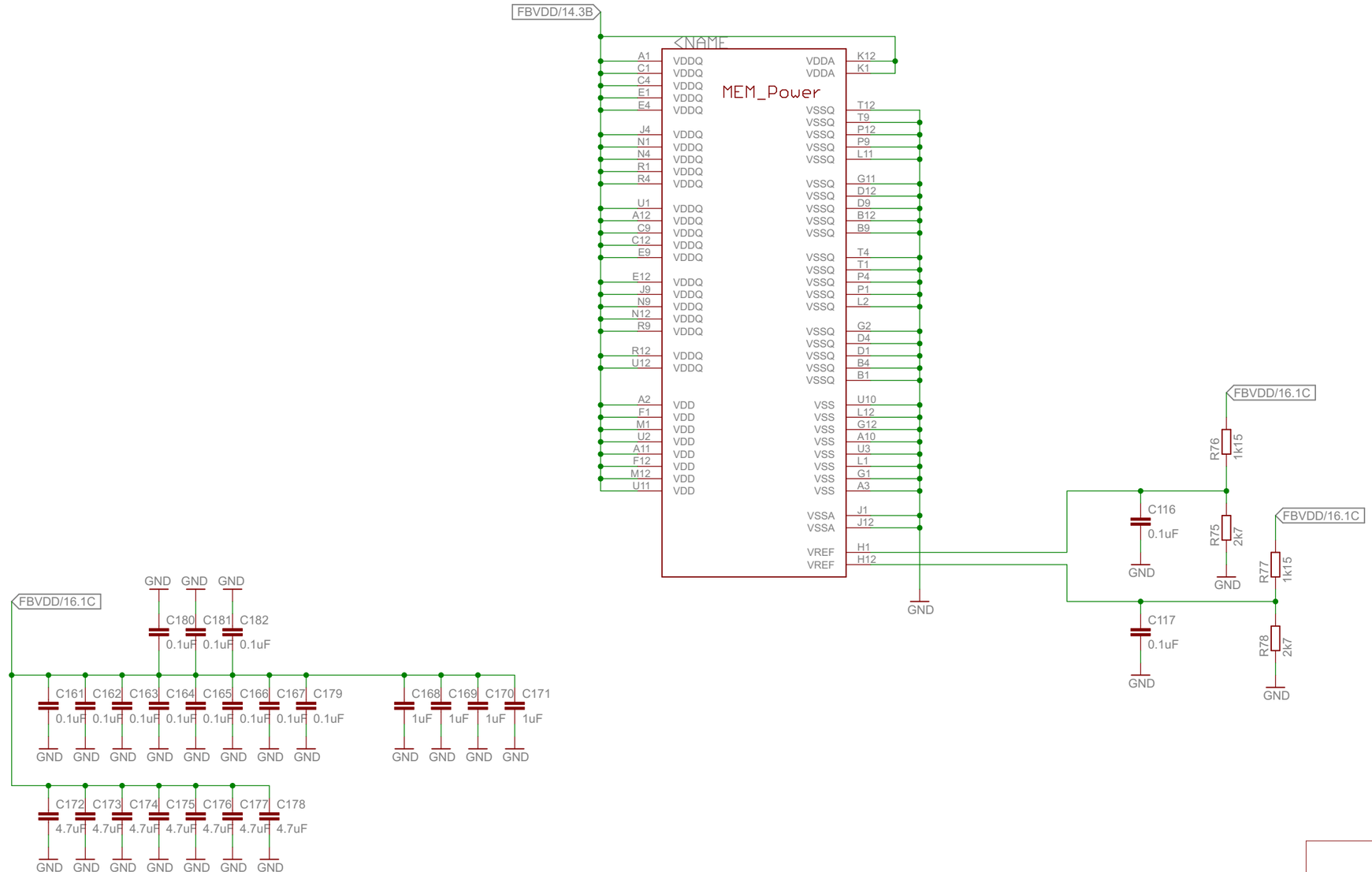

```
CMD-ADDR MAPPING
CMD1 RAS*
CMD10 CAS*
CMD11 WE*
CMD8 CS0*
CMD7 BA2
CMD19 A<0>
CMD25 A<1>
CMD22 0A<2>
CMD24 0A<3>
CMD0 0A<4>
CMD2 0A<5>
CMD4 1A<2>
CMD6 1A<3>
CMD5 1A<4>
CMD13 1A<5>
CMD21 A<6>
CMD16 A<7>
CMD23 A<8>
CMD20 A<9>
CMD17 A<10>
CMD9 A<11>
CMD12 BA0
CMD3 BA1
CMD18 CKE
CMD15 RST
```

```
MEM PIN SWITCH MIRROR
MF LOGIC STATE
     HIGH LOW
RAS# H10 H3
CAS# F9 F4
WE# H4 H9
CS# F4 F9
CKE H9 H4
A0  K9 K4
A1  H11 H2
A2  K10 K3
A3  M9 M4
A4  K4 K9
A5  H2 H11
A6  K3 K10
A7  L4 L9
A8  K2 K11
A9  M4 M9
A10 K11 K2
A11 L9 L4
BA0 G9 G4
BA1 G4 G9
BA2 H3 H10
```

DUDA

88GTEE	
3.3.2014 13:01:41	
Sheet: 14/50	

FBB-HIGH32B-Power

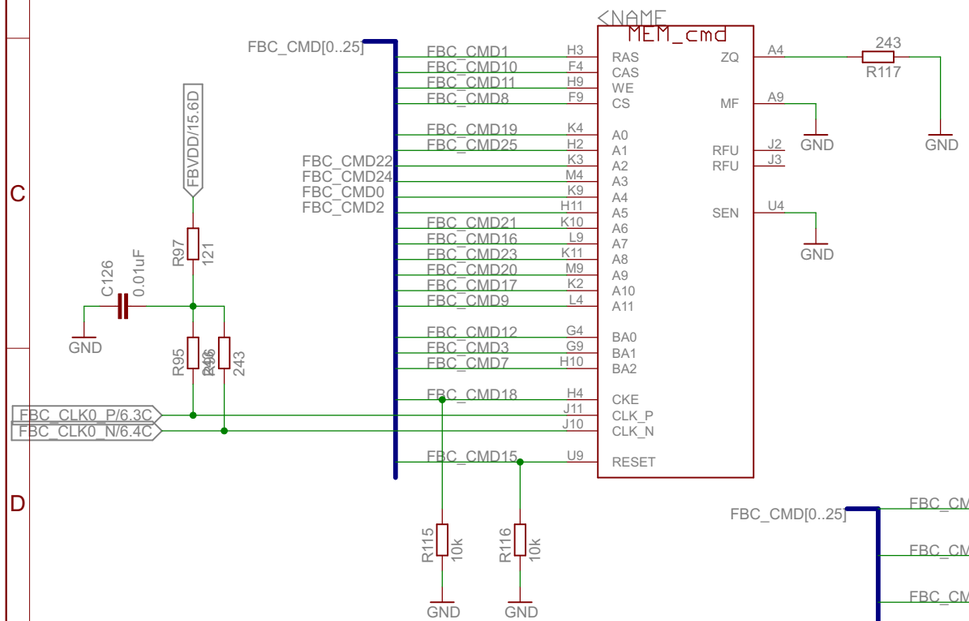


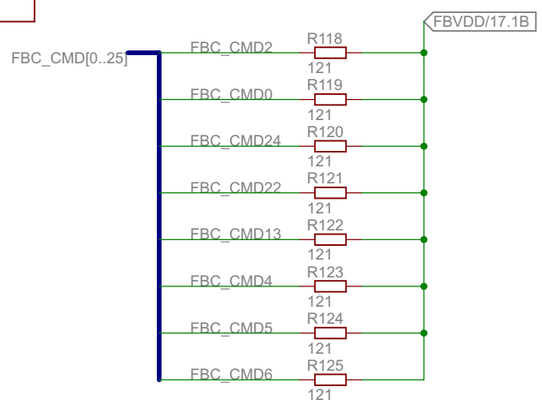
DUDA	88GTEE
	3.3.2014 13:01:41
	Sheet: 15/50

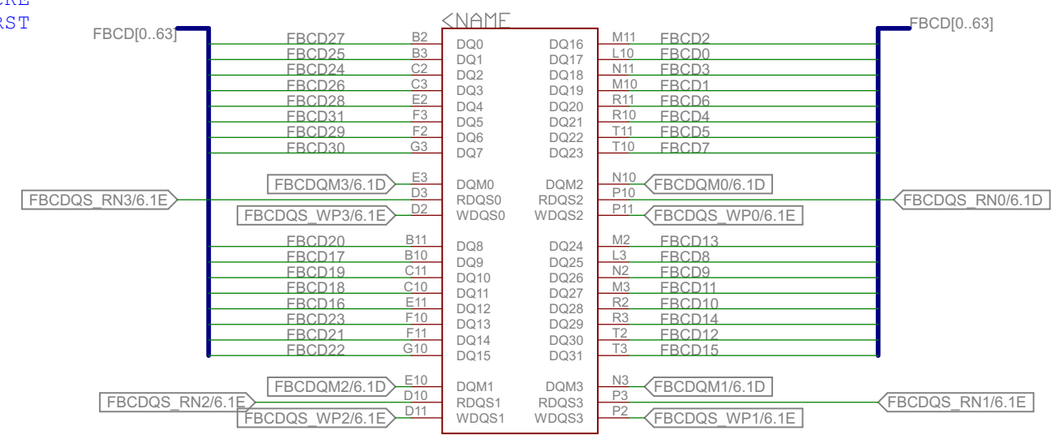
FBC-LOW32B

CMD-ADDR MAPPING
CMD1 RAS*
CMD10 CAS*
CMD11 WE*
CMD8 CS0*
CMD7 BA2
CMD19 A<0>
CMD25 A<1>
CMD22 0A<2>
CMD24 0A<3>
CMD0 0A<4>
CMD2 0A<5>
CMD4 1A<2>
CMD6 1A<3>
CMD5 1A<4>
CMD13 1A<5>
CMD21 A<6>
CMD16 A<7>
CMD23 A<8>
CMD20 A<9>
CMD17 A<10>
CMD9 A<11>
CMD12 BA0
CMD3 BA1
CMD18 CKE
CMD15 RST

MEM PIN SWITCH MIRROR
MF LOGIC STATE
HIGH LOW
RAS# H10 H3
CAS# F9 F4
WE# H4 H9
CS# F4 F9
CKE H9 H4
A0 K9 K4
A1 H11 H2
A2 K10 K3
A3 M9 M4
A4 K4 K9
A5 H2 H11
A6 K3 K10
A7 L4 L9
A8 K2 K11
A9 M4 M9
A10 K11 K2
A11 L9 L4
BA0 G9 G4
BA1 G4 G9
BA2 H3 H10



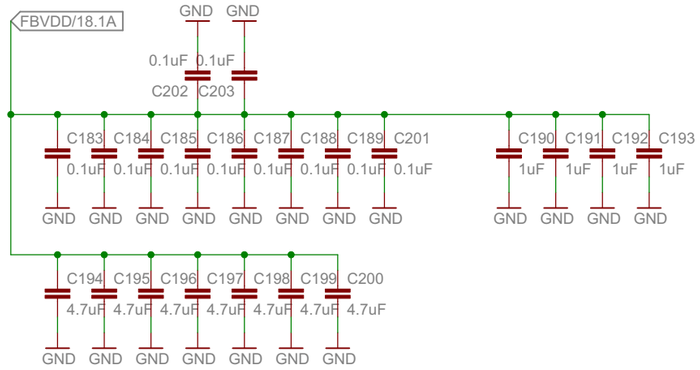


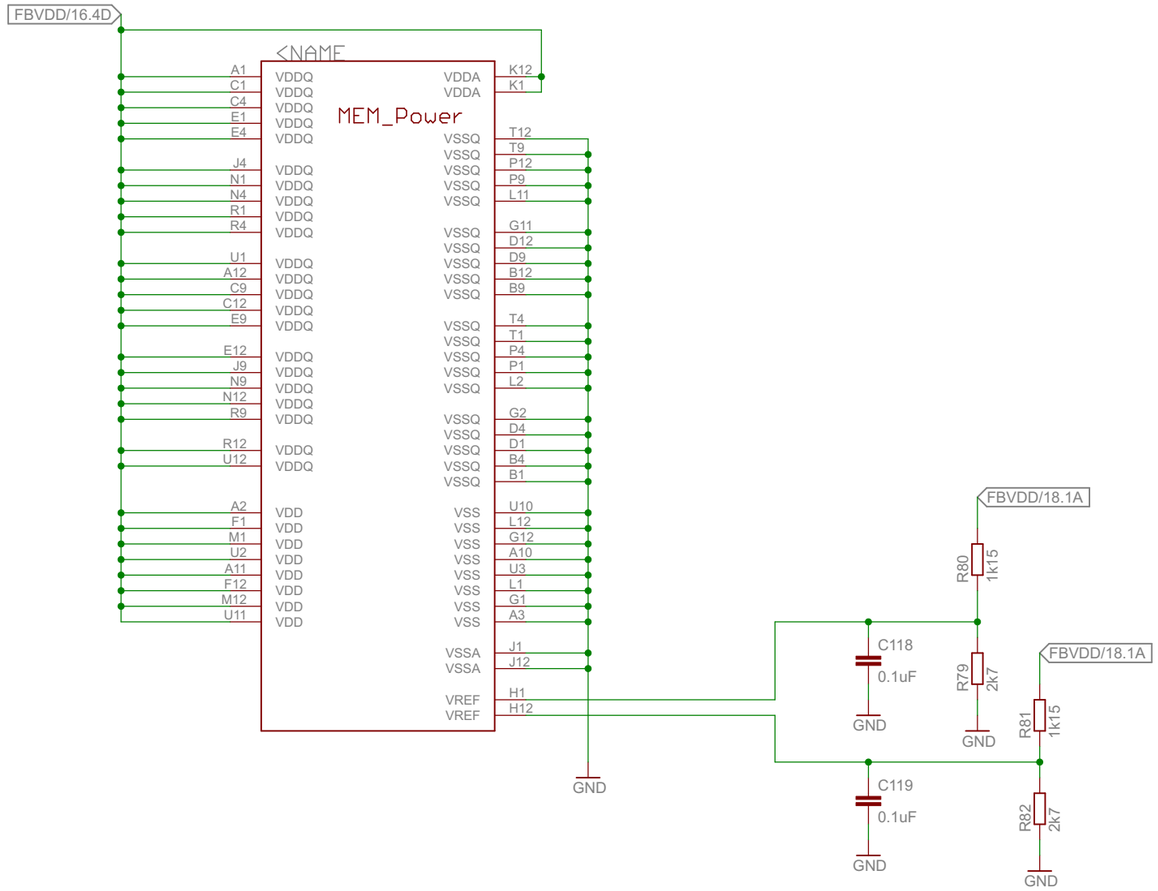


DUDA

88GTEE
3.3.2014 13:01:41
Sheet: 16/50

FBC-L0W32B-Power

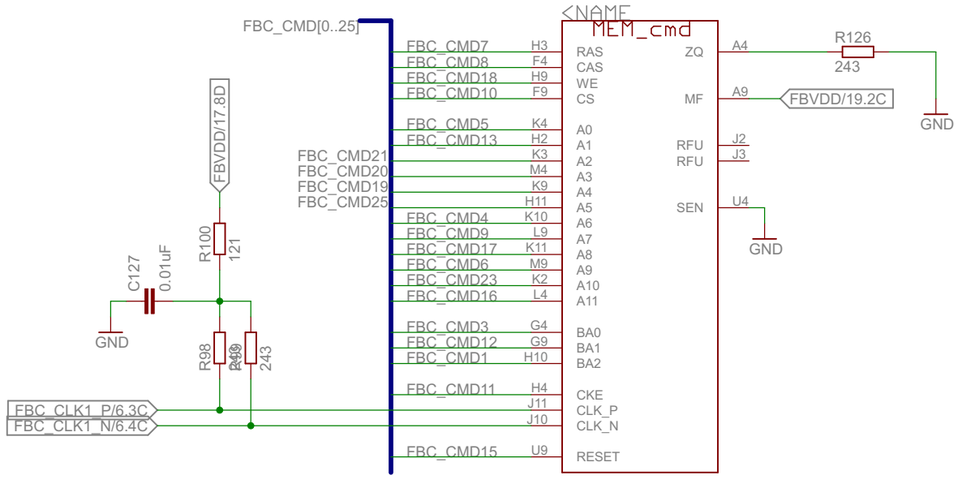


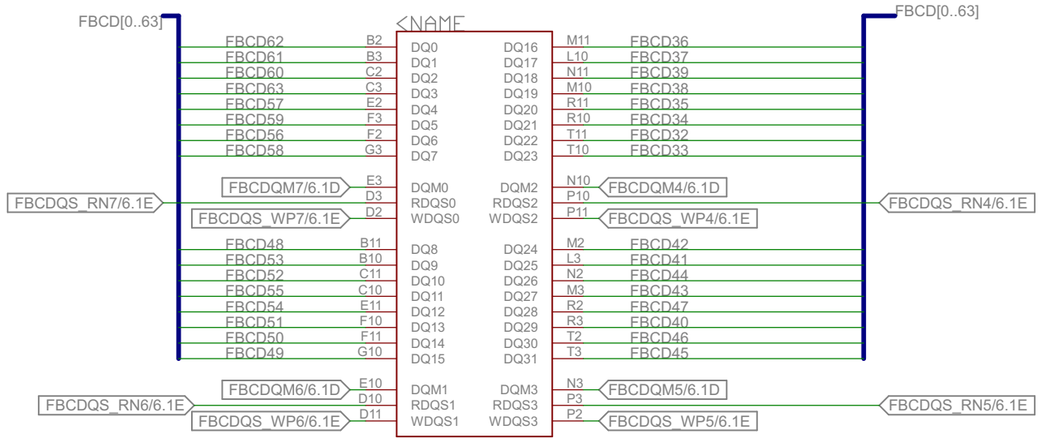


DUDA

88GTEE	
3.3.2014 13:01:41	
Sheet: 17/50	

FBC-HIGH32B





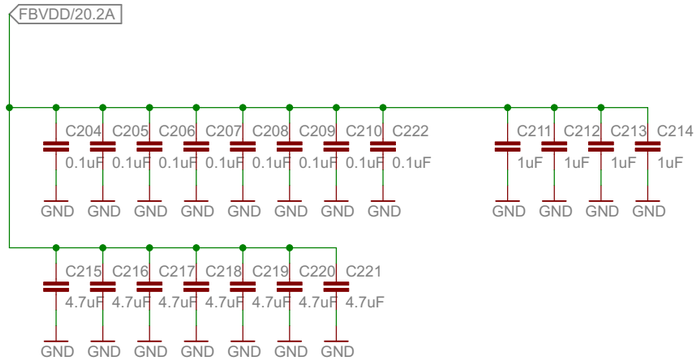

```
CMD-ADDR MAPPING
CMD1 RAS*
CMD10 CAS*
CMD11 WE*
CMD8 CS0*
CMD7 BA2
CMD19 A<0>
CMD25 A<1>
CMD22 0A<2>
CMD24 0A<3>
CMD0 0A<4>
CMD2 0A<5>
CMD4 1A<2>
CMD6 1A<3>
CMD5 1A<4>
CMD13 1A<5>
CMD21 A<6>
CMD16 A<7>
CMD23 A<8>
CMD20 A<9>
CMD17 A<10>
CMD9 A<11>
CMD12 BA0
CMD3 BA1
CMD18 CKE
CMD15 RST
```

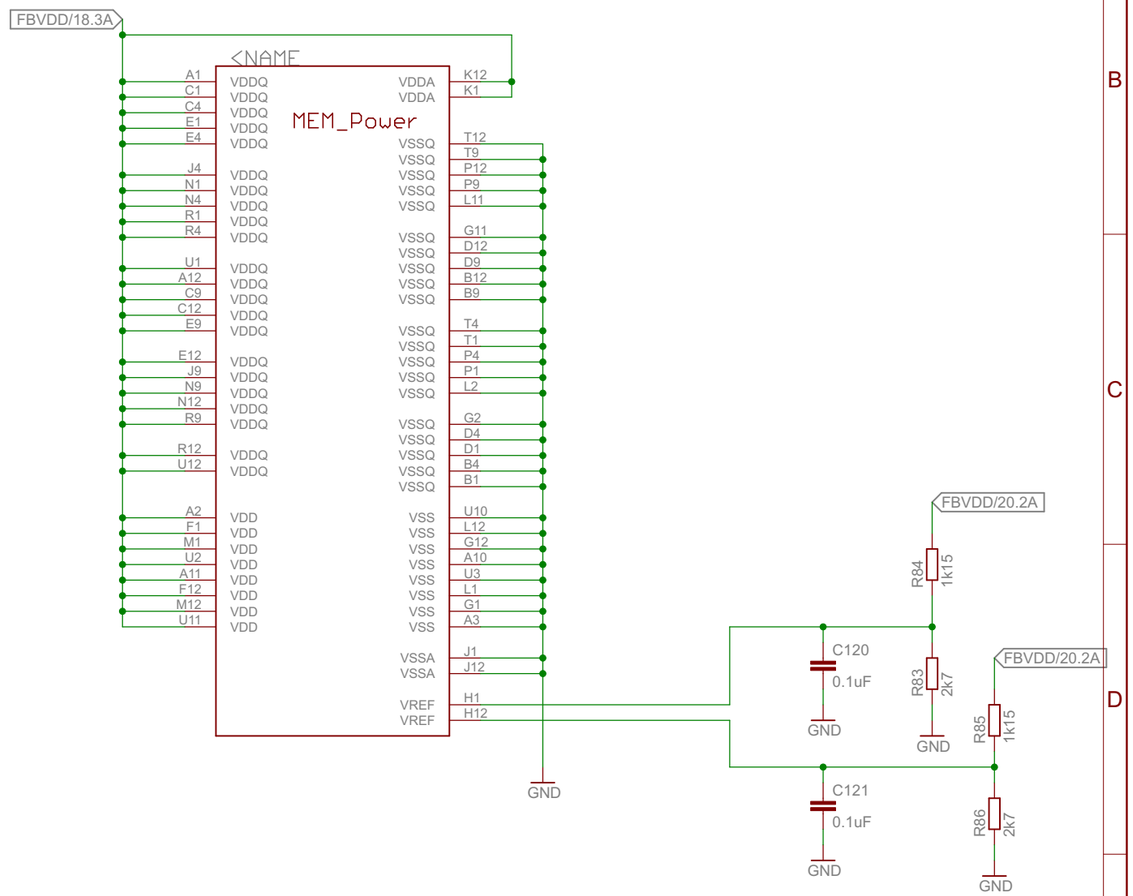
```
MEM PIN SWITCH MIRROR
MF LOGIC STATE
     HIGH LOW
RAS# H10 H3
CAS# F9 F4
WE# H4 H9
CS# F4 F9
CKE H9 H4
A0  K9 K4
A1  H11 H2
A2  K10 K3
A3  M9 M4
A4  K4 K9
A5  H2 H11
A6  K3 K10
A7  L4 L9
A8  K2 K11
A9  M4 M9
A10 K11 K2
A11 L9 L4
BA0 G9 G4
BA1 G4 G9
BA2 H3 H10
```

DUDA

88GTEE	
3.3.2014 13:01:41	
Sheet: 18/50	

FBC-HIGH32B-Power

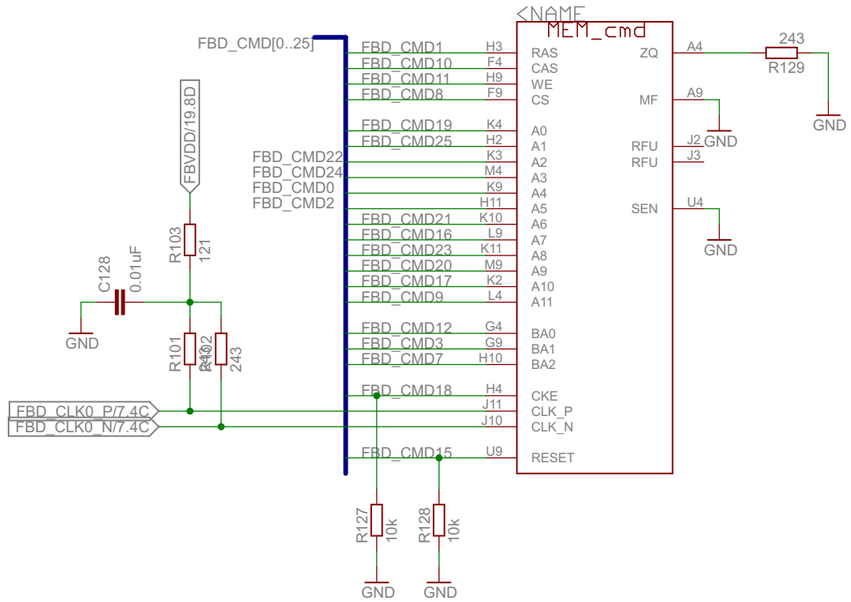


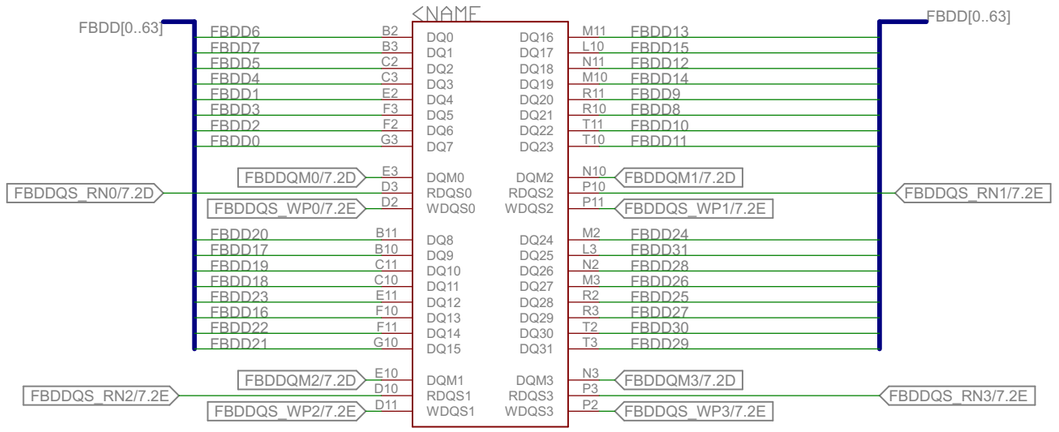


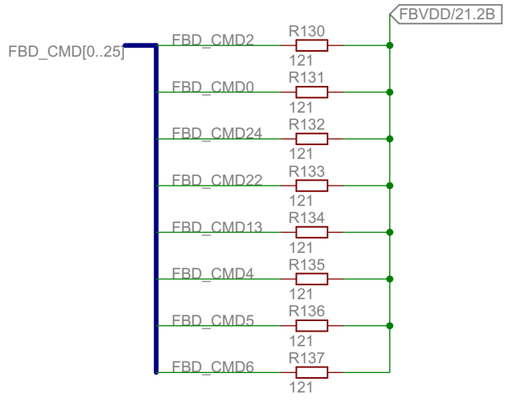
DUDA

88GTEE	
3.3.2014 13:01:41	
Sheet: 19/50	

FBD-LOW32B







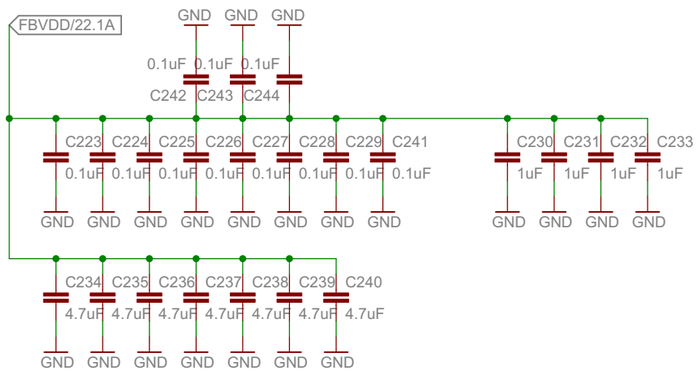

```
CMD-ADDR MAPPING
CMD1 RAS*
CMD10 CAS*
CMD11 WE*
CMD8 CS0*
CMD7 BA2
CMD19 A<0>
CMD25 A<1>
CMD22 0A<2>
CMD24 0A<3>
CMD0 0A<4>
CMD2 0A<5>
CMD4 1A<2>
CMD6 1A<3>
CMD5 1A<4>
CMD13 1A<5>
CMD21 A<6>
CMD16 A<7>
CMD23 A<8>
CMD20 A<9>
CMD17 A<10>
CMD9 A<11>
CMD12 BA0
CMD3 BA1
CMD18 CKE
CMD15 RST
```

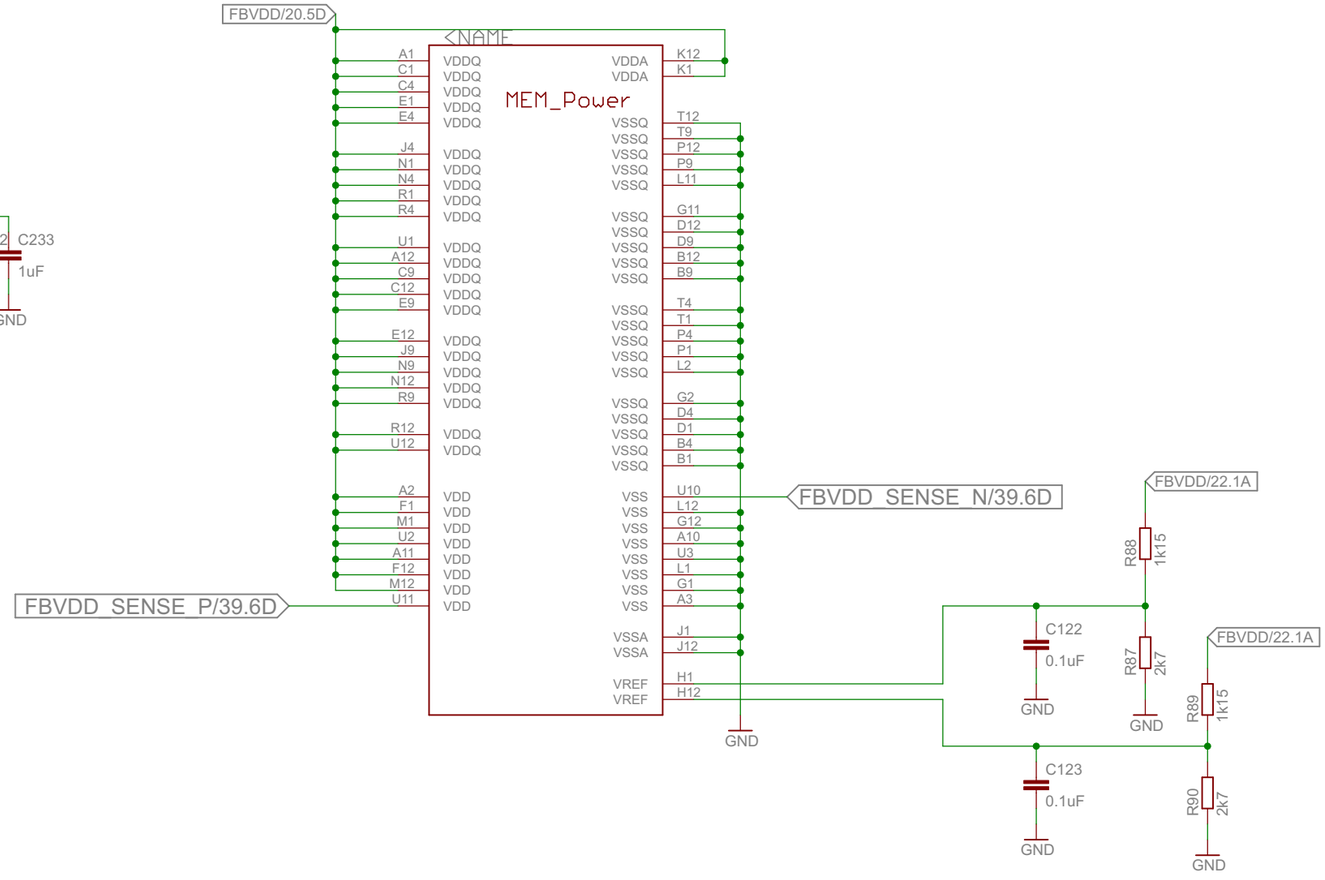
```
MEM PIN SWITCH MIRROR
MF LOGIC STATE
     HIGH LOW
RAS# H10 H3
CAS# F9 F4
WE# H4 H9
CS# F4 F9
CKE H9 H4
A0  K9 K4
A1  H11 H2
A2  K10 K3
A3  M9 M4
A4  K4 K9
A5  H2 H11
A6  K3 K10
A7  L4 L9
A8  K2 K11
A9  M4 M9
A10 K11 K2
A11 L9 L4
BA0 G9 G4
BA1 G4 G9
BA2 H3 H10
```

DUDA

88GTEE	
3.3.2014 13:01:41	
Sheet: 20/50	

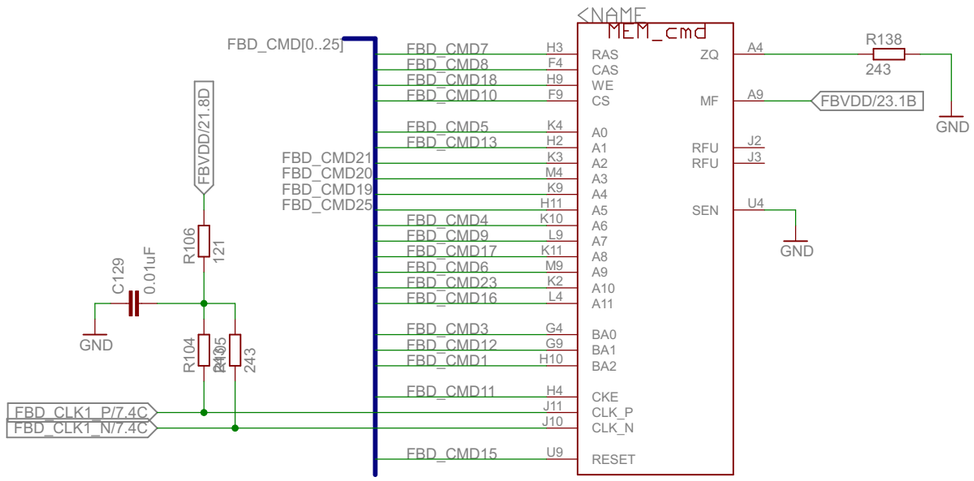
FBD-L0W32B-Power

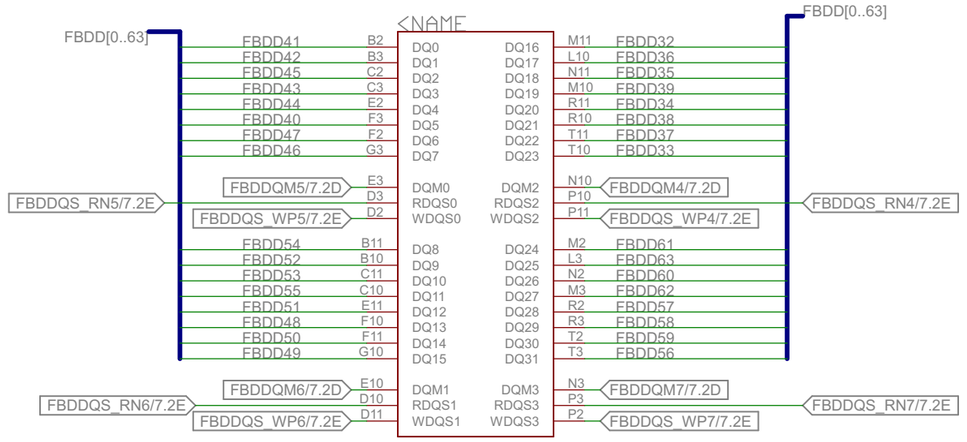




DUDA	88GTEE
	3.3.2014 13:01:41
	Sheet: 21/50

FBD-HIGH32B






```
CMD-ADDR MAPPING
CMD1 RAS*
CMD10 CAS*
CMD11 WE*
CMD8 CS0*
CMD7 BA2
CMD19 A<0>
CMD25 A<1>
CMD22 0A<2>
CMD24 0A<3>
CMD0 0A<4>
CMD2 0A<5>
CMD4 1A<2>
CMD6 1A<3>
CMD5 1A<4>
CMD13 1A<5>
CMD21 A<6>
CMD16 A<7>
CMD23 A<8>
CMD20 A<9>
CMD17 A<10>
CMD9 A<11>
CMD12 BA0
CMD3 BA1
CMD18 CKE
CMD15 RST
```

```
MEM PIN SWITCH MIRROR
MF LOGIC STATE
     HIGH LOW
RAS# H10 H3
CAS# F9 F4
WE# H4 H9
CS# F4 F9
CKE H9 H4
A0  K9 K4
A1  H11 H2
A2  K10 K3
A3  M9 M4
A4  K4 K9
A5  H2 H11
A6  K3 K10
A7  L4 L9
A8  K2 K11
A9  M4 M9
A10 K11 K2
A11 L9 L4
BA0 G9 G4
BA1 G4 G9
BA2 H3 H10
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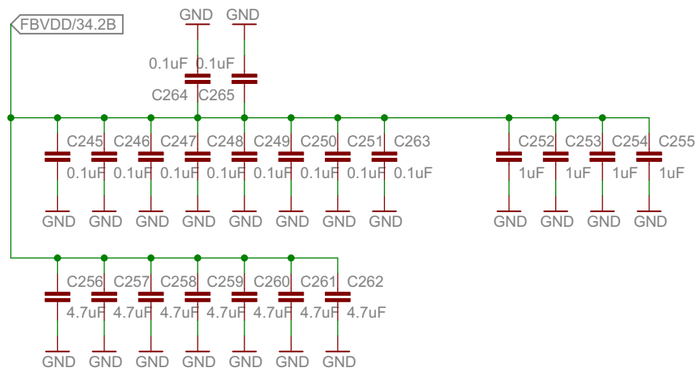
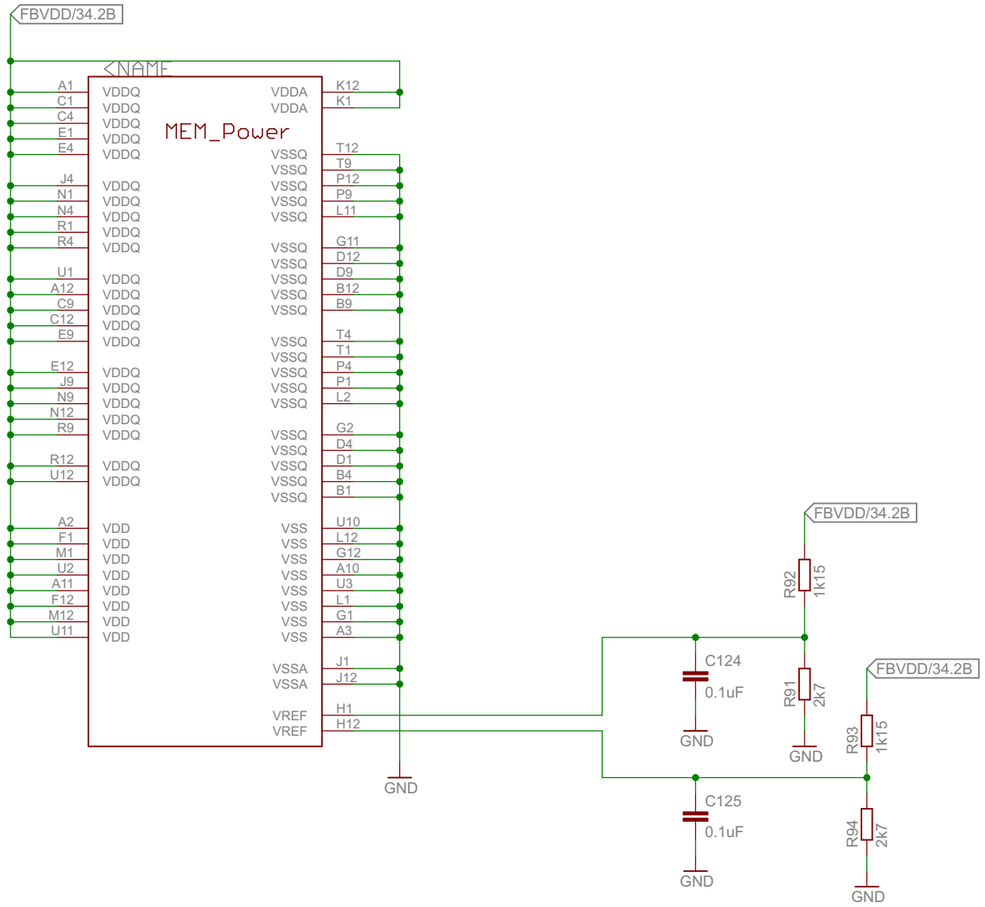
3.3.2014 13:01:41

Sheet: 22/50

FBD-HIGH32B-Power





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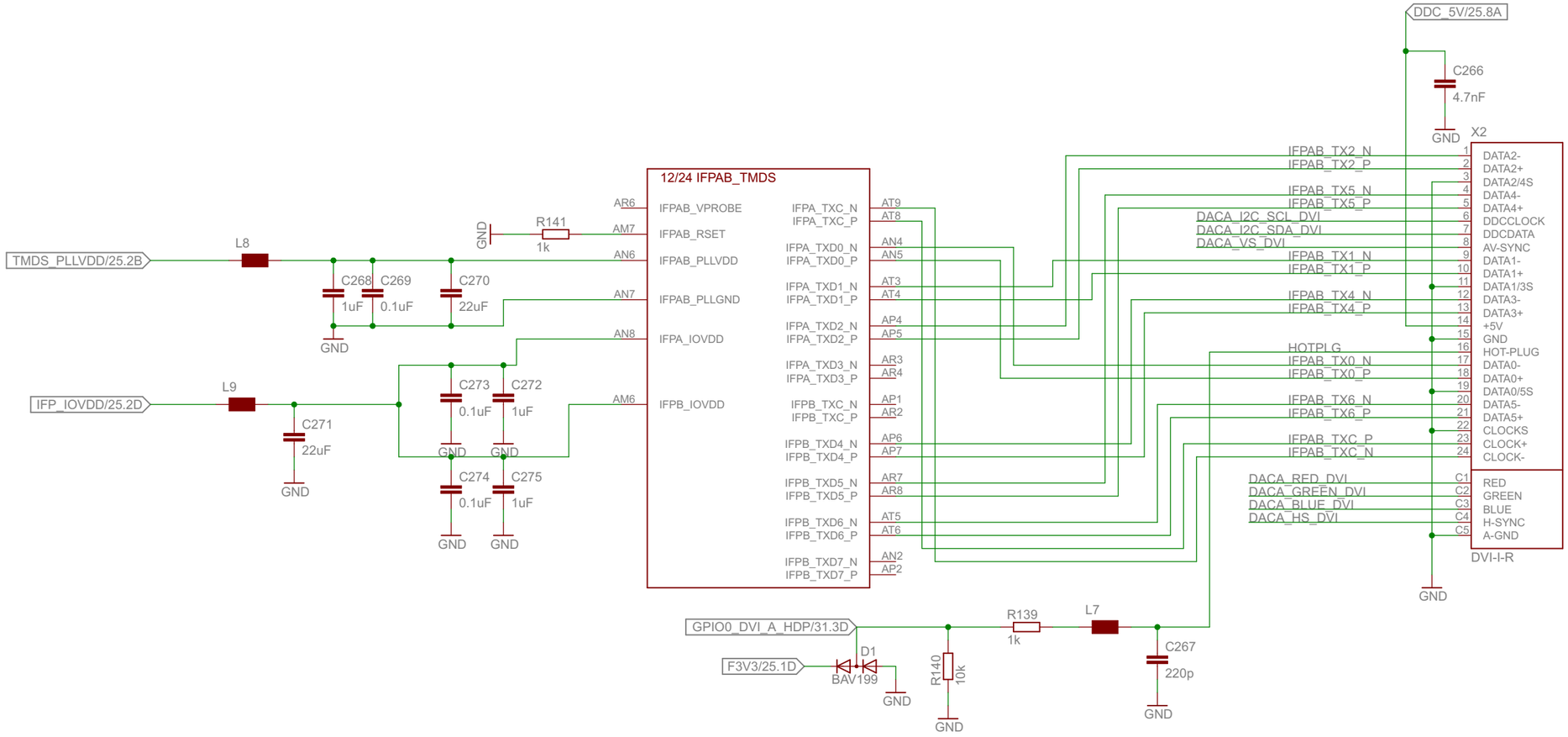
	3.3.2014 13:01:41
	Sheet: 23/50

IFPAB_TMDS



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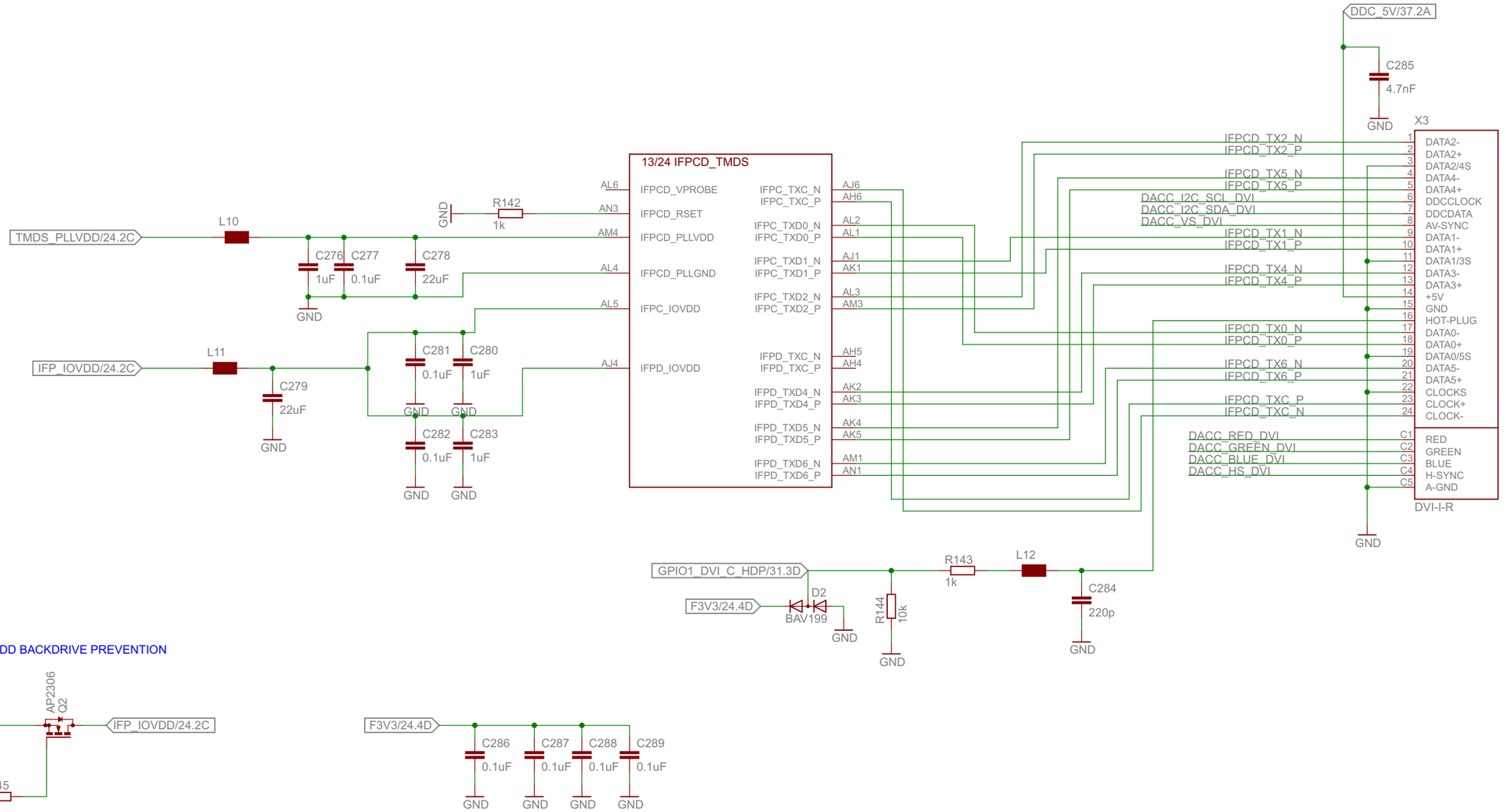
	3.3.2014 13:01:41
	Sheet: 24/50

IFPCD_TMDS



DUDA	88GTEE
	3.3.2014 13:01:41
	Sheet: 25/50

DACA

5V_INT/27.3C

DACA_I2C_SCL_ESD

DACA_I2C_SDA_ESD

DACA_HS_ESD

DACA_VS_ESD

DAC_VDD/27.1B

8/24 DACA

DACA_VDD
DACA_VREF
DACA_RSET
I2CA_SCL
I2CA_SDA
DACA_HSYNC
DACA_VSYNC
DACA_RED
DACA_GREEN
DACA_BLUE
DACA_IDUMP

L13 C298 22uF C299 4.7uF C300 0.1uF C301 0.01uF C302 0.1uF R147 124

R148 33 R149 33 R150 2k2 R151 2k2

L14 L15 C303 22p C304 22p

DACA_I2C_SCL_DVI/24.6B
DACA_I2C_SDA_DVI/24.6B

R152 33 R153 33 IC4A 74AC11008D

L16 C305 27p

DACA_HS_DVI/24.6D

R154 33 R155 33 IC4B 74AC11008D

L17 C306 27p

DACA_VS_DVI/24.6C

C312 4.7uF C311 4.7uF C310 0.1uF IC4P

L18 C307 4.7p

DACA_RED_DVI/24.6C

R156 150 R157 150 R158 150 R159 150 R160 150 R161 150

L19 C308 4.7p

DACA_GREEN_DVI/24.6C

L20 C309 4.7p

DACA_BLUE_DVI/24.6D

near GPU

near connector

DACA_VS_ESD
DACA_HS_ESD
F3V3/27.6D
DACA_I2C_SCL_ESD
DACA_I2C_SDA_ESD

DACA_BLUE_DVI/24.6D
F3V3/27.6D
DACA_RED_DVI/24.6C
DACA_GREEN_DVI/24.6C

GND

DUDA

88GTEE

3.3.2014 13:01:41

Sheet: 26/50

DACC

5V_INT/26.6A

R165 2k2
R166 2k2

DACC_I2C_SCL_ESD

R163 33
R164 33

DACC_I2C_SDA_ESD

L22 DACC_I2C_SCL_DVI/25.7B
L23 DACC_I2C_SDA_DVI/25.7B

C318 22p
C319 22p

DAC_VDD/28.3C

L21

C313 22uF
C314 4.7uF
C315 0.1uF
C316 0.01uF
C317 0.1uF
R162 124

10/24 DACC

AH7	DACC_VDD	I2CB_SCI	R9
AK8	DACC_VREF	I2CB_SDA	T8
AH8	DACC_RSET	DACC_HSYNC	AJ10
		DACC_VSYNC	AJ7
		DACC_RED	AJ9
		DACC_GREEN	AH9
		DACC_BLUE	AH10
		DACC_IDUMP	AK9

DACC_HS_ESD

R167 33
R168 33

IC4D 74AC11008D

L24 DACC_HS_DVI/25.7C

C320 27p

DACC_VS_ESD

R169 33
R170 33

IC4C 74AC11008D

L25 DACC_VS_DVI/25.7B

C321 27p

5V_INT/37.1A

C325

R171 150
R172 150

L26 DACC_RED_DVI/25.7C

C322 4.7p

R173 150
R174 150

L27 DACC_GREEN_DVI/25.7C

C323 4.7p

R175 150
R176 150

L28 DACC_BLUE_DVI/25.7C

C324 4.7p

near GPU

near connector

DACC_VS_ESD
DACC_HS_ESD

P$1 P$2 P$3 P$4 P$5 P$6

F3V3/30.4C

DACC_I2C_SCL_ESD
DACC_I2C_SDA_ESD

DACC_BLUE_DVI/25.7C

F3V3/30.4C

DACC_RED_DVI/25.7C
DACC_GREEN_DVI/25.7C

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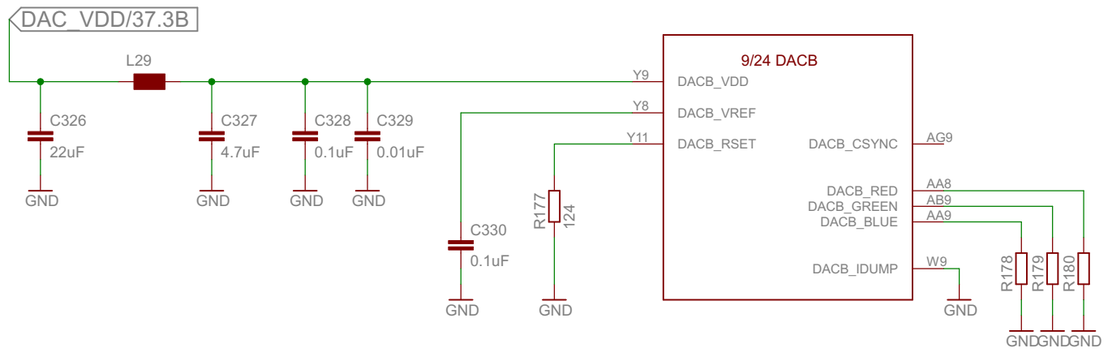
3.3.2014 13:01:41	
Sheet: 27/50	

DACB



DACB TVOUT NOT USED

DUDA	88GTEE
	3.3.2014 13:01:41
	Sheet: 28/50

MIOA/MIOB

route on inner layer

MIOAD[0..14]

MIOA_2V5/32.4A

L30

C331 22uF GND

C332 4.7uF GND

C333 0.1uF GND

C334 0.01uF GND

C335 1uF GND

R181 1K GND

R182 1K GND

C336 0.1uF GND

R184 49.9

R183 49.9 GND

14/24 MIOA

U11	MIOA_VDDQ	MIOAD0	AA4 MIOAD0
V11	MIOA_VDDQ	MIOAD1	Y7 MIOAD1
W11	MIOA_VDDQ	MIOAD2	V7 MIOAD2
T12	MIOA_VDDQ	MIOAD3	V6 MIOAD3
U12	MIOA_VDDQ	MIOAD4	V5 MIOAD4
		MIOAD5	U7 MIOAD5
		MIOAD6	Y3 MIOAD6
W3	MIOA_VREF	MIOAD7	W1 MIOAD7
		MIOAD8	W2 MIOAD8
		MIOAD9	Y4 MIOAD9
		MIOAD10	W5 MIOAD10
		MIOAD11	W6 MIOAD11
V3	MIOACAL_PD_VDDQ	MIOAD12	AA7 MIOAD12
V2	MIOACAL_PU_GND	MIOAD13	AA5 MIOAD13
		MIOAD14	Y5 MIOAD14
		MIOA_DE	W7
		MIOA_CLKOUT_P	AA2
		MIOA_CLKOUT_N	Y1

GPIO11_SYNC/31.3E

SWAPRDY_A/31.4C

B3	GND	MIOD0	A2 MIOAD0
B7	GND	MIOD1	B4 MIOAD1
B11	GND	MIOD2	A4 MIOAD2
A3	GND	MIOD3	A5 MIOAD3
A7	GND	MIOD4	B6 MIOAD4
A11	GND	MIOD5	A6 MIOAD5
GND		MIOD6	A8 MIOAD6
B2	EXT_REFCLK	MIOD7	B9 MIOAD7
A1	GPIO11_SYNC	MIOD8	B10 MIOAD8
B13	MIOA_DE	MIOD9	A10 MIOAD9
		MIOD10	B12 MIOAD10
B8	MIOA_CLK	MIOD11	A12 MIOAD11
		MIOD12	A13 MIOAD12
B1	SWAP_RDY	MIOD13	B5 MIOAD13
		MIOD14	A9 MIOAD14

MIOA_2V5/32.4A

L31

C337 22uF GND

C338 4.7uF GND

C339 0.1uF GND

C340 0.01uF GND

C341 1uF GND

R185 1K GND

R186 1K GND

C342 0.1uF GND

R188 49.9

R187 49.9 GND

15/24 MIOB

AE11	MIOB_VDDQ	MIOBD0	AE6 MIOBD0
AE12	MIOB_VDDQ	MIOBD1	AG7 MIOBD1
AF12	MIOB_VDDQ	MIOBD2	AF9 MIOBD2
AE13	MIOB_VDDQ	MIOBD3	AF8 MIOBD3
AF13	MIOB_VDDQ	MIOBD4	AE9 MIOBD4
		MIOBD5	AE7 MIOBD5
		MIOBD6	AD8 MIOBD6
AG2	MIOB_VREF	MIOBD7	AD9 MIOBD7
		MIOBD8	AC8 MIOBD8
		MIOBD9	AD7 MIOBD9
		MIOBD10	AD5 MIOBD10
		MIOBD11	AC5 MIOBD11
AG1	MIOBCAL_PD_VDDQ	MIOBD12	AE5 MIOBD12
AF1	MIOBCAL_PU_GND		
		MIOB_HSYNC	AF5
		MIOB_VSYNC	AG5
		MIOB_DE	AF7
		MIOB_CLKOUT_P	AG3
		MIOB_CLKOUT_N	AG4
		MIOB_CLKIN	AD3

MIOBD[0..12]

DUDA

88GTEE

3.3.2014 13:01:41

Sheet: 29/50

XTAL/THERM/FAN/I2C/HDCP

NO INTERNAL THERMAL MONITORING

19/24 THERMAL

THERMDN(CATHODE) — T1

THERMDP(ANODE) — U1

F3V3/27.6D — C436 — GND

C454 — F3V3/31.3E — GND

ADT7473

VCCP (14) — VCC (3)

I2CC_SCL — SCL (1) — PWM1/XTO (15) — TACH1 (6)

I2CC_SDA — SDA (16) — PWM2/ALERT (5) — GPIO/THERM (9)

D1+ (13) — D1- (12) — TACH2 (7)

D2+ (11) — D2- (10)

PWM3 (8) — TACH3 (4) — R285 10K — F3V3/31.3E

GND (2) — GND

Q5 2N3904

KEEP AT ROOM TEMPERATURE

PIN8 HIGH-- SLAVE ADDRESS 0x2E

NVVDD_EXT12V_1_IN/39.2C

FAN_CONN X5-1, X5-2

F3V3/27.6D — 10k R286 — 10k R287 — GND

10k R288

Q8 N-HEXFET_SOT323-

U4 BSS138BK (G, S, D) — GND

17/24 I2C

I2CC_SCL — P8 — I2CC_SCL

I2CC_SDA — P9 — I2CC_SDA

F3V3/31.3E — 2K2 R189 — 2K2 R190

I2CS_SCL — AE1 — 10k R55

I2CS_SDA — AE2 — 10k R56 — F3V3/31.3E

I2CH_SCL — U9

I2CH_SDA — V9

F3V3/31.3E — 10k R57

10k R58 — GND

HDCP

IC3

I²C EEPROM Array

SCL (6) — SDA (5) — VCC (8) — GND (4)

24AA00SN

F3V3/31.3E — GND

F3V3/31.3E — C297 1uF — GND

16/24 XTAL

AD2 — XTALSSIN — XTALOUTBUFF — AB3

AD1 — XTALIN — XTALOUT — AC1

R53 10k — GND

Q1 27MHz

C108 18p — GND

C109 18p — GND

R54 330 — GND

R(53-56)--5%

C(108-109)--NPO/50V/5%

DUDA

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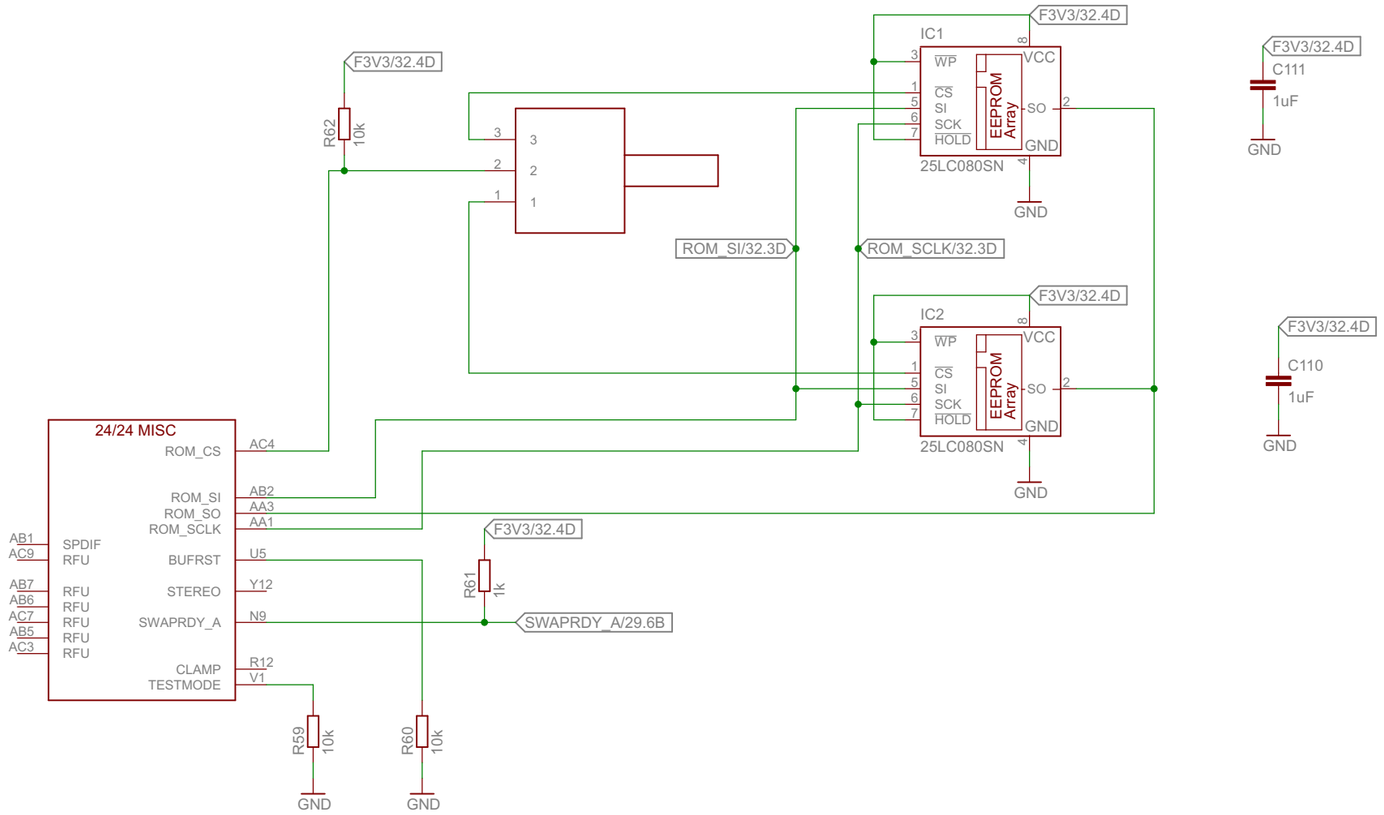
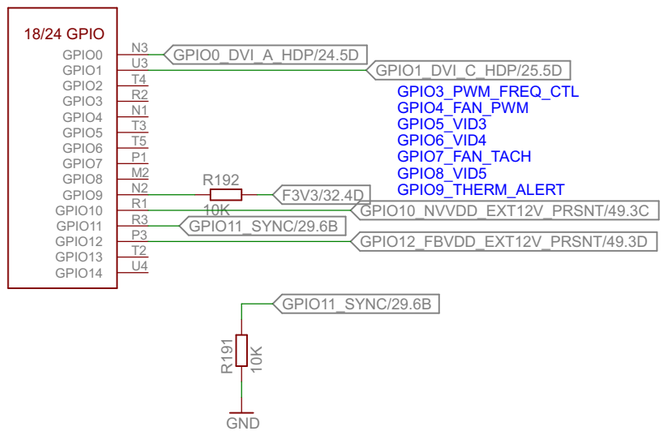
3.3.2014 13:01:41

Sheet: 30/50

BIOS/GPIO





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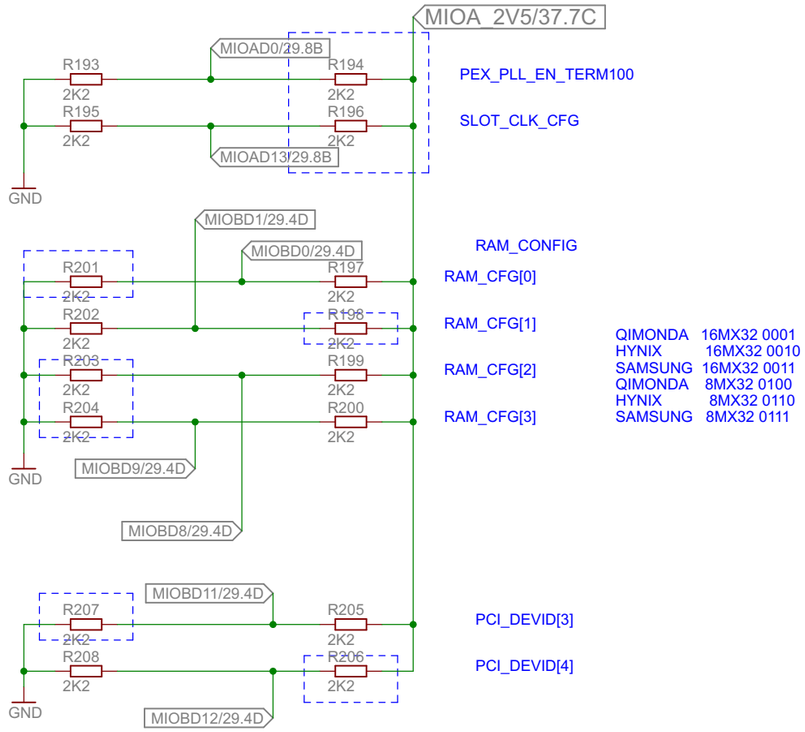
3.3.2014 13:01:41	
Sheet: 31/50	

STRAP CONFIG



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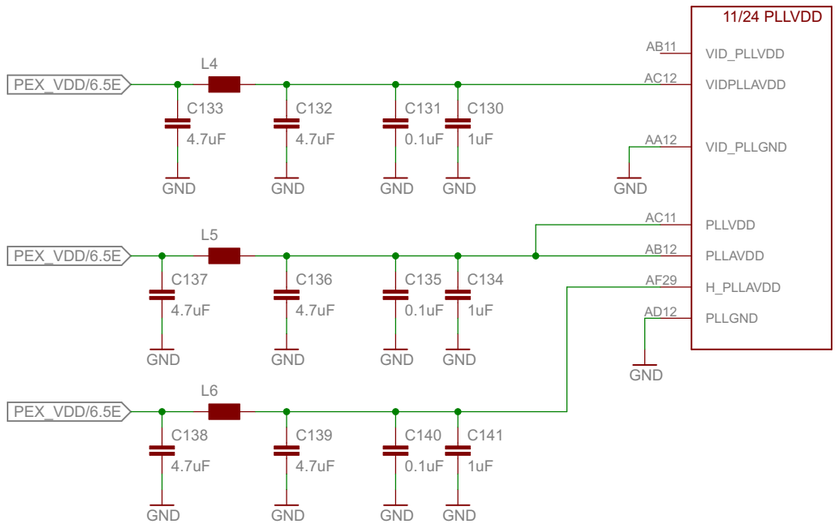
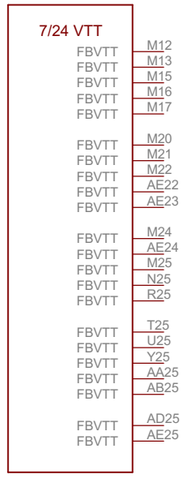
	Sheet: 32/50

PLLVDD/VTT





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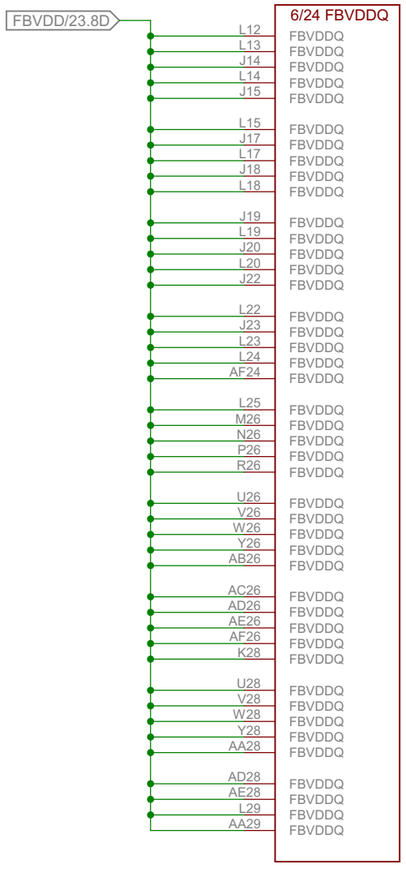
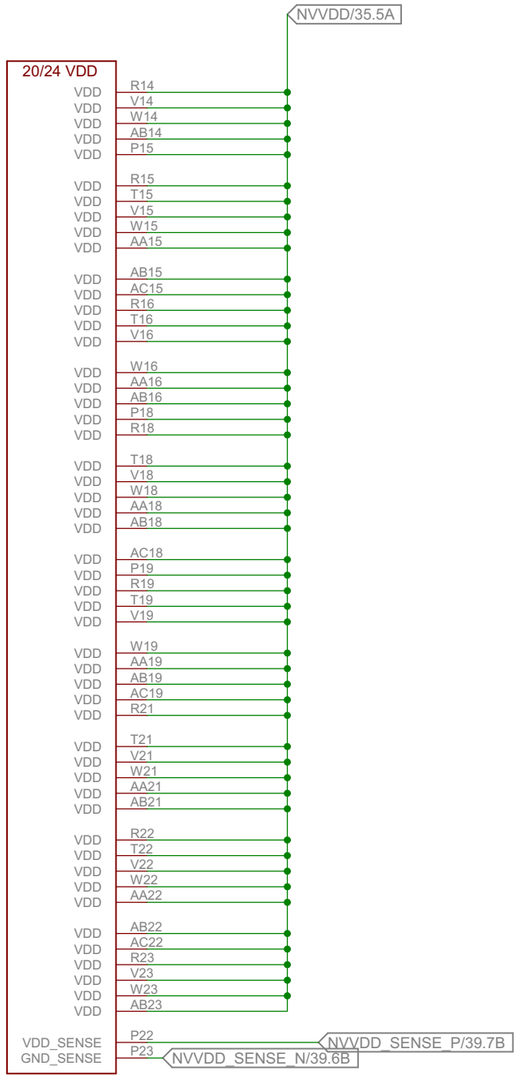
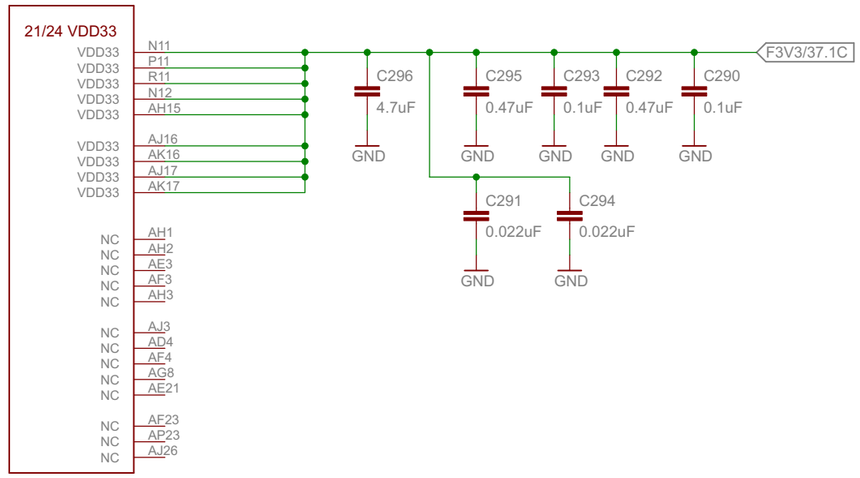
	Sheet: 33/50

NVVDD/VDD33/FBVDDQ







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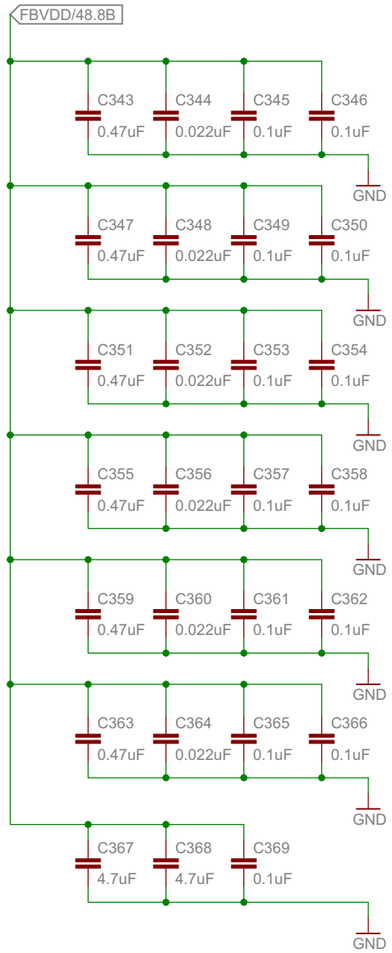
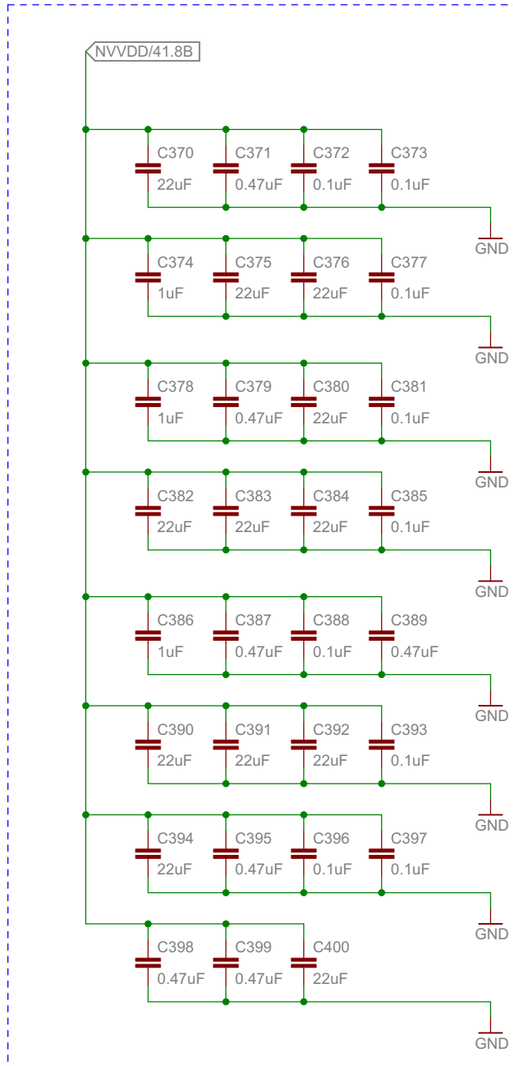
3.3.2014 13:01:41	
Sheet: 34/50	

DECOUPLING NVVDD/FBVDD



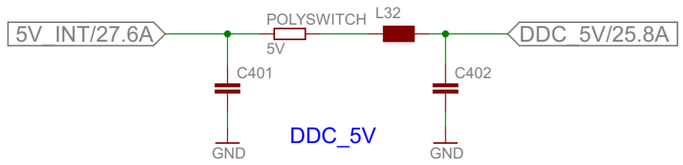


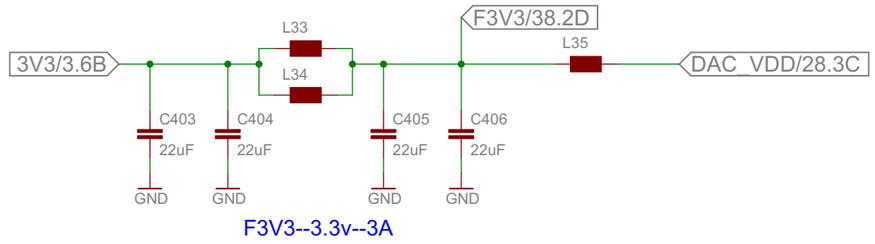
PLACE UNDER GPU!

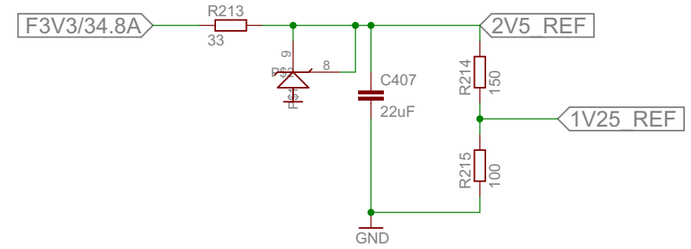
DUDA	88GTEE
	3.3.2014 13:01:41
	Sheet: 35/50

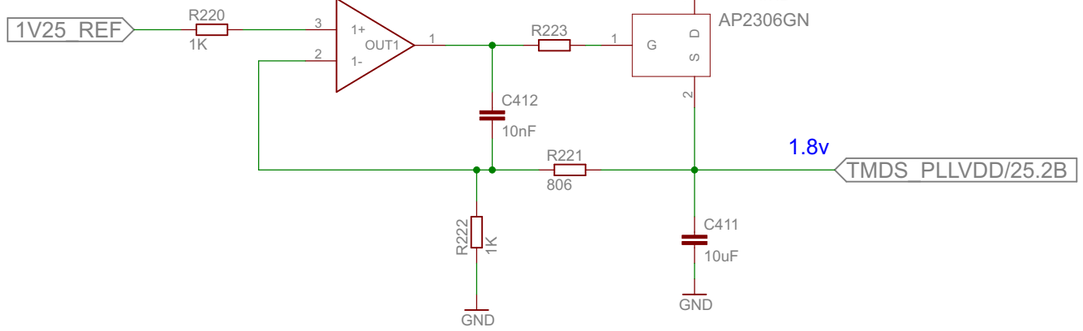
DUDA	
	88GTEE
	3.3.2014 13:01:41
	Sheet: 36/50

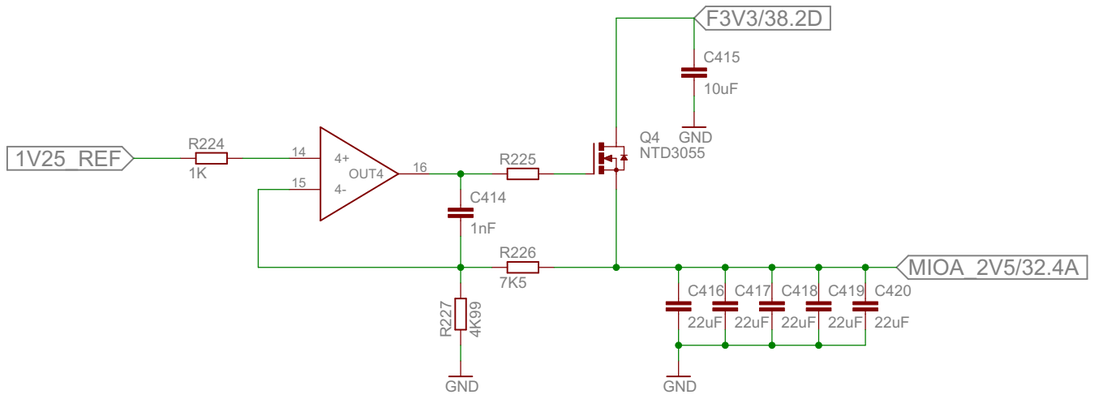
SUPPLY DAC_VDD/5V_INT/TMDS_PLLVDD/MIOA_2V5

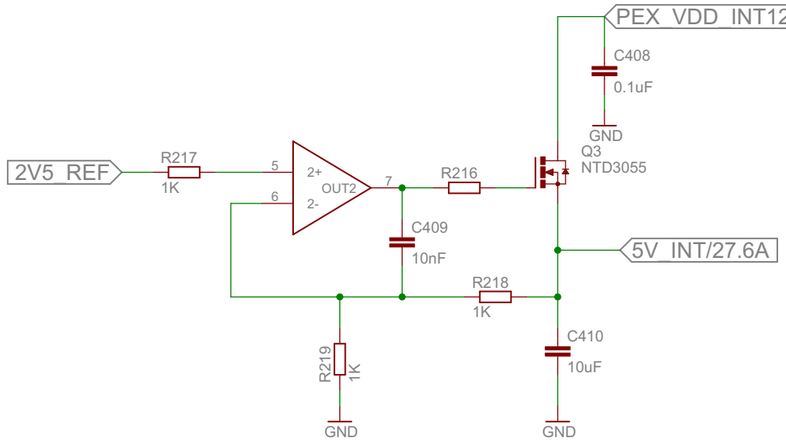


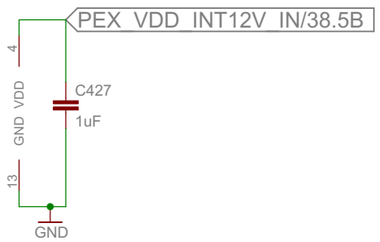


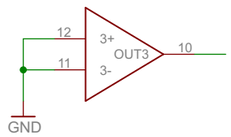












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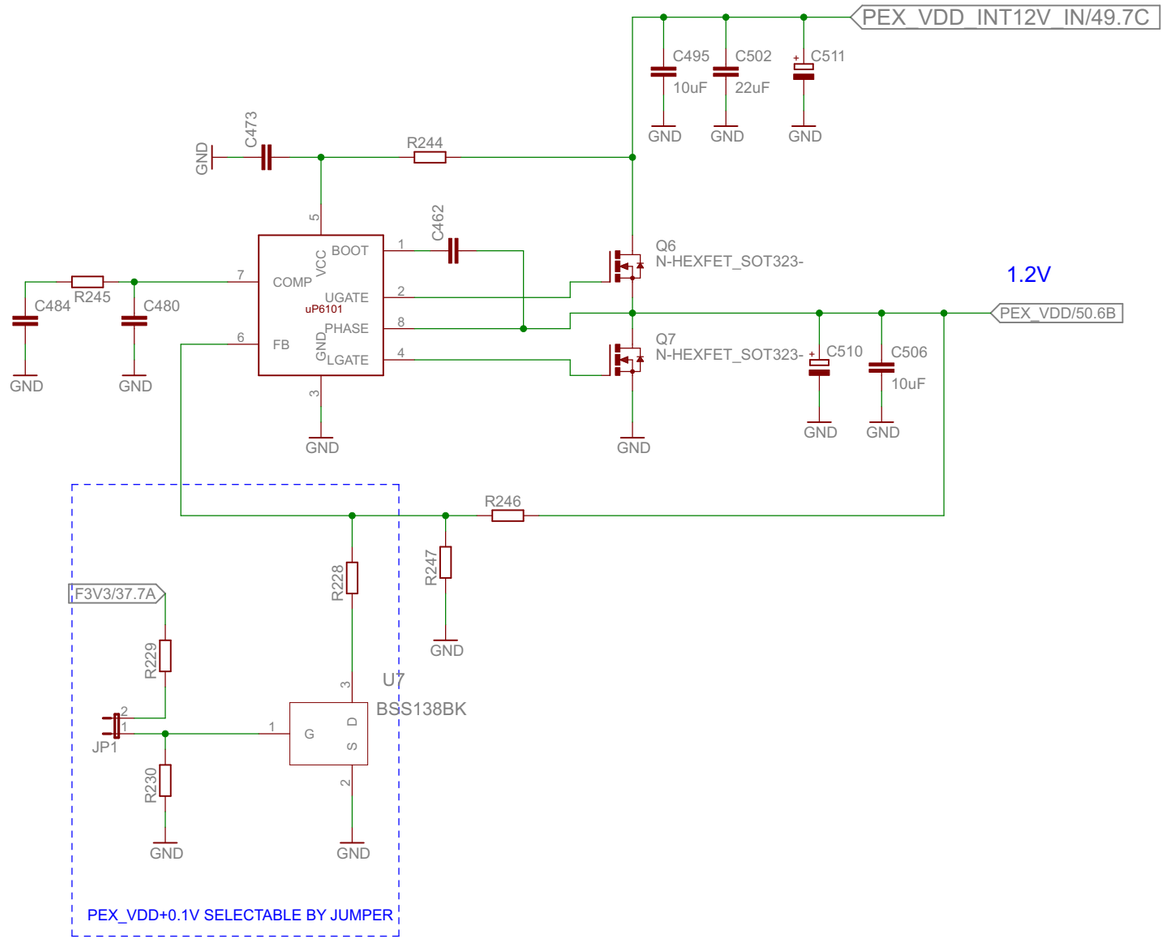
3.3.2014 13:01:41

Sheet: 37/50

PEX_VDD(PLL)



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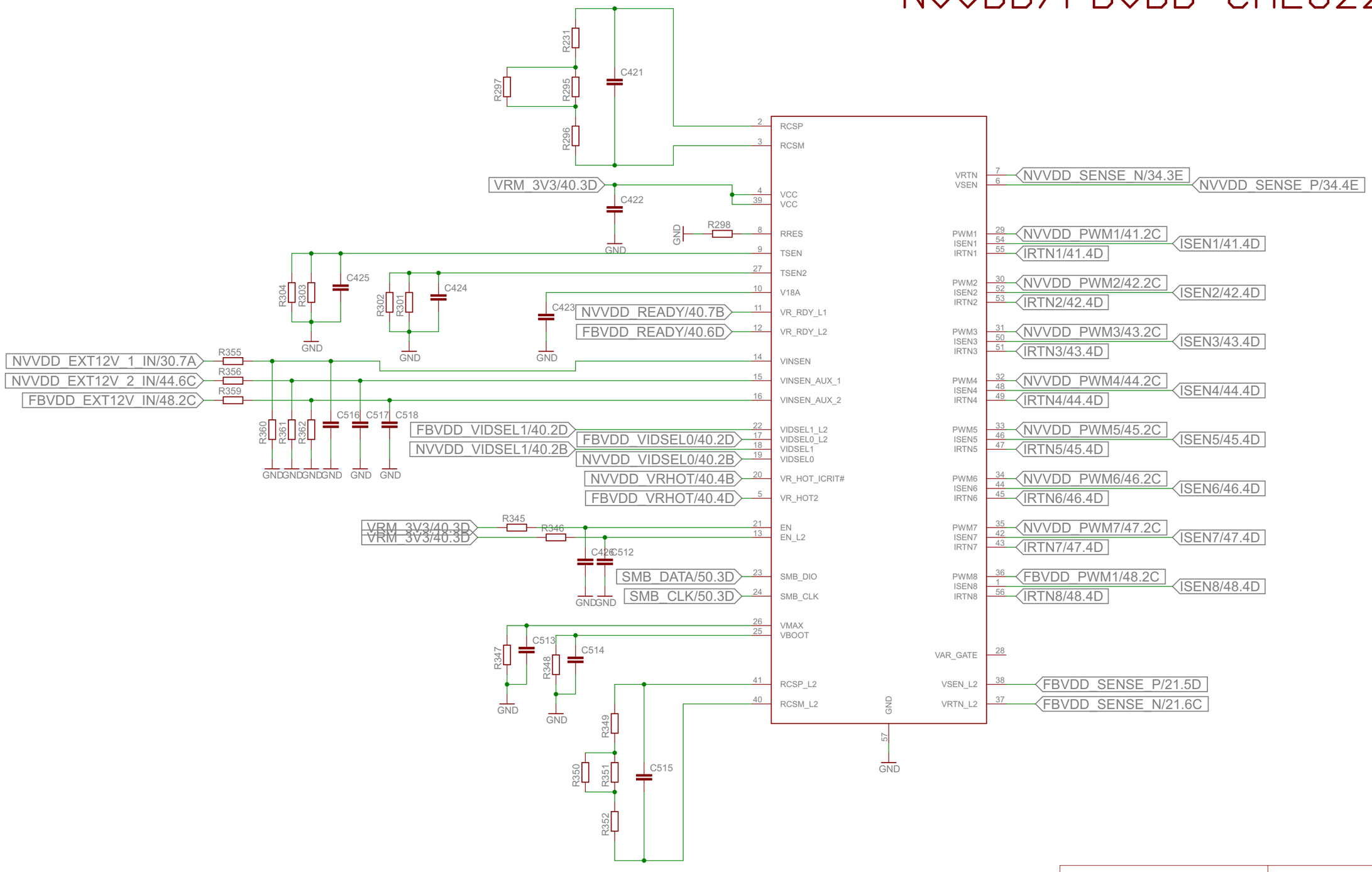
	3.3.2014 13:01:41
	Sheet: 38/50

NVVDD/FBVDD CHL8228



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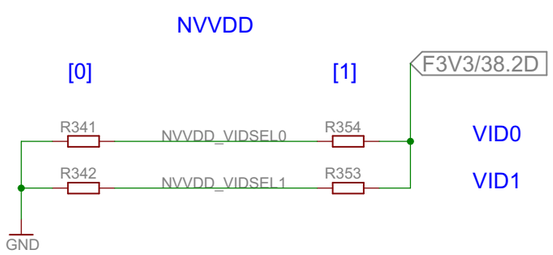
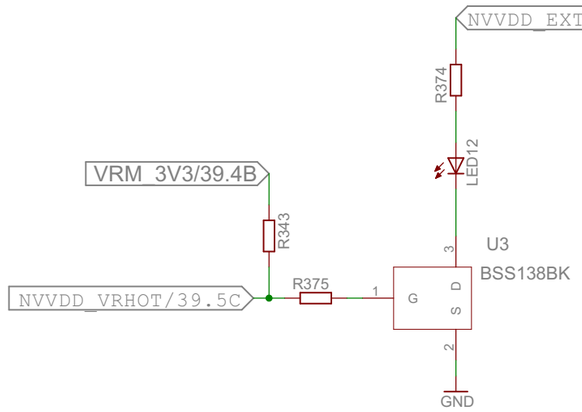
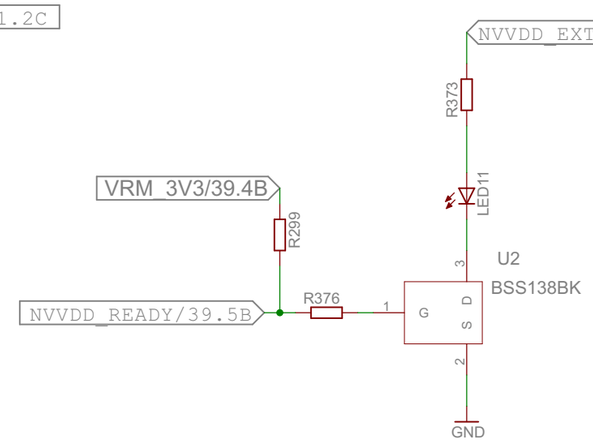
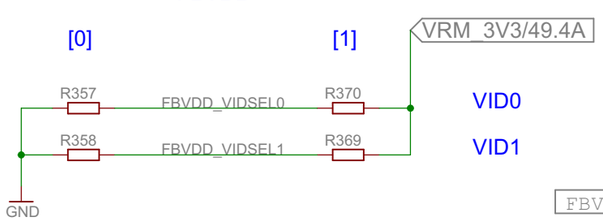
	Sheet: 39/50

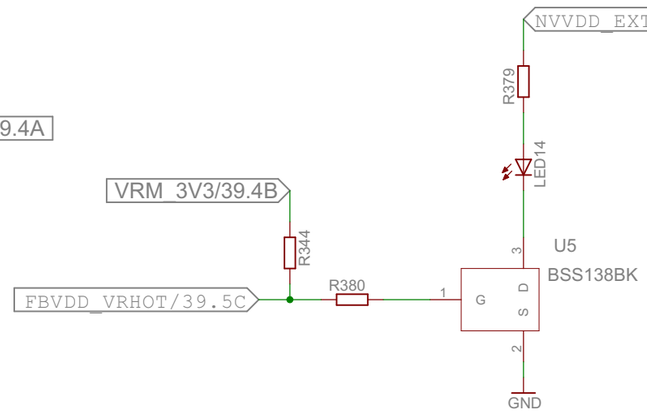
NVVDD/FBVDD CONFIG

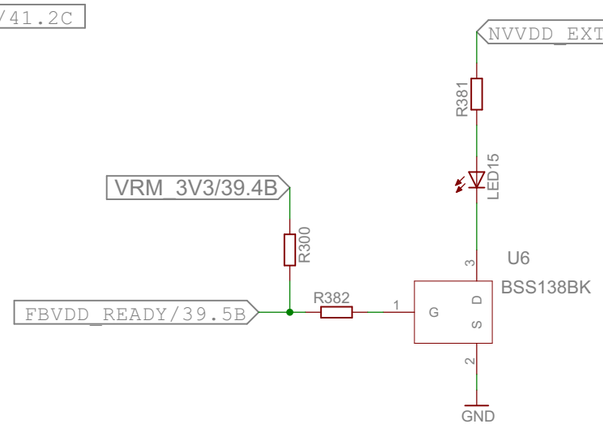












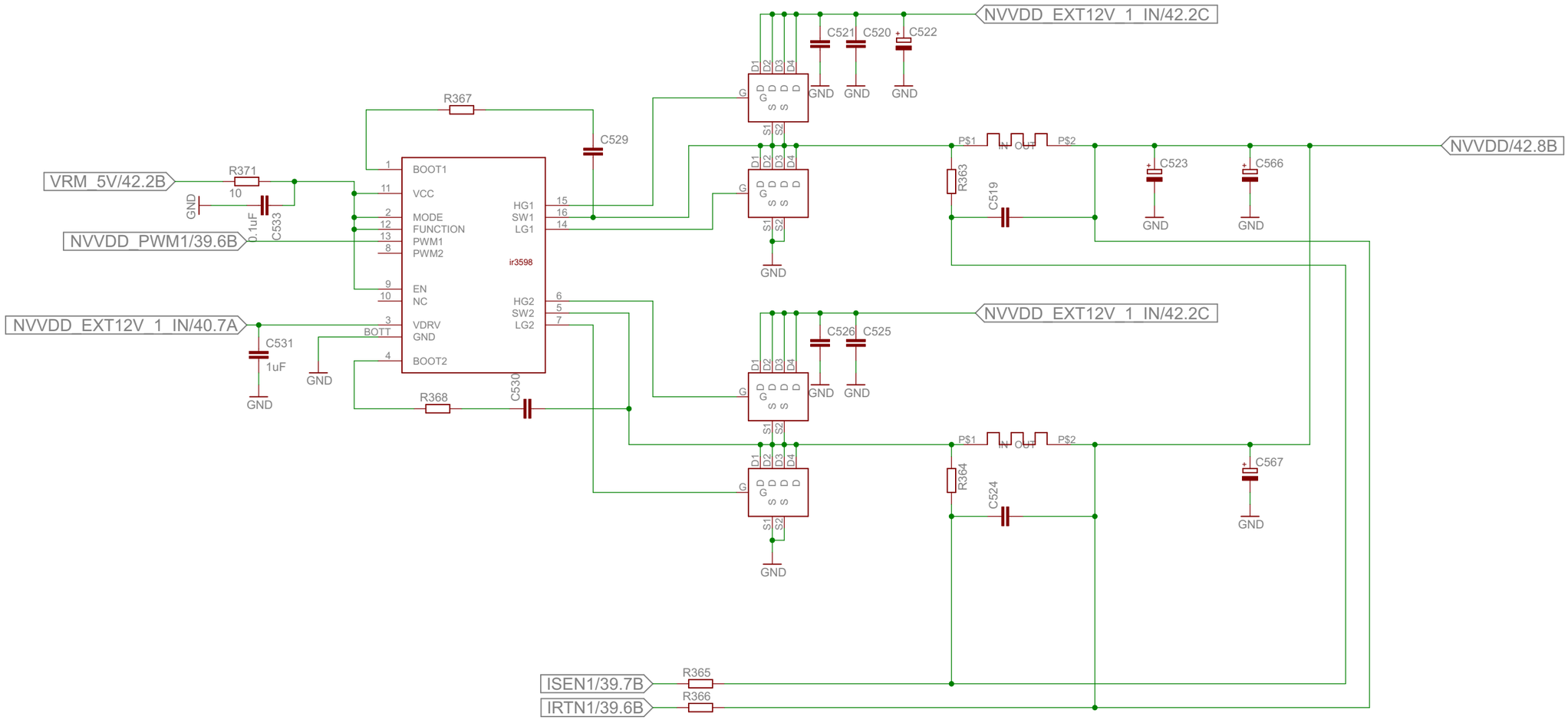
DUDA

88GTEE

3.3.2014 13:01:41

Sheet: 40/50

NVVDD_PHASE_1-2



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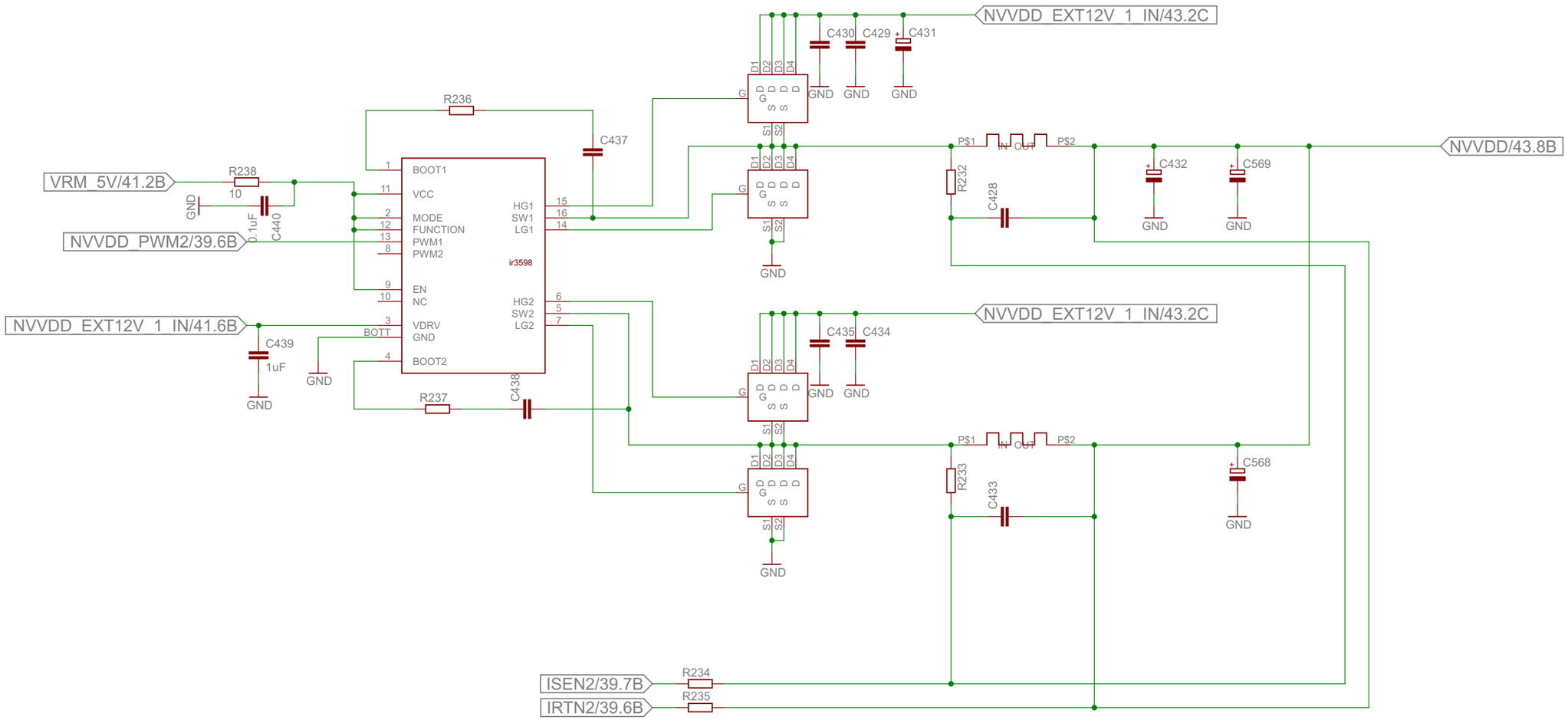
	3.3.2014 13:01:41
	Sheet: 41/50

NVVDD_PHASE_3-4



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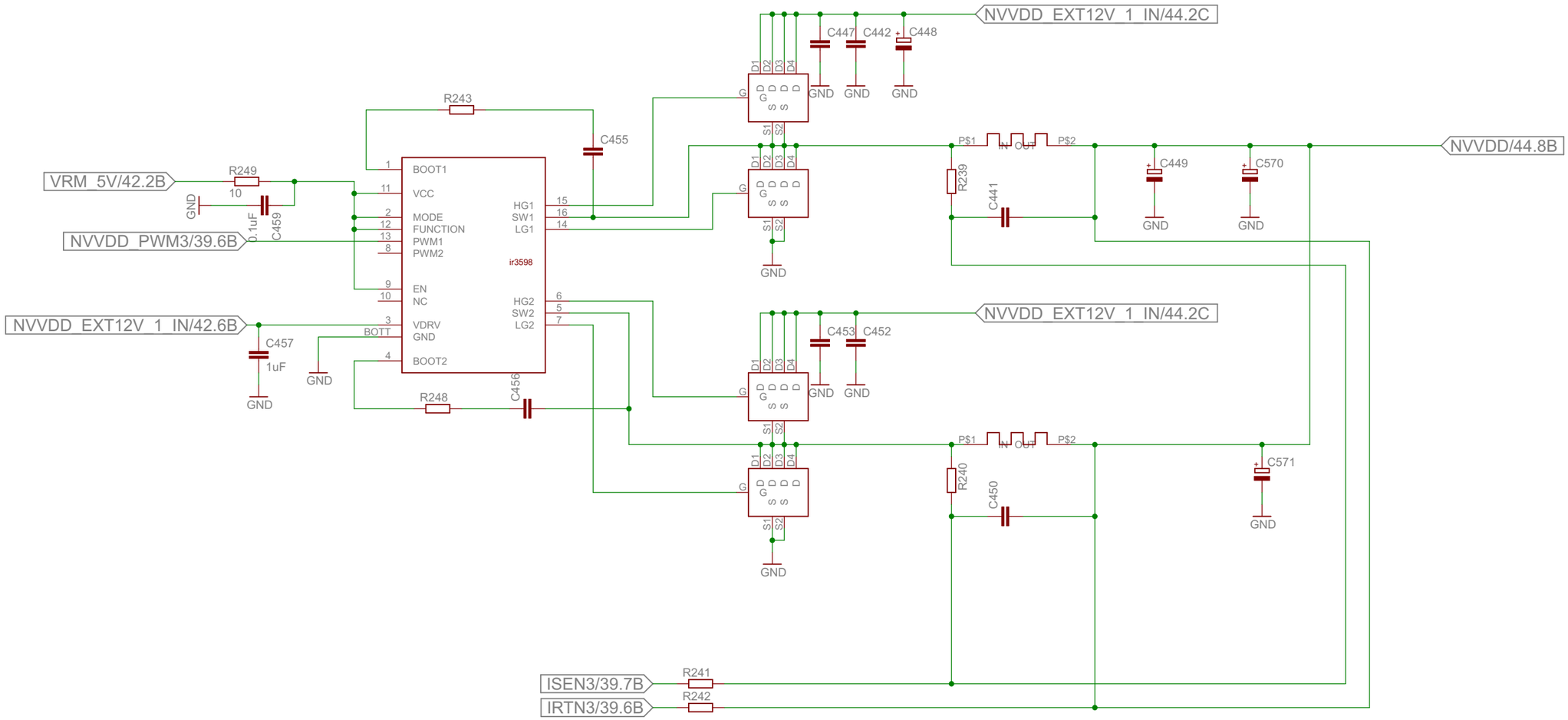
	Sheet: 42/50

NVVDD_PHASE_5-6



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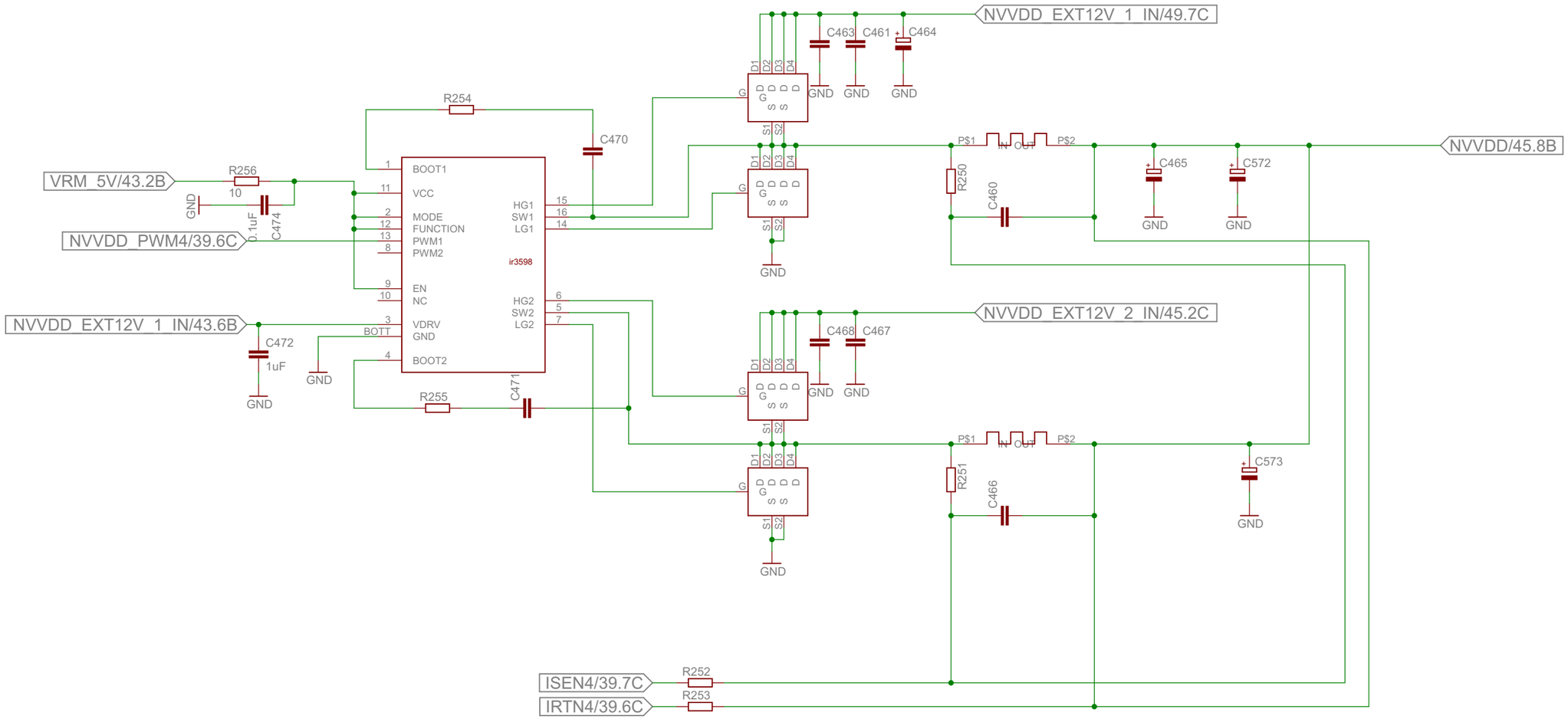
	Sheet: 43/50

NVVDD_PHASE_7-8



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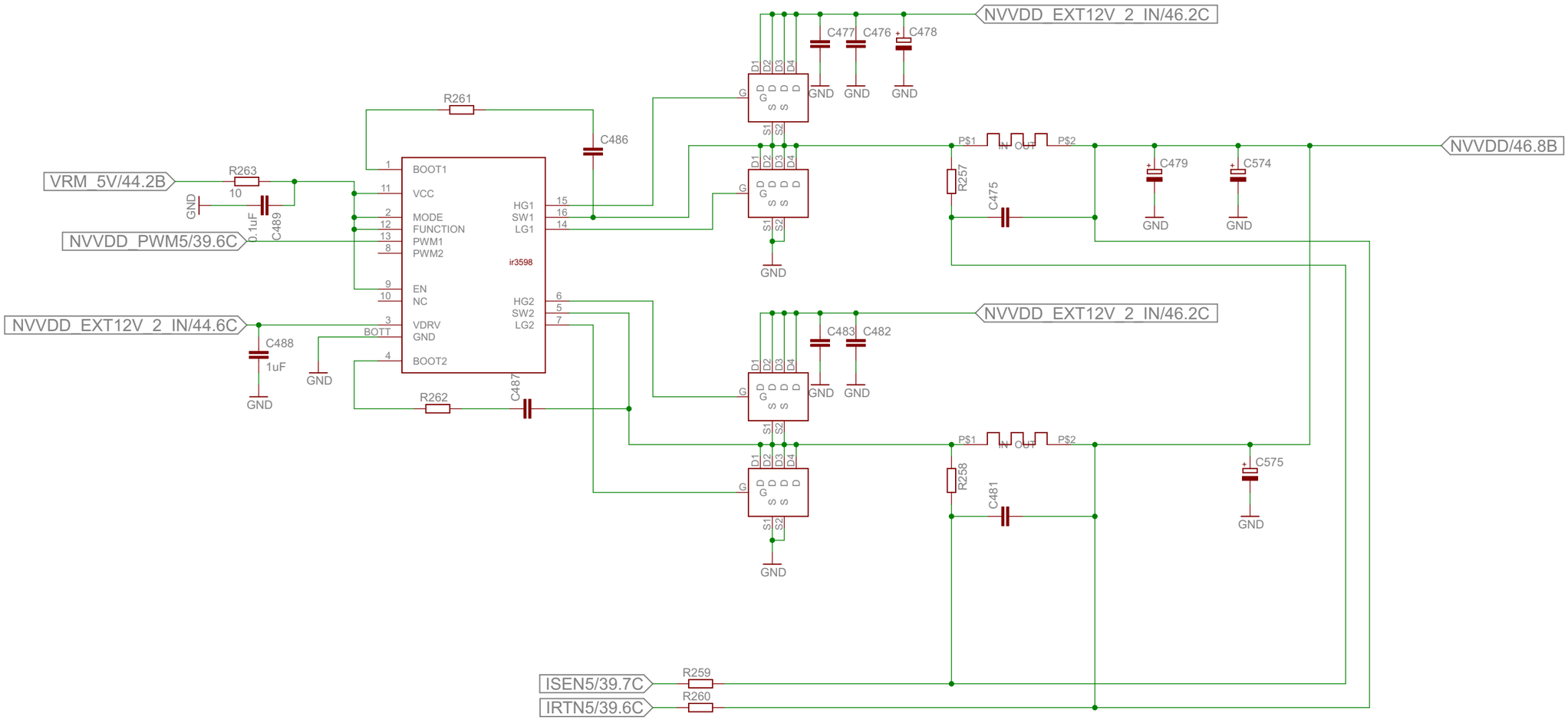
	Sheet: 44/50

NVVDD_PHASE_9-10



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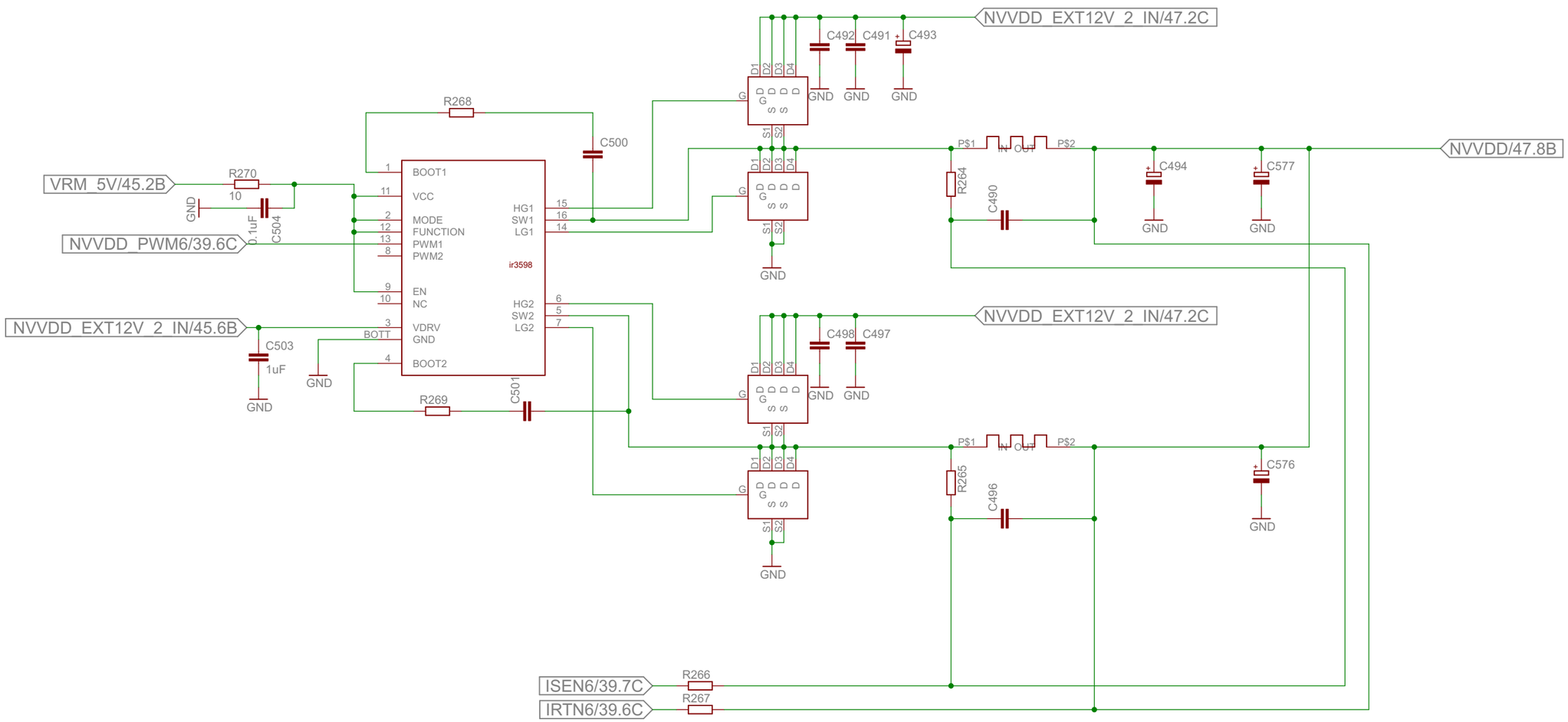
	Sheet: 45/50

NVVDD_PHASE_11-12



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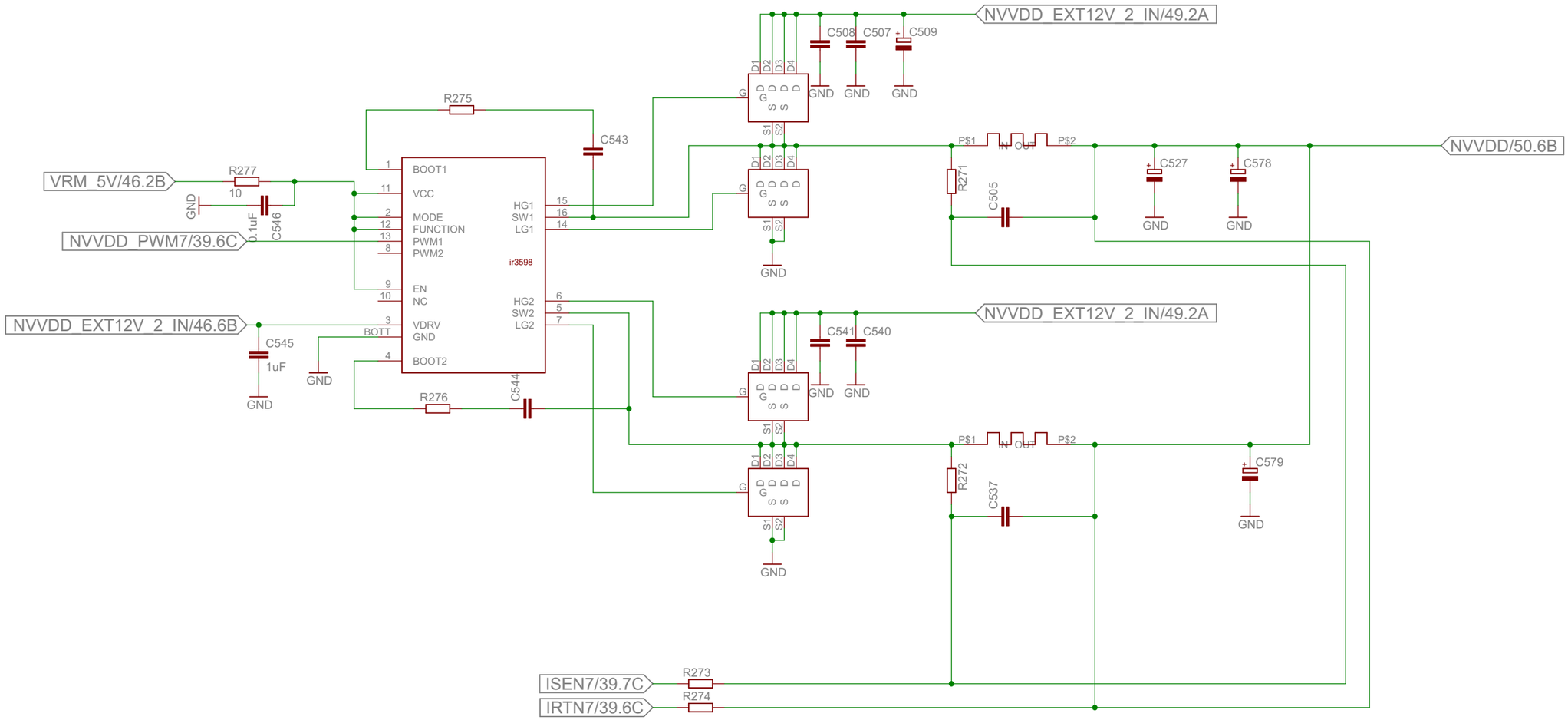
	Sheet: 46/50

NVVDD_PHASE_13-14



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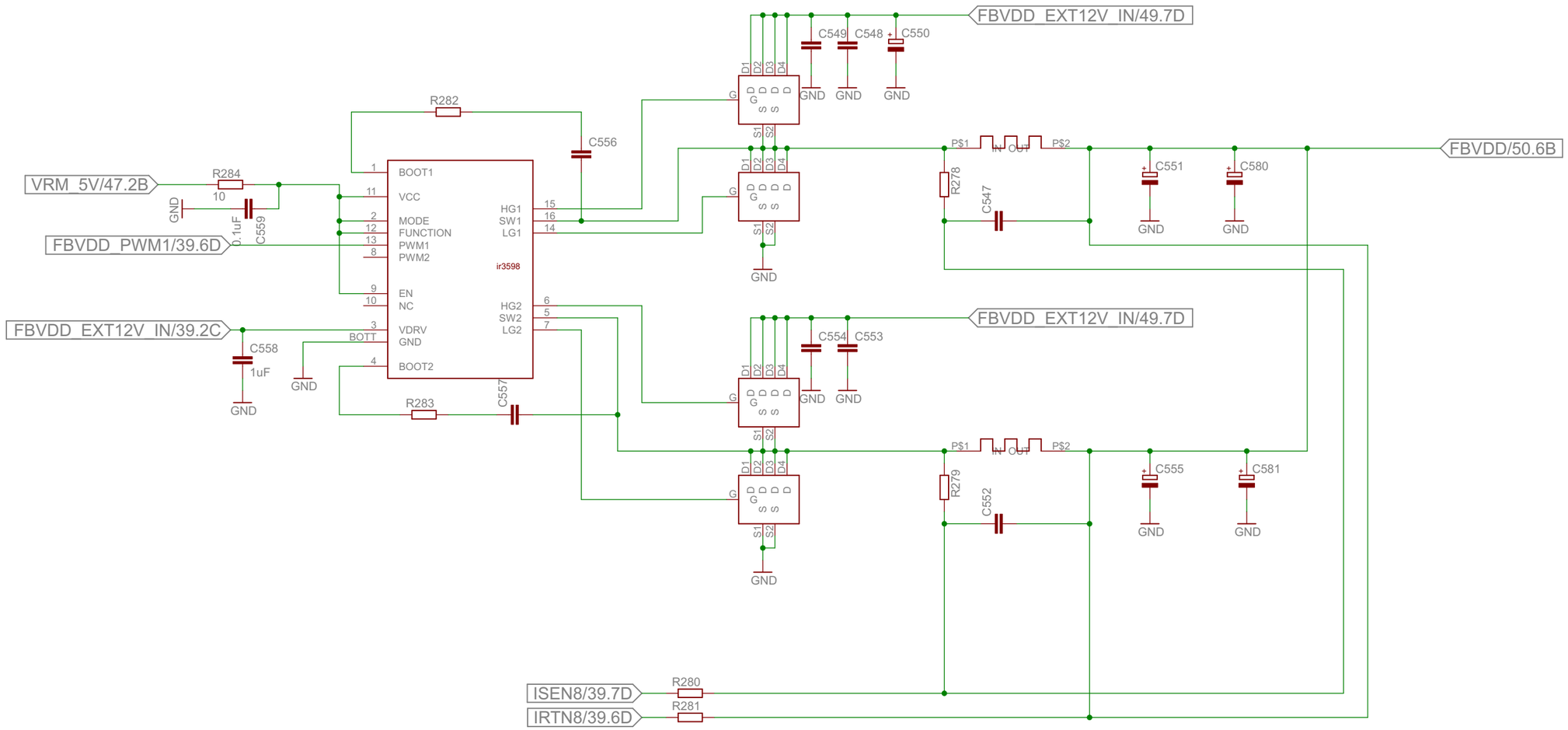
	Sheet: 47/50

FBVDD_PHASE_1-2



DUDA	88GTEE
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	Sheet: 48/50

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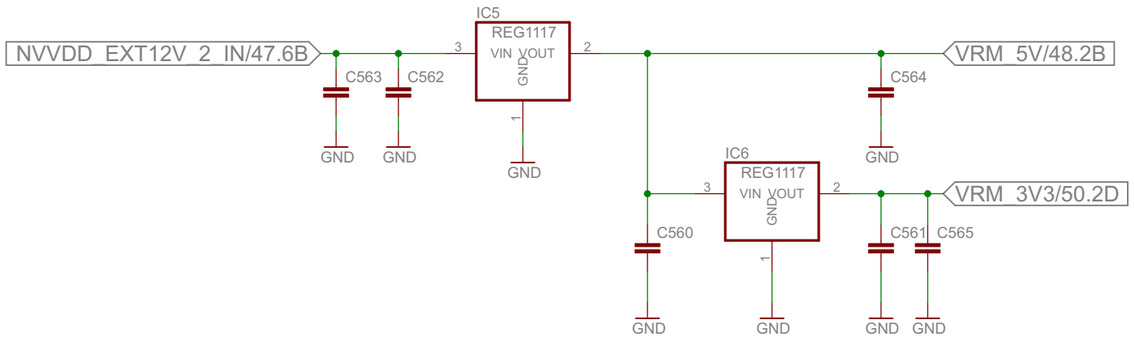

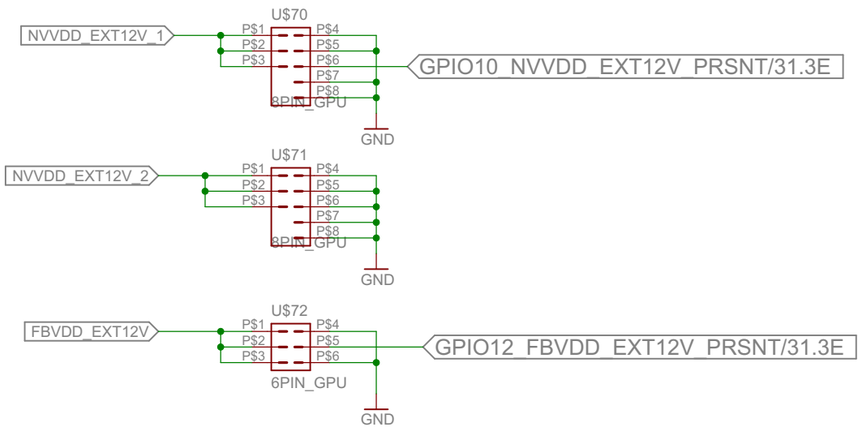

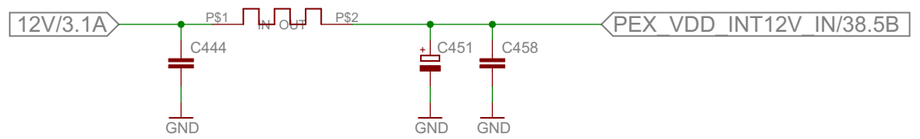

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Sheet: 49/50

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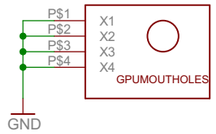

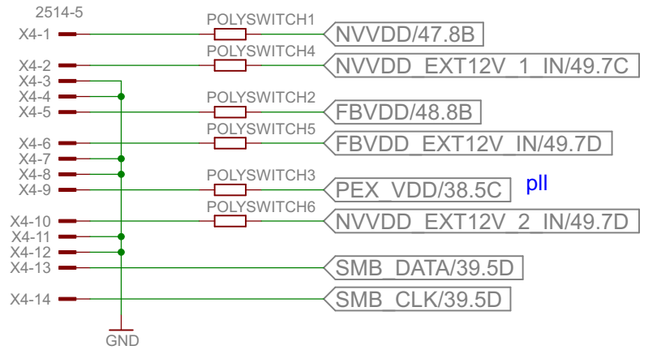

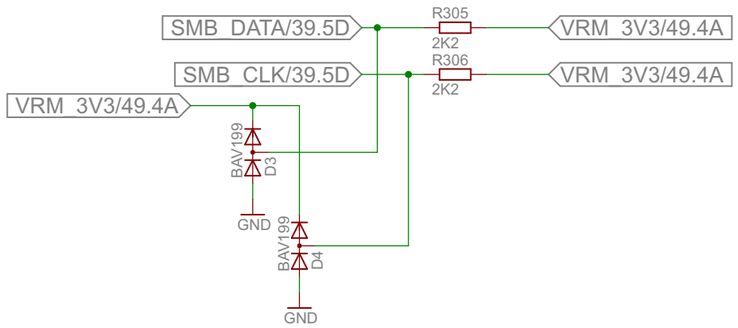

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	3.3.2014 13:01:41
	Sheet: 50/50