

MS-7712

Version : 0C

CPU :

INTEL Sandy Bridge-E Processor

System Chipset :

INTEL Patsburg Chipset

On Board Chipset :

VRM 12 -- ISL6366 6 Phase

Gigabit LAN -- RTL8111E

USB 3.0 -- UPD720202

HDA Codec -- Realtek ALC892

Super I/O -- F71889AD

SPI Flash 64Mb

Main Memory :

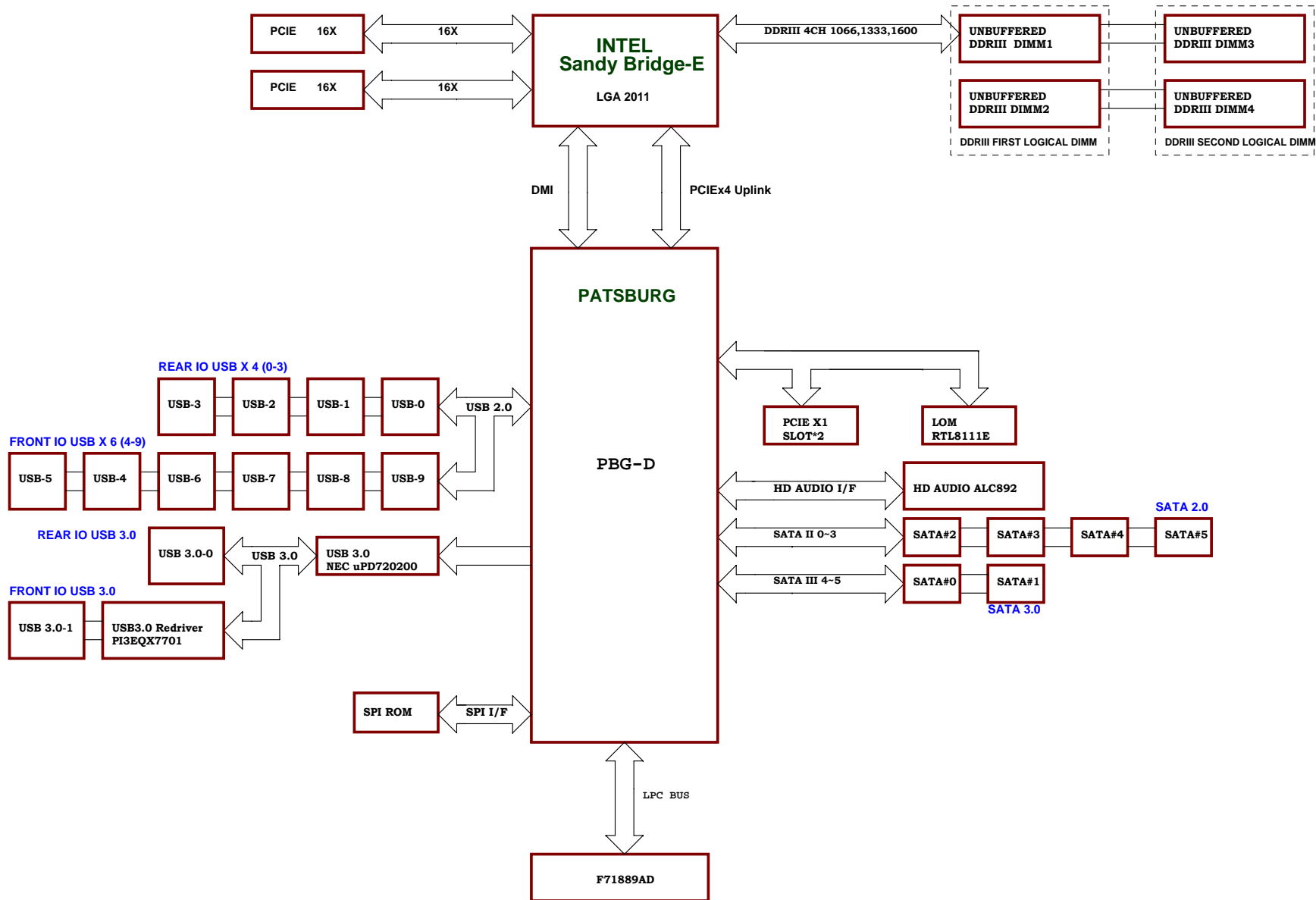
4 Channel DDR III * 4 (Max 16GB)

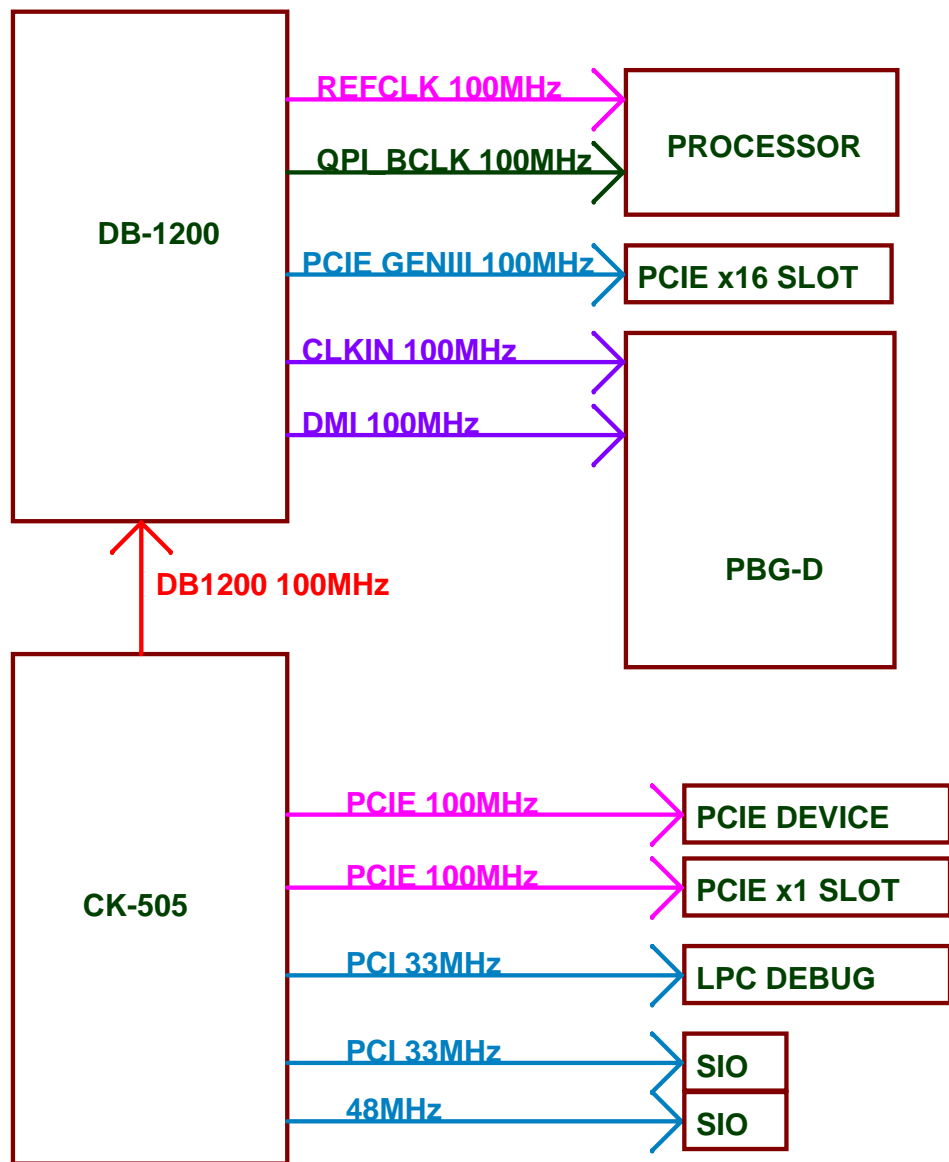
Expansion Slot :

PCI Express x16 Slot * 2

PCI Express x1 Slot * 2

1	Cover Sheet
2	System Block Diagram
3	Clock Distribution
4	SNB-E MEMORY 1 & 2
5	SNB-E MEMORY 3 & 4
6	SNB-E MEMORY CONTROLLER
7	SNB-E MISC/RESERVED
8	SNB-E PCIE/DMI
9	SNB-E POWER
10	SNB-E GND
11	DDR III DIMM 1 / DIMM 2
12	DDR III DIMM 3 / DIMM 4
13	DDR III DQ VREF
14	PBG-PCIE/USB/DMI/SAS
15	PBG-PCI/SATA
16	PBG-SMB/LPC/AUDIO/RTC
17	PBG-NVRAM
18	PBG-POWER
19	PBG-GND
20	Clock Gen 932SQ420D
21	Clock Buffer DB1200
22	PCIE X16 slot
23	PCIE x1 Slots
24	SIO-Fintek F71889AD
25	Gigabit LAN - RTL8111E
26	USB 3.0 NEC UPD720202
27	N/A
28	SATA Port
29	Audio Codec ALC892
30	FAN Port
31	Front / Rear USB Connectors
32	PBG Core Power
33	DDR Power
34	CPU_VTT
35	VRD12 - ISL6366
36	VSA POWER
37	VCCP POWER
38	CPU Decoupling Caps
39	ATX F_Panel/EMI/LED
40	CPU XDP





11 MEM_MA_DATA[63..0] ← MEM_MA_DATA[63..0]

MEM_MA_DATA0	CC7	DDR0_DQ_00	CH8	MEM_MA_DQS_H0	MEM_MA_DQS_H0_11
MEM_MA_DATA1	CD8	DDR0_DQ_01	CG7	MEM_MA_DQS_L0	MEM_MA_DQS_L0_11
MEM_MA_DATA2	CK8	DDR0_DQ_02			
MEM_MA_DATA3	CL8	DDR0_DQ_03	CF4	MEM_MA_DQS_H1	MEM_MA_DQS_H1_11
MEM_MA_DATA4	BY6	DDR0_DQ_04	CE3	MEM_MA_DQS_L1	MEM_MA_DQS_L1_11
MEM_MA_DATA5	CA7	DDR0_DQ_05			
MEM_MA_DATA6	CL7	DDR0_DQ_06	CK14	MEM_MA_DQS_H2	MEM_MA_DQS_H2_11
MEM_MA_DATA7	CB4	DDR0_DQ_07	CH14	MEM_MA_DQS_L2	MEM_MA_DQS_L2_11
MEM_MA_DATA8	CB4	DDR0_DQ_08			
MEM_MA_DATA9	CH4	DDR0_DQ_09	CE11	MEM_MA_DQS_H3	MEM_MA_DQS_H3_11
MEM_MA_DATA10	CH4	DDR0_DQ_10	CD10	MEM_MA_DQS_L3	MEM_MA_DQS_L3_11
MEM_MA_DATA11	CA1	DDR0_DQ_11			
MEM_MA_DATA12	CA3	DDR0_DQ_12	CC33	MEM_MA_DQS_H4	MEM_MA_DQS_H4_11
MEM_MA_DATA13	CG5	DDR0_DQ_13	CE33	MEM_MA_DQS_L4	MEM_MA_DQS_L4_11
MEM_MA_DATA14	CG5	DDR0_DQ_14			
MEM_MA_DATA15	CK12	DDR0_DQ_15	CJ33	MEM_MA_DQS_H5	MEM_MA_DQS_H5_11
MEM_MA_DATA16	CM12	DDR0_DQ_16	CL33	MEM_MA_DQS_L5	MEM_MA_DQS_L5_11
MEM_MA_DATA17	CK16	DDR0_DQ_17			
MEM_MA_DATA18	CM16	DDR0_DQ_18	CD40	MEM_MA_DQS_H6	MEM_MA_DQS_H6_11
MEM_MA_DATA19	CG13	DDR0_DQ_19	CB40	MEM_MA_DQS_L6	MEM_MA_DQS_L6_11
MEM_MA_DATA20	CL11	DDR0_DQ_20			
MEM_MA_DATA21	CL15	DDR0_DQ_21	CK40	MEM_MA_DQS_H7	MEM_MA_DQS_H7_11
MEM_MA_DATA22	BY10	DDR0_DQ_22	CH40	MEM_MA_DQS_L7	MEM_MA_DQS_L7_11
MEM_MA_DATA23	BY10	DDR0_DQ_23			
MEM_MA_DATA24	CB12	DDR0_DQ_24	CC12		
MEM_MA_DATA25	CB12	DDR0_DQ_25	CE12		
MEM_MA_DATA26	CB12	DDR0_DQ_26	CE12		
MEM_MA_DATA27	CB12	DDR0_DQ_27	CE12		
MEM_MA_DATA28	CB12	DDR0_DQ_28	CE12		
MEM_MA_DATA29	CB12	DDR0_DQ_29	CE12		
MEM_MA_DATA30	CB12	DDR0_DQ_30	CE12		
MEM_MA_DATA31	CB12	DDR0_DQ_31	CE12		
MEM_MA_DATA32	CB12	DDR0_DQ_32	CE12		
MEM_MA_DATA33	CB12	DDR0_DQ_33	CE12		
MEM_MA_DATA34	CB12	DDR0_DQ_34	CE12		
MEM_MA_DATA35	CB12	DDR0_DQ_35	CE12		
MEM_MA_DATA36	CB12	DDR0_DQ_36	CE12		
MEM_MA_DATA37	CB12	DDR0_DQ_37	CE12		
MEM_MA_DATA38	CB12	DDR0_DQ_38	CE12		
MEM_MA_DATA39	CB12	DDR0_DQ_39	CE12		
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MEM_MA_DATA41	CB12	DDR0_DQ_41	CE12		
MEM_MA_DATA42	CB12	DDR0_DQ_42	CE12		
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MEM_MA_DATA46	CB12	DDR0_DQ_46	CE12		
MEM_MA_DATA47	CB12	DDR0_DQ_47	CE12		
MEM_MA_DATA48	CB12	DDR0_DQ_48	CE12		
MEM_MA_DATA49	CB12	DDR0_DQ_49	CE12		
MEM_MA_DATA50	CB12	DDR0_DQ_50	CE12		
MEM_MA_DATA51	CB12	DDR0_DQ_51	CE12		
MEM_MA_DATA52	CB12	DDR0_DQ_52	CE12		
MEM_MA_DATA53	CB12	DDR0_DQ_53	CE12		
MEM_MA_DATA54	CB12	DDR0_DQ_54	CE12		
MEM_MA_DATA55	CB12	DDR0_DQ_55	CE12		
MEM_MA_DATA56	CB12	DDR0_DQ_56	CE12		
MEM_MA_DATA57	CB12	DDR0_DQ_57	CE12		
MEM_MA_DATA58	CB12	DDR0_DQ_58	CE12		
MEM_MA_DATA59	CB12	DDR0_DQ_59	CE12		
MEM_MA_DATA60	CB12	DDR0_DQ_60	CE12		
MEM_MA_DATA61	CB12	DDR0_DQ_61	CE12		
MEM_MA_DATA62	CB12	DDR0_DQ_62	CE12		
MEM_MA_DATA63	CB12	DDR0_DQ_63	CE12		

CE15
CE15
CH18
CE18
CB14
CD14
CG17
CK18

DDR0_ECC_0
DDR0_ECC_1
DDR0_ECC_2
DDR0_ECC_3
DDR0_ECC_4
DDR0_ECC_5
DDR0_ECC_6
DDR0_ECC_7

SNB-E

11 MEM_MB_DATA[63..0] ← MEM_MB_DATA[63..0]

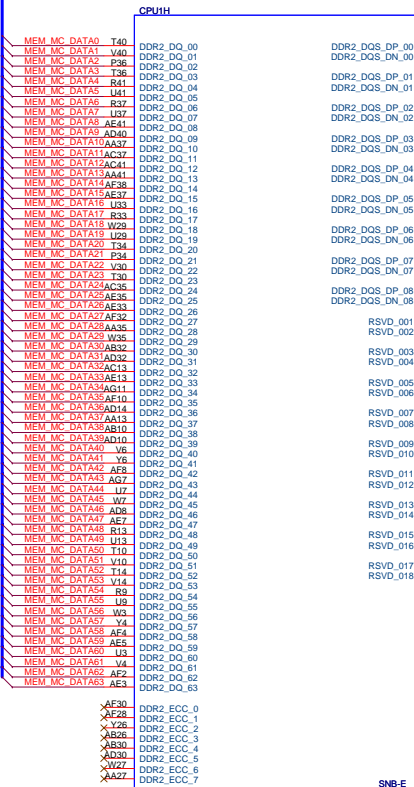
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MEM_MB_DATA1	CP2	DDR1_DQ_01	CT4	MEM_MB_DQS_L0	MEM_MB_DQS_L0_11
MEM_MB_DATA2	CV4	DDR1_DQ_02			
MEM_MB_DATA3	CV4	DDR1_DQ_03	DE9	MEM_MB_DQS_H1	MEM_MB_DQS_H1_11
MEM_MB_DATA4	CM4	DDR1_DQ_04	DC9	MEM_MB_DQS_L1	MEM_MB_DQS_L1_11
MEM_MB_DATA5	CV2	DDR1_DQ_05			
MEM_MB_DATA6	CV2	DDR1_DQ_06	CU9	MEM_MB_DQS_H2	MEM_MB_DQS_H2_11
MEM_MB_DATA7	DA7	DDR1_DQ_07	CV8	MEM_MB_DQS_L2	MEM_MB_DQS_L2_11
MEM_MB_DATA8	DA7	DDR1_DQ_08			
MEM_MB_DATA9	DC7	DDR1_DQ_09	CU15	MEM_MB_DQS_H3	MEM_MB_DQS_H3_11
MEM_MB_DATA10	DE11	DDR1_DQ_10	CR15	MEM_MB_DQS_L3	MEM_MB_DQS_L3_11
MEM_MB_DATA11	DE11	DDR1_DQ_11			
MEM_MB_DATA12	CV6	DDR1_DQ_12	CP32	MEM_MB_DQS_H4	MEM_MB_DQS_H4_11
MEM_MB_DATA13	DB6	DDR1_DQ_13	CT32	MEM_MB_DQS_L4	MEM_MB_DQS_L4_11
MEM_MB_DATA14	DB10	DDR1_DQ_14			
MEM_MB_DATA15	DB10	DDR1_DQ_15	DB34	MEM_MB_DQS_H5	MEM_MB_DQS_H5_11
MEM_MB_DATA16	CU7	DDR1_DQ_16	CT34	MEM_MB_DQS_L5	MEM_MB_DQS_L5_11
MEM_MB_DATA17	CU7	DDR1_DQ_17			
MEM_MB_DATA18	CU7	DDR1_DQ_18	CU38	MEM_MB_DQS_H6	MEM_MB_DQS_H6_11
MEM_MB_DATA19	CP10	DDR1_DQ_19	CB38	MEM_MB_DQS_L6	MEM_MB_DQS_L6_11
MEM_MB_DATA20	CP6	DDR1_DQ_20	DC38	MEM_MB_DQS_H7	MEM_MB_DQS_H7_11
MEM_MB_DATA21	CP6	DDR1_DQ_21	DE38	MEM_MB_DQS_L7	MEM_MB_DQS_L7_11
MEM_MB_DATA22	CP6	DDR1_DQ_22			
MEM_MB_DATA23	CP6	DDR1_DQ_23	DC15		
MEM_MB_DATA24	CP6	DDR1_DQ_24	DE15		
MEM_MB_DATA25	CP6	DDR1_DQ_25			
MEM_MB_DATA26	CP6	DDR1_DQ_26	CT2		
MEM_MB_DATA27	CP6	DDR1_DQ_27	CR1		
MEM_MB_DATA28	CP6	DDR1_DQ_28			
MEM_MB_DATA29	CP6	DDR1_DQ_29	DD8		
MEM_MB_DATA30	CP6	DDR1_DQ_30	DB8		
MEM_MB_DATA31	CP6	DDR1_DQ_31			
MEM_MB_DATA32	CP6	DDR1_DQ_32	CP8		
MEM_MB_DATA33	CP6	DDR1_DQ_33	CT8		
MEM_MB_DATA34	CP6	DDR1_DQ_34	CT8		
MEM_MB_DATA35	CP6	DDR1_DQ_35	CT14		
MEM_MB_DATA36	CP6	DDR1_DQ_36	CP14		
MEM_MB_DATA37	CP6	DDR1_DQ_37			
MEM_MB_DATA38	CP6	DDR1_DQ_38	CU31		
MEM_MB_DATA39	CP6	DDR1_DQ_39	CR31		
MEM_MB_DATA40	CP6	DDR1_DQ_40			
MEM_MB_DATA41	CP6	DDR1_DQ_41	DC33		
MEM_MB_DATA42	CP6	DDR1_DQ_42	DE33		
MEM_MB_DATA43	CP6	DDR1_DQ_43			
MEM_MB_DATA44	CP6	DDR1_DQ_44	CP38		
MEM_MB_DATA45	CP6	DDR1_DQ_45	CT38		
MEM_MB_DATA46	CP6	DDR1_DQ_46			
MEM_MB_DATA47	CP6	DDR1_DQ_47	DB38		
MEM_MB_DATA48	CP6	DDR1_DQ_48	CT38		
MEM_MB_DATA49	CP6	DDR1_DQ_49			
MEM_MB_DATA50	CP6	DDR1_DQ_50	CU14		
MEM_MB_DATA51	CP6	DDR1_DQ_51	DB14		
MEM_MB_DATA52	CP6	DDR1_DQ_52			
MEM_MB_DATA53	CP6	DDR1_DQ_53			
MEM_MB_DATA54	CP6	DDR1_DQ_54			
MEM_MB_DATA55	CP6	DDR1_DQ_55			
MEM_MB_DATA56	CP6	DDR1_DQ_56			
MEM_MB_DATA57	CP6	DDR1_DQ_57			
MEM_MB_DATA58	CP6	DDR1_DQ_58			
MEM_MB_DATA59	CP6	DDR1_DQ_59			
MEM_MB_DATA60	CP6	DDR1_DQ_60			
MEM_MB_DATA61	CP6	DDR1_DQ_61			
MEM_MB_DATA62	CP6	DDR1_DQ_62			
MEM_MB_DATA63	CP6	DDR1_DQ_63			

DE13
DE14
DD16
DB16
DA13
DC13
DA15
DE16

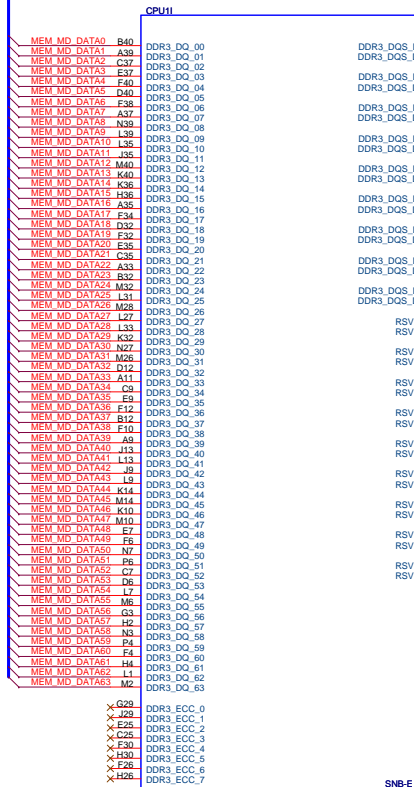
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DDR1_ECC_1
DDR1_ECC_2
DDR1_ECC_3
DDR1_ECC_4
DDR1_ECC_5
DDR1_ECC_6
DDR1_ECC_7

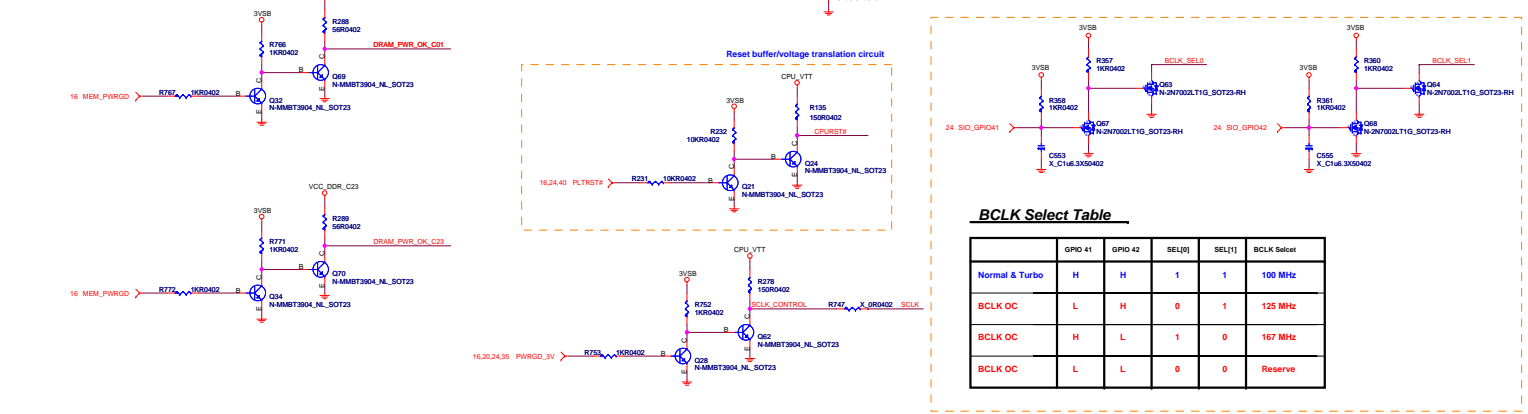
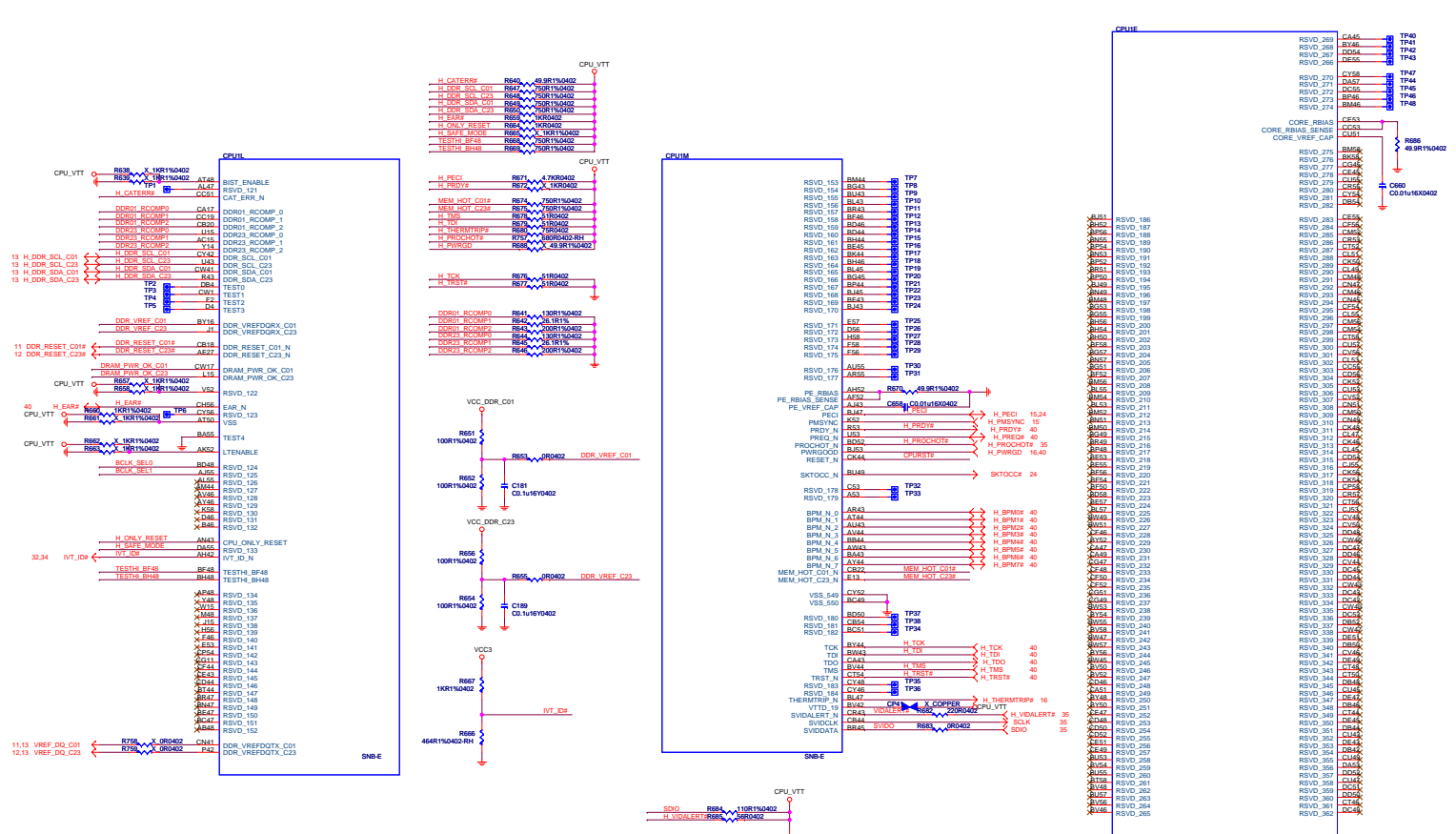
SNB-E

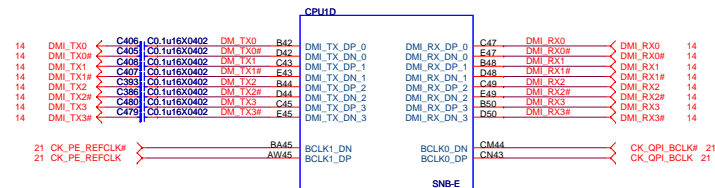
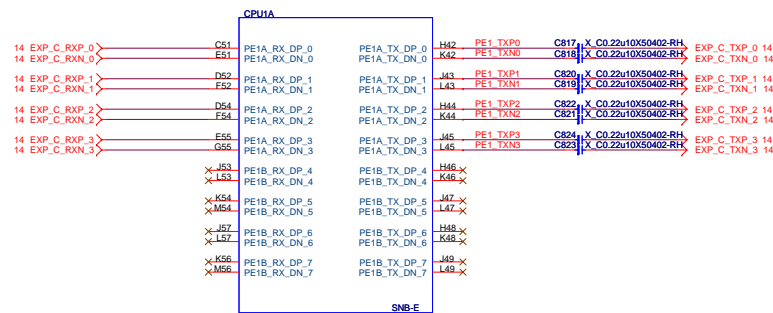
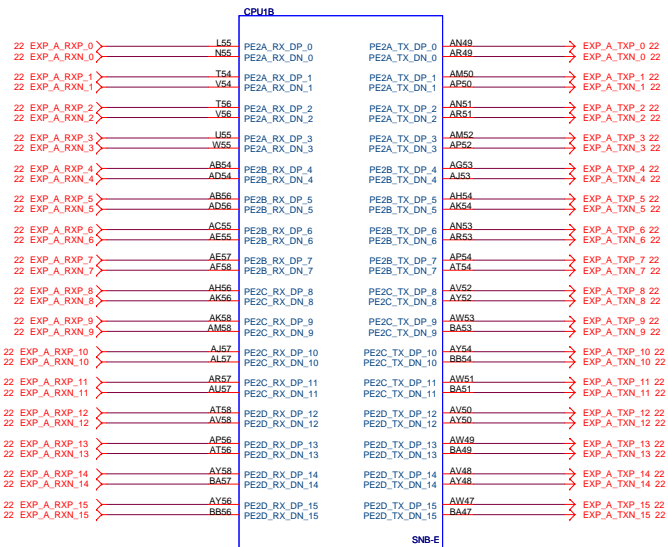
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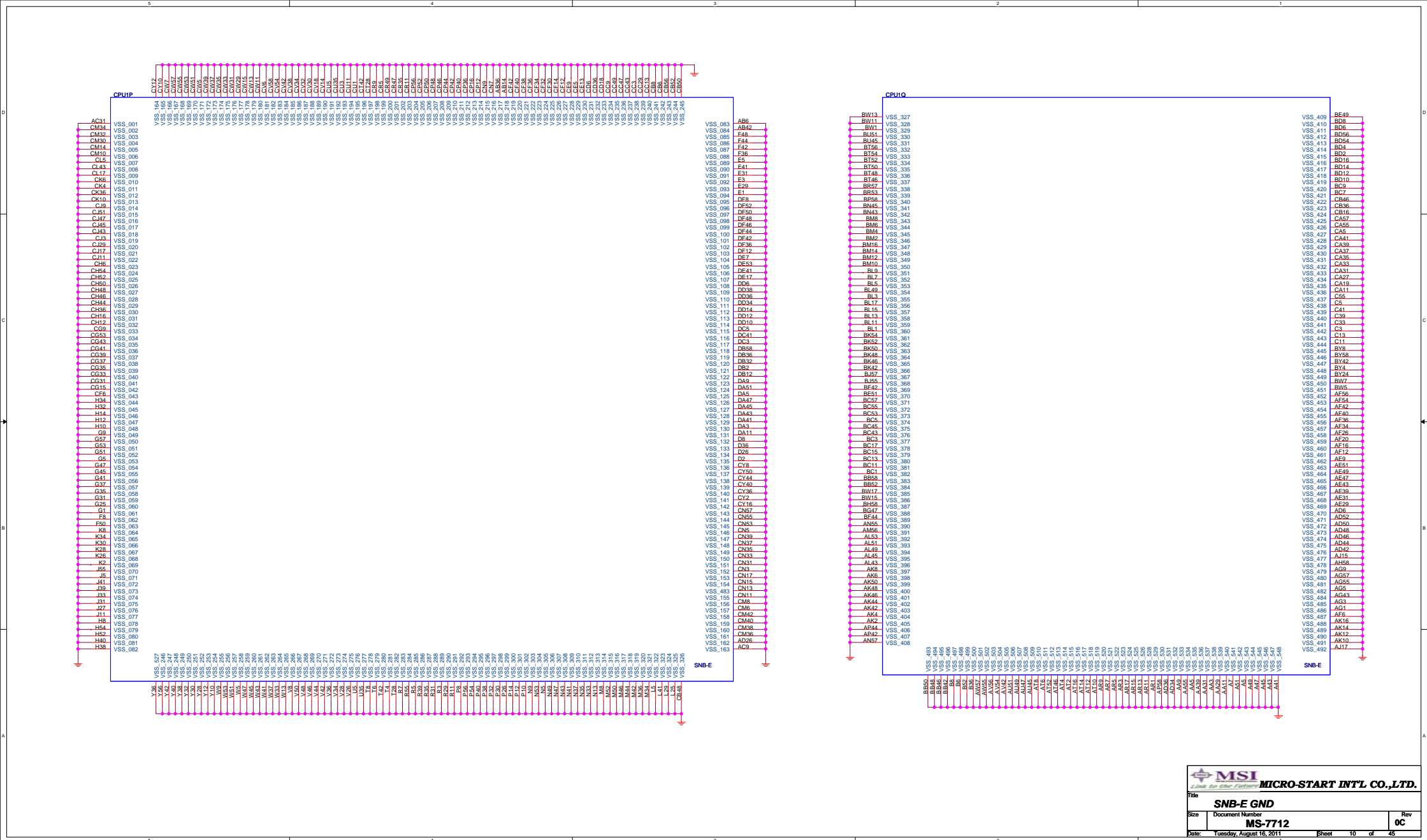


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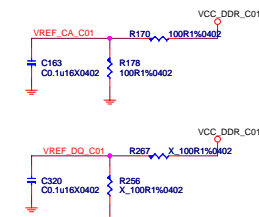
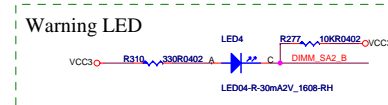




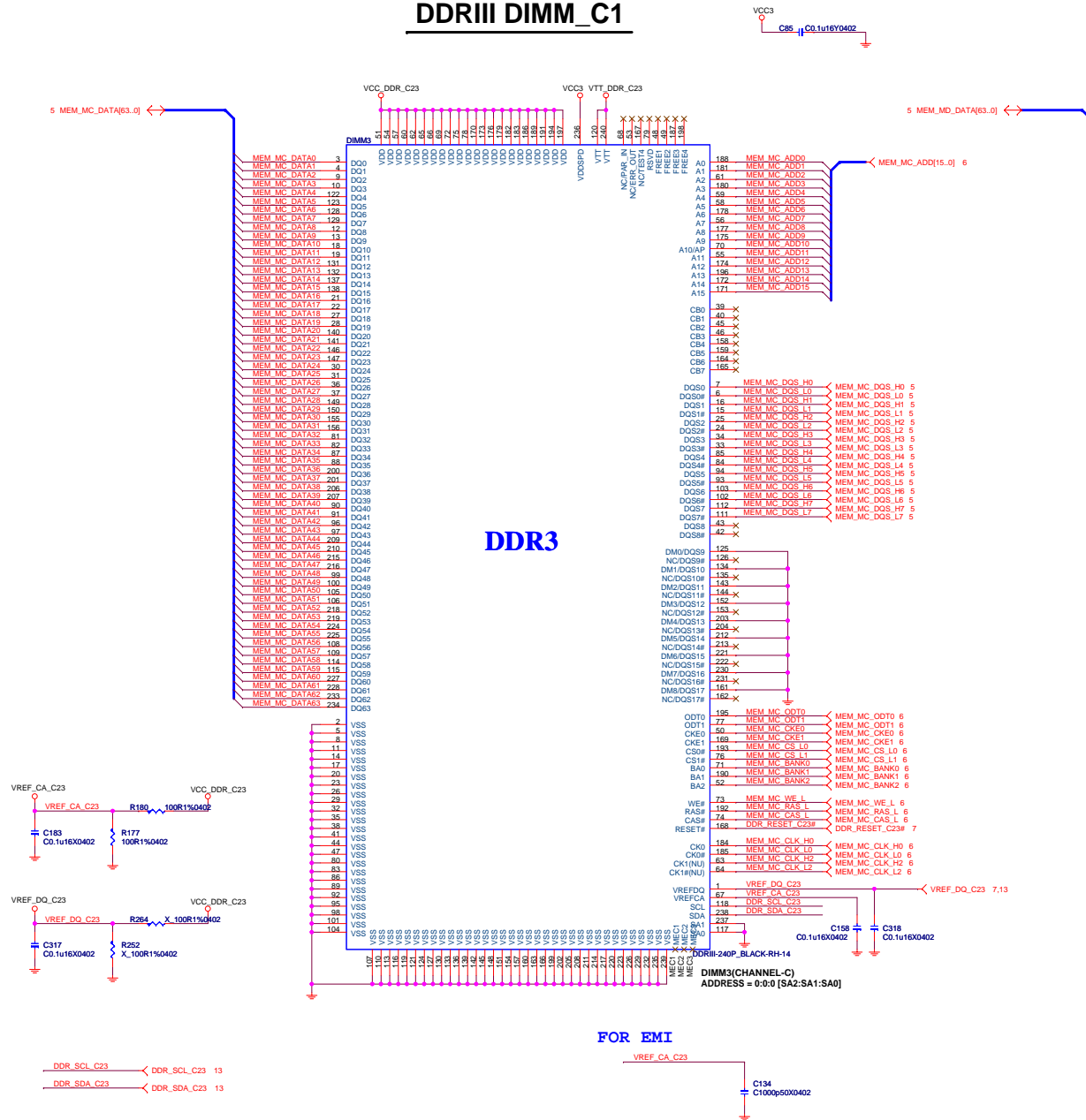


VCC3

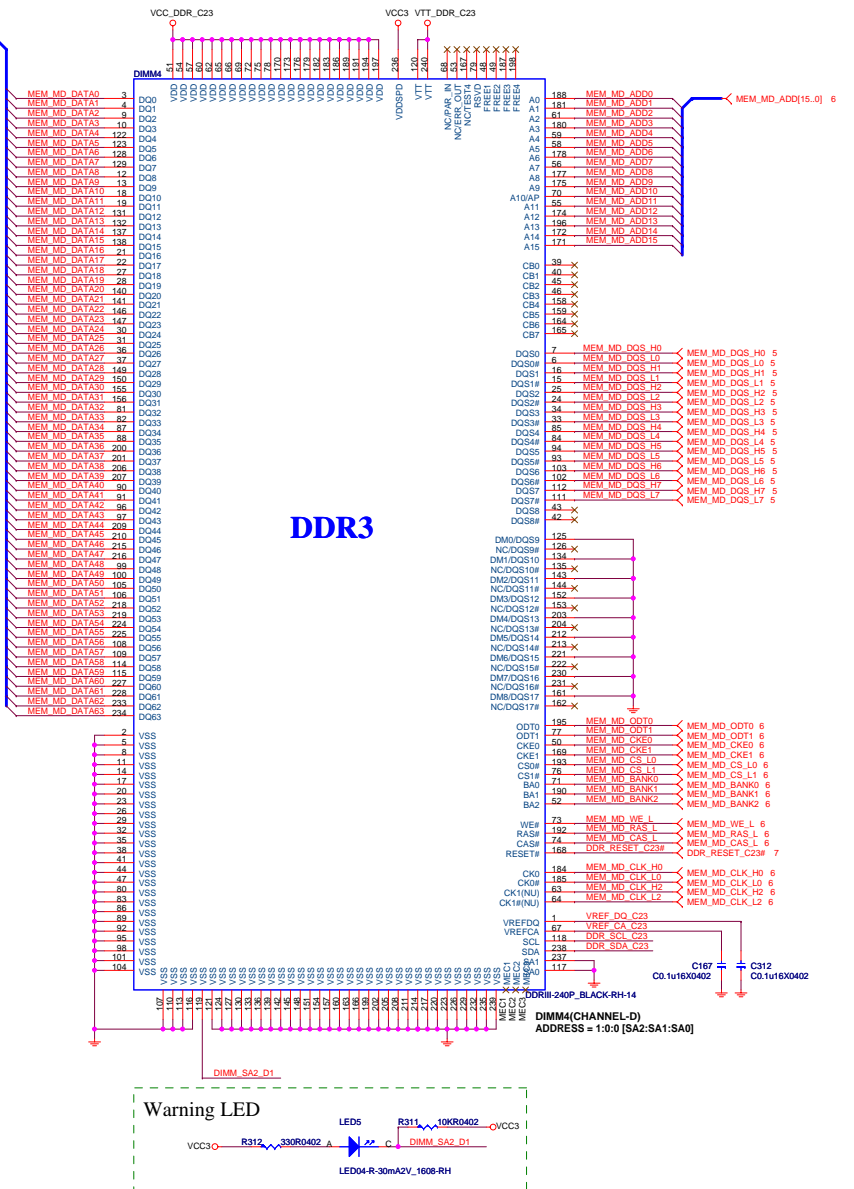
C75 C0.1u16Y0402

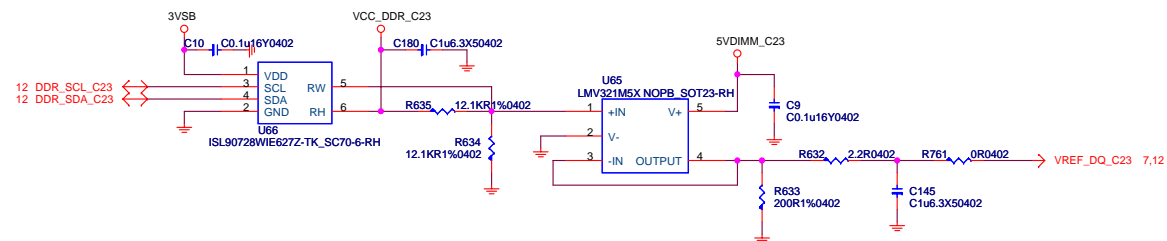
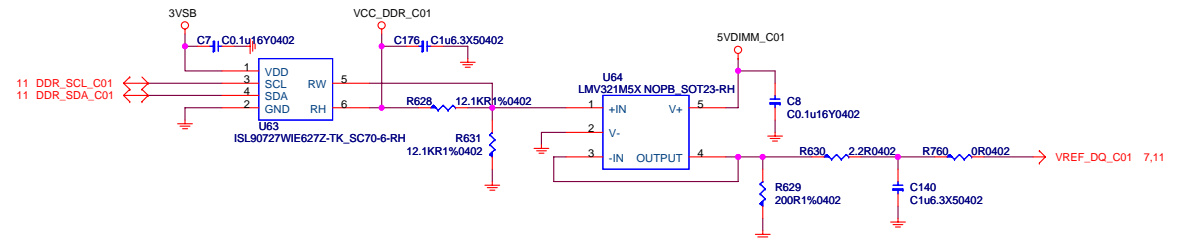
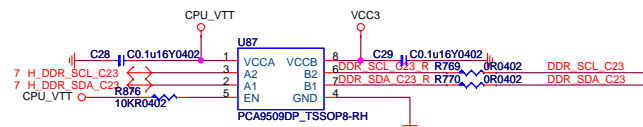
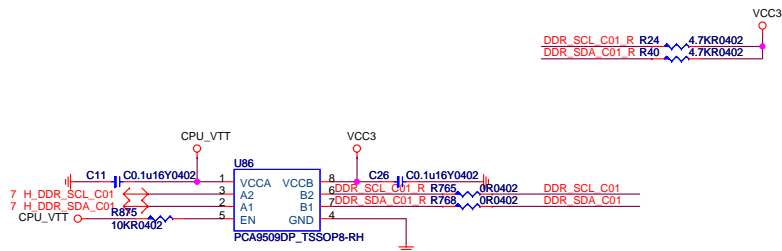


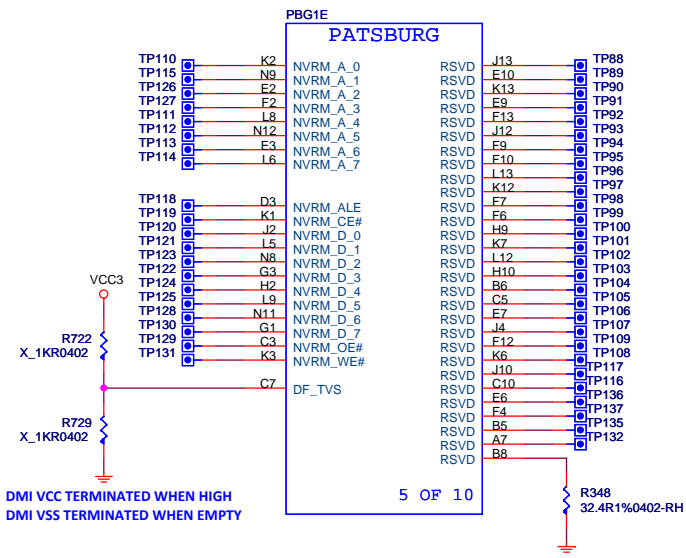
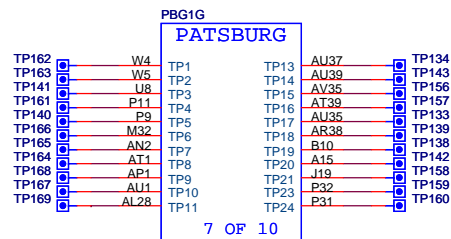
DDRIII DIMM_C1

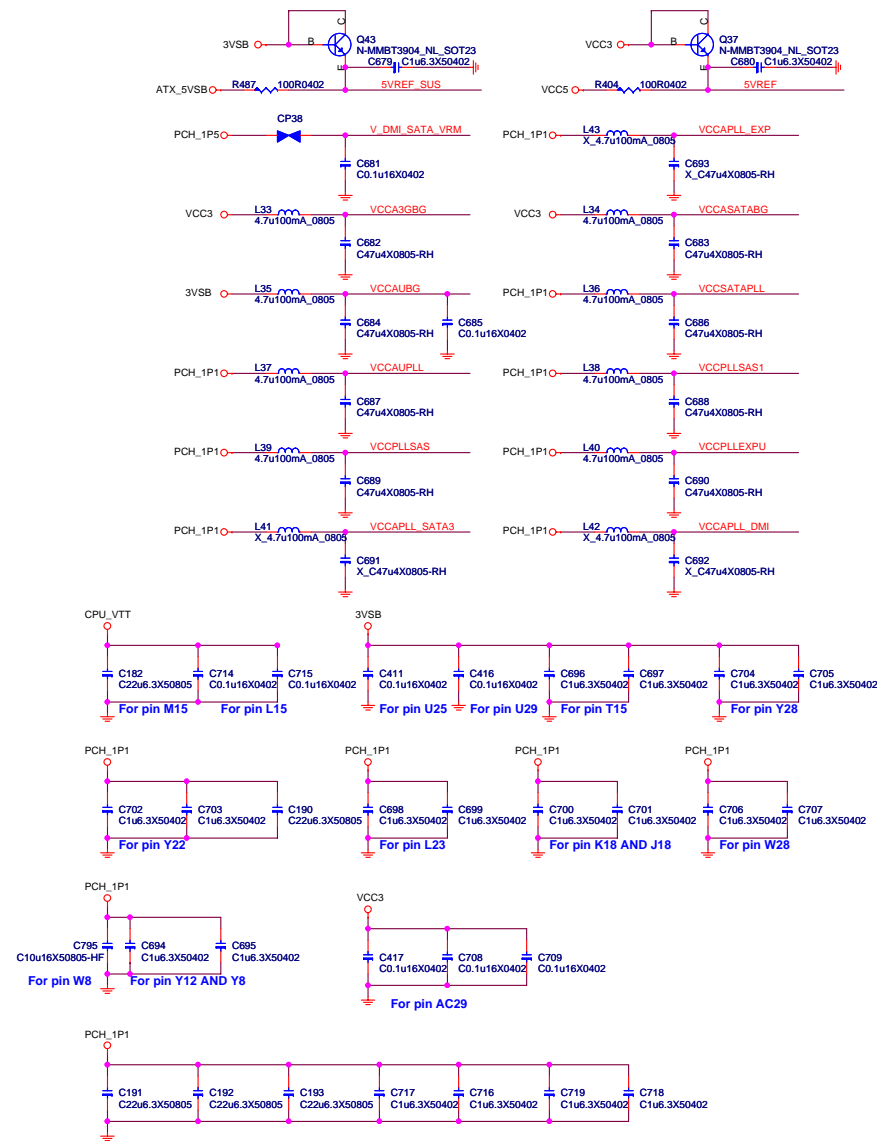


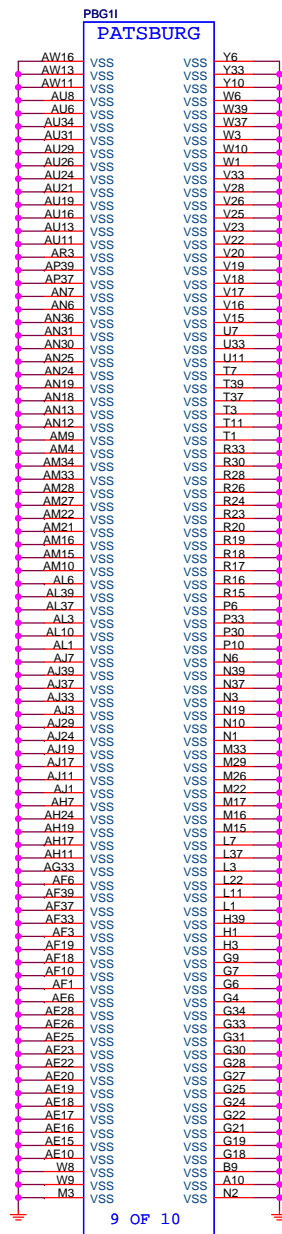
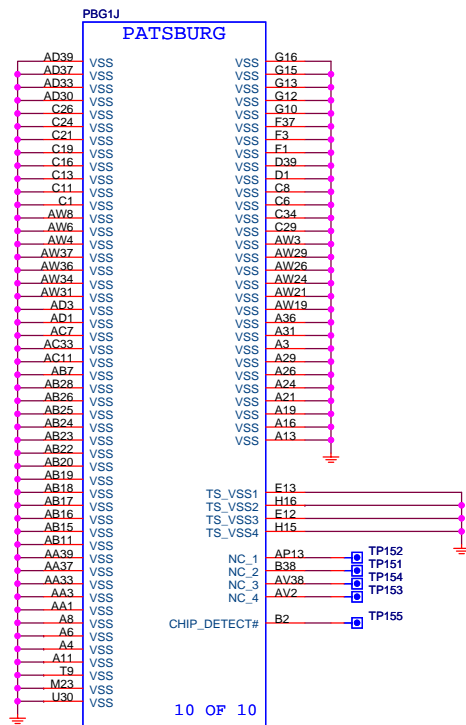
DDRIII DIMM_D1



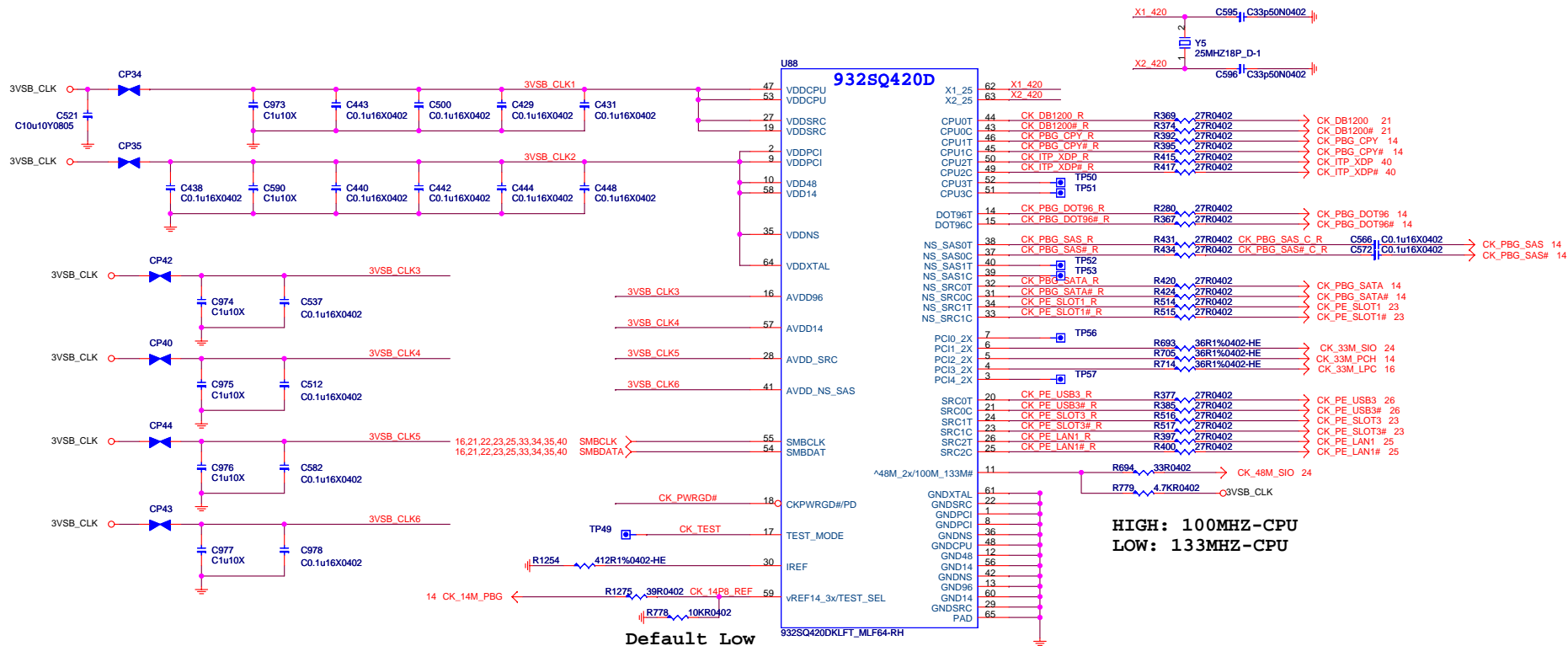








Clock Gen 932SQ420D

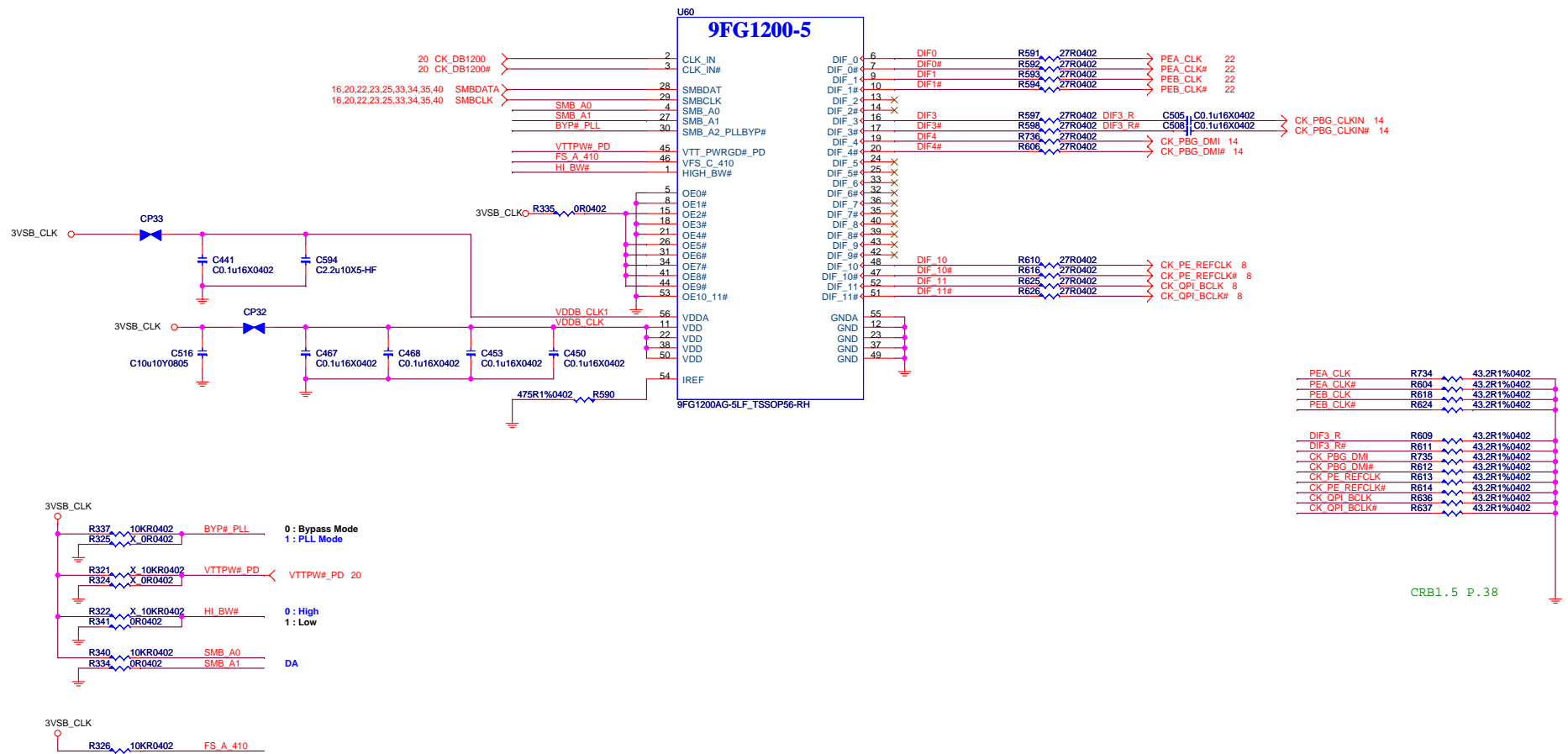


Default Low

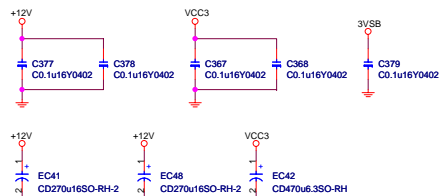
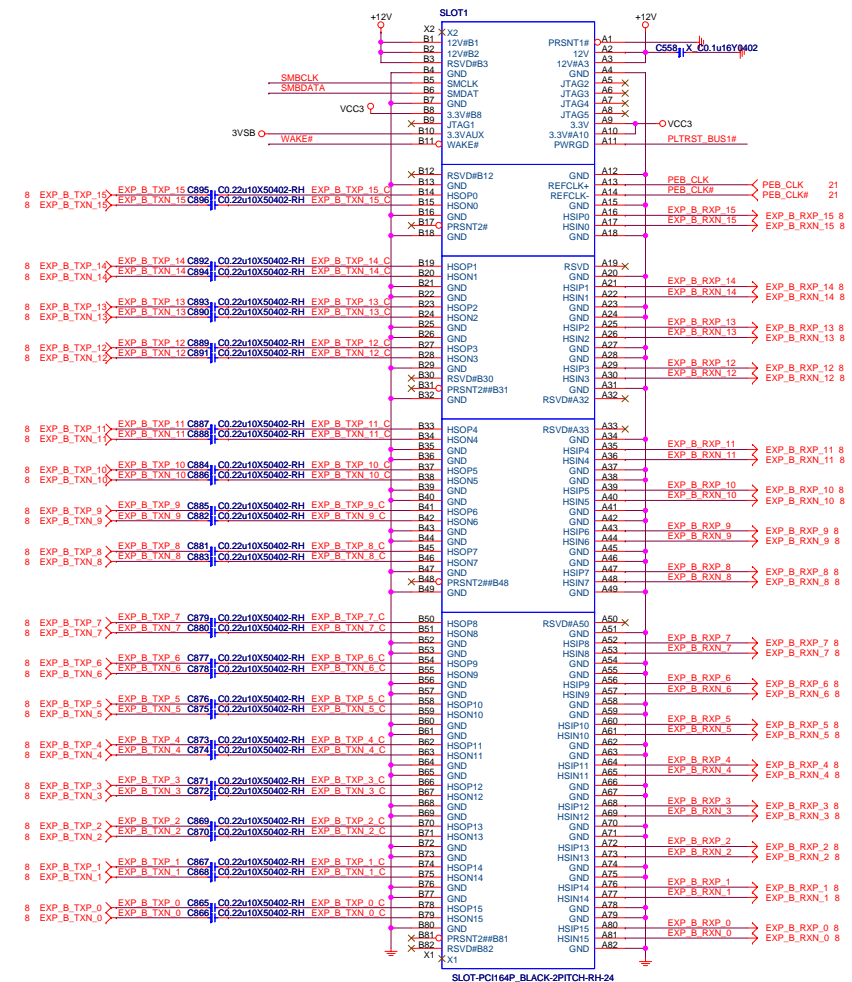
Low Active

HIGH: 100MHZ-CPU
LOW: 133MHZ-CPU

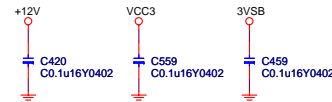
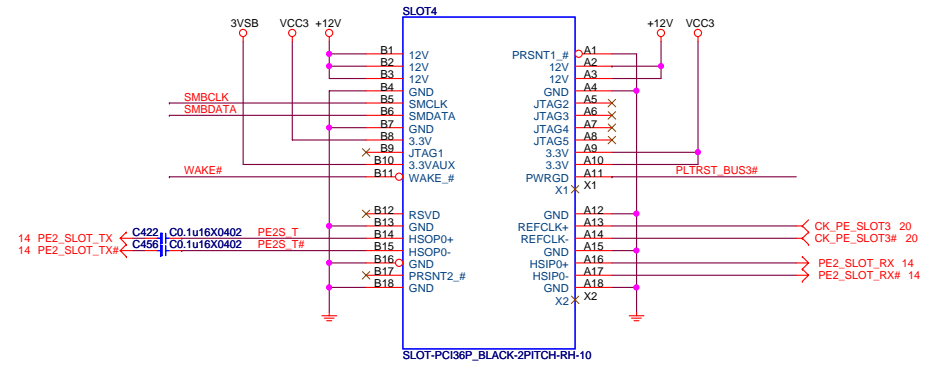
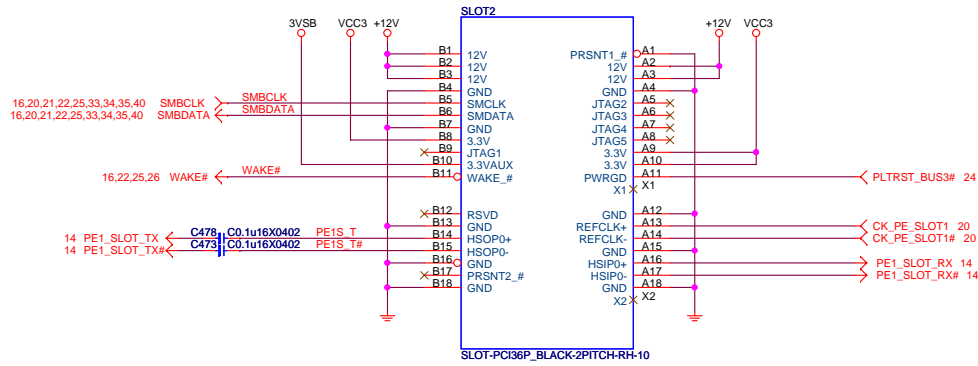
Clock Buffer 9FG1200D



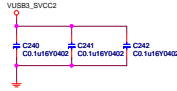
PCI EXPRESS X16 SLOT



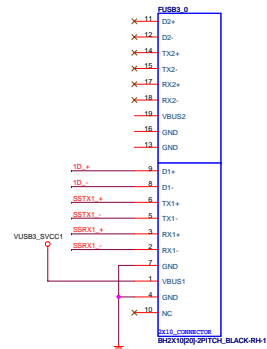
PCI EXPRESS X1 SLOT



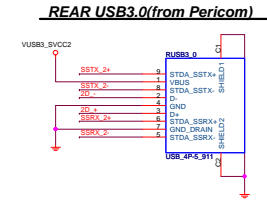
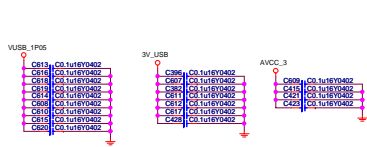
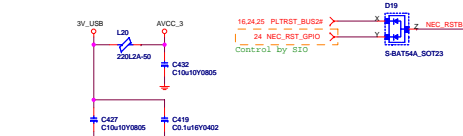
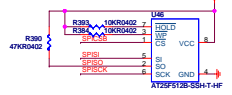
FOR EMI



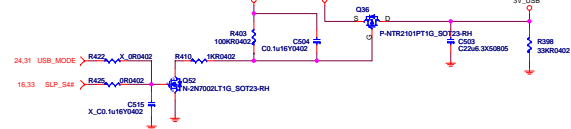
FRONT USB3.0(from NEC)



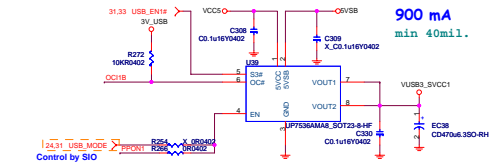
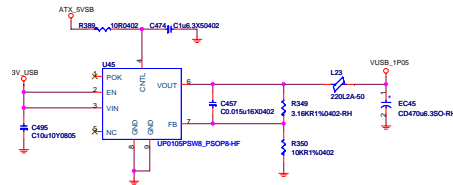
OFF LINE FLASH 3V USB



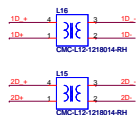
3V Dual Circuit



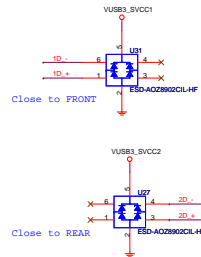
VCC 1P05 Power - 2A



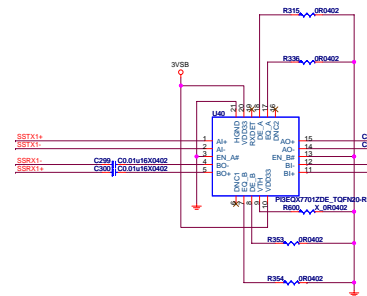
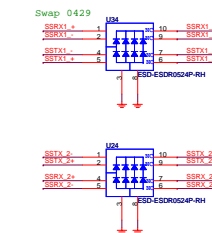
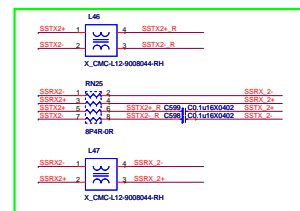
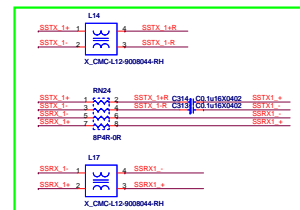
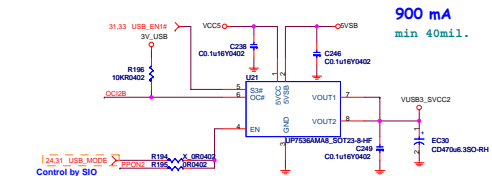
Common Mode Chokes

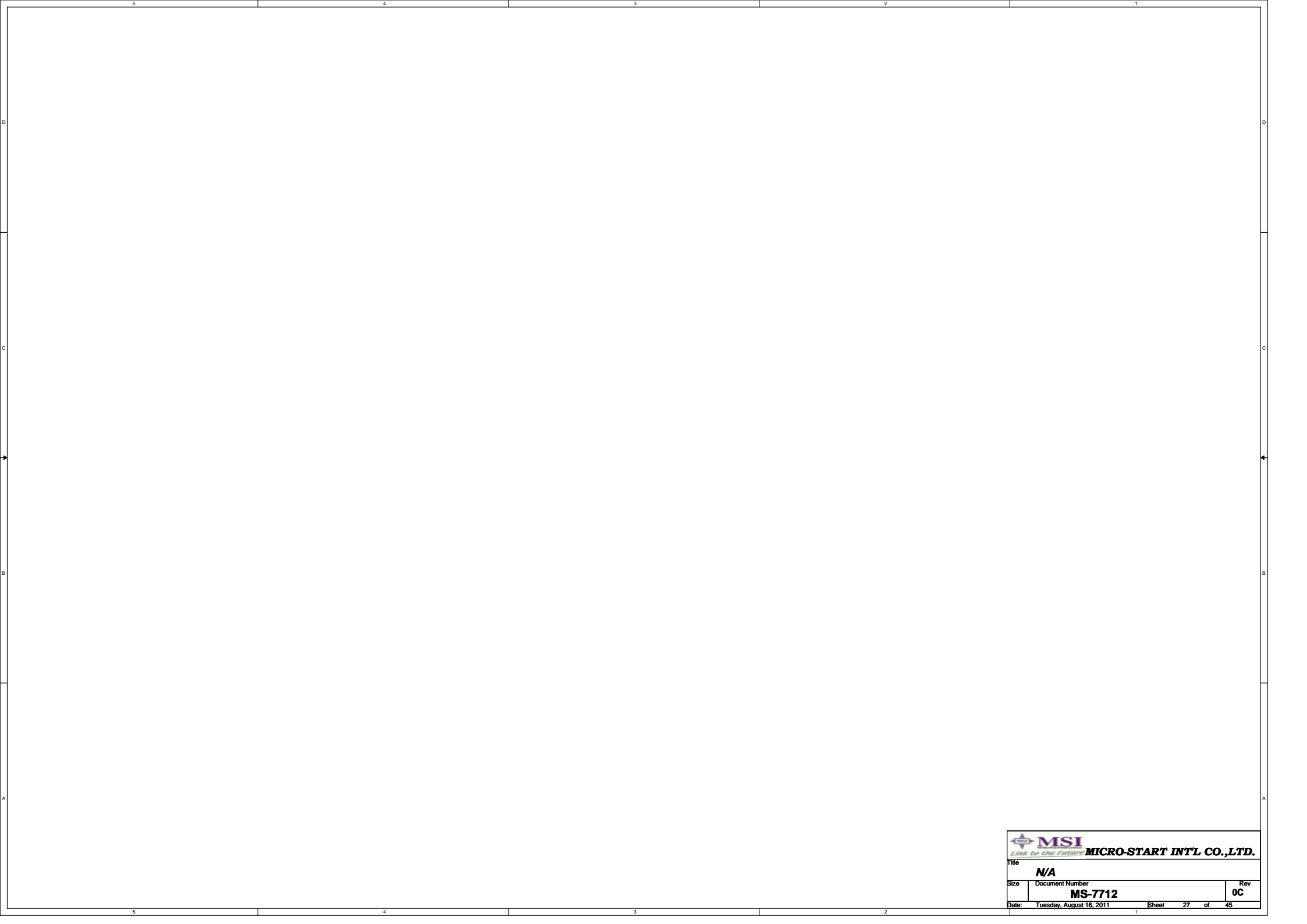



ESD Protection



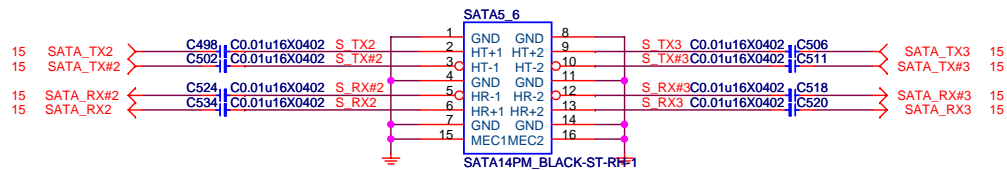
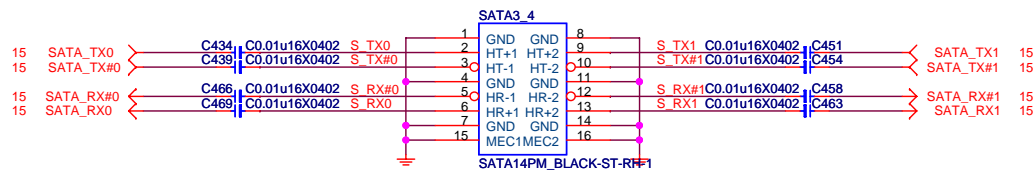
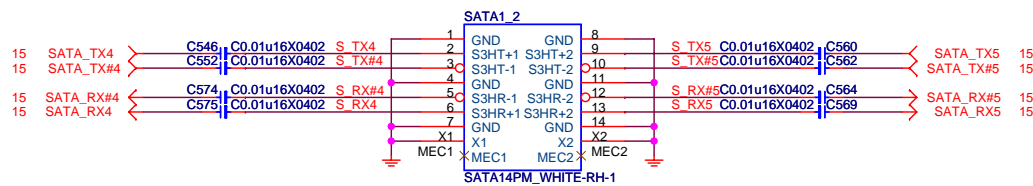
Pericom USB3.0 Redriver






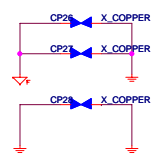
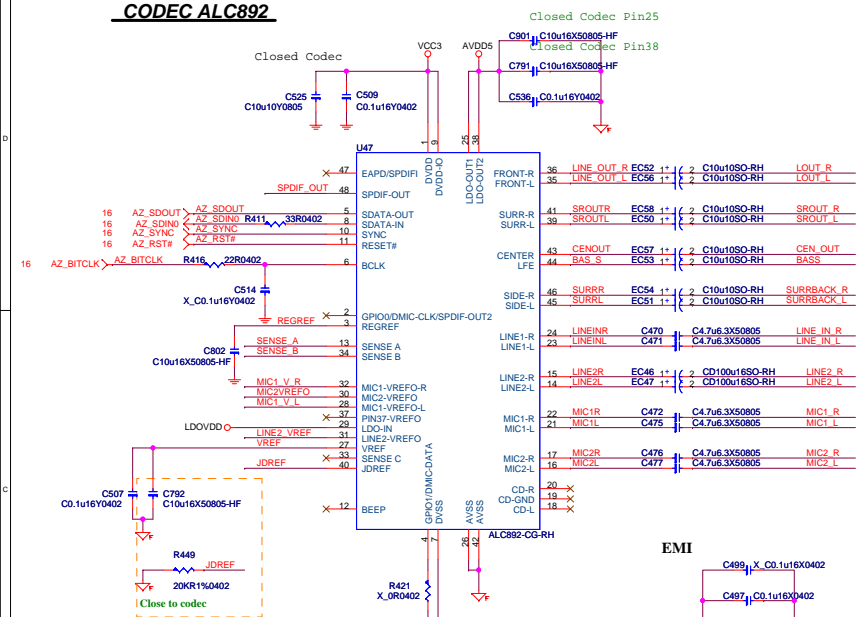
 MSI <i>Link to the Future</i>			MICRO-START INT'L CO.,LTD.		
Title					
N/A					
Size	Document Number				Rev
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SATA Connector

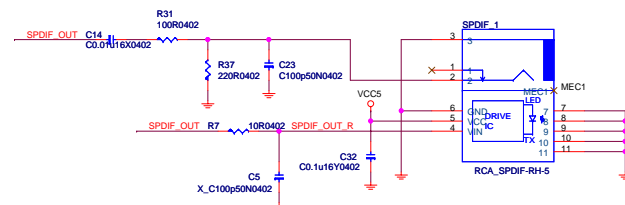
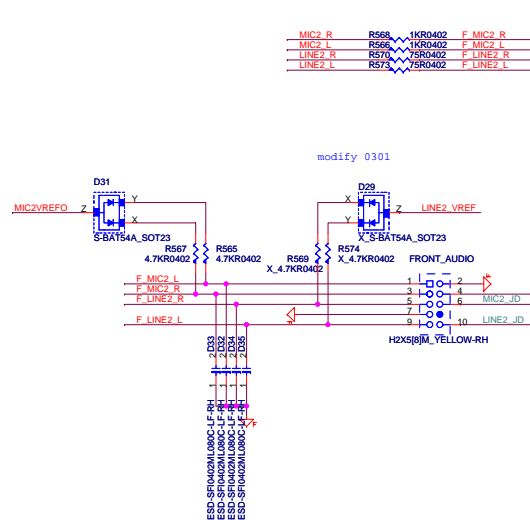


 MICRO-START INT'L CO.,LTD.		
Title		
SATA Port		
Size	Document Number	Rev
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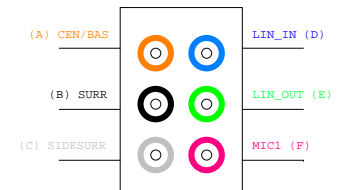
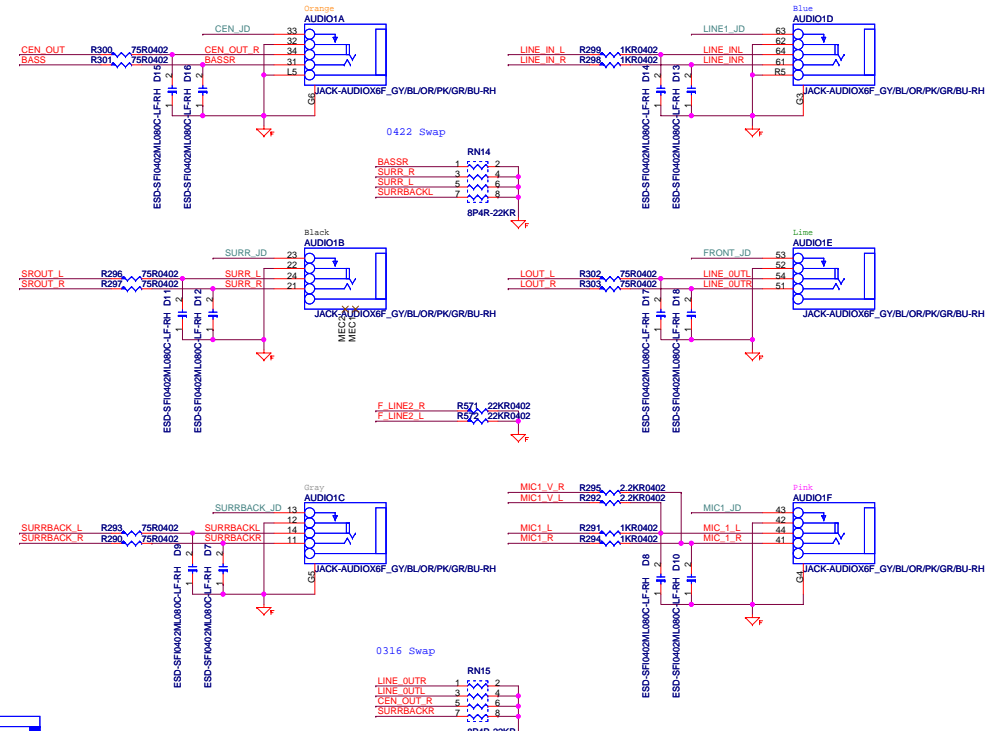
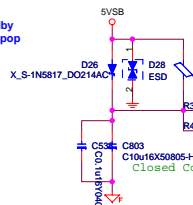
CODEC ALC892



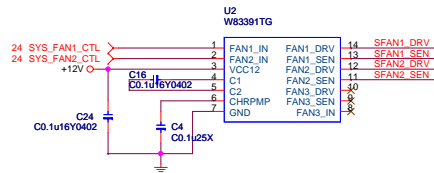
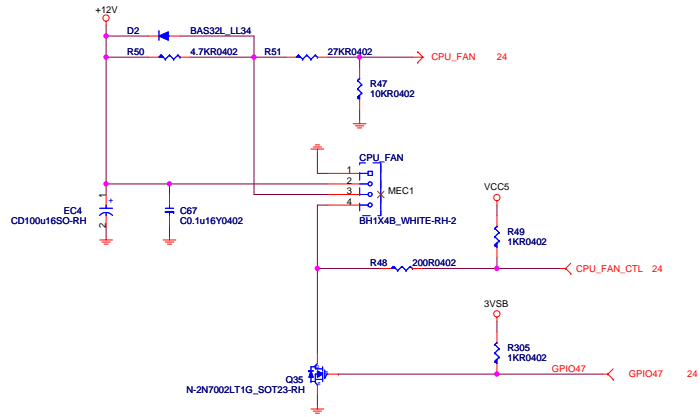
SPDIF OUT OPT+RCA



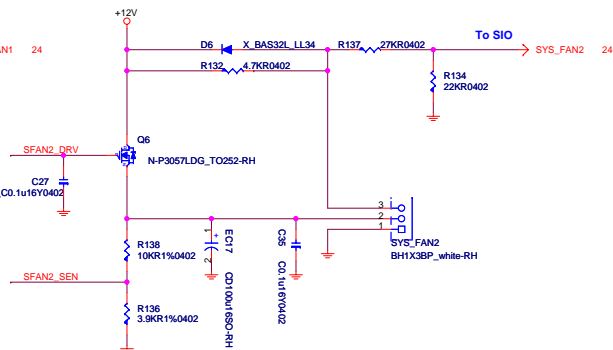
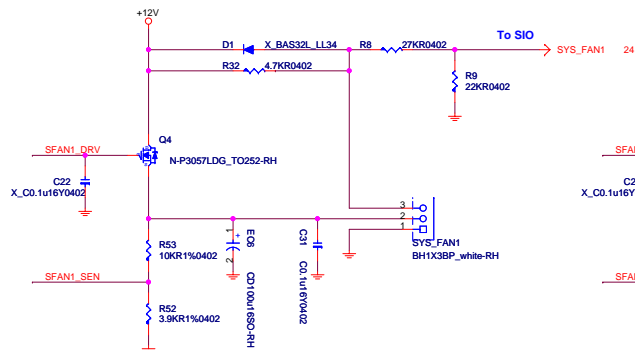
For Standby
mode-De-pop



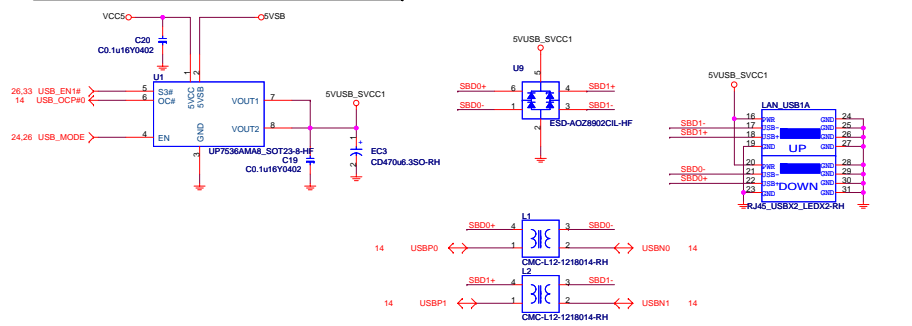
CPU Fan



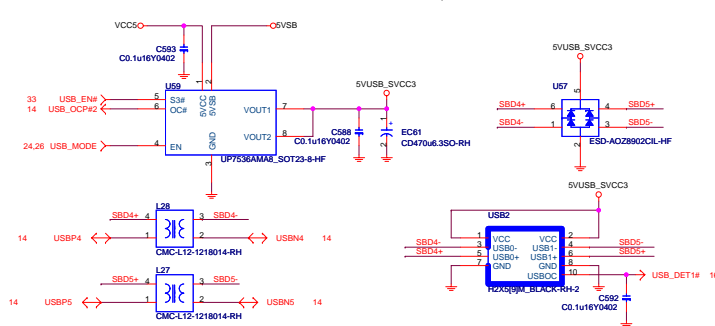
System Fan



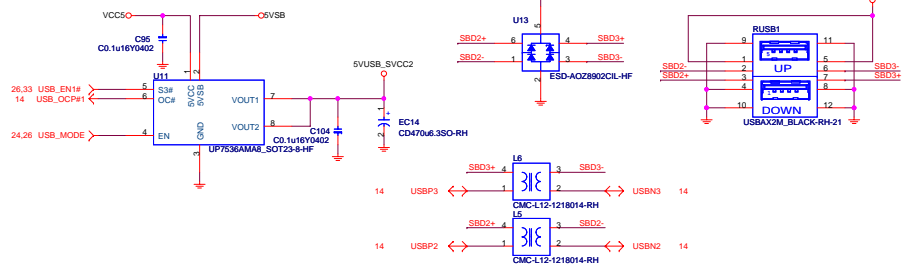
Rear USB Connector For USB Port 0 / 1



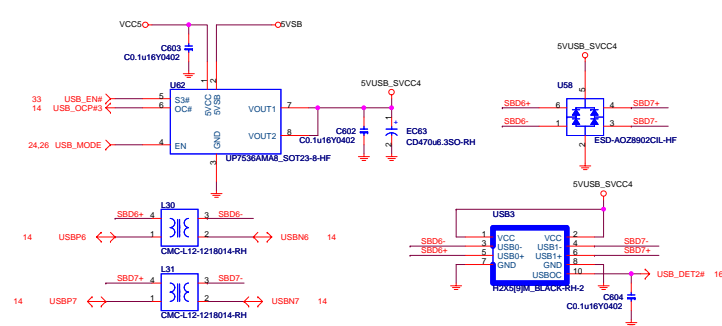
Front Panel USB Connector For USB Port 4 / 5



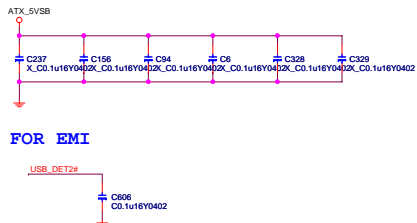
Rear USB Connector For USB Port 2 / 3



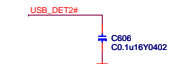
Front Panel USB Connector For USB Port 6 / 7



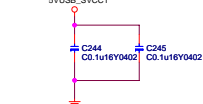
FOR EMI



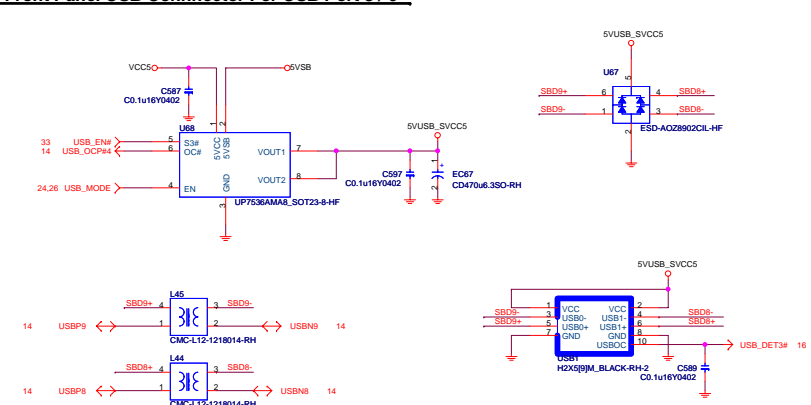
FOR EMI



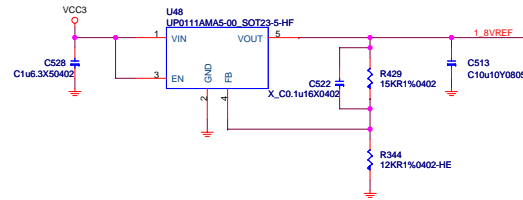
FOR EMI



Front Panel USB Connector For USB Port 8 / 9

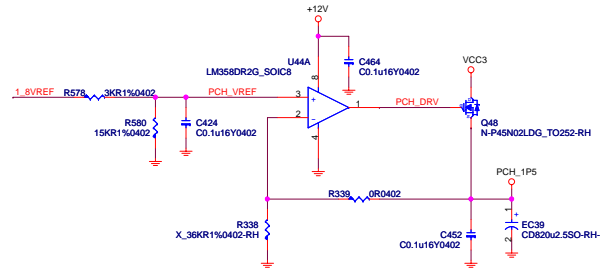


1.8V Reference Power



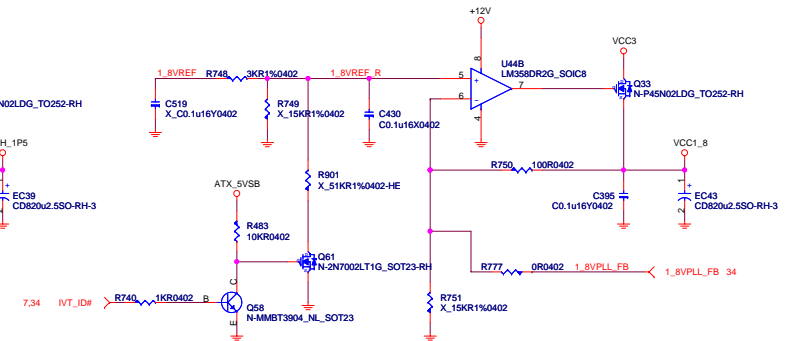
PBG 1.5V Power Rail

Linear 1.5V, 0.512A Imax



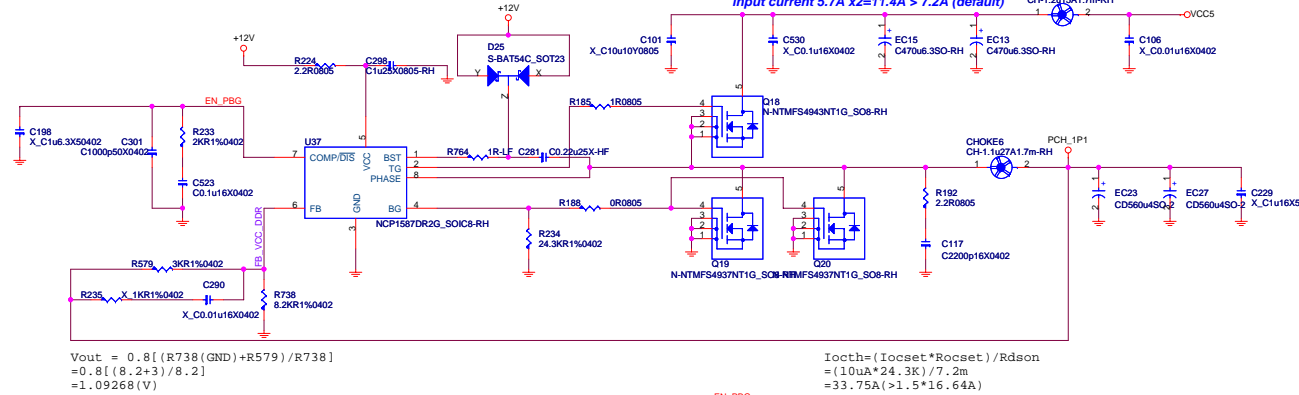
VCCPLL Power Rail

Linear 1.8V, 2A Imax

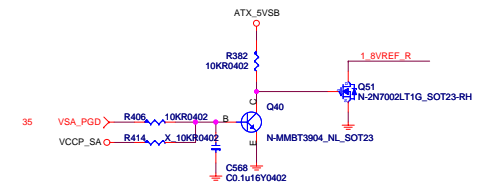


PBG Core Power Rail

Switching 1 phase 1.1V, 16.4A Imax

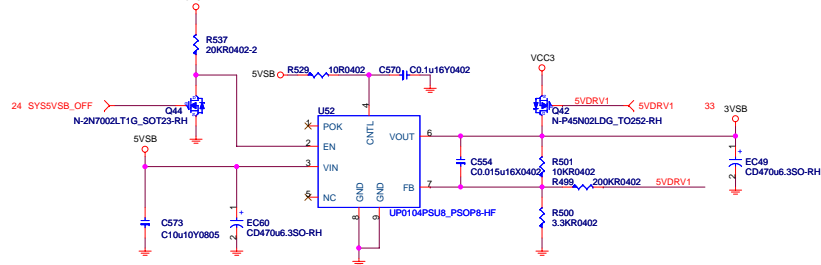


IVT_ID#		VOLTAGE
H	SNB-E	1.8V(normal)
L	IVB-E	1.7V



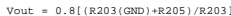
3VSB Power Rail

1.09A



Switch 1 Phase 1.5V 17A

Switch 1 Phase 1.5V 17A



Switch 1 Phase 1.5V 17A

Switch 1 Phase 1.5V 17A



OFF-BOARD CONSOLE

A horizontal number line with tick marks at 0, 1, 2, 3, 4, and 5. A red box highlights the segment between 3 and 4.

OFFICIAL COMMENT

100

Linear, 0.75V - 1A

Linear, 0.75V - 1A



2. Form Regulator : One, State

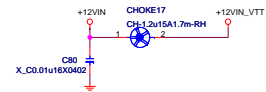
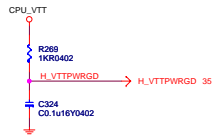


DDR Power

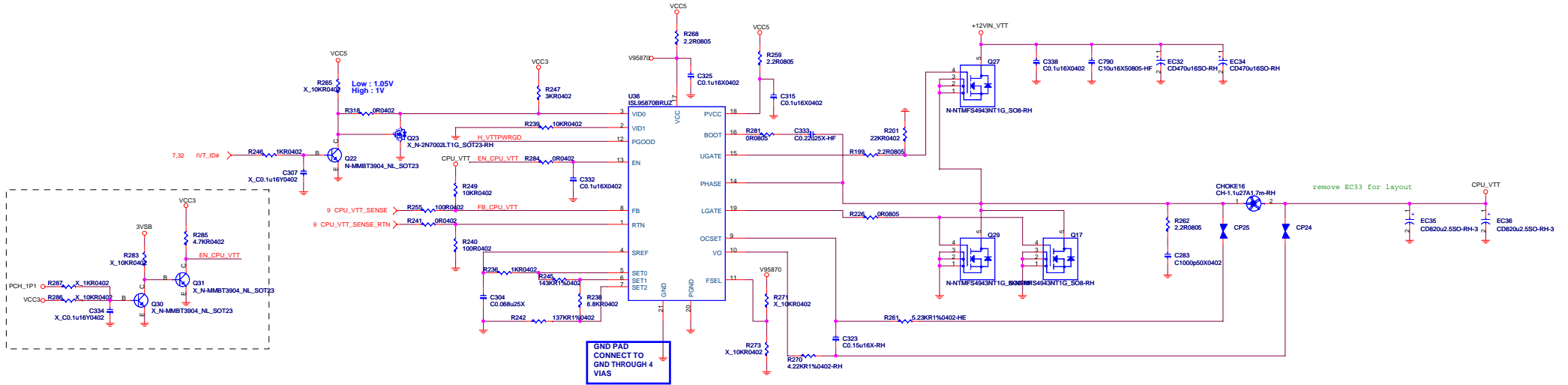
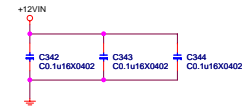
Size	Document Number	Rev
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Size	Document Number	Rev
	MS-7712	0C
Date:	Tuesday, August 16, 2011	Sheet 33 of 45

CPU VTT Power Rail
Switch 1 Phase 1.05V 22A

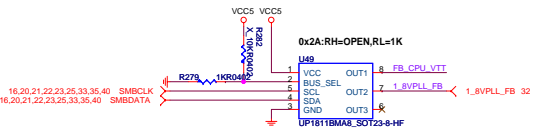


FOR EMI



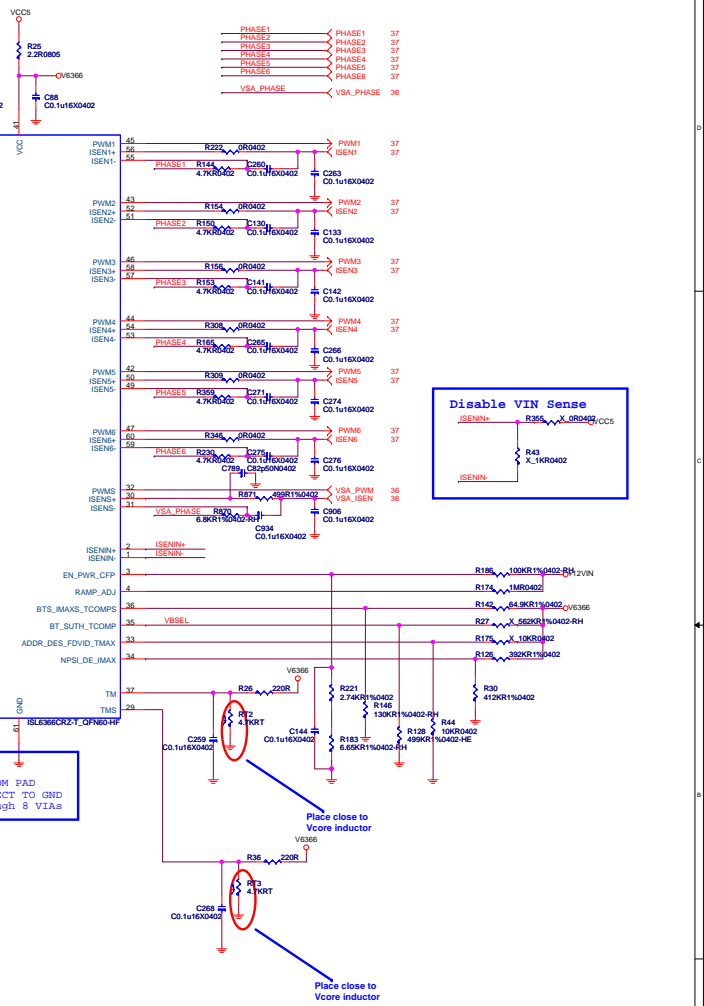
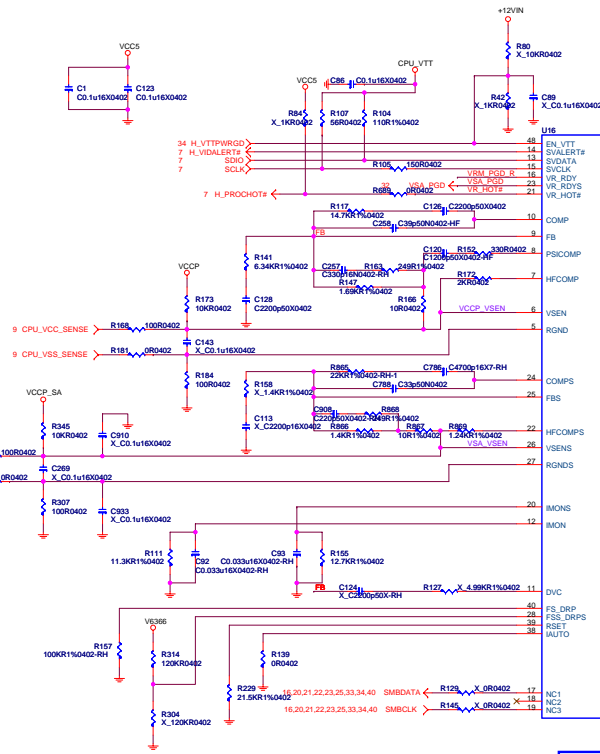
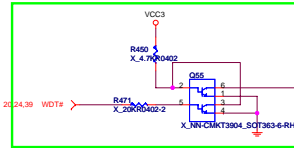
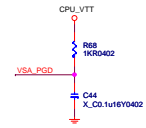
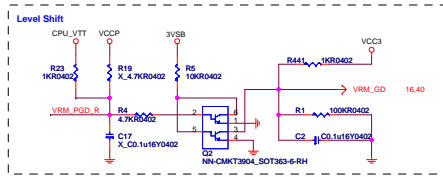
1. $R_{ocset} = I_{out} \cdot DCR / I_{ocset}$; $I_{ocset} = 10uA$
If $DCR = 1m$; $I_{out} = 20A$, $R_{ocset} = 20A \cdot 1m / 10uA \rightarrow R_{ocset} = 2K$
2. $C_{sen} = L / R_{ocset} \cdot DCR$
If $DCR = 1m$; $L = 1u$, $C_{sen} = 1u / 2K \cdot 1m \rightarrow C_{sen} = 0.5u$

UPI VOLTAGE CONSOLE



ADDRESS	0x2A	0x28	0x26	0x24	0x22	0x20
RH (KOhm)	OPEN	3.9	3	2.2	1.3	10
RL (KOhm)	10	1.3	2.3	3	3.9	OPEN
BUS_SEL	0%	25%	40%	60%	75%	100%

Voltage Regular Module (VRD12)

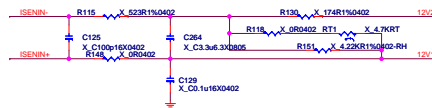
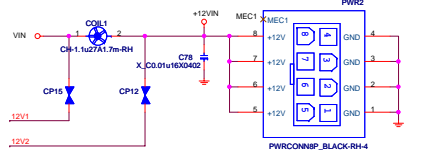


UPI VOLTAGE CONSOLE

0x20:RH=10K,RL=open;Bit7=1

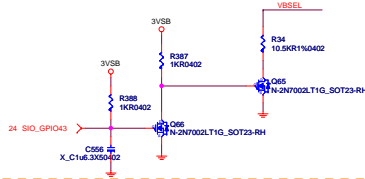
ADDRESS	0x2A	0x28	0x26	0x24	0x22	0x20
RH (Kohm)	OPEN	3.9	3	2.2	1.3	10
RL (Kohm)	10	1.3	2.3	3	3.9	OPEN
BUS_SEL	0%	25%	40%	60%	75%	100%

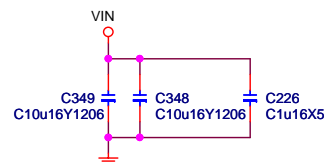
CPU Core Power +12V Input

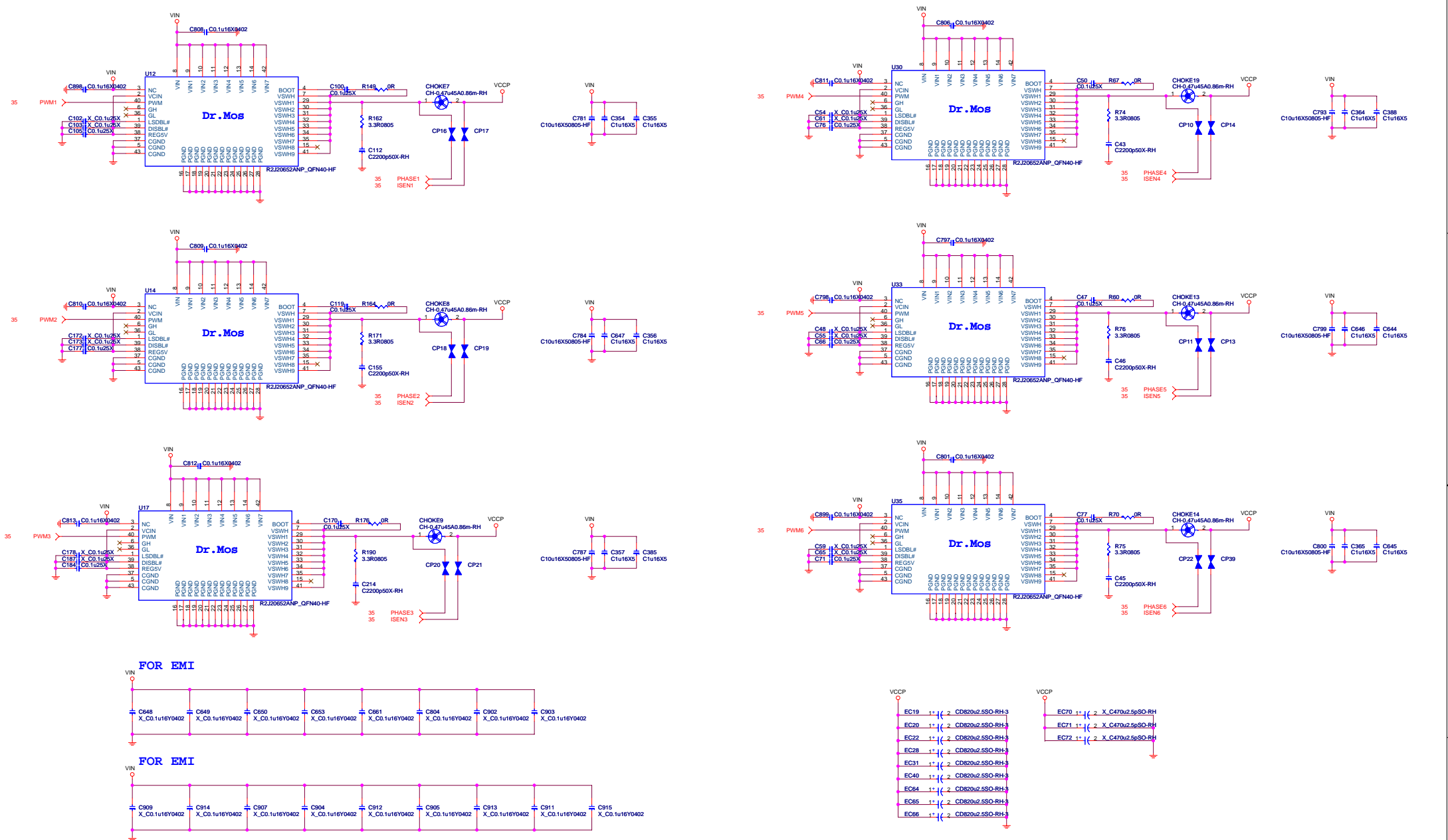


Vboot Select Table

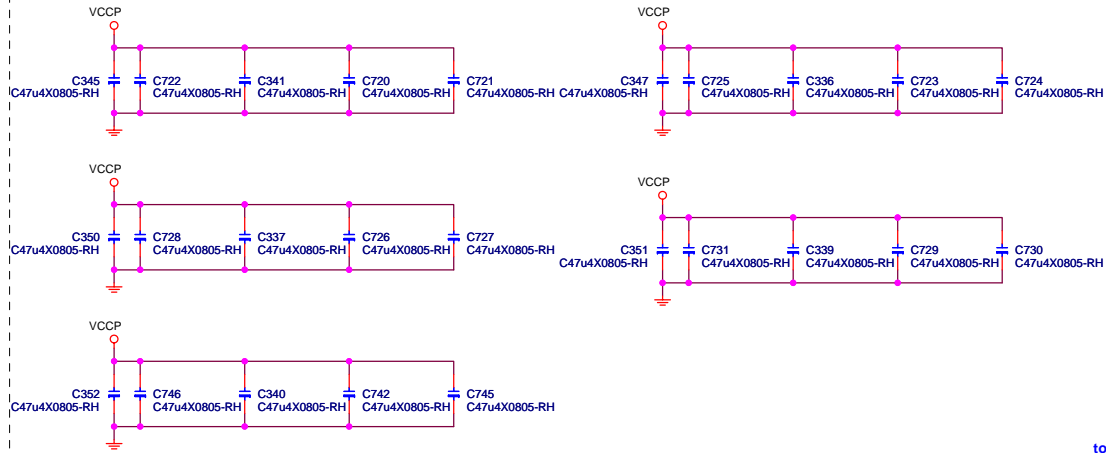
	GPIO 43	Resistor	Vboot
Normal & Turbo	H	Floating	0V
BCLK OC	L	499/10.5 ±10 Kohm	1V





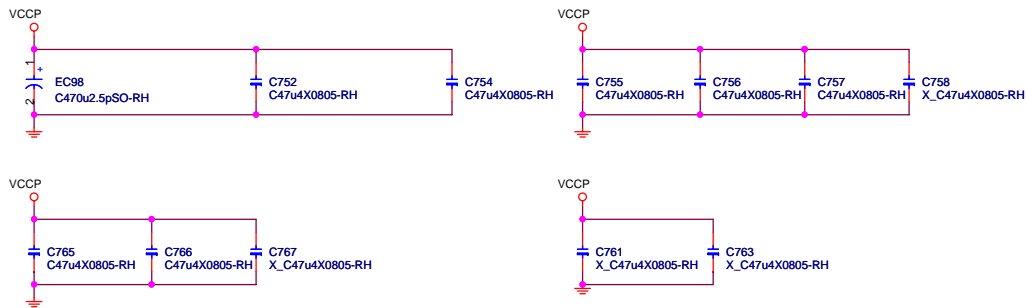


VCCP Decoupling



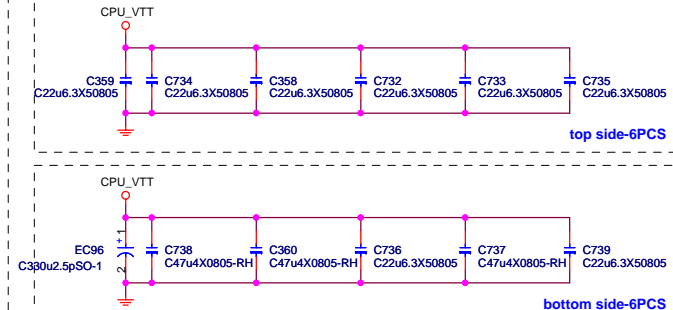
top side-25PCS

VCCP Decoupling Bottom Side



bottom side-4+1PCS

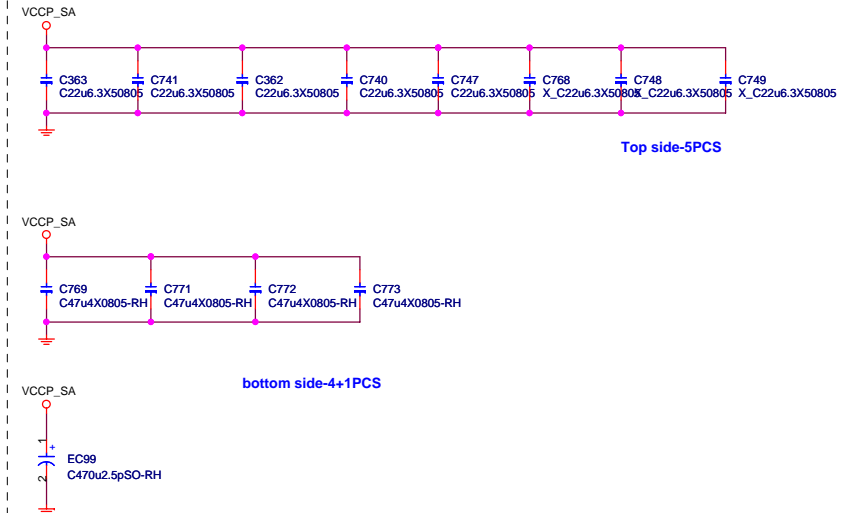
CPU VTT Decoupling



top side-6PCS

bottom side-6PCS

CPU VSA Decoupling



Top side-5PCS

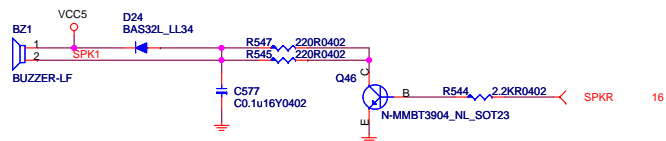
bottom side-4+1PCS

CPU VCC DDR Decoupling

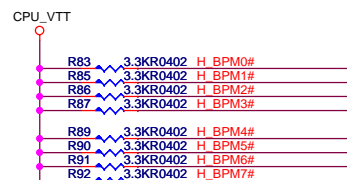
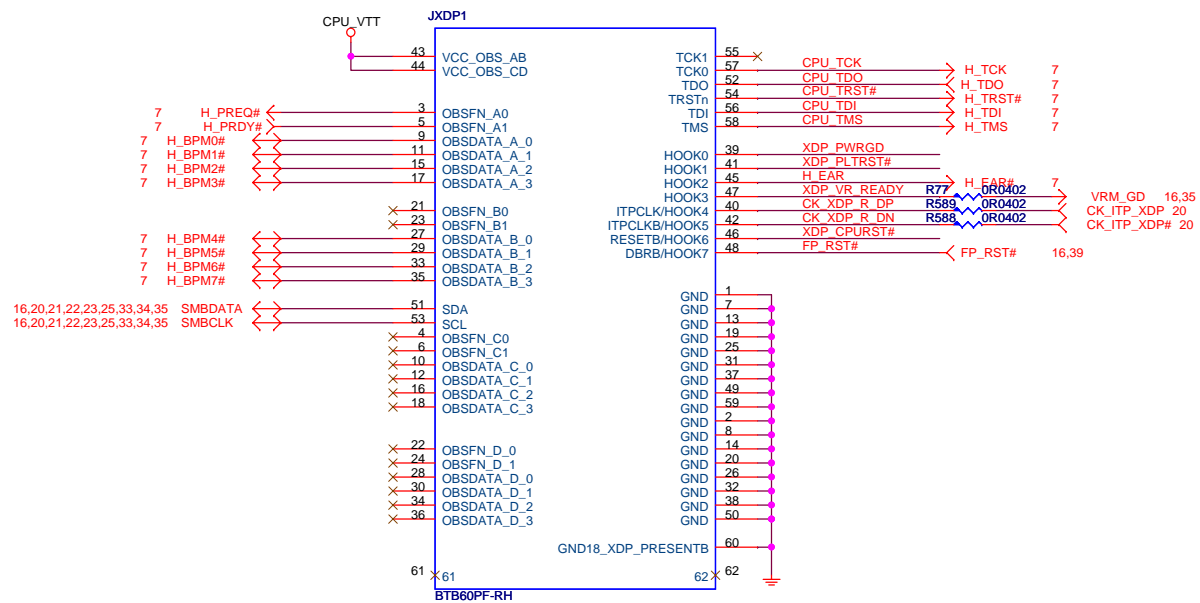


bottom side-4PCS

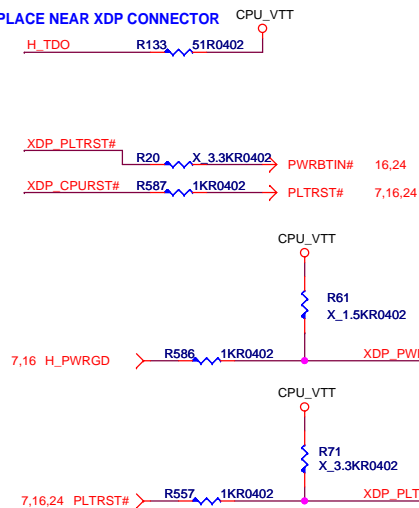
24 Pin ATX Power Connector



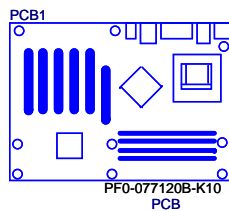
CPU XDP PORT



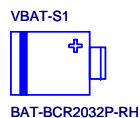
PLACE NEAR XDP CONNECTOR CPU_VTT



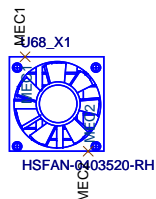
Manual Parts



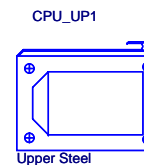
慶生PF0-077120B-K10



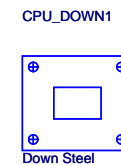
BAT-BCR2032P-RH



HSFAN-0403520-RH



Upper Steel



Down Steel

Simulation



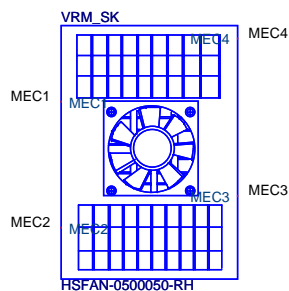
X_PIN1*2

X_PIN1*2



X_PIN1*2

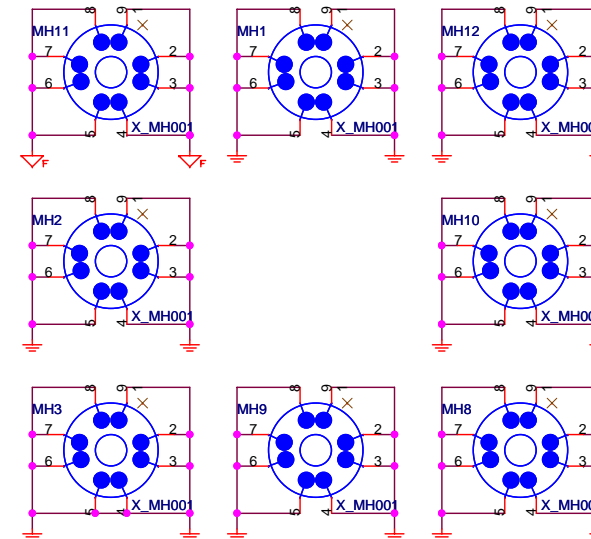
X_PIN1*2



HSFAN-0500050-RH

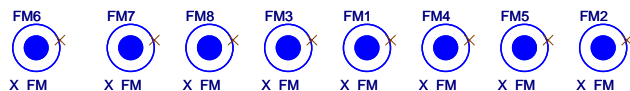
PCB Mounting Holes

Mounting Holes



Optics Orientation Holes

Optical Fiducial Marks-120



X_FM

X_FM

X_FM

X_FM

X_FM

X_FM

X_FM

X_FM