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MS-7971

Intel -Skylake plamform Z170/H170

ATX

Ver: 11

CPU:

System Chipset:

Skylake-S

Z170 Colay H170

Onboard Chip:

HD Audio Codec:ALC892

LAN:RTL8111H

SIO:Nuvoton 6793D

Flash ROM: SPI 64MB /128MB(For H170)

Main Memory:

DDRIV (800/1066/1333/1600/2133MHz) * 4 (Dual Channel)

ACPI:

PWM:

NIKO/UPI

RT3606BC

Expansion Slots:

Other:

PCI Express (X16) Slot *1

PCI Express (X4) Slot * 1

PCI Express (X1) Slot * 2

M2 * 1

SATAe* 2

SATA3.0 x6 (PCH)

REAR USB2.0 *2

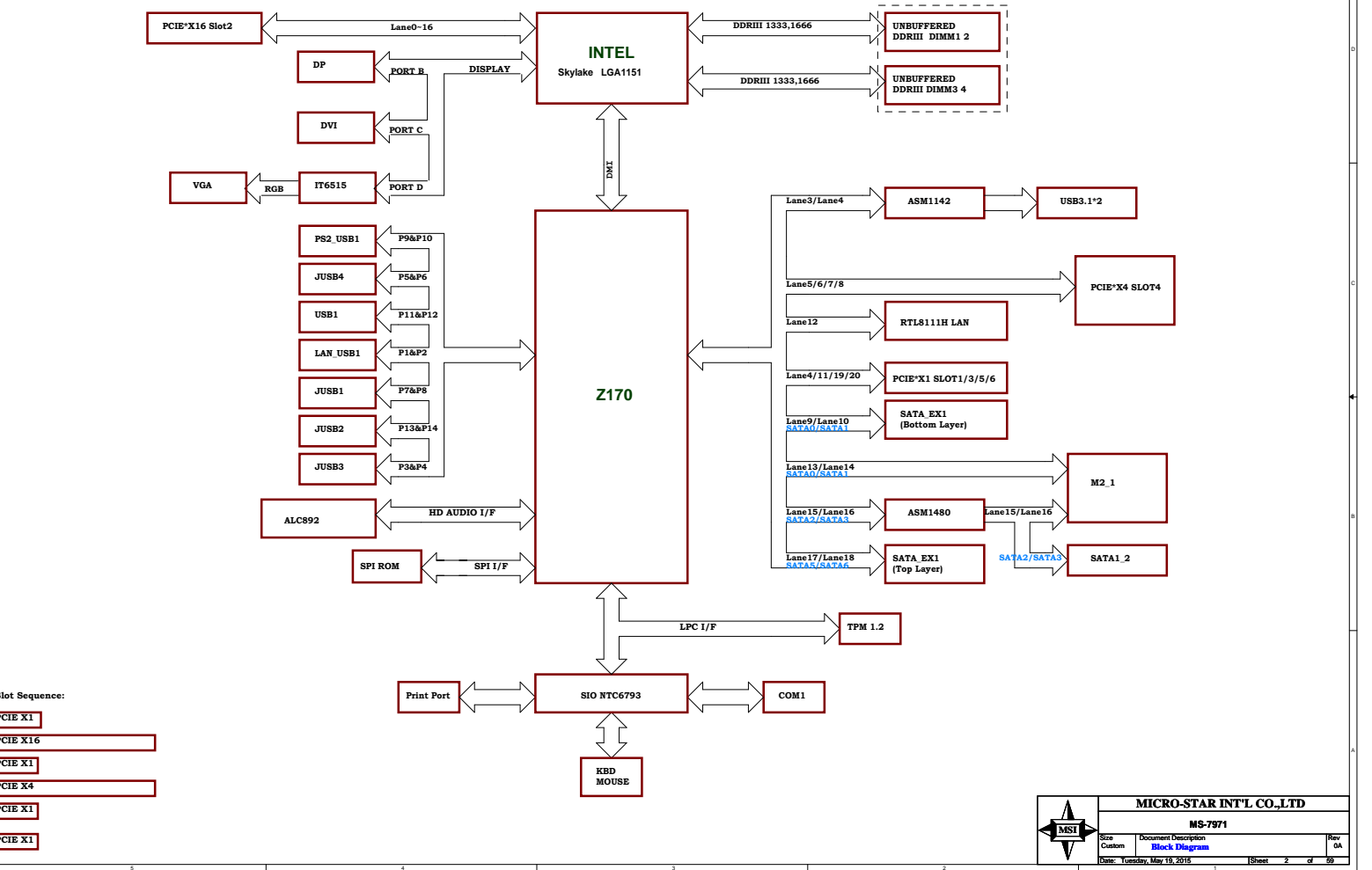
FRONT USB2.0 *4

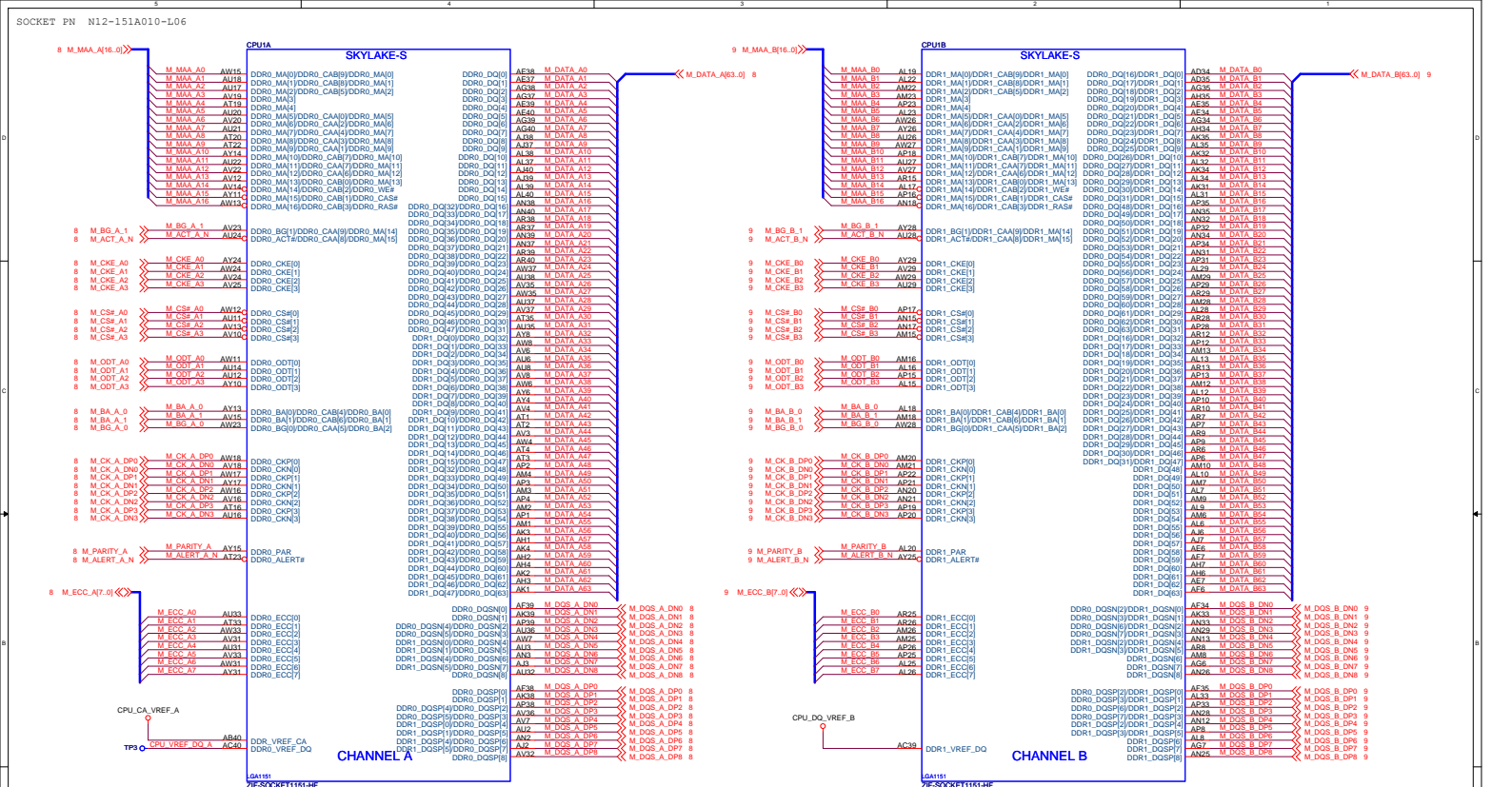
FRONTUSB3.0 *4

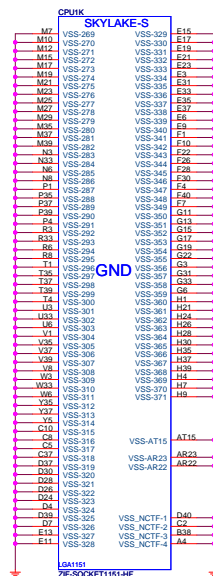
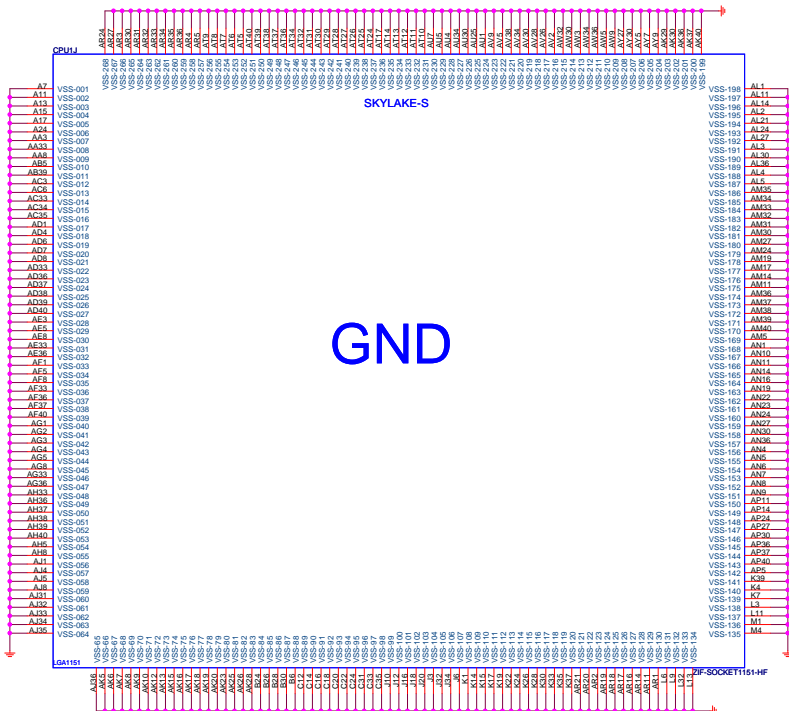
REAR USB3.0 *2

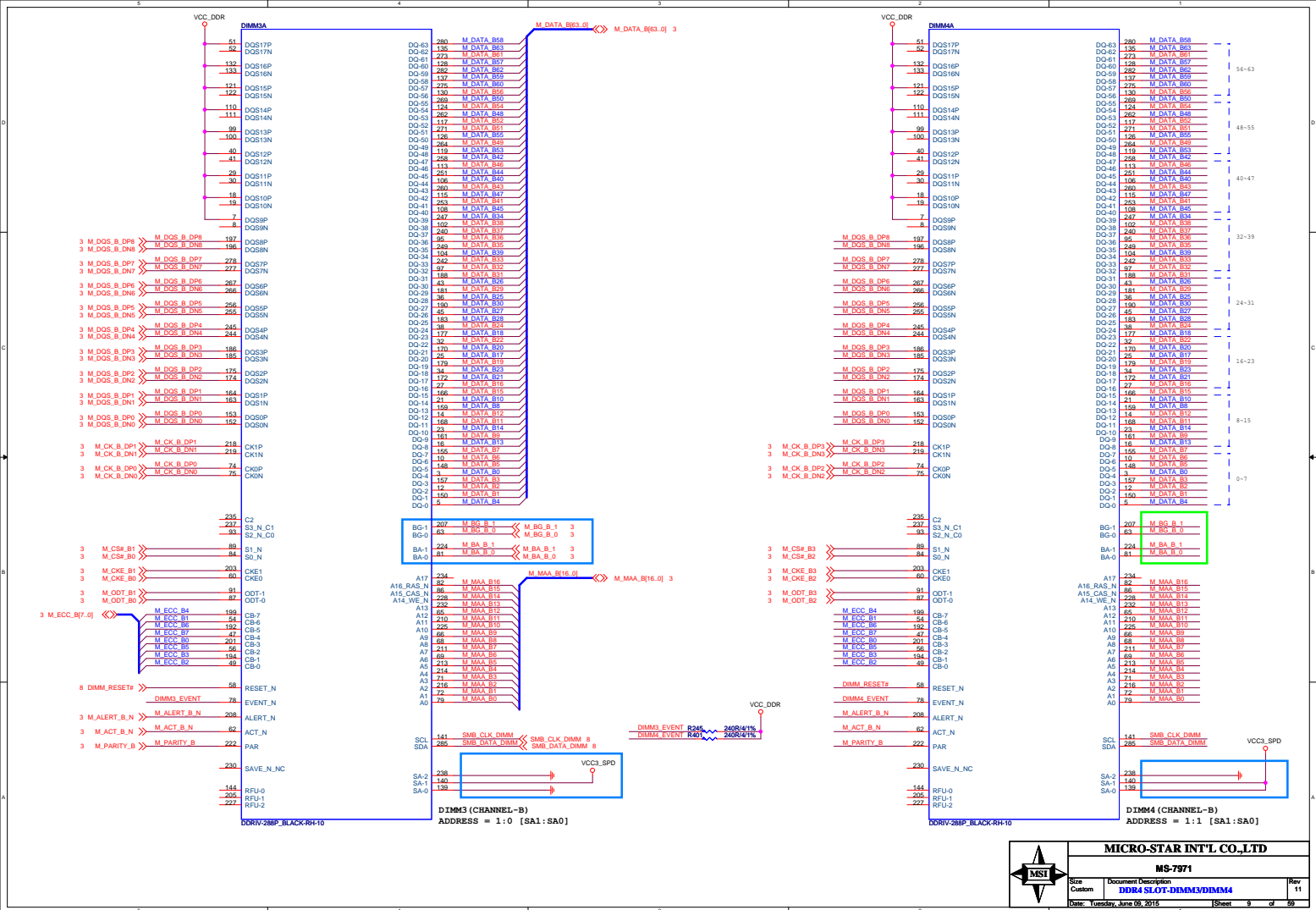
REAR USB3.1 *2

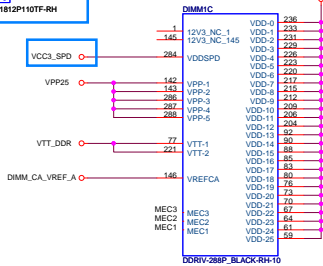
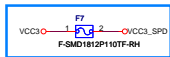
MS-7971 Block Diagram



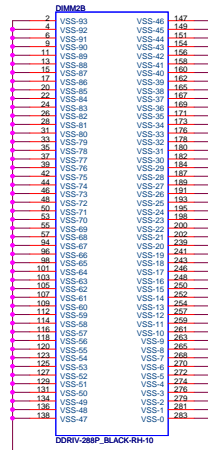
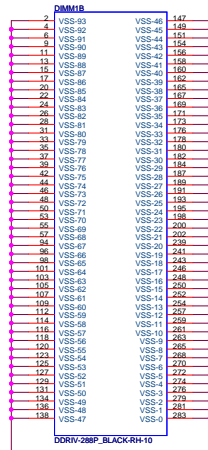
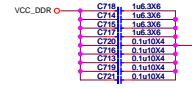
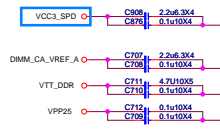
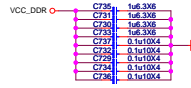
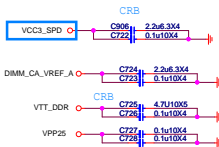
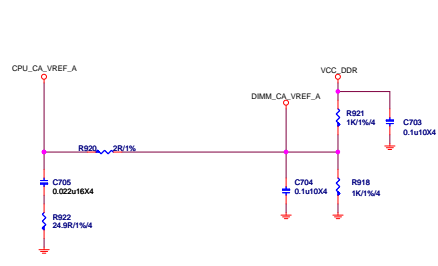
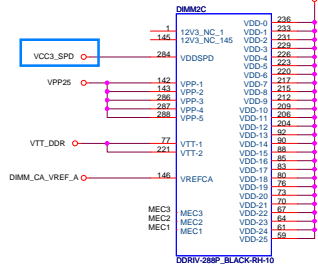
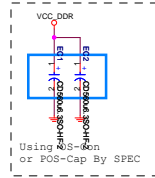






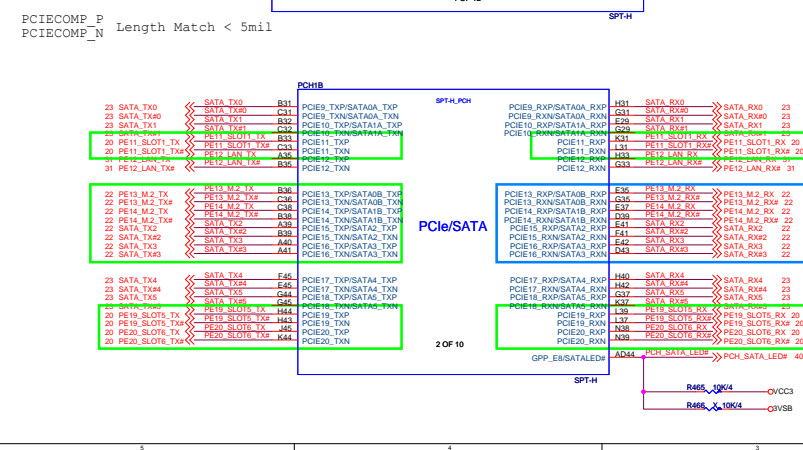
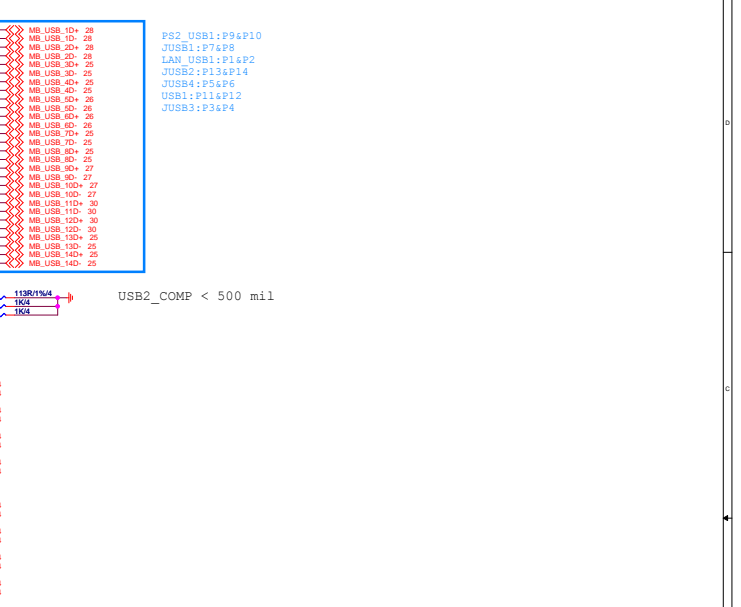
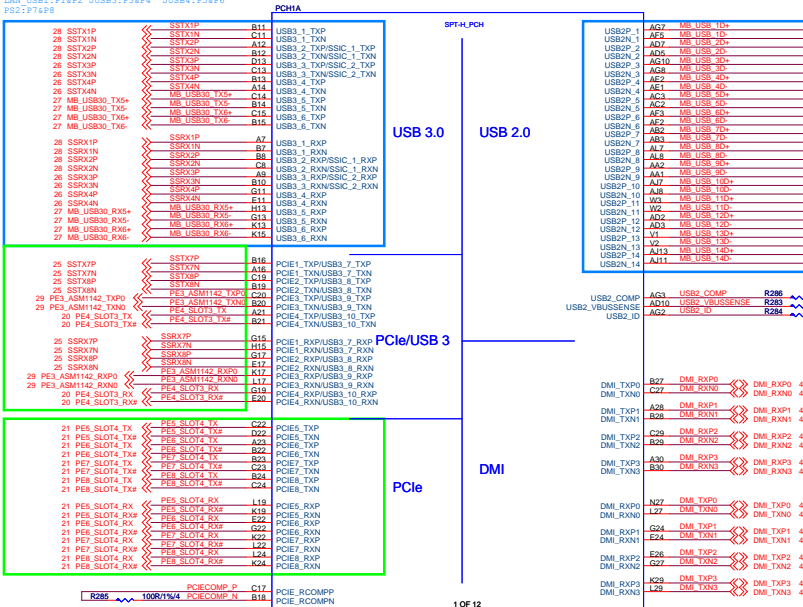


DIMM SLOT PN BY SPEC



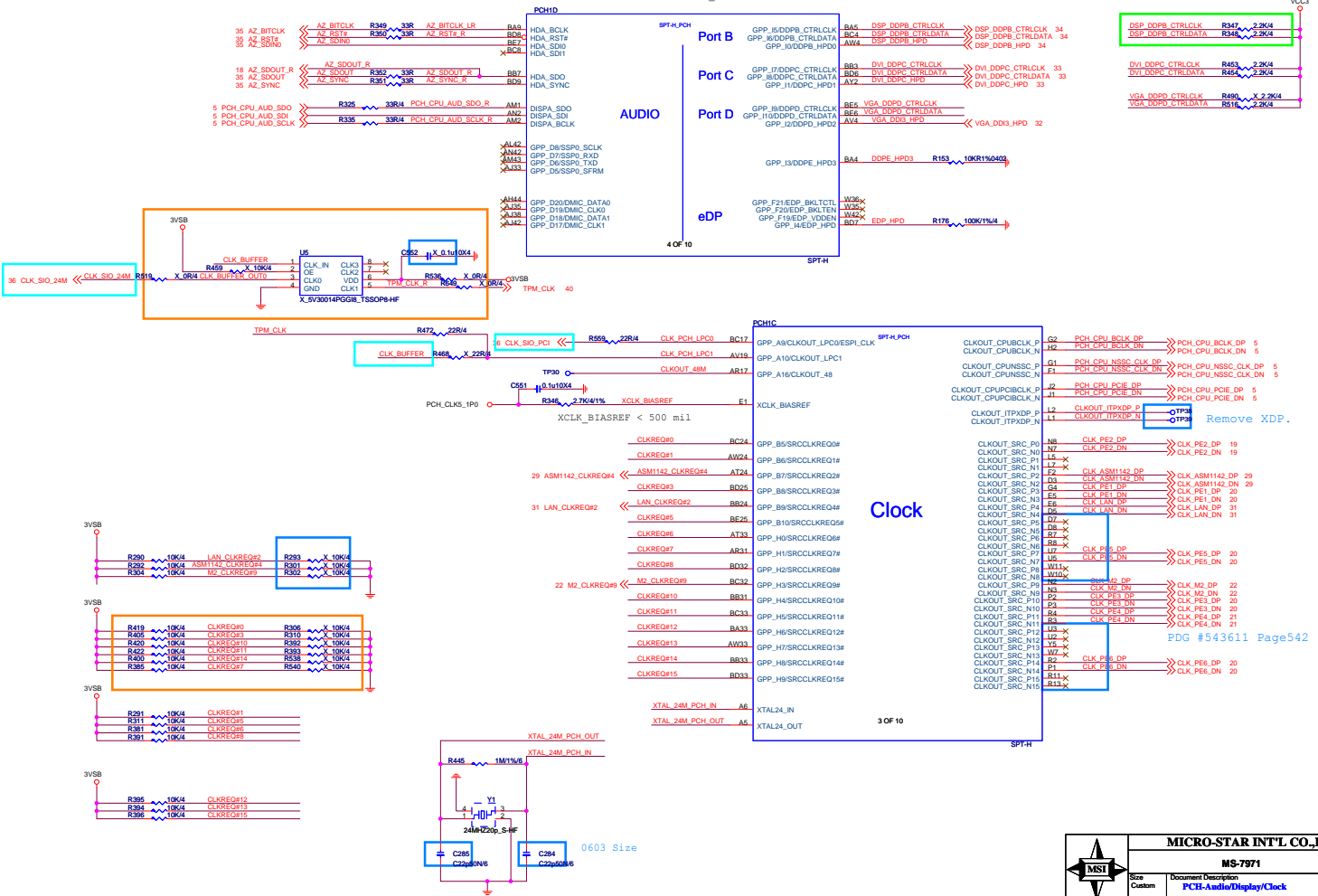
MICRO-STAR INT'L CO.,LTD		
MS-7971		
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Custom	DDR4-POWER/GND-1	11
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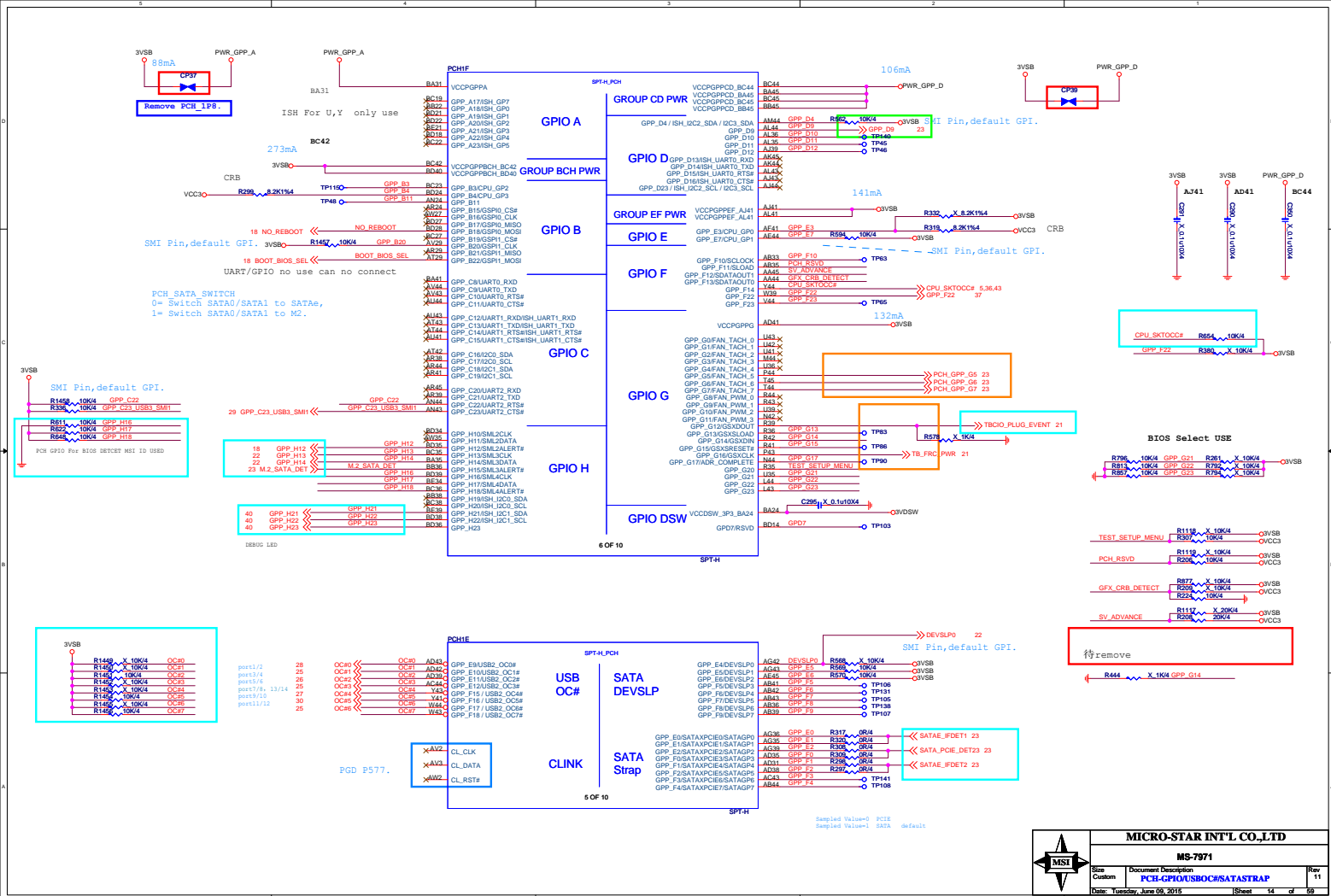


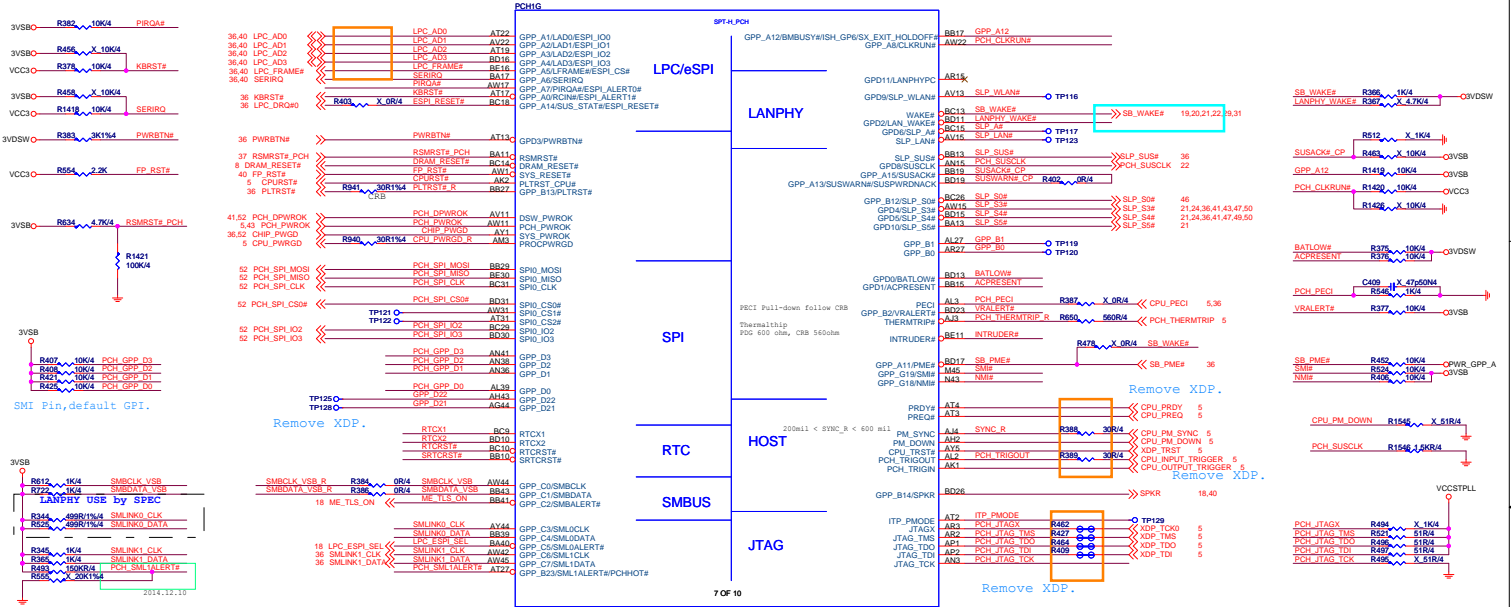


sku	1	2	3	4	5	6	7	8	9	10	11	12	13	14
H110	USB3/OTG	USB3/SSC	USB3/SSC	USB3	N/A	N/A	N/A	N/A	N/A	LAN Only	PCle/LAN	PCle	PCle	PCle
B150	OTG	SSC	SSC	USB3	USB3	USB3	N/A	N/A	N/A	LAN Only	PCle/LAN	PCle	PCle	PCle
H170	OTG	SSC	SSC	USB3	USB3	USB3	USB3	USB3	PCle	PCle	LAN	PCle	PCle	PCle
Z170	USB3/OTG	USB3/SSC	USB3/SSC	USB3	USB3	USB3	USB3/PCle	USB3/PCle	USB3/PCle	USB3/PCle	PCle/LAN	PCle	PCle	PCle
SKU	15	16	17	18	19	20	21	22	23	24	25	26	RST for PCle Ports	
H110	LAN	PCle	N/A	LAN	SATA*/Only	SATA*	SATA	SATA	N/A	N/A	N/A			
B150	PCle/LAN	PCle/SATA*	PCle/LAN	SATA*	SATA*	SATA	SATA	SATA	N/A	N/A				
H170	SATA	SATA	PCle	LAN	SATA	SATA	SATA	SATA	PCle	PCle	PCle	PCle		
Z170	SATA	SATA	PCle	LAN	SATA	SATA	SATA	SATA	PCle	PCle	PCle	PCle		

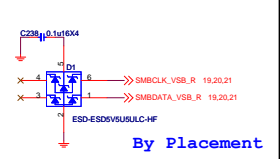
MICRO-STAR INT'L CO.,LTD
MS-7971
Size Custom Document Description **PCB-USB/PCIE/DMI/SATA** Rev 11
Date: Tuesday, June 09, 2016 Sheet 12 of 59



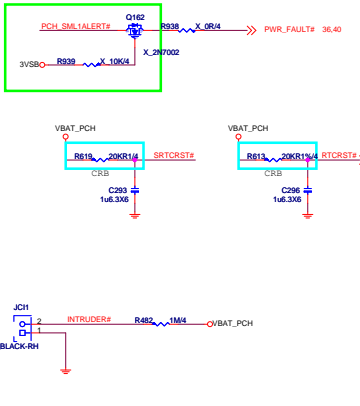
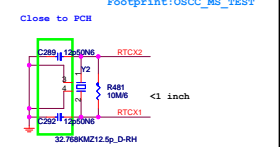




SMBUS ESD

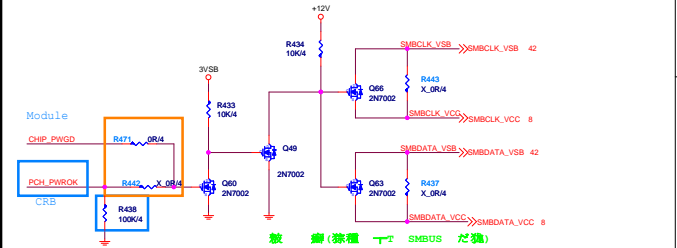


RTC Block



SMBUS 雙端終端 (PCB 兩端均要 PULL HIGH 3VSB)
惠達 S3/S5 包 領 SMBCLK_VSB/SMBDATA_VSB
惠達 領 SMBCLK_VCC/SMBDATA_VCC

勝七 PCIE_SLOT 端鎖
3VSB CPU PWM IC/DDR
端鎖 VCC3 大 叫 蘇種
端 或 鎖



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MS-7971		
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Custom	PCB-LPC/SPI/SMBUS/MISC	11
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GND

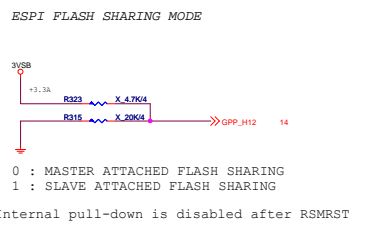
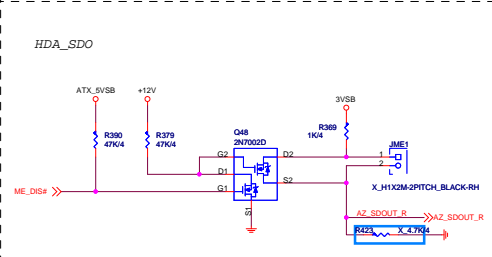
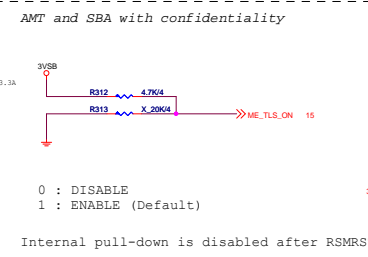
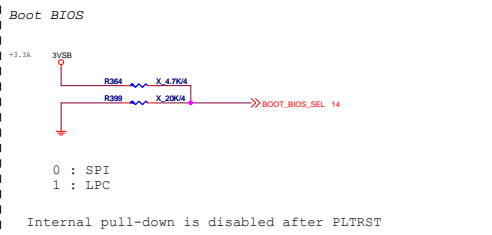
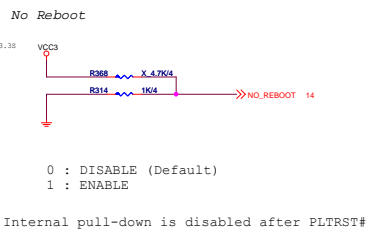
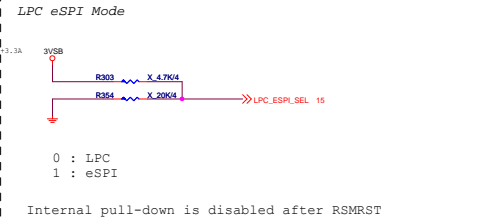
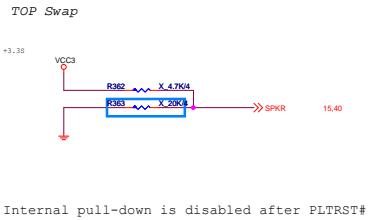
10 OF 10

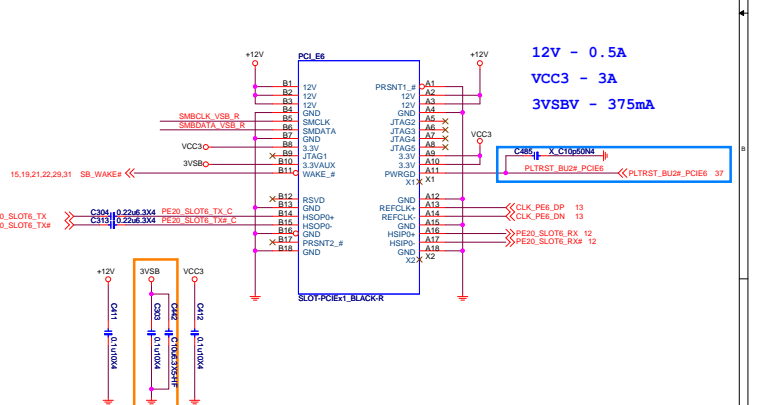
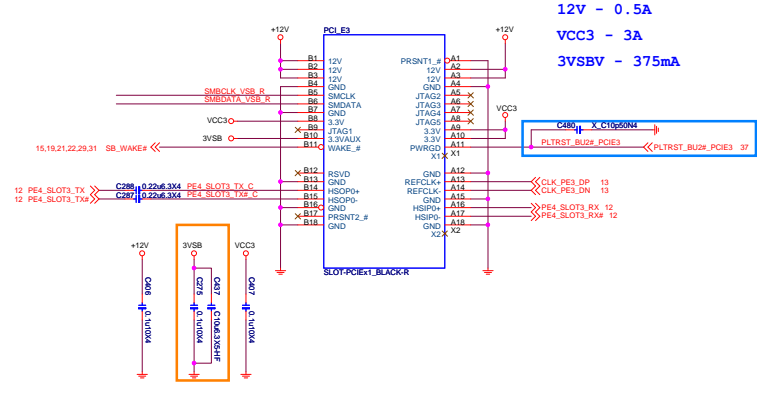
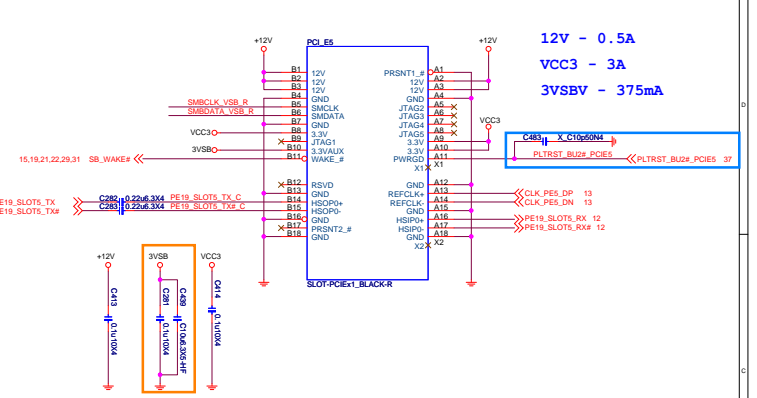
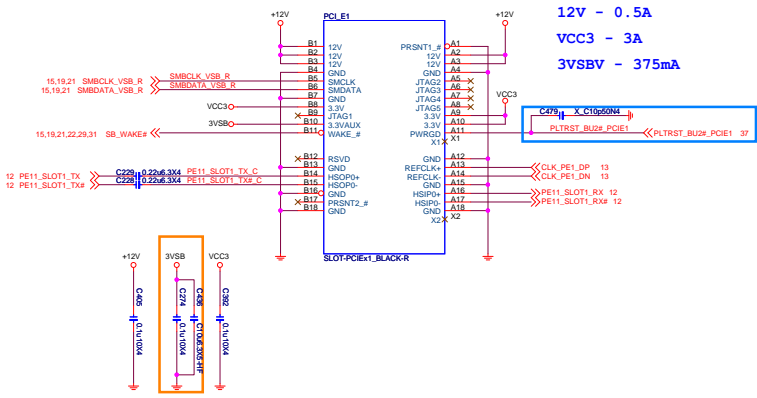


MICRO-STAR INT'L CO.,LTD

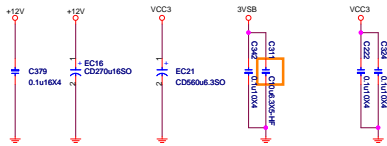
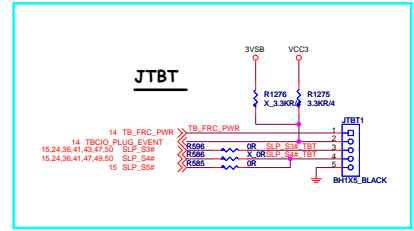
MS-7971

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Custom	PCB-GND	11
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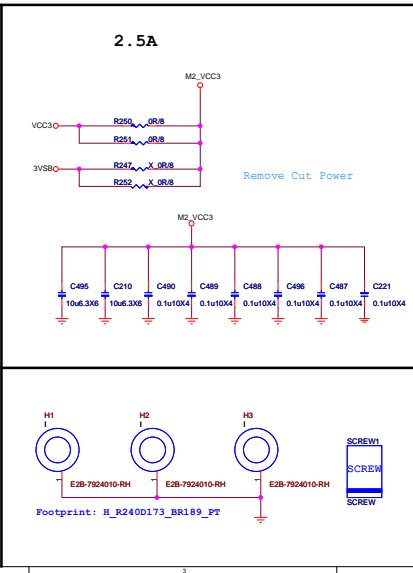
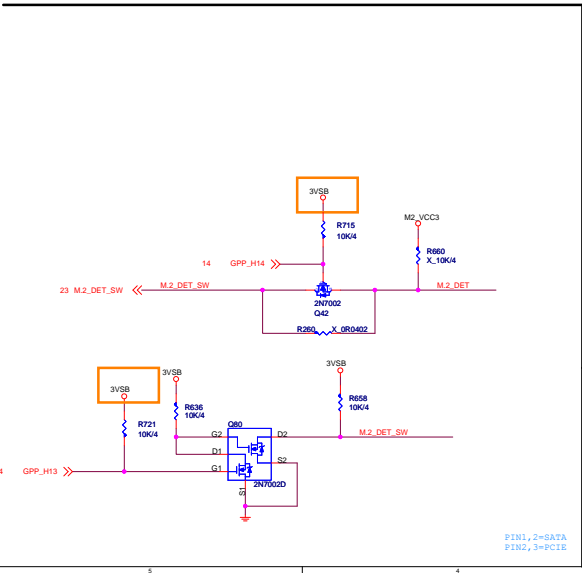
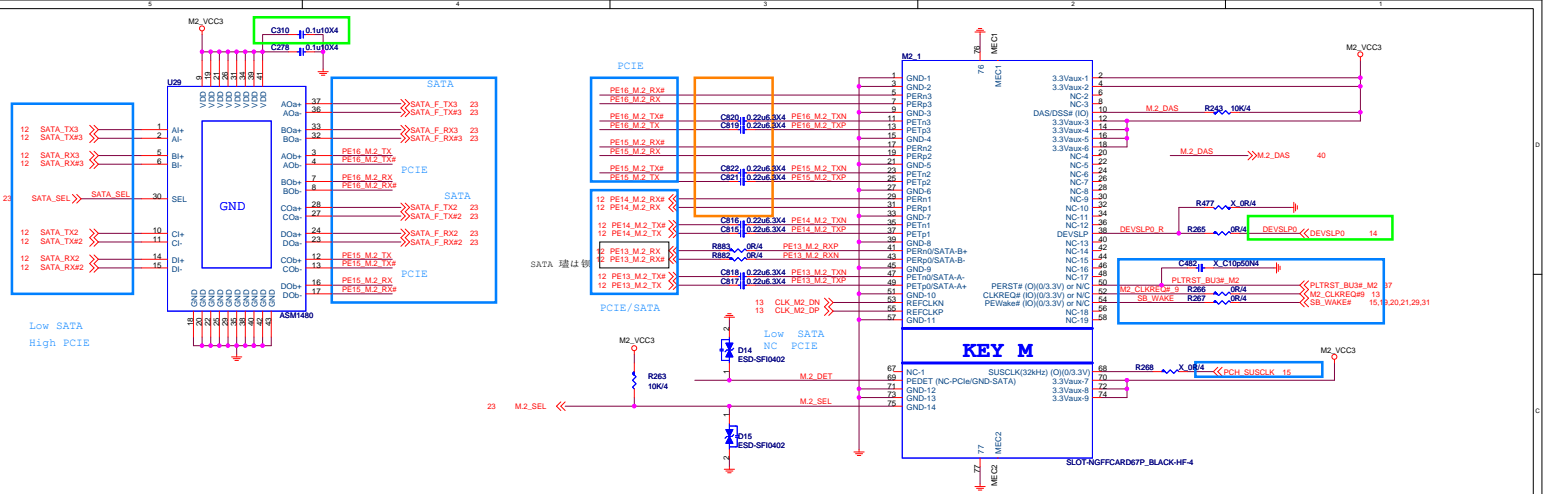




12V - 2.1A
VCC3 - 3A
3VSBV - 375mA



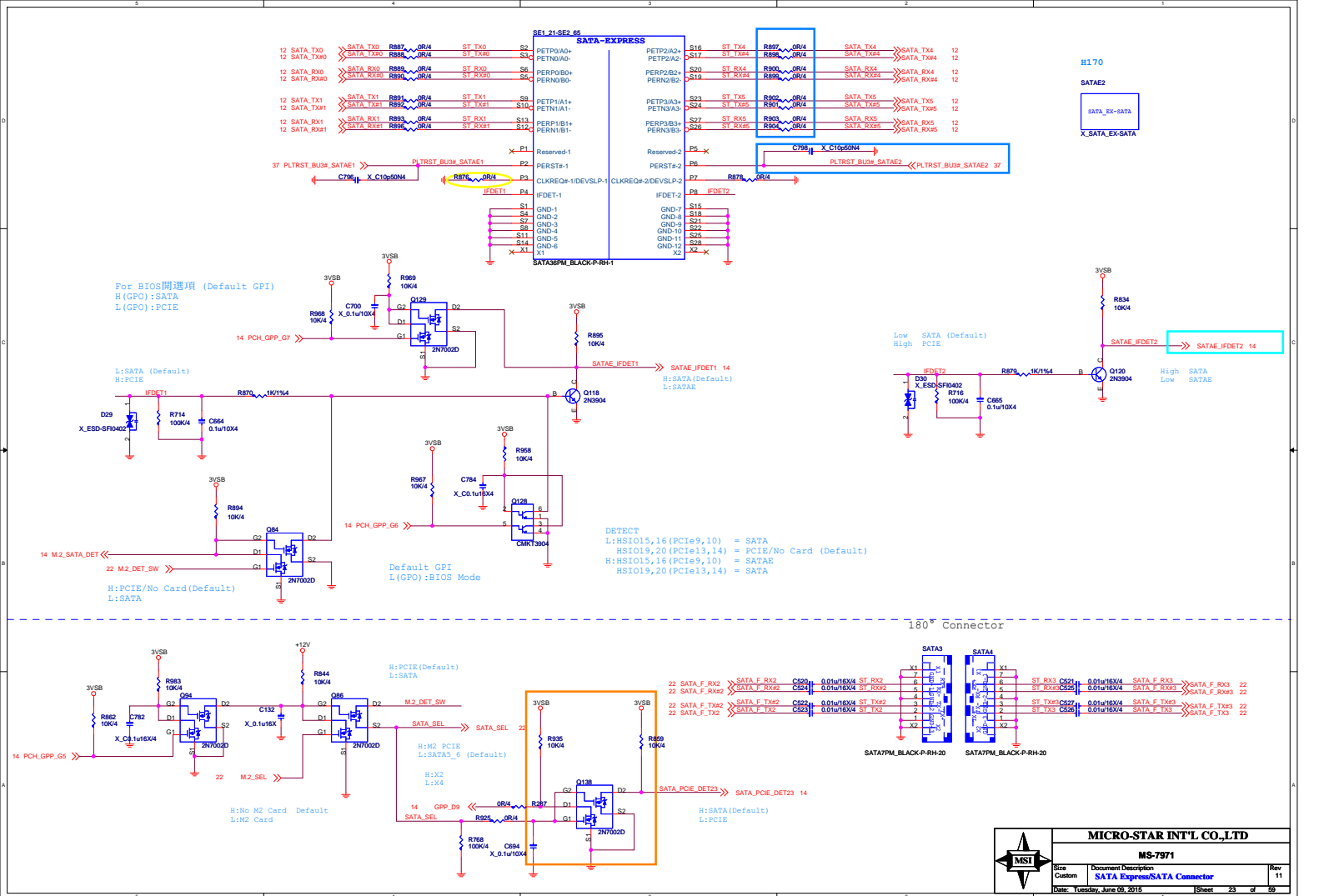
MICRO-STAR INT'L CO.,LTD		
MS-7971		
Size Custom	Document Description PCIE SLOT (X4)	Rev 11
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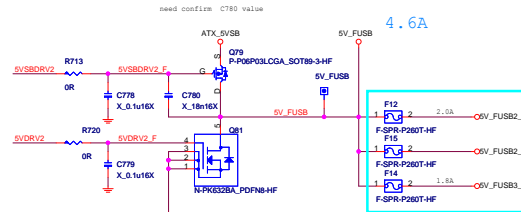
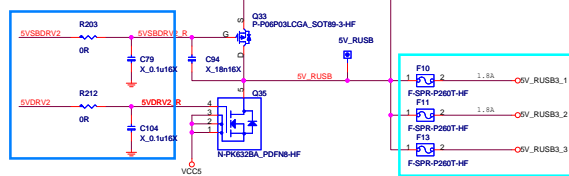
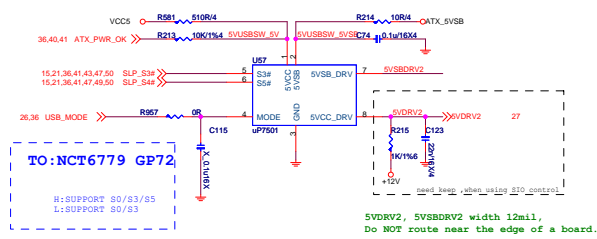
SIO_GP10	SIO_GP11	PCIE_GPP_C21	SATA_Strap01	SATA_Strap23	SIO_GP16	Mode
0	0	1	1	1	1	M2-SATA
1	0	0	0	0	0	M2-PCIe
1	1	0	1	1	1	AUTO No M2 Card
1	1	1	1	1	1	AUTO M2-SATA
1	1	0	0	0	0	AUTO M2-PCIe

Signal change Reference Layer.

MICRO-STAR INT'L CO.,LTD
MS-7971
Size: Custom
Document Description: M.2 Card SLOT
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REAR USB PORT POWER

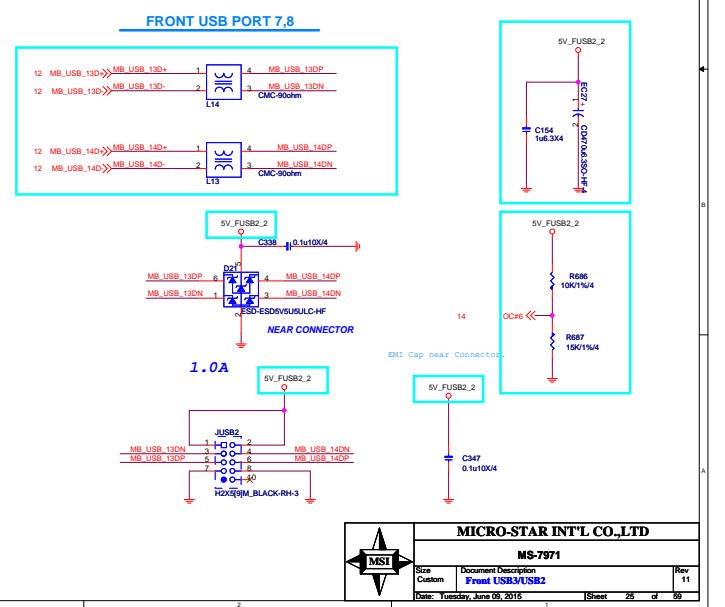
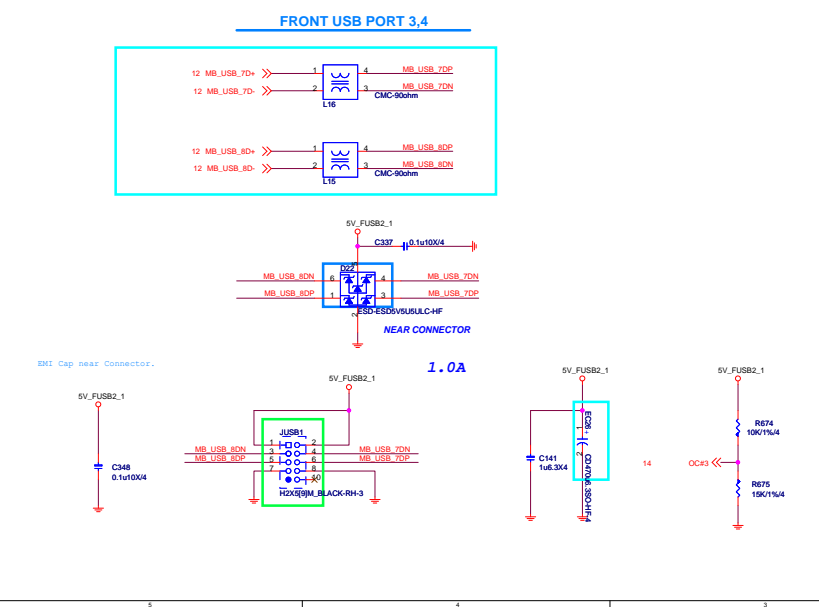
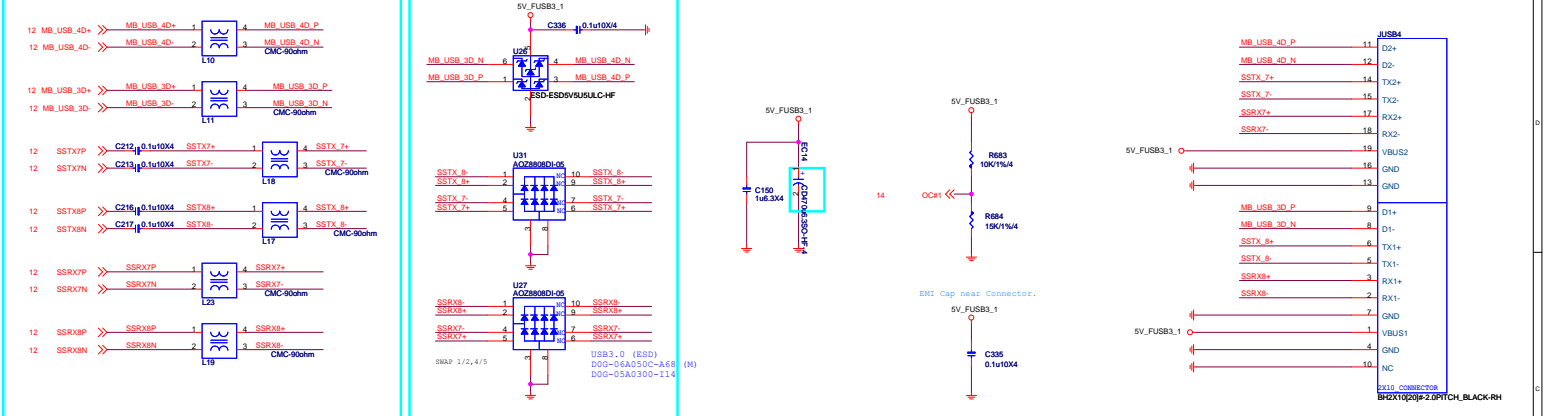


P-MOS
D03-06P0319-N03

N-MOS
D03-510BA0C-N03
D03-3056M00-U47
D03-4C05N03-005
D03-3830D09-N47
D03-632BA0C-N03

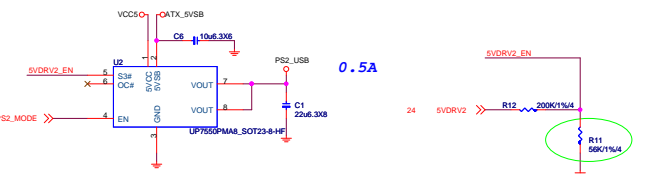
D08-2000300-P16 (Itrip=3.5A; 0.003ohm)
D08-0300700-P16 (Itrip=2.6A; 0.015ohm)

MICRO-STAR INT'L CO.,LTD			
MS-7971			
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Custom	USB POWER-MP1495/UP7501	11	
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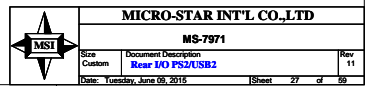


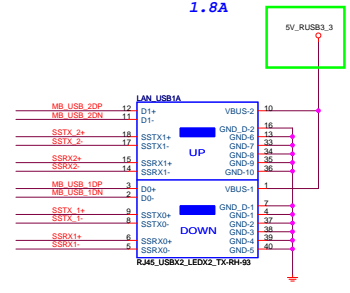
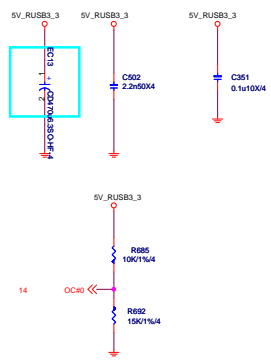
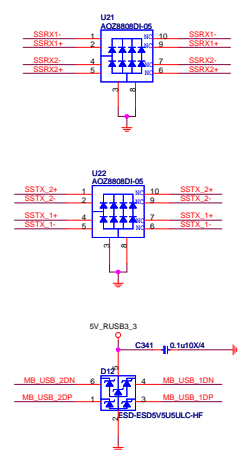
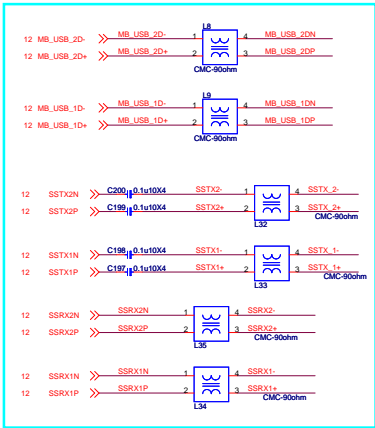
MICRO-STAR INT'L CO.,LTD			
MS-7971			
Size	Document Description	Rev	
Custom	Front USB3/USB2	11	
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USB MODE



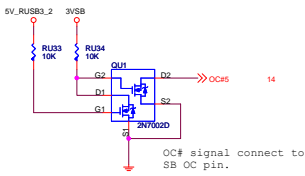
1.8A





USB3_0 (ESD)
DQG-06A050C-A6B (M)
DQG-05A0300-114

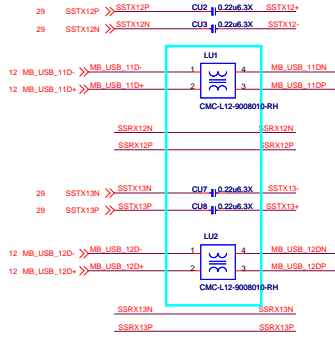
MICRO-STAR INT'L CO.,LTD		
MS-7971		
Size	Document Description	Rev
Custom	Real I/O USB3	11
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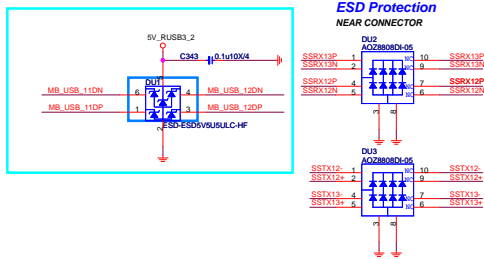
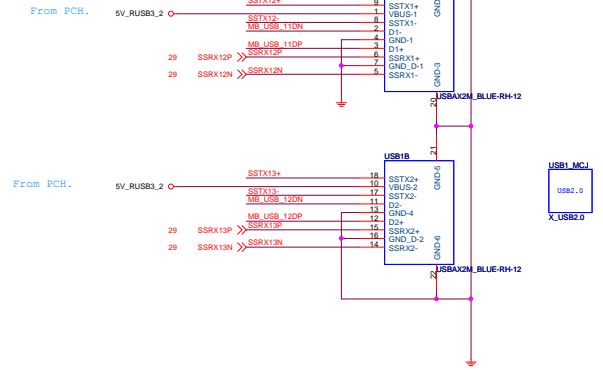
Rear USB3 CONN

USB2.0
DOG-0200529-A68 Main
DOG-0100619-105 AVL

Important---
If USB3.0 signal connect to front pin header,
please must less than 1.5 inch, short trace
has better eye diagram with some bad by cable by SI customer.



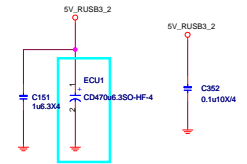
填layout 丁工 簡徑 场だchoke



min 80mil.

1.8 A

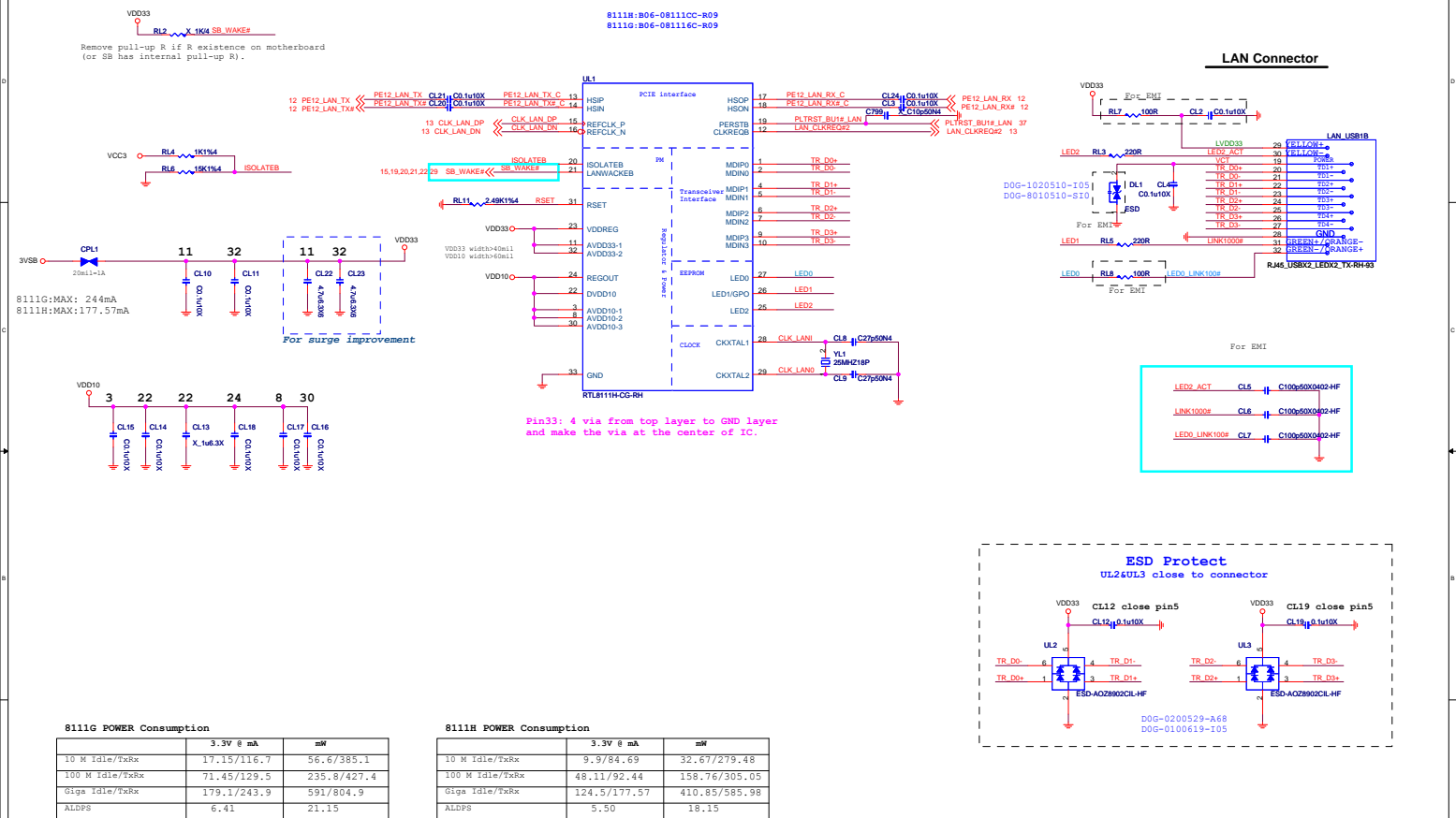
EMI Cap near Connector.

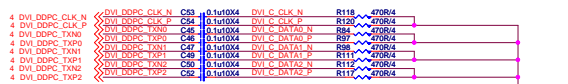


USB3.0
DOG-06A050C-A68 Main
DOG-05A0300-114 AVL

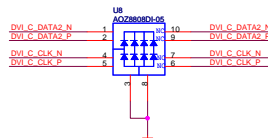
MICRO-STAR INT'L CO.,LTD			
MS-7971			
Size	Document Description	Rev	
Custom	Rear USB3.1 Connector	11	
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RTL8111G/RTL8111H Giga LAN

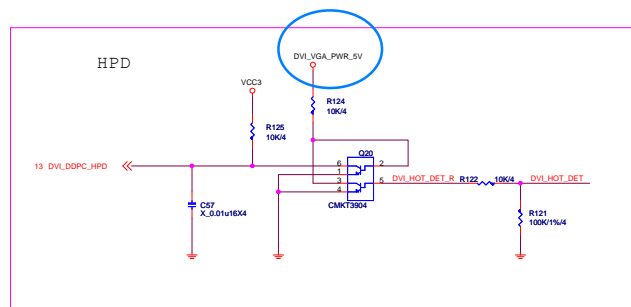
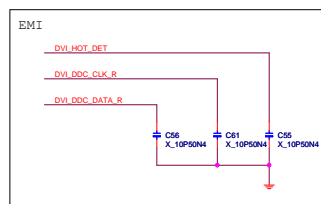
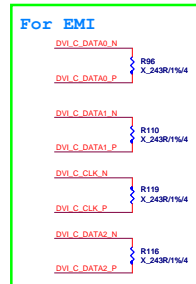
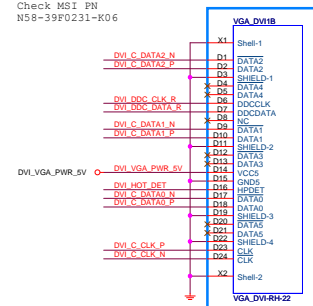
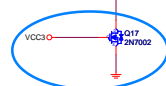
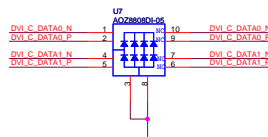




U26 AVL:D0G-05A050C-005
D0G-06A050C-A68



U27 AVL:D0G-05A050C-005
D0G-06A050C-A68

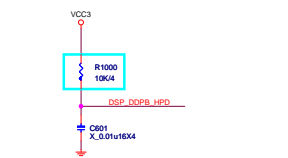
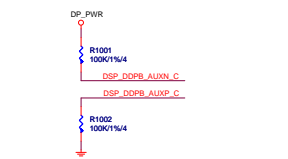
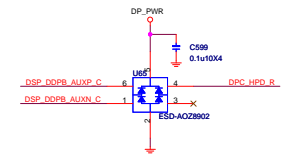
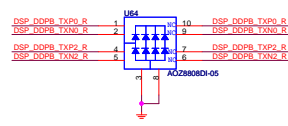
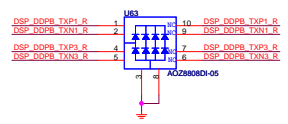


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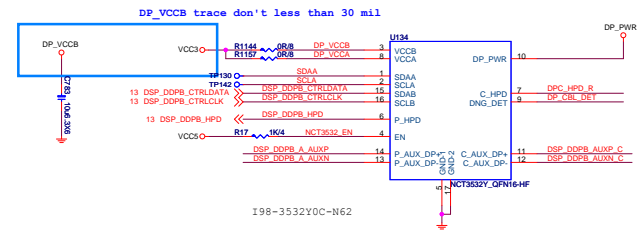
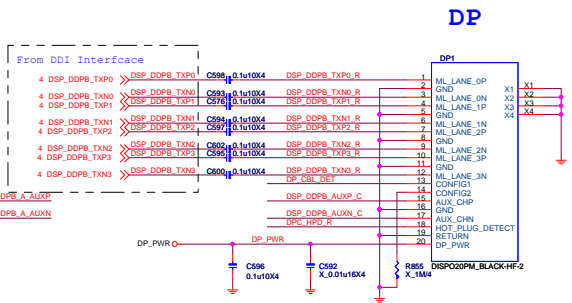
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Size	Document Description	Rev
Custom	DVI Connector	11

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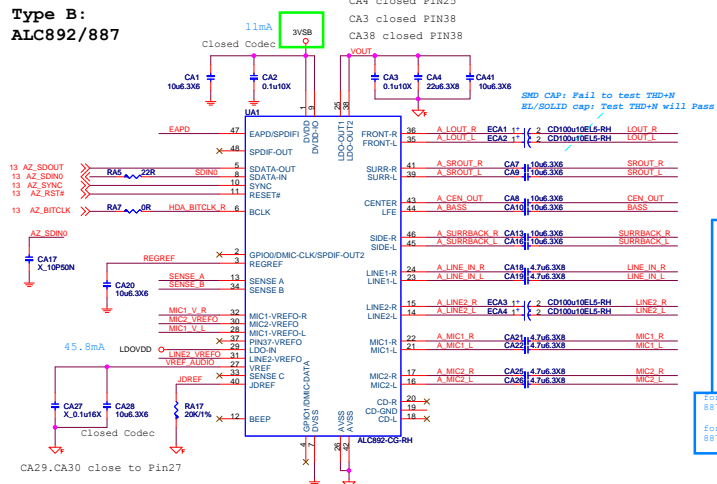


4 DSP_DDPB_AUXP >> DSP_DDPB_AUXP C599 0.1u10X4 DSP_DDPB_A_AUXP
4 DSP_DDPB_AUXN >> DSP_DDPB_AUXN C599 0.1u10X4 DSP_DDPB_A_AUXN

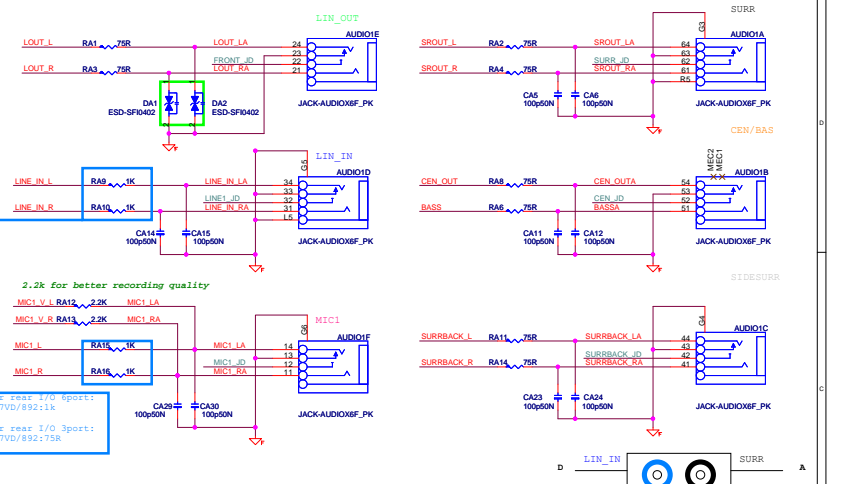
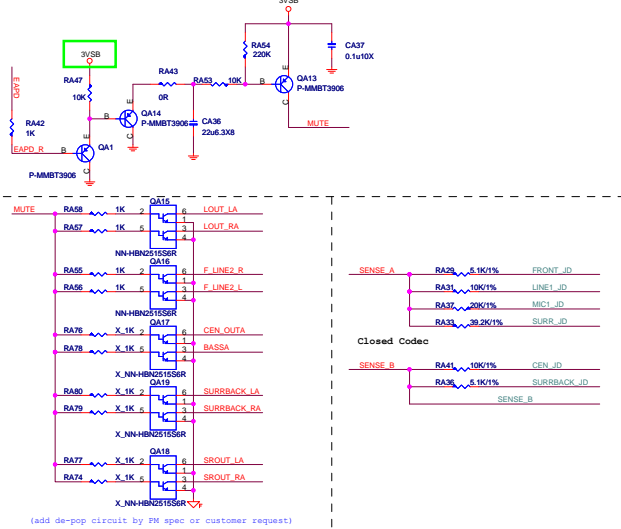


MICRO-STAR INT'L CO.,LTD			
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Size	Document Description	Rev	
Custom	DP Connector	11	
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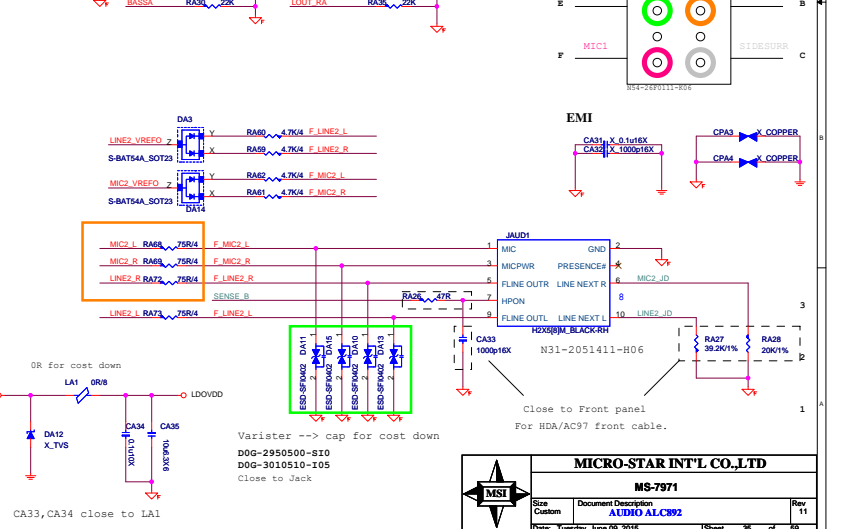
Type B:
ALC892/887




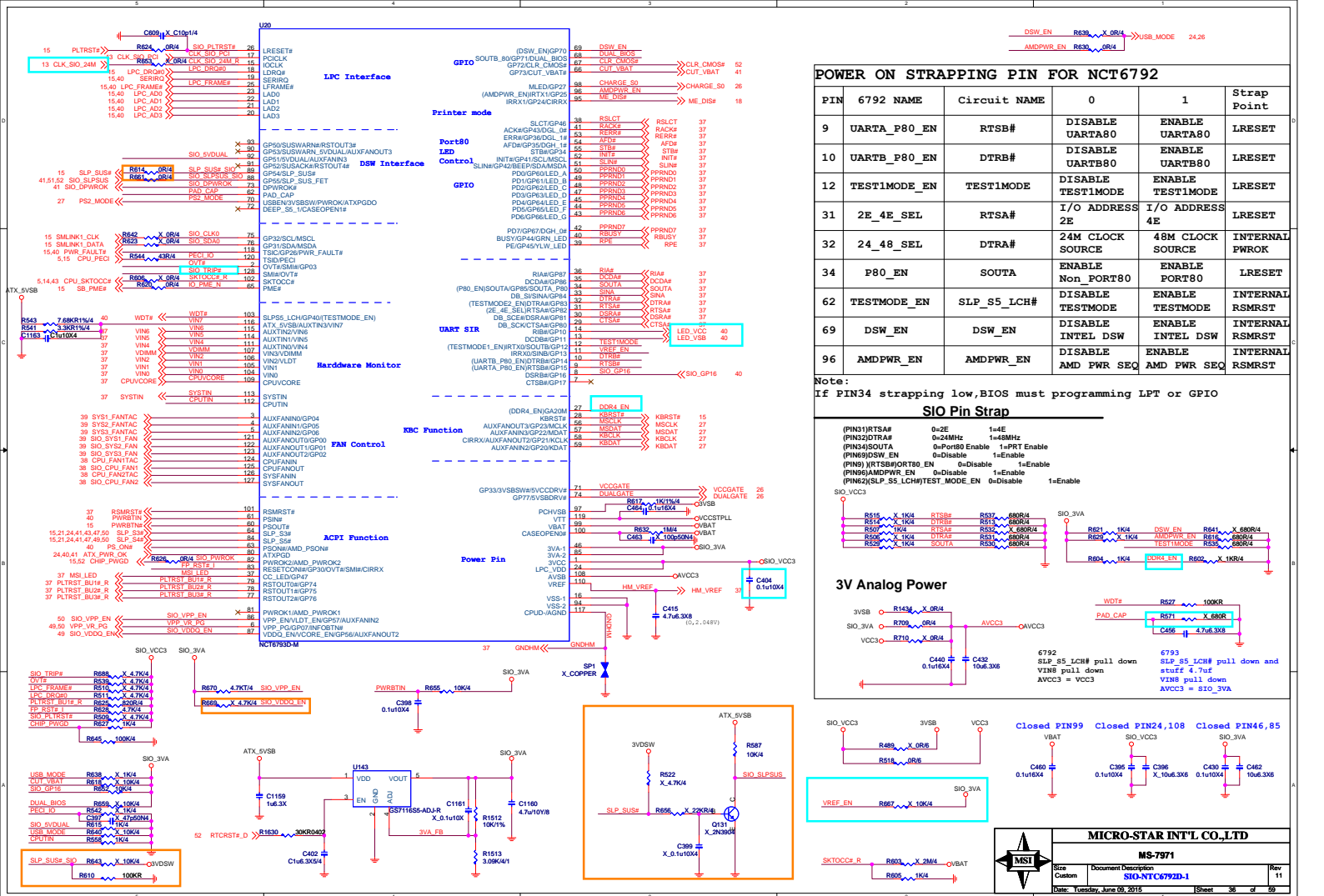
De-pop circuit for Rear Line out & Front Headphone out



De-pop circuit for Rear Line out & Front Headphone out



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	MS-7971		
	Size	Document Description	Rev
	Custom	AUDIO ALC892	11
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		Sheet	35 of 59



HW Monitor - Voltage

SERIAL PORT 1

SIO_VCC3

NO USE UART PORT1

PARALLAL PORT

Thermal Monitor

Close JBAT1

N31-2131151-H06 : 2.0mm
N31-2131131-H06 : 2.54mm

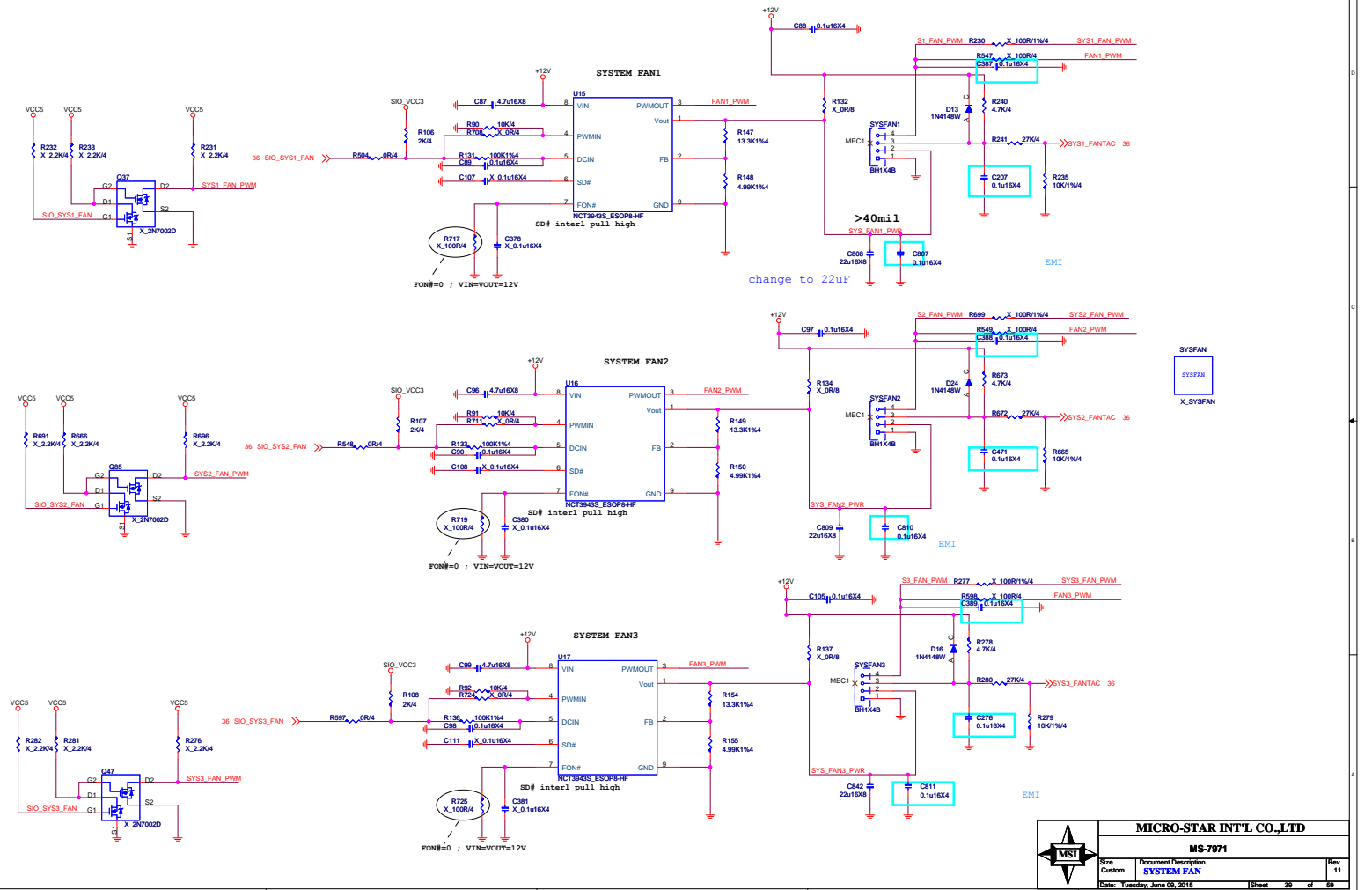


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Type H : 4/3 PIN SYS FAN FROM NCT3943S(USE SIO CUT POWER)



Front Panel

The schematic diagram illustrates the front panel connections for the HTX4M_BLACK4R1 board. Key components and their connections are as follows:

- JFP2 (HTX4M_BLACK4R1)** is connected to **JFP1 (H2X10M_BLACK4R1)** via pins 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.
- D28 (1N4148W)** is connected to **VCC5** and **NC**.
- RH17 (150R/8P4R)** is connected to **VCC5** and **NC**.
- C804 (0.1uF/10K4)** is connected to **VCC5** and **NC**.
- C828 (0.1uF/10K4)** is connected to **VCC5** and **NC**.
- C829 (X_0.1uF/10K4)** is connected to **VCC5** and **NC**.
- C826 (X_0.1uF/10K4)** is connected to **VCC5** and **NC**.
- C827 (X_0.1uF/10K4)** is connected to **VCC5** and **NC**.
- R706 (330R/6)** is connected to **VCC5** and **NC**.
- R714 (33R/4)** is connected to **VCC5** and **NC**.
- R712 (100R/1%4)** is connected to **VCC5** and **NC**.
- R707 (10K/4)** is connected to **VCC5** and **NC**.
- R708 (2N3904)** is connected to **VCC5** and **NC**.
- LEDs** (HDD+, HDD-, SUS, PSIN, PWR, SUS, PWR, SUS) are connected to **VCC5** and **NC**.

LED

Reserve pull high to 5VDDIM if PM don't want FLED light in deep mode.

LED

LED0; default 关; LED10; default 关; LED11; default 关

JTURBO1

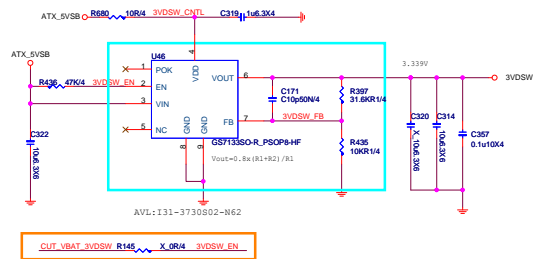
36 SIO_GP16 << 1 2 JTURBO1 CATX_SVSB
H=0 L=1
HIZENM_BLACK-RH

remove JSLOW	
--------------	--



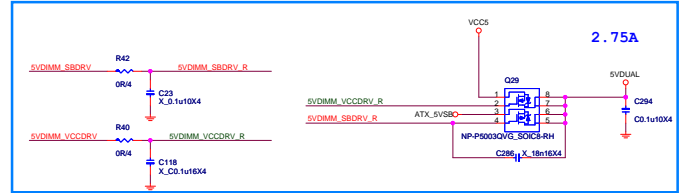
Size Custom	Document Description ATX Power/F_Panel	Rev 11
Date: Tuesday, June 09, 2015		Sheet 40 of 69

3VDSW

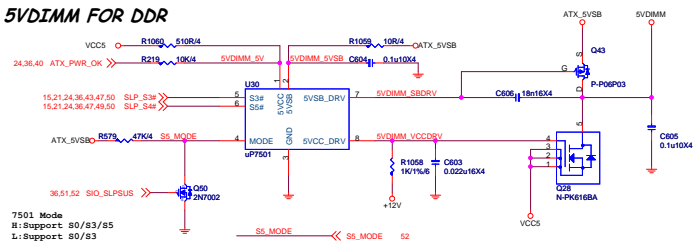


5VDUAL

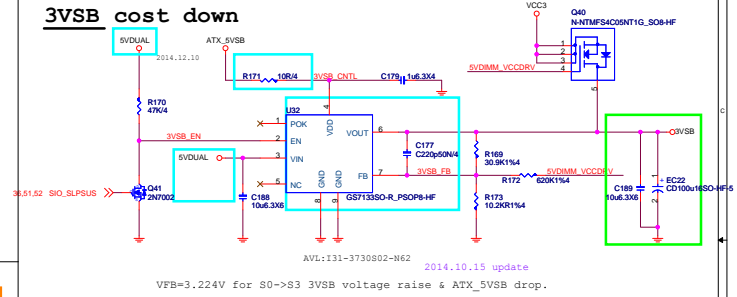
5VDUAL is power source of PCH_1VSB.



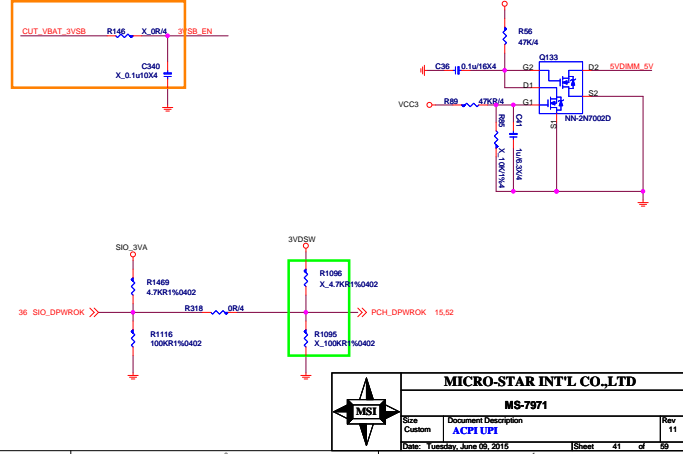
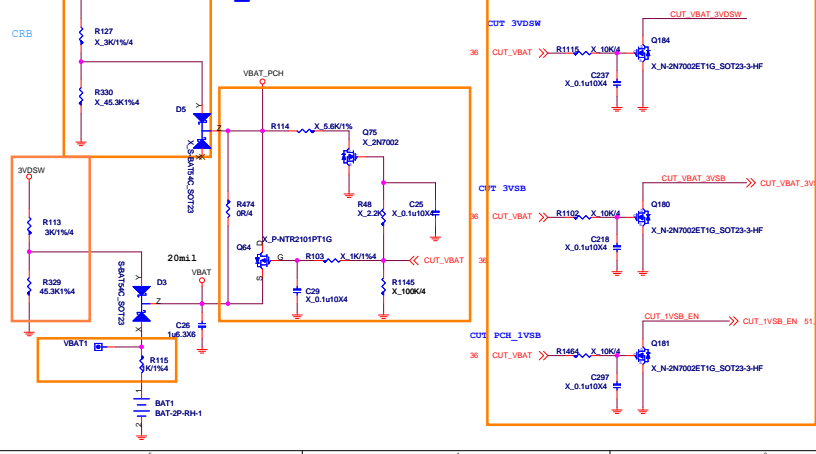
5VDIMM FOR DDR



3VSB cost down



CUT_VBAT



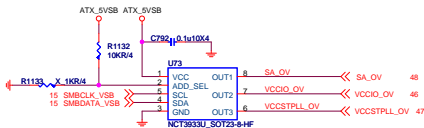
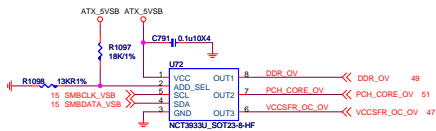
MICRO-STAR INT'L CO.,LTD		
MS-7971		
Size	Document Description	Rev
Custom	ACPI UPI	11
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Remove Cut Power.

UPI VOLTAGE CONSOLE

0x26:RH=18K,RL=13K

0x20:RH=10K,RL=OPEN



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%



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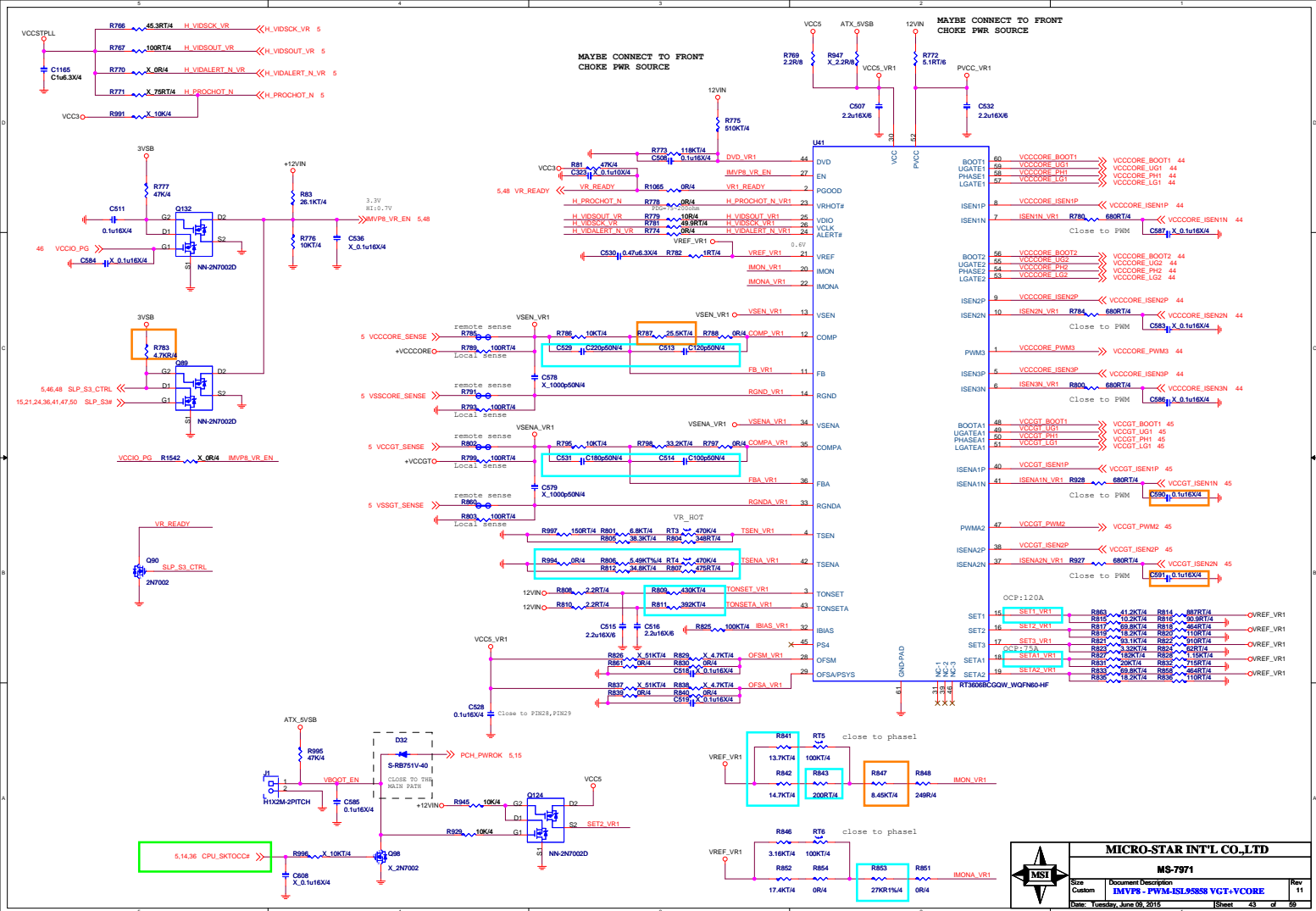
Doc: Custom

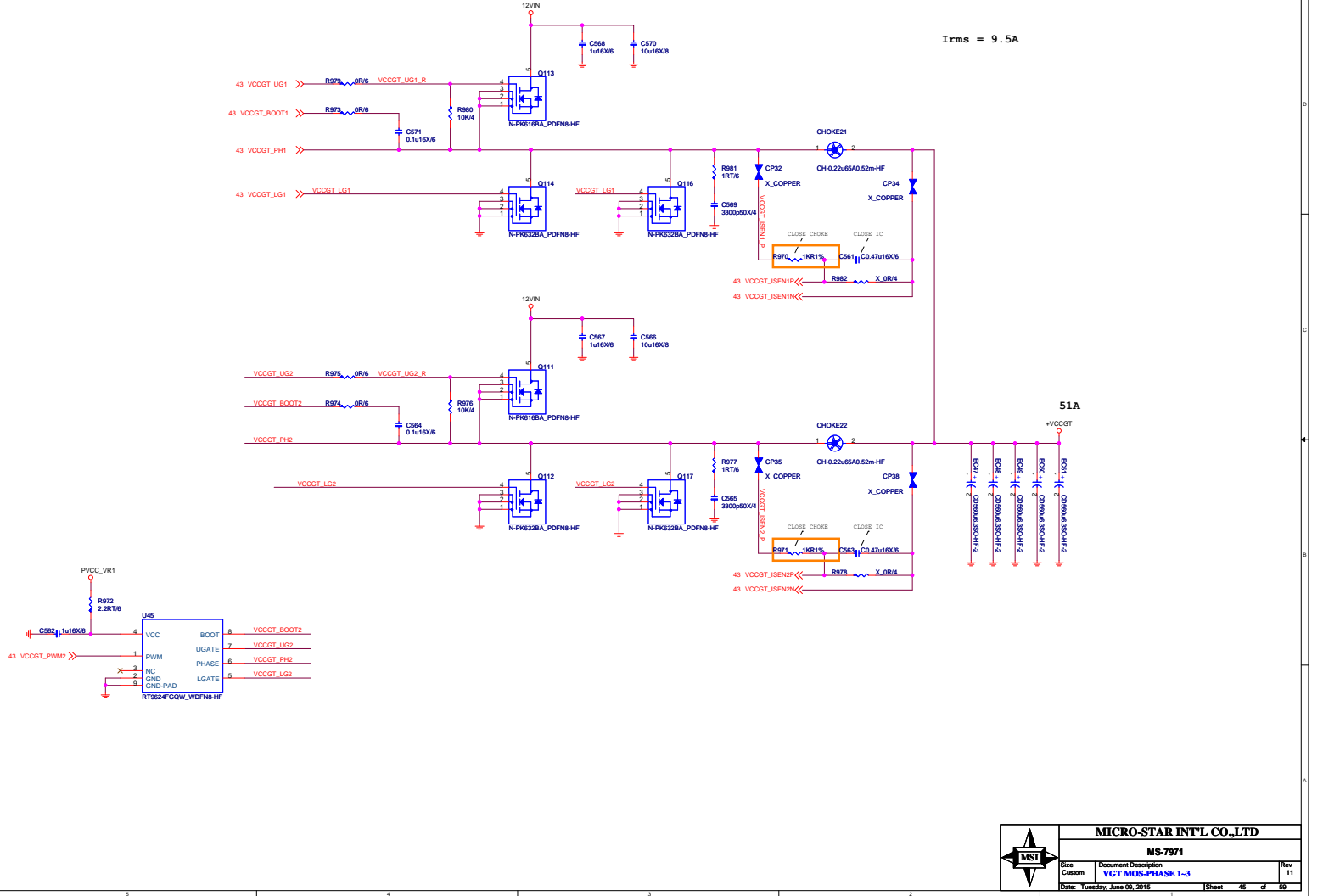
Document Description: OV-NCT3933/GPIO-NCT5605

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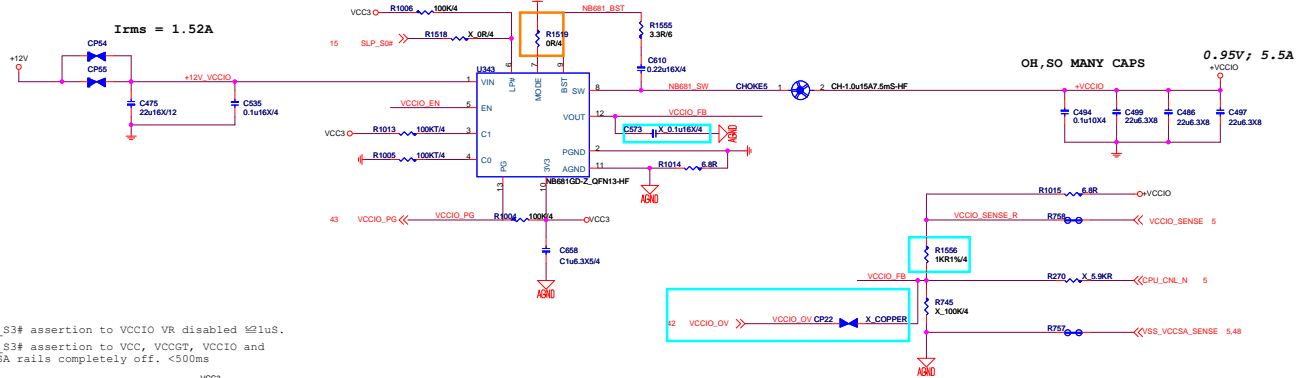
Rev: 11



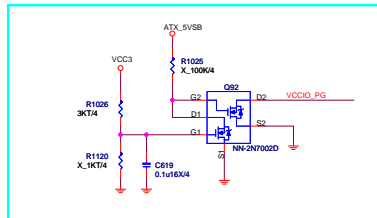
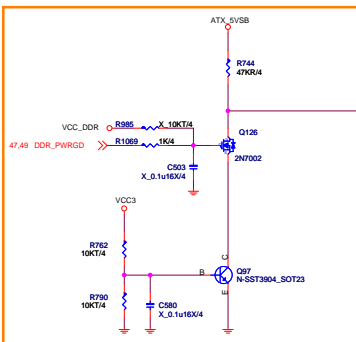


VCCIO

I_{rms} = 1.52A



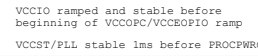
SLP_S3# assertion to VCCIO VR disabled ≤21uS.
SLP_S3# assertion to VCC, VCCGT, VCCIO and VCCSA rails completely off. <500ms



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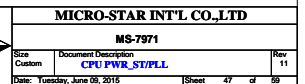
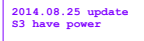
for Gaming3/5, Classic, ECO
and H110

For Cost down VCCST&VCCPLL merge



1.2V; 110mA

1.2V; 110mA



DDR4_1.2V 2.5A+9.5A+1.2A=13.2A

2.5A FOR CPU

9.5A FOR 4DIMM

1.2A FOR DDR VTT

OCp=13.2A*1.5=19.8A

RocS(R95)=OCp*Rdson(Low side)/2/10uA

=19.8A*(4.6/2)mohm/10uA

=4.95Kohm±5K

Rocpset:5.1K

OCp=Rocset*Rdson(Low side)/2/10uA

=5.1K*(5/2)mohm/10uA

=22.173A

use UBIQ MOS need Check

pull up change by layout

up1540 : C145/R102 no stuff

2014.12.25 for up1540:R52>NC

2014.12.25 for up1540:C125 is OCP set min:5K ohm

R105 stuff 5.1K OCP SET:22.173A

2014.12.25 for up1540:stuff R55->OR

2014.12.25 for up1540:stuff R55->OR

2014.12.25 for up1540:stuff R55->OR

2014.12.25 for up1540:stuff R55->OR

2014.12.25 for up1540:stuff R55->OR

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2014.12.25 for up1540:stuff R55->OR

2014.12.25 for up1540:stuff R55->OR

2014.12.25 for up1540:stuff R55->OR

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2014.12.25 for up1540:stuff R55->OR

2014.12.25 for up1540:stuff R55->OR

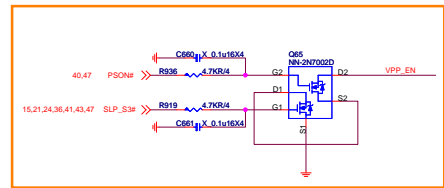
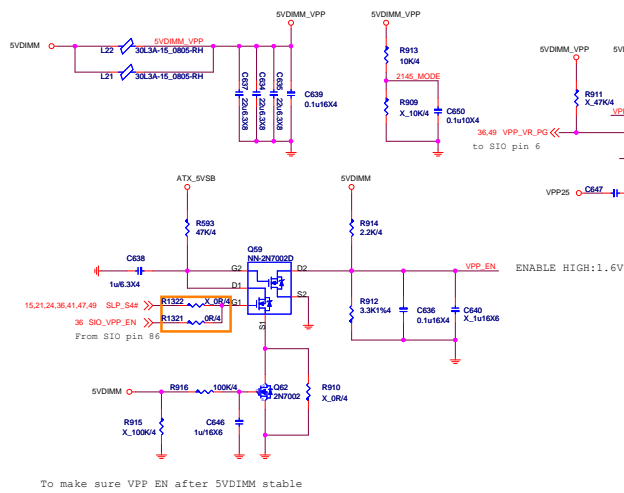
2014.12.25 for up1540:stuff R55->OR

2014.12.25 for up1540:stuff R55->OR

2014.12.25 for up1540:stuff R55->OR

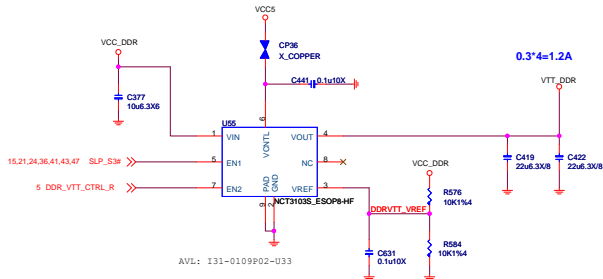
2014.12.25 for up1540:stuff R55->OR

VPP25 Power
2.5V; 2.24A



DDR VTT Power

To CPU Copper trace width > 250mils , Fill island behind DIMM > 400mils .



PCB



PDO-0791810-G37, 弘6, 23, 脚 吹邻红 (MSIS)
PDO-0791810-G37, 弘6, 77, 脚 吹邻红 (MSIS)
PDO-0791810-E48, 脚地, 23, 脚 吹邻红 (MSIS)
PDO-0791810-E48, 脚地, 77, 脚 吹邻红 (MSIS)

CPU Socket



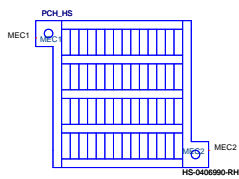
Battery



BIOS Label



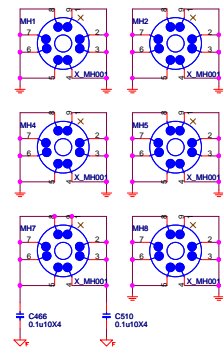
Z170_MCJ



MOS1 Heatsink

MOS2 Heatsink

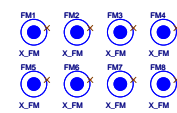
Mounting Holes



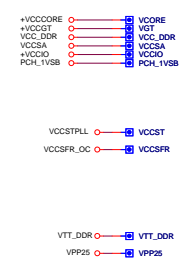
Simulation



Optical Fiducial Marks-120



Test point



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