

MS-7A38 Ver:3.0

CPU:

AMD AM4

System Chipset:

Promontory B350/A320

(Value DIY or System Builder)

Main Memory:

DDR IV * 4 MAX:64 GB

VRM

RT8894 4+2

On Board Chipset:

LPC Super I/O --NCT6795D

LAN RTL8111H

Azalia CODEC - Realtek ALC887

Expansion Slots:

From CPU

PCI Express X16 Slot * 1

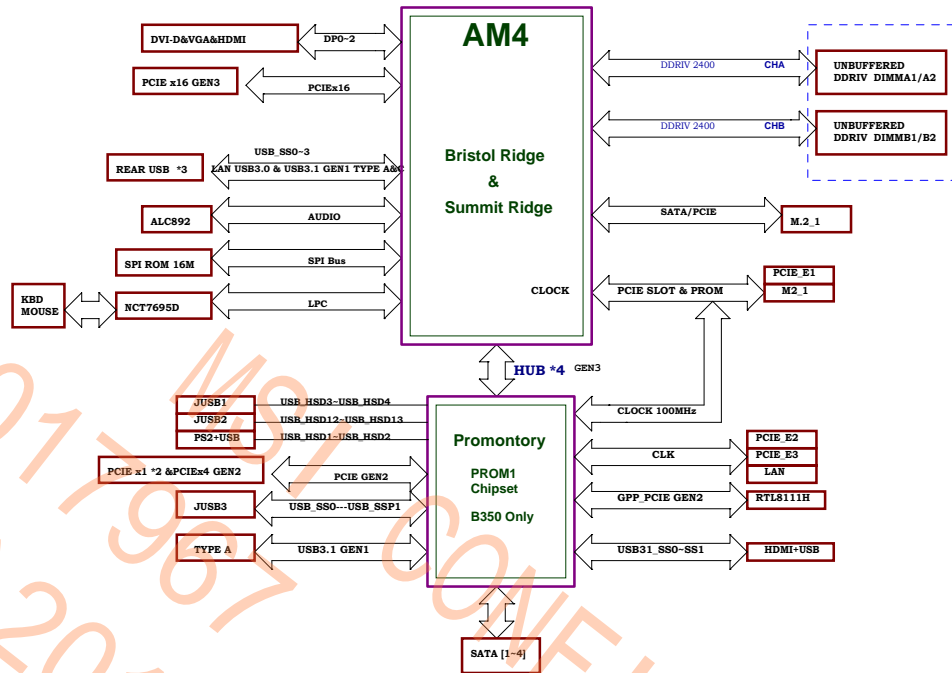
PCI Express X1 Slot * 1

PCI Express X1 Slot * 1


OCF IC:

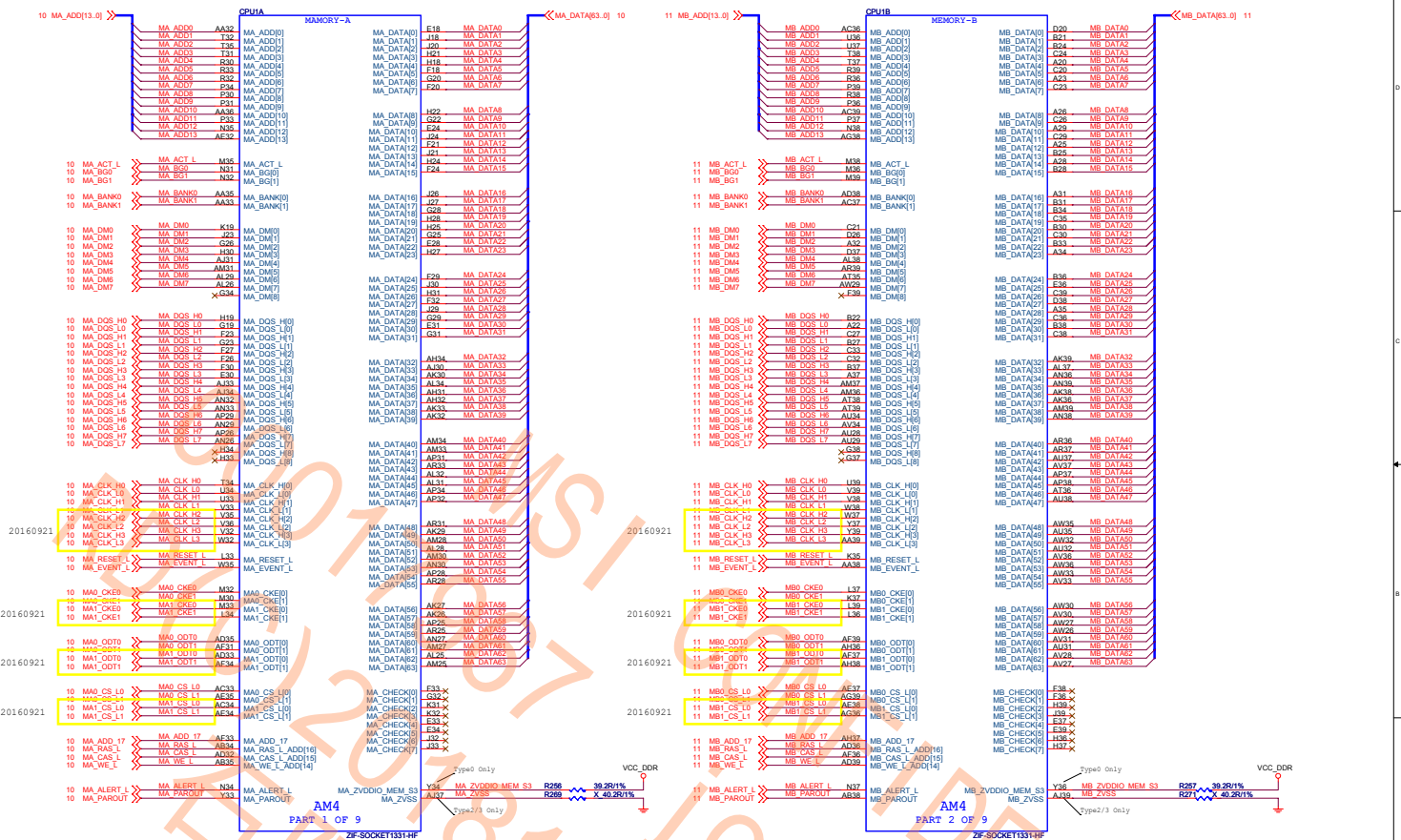
UP6273

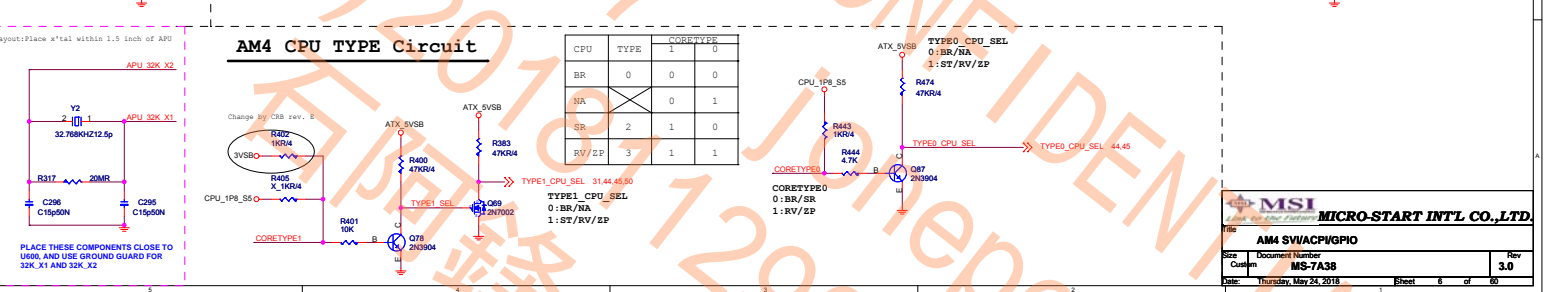
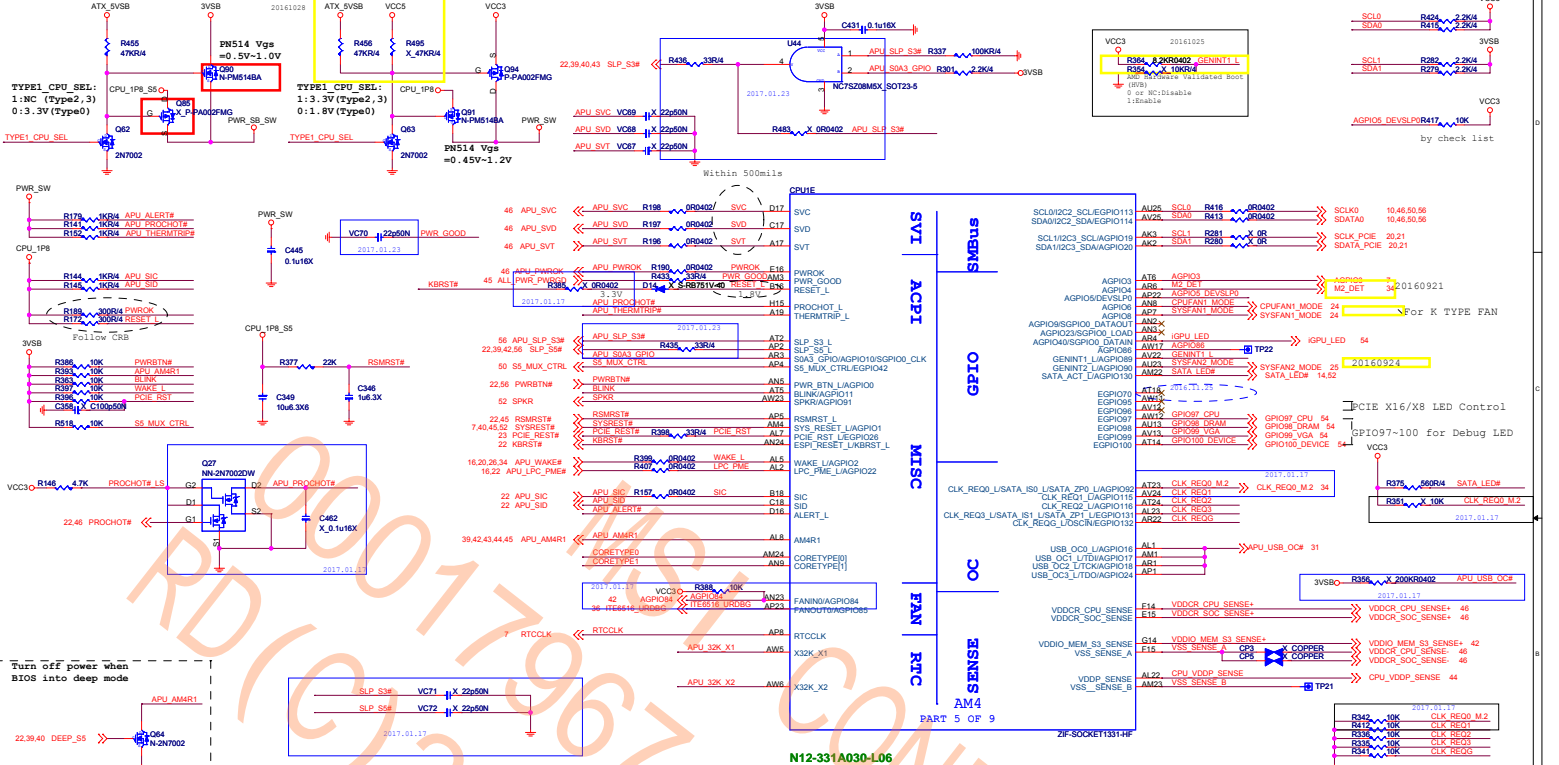
FUSION BLOCK DIAGRAM



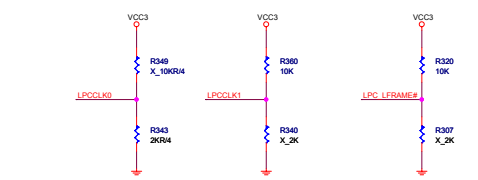
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12,13 DDR4-POWER/GND	46 CPU Power RT8894 4+2 Phase
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16 Promontory-CLK/ACPI/GPIO	50 CPU Power NB Switch/NCT3933
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Title COVER SHEET		
Size	Document Number	Rev
Sample	MS-7A38	3.0
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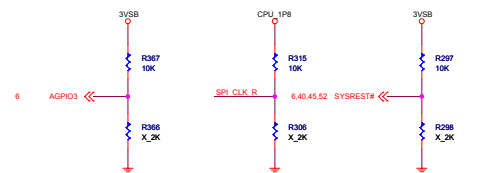




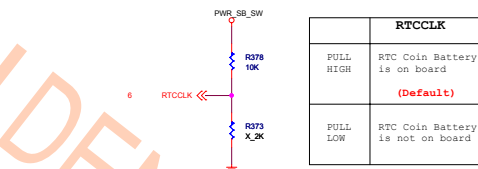
Strapping Options



	LPCCLK0	LPCCLK1	SIO_LFRAME
FULL HIGH	LPC device Boot Fail Timer Enabled	Configured for Internal clock generator (Default)	SPI ROM (Default)
FULL LOW	LPC device Boot Fail Timer Disabled (Default)	Configured for External clock generator ?????	LPC ROM

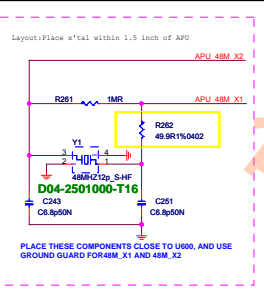
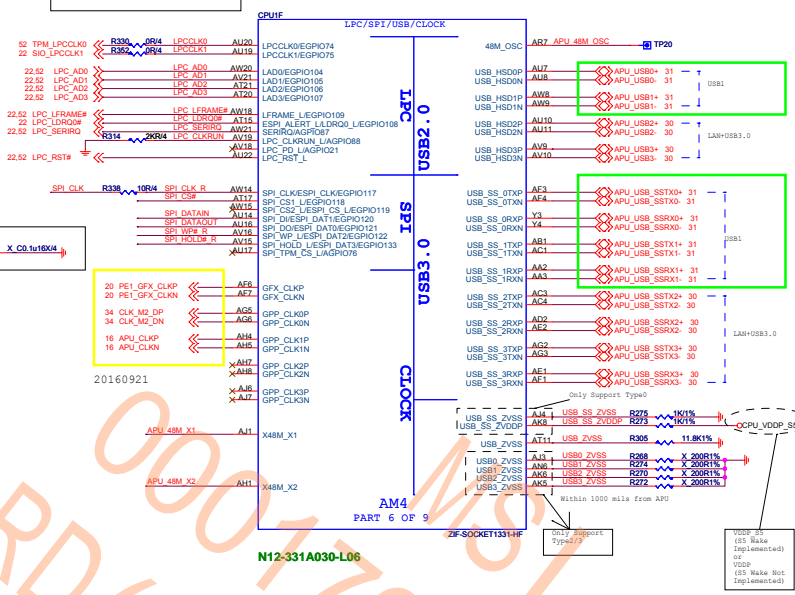


	AGPIO3	SPI_CLK	SYSREST#
FULL HIGH	Enhanced Reset logic (Default)	Use 48MHz crystal clock and generate both internal and external clocks (Default)	Normal reset mode (Default)
FULL LOW	Traditional Reset logic	Use 100MHz PCIe clock as reference clock and generate internal clocks only	short reset mode

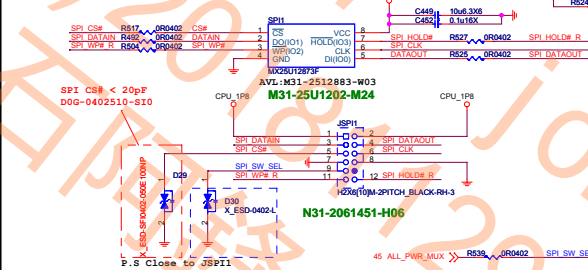


MICRO-START INTL CO., LTD.	
File	AM4 LPC/SPH/USB/CLK/STRAP
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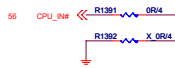
100%
LPCCLK1 C314 X C0.1uF6X4



SPI ROM (1.8V)



RD (00071967) CONFIDENTIAL (00068760) RMA 工程課



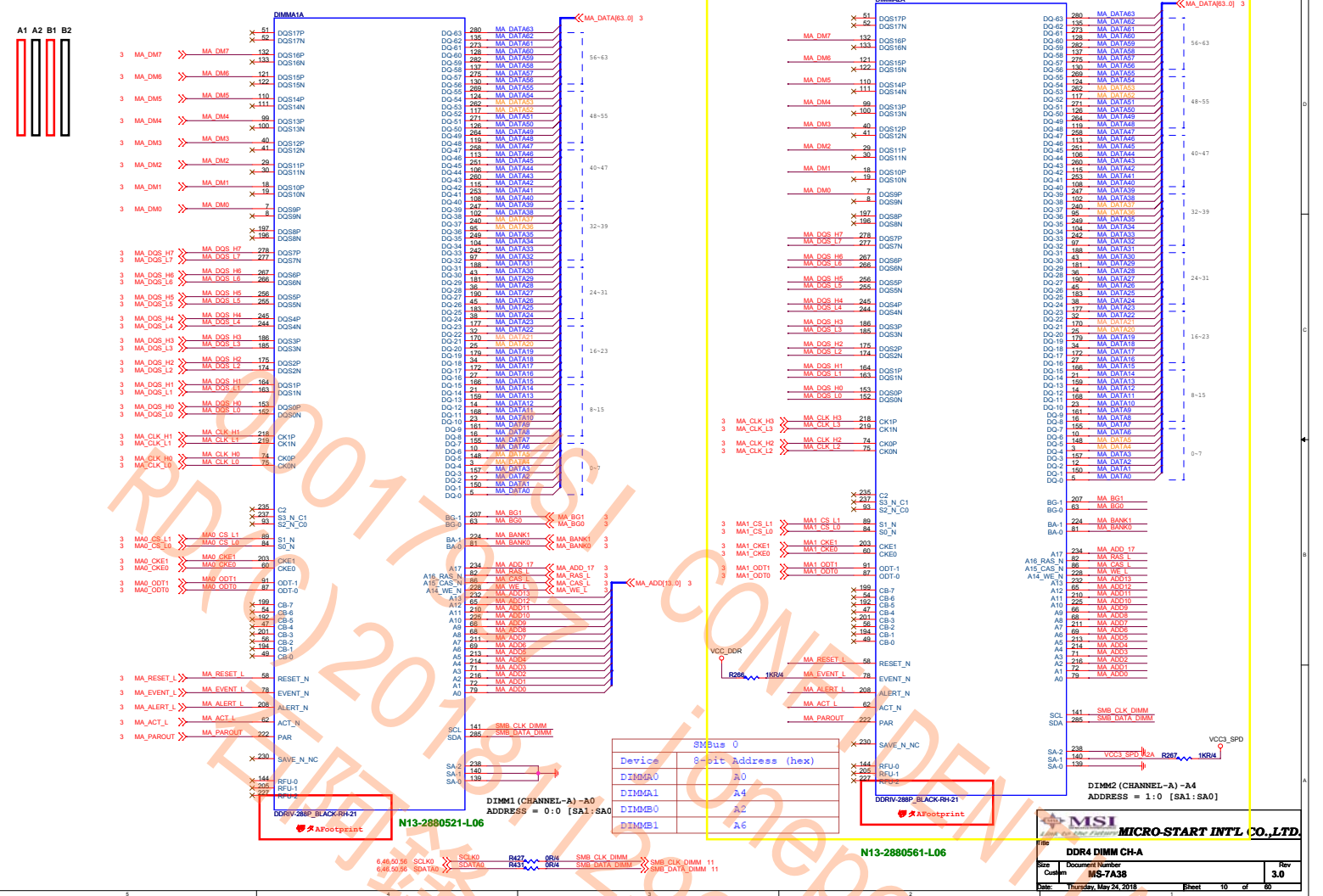
GND

AM4
PART 9 OF 9

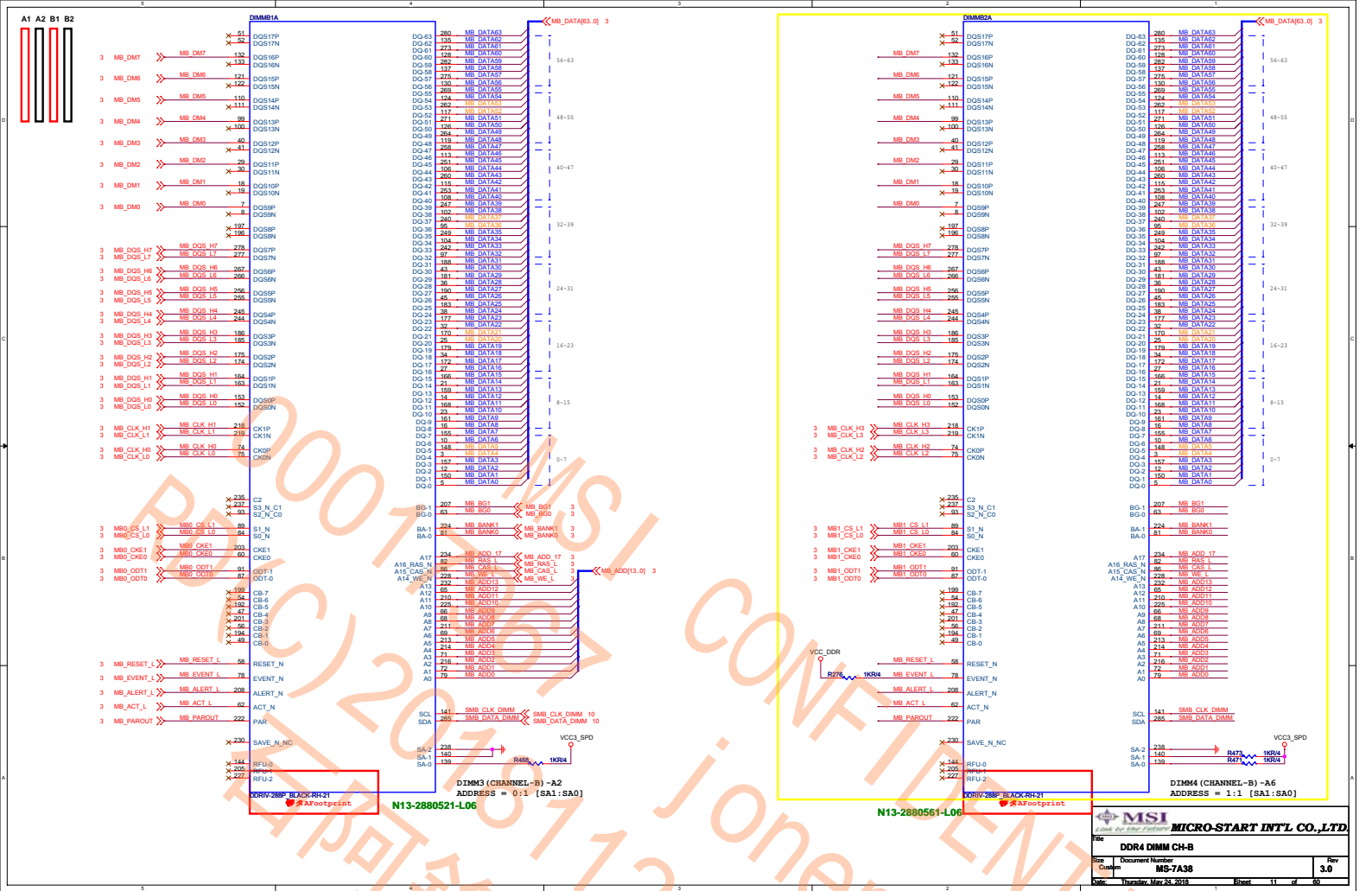
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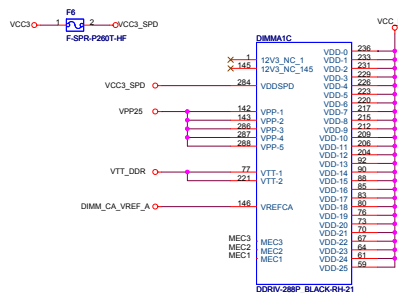
MSI
MICRO-START INTL CO., LTD.

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Customer: MS-7A38		
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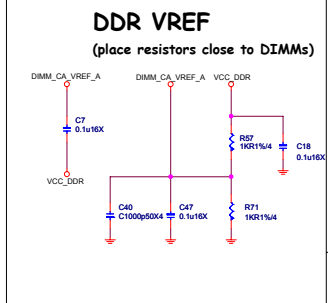
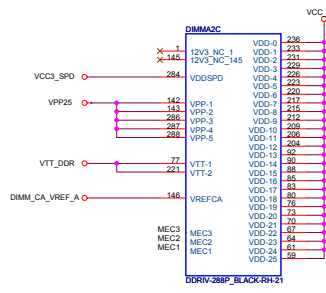


MSI			
MICRO-START INT'L CO., LTD.			
DDR4 DIMM CH-A			
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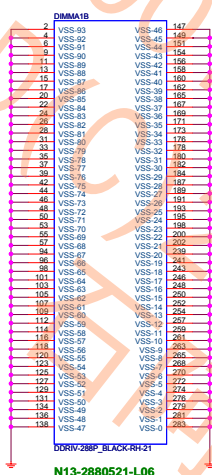
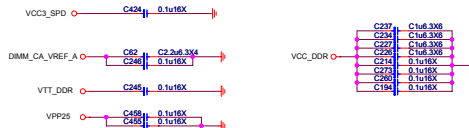
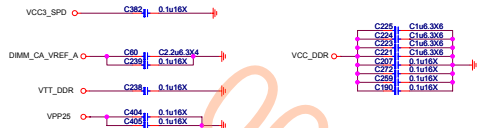


DIMM SLOT PN BY SPEC

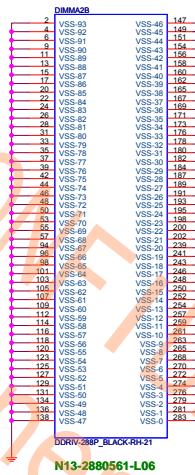


N13-2880521-L06

N13-2880561-L06



N13-2880521-L06

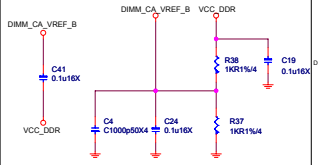


N13-2880561-L06

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File: DDR4-POWER/GND-1		
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DDR VREF

(place resistors close to DIMMs)



MSI MICRO-START INTL CO.,LTD.		
DDR4-POWER/GND-2		
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N13-2880521-L06

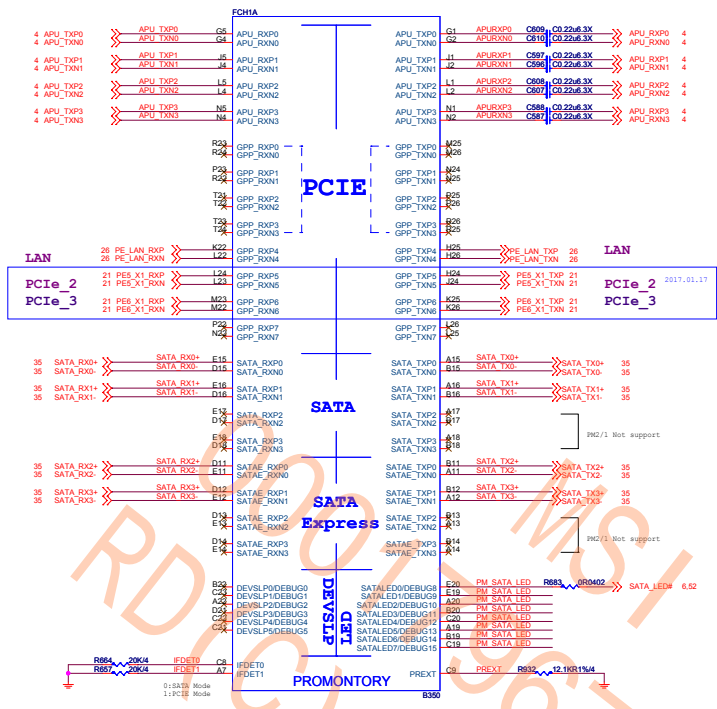
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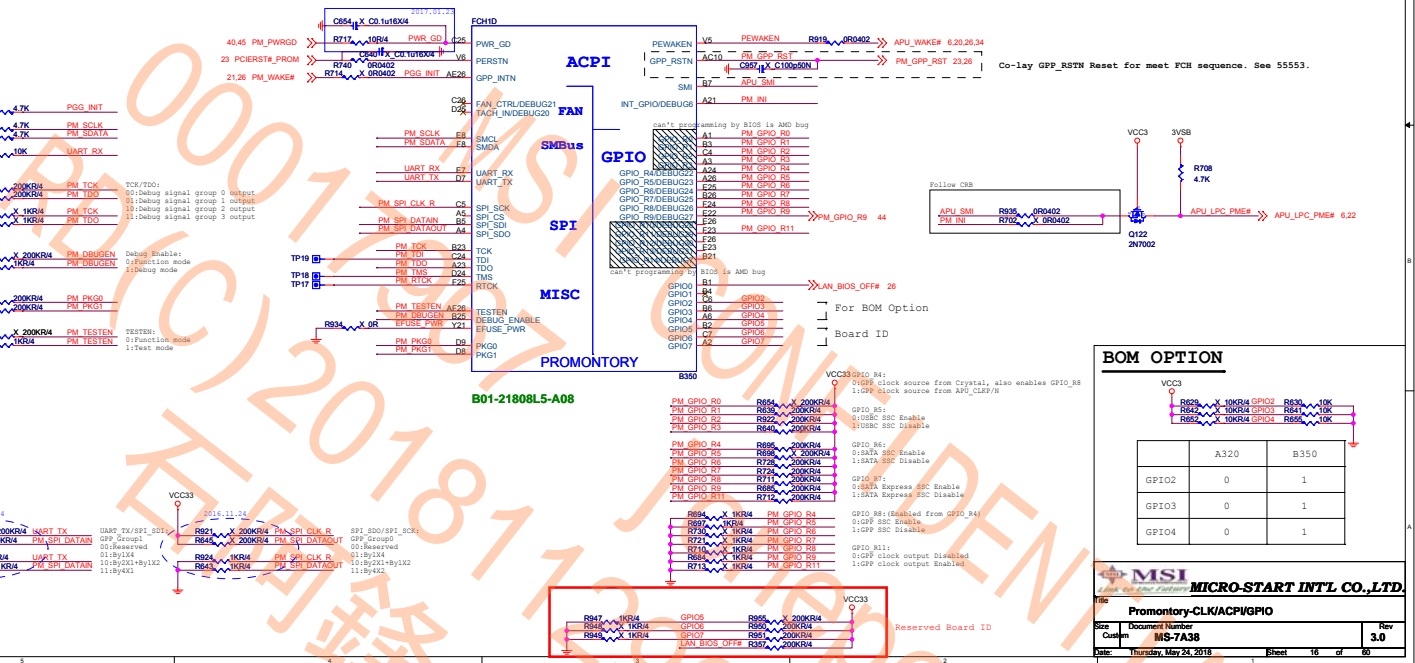
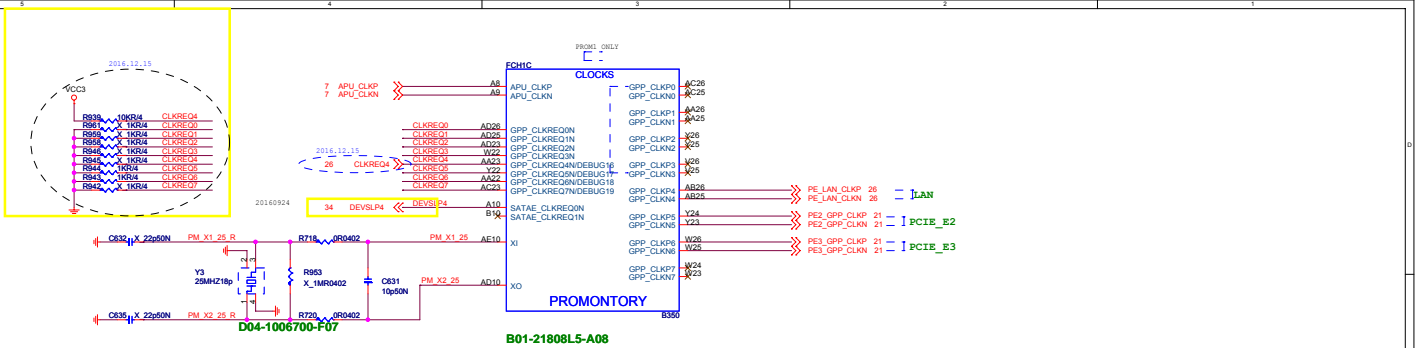
DIMM1B

DIMM2B

N13-2880521-L06

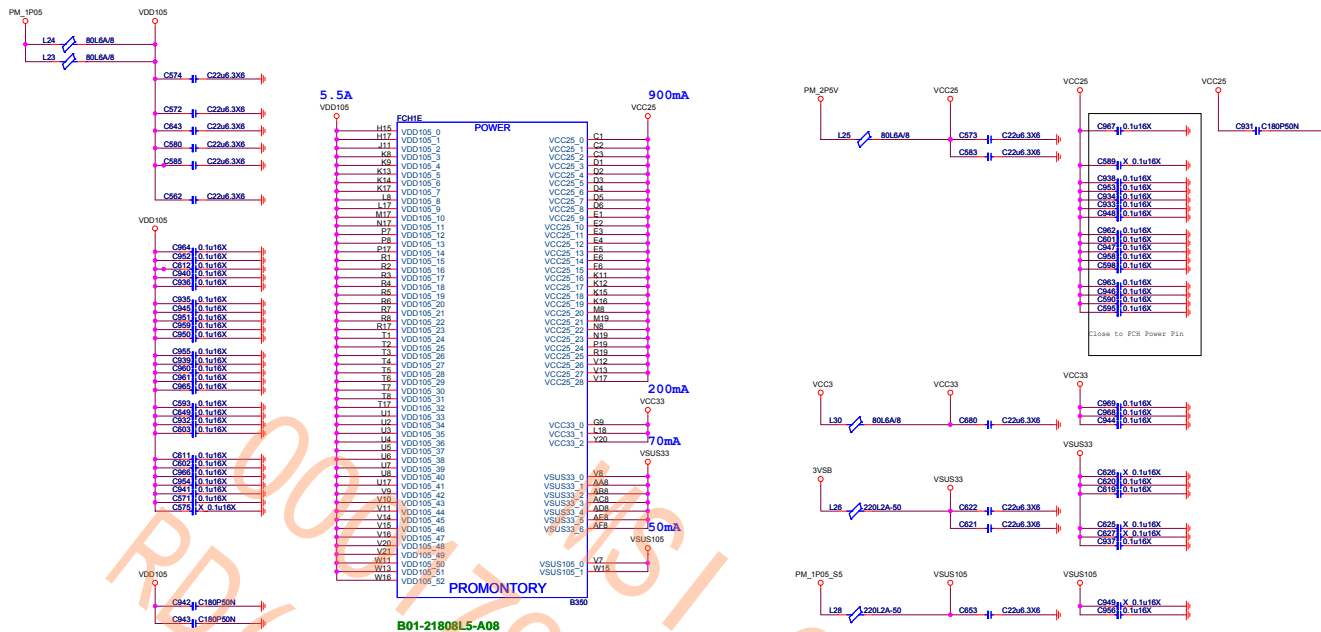
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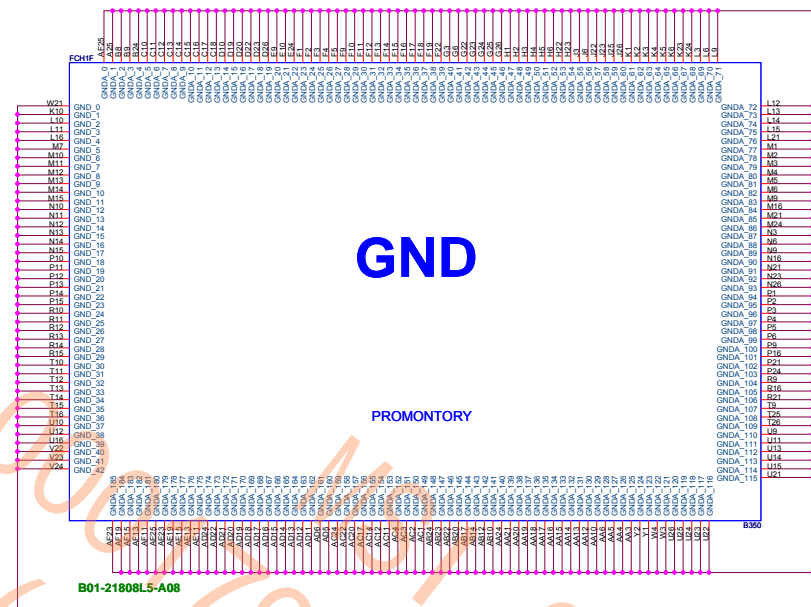





BOM OPTION	
<p>VCC3</p> <p>3V3B</p> <p>R708 4.7K</p> <p>Q122 2N7002</p> <p>APU_SMI R935 GR0402</p> <p>APU_LPC_PME# APU_LPC_PME# 6.22</p>	
<p>Follow C8B</p> <p>APU_SMI R935 GR0402</p> <p>APU_LPC_PME# APU_LPC_PME# 6.22</p>	
<p>VCC3</p> <p>3V3B</p> <p>R708 4.7K</p> <p>Q122 2N7002</p> <p>APU_SMI R935 GR0402</p> <p>APU_LPC_PME# APU_LPC_PME# 6.22</p>	
<p>Follow C8B</p> <p>APU_SMI R935 GR0402</p> <p>APU_LPC_PME# APU_LPC_PME# 6.22</p>	
<p>VCC3</p> <p>3V3B</p> <p>R708 4.7K</p> <p>Q122 2N7002</p> <p>APU_SMI R935 GR0402</p> <p>APU_LPC_PME# APU_LPC_PME# 6.22</p>	
<p>Follow C8B</p> <p>APU_SMI R935 GR0402</p> <p>APU_LPC_PME# APU_LPC_PME# 6.22</p>	


MICRO-START INTL CO., LTD.	
Promontory-CLK/ACPI/GPIO	
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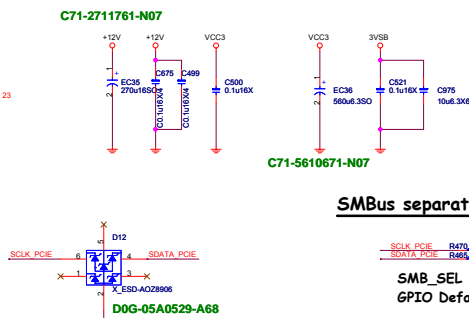
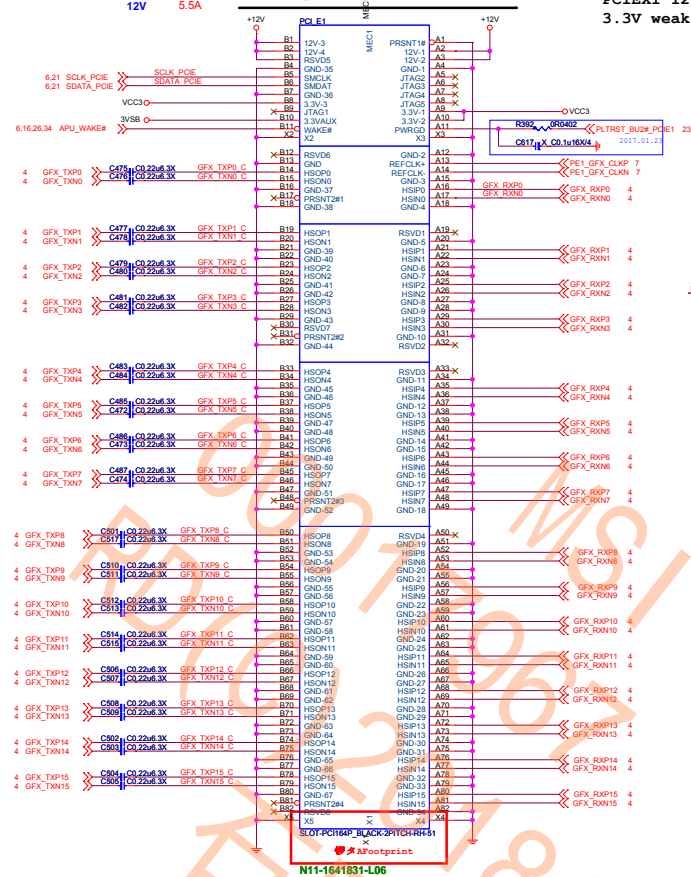




 MICRO-START INTL CO., LTD.			
File: Promontory-GND			
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MSI CONFIDENTIAL
00017967 jonepei (裴亮樂)
RD(C)2018112901 RMA工程課
石阿鋒 (00068760)

 MICRO-START INTL CO.,LTD.	
Title: PCIE CLK	
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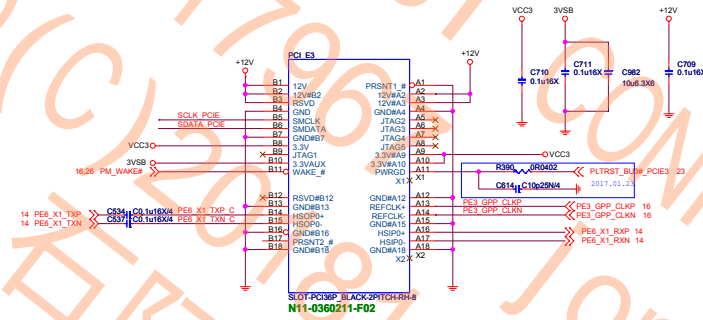
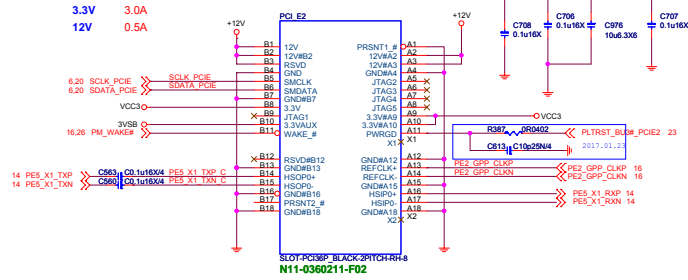
SMBus separate circuit

SMB_SEL

GPIO Default High

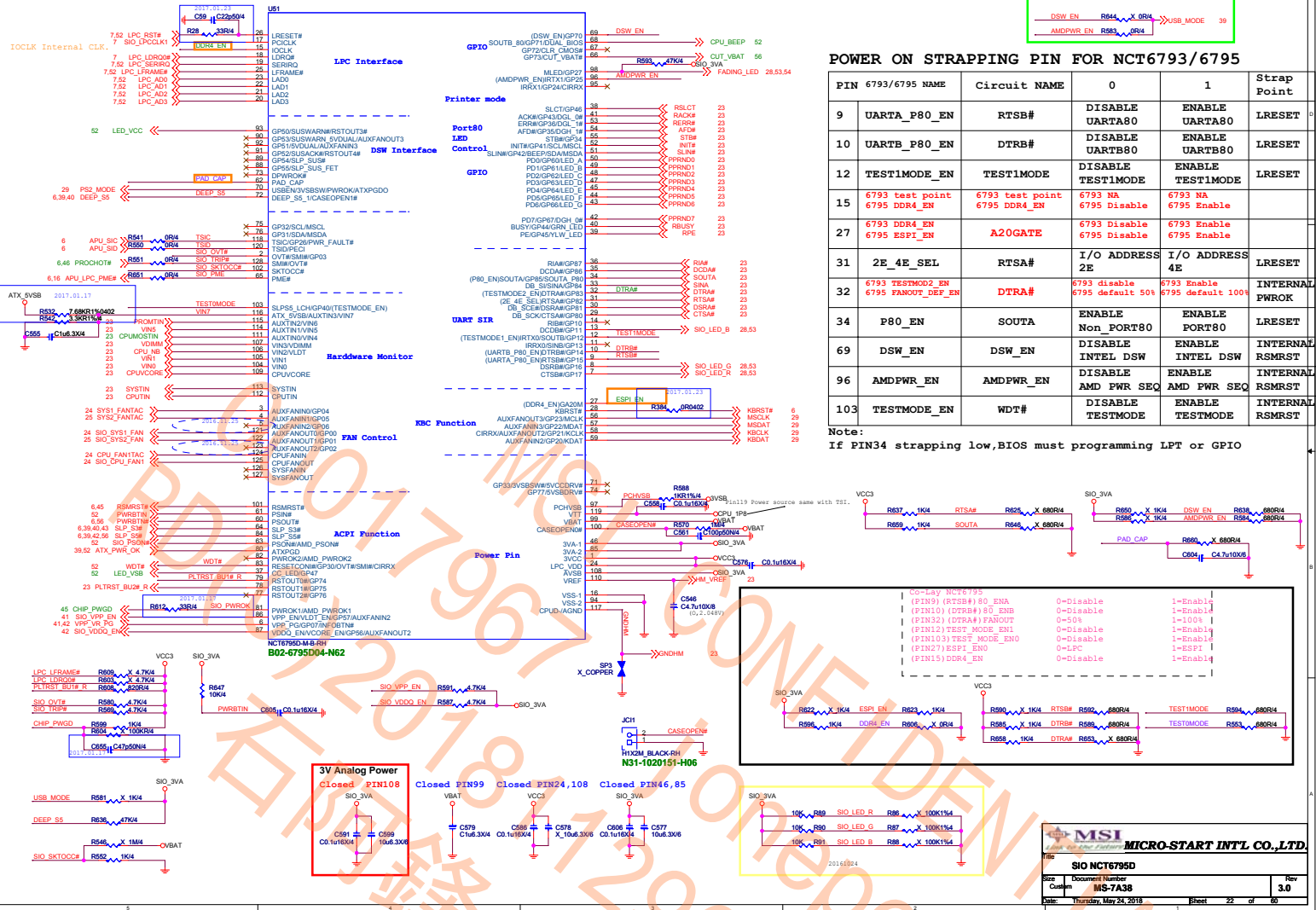
N11-1641831-L06

PCIEX1 12V 0.5A
3.3V weak 375mA



PCI Express x1 Slot *2	
+12V	- 1 A
+VCC3	- 6A
+3V3_S5 (wake)	- 750mA
+3V3_S5 (no wake)	- 40mA

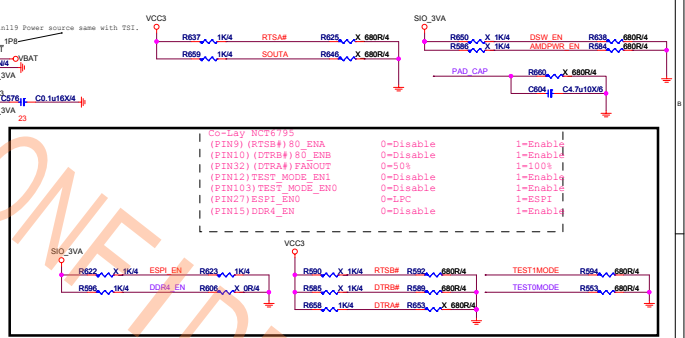
MSI MICRO-START INTL CO.,LTD.	
PCIE X4(X1*2) SLOT	
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POWER ON STRAPPING PIN FOR NCT6793/6795

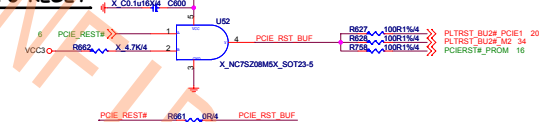
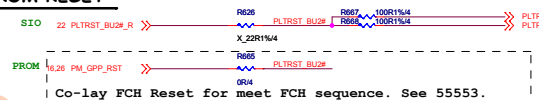
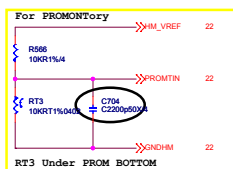
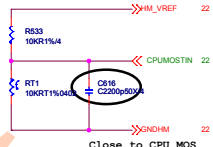
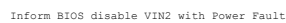
PIN	6793/6795 NAME	Circuit NAME	0	1	Strap Point
9	UARTA_P80_EN	RTSB#	DISABLE UARTA80	ENABLE UARTA80	LRESET
10	UARTB_P80_EN	DTRB#	DISABLE UARTB80	ENABLE UARTB80	LRESET
12	TESTMODE_EN	TESTMODE	DISABLE TESTMODE	ENABLE TESTMODE	LRESET
15	6793 test point 6795 DDR4_EN	6793 test point 6795 DDR4_EN	6793 NA 6795 Disable	6793 NA 6795 Enable	
27	6793 DDR4_EN 6795 ESPI_EN	A20GATE	6793 Disable 6795 Disable	6793 Enable 6795 Enable	
31	2E_4E_SEL	RTSA#	I/O ADDRESS 2E	I/O ADDRESS 4E	LRESET
32	6793 TESTMOD2_EN 6795 FANOUT_DEF_EN	DTRA#	6793 disable 6795 default 50H	6793 Enable 6795 default 100H	INTERNAL PWROK
34	P80_EN	SOUTA	ENABLE Non_PORT80	ENABLE PORT80	LRESET
69	DSW_EN	DSW_EN	DISABLE INTEL DSW	ENABLE INTEL DSW	INTERNAL RSMRST
96	AMDPWR_EN	AMDPWR_EN	DISABLE AMD PWR SEQ	ENABLE AMD PWR SEQ	INTERNAL RSMRST
103	TESTMODE_EN	WDT#	DISABLE TESTMODE	ENABLE TESTMODE	INTERNAL RSMRST


Note:
If PIN34 strapping low, BIOS must programming LPT or GPIO

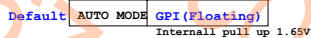
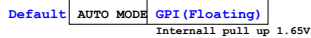


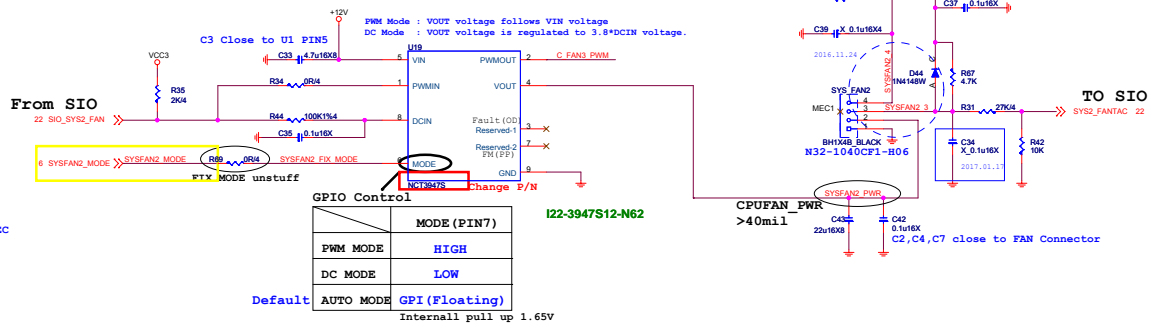
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STG HM Voltage over 2.048V will not detect



 MICRO-START INTL CO.,LTD	
Title HWM/COM/Debug LED	
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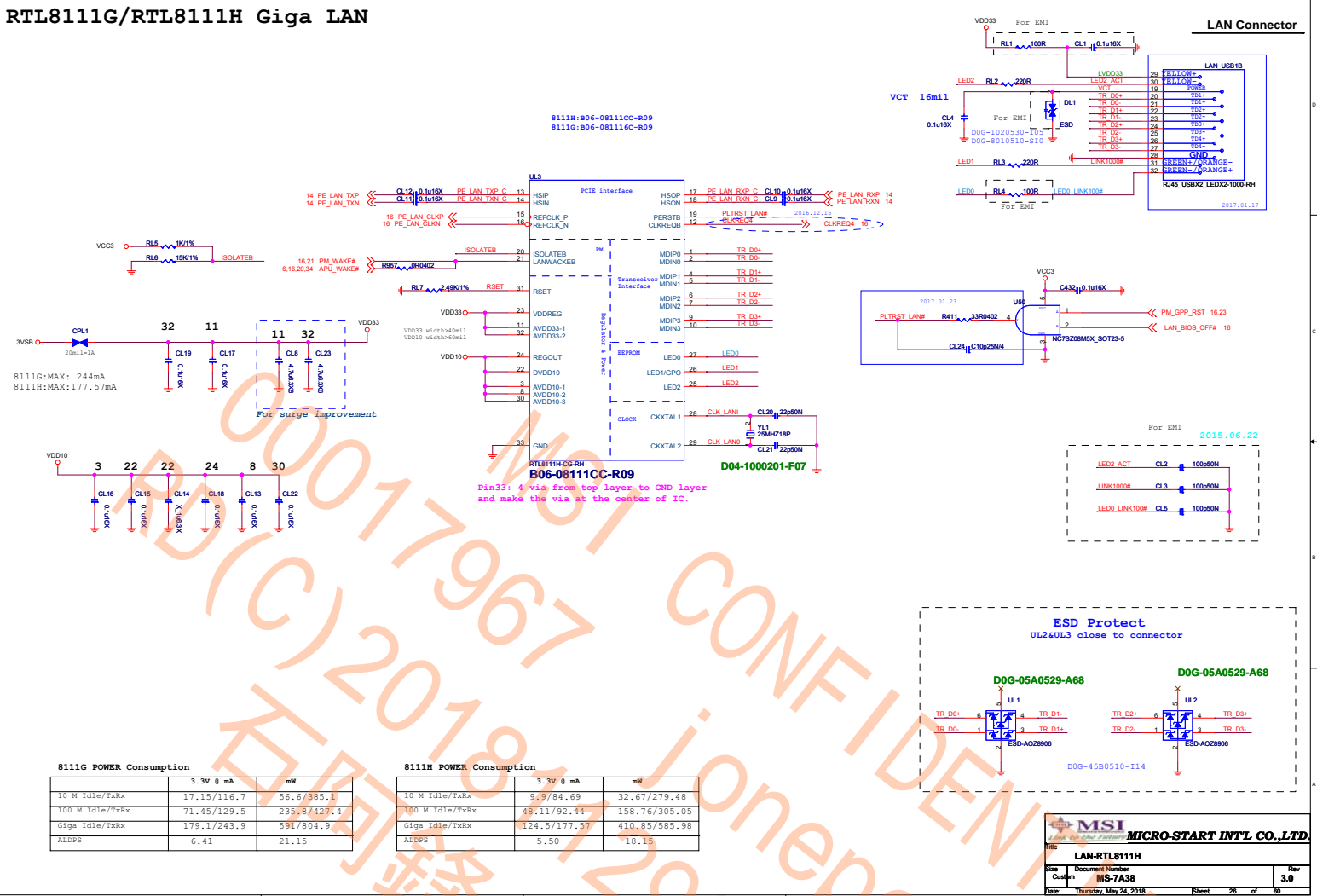


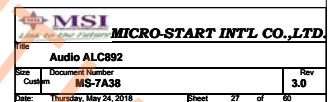


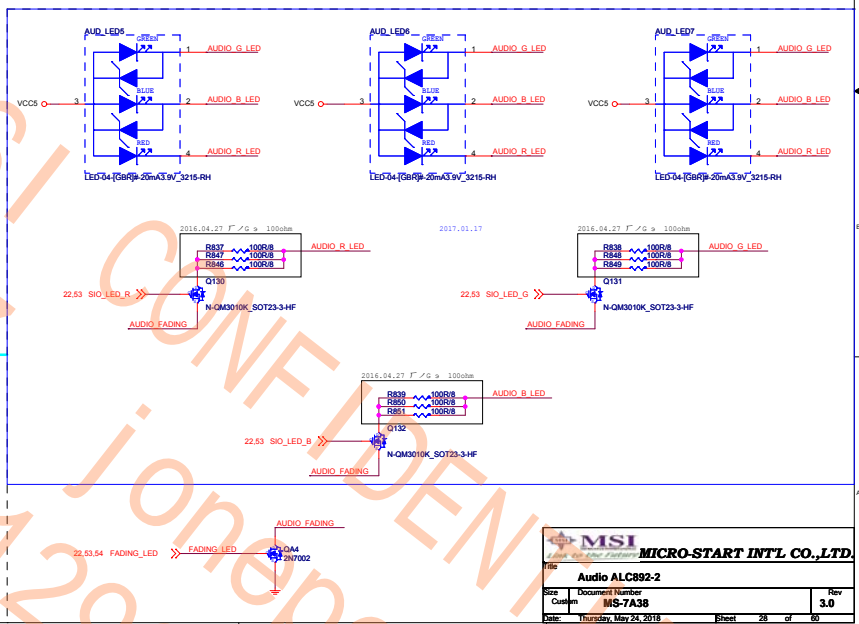
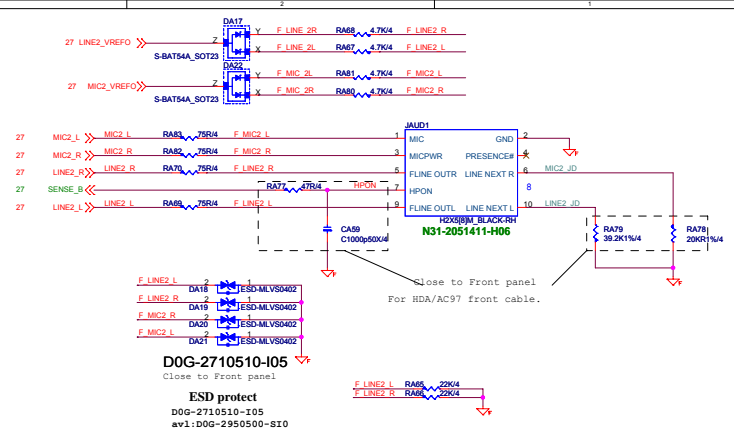
GPIO Control	
	MODE (PIN7)
PWM MODE	HIGH
DC MODE	LOW
AUTO MODE	GPIO (Floating)

Internall pull up 1.65V

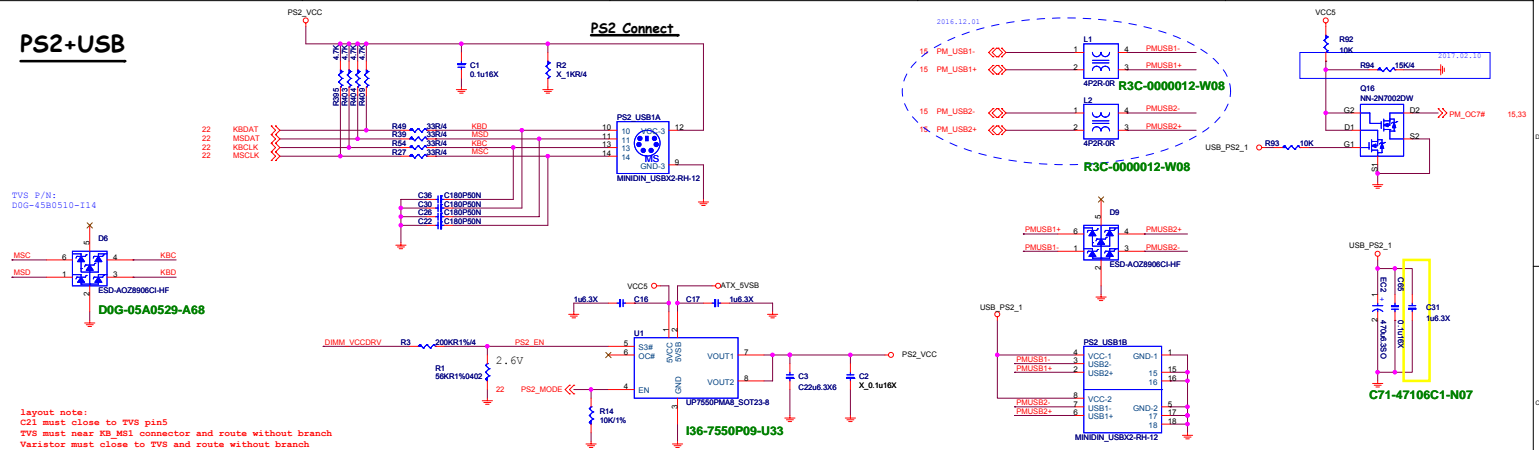
RTL8111G/RTL8111H Giga LAN



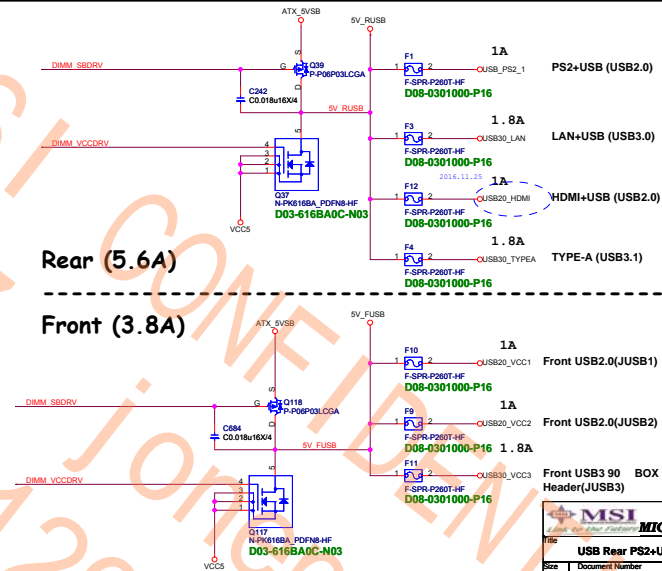





PS2+USB



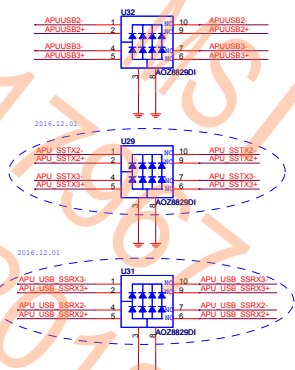
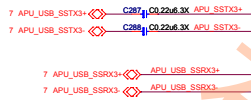
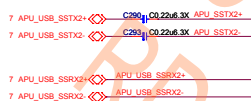
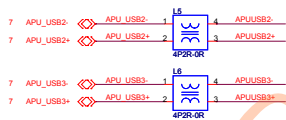
USB Power



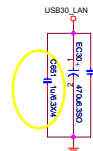
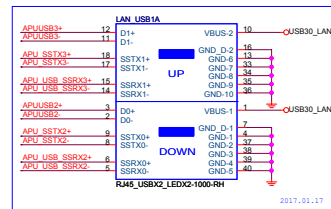
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Title		
USB Rear PS2+USB2.0		
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USB3.1 GEN1

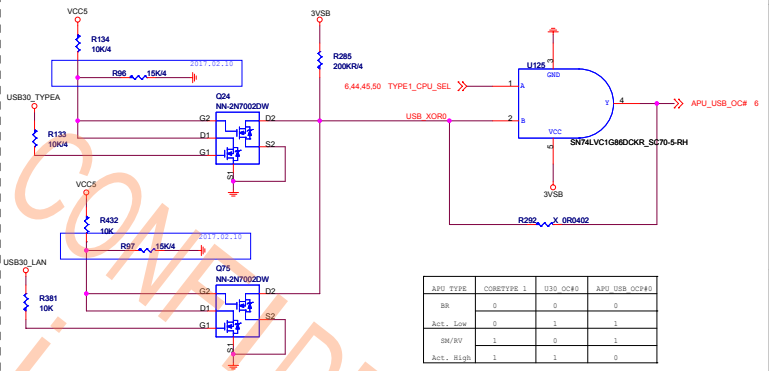
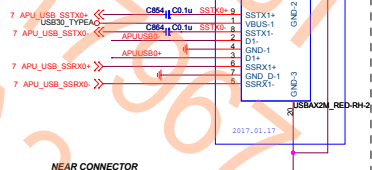
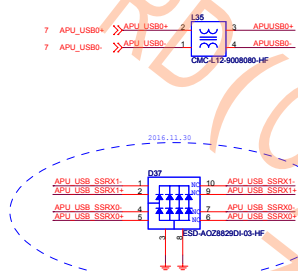
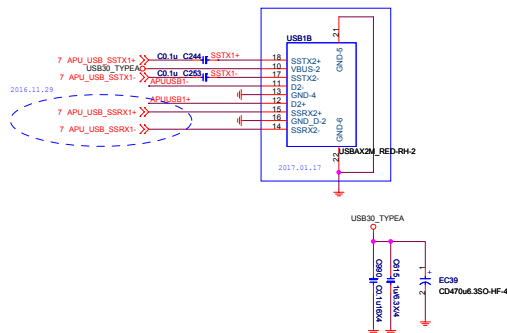
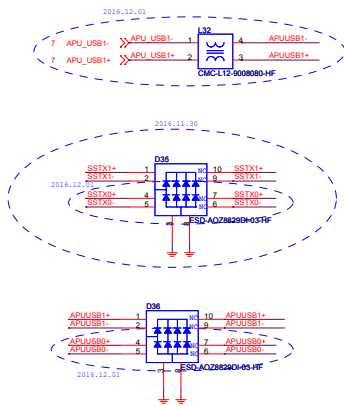
VR Sloution U2 redriver




LAN+USB



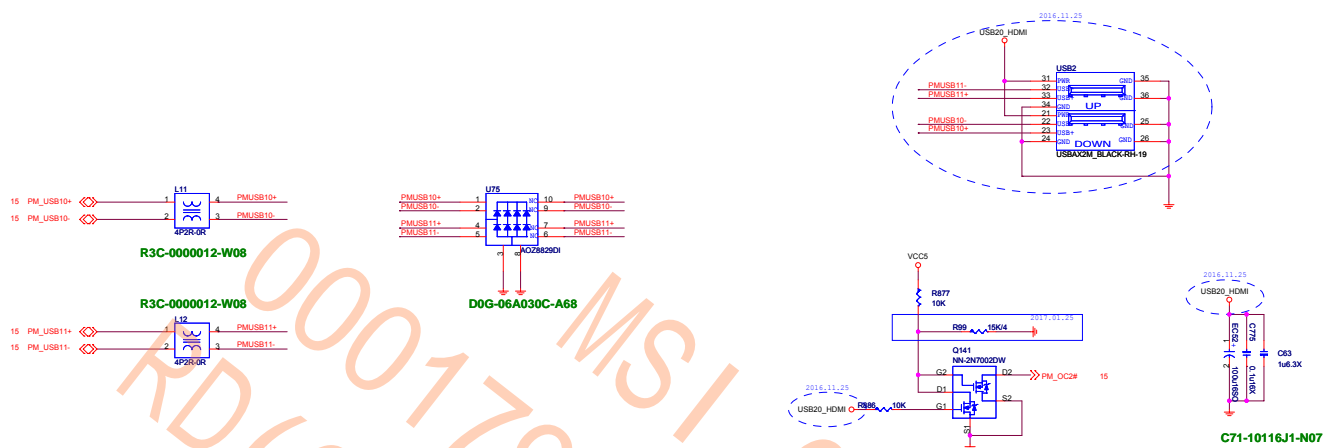
MSI Micro-Start Intl Co., Ltd.			
USB Rear LAN+TYPE A			
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APU TYPE	CORETYPE	USB OC#0	APU USB OC#0
BR	0	0	0
Act. Sel	0	1	1
BA/BU	1	0	1
Act. Rslp	1	1	0

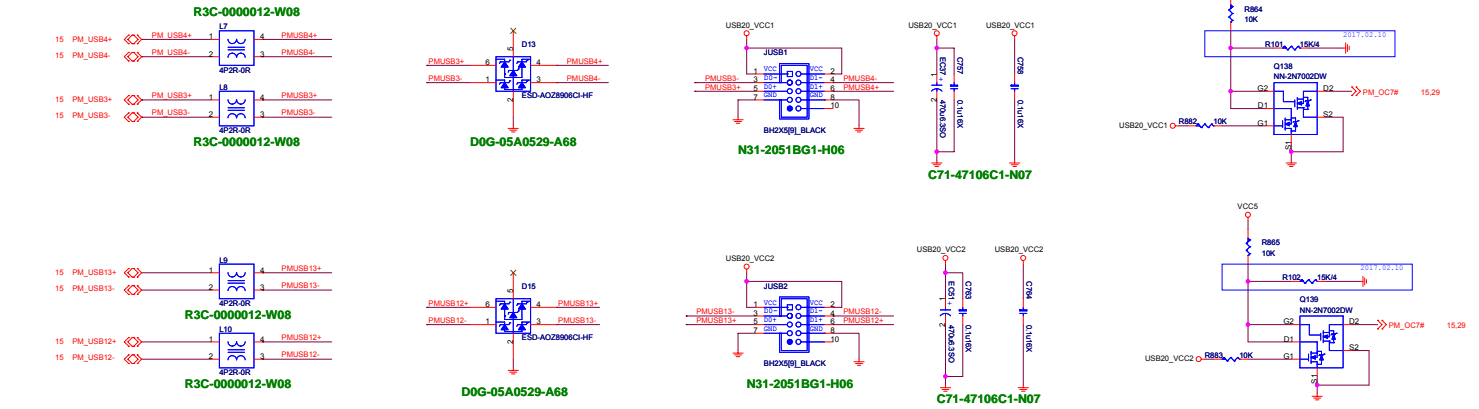
 MSI <i>Look to the Future</i>		MICRO-START INTL CO.,LTD.	
File Rear USB3.1 TYPE C			
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Front USB2.0

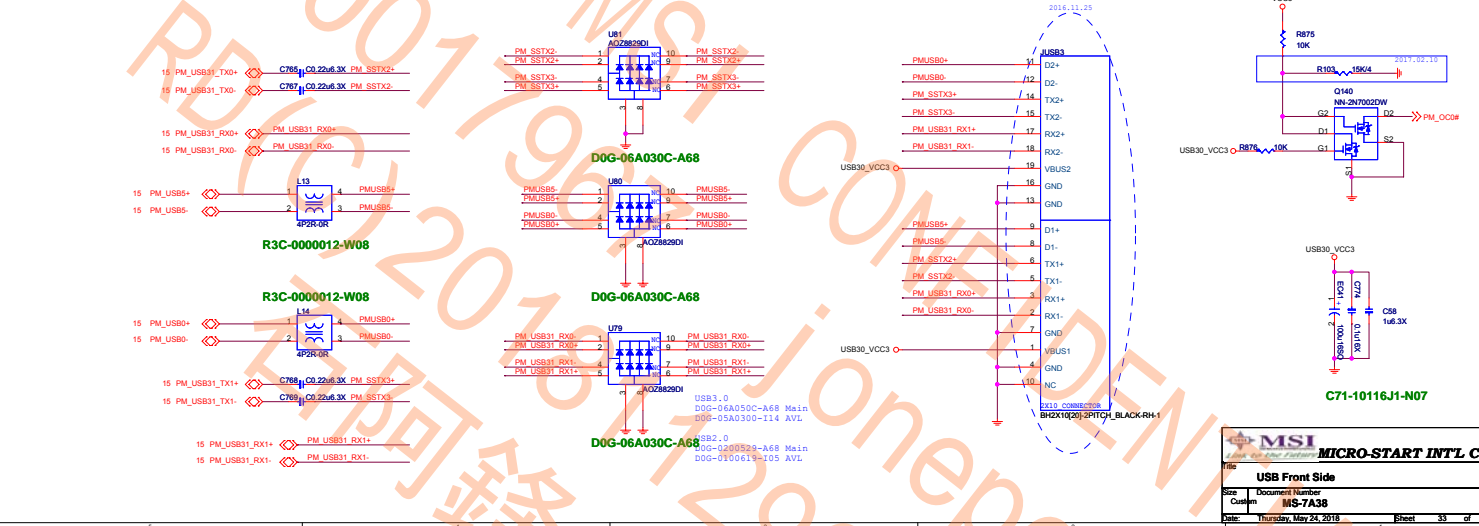


MSI MICRO-START INTL CO.,LTD.			
File: USB Rear HDMI+USB2.0			
Size	Document Number	Rev	
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Front USB2.0

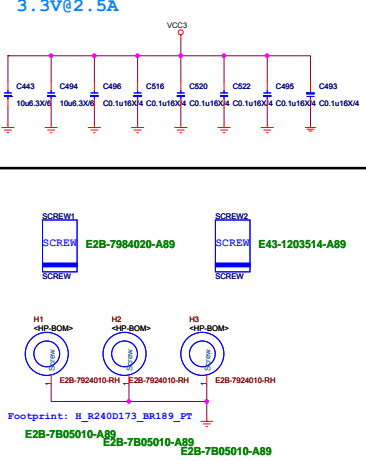
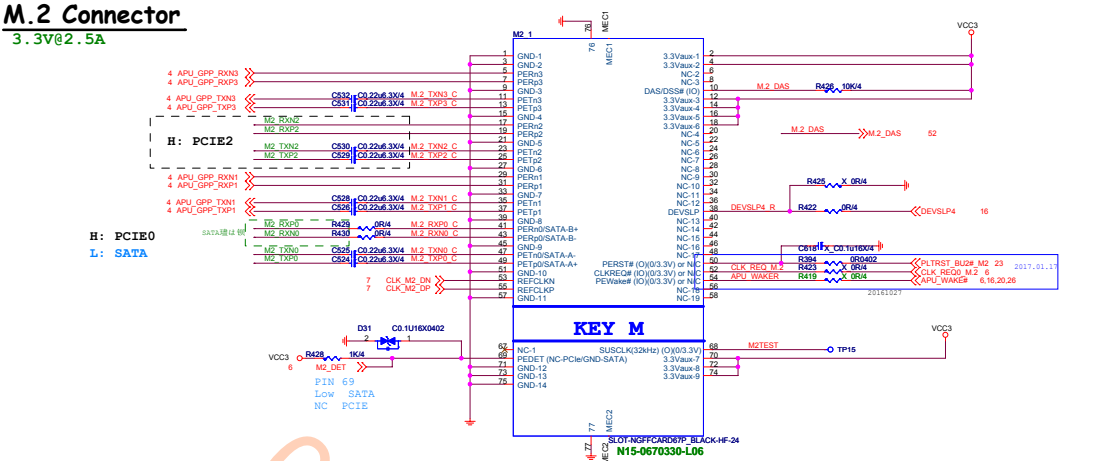


Front USB3.1 GEN1

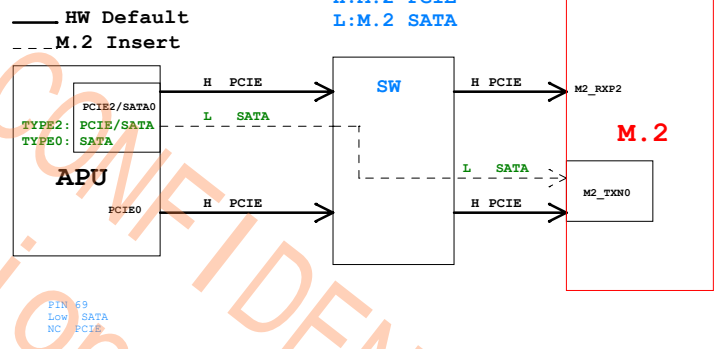
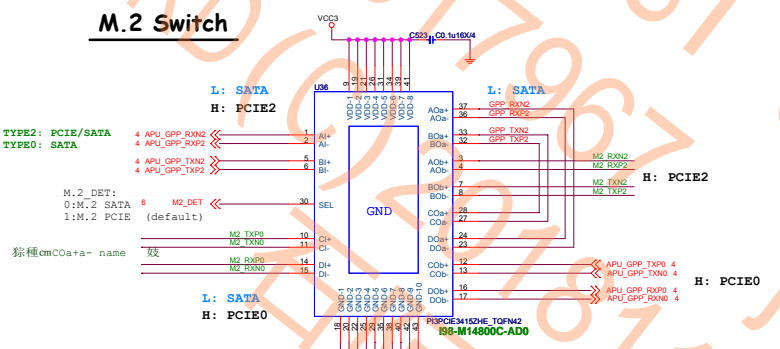


MICRO-START INTL CO., LTD.		
USB Front Side		
Size	Document Number	Rev
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M.2 Connector
3.3V@2.5A

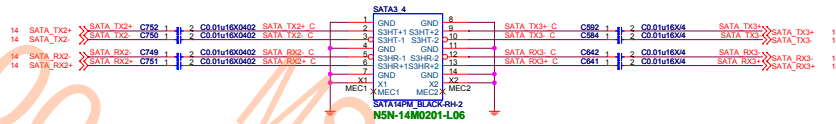
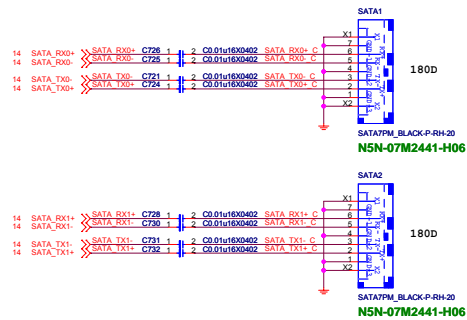


M.2 Switch



MSI MICRO-START INT'L CO., LTD.			
M.2			
Size	Document Number	Rev	
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SATA Connector



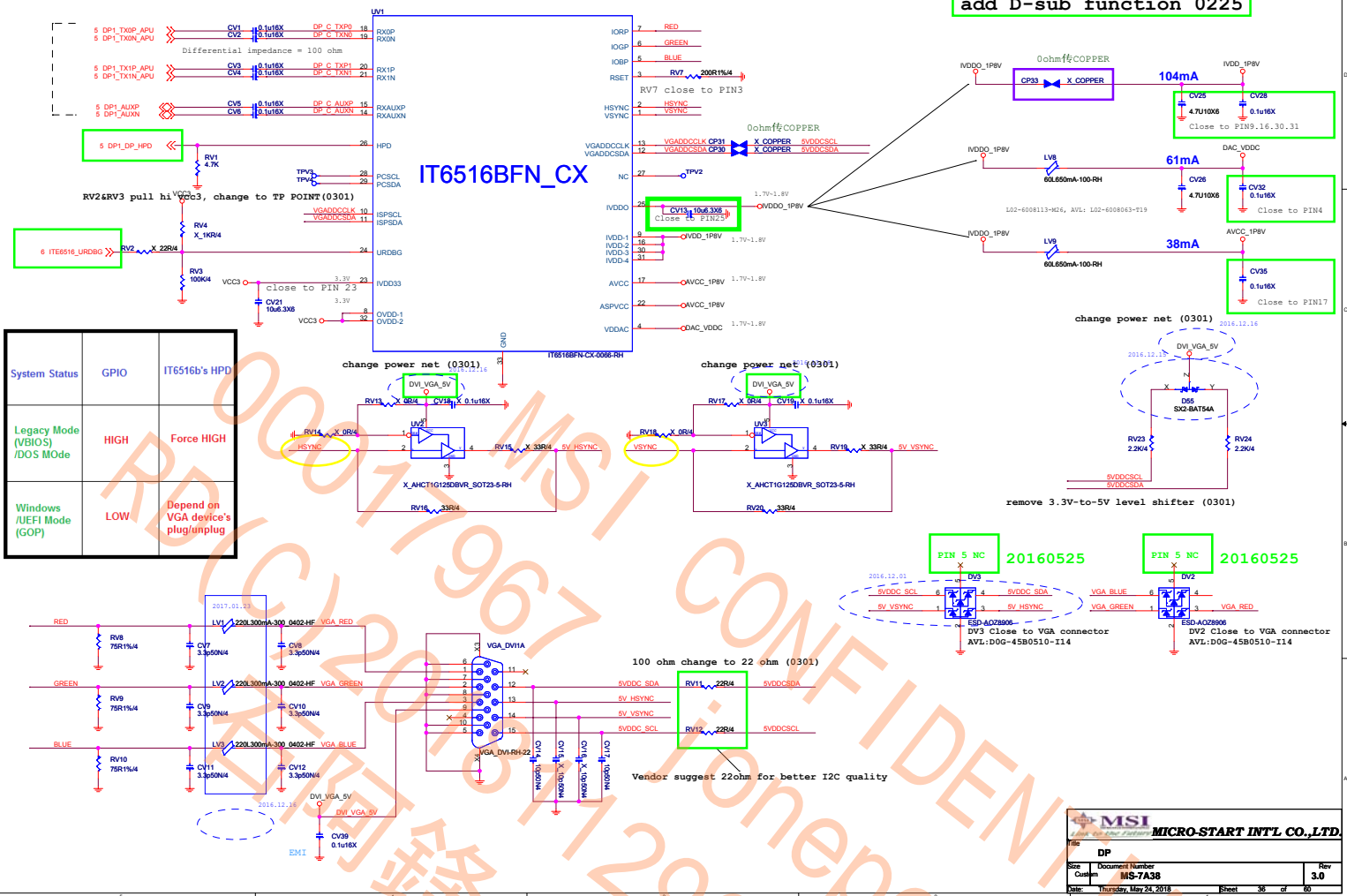
MSI MICRO-START INTL CO., LTD.

File: SATA Connector

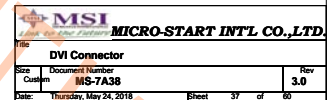
Size: Document Number MS-7A38 Rev: 3.0

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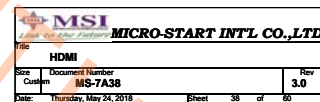
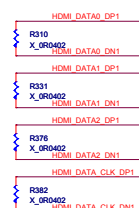
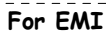
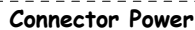
Note:
If connect to eDP port,must confirm whether it
support hot plug detection HPD and re-auxtraining



VGA: resolution of 2048x1536 pixels with 32-bit color at 75 Hz (4:3 QXGA)



For HDMI 1.4



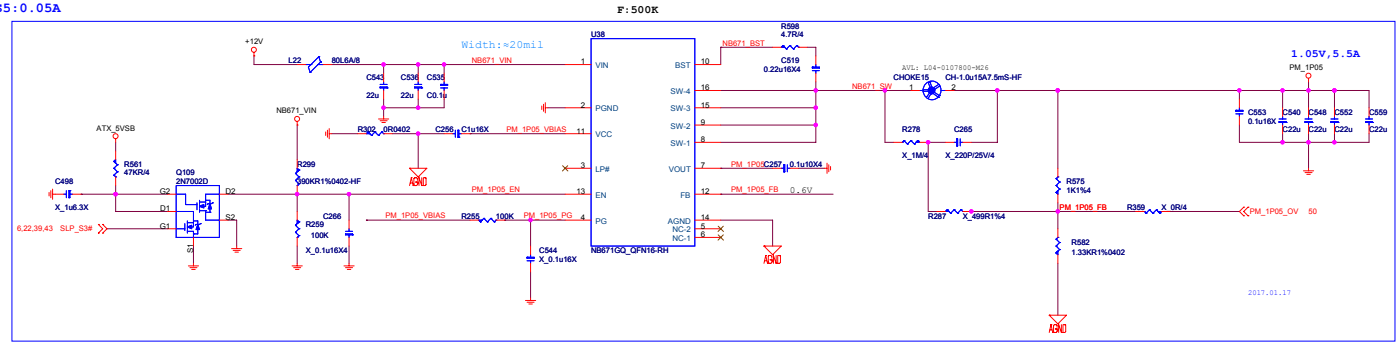
FOR Promontory 1.05V_S0

1.05V
S0:5.5A
S5:0.05A

support OV=>NB685
not support OV=> NB681

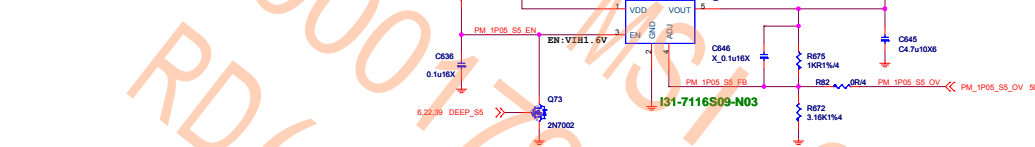
IMAX 10A
ILIMIT=10A~12A
IOC=ILIMIT+40%*IMAX/2=12A~14A.

0.7776uH±1.1664uH



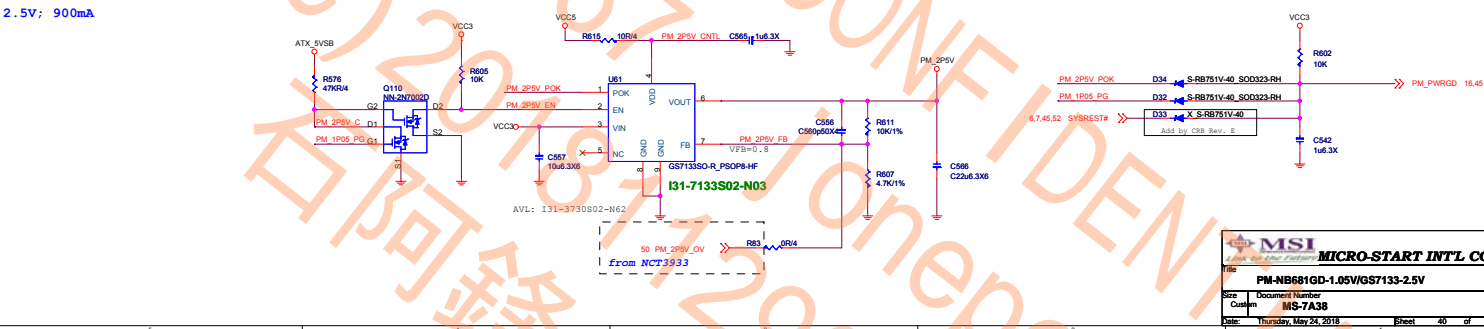
FOR Promontory 1.05V_S5

0.05A



Promontory-2.5V

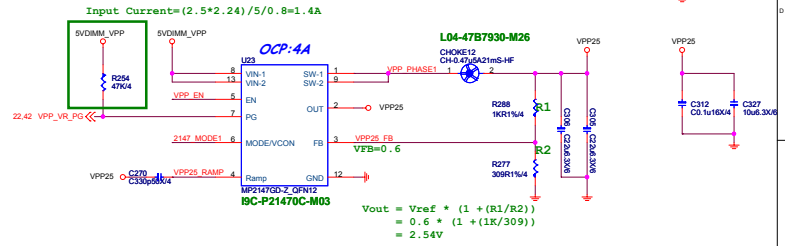
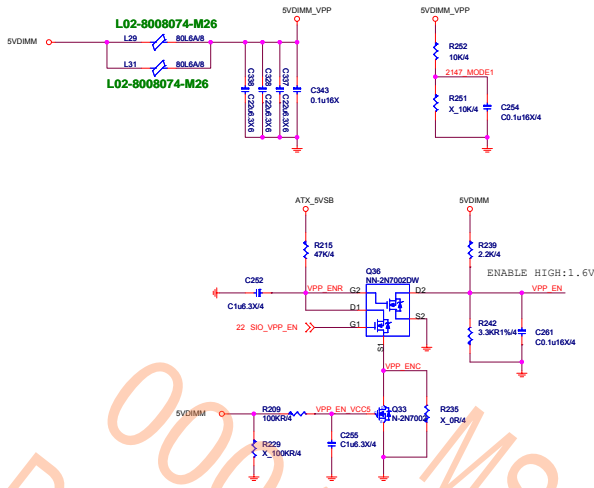
2.5V; 900mA



MSI			
MICRO-START INTL CO., LTD.			
PM-NB681GD-1.05V/GS7133-2.5V			
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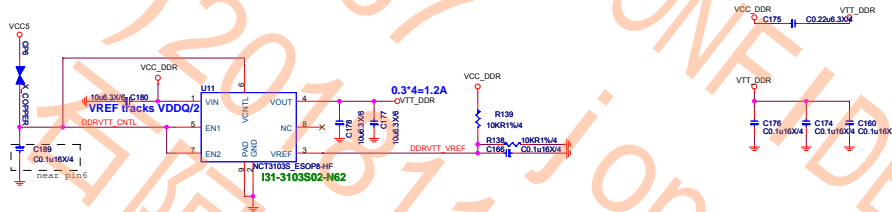
4DIMM : VPP25

2.5V@2.24A



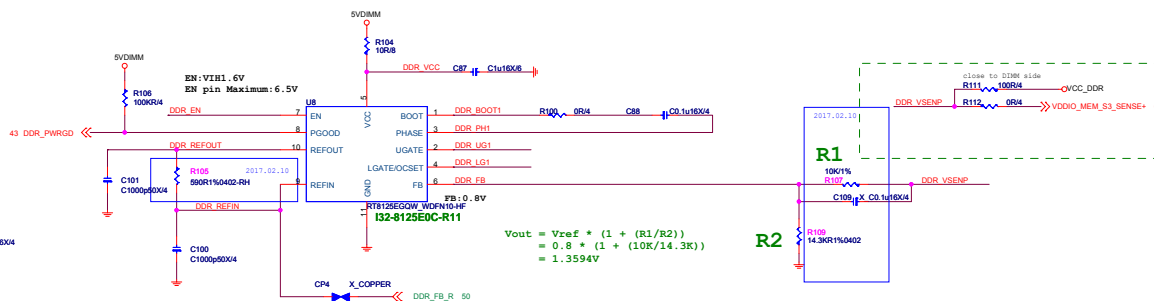
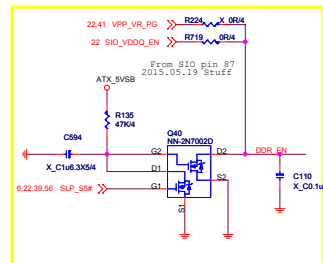
DDR VTT Power

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



MICRO-START INTL CO., LTD.		
DDR PWR VPP25/VTT_DDR		
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DDR4_1.2V@26.2A
15.5A FOR CPU
9.5A FOR 4DIMM
1.2A FOR DDR VTT

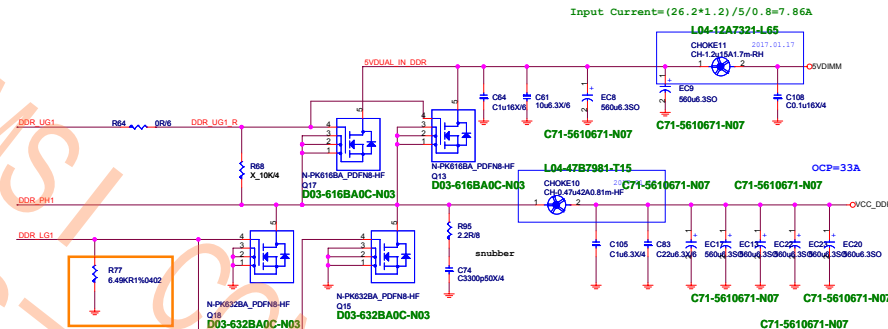
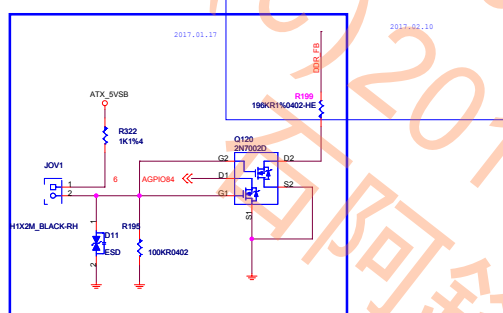



6.39.43.44.45 APU AM4R1 >> D27 S-RB751V-40 DDR_EN

EN:VIH2V
EN pin Maximum:5.5V,RECOMMENDED:3.6V

```
EDC: Irms = Iout / N*SQRT{ND(1-ND)}
CORE:
D=Vout/Vin=1.2/5=0.24
N=Phase number=1
=26.2/1*SQRT{0.24*[1-0.24]}
=11.189A
```

$$\begin{aligned} OCP &= 26.2A * 1.5 = 39.3A \\ R_{cs}(R95) &= OCP * R_{dson}[\text{Low side}] / 10uA \\ &= 35A * 1.65m\Omega / 10uA \\ &= 577K \end{aligned}$$



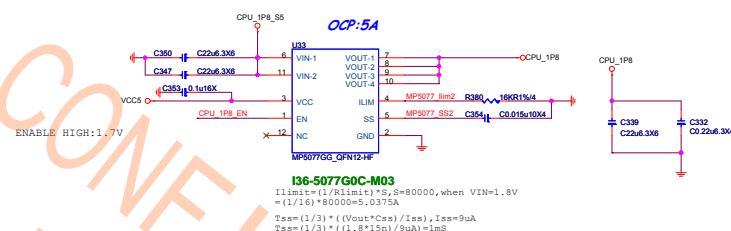
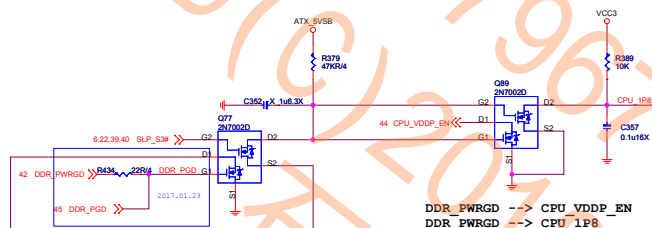
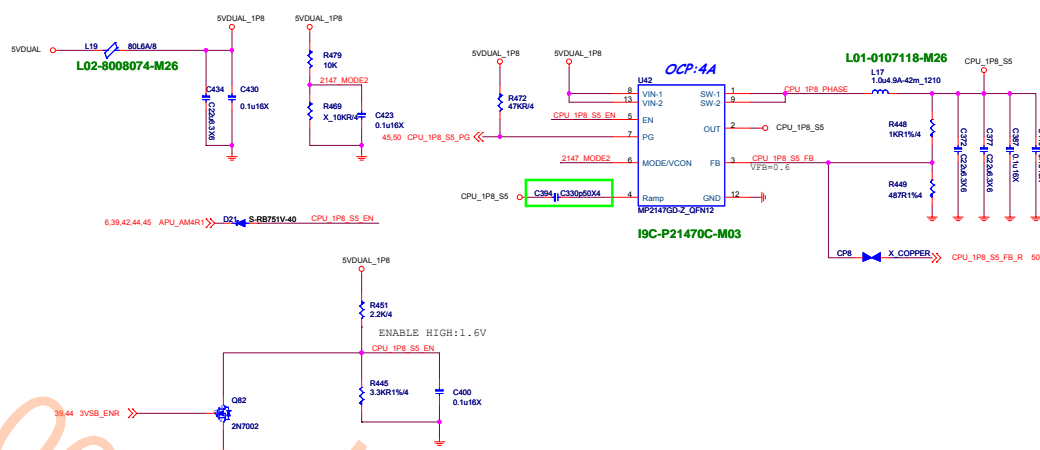
 MICRO-START INTL CO., LTD	
Title DDR4 8125E Power	
Size Custom	Document Number MS-7A38
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0.5A

0.9A

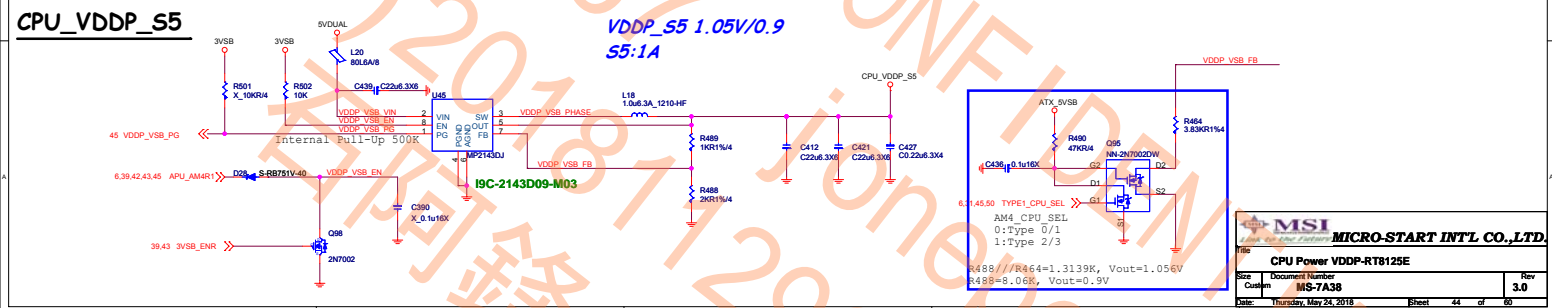
2.0A

$$0.5A + 2.0A + 0.9A = 3.4A$$



 MICRO-START INTL CO., LTD	
CPU Power 1P8V-MP2147	
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1.05V/0.9 OCP=12A
S0:8.5A



6.39,42,43,44 CPU_AMMRY1) S:RB751V-40

VCC3

VR120 10K

RT8894_EN_R

CPU_1P8 VR25 1KR4

VC23 0.1u10K

VQ9 NN-2N7002

RT8894_EN_R

VCC3

VR1 47KR4

VCC3

VR22 100R4

VC1 C2,2u6.334

VC9 100u50N

ATX_5VSB

VR10 47KR4

VQ2 NN-2N7002DW

D1 D2

G1 G2

S1 S2

VR2 9.1KR1%0402

RT8894_EN

VR3 3KR1%0402

VC2 C0.1u10K4

12 * (3/12.1) = 2.975V > 1V

Make sure +12VIN connector plug in

44 CPU_VDDP_PG

VQ1 NN-2N7002

TYPE0_CPU_SEL: 1:TYPE 0 0:TYPE 2

VDDP_SEL1

TYPE1_CPU_SEL: 1:TYPE 0 0:TYPE 2

VQ3 NN-2N7002DW

D1 D2

G1 G2


S1 S2

VDDP_SEL1

CPU	TYPE	TYPE1_CPU_SEL	TYPE0_CPU_SEL
BR	0	0	1
NA	0	0	0
SR	2	1	1
RV/ZP	3	1	0

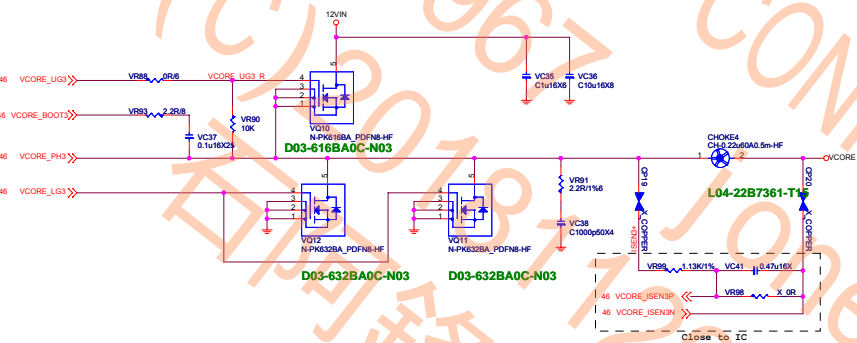
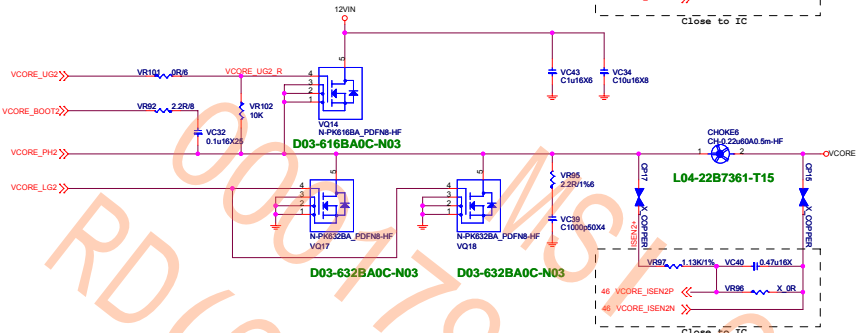
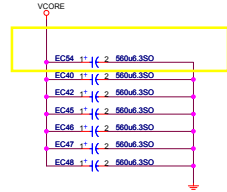
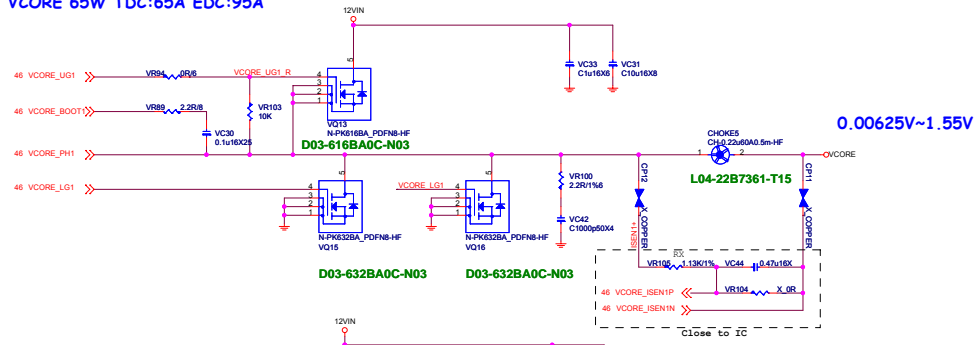
CPU VDDP NOT SUPPORT TYPE2

[illegible]

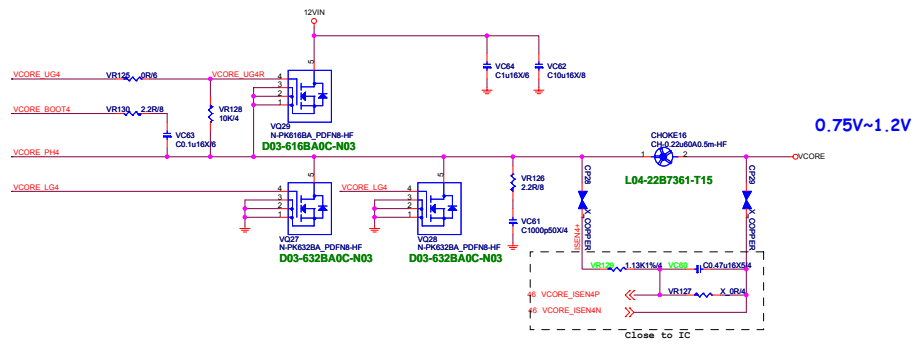
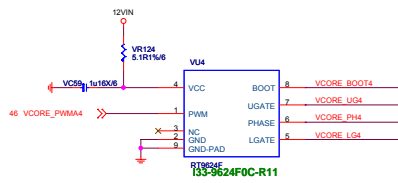
CPU	TYPE	TYPE1_CPU_SEL	TYPE0_CPU_SEL
BR	0	0	1
NA		0	0
SR	2	1	1
RV/3P	3	1	0




VCORE 95W TDC:80A EDC:125A
VCORE 65W TDC:65A EDC:95A



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CPU Power Phase 1-3			
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CPU Power Phase 4			
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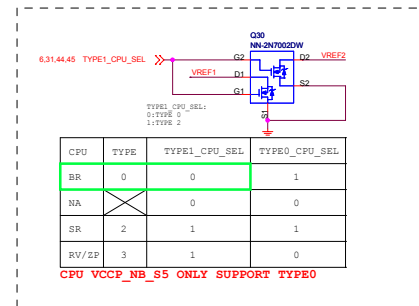
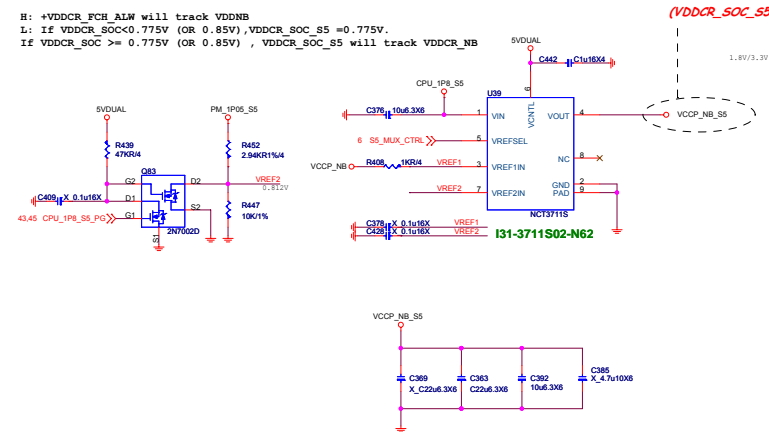

MICRO-START INTL CO.,LTD
 Title: **CPU Power NB Phase 1-2**
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FOR VCCP_SOC_S5 0.9A

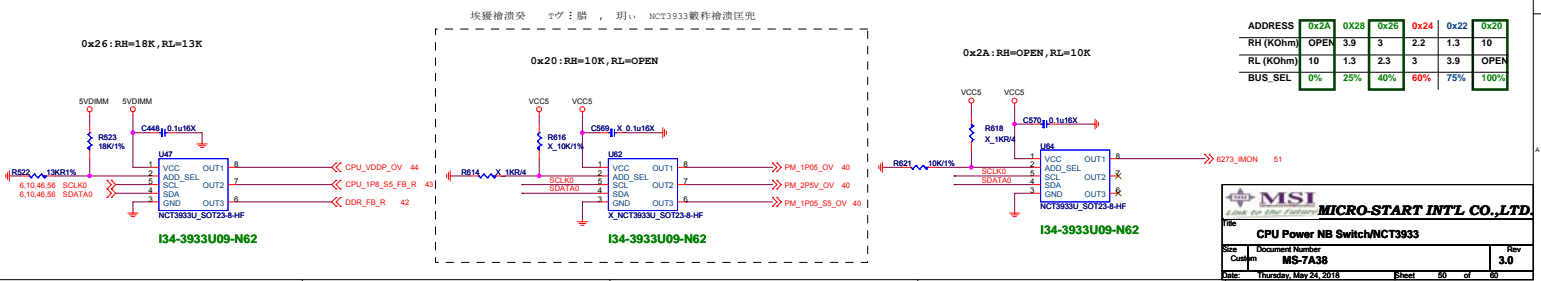
TYPE0 Only

S5_MUX_CTRL
HIGH:S0
LOW: S3/S5

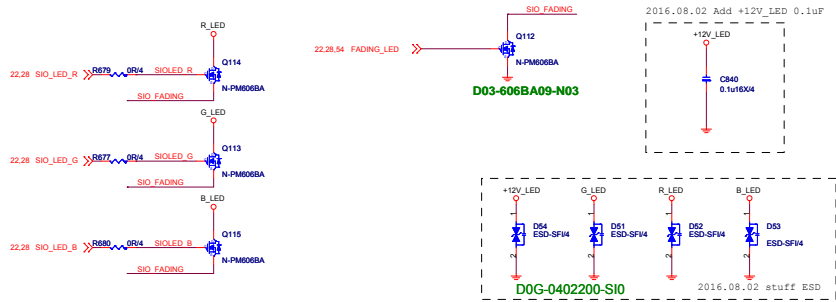
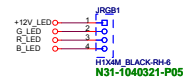
H: +VDDCR_FCH_ALW will track VDDNB
L: If VDDCR_SOC<0.775V (OR 0.85V), VDDCR_SOC_S5 =0.775V.
If VDDCR_SOC >= 0.775V (OR 0.85V) , VDDCR_SOC_S5 will track VDDCR_NB



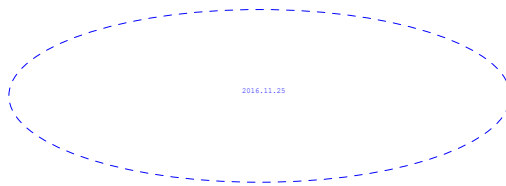
Over Voltage Control IC







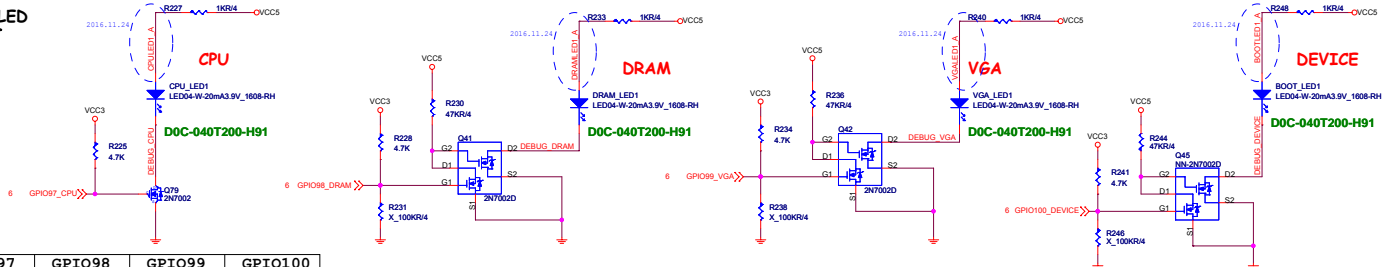
FCH LED Place under Heat-sink



LED
: D0C-040S600-E07
7 : D0C-040S300-E07

MSI Link to the Future			
MICRO-START INTL CO.,LTD.			
File ALL LED			
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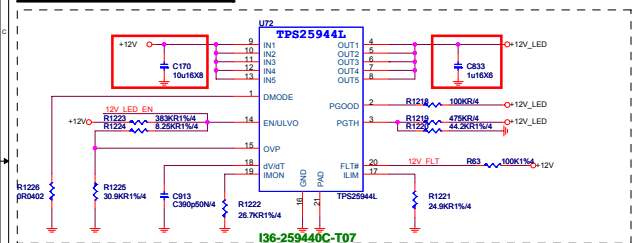
EZ Debug LED



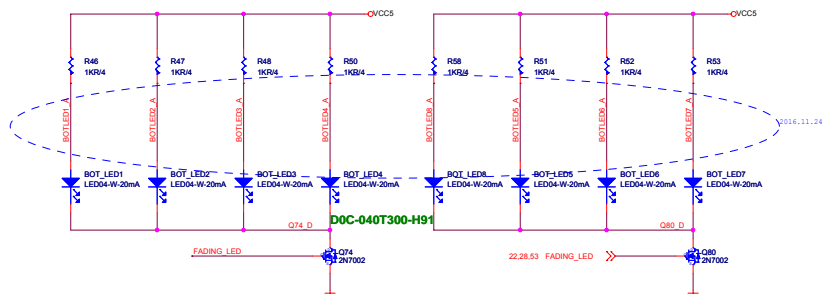
GPIO	GPIO97	GPIO98	GPIO99	GPIO100
LED	GPI FULL HIGH	GPO PO LOW	GPO PO LOW	GPO PO LOW
GPIO	GPO LOW	GPO HIGH (default HIGH)	GPO HIGH (default HIGH)	GPO HIGH (default HIGH)

LED Control by SIO

2016.07.06 Use TPS25944L

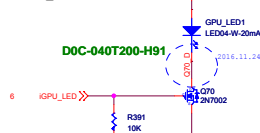


Bottom LED

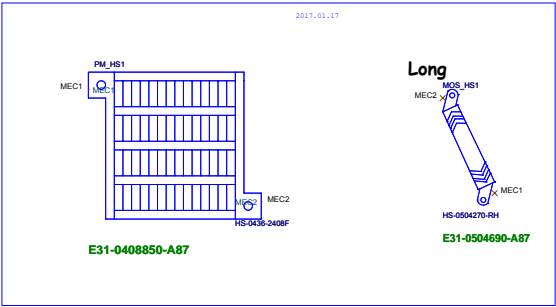


AM4 APU Detect LED Circuit

iGPU GPU_LED1 OFF
dGPU GPU_LED1 Always ON



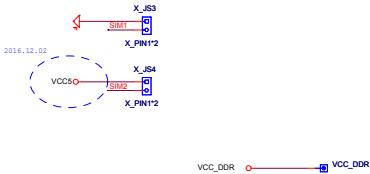
HEAT SINK



CPU Socket



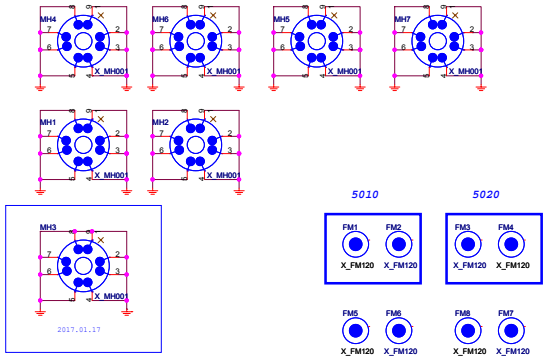
Simulation




MANUAL PART



Optics Orientation Holes



OPT	Configure	BOM	Function
		601-7A38-A01	XXXX

**MICRO-START INTL CO.,LTD.**

File

BOM Option

Size

Document Number

MS-7A38

Rev

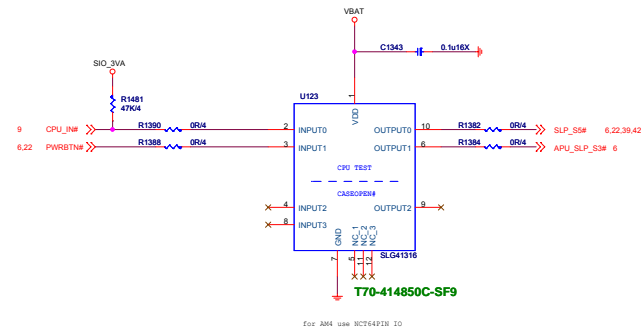
3.0

Date

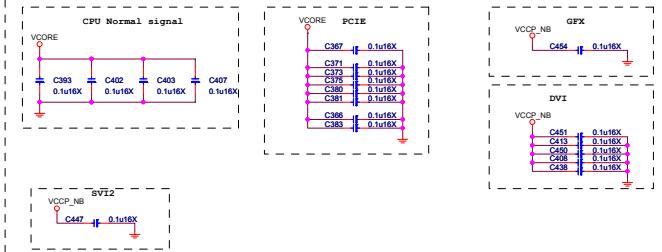
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Sheet

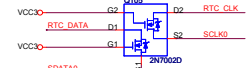
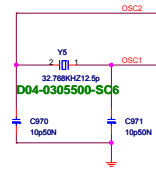
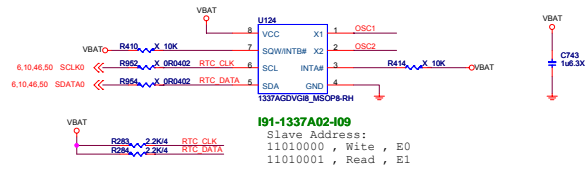
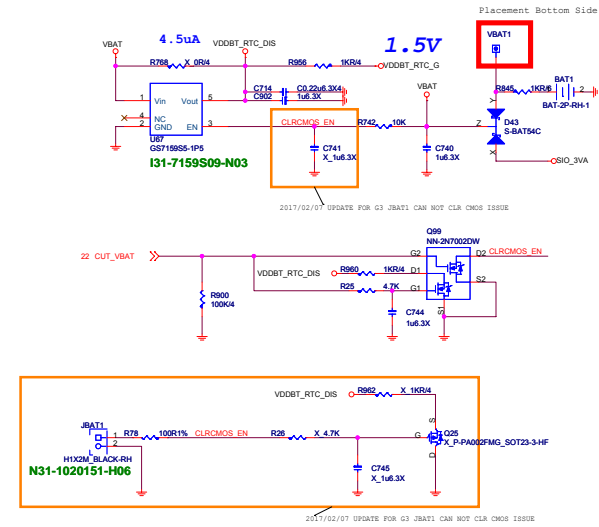
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Moat Cap



RTC & Clear CMOS Circuit



MSI		
Link to the Factory		
MICRO-START INTL CO.,LTD.		
File		
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