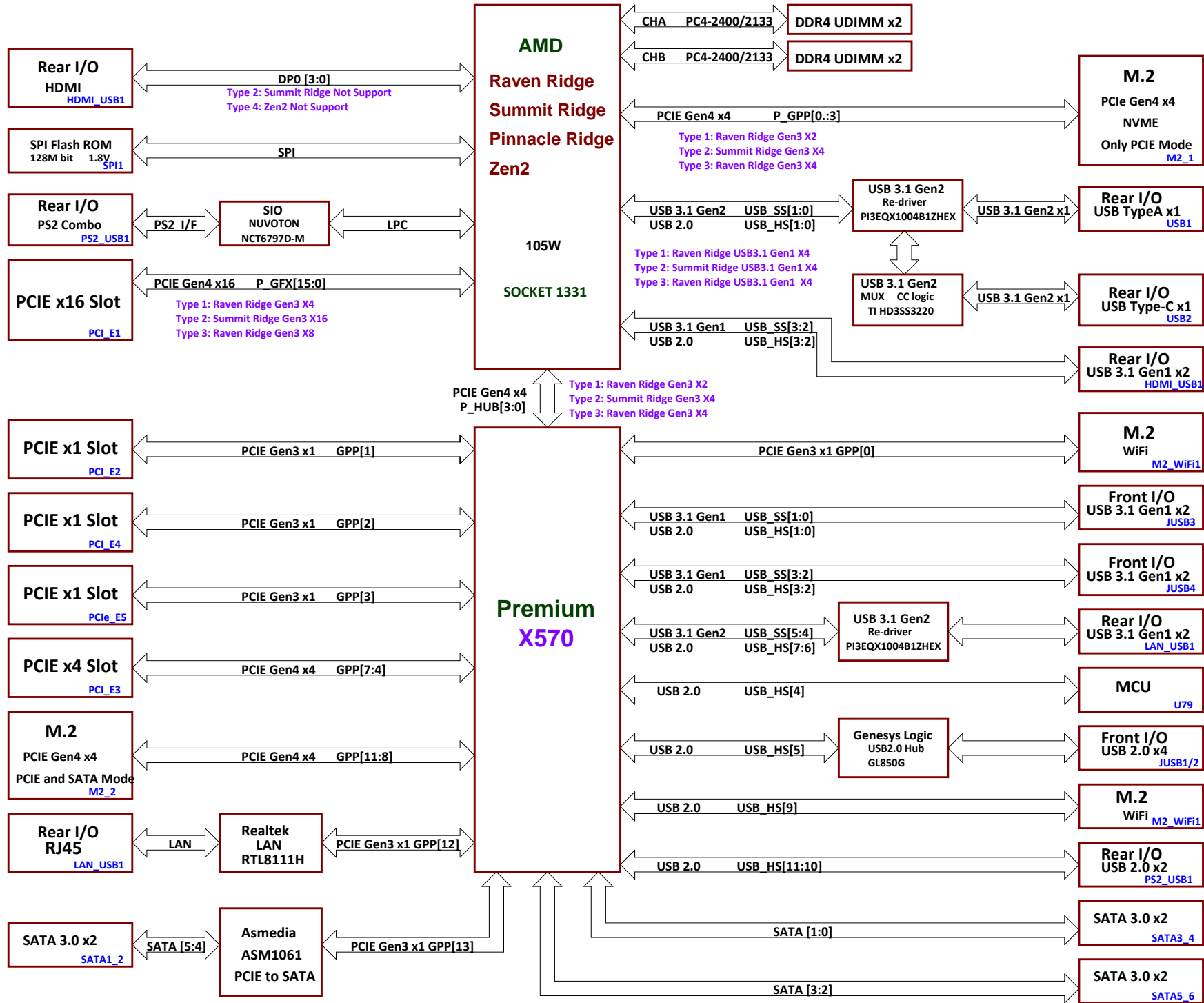
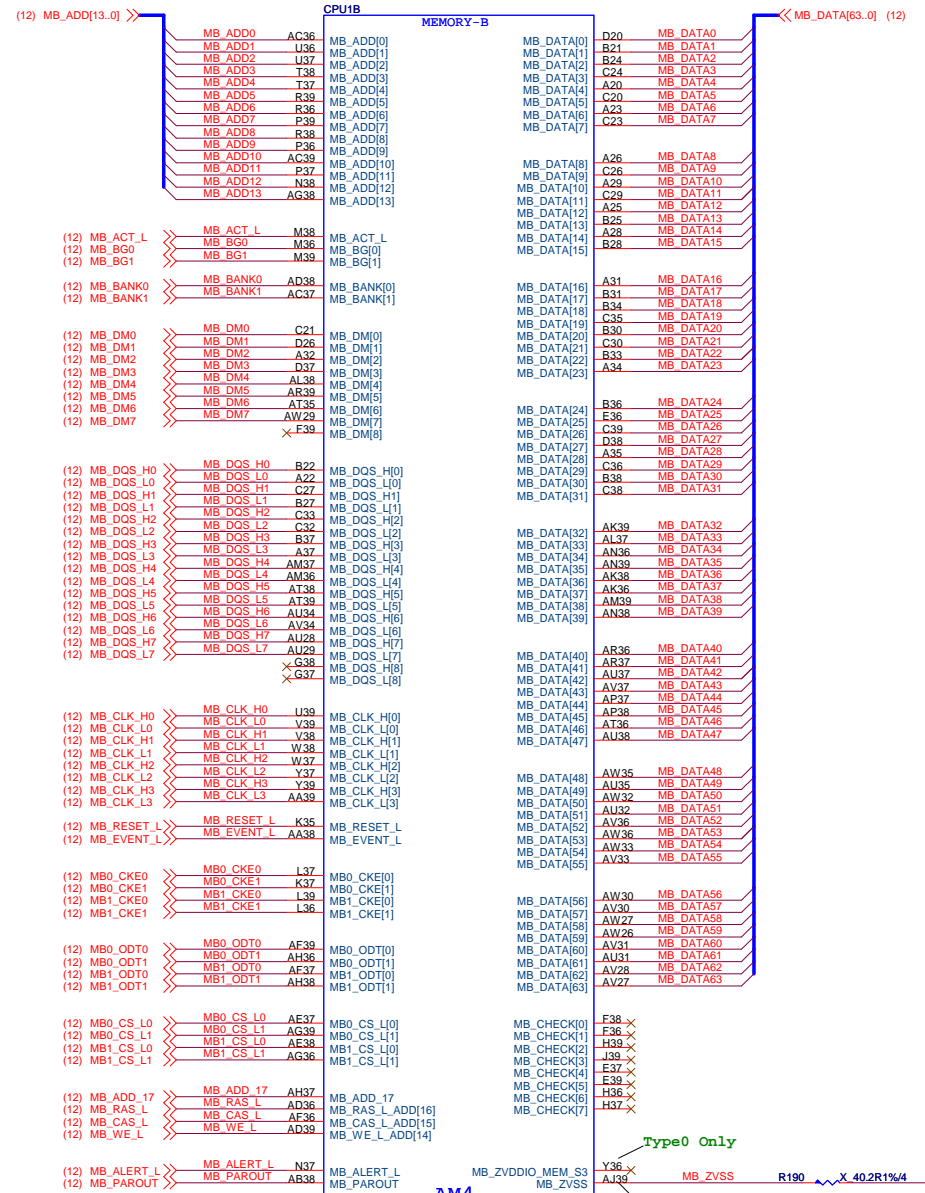
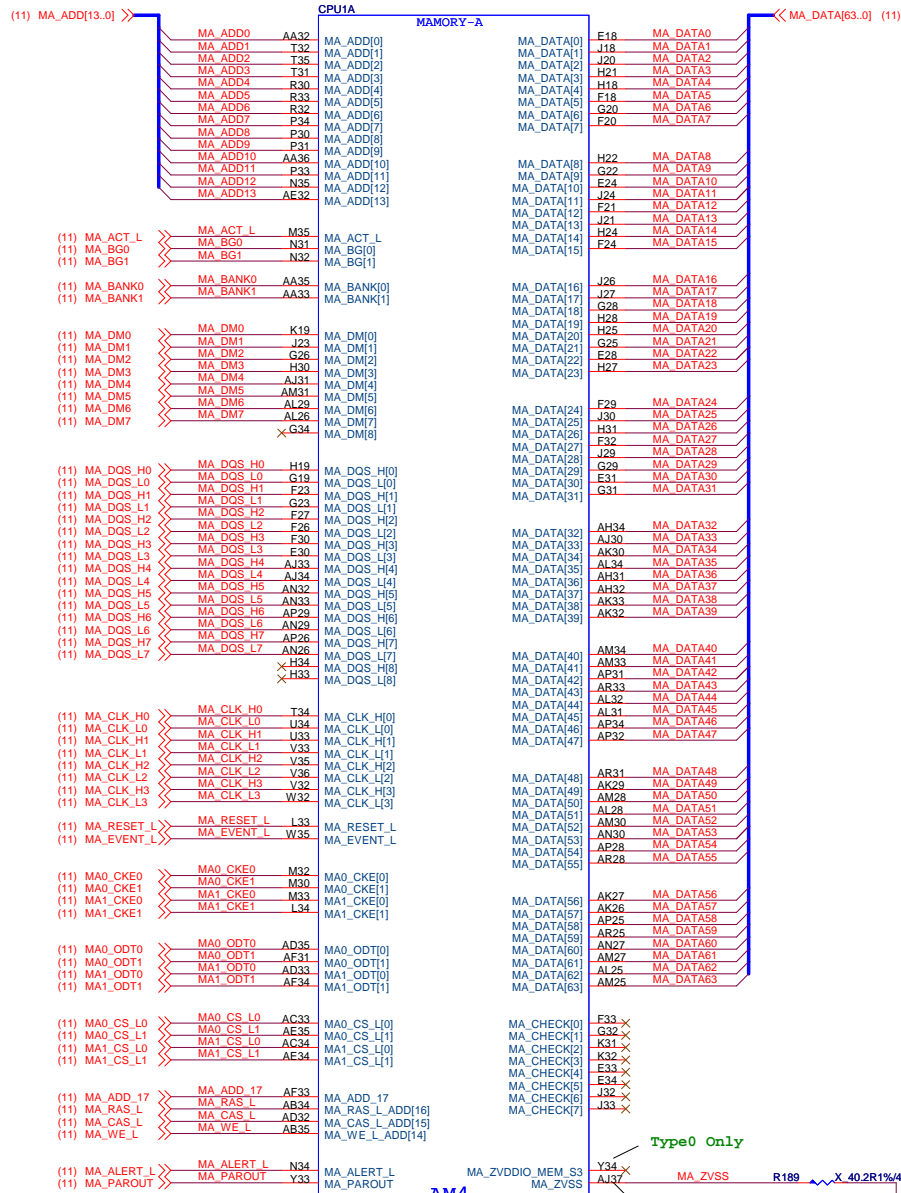


AMD AM4

GAMING EDGE AC

01	Cover Sheet	36	LAN - I211AT	66	MCU - LED Control
02	Block Diagram	37	Audio ALC1220P-VB	67	LED - Power / JPIPE
03	FM4 DDR4 I / F	38	Audio DePop	68	LED - JLED1 / 2 / 3 / 4
04	AM4 PCIE / SATAE	39	USB Power - UP7501	69	LED - Mystic Light - 1
05	AM4 Display / Audio	40	Front USB2.0 Header	70	LED - Mystic Light - 2
06	AM4 SVI / ACPI / GPIO	41	Front USB3.0 Header	71	BOM Option
07	AM4 LPC / SPI / USB / CLK / STRAP	42	Rear USB3.0 + PS2	72	Manual Parts
08-09	AM4 Power / VDDIO_AUDIO Power / GND	43	Rear USB3.0	73	PG MAP
10	RTC / CMOS	44	Rear USB3.1 Type A / redrive	74	GPIO MAP
11-14	DDR4 - POWER / GND	45	Rear USB3.1 Type A / mux	75	Power Sequence
15	Promontory - PCIE / SATA / SATAE	46	DP	76	Power Delivery
16	Promontory - USB / OC	47	HDMI	77	History
17	Promontory - CLK / ACPI / GPIO	48	CPU power UP9505 10+2		
18-19	Promontory - Power / GND	49	CPU power Phase 1-4		
20	PCI_E2 (X16)	50	CPU power Phase 5-10		
21	PCI_E4 (X8)	51	CPU power NB 1-2		
22	PCIE Switch X16 / X8	52	CPU power NB_S5		
23	PCI_E1_E3_E5 (X1)	53	CPU power 1.8_S0 / S5		
24	PCI_E6 (X4)	54	CPU power VDDP - TPS56C215		
25	PCIE Switch X4 / M2_2	55	VRM PWRGD		
26	M.2_1	56	DDR Power - RT8125E		
27	M.2_2	57	DDR Power - VPP25 / VTT		
28	M.2_3 (WIFI+BT)	58	PROM - SY8288RAC / 1.05V		
29	SIO NCT6797D-M	59	PROM - GS7133 / 2.5V		
30	SIO HW Monitor / NCT7718W	60	OV Control - NCT3933		
31	FAN TYPE-J CPUFAN1	61	OV 12VIN - RT9553B		
32	FAN TYPE-J PUMPFAN1	62	ACPI - 3VSB / 5VDIMM		
33	FAN TYPE-K SYSFAN1/2	63	ATX Power - FrpntPanel / EMI		
34	FAN TYPE-K SYSFAN3/4	64	LED - EZDEBUG / AMP		
35	FAN GPIO NCT5605	65	LED - DIMM / PCIE SLOT		

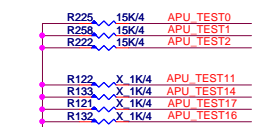
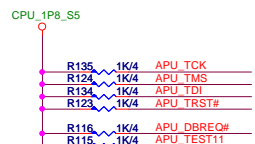
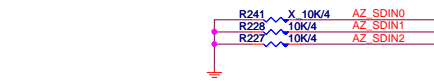
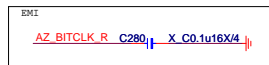
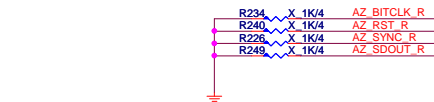




MICRO-STAR INT'L CO.,LTD

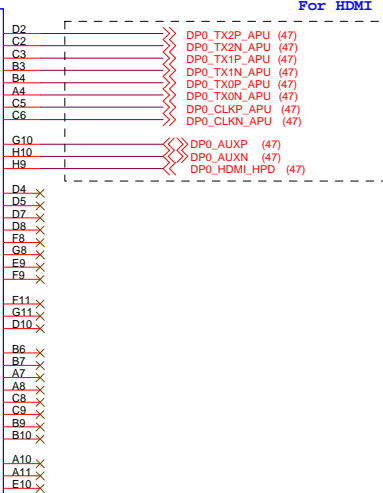
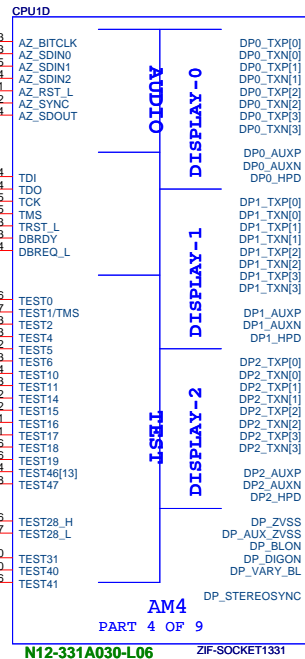
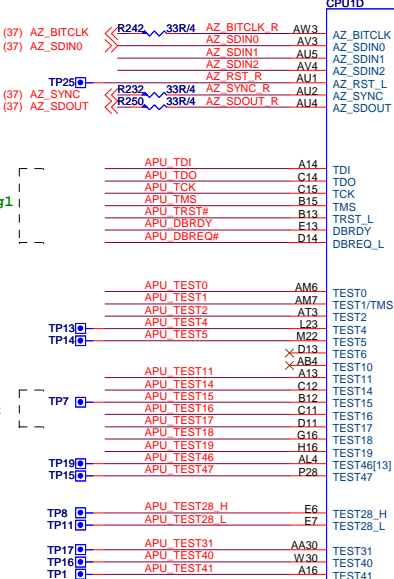
MS-7C37

Size	Document Description	Rev
Custom	AM4 DDR4 I/F	1.3
Date: Friday, April 26, 2019		
Sheet 3 of 75		



For Debug1

For Debug2



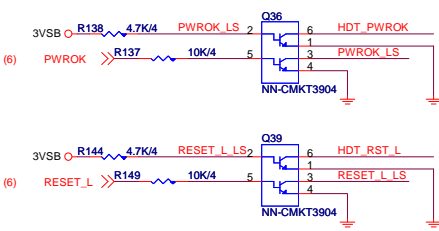
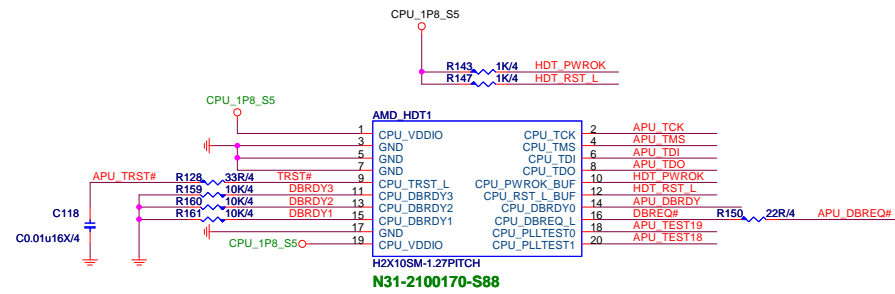
Not supported on TYPE 2/4

Type0 Only

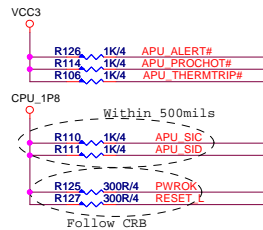
For Debug2

Not support Type2

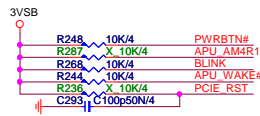
K14 PIN: 有HDMI SPEC的話需Pull-up
ENABLE功能



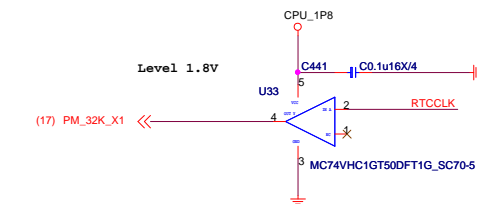
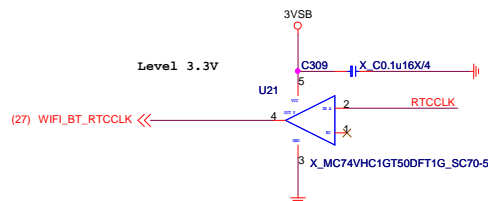
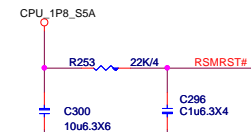
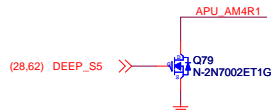
Vinafix.com



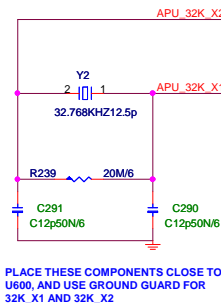
Add for HDT and
close to PIN E16 & B16



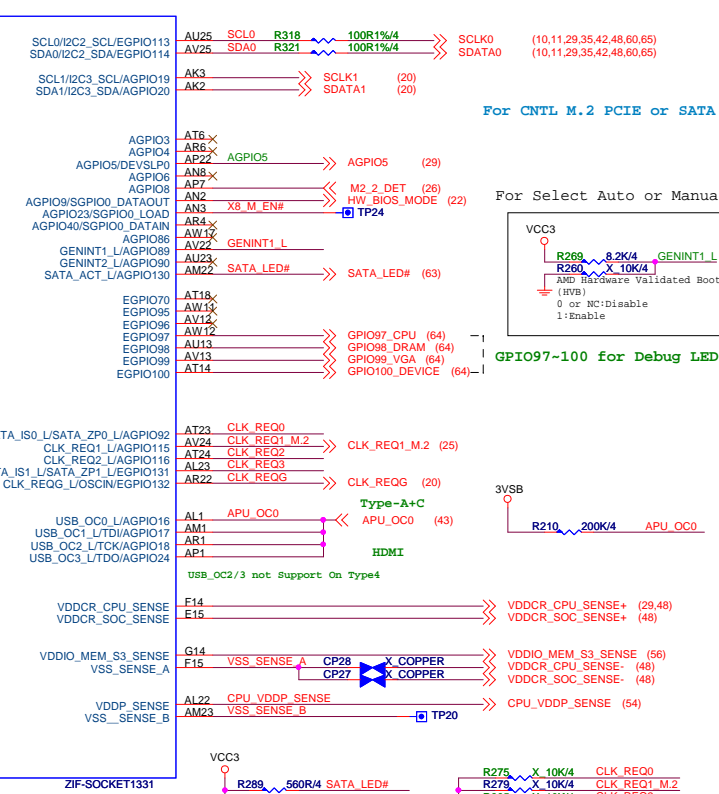
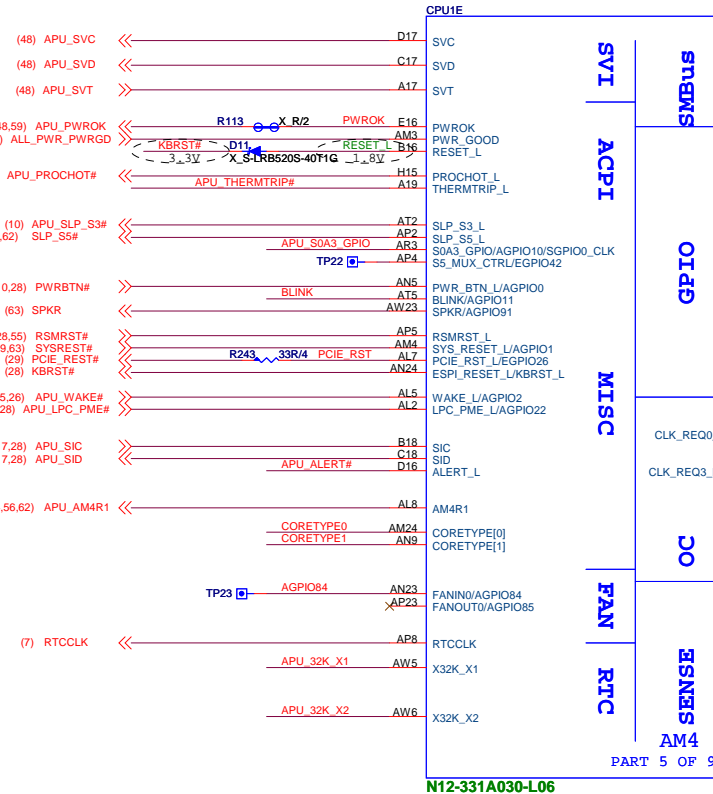
Turn off power when
BIOS into deep mode



Layout: Place x'tal within 1.5 inch of APU



AM4 CPU TYPE Circuit



$$I_B = (CPU_1P8_S5 - V_{be}) / 5.7k$$

$$(1.8 - 0.95) / 5.7k = 0.149mA$$

$$I_C = (VCC5 - V_{ce}) / 47k$$

$$(5 - 0.2) / 47k = 0.102mA$$

TYPE0_CPU_SEL
0:RV
1:BR/SR/PR/MTS

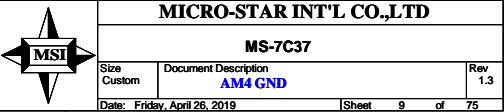
TYPE0_CPU_SEL (7,54,55)

SPEC no Support

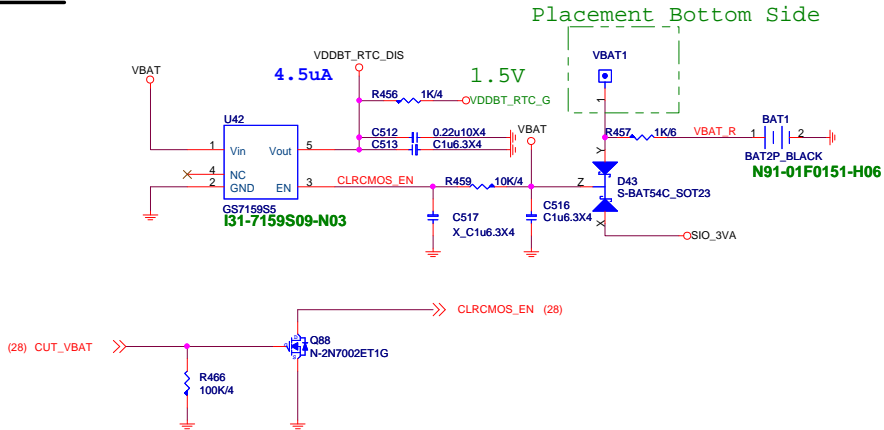
CPU	TYPE	CORETYPE 1	CORETYPE 0
BR	0	0	0
NA		0	1
SR	2	1	0
RV/ZP	3	1	1
MTS	4	1	1



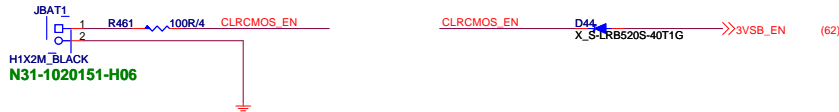
MICRO-STAR INT'L CO.,LTD		
MS-7C37		
Size	Document Description	Rev
Custom	AM4 SVI / ACPI / GPIO	1.3
Date:	Friday, April 26, 2019	Sheet 6 of 75



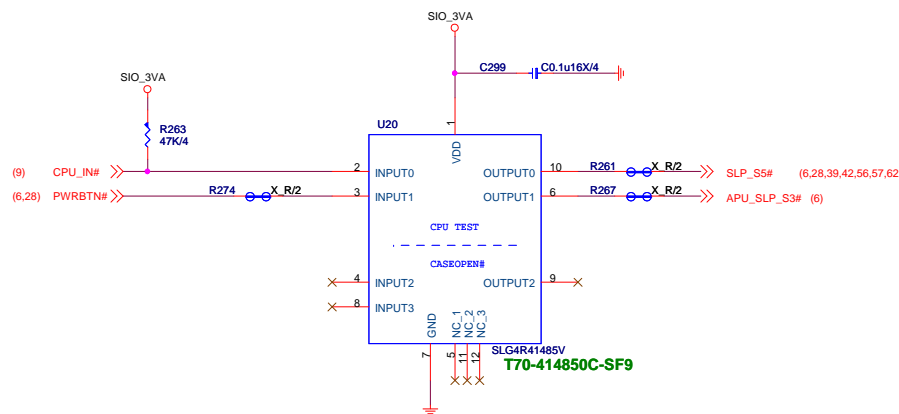
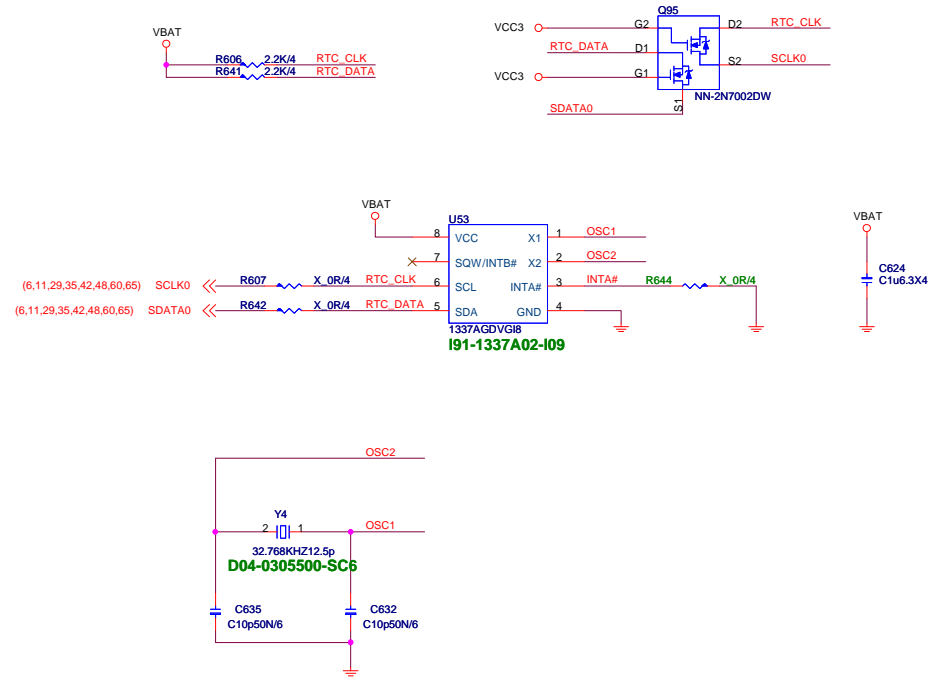
RTC & Clear CMOS Circuit

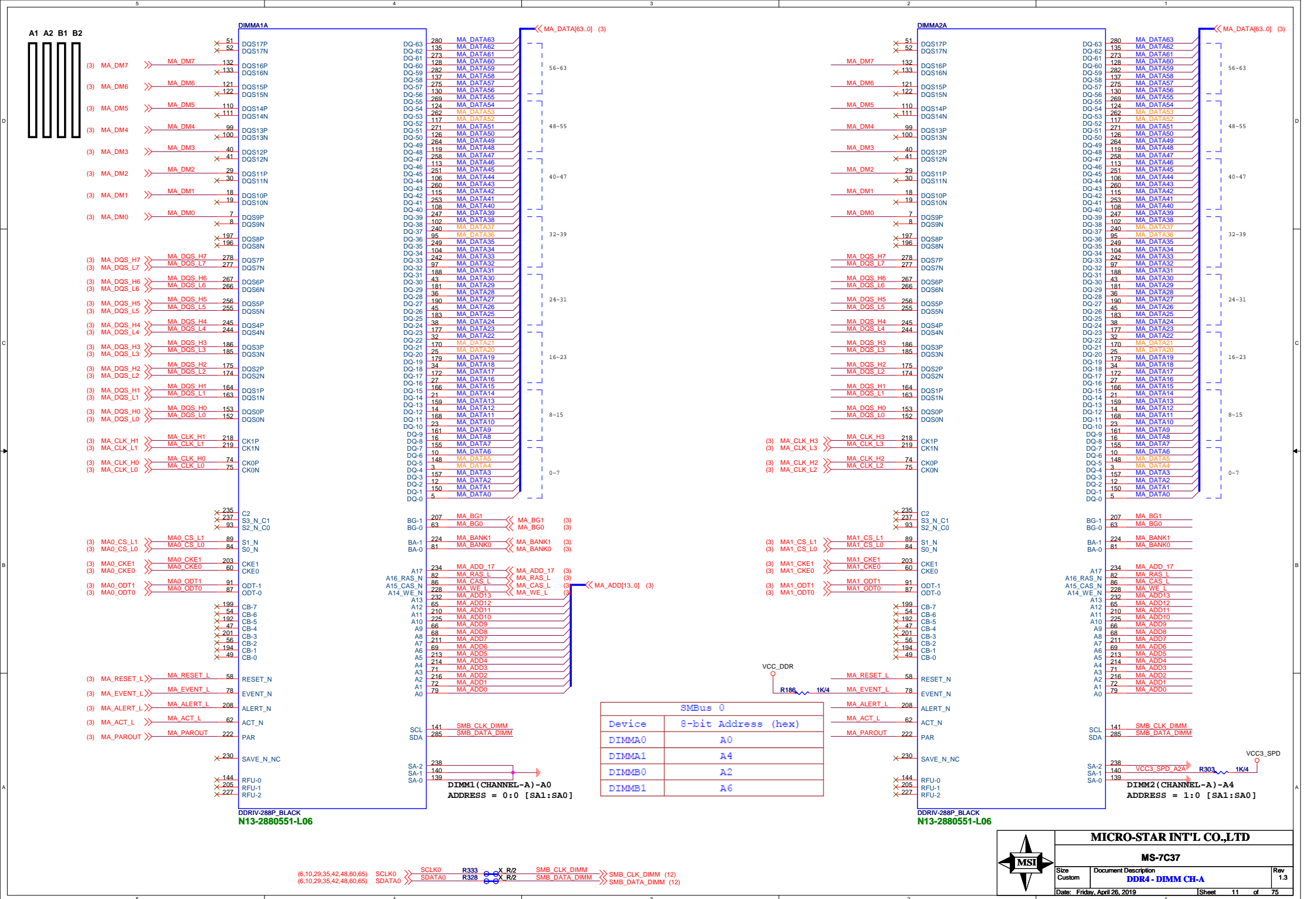


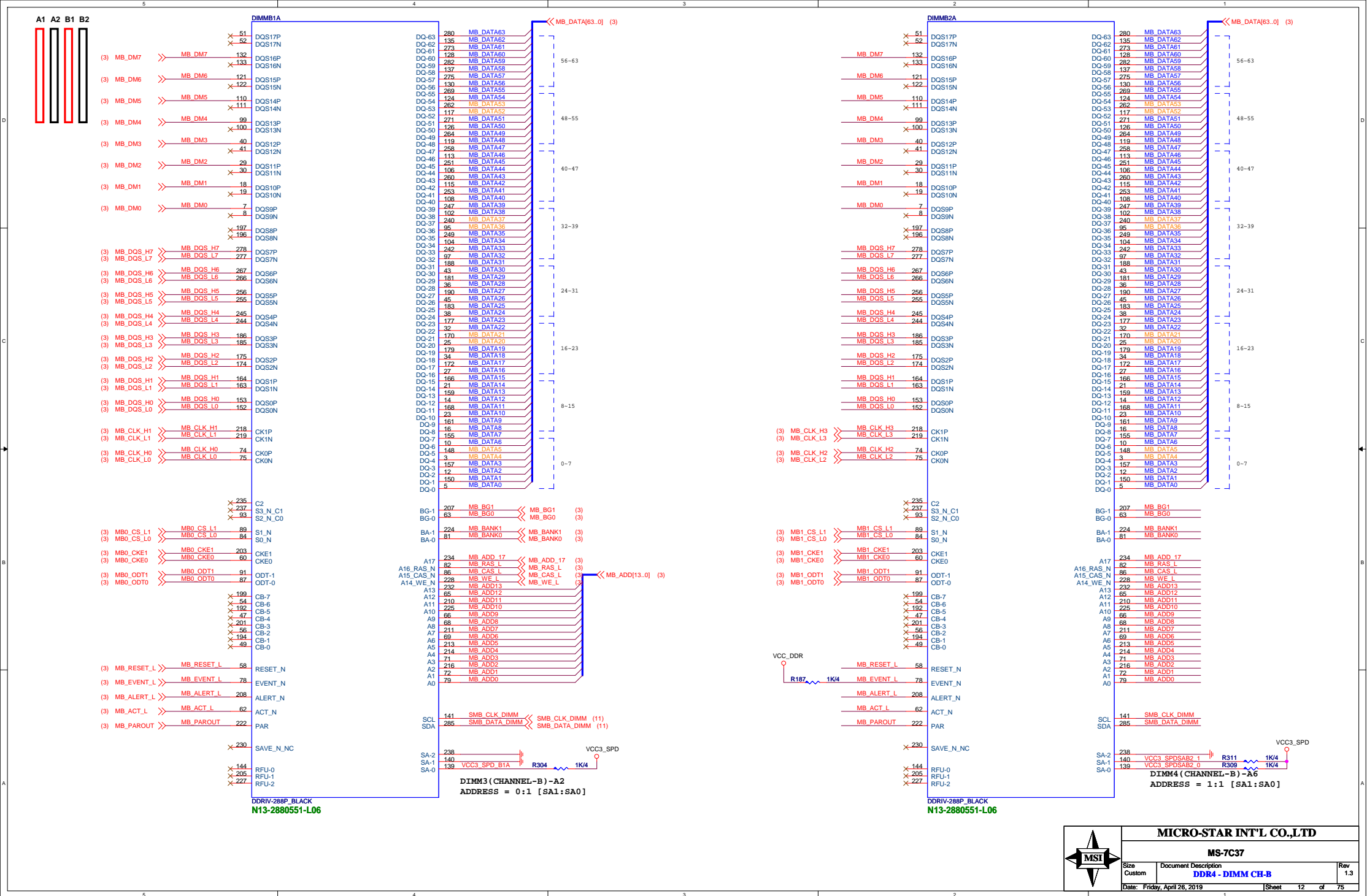
Clear CMOS button



RTC Backup







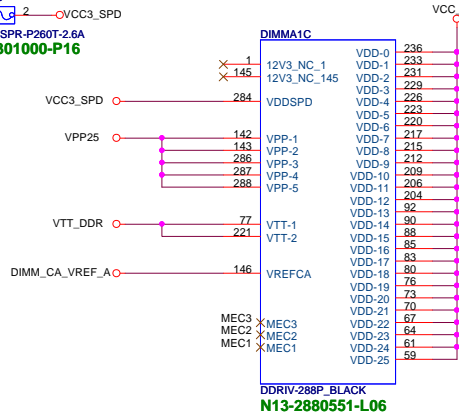
MICRO-STAR INT'L CO.,LTD

MS-7C37

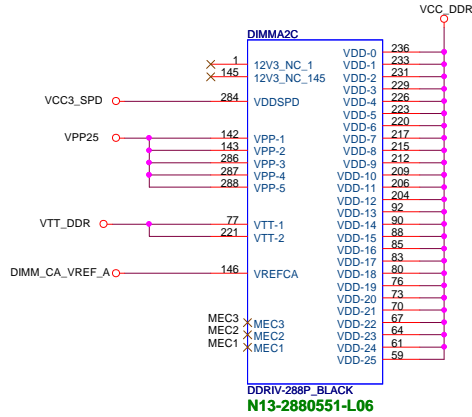
Size Custom	Document Description DDR4 - DIMM CH-B	Rev 1.3
Date: Friday, April 26, 2019	Sheet 12 of 75	

av1:D08-0301100-B07

VCC3 SPD
F5
F-SPR-P260T-2.6A
D08-0301000-P16

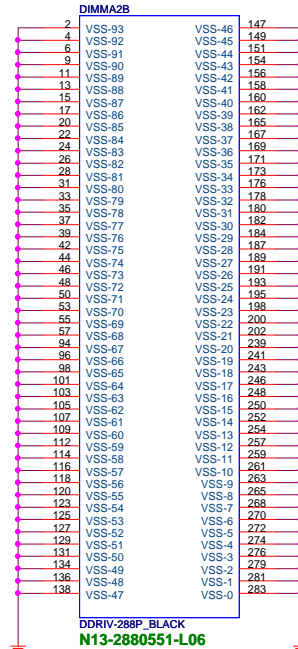
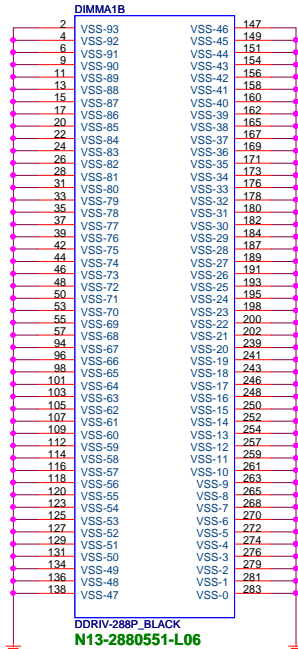
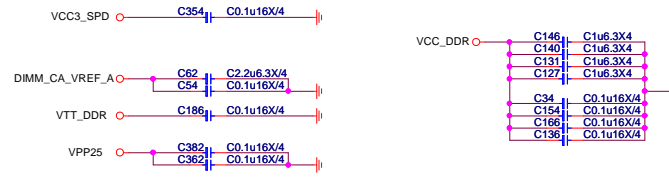
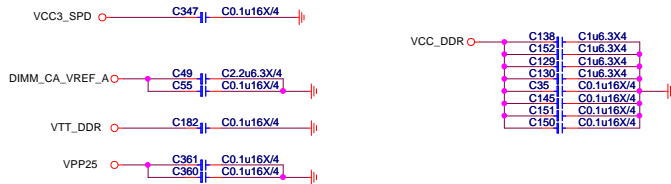
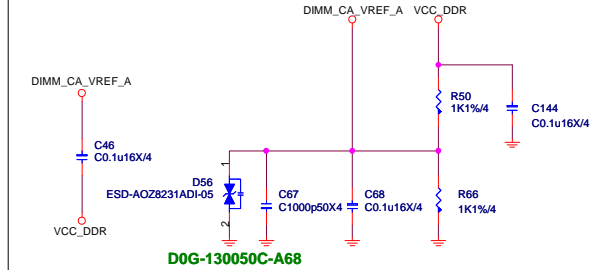


DIMM SLOT PN BY SPEC



DDR VREF

(place resistors close to DIMMs)



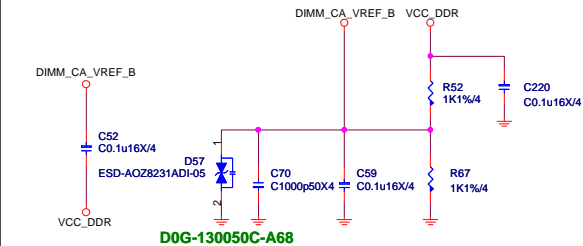
MICRO-STAR INT'L CO.,LTD

MS-7C37

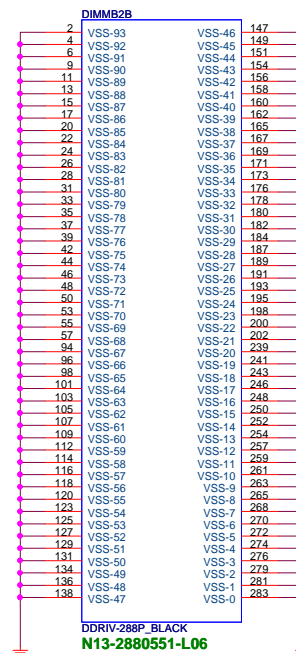
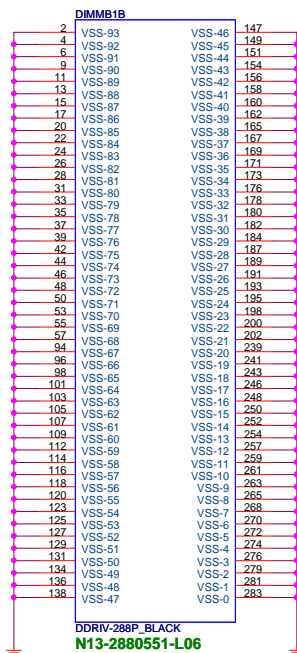
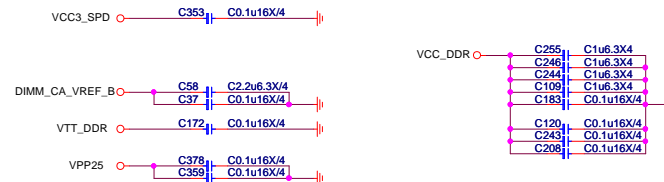
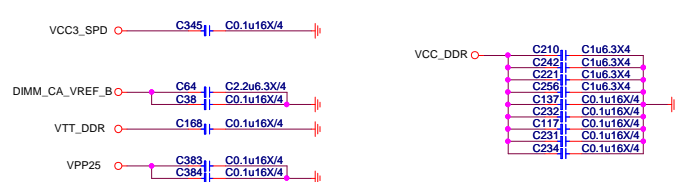
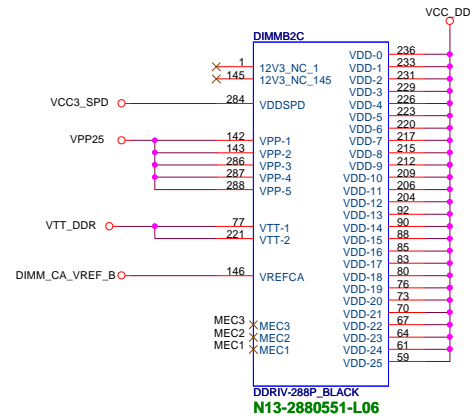
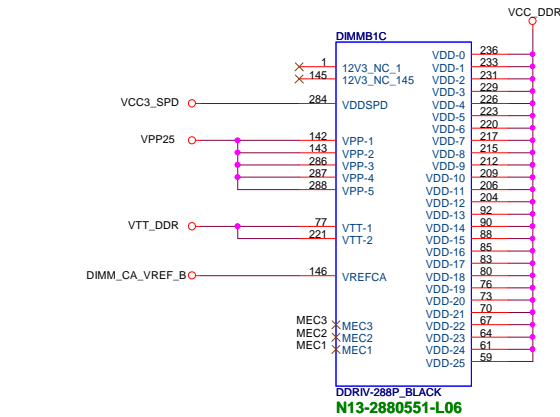
Size	Document Description	Rev
Custom	DDR4 - POWER/GND-1	1.3
Date: Tuesday, April 23, 2019		Sheet 13 of 75

DDR VREF

(place resistors close to DIMMs)



teknisi indonesia

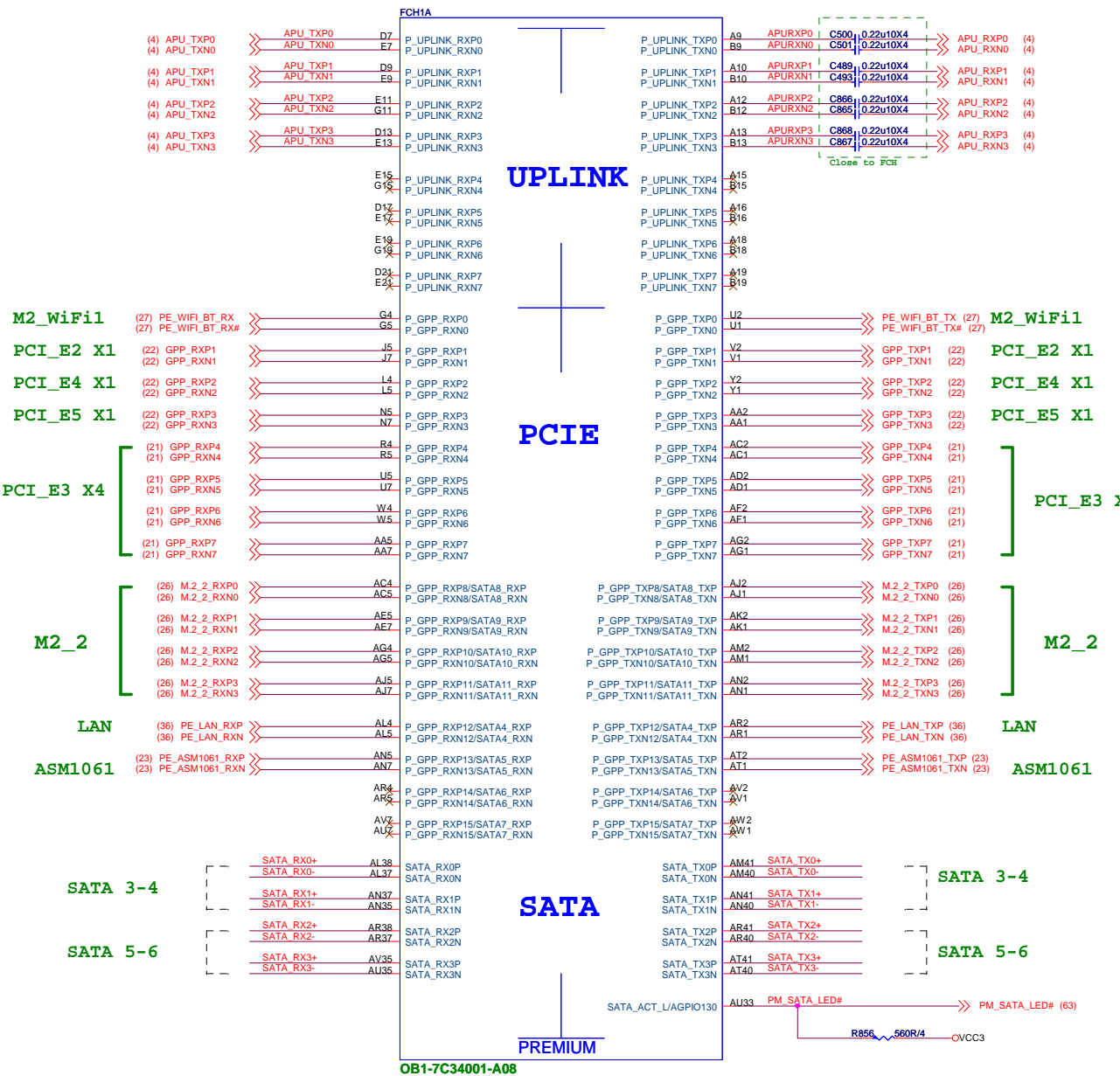
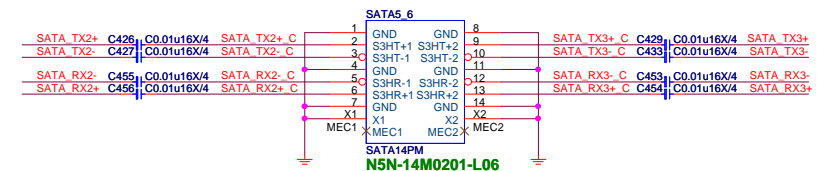
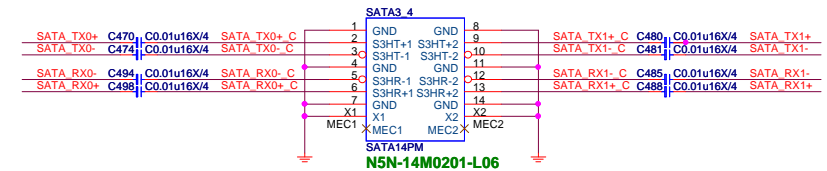


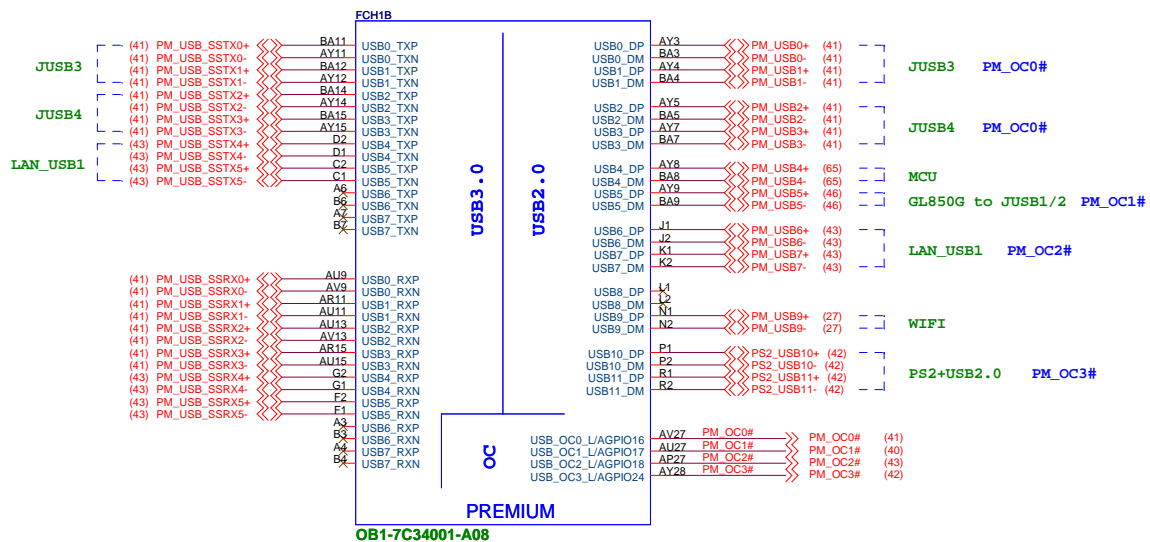
MICRO-STAR INT'L CO.,LTD

MS-7C37

Size	Document Description	Rev
Custom	DDR4 - POWER/GND-2	1.3
Date: Tuesday, April 23, 2019		Sheet 14 of 75

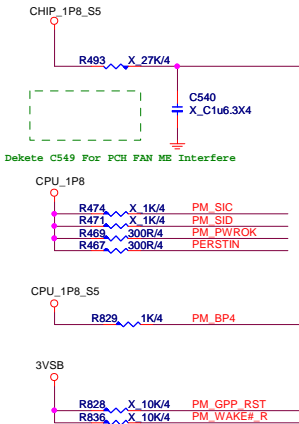
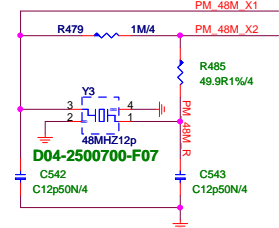
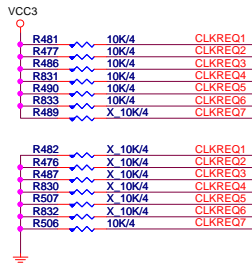
SATA Connector



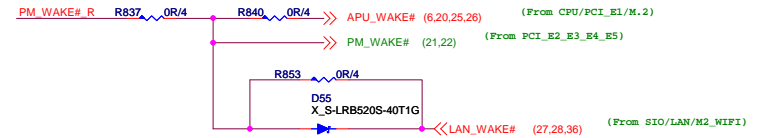
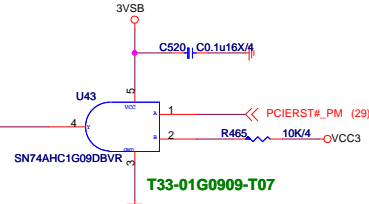
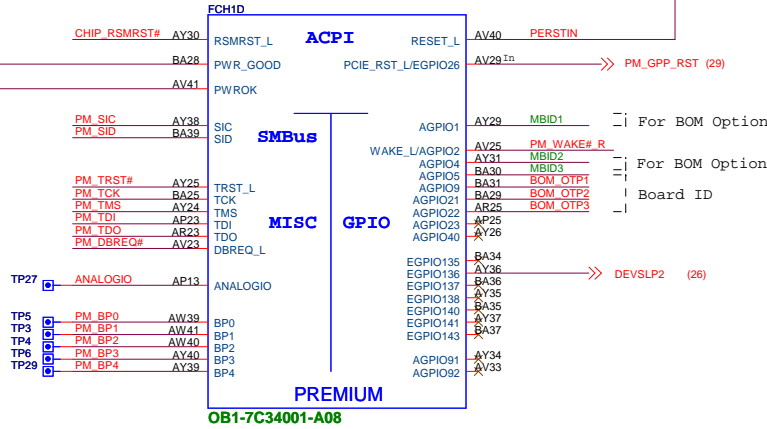
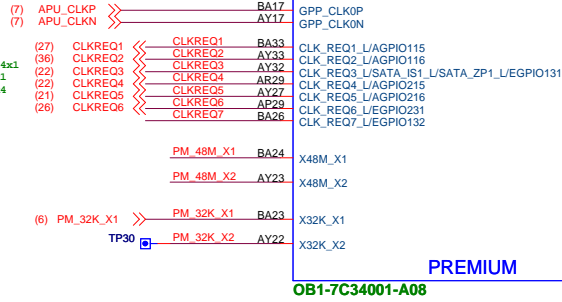


Ports	Host Controller	OC Pin
USB 3.2 Port 0 - 3 and USB 2.0 Port 0 - 5	Host Controller 0 (HC0)	USB_OC0
USB 3.2 Port 4 - 7 and USB 2.0 Port 6 - 11	Host Controller 1 (HC1)	USB_OC1

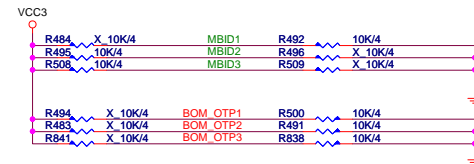




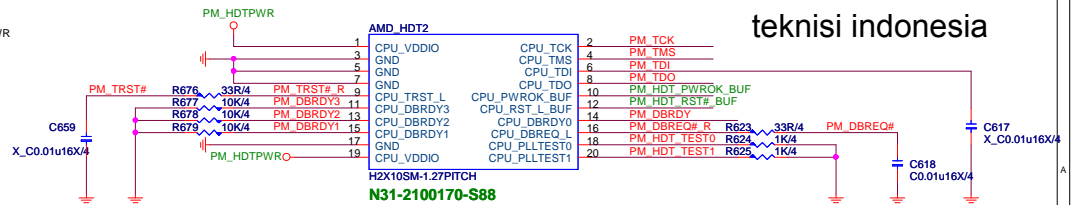
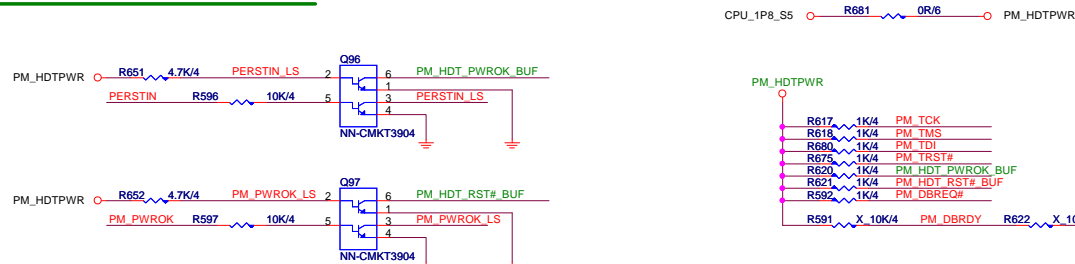
WIFI+BT
LAN
PCIE_E2/4x1
PCIE_E5x1
M.2_2
ASM1061



BOM OPTION



PREMIUM CHIPSET_HDT



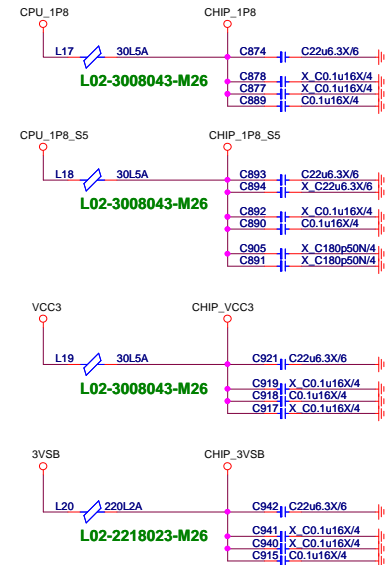
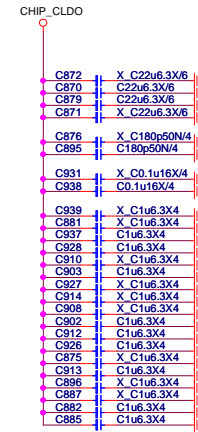
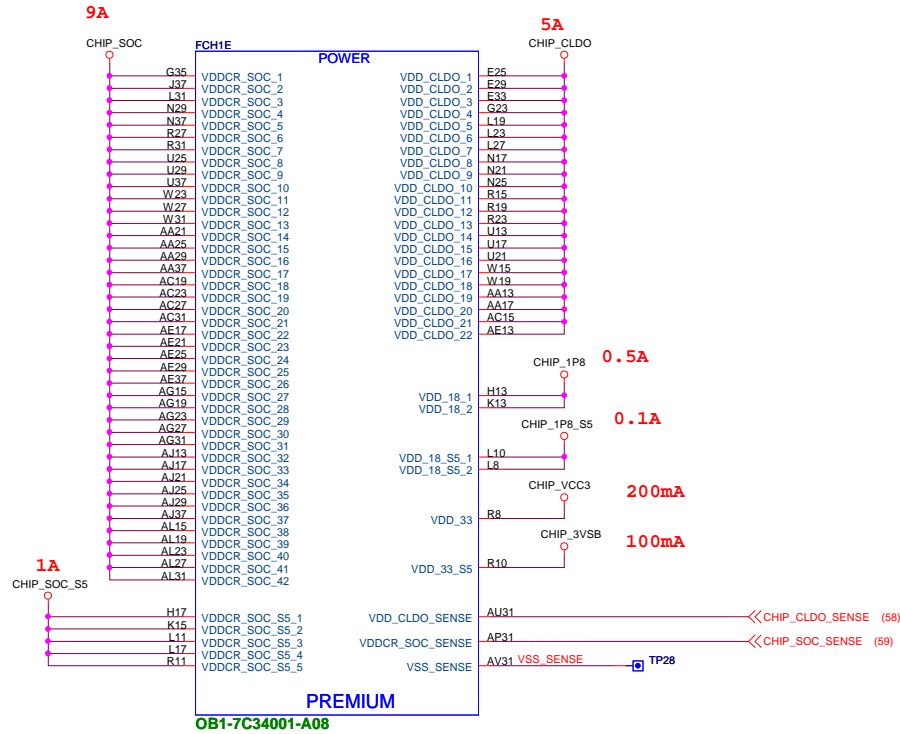
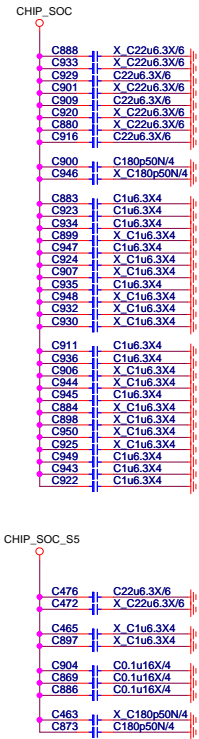
teknisi indonesia

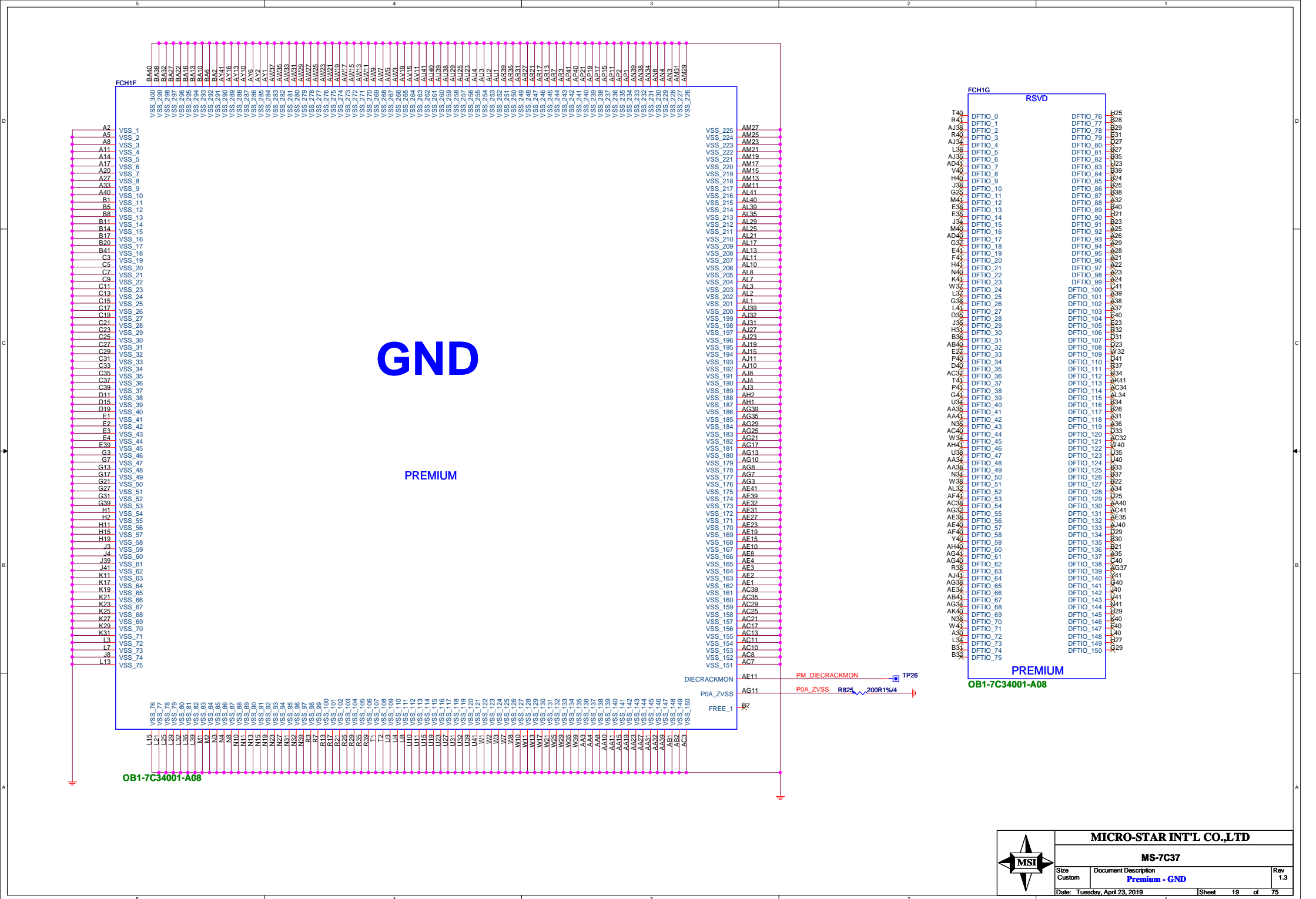


MICRO-STAR INT'L CO.,LTD

MS-7C37

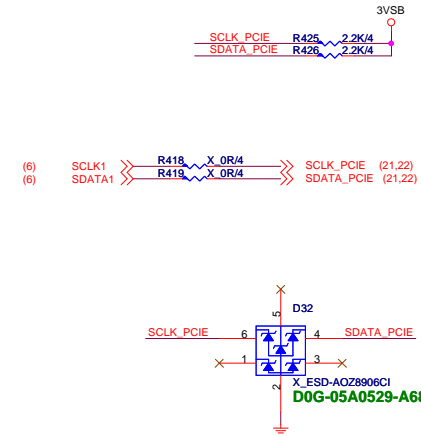
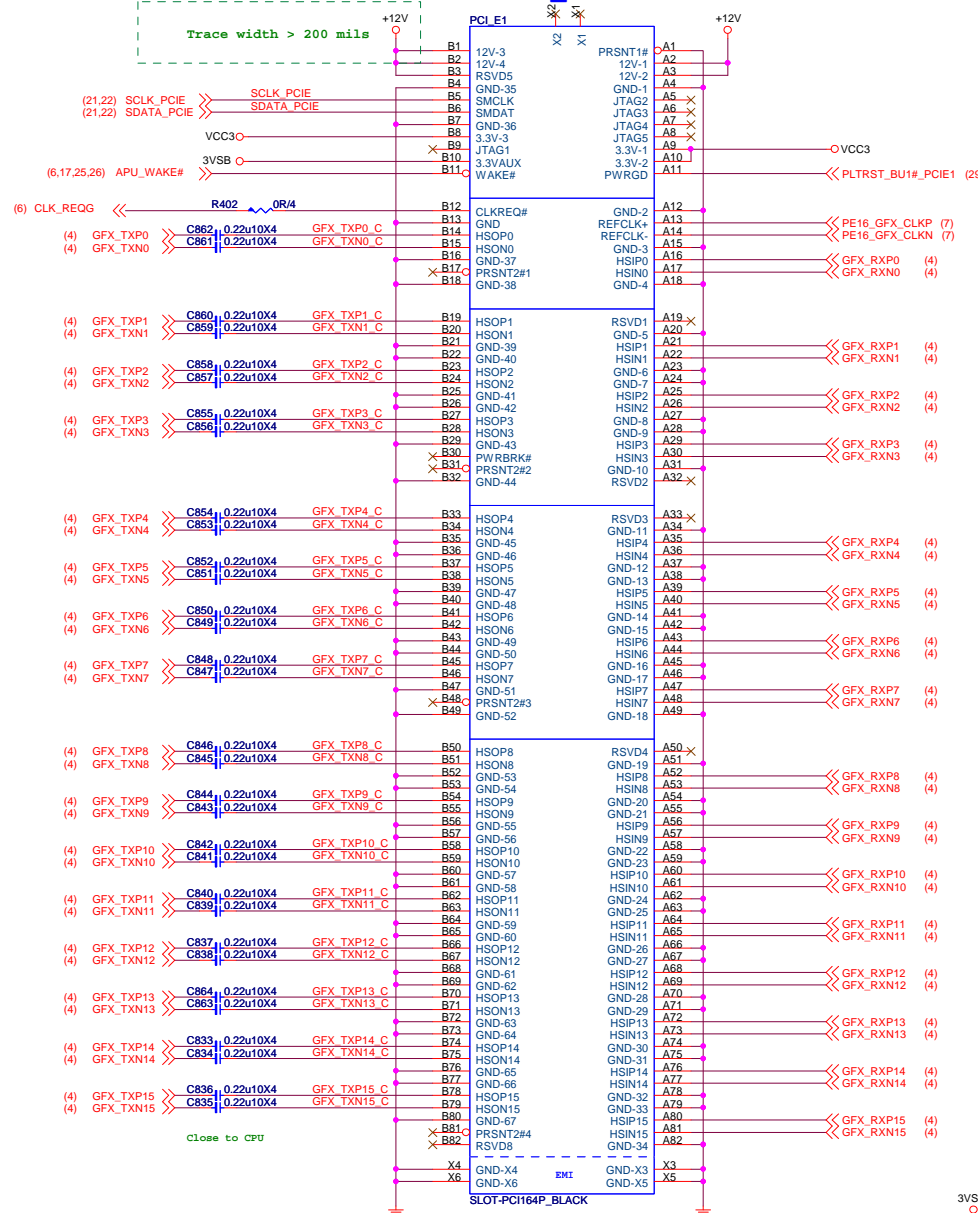
Size	Document Description	Rev
Custom	Premium - CLK/ACPI/GPIO	1.3
Date: Friday, April 26, 2019/	Sheet 17 of 75	



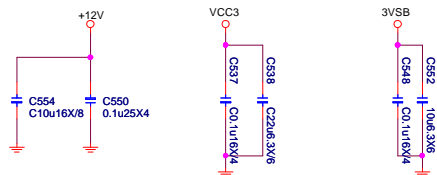
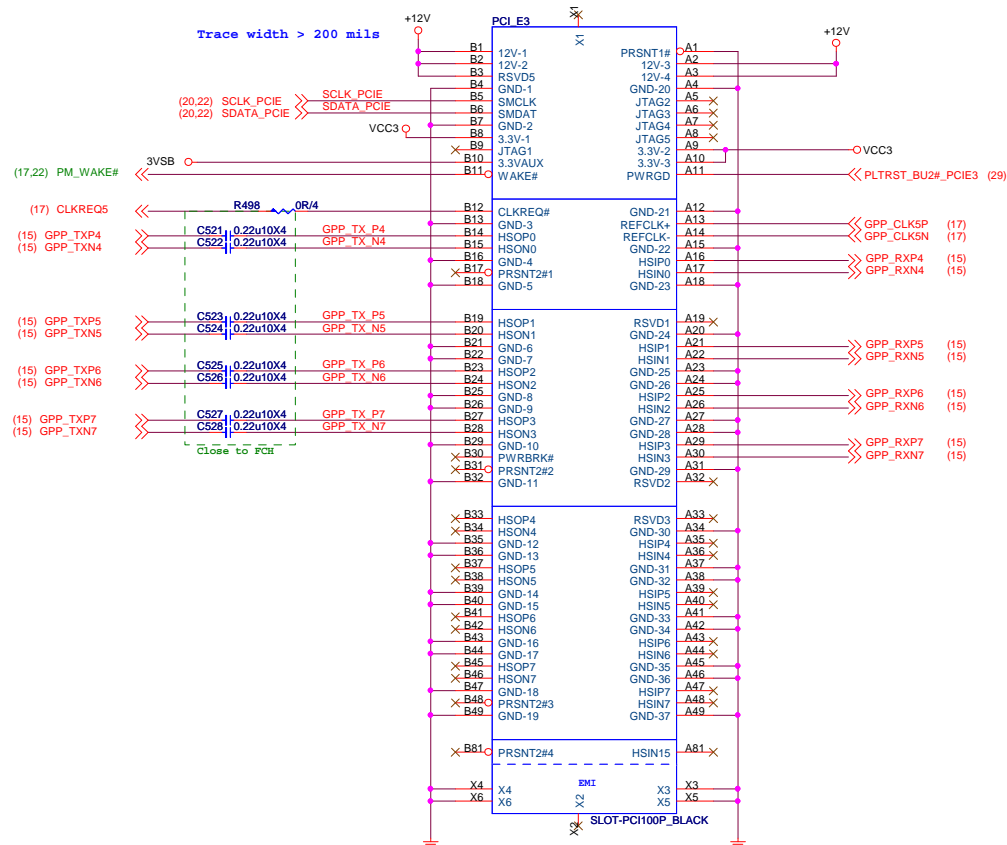


PCI EXPRESS x16 Slot

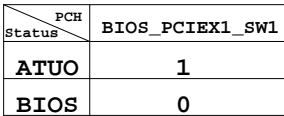
PCI E1



PCI_E3 X4



PCI Express x4 Slot *1		
+12V		- 2.1A
+VCC3		- 3A
+3V3_S5	(wake)	- 375mA
+3V3_S5	(no wake)	- 20mA



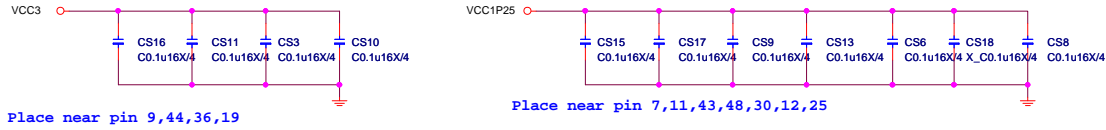
Size Custom	Document Description PCIE Switch PCI_E2 / E4 / E5 (X1)	Rev 1.3
Date: Friday, April 26, 2019	Sheet 22 of 75	

SATA Connector

1.2V delay from 3.3V 90% > 0ms

ASM1061 POWER Consumption

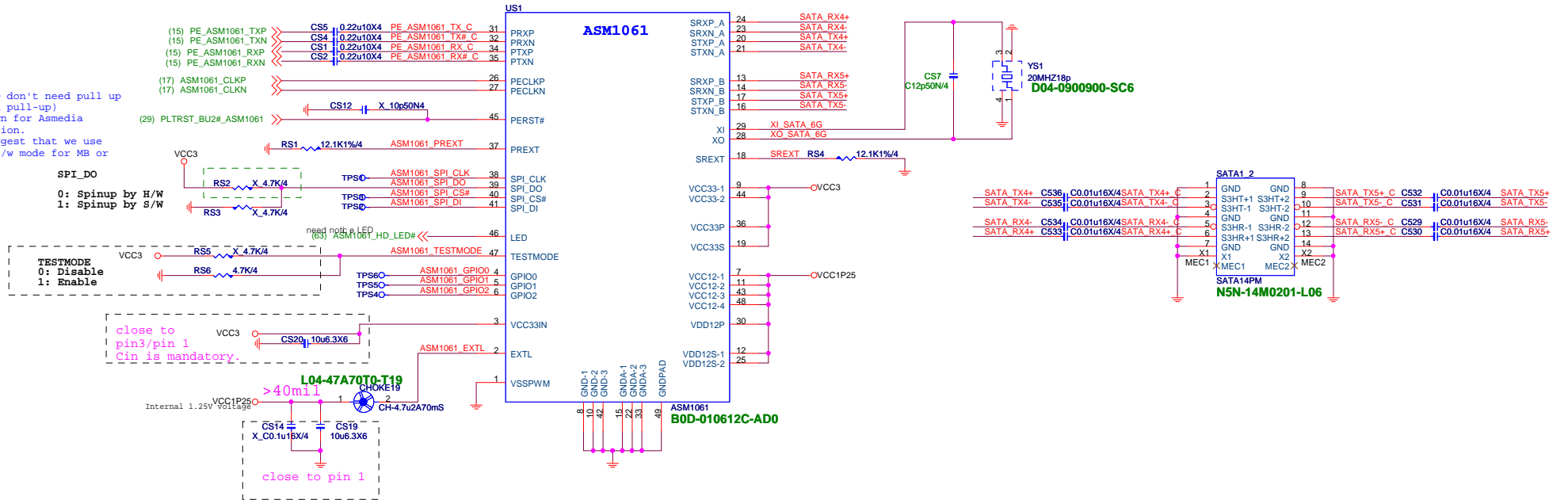
	3.3V	1.25V	Power (mW)
Idle (mA)	98.45	212.3	579.645
Busy (mA)	91.1	330.7	697.47



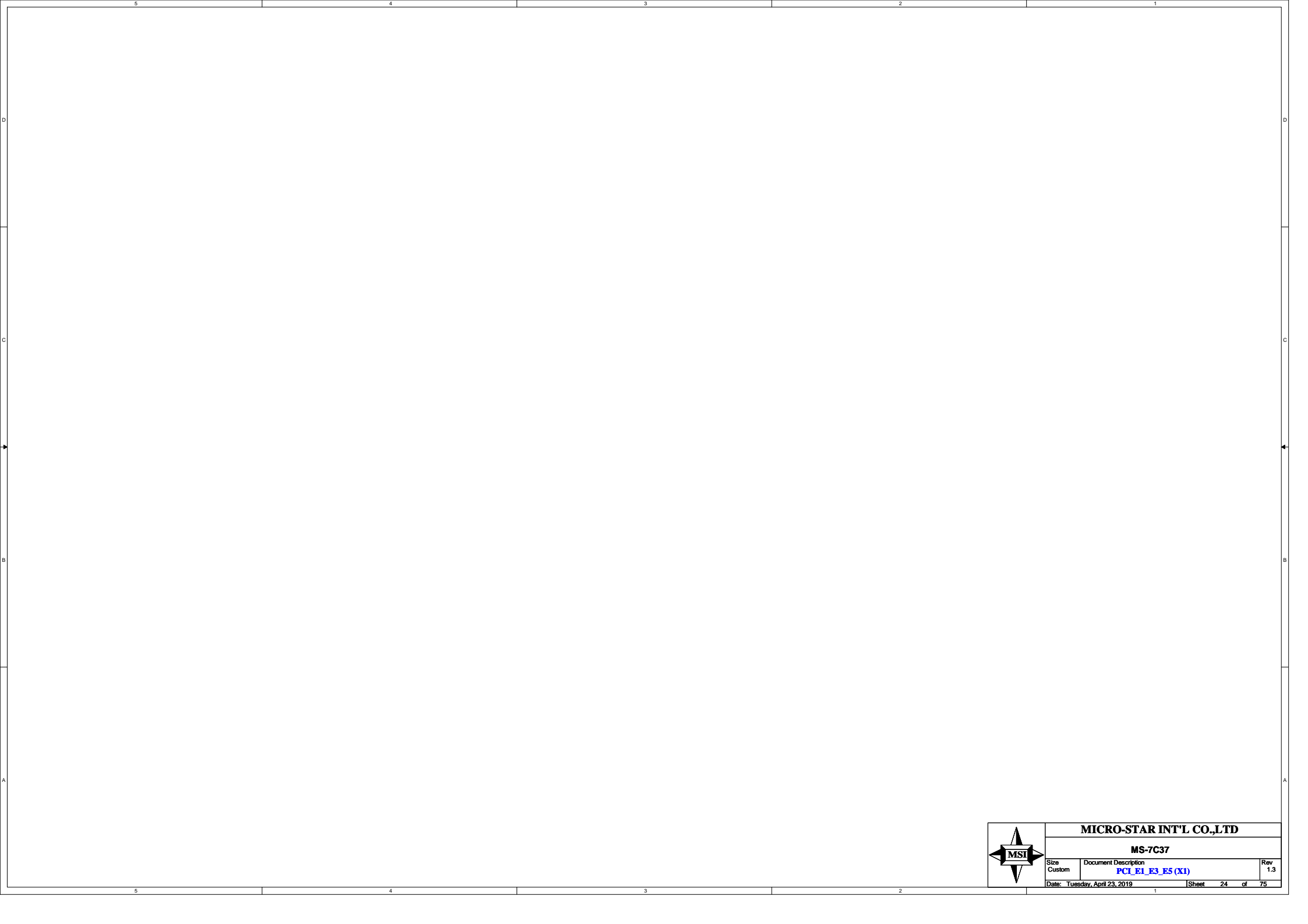
ASM1061 SATA6G

SATA_SPI_DO don't need pull up (integrated pull-up) or pull down for Asmedia recommendation.
Asmedia suggest that we use spinup by s/w mode for MB or PCI-E Card.

SPI_DO
0: Spinup by H/W
1: Spinup by S/W



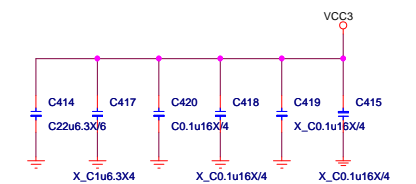
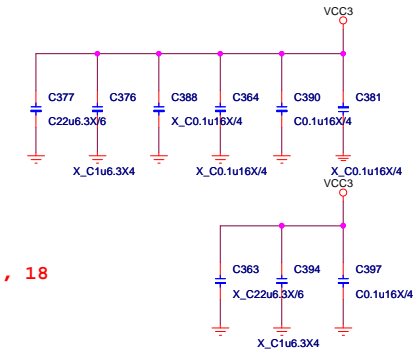
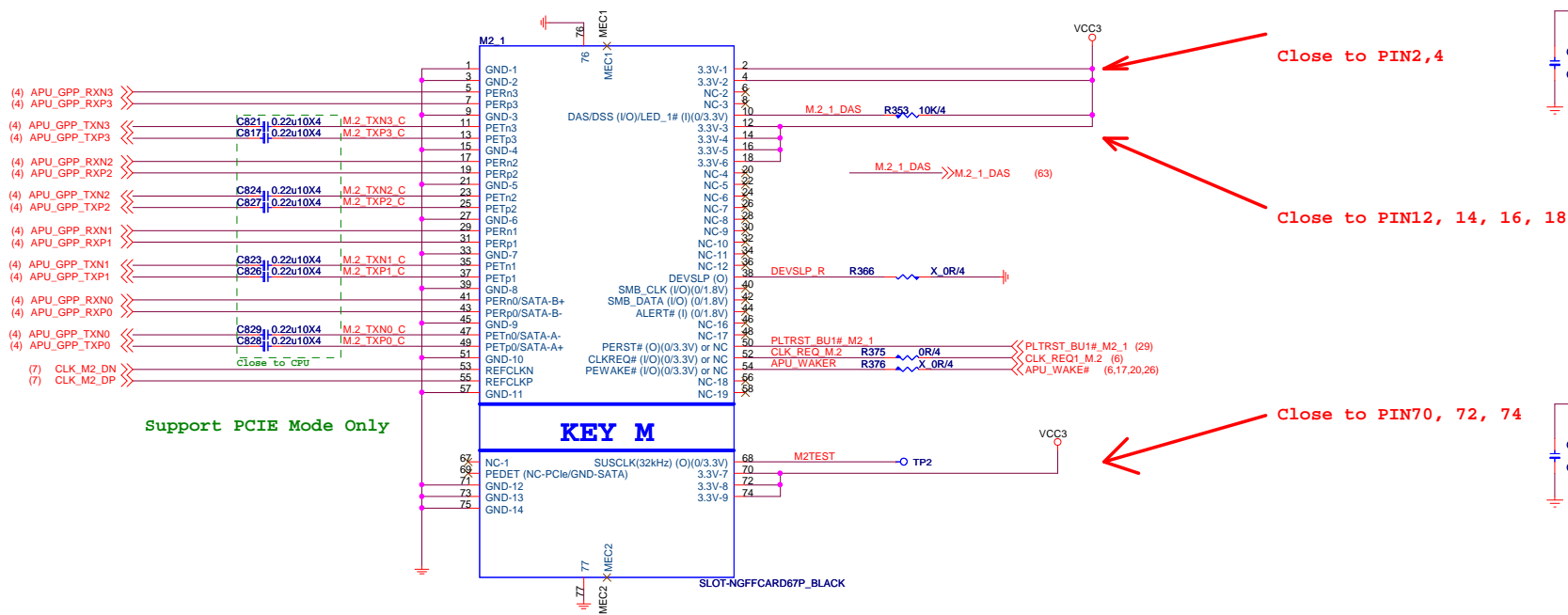
Vinafix.com



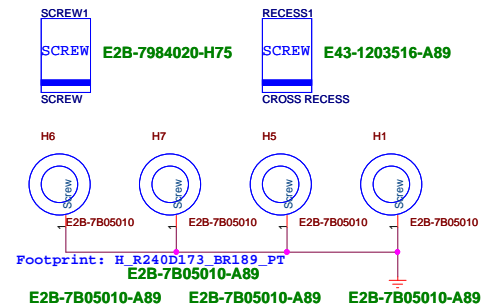
MICRO-STAR INT'L CO.,LTD		
MS-7C37		
Size Custom	Document Description PCI_E1_E3_E5 (X1)	Rev 1.3
Date: Tuesday, April 23, 2019		Sheet 24 of 75

M.2 1 Connector

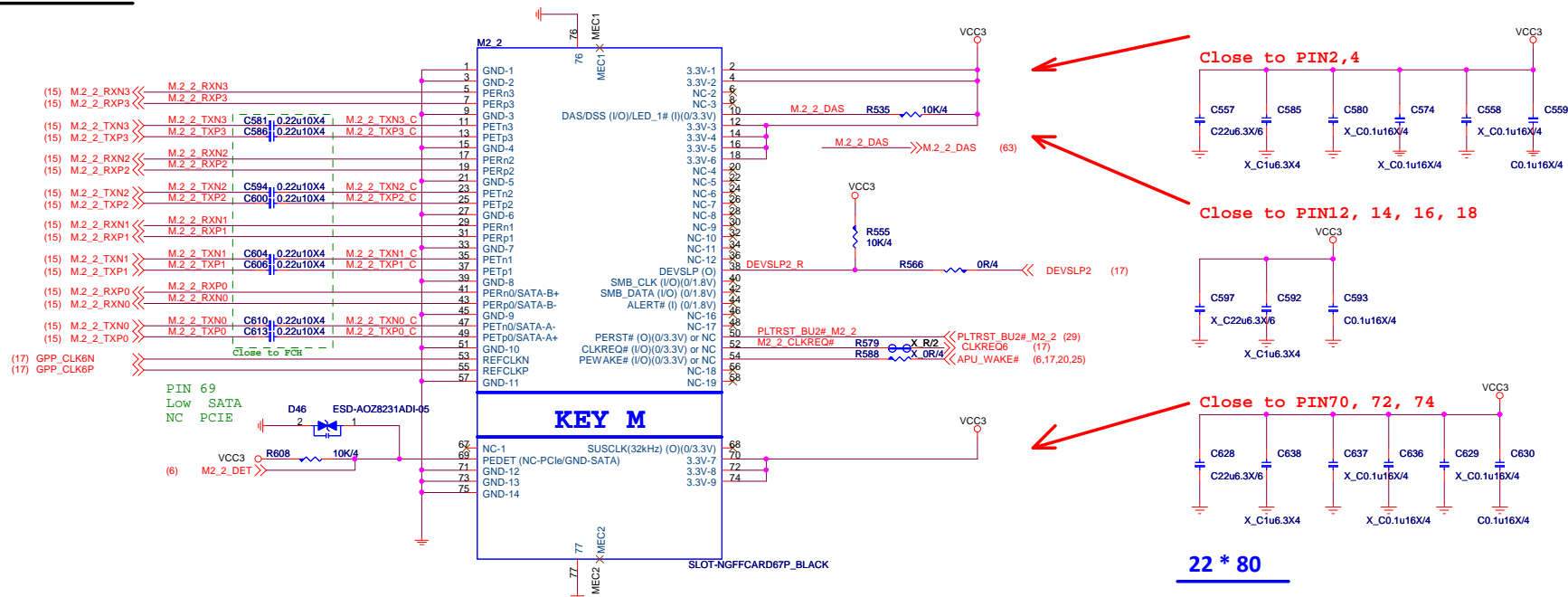
VCC3 4.25A
Max: 14W



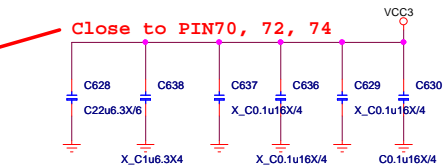
22 * 110



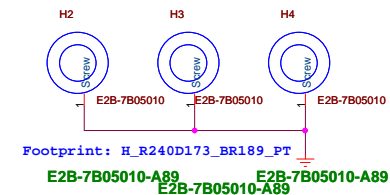
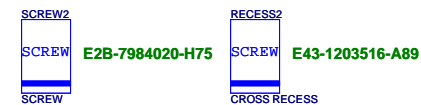
M.2_2 Connector



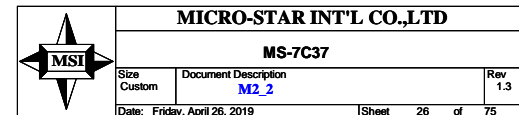
Support PCIE and SATA Mode

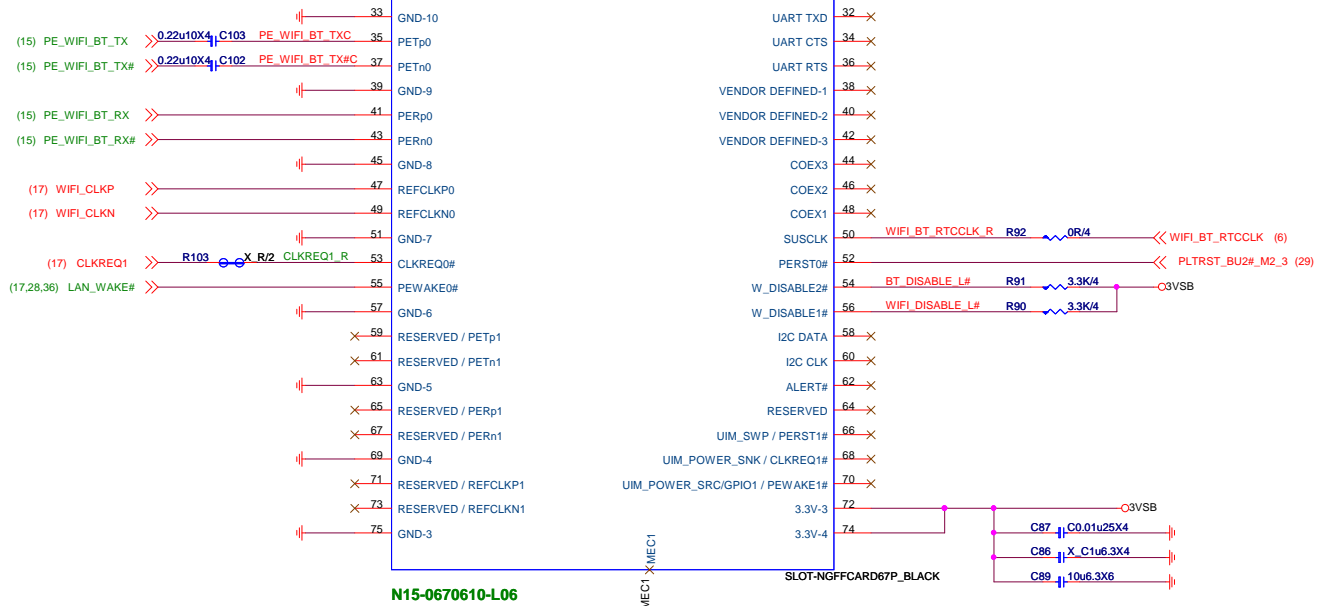
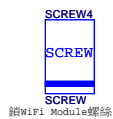
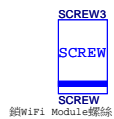
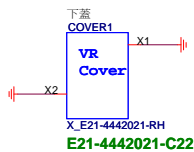
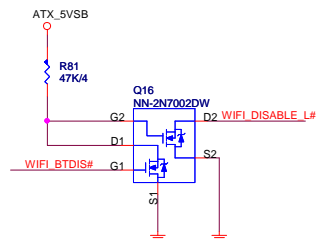
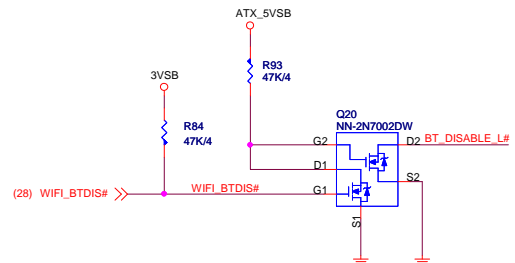
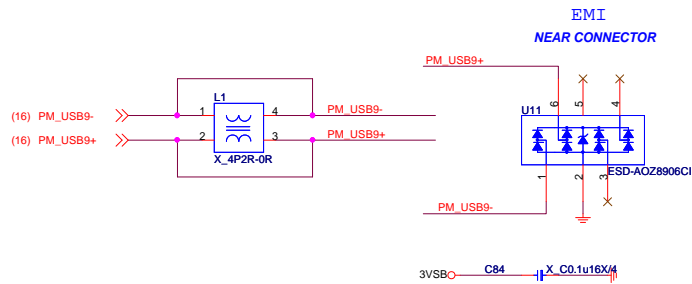


22 * 80



Vinafix.com





10uF+0.1uF+0.01uF at one end of socket in support of 3.3 V3V pins 2 and 4.
10uF+0.1uF+0.01uF at the other end of the socket in support of 3.3 V3V pins 70 and 72.

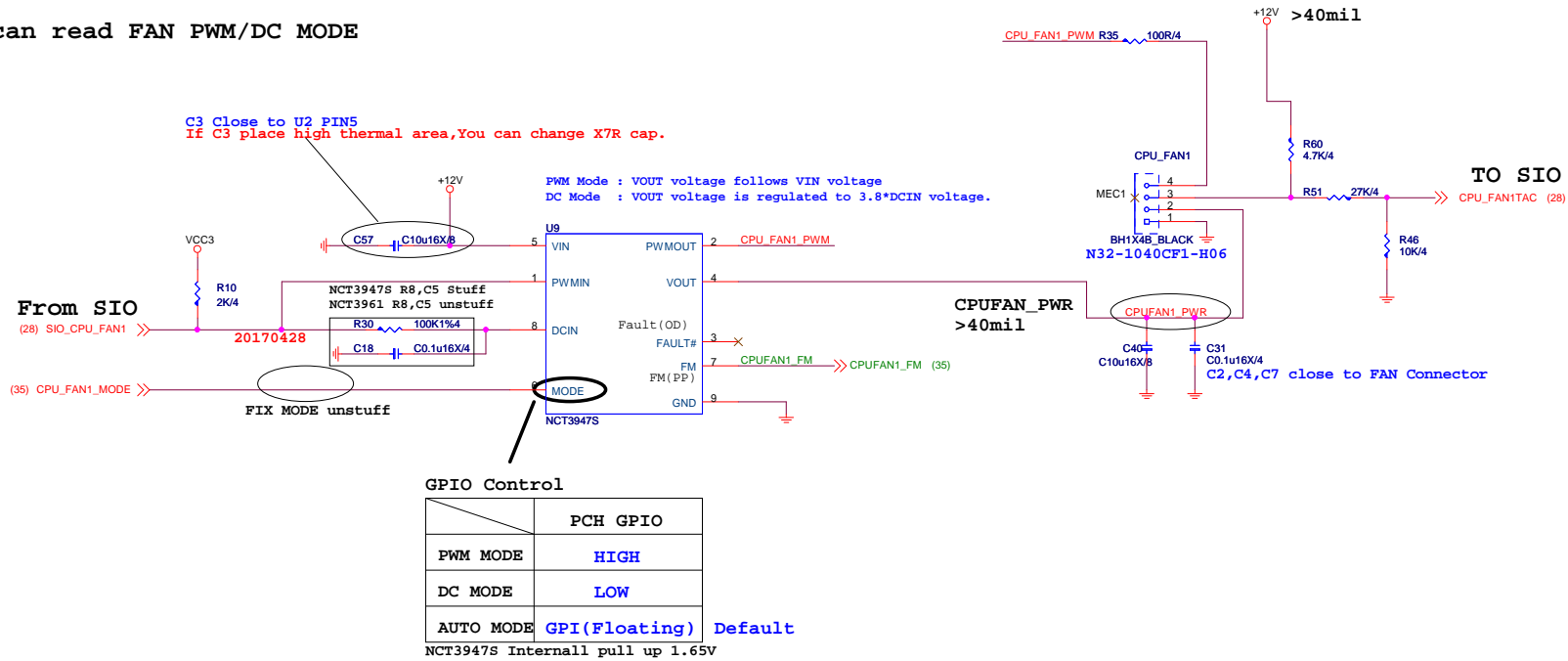
MICRO-STAR INT'L CO.,LTD			
MS-7C37			
Size	Document Description		Rev
Custom	M2_WIFI+BT		1.3
Date: Friday, April 26, 2019	Sheet 27 of 75		

Size Custom	Document Description SIO - NCT6797D-M	Rev 1.3
Date: Monday, May 06, 2019		Sheet 28 of 75

TYPE L : 4 PIN CPU FAN USE NCT3947S USE PCH GPIO

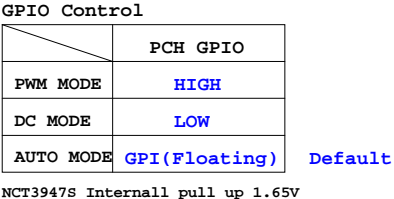
CPUFAN1

- 1.Mode GPIO BIOS can swtich PWM/DC MODE
- 2.FM:BIOS can read FAN PWM/DC MODE



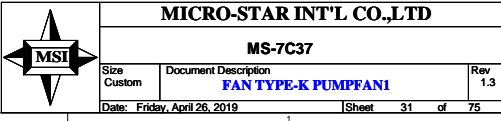
PUMPFAN1

1.Mode GPIO BIOS can swtich PWM/DC MODE



	PCH GPIO
PWM MODE	HIGH
DC MODE	LOW
AUTO MODE	GPI(Floating)

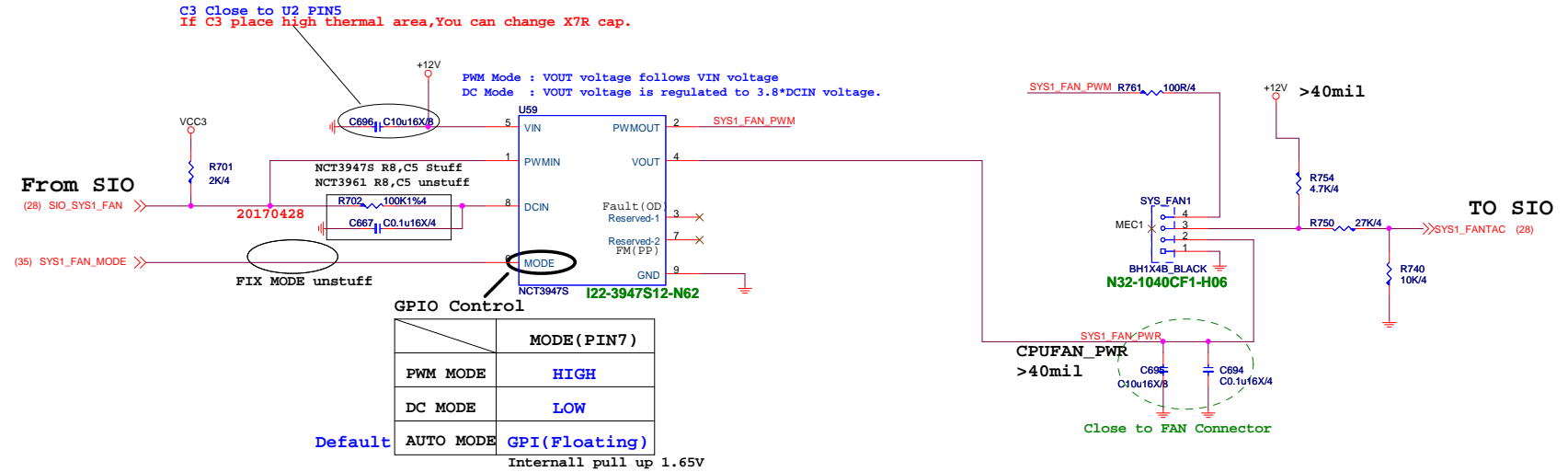
NCT3947S Internall pull up 1.65V



SYSFAN1

TYPE K : 4 PIN CPU FAN USE NCT3947S USE PCH GPIO CONTROL FAN MODE

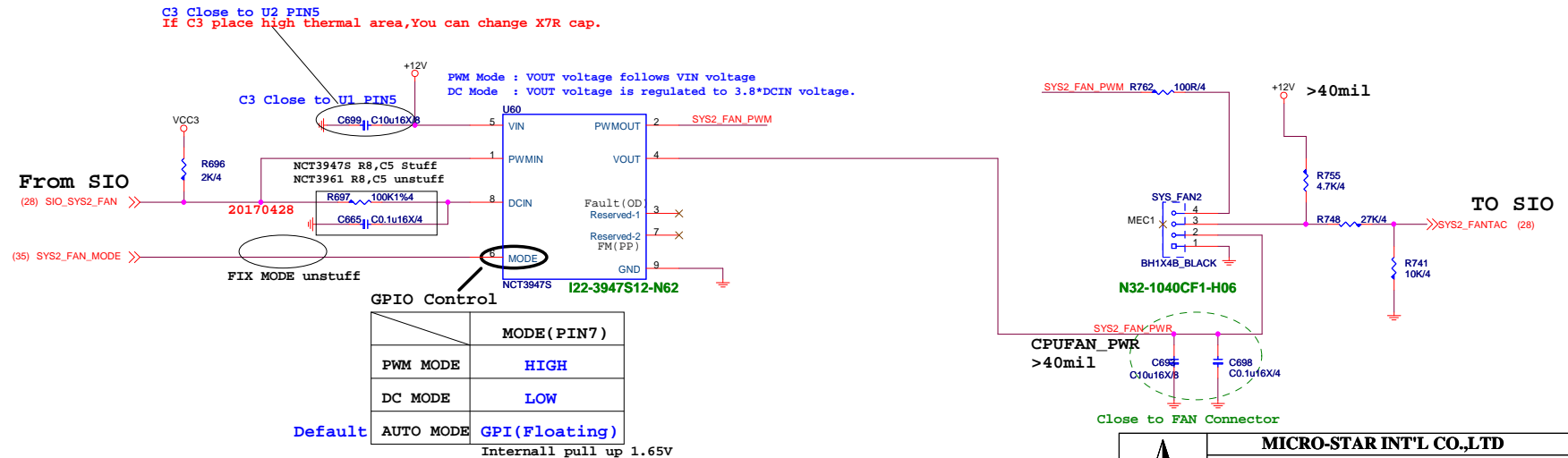
1.Mode GPIO BIOS can switch PWM/DC MODE



SYSFAN2

TYPE K : 4 PIN CPU FAN USE NCT3947S USE PCH GPIO CONTROL FAN MODE

1.Mode GPIO BIOS can switch PWM/DC MODE



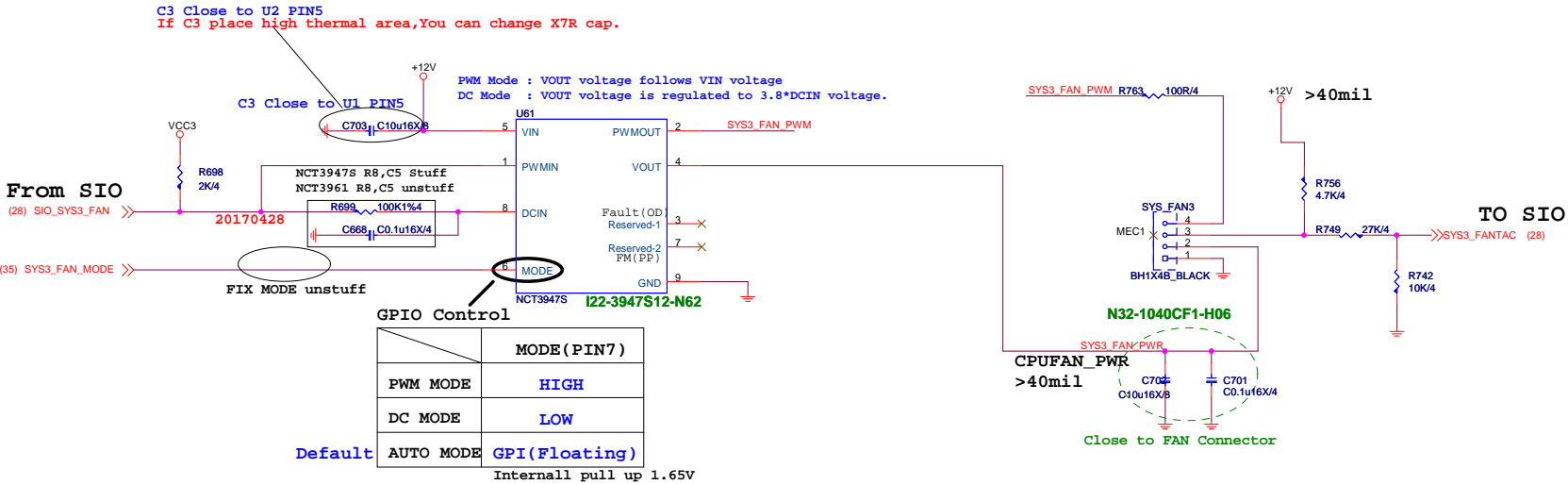
Vinafix.com

MICRO-STAR INT'L CO.,LTD		
MS-7C37		
Size Custom	Document Description	Rev 1.3
FAN TYPE-K SYSFAN1/2		
Date: Friday, April 26, 2019	Sheet 32 of 75	

SYSFAN3

TYPE K : 4 PIN CPU FAN USE NCT3947S USE PCH GPIO CONTROL FAN MODE

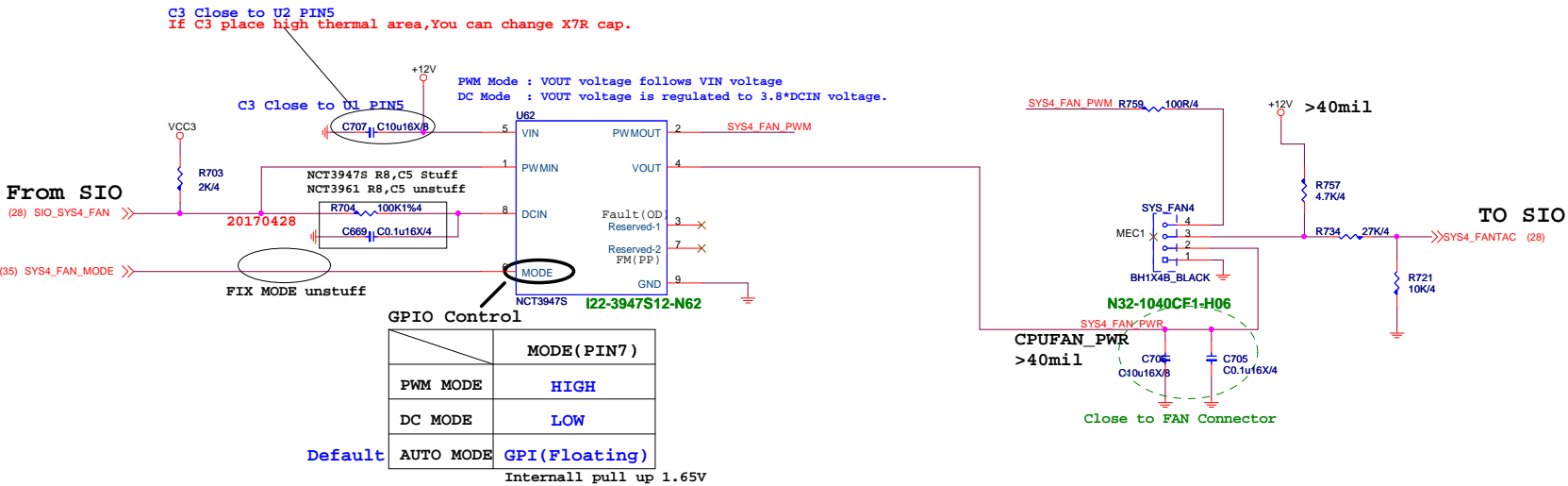
1.Mode GPIO BIOS can switch PWM/DC MODE



SYSFAN4

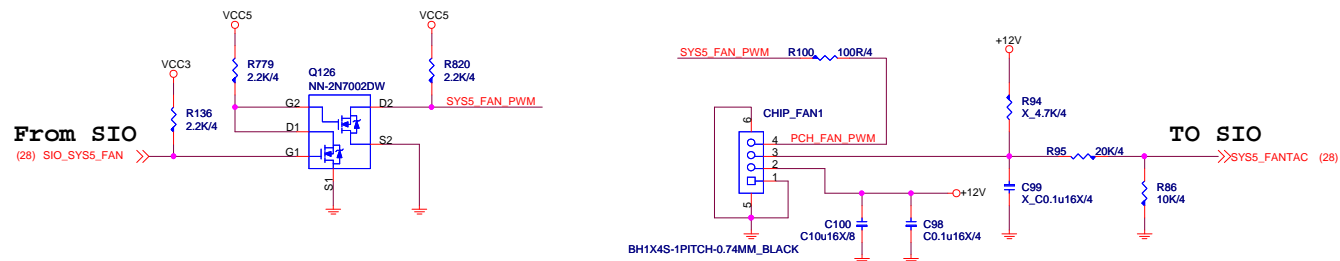
TYPE K : 4 PIN CPU FAN USE NCT3947S USE PCH GPIO CONTROL FAN MODE

1.Mode GPIO BIOS can switch PWM/DC MODE



MICRO-STAR INT'L CO.,LTD		
MS-7C37		
Size Custom	Document Description FAN TYPE-K SYSFAN3/4	Rev 1.3
Date: Friday, April 26, 2019	Sheet 33	of 75

PCH_FAN



MICRO-STAR INT'L CO.,LTD

MS-7C37

Size Custom	Document Description PCH_FAN	Rev 1.3
Date: Friday, April 26, 2019		
Sheet 34 of 75		

By PM Define FAN name

SHOW FAN FAULT USE	FAN
GP10	CPUFAN1
GP11	CPUFAN2 PUMPFAN

BIOS SHOW FAN FAULT Information USE
Default GPI

BIOS SHOW FAN MODE Information USE
Default GPI

use avoid S5 leakage

CPUFAN1_FM R47 1K/4

By PM Define FAN name

SHOW FAN MODE USE	FAN
GP12	CPUFAN1
GP13	CPUFAN2 PUMPFAN

By PM Define FAN name

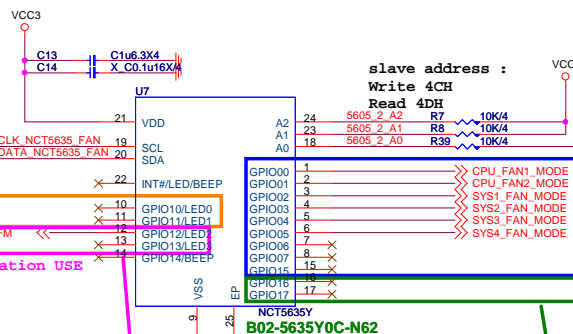
LED OFF BLINK	FAN
GP16	CPUFAN1
GP17	CPUFAN2 PUMPFAN

Default GPI

USE LED OFF & LED BLINK

By PM Define FAN name

FAN MODE USE	FAN
GP00	CPUFAN1
GP01	CPUFAN2 PUMPFAN
GP02	SYSFAN1
GP03	SYSFAN2
GP04	SYSFAN3
GP05	SYSFAN4
GP06	SYSFAN5
GP07	EXT_SYS FAN1
GP15	EXT_SYS FAN2



Vinafix.com



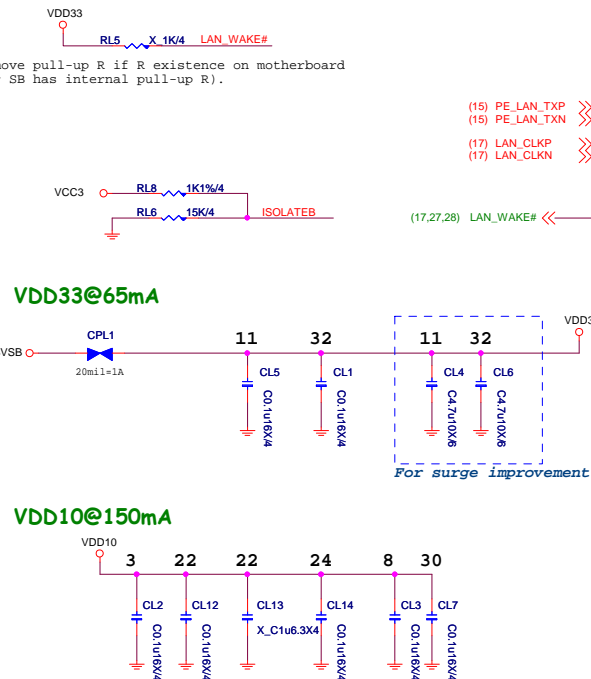
MICRO-STAR INT'L CO.,LTD

MS-7C37

Size Custom	Document Description FAN GPIO NCT5635	Rev 1.3
Date: Friday, April 26, 2019	Sheet 35 of 75	

RTL8111H Giga LAN

Remove pull-up R if R existence on motherboard
(or SB has internal pull-up R).



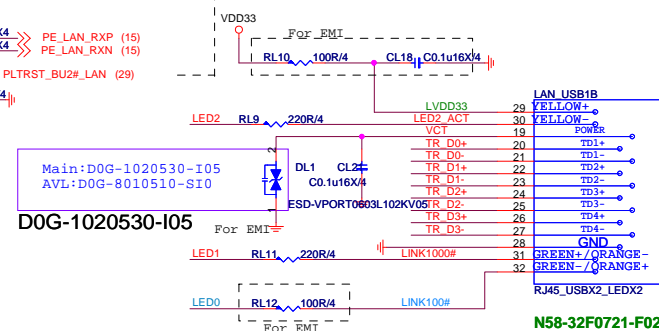
Pin33: 4 via from top layer to GND layer
and make the via at the center of IC.

Pull-up resistor RL9 required to either
3.3V suspend or core rail depending on
the power well of the PCH input CLKREQ# buffer.



PIN19:
AMD platform connect to PCIE_RST#,
don't connect to A-RST#.
INTEL platform connect to PLT_RST#.

LAN Connector

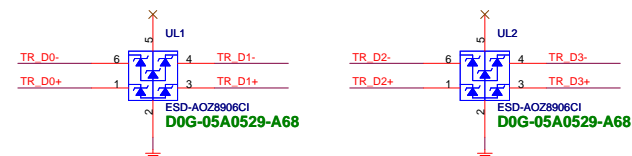


8111H POWER Consumption

	3.3V @ mA	mW
10 M Idle/TxRx	9.9/84.69	32.67/279.48
100 M Idle/TxRx	48.11/92.44	158.76/305.05
Giga Idle/TxRx	124.5/177.57	410.85/585.98
ALDPS	5.50	18.15

ESD Protect close to connector

D0G-0200529-A68
D0G-0100619-I05

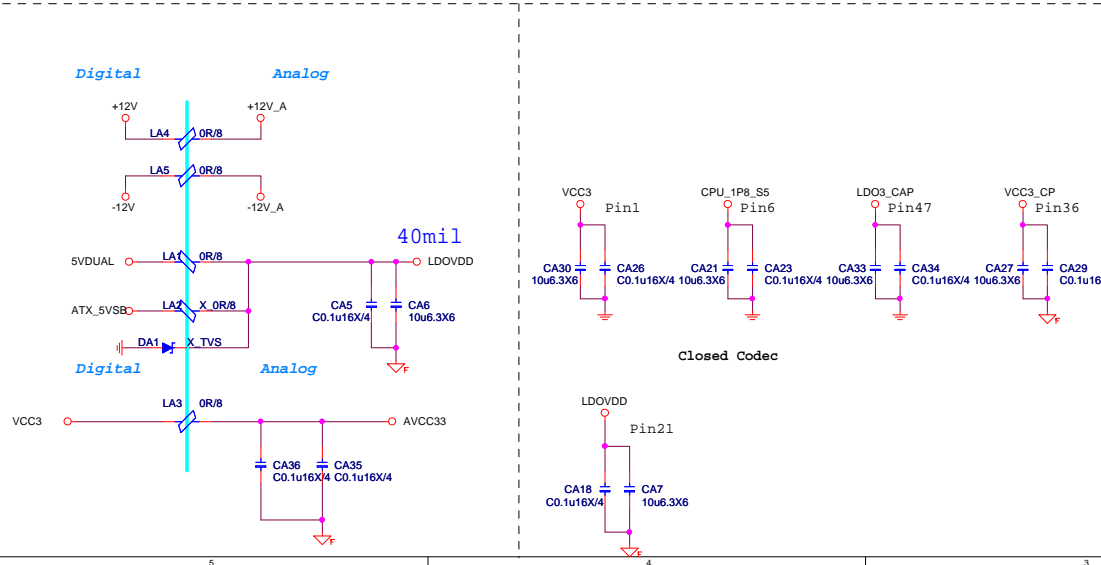
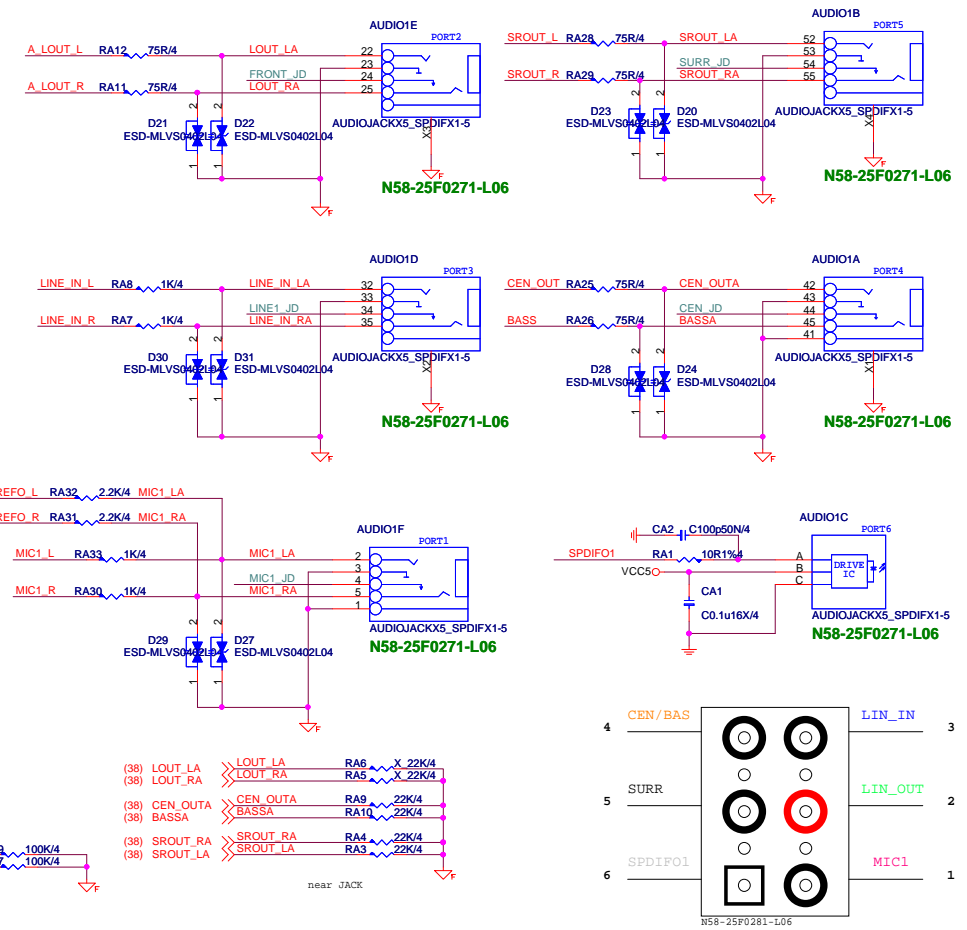
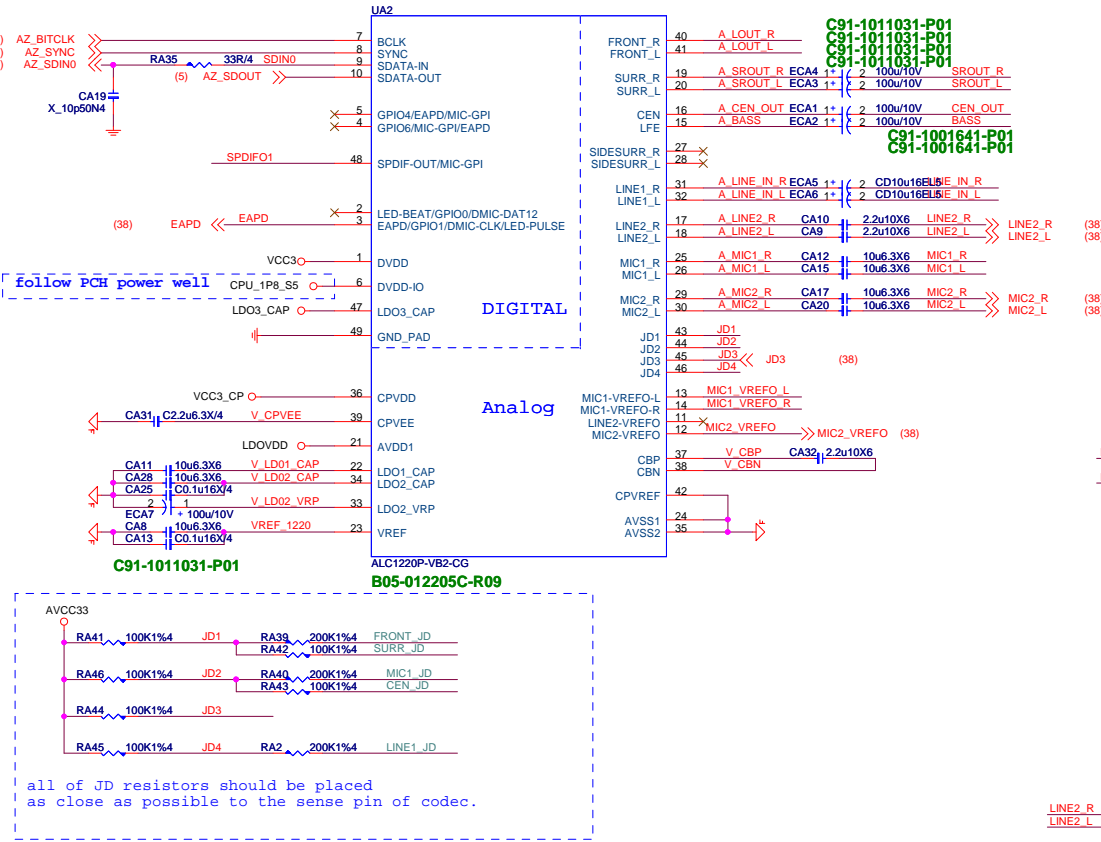


MICRO-STAR INT'L CO.,LTD

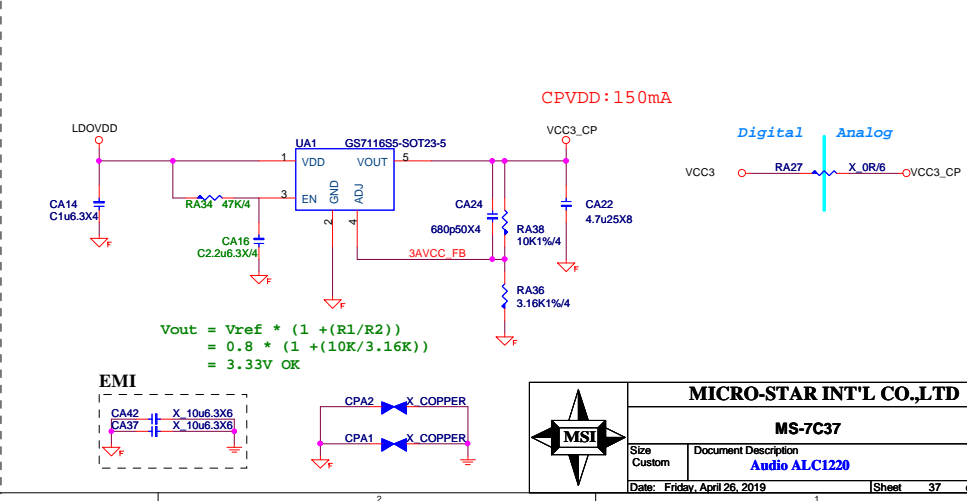
MS-7C37

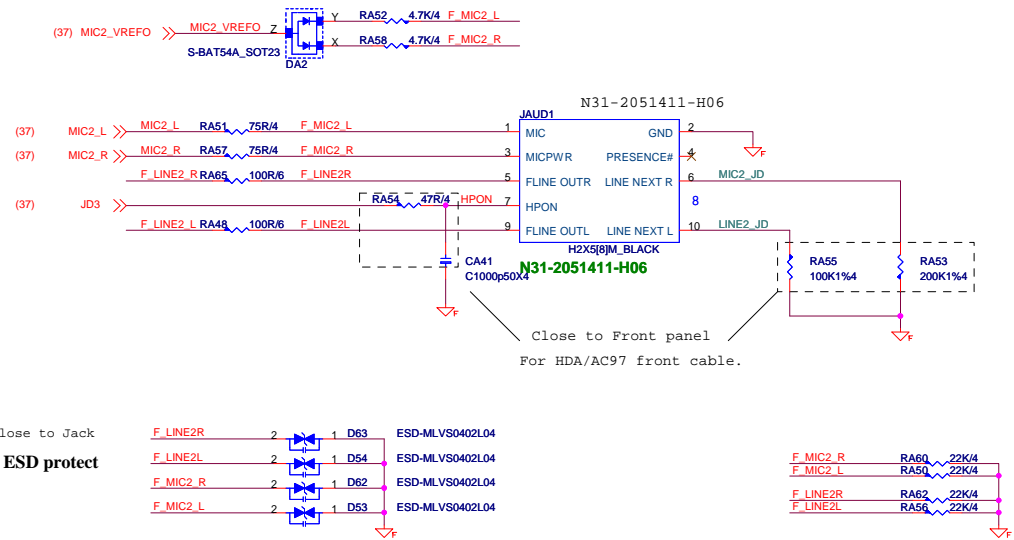
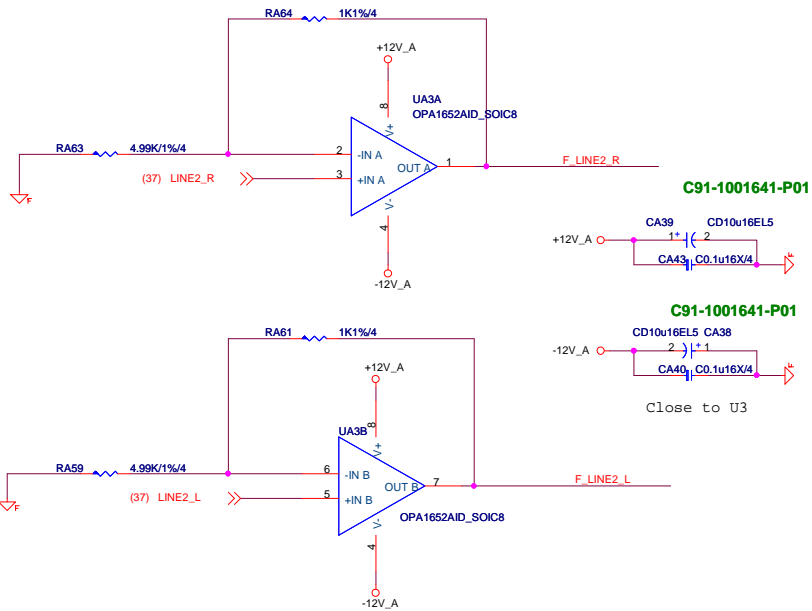
Size	Document Description	Rev
Custom	LAN - I211AT	1.3
Date: Friday, April 26, 2019	Sheet 36 of 75	

ALC1220P-VB2_48PIN

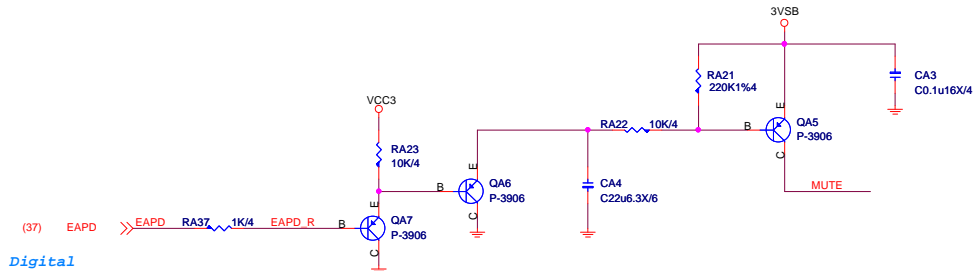


CPVDD POWER:ATX5VSB will Leakage to CVDD by ALC1220, so CVDD must keep 3.3V

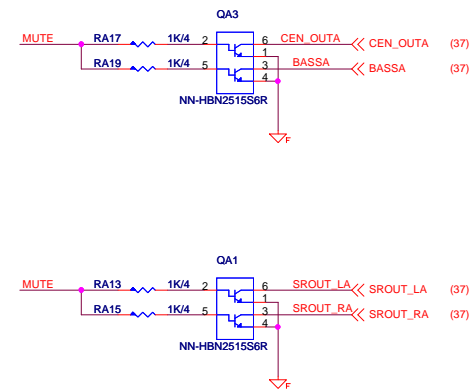




Rear Line OUT De-POP circuit
(De-pop circuit for Rear Line out & Front Headphone out)

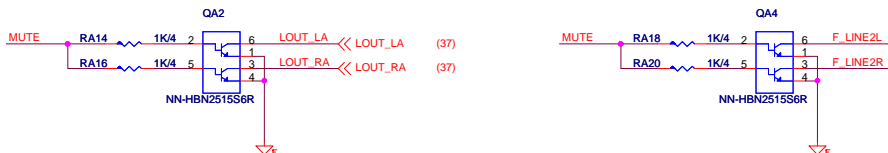


(add de-pop circuit by PM spec or customer request,
NOTE: add de-pop circuit need to change SROUT_LA, SROUT_RA, CEN_OUTA, BASSA to TVS)



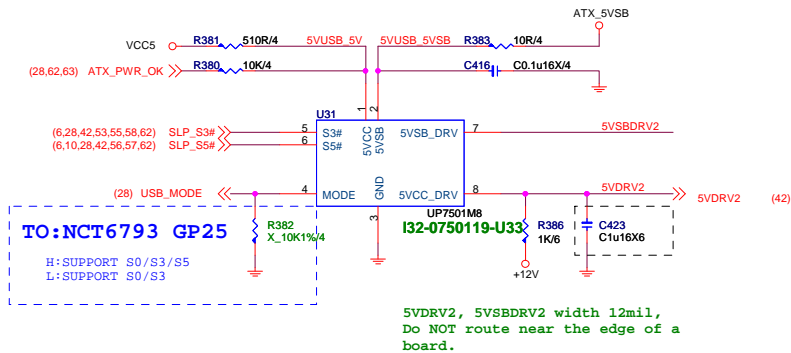
teknisi indonesia

Analog

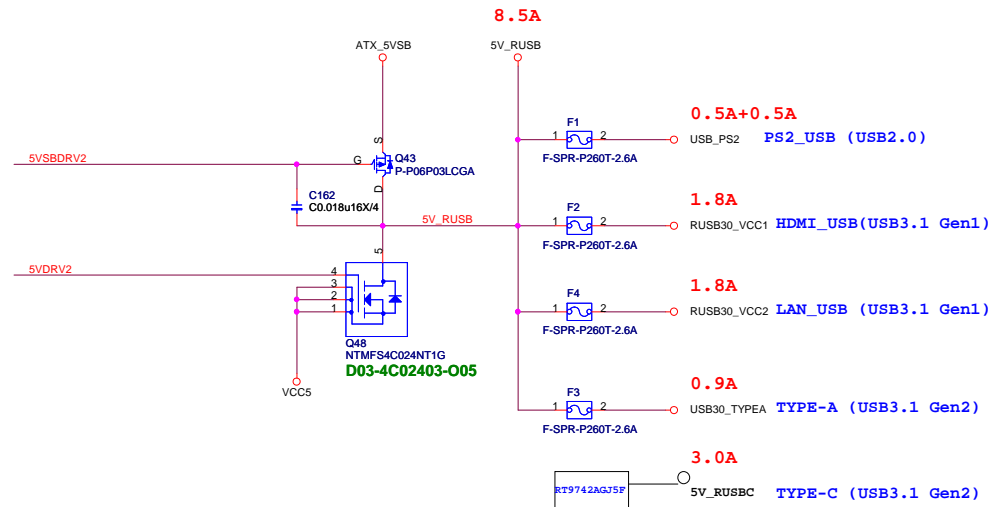


Audio moat is transparent and width 40mil

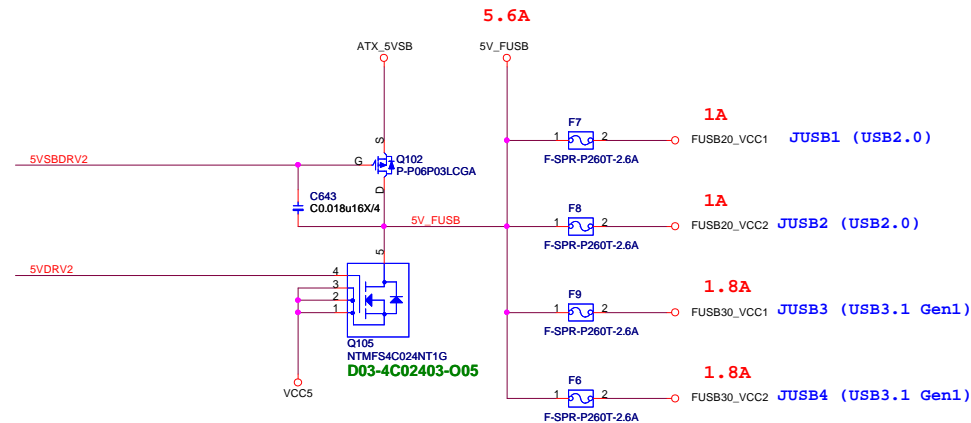
USB Power



Rear USB Port Power



Front USB Port Power

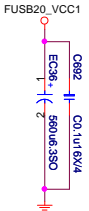
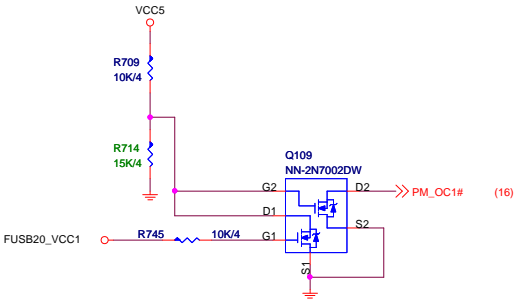
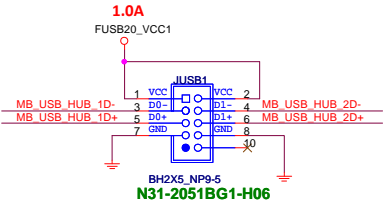
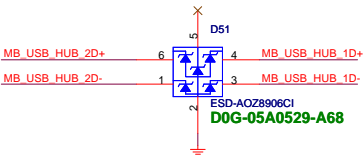
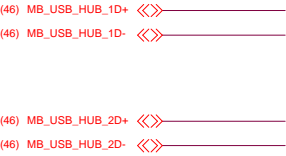


MICRO-STAR INT'L CO.,LTD

MS-7C37

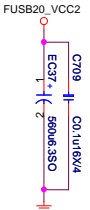
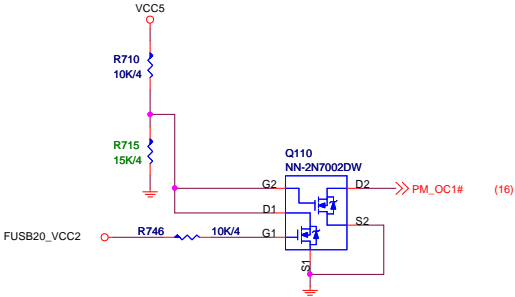
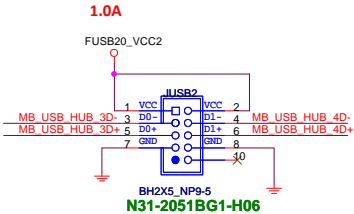
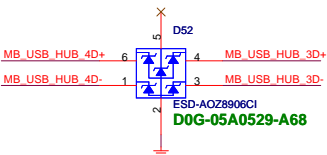
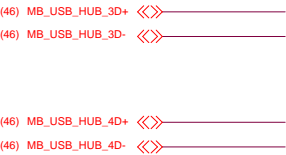
Size	Document Description	Rev
Custom	USB Power - UP7501	1.3
Date: Friday, April 26, 2019		
Sheet 39 of 75		

Front USB2.0(JUSB1)



C71-56106N1-F70

Front USB2.0(JUSB2)



C71-56106N1-F70

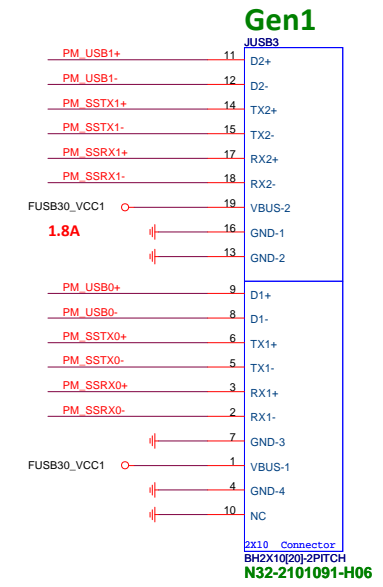
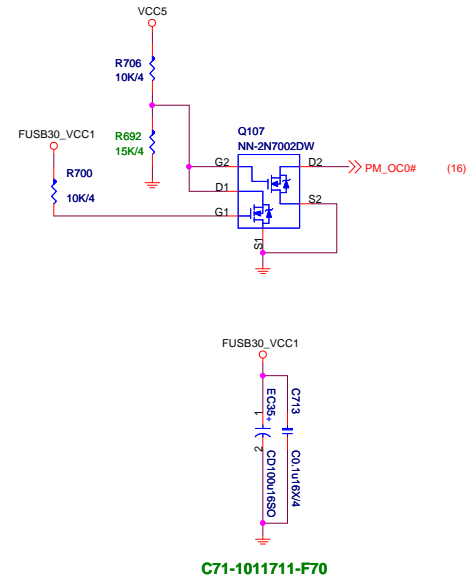
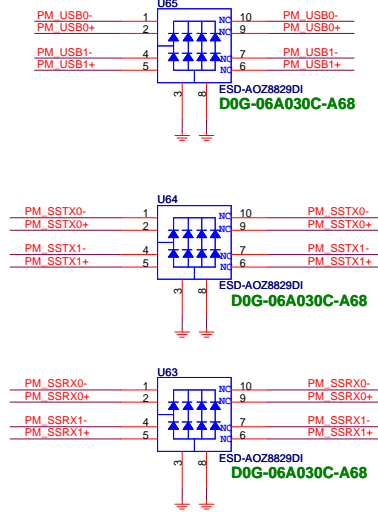
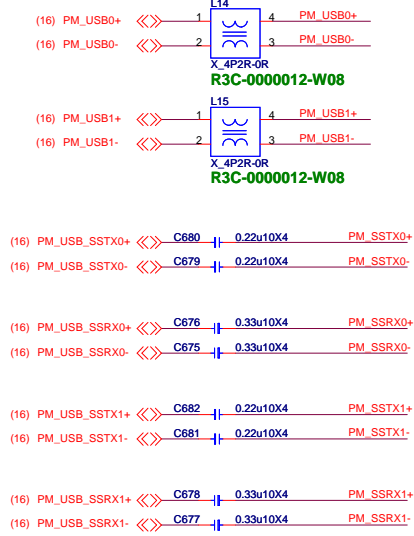


MICRO-STAR INT'L CO.,LTD

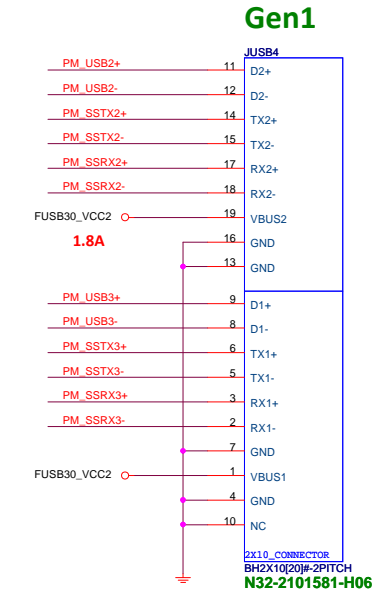
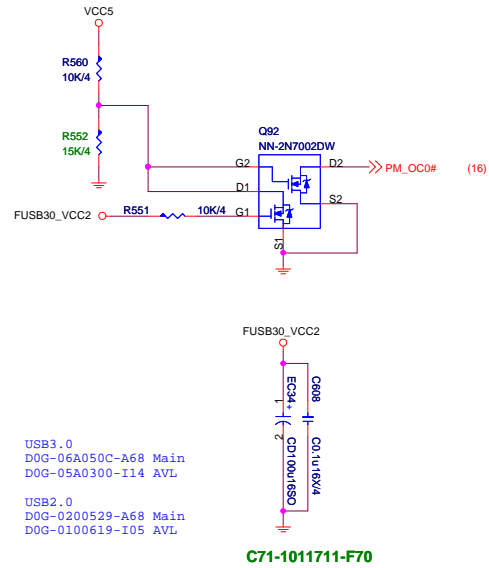
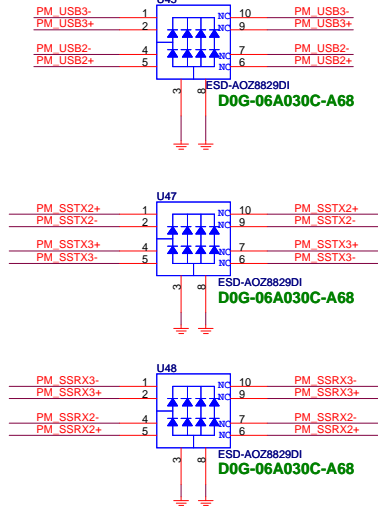
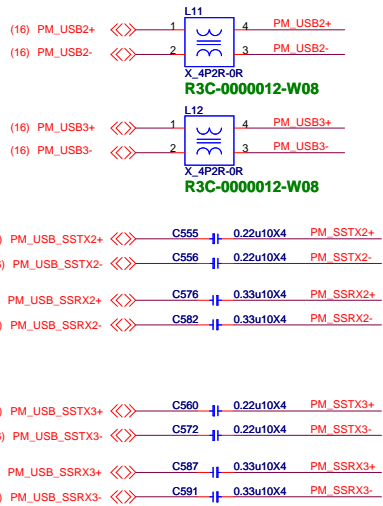
MS-7C37

Size Custom	Document Description Front USB2.0 Header	Rev 1.3
Date: Friday, April 26, 2019	Sheet 40 of 75	

Front USB3 180° BOX Header(JUSB3)



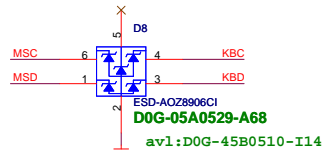
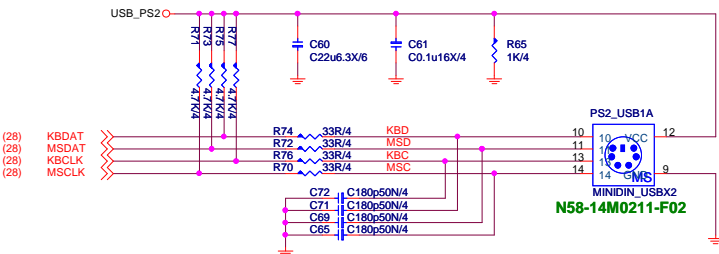
Front USB3 90° BOX Header(JUSB4)



PS2

5V@1A

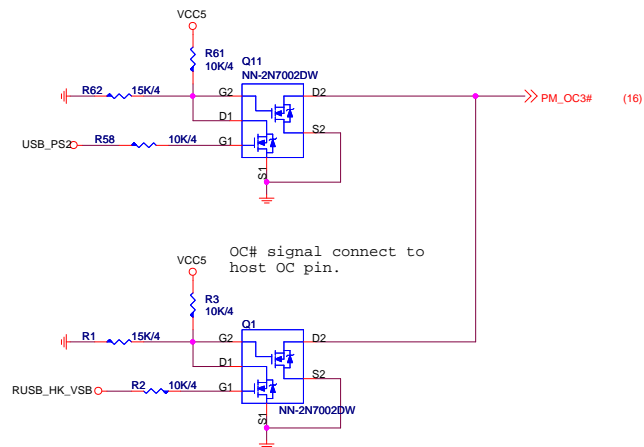
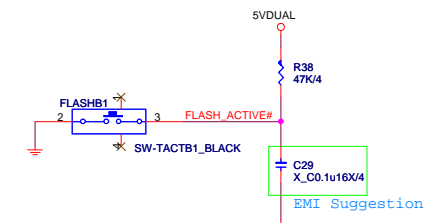
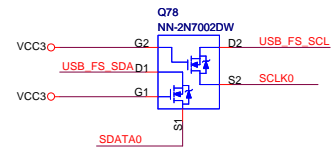
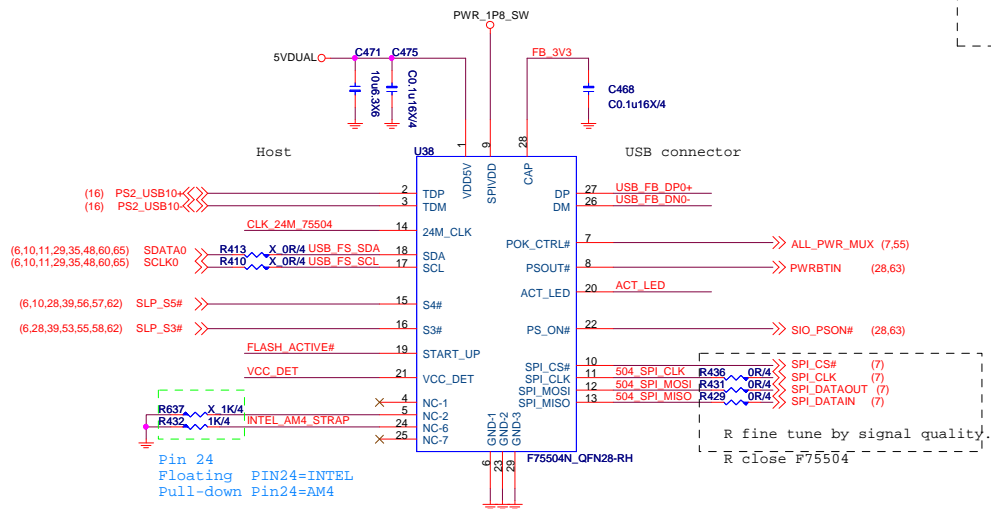
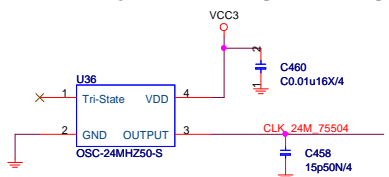
layout note:
C21 must close to TVS pin5
TVS must near KB_MS1 connector and route without branch
Varistor must close to TVS and route without branch



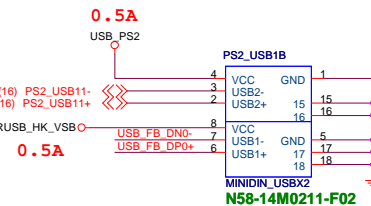
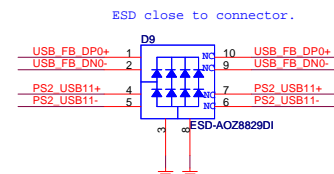
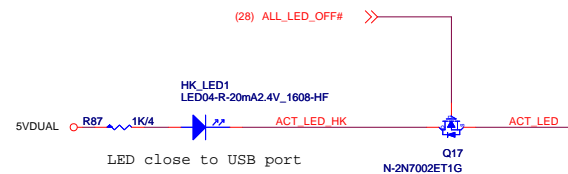
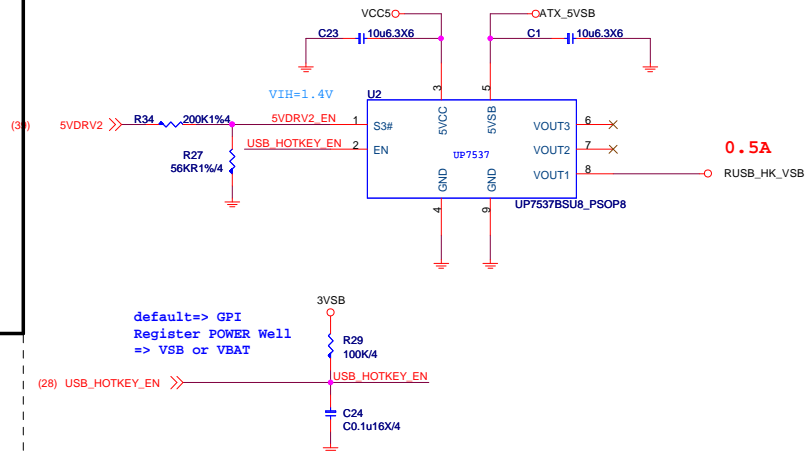
USB2.0 Flash BIOS

F75504 layout placement must meet to spi/usb trace length spec with host.
As for as possible place near to host.

CLK running in S0,don't require in sleep



HOTKEY POWER

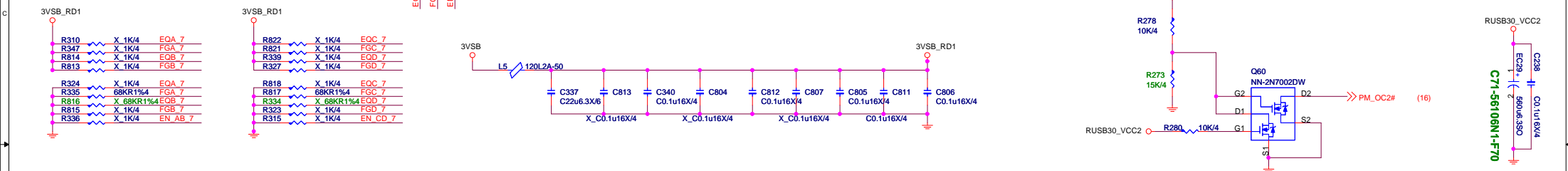
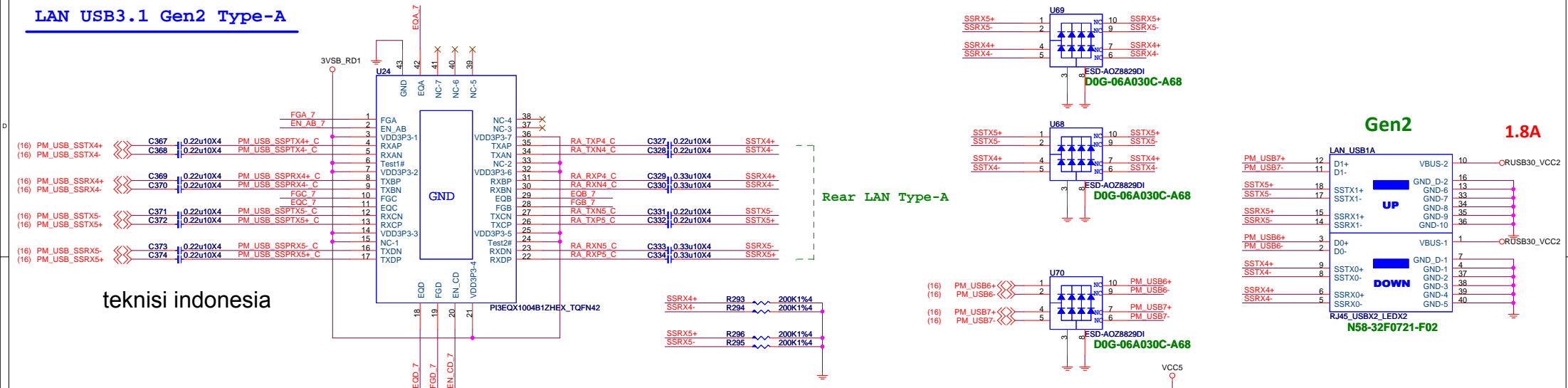


MICRO-STAR INT'L CO.,LTD

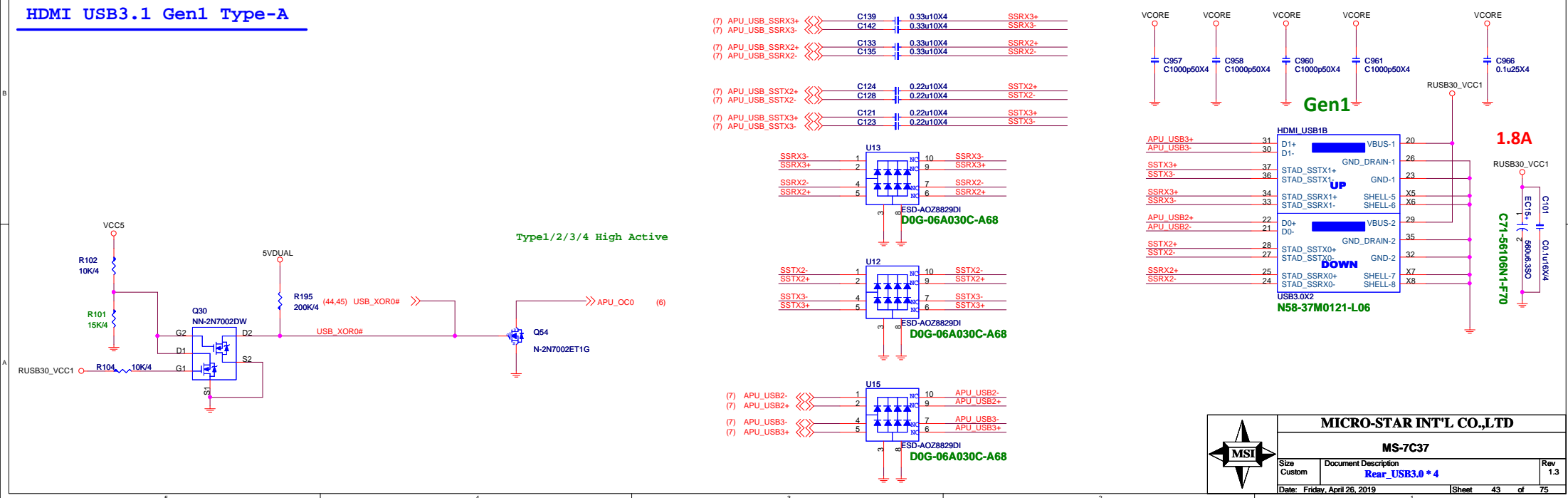
MS-7C37

Size Custom Document Description Rear USB2.0 + PS2 Rev 1.3 Date: Friday, April 26, 2019 Sheet 42 of 75

LAN USB3.1 Gen2 Type-A



HDMI USB3.1 Gen1 Type-A

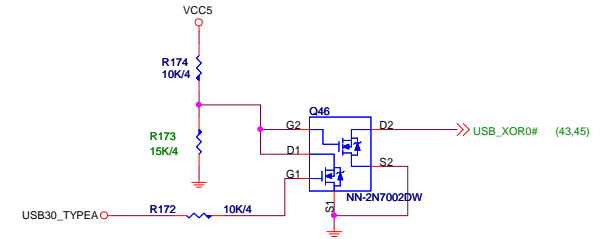
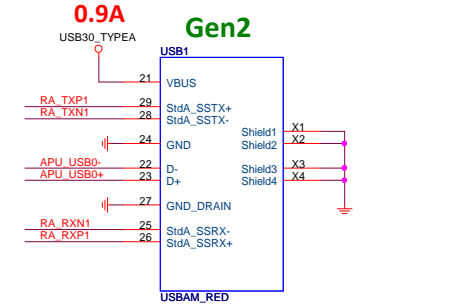
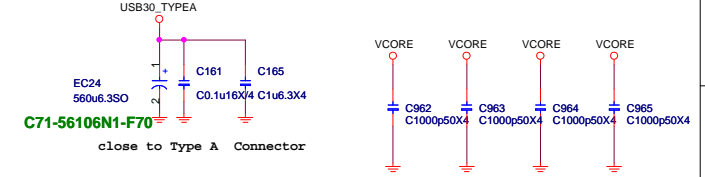
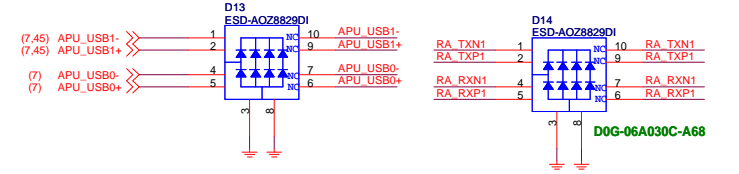
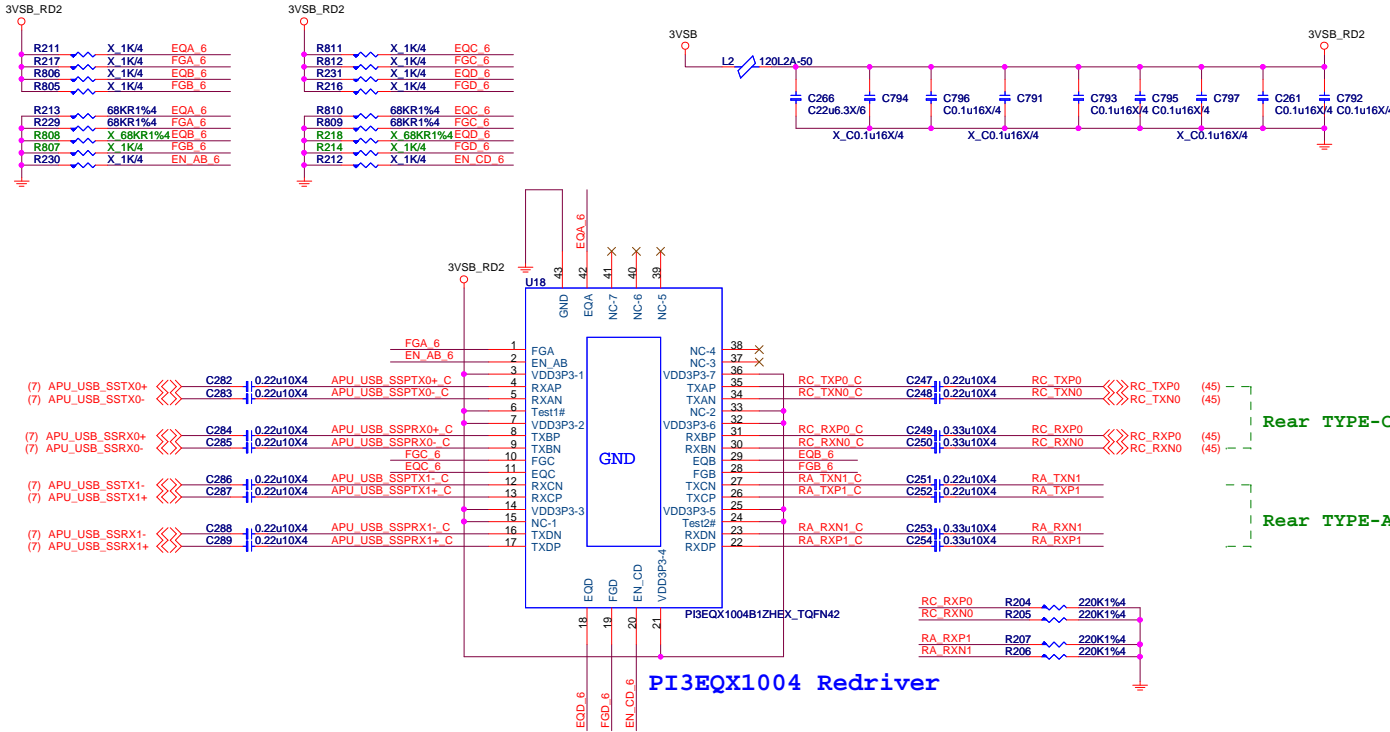


MICRO-STAR INT'L CO.,LTD

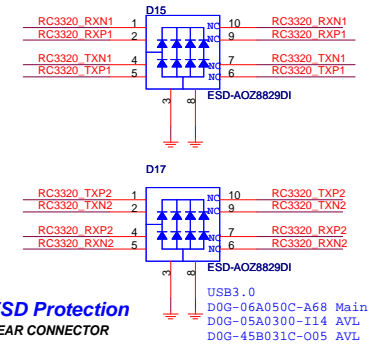
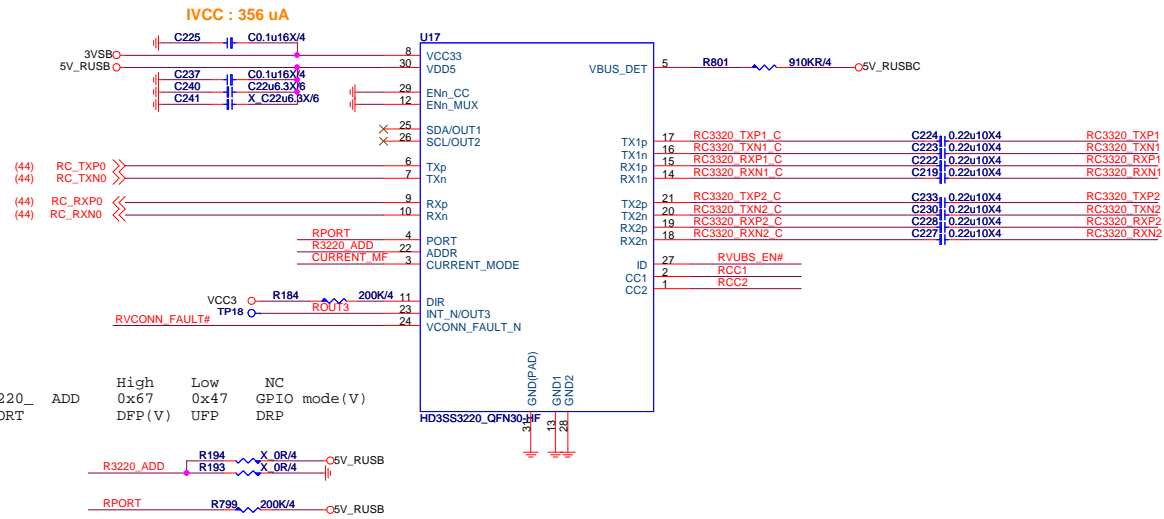
MS-7C37

Size Custom	Document Description Rear_USB3.0 * 4	Rev 1.3
Date: Friday, April 26, 2019		Sheet 43 of 75

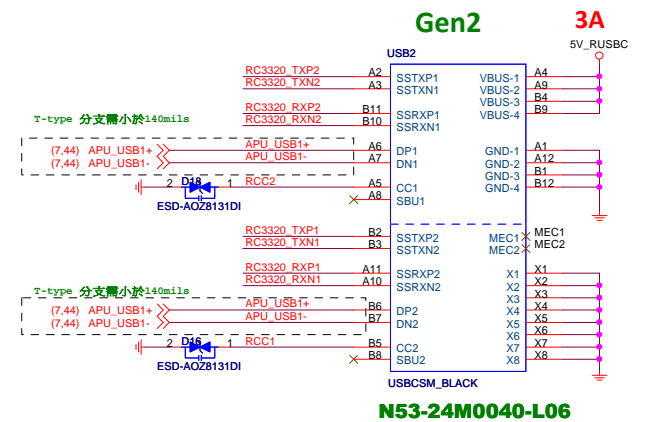
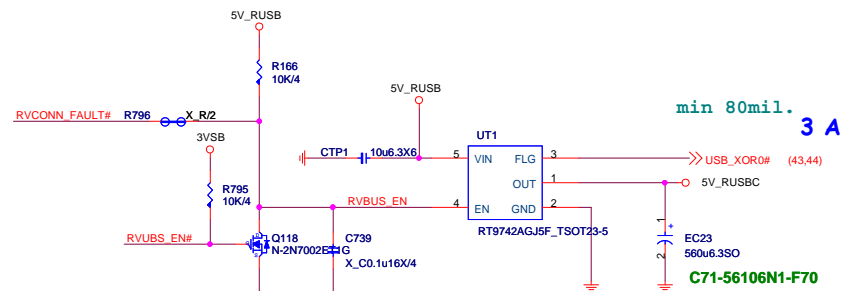
USB3.1 Gen2 Redriver + Type-A



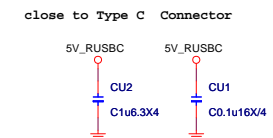
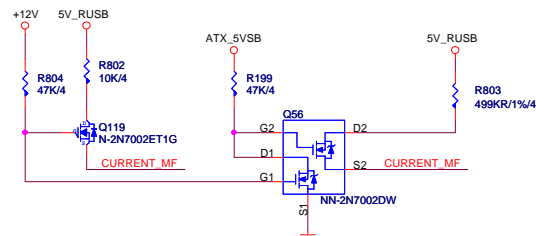
USB Type-C MUX with Configuration Channel (CC)



VBUS EN

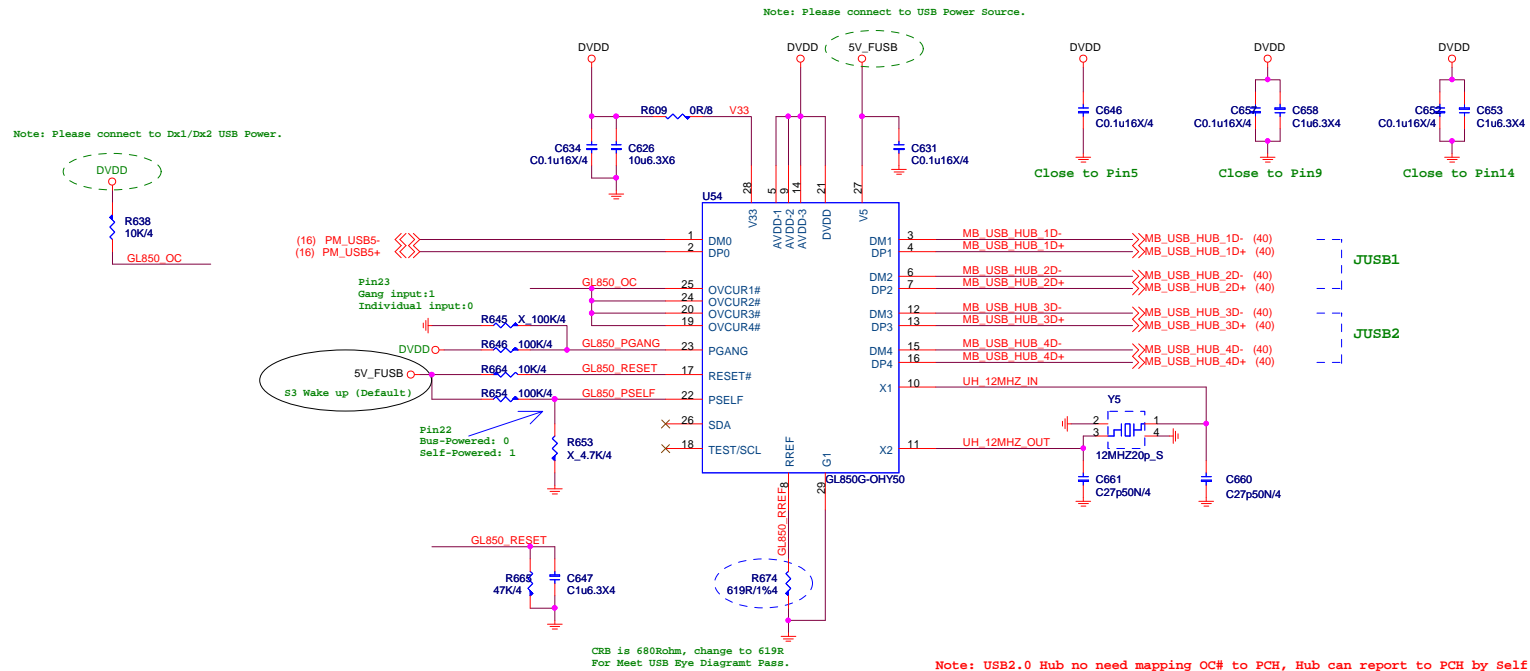


Current Mode



GL850G USB2.0 HUB

5V_FUSB



Note: USB2.0 Hub no need mapping OC# to PCH, Hub can report to PCH by Self.



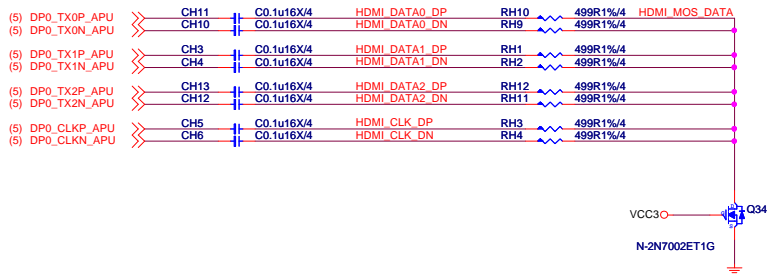
MICRO-STAR INT'L CO.,LTD

MS-7C37

Size Custom	Document Description GL850G	Rev 1.3
Date: Friday, April 26, 2019		Sheet 46 of 75

HDMI CONNECTOR

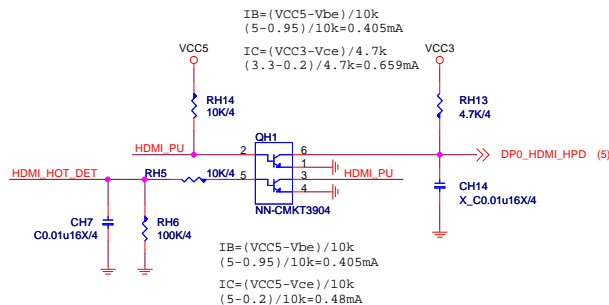
For HDMI 1.4



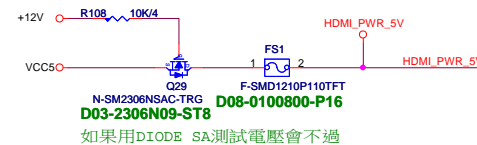
刪除RH6/RH12/RH15/RH16
For 增加VCC5寬度

For EMI

HPD Circuit

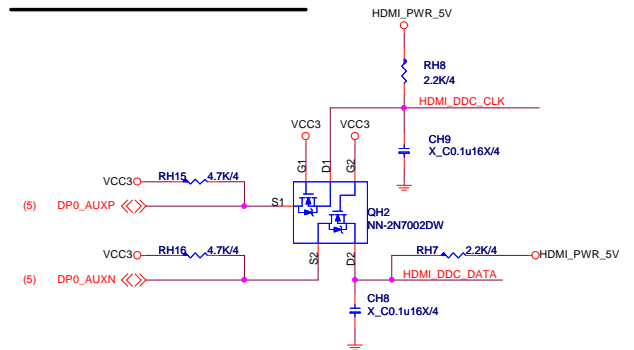


Connector Power

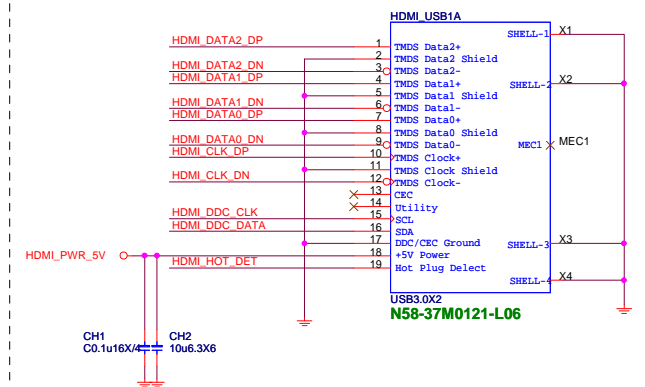


如果用DIODE SA測試電壓會不過

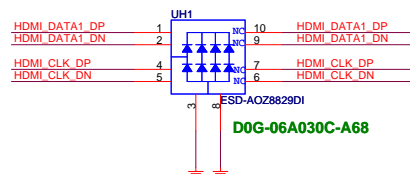
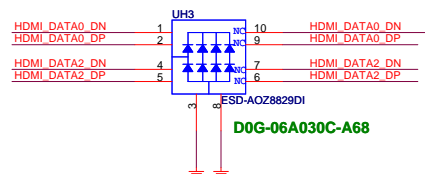
AUX Level Shifter



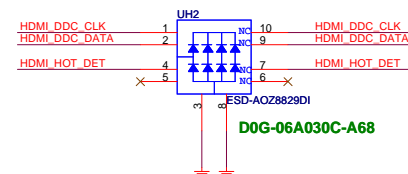
Connector

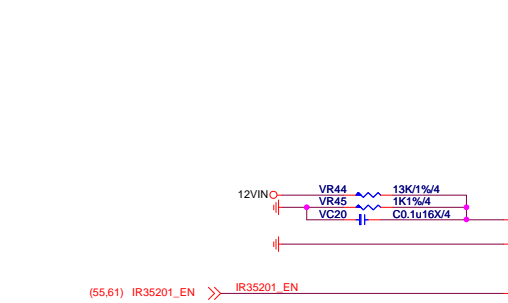


For EMI

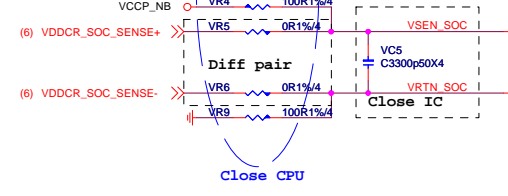
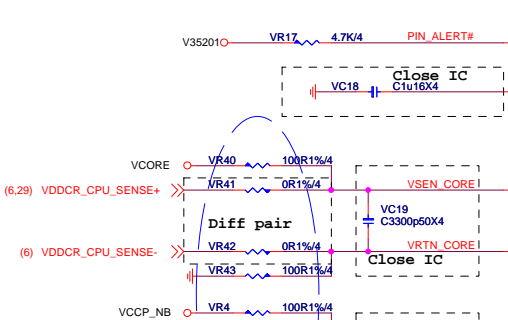
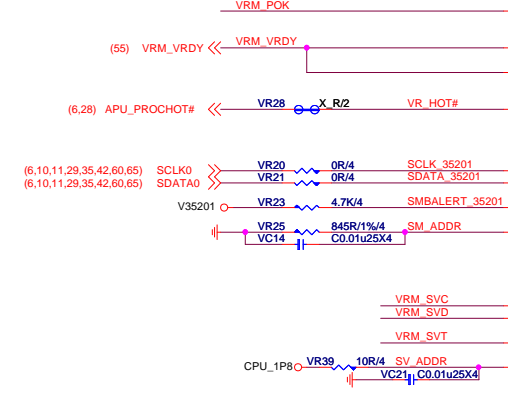
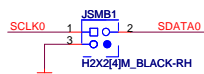


注意:耐壓5V零件



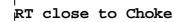
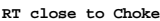
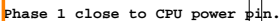


		BOOT VOLTAGE
SVC	SVD	Pre_PWROK Metal VID
0	0	1.1
0	1	1.0
1	0	0.9
1	1	0.8



```
VCORE: ICCMax 140A
LL: 1.3mohm
OCP: 192A

SOC: ICCMax 75A
LL: 2.1ohm
OCP: 90A
```



0x26:RH=18K,RL=13K								
Default		VR53	VR54	VC20	VR58	VR57	VR59	VR60
	Temp	6.49k	10k	100p	X	0R	X	0R
	VAUXSEN	5.76k	1k	0.01u	0R	X	0R	X

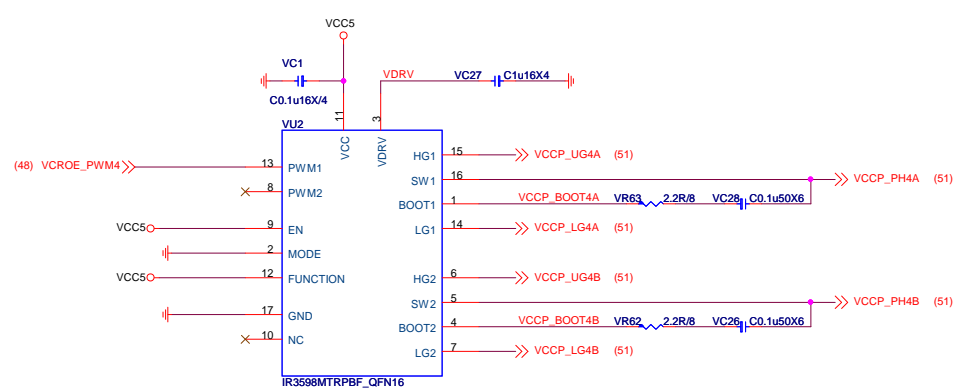
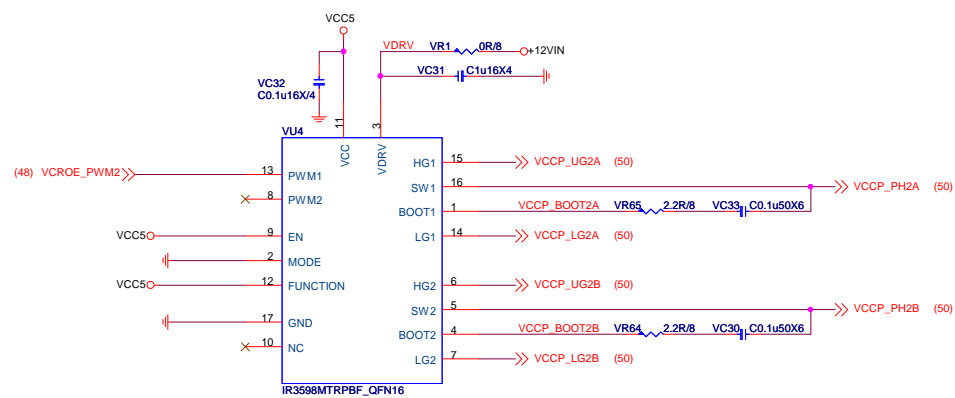
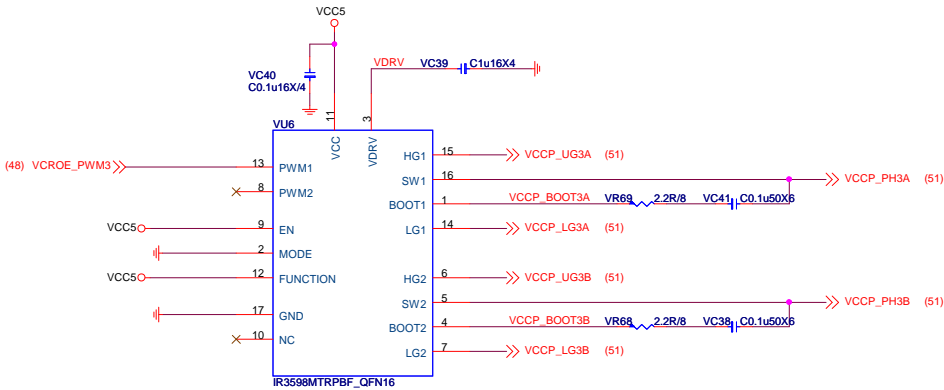
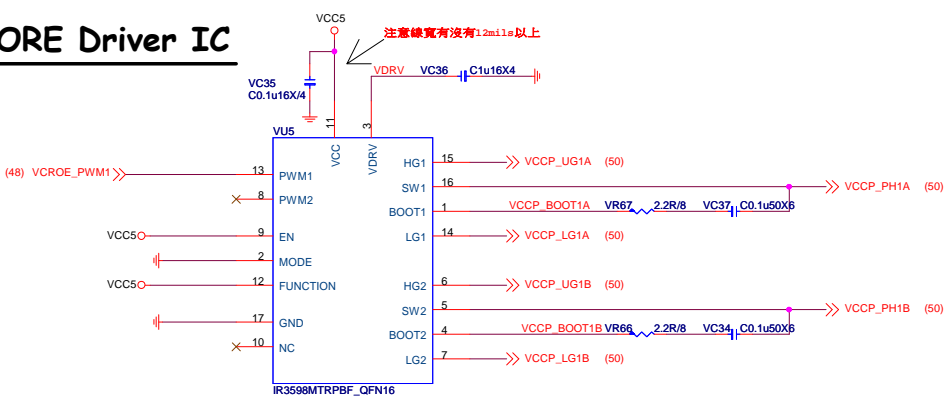


MICRO-STAR INT'L CO.,LTD

MS-7C37

Size Custom	Document Description CPU Power IR35201 8+2	Rev 1.3
Date: Friday, April 26, 2019		Sheet 48 of 75

CPU_CORE Driver IC



teknisi indonesia

CPU_SOC Driver IC

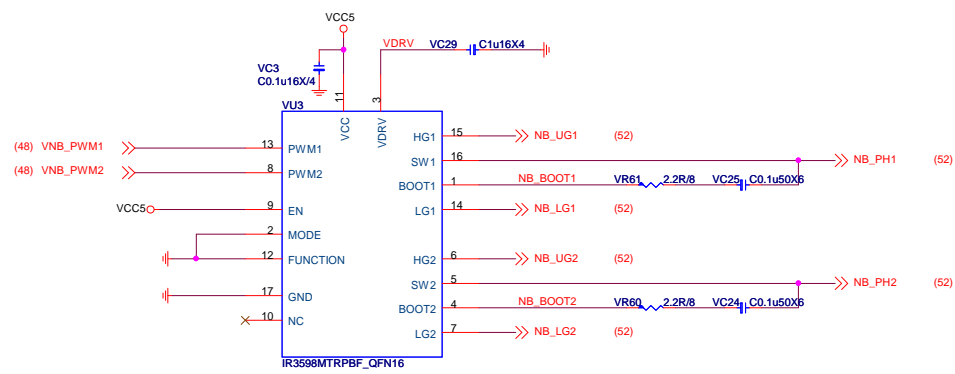


Table for IR3598

Function	Mode	PWM Mode	Phase Mode
0	1	IR ATL	Dual
1	1	IR ATL	Doubler
0	0	Tri-State	Dual
1	0	Tri-State	Doubler

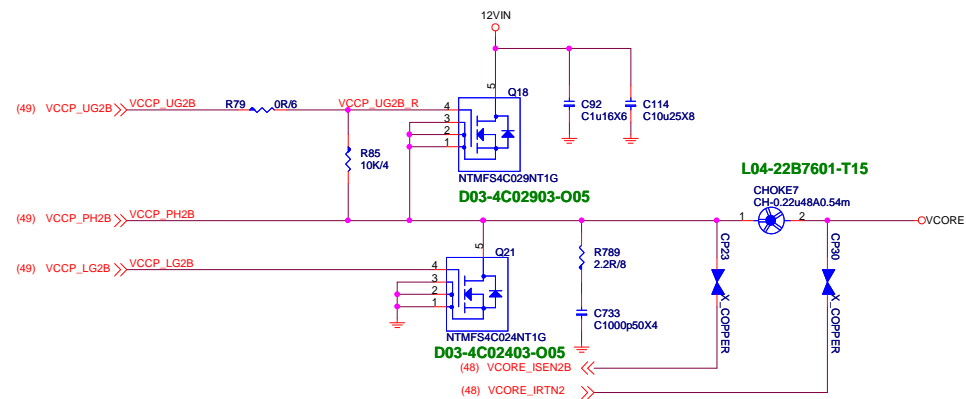
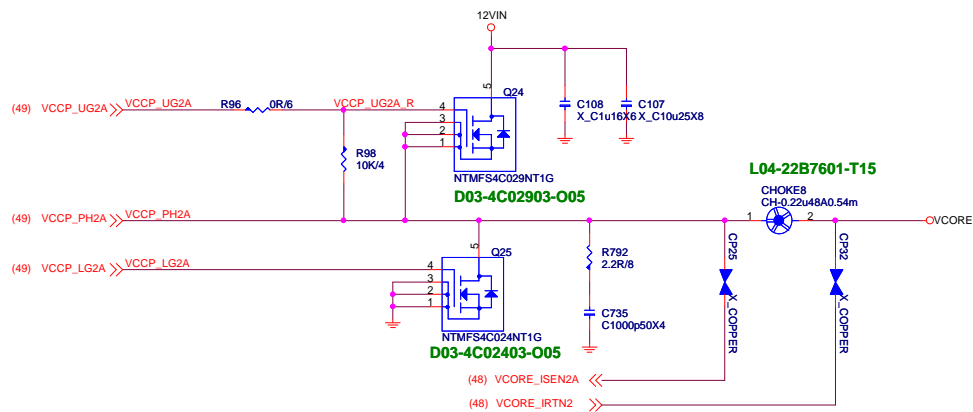
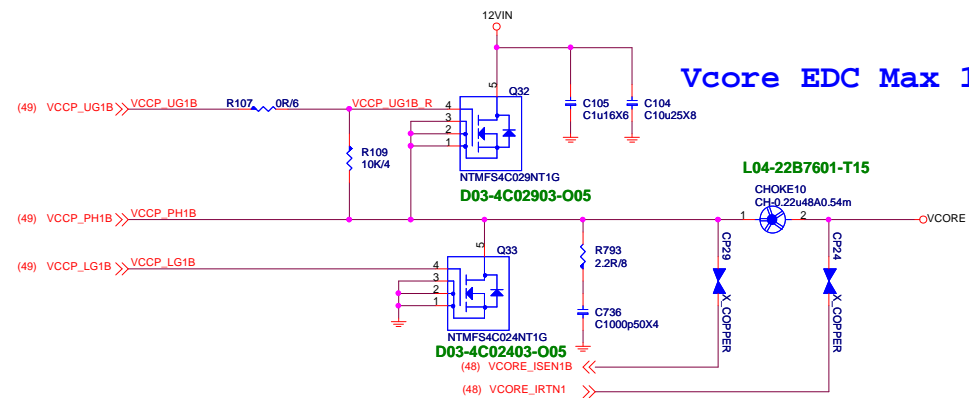
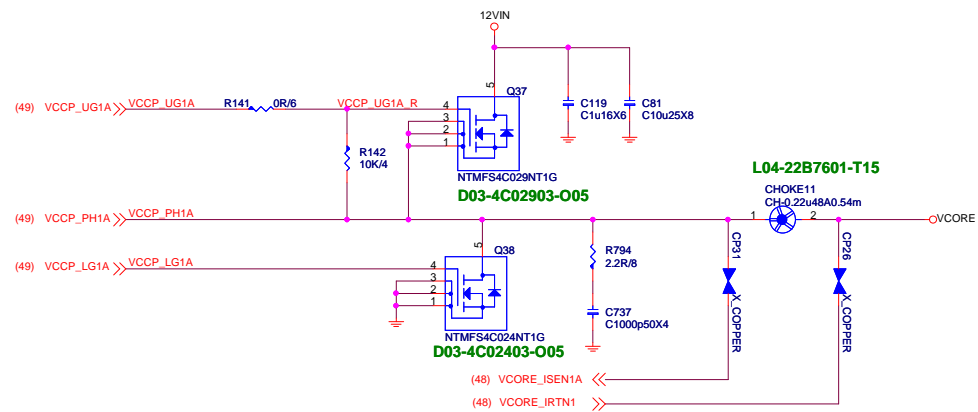
0	0	Tri-State	Dual	SOC
1	0	Tri-State	Doubler	Vcore

MICRO-STAR INT'L CO.,LTD

MS-7C37

Size Custom Document Description **CPU Power Driver IC IR3598** Rev 1.3

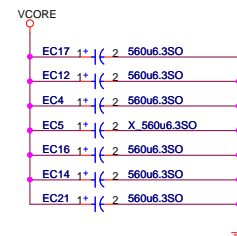
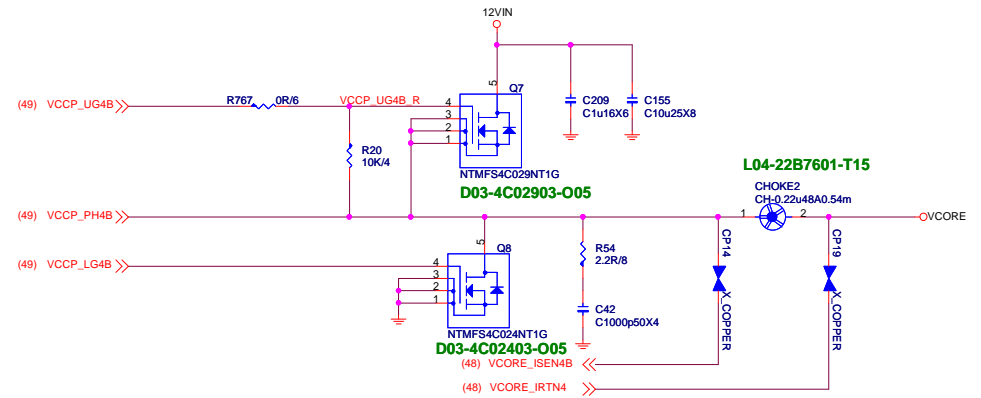
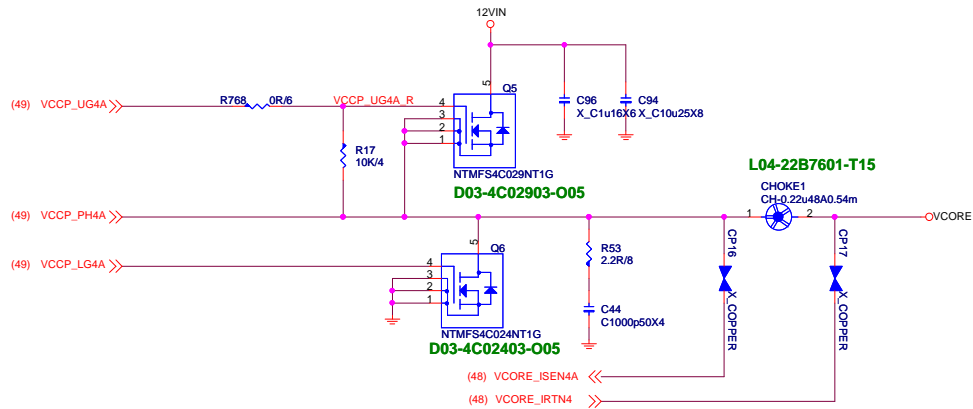
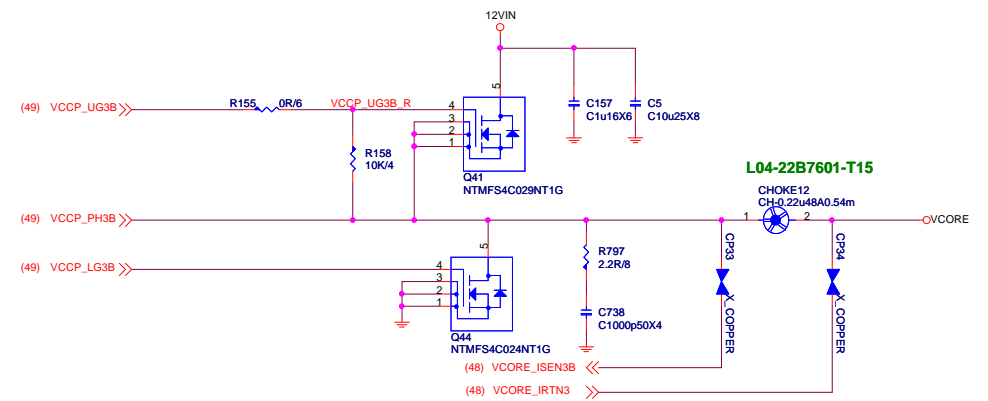
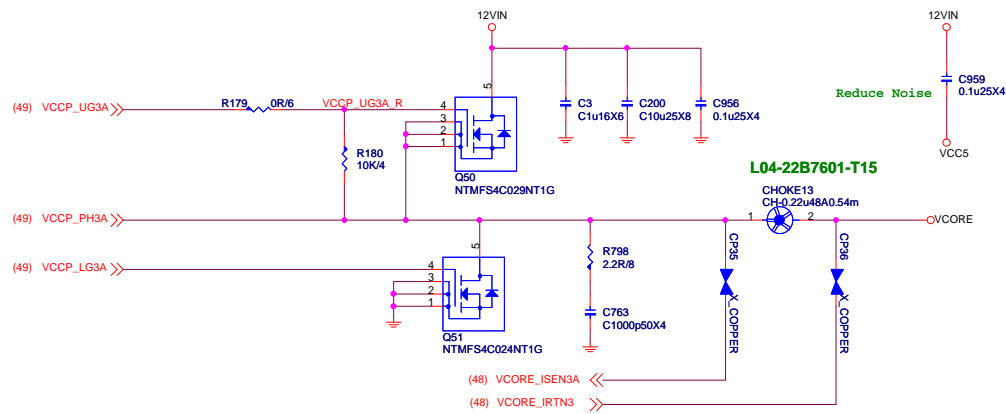
Date: Friday, April 26, 2019 Sheet 49 of 75

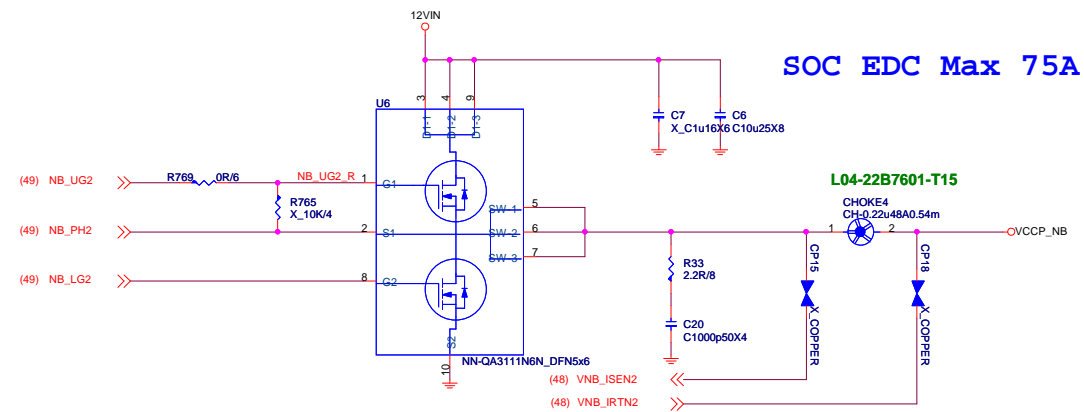


MICRO-STAR INT'L CO.,LTD

MS-7C37

Size Custom	Document Description CPU Power Vocre Phase 1-6	Rev 1.3
Date: Friday, April 26, 2019		Sheet 50 of 75





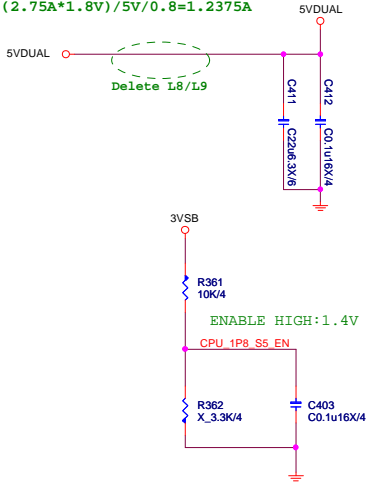
MS-7C37

Size Custom	Document Description CPU Power NB Phase 1-2	Rev 1.3
Date: Friday, April 26, 2019		Sheet 52 of 75

```
CPU: VDD_18_S5@0.5A
CPU: VDDIO_Audio@0.25A
CHIP: VDD_18_S5@0.1A
```

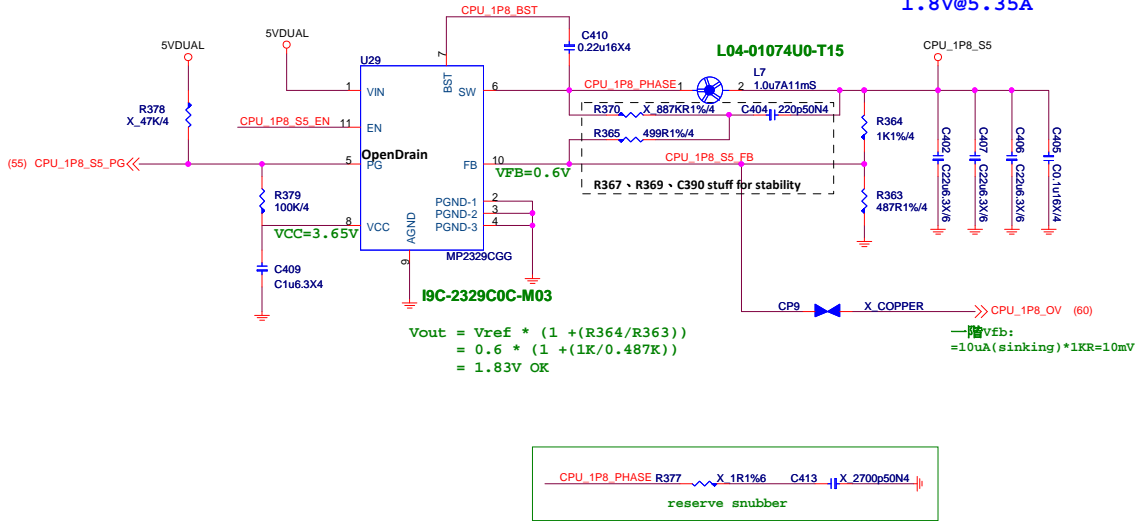
```
CPU_1P8: 2.5A
CPU_VDDP_S5: 1A
CHIP_SOC_S5: 1A
```

Input Current=
 $(2.75\text{A} \times 1.8\text{V}) / 5\text{V} / 0.8 = 1.2375\text{A}$

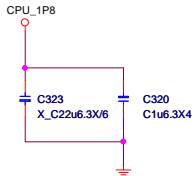
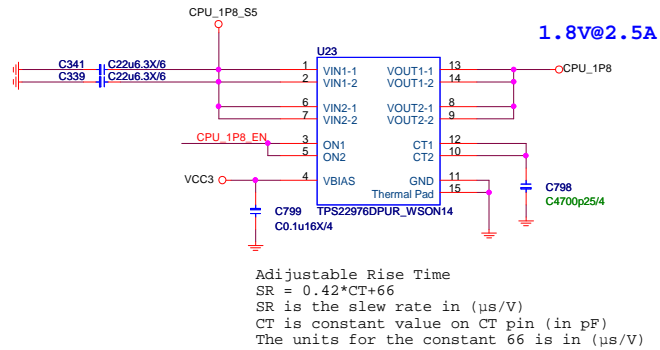
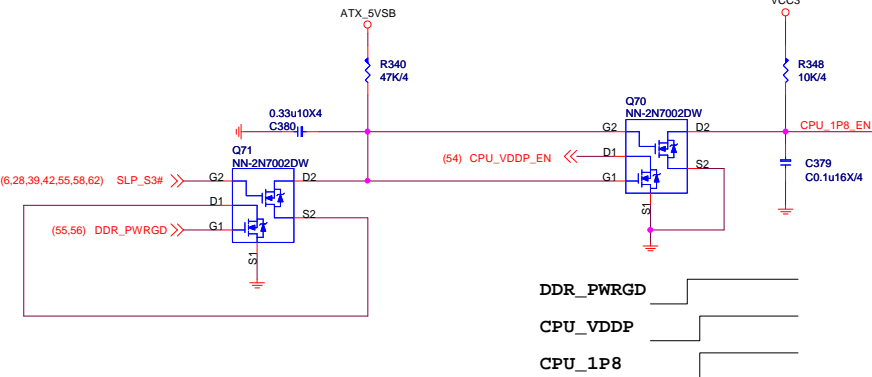


CPU_1P8_BST、CPU_1P8_BST_R >50 mils.

1.8V@5.35A



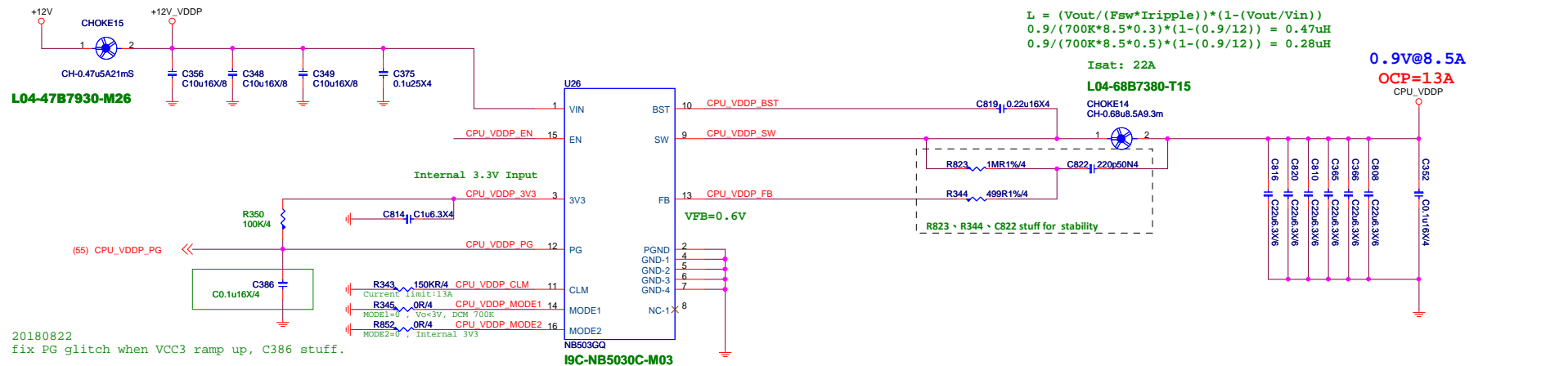
CPU: VDD_18@2A
CHIP: VDD_18@0.5A



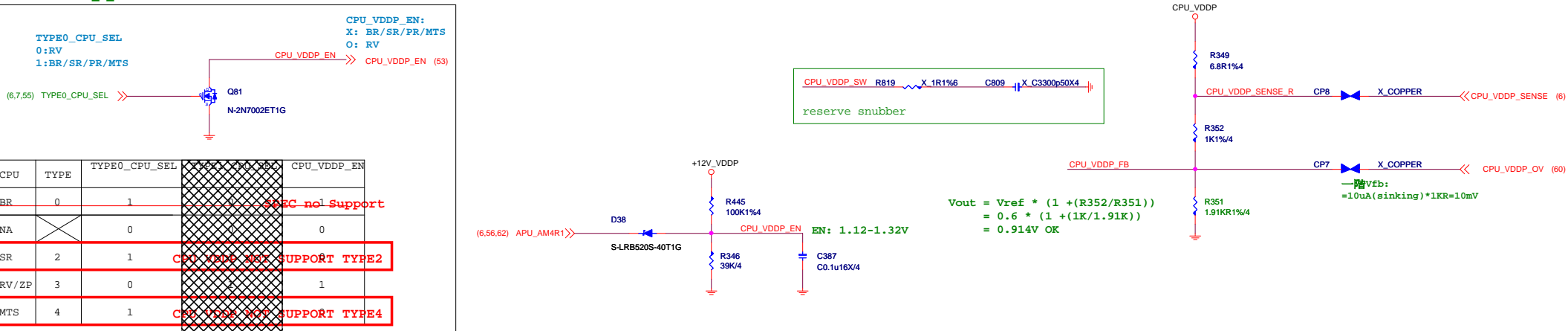
MICRO-STAR INT'L CO.,LTD			
MS-7C37			
Size Custom	Document Description CPU Power 1.8_S0 / S5		Rev 1.3
Date: Friday, April 26, 2019		Sheet 53 of 75	

CPU: VDDP@8.5A

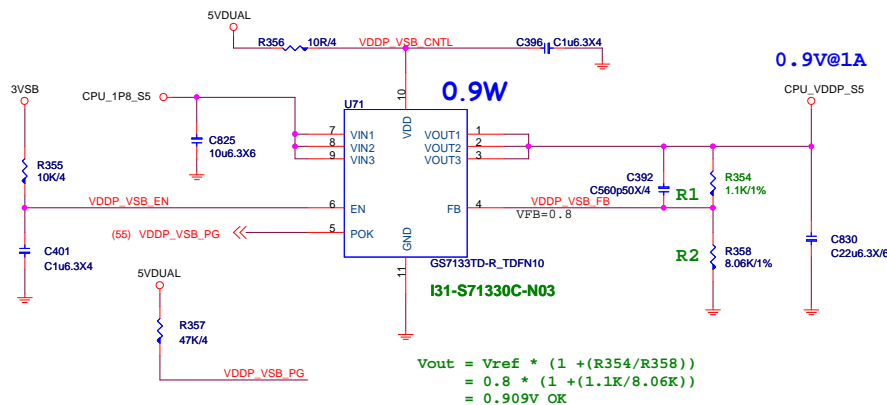
```
Input Current = (8.5A*0.9V)/12V/0.8 = 0.8A
Choke Isat = 8A
Irms=Iout*SQRT((Vo/Vi)*(1-(Vo/Vi)))
=13*SQRT((0.9/12)*(1-(0.9/12))) = 3.42A
Choke Irms =5 A
```



No support BR SPEC



CPU: VDDP_S5@1A



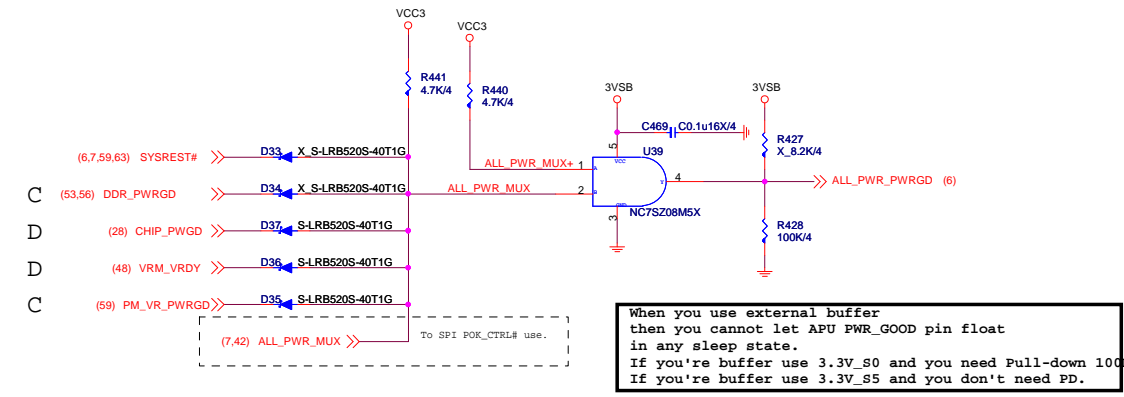
MICRO-STAR INT'L CO.,LTD

MS-7C37

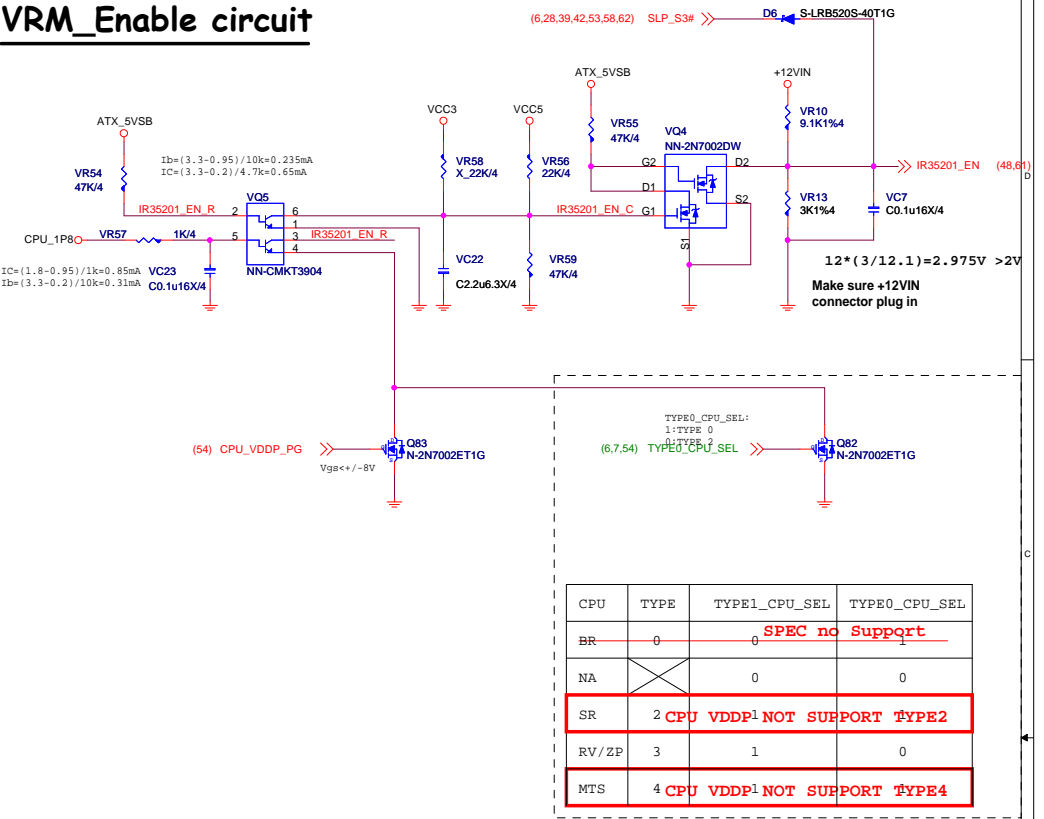
Size Custom	Document Description CPU Power VDDP - NB503	Rev 1.3
Date: Friday, April 26, 2019		Sheet 54 of 75

ALL POWER GOOD MUX

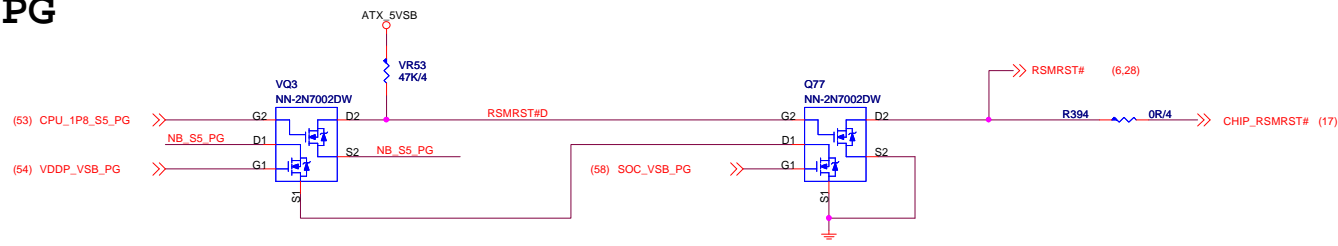
S0 PG



VRM_Enable circuit



S5 PG



15.5A For CPU
9.5A For 4DIMM
1.2A For DDR VTT
OCP = 39.3A; Ch

Rdson(Low Side) 5V
D03-4C02403-005:3.3 ~ 4mohm
4mohm / 2pcs = 2mohm

OCp MOSFET

$$R_{OCSET} = \frac{I_{VALLEY} \times R_{LDS(ON)}}{I_{OCSET}}$$

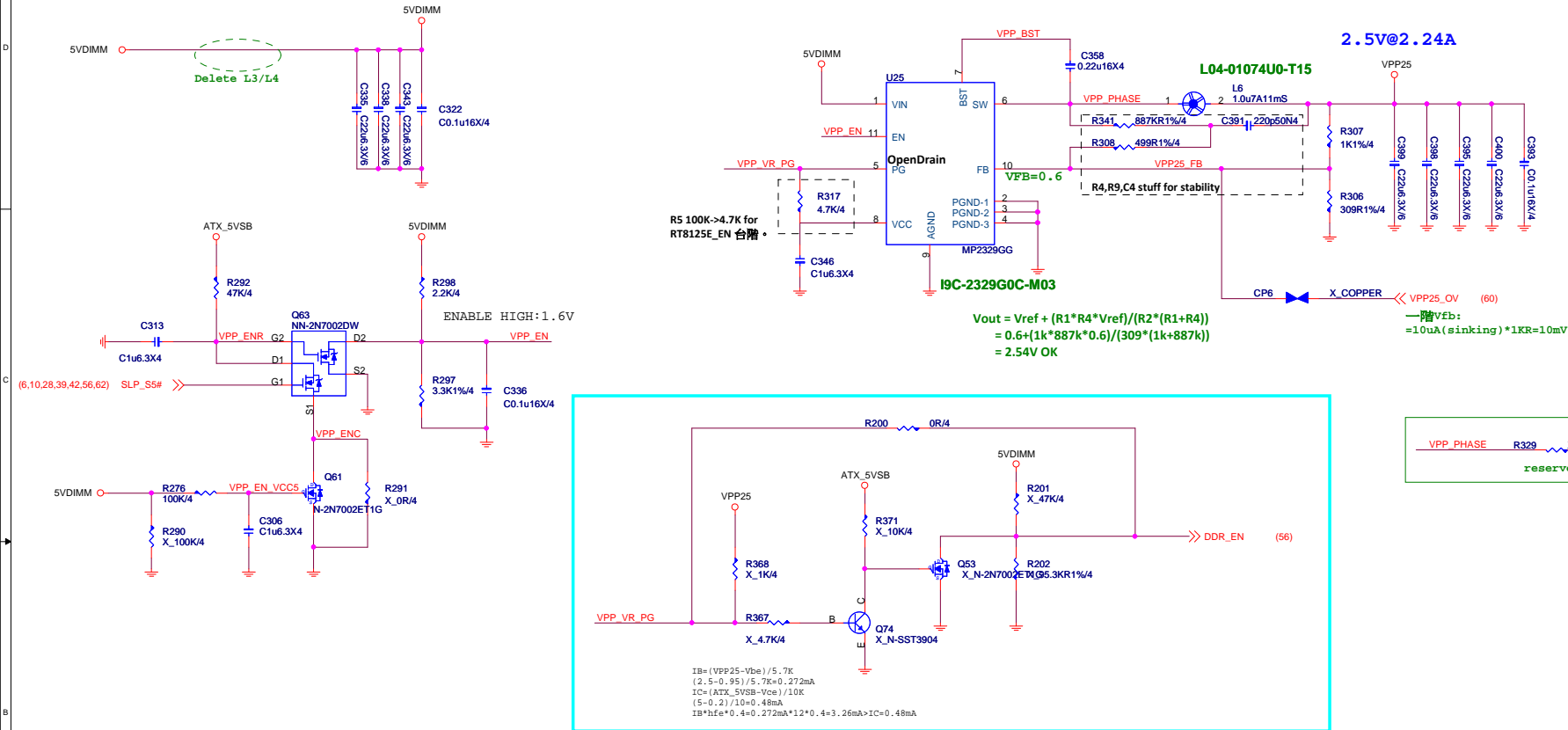
Current Sensing

I _{OCSET}			8	10	11	μA
--------------------	--	--	---	----	----	----



VPP25

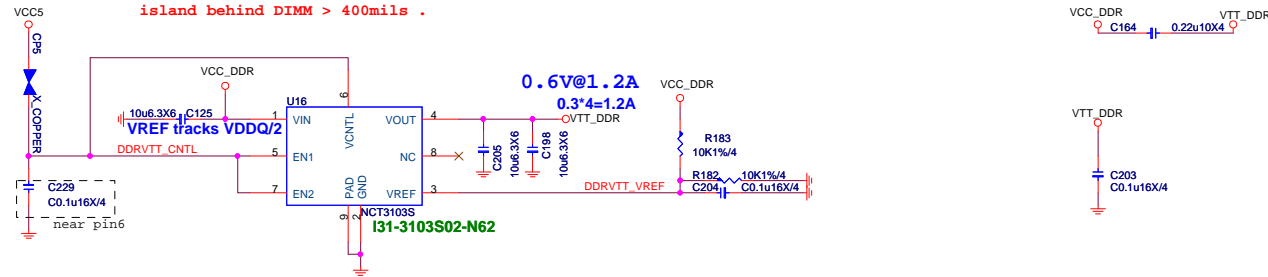
2.5V@2.24A



VTT_DDR

0.6V@1.2A

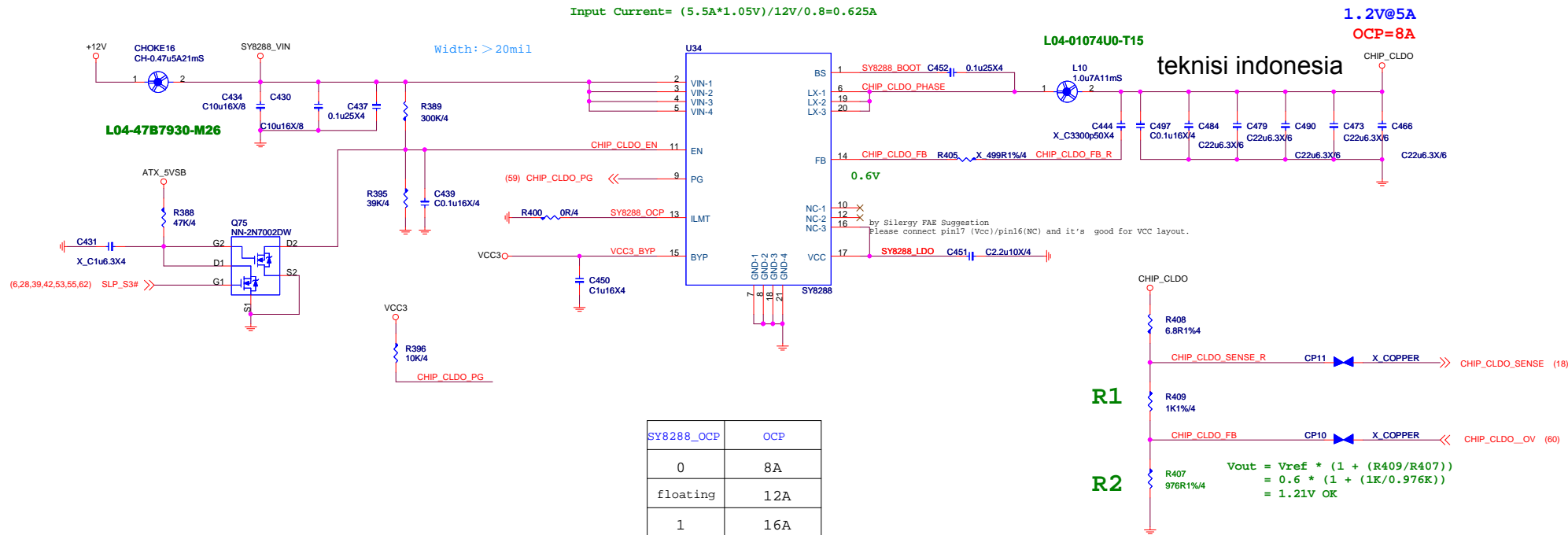
To CPU Copper trace width > 250mils , Fill island behind DIMM > 400mils .



MICRO-STAR INT'L CO.,LTD		
MS-7C37		
Size Custom	Document Description	Rev 1.3
DDR VPP25 / VTT		
Date: Friday, April 26, 2019	Sheet 57	of 75

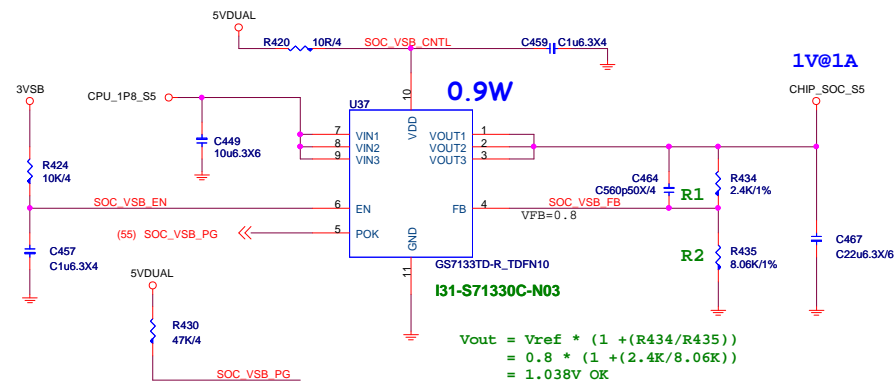
CHIP_CLDO

CHIP: VDD_CLDO@5A



CHIP_SOC_S5

CHIP: VDDCR_SOC_S5@1A



CHIP_SOC

CHIP: VDDCR_SOC@9A

Input Current = $(12A \cdot 1V) / 12V / 0.8 = 1.25A$
 Choke Isat = 8A
 $I_{rms} = I_{out} \cdot \sqrt{((V_o/V_i) \cdot (1 - (V_o/V_i)))}$
 $= 12 \cdot \sqrt{((1/12) \cdot (1 - (1/12)))} = 3.316A$
 Choke $I_{rms} = 5A$

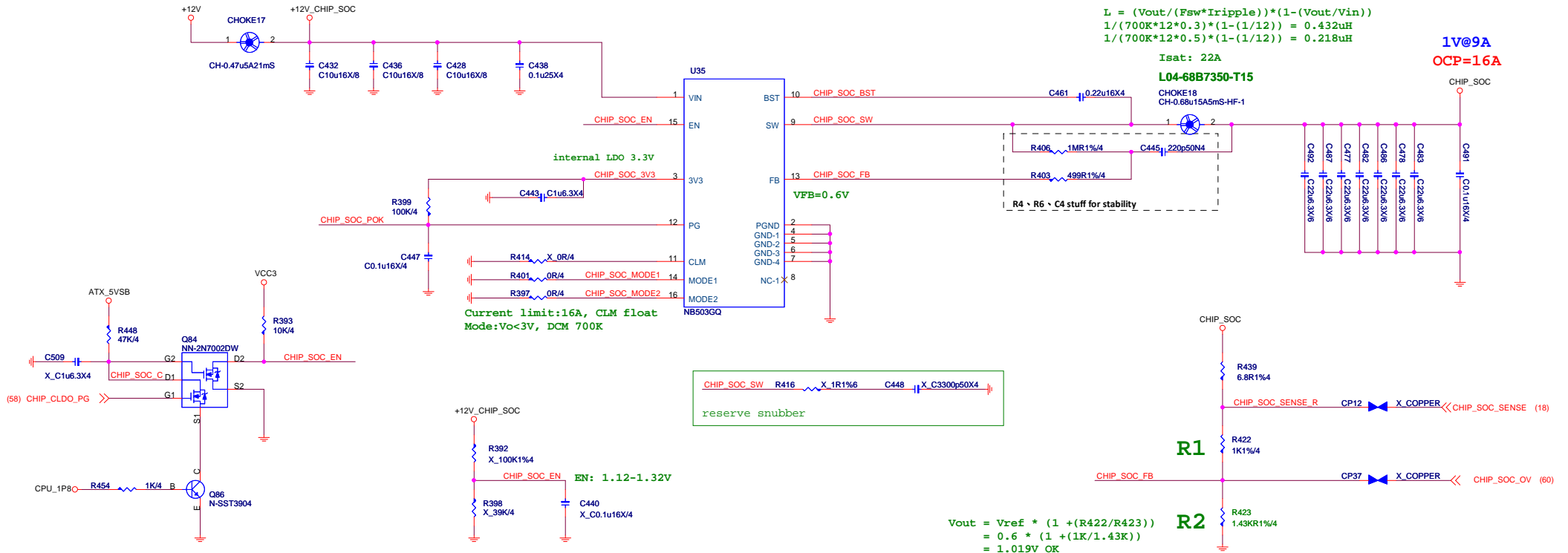
$L = (V_{out} / (F_{sw} \cdot \Delta I_{ripple})) \cdot (1 - (V_{out}/V_{in}))$
 $1 / ((700K \cdot 12 \cdot 0.3) \cdot (1 - (1/12))) = 0.432uH$
 $1 / ((700K \cdot 12 \cdot 0.5) \cdot (1 - (1/12))) = 0.218uH$

Isat: 22A

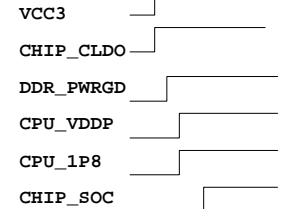
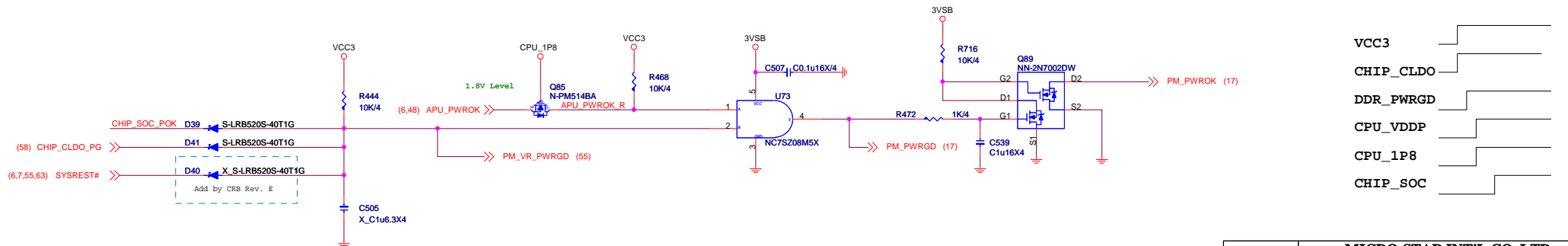
L04-68B7350-T15

CH0KE18
CH-0.68u15A5ms-HF-1

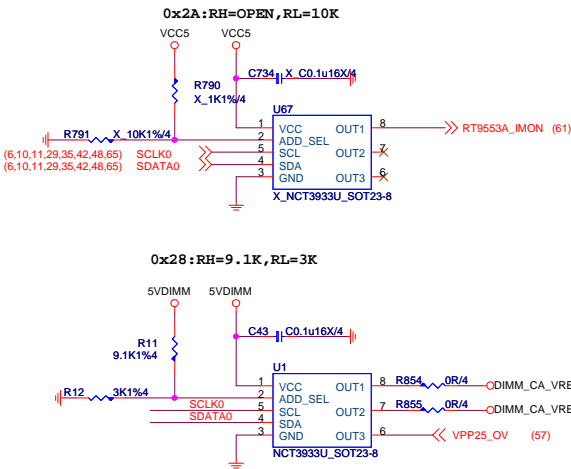
1V@9A
OCP=16A



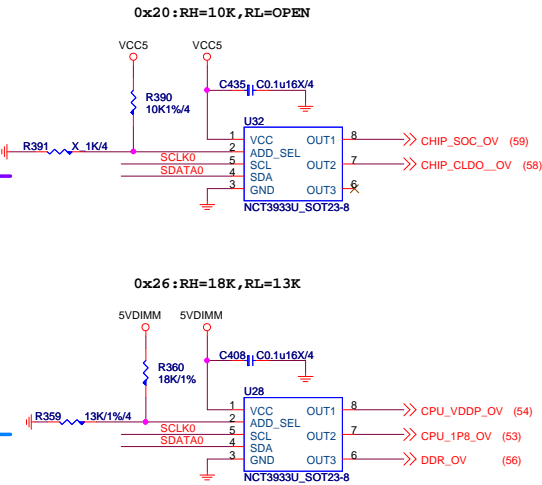
S0 PG



Over Voltage Control IC



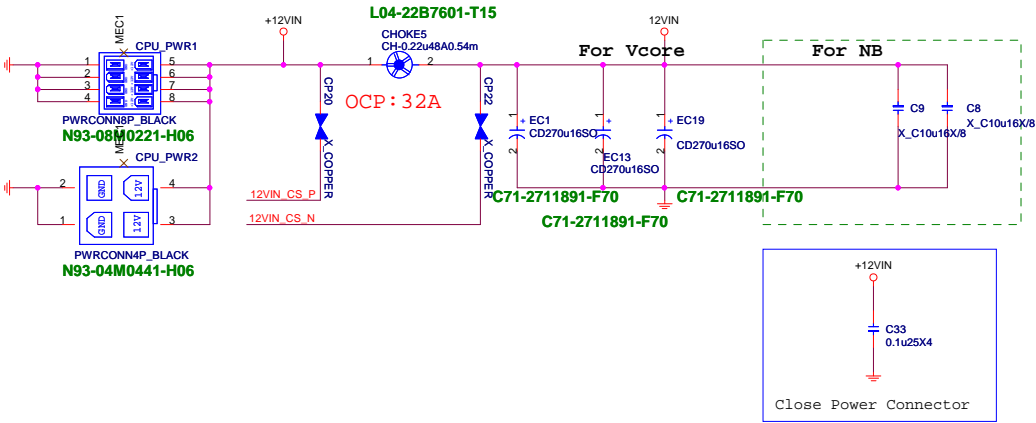
ADDRESS	0x2A	0x28	0x26	0x24	0x22	0x20
RH (KOhm)	OPEN	3.9	3	2.2	1.3	10
RL (KOhm)	10	1.3	2.3	3	3.9	OPEN
BUS_SEL	0%	25%	40%	60%	75%	100%



UPI VOLTAGE CONSOLE

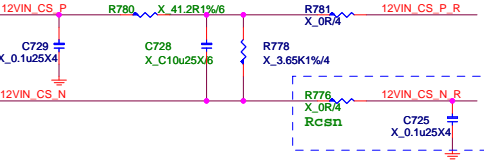
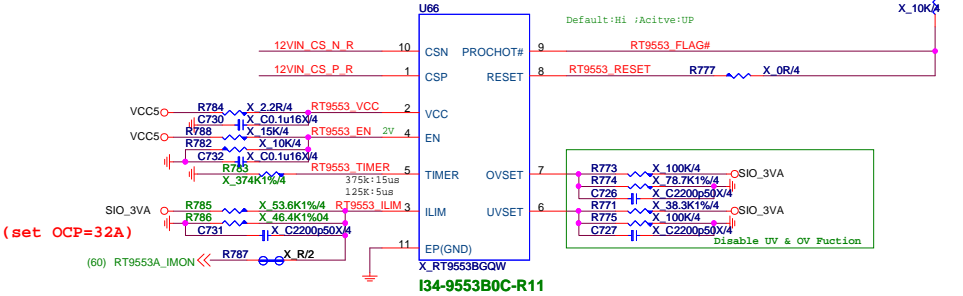
ADDRESS	0x2A	0x28	0x26	0x24	0x22	0x20
RH (KOhm)	OPEN	3.9	3	2.2	1.3	10
RL (KOhm)	10	1.3	2.3	3	3.9	OPEN
BUS_SEL	0%	25%	40%	60%	75%	100%

CPU POWER CONNECTOR

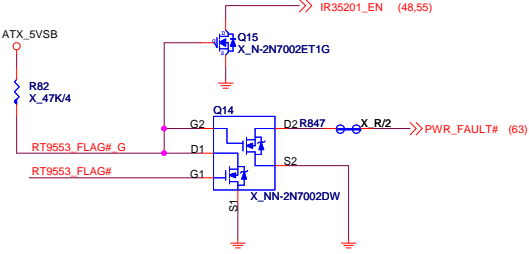


RT9553B CURRENT SENSE

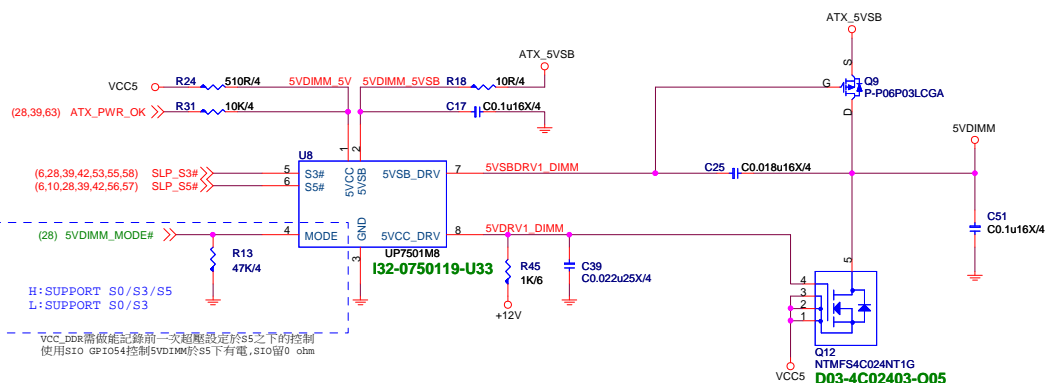
RT9553 PIN5: When start OV/UV, RESET delay time can meet SPEC 15us.



Vcore		SOC	
D=Vout/Vin		D=Vout/Vin	
Vin = 12	> input voltage	Vin = 12	> input voltage
Vout = 2	> output Vcore	Vout = 1.55	> output Vcore
D = 0.166667		D = 0.129167	
Io = Icore(max)*0.8		Io = Icore(max)*0.8	
I core(max) = 200	> Vcore current	I core(max) = 75	> Vcore current
I avg. = 160	A	I avg. = 60	A
I ripple={ Io*√ D*√ (1-D) } / Phase		I ripple={ Io*√ D*√ (1-D) } / Phase	
Phase = 10	phase	Phase = 2	phase
I ripple = 5.962848	A	I ripple = 10.06153	A
How many pcs. Of Cap.		How many pcs. Of Cap.	
I ripple(cap) = 4700	m A	I ripple(cap) = 4700	m A
COETEMP = 1		COETEMP = 1	
Input Cap. = 2	pcs.	Input Cap. = 3	pcs.



5VDIMM FOR DDR



3VSB cost down

3.3V@3.363A

CPU: VDD_33_S5@0.25A

CHIP: VDD_33_S5@0.1A

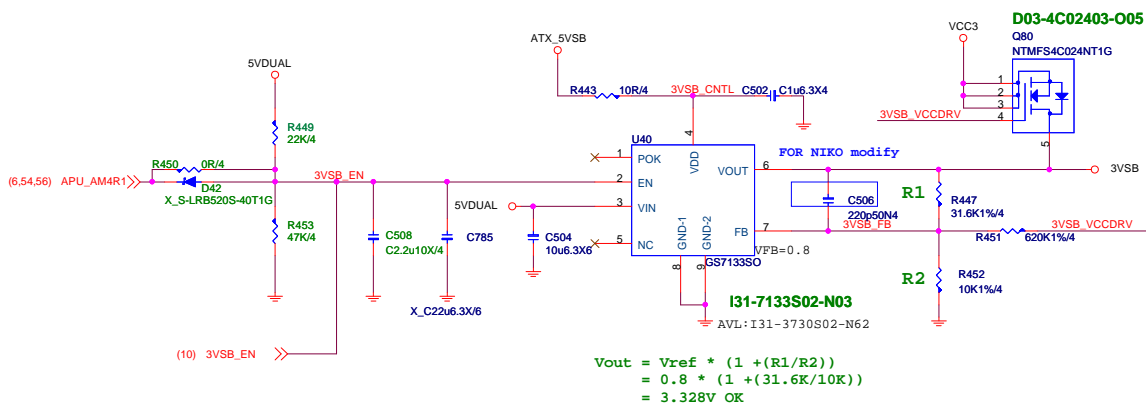
PCIE*4@1.5A

M.2_WIFI@0.78A

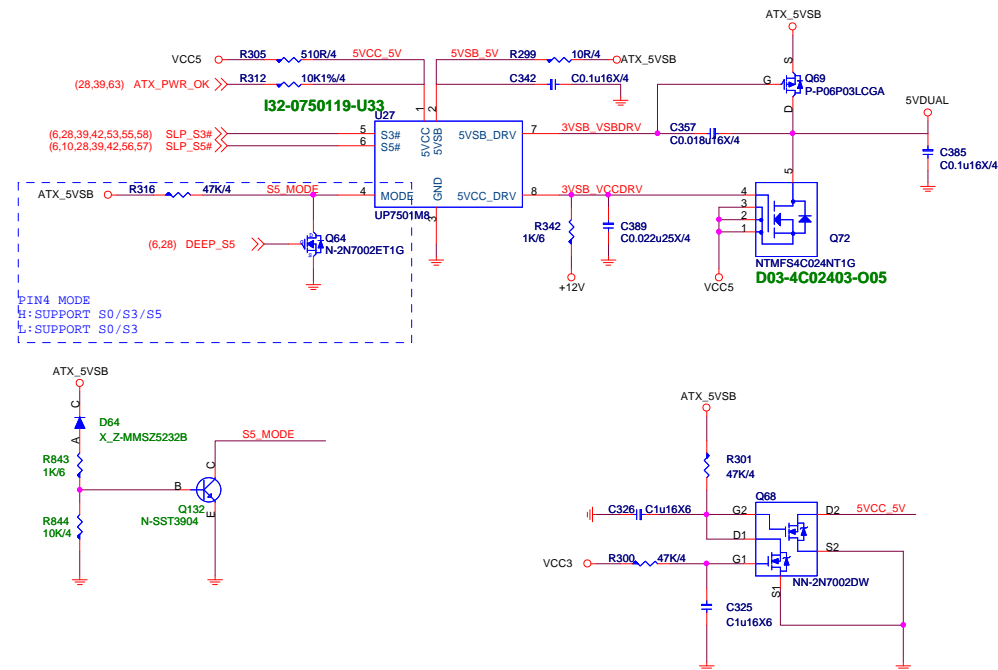
LAN@0.065A

Redriver*2@0.668A

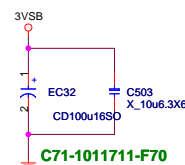
USB TYPE-C@0.9mA



5VDUAL For 3VSB、CPU 1.8V、 VDDP



```
| For power 700W solution (only for uP7501+uP7506 for 3VSB solution)|
| The power supply VCC3 delay 12ms after VCC5 assert.             |
| The chip U7501 5VSDRV1 work when the VCC5 ready                 |
| (When VCC5 up to 4.2V and the 5VSDRV1 delay 6ms assert), but   |
| VCC3 not ready and let the 3VSB sequence fail.                  |
```



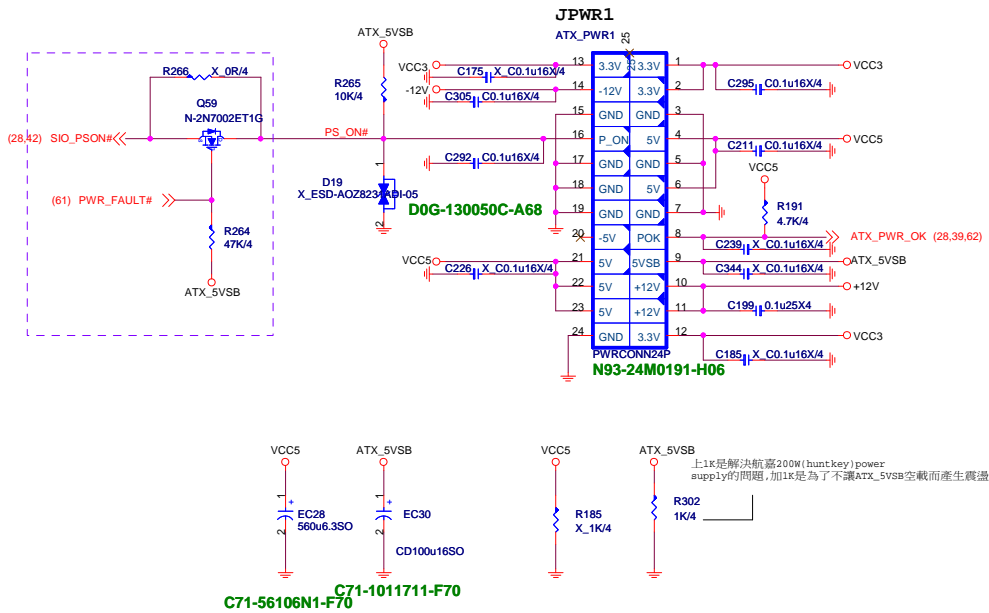
MICRO-STAR INT'L CO.,LTD

MS-7C37

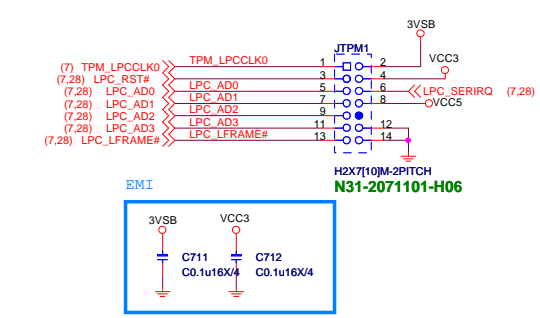
Size Custom	Document Description ACPI - 3VSB / 5VDIMM	Rev 1.3
----------------	---	------------

Date: Friday, April 26, 2019	Sheet 62 of 75
------------------------------	----------------

ATX POWER CONNECTOR



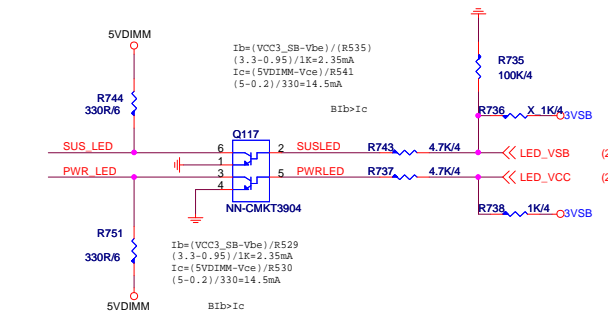
TPM



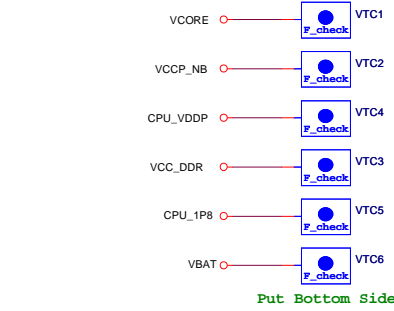
Add for EMI



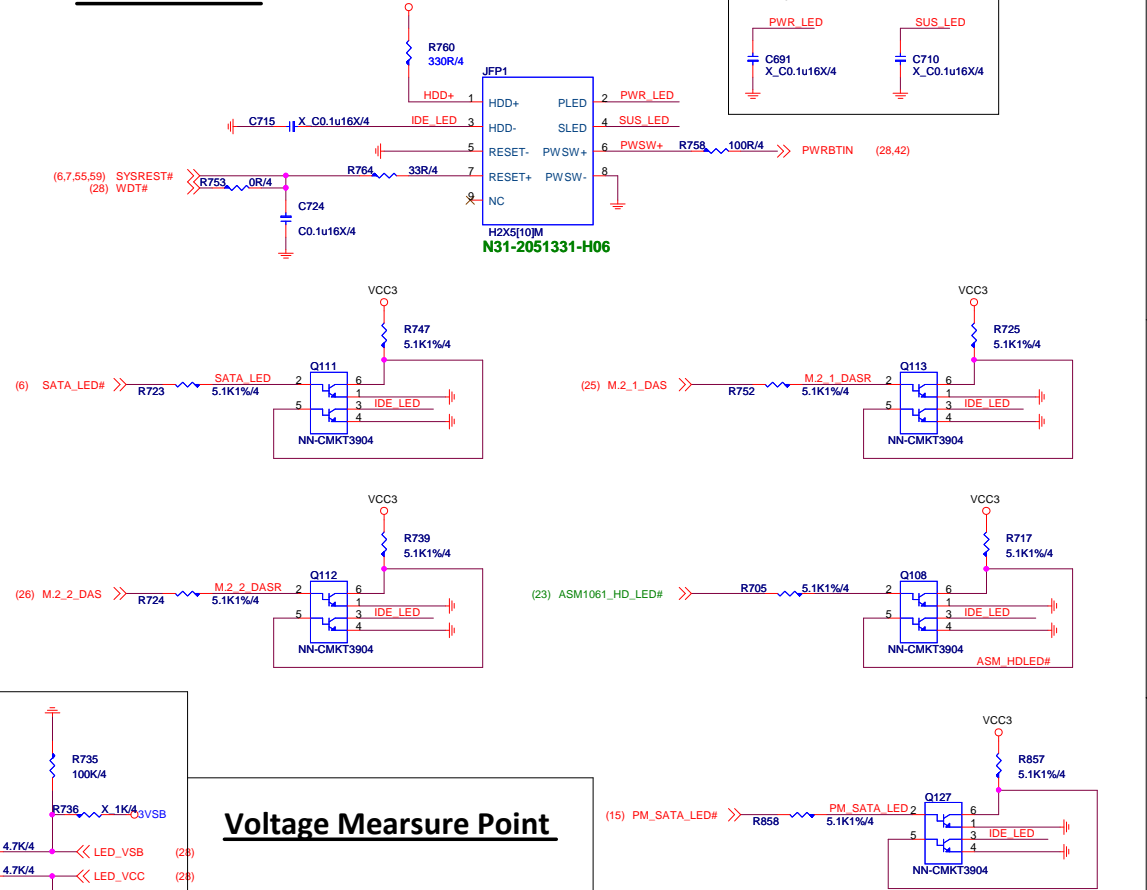
LED (for NCT6797D)



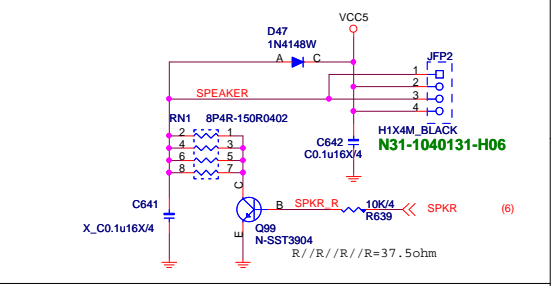
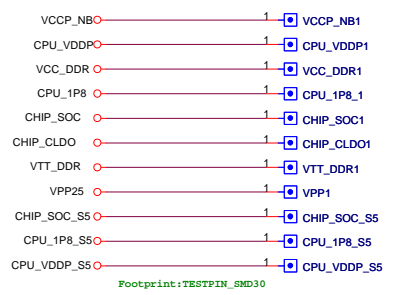
Factory check point



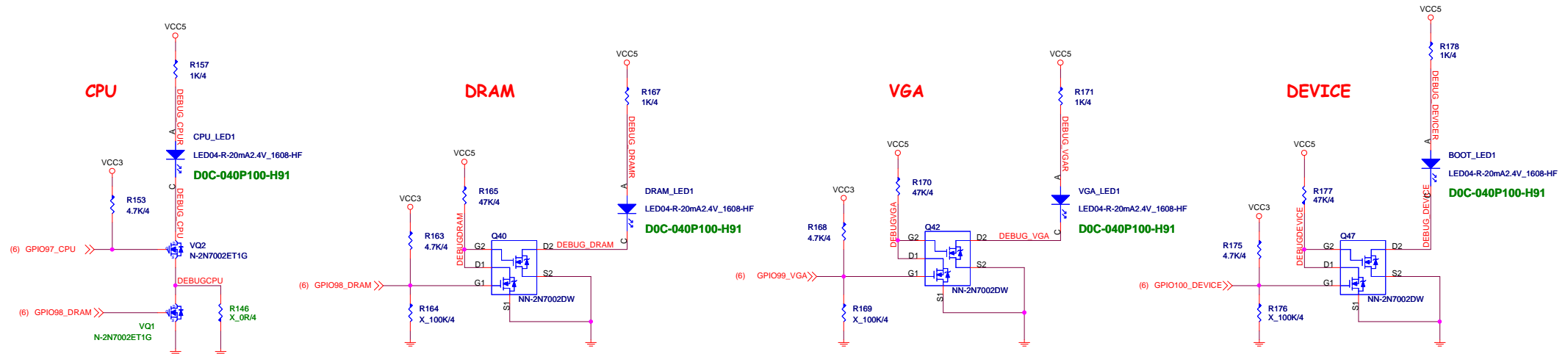
FRONT PANNEL



Voltage Mearsure Point



EZ Debug LED



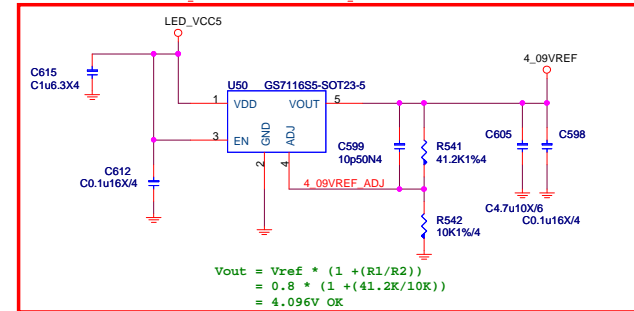
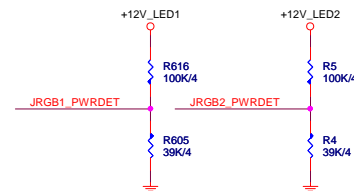
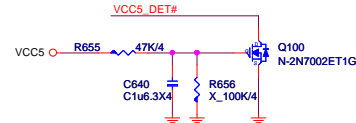
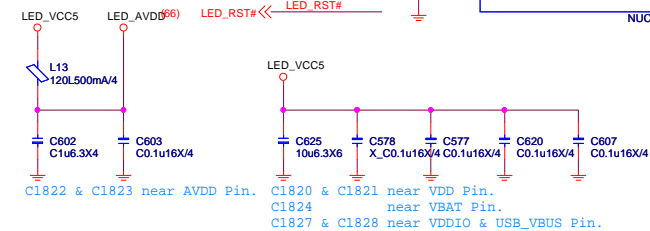
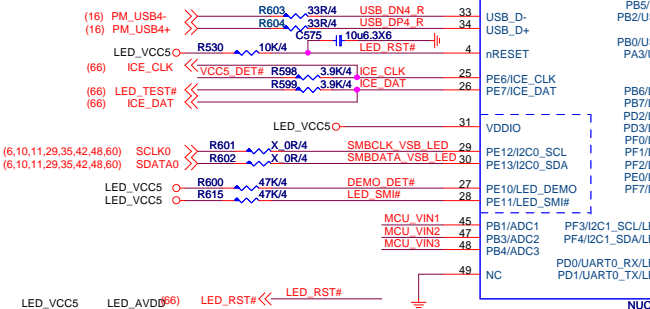
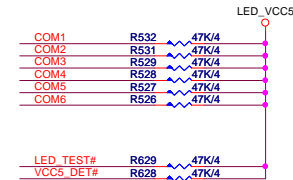
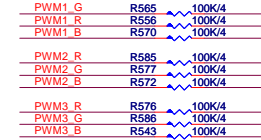
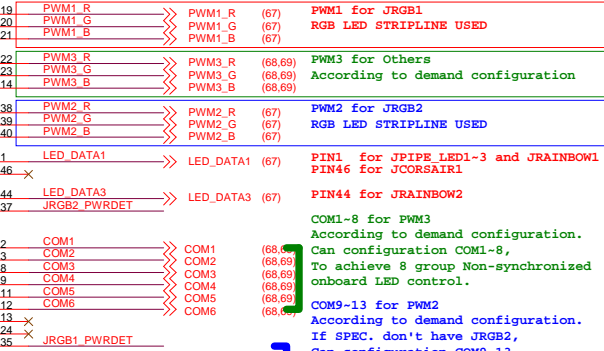
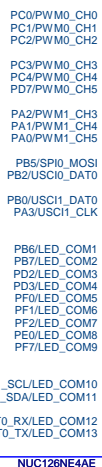
LED GPIO	GPIO97	GPIO98	GPIO99	GPIO100
亮	GPI PULL HIGH	GPO PO LOW	GPO PO LOW	GPO PO LOW
滅	GPO LOW	GPO HIGH (default HIGH)	GPO HIGH (default HIGH)	GPO HIGH (default HIGH)

LED亮燈時同時將CPU LED關掉

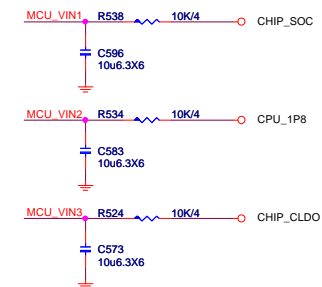
AMD AMP Detect LED

48 PIN LED MCU

If you use ADC function, need to separate VREF from AVDD and 4_09VREF stuff for VREF.



Option Spec For Voltage Monitor Require.



Control	Net Name	PWM USE
PCH	LED_DATA1	No Use
AUDIO Cover	LED_GPIO_01	No Use
MOS/IO cover	LED_GPIO_02	No Use
JRAINBOW1	LED_GPIO_03	No Use
JCORSAIR1	LED_DATA2	No Use
JRGB1/JRGB2	PWM1/ PWM2	PWM1/ PWM2
Board Side LED	COM 1-8	PWM3
Board Side LED	COM 9-13	PWM2

Vinafix.com

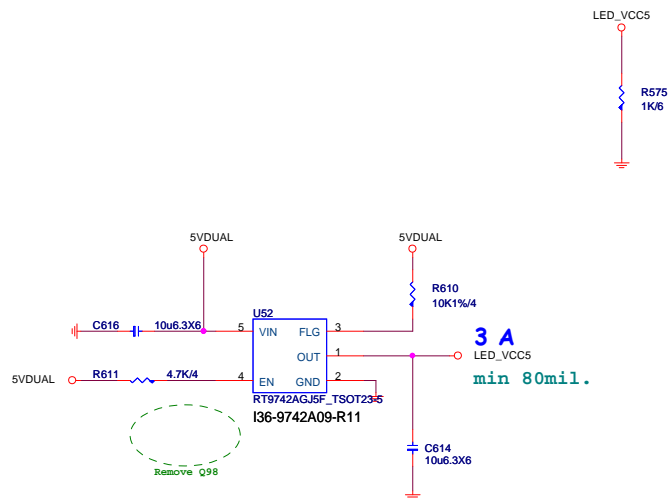


MICRO-STAR INT'L CO.,LTD

MS-7C37

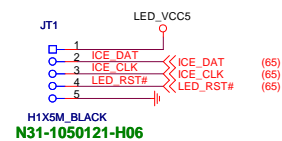
Size Custom	Document Description MCU - LED Control	Rev 1.3
Date: Friday, April 26, 2019		Sheet 65 of 75

EXTERNAL POWER INPUT

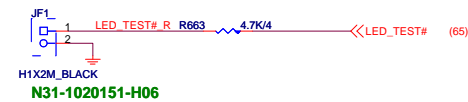


External Power

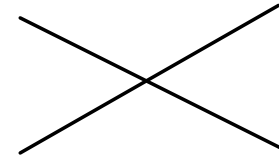
JT1 for FW update



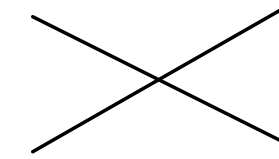
JF1 For Factory Test



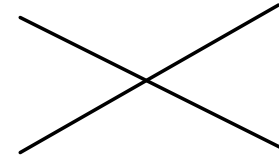
1 PCH HEATSINK LED



2 AUDIO/IO Cover LED



3 MOS HEATSINK LED



JPIPE:PIN1:output ,PIN2:input
PIN2:MCU IN
PIN1:HEATSINK OUT

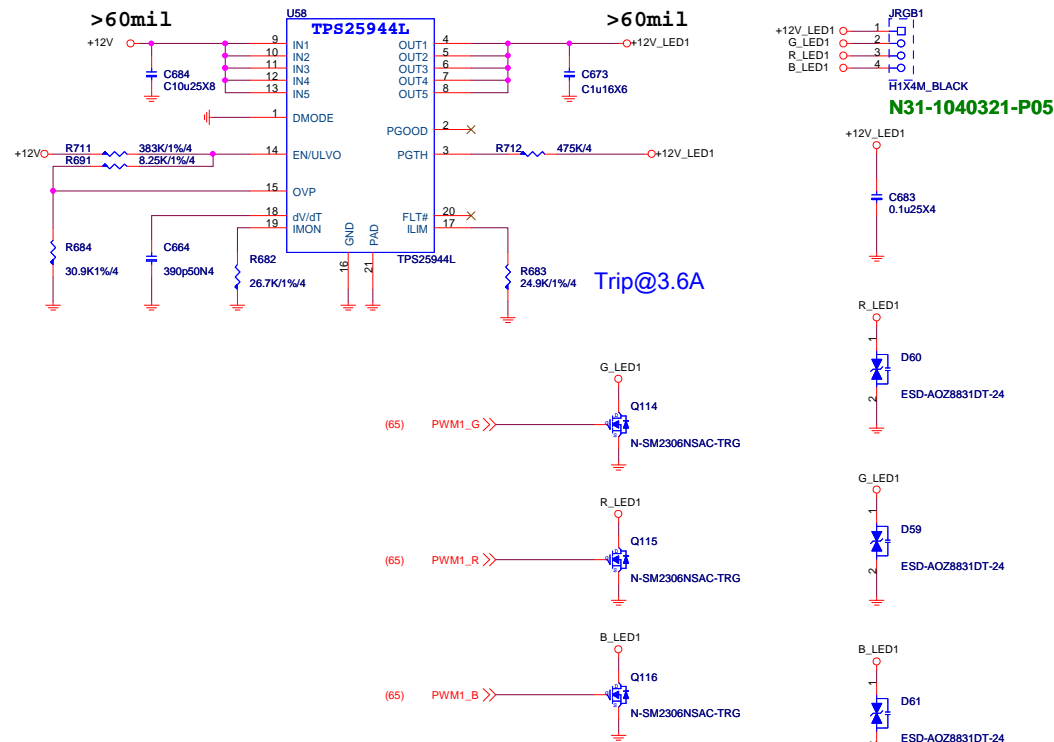


MICRO-STAR INT'L CO.,LTD

MS-7C37

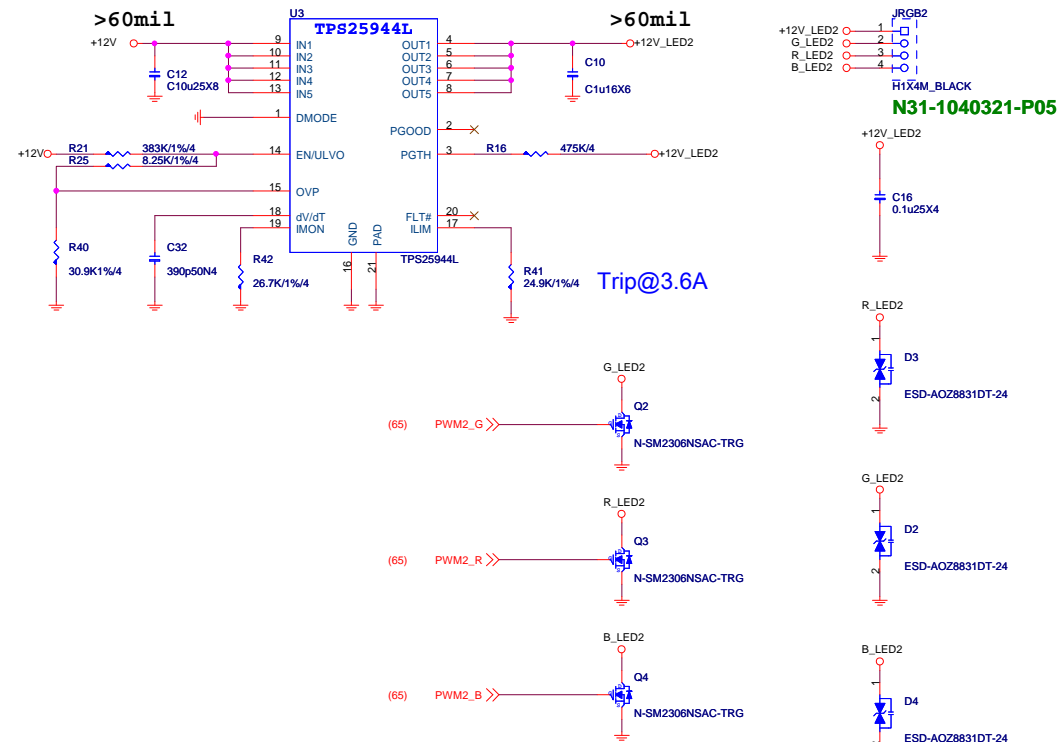
Size Custom	Document Description LED - Power / JPIPE	Rev 1.3
Date: Friday, April 26, 2019 Sheet 66 of 75		

JRGB1



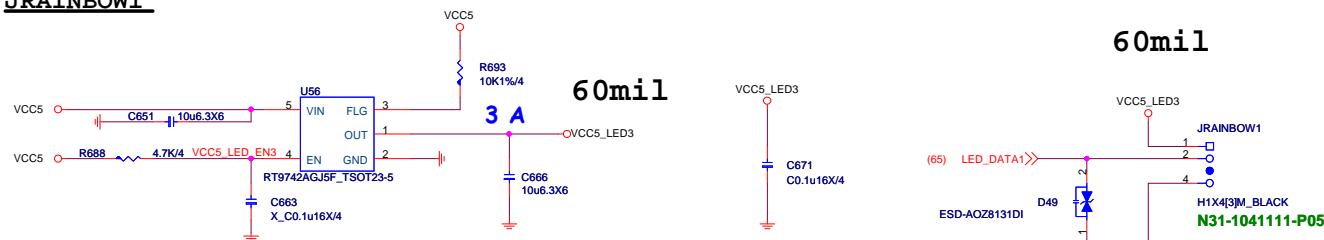
外接LED 燈條 (RGB)
 ---- PCB 文字面 (JRGB1)
 ---- 手冊 註明 RGB 接頭支援標準 5050 RGB LED 燈條 (12V/G/R/B), 燈條總輸出電流限制為3安培 (12 伏特), 長度限制為2公尺

JRGB2

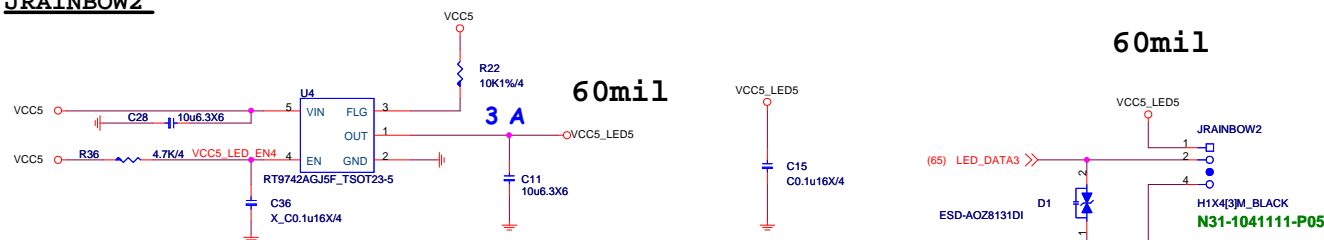


外接LED 燈條 (RGB)
 ---- PCB 文字面 (JRGB2)
 ---- 手冊 註明 RGB 接頭支援標準 5050 RGB LED 燈條 (12V/G/R/B), 燈條總輸出電流限制為3安培 (12 伏特), 長度限制為2公尺

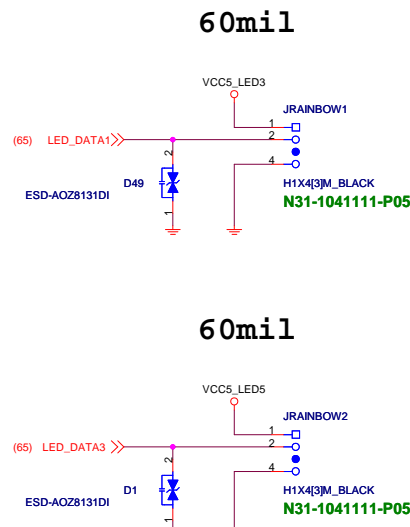
JRAINBOW1



JRAINBOW2

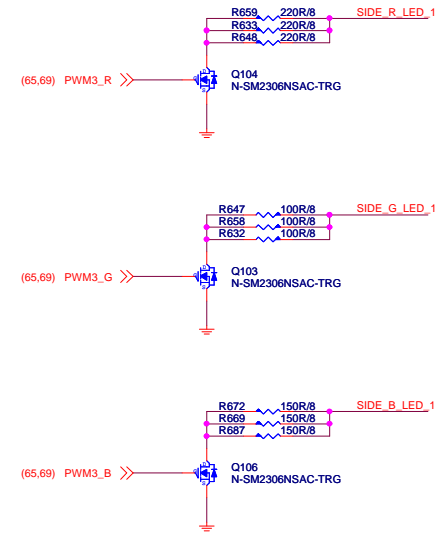
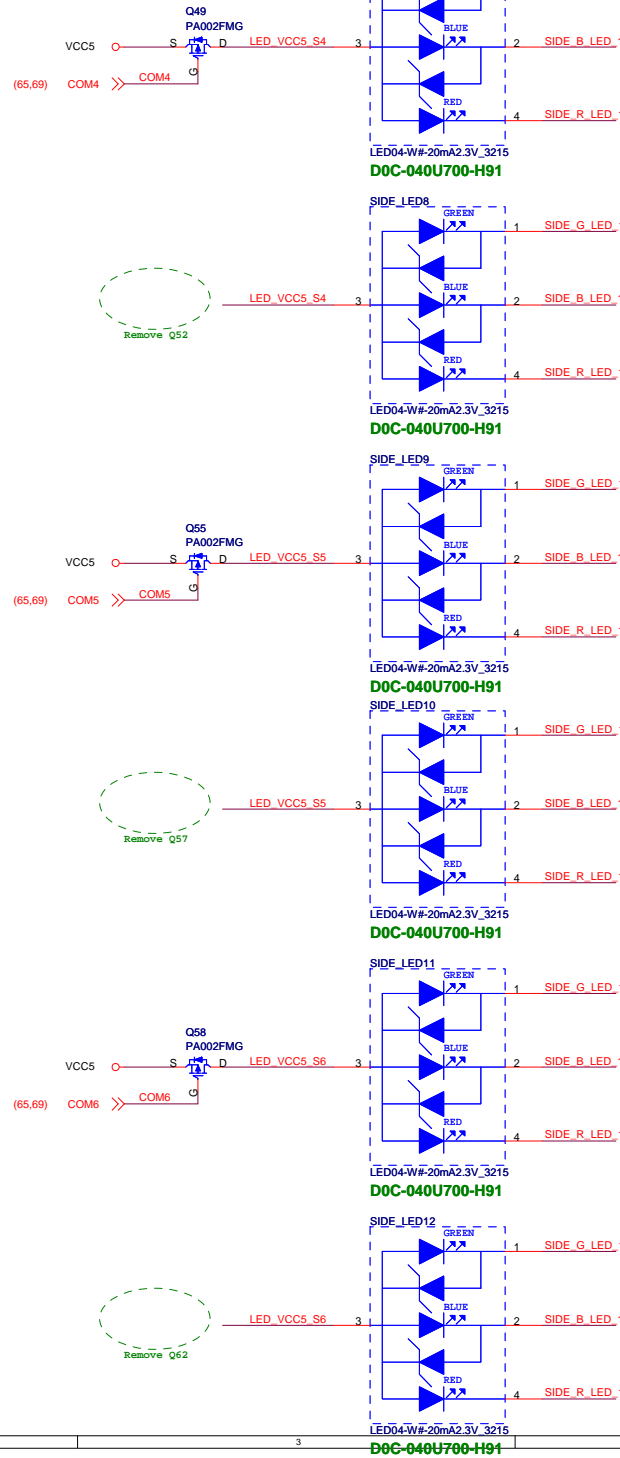
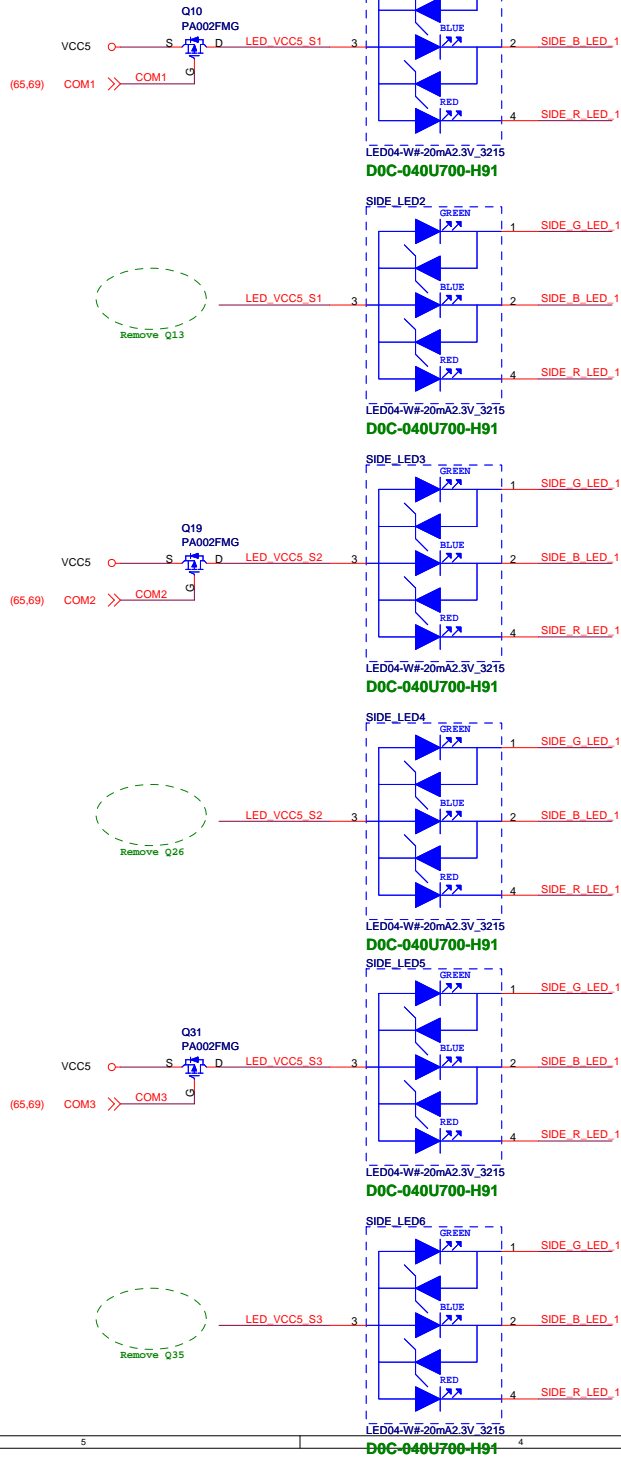


JCORSAIR1

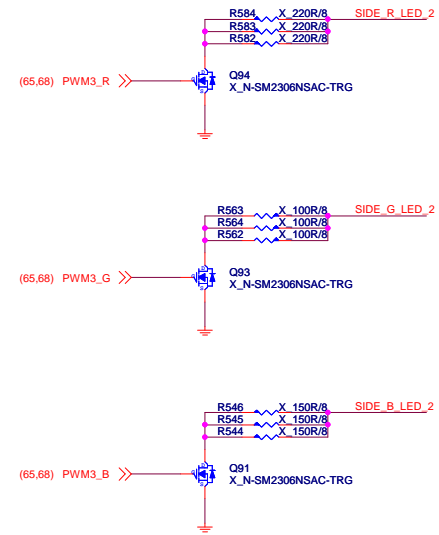
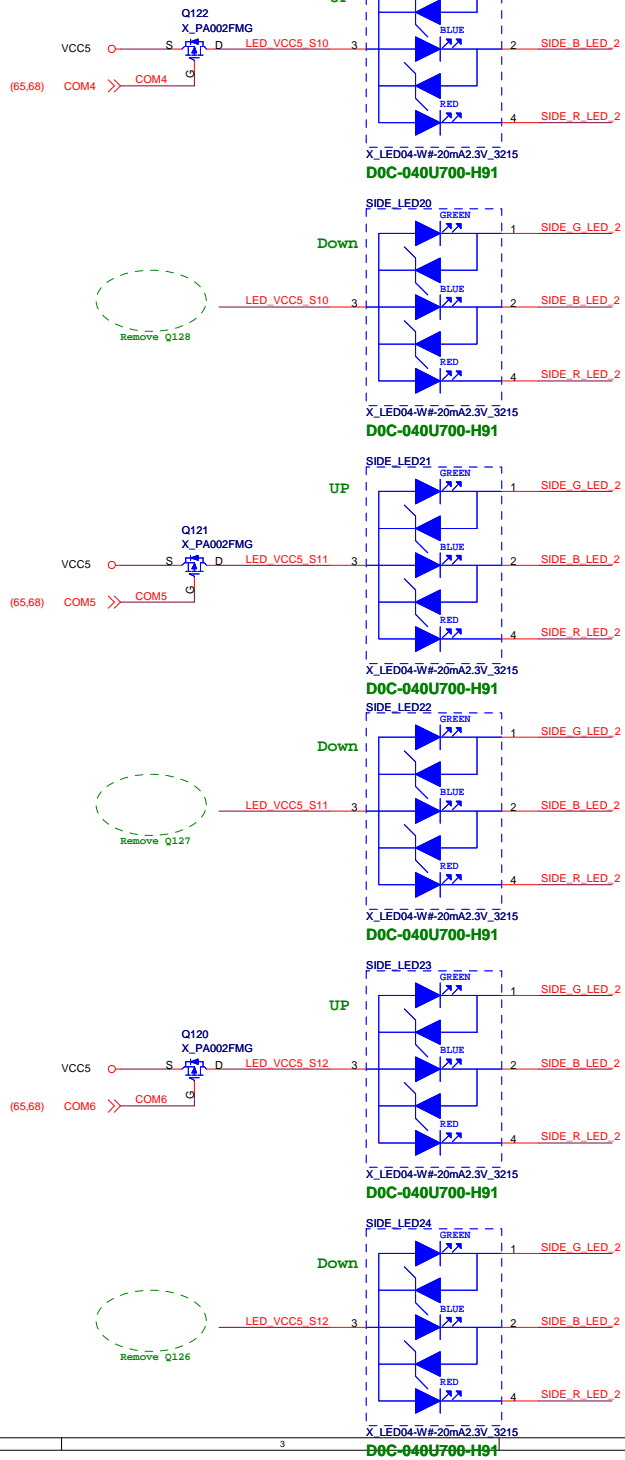
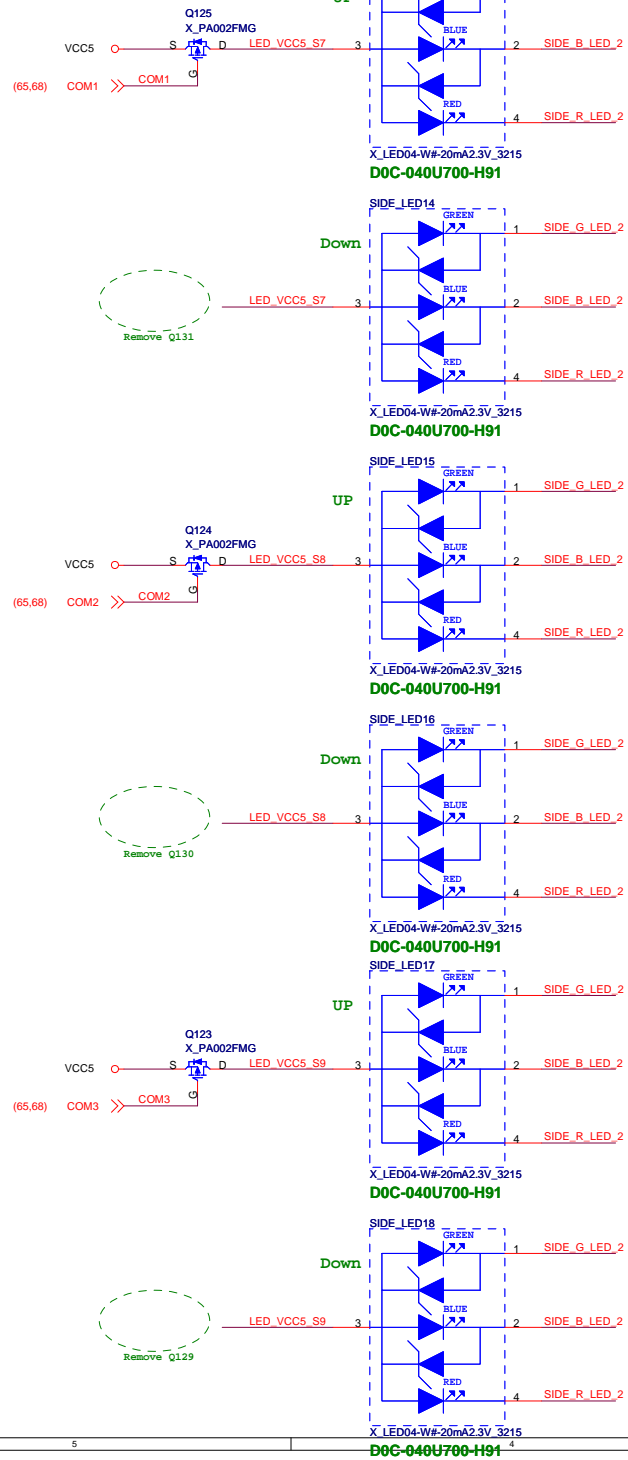


MICRO-STAR INT'L CO.,LTD			
MS-7C37			
Size	Document Description	Rev	
Custom	LED - JLED1 / 2 / 3 / 4	1.3	
Date: Friday, April 26, 2019		Sheet	67 of 75

Sidebar LED *12

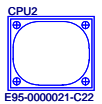


Market Name LED *12



MSI			
MICRO-STAR INT'L CO.,LTD			
MS-7C37			
Size	Document Description	Rev	
Custom	LED - Market Name	1.3	
Date: Friday, April 26, 2019		Sheet	69 of 75

CPU Socket



E95-0000022-C22

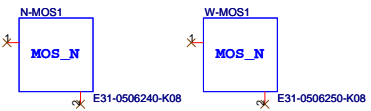
PCB

PCB1



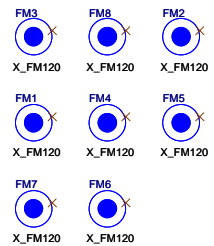
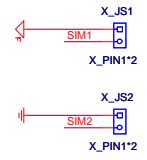
7C37-1.3
PD0-07C3713-E48

MOS HEATSINK

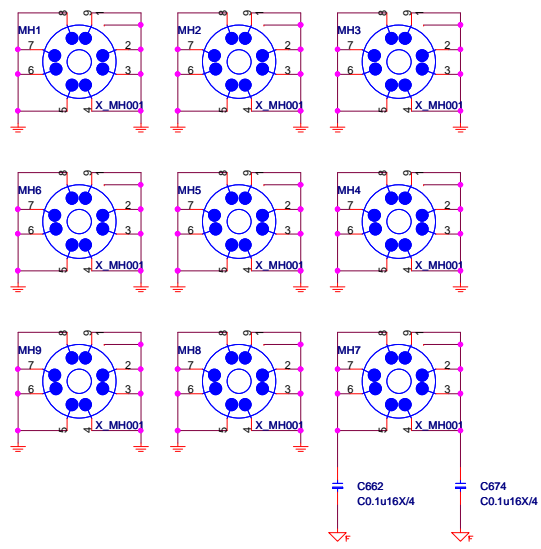


IO COVER

Simulation



Optics Orientation Holes



MANUAL PART

UEFI1
G51-M1SPXXA-A09
G51-M1SPXXA-A09

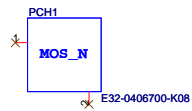
HDMI_LA1
Label
HDMI
HDMI LABEL
Y01-RHDMI03-000

NAHIMIC1
Y02-MU00100-NAH
Y02-MU00100-NAH

XSPILT1
X_Y02-MA00401-XSP
Y02-MA00401-XSP

SSE1
X_Y02-MA00101-SSE
Y02-MA00101-SSE

PCH HEATSINK



Audio COVER



DDR COVER