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53	CPU PWR VCCIO - NB681G
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55	CPU PWR SA-RT8125E
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57	DDR4 Power-VFP25
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MS-7B48

Intel -CFL Z370

Ver: 11 ATX
PCB size : 304.8mm * 244mm

CPU:

CFL

System Chipset:

Z370

Onboard Chip:

HD Audio Codec : ALC892

LAN : Realtek RTL8111H

SIO : Nuvoton 6795

Flash ROM : 16MB Z270

U3.1 Gen2 : ASM3142 (option)

Main Memory:

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

ACPI:

NIKO/UIPI

PWM:

UP9508

Expansion Slots:

PCI Express (X16) Slot *1

PCI Express (X4) Slot * 1

PCI Express (X1) Slot * 4

M2 M-Key * 1

Other:

SATA3.0 *6

FRONT USB2.0 *4

FRONT USB3.0 *4

REAR USB3.0 GEN1 Z270 *4

REAR USB3.1 GEN2 TYPE A *2 (option)

Display :

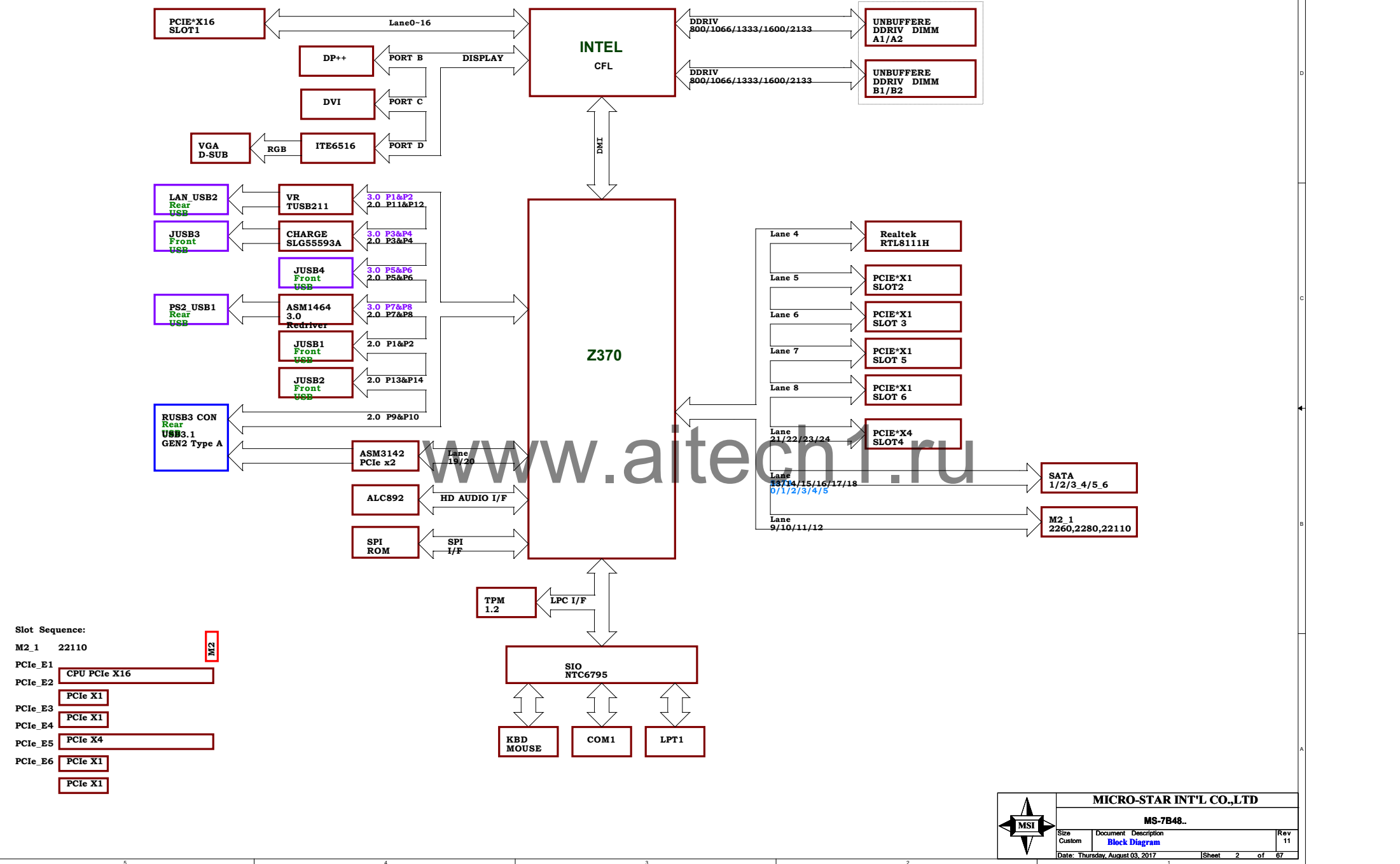
DISPLAY PORT

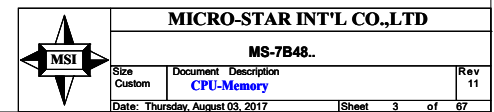
DVI

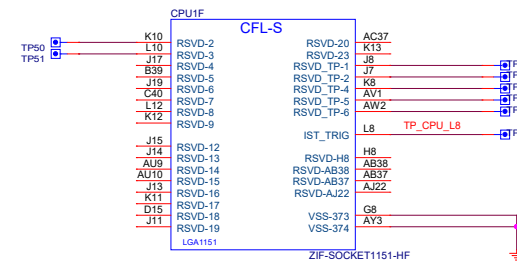
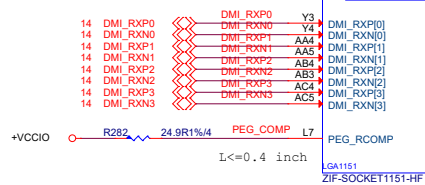
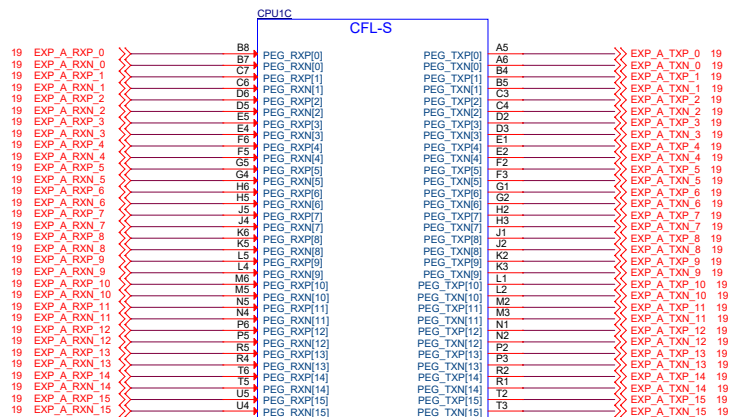
VGA-ITE6516 DDI to D-SUB

MICRO-STAR INT'L CO.,LTD			
MS-7B48..			
Size	Document	Description	Rev
Custom		Cover Sheet	11
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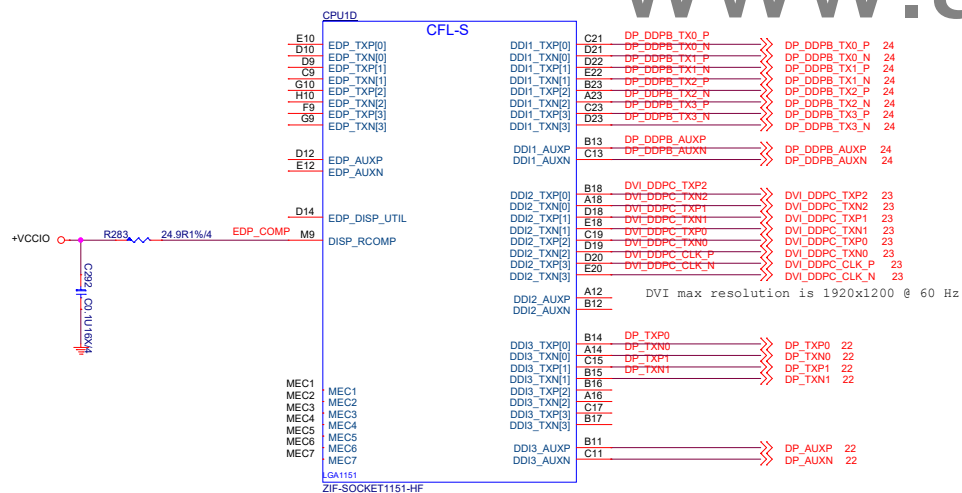
MS-7B48 Block Diagram

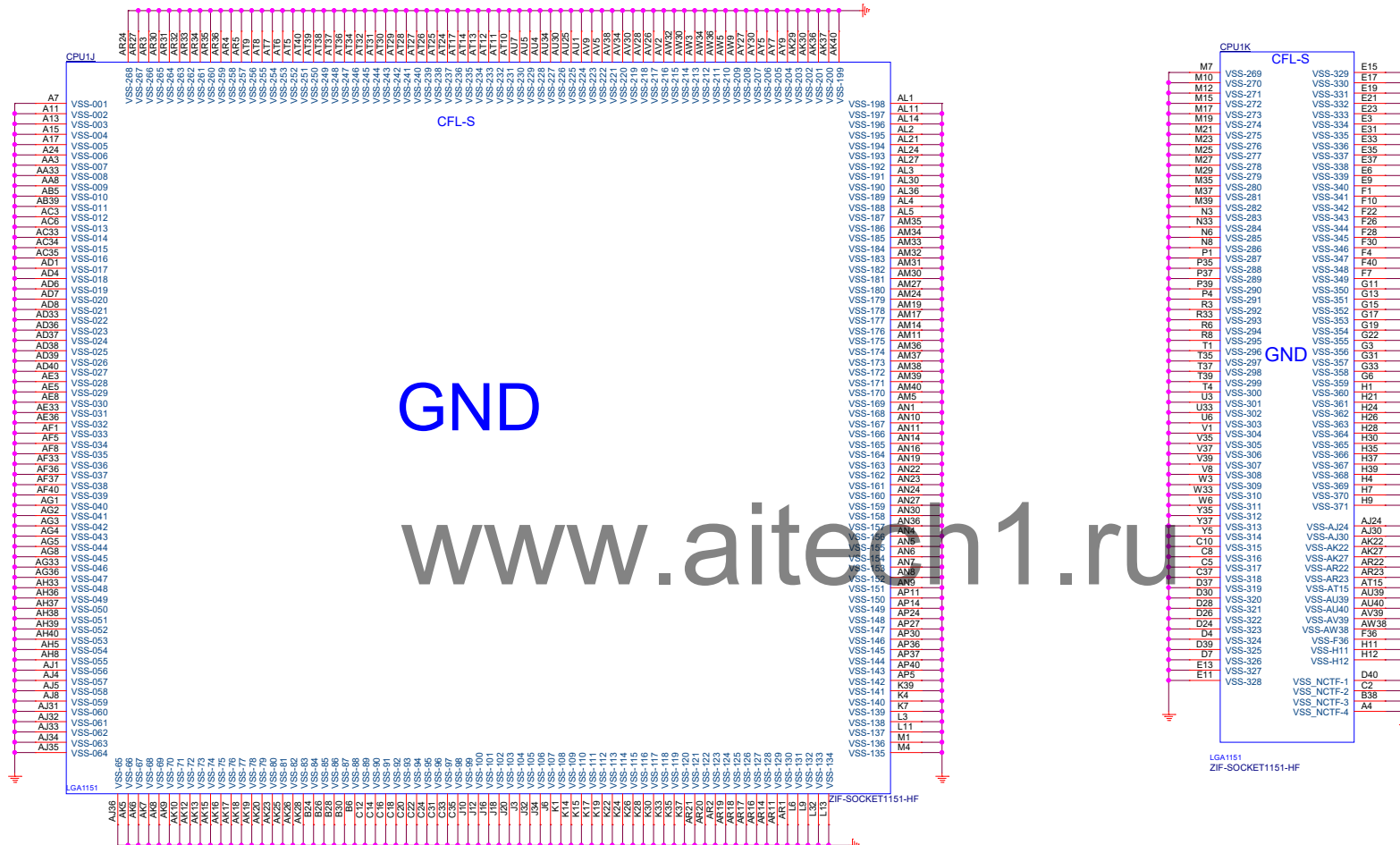


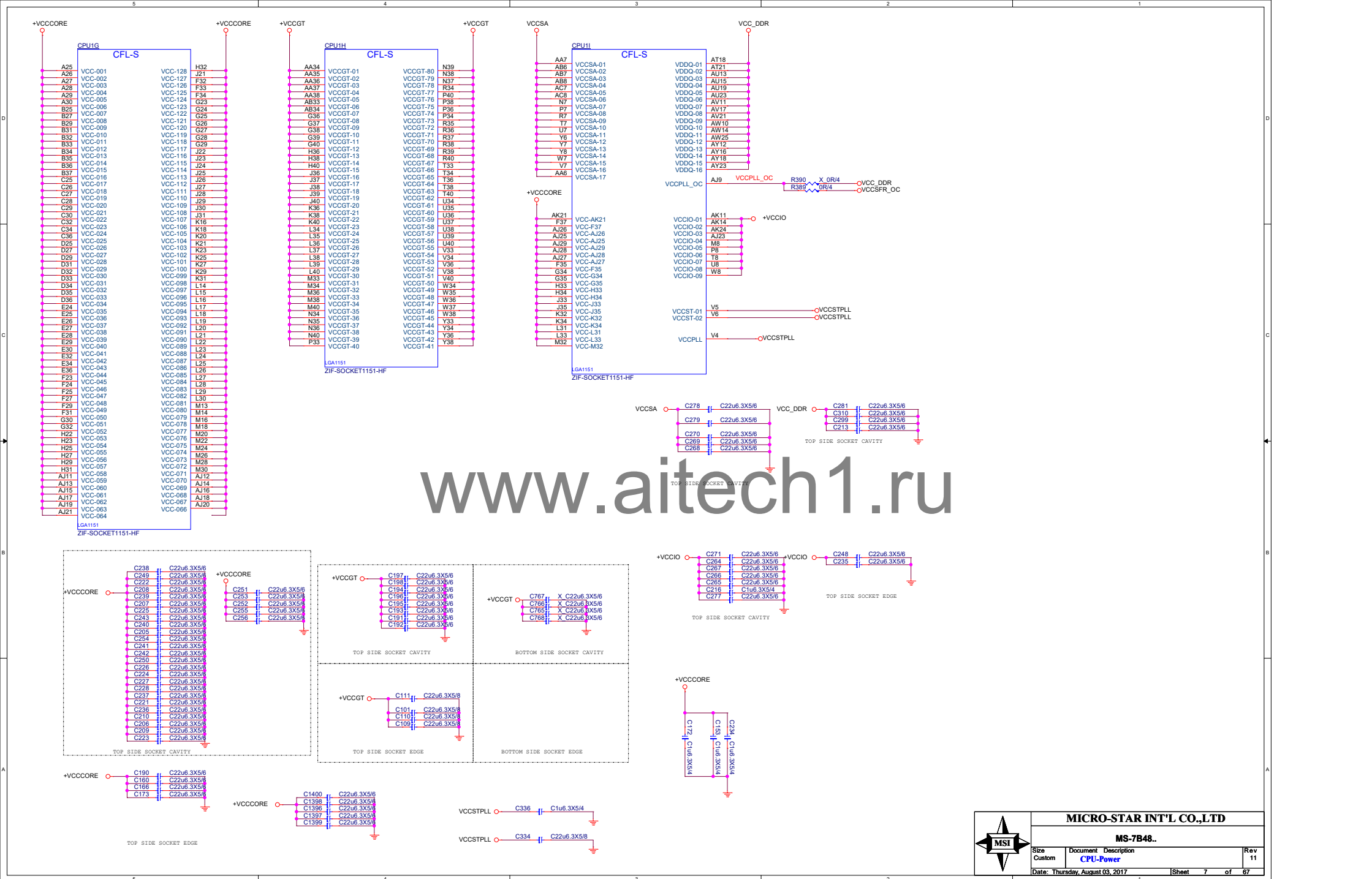


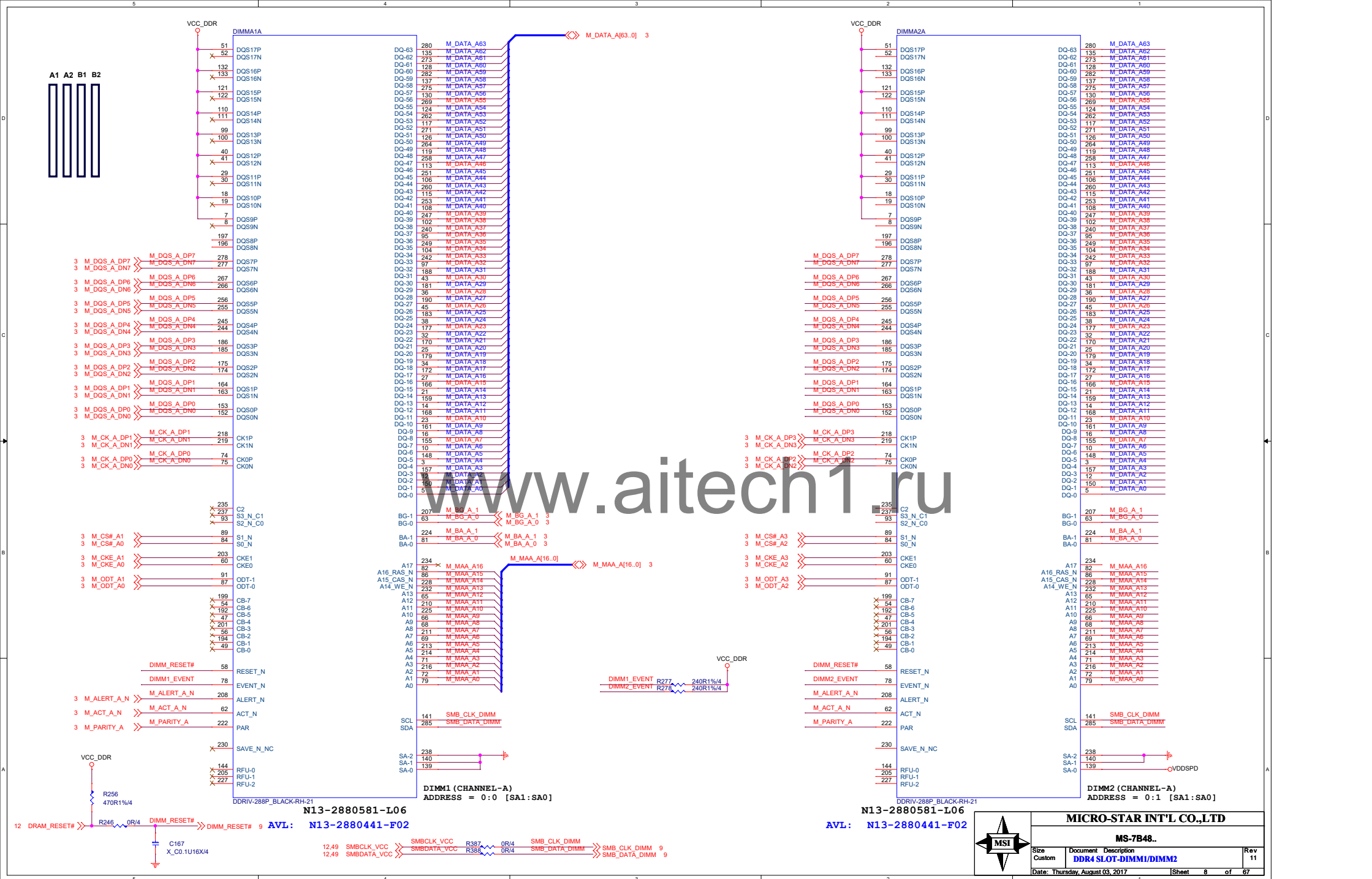


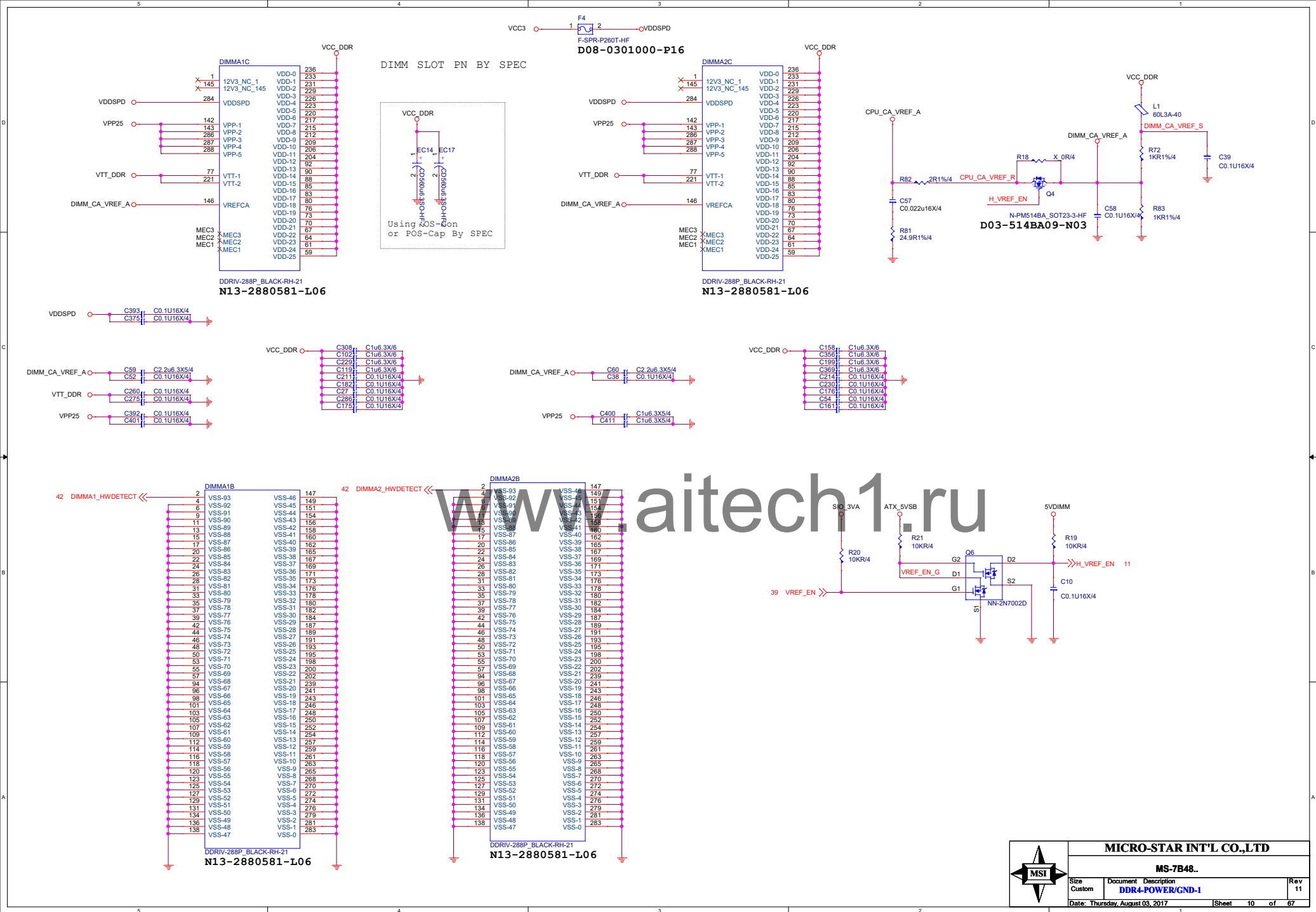
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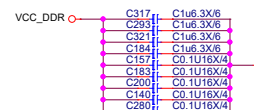
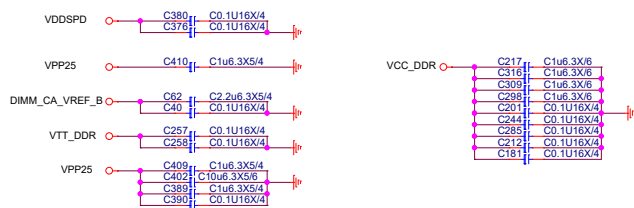




N13-2880581-L06

N13-2880581-L06

D03-514BA09-N03

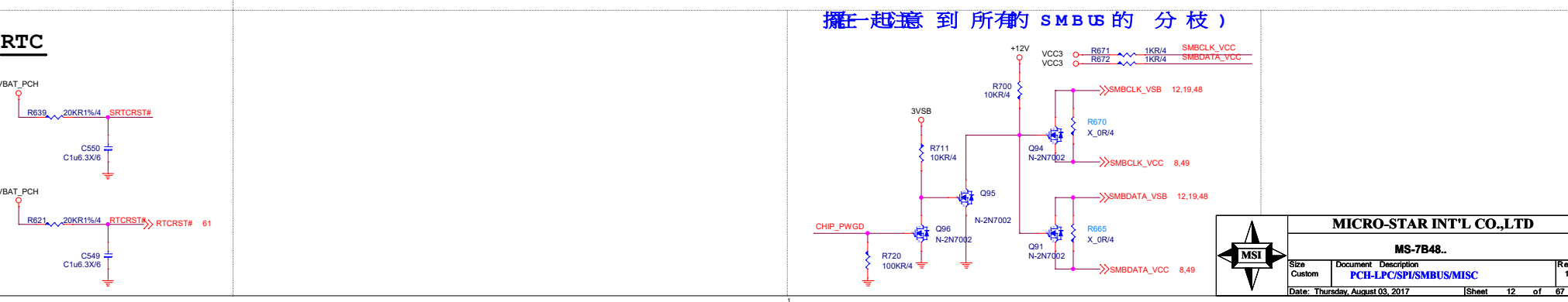
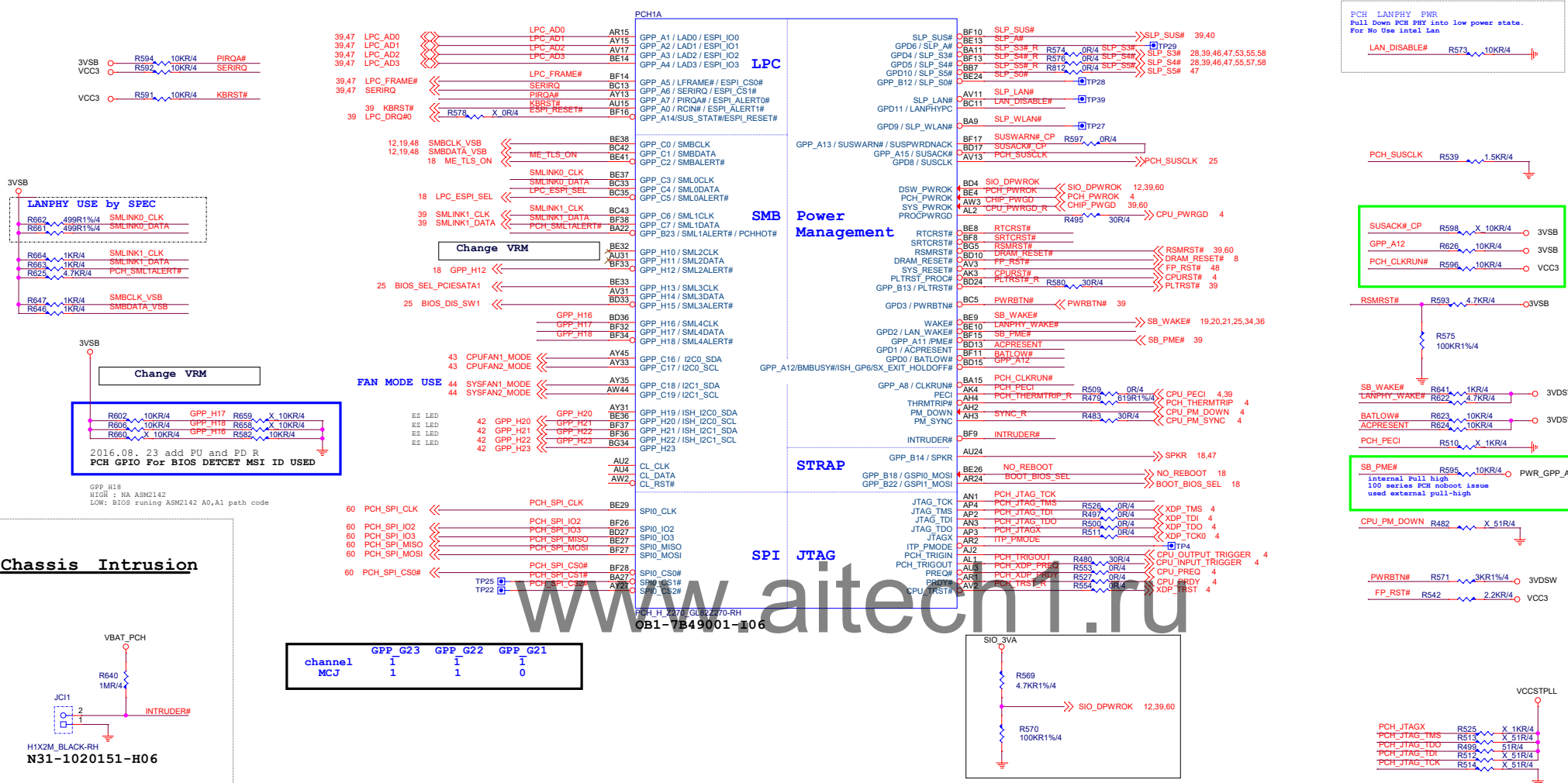


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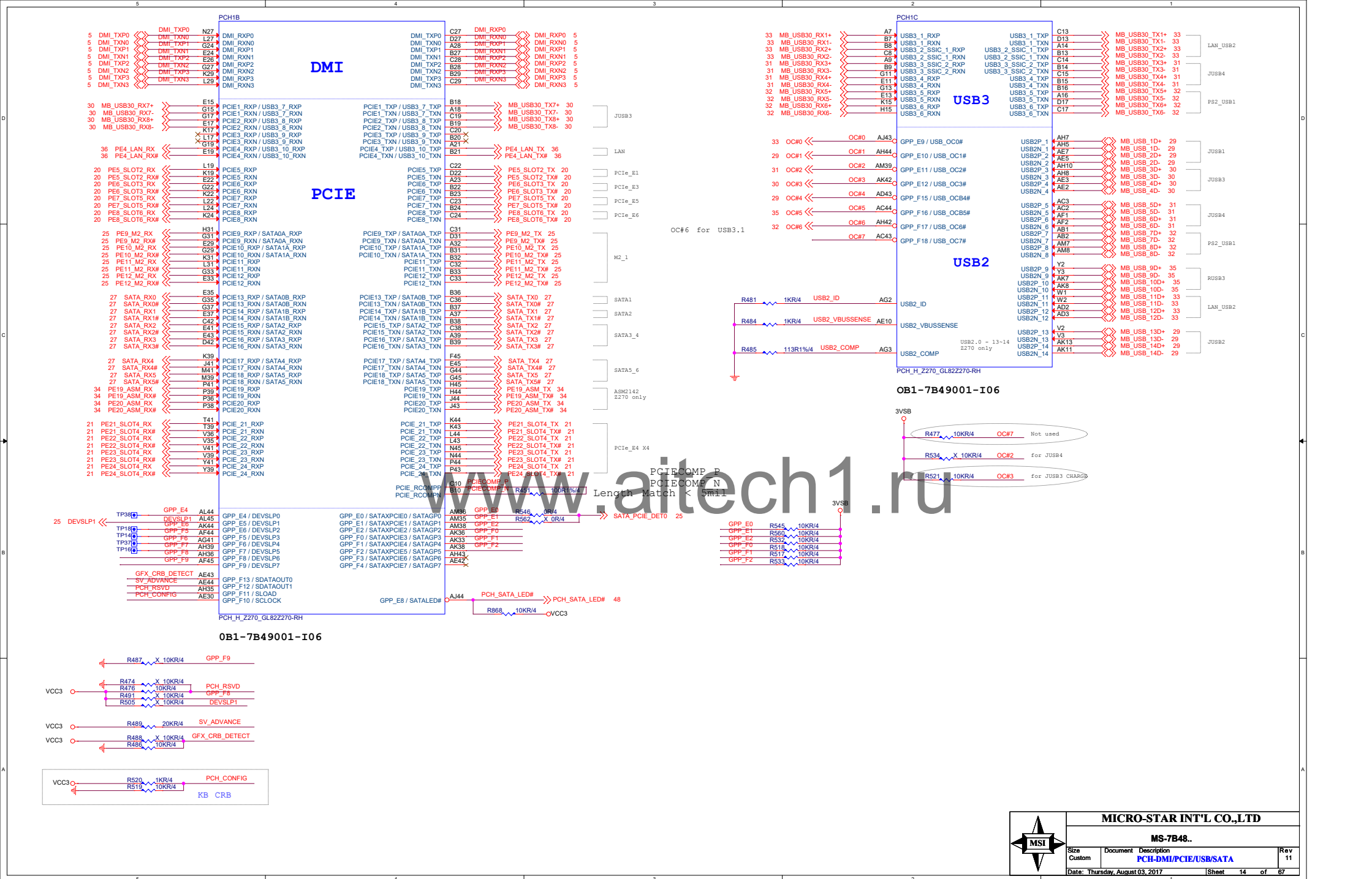
N13-2880581-L06



MICRO-STAR INT'L CO.,LTD			
MS-7B48..			
Size Custom	Document Description		Rev 11
	DDR4-POWER/GND-2		
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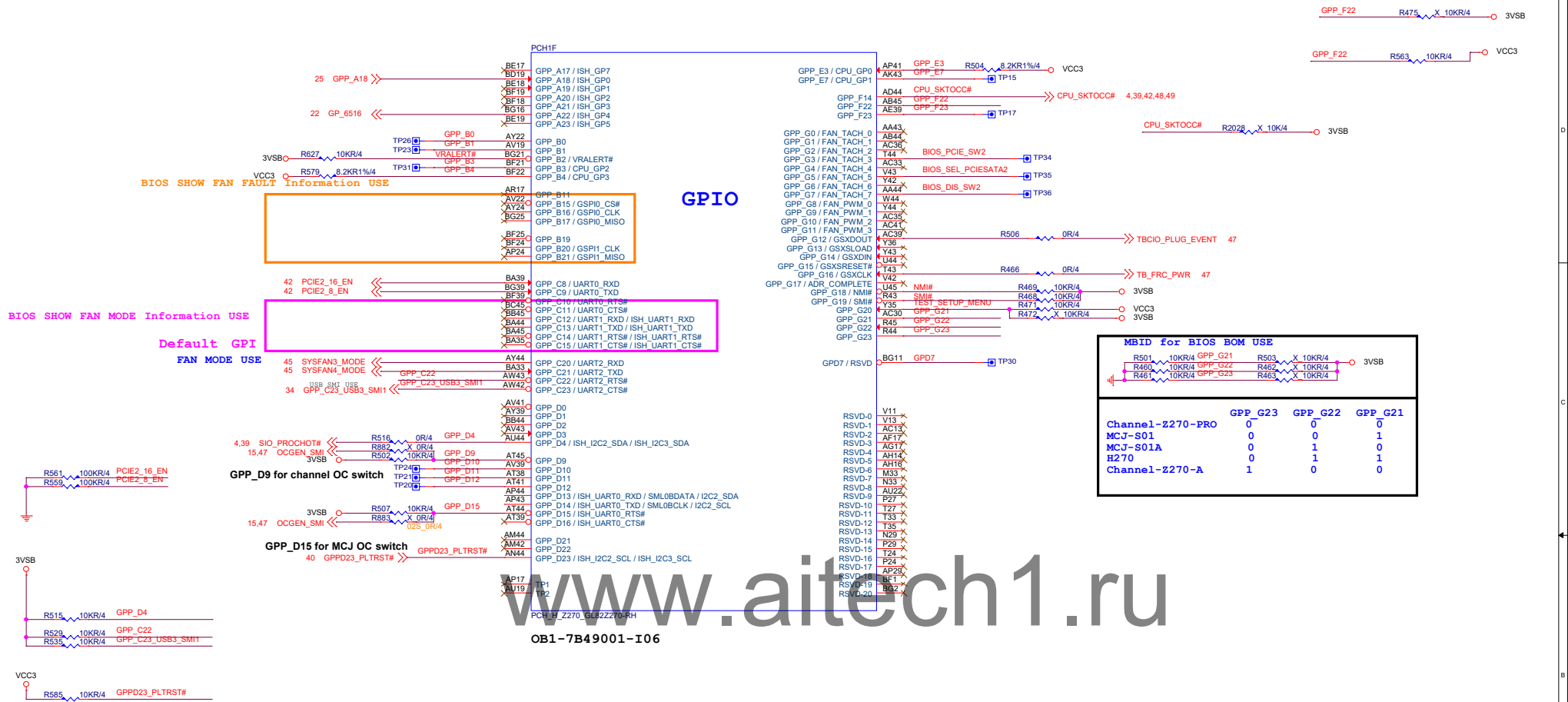


MICRO-STAR INT'L CO.,LTD		
MS-7B48..		
Size	Document	Description
Custom	PCH-LPC/SPI/SMBUS/MISC	Rev 11
Date: Thursday, August 03, 2017		Sheet 12 of 67



MS-7B48..

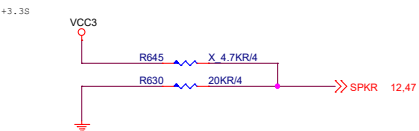
Size Custom	Document Description PCH-DMI/PCIE/USB/SATA	Rev 11
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MBID for BIOS BOM USE			
R501 10KR/4	GPP_G21	R503 10KR/4	3VSB
R460 10KR/4	GPP_G22	R462 10KR/4	
R461 10KR/4	GPP_G23	R463 10KR/4	

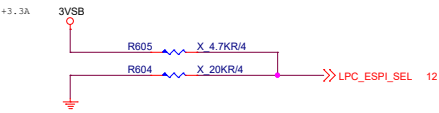
	GPP_G23	GPP_G22	GPP_G21
Channel-Z270-PRO	0	0	0
MCJ-S01	0	0	1
MCJ-S01A	0	1	0
H270	0	1	1
Channel-Z270-A	1	0	0

TOP Swap



Internal pull-down is disabled after PLTRST#

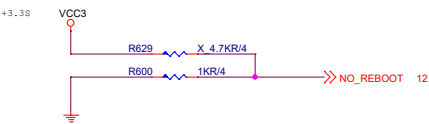
LPC eSPI Mode



0 : LPC
1 : eSPI

Internal pull-down is disabled after RSMRST

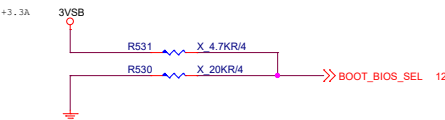
No Reboot



0 : DISABLE (Default)
1 : ENABLE

Internal pull-down is disabled after PLTRST#

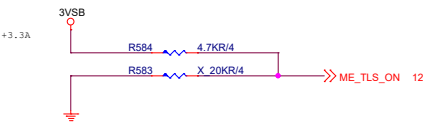
Boot BIOS



0 : SPI
1 : LPC

Internal pull-down is disabled after PLTRST

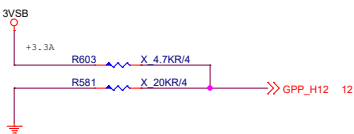
AMT and SBA with confidentiality



0 : DISABLE
1 : ENABLE (Default)

Internal pull-down is disabled after RSMRST

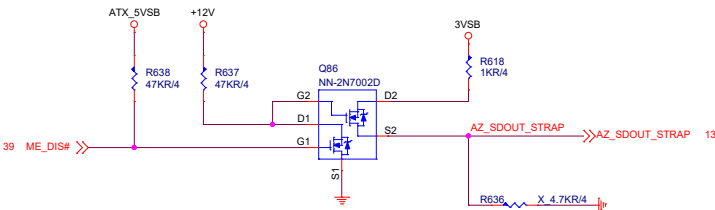
ESPI FLASH SHARING MODE



0 : MASTER ATTACHED FLASH SHARING
1 : SLAVE ATTACHED FLASH SHARING

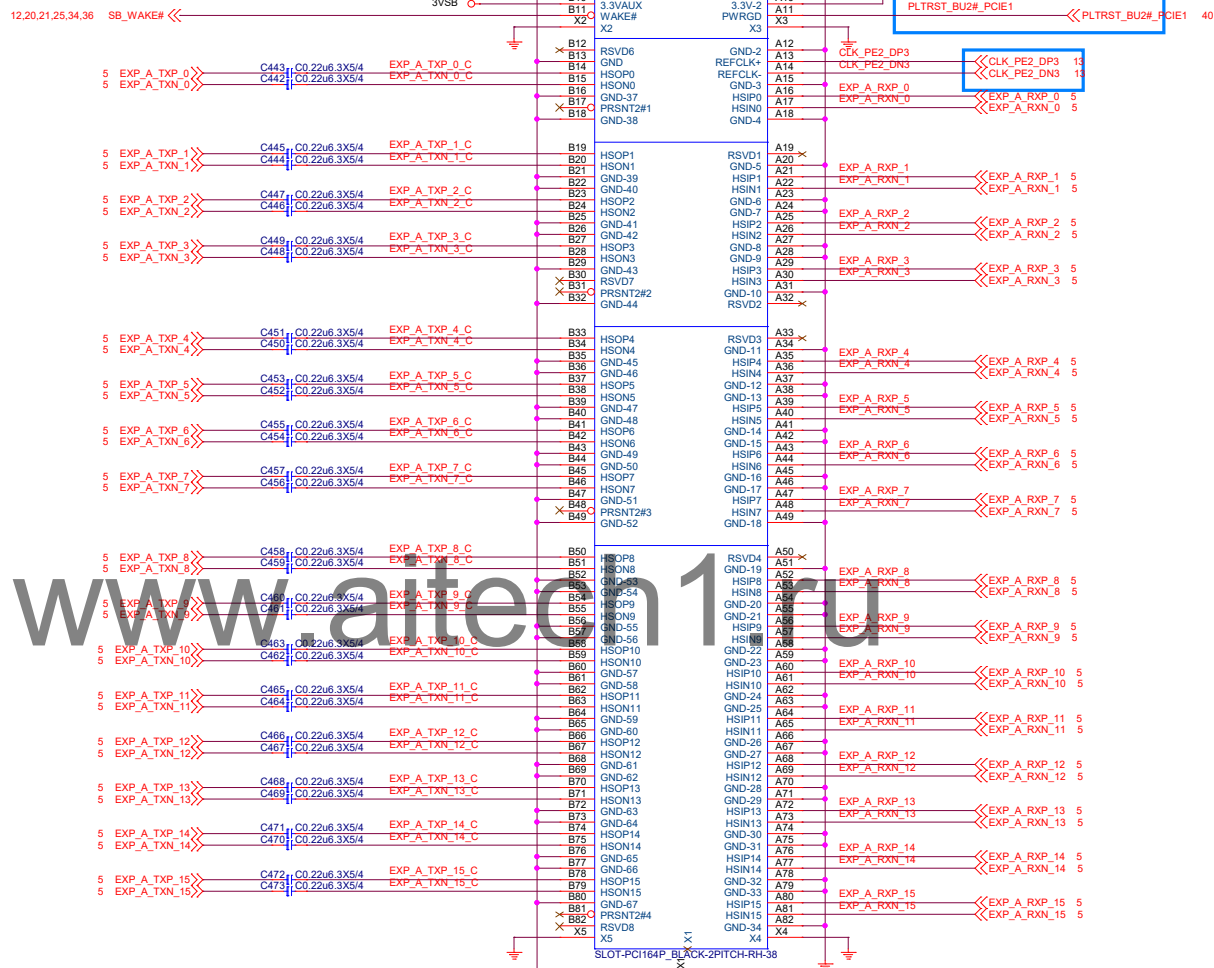
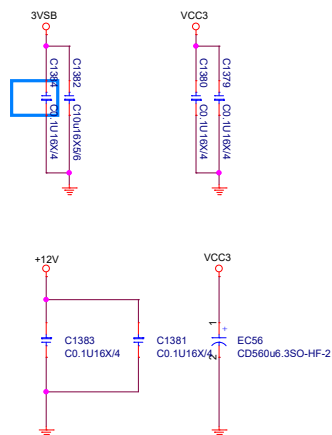
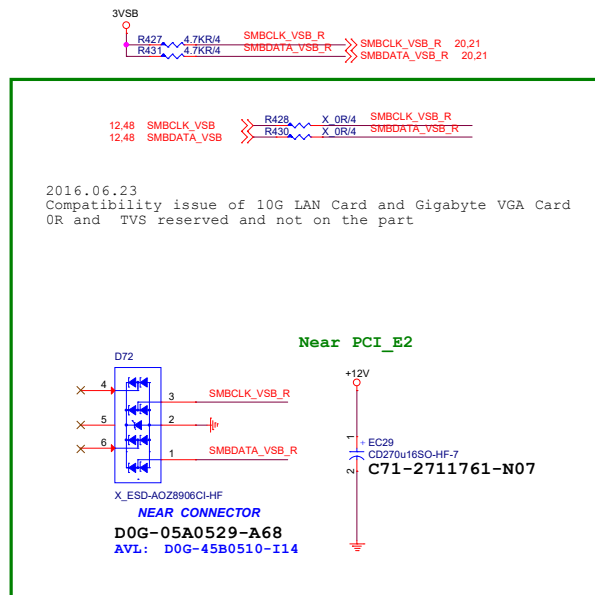
Internal pull-down is disabled after RSMRST

HDA_SDO



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12V - 5.5A
VCC3 - 3A
3VSB - 375mA



01S : N11-1641221-L06
02S : N11-1641491-L06

N11-1641221-L06
PCI E1 SPEC request :
change used N11-1641491-L06 footprint
SLOT_PCIEXP164_13

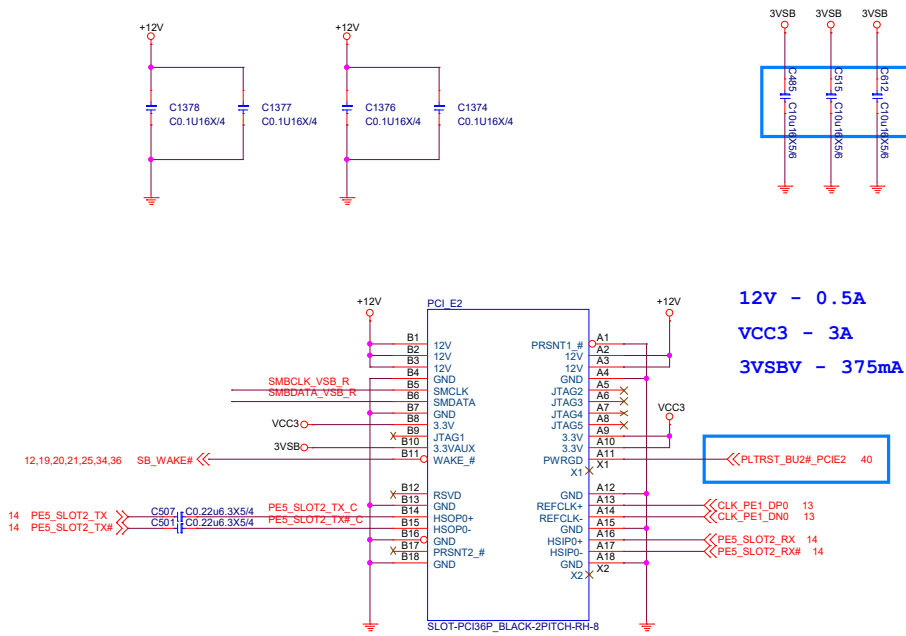
PCI E1 OPT1
Metal shell

SLOT_PCIE164P_BLACK-2PITCH-RH-51
N11-1641491-L06

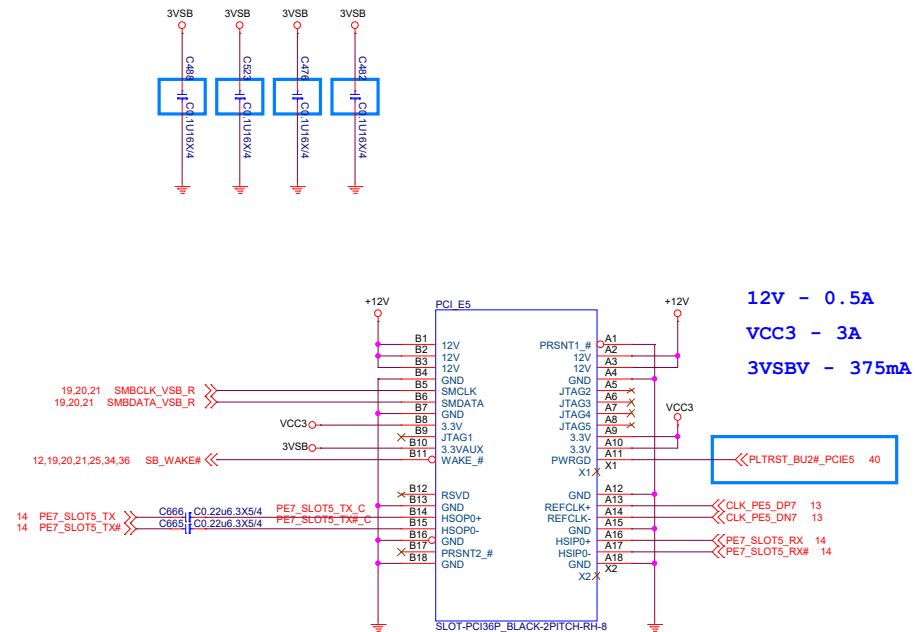
MICRO-STAR INT'L CO.,LTD

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Size	Custom	Document	Description	Rev
			PCIE SLOT (X16)	11
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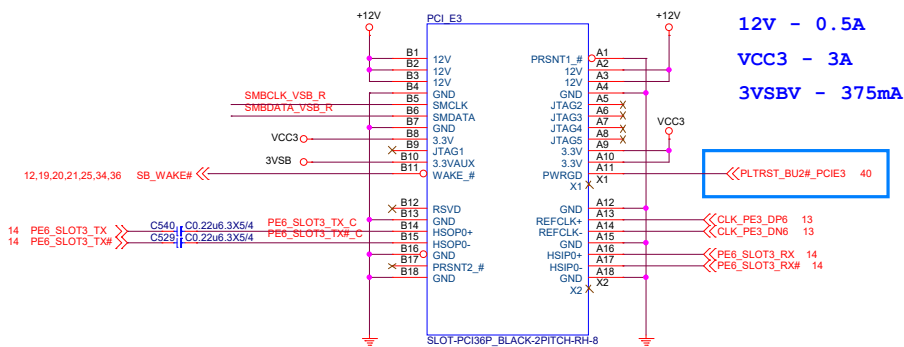


N11-0360211-F02

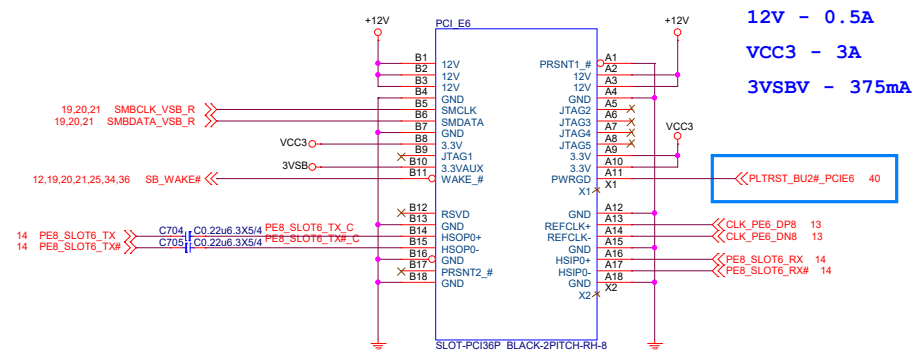


N11-0360211-F02

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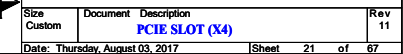
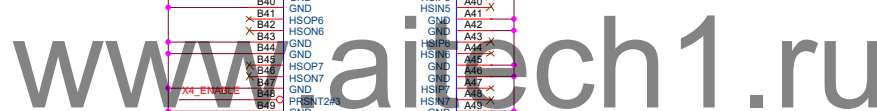
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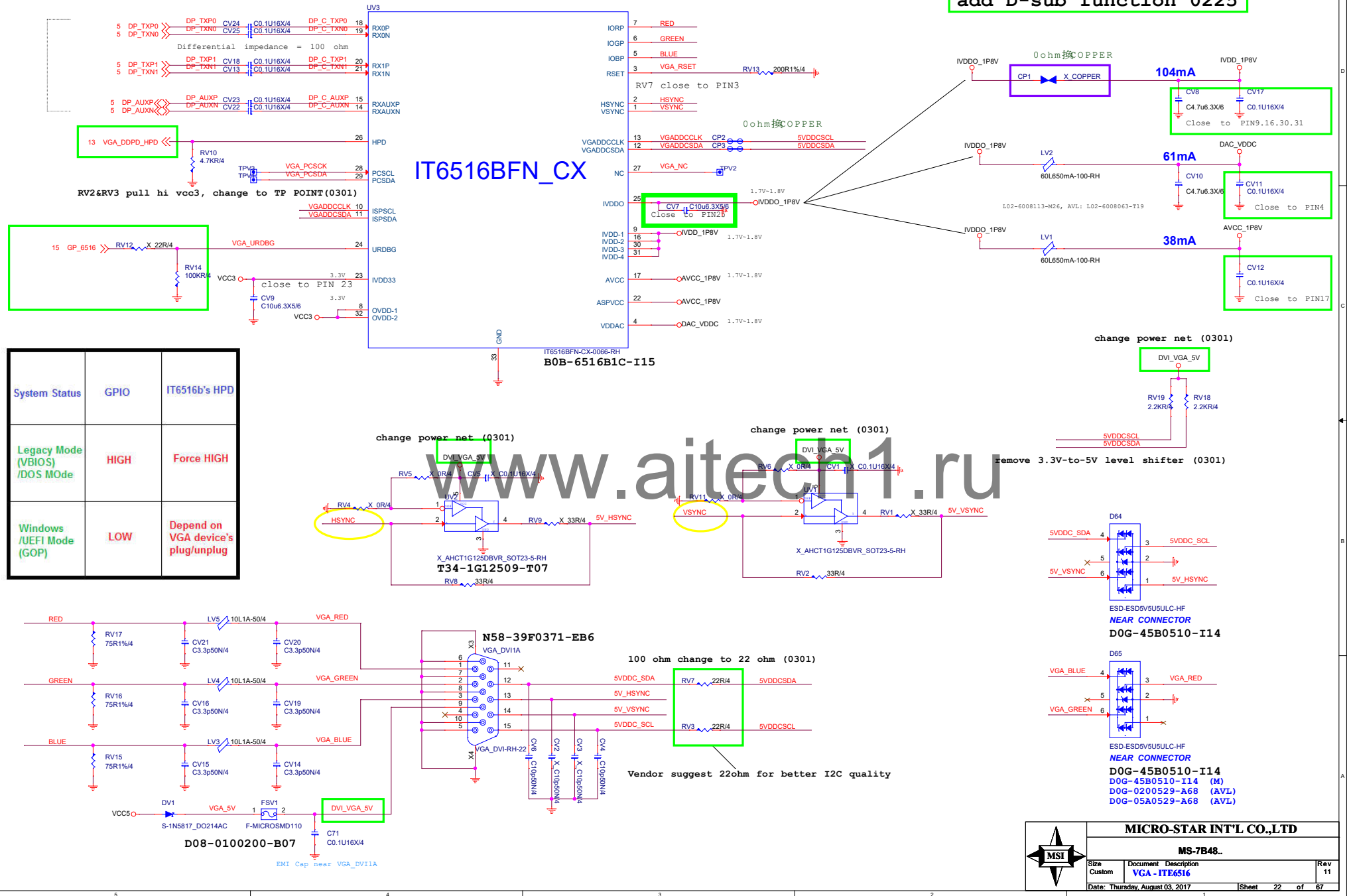
N11-0360211-F02

		MICRO-STAR INT'L CO.,LTD	
		MS-7B48..	
Size	Document	Description	Rev
Custom		PCIE SLOT (X1)	11
Date: Thursday, August 03, 2017		Sheet	20 of 67

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

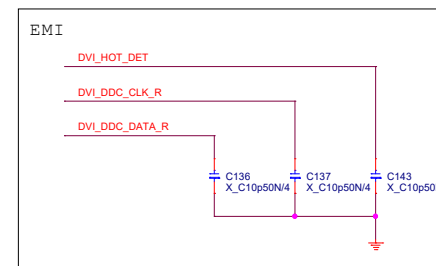
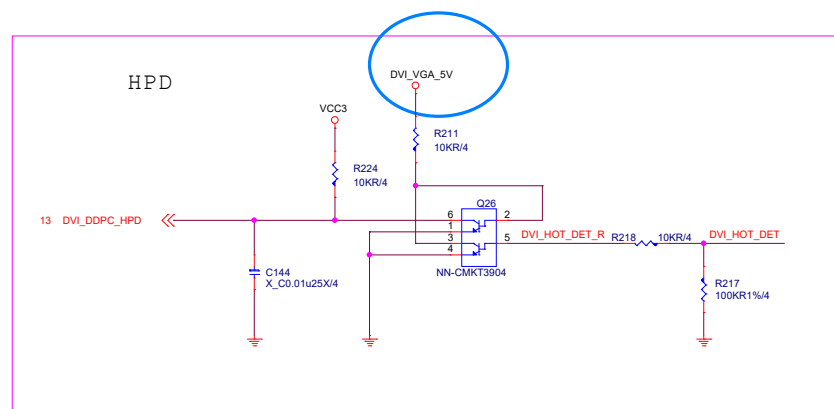
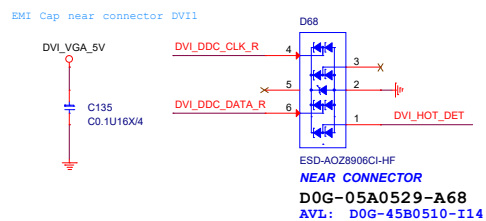
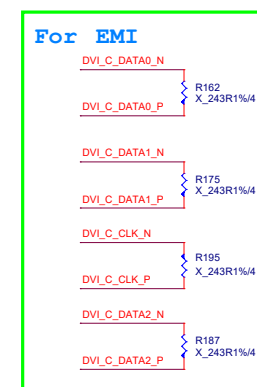
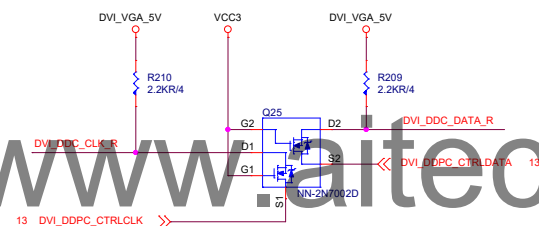
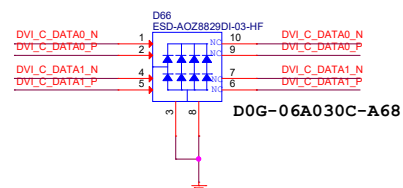
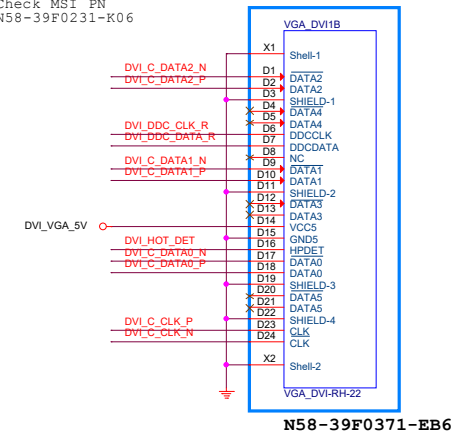


Note:
If connect to eDP port,must confirm whether it support hot plug detection HPD and re-auxtraining

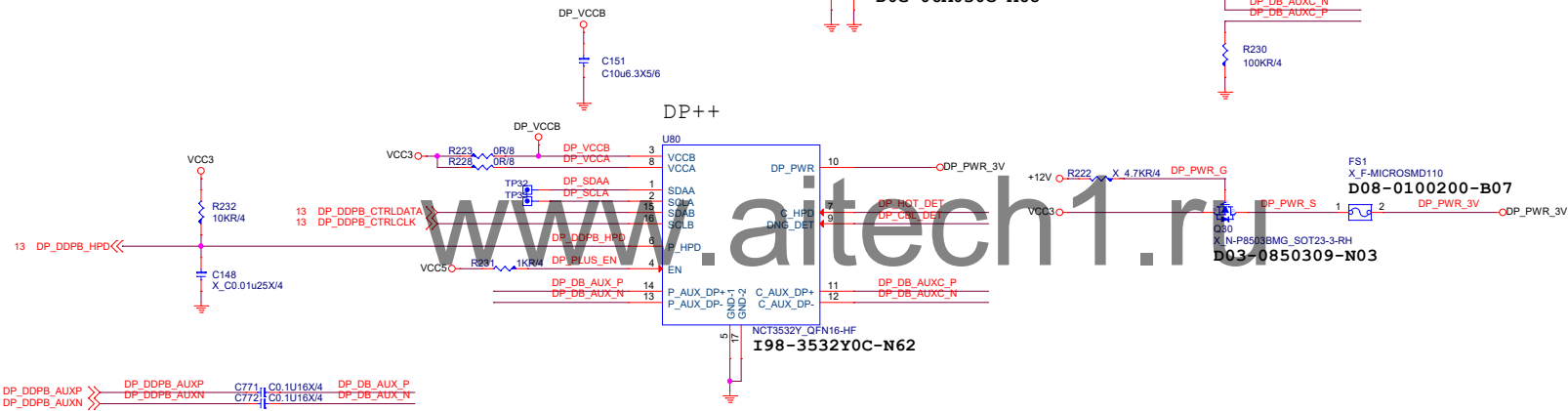
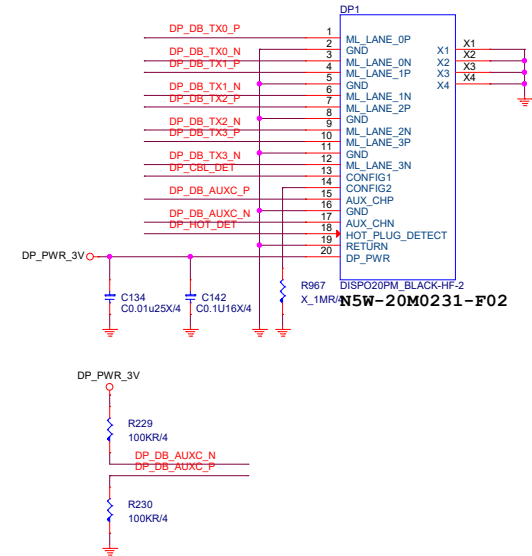
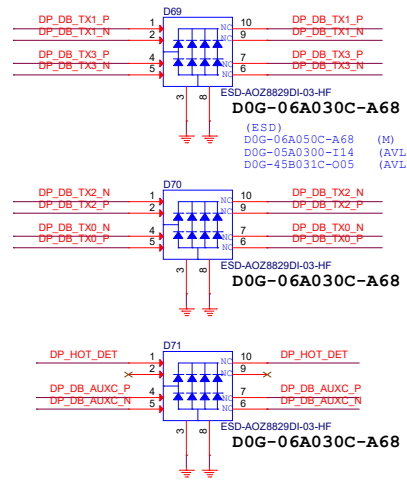


System Status	GPIO	IT6516b's HPD
Legacy Mode (VBIOS) /DOS Mode	HIGH	Force HIGH
Windows /UEFI Mode (GOP)	LOW	Depend on VGA device's plug/unplug

Check MSI PN
N58-39F0231-K06



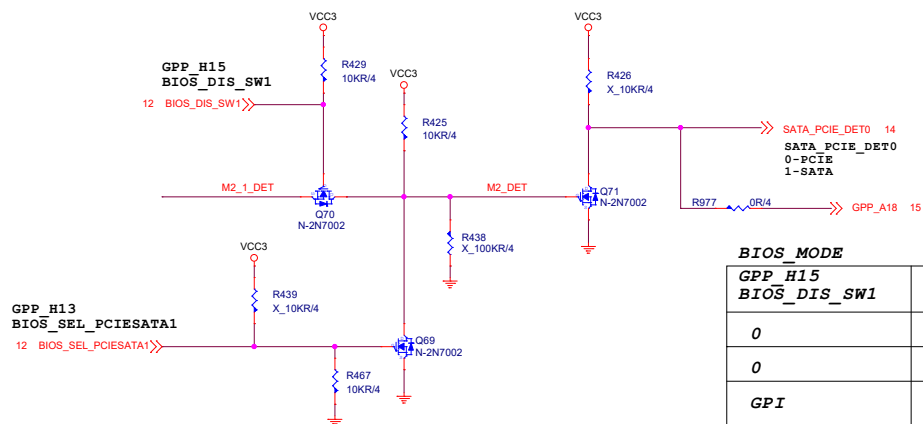
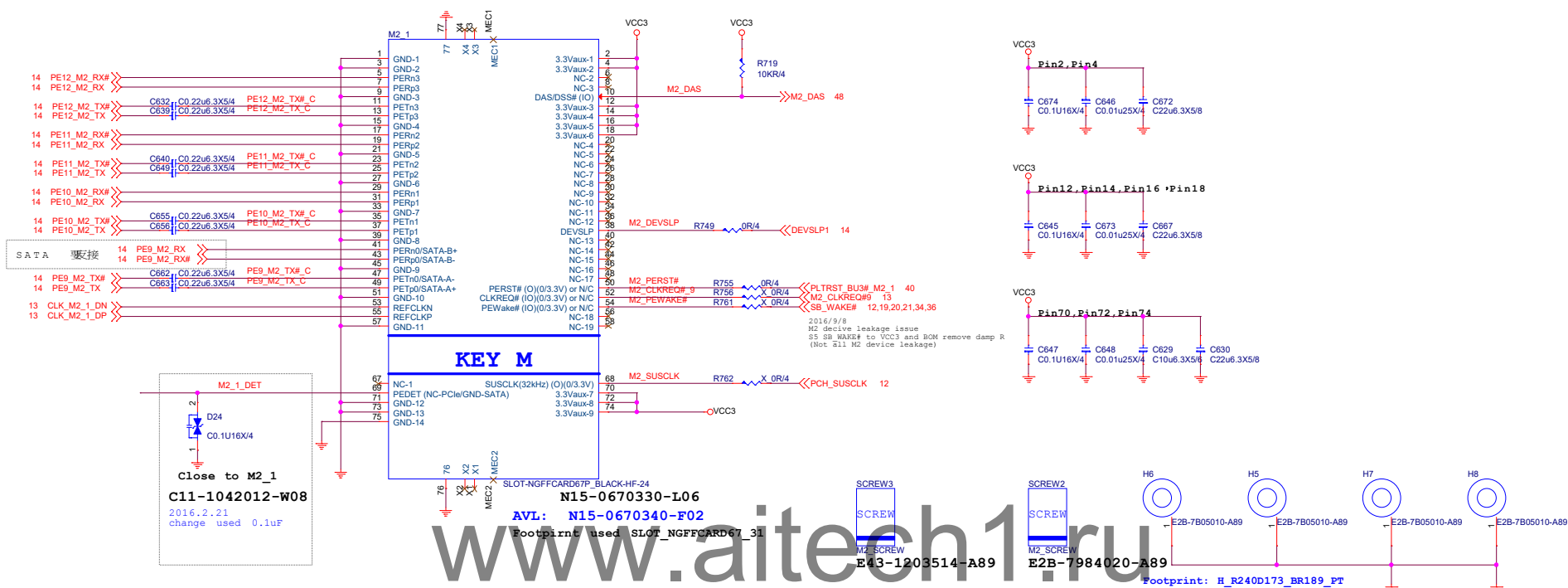
5	DP_DDPB_TX2_P >>	DP_DDPB_TX2_P	C169	C0.1U16X4	DP_DB_TX2_P
5	DP_DDPB_TX2_N >>	DP_DDPB_TX2_N	C163	C0.1U16X4	DP_DB_TX2_N
5	DP_DDPB_TX1_P >>	DP_DDPB_TX1_P	C170	C0.1U16X4	DP_DB_TX1_P
5	DP_DDPB_TX1_N >>	DP_DDPB_TX1_N	C171	C0.1U16X4	DP_DB_TX1_N
5	DP_DDPB_TX0_P >>	DP_DDPB_TX0_P	C162	C0.1U16X4	DP_DB_TX0_P
5	DP_DDPB_TX0_N >>	DP_DDPB_TX0_N	C159	C0.1U16X4	DP_DB_TX0_N
5	DP_DDPB_TX3_P >>	DP_DDPB_TX3_P	C178	C0.1U16X4	DP_DB_TX3_P
5	DP_DDPB_TX3_N >>	DP_DDPB_TX3_N	C177	C0.1U16X4	DP_DB_TX3_N



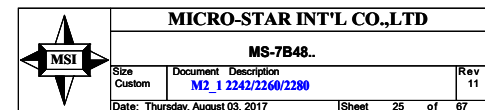
MS-7B48..

Size Custom	Document Description DISPLAY PORT CON	Rev 11
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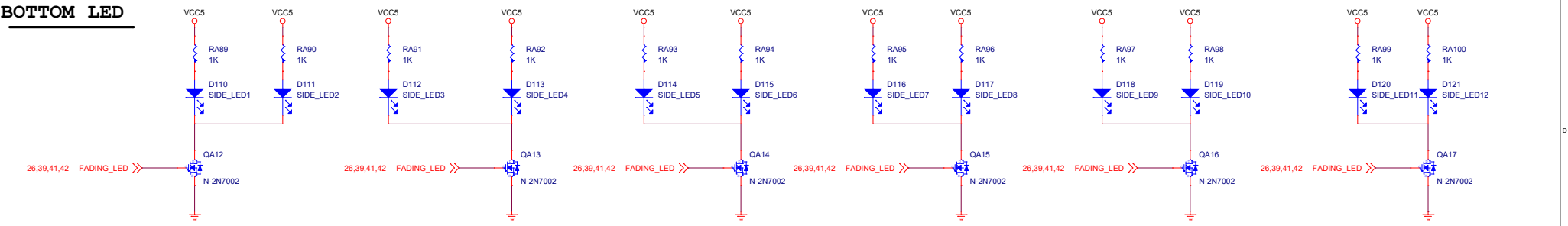
M2_1 2242/2260/2280/22110
(PCIeX4 mode and SATA mode)



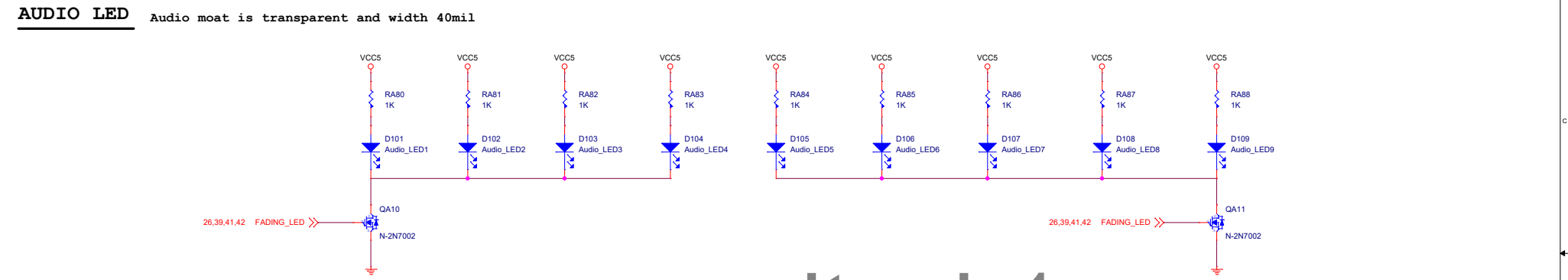
BIOS_MODE		
GPP_H15 BIOS_DIS_SW1	GPP_H13 BIOS_SEL_PCIESATA1	
0	1	M2-SATA
0	0	M2-PCIe X4
GPI	GPI	AUTO



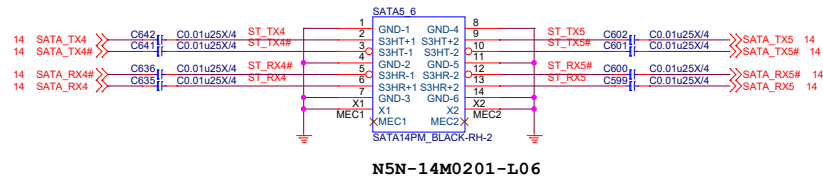
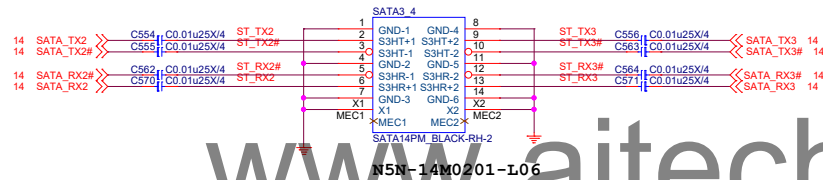
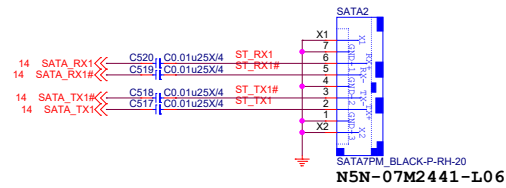
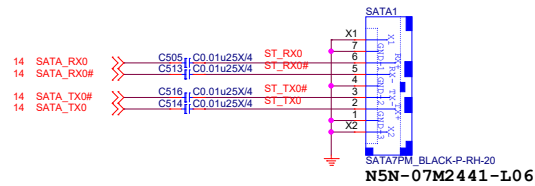
BOTTOM LED



AUDIO LED Audio moat is transparent and width 40mil



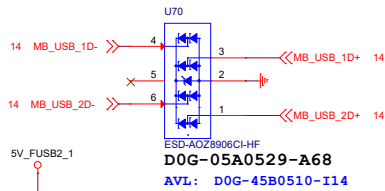
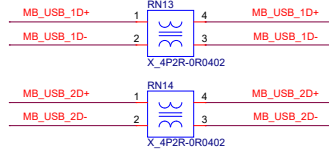
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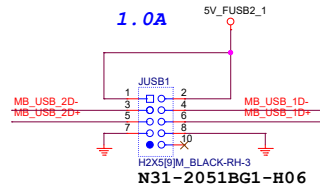
FRONT USB2.0 PORT 3,4

ComChoke co-lay 4P2R-0R0402
Footprint: FILTER_S4_RN4P2R_COLAY
Defaule ComChoke: L12-9008080-P01
4P2R-0R0402: R3C-0000012-W08

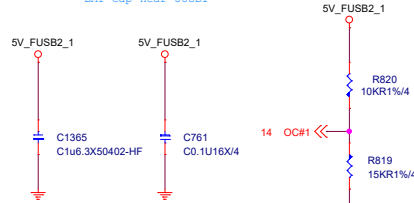


C71-5610671-N07

1.0A

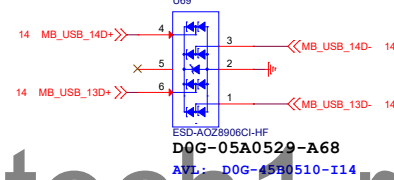
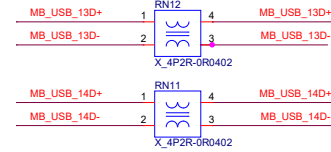


EMI Cap near JUSB1



FRONT USB2.0 PORT 5,6 (Z270 only)

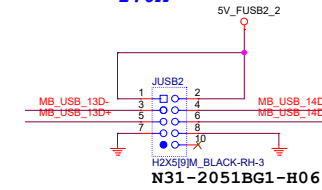
ComChoke co-lay 4P2R-0R0402
Footprint: FILTER_S4_RN4P2R_COLAY
Defaule ComChoke: L12-9008080-P01
4P2R-0R0402: R3C-0000012-W08



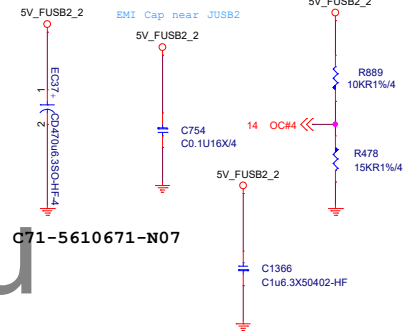
D0G-05A0529-A68
AVL: D0G-45B0510-I14

C71-5610671-N07

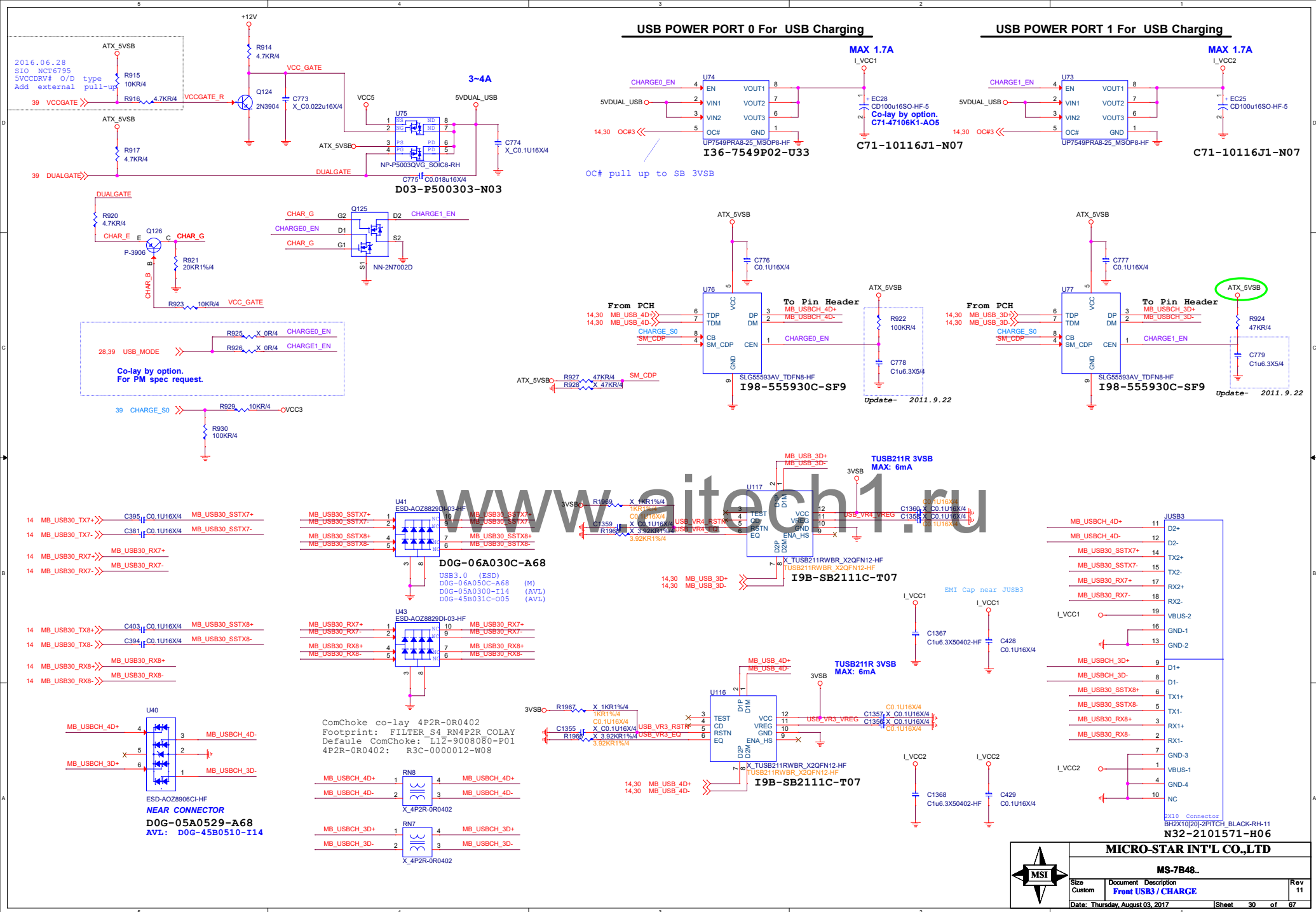
1.0A

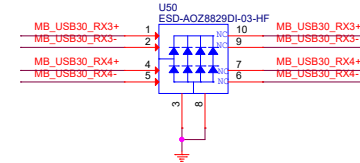
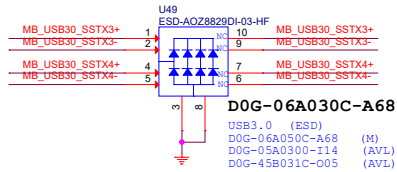
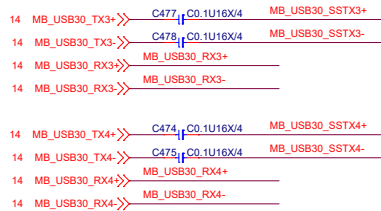


EMI Cap near JUSB2

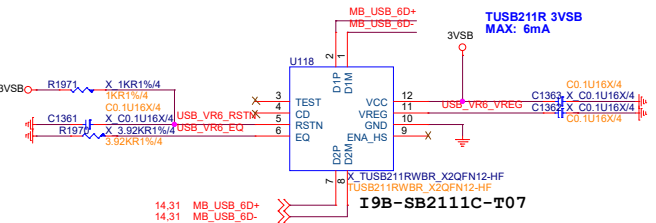
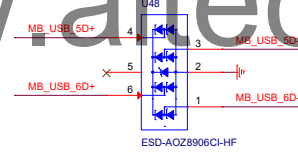
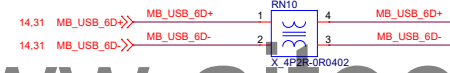
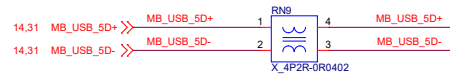
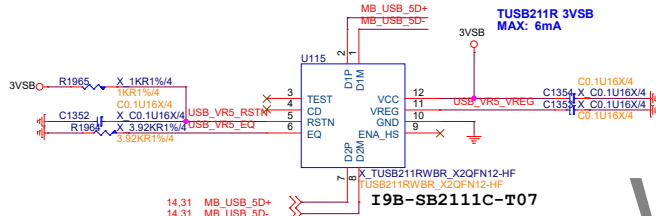
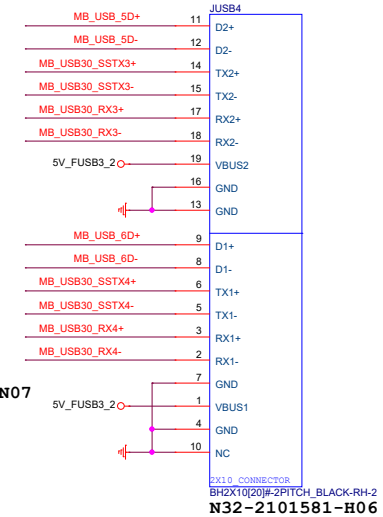
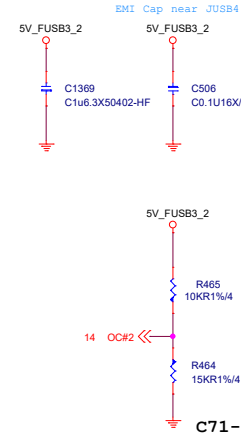


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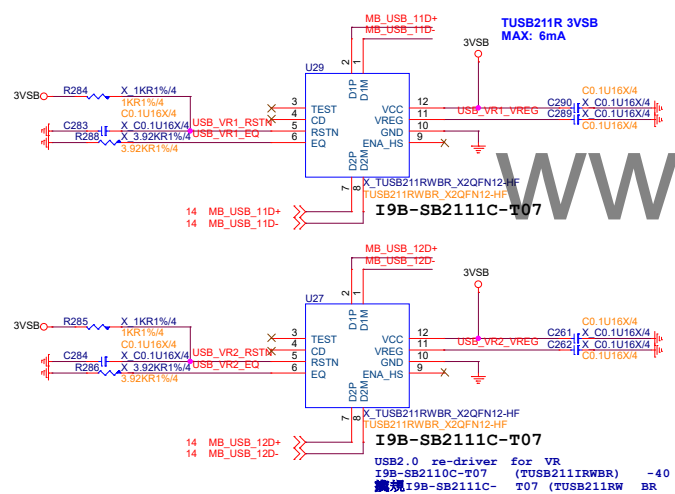
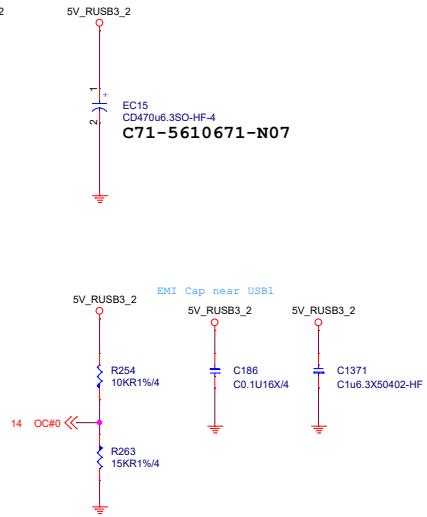
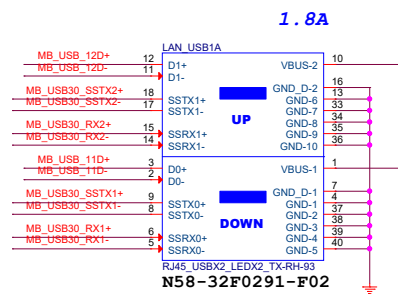
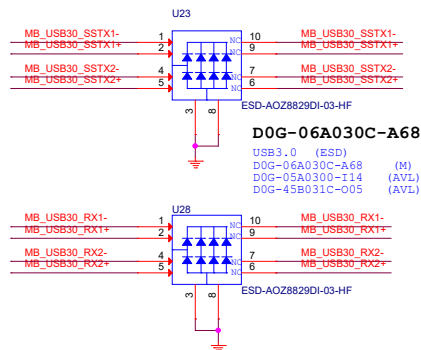
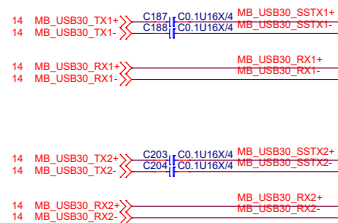


ComChoke co-lay 4P2R-0R0402
 Footprint: FILTER_S4 RN4P2R_COLAY
 Defaule ComChoke: LI2-9008080-P01
 4P2R-0R0402: R3C-0000012-W08

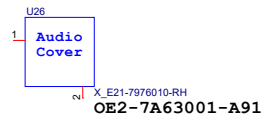
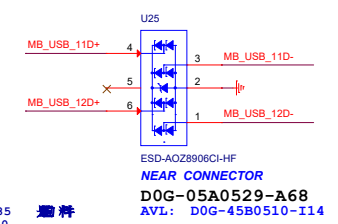
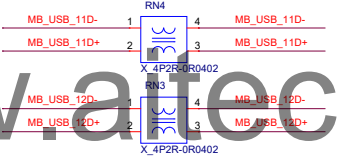


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MSI		MICRO-STAR INT'L CO.,LTD	
Size Custom		MS-7B48..	
Document		Description	
Front USB3.0		Rev 11	
Date: Thursday, August 03, 2017		Sheet 31 of 67	



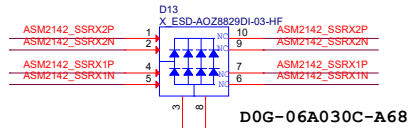
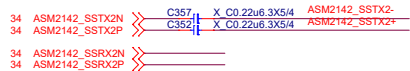
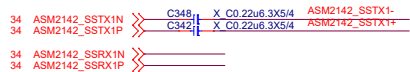
ComChoke co-lay 4P2R-0R0402
 Footprint: FILTER S4 RN4P2R COLAY
 Defaule ComChoke: L1Z-9008080-P01
 4P2R-0R0402: R3C-0000012-W08



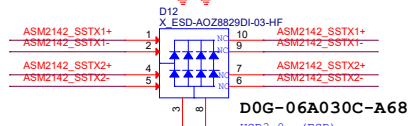
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MICRO-STAR INT'L CO.,LTD			
MS-7B48..			
Size Custom	Document Description	Rev 11	
	Rear LAN_USB / VR		
Date: Thursday, August 03, 2017	Sheet 33 of 67		

ESD Protection NEAR CONNECTOR

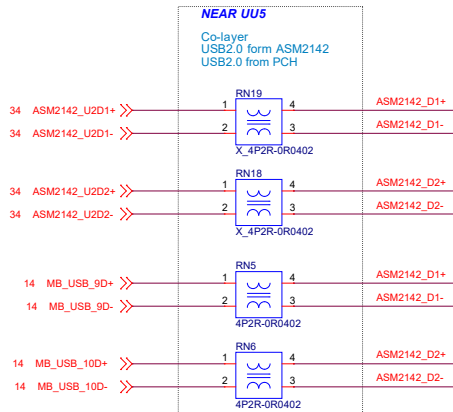
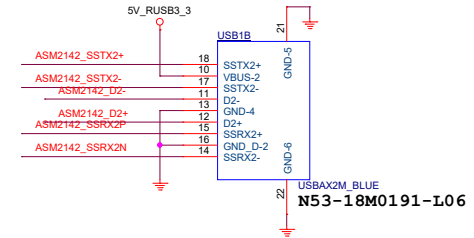
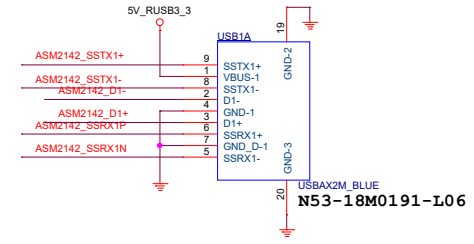


D0G-06A030C-A68

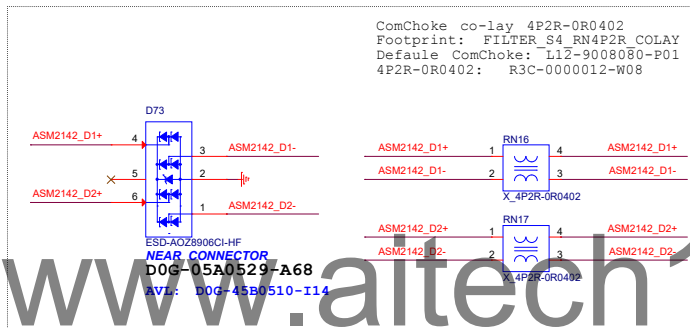


D0G-06A030C-A68

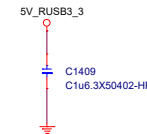
USB3.0 (ESD)
D0G-06A050C-A68 (M)
D0G-05A0300-I14 (AVL)
D0G-45B031C-005 (AVL)



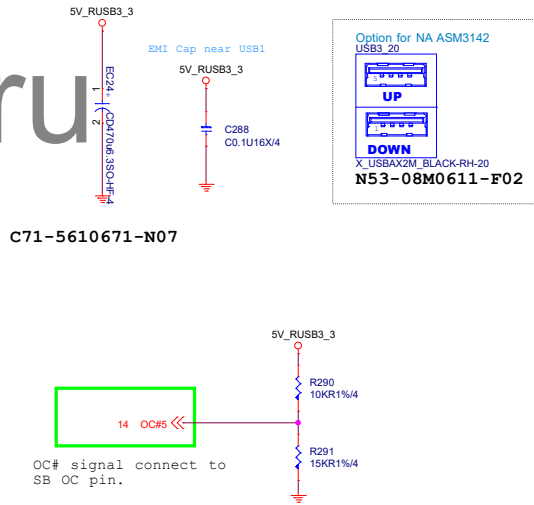
ComChoke co-lay 4P2R-0R0402
Footprint: FILTER_S4 RN4P2R COLAY
Defaule ComChoke: L1Z-9008080-P01
4P2R-0R0402: R3C-0000012-W08



D0G-05A0529-A68
AVL: D0G-45B0510-I14



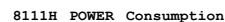
C71-5610671-N07



OC# signal connect to
SB OC pin.

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3.3V@177.57mA



	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

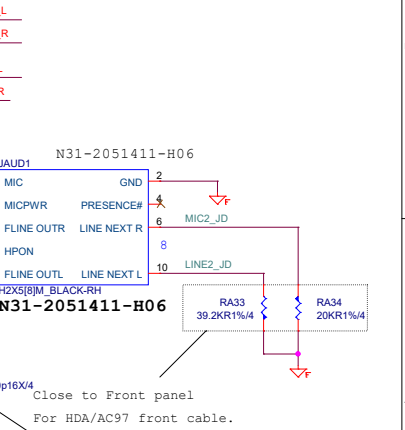
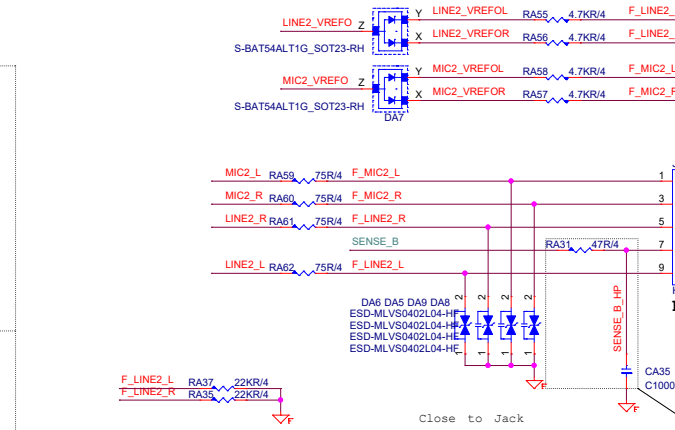
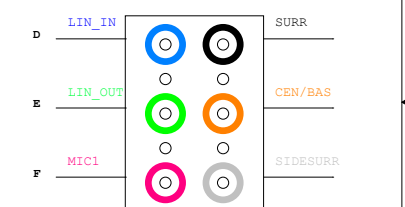
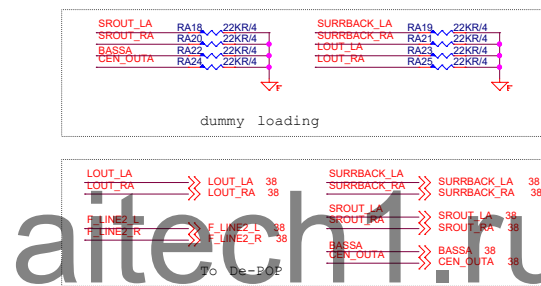
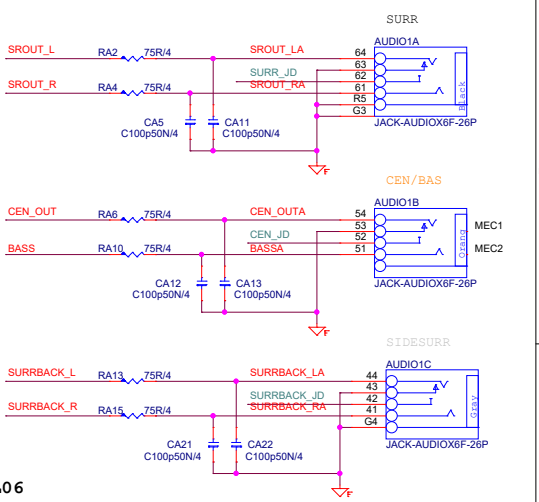
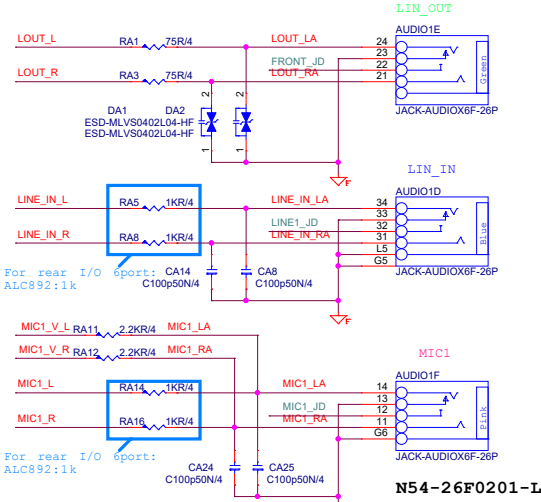
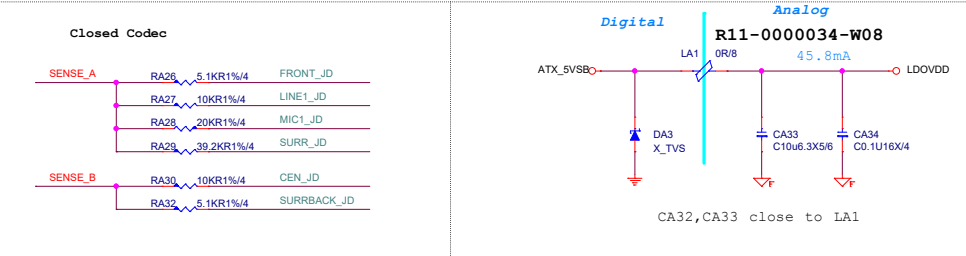
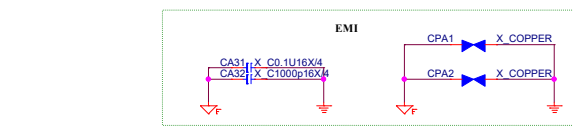
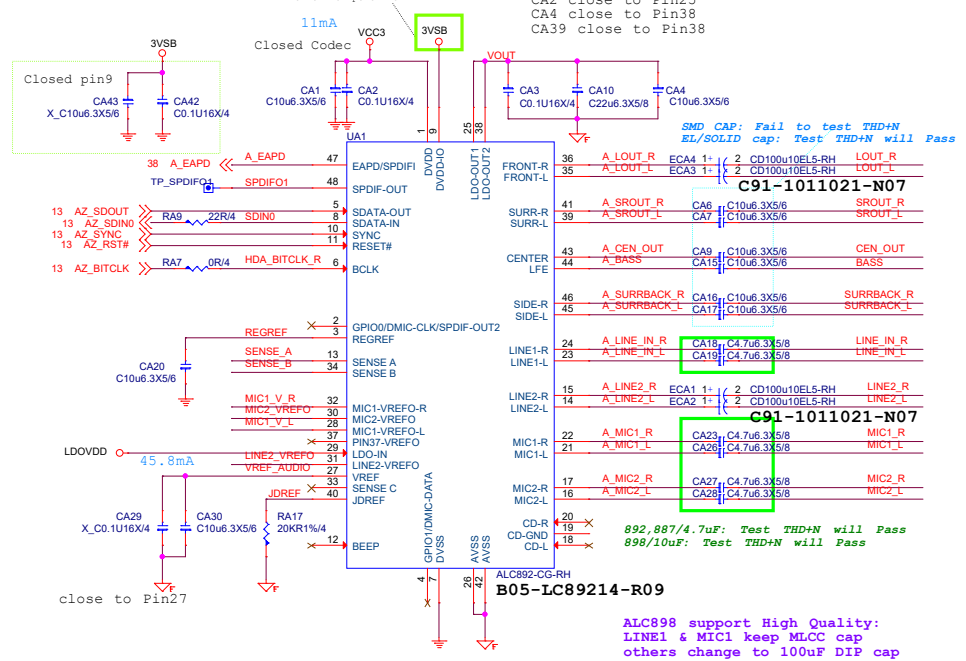


MICRO-STAR INT'L CO.,LTD

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ALC892 Type A:



ESD protect
D0G-2710510-I05
av1:D0G-2950500-SI0

Close to Jack
Close to Front panel
For HDA/AC97 front cable.

MSI

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MS-7B48..

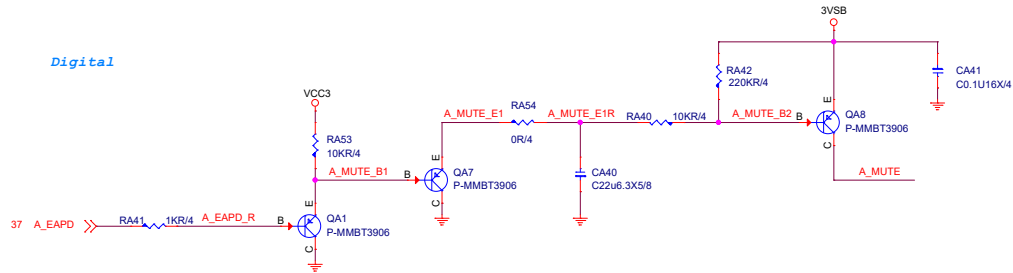
Size	Document	Description	Rev
Custom		AUDIO ALC892	11

Date: Thursday, August 03, 2017 | Sheet 37 of 67

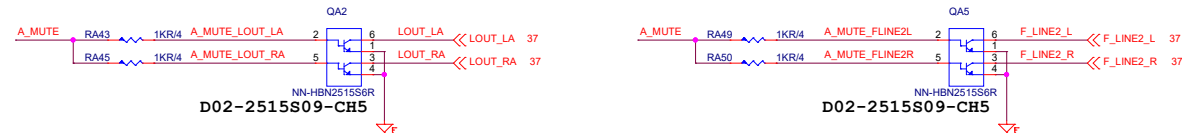
Rear Line OUT De-POP circuit

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

Digital

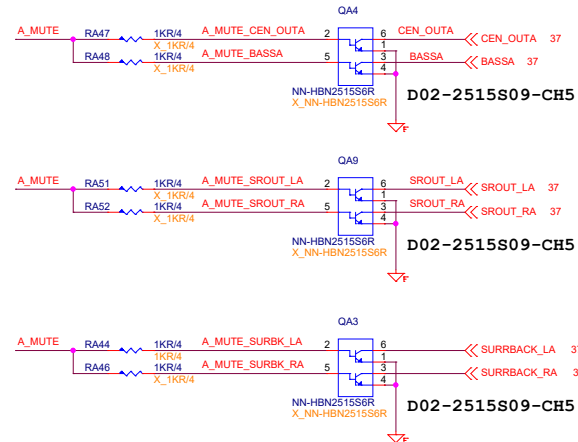


Analog



(add de-pop circuit by PM spec or customer request,
NOTE: add de-pop circuit need to change CA5,CA11, CA12, CA13, CA21, CA22 to TVS)

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History:

2014/02/13: stuff de-pop circuit of Line out & HP out.

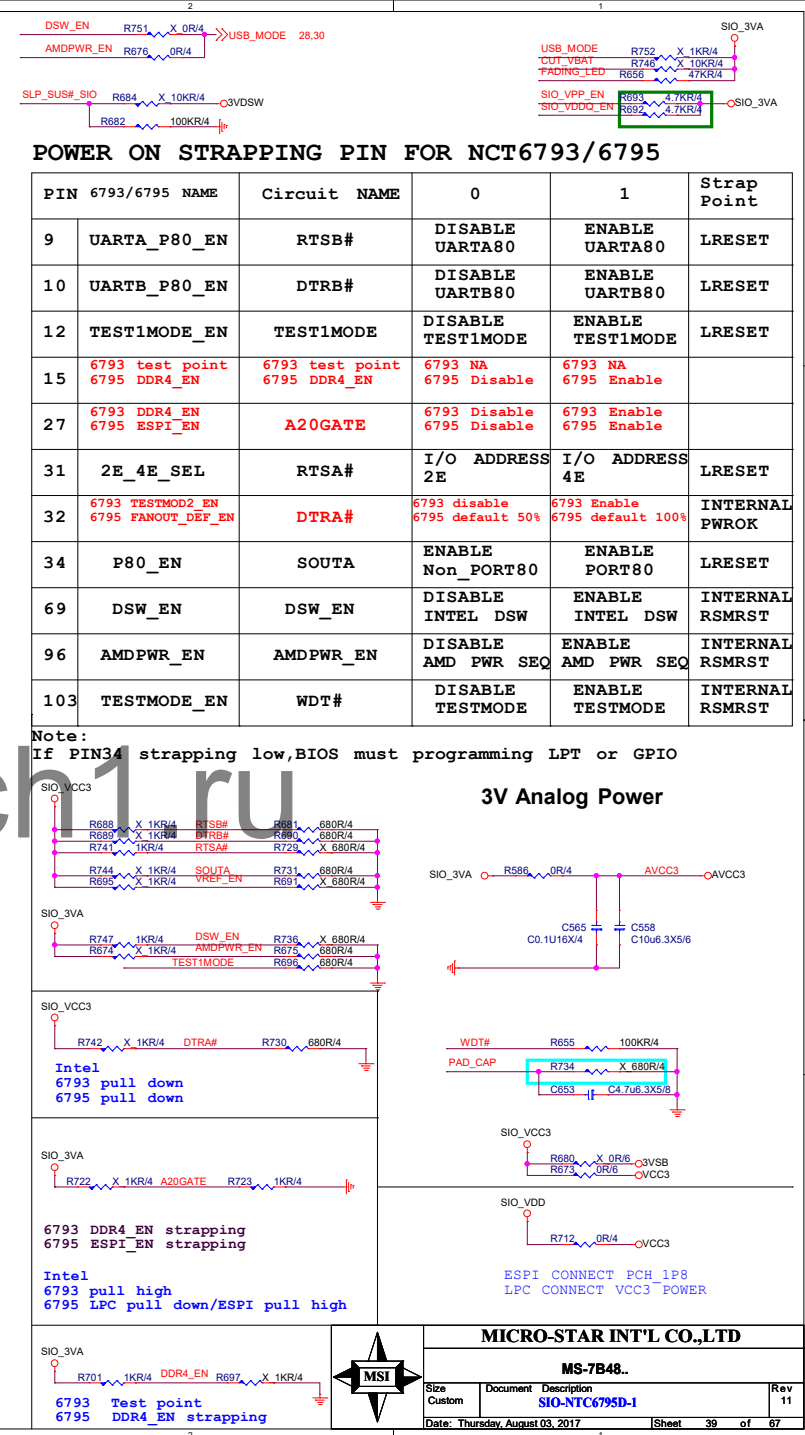
2014/09/11:

RNA1 change to
RA55/RA56/RA58/RA57
RNA2 change to
RA59/RA60/RA61/RA62

2015/11/09:

esd p/n m:D0G-2710510-I05;avl:D0G-2950500-SI0

MICRO-STAR INT'L CO.,LTD			
MS-7B48..			
Size	Document	Description	Rev
Custom		AUDIO ALC892 De-POP	11
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SIO HM Voltage voer 2V will not detect



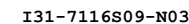
D02-0390629-005



SIO_VCC3

R743	X 2.7KR/4	SINA
R728	X 2.7KR/4	CTSA#
R733	X 2.7KR/4	RIA#
R732	X 2.7KR/4	DCDA#
R740	X 2.7KR/4	DSRA#

NO USE UART PORT1



MICRO-STAR INT'L CO.,LTD

MS-7B48..

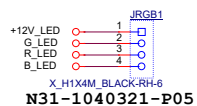
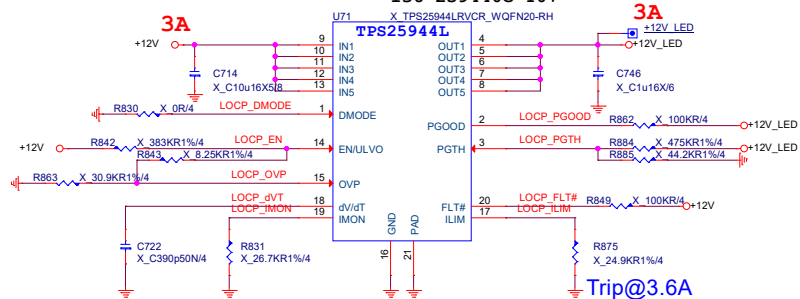
Document Description	SIO-NTC6795D-2
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LED Light bar 3A OCP

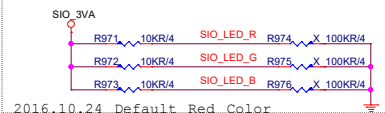
2016.08.06 Use TPS25944L

I36-259440C-T07

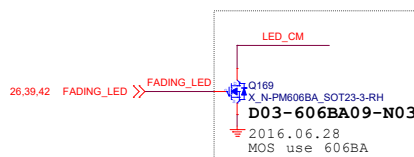
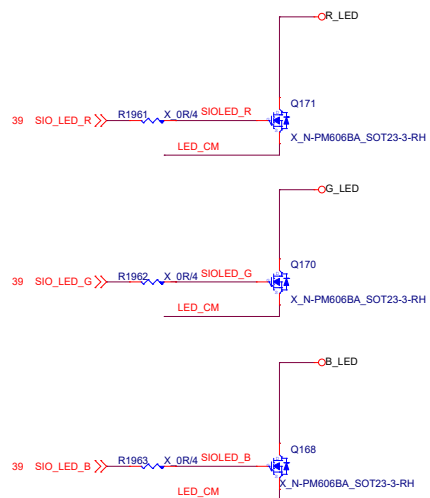
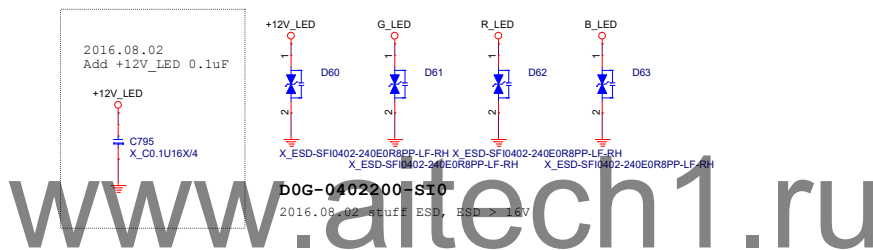


LED Light bar Control by SIO

Color	SIO_LED_R	SIO_LED_G	SIO_LED_B
RED	1	0	0
GREEN	0	1	0
BLUE	0	0	1
WHITE	1	1	1



2016.10.24 Default Red Color



EZ Debug

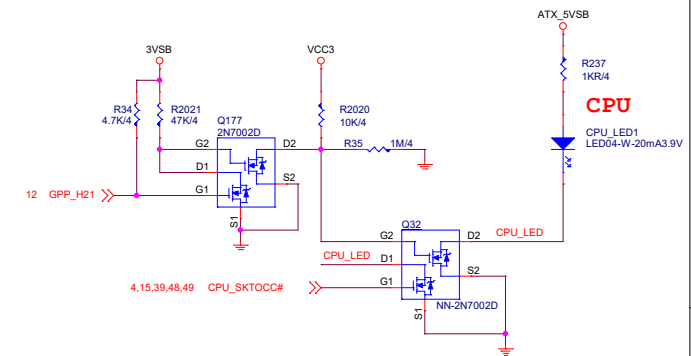
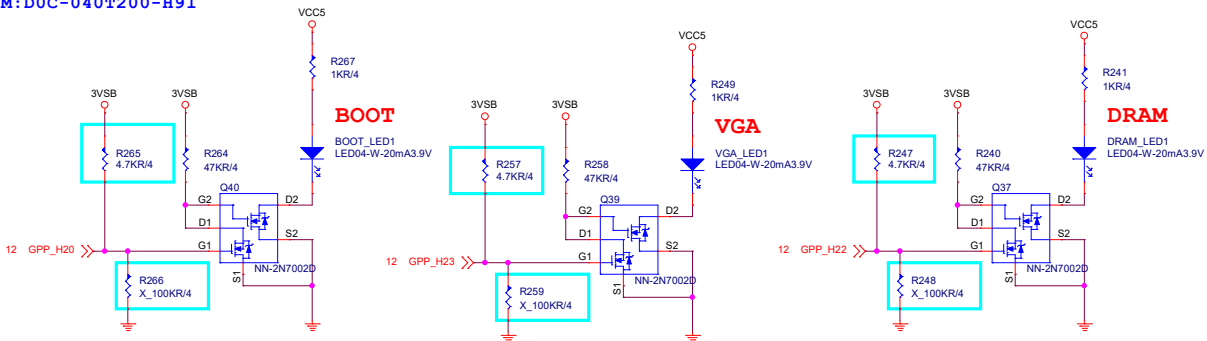
D0C-040T200-H91

D0C-040T200-H91

D0C-040T200-H91

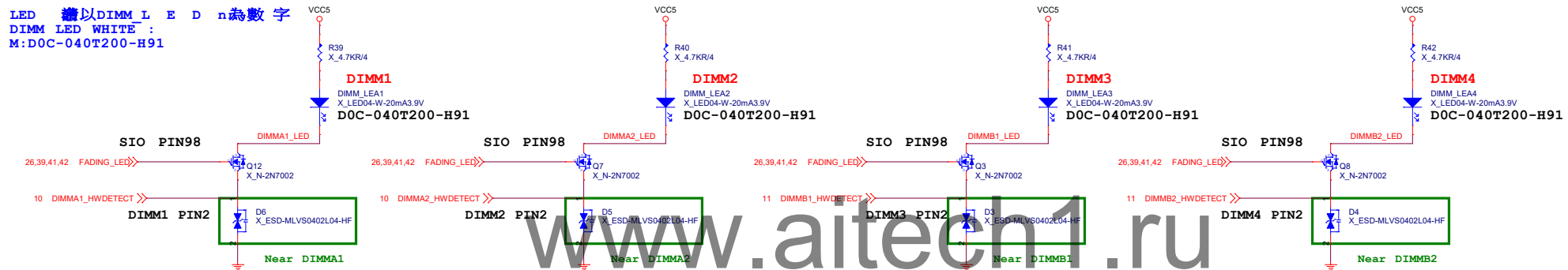
D0C-040T200-H91

EZ Debug LED WHITE :
M:D0C-040T200-H91



DIMM

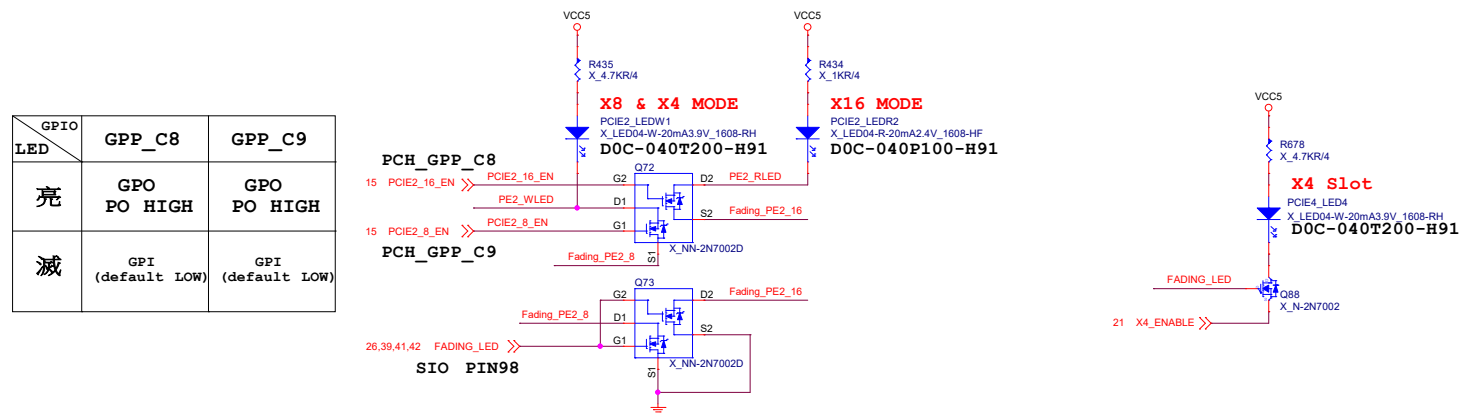
LED 續以DIMM L E D n為數字
DIMM LED WHITE :
M:D0C-040T200-H91



PCIE

PCIE SLOT LED

PCIE SLOT LED 續以PCIE L E D nn為數字
PCIE x16 紅 : M:D0C-040P100-H91 / S:D0C-040S500-E07
PCIE x4 白 : D0C-040T200-H91 / S:D0C-040S200-E07
PCIE x1 白 : D0C-040T200-H91 / S:D0C-040S200-E07



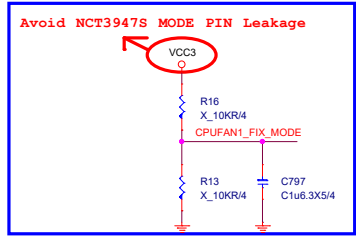
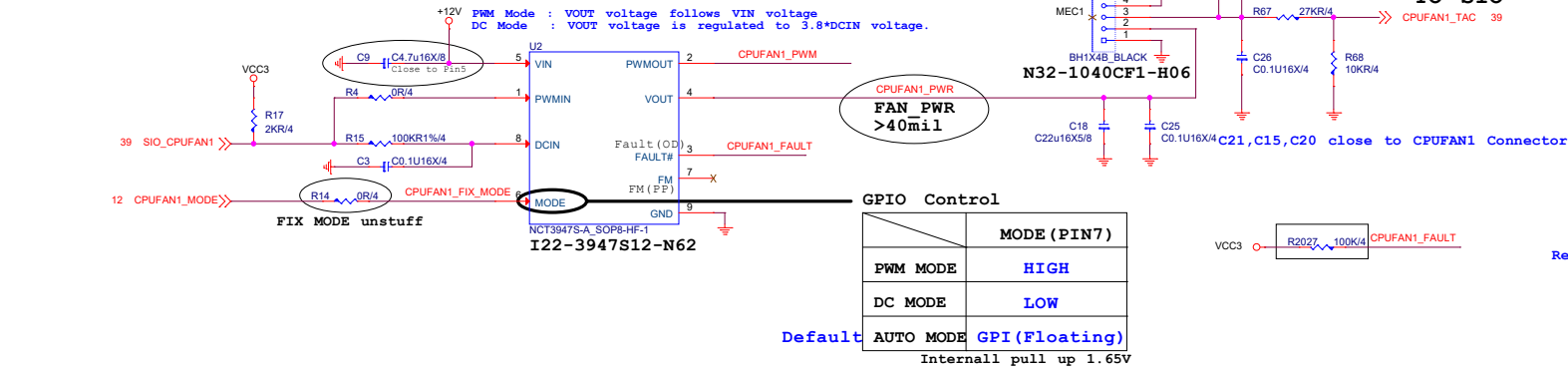
MICRO-STAR INT'L CO.,LTD

MS-7B48..

Size	Document	Description	Rev
Custom	LED-EZ DBG/DIMM/PCIE		11
Date:	Thursday, August 03, 2017	Sheet	42 of 67

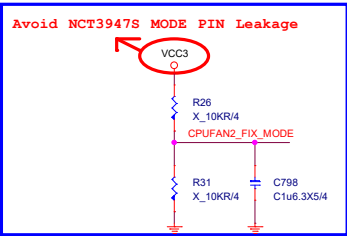
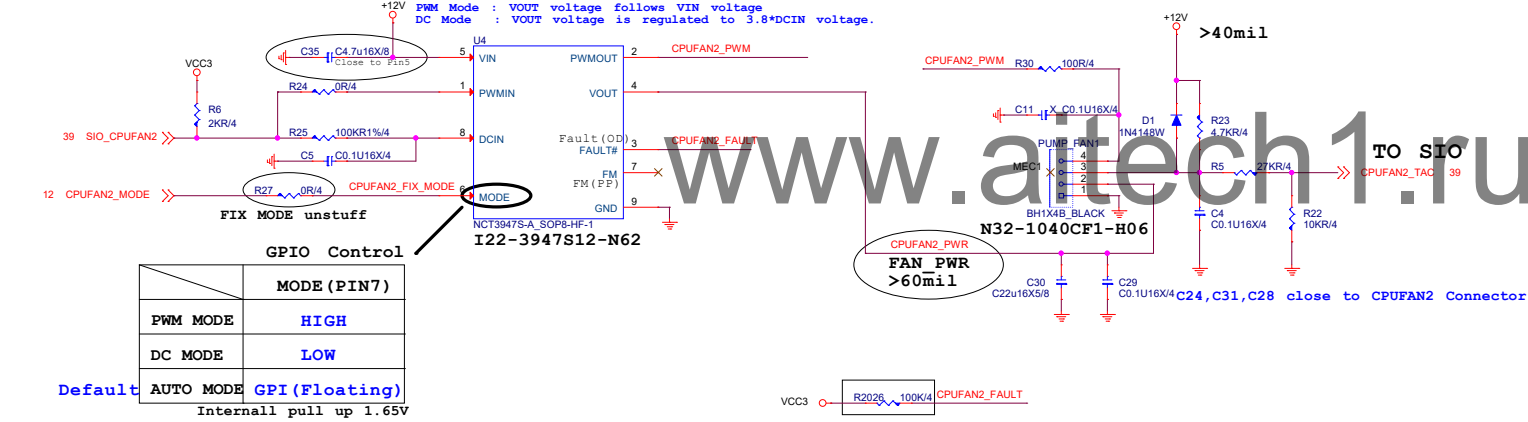
TYPE K : 4 PIN CPU FAN USE NCT3947S USE PCH GPIO CONTROL FAN MODE

- 1. PWM/DC/OCF LED (變成 RGB 色 LED)
- 2. GPIO 由 BIOS 切換 PWM/DC MODE
- 3. OCP 由 BIOS 給 B/D 報
- 4. PWM OR DC FAN 由 BIOS 給 B/D 報
- 5. FAN 轉速的時候由 SOFTWARE 控制 GPIO 讀的變化



Resever For FIX DC or PWM MODE USE By PM SPEC

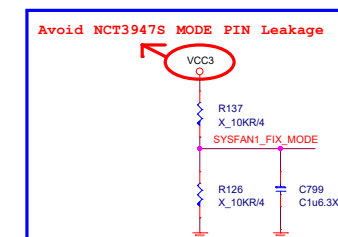
TYPEK : 4 PIN CPU FAN USE NCT3947S USE PCH GPIO CONTROL FAN MODE (2A pump FAN)



Resever For FIX DC or PWM MODE USE By PM SPEC

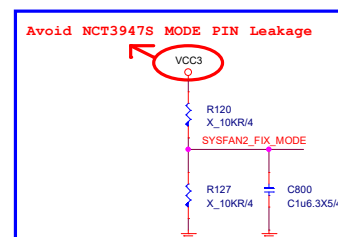
- 1. MODE : USE MODE PIN change FAN MODE (PWM or DC FAN)
- 2. FAULT : USE FAULT PIN Triger OVT/OCF Protection, LOW Atcive (Reserve NEW IC)
- 3. FM : USE FM PIN For BIOS USE to Detect PWM or DC FAN & Show information (Reserve NEW IC)

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



	MODE (PIN7)
PWM MODE	HIGH
DC MODE	LOW
AUTO MODE	GPI (Floating)

Internall pull up 1.65V



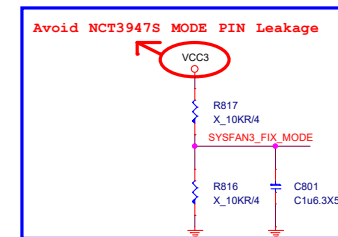
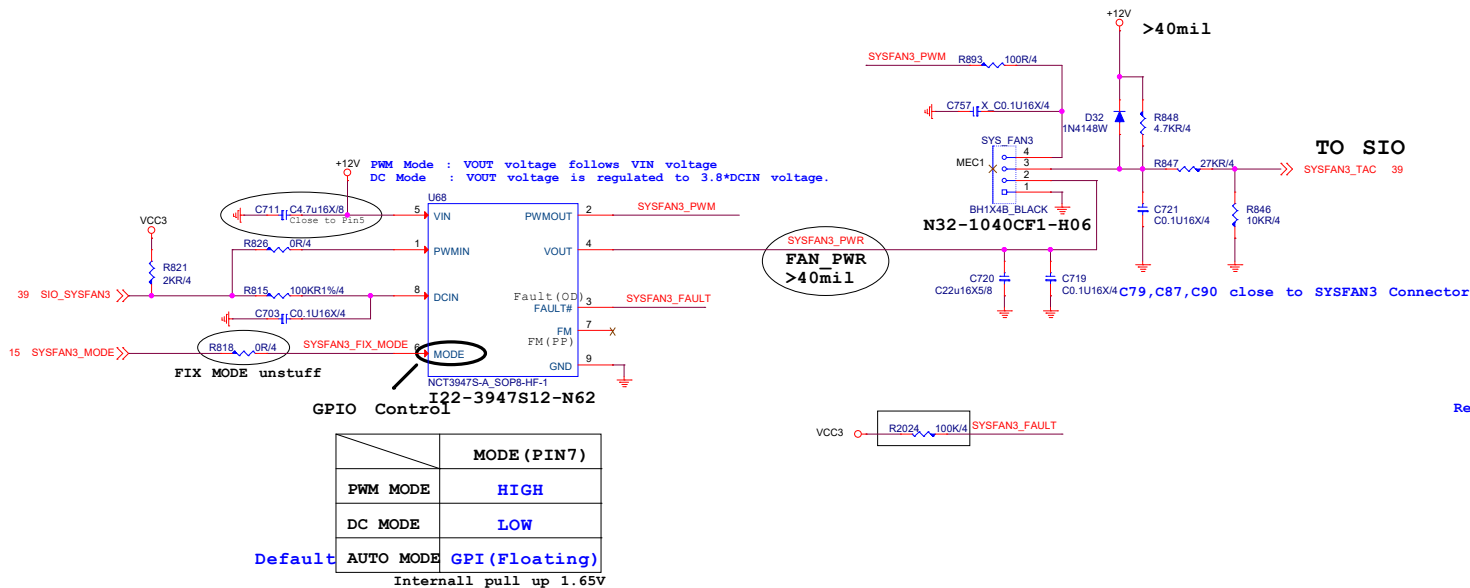
	MODE (PIN7)
PWM MODE	HIGH
DC MODE	LOW
AUTO MODE	GPI (Floating)

Default Internall pull up 1.65V



Size Custom	Document Description SYSTEM FAN 1/2	Re 1
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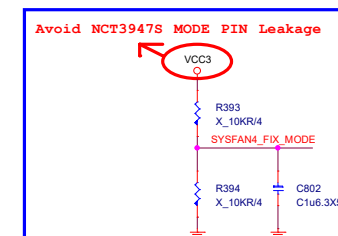
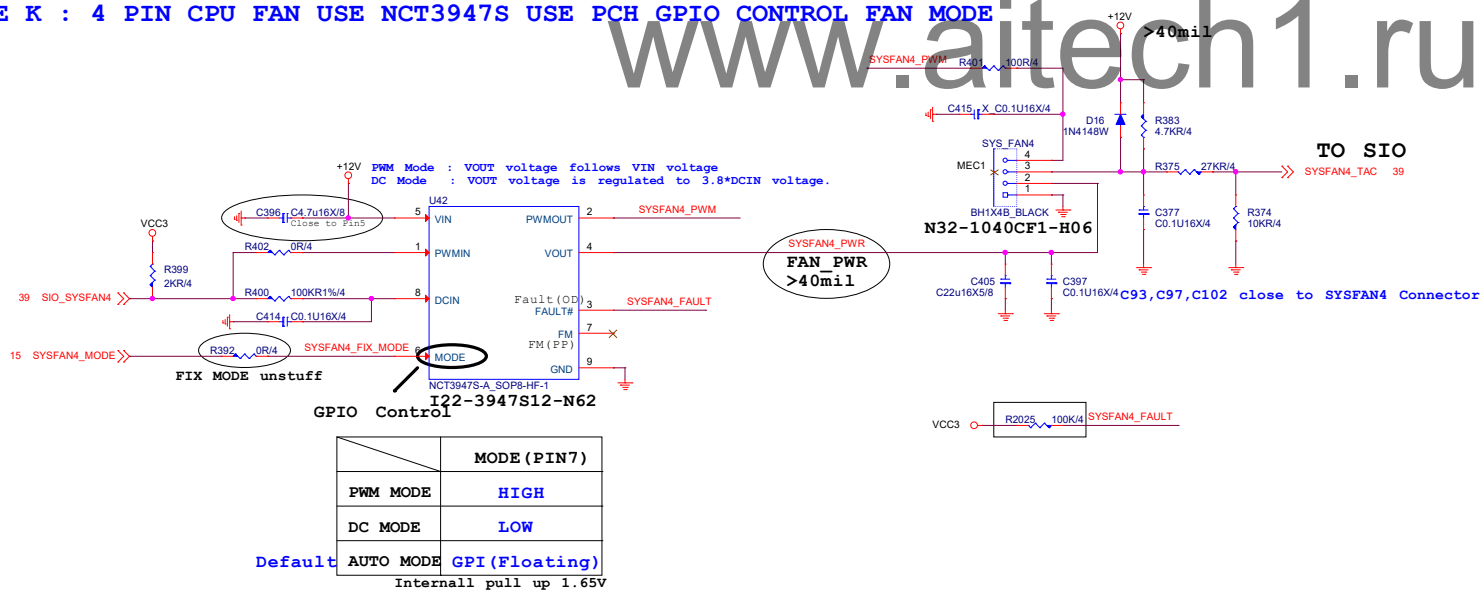
TYPE K : 4 PIN CPU FAN USE NCT3947S USE PCH GPIO CONTROL FAN MODE



Resever For FIX DC or PWM MODE USE By PM SPEC

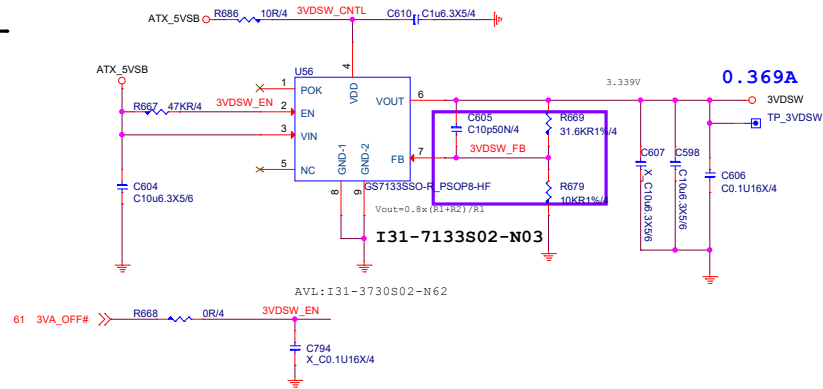
TYPE K : 4 PIN CPU FAN USE NCT3947S USE PCH GPIO CONTROL FAN MODE

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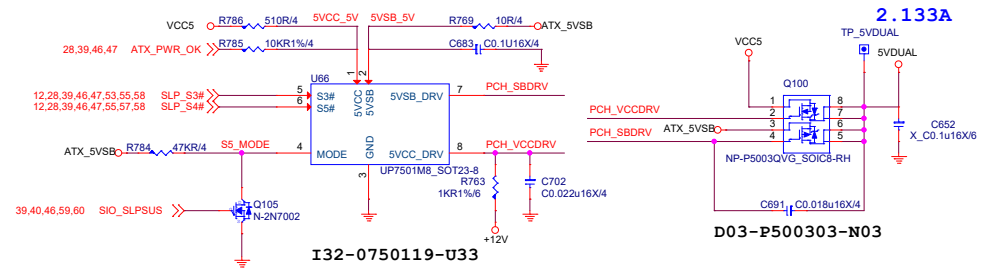
Resever For FIX DC or PWM MODE USE By PM SPEC

3VDSW

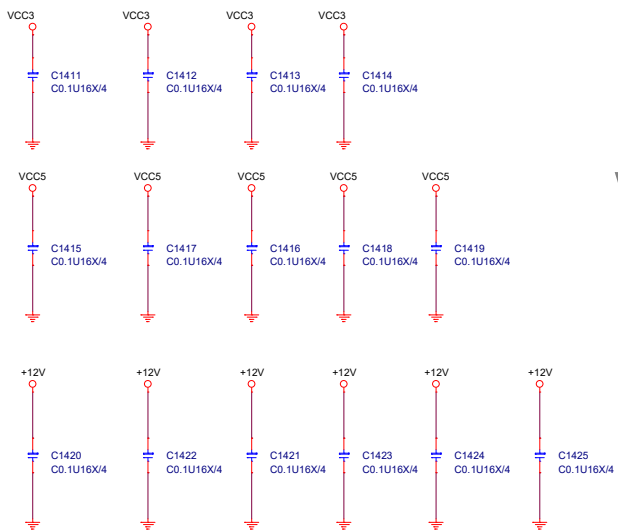
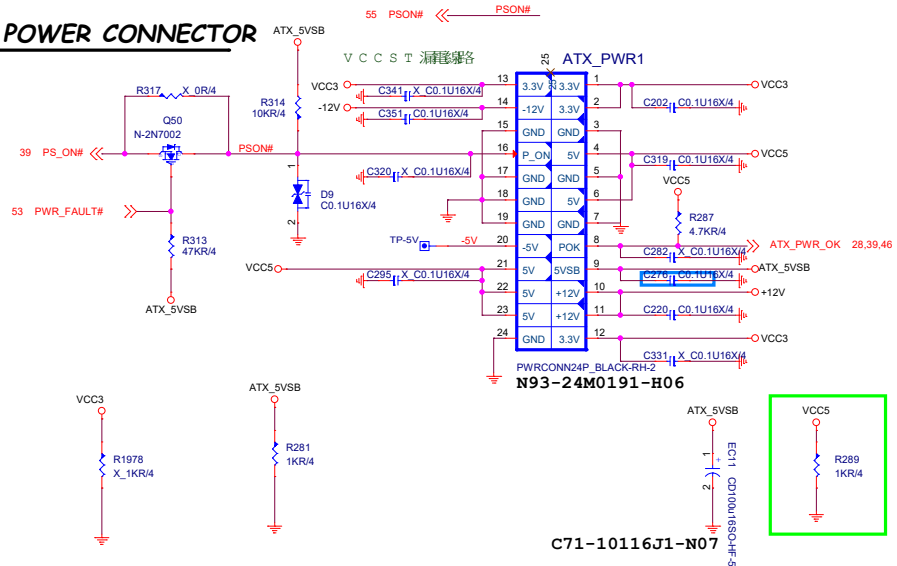


5VDUAL

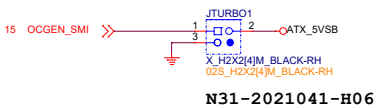
5VDUAL is power source of 1F0SB



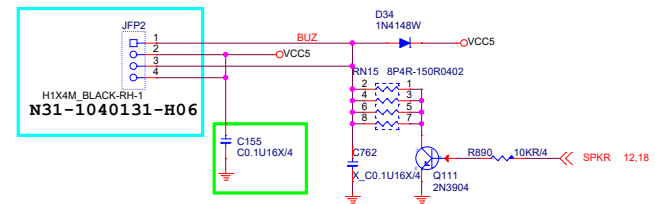
ATX POWER CONNECTOR



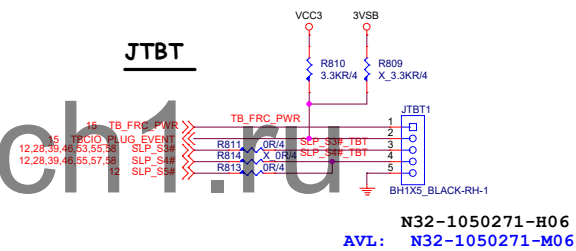
External Turbo switch pin header



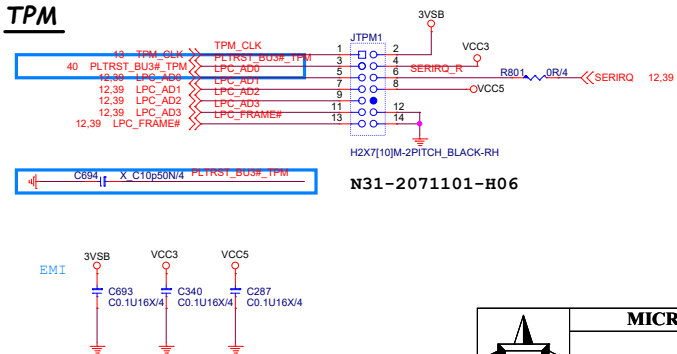
Front Panel



JTBT



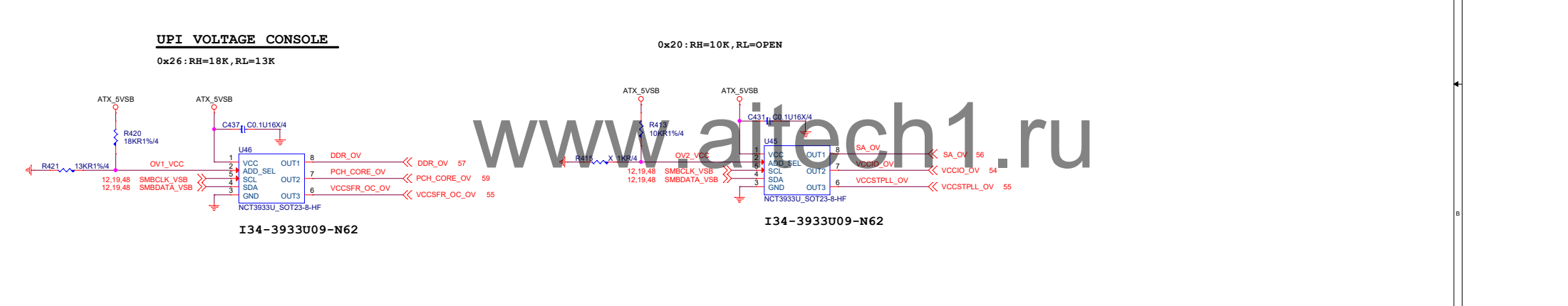
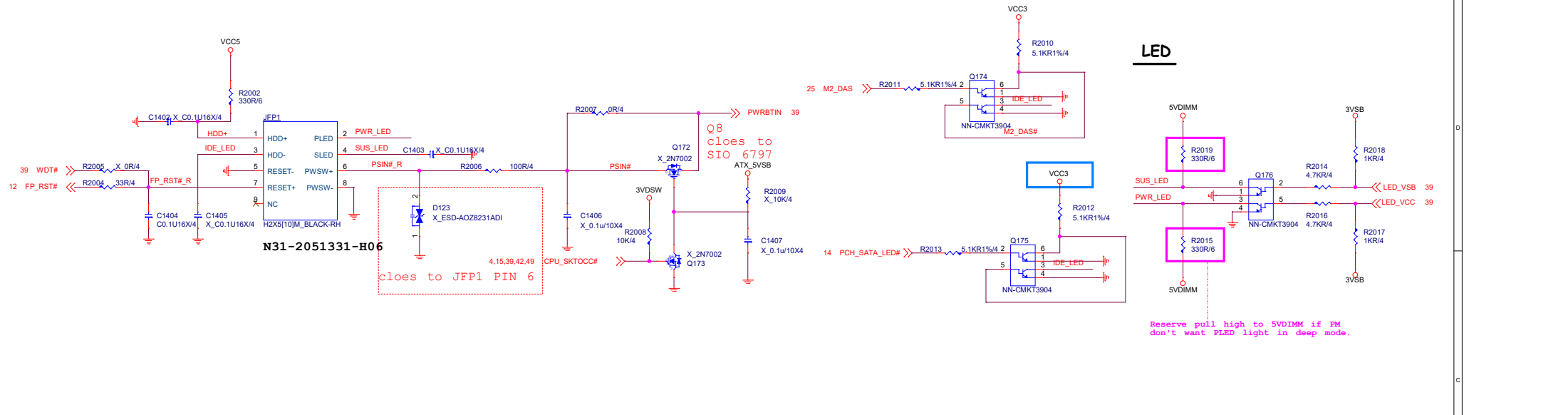
TPM



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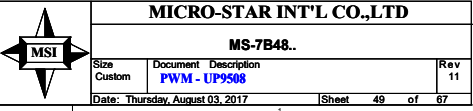
MS-7B48..

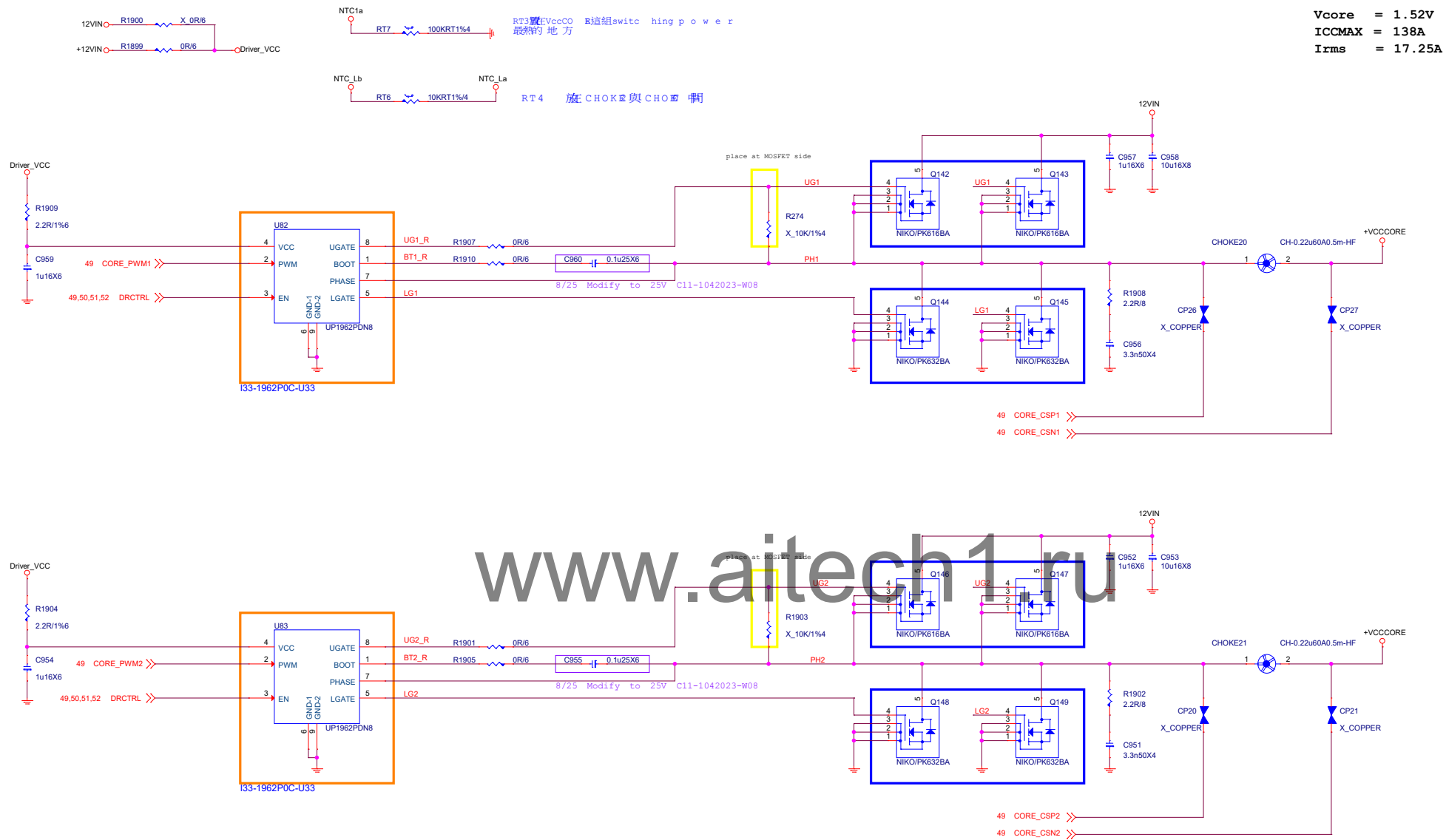
Size Custom	Document Description ATX Power/F_Panel/JTPM/JTBT	Rev 11
Date: Thursday, August 03, 2017		Sheet 47 of 67

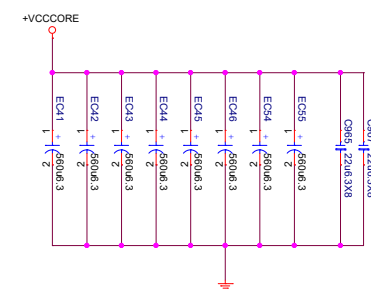
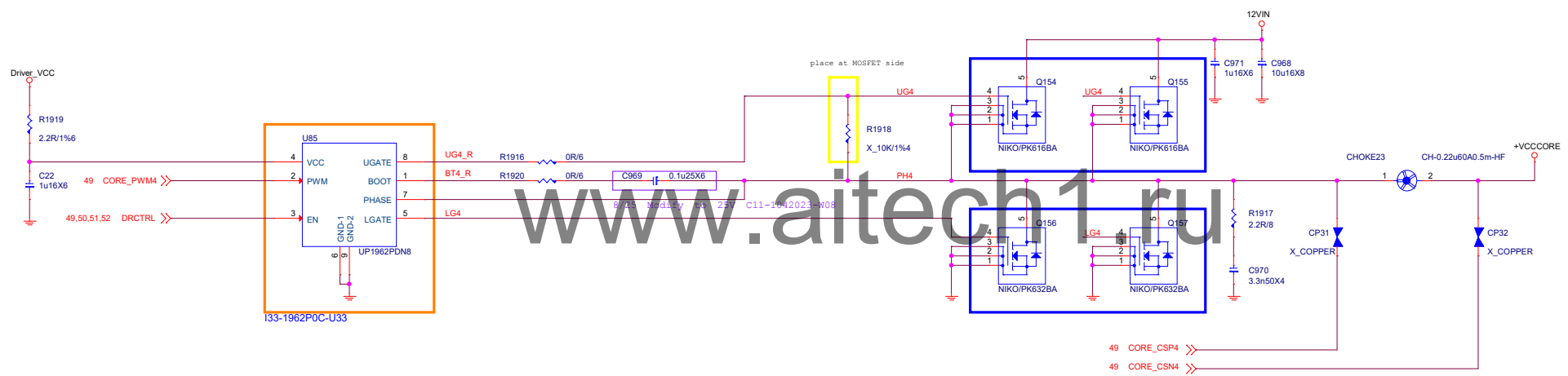
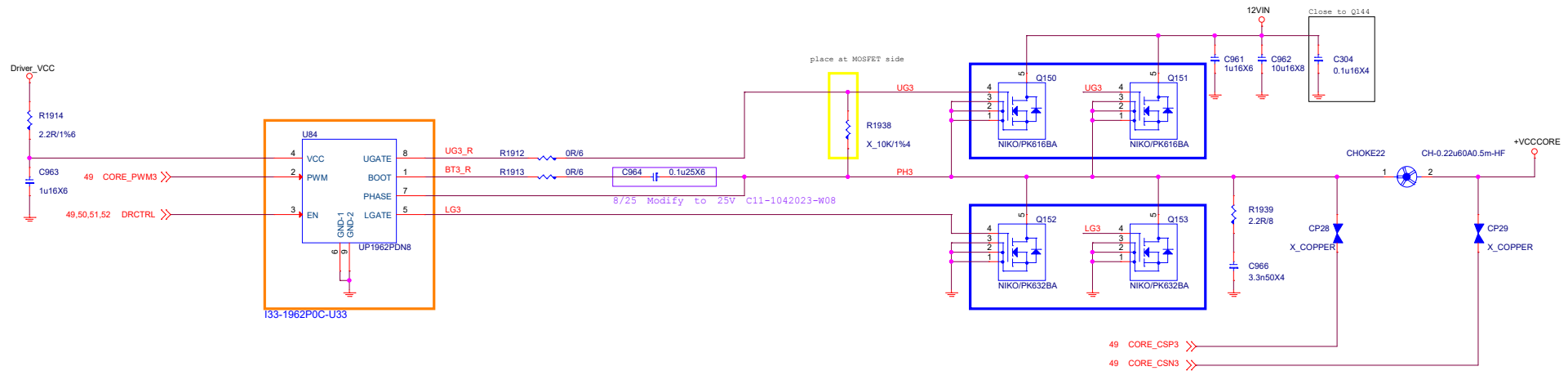


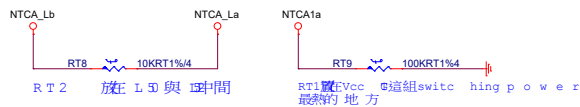
ADDRESS	0x2A	0x28	0x26	0x24	0x22	0x20
RH (KOhm)	OPEN	3.9	3	2.2	1.3	10
RL (KOhm)	10	1.3	2.3	3	3.9	OPEN
BUS_SEL	0%	25%	40%	60%	75%	100%

VGT: ICC Max 45A
LL: 3.1 mohm
OCP: 75A

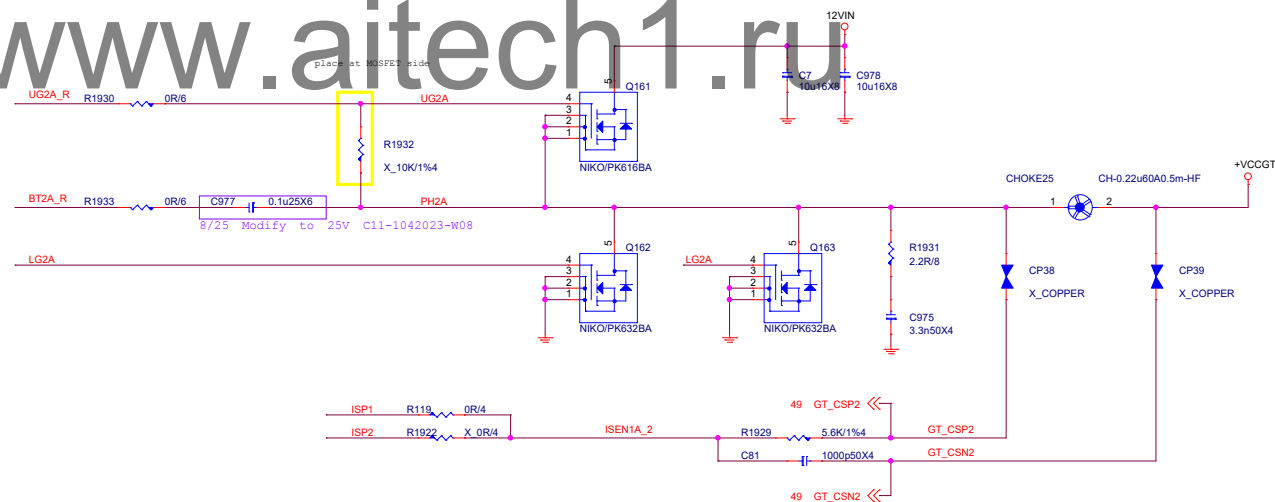
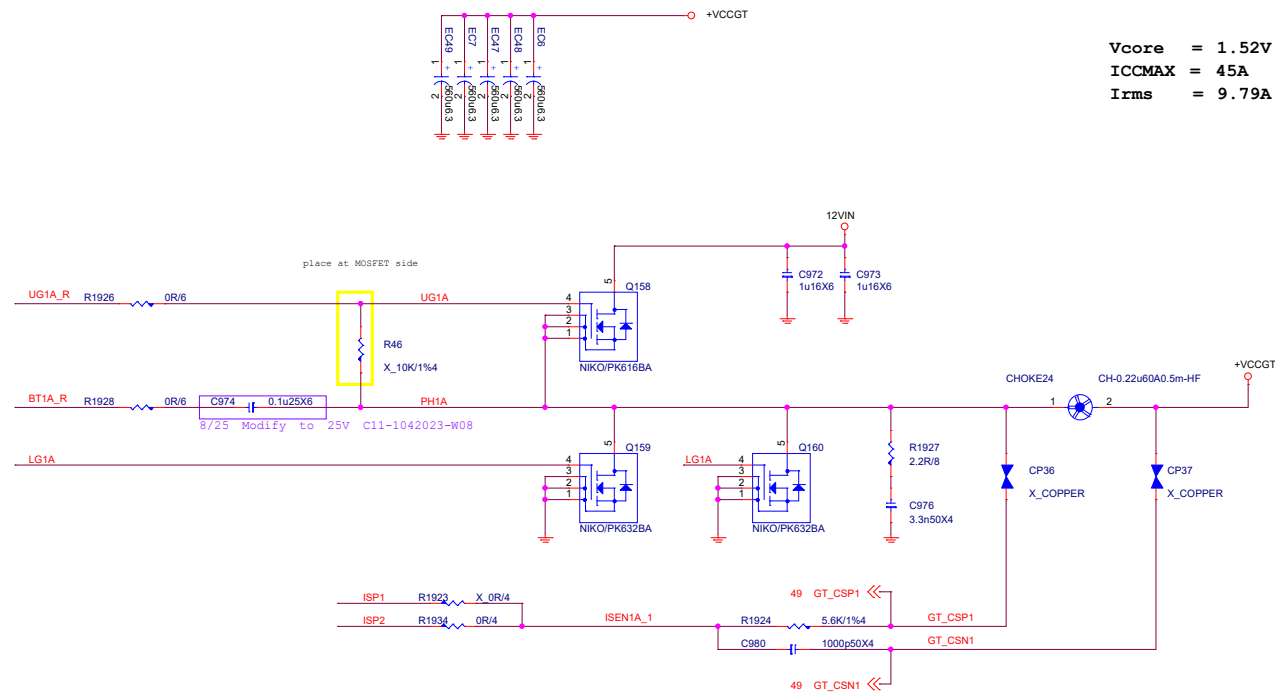
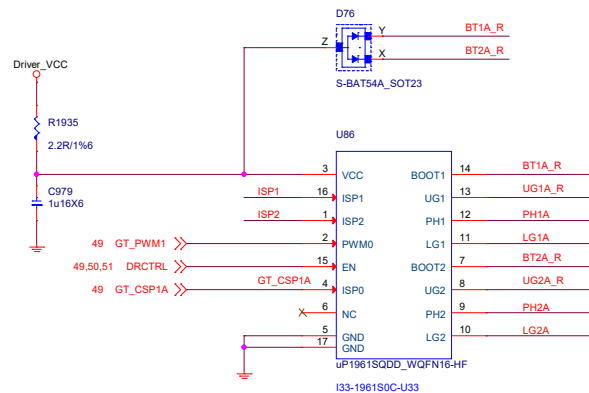








Vcore = 1.52V
ICCMAX = 45A
Irms = 9.79A

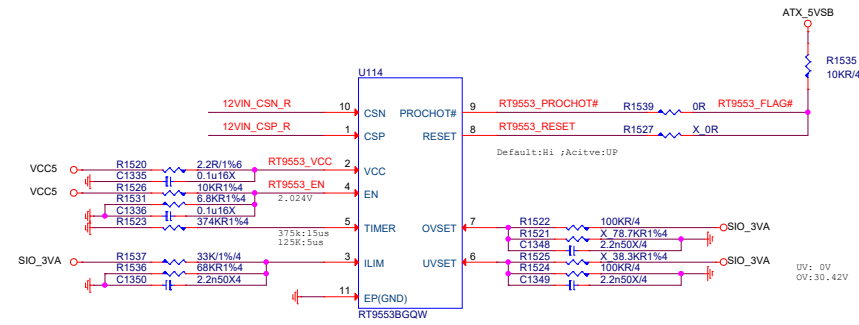
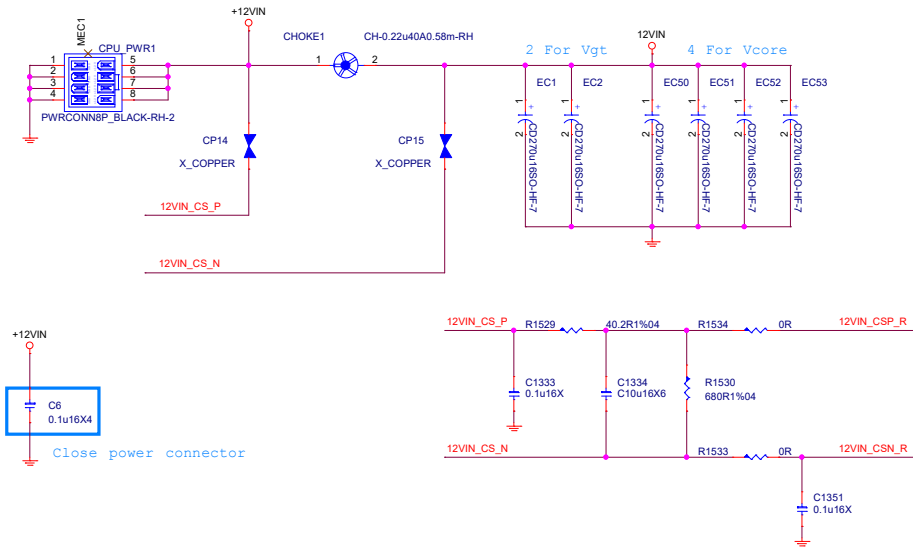


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ATX POWER CONNECTOR

Iripple = 27.04A
 Vcore = 17.25A
 VGT = 9.79A

RT9553B CURRENT SENSE



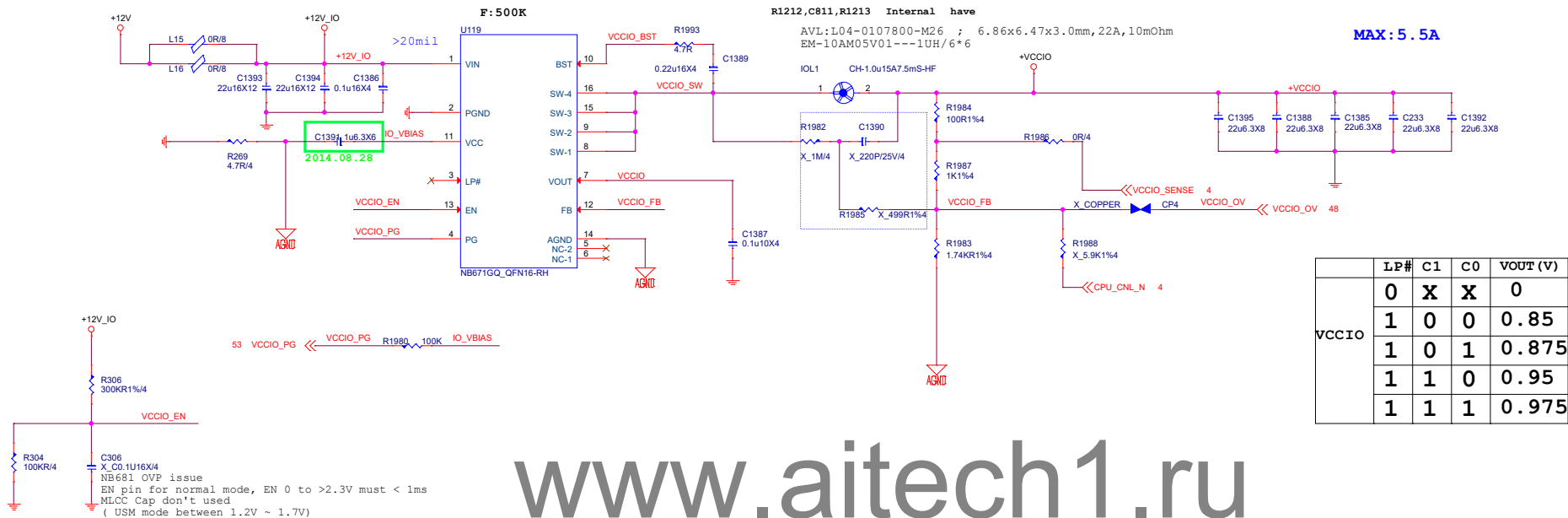
OCP:30A
 Real OCP:30.05A
 R17+R18>100k V_{sio_3va}= 3.33V R_{dcr}= 0.58 mohm

$I_{3933_imon} * [R17 * R18 / (R17 + R18)] = I_{step} * R_{dcr} * 100$
 $I_{3933_imon} = 10\mu A / step$
 $I_{step} = 4.785A$

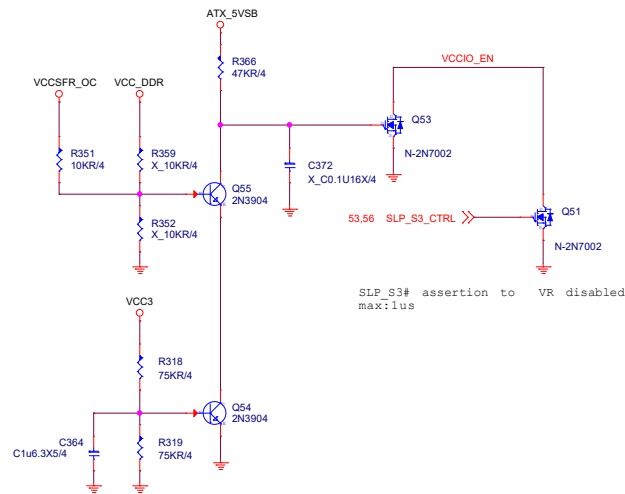


VCCIO

0.95V; 5.5A IMAX 6A
ILIMIT=8.5~9A



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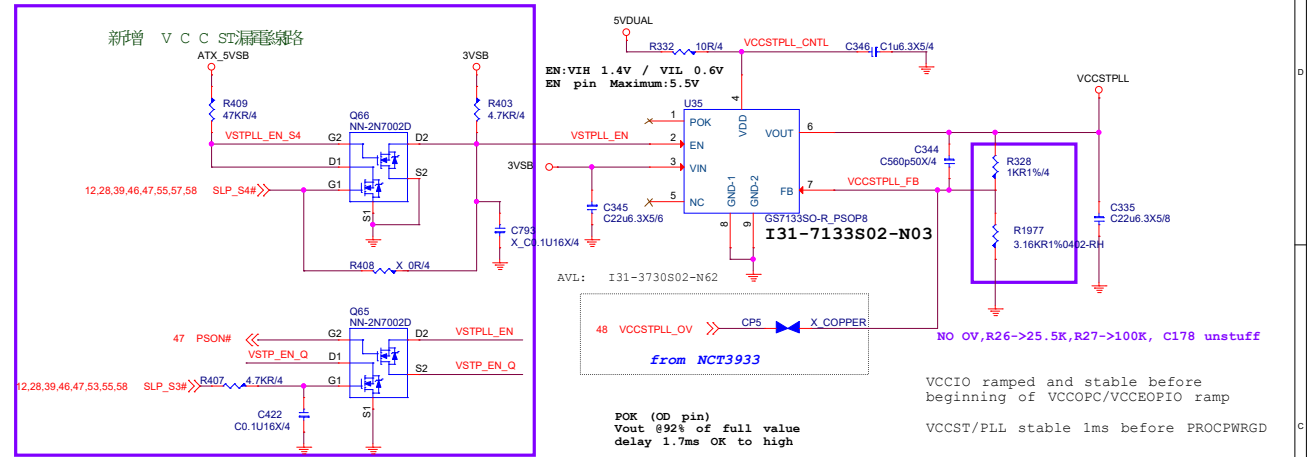


VCCSTPLL

1.0V; 250mA

For Cost down VCCST&VCCPLL merge

for Gaming3/5, Classic, ECO and H110

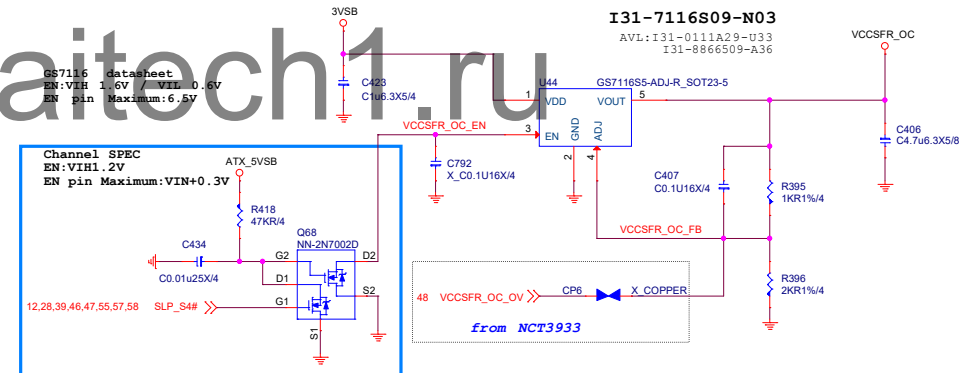


VCCPLL OC

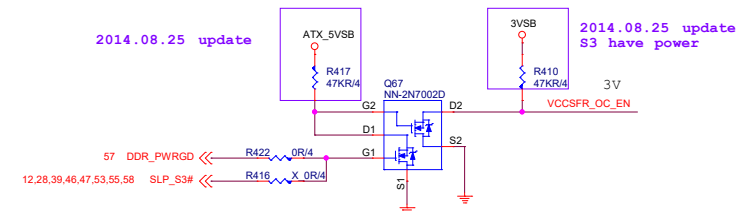
1.2V; 110mA

2014.08.21 update

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2014.08.25 update

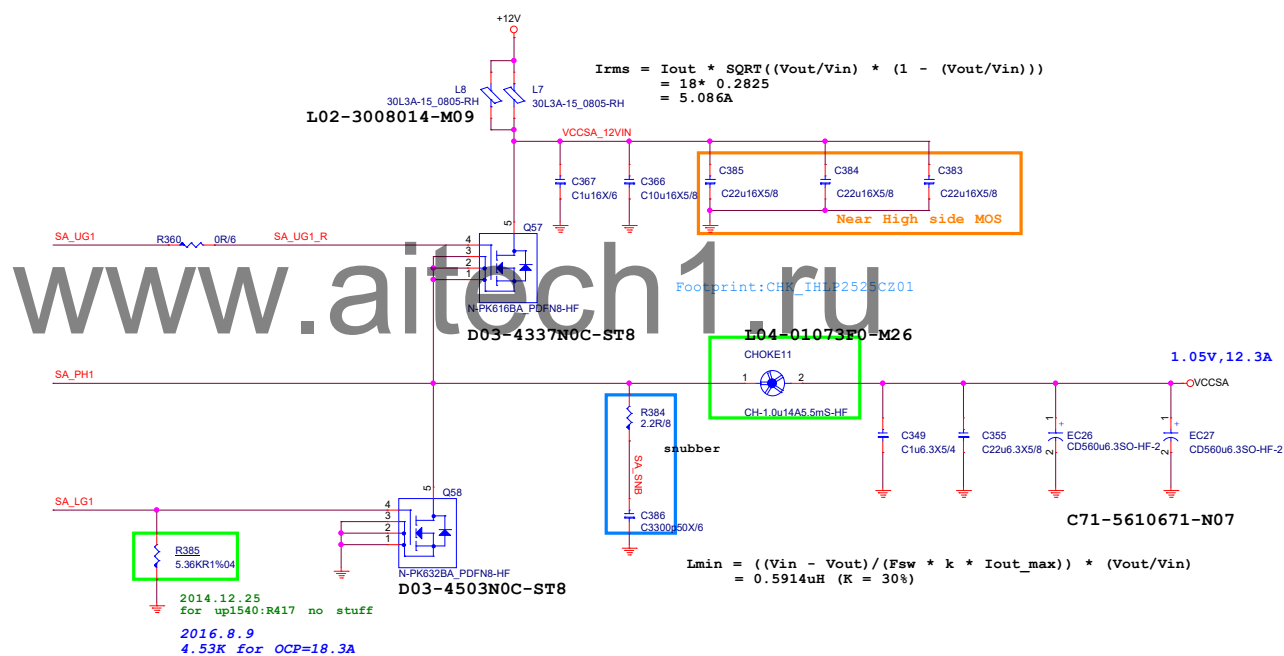
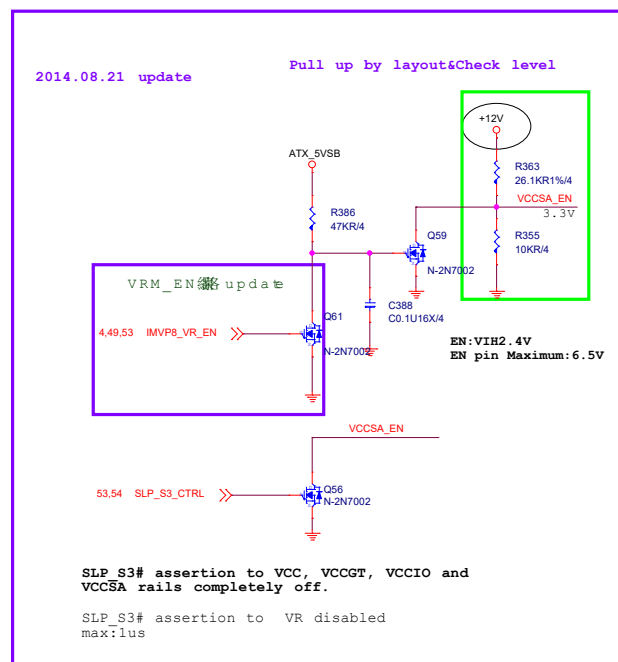
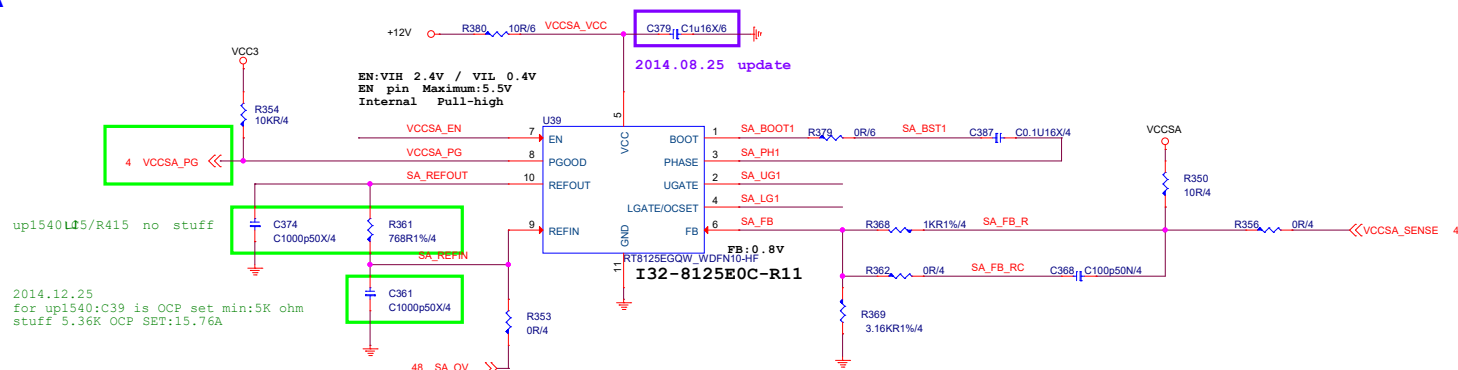


MSI		MICRO-STAR INT'L CO.,LTD	
MS-7B48..		Rev 11	
Size	Document	Description	Date
Custom		CPU PWR ST/PLL	Thursday, August 03, 2017
Date: Thursday, August 03, 2017		Sheet 55 of 67	

$$\begin{aligned} R_{ocpset} &= 5.36K \\ OCP &= R_{ocpset} * R_{dson}(\text{Low side}) / 10uA \\ &= 5.36K * 3mohm / 10uA \\ &= 16.08A \end{aligned}$$

Rocs:5.76K,OCP:
D03-4C05N03-O05 : 16.94A
D03-632BA0C-N03 : 17.45A
use UBIQ MOS need Check

```
Rdson (low) 10V
D03-4503N0C-ST8 : 3.0mohm
D03-632BA0C-N03 : 3.3mohm
D03-3056M00-U47 : 4.2mohm
```



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MS-7B48..

Size Custom	Document Description CPU PWR_SA-RT8125E	Re 1
Date: Thursday, August 03, 2017		Sheet 56 of 67

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

2.5A FOR CPU

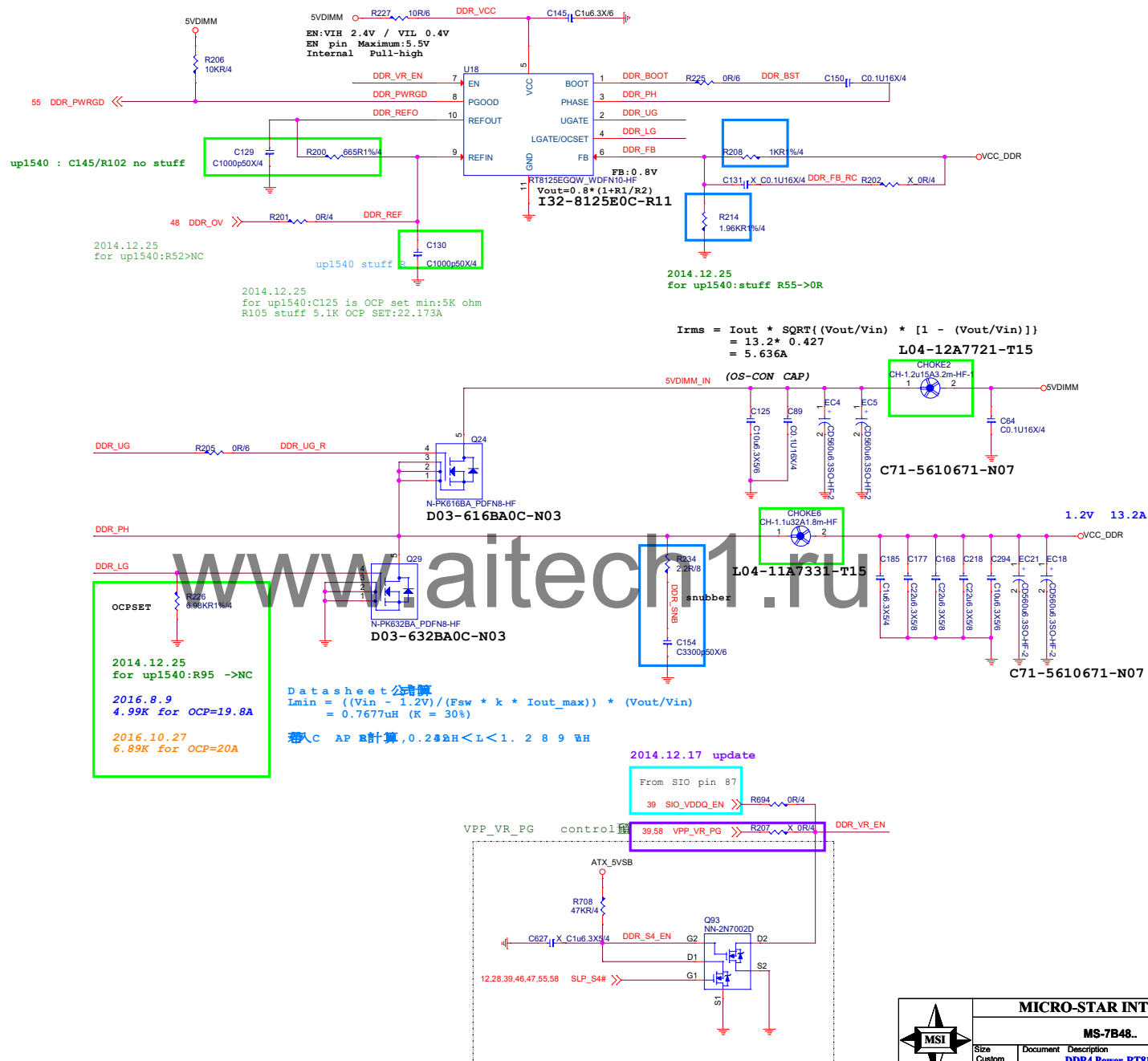
9.5A FOR 4DIMM

1.2A FOR DDR VTT

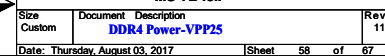
$OCp = 13.2A * 1.5 = 19.8A$
 $Roc_s(R3) = OCp * R_{dson}[(Low\ side)/2] / 10uA$
 $= 19.8A * (4.6/2)mohm / 10uA$
 $= 4.95Kohm < 5K\ ohm$

$Rocpset: 4.3K$
 $OCp = Rocset * R_{dson}(Low\ side) / 10uA$
 $= 4.75K * 4.6mohm / 10uA$
 $= 21.85A$

$R_{dson}(Low) 4.5V$
D03-4C05N03-O05 : 5 mohm
D03-632BA0C-N03 : 4.6mohm
D03-3056M00-U47 : 6.2mohm



VPP25 Power
2.5V; 2.24A

[illegible]

PCH 1VSB

1.0V; 11A

OCF = 16.69A

OCF = 10uA*7.68K / 4.6 mohm
= 16.69 A

Rocs:7.87K,OCF:

D03-4C05N03-005 : 15.74A

D03-632BA0C-N03 : 17.1A

use UBIQ MOS need Check

Rdson(low side mosfet)4.5V

D03-3116M00-U47 : 3.6 mohm

D03-632BA0C-N03 : 4.6mohm

D03-3056M00-U47 : 6.2mohm

EN:VIH 2.4V / VIL 0.4V
EN pin Maximum:5.5V
Internal Pull-high

2014.08.21 update

PCH_REFOUT

PCH_REFIN

PCH_SWIC_VCC

PCH_BOOT

PCH_PHASE

PCH_UGATE

PCH_LGATE

PCH_CORE_FB

PCH_CORE_FB_RC

PCH_CORE_FB_CP

PCH_1VSB_EN

PCH_1VSB

PCH_1VSB_EN

PCH_1VSB

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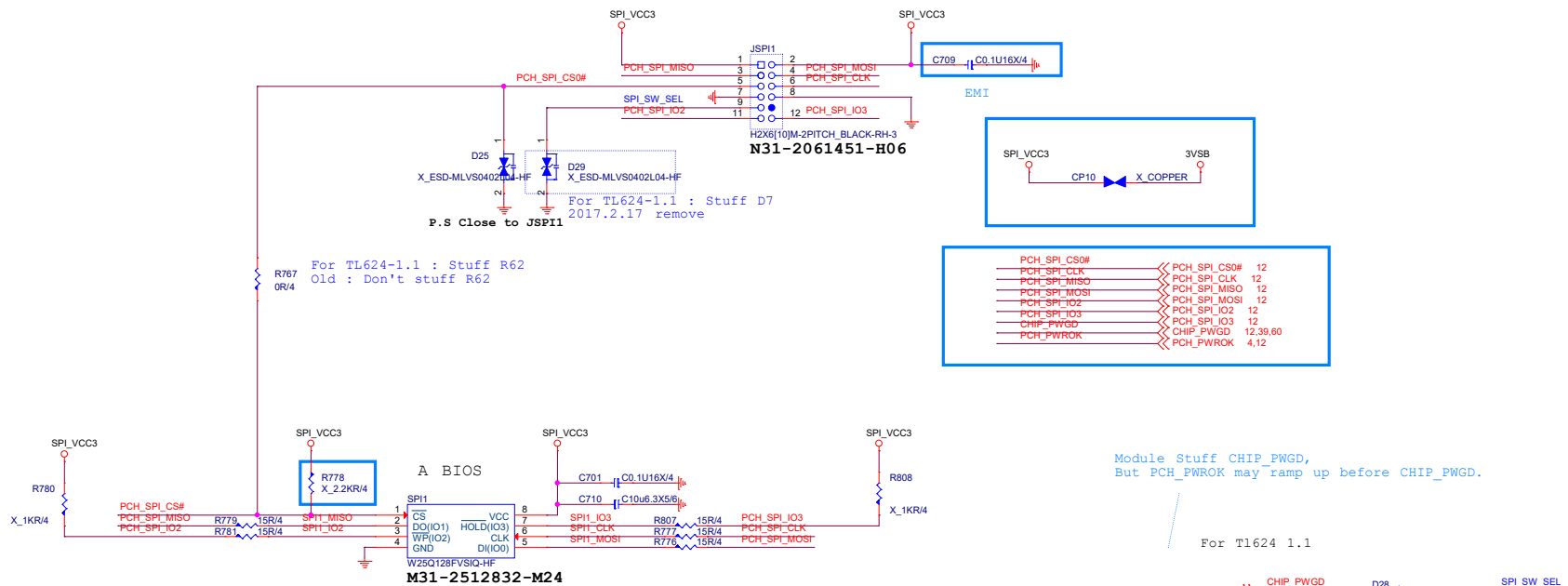
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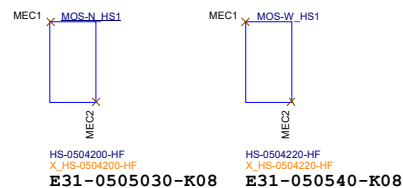
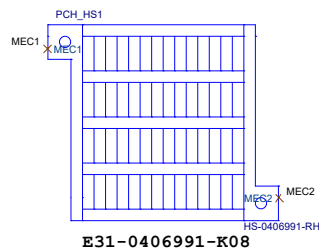
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PK0-07B4810-E48, 鴻華, 23 寶恩斯邁廠 MS9
PK0-07B4810-G37, 織深深圳, 23 寶恩斯邁廠 MS9

CPU_H1

CPU
鐵座

CPU_H1 (PT44A34-641C)
E21-7869020-F02



AMI_LABEL

AMI BIOS
LABEL

G51-M1SPXXA-A09

Label
THX

X_USB3.1
G51-M1SPG42-Q13

MKT LAB11

X_MKT_Channel_Z370-A PRO
G51-M1SPL93-Q13

MKT LABE2

X_MKT_MCJ_Z370-S01
G51-M1SPL92-Q13

OPT_B250

B250

X_B250

B01-82B2505-I06

H270

B01-82H2705-I06

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+VCCORE	○	→	□	VCORE
+VCCGT	○	→	□	VGT
VCC_DDR	○	→	□	VCC_DDR
VCCSA	○	→	□	VCCSA
+VCCIO	○	→	□	VCCIO
PCH_1VSB	○	→	□	PCH_1VSB

VCCSTPLL   VCCST

VCCSFR_OC   VCCSFR

VTT_DDR   VTT_DDR

VPP25   VPP25



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