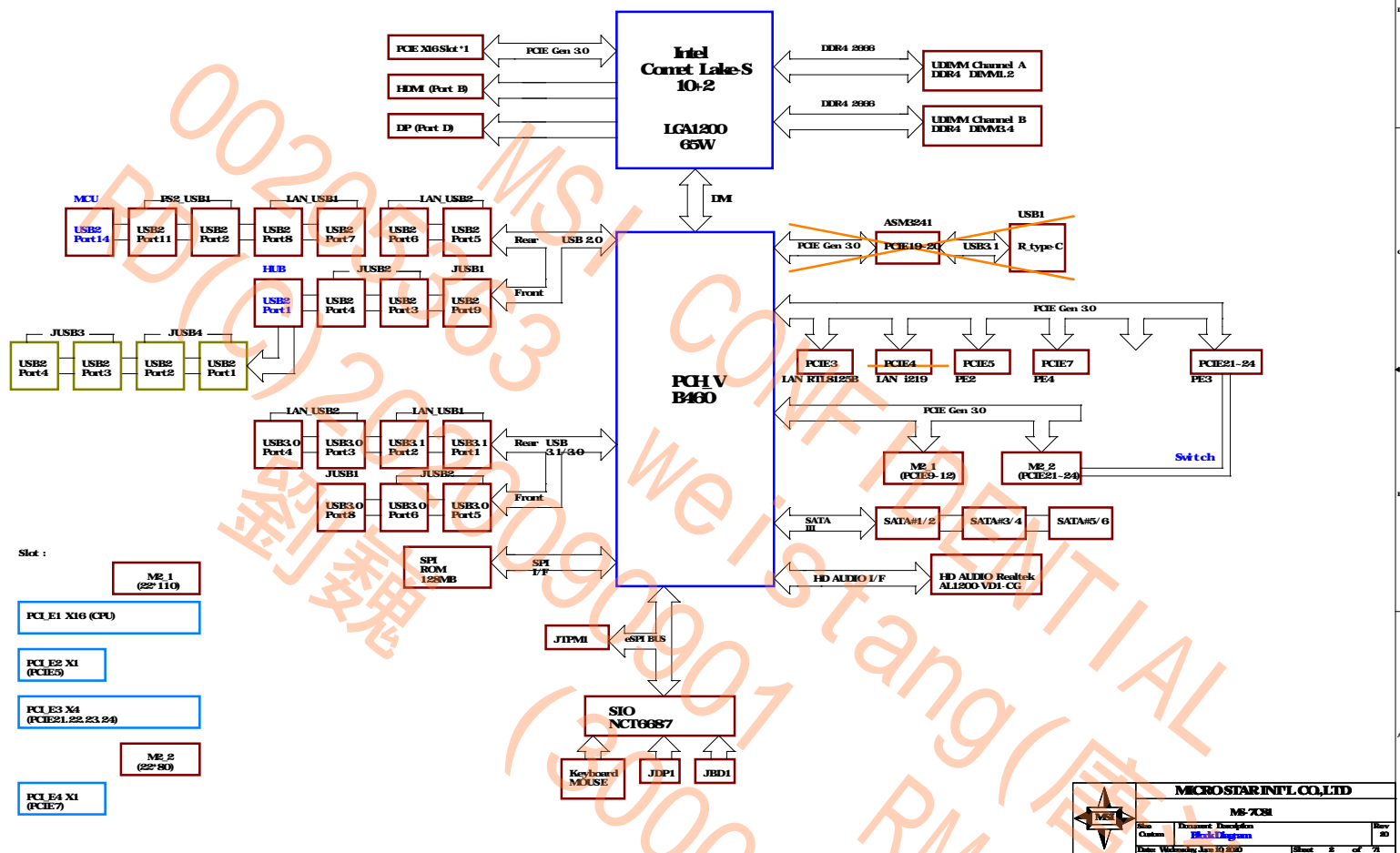
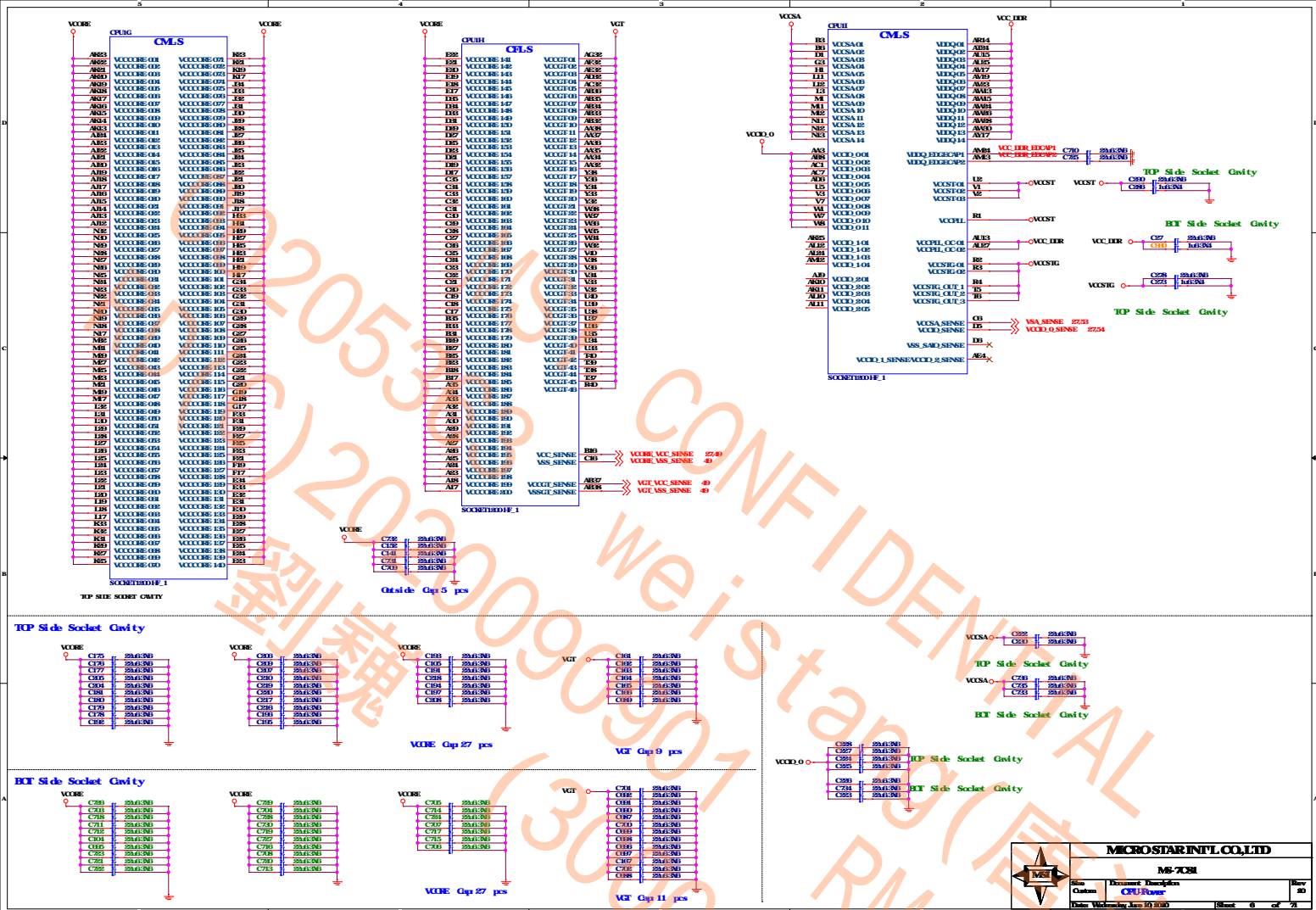
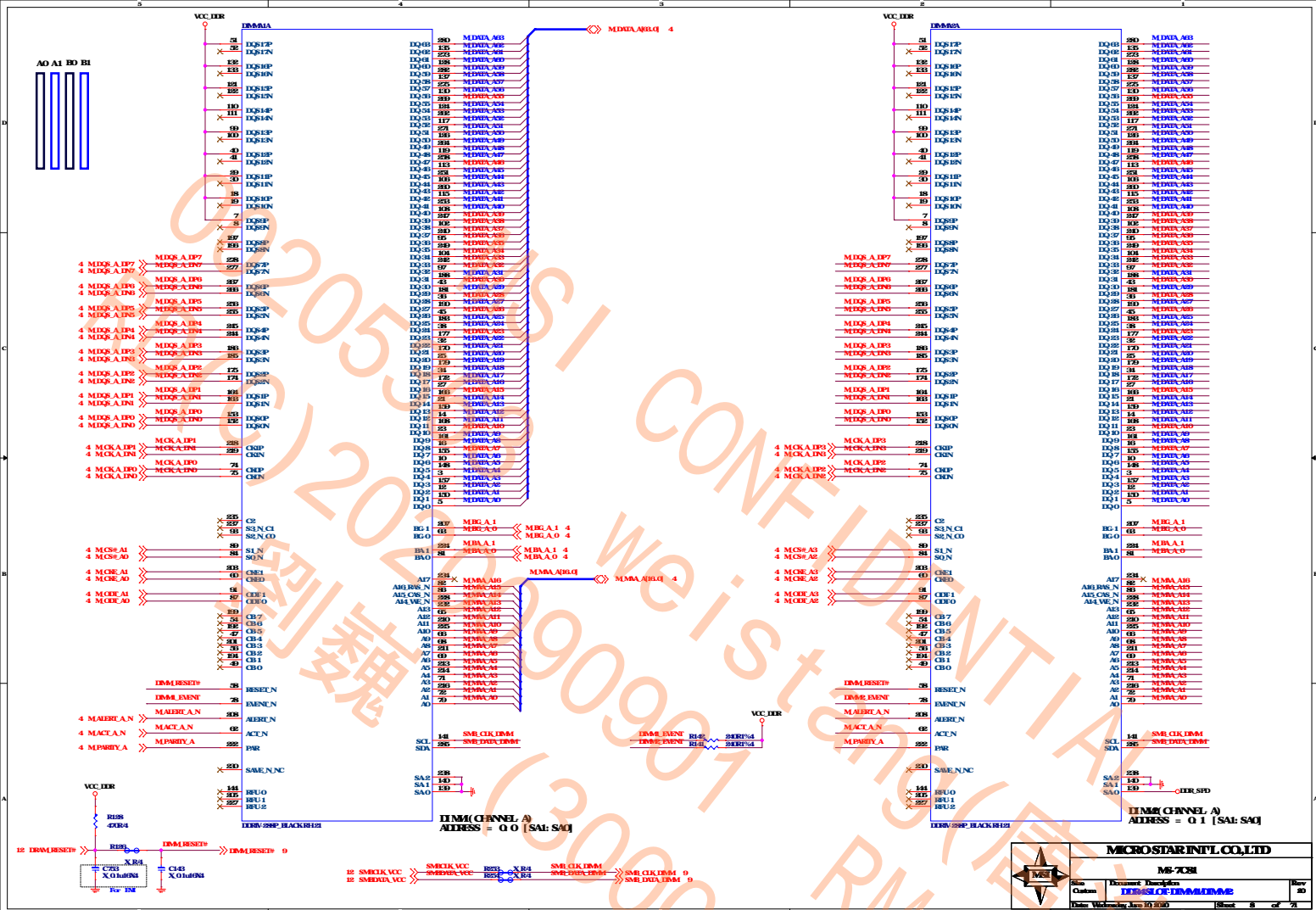
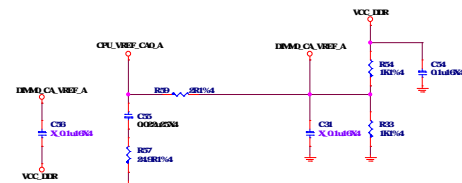
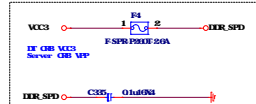
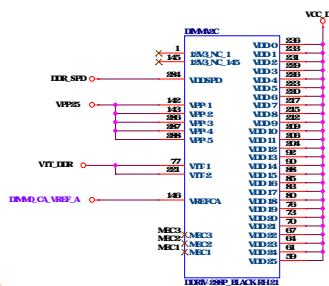
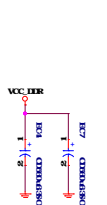
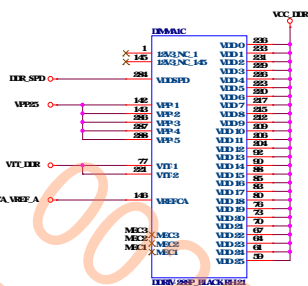


MS-7C81 Block Diagram

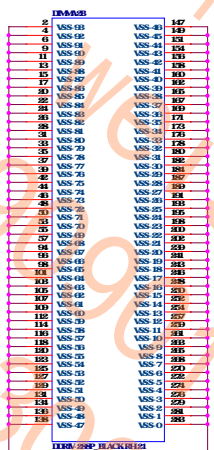
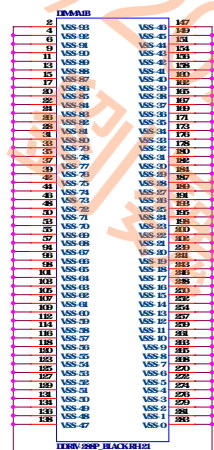
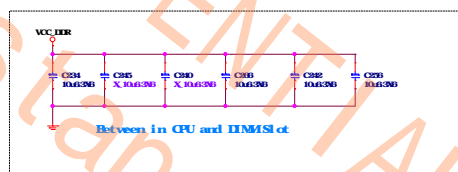
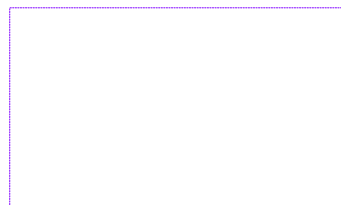


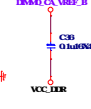
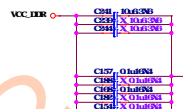
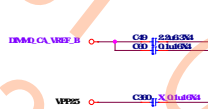
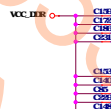
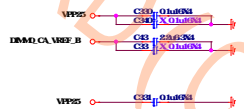
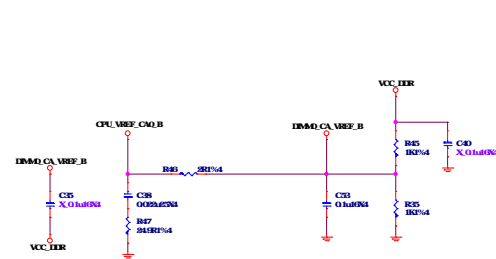
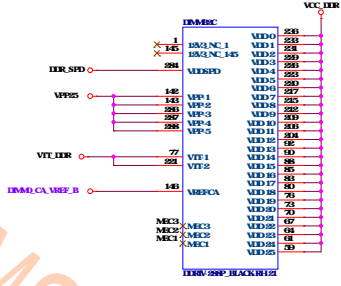
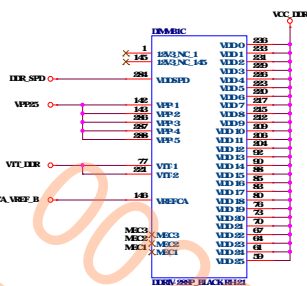




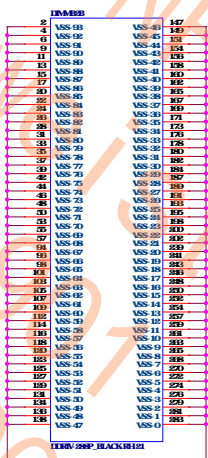
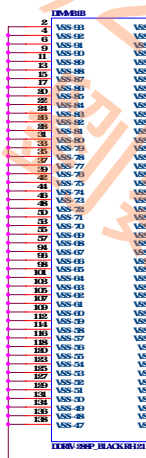


20000220
remove DIMM1, VREF, CPU, VREF, CPU, follow FIG

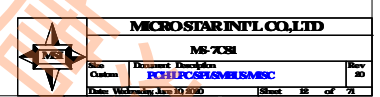
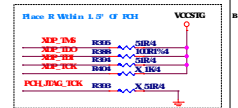




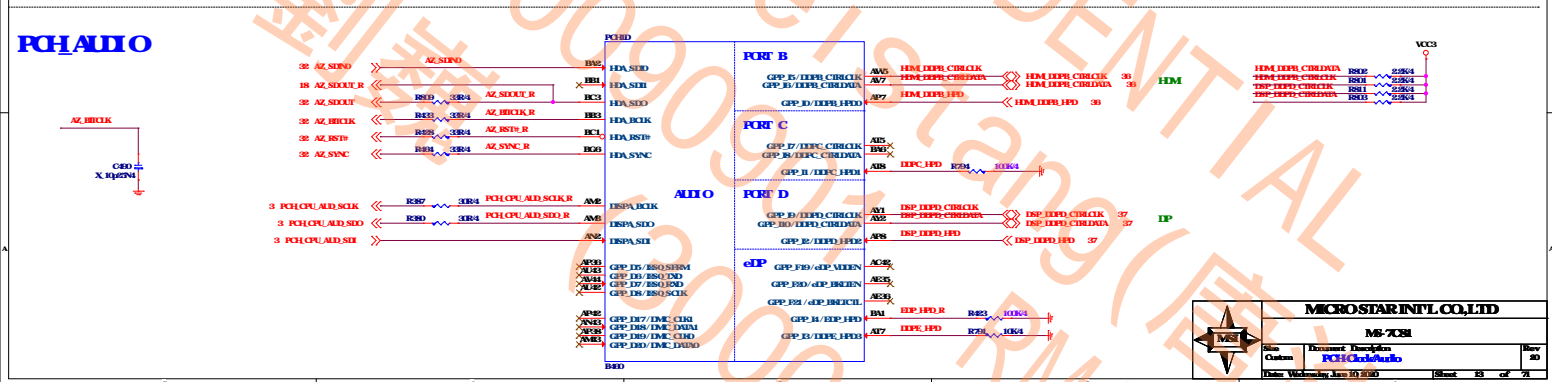
20200220
remove DIMM_CA_VREF_B CPU_VREF_CA0_B follow FIG



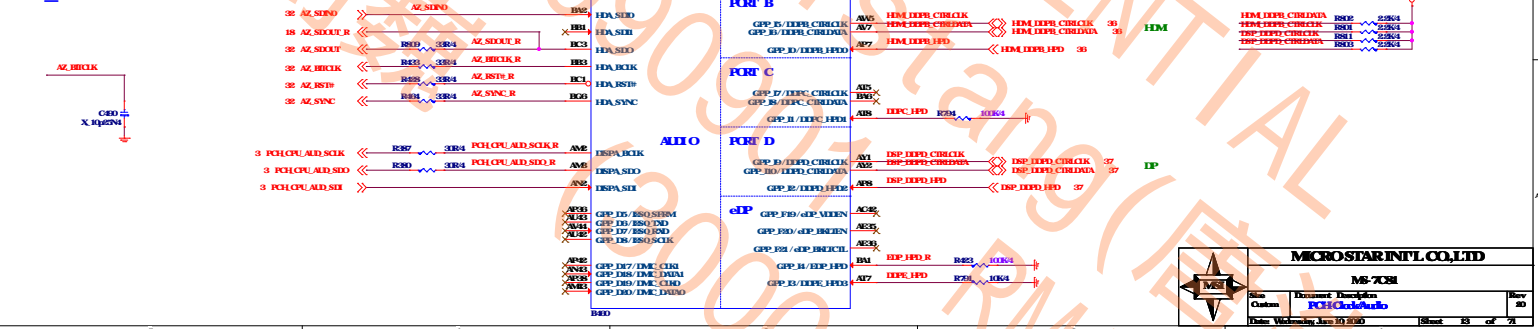
MICROSTAR INT'L CO., LTD		
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PCH_{OLK}

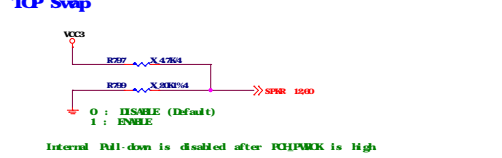
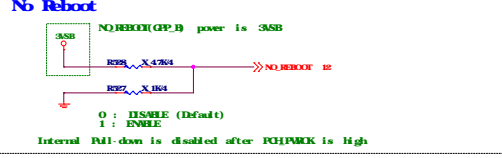

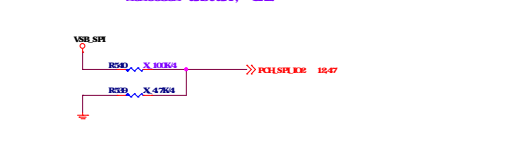
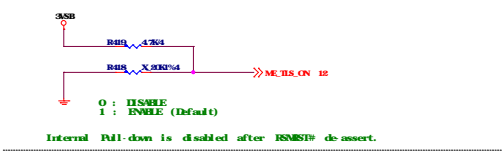
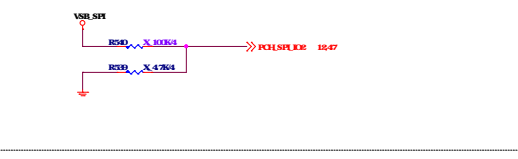
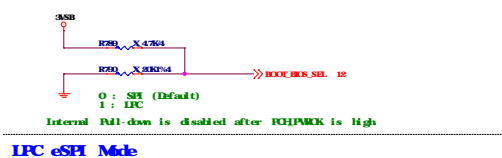
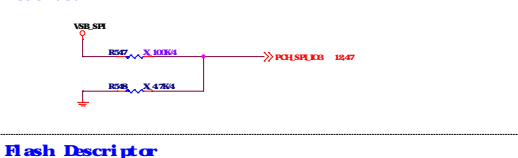
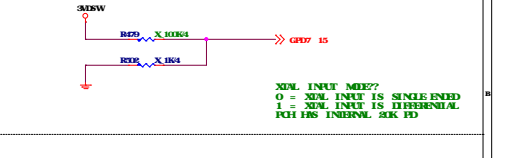
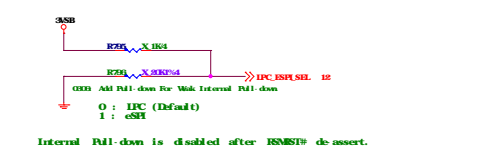
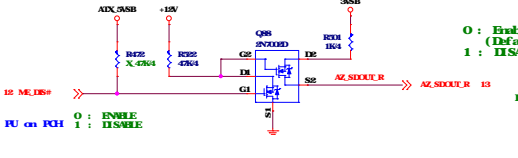
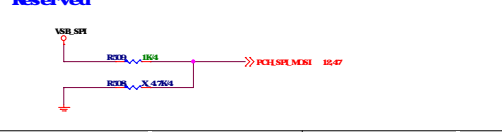
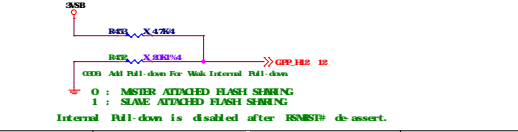



PCH AUDIO



VSS

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<div>TOP Swap</div> <div></div> <div>No Reboot</div> <div></div>	<div>ODT Disable</div> <div><p>20800220 remove GP_H5 strap not for PCHV</p></div> <div>DCI Enable</div> <div><p>20800302 unstuff, CRB</p></div>	<div>XOAL FREQUENCY SELECTION(CNV_HM_ID)</div> <div><p>This Signal has a Weak Internal Pull-down An External Pull-up is Required On this Strap Since 38.4 MHz XOAL is Not Supported On the PCH 0 = 38.4 XOAL Frequency Selected (Default) 1 = 25MHz XOAL Frequency Selected</p></div> <div>Modem Reference Clock Source Select(CNV_RCI_ID)</div> <div><p>A Weak External Pull-up is Required 0 = Integrated OMI Enable 1 = Integrated OMI Disable</p><p>Note: When a B-Gasket Chip is Connected to the PCH/OMI Interface, The Default Internal Pull Down Resistor will Pull the Strap Load to Enable OMI Interface.</p></div>															
<div>TIS confidentiality</div> <div></div>	<div>Reserved</div> <div><p>20800302 unstuff, CRB</p></div>	<div>1.8V VCCSH (GPP_J_9,CNV_MUAR2_TXD)</div> <div><p>SELECT THE SH_HCS FLASH INTERFACE OPERATING VOLTAGE 0 = VCCSH IS CONNECTED TO 3.3V BML - DEFAULT 1 = VCCSH IS CONNECTED TO 1.8V BML PCH HAS INTERNAL 2K PD</p></div>															
<div>Boot HCS</div> <div></div>	<div>Reserved</div> <div><p>20800302 unstuff, CRB</p></div>	<div>Reserved</div> <div></div> <div><p>XOAL INPUT MODE?? 0 = XOAL INPUT IS SINGLE ENDED 1 = XOAL INPUT IS DIFFERENTIAL PCH HAS INTERNAL 2K PD</p></div>															
<div>LPC eSPI Mode</div> <div></div>	<div>Flash Descriptor Security Override</div> <div></div>																
<div>Reserved</div> <div></div>	<div>ESH FLASH SENSE MODE</div> <div></div>	<div></div> <div><table><tr><th colspan="3">MICROSTAR INT'L CO.,LTD</th></tr><tr><td colspan="3">MS-703H</td></tr><tr><td>Rev</td><td>Document Description</td><td>Rev</td></tr><tr><td>Custom</td><td>FCHShop</td><td>20</td></tr><tr><td colspan="2">Order Worksheet Date 01/20/2010</td><td>Sheet 28 of 31</td></tr></table></div>	MICROSTAR INT'L CO.,LTD			MS-703H			Rev	Document Description	Rev	Custom	FCHShop	20	Order Worksheet Date 01/20/2010		Sheet 28 of 31
MICROSTAR INT'L CO.,LTD																	
MS-703H																	
Rev	Document Description	Rev															
Custom	FCHShop	20															
Order Worksheet Date 01/20/2010		Sheet 28 of 31															

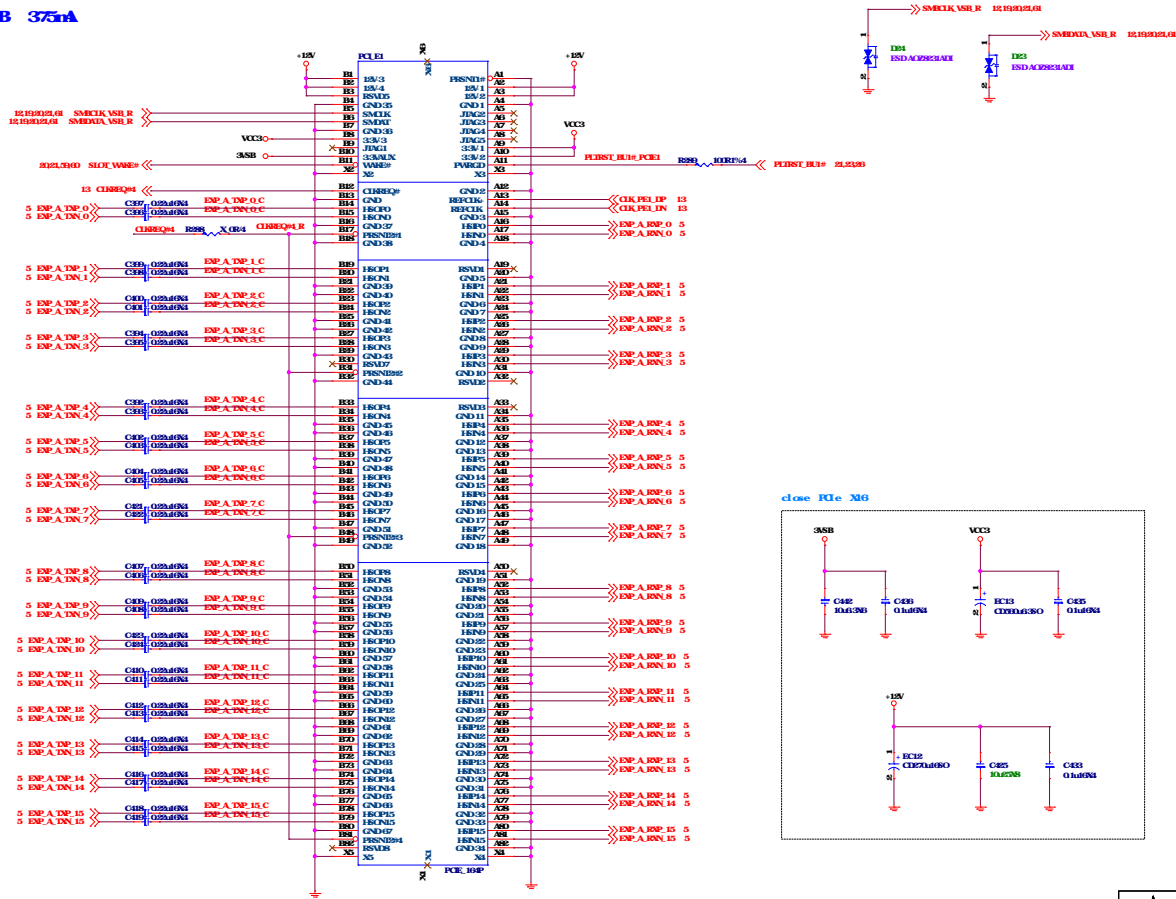
PCI Express X16 Slot

12V - 5.5A

VCC3 - 3A

3ASB 375mA

SMAs ESD

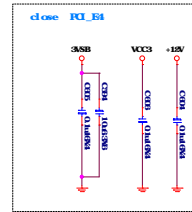
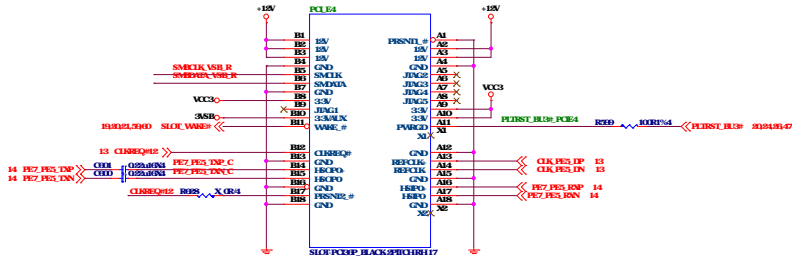
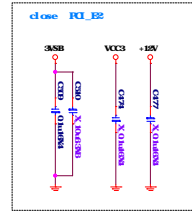
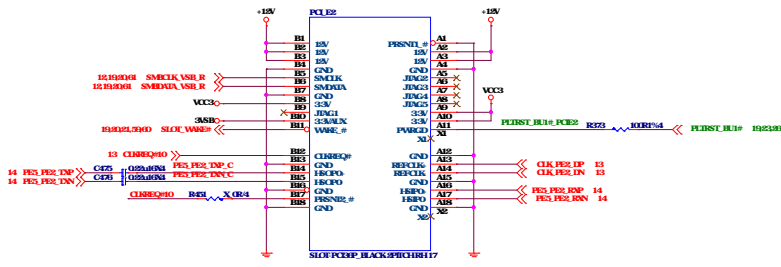


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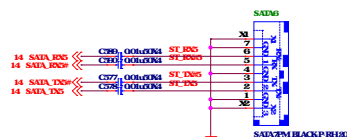
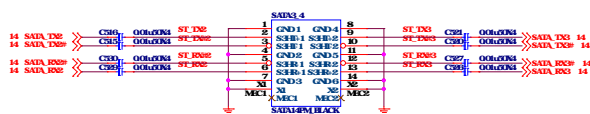
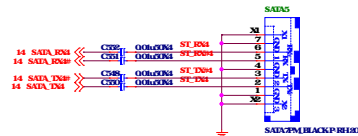
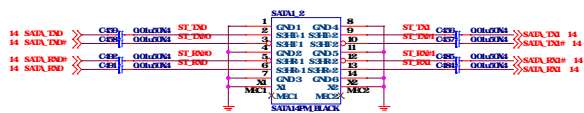
3VSB - 375mA

PCIE X1 Slot

12V - 0.5A
VCC3 - 3A
3ASB - 375mA



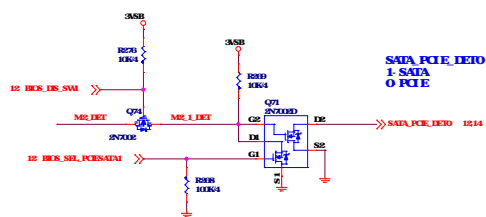
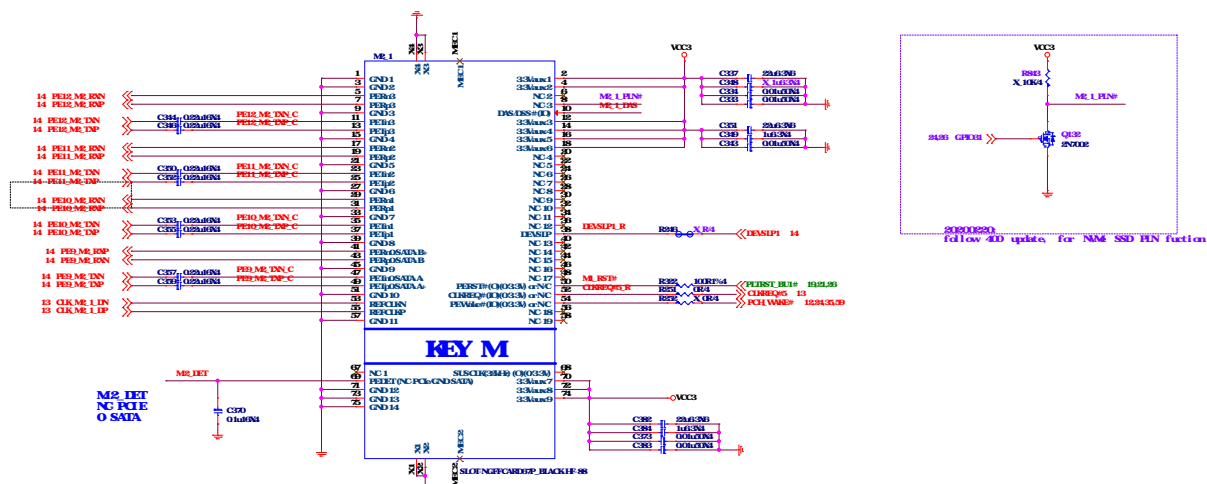
SATA Connector



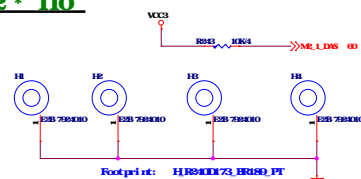
MICROSTAR INT'L CO., LTD

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**HCS_MDE**

HC8_IIS_SW	HC8_SEL_PCIESATAI	Mode
0	1	PCIE SATA
0	0	PCIE
GPI	GPI	AUTO



20200410 remove SCREW, M2 Heat sink

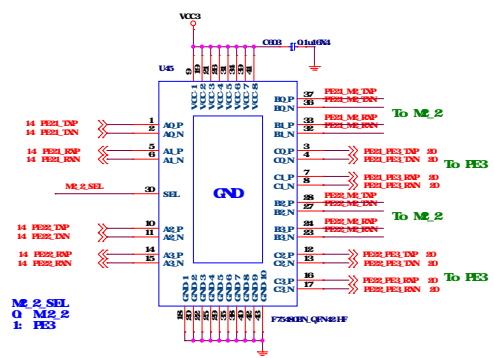


20200508 Add SCREW for 2280

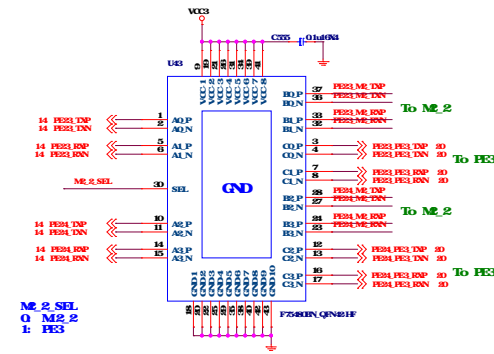


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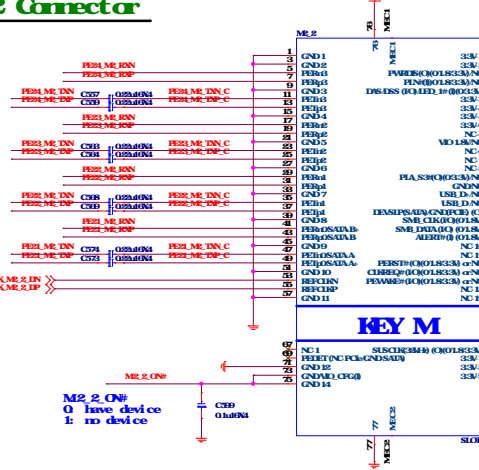
M2 Connector



M2_2_SEL
0 M2_2
1 PE3



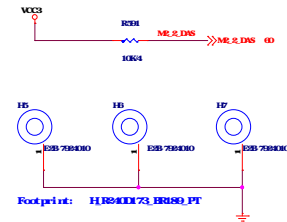
M2_2_SEL
0 M2_2
1 PE3



To Switch
M2_2_SEL
0 M2_2
1 PE3

GPIO_G7	GPIO_G5	M2_2_SEL	M2_2_ON#	Mode
GH (1)	GH (1)	1	1	AUTO PE3
GH (1)	GH (0)	0	0	AUTO M2_2
0	1			PE3
0	0			M2_2 PCIe

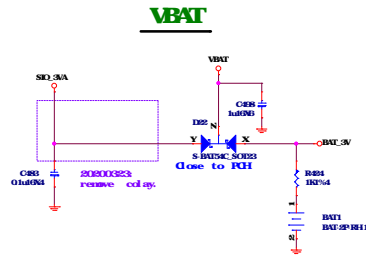
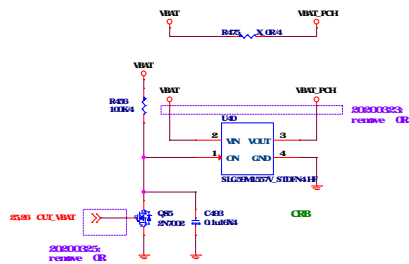
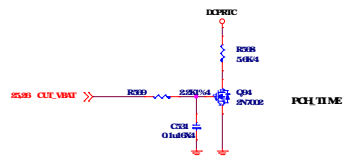
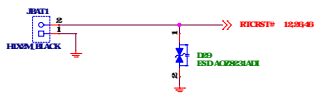
22 * 80

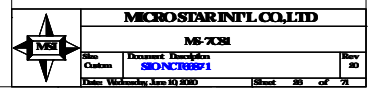


Footprint: H1840073, B1840_PT



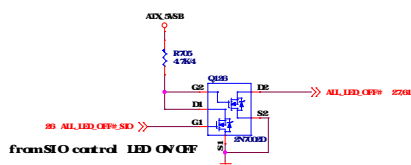
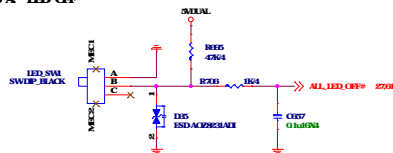
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LED SW for ALL LED OFF

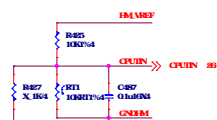
B C LED ON (default)
B A LED OFF



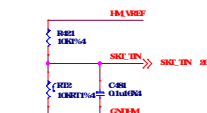
Thermal



To SYSTEM



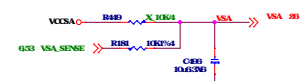
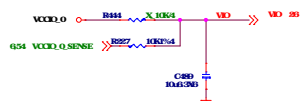
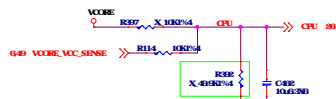
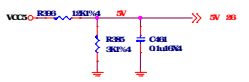
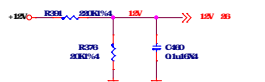
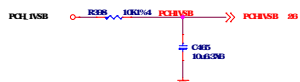
To PWMFET



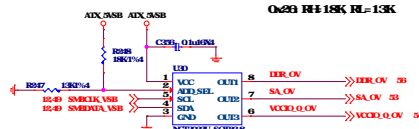
To CPU Socket

HVMonitor - Voltage

SIO HV Voltage Over 2V v411 Not Detect



VOLTAGE CONSOLE



0x20 H418K HL=13K

UH VOLTAGE CONSOLE

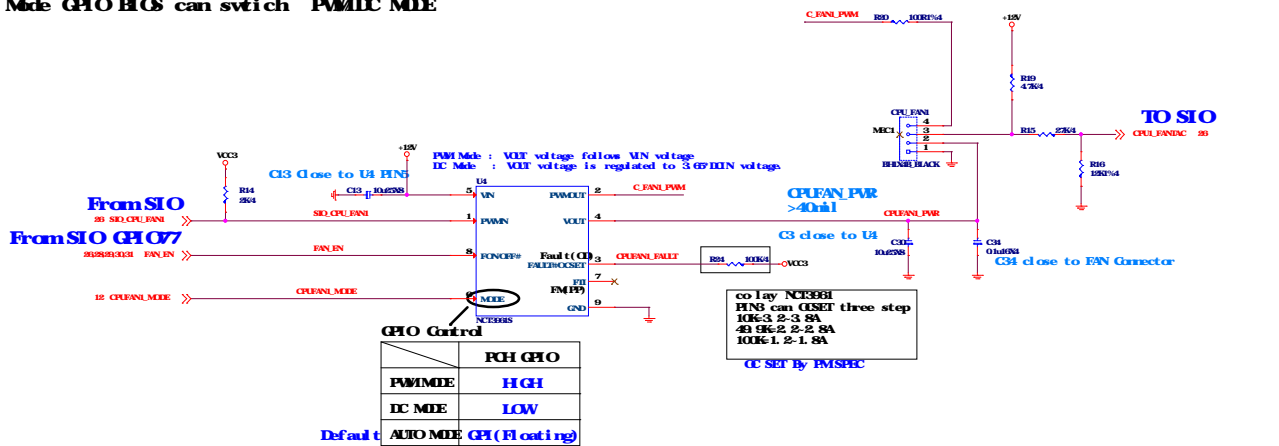
ADDRESS	0x20	0x21	0x22	0x23	0x24	0x25	0x26
H41 (HL=13K)	OPEN	3D	3	22	13	10	
HL (HL=13K)	10	13	23	3	3D	OPEN	
HL5_SEL	0%	25%	43%	60%	75%	100%	



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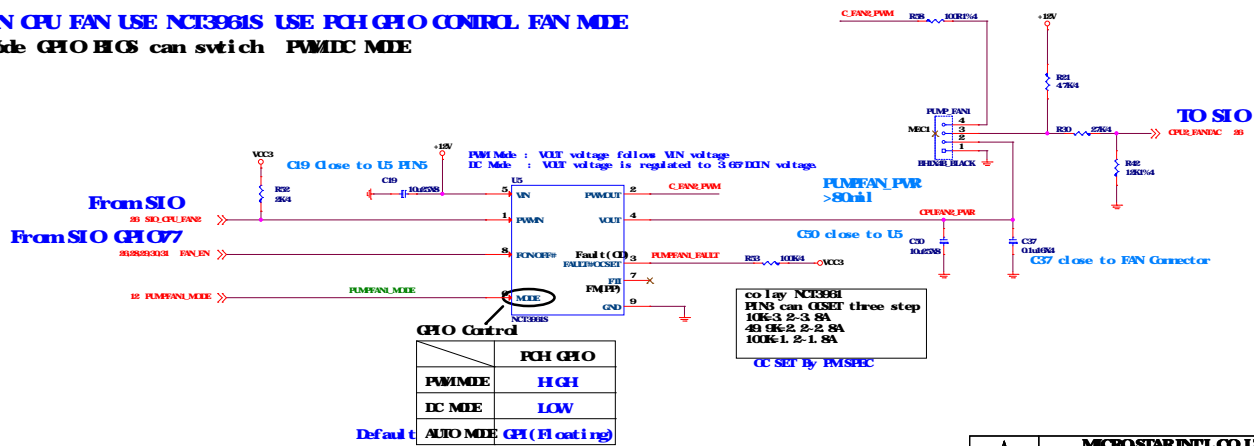
TYPE M: 4 PIN CPU FAN USE NCT3961S USE FCH GPIO CONTROL FAN MODE

1. Mode GPIO HIG can switch PWMIC MIDE



TYPE M: 4 PIN CPU FAN USE NCT3961S USE FCH GPIO CONTROL FAN MODE

1. Mode GPIO HIG can switch PWMIC MIDE



1. Mode GPIO HCS can switch PWMDC MODE

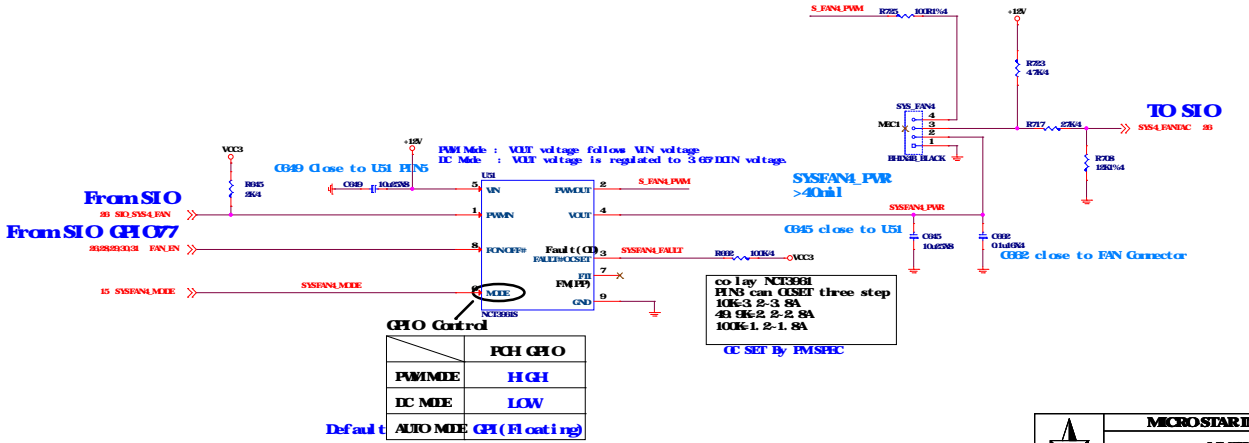
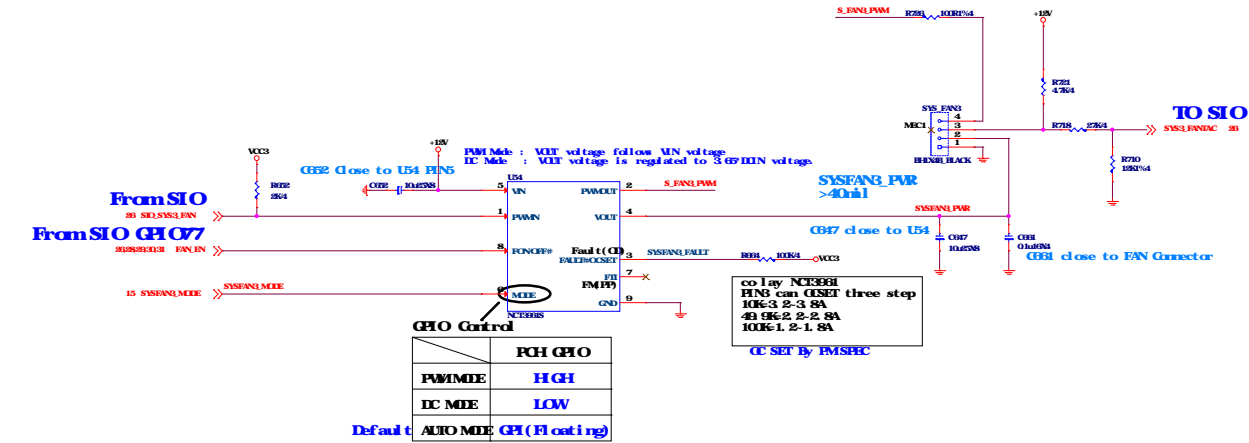


	PCH GPIO
PWM MDE	HIGH
DC MDE	LOW
AUTO MDE	GPIO (Floating)



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Site Custom	Document Description SYSL and SYSEFAN		Rev 20
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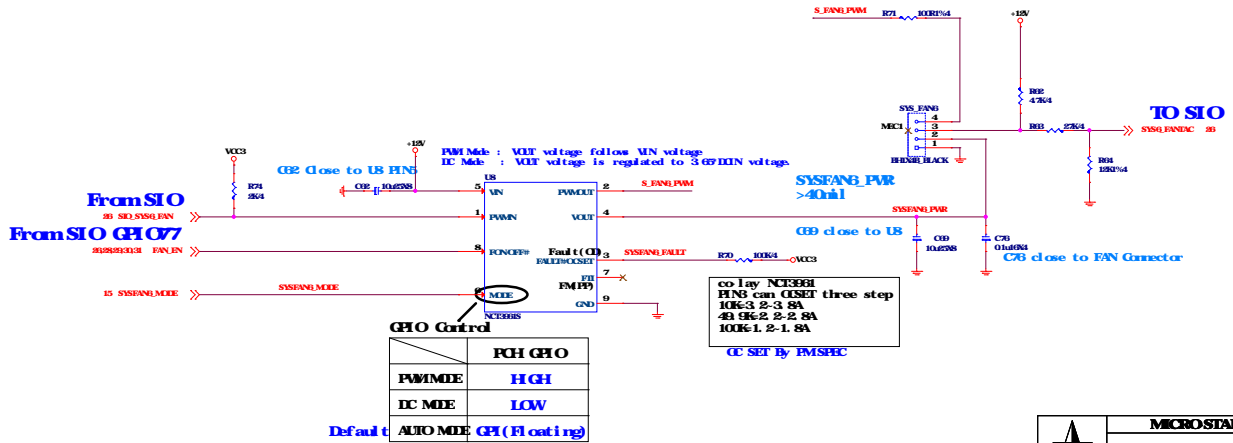
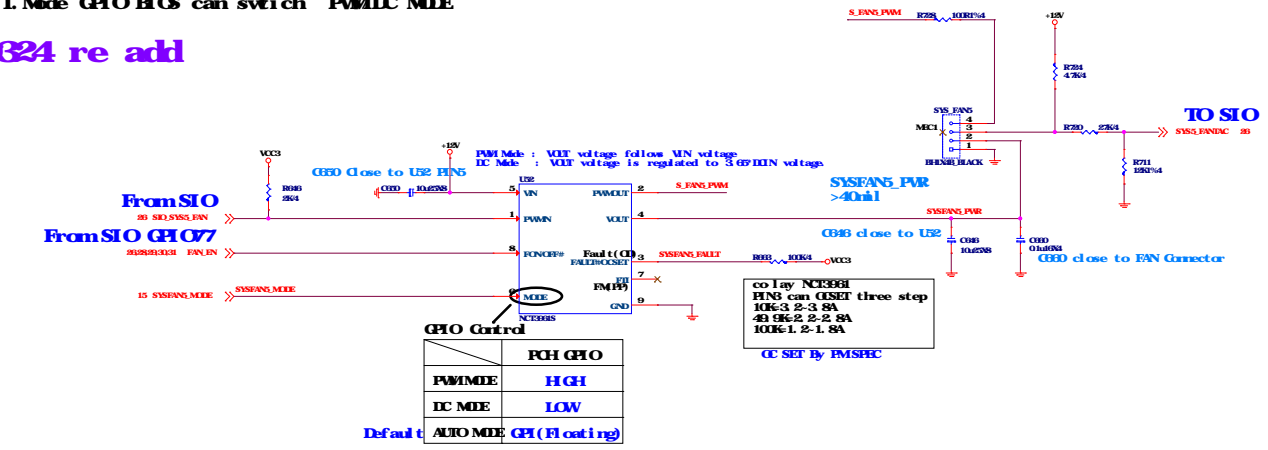
TYPE M: 4 PIN CPU FAN USE NCT3961S USE PCH GPIO CONTROL FAN MDE
1. Mode GPIO BIOS can switch PWMDC MDE



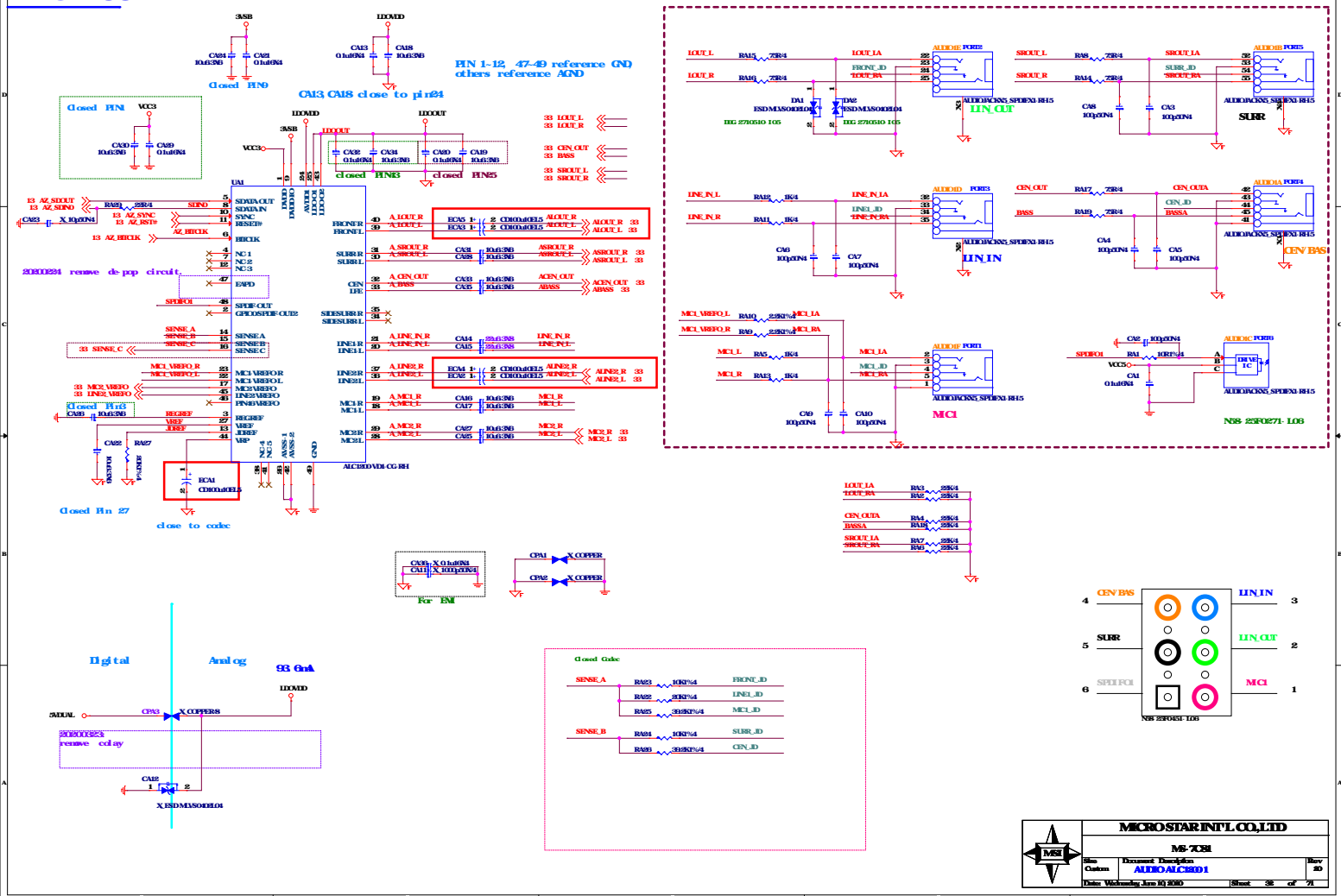
TYPE M: 4 PIN CPU FAN USE NC13961S USE PCH GPIO CONTROL FAN MDE

1. Mode GPIO HIG can switch PWMDC MDE


20200624 re add



ALC1200

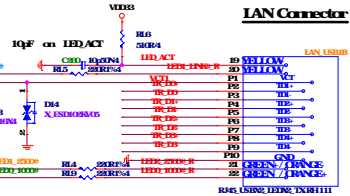
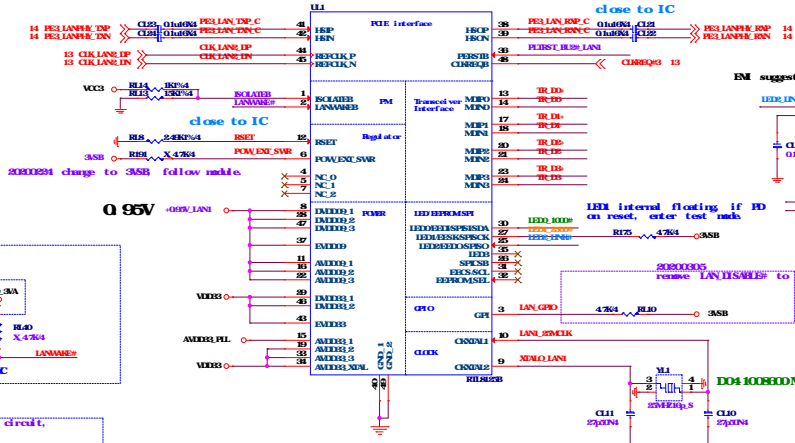
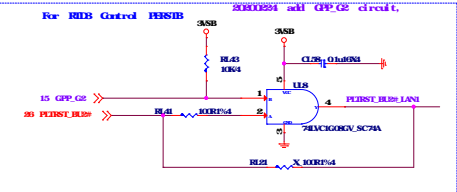
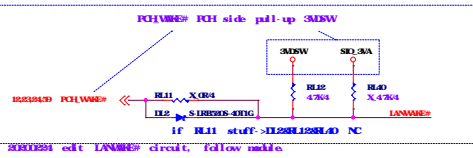
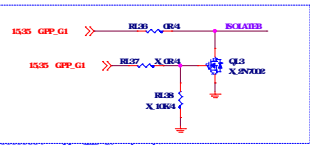


20200522
2 0 Remove i 219v.

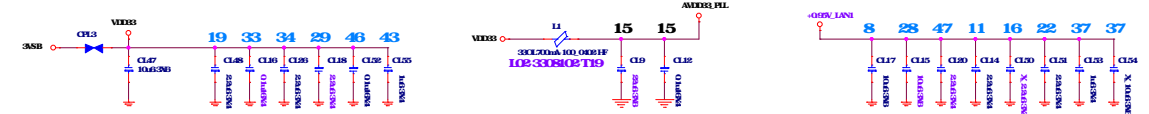


MICROSTAR INT'L CO., LTD		
MS-708		
Rev	Document Description	Rev
Custom	Intel i5m 820	80
Order: Visit us at www.msi.com		Sheet 34 of 34

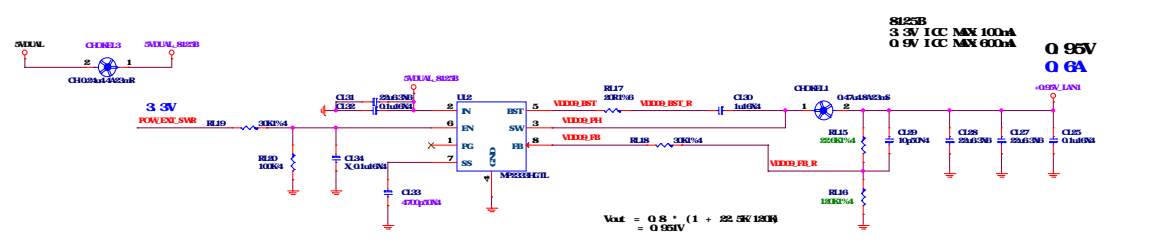
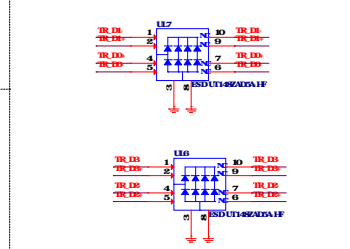
Realtek Lan RTL8125B(25G)



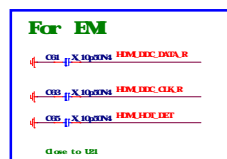
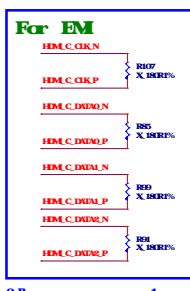
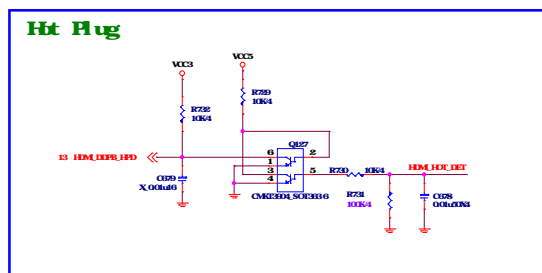
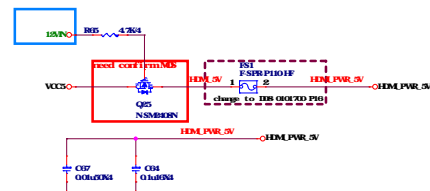
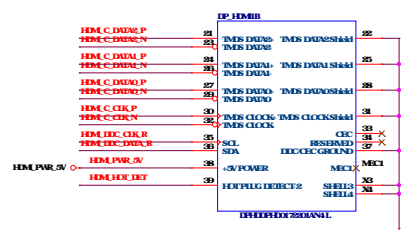
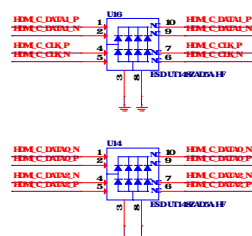
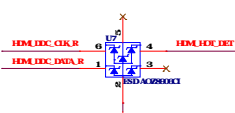
R103 9 via fronttop layer to GND layer and make the via at the center of IC

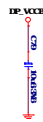
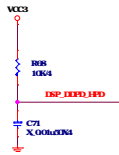
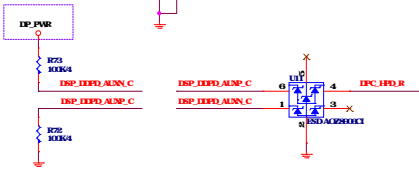
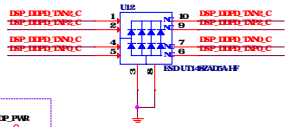
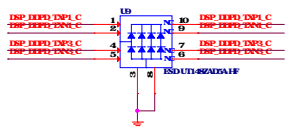


ESD Protect close to connector

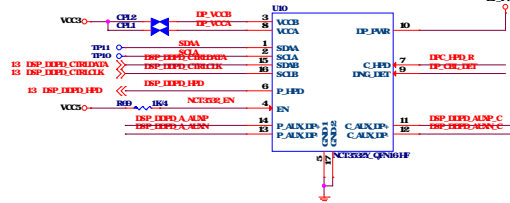


MICROSTAR INT'L CO., LTD			
MS-708H			
Rev	Docment Description	Rev	
Custom	Intel Lan R21	Rev	
Date: Wednesday, June 20, 2020		Sheet 35 of 51	

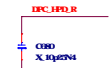
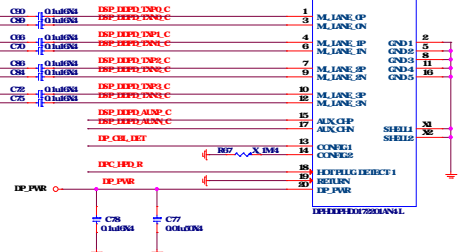




DP_VCB trace don't less than 30 mil

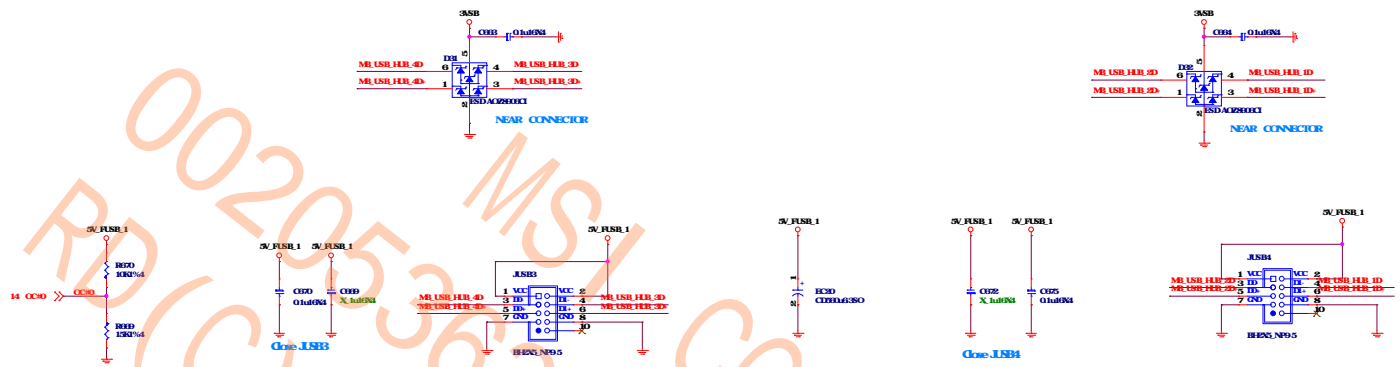


DP

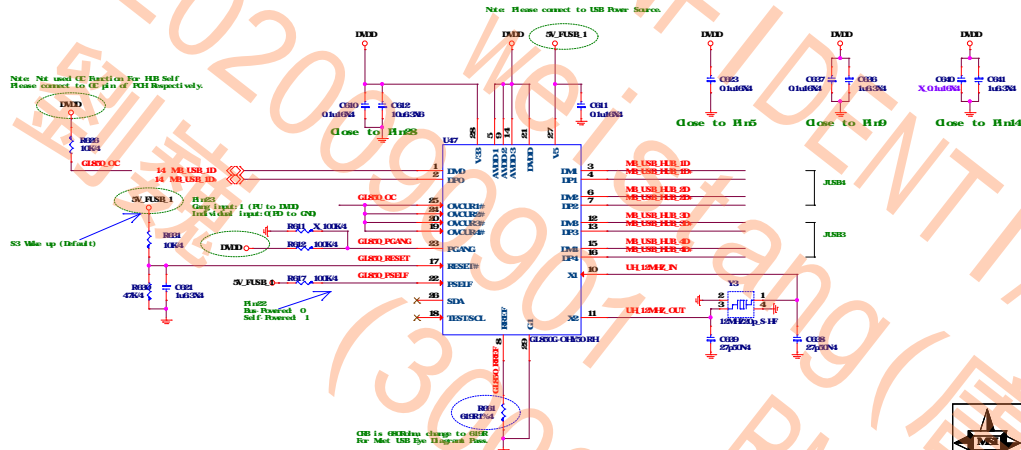


MICROSTAR INT'L CO., LTD			
MS-7281			
Doc	Document Description	Rev	
Custom	DP Connector	20	
Date: Wednesday, June 20, 2007	Sheet	20	of 21

Front USB2_0

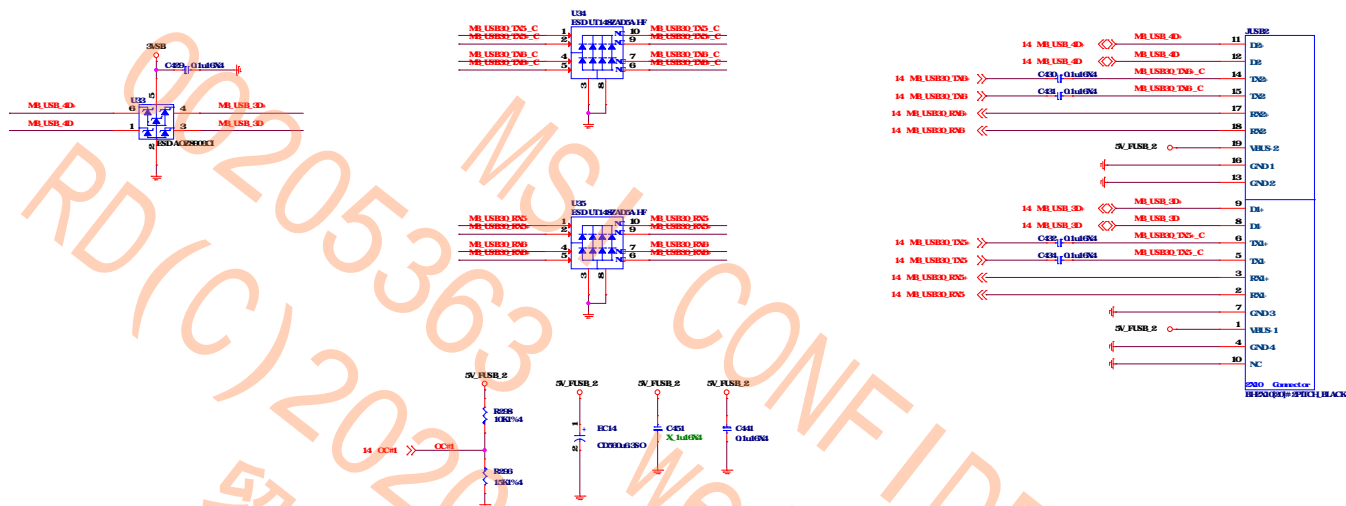


GL50G USB20HUB



MICROSTAR INT'L CO., LTD			
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Client	Product	Ver	1.00
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Front USB3.1 Gen1



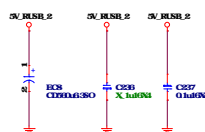
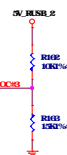
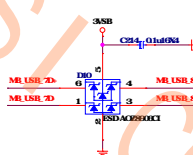
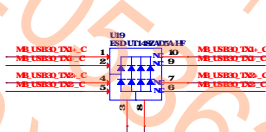
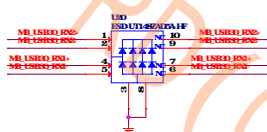
MICROSTAR INT'L CO., LTD			
MS-708			
Doc No.	Document Description	Rev.	80
Client	Front USB3.1		
Order Number	MS-708	Sheet	40 of 50

Rear LAN USB3 1 Gen2

UP

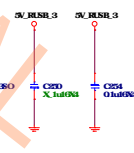
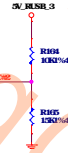
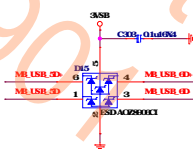
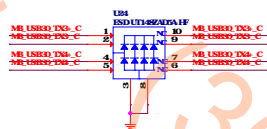
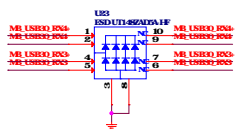
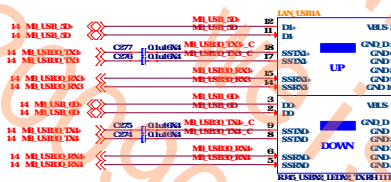
DOWN

1.8A



Rear LAN1 USB3 1 Gen1

RIL8125B 2 5G



MICROSTAR INT'L CO., LTD.

MS-7081

Size	Document Description
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Order LANUSE31/PS2

Date: Wednesday, June 10, 2020

20200522
2 0 Remove ASM6241&rear type C

MSI CONFIDENTIAL
RD(C)2020090901
weistang (周浩健)
(30001789)
RMA工程課

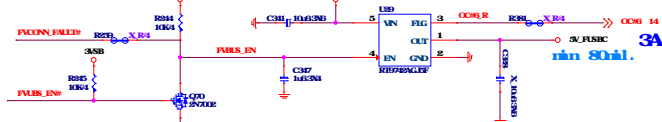
MICROSTAR INT'L CO., LTD	
MS-7CE	
Doc	Document Description
Customer	Blue-LED PCB ASSEMBLY
Doc. Modifying Item ID	Doc. No.
1	46 of 74

20200522

2 0 Remove ASM241&rear type C

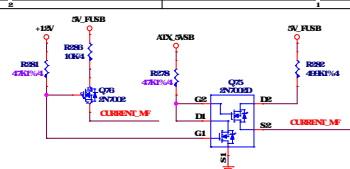
MSI CONFIDENTIAL
RD(C)2020090901
weistang (廖浩健)
RMA工程課
(30001789)
劉魏

		MICROSTAR INT'L CO., LTD	
MS-708			
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01	USBTYPECA	01	
Order: 10000000000000000000		Sheet 45 of 58	



3A under S0 node
1. 5A under S3 node

3A under S0 node
1. 5A under S3 node

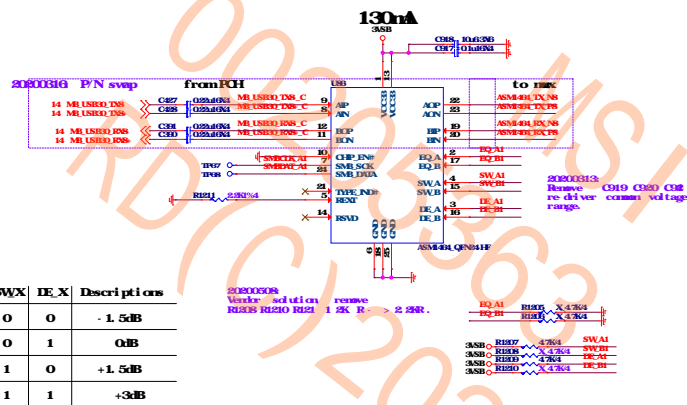


CURRENT MF
L - Default for 900mA
M- Mid (500K) for 1.5A
H- High (10K) for 3A

L- Default for 900K
M- Mid (500K) for 1.5A
H- High (10K) for 3A

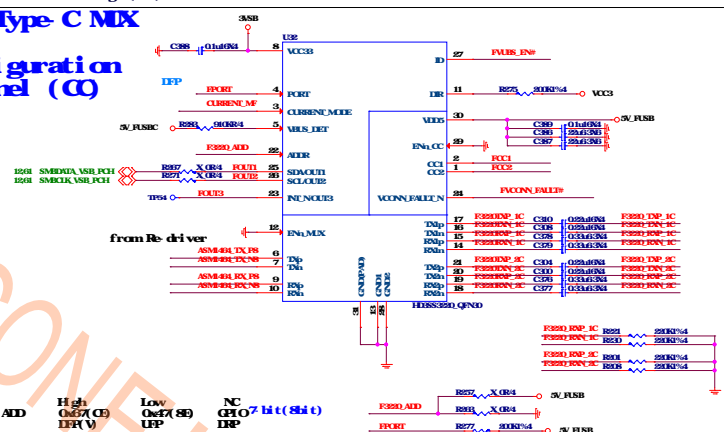
M- Mid (50K) for 1.5A
H- High (10K) for 3A

Rear USB3.1 Redriver **20300224 Add USB3.0 re-driver**

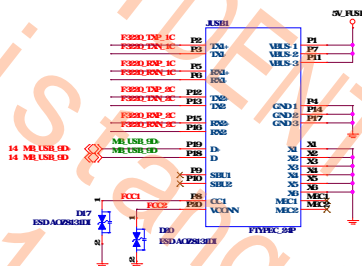
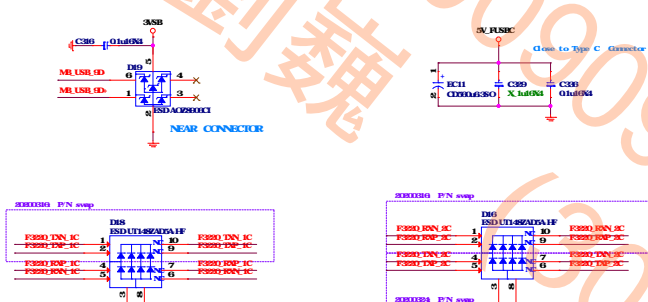


SWX	IE_X	Descriptions
0	0	- 1.5dB
0	1	0dB
1	0	+1.5dB
1	1	+3dB

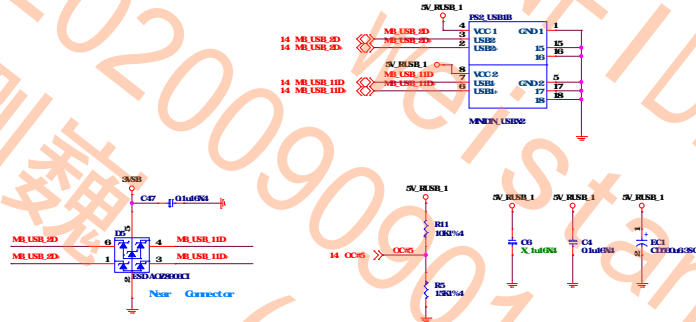
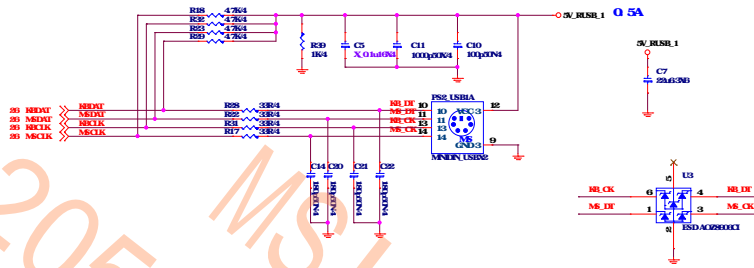
USB Type-C ME with Configuration Channel (CC)



TYPE C

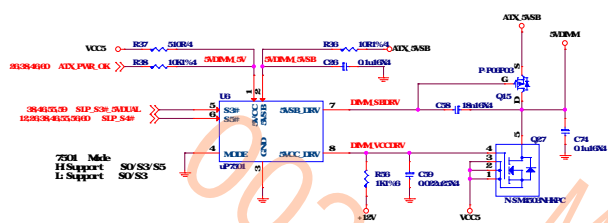


PS2 USB2 0

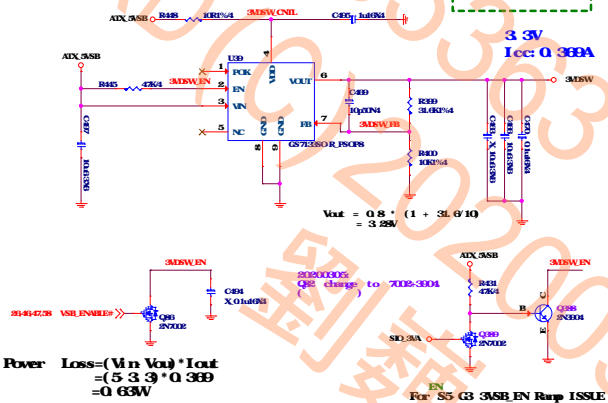


5MINMFOR DDR

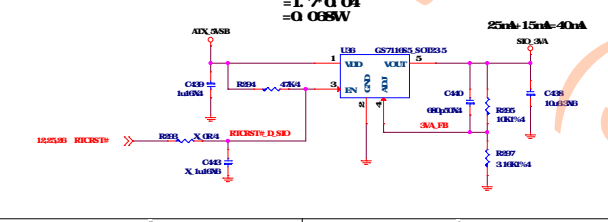
9 831A



3MSW

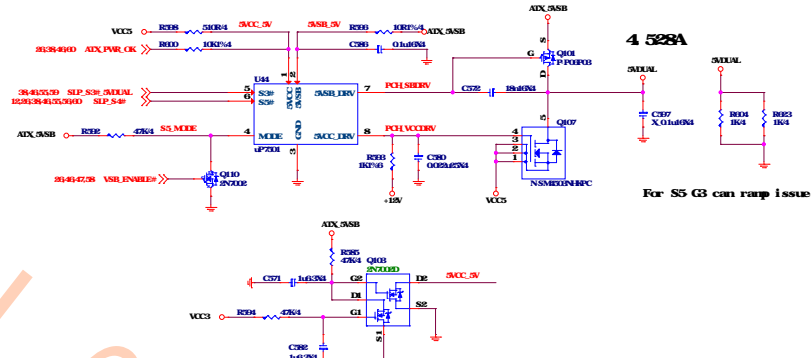


SIO 3A



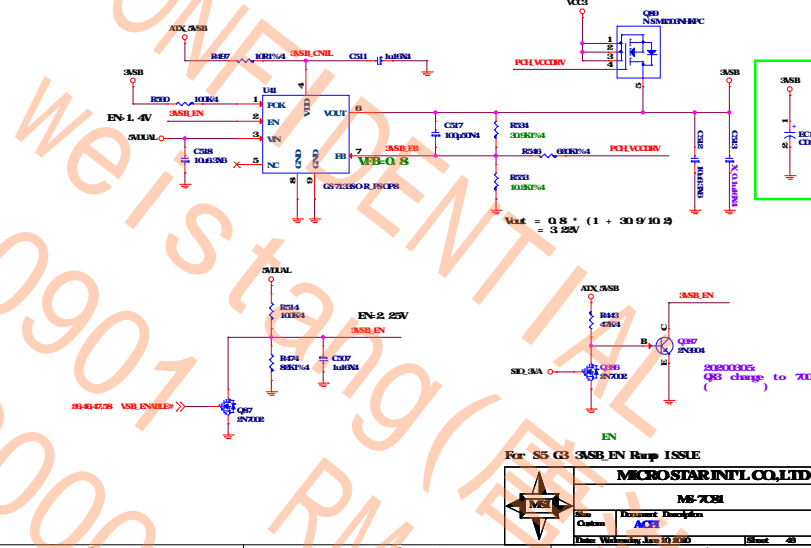
5MDUAL

4 528A



3ASB

Current limit test : 30A



MICROSTAR INT'L CO., LTD			
MS-708H			
Rev	Docu	Docu	Docu
Docu	Docu	Docu	Docu
Docu	Docu	Docu	Docu

For TL084 L
DEEP Mode : Stuff D89/D85
DSWMode : Stuff D89/D85/R805

For EM

For SPI TP/MUSE

Close to J1PM

Series resistor is 62 ohm for 3.3V

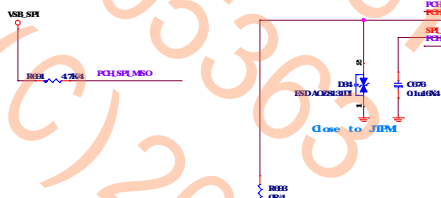
G4my -SSM footprint

MICROSTAR INT'L CO., LTD.

MS-7C8H

Doc No: MS-7C8H

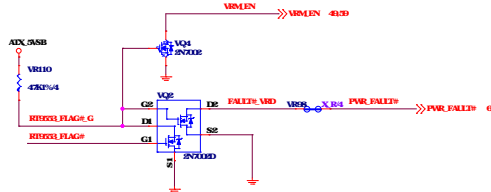
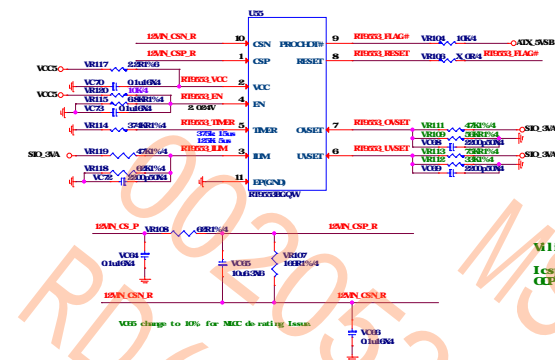
Date: Working Area P0.000 Sheet: 42 of 47



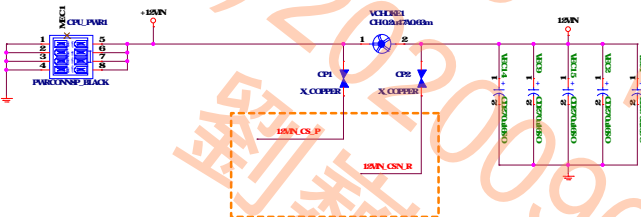
Colay 32M footprint



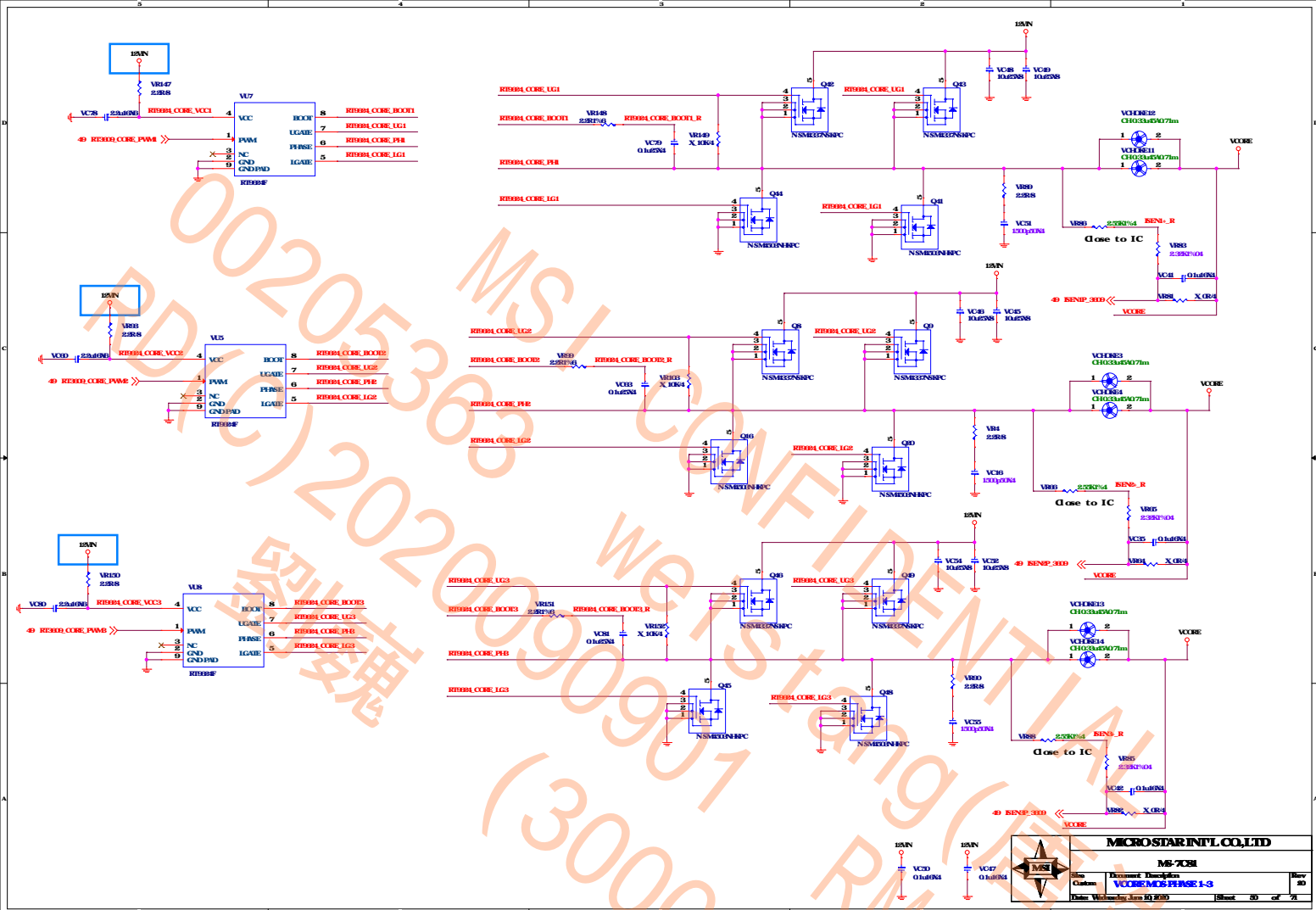
COP: 45A For 10 core 210A Support Current limit test : 42A

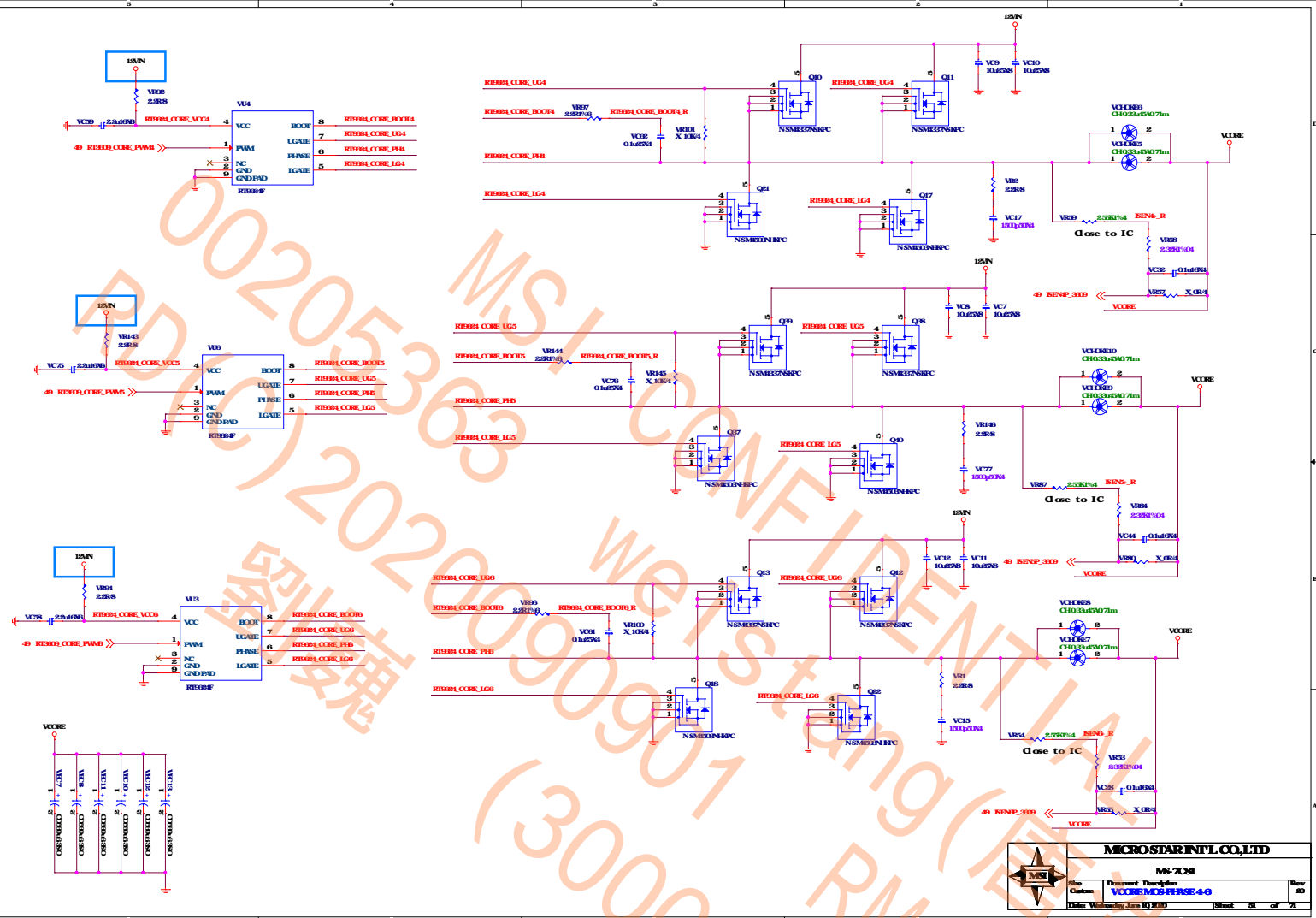


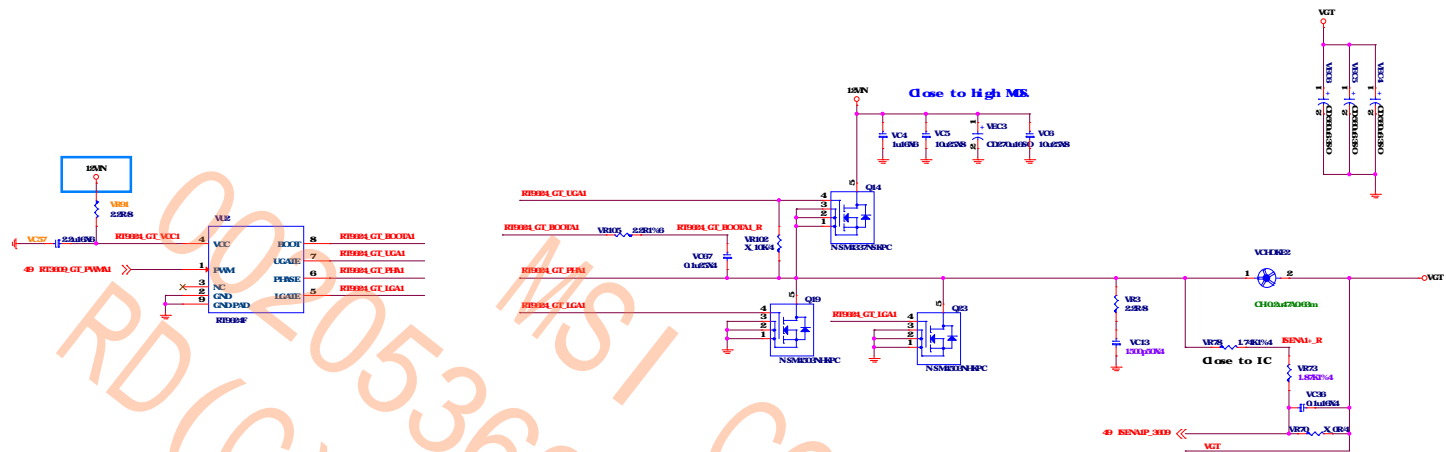
$$\begin{aligned}
 V_{lim} &= 3.3V * 0.625 / (0.625 - 0.475) \\
 &= 1.877V \\
 I_{CSP} &= 0.43A \\
 CIP &= [(0.625 - 1.625) / 100] * [1.877V / (100 * 0.625)] + [(0.43A * 0.625) / 0.625] \\
 &= 45A
 \end{aligned}$$



MICROSTAR INT'L CO., LTD		
MS-708		
Doc	Document Description	Rev
Client	MS-708 Current Test	01
Order	Versioning	01/01







MICROSTAR INT'L CO., LTD	
MS-708	
Doc	Document Description
Content	VOUT MOS FET PHASE 1-2
Issue	Version 1.0
Rev	20

20

Q 95V Icc: 6 4A

Current limit: 8 1A~12A, TYP=9 8A

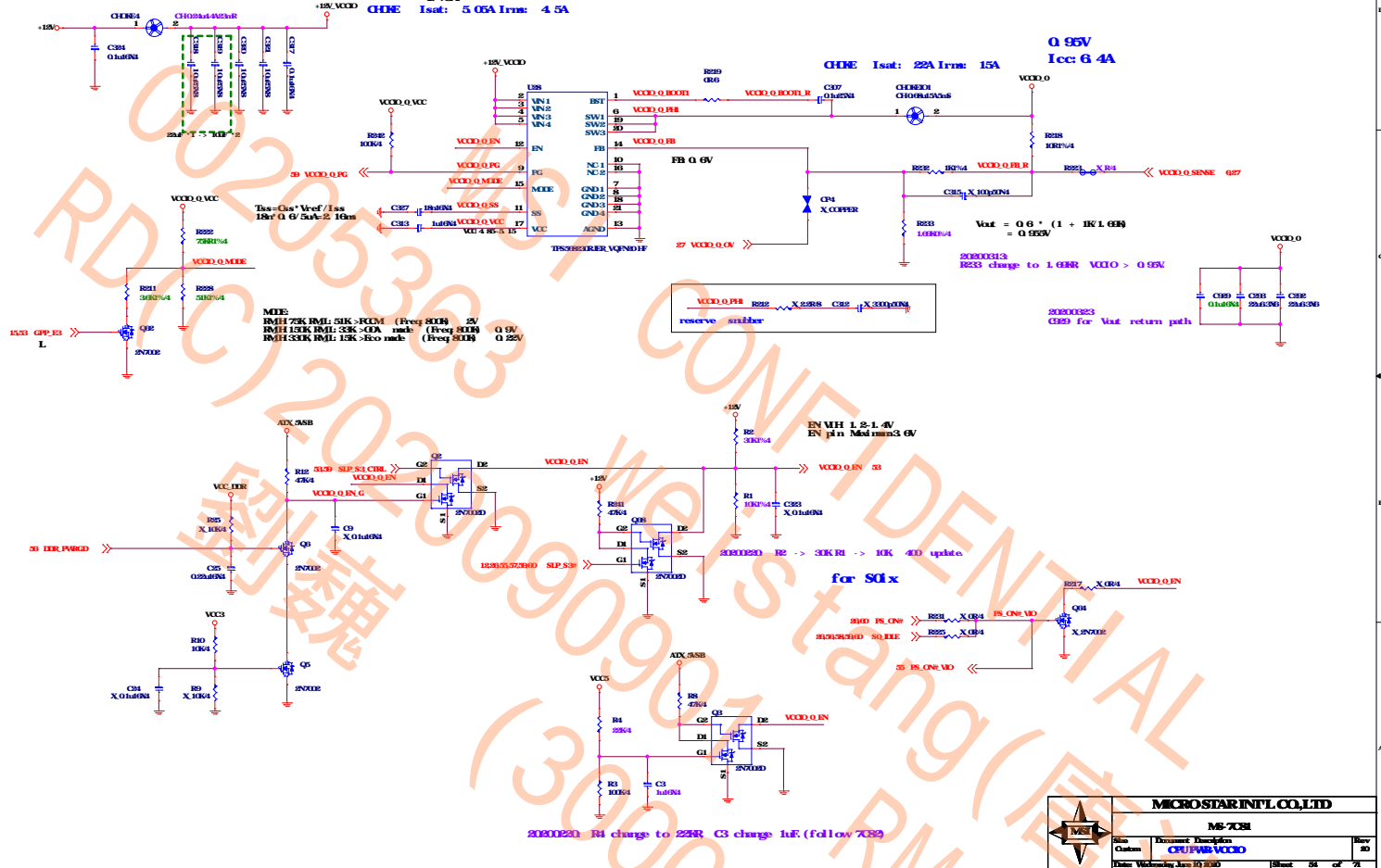
Current limit test : 10 36A

$$I_{rms} = I_{out} \cdot \sqrt{[(V_{out}/V_{in})^2 + ((V_{in} - V_{out})/V_{in})^2]}$$

$$= 6.4 \cdot \sqrt{[(0.95/12)^2 + ((12 - 0.95)/12)^2]}$$

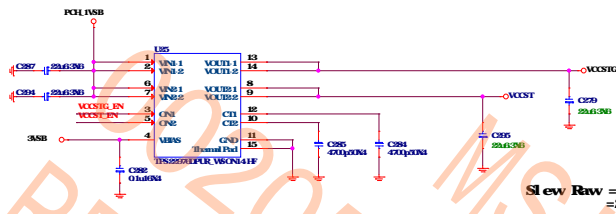
$$= 1.73A$$

Q4NE Isat: 5.05A Irms: 4.5A



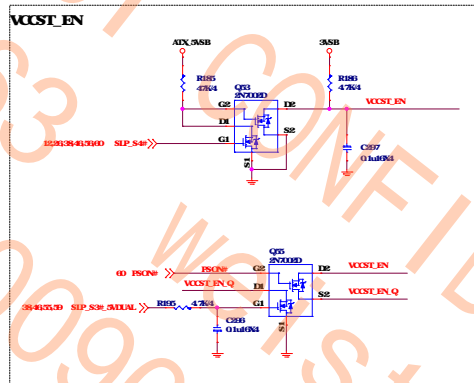
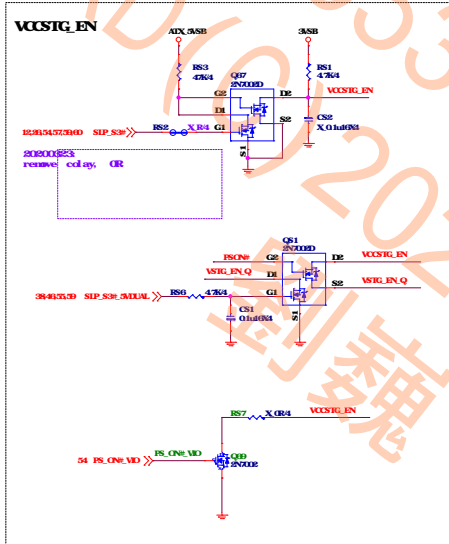
	MICROSTAR INTL CO., LTD		
	MS-7081		
	CPUPWR VCCIO		
	S/W Contain	Document Description	Rev 80
Date: Wed, May 30, 2000		Sheet 56 of 71	

$$\begin{aligned} P_{\text{over Loss1}} &= (I^2 \cdot R) \cdot R_{\text{th}}(\text{on}) \\ &= (0.45 \cdot 0.45) \cdot 0.027 \\ &= 5.5 \text{ mW} \\ P_{\text{over Loss2}} &= (I^2 \cdot R) \cdot R_{\text{th}}(\text{on}) \\ &= (0.2 \cdot 0.2) \cdot 0.027 \\ &= 1 \text{ mW} \end{aligned}$$



Slew Rate = 0.42 470p/56
= 2030uS

A CIN greater than C1 is highly recommended



MICROSTAR INT'L CO., LTD

MS-708

Doc Custm	Documt Designtm CPU FWR VCSTG/EN	Rev 80
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Under VLSI Technology 10/00 Sheet 85 of 91

DDR4 Power: 1.2V @ 13.67A

3.7A For CPU

9.1A For DIMM

0.7A For DDR VTT

0.17A For VCCPLCC

OPP = 16.2A-21.2A; Choke Isat=17A-20A

$I_{cp} = R_{reset} \cdot I_{ocset} / R_{load}(low)$

$= 8.22k \Omega \cdot 10uA / 3.5m$

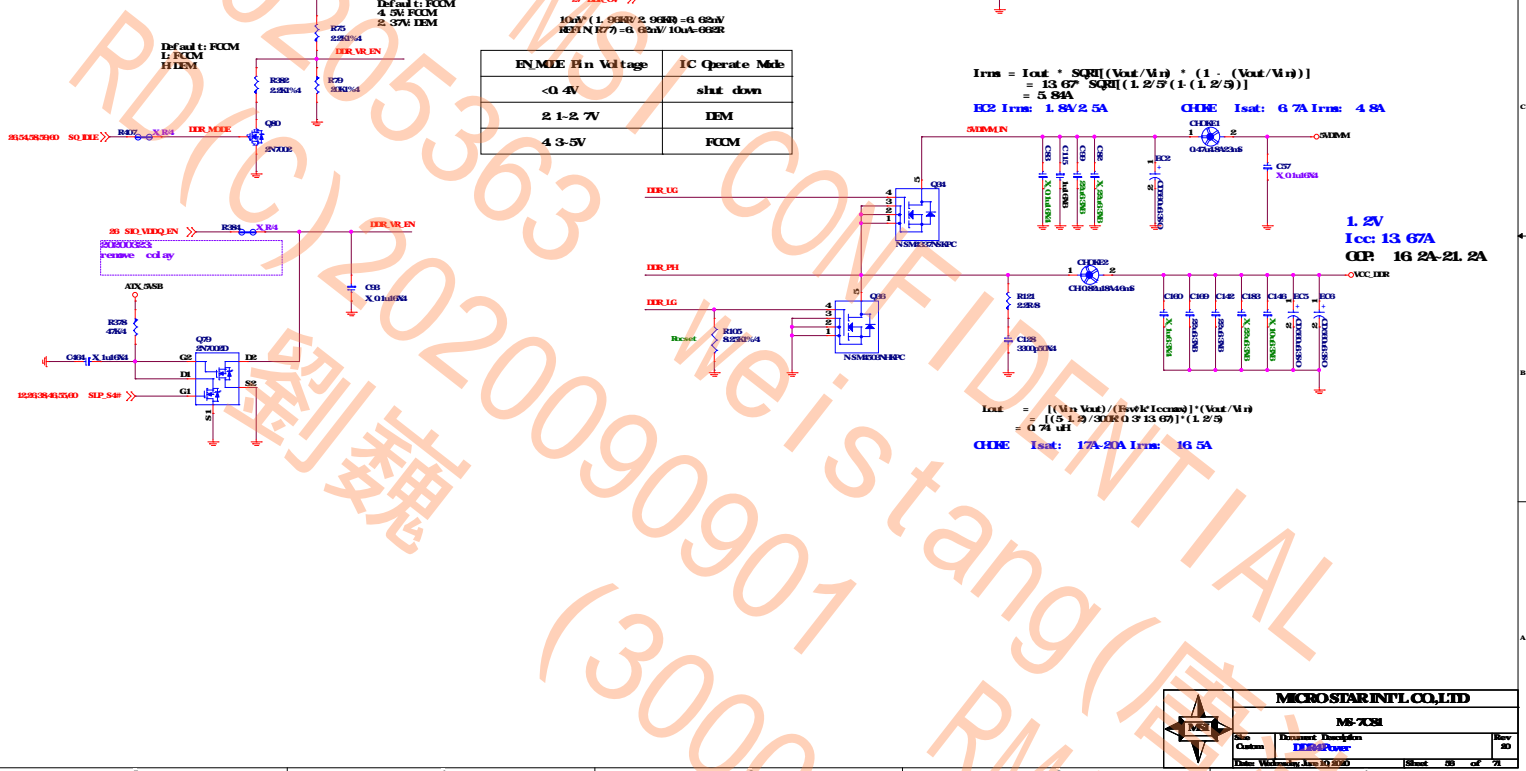
$= 23.2A$

$I_{cp} = R_{reset} \cdot I_{ocset} / R_{load}(max)$

$= 8.22k \Omega \cdot 10uA / 5.1m$

$= 16.2A$

Current limit test : 20.98A

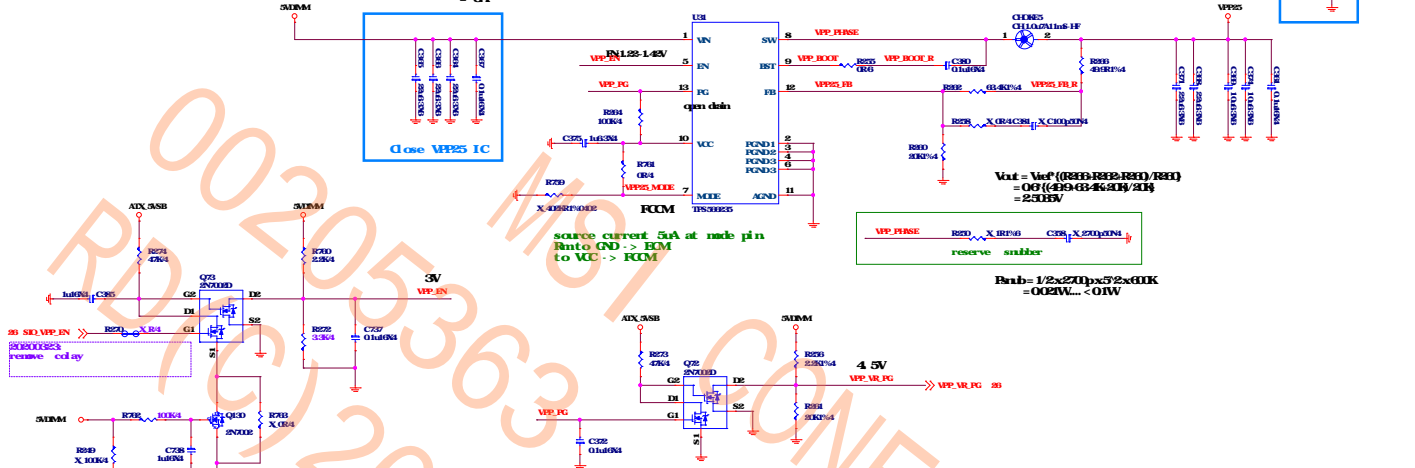


VPP2.5V Power: 2.5V/6A(for dimmLED)

IC OCP: 76A(66A-86A)

Current limit test : 8.44A

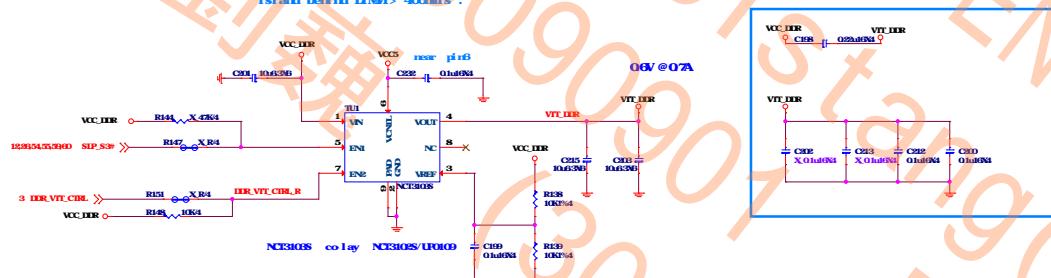
$$I_{lim} = I_{out} * \sqrt{R_{DS(on)} * (V_{out}/M_{tr}) * (1 - (V_{out}/M_{tr}))}$$
$$= 8 * 0.5$$
$$= 3A$$



DDR VIT Power

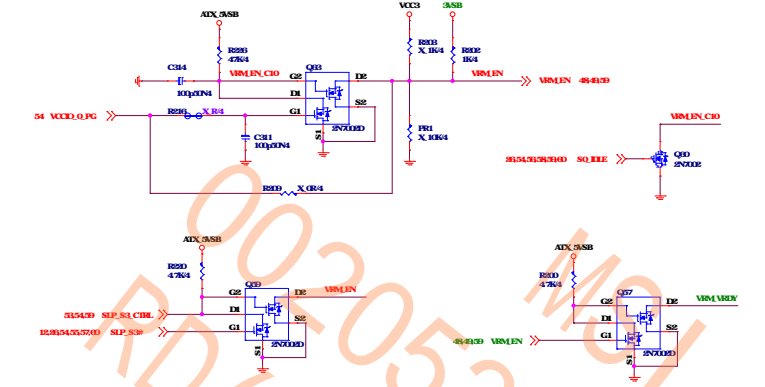
IC OCP: 21A-4A

To GU Gpper trace width > 250uils , R11
Island behind DIM1: 400uils .



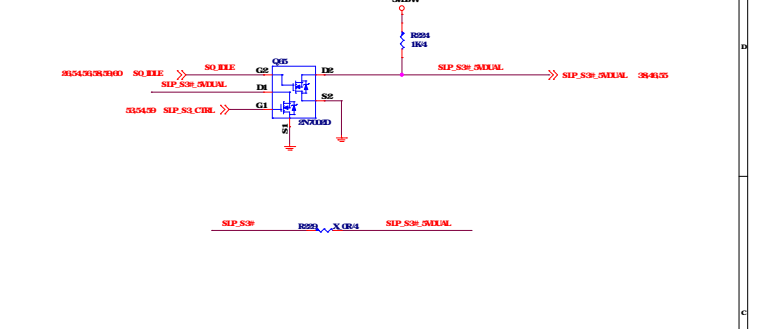
MICROSTAR INT'L CO., LTD			
MS-708			
Rev	Docu	Docu	Rev
01	01	01	01
Under Modification: 2010/10/10			

for VRMEN



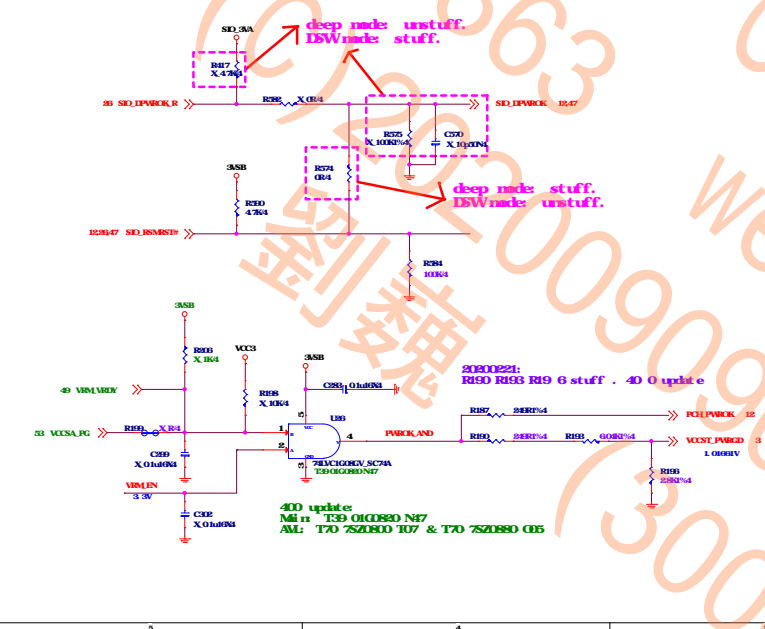
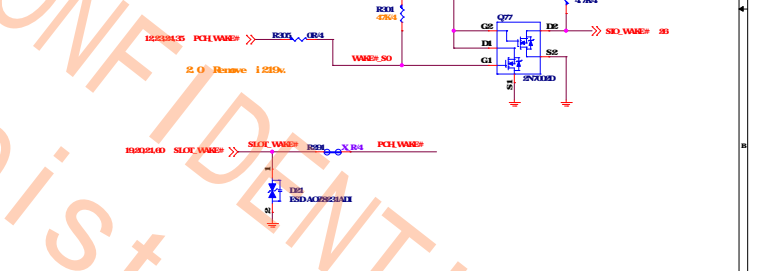
for 5VIMM and 5VIAL

for S01x

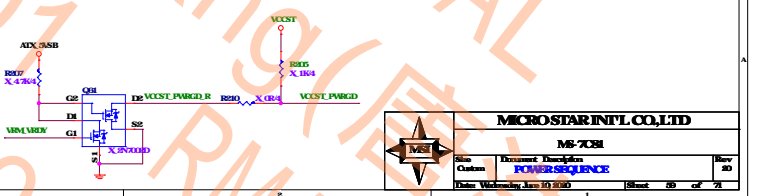


for v04e

PCH V04E# PCH / M2 / ASM241 / RL18125B
SLOT V04E# PCIe Slot
LANPHY V04E# 1219

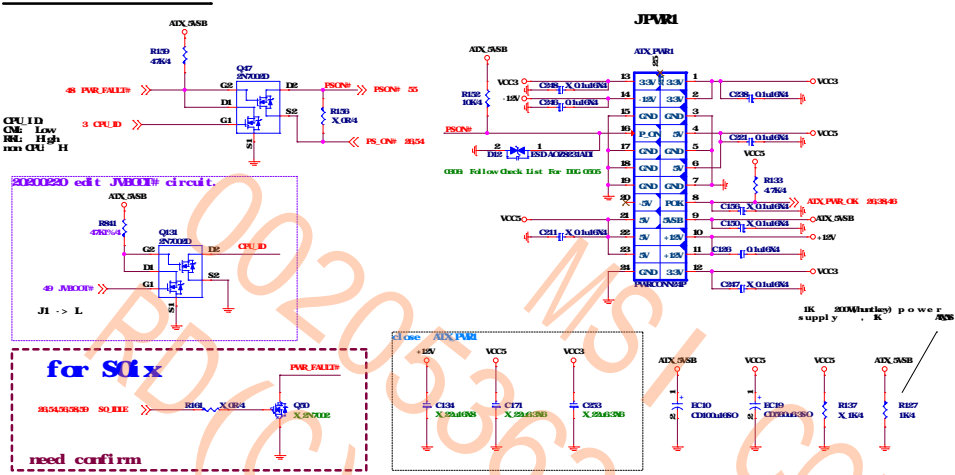


20000221: Q01 R007 R08 R2 - 05 unstuff f. 4 00 upds

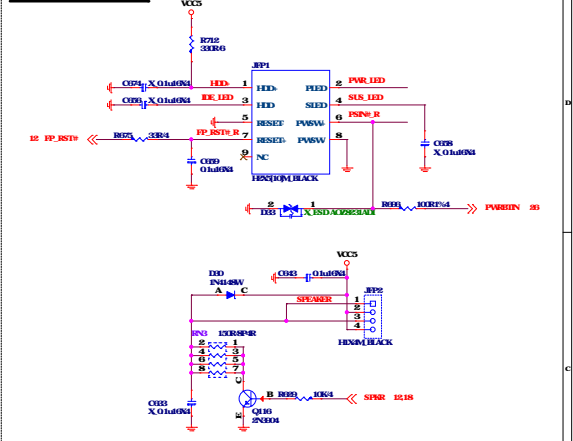


MICROSTAR INT'L CO., LTD			
MS-702H			
Rev	Document Description	POWERSEQUENCE	
Custom			
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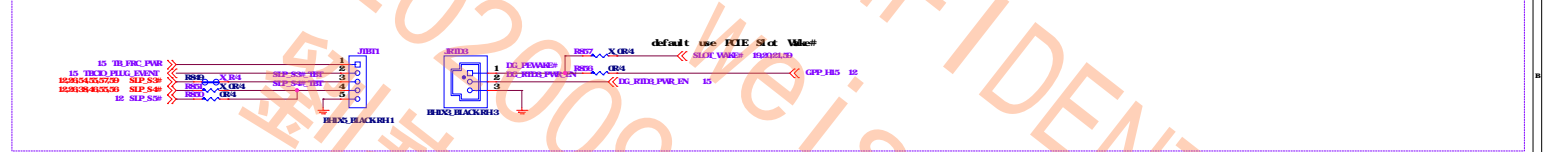
AUX POWER CONNECTOR



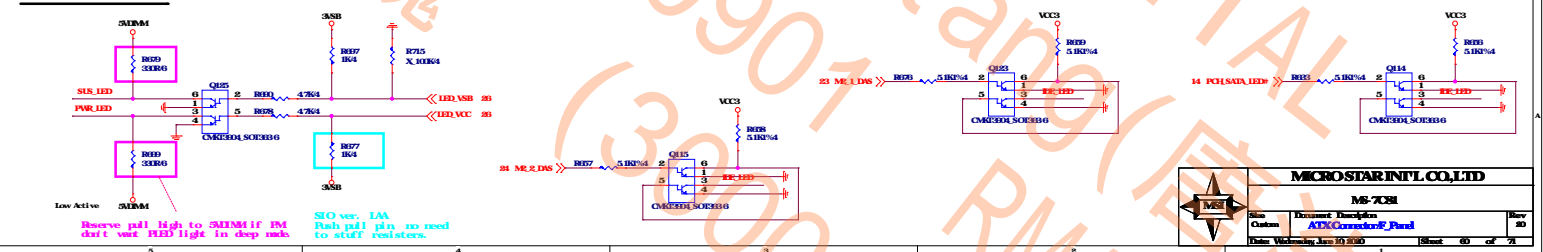
FRONT PANEL



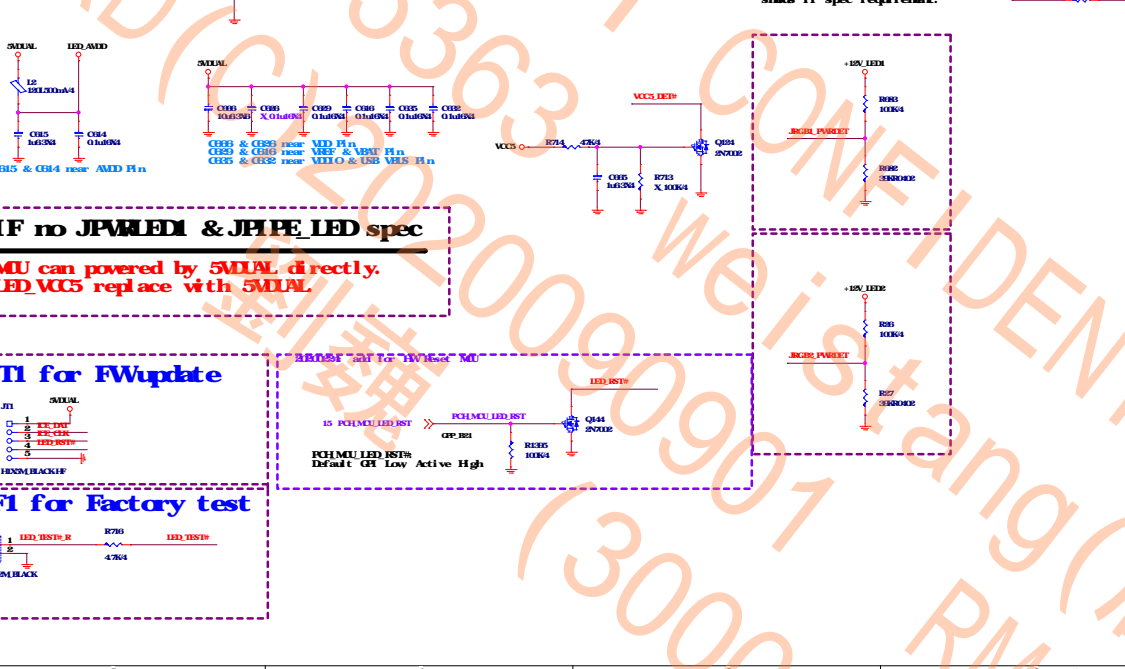
Thunderbolt card support



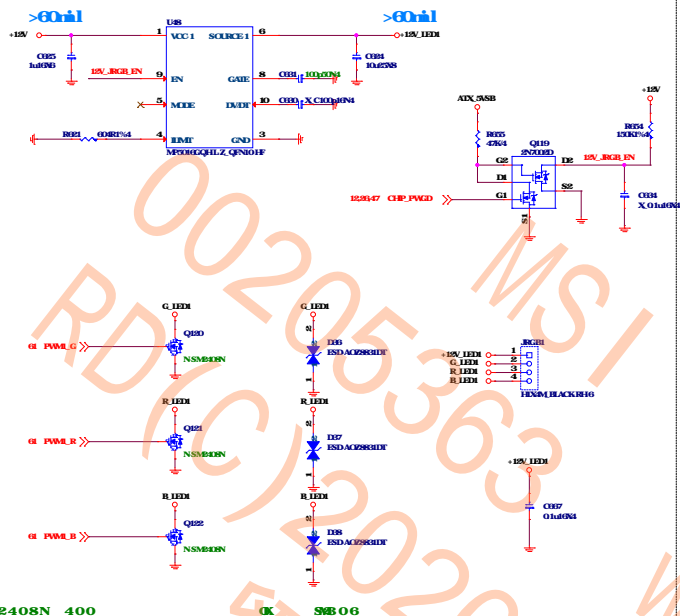
Front Panel LED



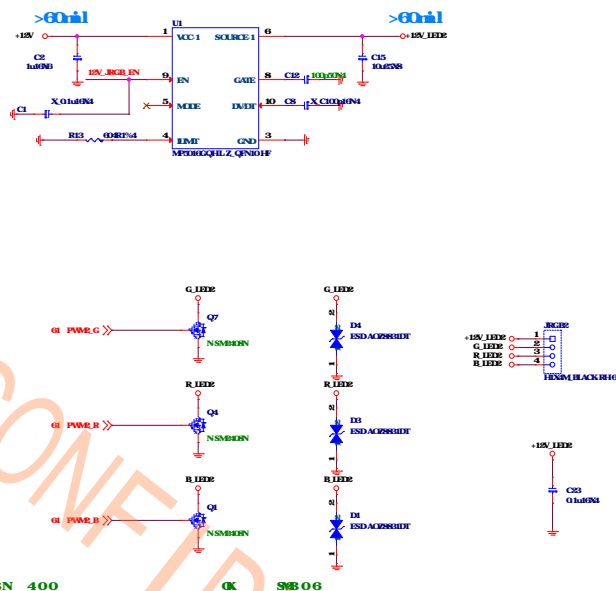
MICROSTAR INT'L CO., LTD			
MS-702H			
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Custom	AUX Connector_P_Panel	80	
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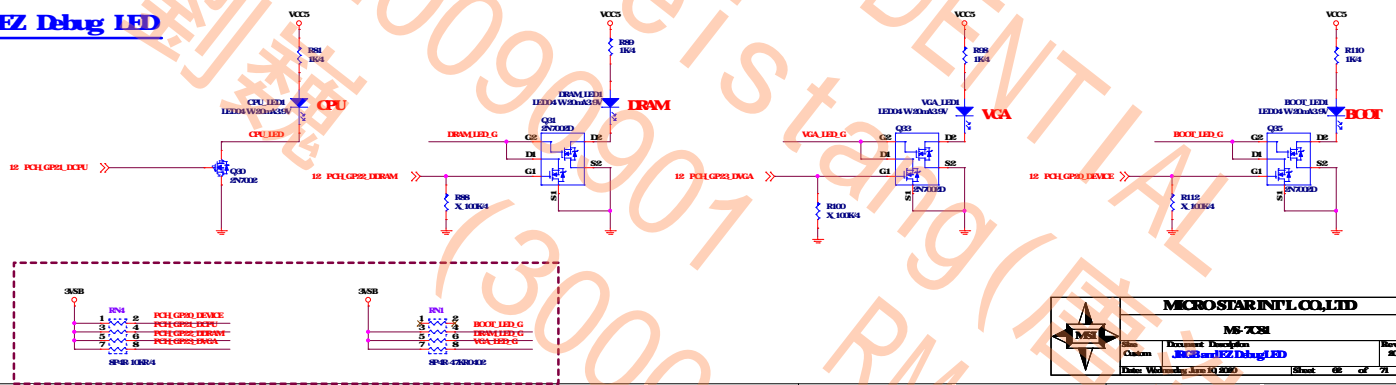
JRCB1



JRCB2

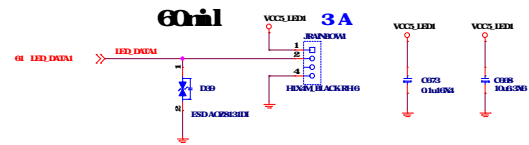
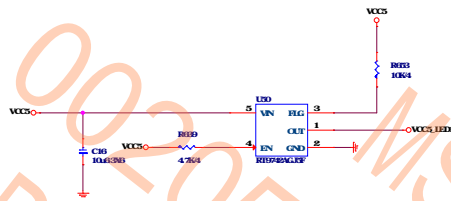


EZ Debug LED

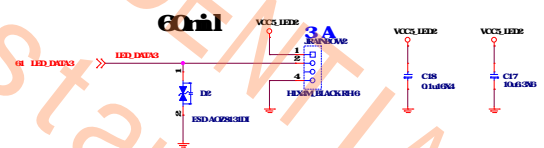
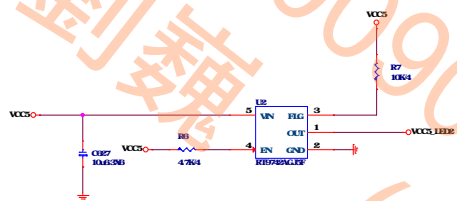


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MS-7C81			
Doc No.	Documen Description	Rev	Ed
000001	MS-7C81 EZ Debug LED	1	01
Date: Wed, 2009-10-20 10:00:00		10/20/09	01 of 01

JRAINBOW1 LED



JRAINBOW2 LED



MICROSTAR INT'L CO., LTD

MS-708

Doc: JRAINBOW1_LED Rev: 1.0

Under: MicroStar J-1000 Sheet: 65 of 71

PCH LED

20200522

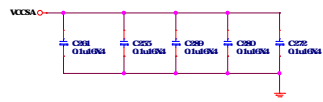
2 0 Remove PCH LED

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RD(C) 2020090901
weistang (廖浩健)
RMA 工程課
(30001789)
劉魏

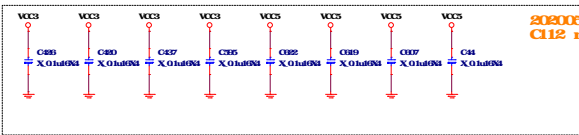
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MS-7C81	
Doc No.	MS-7C81
Doc Name	MS-7C81
Doc Version	MS-7C81
Doc Date	MS-7C81

Return path cap

for VCCSA return path

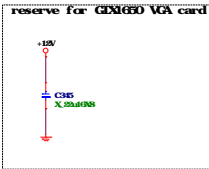
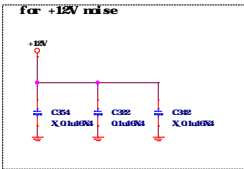
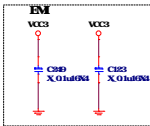
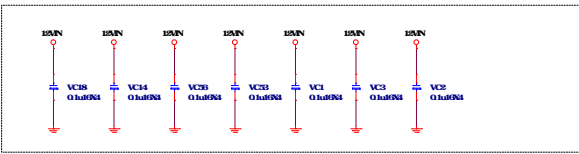


For EMC Request

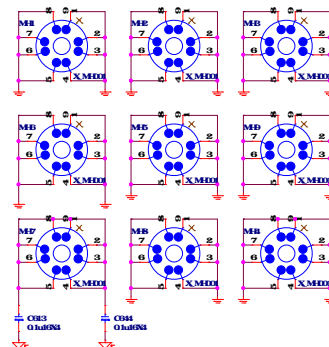


20200622
C112 remove, 2 0 Remove ASM241&rear type C

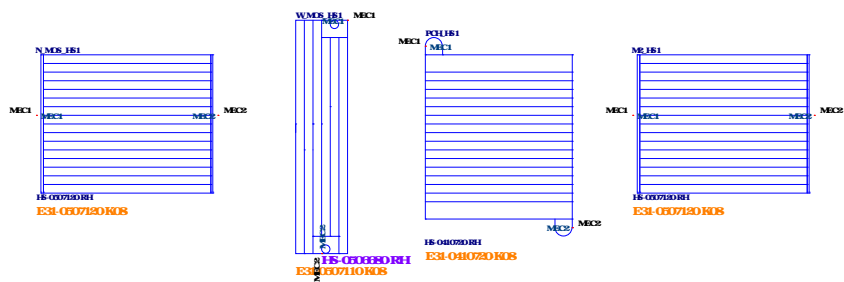
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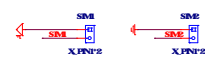
Munting Hb es



Heat Sink



Simulation



Optical Fiducial Marks- 120

