MS-7B23

ATX:243.8mm*243.8mm

Ver: 1.0

Intel -CoffeeLake-S plamform

CPU:

LGA1151

*CPU POWER PAK *4Phase*

*GT POWER PAK *2 Phase*

Onboard Chip:

SIO: NCT5567D colay NCT5565D

HD Audio Codec: ALC887

LAN: RTL8111H

Flash ROM: SPI 64 MB

DP to VGA: RTD2167

CUT VBAT:SLG4B41231

Main Memory:

*DDR4 * 4 (Dual Channel)*

ACPI:

5VDAUL:uP7501

5VDIMM:uP7501

3VSB:GS7133+N MOS

1P8_VSB:GS7133

3VDSW:GS7116

VCCSTPLL:GS7133

System Chipset:

Cannon Lake B360

PWM:

VCORE - RT3606

DDR - RT8125E

DDR VPP25- MP2147

PCH(1.05V) - RT8125E

VCCSA - RT8125E

VCCIO - SY8288

Expansion Slots:

*PCI Express (X16) Slot * 1*

*PCI Express (X1) Slot * 2*

*M.2 Slot * 2*

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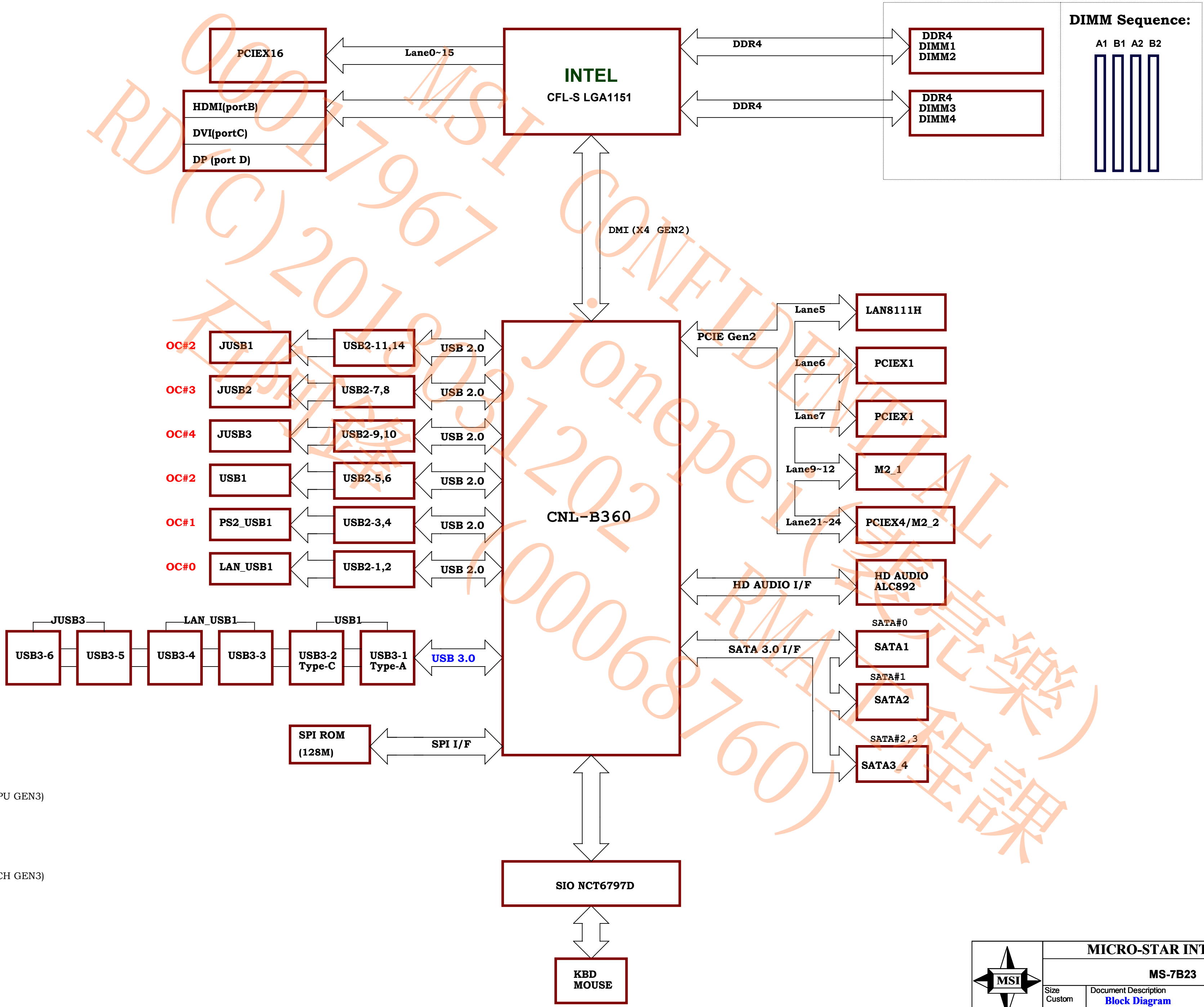
Size: Custom | Document Description: Cover Sheet | Rev: 1.0

Date: Wednesday, January 03, 2018 | Sheet 1 of 63

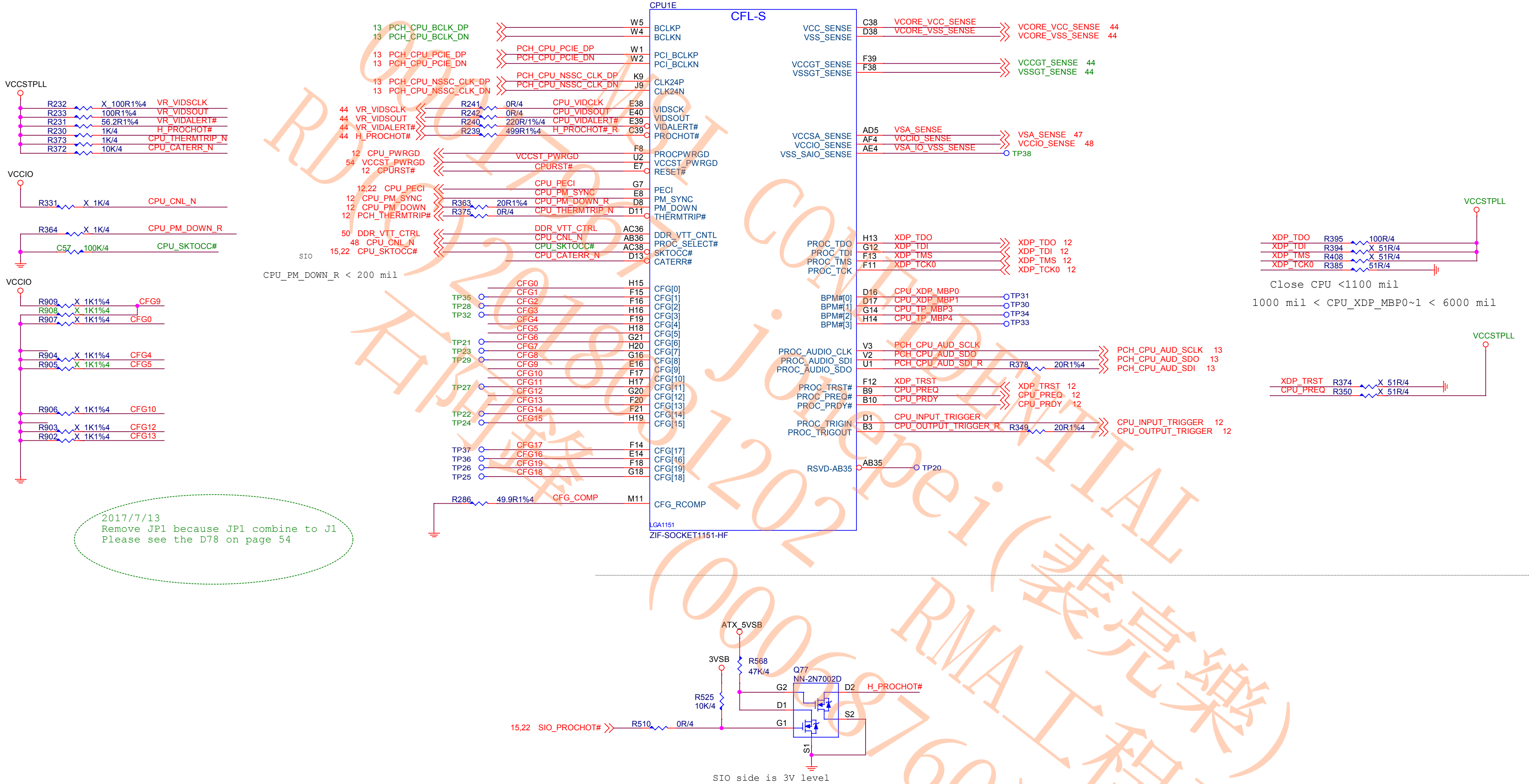
MS-7B23 Block Diagram



Slot Sequence:

Slot	Source
PCIE X16	(By CPU GEN3)
PCIE X1	(By PCH GEN3)
PCIE X1	(By PCH GEN3)
PCIE X4	(By PCH GEN3)
M2_1	(By PCH GEN3)
M2_2	(By PCH GEN3)

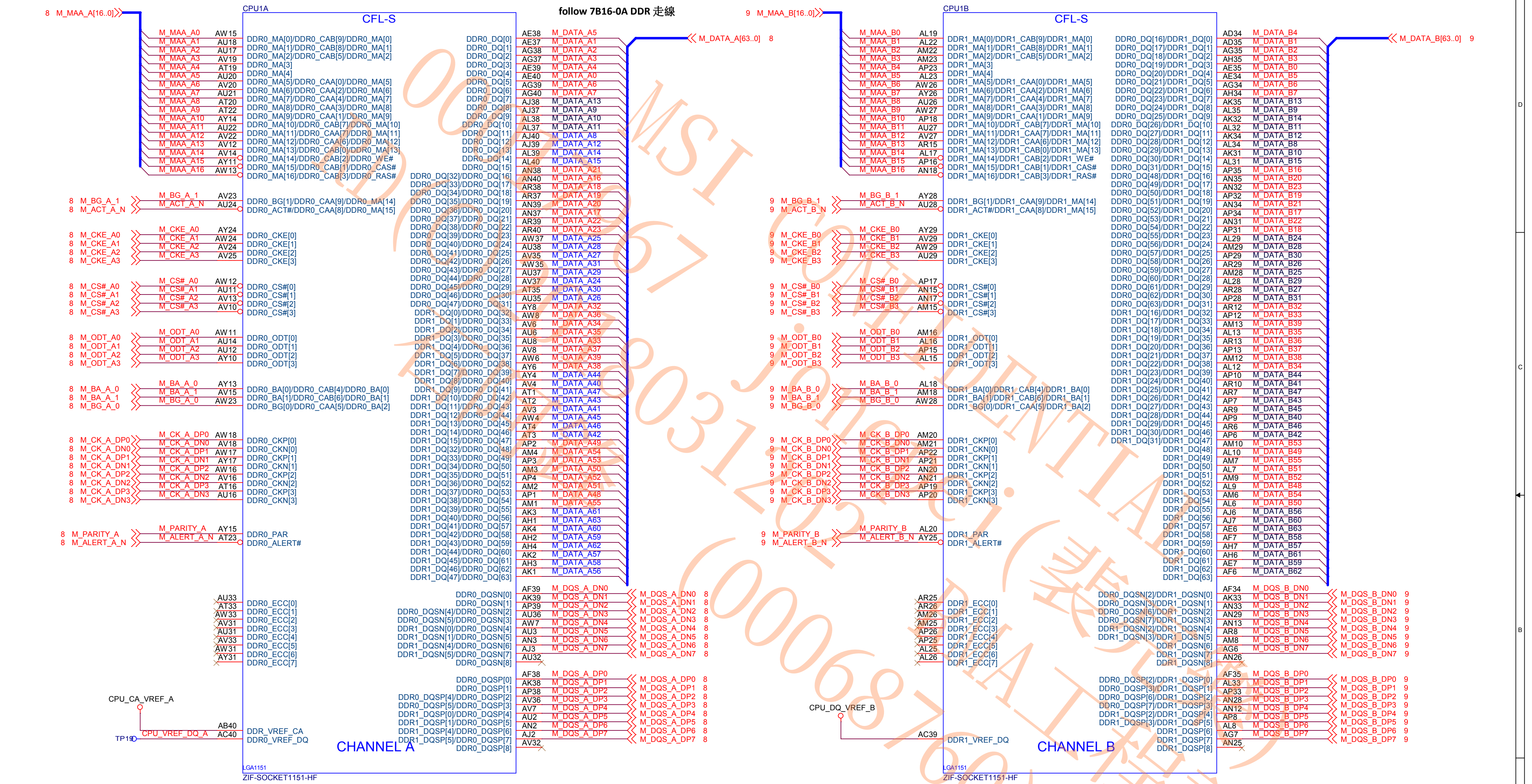
MSI
MICRO-STAR INT'L CO.,LTD
MS-7B23
Size: Custom
Document Description: Block Diagram
Rev 1.0
Date: Wednesday, January 03, 2018
Sheet 2 of 63



CFG Strap

CFG Table			
	HIGH	LOW	DESCRIPTION
0	No Lock	Lock	PCU PLL lock
1			RSVD
2	NORM	REVERSE	PEG LANE REVERSAL
3			RSVD
4	DISABLE	ENABLE	eDP
5	DISABLE	ENABLE	PEG0CFGSEL[0]
6	DISABLE	ENABLE	PEG0CFGSEL[1]
7	RESET#	BIOS REQ	PEG_DEFER_TRAINING
8			RSVD
9	PRESENT	NO PRESENT	SVID PRESENT
10			RSVD
11			RSVD
12			RSVD
13			RSVD
14			RSVD
15			RSVD
16			RSVD
17			RSVD
18			RSVD
19			RSVD

SOCKET PN N12-151A010-L06



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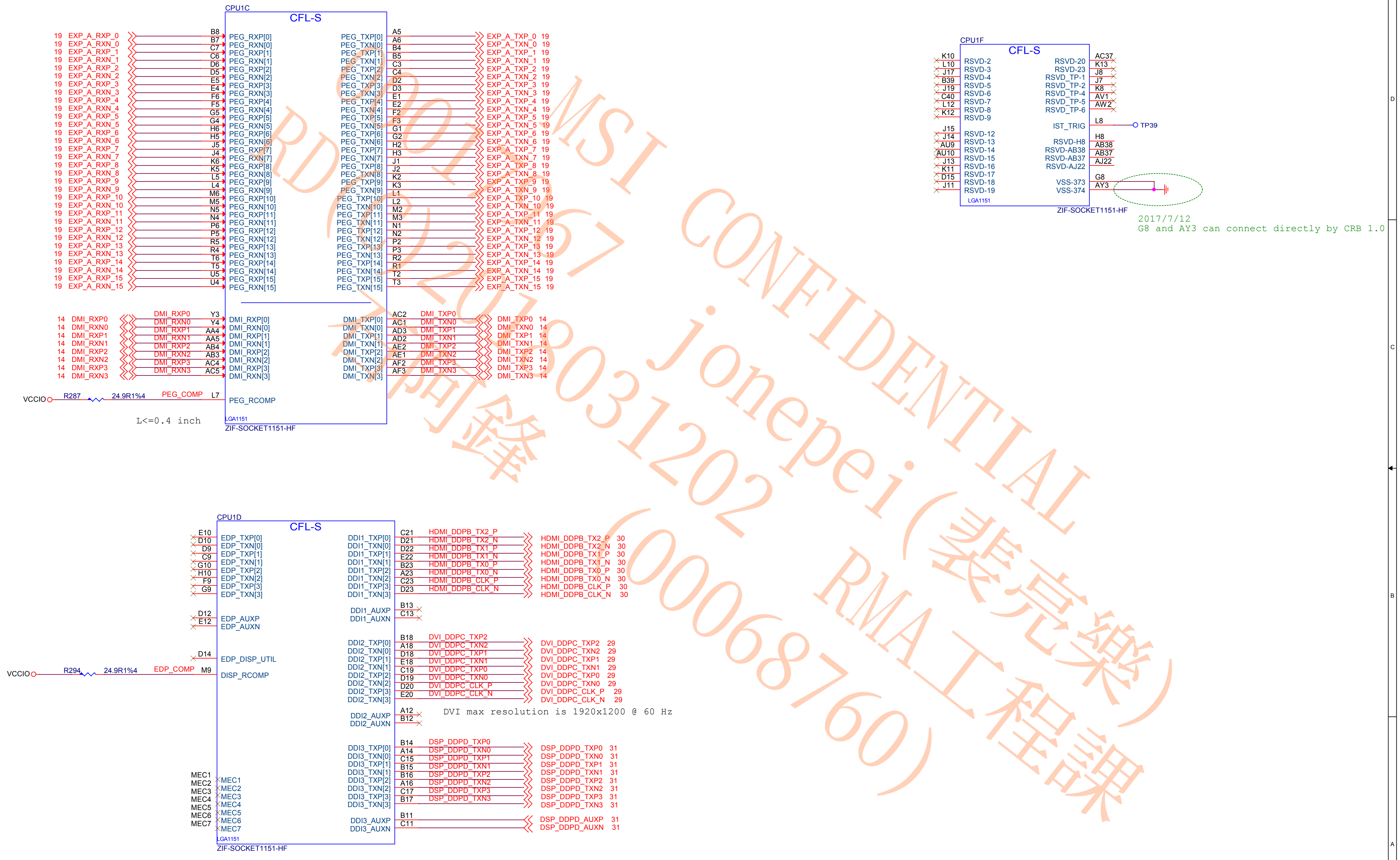
MS-7B23

Size	Document Description	Rev
Custom	CPU-Memory	1.0

Date: Wednesday, January 03, 2018 Sheet 4 of 63

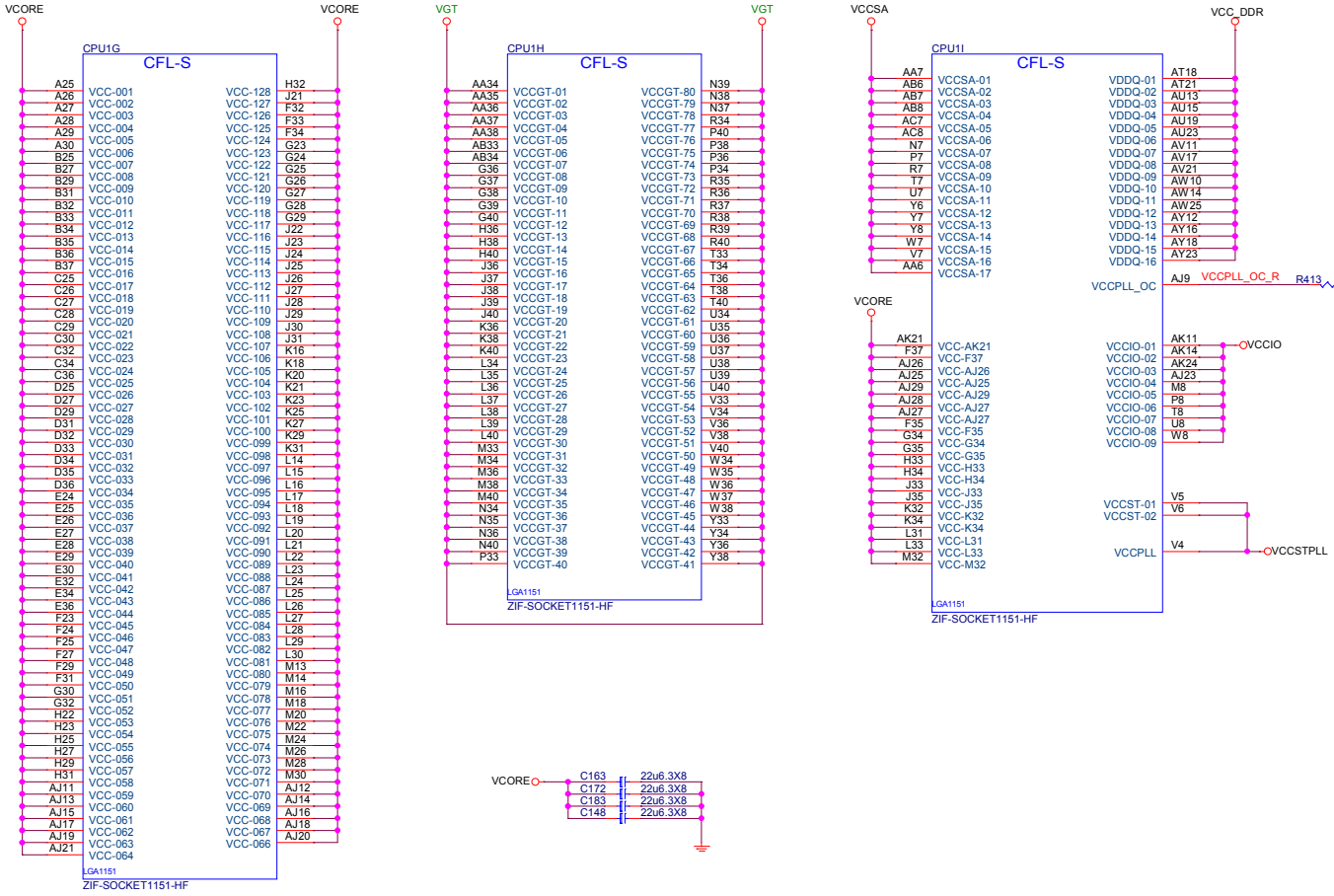


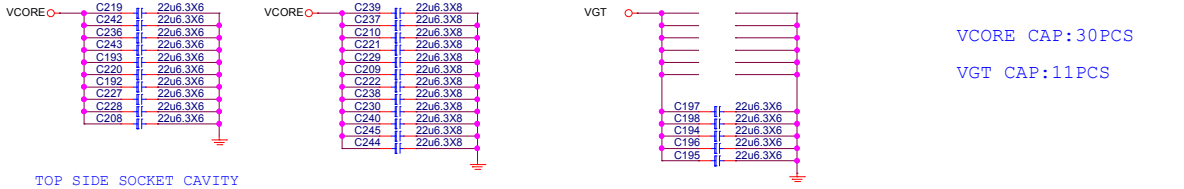
MICRO-STAR INT'L CO.,LTD

MS-7B23

Size	Document Description	Rev
Custom	CPU-PEG/Display	1.0

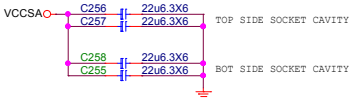
Date: Wednesday, January 03, 2018 Sheet 5 of 63

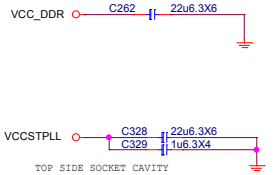


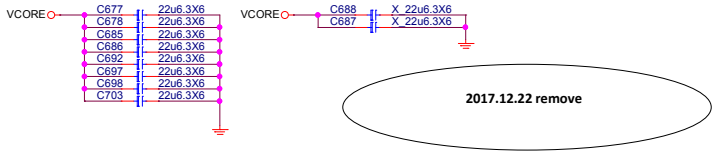


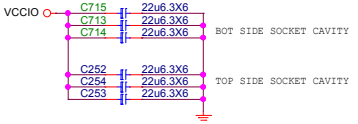
VCORE CAP:30PCS

VGT CAP:11PCS









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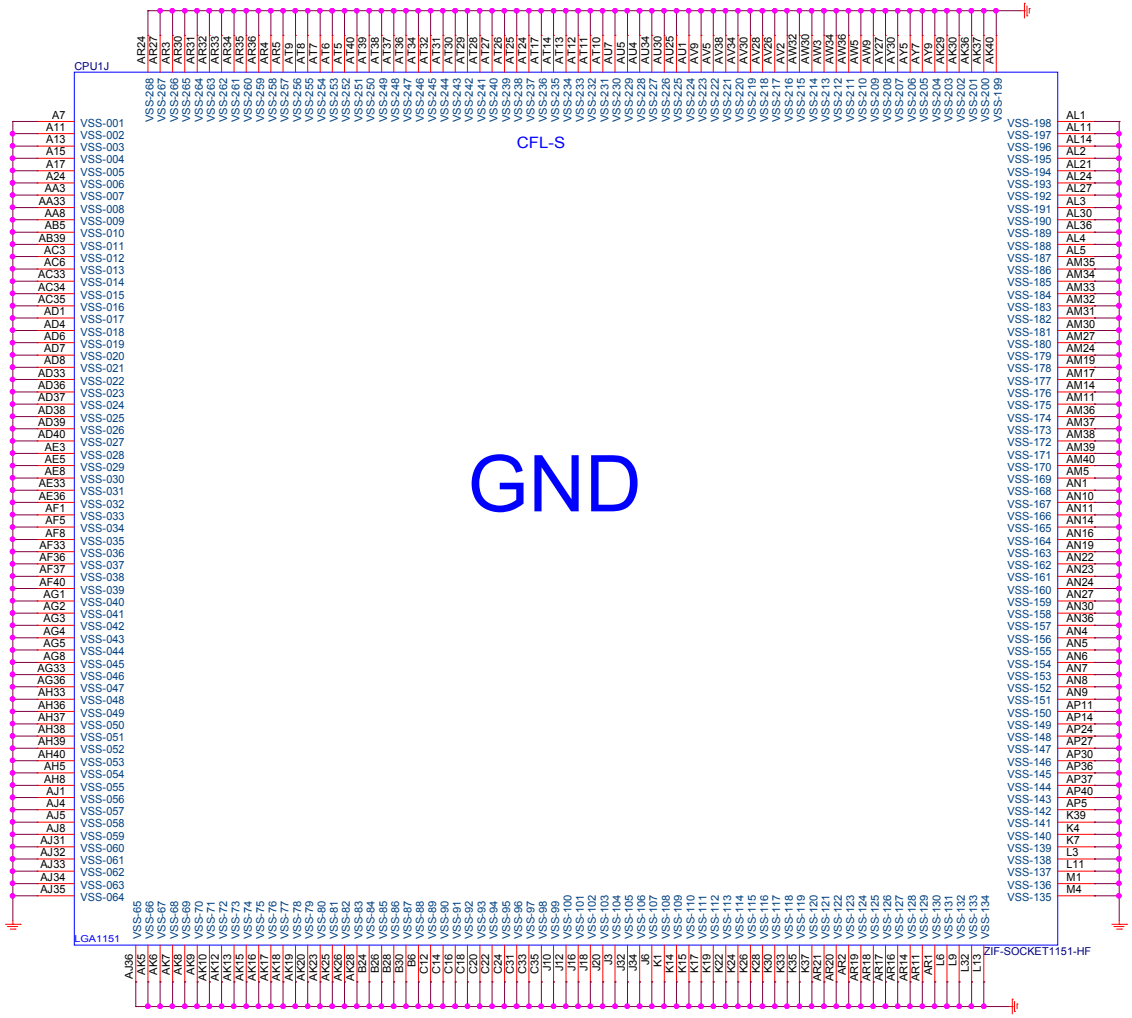
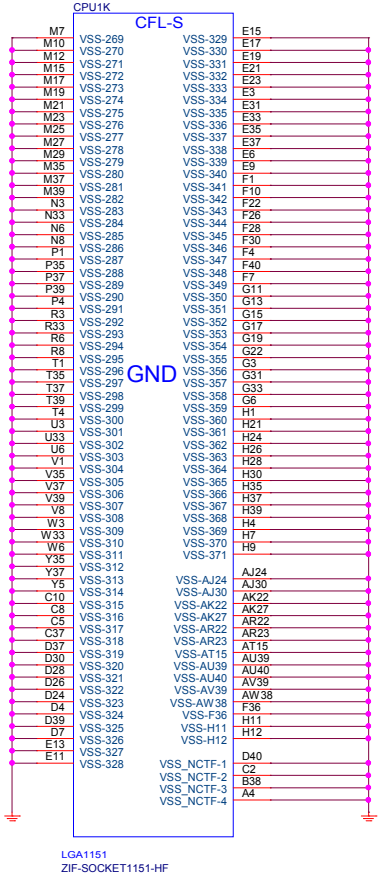
MS-7B23

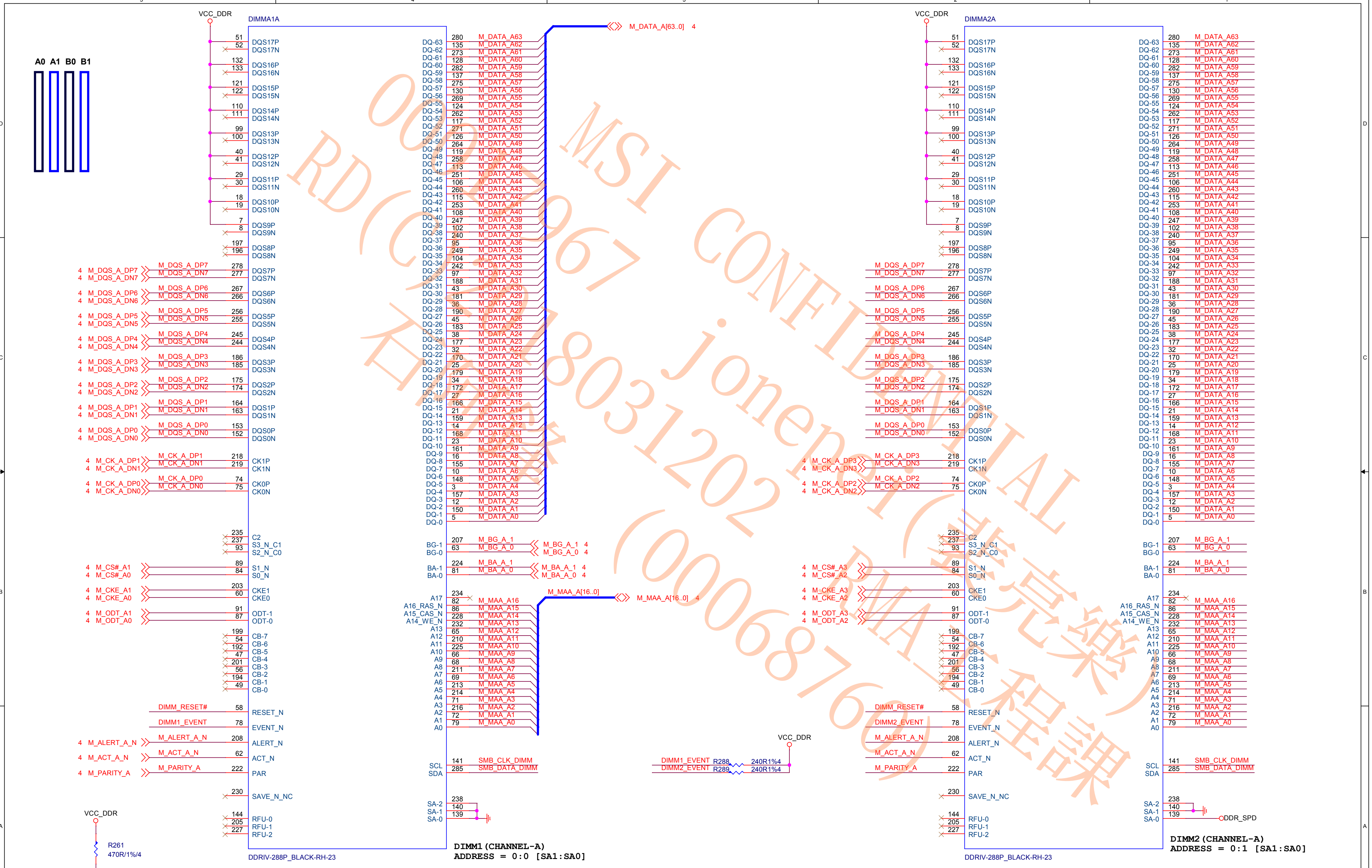
Size	Document Description	Rev
Custom	CPU-Power	1.0

Date: Wednesday, January 03, 2018 Sheet 6 of 63

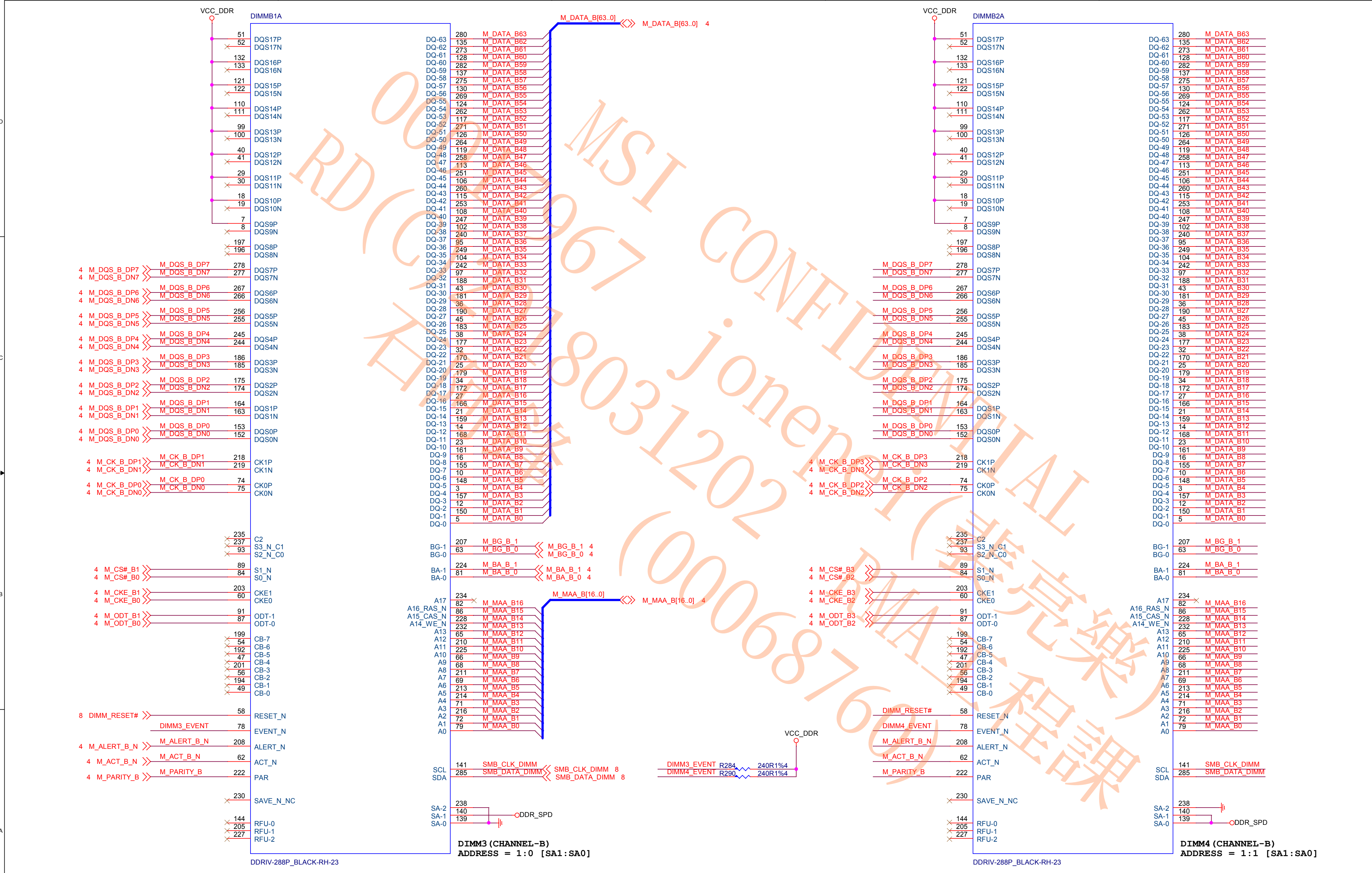




MICRO-STAR INT'L CO.,LTD		
MS-7B23		
Size: Custom	Document Description: CPU-GND	Rev: 1.0
Date: Wednesday, January 03, 2018	Sheet 7 of 63	



MICRO-STAR INT'L CO.,LTD		
MS-7B23		
Size: Custom	Document Description: DDR4 SLOT-DIMM1/DIMM2	Rev: 1.0
Date: Wednesday, January 03, 2018	Sheet 8 of 63	



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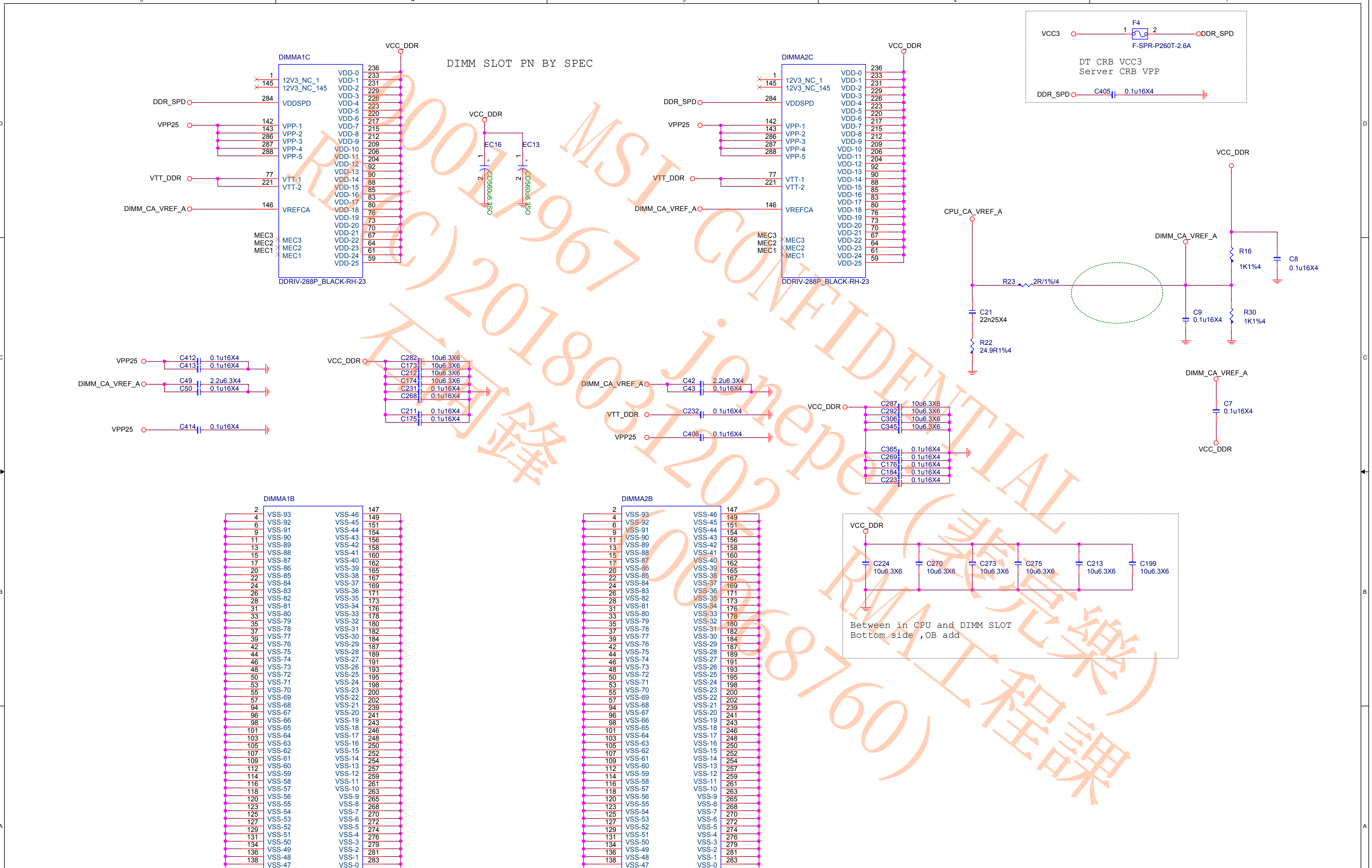
MS-7B23

Size	Document Description	Rev
Custom	DDR4 DIMM 2	1.0

Date: Wednesday, January 03, 2018 | Sheet 9 of 63

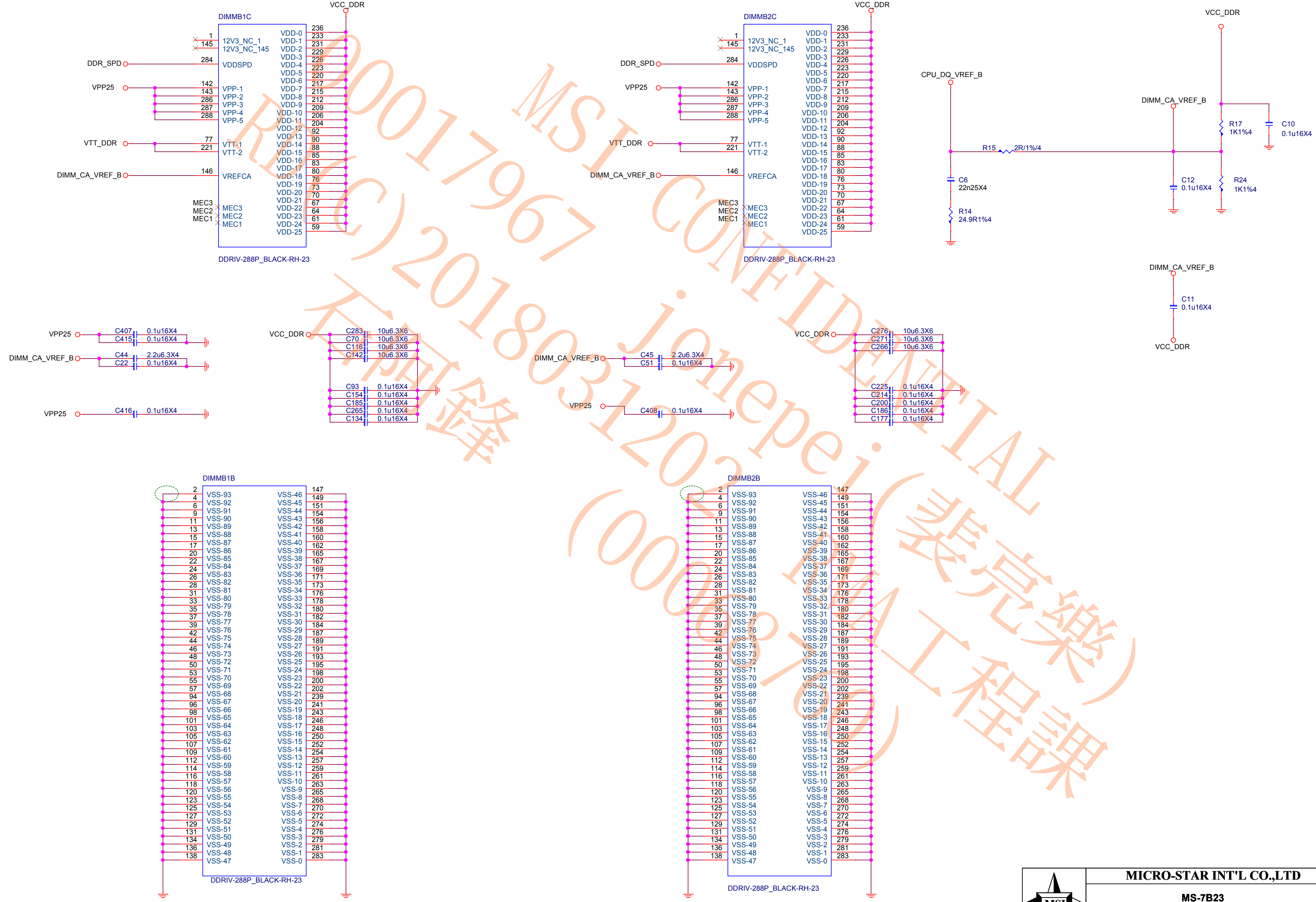


MICRO-STAR INT'L CO.,LTD

MS-7B23

Size	Document Description	Rev
Custom	DDR4-POWER/GND-1	1.0

Date: Wednesday, January 03, 2018 Sheet 10 of 63



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MS-7B23

Size	Document Description	Rev
Custom	DDR4-POWER/GND-2	1.0

Date: Wednesday, January 03, 2018 | Sheet 11 of 63

2017.12.07 Eric mail

VCC3 3VSB R785 X_10K/4 R2113 X_10K/4 LFRAME_CS0_N
VCC3 3VSB R965 X_10K/4 R2112 10K/4 SERIRQ
VCC3 3VSB R774 X_10K/4 R2111 10K/4 KBRST#_R
3VSB R952 10K/4 PIRQA#
VCC3 3VSB R2117 X_10K/4 R2118 X_10K/4 LDRQ#_RST_N

LPC_ESPI_IO0_R C1884 X_10p50N4
LPC_ESPI_IO1_R C1885 X_10p50N4
LPC_ESPI_IO2_R C1886 X_10p50N4
LPC_ESPI_IO3_R C1887 X_10p50N4
close to PCH in 500~1000mil

3VSB R484 1K/4 R485 1K/4 SMBCLK_VSB_R SMBDATA_VSB_R
R772 1K/4 R771 1K/4 SMBCLK_VSB SMBDATA_VSB
LANPHY USE by SPEC
R730 499R1%4 R731 499R1%4 SMLINK0_CLK SMLINK0_DATA
R783 1K/4 R782 1K/4 SMLINK1_CLK SMLINK1_DATA

for loadline disable
3VSB R605 10K/4 GPP_H19

3VSB R917 10K/4 R606 10K/4 R919 X_10K/4 GPP_H18 GPP_H17 GPP_H16
R920 X_10K/4 R604 X_10K/4 R921 10K/4 GPP_H18 GPP_H17 GPP_H16 ID

22,55 LPC_ESPI_IO0_R R950 0R/4 LPC_ESPI_IO0 BB39
22,55 LPC_ESPI_IO1_R R951 0R/4 LPC_ESPI_IO1 AW37
22,55 LPC_ESPI_IO2_R R953 0R/4 LPC_ESPI_IO2 AV37
22,55 LPC_ESPI_IO3_R R957 0R/4 LPC_ESPI_IO3 BA38
22,55 LFRAME_CS0_N BE38
22,55 SERIRQ AW35
PIRQA# BA36
To SIO 22 KBRST# R786 0R/4 KBRST#_R BE39
22 LDRQ#_RST_N R736 X_0R/4 ESPI_RST# BF38
12,19,20,21 SMBCLK_VSB_R R781 X_0R/4 SMBCLK_VSB BE26
12,19,20,21 SMBDATA_VSB_R R770 X_0R/4 SMBDATA_VSB BF26
18 ME_TLS_ON ME_TLS_ON BE25
24 SMLINK0_CLK SMLINK0_CLK BF25
24 SMLINK0_DATA SMLINK0_DATA BE24
18 LPC_ESPI_SEL LPC_ESPI_SEL BF24
22 SMLINK1_CLK SMLINK1_CLK BF27
22 SMLINK1_DATA SMLINK1_DATA BE27
18 PCH_SML1ALERT# PCH_SML1ALERT# BD33

PCH1A

GPP_A1/LAD0/ESPI_IO0
GPP_A2/LAD1/ESPI_IO1
GPP_A3/LAD2/ESPI_IO2
GPP_A4/LAD3/ESPI_IO3
GPP_A5/LFRAME#/ESPI_CS0#
GPP_A6/SERIRQ/ESPI_CS1#
GPP_A7/PIRQA#/ESPI_ALERT0#
GPP_A0/RCIN#/ESPI_ALERT1#
GPP_A14/SUS_STAT#/ESPI_RESET#
LPC eSPI

GPP_C0/SMBCLK
GPP_C1/SMBDATA
GPP_C2/SMBALERT#
GPP_C3/SML0CLK
GPP_C4/SML0DATA
GPP_C5/SML0ALERT#
GPP_C6/SML1CLK
GPP_C7/SML1DATA
GPP_B23/SML1ALERT#/PCHHOT#
SMB

GPP_H12 AE48 AD47 AB47 AF47 AD48 AC47 AE43 AJ46 AE44
18 GPP_H12
32 BIOS_SEL_PCIESATA1
32 BIOS_DIS_SW1
18 GPP_H15
GPP_H10/SML2CLK
GPP_H11/SML2DATA
GPP_H12/SML2ALERT#
GPP_H13/SML3CLK
GPP_H14/SML3DATA
GPP_H15/SML3ALERT#
GPP_H16/SML4CLK
GPP_H17/SML4DATA
GPP_H18/SML4ALERT#

FAN MODE USE
25 CPUFAN1_MODE BF23
25 SYSFAN1_MODE BC22
26 SYSFAN2_MODE BF21 BE21
GPP_C16/I2C0_SDA
GPP_C17/I2C0_SCL
GPP_C18/I2C1_SDA
GPP_C19/I2C1_SCL

PWM LL disable 44 GPP_H19 AH46
EZ LED 56 GPP_H20 AG45
EZ LED 56 GPP_H21 AH48
EZ LED 56 GPP_H22 AH47
EZ LED 56 GPP_H23 AJ47
GPP_H19/ISH_I2C0_SDA
GPP_H20/ISH_I2C0_SCL
GPP_H21/ISH_I2C1_SDA
GPP_H22/ISH_I2C1_SCL
GPP_H23/TIME_SYNC0

AR2 CL_CLK
AT5 CL_DATA
AU4 CL_RST#

41 PCH_CLK AW47
41 PCH_MISO BA45
18,41 PCH_MOSI AU41
18,41 PCH_IO2 AY48
18,41 PCH_IO3 BA46
41 PCH_SPI_CS0# AY47 AW48 AT40 BF19 BE19 BE18 BF18 BD17 BC17
SPI0_CLK
SPI0_MISO
SPI0_MOSI
SPI0_IO2
SPI0_IO3
SPI0_CS0#
SPI0_CS1#
SPI0_CS2#
SPI

GPP_D0/SPI1_CS#/SBK0/BK0
GPP_D1/SPI1_CLK/SBK1/BK1
GPP_D2/SPI1_MISO/SBK2/BK2
GPP_D3/SPI1_MOSI/SBK3/BK3
GPP_D21/SPI1_IO2
GPP_D22/SPI1_IO3

PCH_H

SLP_SUS# BD39 SLP_SUS# 22,23,54
SLP_A# BE40
GPD6/SLP_A# TP16
SLP_S3# BF42 R787 0R/4 SLP_S3# SLP_S3# 15,22,38,42,50,51,54
SLP_S4# BE42 R761 0R/4 SLP_S4# SLP_S4# 15,22,38,42,49,50,51
SLP_S5# BC42 SLP_S5# 15
SLP_S0# BC28 TP52
SLP_LAN# BF40 SLP_LAN# SLP_LAN# 24
LAN_DISABLE# BF41 LAN_DISABLE# 24
GPD9/SLP_WLAN# BD42
SUSWARN# BC37 R734 0R/4
SUSACK# BE35
PCH_SUSCLK BE45
GPP_A13/SUSWARN#/SUSPWRDNACK
GPP_A15/SUSACK#
GPD8/SUSCLK
CHIP_PWGD_SPI 41
R795 0R/4
DSW_PWROK AW41 PCH_DPWROK
PCH_PWROK AY42 PCH_PWROK_R R942 0R/4 PCH_DPWROK 22
SYS_PWROK AU3 CHIP_PWGD_PCH R796 0R/4 PCH_PWROK 54
CPUPWRGD AE3 CPU_PWRGD_R R633 0R/4 CPU_PWRGD 3 CHIP_PWGD 22
Power Management
RTCRST# BE47 RTCRST# RTCRST# 40,42,54
SRTCRST# BD46 SRTCRST#
RSMRST# BA47 RSMRST#
DRAM_RESET# BB46 DRAM_RESET# DRAM_RESET# 8
SYS_RESET# AU2 FP_RST# FP_RST# 55
PLTRST_CPU# AG5 CPURST# CPURST# 3
GPP_B13/PLTRST# AV29 PLTRST#_R R946 30R1%4 PLTRST# 22
GPD3/PWRBTN# BE46 PWRBTN# PWRBTN# 22
SB_WAKE# BB47
LANPHY_WAKE# BG44
IO_PME_N BE36
ACPRESENT BG42
GPP_A12 BF44 BF36
WAKE# SB_WAKE# 19,20,21,32,33
GPD2/LAN_WAKE# LANPHY_WAKE# 24
GPP_A11/PME#/SD_VDD2_PWR_EN# IO_PME_N 22
GPD1/ACPRESENT ACPRESENT
GPD0/BATLOW# BATLOW#
GPP_A12/BM_BUSY#/ISH_GP6/SX_EXIT_HOLDOFF# GPP_A12
GPP_A8/CLKRUN# AV32 PCH_CLKRUN#
PECI AF2 PCH_PECI R648 X_0R/4 CPU_PECI 3,22
THRMTRIP# AD3 PCH_THERMTRIP_R R626 619R/1%4 PCH_THERMTRIP# 3
PM_DOWN AE2 CPU_PM_DOWN 3
PM_SYNC AF3 SYNC_R R634 30R1%4 CPU_PM_SYNC 3
INTRUDER# BB44 INTRUDER#
STRAP
GPP_B14/SPKR AW29 SPKR SPKR 18,55
GPP_B18/GSPI0_MOSI BE30 NO_REBOOT NO_REBOOT 18
GPP_B22/GSPI1_MOSI BA26 BOOT_BIOS_SEL BOOT_BIOS_SEL 18
GPD7 BE41 GPD7 18
JTAG
PCH_JTAG_TCK AJ3 PCH_JTAG_TCK
PCH_JTAG_TMS AJ4 XDP_TMS 3
PCH_JTAG_TDI AH2 XDP_TDI 3
PCH_JTAG_TDO AH3 XDP_TDO 3
PCH_JTAGX AH4 XDP_TCK0 3
ITP_PMODE AL3 ITP_PMODE
TRIGGER_IN AK2 TP13
TRIGGER_OUT AK3 PCH_TRIGOUT R652 30R/4 CPU_OUTPUT_TRIGGER 3
PREQ# AL2 CPU_INPUT_TRIGGER 3
PRDY# AM5 CPU_PREQ 3
CPU_TRST# AM4 CPU_PRDY 3 XDP_TRST 3

Place R390 within 200mil of PCH.

PCH LANPHY PWR
Pull Down PCH PHY into low power state.
For No Use intel Lan
LAN_DISABLE# R759 X_10K/4

SB_WAKE# R762 1K/4
LANPHY_WAKE# R788 4.7K/4
PWRBTN# R956 3K1%4
BATLOW# R737 10K/4
ACPRESENT R760 X_10K/4 3VDSW
PCH_SUSCLK R941 X_1.5K/4
PCH_CLKRUN# R945 X_10K/4 3VSB
2017.12.07 Eric mail
CRB RSVD pull up to +V3P3_DUAL.

IO_PME_N R756 10K/4 3VSB
SUSACK# R755 X_10K/4 3VSB
GPP_A12 R735 X_10K/4 3VSB
PCH_PECI R650 X_1K/4
CPU_PM_DOWN R632 X_51R/4
FP_RST# R719 1K/4 VCC3

Defensive Termination. CRB unstuff.
Place within 1.1" of PCH Pin.
VCCSTPLL
XDP_TCK0 R649 X_1K/4
XDP_TMS R653 51R/4
XDP_TDO R635 100R1%4
XDP_TDI R651 51R/4
Place within 1.5" of PCH Pin.
PCH_JTAG_TCK R636 X_51R/4
Defensive Termination. CRB unstuff.
Place within 1.1" of PCH Pin.

RSMRST# USE solution

2017.08.14 Eric mail add
2017.11.30 Robert mail remove

RSMRST#
3VSB R800 4.7K/4
RSMRST# R789 X_0R/4 SIO_RSMRST# 22,41
R997 0R/4 RSMRST#_SLG 54
R801 100K/4

擺在一起(注意到所有的SMBUS的分支)

SMBCLK_VCC R798 1K/4
SMBDATA_VCC R779 1K/4 VCC3
3VSB R753 10K/4
+12V R750 10K/4
CFL CRB
PCH_PWROK R749 0R/4 PCH_PWROK_SMBUS
R748 100K/4
Q88 NN-2N7002D
59G
Q93 2N7002 R797 X_0R/4
SMBCLK_VSB SMBCLK_VSB 35,36,37,49
SMBCLK_VCC SMBCLK_VCC 8
Q92 2N7002 R780 X_0R/4
SMBDATA_VSB SMBDATA_VSB 35,36,37,49
SMBDATA_VCC SMBDATA_VCC 8

SMBUS ESD

D18 X_ESD-AOZ8231 SMBCLK_VSB_R 12,19,20,21
D17 X_ESD-AOZ8231 SMBDATA_VSB_R 12,19,20,21
close to PCH

RTC

VBAT_PCH
2014.12.29
CRB R763 20K1%4
SRTCRST#
C623 1u16X6
2017.12.20 remove RTC

Chassis Intrusion

VBAT_PCH
R738 1M/4
JCI1 H1X2M_BLACK-RH
INTRUDER#
D19 X_ESD-AOZ8231

MICRO-STAR INT'L CO.,LTD
MS-7B23
Size: Custom
Document Description: PCH-LPC/SPI/SMBUS/MISC
Rev: 1.0
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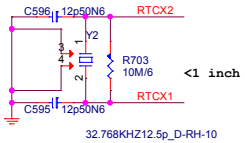
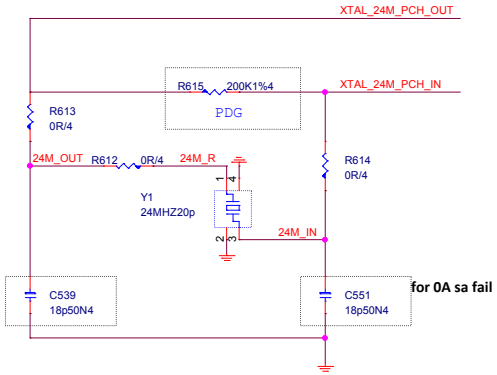
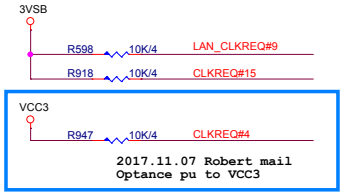
RTC Block

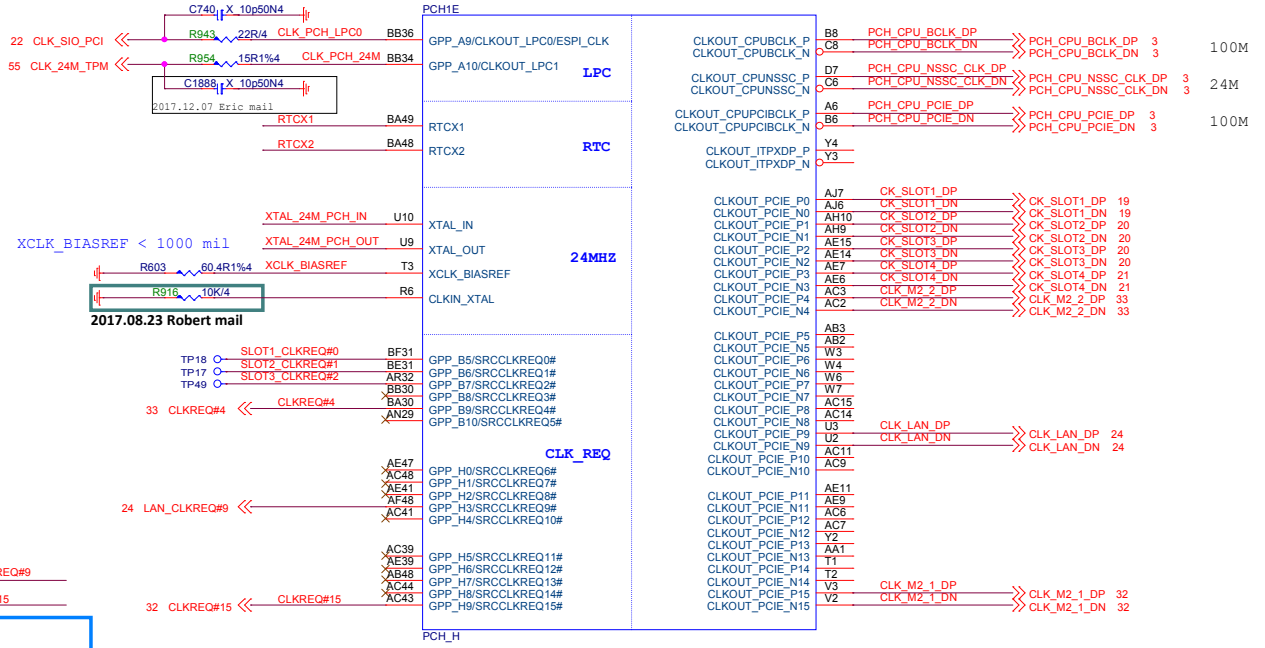
Close to PCH

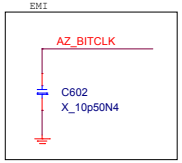


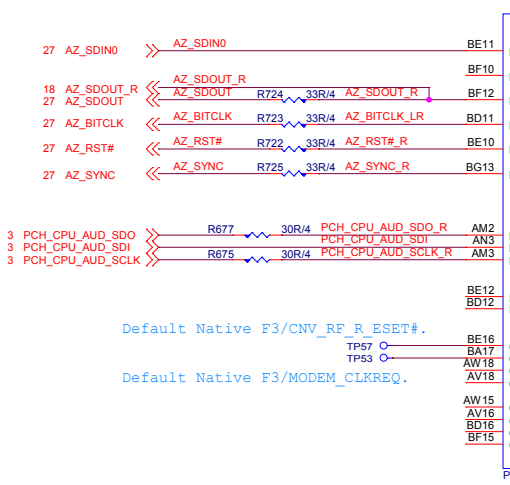


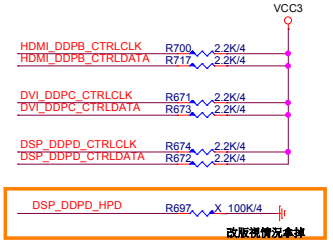
for 0A sa fail











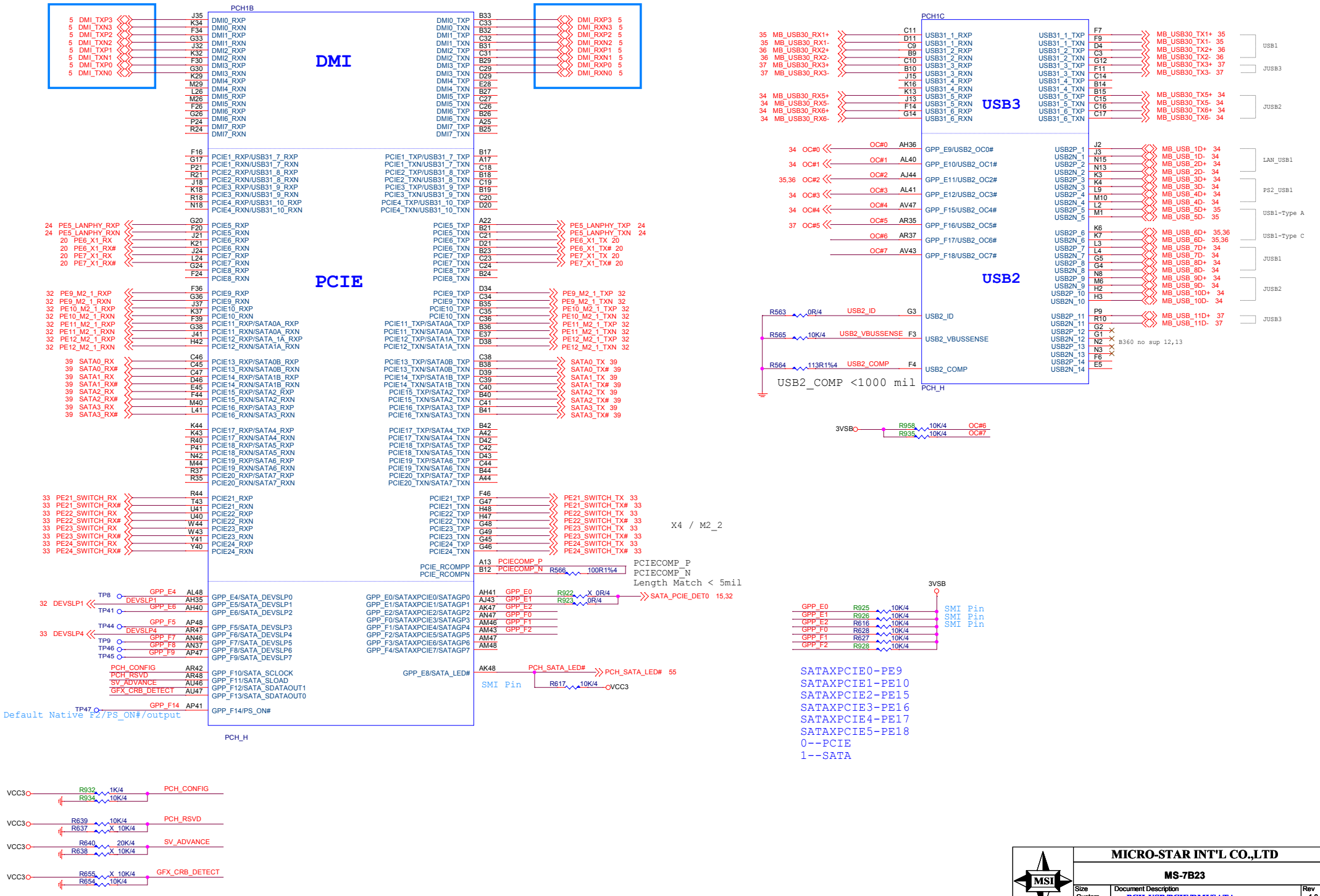
DDI interfaace Disable
no connect

Port B HDMI

Port C DVI,HDMI2.0 OR Others

Port D DisplayPort to VGA

MICRO-STAR INT'L CO.,LTD		
MS-7B23		
Size: Custom	Document Description: PCH-Audio/Display/Clock	Rev: 1.0
Date: Wednesday, January 03, 2018	Sheet 13 of 63	


PCH1B
DMI
PCIE
PCH_H
PCH1C
USB3
USB2
PCH_H
X4 / M2_2
PCIECOMP_P
PCIECOMP_N
Length Match < 5mil
USB2_COMP <1000 mil
B360 no sup 12,13
SMI Pin
SMI Pin
SMI Pin
SATAXPCIE0-PE9
SATAXPCIE1-PE10
SATAXPCIE2-PE15
SATAXPCIE3-PE16
SATAXPCIE4-PE17
SATAXPCIE5-PE18
0--PCIE
1--SATA
Default Native PZ/PS_ON#/output
MICRO-STAR INT'L CO.,LTD
MS-7B23
PCH-USB/PCIE/DMI/SATA
Rev 1.0
Date: Wednesday, January 03, 2018
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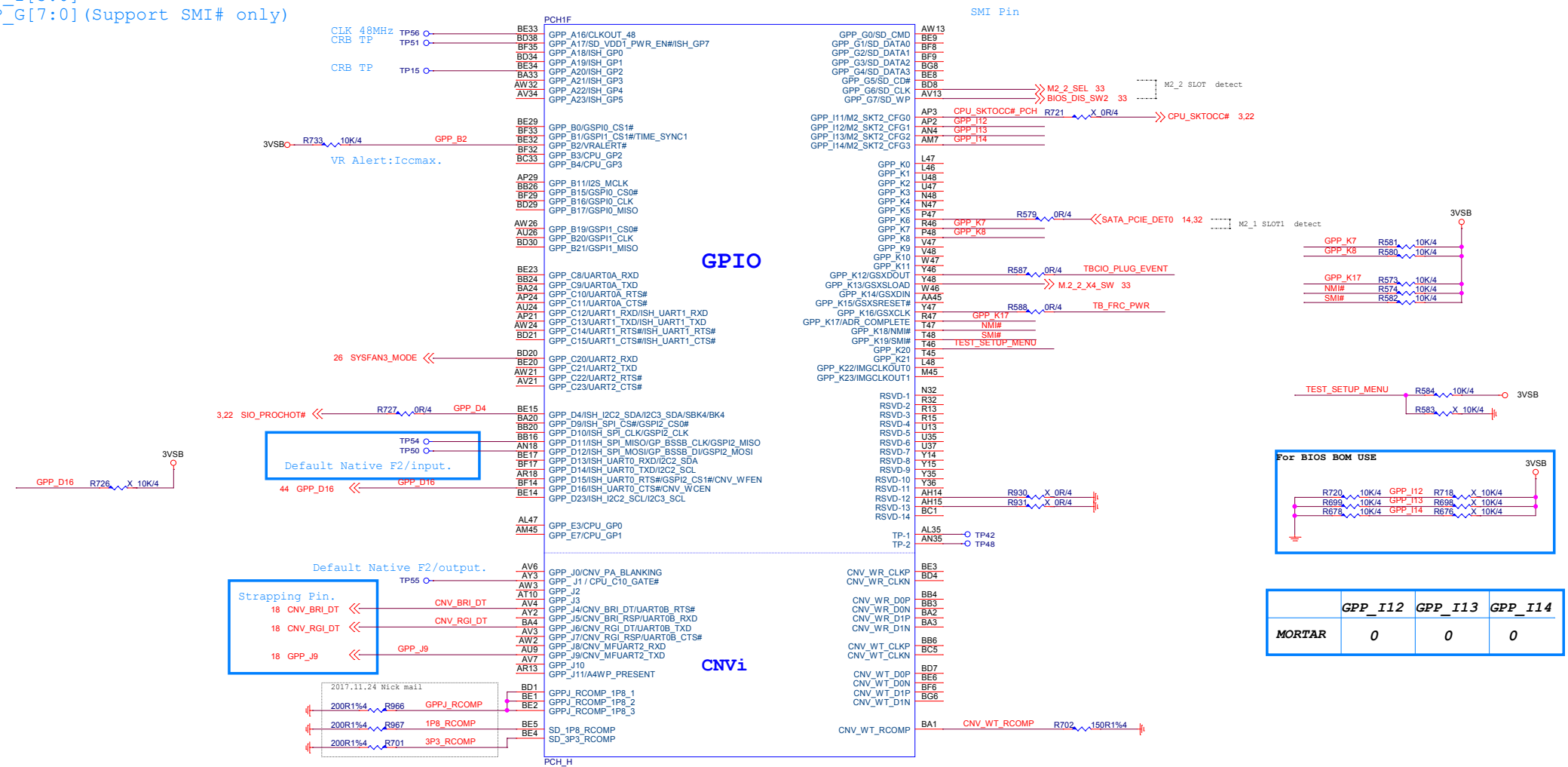
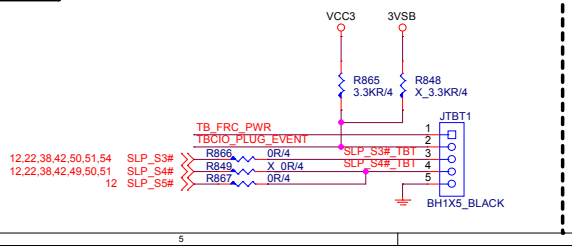
GPIO(SMI/NMI):
GPP_B14,GPP_B20,GPP_B23
GPP_C[23:22]
GPP_D[4:0]
GPP_E[8:0]
GPP_I[3:0]
GPP_G[7:0](Support SMI# only)

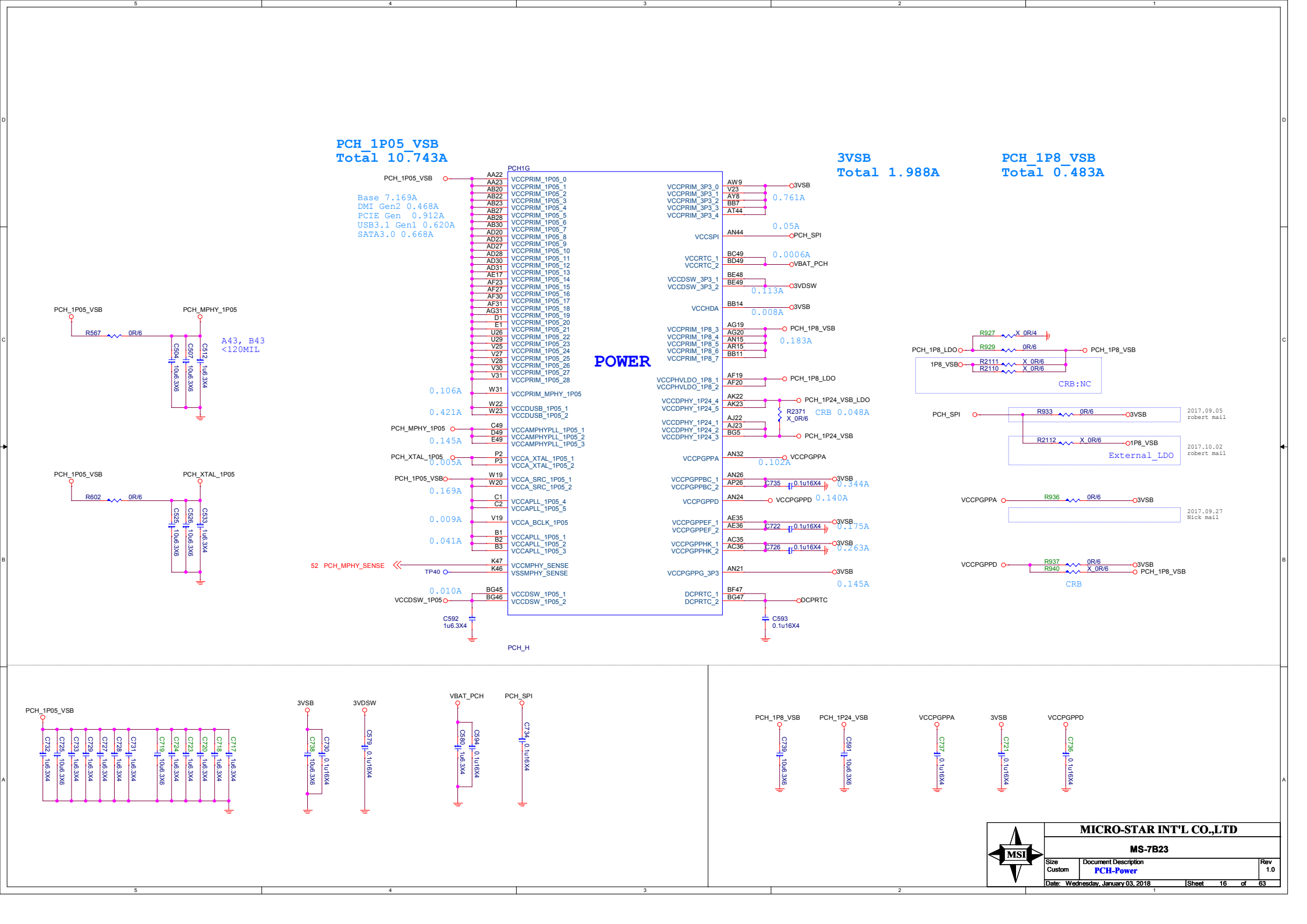


	GPP_I12	GPP_I13	GPP_I14
MORTAR	0	0	0

JTBT



MICRO-STAR INT'L CO.,LTD	
MS-7B23	
Size: Custom	Document Description: PCH-GPIO/USBOC#/SATASTRAP
Rev: 1.0	
Date: Wednesday, January 03, 2018	Sheet 15 of 63


PCH_1P05_VSB
Total 10.743A
Base 7.169A
DMI Gen2 0.468A
PCIE Gen 0.912A
USB3.1 Gen1 0.620A
SATA3.0 0.668A
PCH1G
PCH_1P05_VSB
AA22 VCCPRIM_1P05_0
AA23 VCCPRIM_1P05_1
AB20 VCCPRIM_1P05_2
AB22 VCCPRIM_1P05_3
AB23 VCCPRIM_1P05_4
AB27 VCCPRIM_1P05_5
AB28 VCCPRIM_1P05_6
AB30 VCCPRIM_1P05_7
AD20 VCCPRIM_1P05_8
AD23 VCCPRIM_1P05_9
AD27 VCCPRIM_1P05_10
AD28 VCCPRIM_1P05_11
AD30 VCCPRIM_1P05_12
AD31 VCCPRIM_1P05_13
AE17 VCCPRIM_1P05_14
AF23 VCCPRIM_1P05_15
AF27 VCCPRIM_1P05_16
AF30 VCCPRIM_1P05_17
AF31 VCCPRIM_1P05_18
AG31 VCCPRIM_1P05_19
D1 VCCPRIM_1P05_20
E1 VCCPRIM_1P05_21
U26 VCCPRIM_1P05_22
U29 VCCPRIM_1P05_23
V25 VCCPRIM_1P05_24
V27 VCCPRIM_1P05_25
V28 VCCPRIM_1P05_26
V30 VCCPRIM_1P05_27
V31 VCCPRIM_1P05_28
0.106A
W31 VCCPRIM_MPHY_1P05
0.421A
W22 VCCDUSB_1P05_1
W23 VCCDUSB_1P05_2
PCH_MPHY_1P05
C49 VCCAMPHYPLL_1P05_1
D49 VCCAMPHYPLL_1P05_2
0.145A
E49 VCCAMPHYPLL_1P05_3
PCH_XTAL_1P05
0.005A
P2 VCCA_XTAL_1P05_1
P3 VCCA_XTAL_1P05_2
PCH_1P05_VSB
W19 VCCA_SRC_1P05_1
W20 VCCA_SRC_1P05_2
0.169A
C1 VCCAPLL_1P05_4
C2 VCCAPLL_1P05_5
0.009A
V19 VCCA_BCLK_1P05
B1 VCCAPLL_1P05_1
0.041A
B2 VCCAPLL_1P05_2
B3 VCCAPLL_1P05_3
52 PCH_MPHY_SENSE
K47 VCCMPHY_SENSE
TP40
K46 VSSMPHY_SENSE
0.010A
BG45 VCCDSW_1P05_1
VCCDSW_1P05
BG46 VCCDSW_1P05_2
C592
1u6.3X4
PCH_H
POWER
VCCPRIM_3P3_0
VCCPRIM_3P3_1
VCCPRIM_3P3_2
VCCPRIM_3P3_3
VCCPRIM_3P3_4
AW9
V23
AY8
BB7
AT44
3VSB
0.761A
0.05A
VCCSPI
AN44
PCH_SPI
VCCRTC_1
VCCRTC_2
BC49
BD49
0.0006A
VBAT_PCH
VCCDSW_3P3_1
VCCDSW_3P3_2
BE48
BE49
0.113A
3VDSW
VCCHDA
BB14
0.008A
3VSB
VCCPRIM_1P8_3
VCCPRIM_1P8_4
VCCPRIM_1P8_5
VCCPRIM_1P8_6
VCCPRIM_1P8_7
AG19
AG20
AN15
AR15
BB11
PCH_1P8_VSB
0.183A
VCCPHVLDO_1P8_1
VCCPHVLDO_1P8_2
AF19
AF20
PCH_1P8_LDO
VCCDPHY_1P24_4
VCCDPHY_1P24_5
AK22
AK23
PCH_1P24_VSB_LDO
R2371
X_0R/6
CRB 0.048A
VCCDPHY_1P24_1
VCCDPHY_1P24_2
VCCDPHY_1P24_3
AJ22
AJ23
BG5
PCH_1P24_VSB
VCCPGPPA
AN32
VCCPGPPA
0.102A
VCCPGPPBC_1
VCCPGPPBC_2
AN26
AP26
C735
0.1u16X4
3VSB
0.344A
VCCPGPPD
AN24
VCCPGPPD
0.140A
VCCPGPPEF_1
VCCPGPPEF_2
AE35
AE36
C722
0.1u16X4
3VSB
0.175A
VCCPGPPHK_1
VCCPGPPHK_2
AC35
AC36
C726
0.1u16X4
3VSB
0.263A
VCCPGPPG_3P3
AN21
3VSB
0.145A
DCPRTC_1
DCPRTC_2
BF47
BG47
DCPRTC
C593
0.1u16X4
3VSB
Total 1.988A
PCH_1P8_VSB
Total 0.483A
R927 X_0R/4
PCH_1P8_LDO
R929 0R/6
PCH_1P8_VSB
1P8_VSB
R2111 X_0R/6
R2110 X_0R/6
CRB:NC
PCH_SPI
R933 0R/6
3VSB
2017.09.05
robert mail
R2112 X_0R/6
1P8_VSB
External_LDO
2017.10.02
robert mail
VCCPGPPA
R936 0R/6
3VSB
2017.09.27
Nick mail
VCCPGPPD
R937 0R/6
R940 X_0R/6
3VSB
PCH_1P8_VSB
CRB
PCH_1P05_VSB
PCH_MPHY_1P05
R567 0R/6
C504 10u6.3X6
C507 10u6.3X6
C512 1u6.3X4
A43, B43
<120MIL
PCH_1P05_VSB
PCH_XTAL_1P05
R602 0R/6
C525 10u6.3X6
C526 10u6.3X6
C533 1u6.3X4
PCH_1P05_VSB
C732 1u6.3X4
C725 10u6.3X6
C733 1u6.3X4
C729 1u6.3X4
C727 1u6.3X4
C728 1u6.3X4
C731 1u6.3X4
C719 10u6.3X6
C724 1u6.3X4
C723 1u6.3X4
C720 1u6.3X4
C718 1u6.3X4
C717 1u6.3X4
3VSB
C738 10u6.3X6
C730 0.1u16X4
3VDSW
C579 0.1u16X4
VBAT_PCH
C580 1u6.3X4
C594 0.1u16X4
PCH_SPI
C734 0.1u16X4
PCH_1P8_VSB
C739 10u6.3X6
PCH_1P24_VSB
C591 10u6.3X6
VCCPGPPA
C737 0.1u16X4
3VSB
C721 0.1u16X4
VCCPGPPD
C736 0.1u16X4
MICRO-STAR INT'L CO.,LTD
MS-7B23
Size
Custom
Document Description
PCH-Power
Rev
1.0
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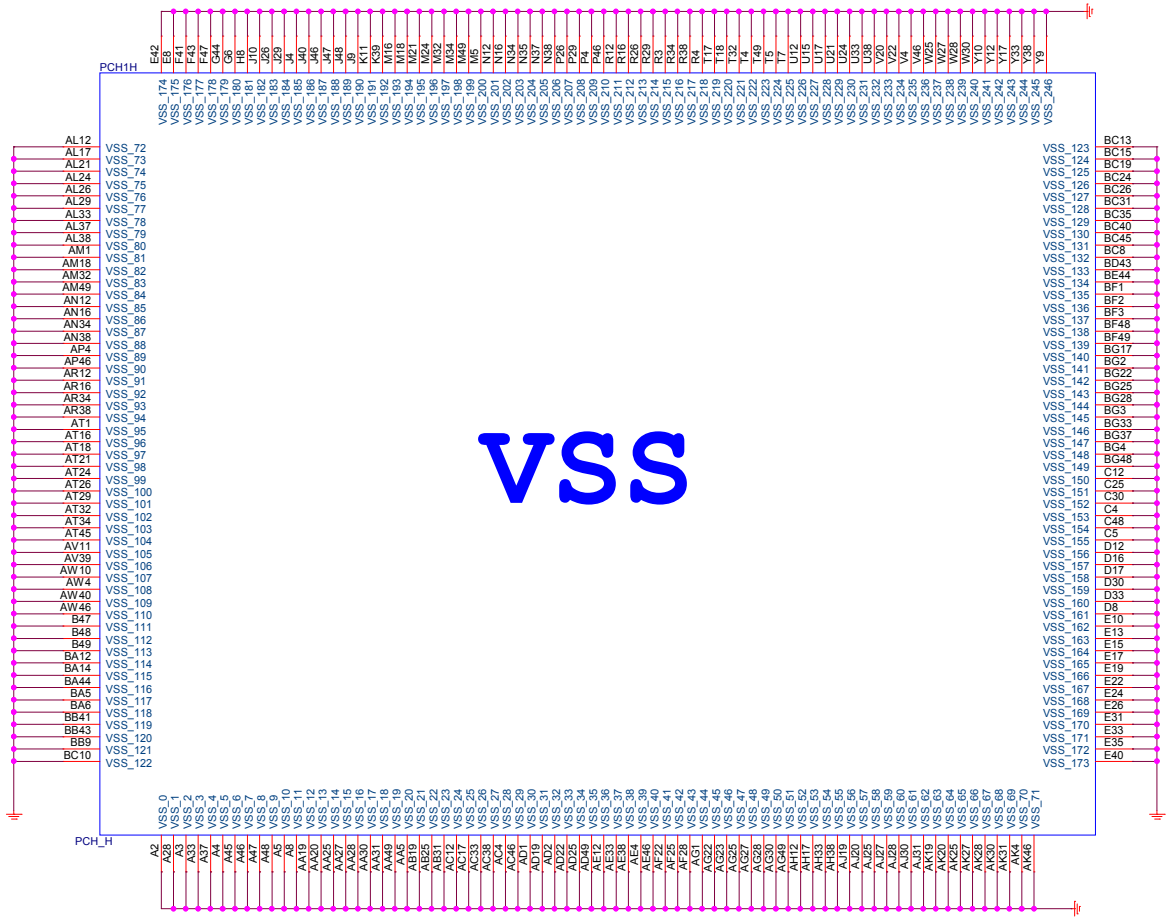

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MS-7B23	
Size: Custom	Document Description: PCH-GND
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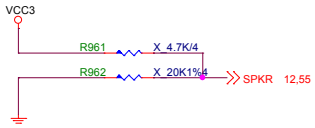
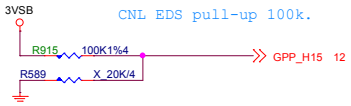
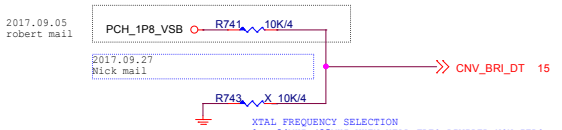
TOP Swap



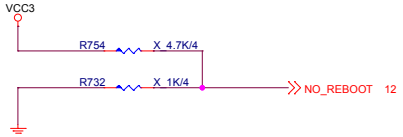
Internal pull-down 20K is disabled after PLTRST#

Reserved





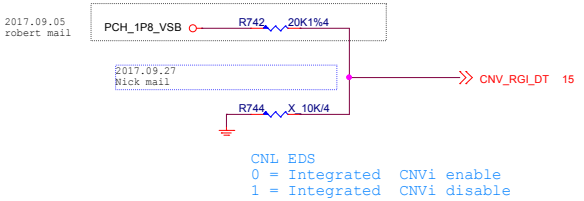
No Reboot



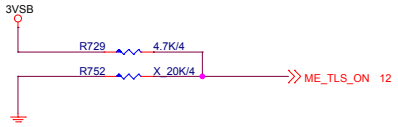
0 : DISABLE (Default)
1 : ENABLE

Internal pull-down 20K is disabled after PLTRST#

Reserved



AMT and SBA with confidentiality

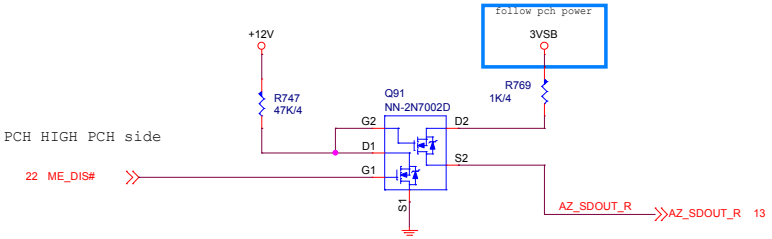


0 : DISABLE
1 : ENABLE (Default)

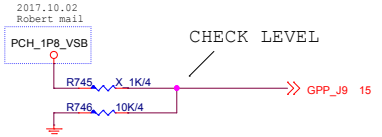
Internal pull-down 20K is disabled after RSMRST

HDA_SDO

ME flash by GPIO



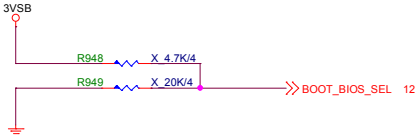
1.8V VCCPSPI



VCCSPI 3.3V,Internal pull-down.

SELECT THE SPI BIOS FLASH INTERFACE OPERATING VOLTAGE
0 = VCCPSPI IS CONNECTED TO 3.3V RAIL - DEFAULT
1 = VCCPSPI IS CONNECTED TO 1.8V RAIL
PCH HAS INTERNAL 20K PD

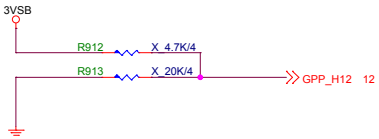
Boot BIOS



0 : SPI
1 : LPC

Internal pull-down 20K is disabled after PLTRST

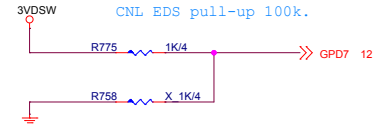
ESPI FLASH SHARING MODE



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

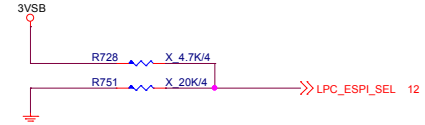
Internal pull-down 20K is disabled after RSMRST

Reserved



XTAL INPUT MODE
0 = XTAL INPUT IS SINGLE-ENDED
1 = XTAL INPUT IS DIFFERENTIAL
PCH HAS INTERNAL 20K PD

LPC eSPI Mode

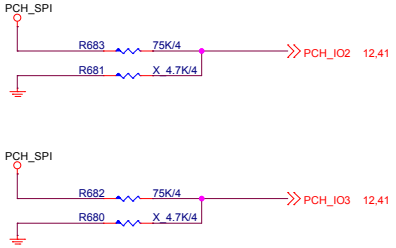


0 : LPC
1 : eSPI

Internal pull-down 20K is disabled after RSMRST

Reserved

CRB 571506 Page.99



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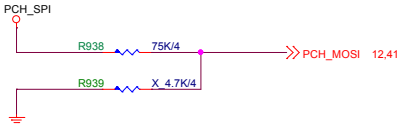

MICRO-STAR INT'L CO.,LTD		
MS-7B23		
Size: Custom	Document Description: PCH-Strap	Rev: 1.0
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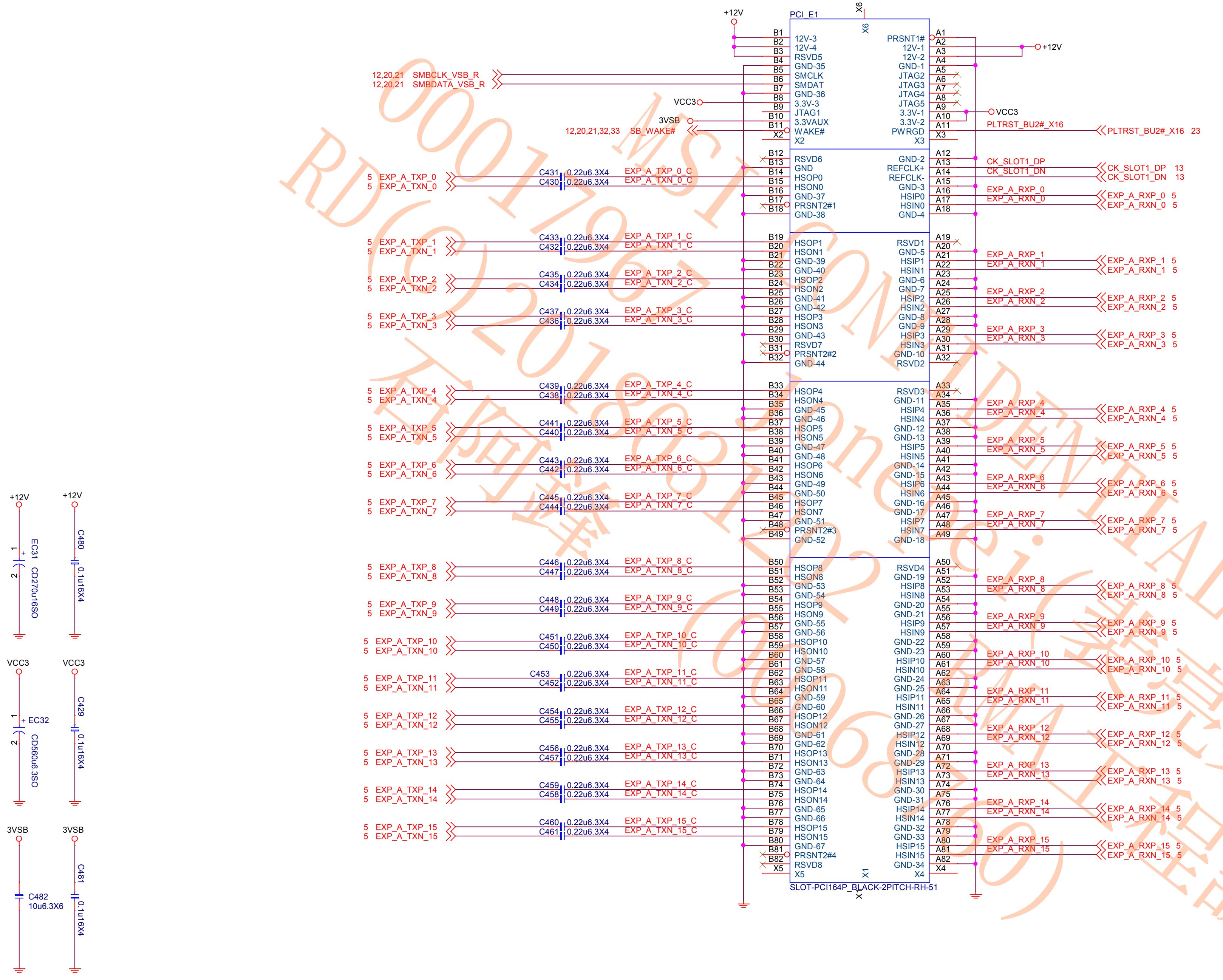
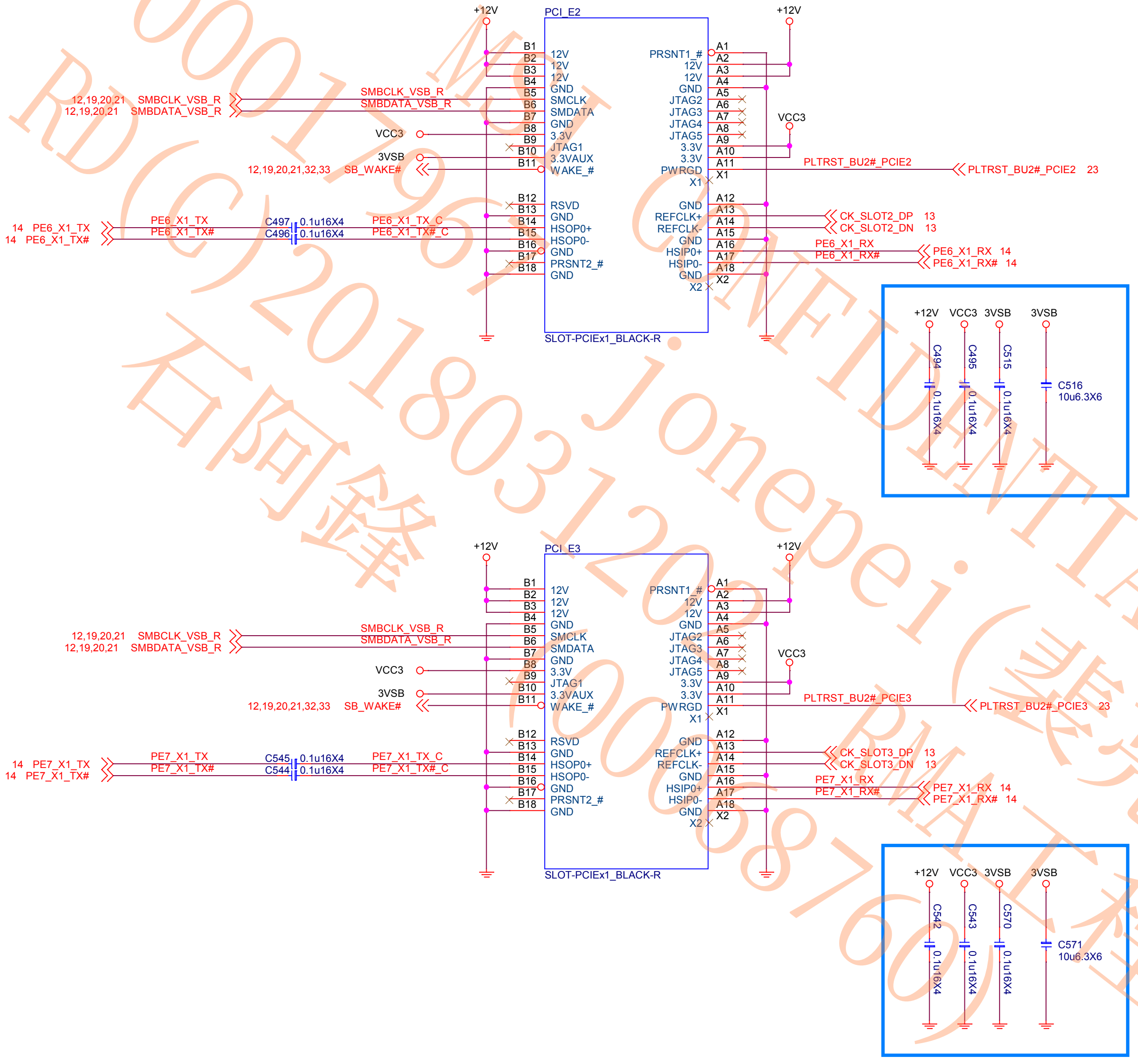


MICRO-STAR INT'L CO.,LTD	
MS-7B23	
Size: Custom	Document Description: PCIE SLOT-CPU(X16)
Rev: 1.0	
Date: Wednesday, January 03, 2018	Sheet 19 of 63



MICRO-STAR INT'L CO.,LTD

MS-7B23

Size: Custom | Document Description: PCIE SLOT-PCH(X1) | Rev 1.0

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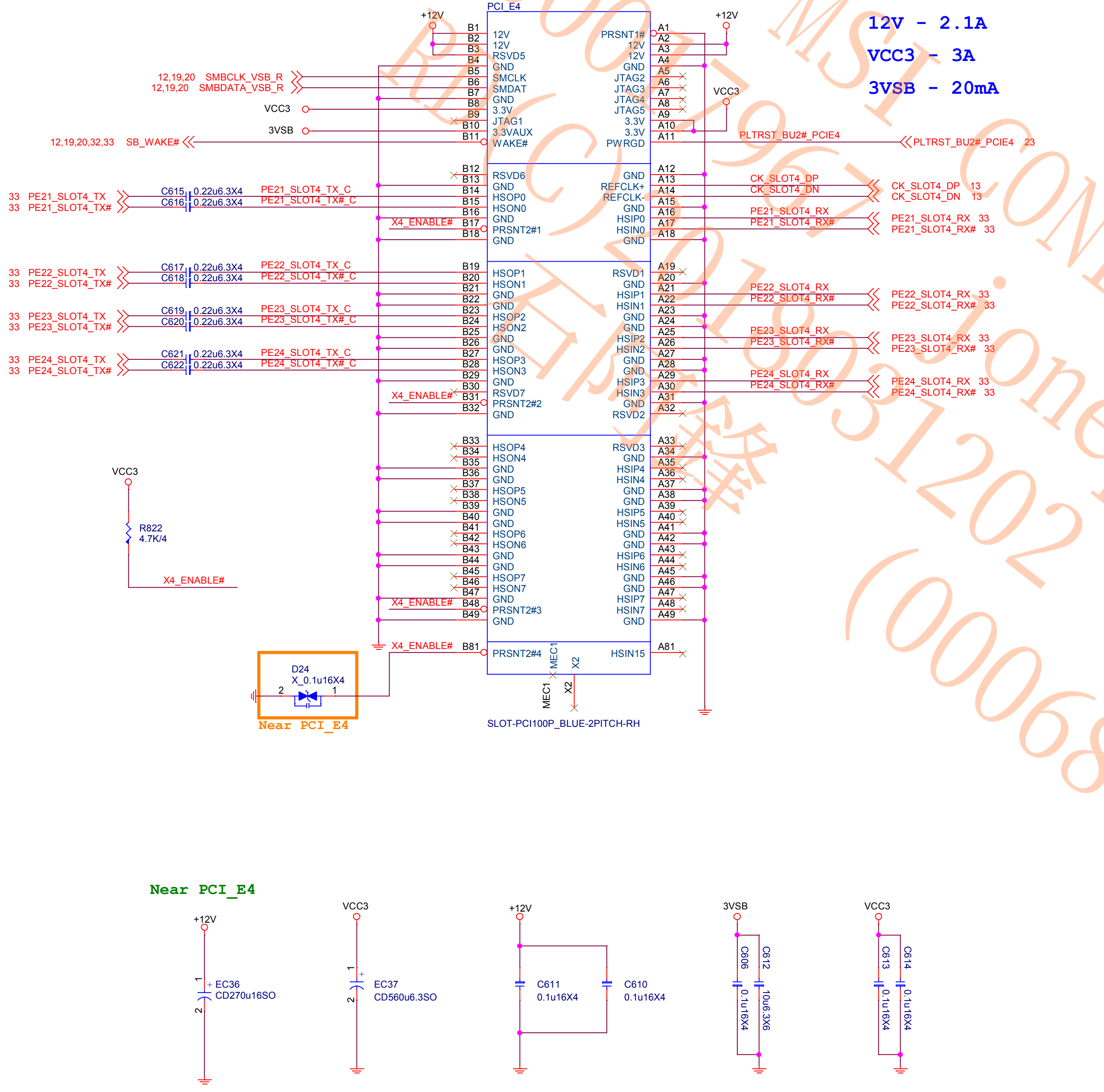
PCI Express X4 Slot



MICRO-STAR INT'L CO.,LTD

MS-7B23

Size	Document Description	Rev
Custom	PCIE SLOT-PCH(X4)	1.0

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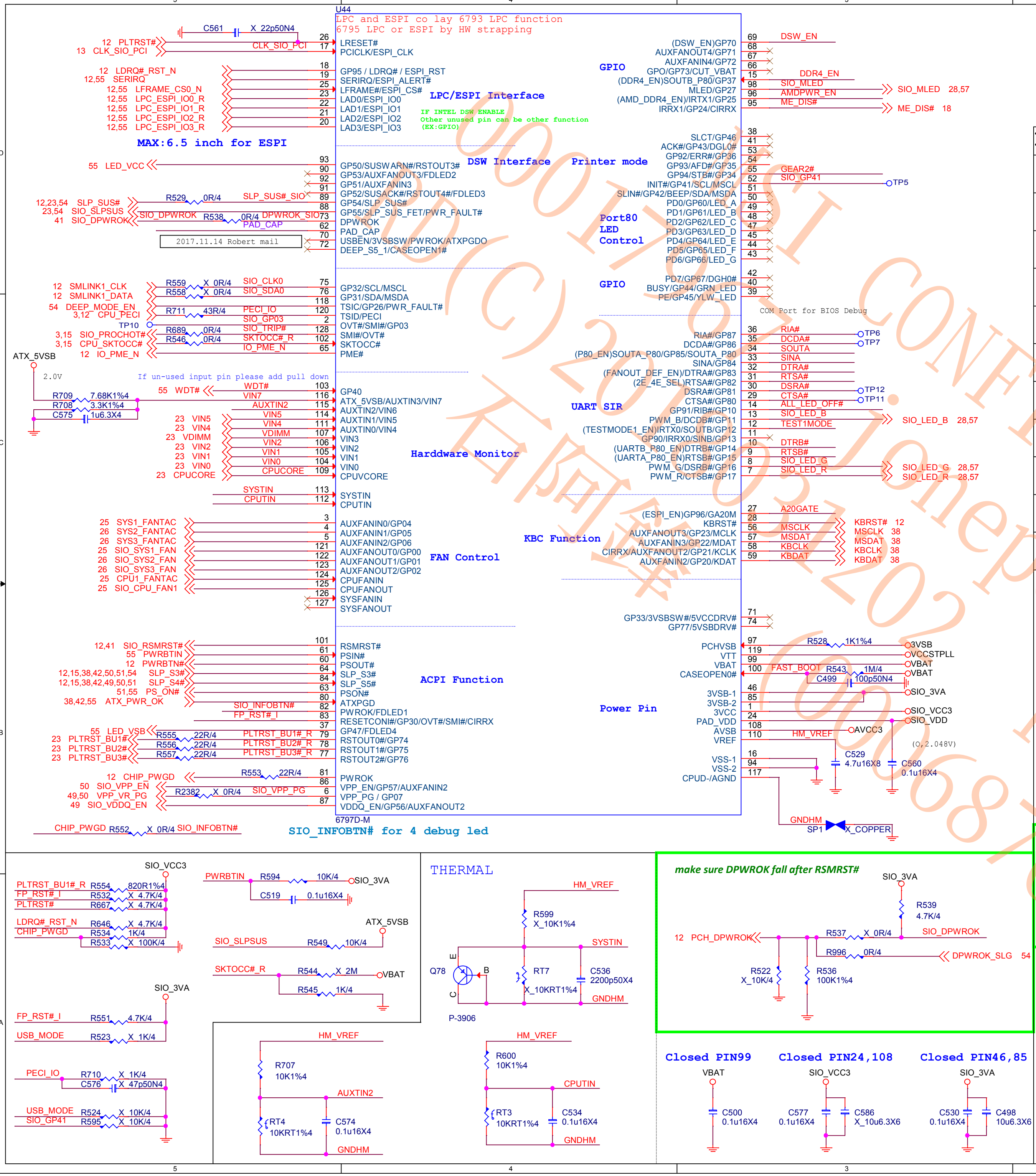
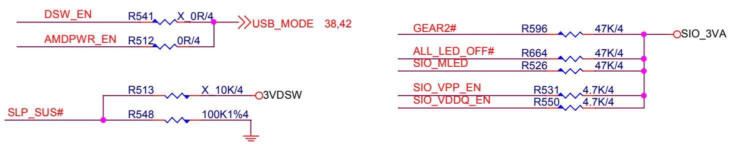
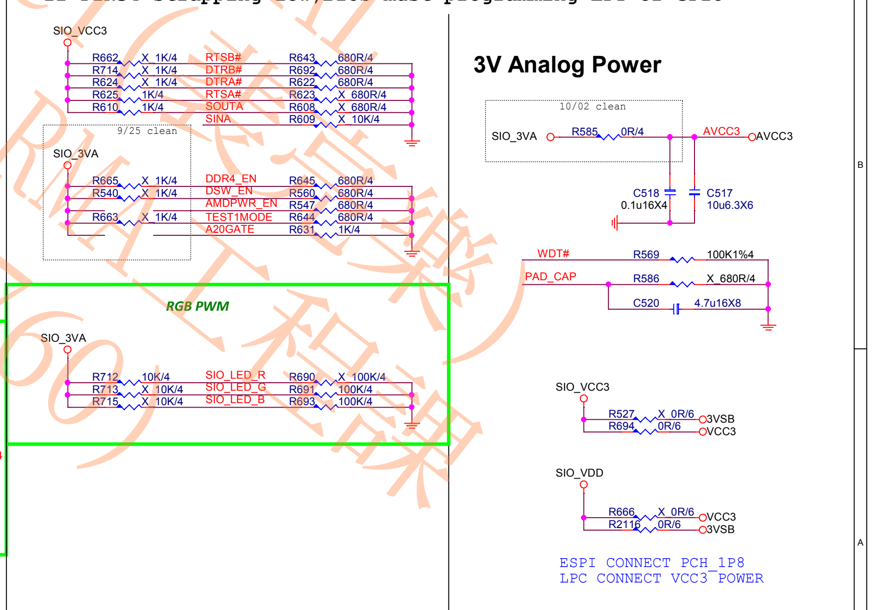




POWER ON STRAPPING PIN FOR NCT6797

PIN	NAME	Circuit NAME	0	1	Strap Point
9	UARTA_P80_EN	RTSB#	DISABLE UARTA80	ENABLE UARTA80	LRESET
10	UARTB_P80_EN	DTRB#	DISABLE UARTB80	ENABLE UARTB80	LRESET
12	TEST1MODE_EN	TEST1MODE	DISABLE TEST1MODE	ENABLE TEST1MODE	LRESET
15	DDR4_EN	DDR4_EN	Disable	Enable	
27	ESPI_EN	A20GATE	LPC	ESPI	
31	2E_4E_SEL	RTSA#	I/O ADDRESS 2E	I/O ADDRESS 4E	LRESET
32	FANOUT_DEF_EN	DTRA#	default 50%	default 100%	INTERNAL PWROK
34	P80_EN	SOUTA	ENABLE Non_PORT80	ENABLE PORT80	LRESET
69	DSW_EN	DSW_EN	DISABLE INTEL DSW	ENABLE INTEL DSW	INTERNAL RSMRST
96	AMDPWR_EN	AMDPWR_EN	DISABLE AMD PWR SEQ	ENABLE AMD PWR SEQ	INTERNAL RSMRST

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



MICRO-STAR INT'L CO.,LTD

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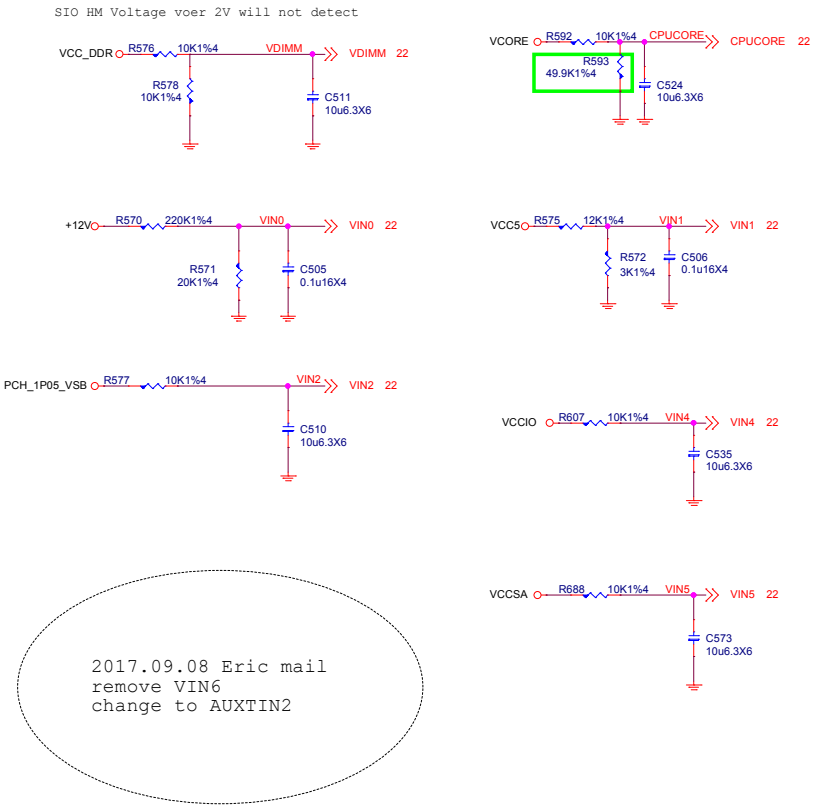
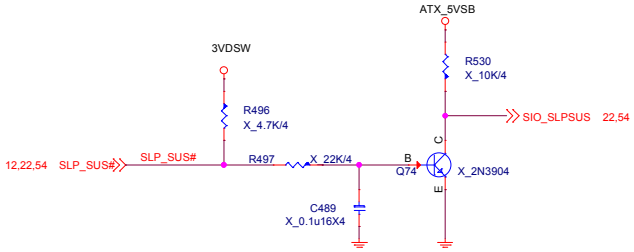
HW Monitor - Voltage



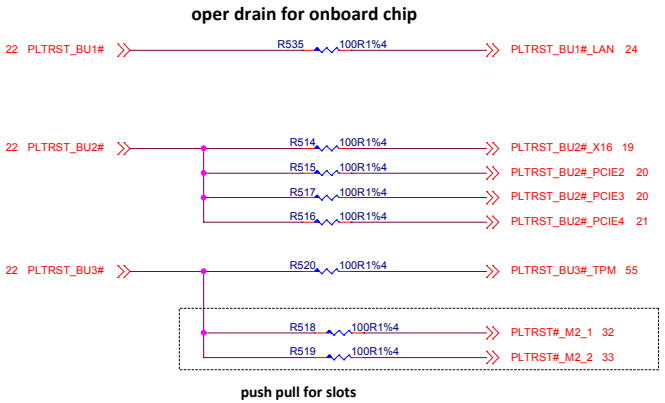
2017.09.08 Eric mail
remove VIN6
change to AUXTIN2

SLP_SUS Co-lay circuit



2017.09.25
remove for space

PLTRST#



SERIAL PORT 1

2017.09.25
remove JCOM1

MICRO-STAR INT'L CO.,LTD

MS-7B23

Size	Document Description	Rev
Custom	SIO-NCT6793D-2	1.0

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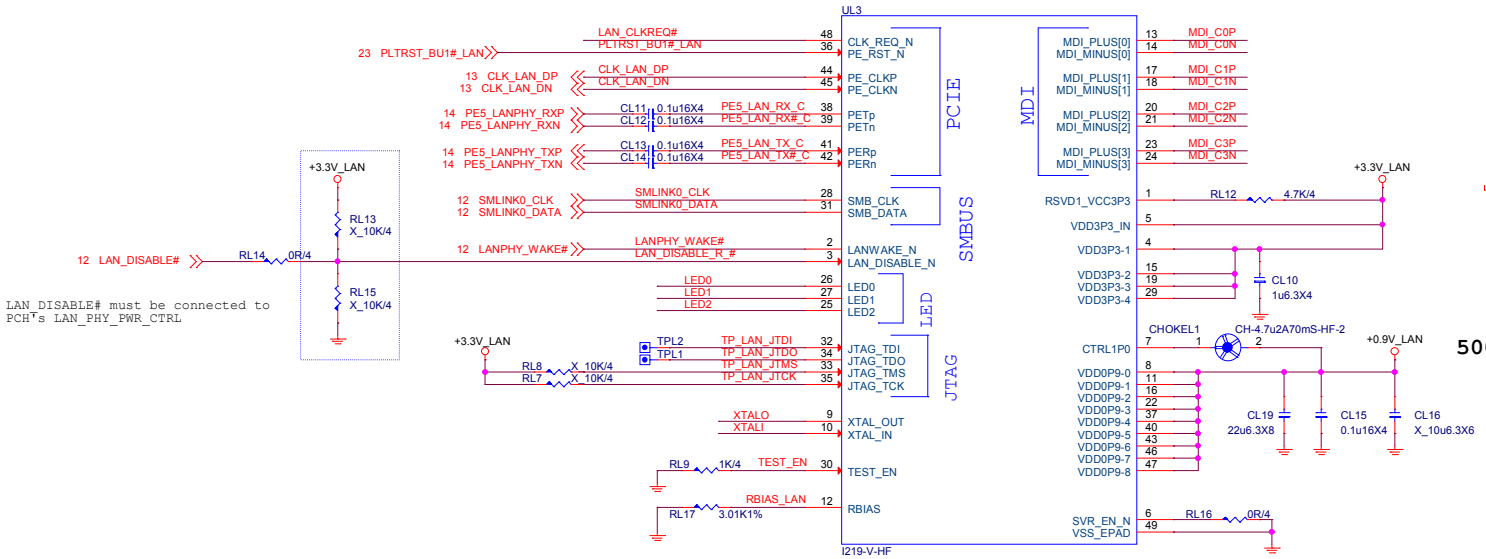
Intel Lan- i219

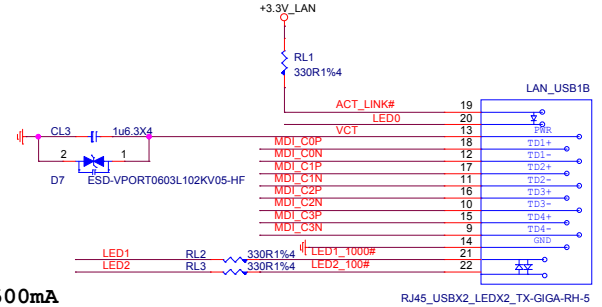
8111H:B06-08111CC-R09
8111G:B06-081116C-R09



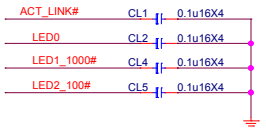
LAN_DISABLE# must be connected to PCH's LAN_PHY_PWR_CTRL

500mA

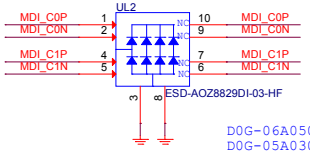
LAN Connector



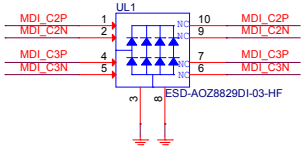
For EMI



UL2&UL3 close to connector

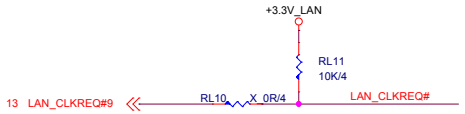


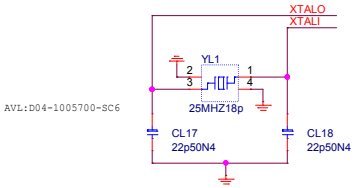
D0G-06A050C-A68
D0G-05A0300-I14



Do not pair MDI0 and MDI1 on the same TVSdevice (avoid LAN POE connecting issue).
Otherpairing combination is ok.

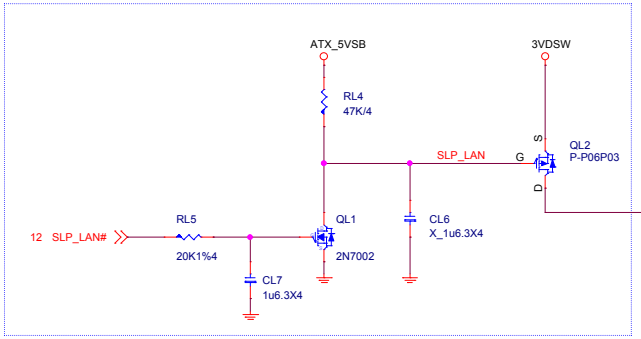
PCH's PCIECLKRQ<n> port mustbe mapped to PCH's PET/R<n+1>port.
If CLK_REQ_N is not used, pin48 is pulled up 10KR to 3.3V_LAN

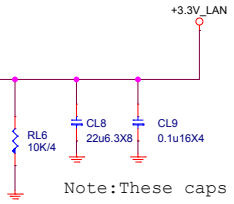




The 10Kohm pull-up resistor (RL18) of CLK_REQ_N is connected to 3.3V Suspend/Core/etc. power well, depending on the power well of PCH's input PCIECLKRQ<n> buffer.

support WOL from Deep Sx:
Power source from 3VA (DSW power) & make sure MAX current is enough to support i218/i219.





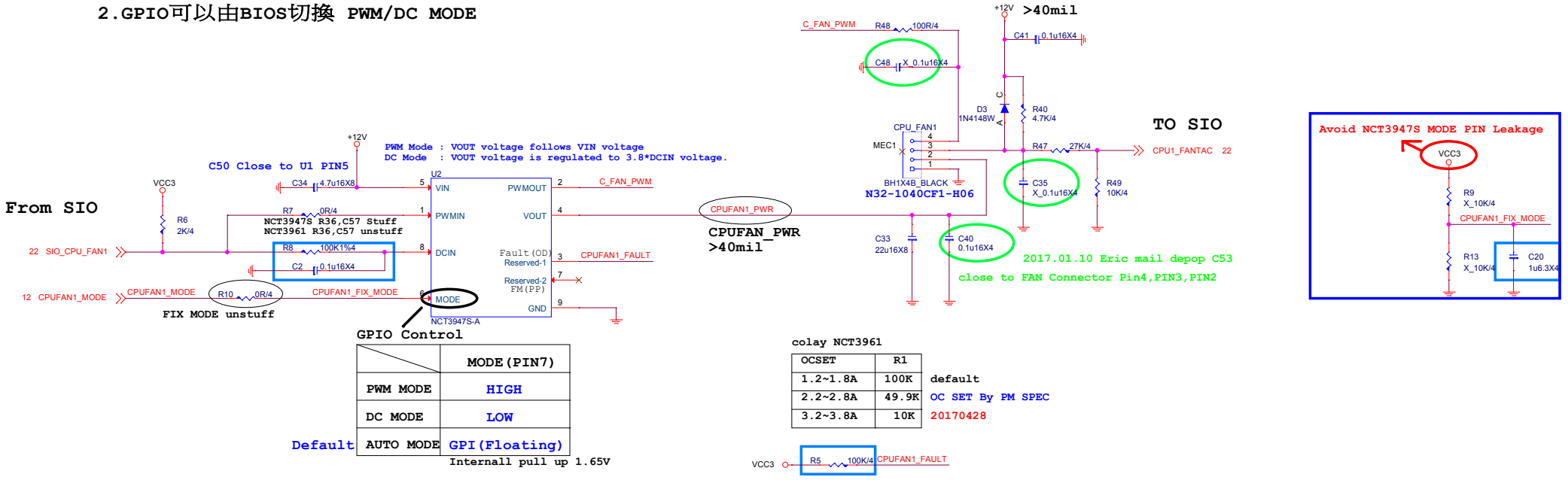
Note:These caps closed to PHY

+3.3V_LAN

I218:132mA
I219:542mW

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

2.GPIO可以由BIOS切换 PWM/DC MODE



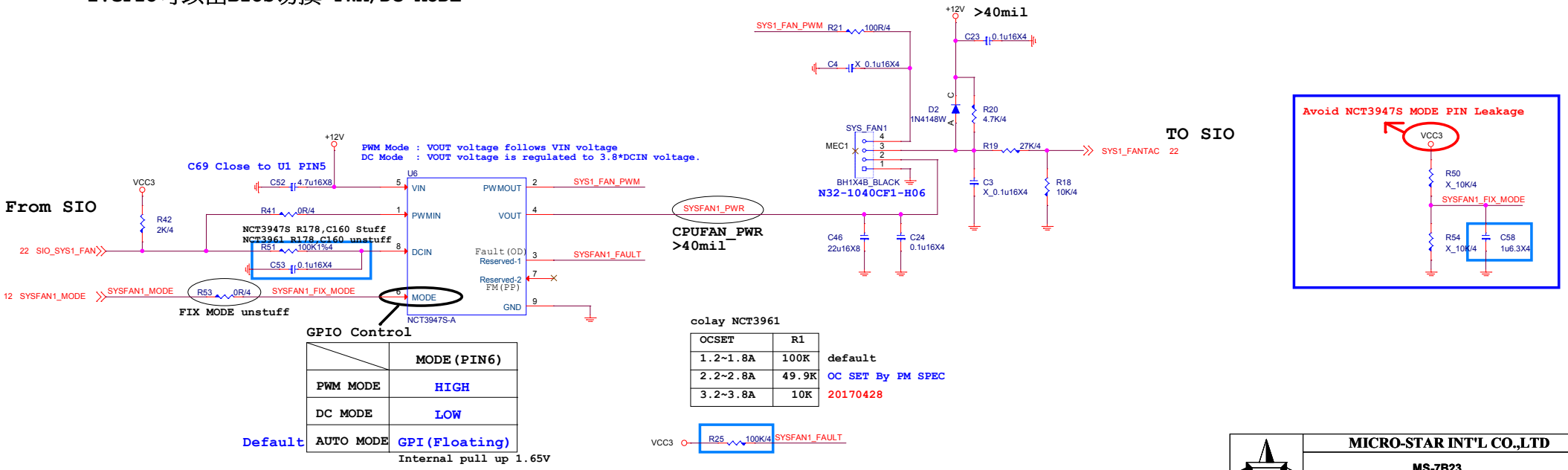
	MODE(PIN7)
PWM MODE	HIGH
DC MODE	LOW
AUTO MODE	GPI(Floating)

colay NCT3961

OCSET	R1	
1.2~1.8A	100K	default
2.2~2.8A	49.9K	OC SET By PM SPEC
3.2~3.8A	10K	20170428

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

2.GPIO可以由BIOS切换 PWM/DC MODE



	MODE(PIN6)
PWM MODE	HIGH
DC MODE	LOW
AUTO MODE	GPI(Floating)

colay NCT3961

OCSET	R1	
1.2~1.8A	100K	default
2.2~2.8A	49.9K	OC SET By PM SPEC
3.2~3.8A	10K	20170428

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	MS-7B23		
Size: Custom	Document Description: FAN CONTROLLOR		Rev: 1.0
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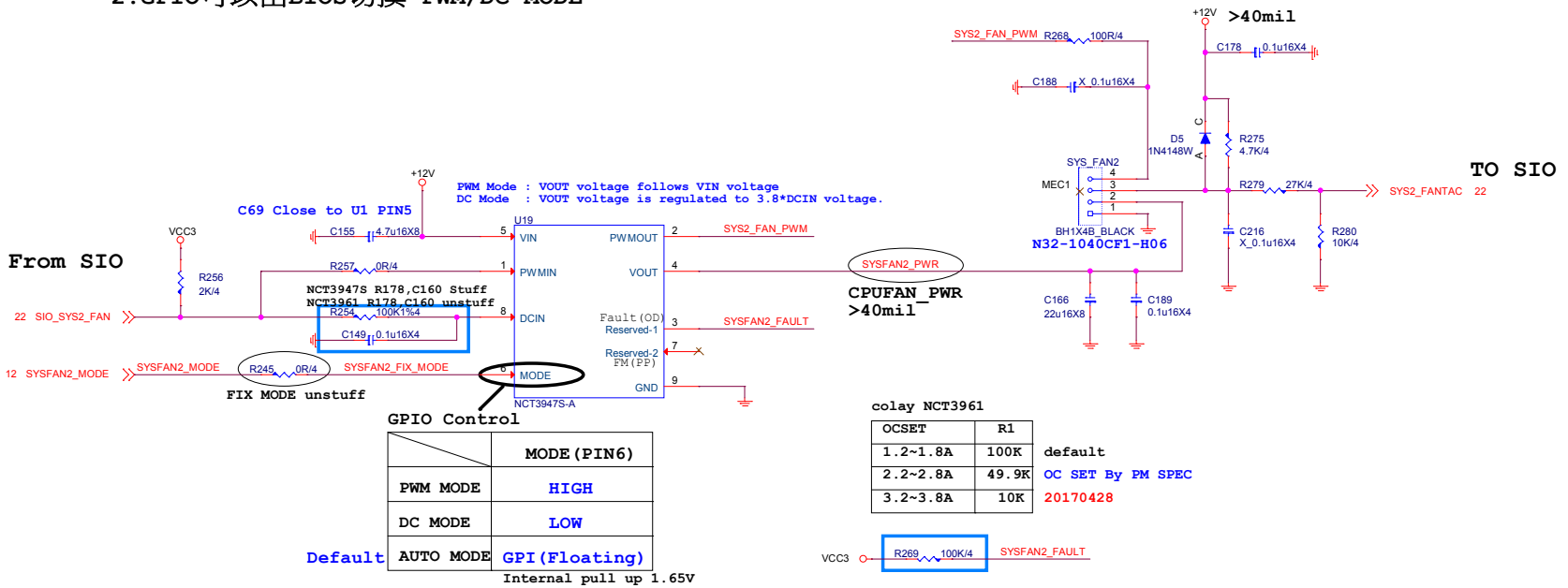
TYPE K : 4 PIN CPU FAN USE NCT3947S USE PCH GPIO CONTROL FAN MODE

2.GPIO可以由BIOS切换 PWM/DC MODE

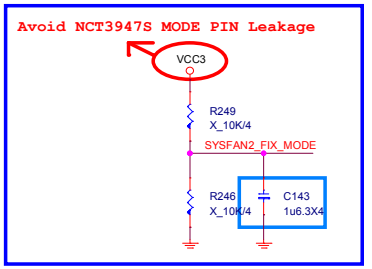


	MODE(PIN6)
PWM MODE	HIGH
DC MODE	LOW
Default AUTO MODE	GPI(Floating)

Internal pull up 1.65V

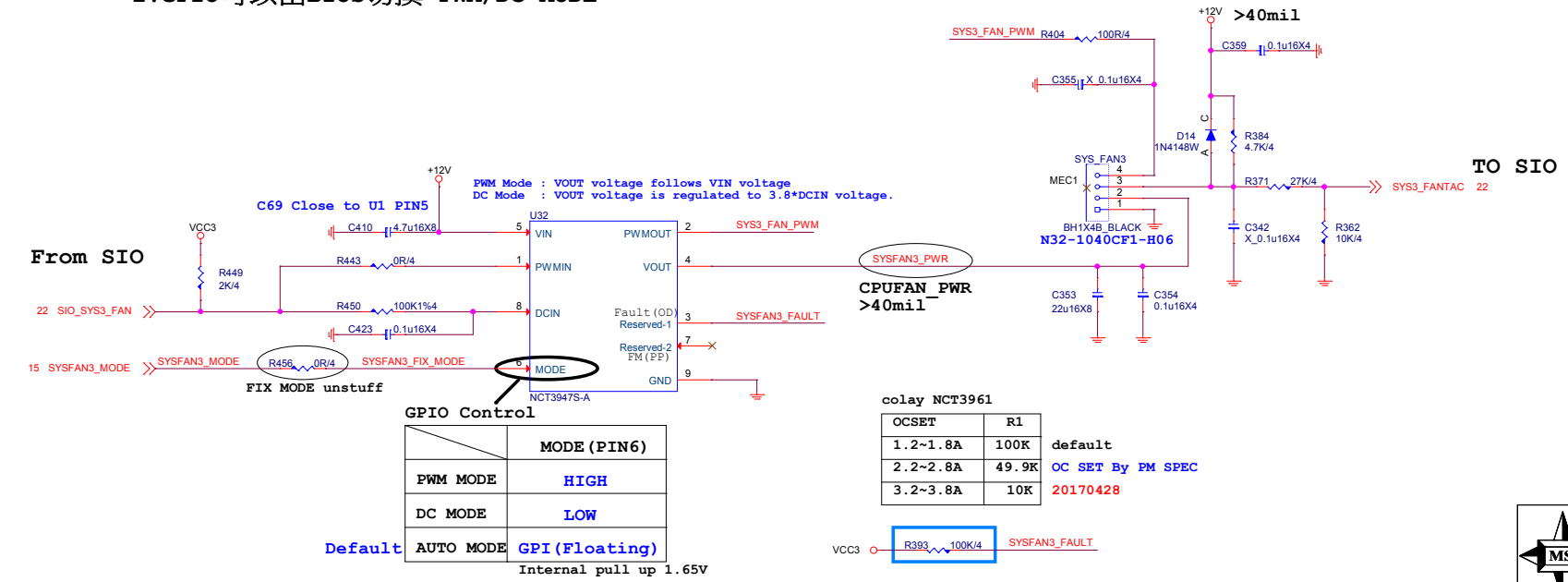
colay NCT3961

OCSET	R1	
1.2~1.8A	100K	default
2.2~2.8A	49.9K	OC SET By PM SPEC
3.2~3.8A	10K	20170428



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

2.GPIO可以由BIOS切换 PWM/DC MODE

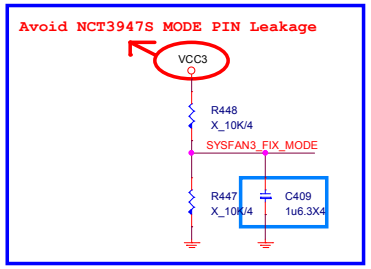


	MODE(PIN6)
PWM MODE	HIGH
DC MODE	LOW
Default AUTO MODE	GPI(Floating)

Internal pull up 1.65V

colay NCT3961

OCSET	R1	
1.2~1.8A	100K	default
2.2~2.8A	49.9K	OC SET By PM SPEC
3.2~3.8A	10K	20170428



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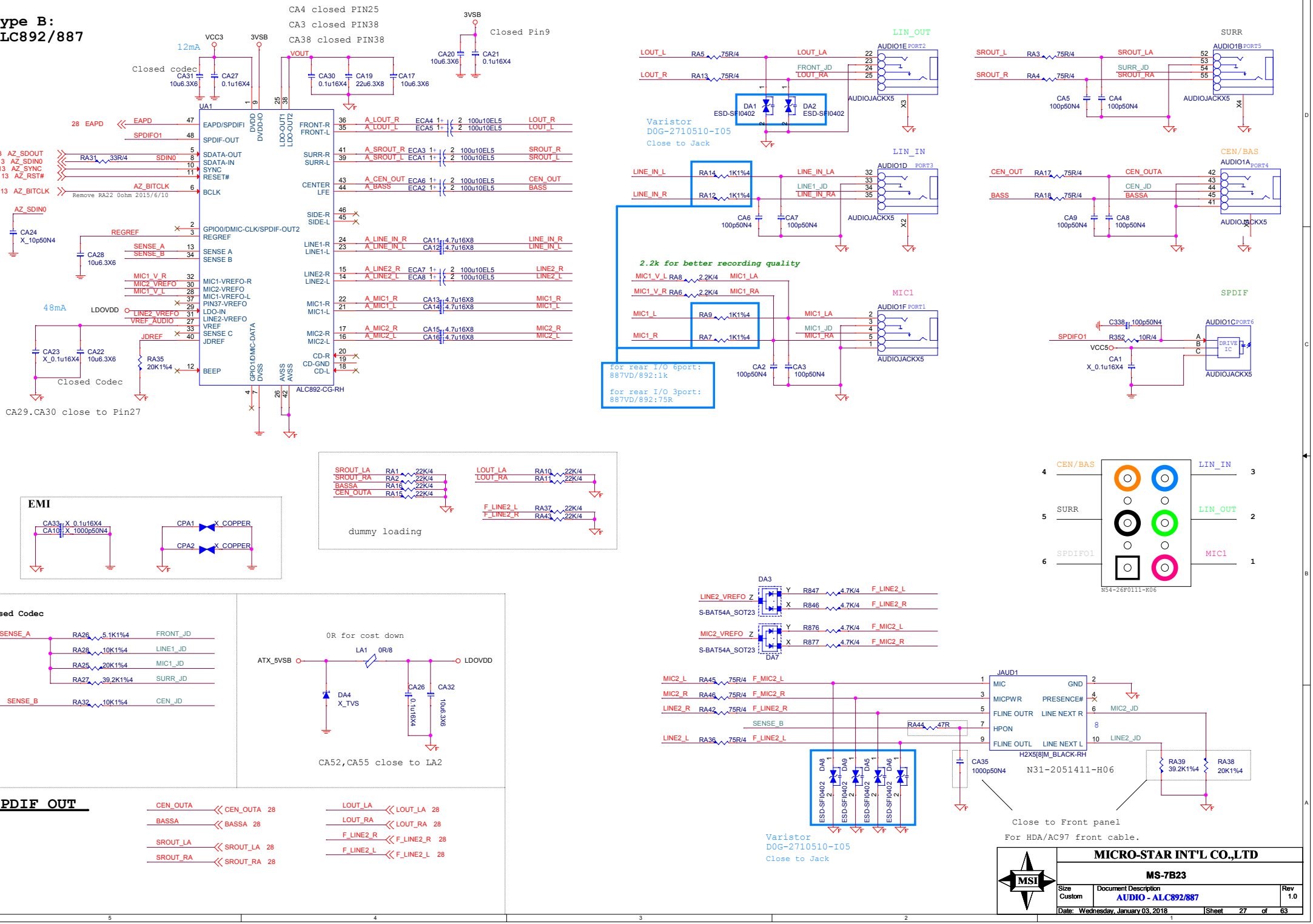
Size: Custom | Document Description: FAN CONTROLLOR | Rev: 1.0

Date: Wednesday, January 03, 2018 | Sheet 26 of 63

Type B:
ALC892/887



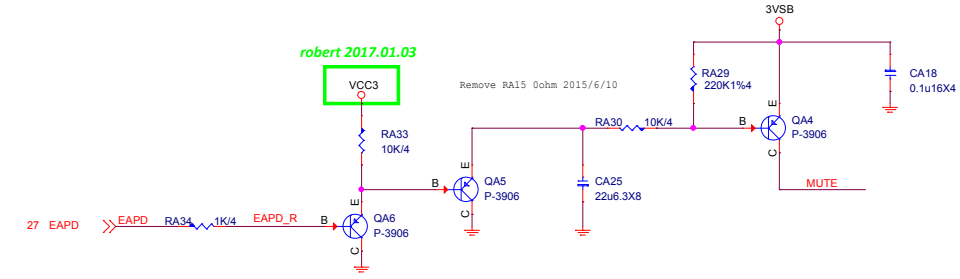
SPDIF OUT

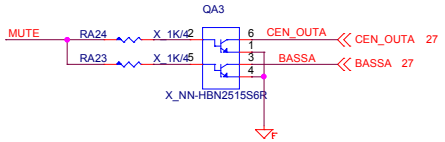
MICRO-STAR INT'L CO.,LTD	
MS-7B23	
Size: Custom	Document Description: AUDIO - ALC892/887
Rev: 1.0	
Date: Wednesday, January 03, 2018	Sheet 27 of 63

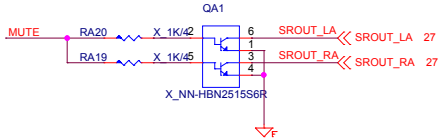
Rear Line OUT De-POP circuit

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

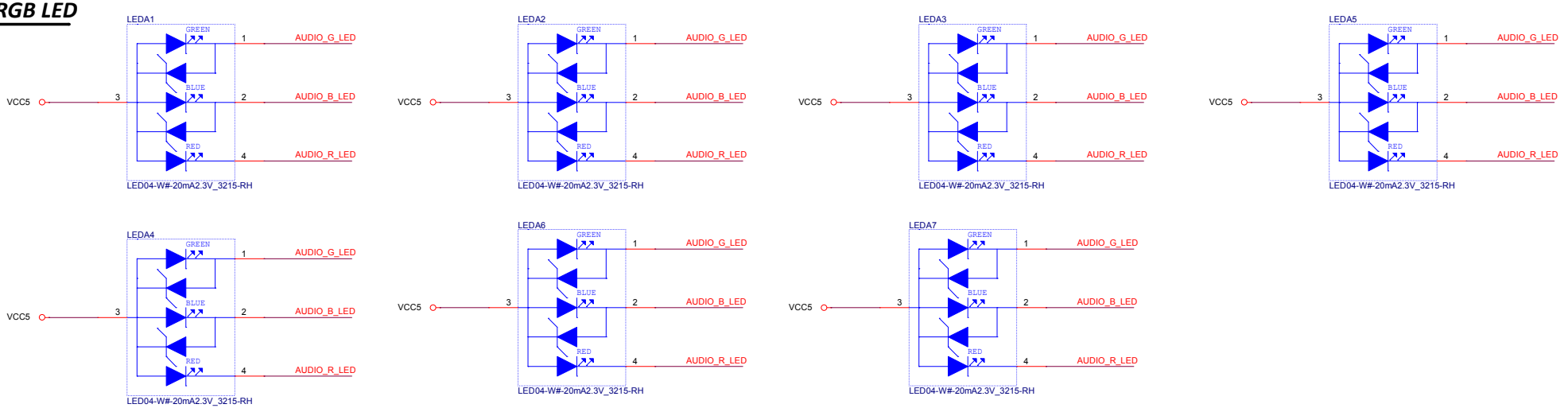
(add de-pop circuit by PM spec or customer request,
NOTE: add de-pop circuit need to change CA21,CA37, CA38, CA39, CA40, CA41 to TVS)







Audio RGB LED



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	MS-7B23	
Size: Custom	Document Description: AUDIO - depop circuit	Rev: 1.0
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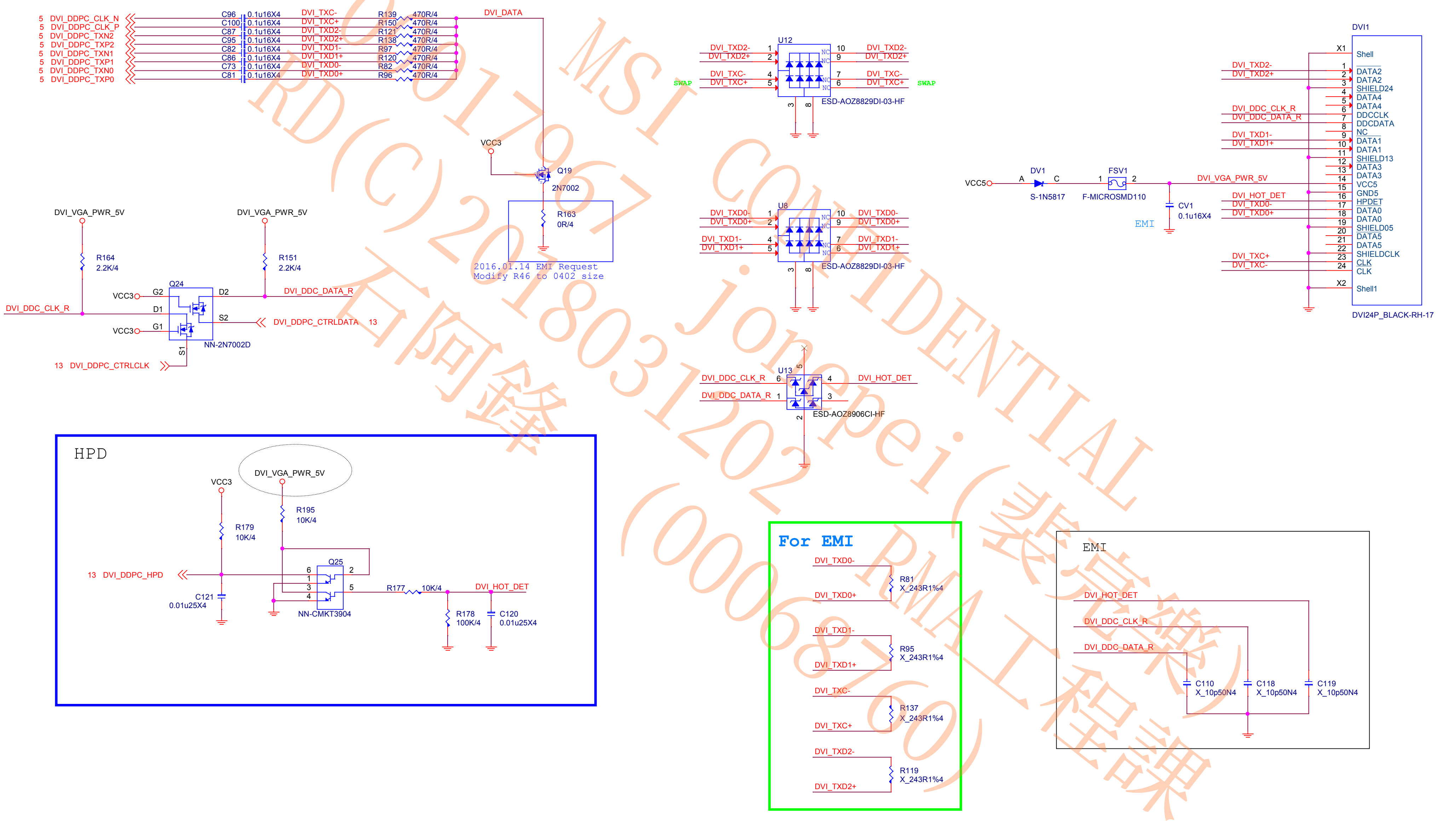
DVI level shifter

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



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MS-7B23		
Size: Custom	Document Description: DVI	Rev 1.0
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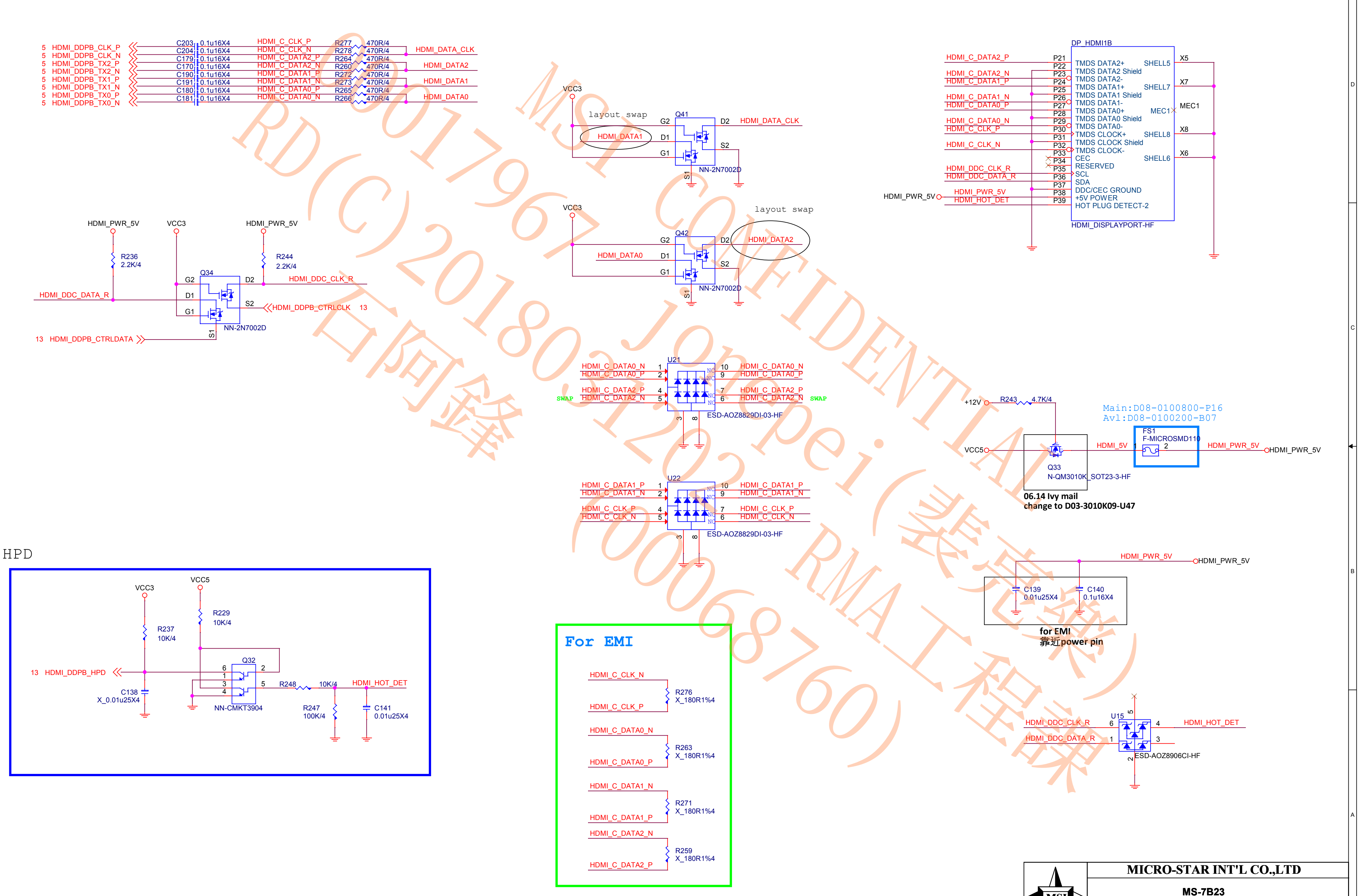
HDMI, DVI : 1920x1200 at 60 Hz (16:10 WUXGA)



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Size Custom | Document Description HDMI Connector | Rev 1.0
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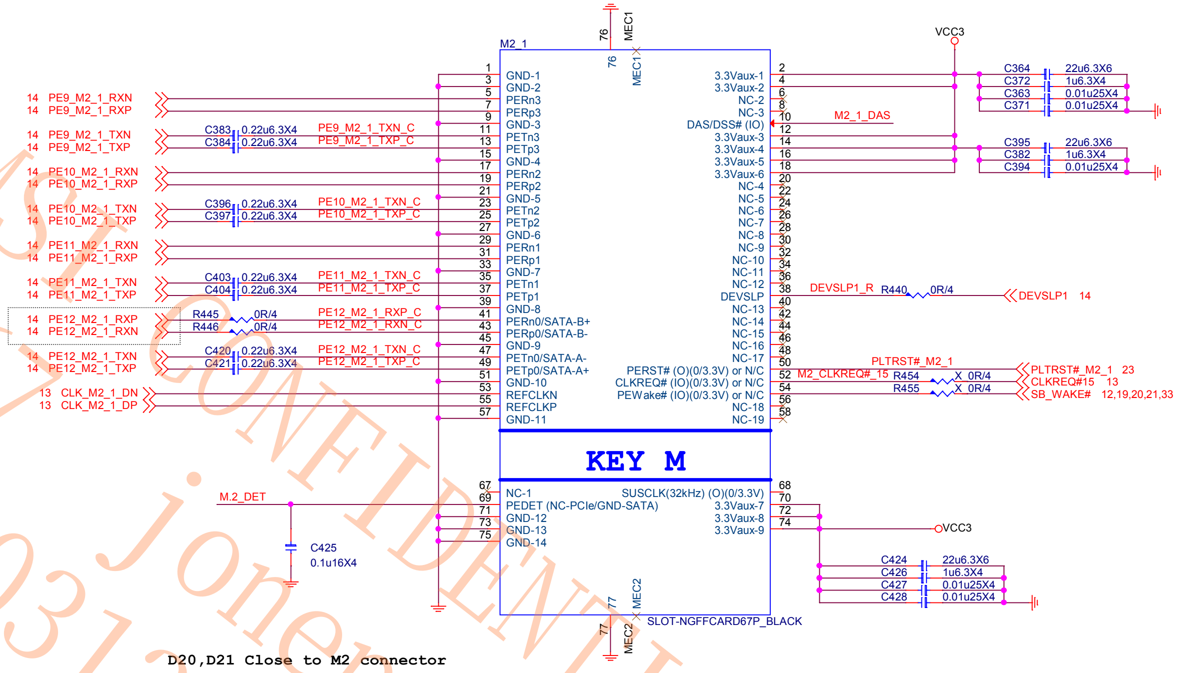
DP

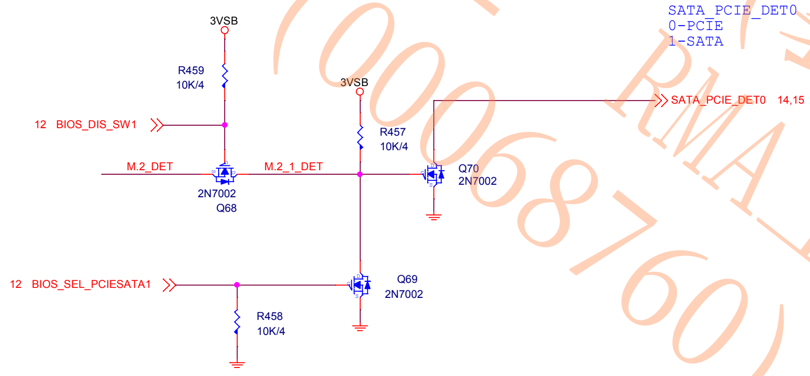
MICRO-STAR INT'L CO.,LTD

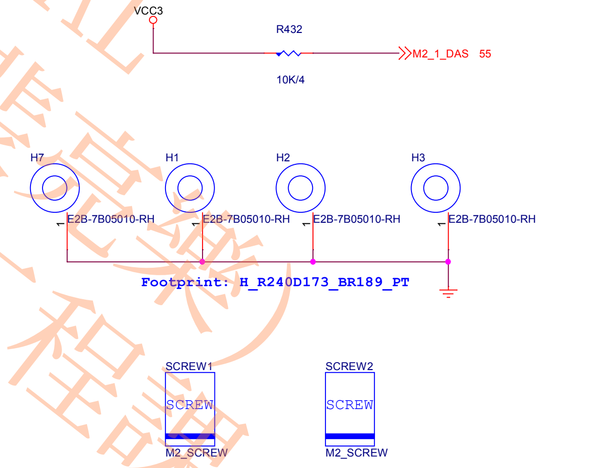
MS-7B23

Size	Document Description	Rev
Custom	DisplayPort Connector	1.0

Date: Wednesday, January 03, 2018 | Sheet 31 of 63







BIOS_MODE

DIS_SW	*M1_SEL_PCIESATA*	*Mode*
0	*1*	***M2-SATA***
0	*0*	***M2-PCIE***
GPI	*GPI*	***AUTO***

MICRO-STAR INT'L CO.,LTD

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Size	Document Description	Rev
Custom	**M.2-SLOT1**	1.0

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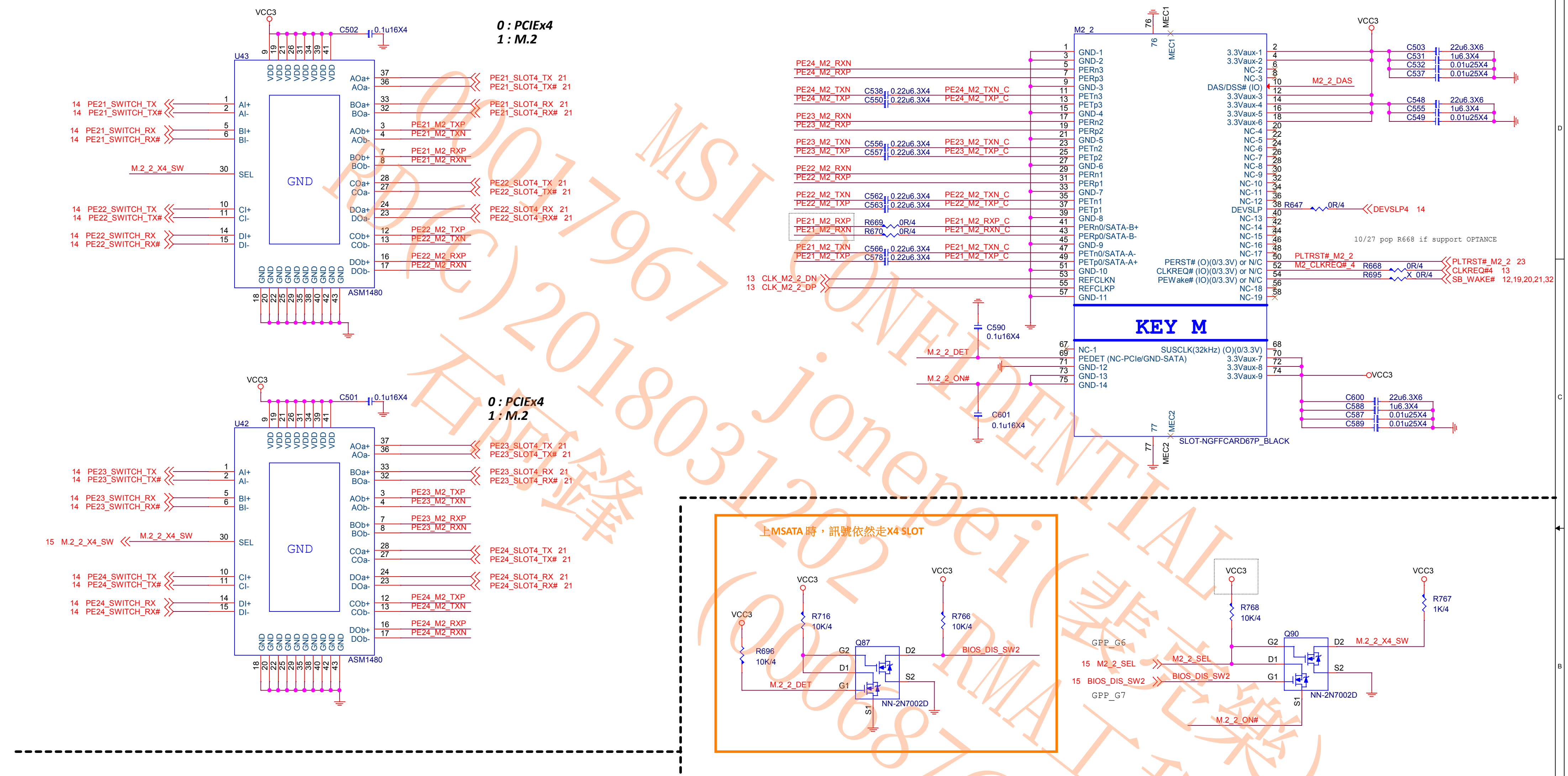

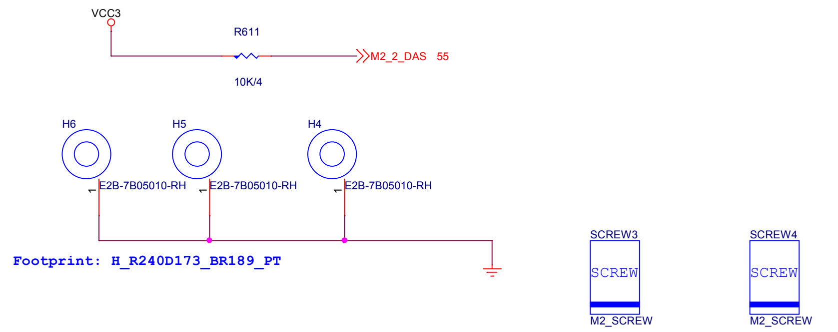

BIOS_MODE

GPP_G7 GPP_G6

BIOS_DIS_SW2	*M2_2_SEL*	*Mode*
0	*0*	*M2 SLOT-PCIE*
0	*1*	*X4 SLOT-PCIE*
GPI	*GPI*	*GPI*

MICRO-STAR INT'L CO.,LTD

MS-7B23

Size	Document Description	Rev
Custom	M.2-SLOT2	1.0

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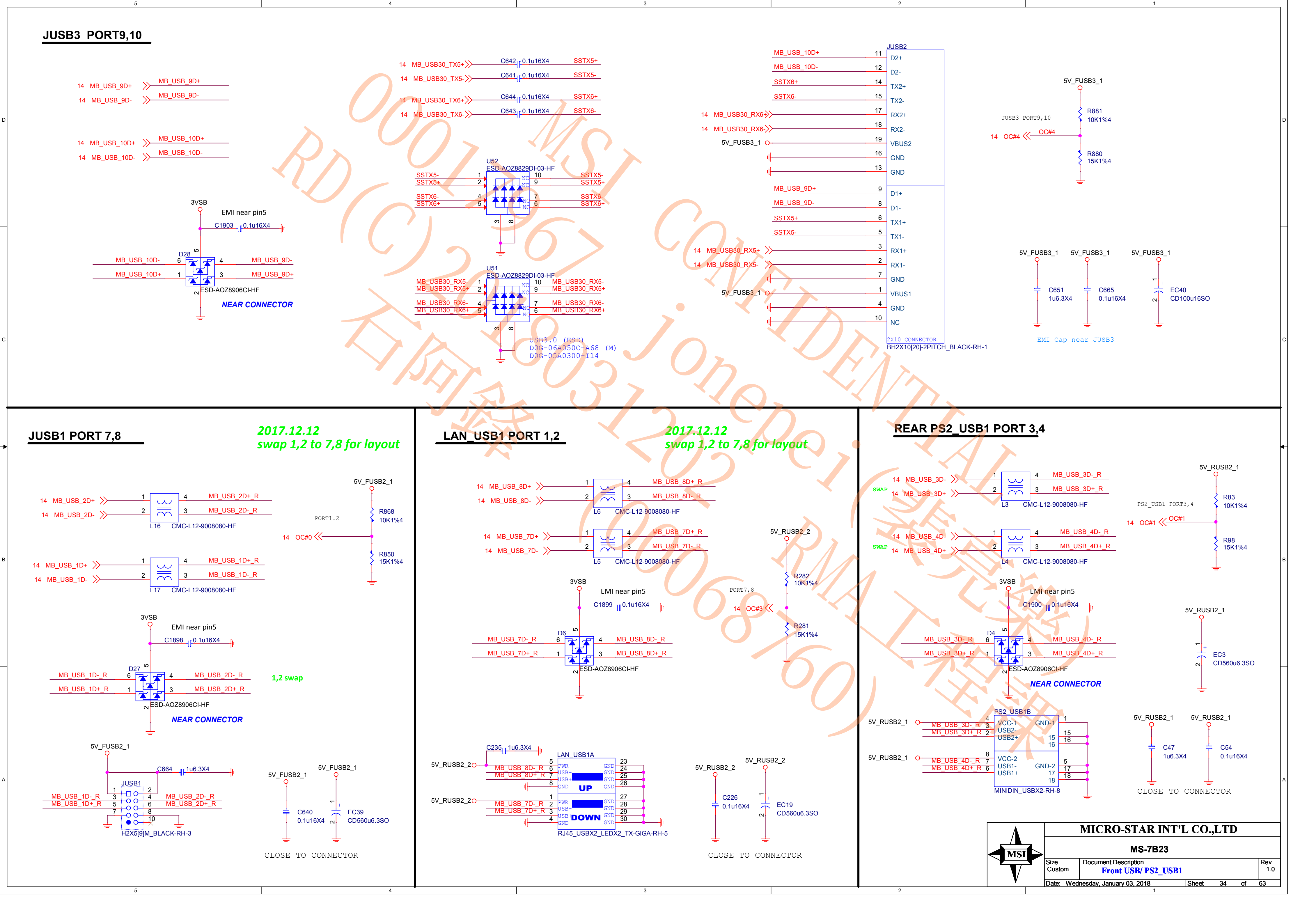
JUSB3 PORT9,10
14 MB_USB_9D+
14 MB_USB_9D-
14 MB_USB_10D+
14 MB_USB_10D-
14 MB_USB30_TX5+
14 MB_USB30_TX5-
14 MB_USB30_TX6+
14 MB_USB30_TX6-
C642 0.1u16X4 SSTX5+
C641 0.1u16X4 SSTX5-
C644 0.1u16X4 SSTX6+
C643 0.1u16X4 SSTX6-
U52 ESD-AOZ8829DI-03-HF
U51 ESD-AOZ8829DI-03-HF
USB3.0 (ESD)
D0G-06A050C-A68 (M)
D0G-05A0300-I14
3VSB
EMI near pin5
C1903 0.1u16X4
D28
ESD-AOZ8906CI-HF
NEAR CONNECTOR
JUSB2
D2+ D2- TX2+ TX2- RX2+ RX2- VBUS2 GND GND D1+ D1- TX1+ TX1- RX1+ RX1- GND VBUS1 GND NC
2X10_CONNECTOR
BH2X10[20]-2PITCH_BLACK-RH-1
5V_FUSB3_1
JUSB3 PORT9,10
14 OC#4
R881 10K1%4
R880 15K1%4
C651 1u6.3X4
C665 0.1u16X4
EC40 CD100u16SO
EMI Cap near JUSB3
JUSB1 PORT 7,8
2017.12.12
swap 1,2 to 7,8 for layout
14 MB_USB_2D+
14 MB_USB_2D-
14 MB_USB_1D+
14 MB_USB_1D-
L16 CMC-L12-9008080-HF
L17 CMC-L12-9008080-HF
5V_FUSB2_1
PORT1.2
14 OC#0
R868 10K1%4
R850 15K1%4
C1898 0.1u16X4
D27
1,2 swap
C664 1u6.3X4
JUSB1
H2X5[9]M_BLACK-RH-3
C640 0.1u16X4
EC39 CD560u6.3SO
CLOSE TO CONNECTOR
LAN_USB1 PORT 1,2
2017.12.12
swap 1,2 to 7,8 for layout
14 MB_USB_8D+
14 MB_USB_8D-
14 MB_USB_7D+
14 MB_USB_7D-
L6 CMC-L12-9008080-HF
L5 CMC-L12-9008080-HF
5V_RUSB2_2
PORT7,8
14 OC#3
R282 10K1%4
R281 15K1%4
C1899 0.1u16X4
D6
C235 1u6.3X4
LAN_USB1A
UP
DOWN
RJ45_USBX2_LEDX2_TX-GIGA-RH-5
C226 0.1u16X4
EC19 CD560u6.3SO
CLOSE TO CONNECTOR
REAR PS2_USB1 PORT 3,4
14 MB_USB_3D-
14 MB_USB_3D+
14 MB_USB_4D-
14 MB_USB_4D+
SWAP
L3 CMC-L12-9008080-HF
L4 CMC-L12-9008080-HF
5V_RUSB2_1
PS2_USB1 PORT3,4
14 OC#1
R83 10K1%4
R98 15K1%4
C1900 0.1u16X4
D4
NEAR CONNECTOR
EC3 CD560u6.3SO
PS2_USB1B
MINIDIN_USBX2-RH-8
C47 1u6.3X4
C54 0.1u16X4
CLOSE TO CONNECTOR
MICRO-STAR INT'L CO.,LTD
MS-7B23
Size Custom
Document Description Front USB/ PS2_USB1
Rev 1.0
Date: Wednesday, January 03, 2018
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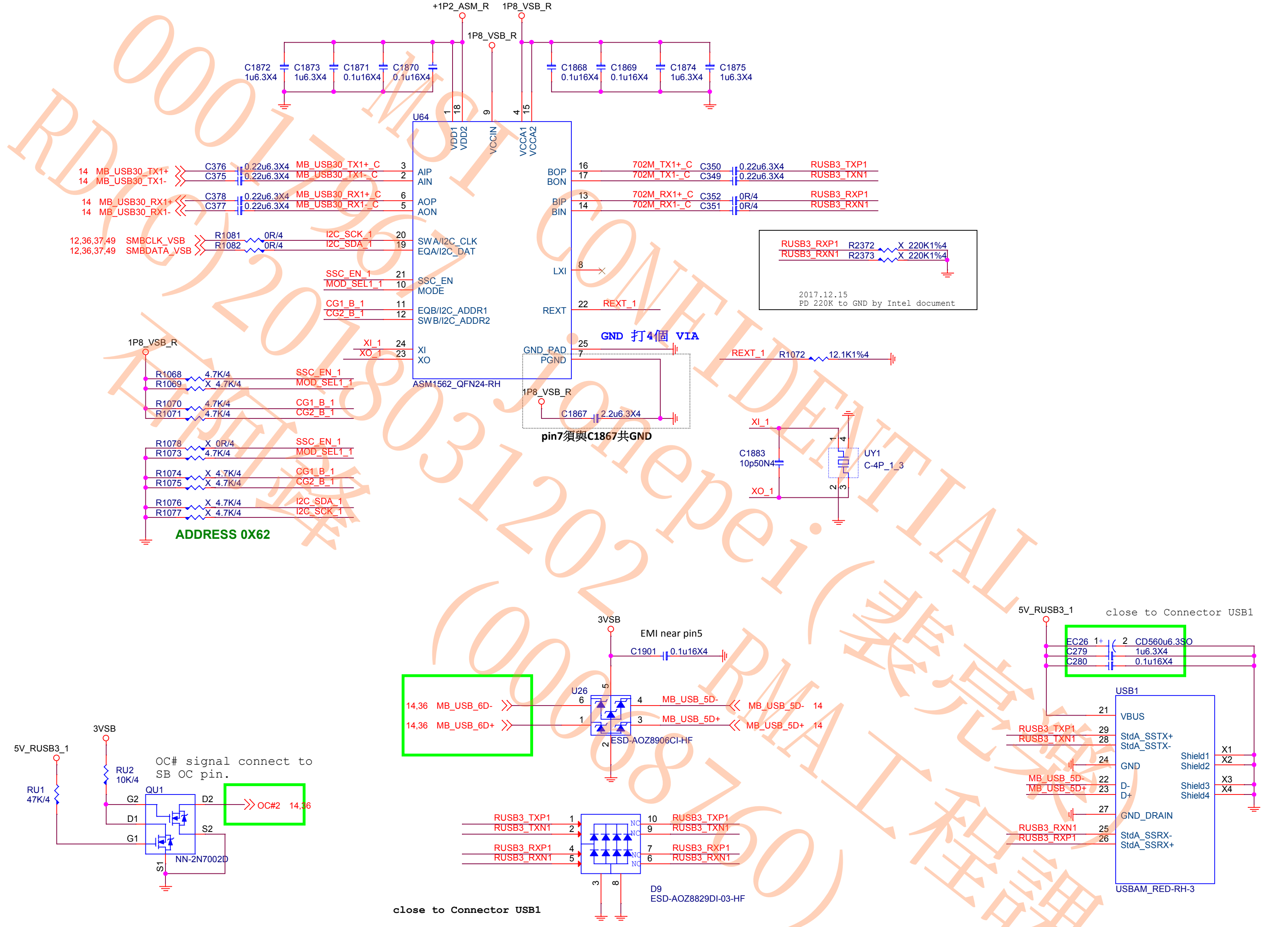
Rear TYPE-A USB3.1 Re-Timer



MICRO-STAR INT'L CO.,LTD

MS-7B23

Size	Document Description	Rev
Custom	Type-A & Re_driver	1.0

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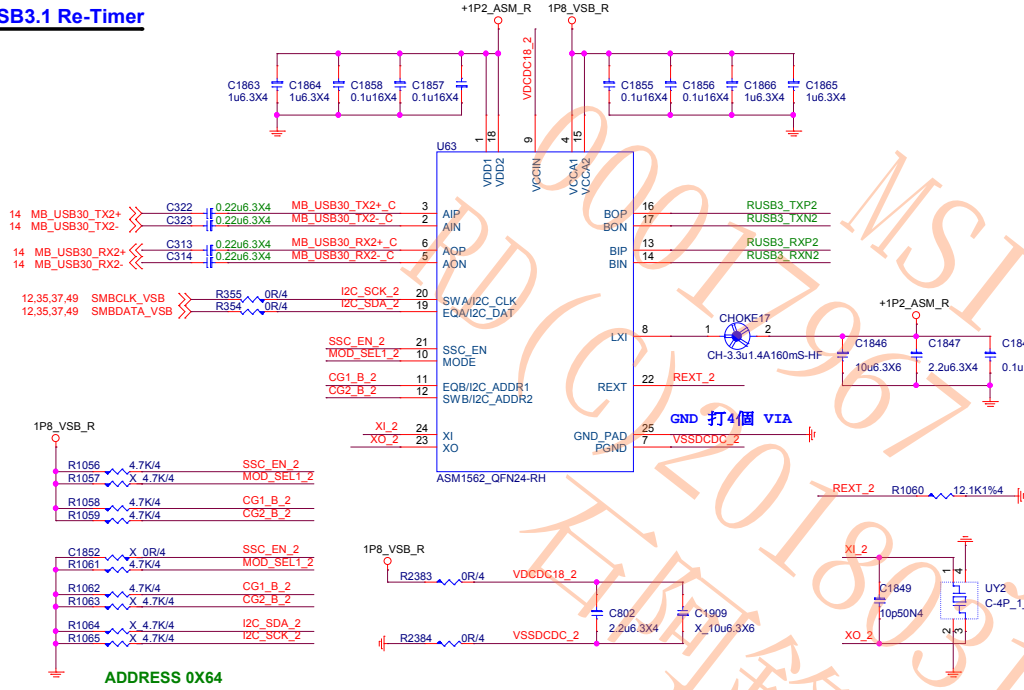
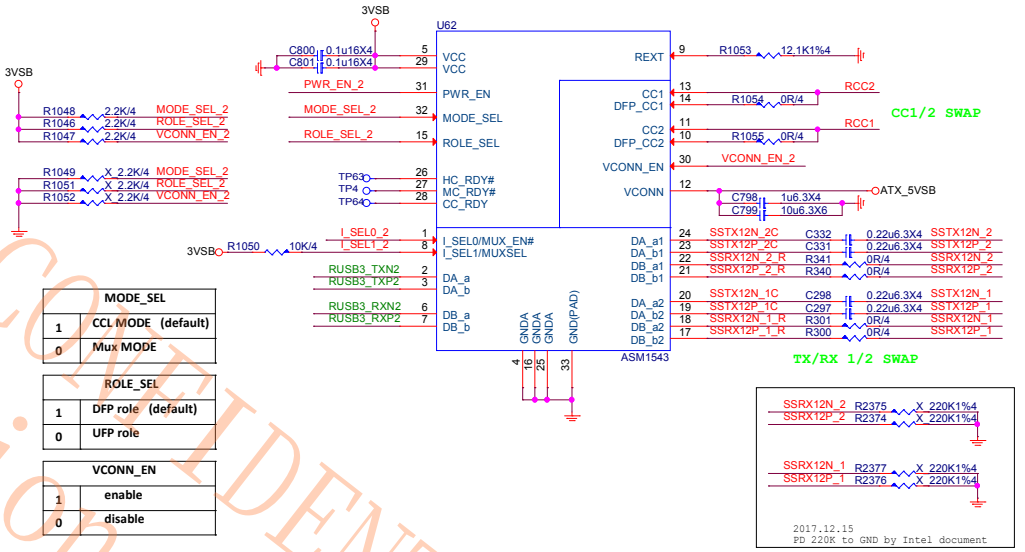
USB3.1 Re-Timer



USB Type-C MUX with Configuration Channel (CC)

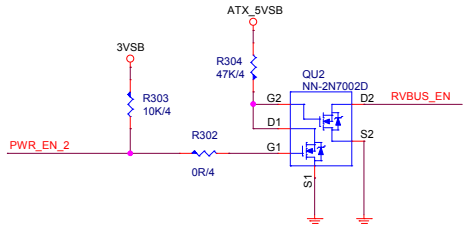


MODE_SEL	
1	CCL MODE (default)
0	Mux MODE

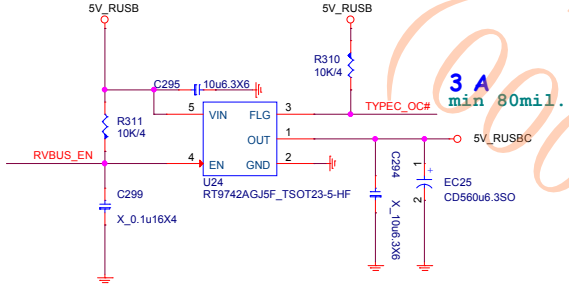
ROLE_SEL	
1	DFP role (default)
0	UFP role

VCONN_EN	
1	enable
0	disable

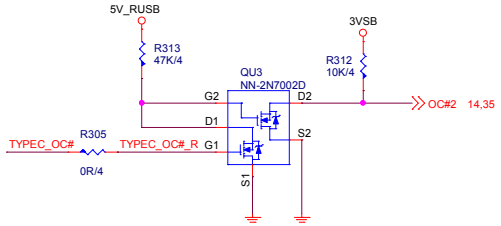
VCOM OC#



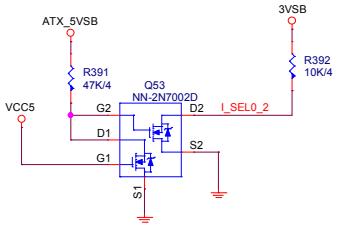
VBUS EN



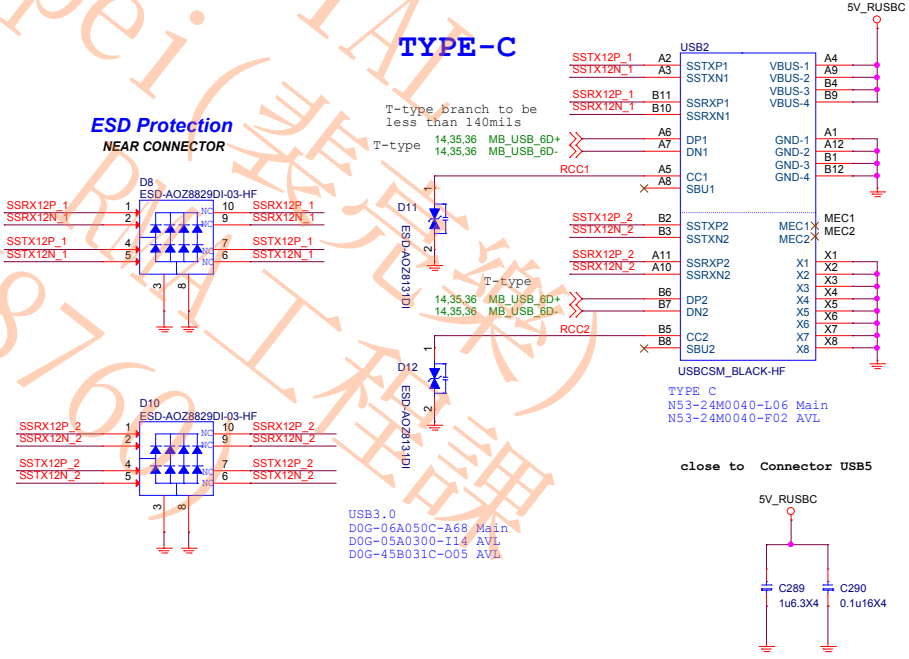
VBUS OC# LEVEL SHIFT



Current Mode



TYPE-C



MICRO-STAR INT'L CO.,LTD		
MS-7B23		
Size: Custom	Document Description: Rear Type-C & Re-Timer	Rev: 1.0
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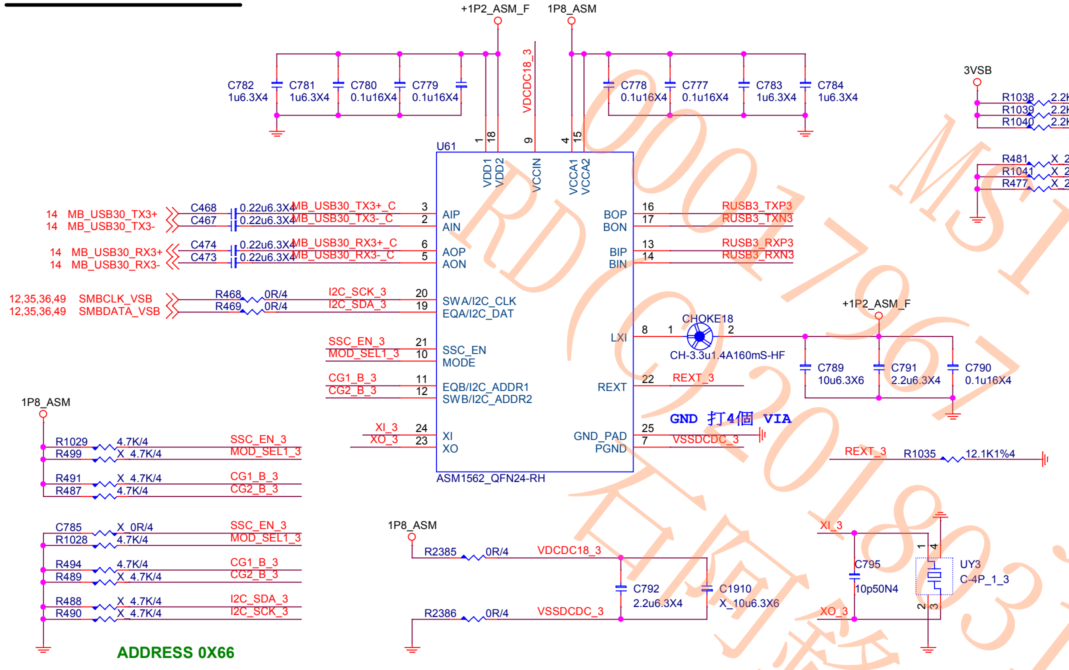
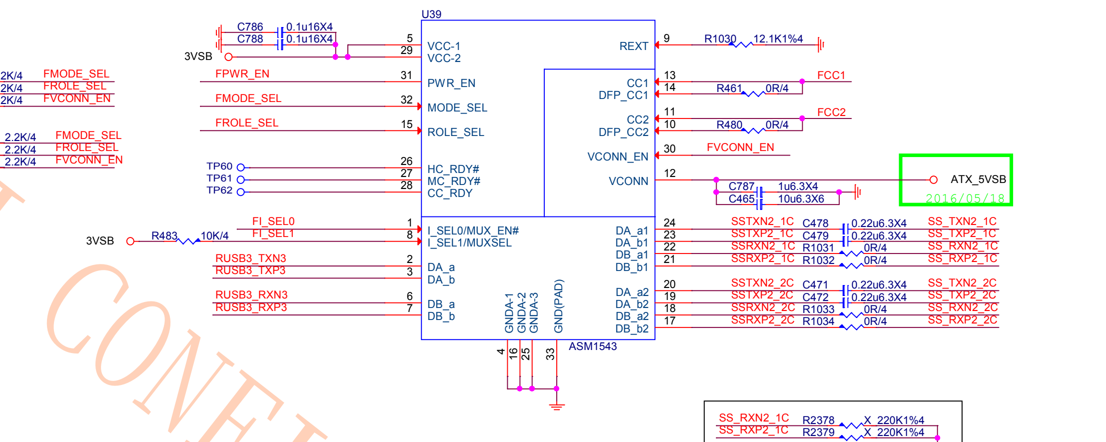
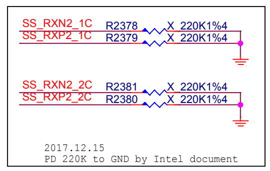
USB3.1 Gen2 Re-Timer

USB Type-C MUX with Configuration Channel (CC)

USB 3.1-Type-C





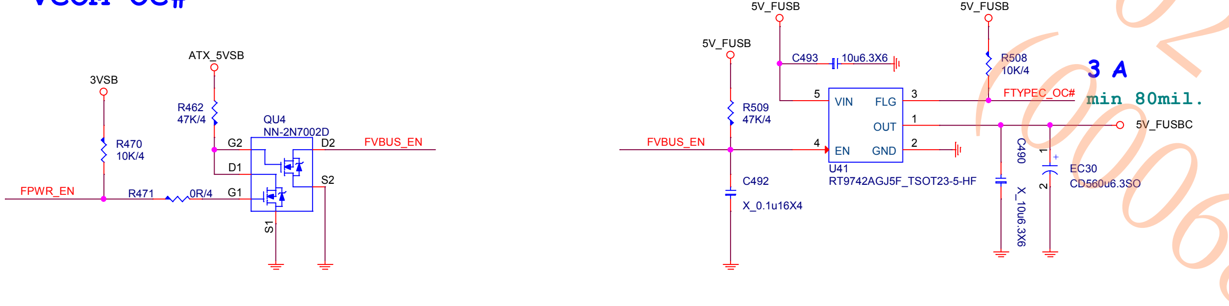


ASM1562 USB3.1 re-timer

ADDRESS	0x62	0x64	0x66	0x68	0x70	0x72	0x74	0x76	0x78
PIN11 RH (KOhm)	4.7K	4.7K	N/A	4.7K	4.7K	N/A	4.7K	4.7K	N/A
PIN11 RL (KOhm)	N/A	4.7K	4.7K	N/A	4.7K	4.7K	N/A	4.7K	4.7K
PIN12 RH (KOhm)	4.7K	4.7K	4.7K	4.7K	4.7K	4.7K	N/A	N/A	N/A
PIN12 RL (KOhm)	N/A	N/A	N/A	4.7K	4.7K	4.7K	4.7K	4.7K	4.7K

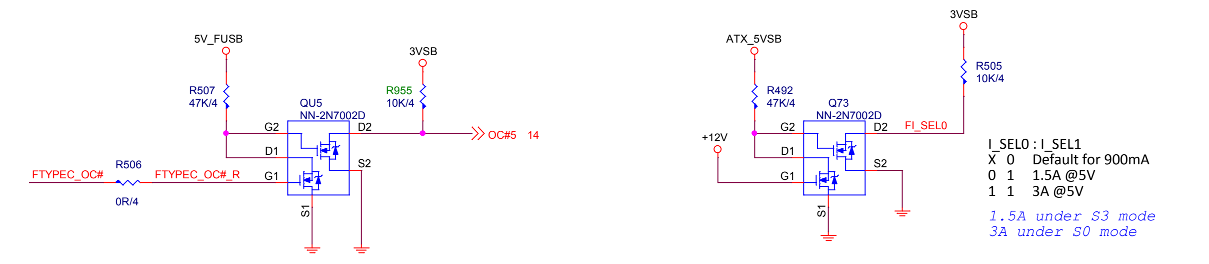
VCOM OC#

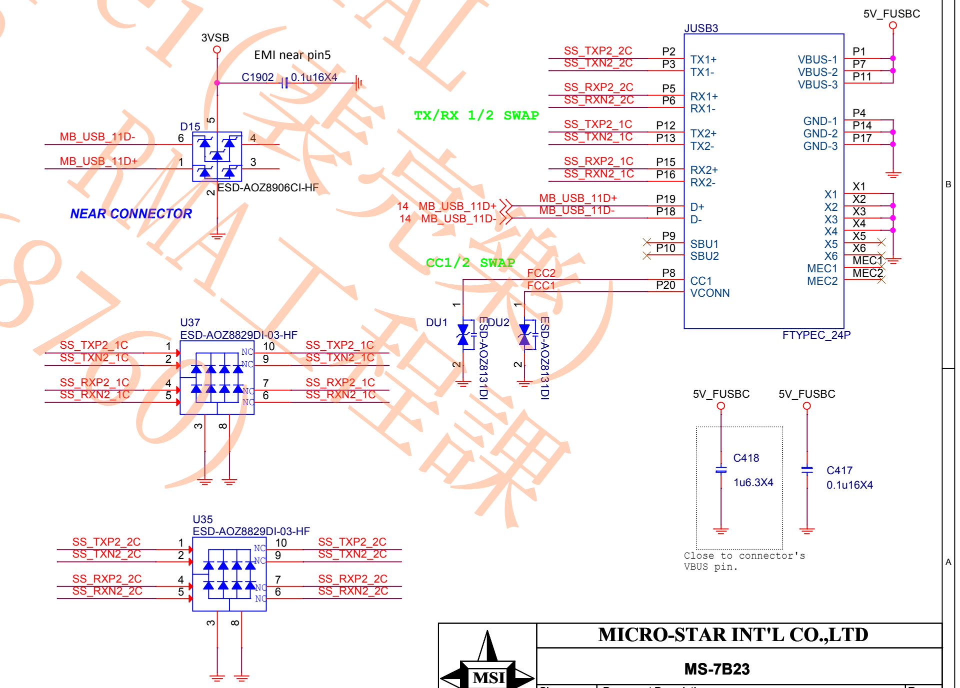
VBUS EN



VBUS OC# LEVEL SHIFT

Current Mode





MICRO-STAR INT'L CO.,LTD

MS-7B23

Size	Document Description	Rev
Custom	Front Type-C & Re-driver	1.0

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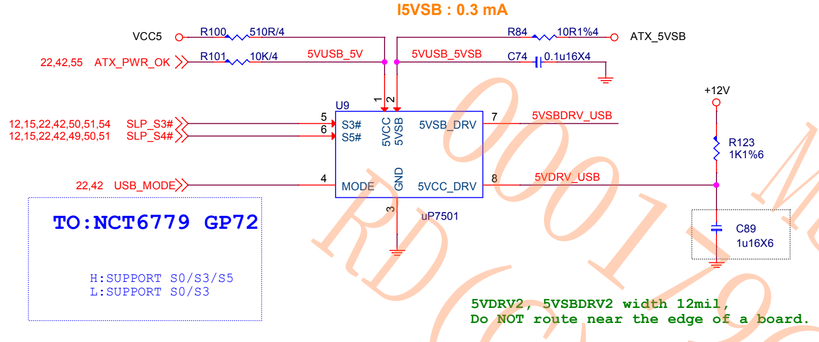
USB POWER

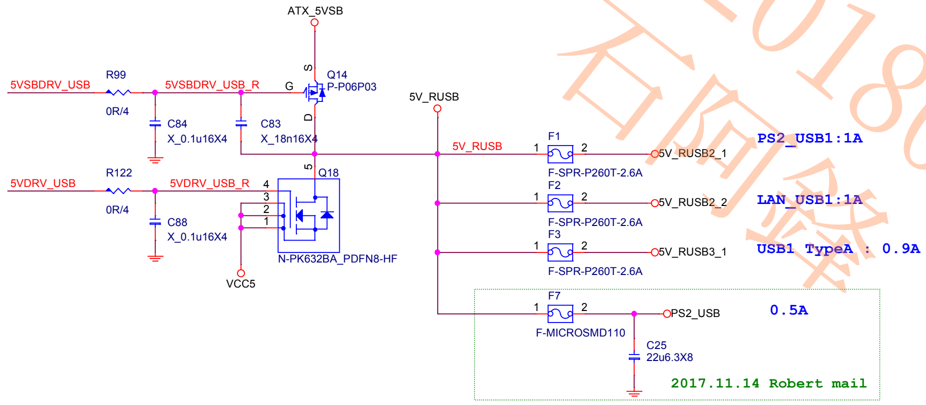
USB MODE


I5VSB : 0.3 mA
VCC5
R100 510R/4
R84 10R1%4
ATX_5VSB
22,42,55 ATX_PWR_OK
R101 10K/4
5VUSB_5V
5VUSB_5VSB
C74 0.1u16X4
+12V
U9
S3#
S5#
5VCC
5VSB
5VSB_DRV
5VSBDRV_USB
12,15,22,42,50,51,54 SLP_S3#
12,15,22,42,49,50,51 SLP_S4#
R123 1K1%6
22,42 USB_MODE
MODE
GND
5VCC_DRV
5VDRV_USB
uP7501
C89 1u16X6
TO:NCT6779 GP72
H:SUPPORT S0/S3/S5
L:SUPPORT S0/S3
5VDRV2, 5VSBDRV2 width 12mil,
Do NOT route near the edge of a board.

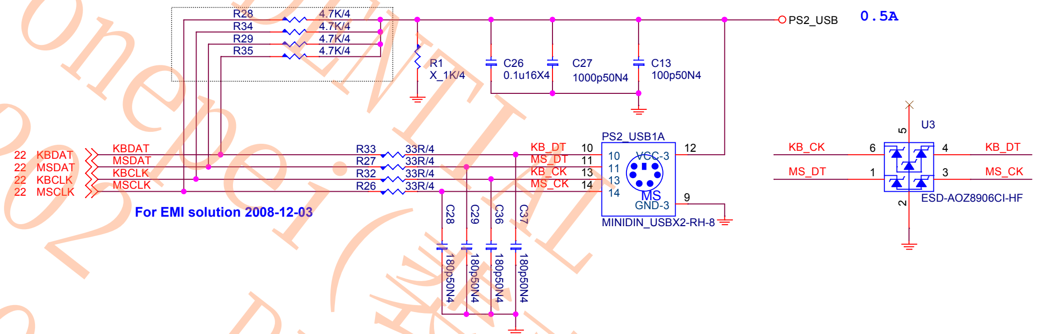
PS2 POWER

0.5A

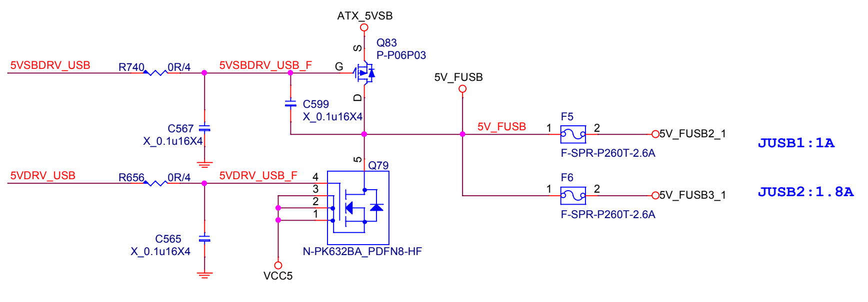
REAR USB PORT POWER


ATX_5VSB
5VSBDRV_USB
R99 0R/4
5VSBDRV_USB_R
Q14 P-P06P03
C84 X_0.1u16X4
C83 X_18n16X4
5V_RUSB
5VDRV_USB
R122 0R/4
5VDRV_USB_R
Q18
C88 X_0.1u16X4
N-PK632BA_PDFN8-HF
VCC5
F1
5V_RUSB2_1
F-SPR-P260T-2.6A
PS2_USB1:1A
F2
5V_RUSB2_2
F-SPR-P260T-2.6A
LAN_USB1:1A
F3
5V_RUSB3_1
F-SPR-P260T-2.6A
USB1 TypeA : 0.9A
F7
PS2_USB
0.5A
F-MICROSMD110
C25 22u6.3X8
2017.11.14 Robert mail

PS2 KEYBOARD & MOUSE CONNECTOR


R28 4.7K/4
R34 4.7K/4
R29 4.7K/4
R35 4.7K/4
PS2_USB
0.5A
R1 X_1K/4
C26 0.1u16X4
C27 1000p50N4
C13 100p50N4
22 KBDAT
22 MSDAT
22 KBCLK
22 MSCLK
R33 33R/4
R27 33R/4
R32 33R/4
R26 33R/4
KB_DT
MS_DT
KB_CK
MS_CK
PS2_USB1A
VCC-3
MS
GND-3
MINIDIN_USBX2-RH-8
C28 C29 C36 C37
180p50N4
For EMI solution 2008-12-03
U3
KB_CK
KB_DT
MS_DT
MS_CK
ESD-AOZ8906CI-HF

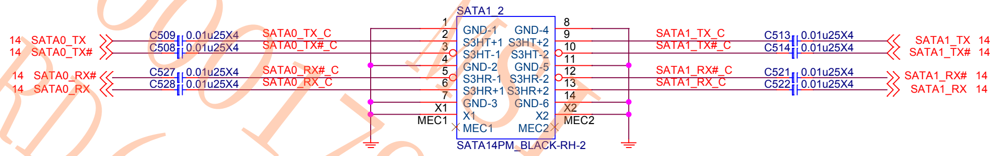
FRONT USB PORT POWER



USB CONN	USB POWER	PCH PORT	OC# SIGNAL
LAN_USB1	5V_FUSB2_1	Port5,6	OC#0
PS2_USB1	5V_RUSB2_2	Port9,10	OC#1
USB1	5V_FUSB3_1	Port1,2	OC#2
JUSB3	5V_RUSB3_1	Port3,4	OC#3
JUSB2	5V_RUSB2_1	Port7,8	OC#4

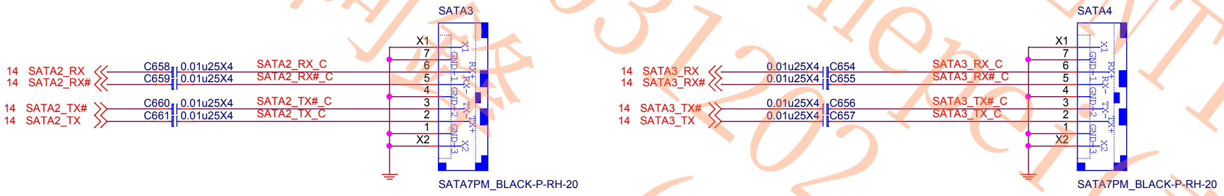
SATA PORT 0,1

Black 90 degree



SATA PORT 2,3

Black 180 degree



MICRO-STAR INT'L CO.,LTD		
MS-7B23		
Size Custom	Document Description SATA connector	Rev 1.0
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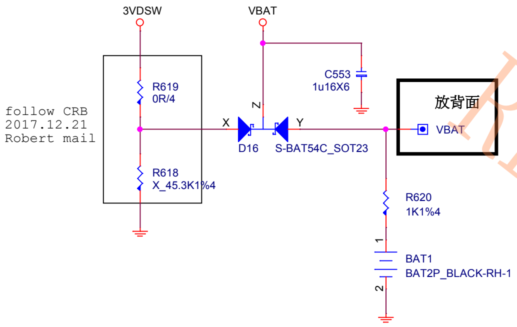
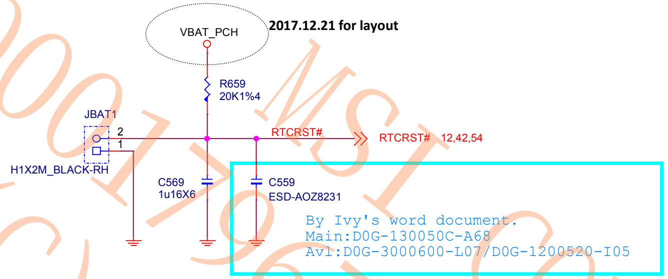
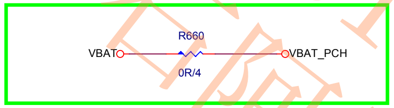
VBAT



Cut VBAT





Function 1

IN		OUT	
INPUT1	INPUT2	OUTPUT1	
0	1	1	Default
1	0	0	
1	1	0	
0	0	0	

Function 2

IN		OUT			
INPUT3 & lowswitch EN	INPUT4	OUTPUT2	OUTPUT3	VOUT	
0	0	0	1	1	Default
1	0	1	1	0 (discharge)	
0	1	1	0	0 (discharge)	
1	1	1	0	0 (discharge)	

MICRO-STAR INT'L CO.,LTD		
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Size: Custom	Document Description: CUT VBAT circuit	Rev 1.0
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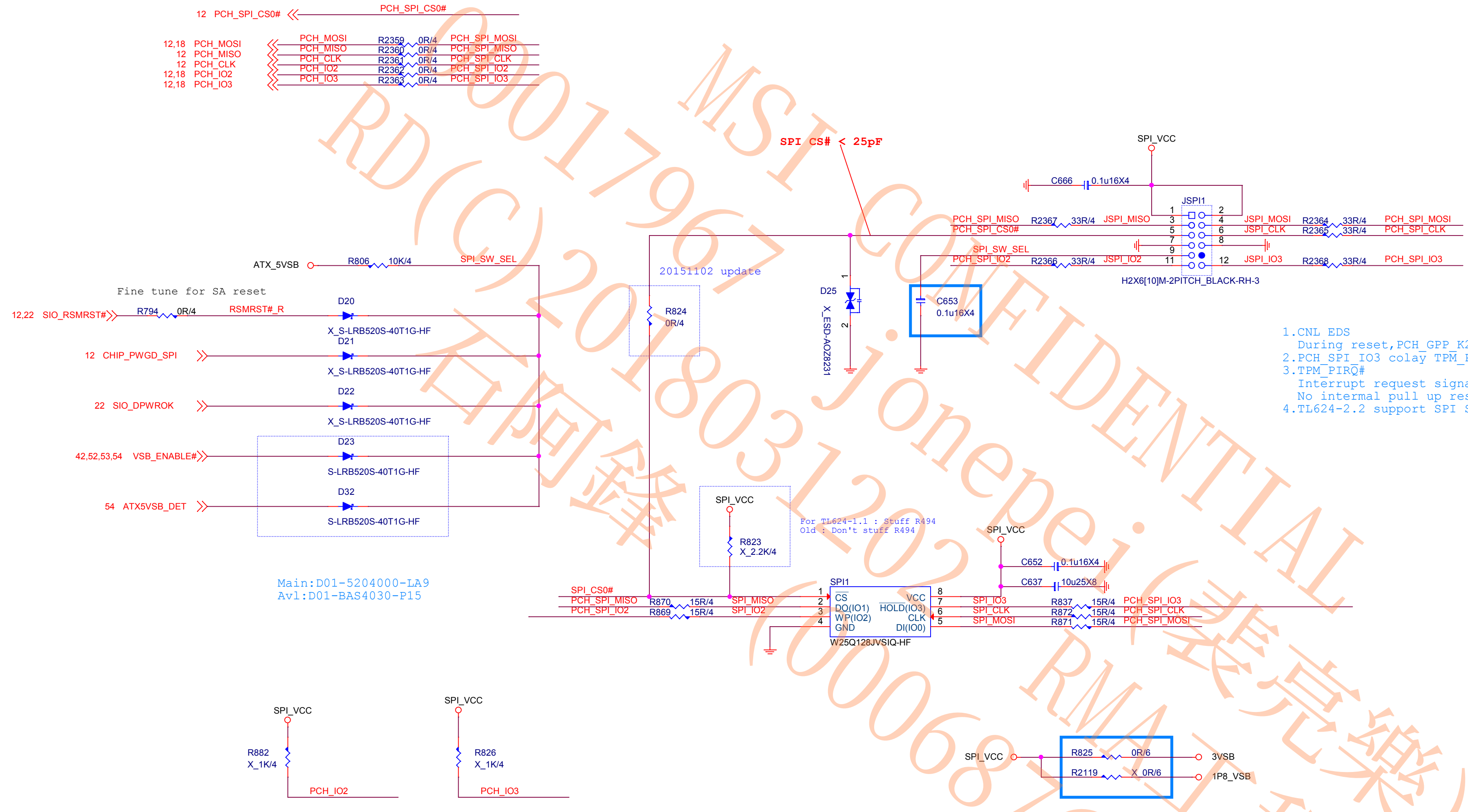

1. CNL EDS
   During reset, PCH_GPP_K21 via 20k pull up to 3.3V.
2. PCH_SPI_IO3 colay TPM_PIRQ#(1.8V or 3.3V,OD)
3. TPM_PIRQ#
   Interrupt request signal to the host.
   No internal pull up resistor.Active low.
4. TL624-2.2 support SPI Standard Mode.

MICRO-STAR INT'L CO.,LTD

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Size	Document Description	Rev
Custom	**BIOS ROM**	1.0

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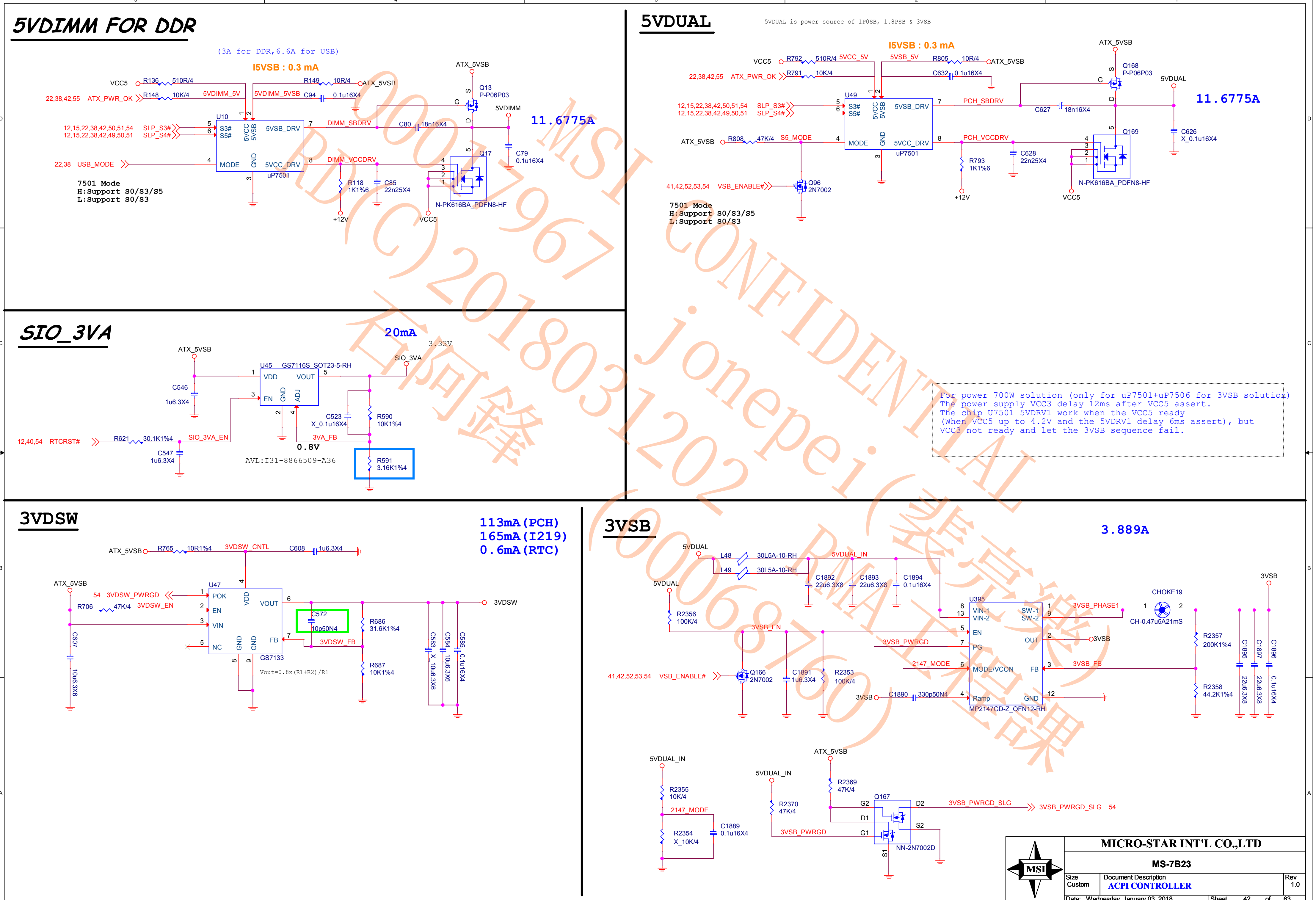
5VDIMM FOR DDR
(3A for DDR,6.6A for USB)
I5VSB : 0.3 mA
11.6775A
7501 Mode
H:Support S0/S3/S5
L:Support S0/S3
VCC5 R136 510R/4
22,38,42,55 ATX_PWR_OK R148 10K/4 5VDIMM_5V
5VDIMM_5VSB C94 0.1u16X4
R149 10R/4 ATX_5VSB
12,15,22,38,42,50,51,54 SLP_S3#
12,15,22,38,42,49,50,51 SLP_S4#
22,38 USB_MODE
U10 uP7501
S3# S5# MODE 5VCC 5VSB GND 5VSB_DRV 5VCC_DRV
DIMM_SBDRV C80 18n16X4
DIMM_VCCDRV R118 1K1%6 C85 22n25X4
Q13 P-P06P03
Q17 N-PK616BA_PDFN8-HF
5VDIMM C79 0.1u16X4
+12V VCC5
5VDUAL
5VDUAL is power source of 1P05B, 1.8PSB & 3VSB
I5VSB : 0.3 mA
11.6775A
VCC5 R792 510R/4 5VCC_5V
5VSB_5V R805 10R/4 ATX_5VSB
22,38,42,55 ATX_PWR_OK R791 10K/4
C632 0.1u16X4
12,15,22,38,42,50,51,54 SLP_S3#
12,15,22,38,42,49,50,51 SLP_S4#
U49 uP7501
PCH_SBDRV C627 18n16X4
PCH_VCCDRV C628 22n25X4
ATX_5VSB R808 47K/4 S5_MODE
R793 1K1%6
41,42,52,53,54 VSB_ENABLE# Q96 2N7002
Q168 P-P06P03
Q169 N-PK616BA_PDFN8-HF
5VDUAL C626 X_0.1u16X4
7501 Mode
H:Support S0/S3/S5
L:Support S0/S3
SIO_3VA
20mA
3.33V
ATX_5VSB
U45 GS7116S_SOT23-5-RH
VDD VOUT EN GND ADJ
SIO_3VA
C546 1u6.3X4
C523 X_0.1u16X4
R590 10K1%4
3VA_FB
0.8V
R591 3.16K1%4
12,40,54 RTCRST# R621 30.1K1%4 SIO_3VA_EN
C547 1u6.3X4
AVL:I31-8866509-A36
For power 700W solution (only for uP7501+uP7506 for 3VSB solution)
The power supply VCC3 delay 12ms after VCC5 assert.
The chip U7501 5VDRV1 work when the VCC5 ready
(When VCC5 up to 4.2V and the 5VDRV1 delay 6ms assert), but
VCC3 not ready and let the 3VSB sequence fail.
3VDSW
113mA(PCH)
165mA(I219)
0.6mA(RTC)
ATX_5VSB R765 10R1%4 3VDSW_CNTL C608 1u6.3X4
ATX_5VSB
54 3VDSW_PWRGD
R706 47K/4 3VDSW_EN
U47 GS7133
POK EN VIN NC VDD VOUT FB GND
C607 10u6.3X6
C572 10p50N4
3VDSW_FB
R686 31.6K1%4
R687 10K1%4
Vout=0.8x(R1+R2)/R1
C583 X_10u6.3X6
C584 10u6.3X6
C585 0.1u16X4
3VDSW
3VSB
3.889A
5VDUAL L48 30L5A-10-RH 5VDUAL_IN
L49 30L5A-10-RH
C1892 22u6.3X8 C1893 22u6.3X8 C1894 0.1u16X4
5VDUAL R2356 100K/4
3VSB_EN
3VSB_PWRGD
2147_MODE
41,42,52,53,54 VSB_ENABLE# Q166 2N7002
C1891 1u6.3X4
R2353 100K/4
3VSB C1890 330p50N4
U395 MP2147GD-Z_QFN12-RH
VIN-1 VIN-2 EN PG MODE/VCON Ramp SW-1 SW-2 OUT FB GND
3VSB_PHASE1
CHOKE19 CH-0.47u5A21mS
3VSB
R2357 200K1%4
3VSB_FB
R2358 44.2K1%4
C1895 22u6.3X8 C1897 22u6.3X8 C1896 0.1u16X4
5VDUAL_IN R2355 10K/4
2147_MODE
R2354 X_10K/4 C1889 0.1u16X4
5VDUAL_IN R2370 47K/4
3VSB_PWRGD
ATX_5VSB R2369 47K/4
Q167 NN-2N7002D
3VSB_PWRGD_SLG
3VSB_PWRGD_SLG 54

MICRO-STAR INT'L CO.,LTD			
MS-7B23			
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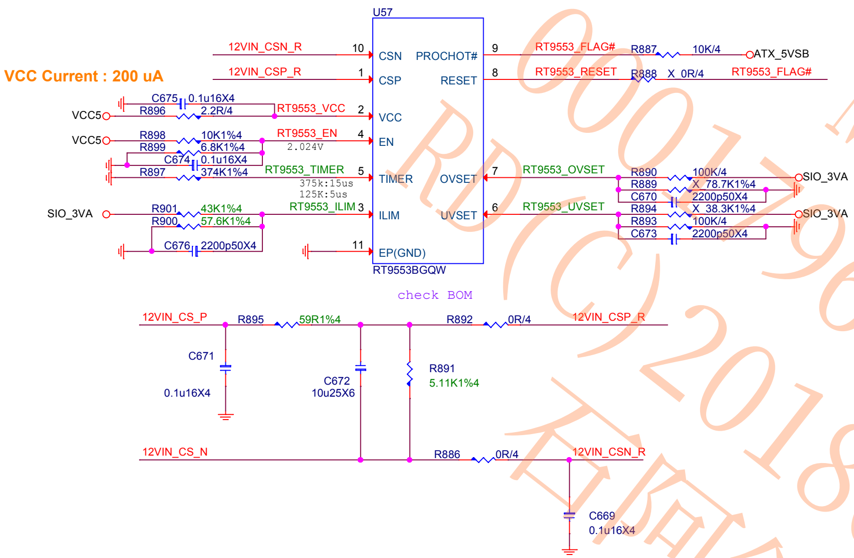
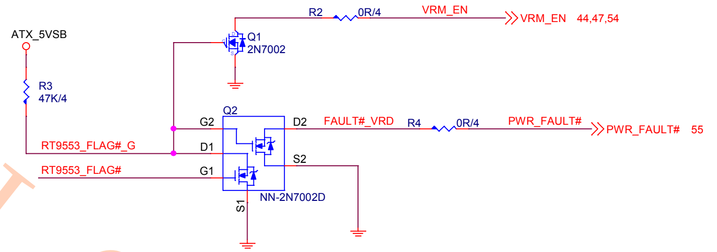
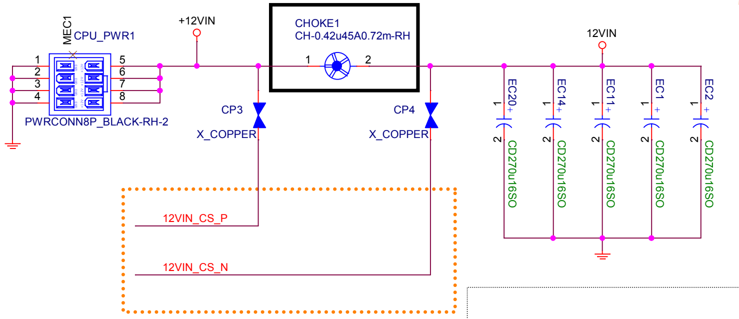


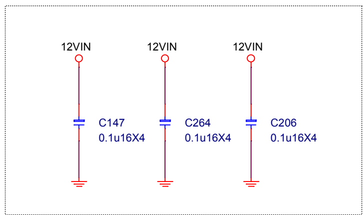


OCP:30A
Real OCP:30.05A
R17+R18>100k Vsio_3va= 3.38V Rdcr= 0.5 mohm

I3933_imon*[R17*R18/(R17+R18)]= Istep* Rdcr*100
I3933_imon= 10uA/step
Istep=4.968A

2017.12.01 Ivy mail
0.22uH->0.42uH





D=Vout/Vin			
Vin	=	12	> input voltage
Vout	=	1.52	> output Vcore
D	=	0.126667	
I o = Icore(max)*0.8			
I core(max)	=	138	> Vcore current
I avg.	=	110.4	A
I ripple={ Io*√D*√(1-D)} / Phase			
Phase	=	4	phase
I ripple	=	9.179738	A
How many pcs. Of Cap.			
I ripple(cap)	=	5000	m A
COE TEMP	=	1	
Input Cap.	=	2	pcs.

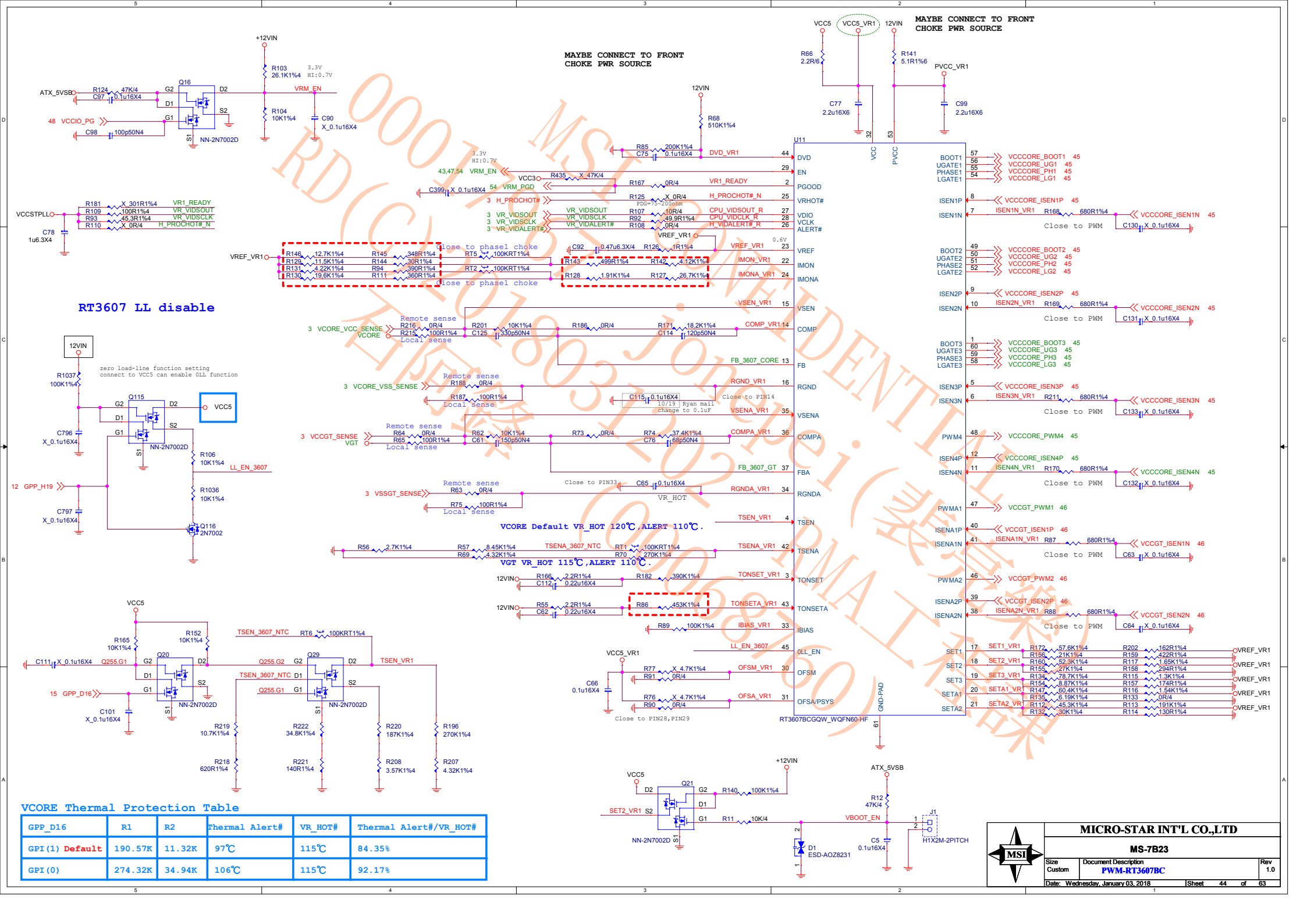
D=Vout/Vin			
Vin	=	12	> input voltage
Vout	=	1.52	> output Vcore
D	=	0.126667	
I o = Icore(max)*0.8			
I core(max)	=	45	> Vcore current
I avg.	=	36	A
I ripple={ Io*√D*√(1-D)} / Phase			
Phase	=	2	phase
I ripple	=	5.986785	A
How many pcs. Of Cap.			
I ripple(cap)	=	5000	m A
COE TEMP	=	1	
Input Cap.	=	2	pcs.

D=Vout/Vin			
Vin	=	12	> input voltage
Vout	=	0.95	> output Vcore
D	=	0.079167	
I o = Icore(max)*0.8			
I core(max)	=	6.4	> Vcore current
I avg.	=	5.12	A
I ripple={ Io*√D*√(1-D)} / Phase			
Phase	=	1	phase
I ripple	=	1.382393	A
How many pcs. Of Cap.			
I ripple(cap)	=	5000	m A
COE TEMP	=	1	
Input Cap.	=	1	pcs.

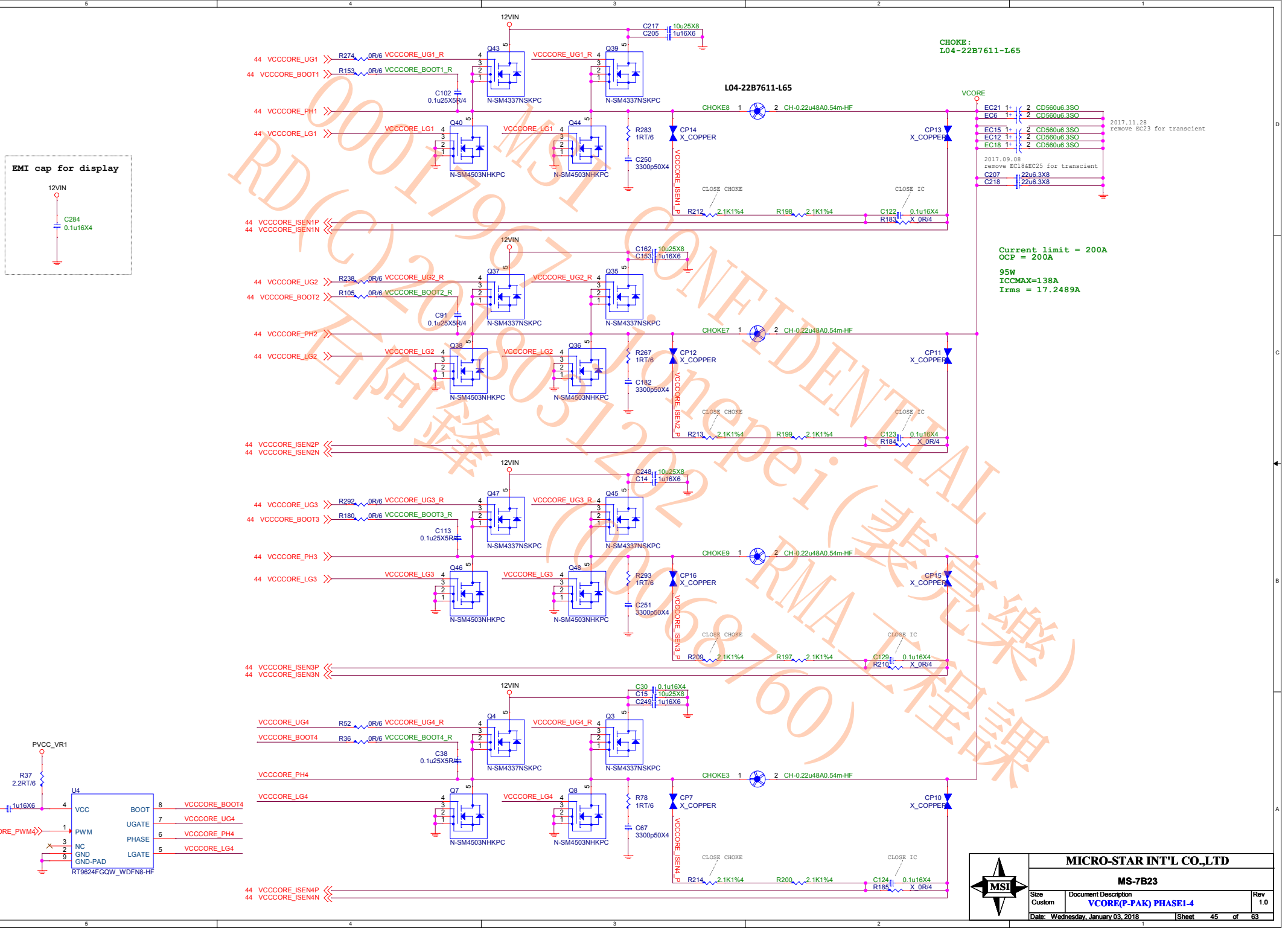
```
VCCIO:
D = Vout/Vin
  = 0.95/12
  = 0.079167
N = 1
Irms = Iout * [D/N - (D)^2]^(1/2)
     = 6.4* (0.079167 - 0.006267)^(1/2)
     = 1.728A
```

```
CORE:
D = Vout/Vin
  = 1.52/12
  = 0.126667
N = 4
Irms = Iout * [D/N - (D)^2]^(1/2)
     = 138* (0.031667 - 0.016044)^(1/2)
     = 17.2489A
```

```
GT:
D = Vout/Vin
  = 1.52/12
  = 0.126667
N = 2
Irms = Iout * [D/N - (D)^2]^(1/2)
     = 45* (0.063333 - 0.016044)^(1/2)
     = 9.7857A
```



GPP_D16	R1	R2	Thermal Alert#	VR_HOT#	Thermal Alert#/VR_HOT#
GPI(1) Default	190.57K	11.32K	97℃	115℃	84.35%
GPI(0)	274.32K	34.94K	106℃	115℃	92.17%


EMI cap for display
12VIN
C284
0.1u16X4
CHOKE:
L04-22B7611-L65
L04-22B7611-L65
VCORE
Current limit = 200A
OCP = 200A
95W
ICCMAX=138A
Irms = 17.2489A
2017.11.28
remove EC23 for transcient
2017.09.08
remove EC18&EC25 for transcient
CHOKE8
CHOKE7
CHOKE9
CHOKE3
CH-0.22u48A0.54m-HF
N-SM4337NSKPC
N-SM4503NHKPC
CLOSE CHOKE
CLOSE IC
PVCC_VR1
R37
2.2RT/6
U4
VCC
PWM
NC
GND
GND-PAD
BOOT
UGATE
PHASE
LGATE
RT9624FGQW_WDFN8-HF
MICRO-STAR INT'L CO.,LTD
MS-7B23
Size
Custom
Document Description
VCORE(P-PAK) PHASE1-4
Rev
1.0
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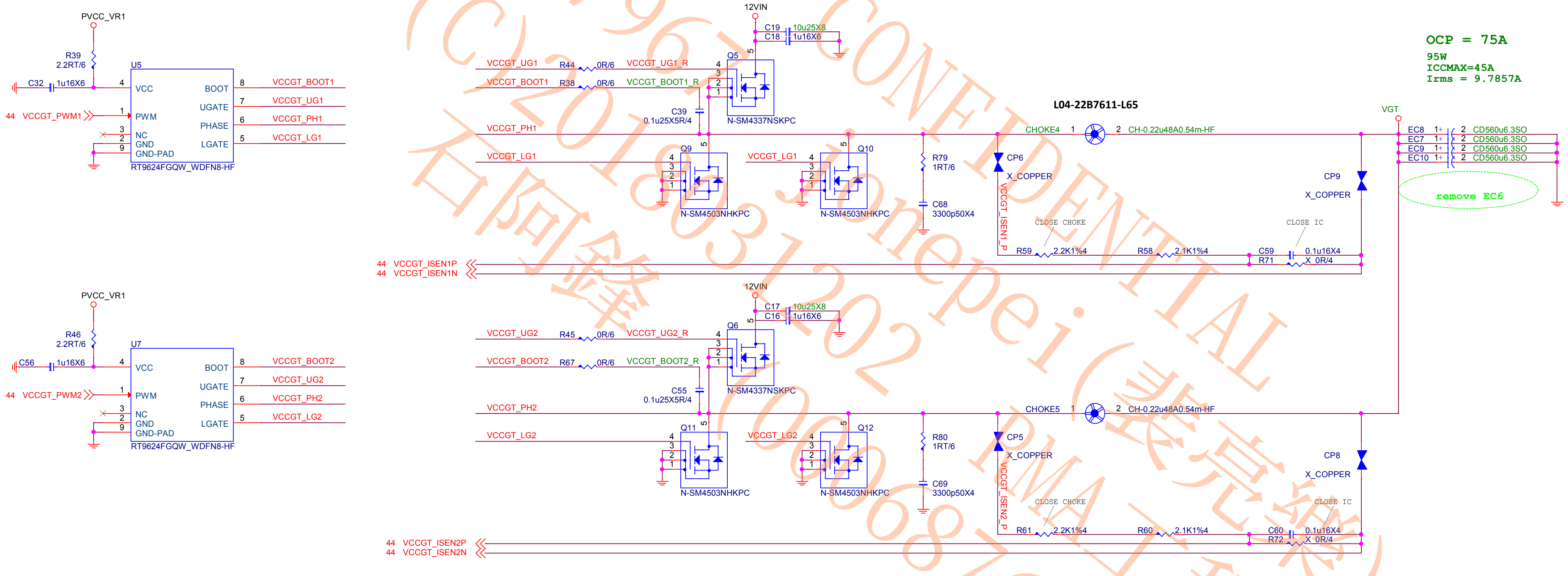

MICRO-STAR INT'L CO.,LTD

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Size	Document Description	Rev
Custom	VGT(P-PAK) PHASE1-2	1.0

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SA Power:1.05V,11.1A

OCP:16.65A

Rocset = 1.5 * Imax * Rdson(low) / Iocset
= 16.65* 3mohm / 10uA
= 14.28K

Rdson(low)10V

MOS : 5.1mohm

ICC : 1.25 mA

EN:VIH2.4V
EN pin Maximum:6.5V

FB:0.8V

Vout = Vrefout * (1 + Rpull-up/Rpull-down)
= 0.8 * (1 + 1/3.16)
= 1.053v

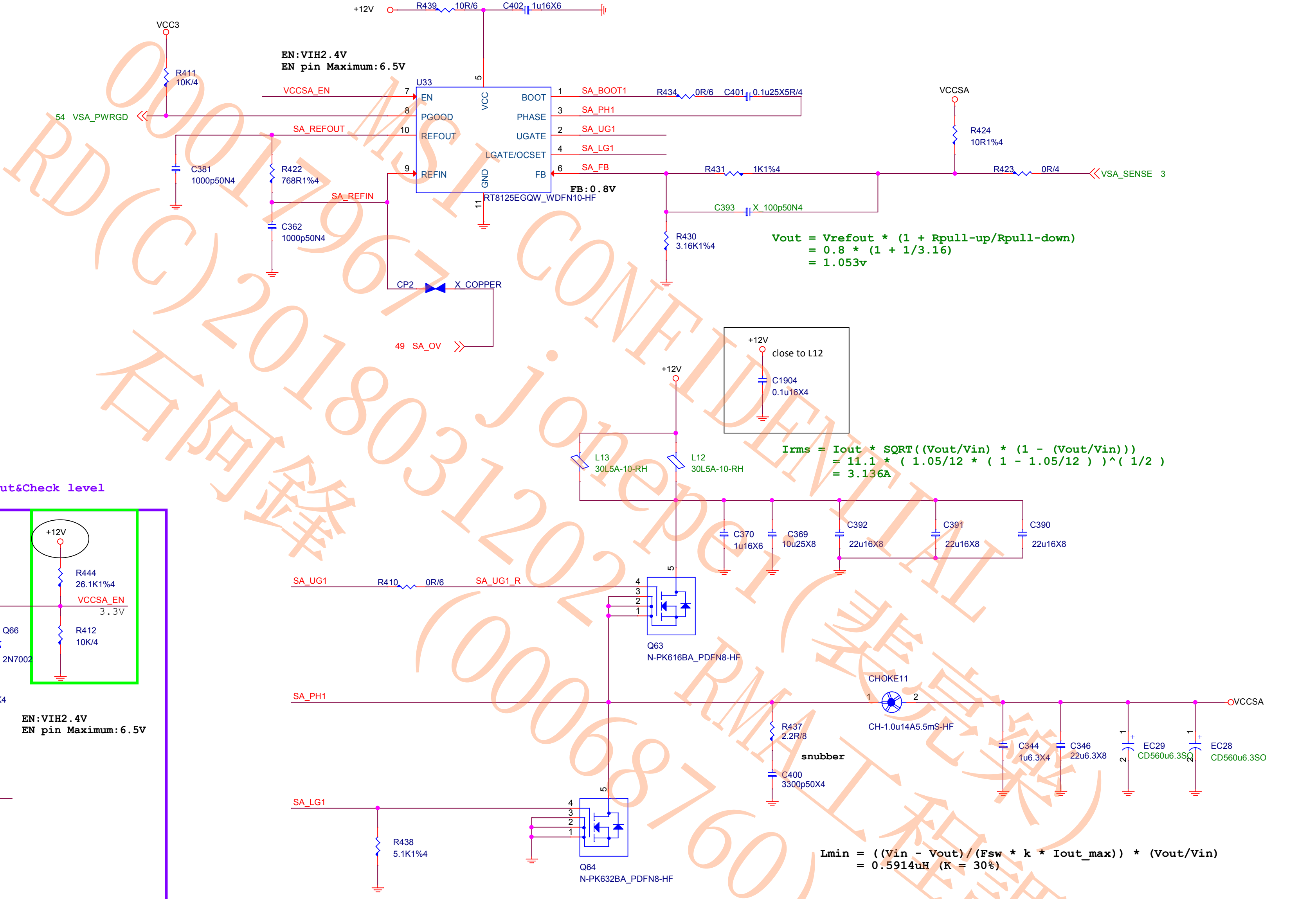
Irms = Iout * SQRT((Vout/Vin) * (1 - (Vout/Vin))
= 11.1 * (1.05/12 * (1 - 1.05/12))^(1/2)
= 3.136A

Lmin = ((Vin - Vout)/(Fsw * k * Iout_max)) * (Vout/Vin)
= 0.5914uH (K = 30%)

2014.08.21 update

Pull up by layout&Check level

EN:VIH2.4V
EN pin Maximum:6.5V



SLP_S3# assertion to VCC, VCCGT, VCCIO and VCCSA rails completely off.

SLP_S3# assertion to VR disabled
max:1us

MICRO-STAR INT'L CO.,LTD

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Size	Document Description	Rev
Custom	VCCSA - POWER RT8125E	1.0

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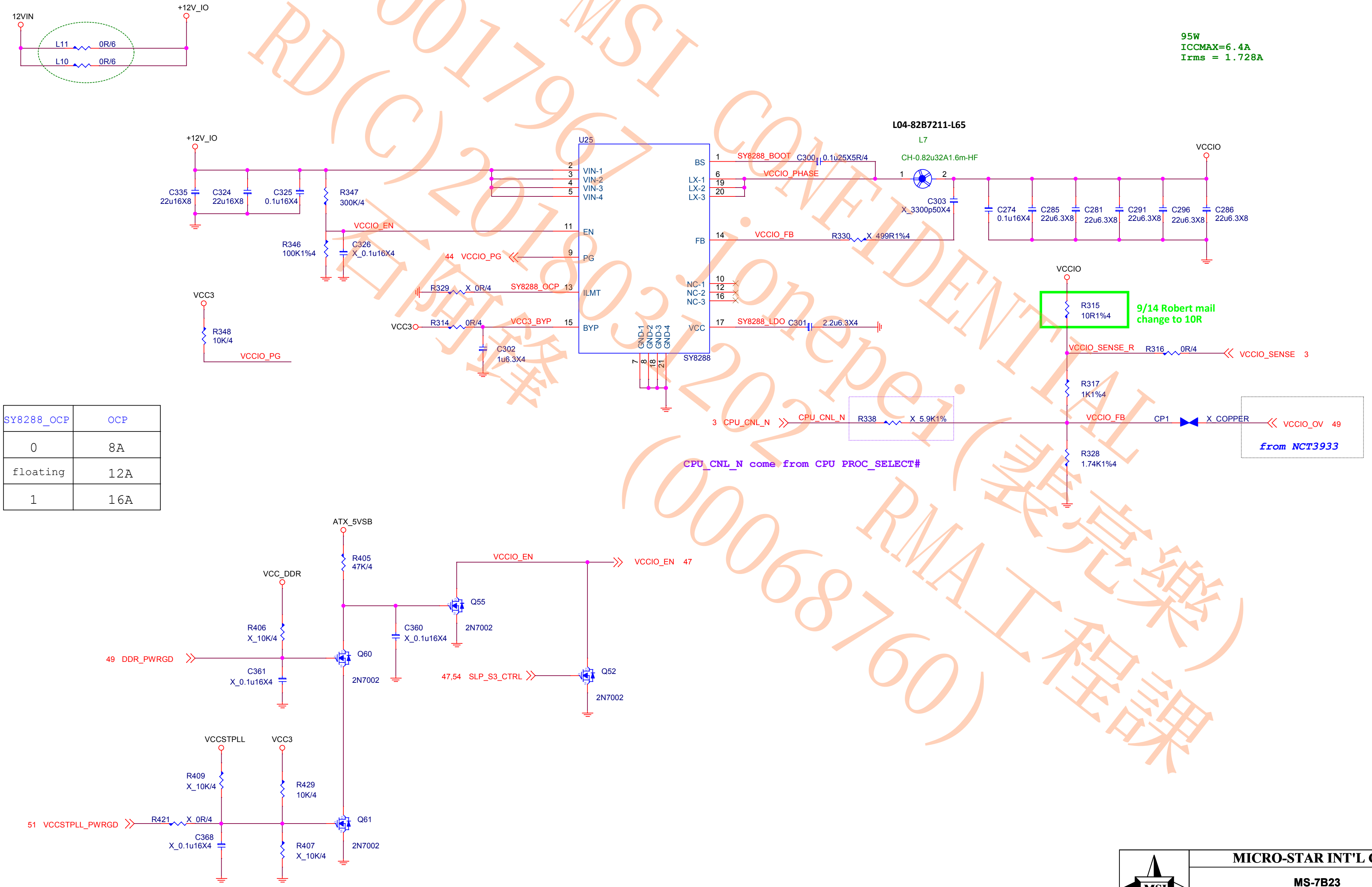
IO Power:0.95V,6.4A

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

95W
ICCMAX=6.4A
Irms = 1.728A



SY8288_OCP	OCP
0	8A
floating	12A
1	16A

MICRO-STAR INT'L CO.,LTD

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Size: Custom | Document Description: VCCIO - SY8288 | Rev 1.0

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DDR4 Power:1.2V,19.8A *OCP:28A*

3.3A FOR CPU
15.7A FOR 4DIMM
0.7A FOR DDR VTT

OCP = 19.6A

Rocset = 1.5 * Imax * Rdson(low) / Iocset
= 28* 5.1mohm / 10uA
= 14.28K

Rdson(low)

D03-4503N0C-ST8 : 5.1mohm

EN:2.4V

FB:0.8V

Vout=0.8*(1+R1/R2)

Vout = Vrefout * (1 + Rpull-up/Rpull-down)
= 0.8 * (1 + 1/1.96)
= 1.208v

Irms = Iout * SQRT((Vout/Vin) * (1 - (Vout/Vin)))
= 20.2 * (1.2/5 * (1 - 1.2/12))^(1/2)
= 8.627A

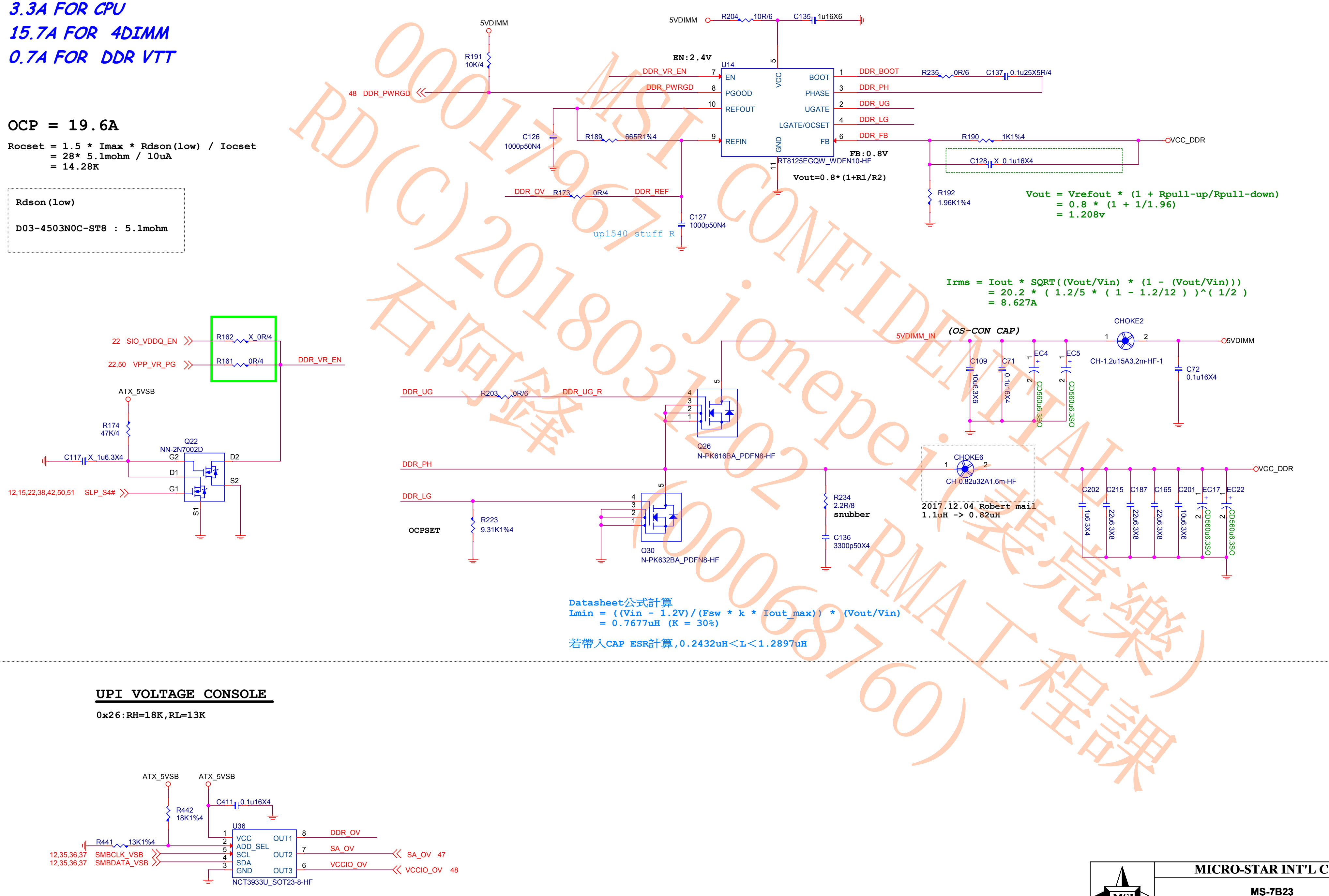
(OS-CON CAP)

2017.12.04 Robert mail
1.1uH -> 0.82uH

Datasheet公式計算
Lmin = ((Vin - 1.2V)/(Fsw * k * Iout_max)) * (Vout/Vin)
= 0.7677uH (K = 30%)
若帶入CAP ESR計算,0.2432uH＜L＜1.2897uH

UPI VOLTAGE CONSOLE

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



MICRO-STAR INT'L CO.,LTD		
MS-7B23		
Size: Custom	Document Description: DDR - RT8125E	Rev: 1.0
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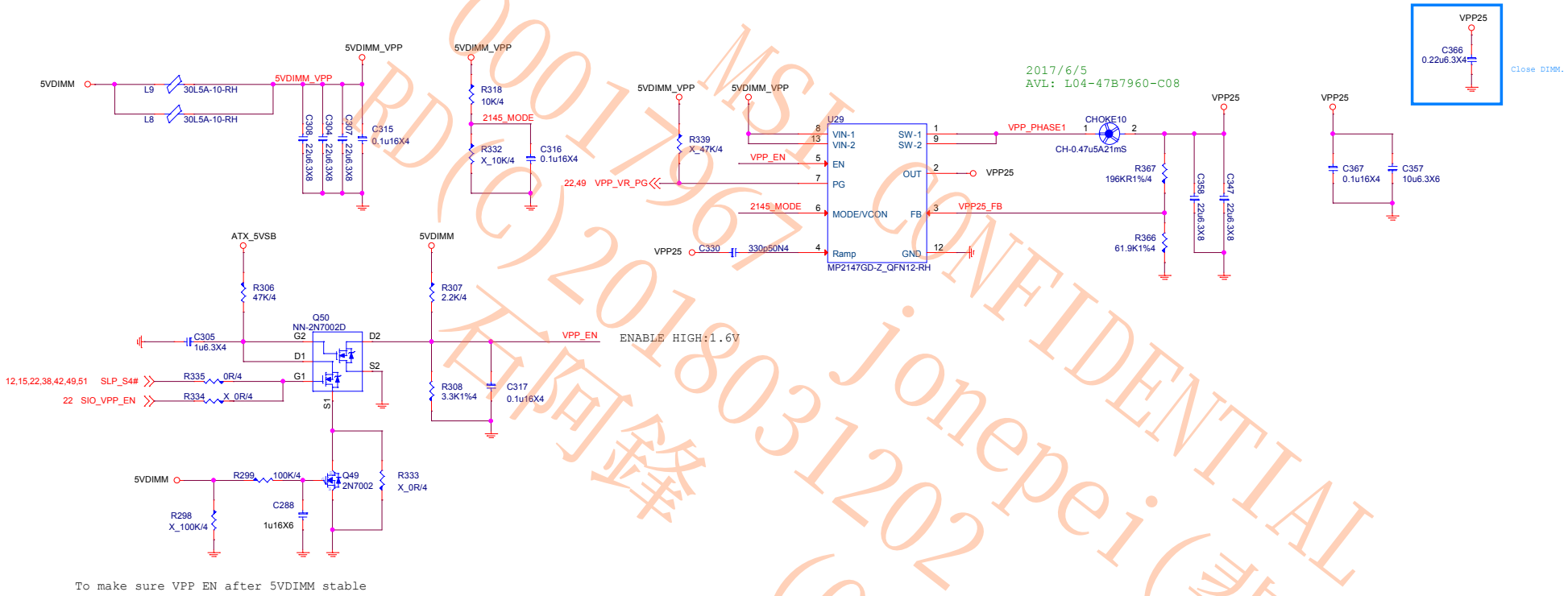
4DIMM :2.24A FOR
DDR VPP2.5V

VPP25 Power

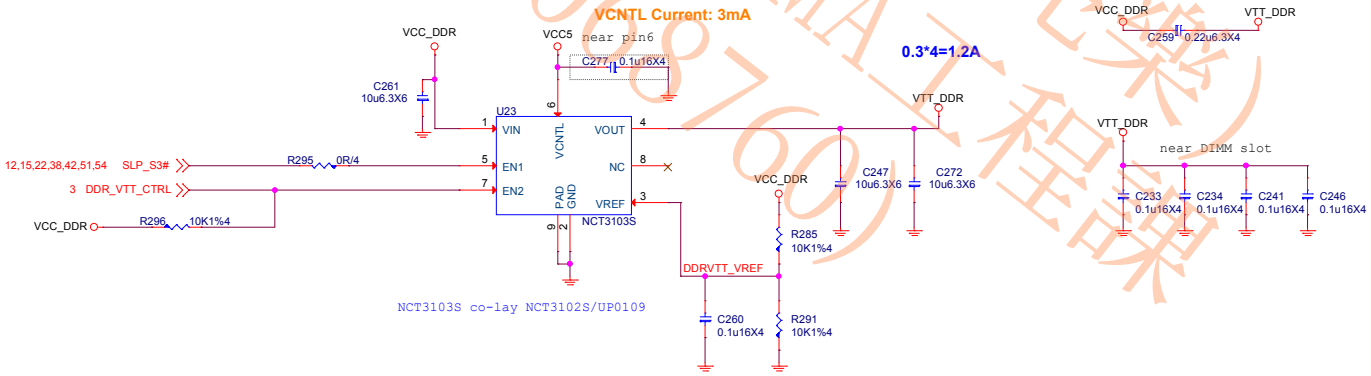
2.5V; 2.24A



To make sure VPP EN after 5VDIMM stable

DDR VTT Power

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



NCT3103S co-lay NCT3102S/UP0109

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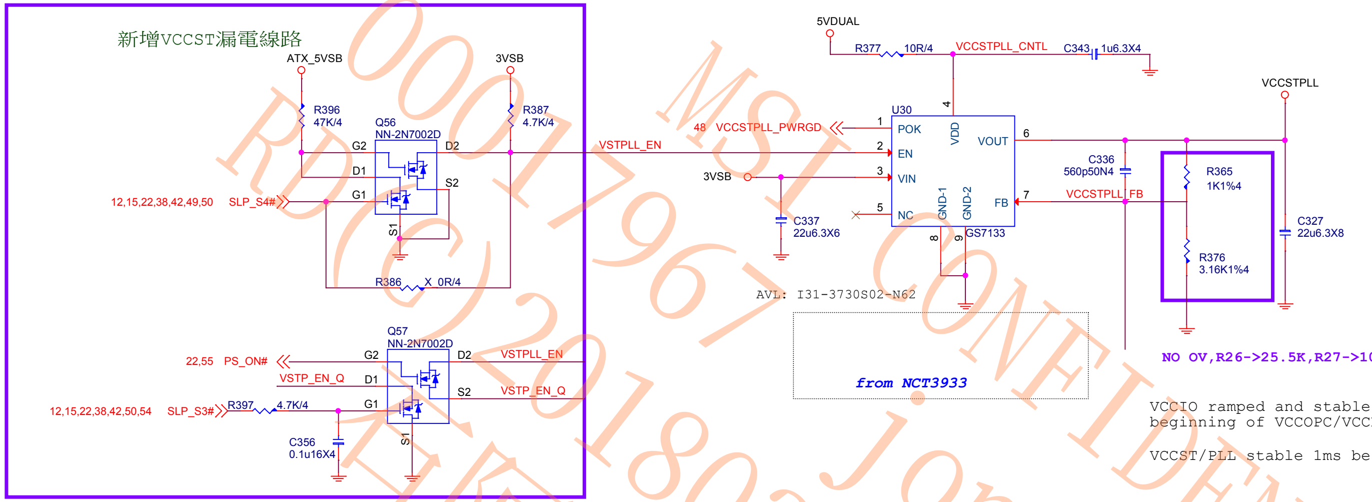
VCCSTPLL

1.05V; 230mA

For Cost down VCCST&VCCPLL merge



NO OV,R26->25.5K,R27->100K, C178 unstuff

VCCIO ramped and stable before beginning of VCCOPC/VCCEOPIO ramp

VCCST/PLL stable 1ms before PROCPWRGD

VCCPLL_OC

1.2V; 130mA

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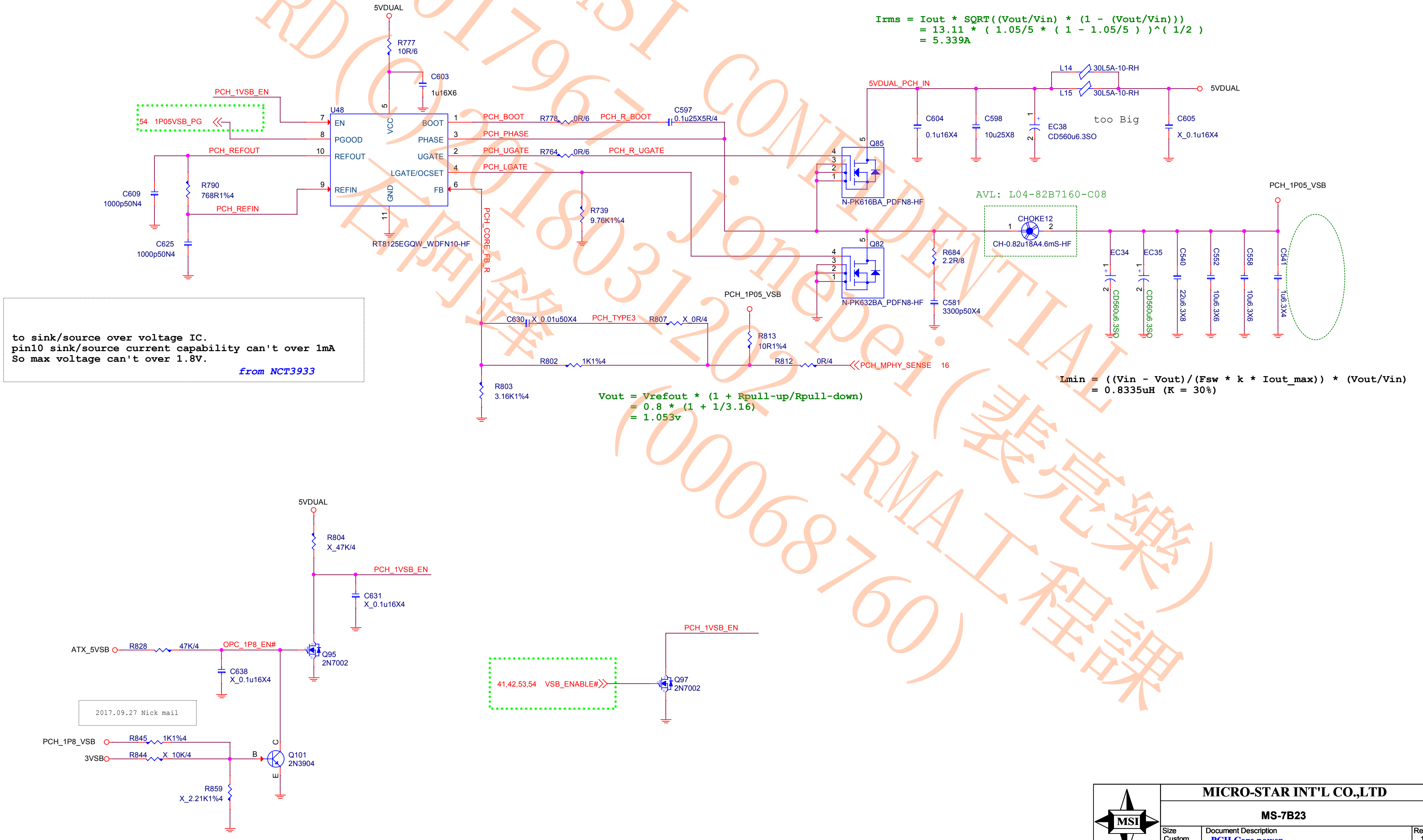
PCH_1VSB

1.05V; 13.11A

OCP=Rocset x Iocset / Rlgds(on)
=9.76K x 10u / 4.6m
= 21.21A



5VDUAL
R777
10R/6
C603
1u16X6
U48
PCH_1VSB_EN
54 1P05VSB_PG
EN
PGOOD
REFOUT
REFIN
VCC
GND
BOOT
PHASE
UGATE
LGATE/OCSET
FB
RT8125EGQW_WDFN10-HF
PCH_REFOUT
PCH_REFIN
C609
1000p50N4
R790
768R1%4
C625
1000p50N4
PCH_BOOT
PCH_PHASE
PCH_UGATE
PCH_LGATE
R778
0R/6
PCH_R_BOOT
C597
0.1u25X5R/4
R764
0R/6
PCH_R_UGATE
R739
9.76K1%4
PCH_CORE_FB_R
Irms = Iout * SQRT((Vout/Vin) * (1 - (Vout/Vin)))
= 13.11 * (1.05/5 * (1 - 1.05/5))^(1/2)
= 5.339A
5VDUAL_PCH_IN
L14
30L5A-10-RH
L15
30L5A-10-RH
5VDUAL
C604
0.1u16X4
C598
10u25X8
EC38
CD560u6.3SO
too Big
C605
X_0.1u16X4
Q85
N-PK616BA_PDFN8-HF
Q82
N-PK632BA_PDFN8-HF
AVL: L04-82B7160-C08
CHOKE12
CH-0.82u18A4.6mS-HF
PCH_1P05_VSB
R684
2.2R/8
C581
3300p50X4
EC34
EC35
C540
C552
C558
C541
CD560u6.3SO
CD560u6.3SO
22u6.3X8
10u6.3X6
10u6.3X6
1u6.3X4
to sink/source over voltage IC.
pin10 sink/source current capability can't over 1mA
So max voltage can't over 1.8V.
from NCT3933
C630
X_0.01u50X4
PCH_TYPE3
R807
X_0R/4
PCH_1P05_VSB
R813
10R1%4
R802
1K1%4
R812
0R/4
PCH_MPHY_SENSE 16
R803
3.16K1%4
Vout = Vrefout * (1 + Rpull-up/Rpull-down)
= 0.8 * (1 + 1/3.16)
= 1.053v
Lmin = ((Vin - Vout)/(Fsw * k * Iout_max)) * (Vout/Vin)
= 0.8335uH (K = 30%)
5VDUAL
R804
X_47K/4
PCH_1VSB_EN
C631
X_0.1u16X4
ATX_5VSB
R828
47K/4
OPC_1P8_EN#
C638
X_0.1u16X4
Q95
2N7002
2017.09.27 Nick mail
PCH_1P8_VSB
R845
1K1%4
3VSB
R844
X_10K/4
R859
X_2.21K1%4
Q101
2N3904
PCH_1VSB_EN
41,42,53,54 VSB_ENABLE#
Q97
2N7002

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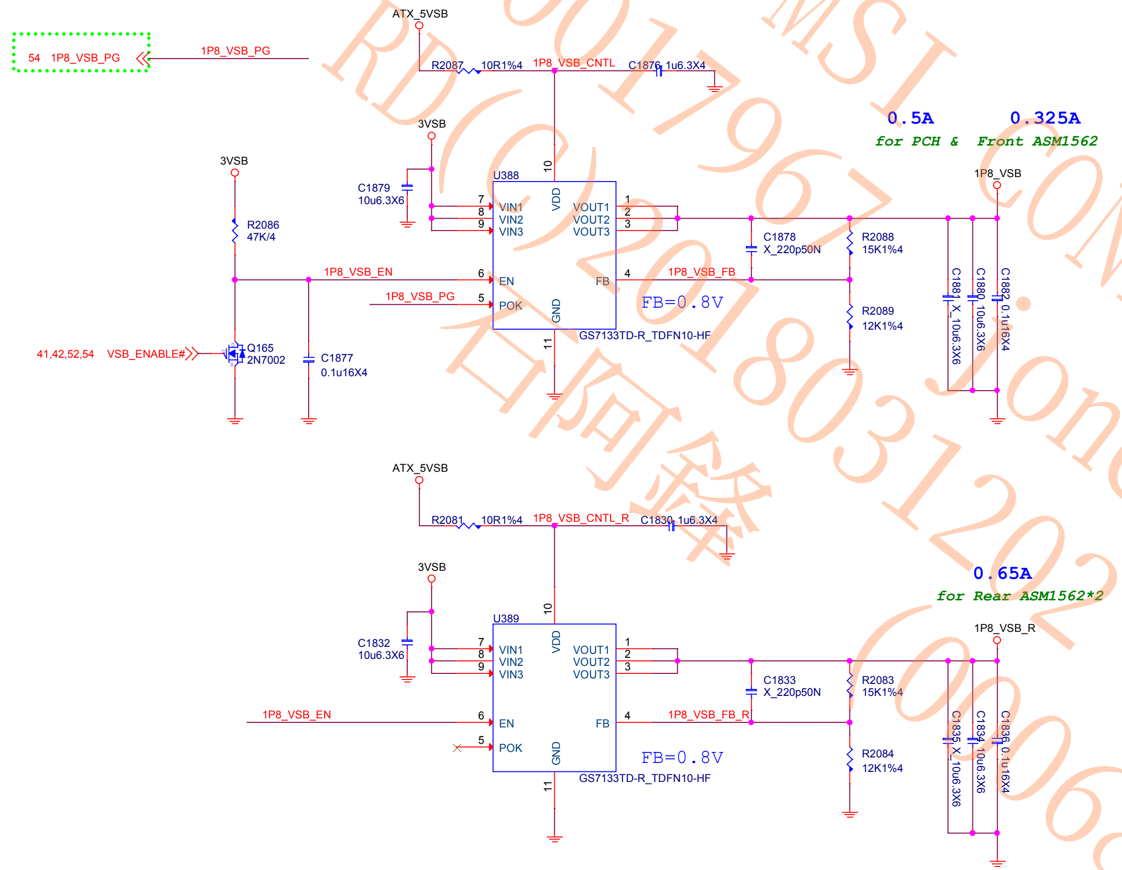
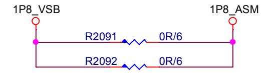
1P8_VSB

1.8V; 500mA
Current Limit: 3.8A

2017.12.07
GS7133 down size to I31-S71330C-N03.





● The power consumption with Internal LDO

item	Power state	VCCA 1.8V (mA)	Total power (mW)
Without device plug in,	Power on	25.82	46.47
USB3.1 Gen2 device is plugged in	Burning state	324.60	584.29
USB3.1 Gen2 device is plugged in	In idle	50.58	91.05
USB3.1 Gen2 device is plugged in	S3(D3) state	50.59	91.06

● The power consumption with External LDO

item	Power state	VCCA 1.8V (mA)	VDD 1.2V (mA)	Total power (mW)
Without device plug in,	Power on	10.46	17.47	39.79
USB3.1 Gen2 device is plugged in	Burning state	95.34	226.37	443.25
USB3.1 Gen2 device is plugged in	In idle	17.18	52.10	93.44
USB3.1 Gen2 device is plugged in	S3(D3) state	17.17	52.10	93.42

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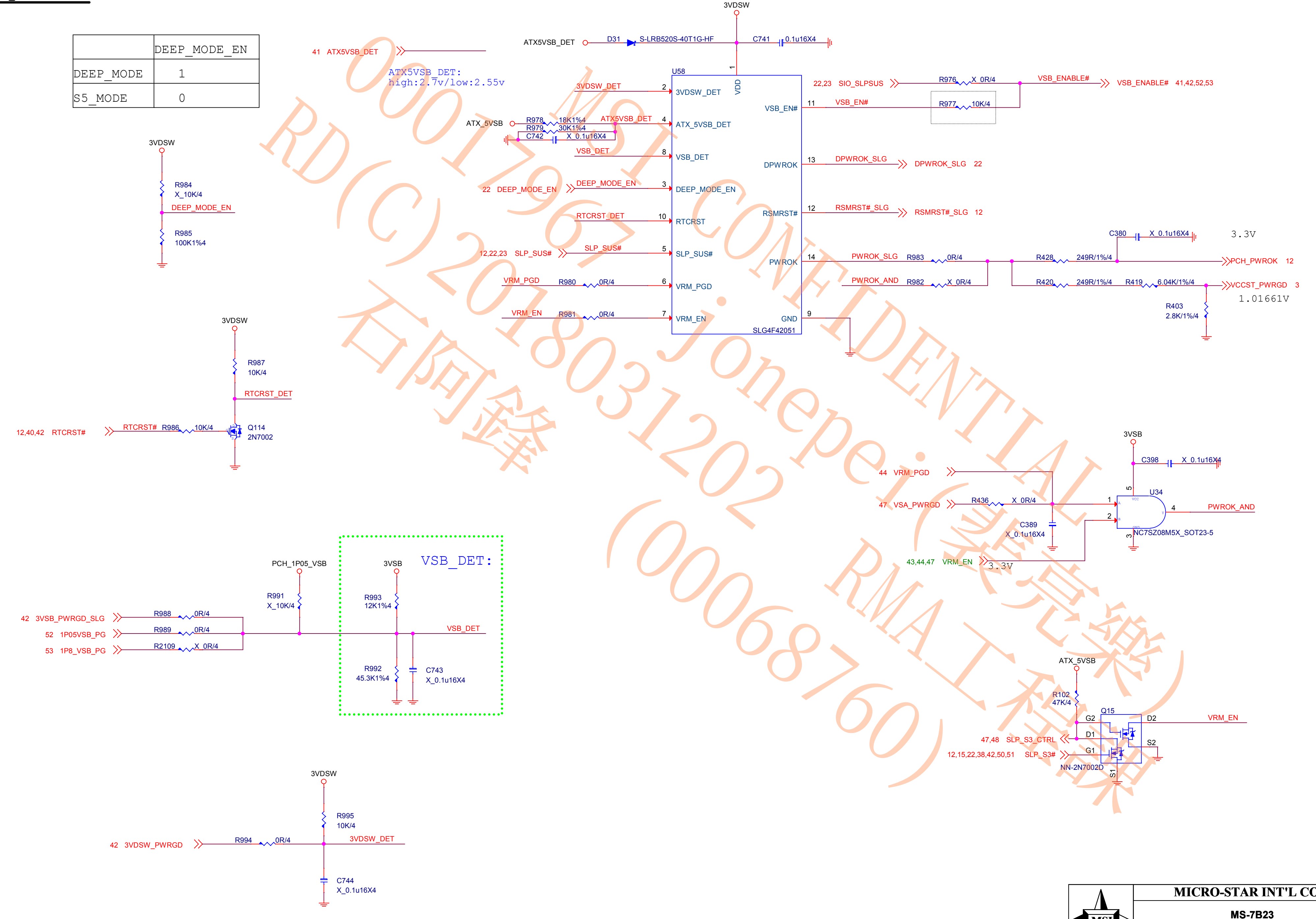
Sequence

	DEEP_MODE_EN
DEEP_MODE	1
S5_MODE	0



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Custom	CPU PWR-VRM-Seqence	1.0

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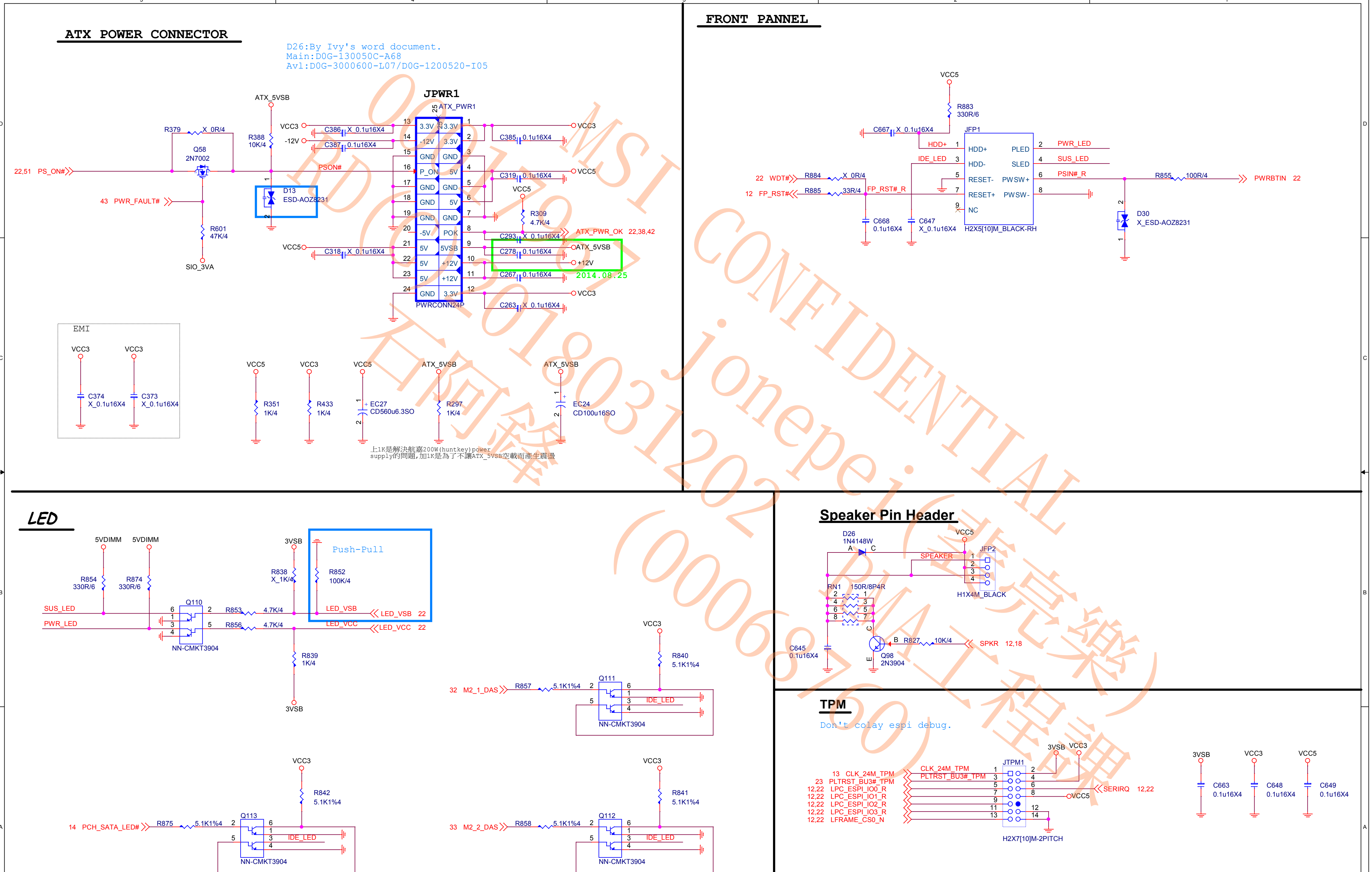

ATX POWER CONNECTOR
D26:By Ivy's word document.
Main:D0G-130050C-A68
Avl:D0G-3000600-L07/D0G-1200520-I05
JPWR1
ATX_PWR1
PWRCONN24P
22,51 PS_ON#
43 PWR_FAULT#
R379 X_0R/4
Q58 2N7002
R388 10K/4
ATX_5VSB
D13 ESD-AOZ8231
R601 47K/4
SIO_3VA
VCC3
-12V
VCC5
PSON#
C386 X_0.1u16X4
C387 0.1u16X4
C318 X_0.1u16X4
C385 0.1u16X4
C319 0.1u16X4
R309 4.7K/4
C293 X_0.1u16X4
ATX_PWR_OK 22,38,42
C278 0.1u16X4
+12V
C267 0.1u16X4
2014.08.25
C263 X_0.1u16X4
EMI
C374 X_0.1u16X4
C373 X_0.1u16X4
R351 1K/4
R433 1K/4
EC27 CD560u6.3SO
R297 1K/4
EC24 CD100u16SO
上1K是解決航嘉200W(huntkey)power supply的問題,加1K是為了不讓ATX_5VSB空載而產生震盪
FRONT PANNEL
R883 330R/6
C667 X_0.1u16X4
JFP1
HDD+
HDD-
PLED
SLED
RESET-
RESET+
PWSW+
PWSW-
NC
PWR_LED
SUS_LED
IDE_LED
PSIN#_R
22 WDT#
R884 X_0R/4
12 FP_RST#
R885 33R/4
FP_RST#_R
C668 0.1u16X4
C647 X_0.1u16X4
H2X5[10]M_BLACK-RH
R855 100R/4
PWRBTIN 22
D30 X_ESD-AOZ8231
LED
5VDIMM
R854 330R/6
R874 330R/6
SUS_LED
PWR_LED
Q110
NN-CMKT3904
R853 4.7K/4
R856 4.7K/4
3VSB
R838 X_1K/4
R852 100K/4
Push-Pull
LED_VSB 22
LED_VCC 22
R839 1K/4
R840 5.1K1%4
32 M2_1_DAS
R857 5.1K1%4
Q111
R842 5.1K1%4
14 PCH_SATA_LED#
R875 5.1K1%4
Q113
R841 5.1K1%4
33 M2_2_DAS
R858 5.1K1%4
Q112
Speaker Pin Header
D26 1N4148W
SPEAKER
JFP2
H1X4M_BLACK
RN1 150R/8P4R
C645 0.1u16X4
Q98 2N3904
R827 10K/4
SPKR 12,18
TPM
Don't colay espi debug.
JTPM1
13 CLK_24M_TPM
23 PLTRST_BU3#_TPM
12,22 LPC_ESPI_IO0_R
12,22 LPC_ESPI_IO1_R
12,22 LPC_ESPI_IO2_R
12,22 LPC_ESPI_IO3_R
12,22 LFRAME_CS0_N
SERIRQ 12,22
H2X7[10]M-2PITCH
C663 0.1u16X4
C648 0.1u16X4
C649 0.1u16X4

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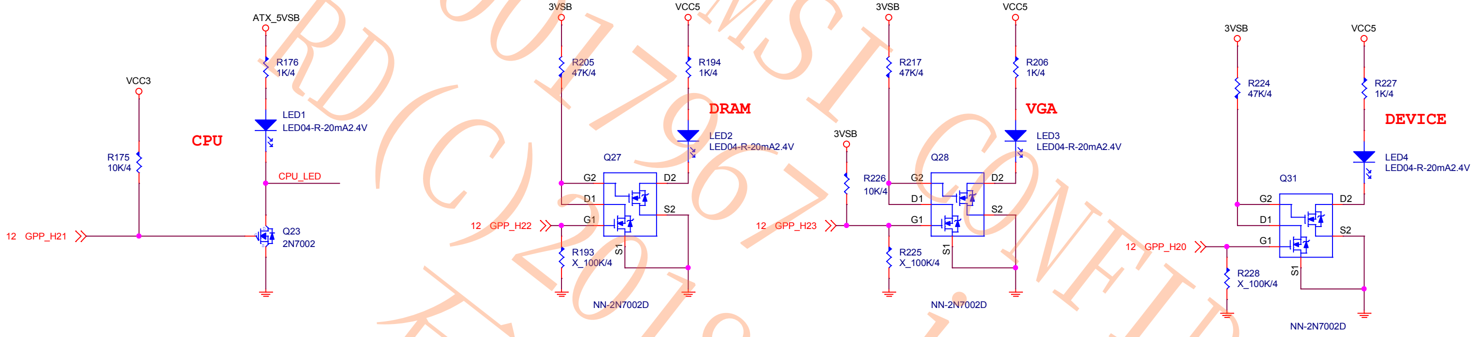
DEBUG LED

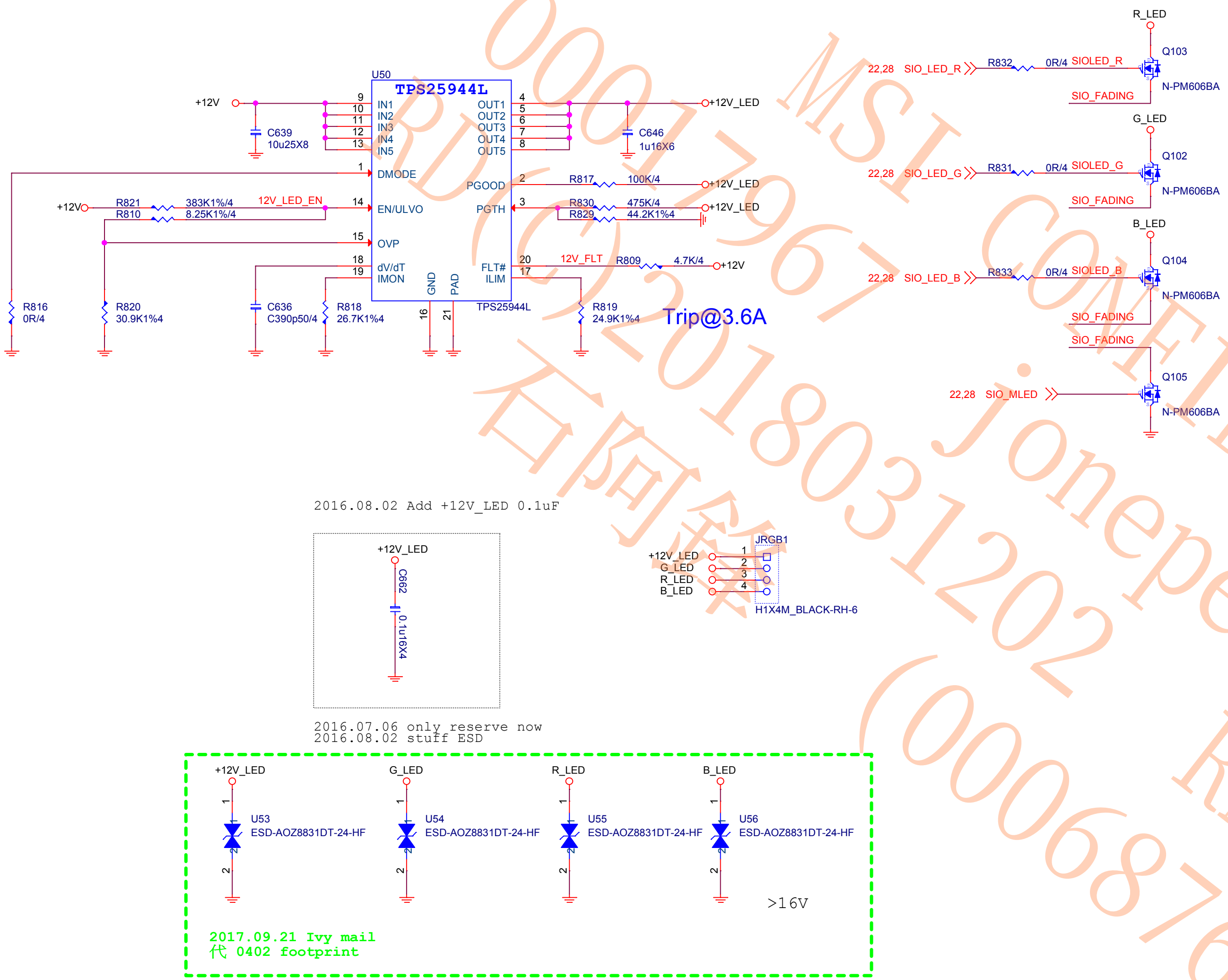


GPIO / LED	PCH_GP20	PCH_GP21	PCH_GP22	PCH_GP23
亮	NATIVE PULL HIGH	GPO PULL HIGH	GPO PULL HIGH	NATIVE PULL HIGH
滅	NATIVE LOW	GPO LOW (default LOW)	GPO LOW (default LOW)	GPO LOW (default LOW)

關機斷電狀態下，3個LED先維持default全暗，開機通電後：

1. 首先進行CPU checkCPU LED 亮，check PASS後則CPU LED滅掉。
2. 接著依序進行Memory /memory LED亮check PASS後則memory LED滅掉。
3. VGA的check/VGA LED亮，check PASS後則VGA LED滅掉。
4. 因此最後正常順利開機後，三個LED燈都是滅掉的。（系統重啟或其他原因造成系統重開機，則LED仍按上述行為動作）

LED STRIPLINE



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Custom	LED STRIP	1.0

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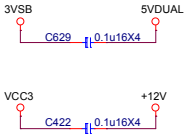
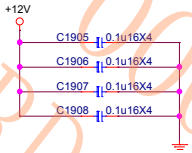
EMI CAP

2017.10.13 moat cap



2017.12.21 SA_PH decouple cap



MSI	MICRO-STAR INT'L CO.,LTD	
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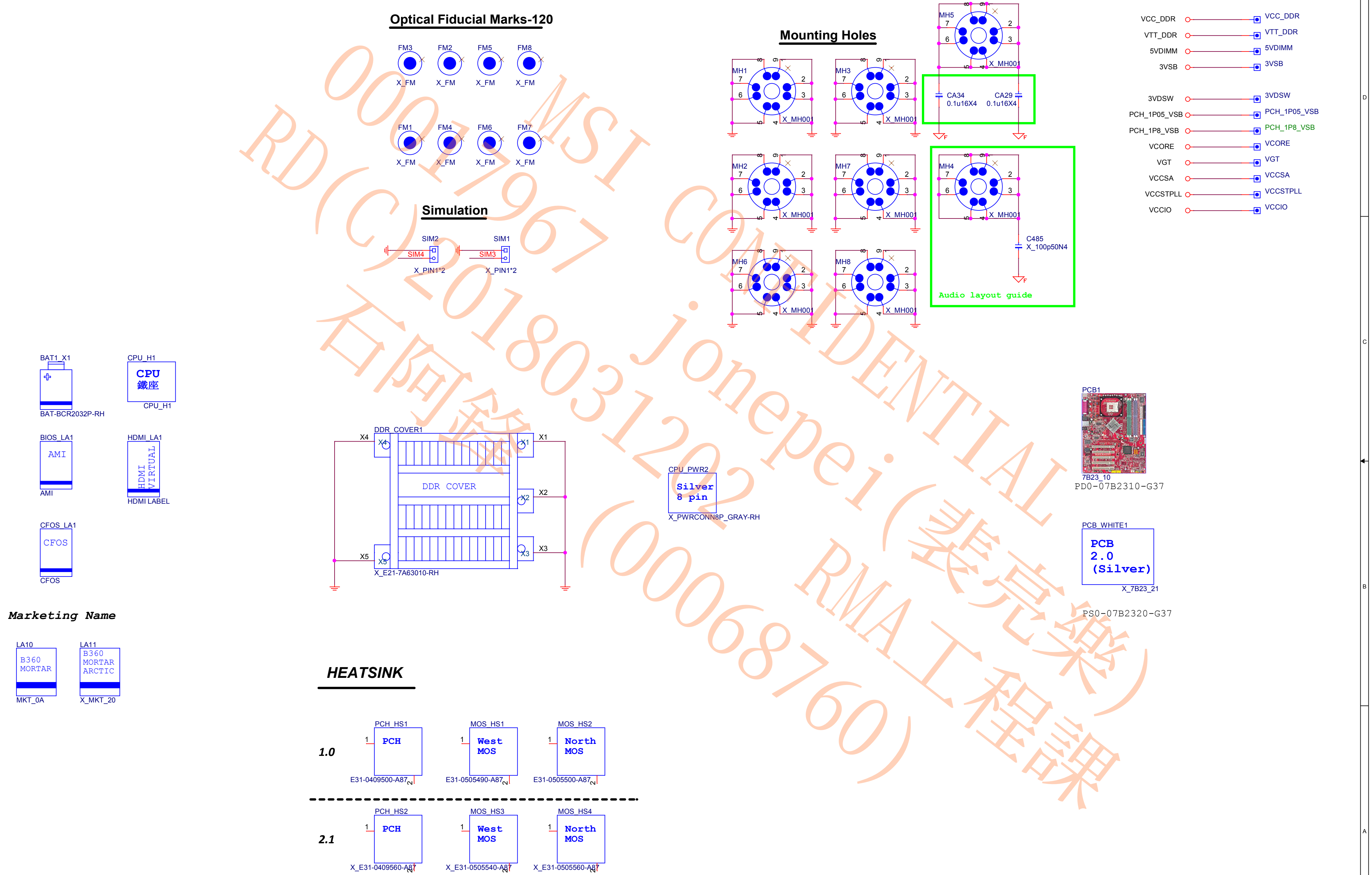

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Size	Document Description	Rev
Custom	Manual Parts	1.0

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