MS-7B28

ATX:234mm*185mm

Intel -CoffeeLake-S plamform

CPU:

LGA1151
*CPU POWER PAK *4Phase*
*GT POWER PAK *2 Phase*

Onboard Chip:

SIO: NUVOTON 5567
HD Audio Codec: ALC887
LAN: INTEL I219V
Flash ROM: SPI 64 MB
CUT VBAT:SLG4B41231

Main Memory:

*DDR4 * 2 (Dual Channel)*

ACPI:

5VDAUL:uP7501
5VDIMM:uP7501
3VSB:GS7133+N MOS
1P8_VSB:GS7166
3VDSW:L11831
VCCSTPLL:GS7133

Expansion Slots:

*PCI Express (X16) Slot * 1*
*PCI Express (X1) Slot * 2*

System Chipset:

H310

PWM:

VCORE - RT3607	138A
VGT- RT3607	45A
DDR - RT8231	11.525A
DDR VPP25- MP2143	1.12A
PCH(1.05V) - RT8125E	10.743A
VCCSA - RT8125E	11.1A
VCCIO - SY8288	6.4A

MSI

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MS-7B28

Size: Custom | Document Description: Cover Sheet | Rev: 10/20/30

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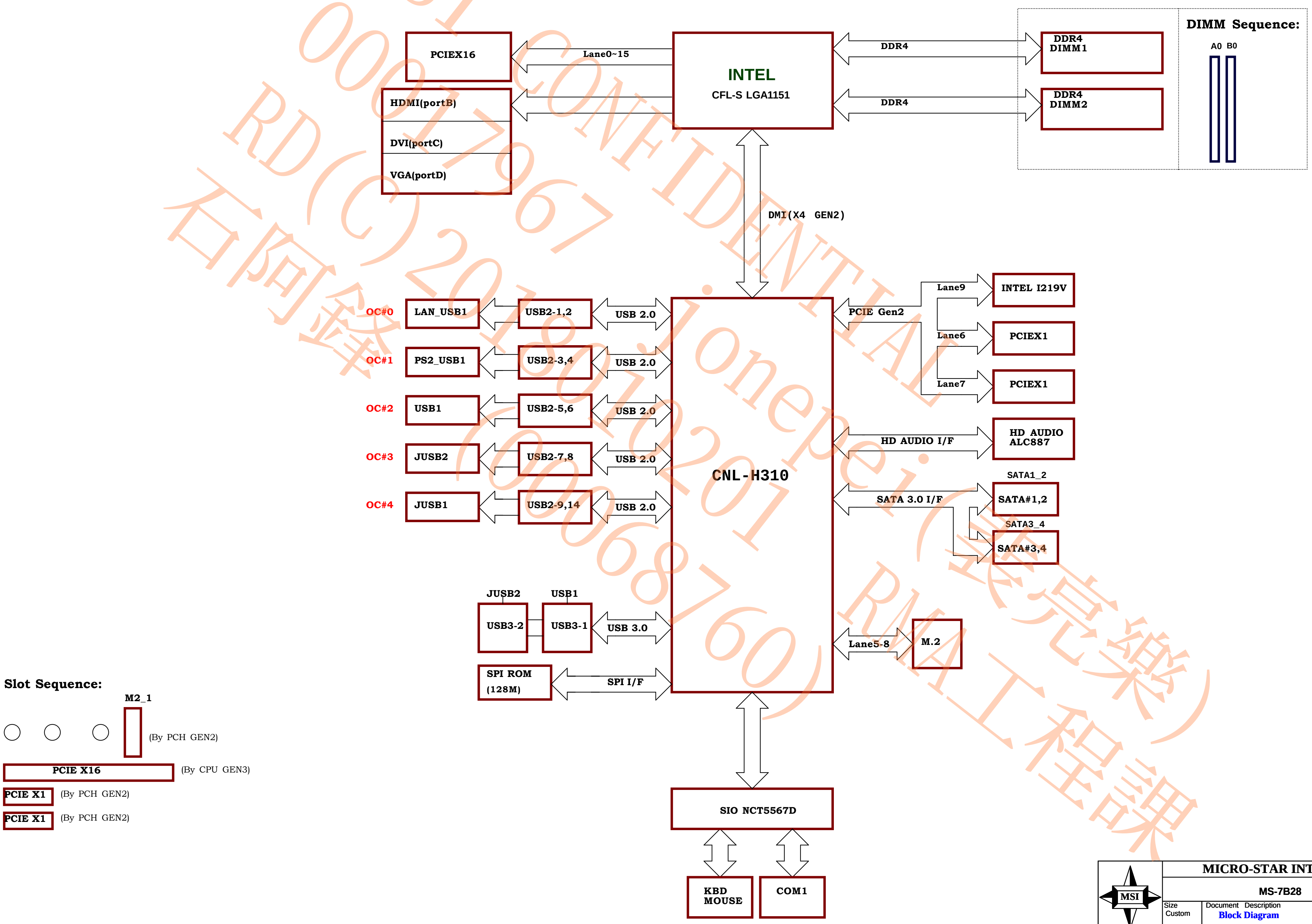
Block Diagram



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Size: Custom
Document Description: Block Diagram
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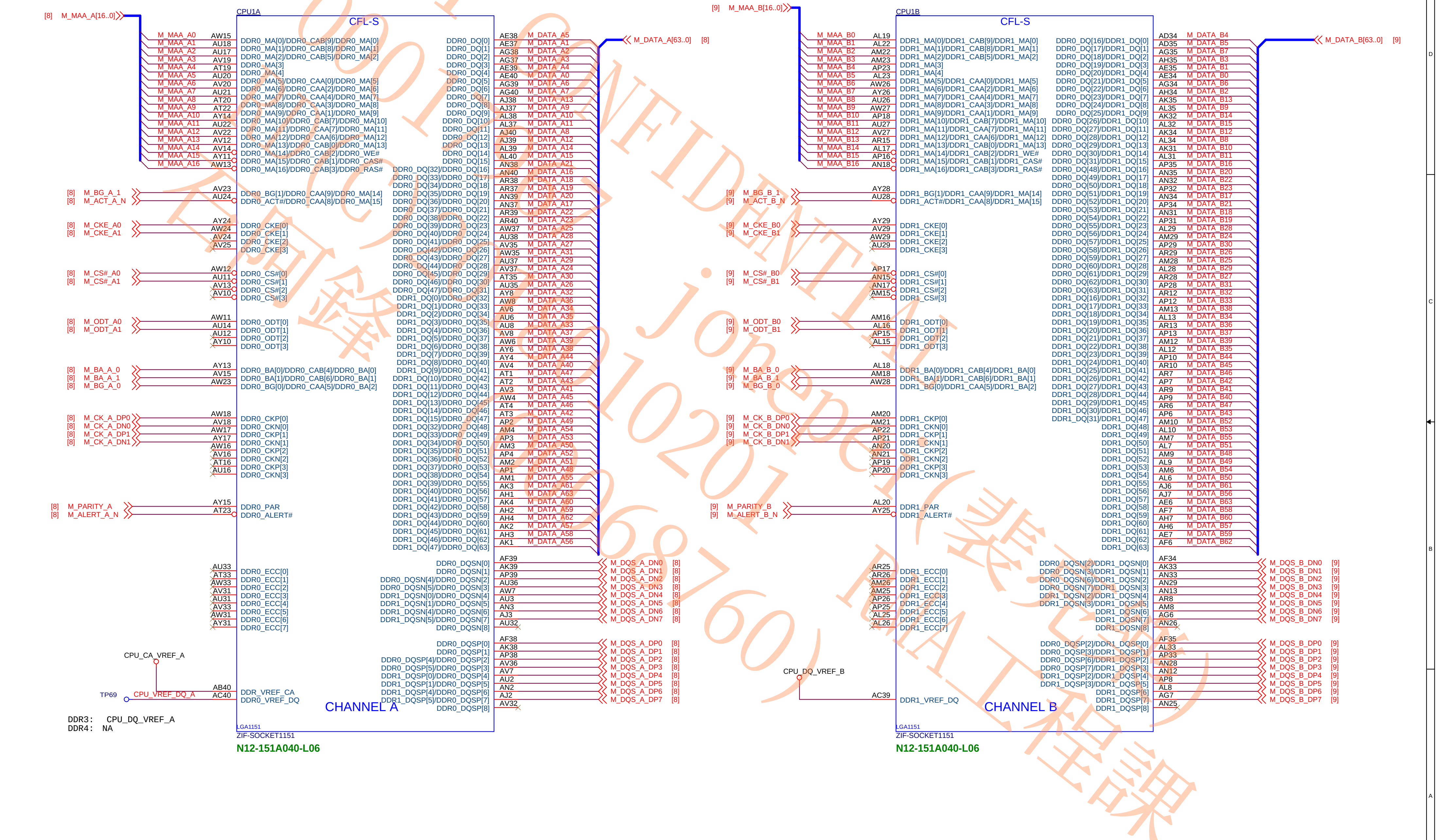

MICRO-STAR INT'L CO.,LTD

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Size	Document Description	Rev
Custom	CPU-Memory	10/20/30

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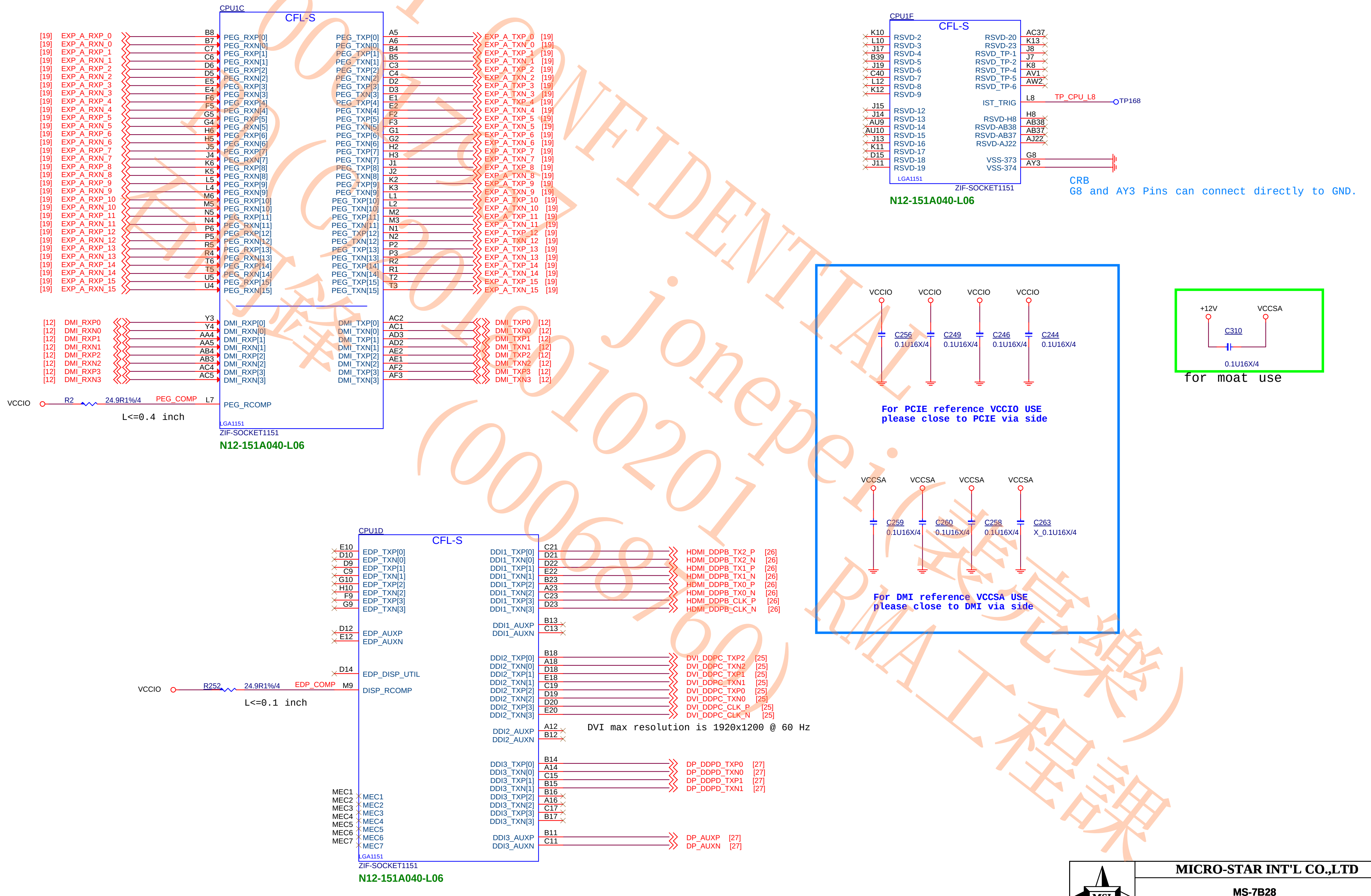

MICRO-STAR INT'L CO.,LTD

MS-7B28

Size	Document Description	Rev
Custom	CPU-PEG/Display	10/20/30

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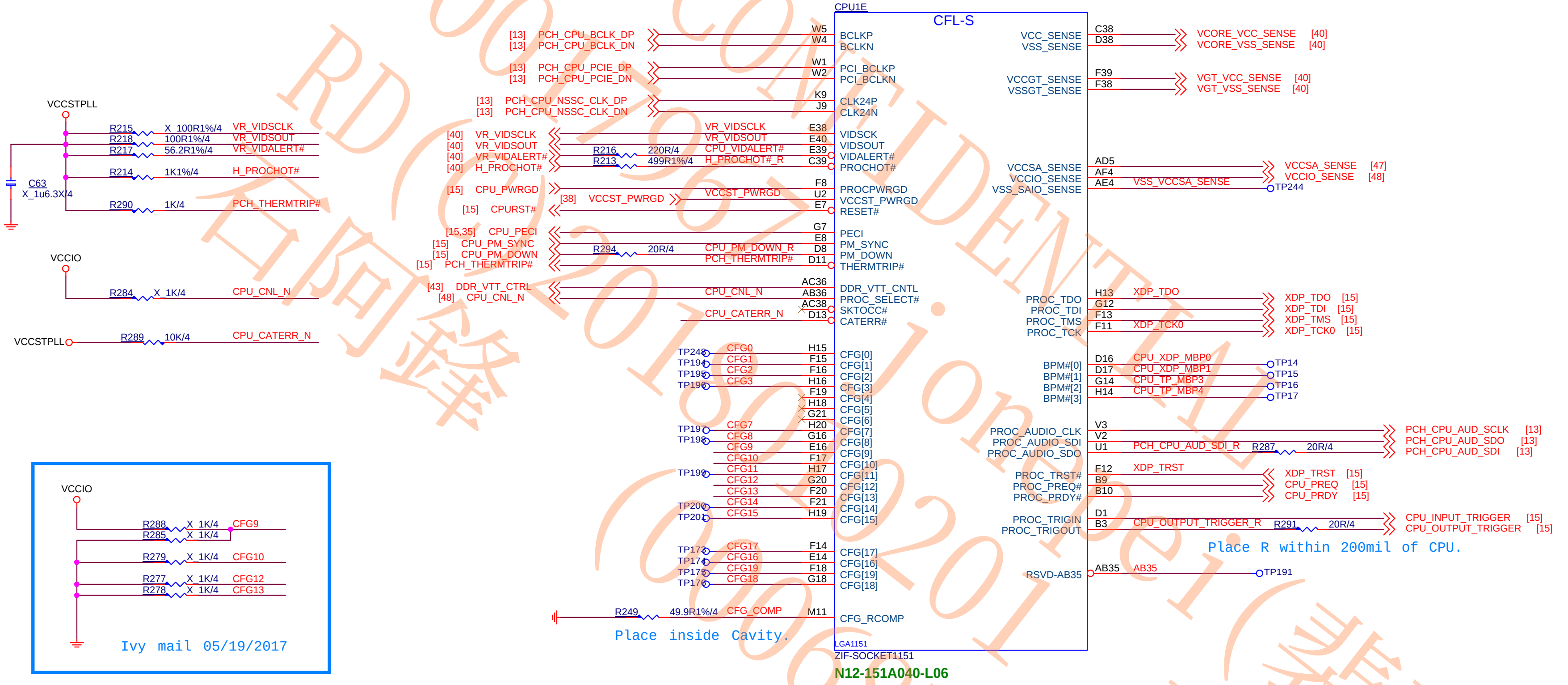
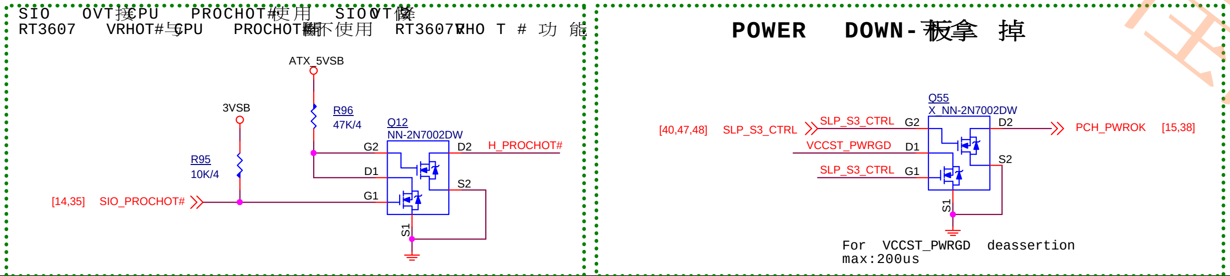


CFG Table

	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			RSVD
10			RSVD
11			RSVD
12			RSVD
13			RSVD
14	RSVD		
15	RSVD		



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MS-7B28

Size: Custom | Document Description: CPU-Control/MISC/CFG/Audio | Rev 10/20/30

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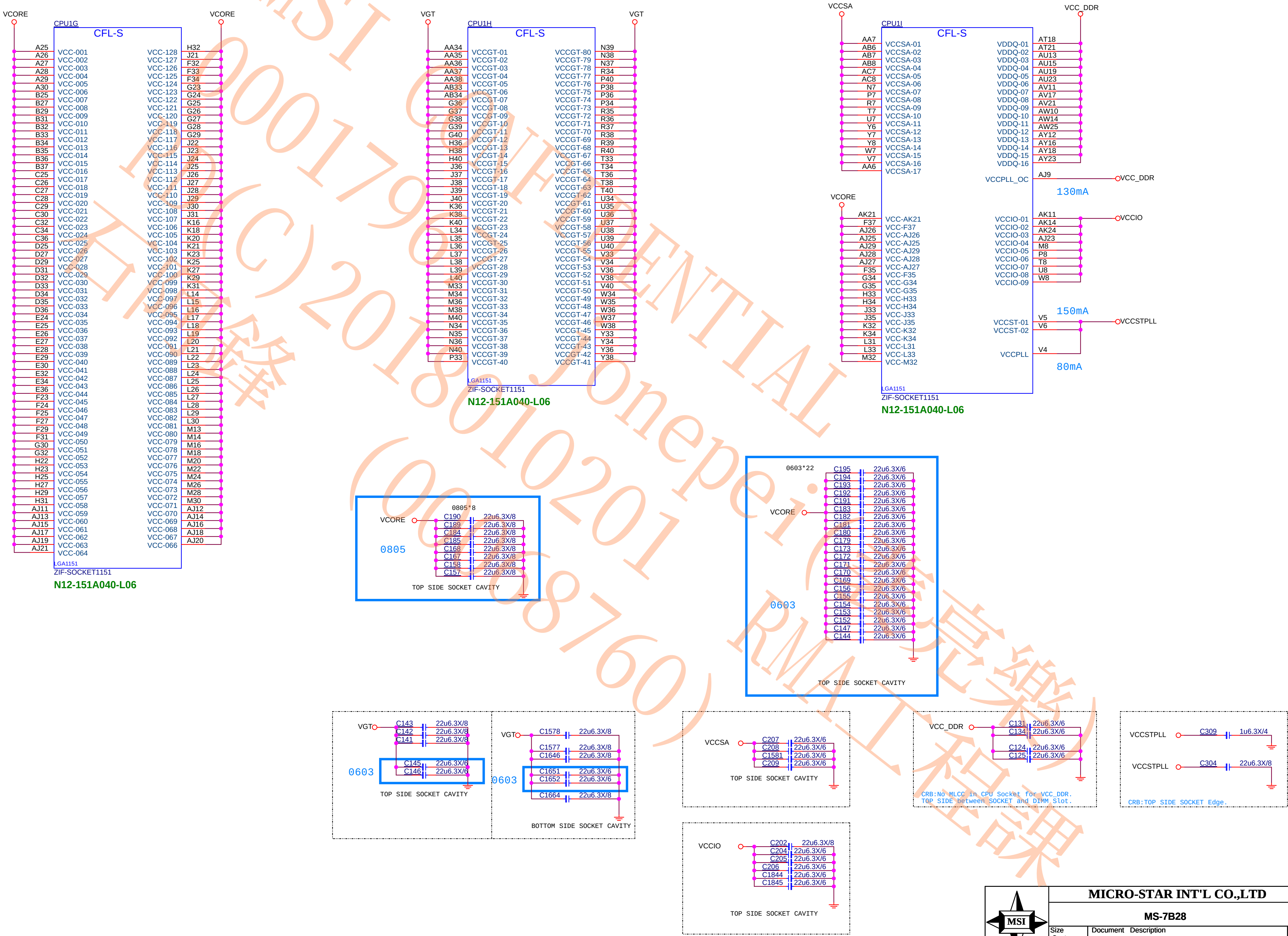

MICRO-STAR INT'L CO.,LTD

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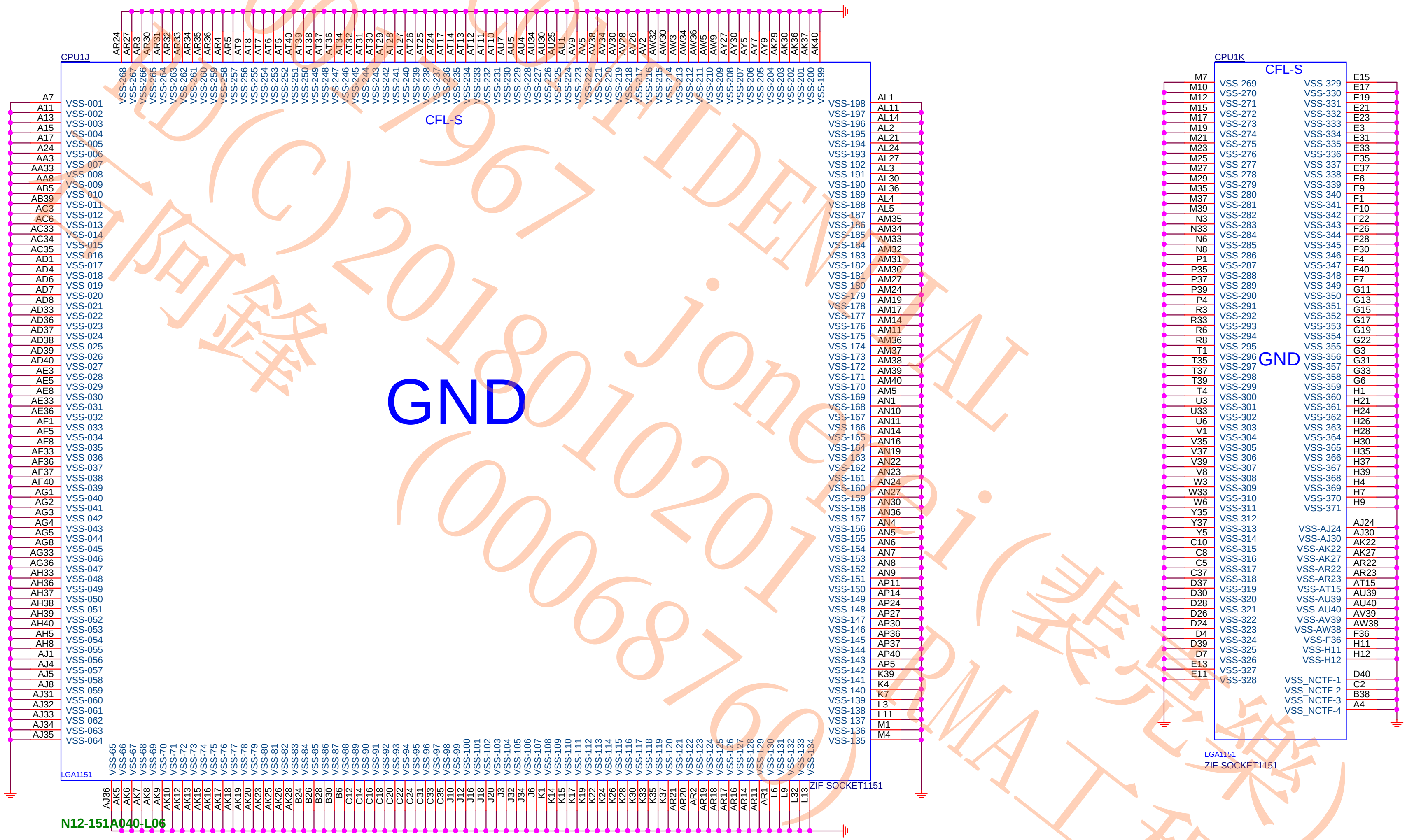
Size	Document Description	Rev
Custom	CPU-Power	10/20/30

Date: Tuesday, December 12, 2017 Sheet 6 of 53



MICRO-STAR INT'L CO.,LTD

MS-7B28

Size	Document Description	Rev
Custom	CPU-GND	10/20/30

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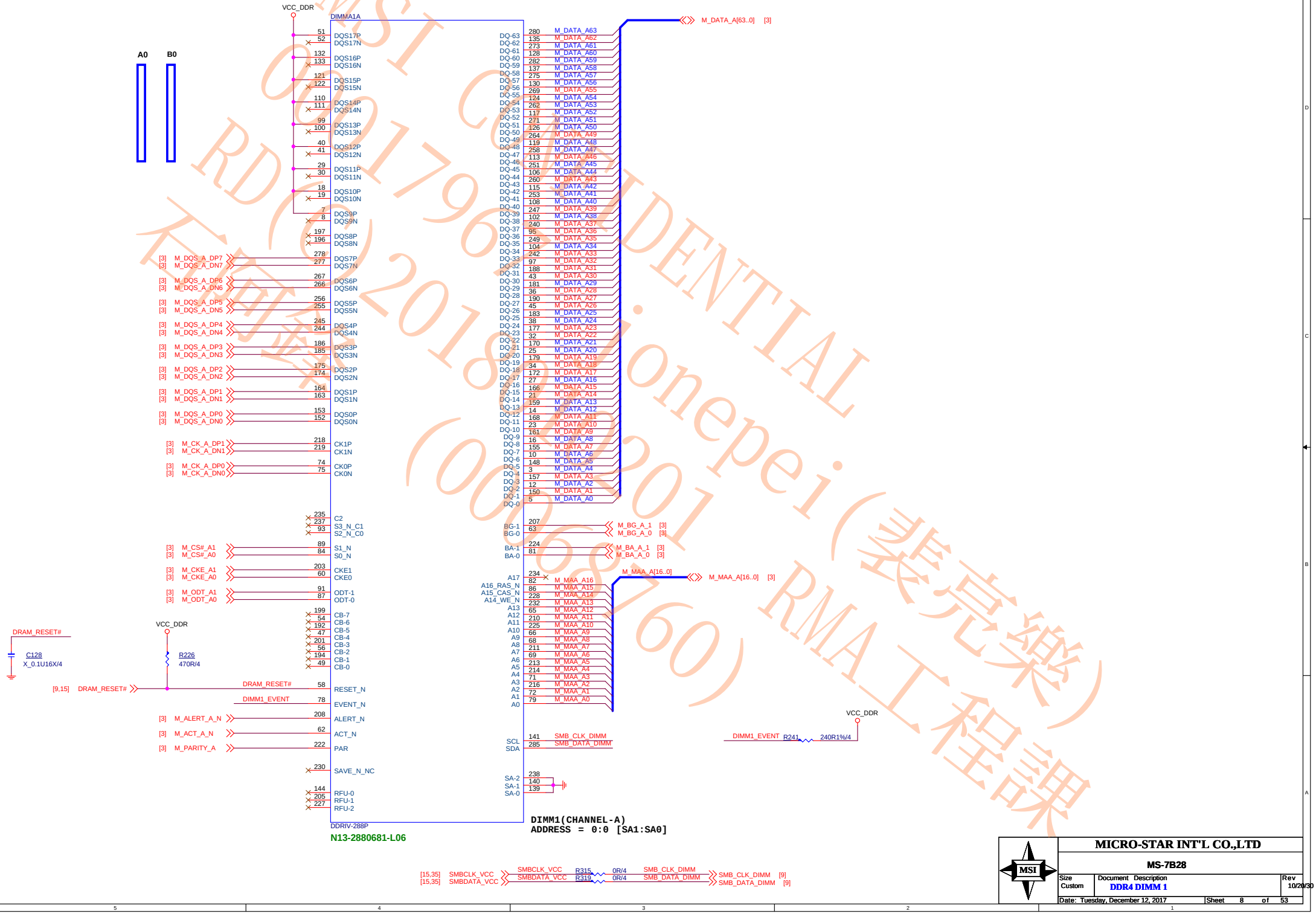
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A0
B0
DQS17P
DQS17N
DQS16P
DQS16N
DQS15P
DQS15N
DQS14P
DQS14N
DQS13P
DQS13N
DQS12P
DQS12N
DQS11P
DQS11N
DQS10P
DQS10N
DQS9P
DQS9N
DQS8P
DQS8N
DQS7P
DQS7N
DQS6P
DQS6N
DQS5P
DQS5N
DQS4P
DQS4N
DQS3P
DQS3N
DQS2P
DQS2N
DQS1P
DQS1N
DQS0P
DQS0N
CK1P
CK1N
CK0P
CK0N
C2
S3_N_C1
S2_N_C0
S1_N
S0_N
CKE1
CKE0
ODT-1
ODT-0
CB-7
CB-6
CB-5
CB-4
CB-3
CB-2
CB-1
CB-0
RESET_N
EVENT_N
ALERT_N
ACT_N
PAR
SAVE_N_NC
RFU-0
RFU-1
RFU-2
DDRIV-288P
M_DATA_A[63..0]
M_BG_A_1
M_BG_A_0
M_BA_A_1
M_BA_A_0
M_MAA_A[16..0]
SMB_CLK_DIMM
SMB_DATA_DIMM
SA-2
SA-1
SA-0
DRAM_RESET#
C128
X_0.1U16X/4
R226
470R/4
DIMM1_EVENT
R241
240R1%/4
SMBCLK_VCC
SMBDATA_VCC
R315
R319
0R/4
DIMM1(CHANNEL-A)
ADDRESS = 0:0 [SA1:SA0]
N13-2880681-L06
MICRO-STAR INT'L CO.,LTD
MS-7B28
Size
Custom
Document Description
DDR4 DIMM 1
Rev
10/20/30
Date: Tuesday, December 12, 2017
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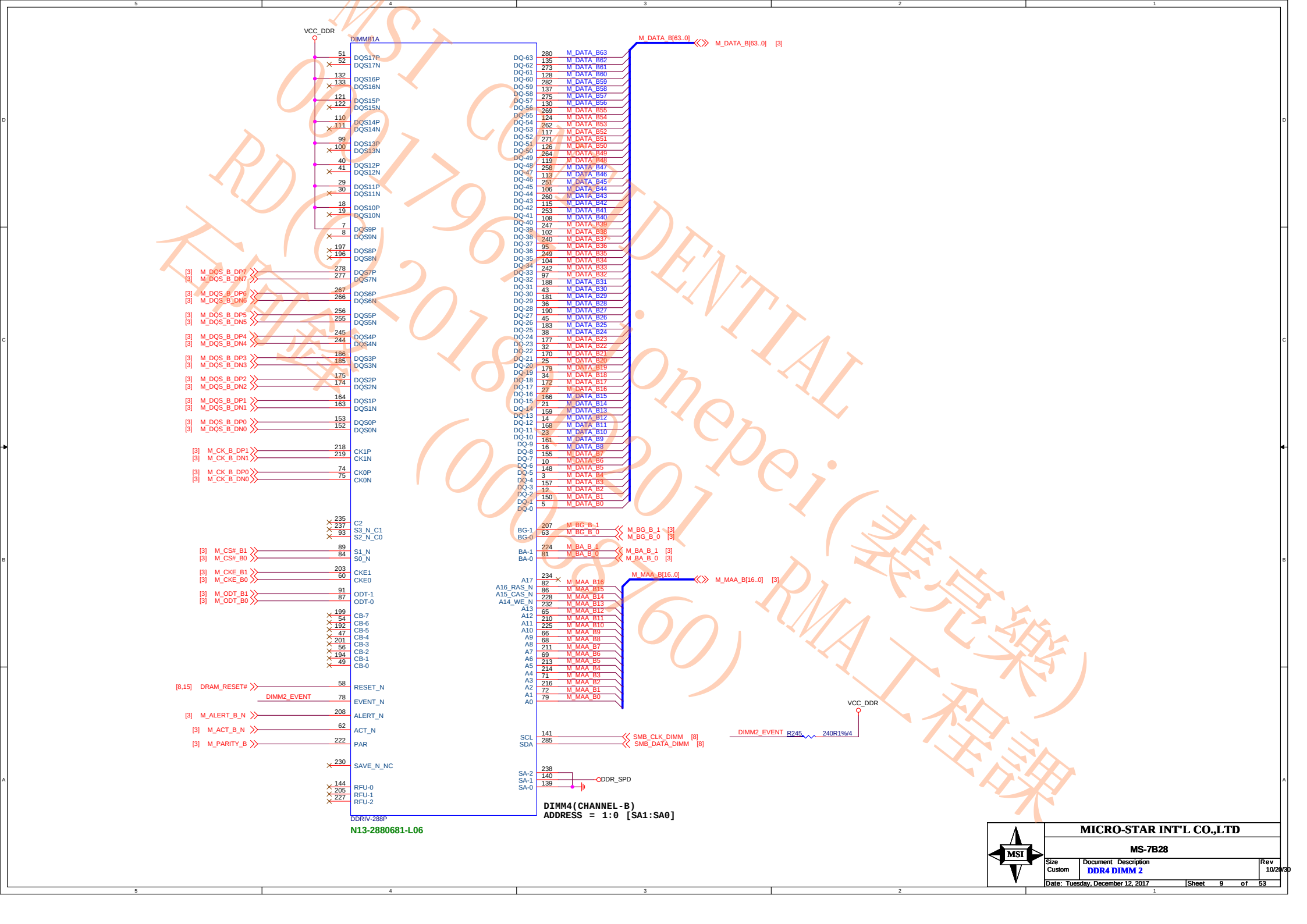
VCC_DDR
DIMMB1A
M_DATA_B[63..0]
M_DATA_B[63..0] [3]
DQS17P
DQS17N
DQS16P
DQS16N
DQS15P
DQS15N
DQS14P
DQS14N
DQS13P
DQS13N
DQS12P
DQS12N
DQS11P
DQS11N
DQS10P
DQS10N
DQS9P
DQS9N
DQS8P
DQS8N
M_DQS_B_DP7 [3]
M_DQS_B_DN7 [3]
DQS7P
DQS7N
M_DQS_B_DP6 [3]
M_DQS_B_DN6 [3]
DQS6P
DQS6N
M_DQS_B_DP5 [3]
M_DQS_B_DN5 [3]
DQS5P
DQS5N
M_DQS_B_DP4 [3]
M_DQS_B_DN4 [3]
DQS4P
DQS4N
M_DQS_B_DP3 [3]
M_DQS_B_DN3 [3]
DQS3P
DQS3N
M_DQS_B_DP2 [3]
M_DQS_B_DN2 [3]
DQS2P
DQS2N
M_DQS_B_DP1 [3]
M_DQS_B_DN1 [3]
DQS1P
DQS1N
M_DQS_B_DP0 [3]
M_DQS_B_DN0 [3]
DQS0P
DQS0N
M_CK_B_DP1 [3]
M_CK_B_DN1 [3]
CK1P
CK1N
M_CK_B_DP0 [3]
M_CK_B_DN0 [3]
CK0P
CK0N
C2
S3_N_C1
S2_N_C0
M_CS#_B1 [3]
M_CS#_B0 [3]
S1_N
S0_N
M_CKE_B1 [3]
M_CKE_B0 [3]
CKE1
CKE0
M_ODT_B1 [3]
M_ODT_B0 [3]
ODT-1
ODT-0
CB-7
CB-6
CB-5
CB-4
CB-3
CB-2
CB-1
CB-0
[8,15] DRAM_RESET#
RESET_N
DIMM2_EVENT
EVENT_N
M_ALERT_B_N [3]
ALERT_N
M_ACT_B_N [3]
ACT_N
M_PARITY_B [3]
PAR
SAVE_N_NC
RFU-0
RFU-1
RFU-2
DDRIV-288P
N13-2880681-L06
DQ-63 M_DATA_B63
DQ-62 M_DATA_B62
DQ-61 M_DATA_B61
DQ-60 M_DATA_B60
DQ-59 M_DATA_B59
DQ-58 M_DATA_B58
DQ-57 M_DATA_B57
DQ-56 M_DATA_B56
DQ-55 M_DATA_B55
DQ-54 M_DATA_B54
DQ-53 M_DATA_B53
DQ-52 M_DATA_B52
DQ-51 M_DATA_B51
DQ-50 M_DATA_B50
DQ-49 M_DATA_B49
DQ-48 M_DATA_B48
DQ-47 M_DATA_B47
DQ-46 M_DATA_B46
DQ-45 M_DATA_B45
DQ-44 M_DATA_B44
DQ-43 M_DATA_B43
DQ-42 M_DATA_B42
DQ-41 M_DATA_B41
DQ-40 M_DATA_B40
DQ-39 M_DATA_B39
DQ-38 M_DATA_B38
DQ-37 M_DATA_B37
DQ-36 M_DATA_B36
DQ-35 M_DATA_B35
DQ-34 M_DATA_B34
DQ-33 M_DATA_B33
DQ-32 M_DATA_B32
DQ-31 M_DATA_B31
DQ-30 M_DATA_B30
DQ-29 M_DATA_B29
DQ-28 M_DATA_B28
DQ-27 M_DATA_B27
DQ-26 M_DATA_B26
DQ-25 M_DATA_B25
DQ-24 M_DATA_B24
DQ-23 M_DATA_B23
DQ-22 M_DATA_B22
DQ-21 M_DATA_B21
DQ-20 M_DATA_B20
DQ-19 M_DATA_B19
DQ-18 M_DATA_B18
DQ-17 M_DATA_B17
DQ-16 M_DATA_B16
DQ-15 M_DATA_B15
DQ-14 M_DATA_B14
DQ-13 M_DATA_B13
DQ-12 M_DATA_B12
DQ-11 M_DATA_B11
DQ-10 M_DATA_B10
DQ-9 M_DATA_B9
DQ-8 M_DATA_B8
DQ-7 M_DATA_B7
DQ-6 M_DATA_B6
DQ-5 M_DATA_B5
DQ-4 M_DATA_B4
DQ-3 M_DATA_B3
DQ-2 M_DATA_B2
DQ-1 M_DATA_B1
DQ-0 M_DATA_B0
BG-1 M_BG_B_1
BG-0 M_BG_B_0
M_BG_B_1 [3]
M_BG_B_0 [3]
BA-1 M_BA_B_1
BA-0 M_BA_B_0
M_BA_B_1 [3]
M_BA_B_0 [3]
A17
A16_RAS_N
A15_CAS_N
A14_WE_N
A13
A12
A11
A10
A9
A8
A7
A6
A5
A4
A3
A2
A1
A0
M_MAA_B16
M_MAA_B15
M_MAA_B14
M_MAA_B13
M_MAA_B12
M_MAA_B11
M_MAA_B10
M_MAA_B9
M_MAA_B8
M_MAA_B7
M_MAA_B6
M_MAA_B5
M_MAA_B4
M_MAA_B3
M_MAA_B2
M_MAA_B1
M_MAA_B0
M_MAA_B[16..0]
M_MAA_B[16..0] [3]
SCL
SDA
SMB_CLK_DIMM [8]
SMB_DATA_DIMM [8]
SA-2
SA-1
SA-0
DDR_SPD
VCC_DDR
DIMM2_EVENT
R245
240R1%/4
DIMM4(CHANNEL-B)
ADDRESS = 1:0 [SA1:SA0]
MICRO-STAR INT'L CO.,LTD
MS-7B28
Size
Custom
Document Description
DDR4 DIMM 2
Rev
10/20/30
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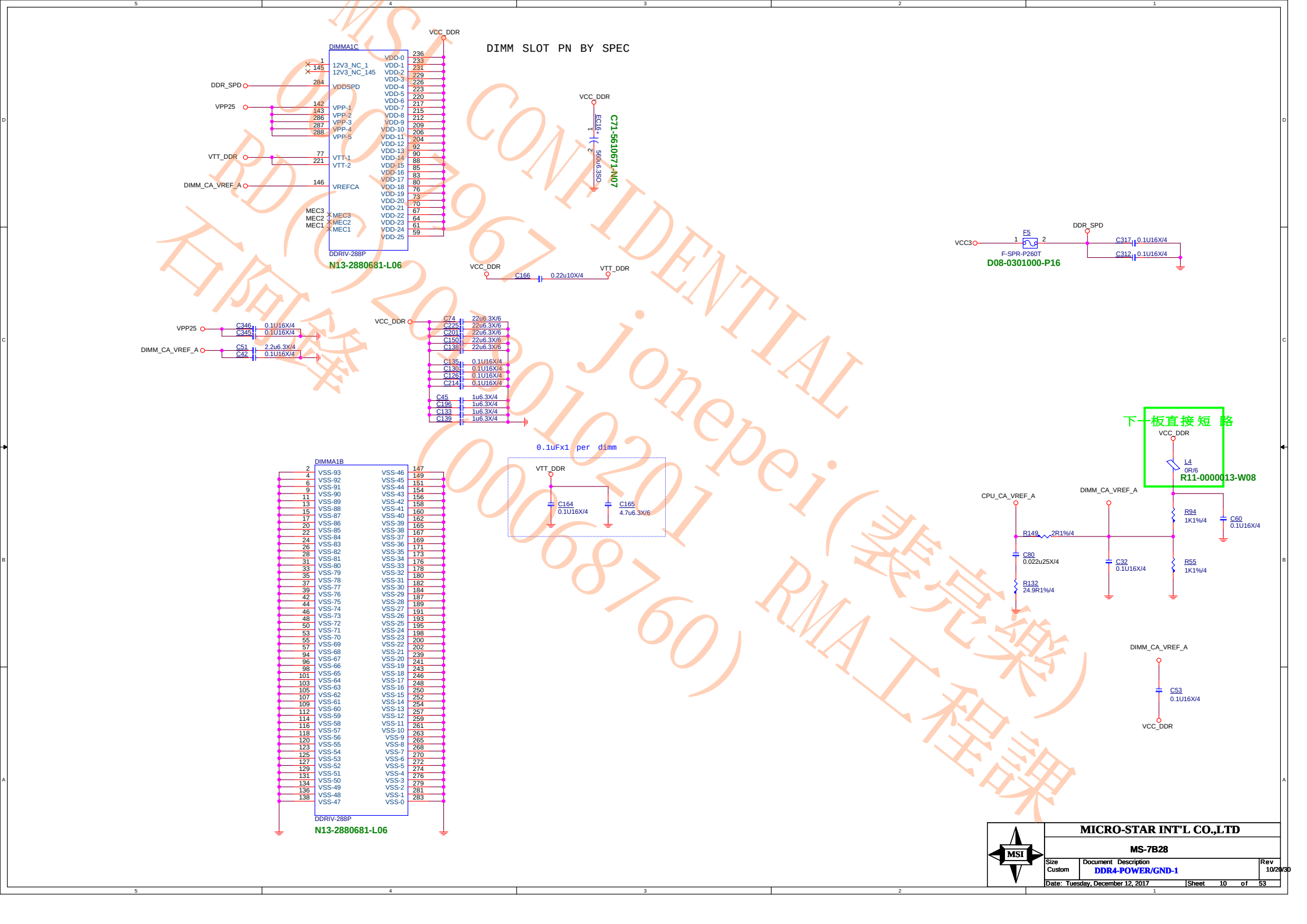
DIMM SLOT PN BY SPEC
DIMMA1C
DDRIV-288P
N13-2880681-L06
VCC_DDR
VTT_DDR
DDR_SPD
VPP25
DIMM_CA_VREF_A
C71-5610671-N07
C166 0.22u10X/4
0.1uFx1 per dimm
C164 0.1U16X/4
C165 4.7u6.3X/6
DIMMA1B
DDRIV-288P
N13-2880681-L06
D08-0301000-P16
F-SPR-P260T
下一板直接短路
L4 0R/6
R11-0000013-W08
CPU_CA_VREF_A
R149 2R1%/4
C80 0.022u25X/4
R132 24.9R1%/4
C32 0.1U16X/4
R94 1K1%/4
R55 1K1%/4
C60 0.1U16X/4
C53 0.1U16X/4
MICRO-STAR INT'L CO.,LTD
MS-7B28
DDR4-POWER/GND-1
Date: Tuesday, December 12, 2017
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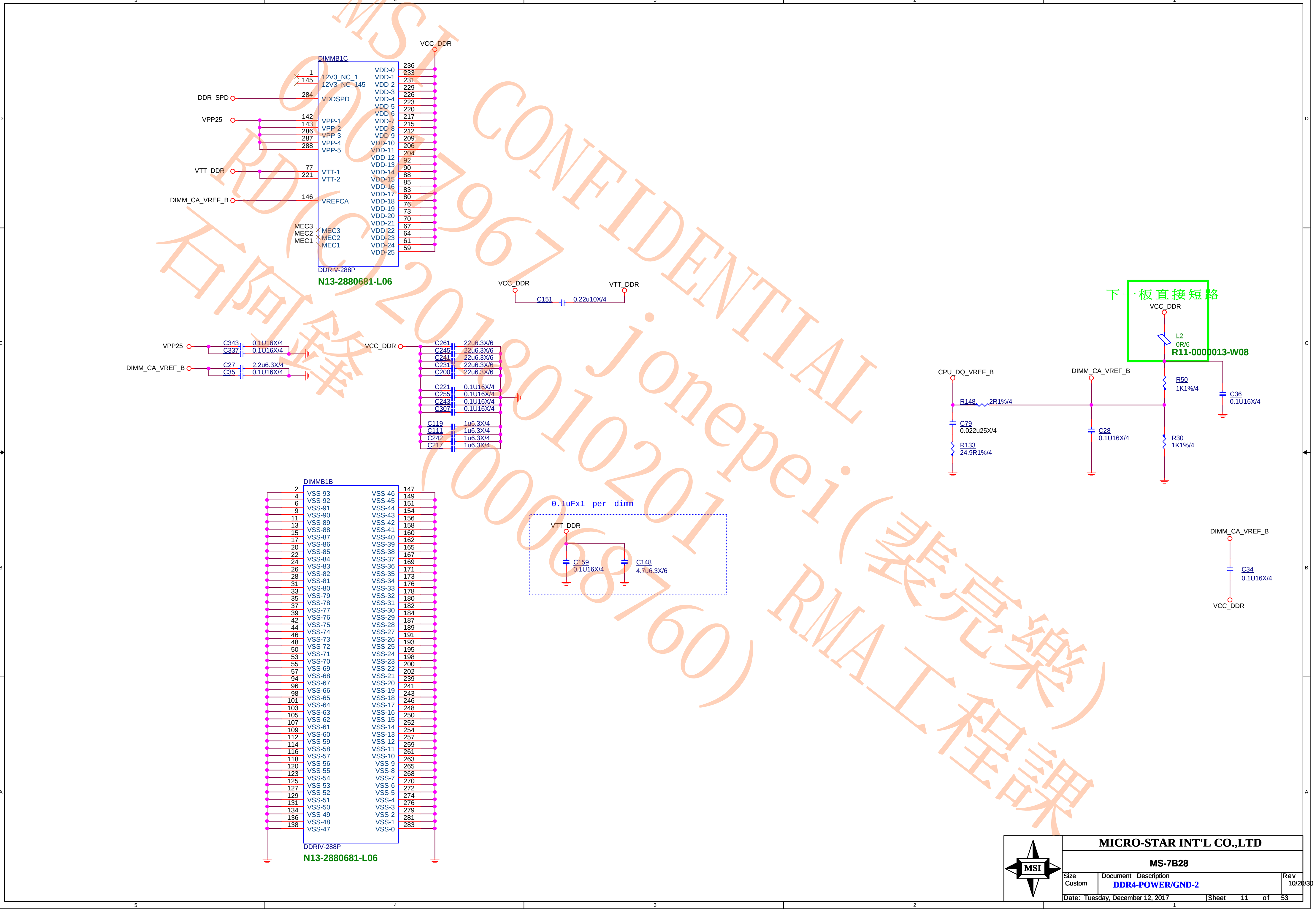
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DDRIV-288P
N13-2880681-L06
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DDR_SPD
VPP25
VTT_DDR
DIMM_CA_VREF_B
12V3_NC_1
12V3_NC_145
VDDSPD
VPP-1
VPP-2
VPP-3
VPP-4
VPP-5
VTT-1
VTT-2
VREFCA
MEC3
MEC2
MEC1
C151 0.22u10X/4
下一板直接短路
L2 0R/6
R11-0000013-W08
CPU_DQ_VREF_B
R148 2R1%/4
C79 0.022u25X/4
R133 24.9R1%/4
C28 0.1U16X/4
R50 1K1%/4
R30 1K1%/4
C36 0.1U16X/4
C34 0.1U16X/4
C343 0.1U16X/4
C337 0.1U16X/4
C27 2.2u6.3X/4
C35 0.1U16X/4
C261 22u6.3X/6
C245 22u6.3X/6
C241 22u6.3X/6
C231 22u6.3X/6
C200 22u6.3X/6
C221 0.1U16X/4
C255 0.1U16X/4
C243 0.1U16X/4
C307 0.1U16X/4
C119 1u6.3X/4
C111 1u6.3X/4
C242 1u6.3X/4
C217 1u6.3X/4
0.1uFx1 per dimm
C159 0.1U16X/4
C148 4.7u6.3X/6
DIMMB1B
DDRIV-288P
N13-2880681-L06
MICRO-STAR INT'L CO.,LTD
MS-7B28
Size Custom
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DDR4-POWER/GND-2
Rev 10/20/30
Date: Tuesday, December 12, 2017
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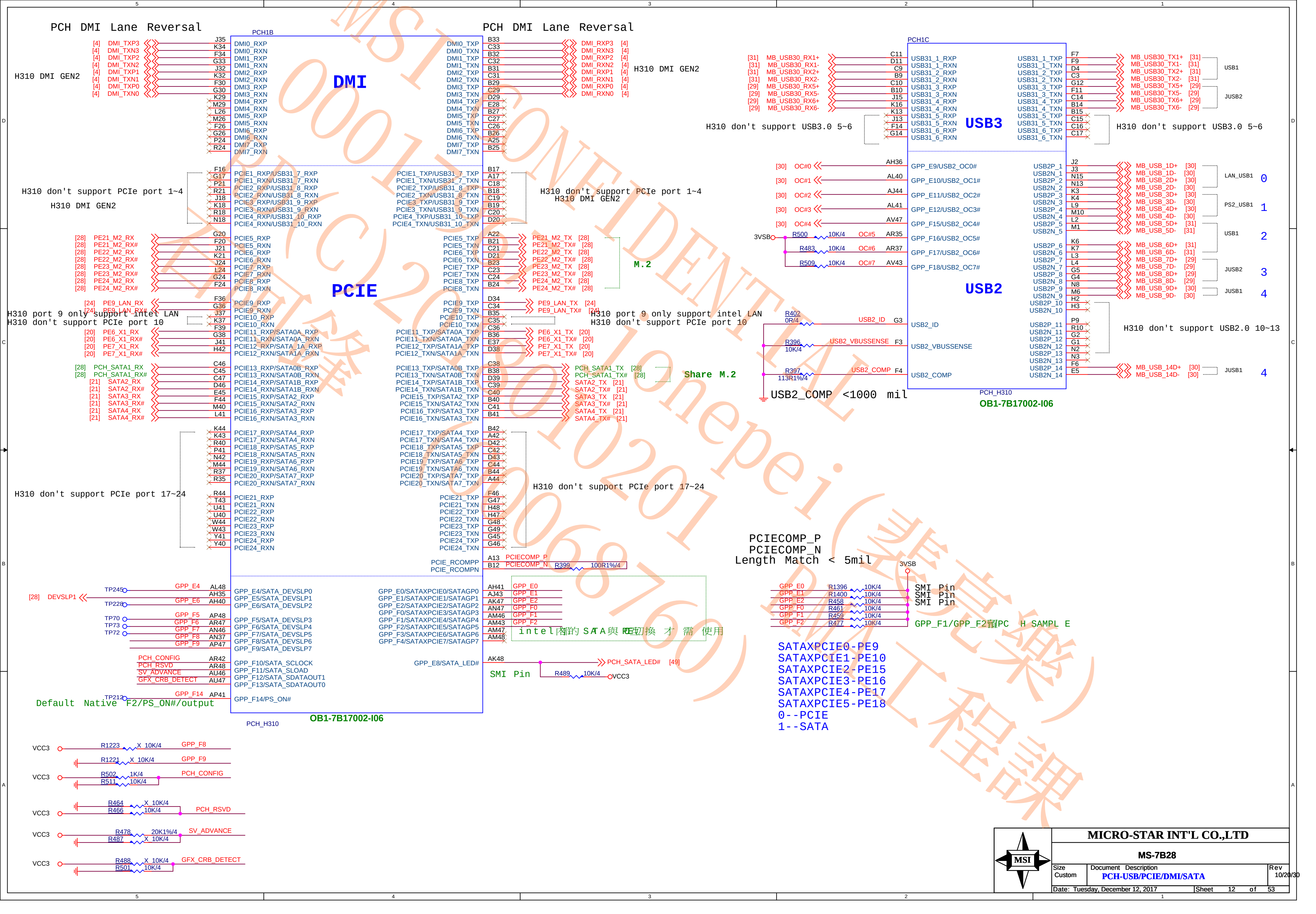

PCH DMI Lane Reversal
H310 DMI GEN2
DMI
PCIE
USB3
USB2
H310 don't support USB3.0 5~6
H310 don't support PCIe port 1~4
H310 port 9 only support intel LAN
H310 don't support PCIe port 10
M.2
Share M.2
H310 don't support USB2.0 10~13
USB2_COMP <1000 mil
PCH_H310
OB1-7B17002-I06
H310 don't support PCIe port 17~24
PCIECOMP_P
PCIECOMP_N
Length Match < 5mil
SMI Pin
SMI Pin
SMI Pin
GPP_F1/GPP_F2留PC H SAMPL E
SMI Pin
SATAXPCIE0-PE9
SATAXPCIE1-PE10
SATAXPCIE2-PE15
SATAXPCIE3-PE16
SATAXPCIE4-PE17
SATAXPCIE5-PE18
0--PCIE
1--SATA
Default Native F2/PS_ON#/output
MICRO-STAR INT'L CO.,LTD
MS-7B28
Size Custom
Document Description
PCH-USB/PCIE/DMI/SATA
Rev 10/20/30
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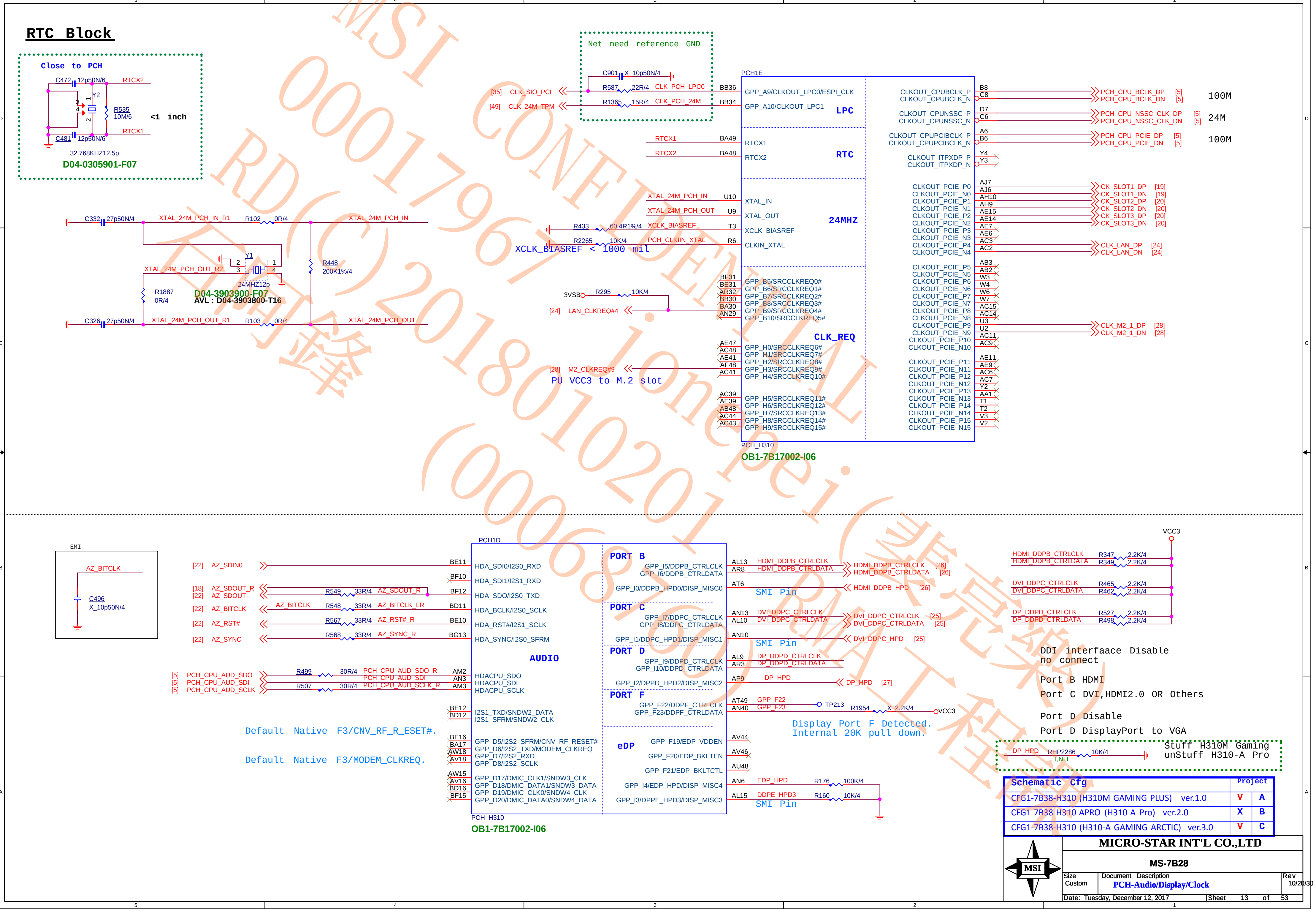
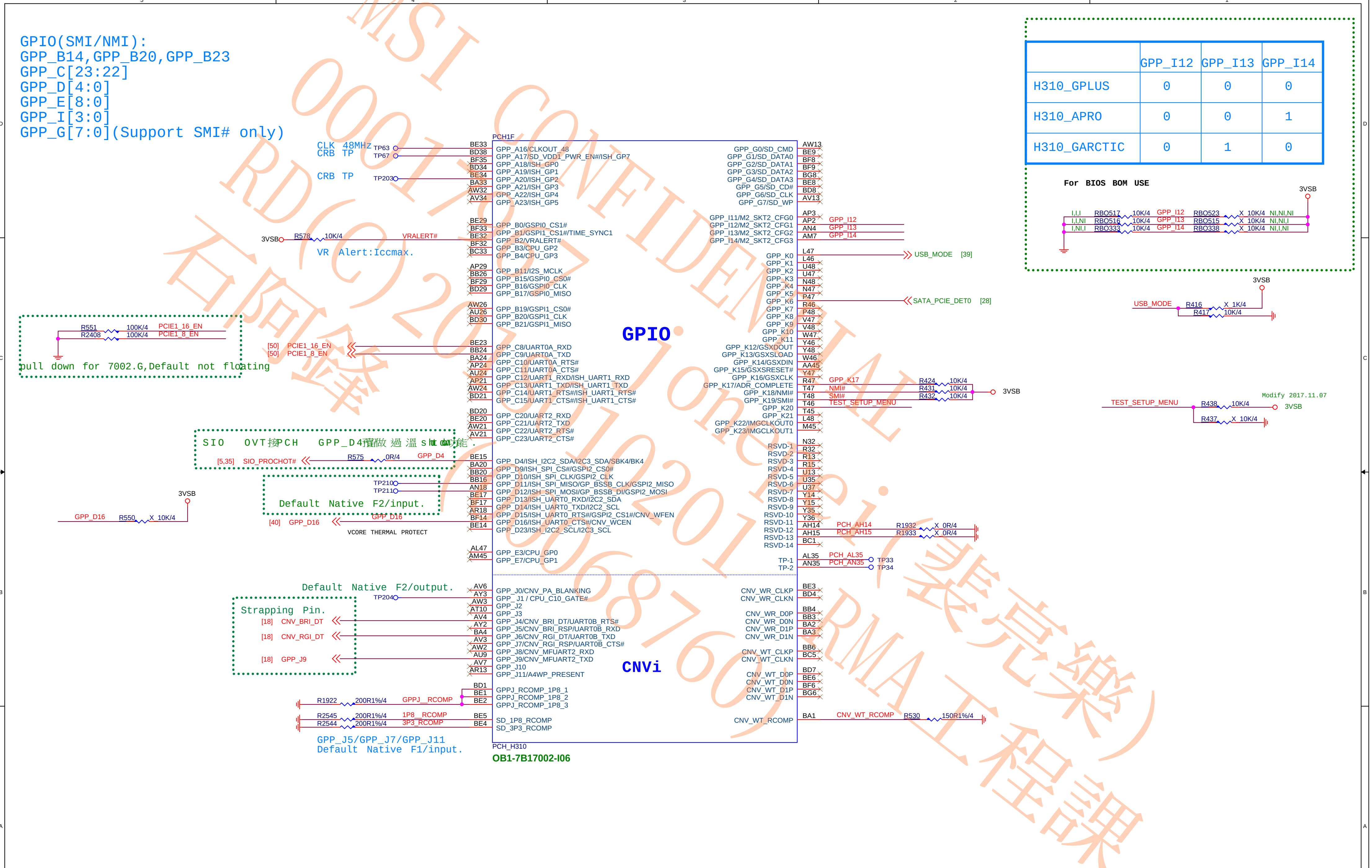


RTC Block
Close to PCH
C472 12p50N/6
RTCX2
Y2
R535 10M/6
<1 inch
C481 12p50N/6
RTCX1
32.768KHZ12.5p
D04-0305901-F07
Net need reference GND
C901 X_10p50N/4
[35] CLK_SIO_PCI
R587 22R/4 CLK_PCH_LPC0
[49] CLK_24M_TPM
R1365 15R/4 CLK_PCH_24M
PCH1E
GPP_A9/CLKOUT_LPC0/ESPI_CLK
GPP_A10/CLKOUT_LPC1
LPC
RTCX1
RTCX2
RTC
XTAL_24M_PCH_IN
XTAL_24M_PCH_OUT
XTAL_IN
XTAL_OUT
XCLK_BIASREF
CLKIN_XTAL
24MHZ
C332 27p50N/4
XTAL_24M_PCH_IN_R1
R102 0R/4
R448 200K1%/4
R433 60.4R1%/4
R2265 10K/4
PCH_CLKIN_XTAL
XCLK_BIASREF < 1000 mil
Y1
24MHZ12p
XTAL_24M_PCH_OUT_R2
R1887 0R/4
D04-3903900-F07
AVL : D04-3903800-T16
C326 27p50N/4
XTAL_24M_PCH_OUT_R1
R103 0R/4
XTAL_24M_PCH_OUT
3VSB
R295 10K/4
[24] LAN_CLKREQ#4
GPP_B5/SRCCLKREQ0#
GPP_B6/SRCCLKREQ1#
GPP_B7/SRCCLKREQ2#
GPP_B8/SRCCLKREQ3#
GPP_B9/SRCCLKREQ4#
GPP_B10/SRCCLKREQ5#
CLK_REQ
GPP_H0/SRCCLKREQ6#
GPP_H1/SRCCLKREQ7#
GPP_H2/SRCCLKREQ8#
GPP_H3/SRCCLKREQ9#
GPP_H4/SRCCLKREQ10#
[28] M2_CLKREQ#9
PU VCC3 to M.2 slot
GPP_H5/SRCCLKREQ11#
GPP_H6/SRCCLKREQ12#
GPP_H7/SRCCLKREQ13#
GPP_H8/SRCCLKREQ14#
GPP_H9/SRCCLKREQ15#
PCH_H310
OB1-7B17002-I06
CLKOUT_CPUBCLK_P
CLKOUT_CPUBCLK_N
PCH_CPU_BCLK_DP [5]
PCH_CPU_BCLK_DN [5]
100M
CLKOUT_CPUNSSC_P
CLKOUT_CPUNSSC_N
PCH_CPU_NSSC_CLK_DP [5]
PCH_CPU_NSSC_CLK_DN [5]
24M
CLKOUT_CPUPCIBCLK_P
CLKOUT_CPUPCIBCLK_N
PCH_CPU_PCIE_DP [5]
PCH_CPU_PCIE_DN [5]
100M
CLKOUT_ITPXDP_P
CLKOUT_ITPXDP_N
CLKOUT_PCIE_P0 ... CLKOUT_PCIE_N15
CK_SLOT1_DP [19]
CK_SLOT1_DN [19]
CK_SLOT2_DP [20]
CK_SLOT2_DN [20]
CK_SLOT3_DP [20]
CK_SLOT3_DN [20]
CLK_LAN_DP [24]
CLK_LAN_DN [24]
CLK_M2_1_DP [28]
CLK_M2_1_DN [28]
EMI
AZ_BITCLK
C496 X_10p50N/4
PCH1D
[22] AZ_SDIN0
HDA_SDI0/I2S0_RXD
HDA_SDI1/I2S1_RXD
[18] AZ_SDOUT_R
[22] AZ_SDOUT
R549 33R/4
HDA_SDO/I2S0_TXD
[22] AZ_BITCLK
R548 33R/4 AZ_BITCLK_LR
HDA_BCLK/I2S0_SCLK
[22] AZ_RST#
R567 33R/4 AZ_RST#_R
HDA_RST#/I2S1_SCLK
[22] AZ_SYNC
R568 33R/4 AZ_SYNC_R
HDA_SYNC/I2S0_SFRM
AUDIO
[5] PCH_CPU_AUD_SDO
[5] PCH_CPU_AUD_SDI
[5] PCH_CPU_AUD_SCLK
R499 30R/4
R507 30R/4
HDACPU_SDO
HDACPU_SDI
HDACPU_SCLK
I2S1_TXD/SNDW2_DATA
I2S1_SFRM/SNDW2_CLK
Default Native F3/CNV_RF_R_ESET#.
Default Native F3/MODEM_CLKREQ.
GPP_D5/I2S2_SFRM/CNV_RF_RESET#
GPP_D6/I2S2_TXD/MODEM_CLKREQ
GPP_D7/I2S2_RXD
GPP_D8/I2S2_SCLK
GPP_D17/DMIC_CLK1/SNDW3_CLK
GPP_D18/DMIC_DATA1/SNDW3_DATA
GPP_D19/DMIC_CLK0/SNDW4_CLK
GPP_D20/DMIC_DATA0/SNDW4_DATA
PCH_H310
OB1-7B17002-I06
PORT B
GPP_I5/DDPB_CTRLCLK
GPP_I6/DDPB_CTRLDATA
GPP_I0/DDPB_HPD0/DISP_MISC0
PORT C
GPP_I7/DDPC_CTRLCLK
GPP_I8/DDPC_CTRLDATA
GPP_I1/DDPC_HPD1/DISP_MISC1
PORT D
GPP_I9/DDPD_CTRLCLK
GPP_I10/DDPD_CTRLDATA
GPP_I2/DPPD_HPD2/DISP_MISC2
PORT F
GPP_F22/DDPF_CTRLCLK
GPP_F23/DDPF_CTRLDATA
eDP
GPP_F19/EDP_VDDEN
GPP_F20/EDP_BKLTEN
GPP_F21/EDP_BKLTCTL
GPP_I4/EDP_HPD/DISP_MISC4
GPP_I3/DPPE_HPD3/DISP_MISC3
HDMI_DDPB_CTRLCLK [26]
HDMI_DDPB_CTRLDATA [26]
SMI Pin
HDMI_DDPB_HPD [26]
DVI_DDPC_CTRLCLK [25]
DVI_DDPC_CTRLDATA [25]
SMI Pin
DVI_DDPC_HPD [25]
DP_DDPD_CTRLCLK
DP_DDPD_CTRLDATA
DP_HPD [27]
GPP_F22
GPP_F23
TP213
R1954 X_2.2K/4
VCC3
Display Port F Detected.
Internal 20K pull down.
EDP_HPD
R176 100K/4
DDPE_HPD3
R160 10K/4
SMI Pin
VCC3
HDMI_DDPB_CTRLCLK R347 2.2K/4
HDMI_DDPB_CTRLDATA R349 2.2K/4
DVI_DDPC_CTRLCLK R465 2.2K/4
DVI_DDPC_CTRLDATA R462 2.2K/4
DP_DDPD_CTRLCLK R527 2.2K/4
DP_DDPD_CTRLDATA R498 2.2K/4
DDI interfaace Disable
no connect
Port B HDMI
Port C DVI,HDMI2.0 OR Others
Port D Disable
Port D DisplayPort to VGA
DP_HPD RHP2286 10K/4
Stuff H310M Gaming
unStuff H310-A Pro
Schematic Cfg
Project
CFG1-7B38-H310 (H310M GAMING PLUS) ver.1.0 V A
CFG1-7B38-H310-APRO (H310-A Pro) ver.2.0 X B
CFG1-7B38-H310 (H310-A GAMING ARCTIC) ver.3.0 V C
MSI
MICRO-STAR INT'L CO.,LTD
MS-7B28
Size Custom
Document Description
PCH-Audio/Display/Clock
Rev 10/20/30
Date: Tuesday, December 12, 2017
Sheet 13 of 53



	GPP_I12	GPP_I13	GPP_I14
H310_GPLUS	0	0	0
H310_APRO	0	0	1
H310_GARCTIC	0	1	0

MICRO-STAR INT'L CO.,LTD

MS-7B28

Size	Document Description	Rev
Custom	PCH-GPIO/USBOC#/SATASTRAP	10/20/30

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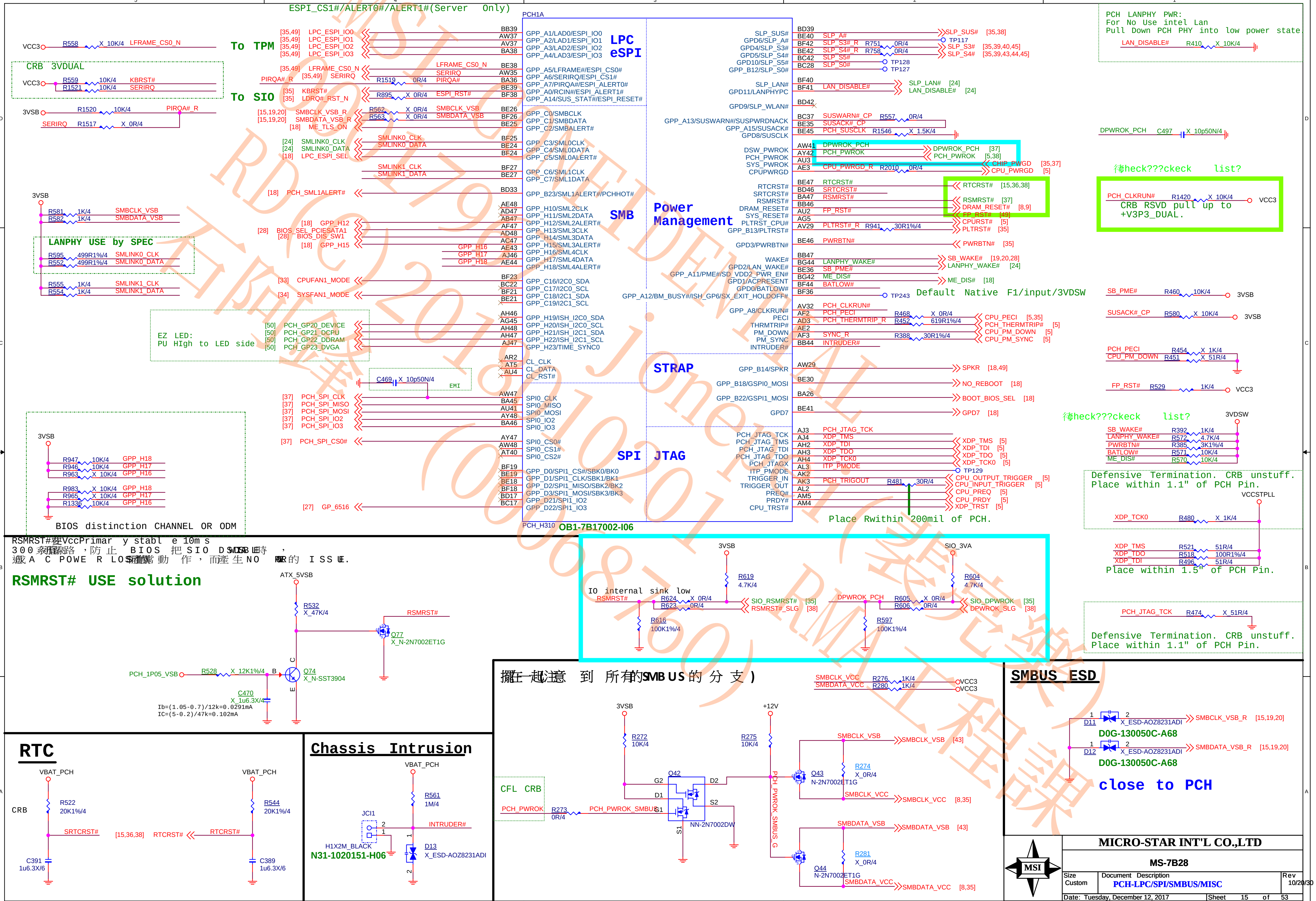


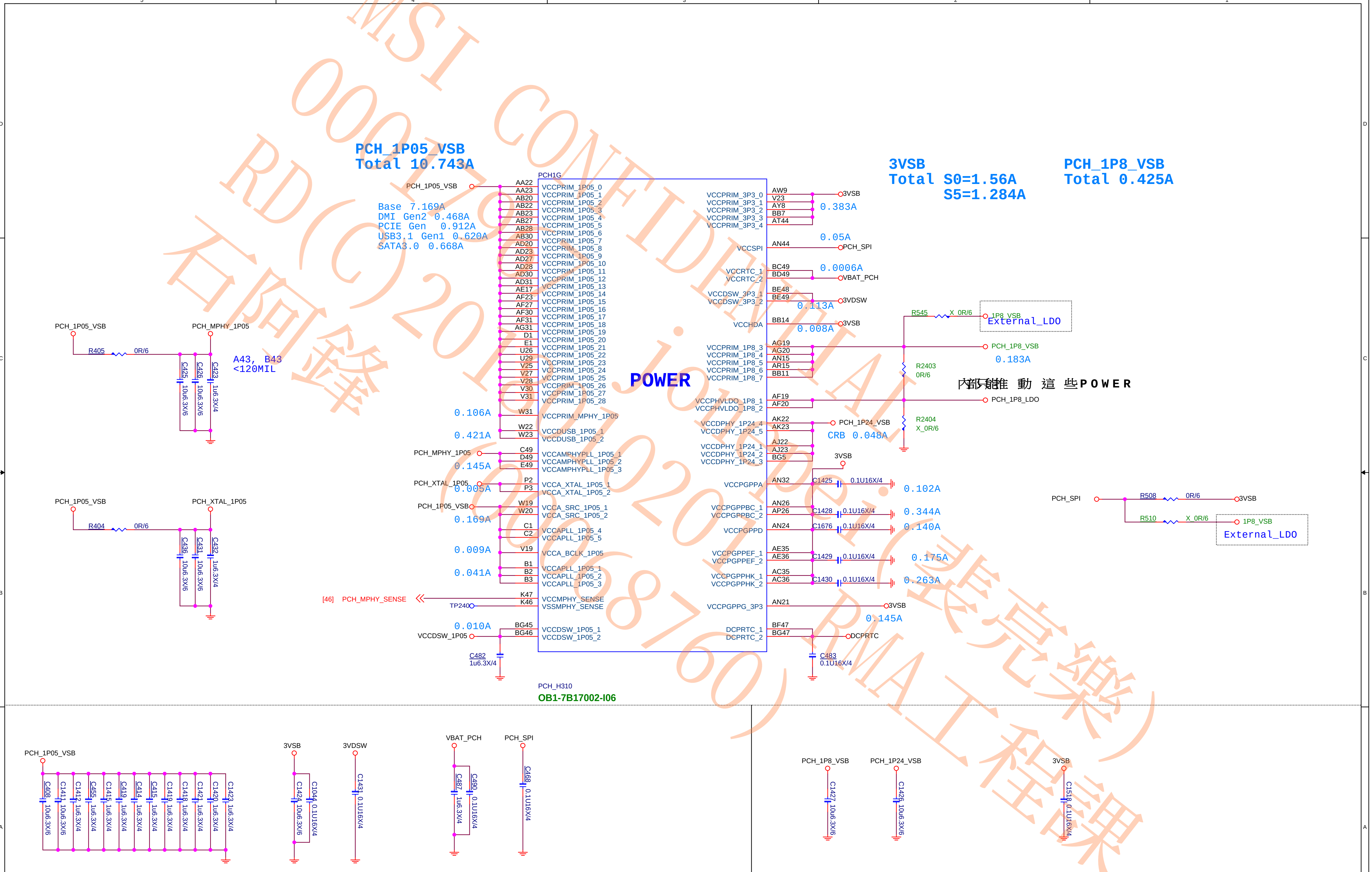
ESPI_CS1#/ALERT0#/ALERT1#(Server Only)
PCH1A
To TPM
CRB 3VDUAL
To SIO
LPC
eSPI
SMB
Power Management
STRAP
SPI
JTAG
PCH LANPHY PWR:
For No Use intel Lan
Pull Down PCH PHY into low power state
LANPHY USE by SPEC
EZ LED:
PU HIgh to LED side
BIOS distinction CHANNEL OR ODM
CRB RSVD pull up to +V3P3_DUAL.
Default Native F1/input/3VDSW
Defensive Termination. CRB unstuff.
Place within 1.1" of PCH Pin.
Place within 1.5" of PCH Pin.
Place Rwithin 200mil of PCH.
PCH_H310
OB1-7B17002-I06
IO internal sink low
RSMRST# USE solution
Ib=(1.05-0.7)/12k=0.0291mA
IC=(5-0.2)/47k=0.102mA
RTC
CRB
Chassis Intrusion
N31-1020151-H06
CFL CRB
SMBUS ESD
D0G-130050C-A68
close to PCH

MICRO-STAR INT'L CO.,LTD

MS-7B28

Size: Custom
Document Description: PCH-LPC/SPI/SMBUS/MISC
Rev: 10/20/30

Date: Tuesday, December 12, 2017 | Sheet 15 of 53


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
3VSB
Total S0=1.56A
S5=1.284A
PCH_1P8_VSB
Total 0.425A
PCH1G
POWER
VCCPRIM_1P05_0
VCCPRIM_MPHY_1P05
VCCDUSB_1P05_1
VCCDUSB_1P05_2
VCCAMPHYPLL_1P05_1
VCCA_XTAL_1P05_1
VCCA_SRC_1P05_1
VCCAPLL_1P05_4
VCCA_BCLK_1P05
VCCAPLL_1P05_1
VCCMPHY_SENSE
VSSMPHY_SENSE
VCCDSW_1P05_1
VCCDSW_1P05_2
VCCPRIM_3P3_0
VCCSPI
VCCRTC_1
VCCRTC_2
VCCDSW_3P3_1
VCCHDA
VCCPRIM_1P8_3
VCCPHVLDO_1P8_1
VCCDPHY_1P24_4
VCCGPPA
VCCPGPPBC_1
VCCPGPPD
VCCPGPPEF_1
VCCPGPPHK_1
VCCPGPPG_3P3
DCPRTC_1
DCPRTC_2
0.383A
0.05A
0.0006A
0.113A
0.008A
0.183A
CRB 0.048A
0.102A
0.344A
0.140A
0.175A
0.263A
0.145A
0.106A
0.421A
0.145A
0.005A
0.169A
0.009A
0.041A
0.010A
A43, B43
<120MIL
External_LDO
PCH_1P8_LDO
PCH_1P24_VSB
PCH_MPHY_1P05
PCH_XTAL_1P05
PCH_MPHY_SENSE
VCCDSW_1P05
VBAT_PCH
3VDSW
PCH_SPI
DCPRTC
R405 0R/6
R404 0R/6
R545 X_0R/6
R2403 0R/6
R2404 X_0R/6
R508 0R/6
R510 X_0R/6
PCH_H310
OB1-7B17002-I06

MICRO-STAR INT'L CO.,LTD

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Size: Custom | Document Description: PCH-Power | Rev: 10/20/30

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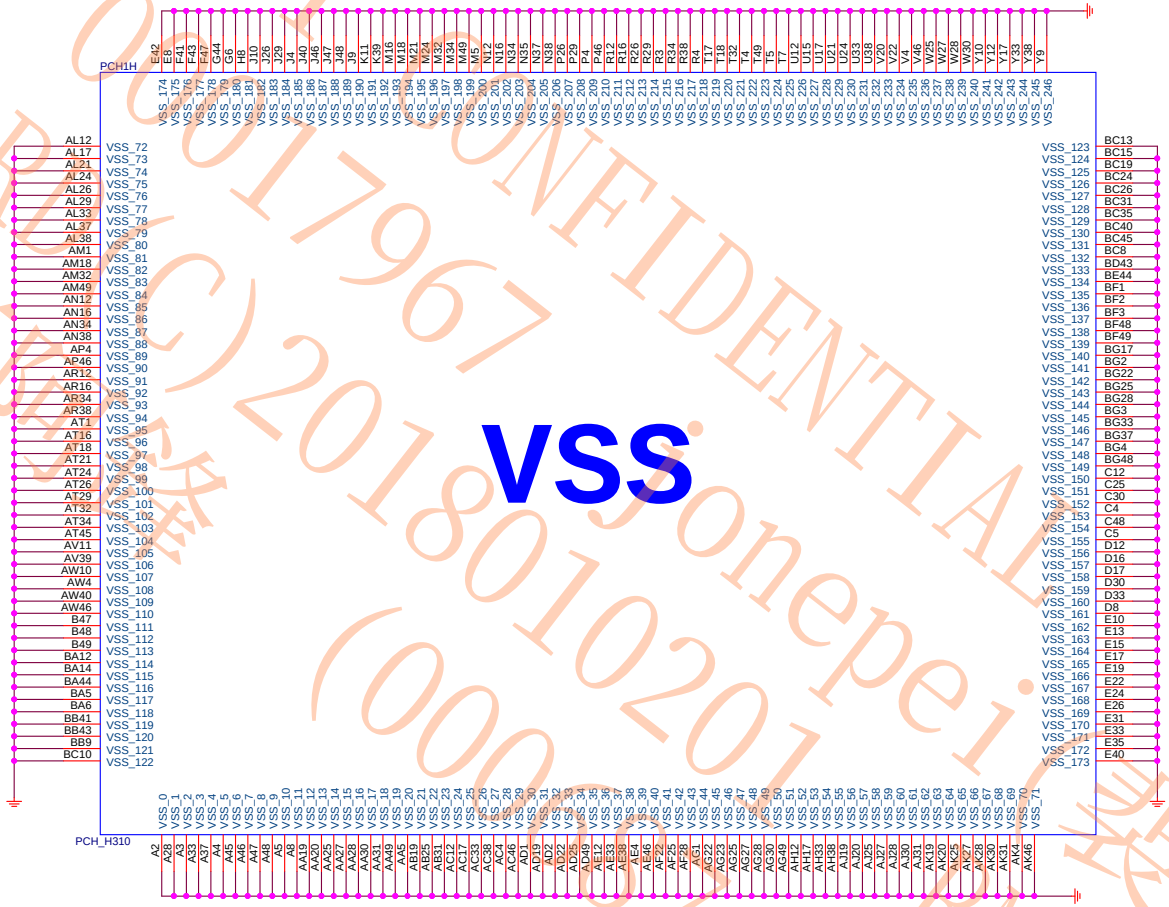

OB1-7B17002-I06

MICRO-STAR INT'L CO.,LTD			
MS-7B28			
Size: Custom	Document Description: PCH-GND		Rev: 10/20/30
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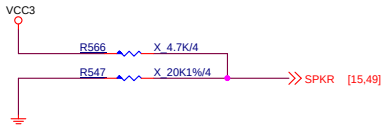
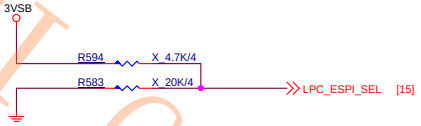
TOP Swap



Internal pull-down 20K is disabled after PLTRST#

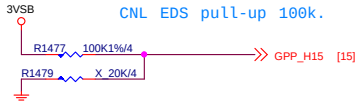
LPC eSPI Mode



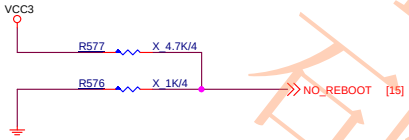
0 : LPC
1 : eSPI

Internal pull-down 20K is disabled after RSMRST

Reserved



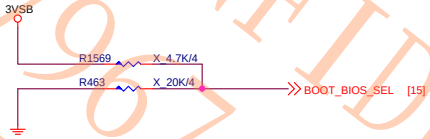
No Reboot



0 : DISABLE (Default)
1 : ENABLE

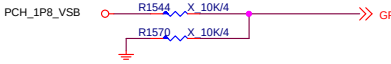
Internal pull-down 20K is disabled after PLTRST#

Boot BIOS



0 : SPI
1 : LPC

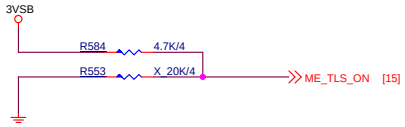
Internal pull-down 20K is disabled after PLTRST



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

AMT and SBA with confidentiality

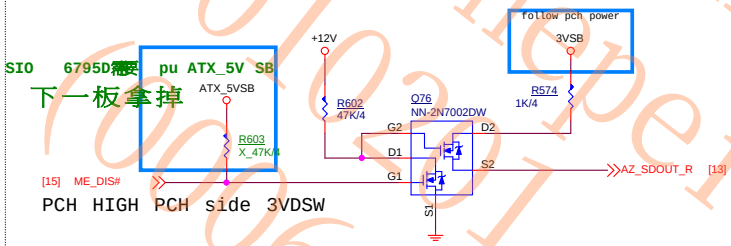


0 : DISABLE
1 : ENABLE (Default)

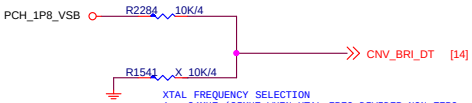
Internal pull-down 20K is disabled after RSMRST

HDA_SDO

ME flash by GPIO

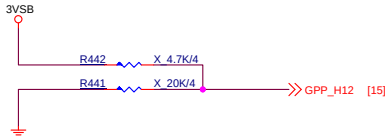


PCH HIGH PCH side 3VDSW



XTAL FREQUENCY SELECTION
1 = 24MHZ (25MHZ WHEN XTAL FREQ DIVIDER NON ZERO
0 = 38.4/19.2MHZ

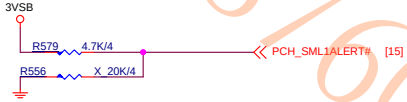
ESPI FLASH SHARING MODE

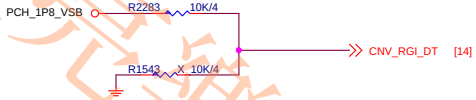


0 : MASTER ATTACHED FLASH SHARING
1 : SLAVE ATTACHED FLASH SHARING

Internal pull-down 20K is disabled after RSMRST

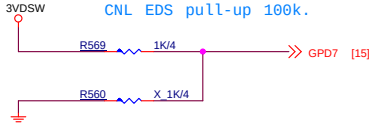
Reserved





CNL EDS
1 = Integrated CNVi enable
0 = Integrated CNVi disable

Reserved



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

MICRO-STAR INT'L CO.,LTD		
MS-7B28		
Size: Custom	Document Description: PCH-Strap	Rev: 10/20/30
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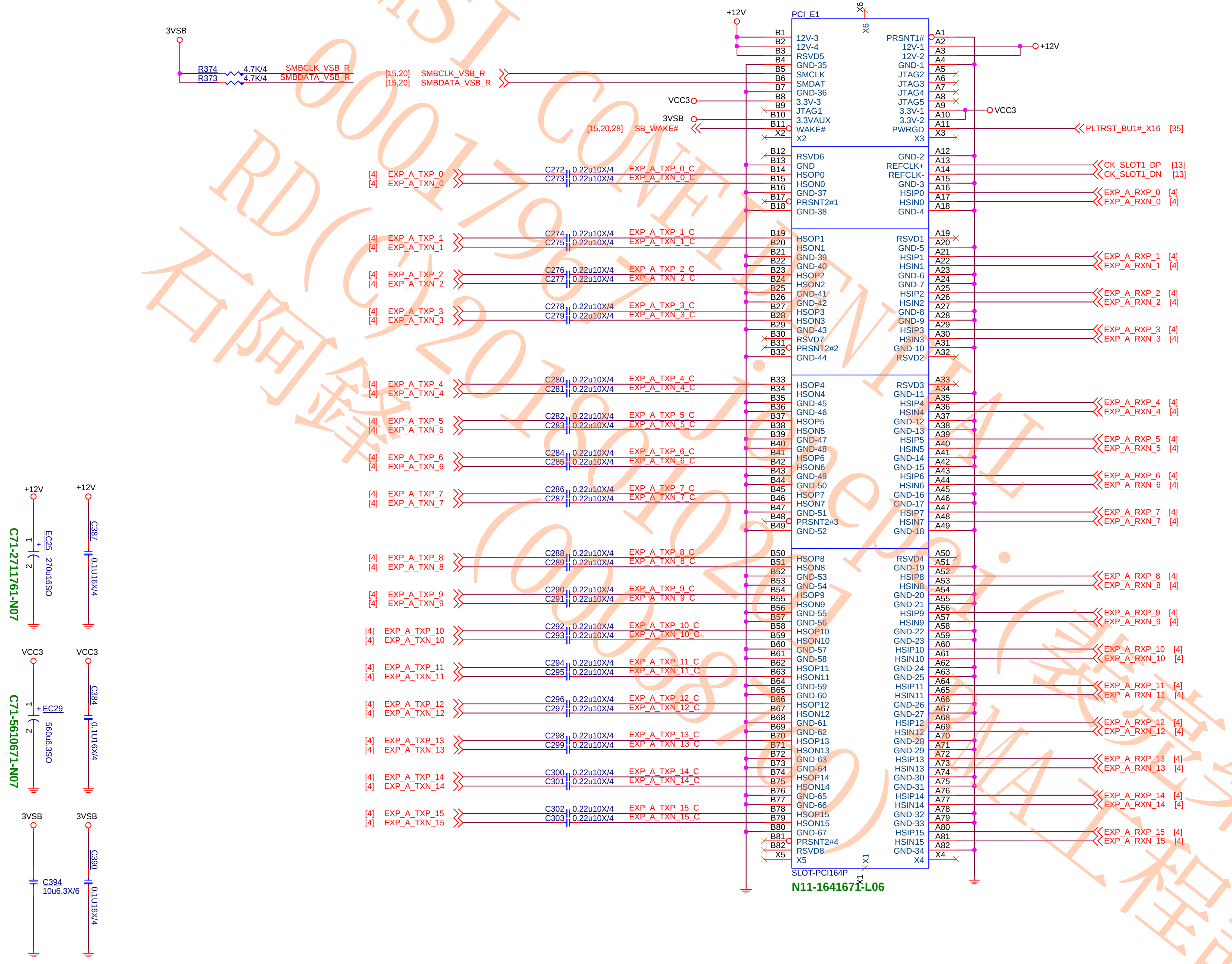
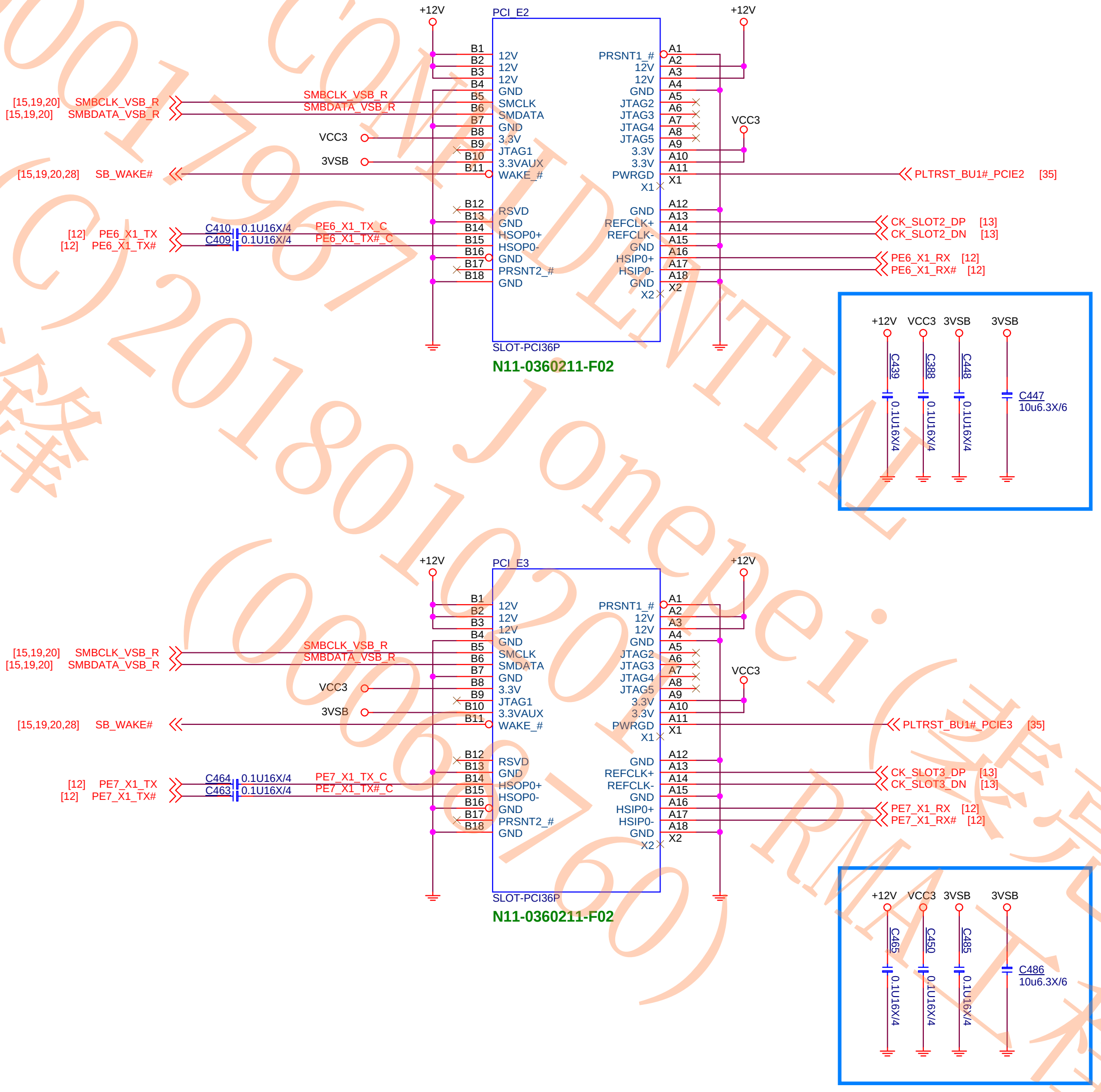


MICRO-STAR INT'L CO.,LTD

MS-7B28

Size	Document Description	Rev
Custom	PCIE SLOT-CPU(X16)	10/20/30

Date: Tuesday, December 12, 2017 Sheet 19 of 53



MICRO-STAR INT'L CO.,LTD

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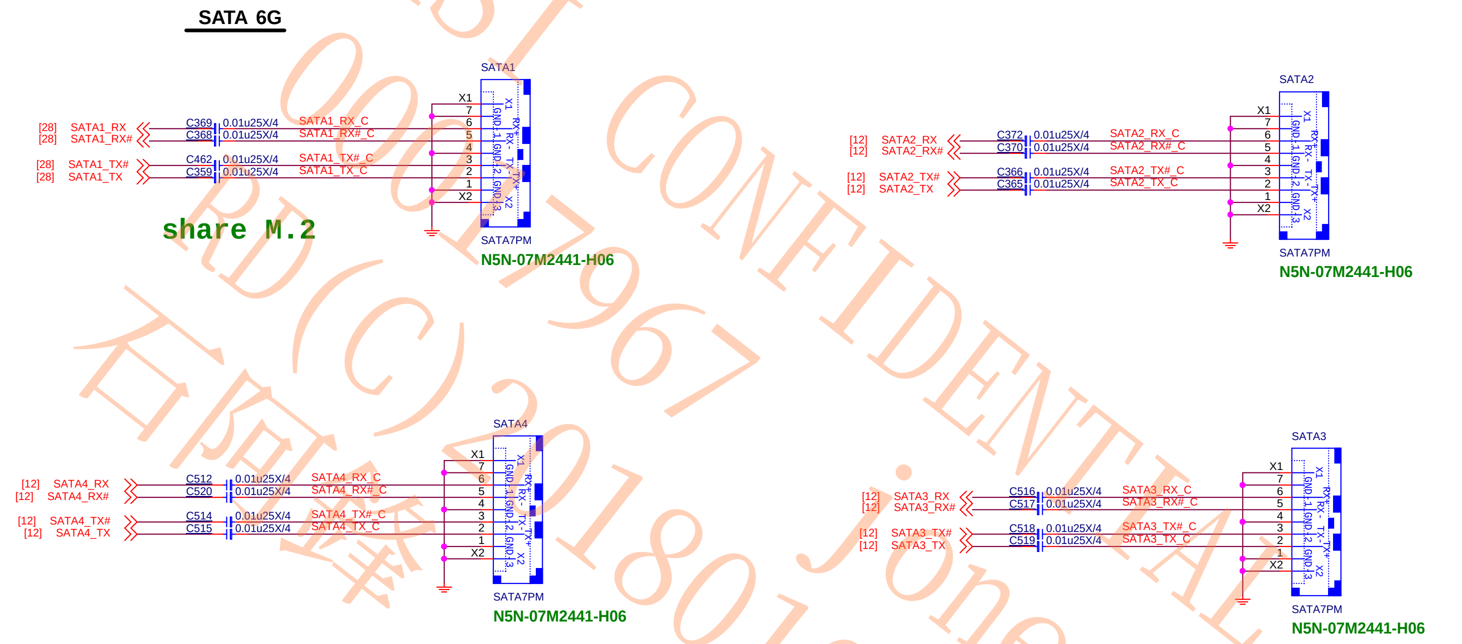
Size	Document Description	Rev
Custom	PCIE SLOT-PCH(X1)	10/20/30

Date: Tuesday, December 12, 2017 Sheet 20 of 53



MICRO-STAR INT'L CO.,LTD

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Size	Document Description	Rev
Custom	SATA connector	10/20/30

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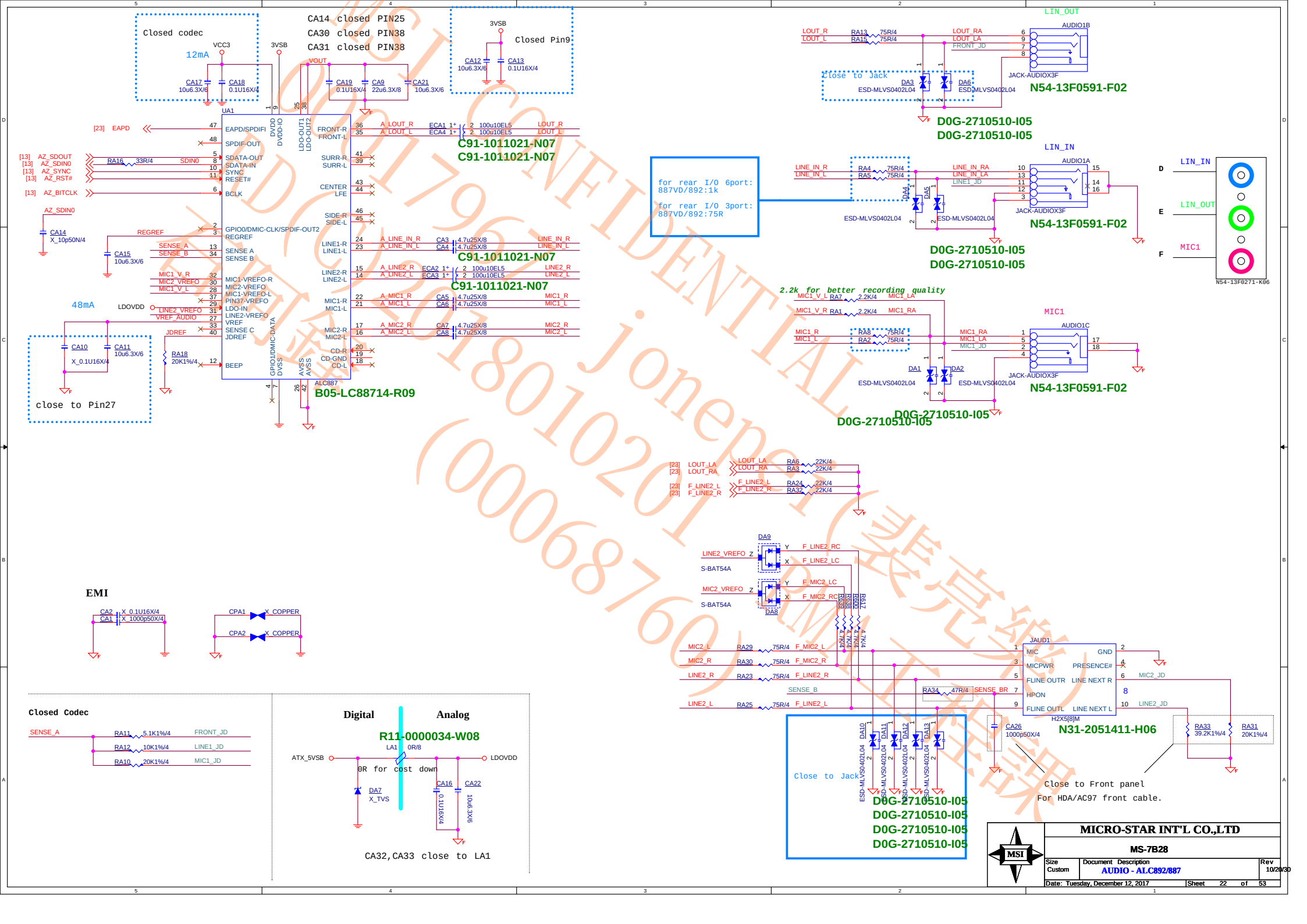
Closed codec
12mA
VCC3
3VSB
CA17 10u6.3X/6
CA18 0.1U16X/4
CA14 closed PIN25
CA30 closed PIN38
CA31 closed PIN38
Closed Pin9
CA12 10u6.3X/6
CA13 0.1U16X/4
VOUT
CA19 0.1U16X/4
CA9 22u6.3X/8
CA21 10u6.3X/6
UA1
EAPD/SPDIFI
SPDIF-OUT
SDATA-OUT
SDATA-IN
SYNC
RESET#
BCLK
GPIO0/DMIC-CLK/SPDIF-OUT2
REGREF
SENSE A
SENSE B
MIC1-VREFO-R
MIC2-VREFO
MIC1-VREFO-L
PIN37-VREFO
LDO-IN
LINE2-VREFO
VREF
SENSE C
JDREF
BEEP
GPIO1/DMIC-DATA
LDO-OUT1
LDO-OUT2
DVDD
DVDD-IO
AVSS
DVSS
FRONT-R
FRONT-L
SURR-R
SURR-L
CENTER
LFE
SIDE-R
SIDE-L
LINE1-R
LINE1-L
LINE2-R
LINE2-L
MIC1-R
MIC1-L
MIC2-R
MIC2-L
CD-R
CD-GND
CD-L
ALC887
B05-LC88714-R09
C91-1011021-N07
C91-1011021-N07
C91-1011021-N07
C91-1011021-N07
close to Pin27
48mA
LDOVDD
EMI
CA2 X_0.1U16X/4
CA1 X_1000p50X/4
CPA1 X_COPPER
CPA2 X_COPPER
Closed Codec
SENSE_A
RA11 5.1K1%/4 FRONT_JD
RA12 10K1%/4 LINE1_JD
RA10 20K1%/4 MIC1_JD
Digital
Analog
R11-0000034-W08
LA1 0R/8
ATX_5VSB
LDOVDD
0R for cost down
DA7 X_TVS
CA16 0.1U16X/4
CA22 10u6.3X/6
CA32,CA33 close to LA1
LIN_OUT
LOUT_R
LOUT_L
RA13 75R/4
RA15 75R/4
LOUT_RA
LOUT_LA
FRONT_JD
AUDIO1B
JACK-AUDIOX3F
Close to Jack
DA3 ESD-MLVS0402L04
DA6 ESD-MLVS0402L04
N54-13F0591-F02
D0G-2710510-I05
D0G-2710510-I05
LIN_IN
for rear I/O 6port: 887VD/892:1k
for rear I/O 3port: 887VD/892:75R
LINE_IN_R
LINE_IN_L
RA4 75R/4
RA5 75R/4
LINE_IN_RA
LINE_IN_LA
LINE1_JD
AUDIO1A
DA4
DA5
ESD-MLVS0402L04
JACK-AUDIOX3F
N54-13F0591-F02
D0G-2710510-I05
D0G-2710510-I05
D LIN_IN
E LIN_OUT
F MIC1
N54-13F0271-K06
2.2k for better recording quality
MIC1_V_L
MIC1_V_R
RA7 2.2K/4
RA1 2.2K/4
MIC1_LA
MIC1_RA
MIC1_R
MIC1_L
RA8 75R/4
RA2 75R/4
MIC1_JD
AUDIO1C
DA1
DA2
ESD-MLVS0402L04
JACK-AUDIOX3F
N54-13F0591-F02
D0G-2710510-I05
LOUT_LA
LOUT_RA
F_LINE2_L
F_LINE2_R
RA6 22K/4
RA3 22K/4
RA24 22K/4
RA32 22K/4
DA9
DA8
S-BAT54A
LINE2_VREFO
MIC2_VREFO
F_LINE2_RC
F_LINE2_LC
F_MIC2_LC
F_MIC2_RC
RA28 RA26 RA27 RA29
MIC2_L
MIC2_R
LINE2_R
LINE2_L
SENSE_B
RA29 75R/4 F_MIC2_L
RA30 75R/4 F_MIC2_R
RA23 75R/4 F_LINE2_R
RA25 75R/4 F_LINE2_L
RA34 47R/4 SENSE_BR
JAUD1
MIC
MICPWR
FLINE OUTR
HPON
FLINE OUTL
GND
PRESENCE#
LINE NEXT R
LINE NEXT L
H2X5[8]M
N31-2051411-H06
MIC2_JD
LINE2_JD
CA26 1000p50X/4
RA33 39.2K1%/4
RA31 20K1%/4
Close to Front panel
For HDA/AC97 front cable.
Close to Jack
DA10 DA11 DA12 DA13
ESD-MLVS0402L04
D0G-2710510-I05
D0G-2710510-I05
D0G-2710510-I05
D0G-2710510-I05
MICRO-STAR INT'L CO.,LTD
MS-7B28
Size Custom
Document Description
AUDIO - ALC892/887
Rev 10/20/30
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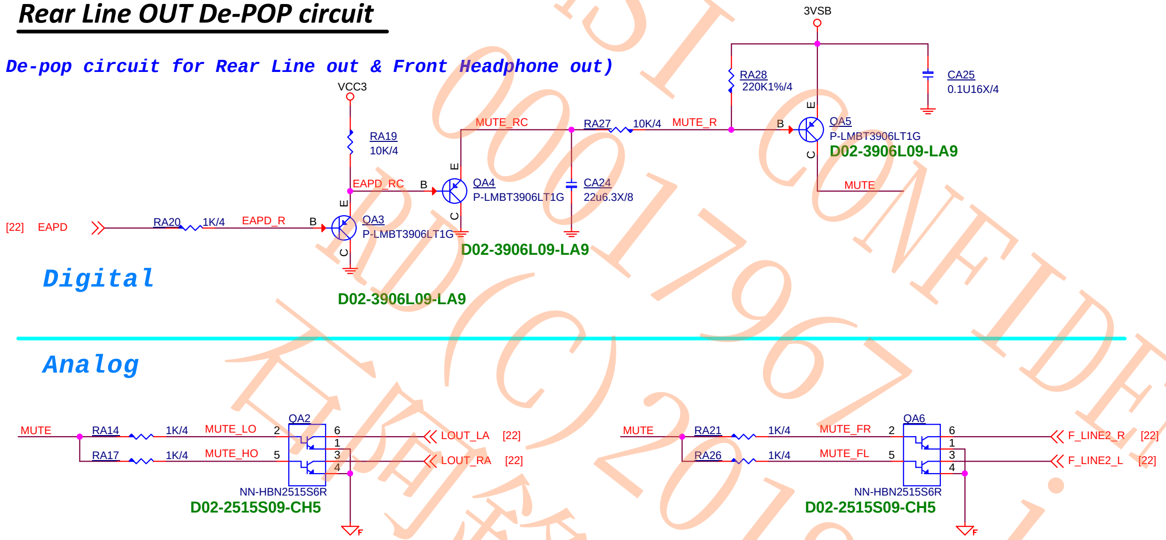
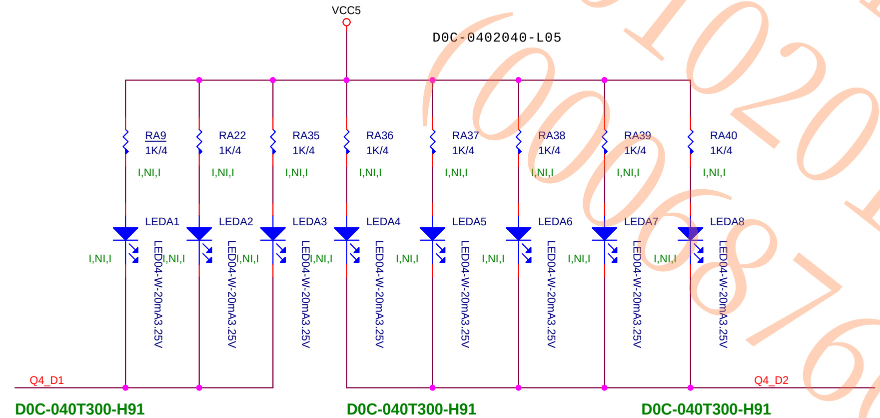
Rear Line OUT De-POP circuit

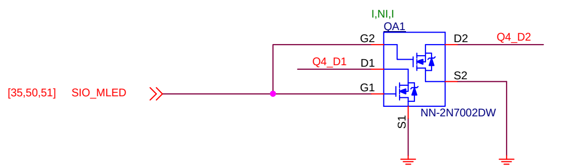
De-pop circuit for Rear Line out & Front Headphone out)



Audio moat is transparent and width 40mil

Audio LED





Schematic Cfg	Project	
CFG1-7B38-H310 (H310M GAMING PLUS) ver.1.0	V	A
CFG1-7B38-H310-APRO (H310-A Pro) ver.2.0	X	B
CFG1-7B38-H310 (H310-A GAMING ARCTIC) ver.3.0	V	C

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Size: Custom | Document Description: AUDIO - depop circuit | Rev: 10/20/30

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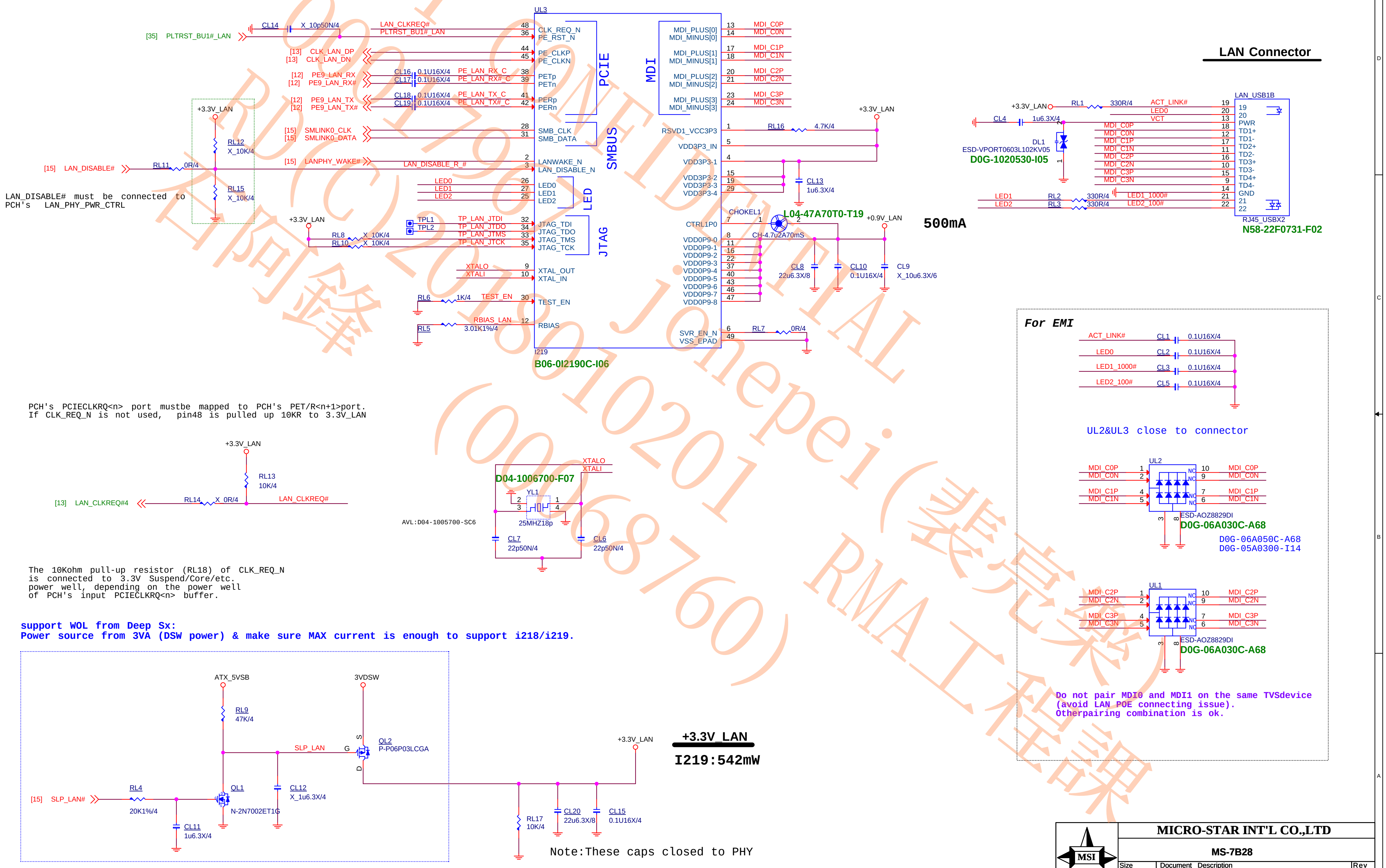
Intel Lan- I219



UL3
CLK_REQ_N
PE_RST_N
PE_CLKP
PE_CLKN
PETp
PETn
PERp
PERn
PCIE
MDI
MDI_PLUS[0]
MDI_MINUS[0]
MDI_PLUS[1]
MDI_MINUS[1]
MDI_PLUS[2]
MDI_MINUS[2]
MDI_PLUS[3]
MDI_MINUS[3]
SMB_CLK
SMB_DATA
SMBUS
LANWAKE_N
LAN_DISABLE_N
LED0
LED1
LED2
LED
JTAG_TDI
JTAG_TDO
JTAG_TMS
JTAG_TCK
JTAG
XTAL_OUT
XTAL_IN
TEST_EN
RBIAS
RSVD1_VCC3P3
VDD3P3_IN
VDD3P3-1
VDD3P3-2
VDD3P3-3
VDD3P3-4
CTRL1P0
VDD0P9-0
VDD0P9-1
VDD0P9-2
VDD0P9-3
VDD0P9-4
VDD0P9-5
VDD0P9-6
VDD0P9-7
VDD0P9-8
SVR_EN_N
VSS_EPAD
I219
B06-0I2190C-I06
[35] PLTRST_BU1#_LAN
CL14 X_10p50N/4
LAN_CLKREQ#
PLTRST_BU1#_LAN
[13] CLK_LAN_DP
[13] CLK_LAN_DN
[12] PE9_LAN_RX
[12] PE9_LAN_RX#
CL16 0.1U16X/4 PE_LAN_RX_C
CL17 0.1U16X/4 PE_LAN_RX#_C
[12] PE9_LAN_TX
[12] PE9_LAN_TX#
CL18 0.1U16X/4 PE_LAN_TX_C
CL19 0.1U16X/4 PE_LAN_TX#_C
[15] SMLINK0_CLK
[15] SMLINK0_DATA
[15] LANPHY_WAKE#
LAN_DISABLE_R_#
+3.3V_LAN
RL12 X_10K/4
RL15 X_10K/4
[15] LAN_DISABLE#
RL11 0R/4
LAN_DISABLE# must be connected to PCH's LAN_PHY_PWR_CTRL
TPL1
TPL2
TP_LAN_JTDI
TP_LAN_JTDO
TP_LAN_JTMS
TP_LAN_JTCK
RL8 X_10K/4
RL10 X_10K/4
XTALO
XTALI
RL6 1K/4 TEST_EN
RL5 3.01K1%/4 RBIAS_LAN
MDI_C0P
MDI_C0N
MDI_C1P
MDI_C1N
MDI_C2P
MDI_C2N
MDI_C3P
MDI_C3N
RL16 4.7K/4
CL13 1u6.3X/4
CHOKEL1
L04-47A70T0-T19
CH-4.7u2A70mS
+0.9V_LAN
500mA
CL8 22u6.3X/8
CL10 0.1U16X/4
CL9 X_10u6.3X/6
RL7 0R/4
LAN Connector
LAN_USB1B
+3.3V_LAN RL1 330R/4 ACT_LINK#
LED0
VCT
CL4 1u6.3X/4
DL1
ESD-VPORT0603L102KV05
D0G-1020530-I05
PWR
TD1+
TD1-
TD2+
TD2-
TD3+
TD3-
TD4+
TD4-
GND
LED1 RL2 330R/4 LED1_1000#
LED2 RL3 330R/4 LED2_100#
RJ45_USBX2
N58-22F0731-F02
For EMI
ACT_LINK# CL1 0.1U16X/4
LED0 CL2 0.1U16X/4
LED1_1000# CL3 0.1U16X/4
LED2_100# CL5 0.1U16X/4
UL2&UL3 close to connector
UL2
ESD-AOZ8829DI
D0G-06A030C-A68
D0G-06A050C-A68
D0G-05A0300-I14
UL1
ESD-AOZ8829DI
D0G-06A030C-A68
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
RL13 10K/4
[13] LAN_CLKREQ#4
RL14 X_0R/4
LAN_CLKREQ#
D04-1006700-F07
YL1
25MHZ18p
CL7 22p50N/4
CL6 22p50N/4
AVL:D04-1005700-SC6
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.
ATX_5VSB
3VDSW
RL9 47K/4
SLP_LAN
QL2
P-P06P03LCGA
[15] SLP_LAN#
RL4 20K1%/4
QL1
N-2N7002ET1G
CL12 X_1u6.3X/4
CL11 1u6.3X/4
RL17 10K/4
CL20 22u6.3X/8
CL15 0.1U16X/4
+3.3V_LAN
I219:542mW
Note:These caps closed to PHY

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Custom	LAN - I219	10/20/30

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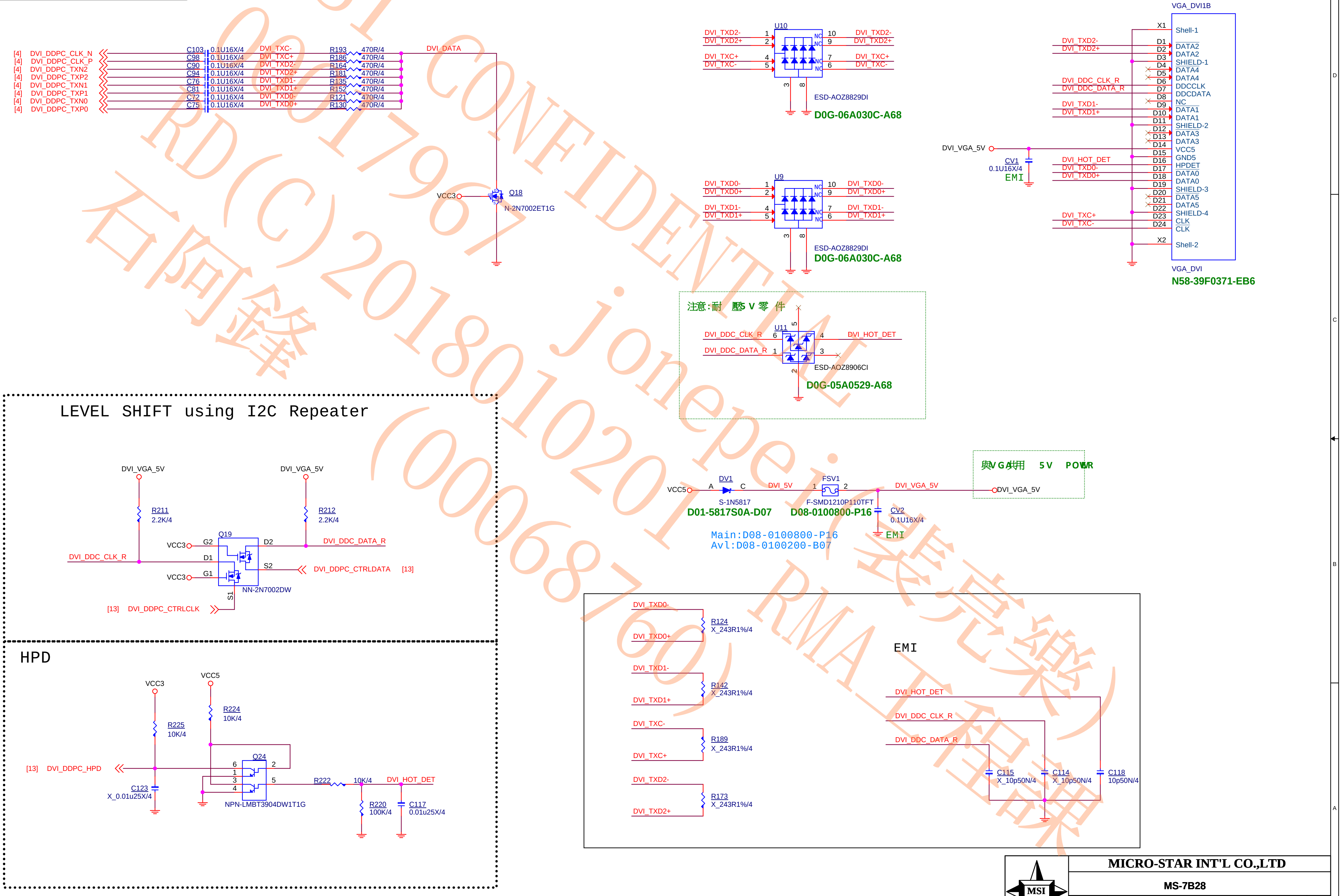
DVI level shifter

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



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Size: Custom | Document Description: DVI | Rev: 10/20/30

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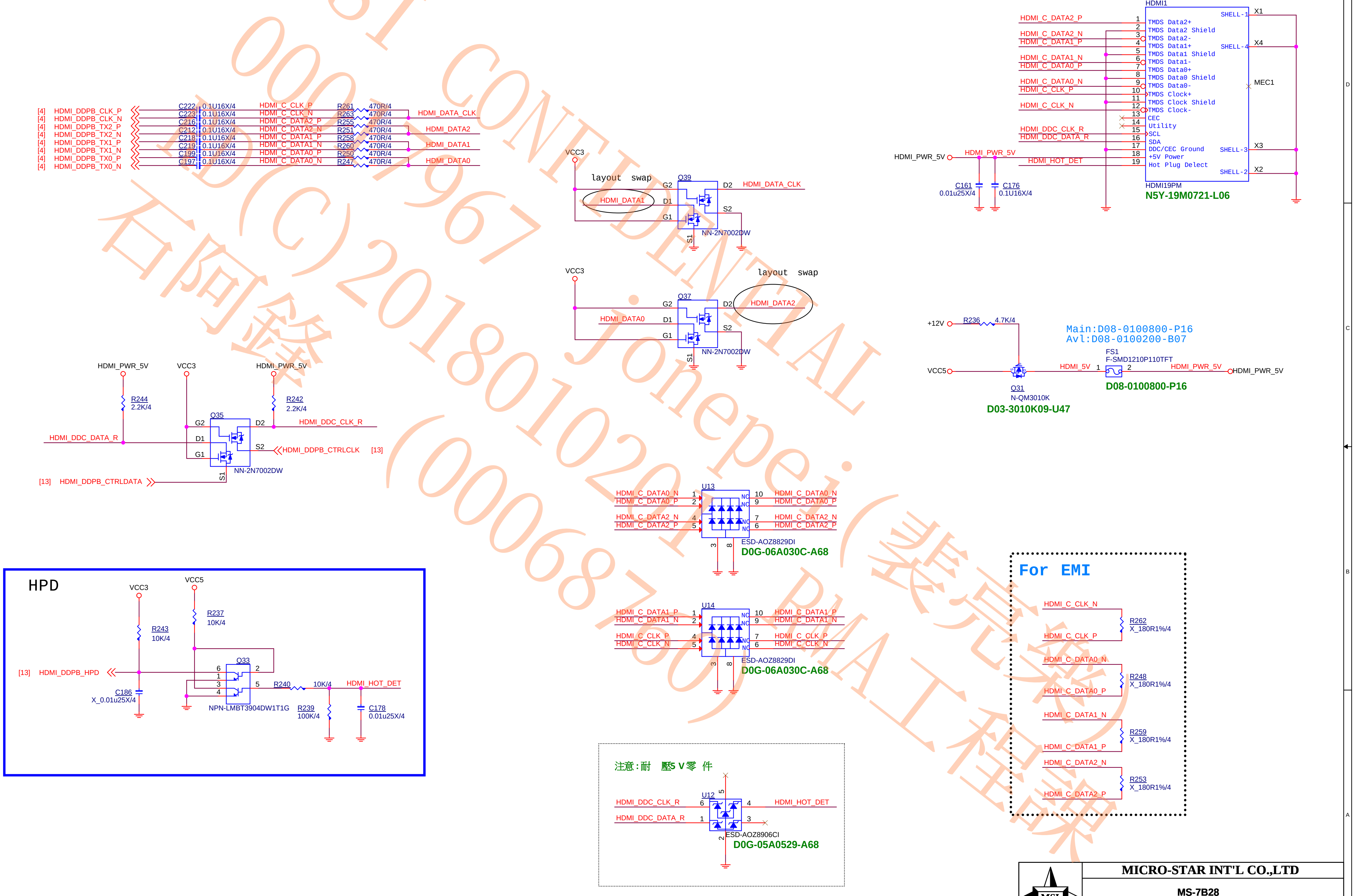
HDMI, DVI : 1920x1200 at 60 Hz (16:10 WUXGA)



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Size: Custom | Document Description: HDMI Connector | Rev: 10/20/30

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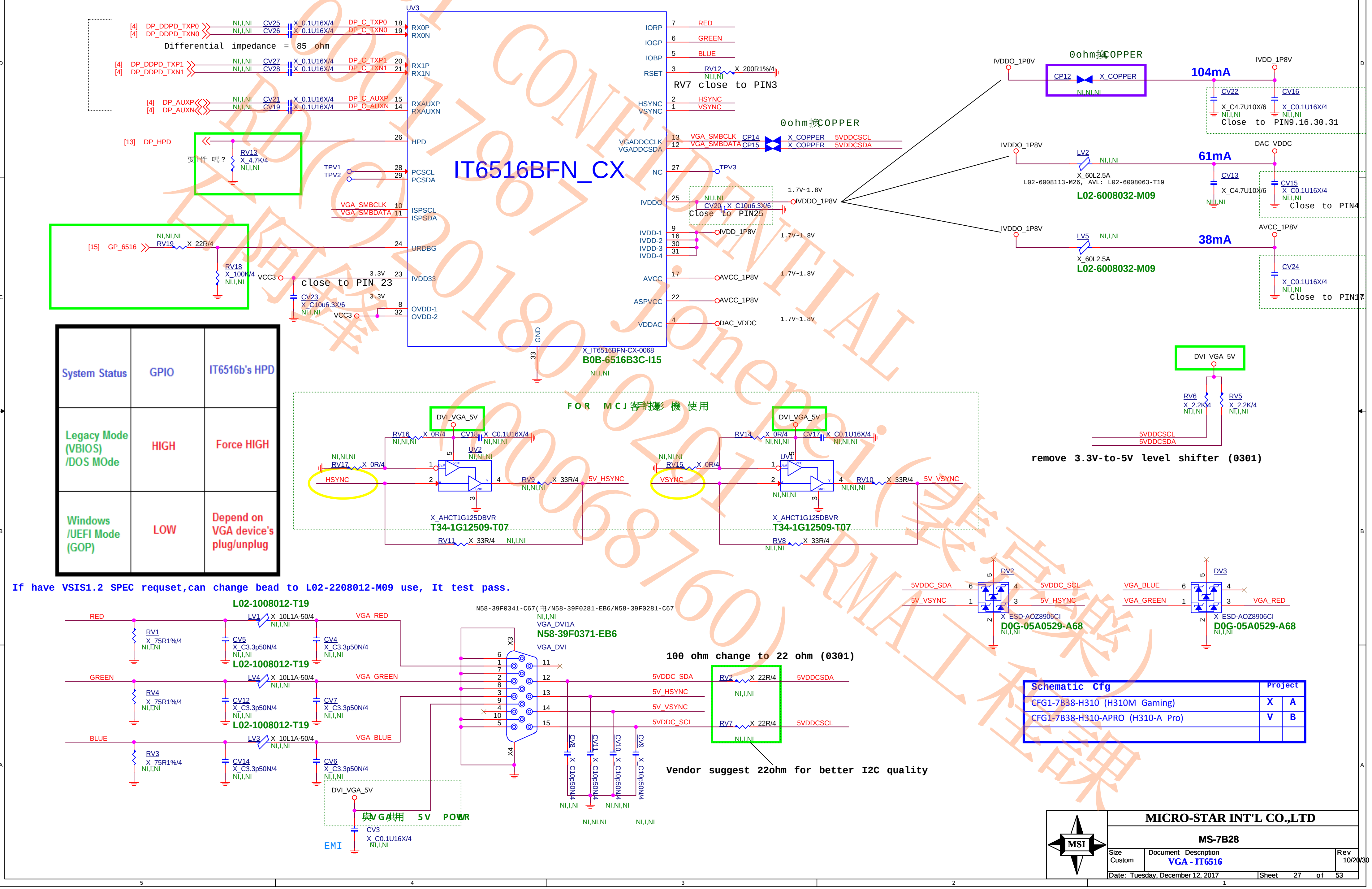
Note:
If connect to eDP port,must confirm whether it support hot plug detection HPD and re-auxtraining



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

If have VSIS1.2 SPEC requset,can change bead to L02-2208012-M09 use, It test pass.

Schematic Cfg	Project	
CFG1-7B38-H310 (H310M Gaming)	X	A
CFG1-7B38-H310-APRO (H310-A Pro)	V	B

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Size: Custom
Document Description: VGA - IT6516
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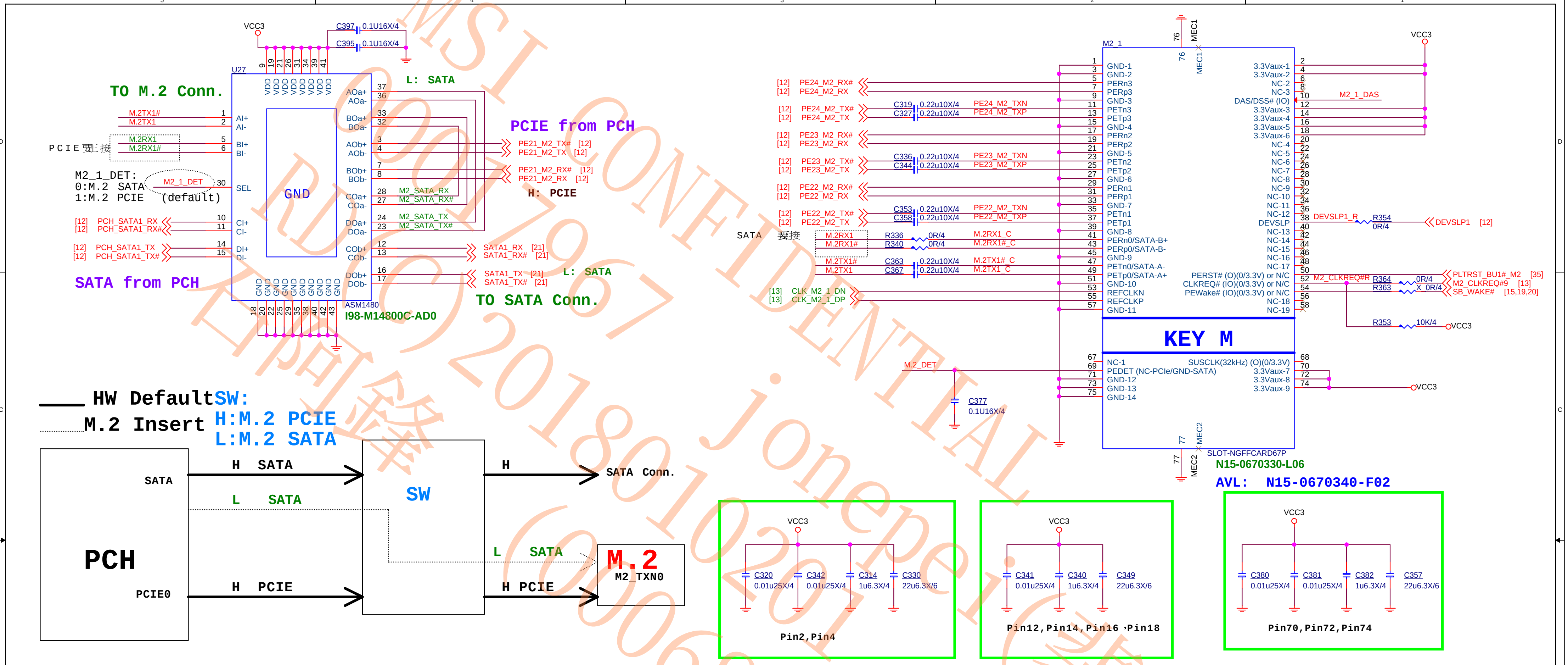

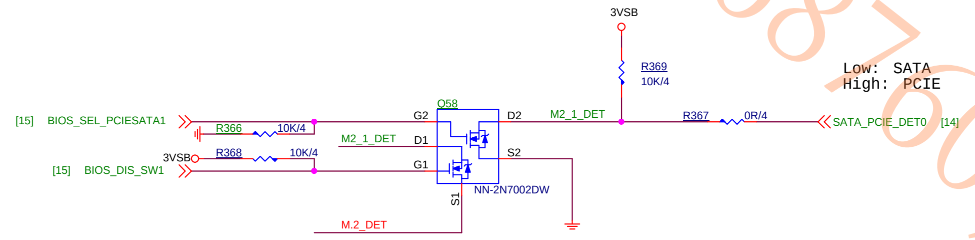

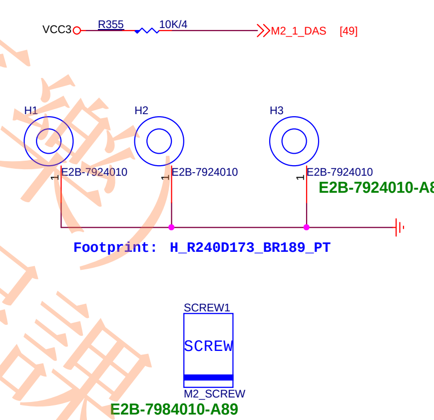

GPP_H14	GPP_H13	BIOS_MODE
BIOS_DIS_SW1	BIOS_SEL_PCIESATA1	Mode
0	1	M2-SATA
0	0	M2-PCIE
GPI	GPI	AUTO

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Custom	M.2-SLOT1	10/20/30

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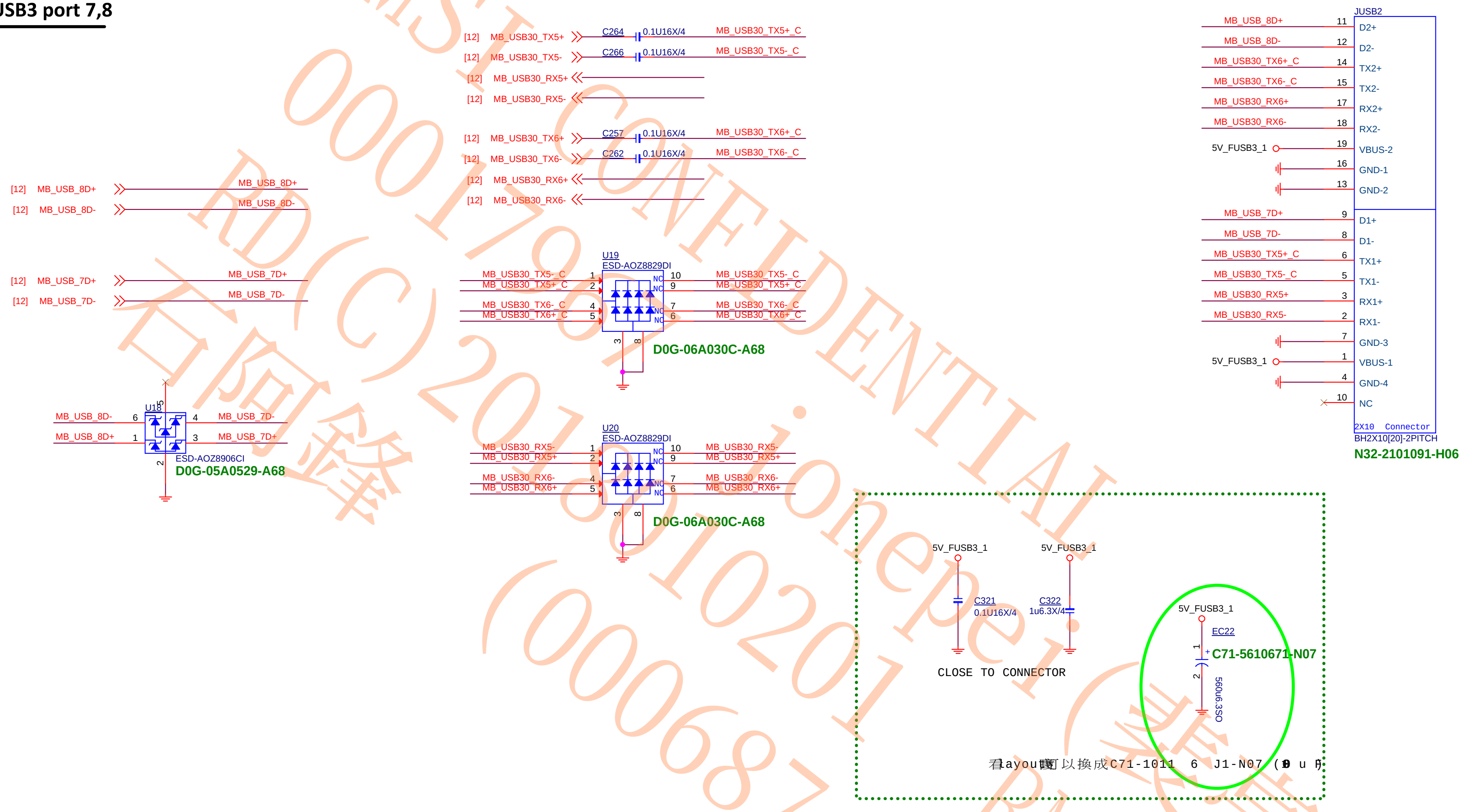
Front JUSB3 port 7,8



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Size	Document Description	Rev
Custom	Front USB3.0 Connector	10/20/30

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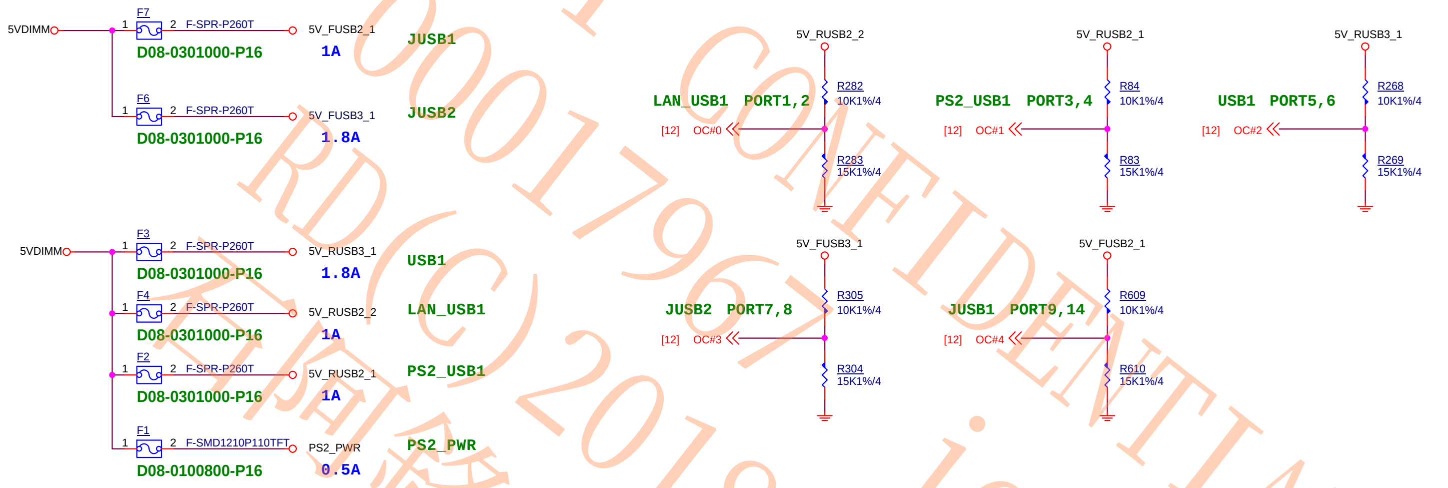
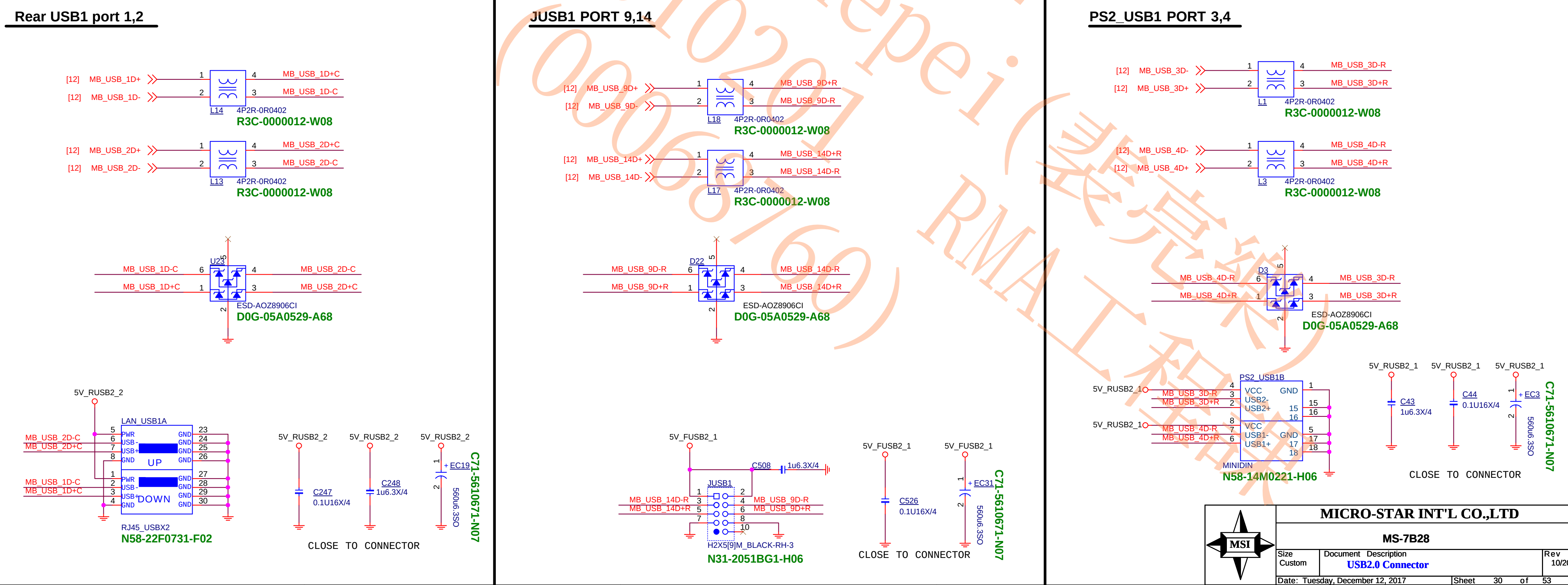


USB CONN	USB POWER	PCH PORT	OC# SIGNAL
LAN_USB1	5V_RUSB2_2	Port1,2	OC#0
PS2_USB1	5V_RUSB2_1	Port3,4	OC#1
USB1	5V_RUSB3_1	Port5,6	OC#2
JUSB2	5V_FUSB3_1	Port7,8	OC#3
JUSB1	5V_FUSB2_1	Port9,14	OC#4

Rear USB1 port 1,2

JUSB1 PORT 9,14

PS2_USB1 PORT 3,4



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Size	Document Description	Rev
Custom	USB2.0 Connector	10/20/30

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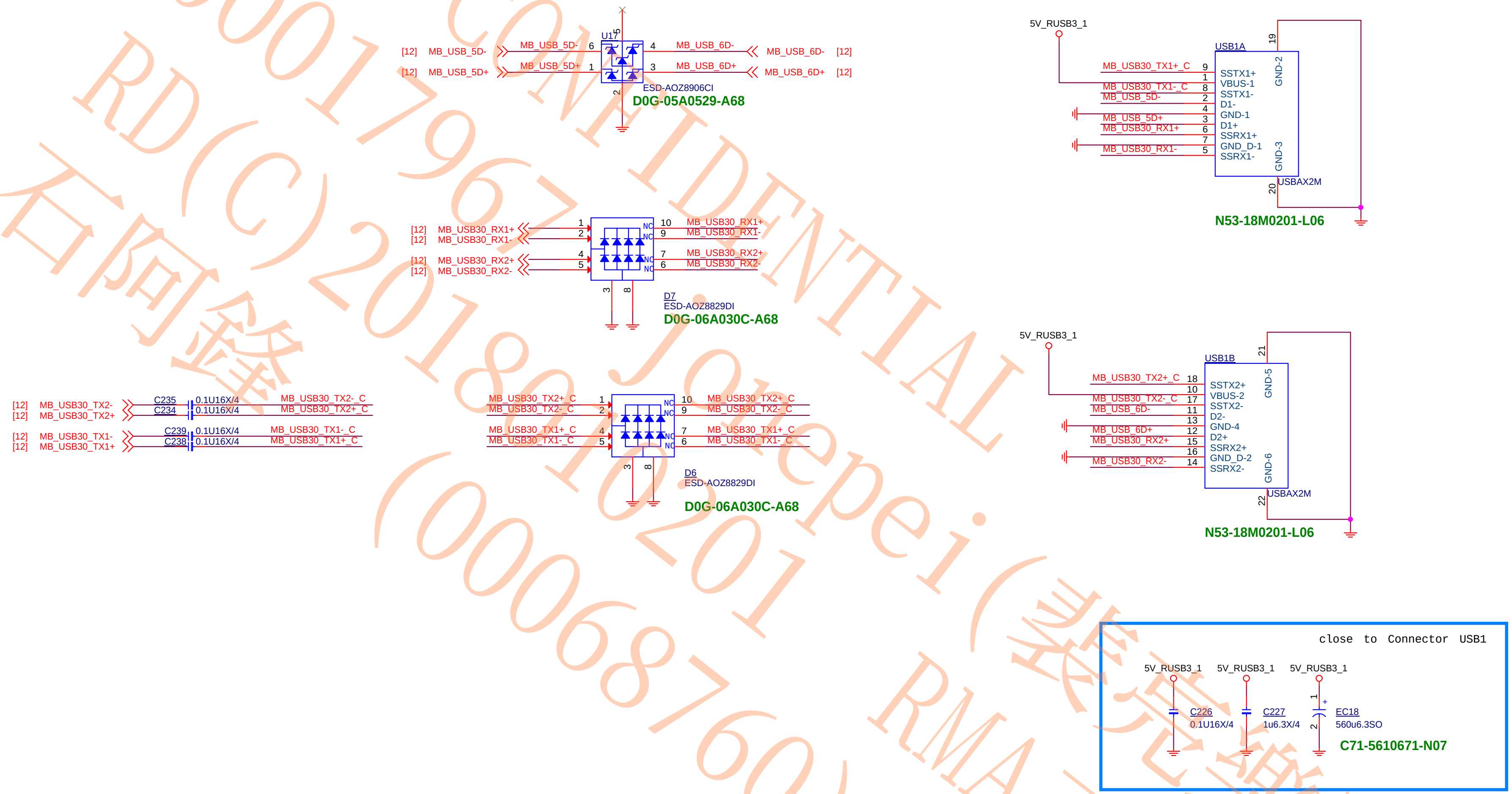
REAR USB1 Connect



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MS-7B28	
Size: Custom	Document Description: REAR USB1 Connect
Rev: 10/20/30	
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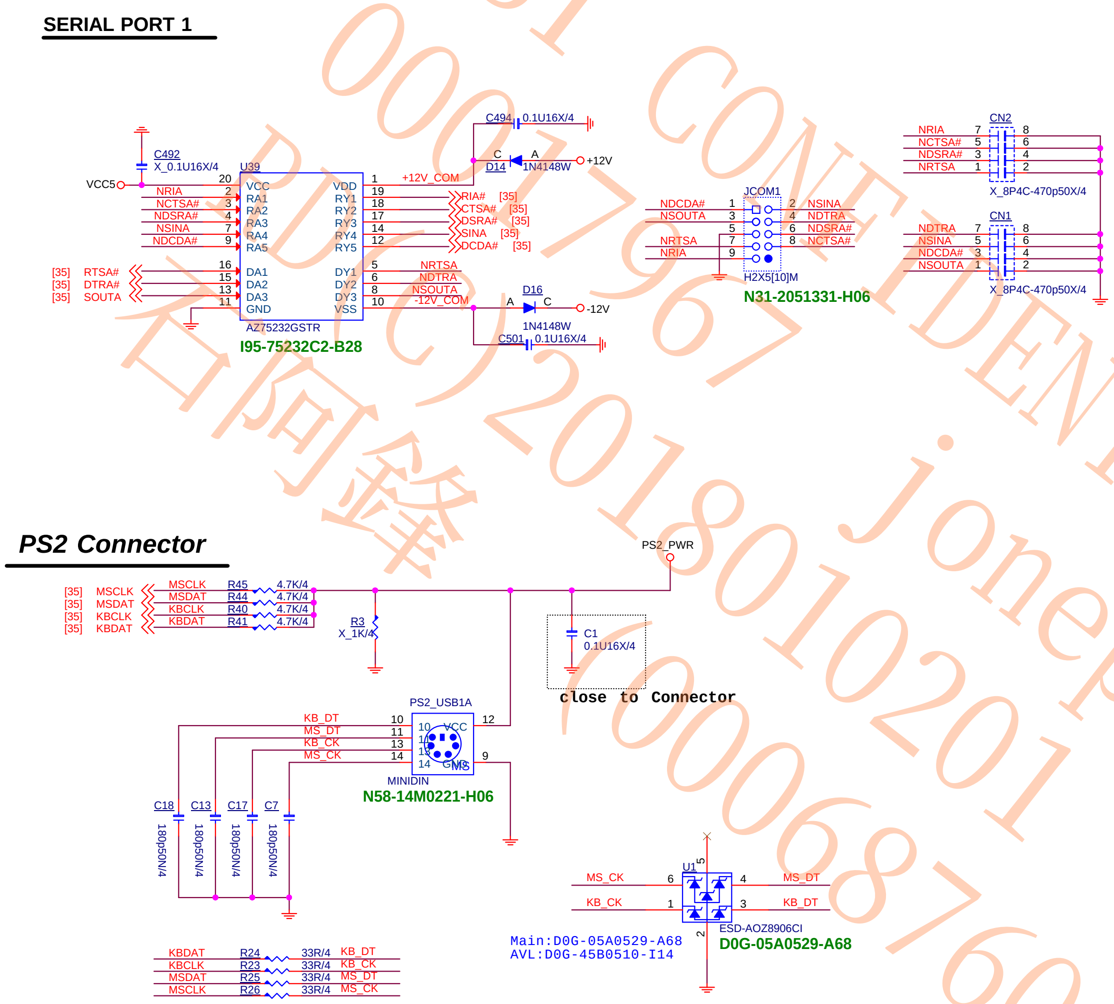

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MS-7B28		
Size: Custom	Document Description: SERIAL POR/PS2	Rev: 10/20/30
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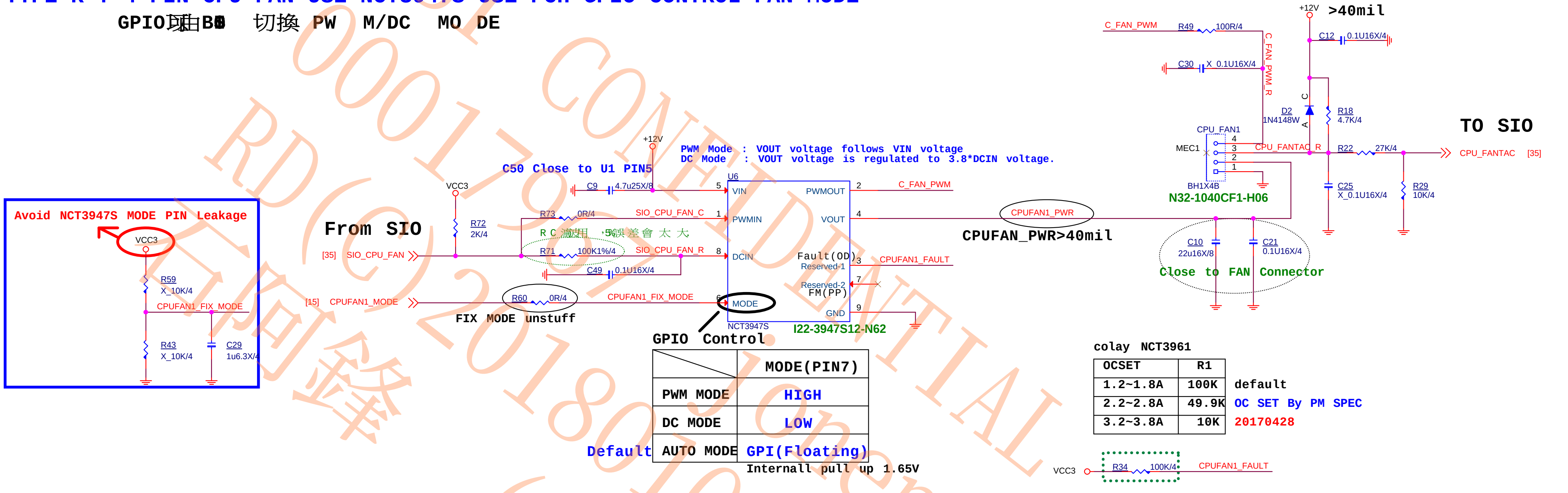
TYPE K : 4 PIN CPU FAN USE NCT3947S USE PCH GPIO CONTROL FAN MODE

GPIO 切換 PWM/DC MODE



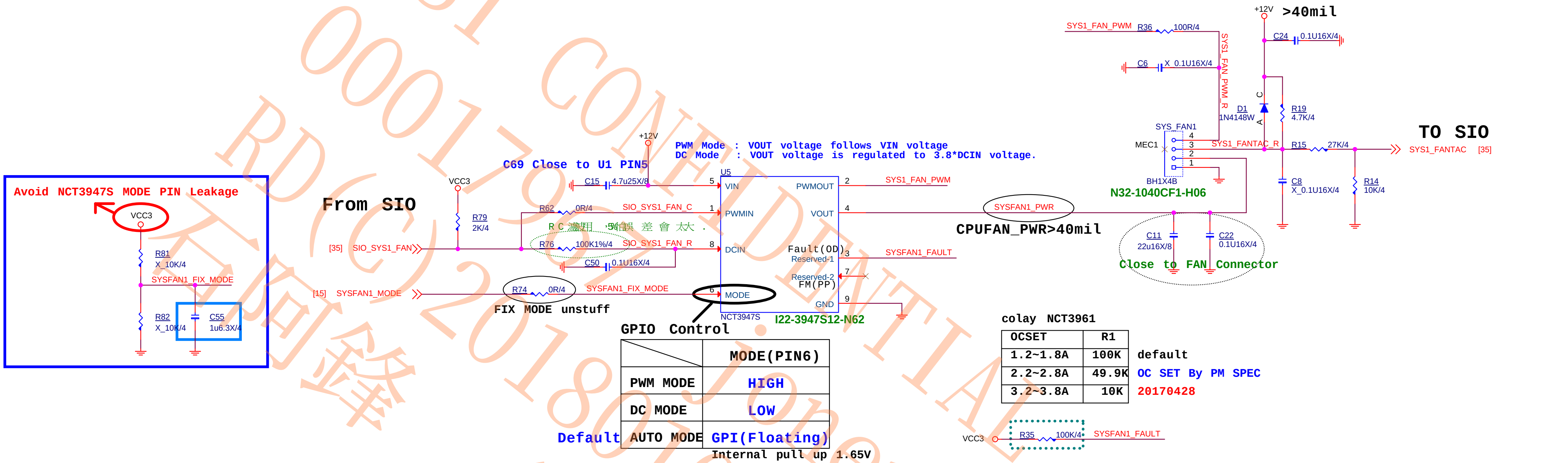
	MODE(PIN7)
PWM MODE	HIGH
DC MODE	LOW
Default AUTO MODE	GPI(Floating)

Internall 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



GPIO Control

	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: SYSTEM FAN | Rev: 10/20/30

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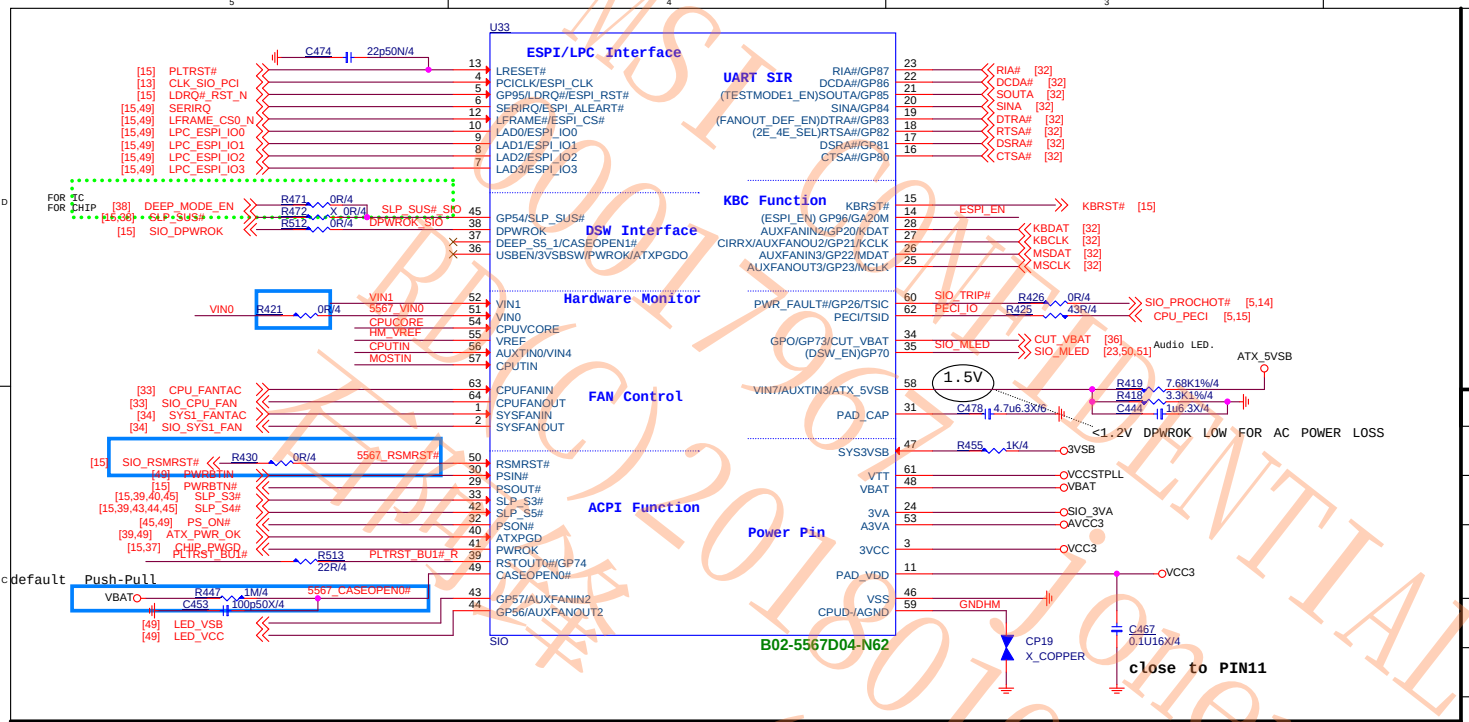
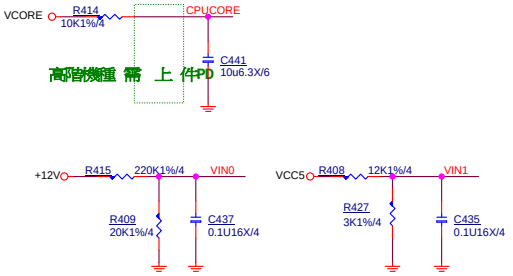
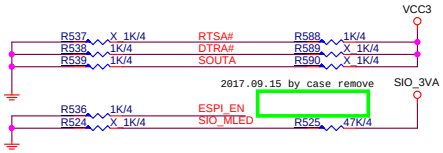


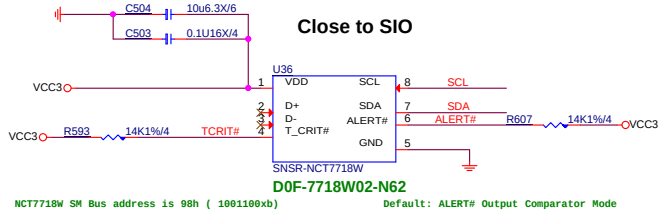
HW Monitor - Voltage

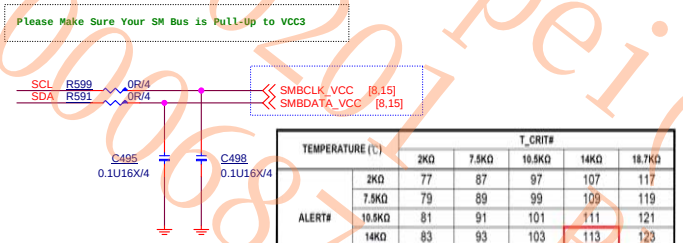


PIN	5567D NAME	Circuit NAME	0	1
18	2E_4E_SEL	RTSA#	I/O ADDRESS 2E	I/O ADDRESS 4E
19	FANOUT_DEF_EN	DTRA#	CPU FANOUT default RPM 50%.	CPU FANOUT default RPM 100%
21	TESTMODE1_EN	SOUTA	DISABLE TEST1MODE	ENABLE TEST1MODE
14	ESPI_EN	GA20M	ENABLE LPC	ENABLE ESPI
35	DSW_EN	DSW_EN	DISABLE	ENABLE DSW_EN



NCT7718W



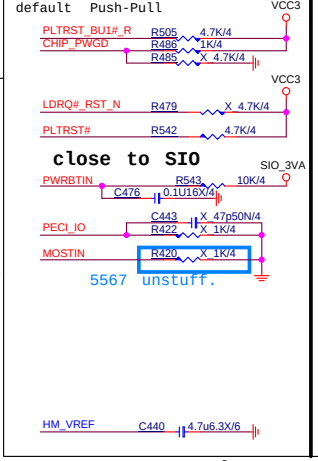


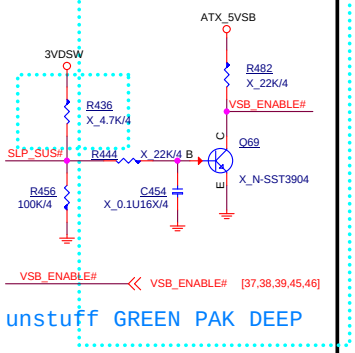
TEMPERATURE (℃)		T_CRIT#				
		2KΩ	7.5KΩ	10.5KΩ	14KΩ	18.7KΩ
ALERT#	2KΩ	77	87	97	107	117
	7.5KΩ	79	89	99	109	119
	10.5KΩ	81	91	101	111	121
	14KΩ	83	93	103	113	123
	18.7KΩ	85	95	105	115	125

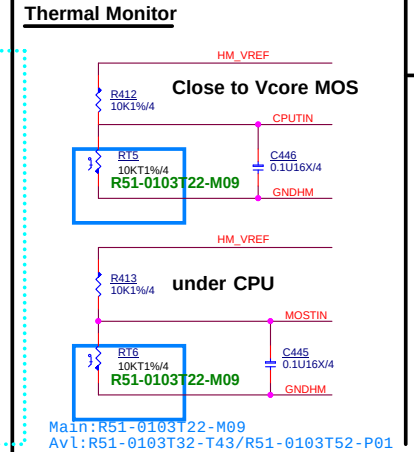
need near SIO

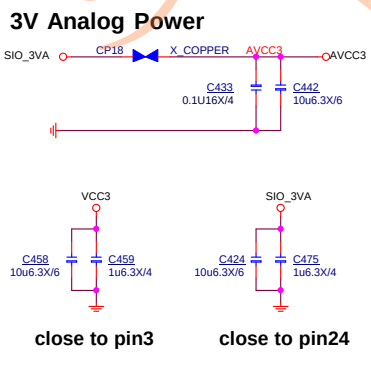
5567 colay 5565.

5567		5565
5567 Pin51		5565 Pin51
5567_VIN0	R428 X 0R/4 VIN1	
5567 Pin50		5565 Pin50
5567_RSMRST#	R429 X 0R/4 VIN0	
5567 Pin49		5565 Pin49
5567_CASEOPEN0#	R440 X 0R/4 SIO_RSMRST#	









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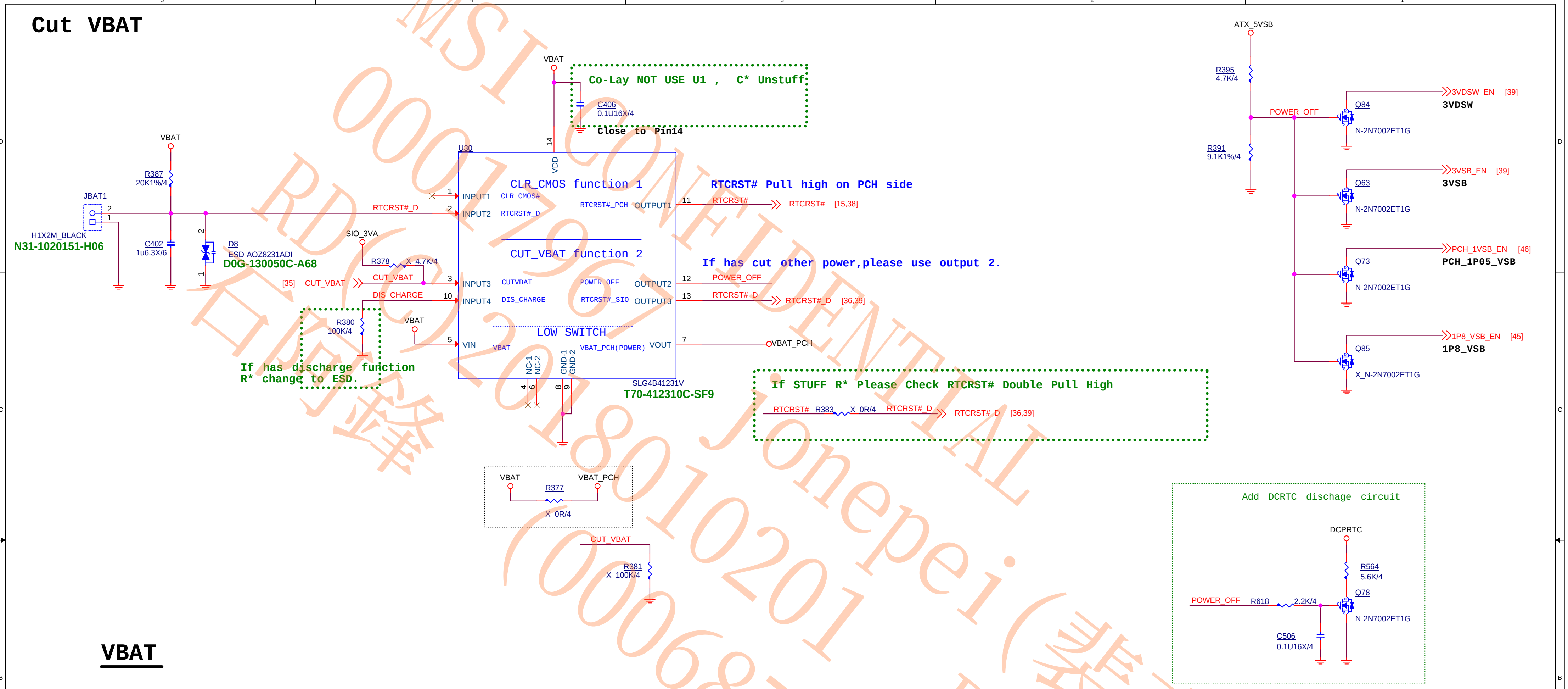
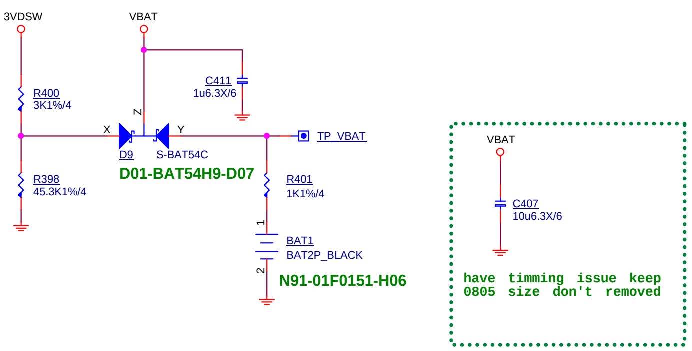
Cut VBAT



VBAT

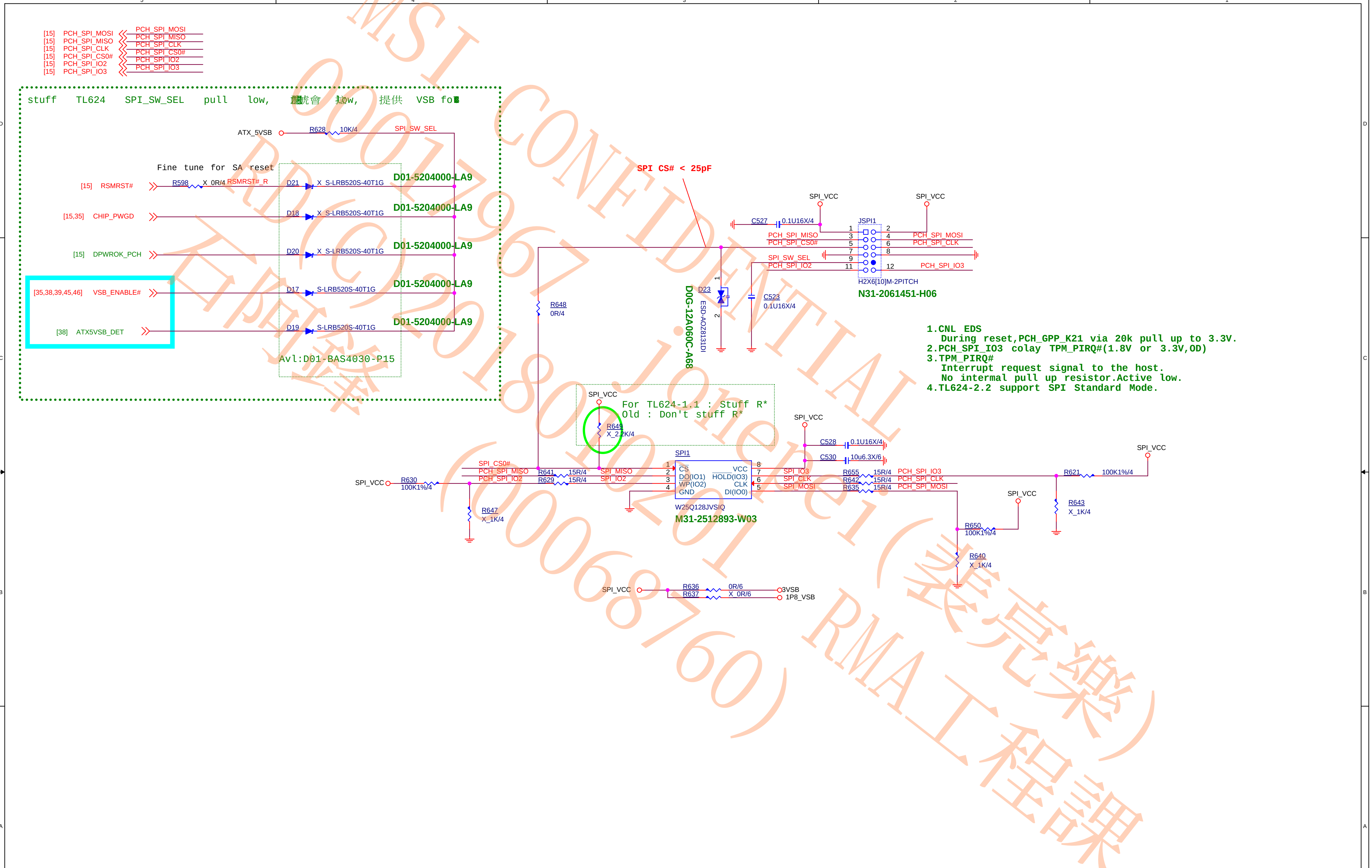


Function 1		
IN		OUT
INPUT1	INPUT2	OUTPUT1
0	1	1
1	0	0
1	1	0
0	0	0

Default

Function 2				
IN		OUT		
INPUT3 & lowswitch EN	INPUT4	OUTPUT2	OUTPUT3	VOUT
0	0	0	1	1
1	0	1	1	0 (discharge)
0	1	1	0	0 (discharge)
1	1	1	0	0 (discharge)

Default



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Size: Custom | Document Description: BIOS ROM | Rev: 10/20/30

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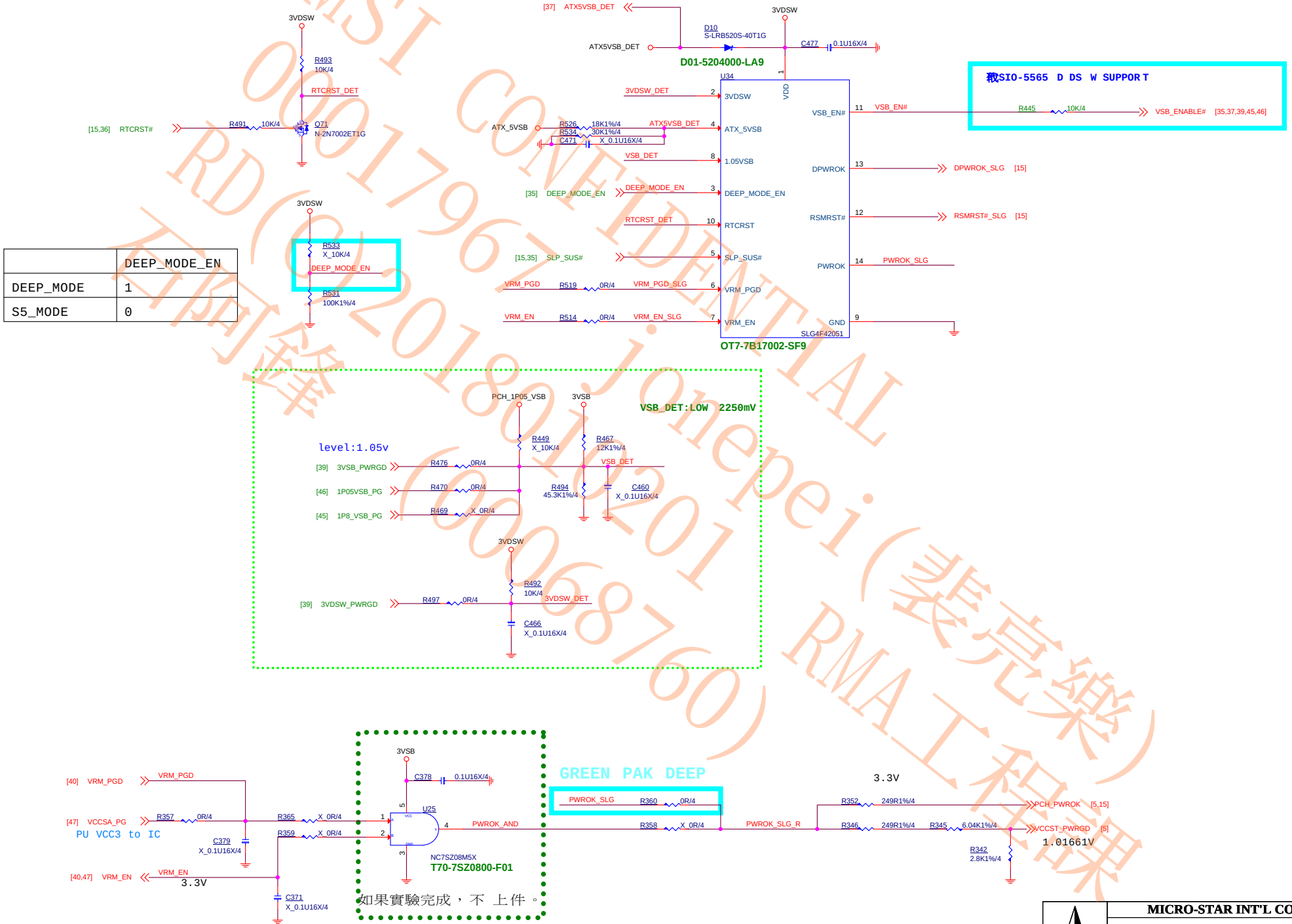
3VDSW
R493
10K/4
RTCRST_DET
[15,36] RTCRST#
R491 10K/4
Q71
N-2N7002ET1G
[37] ATX5VSB_DET
D10
S-LRB520S-40T1G
ATX5VSB_DET
C477 0.1U16X/4
D01-5204000-LA9
U34
3VDSW_DET
3VDSW
ATX_5VSB
R526 18K1%/4
R534 30K1%/4
C471 X_0.1U16X/4
ATX5VSB_DET
VSB_DET
1.05VSB
[35] DEEP_MODE_EN
DEEP_MODE_EN
RTCRST_DET
RTCRST
[15,35] SLP_SUS#
SLP_SUS#
VRM_PGD R519 0R/4 VRM_PGD_SLG
VRM_PGD
VRM_EN R514 0R/4 VRM_EN_SLG
VRM_EN
VDD
GND
SLG4F42051
VSB_EN#
DPWROK
RSMRST#
PWROK
11 VSB_EN#
13 DPWROK_SLG [15]
12 RSMRST#_SLG [15]
14 PWROK_SLG
9
R445 10K/4
VSB_ENABLE# [35,37,39,45,46]
OT7-7B17002-SF9
R533
X_10K/4
DEEP_MODE_EN
R531
100K1%/4
DEEP_MODE_EN
DEEP_MODE
S5_MODE
1
0
PCH_1P05_VSB
3VSB
VSB_DET:LOW 2250mV
level:1.05v
R449
X_10K/4
R467
12K1%/4
[39] 3VSB_PWRGD
R476 0R/4
VSB_DET
[46] 1P05VSB_PG
R470 0R/4
R494
45.3K1%/4
C460
X_0.1U16X/4
[45] 1P8_VSB_PG
R469 X_0R/4
3VDSW
R492
10K/4
[39] 3VDSW_PWRGD
R497 0R/4
3VDSW_DET
C466
X_0.1U16X/4
3VSB
C378 0.1U16X/4
U25
NC7SZ08M5X
T70-7SZ0800-F01
GREEN PAK DEEP
[40] VRM_PGD
VRM_PGD
[47] VCCSA_PG
R357 0R/4
PU VCC3 to IC
R365 X_0R/4
R359 X_0R/4
C379
X_0.1U16X/4
[40,47] VRM_EN
VRM_EN
3.3V
C371
X_0.1U16X/4
PWROK_AND
PWROK_SLG
R360 0R/4
R358 X_0R/4
PWROK_SLG_R
3.3V
R352 249R1%/4
R346 249R1%/4
R345 6.04K1%/4
R342
2.8K1%/4
PCH_PWROK [5,15]
VCCST_PWRGD [5]
1.01661V
如果實驗完成，不 上件。
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MS-7B28
Size Custom
Document Description
GREEN PAK DEEP
Rev 10/20/30
Date: Tuesday, December 12, 2017
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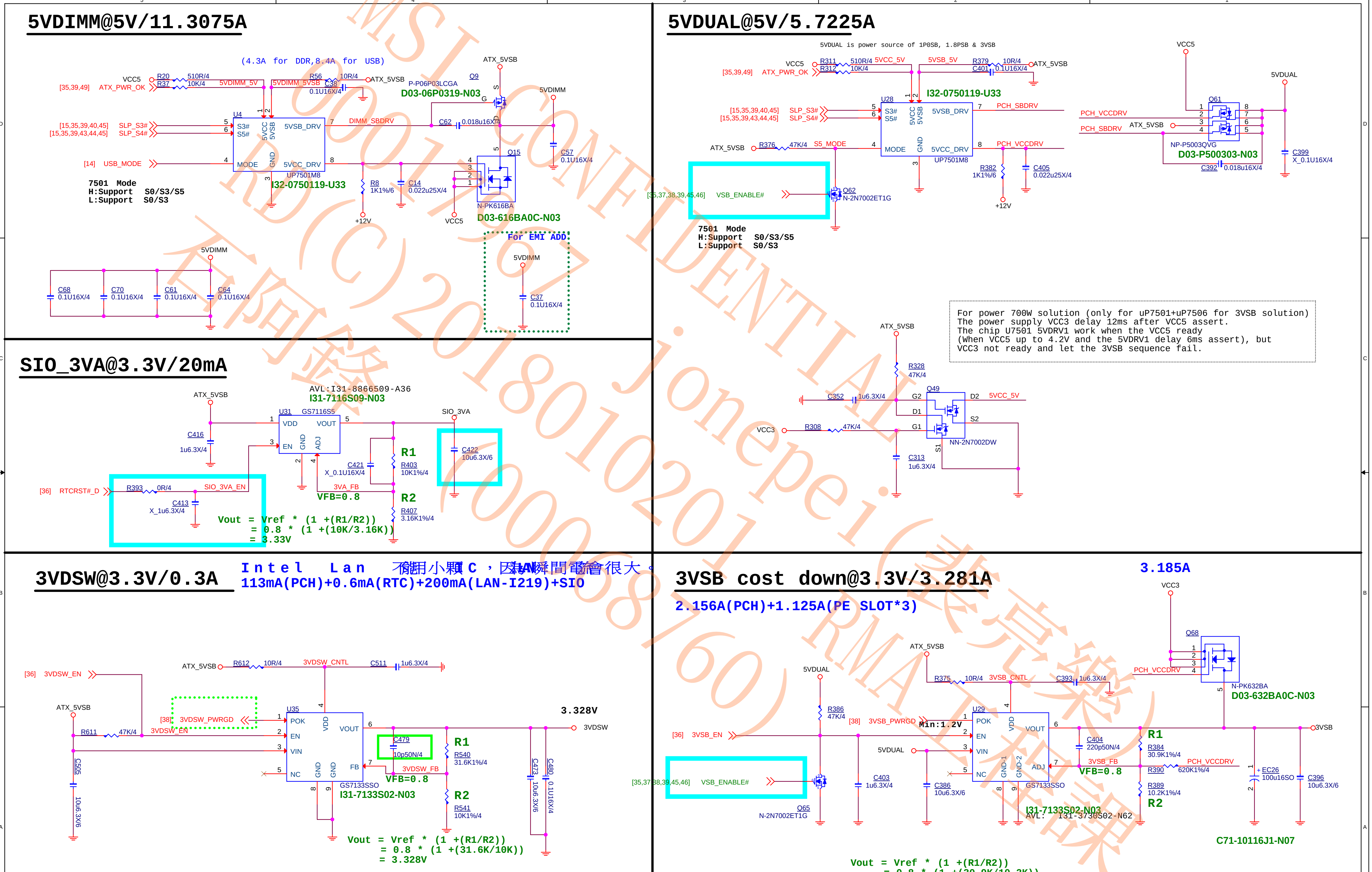
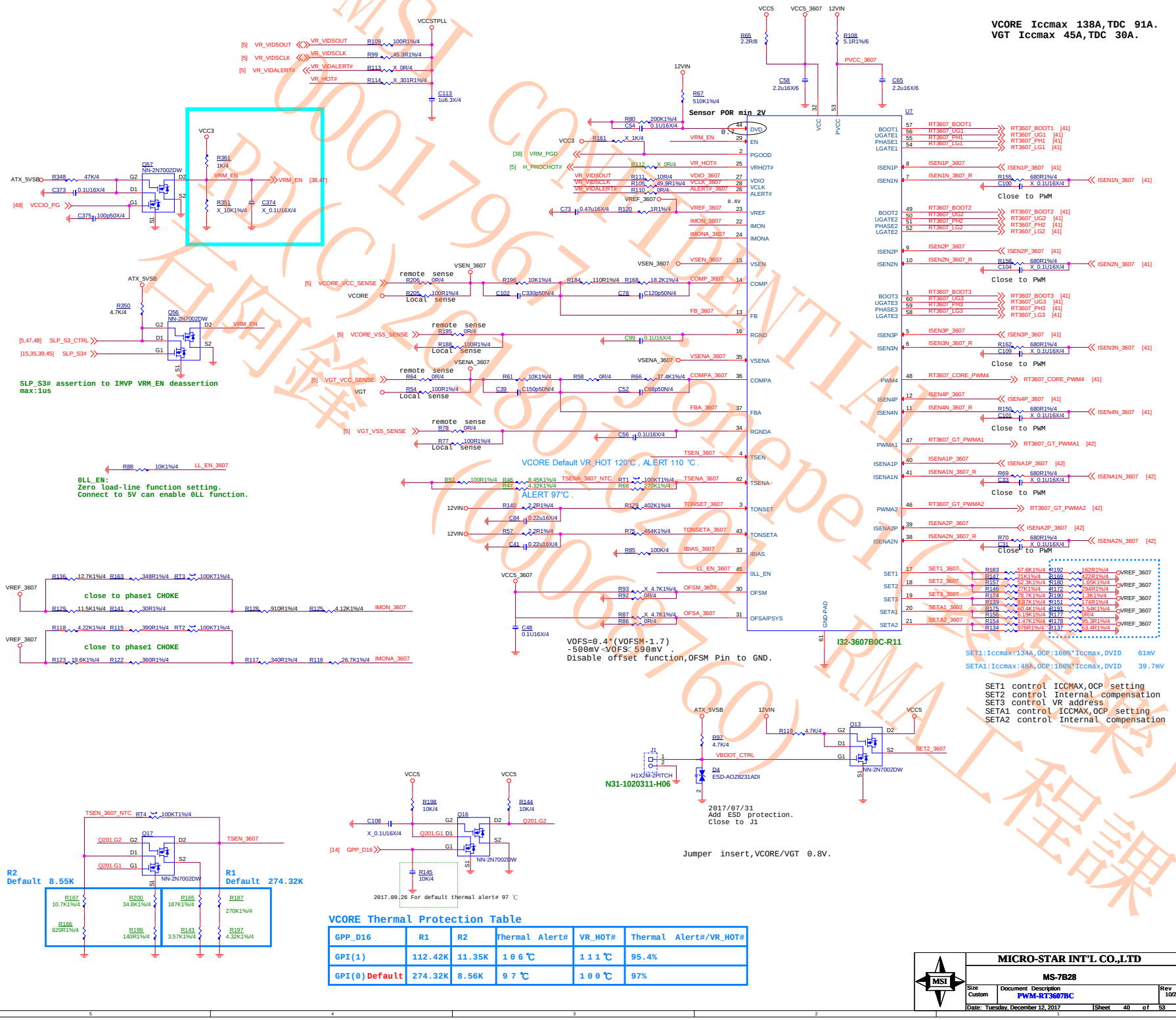

5VDIMM@5V/11.3075A
(4.3A for DDR,8.4A for USB)
ATX_5VSB
VCC5
[35,39,49] ATX_PWR_OK
R20 510R/4
R37 10K/4
5VDIMM_5V
R56 10R/4
5VDIMM_5VSB
C38 0.1U16X/4
P-P06P03LCGA
Q9
D03-06P0319-N03
5VDIMM
[15,35,39,40,45] SLP_S3#
[15,35,39,43,44,45] SLP_S4#
U4
5VSB_DRV
DIMM_SBDRV
C62 0.018u16X/4
[14] USB_MODE
MODE
5VCC_DRV
UP7501M8
I32-0750119-U33
R8 1K1%/6
C14 0.022u25X/4
+12V
VCC5
Q15
N-PK616BA
D03-616BA0C-N03
C57 0.1U16X/4
7501 Mode
H:Support S0/S3/S5
L:Support S0/S3
5VDIMM
C68 0.1U16X/4
C70 0.1U16X/4
C61 0.1U16X/4
C64 0.1U16X/4
For EMI ADD
5VDIMM
C37 0.1U16X/4
5VDUAL@5V/5.7225A
5VDUAL is power source of 1P0SB, 1.8PSB & 3VSB
VCC5
[35,39,49] ATX_PWR_OK
R311 510R/4 5VCC_5V
R312 10K/4
5VSB_5V
R379 10R/4 ATX_5VSB
C401 0.1U16X/4
U28
I32-0750119-U33
[15,35,39,40,45] SLP_S3#
[15,35,39,43,44,45] SLP_S4#
5VSB_DRV
PCH_SBDRV
ATX_5VSB
R376 47K/4 S5_MODE
MODE
5VCC_DRV
PCH_VCCDRV
UP7501M8
R382 1K1%/6
C405 0.022u25X/4
+12V
[35,37,38,39,45,46] VSB_ENABLE#
Q62 N-2N7002ET1G
7501 Mode
H:Support S0/S3/S5
L:Support S0/S3
VCC5
5VDUAL
Q61
PCH_VCCDRV
PCH_SBDRV
ATX_5VSB
NP-P5003QVG
D03-P500303-N03
C392 0.018u16X/4
C399 X_0.1U16X/4
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.
ATX_5VSB
R328 47K/4
C352 1u6.3X/4
Q49
5VCC_5V
VCC3
R308 47K/4
NN-2N7002DW
C313 1u6.3X/4
SIO_3VA@3.3V/20mA
AVL:I31-8866509-A36
I31-7116S09-N03
ATX_5VSB
U31 GS7116S5
VDD VOUT
EN GND ADJ
SIO_3VA
C416 1u6.3X/4
C421 X_0.1U16X/4
R1
R403 10K1%/4
C422 10u6.3X/6
[36] RTCRST#_D
R393 0R/4
SIO_3VA_EN
C413 X_1u6.3X/4
3VA_FB
VFB=0.8
R2
R407 3.16K1%/4
Vout = Vref * (1 +(R1/R2))
= 0.8 * (1 +(10K/3.16K))
= 3.33V
3VDSW@3.3V/0.3A
Intel Lan 有用小顆 C，因 LAN 瞬間電流會很大。
113mA(PCH)+0.6mA(RTC)+200mA(LAN-I219)+SIO
[36] 3VDSW_EN
ATX_5VSB
R612 10R/4
3VDSW_CNTL
C511 1u6.3X/4
ATX_5VSB
[38] 3VDSW_PWRGD
R611 47K/4
3VDSW_EN
U35
POK VOUT EN VIN NC GND FB
3.328V
3VDSW
C479 10p50N/4
R1
R540 31.6K1%/4
3VDSW_FB
VFB=0.8
R2
R541 10K1%/4
GS7133SSO
I31-7133S02-N03
C505 10u6.3X/6
C473 10u6.3X/6
C480 0.1U16X/4
Vout = Vref * (1 +(R1/R2))
= 0.8 * (1 +(31.6K/10K))
= 3.328V
3VSB cost down@3.3V/3.281A
3.185A
2.156A(PCH)+1.125A(PE SLOT*3)
VCC3
Q68
PCH_VCCDRV
N-PK632BA
D03-632BA0C-N03
ATX_5VSB
R375 10R/4
3VSB_CNTL
C393 1u6.3X/4
5VDUAL
R386 47K/4
[38] 3VSB_PWRGD
Min:1.2V
[36] 3VSB_EN
U29
POK VOUT EN VIN NC ADJ
5VDUAL
C404 220p50N/4
R1
R384 30.9K1%/4
3VSB_FB
PCH_VCCDRV
VFB=0.8
R390 620K1%/4
R389 10.2K1%/4
R2
EC26 100u16SO
C396 10u6.3X/6
3VSB
[35,37,38,39,45,46] VSB_ENABLE#
Q65
N-2N7002ET1G
C403 1u6.3X/4
C386 10u6.3X/6
GS7133SSO
I31-7133S02-N03
AVL: I31-3730S02-N62
C71-10116J1-N07
Vout = Vref * (1 +(R1/R2))
= 0.8 * (1 +(30.9K/10.2K))
= 3.22V

MICRO-STAR INT'L CO.,LTD

MS-7B28

Size	Document Description	Rev
Custom	ACPI CONTROLLER	10/20/30

Date: Tuesday, December 12, 2017 Sheet 39 of 53



VCORE Thermal Protection Table

GPP_D16	R1	R2	Thermal Alert#	VR_HOT#	Thermal Alert#/VR_HOT#
GPI(1)	112.42K	11.35K	106℃	111℃	95.4%
GPI(0) Default	274.32K	8.56K	97℃	100℃	97%

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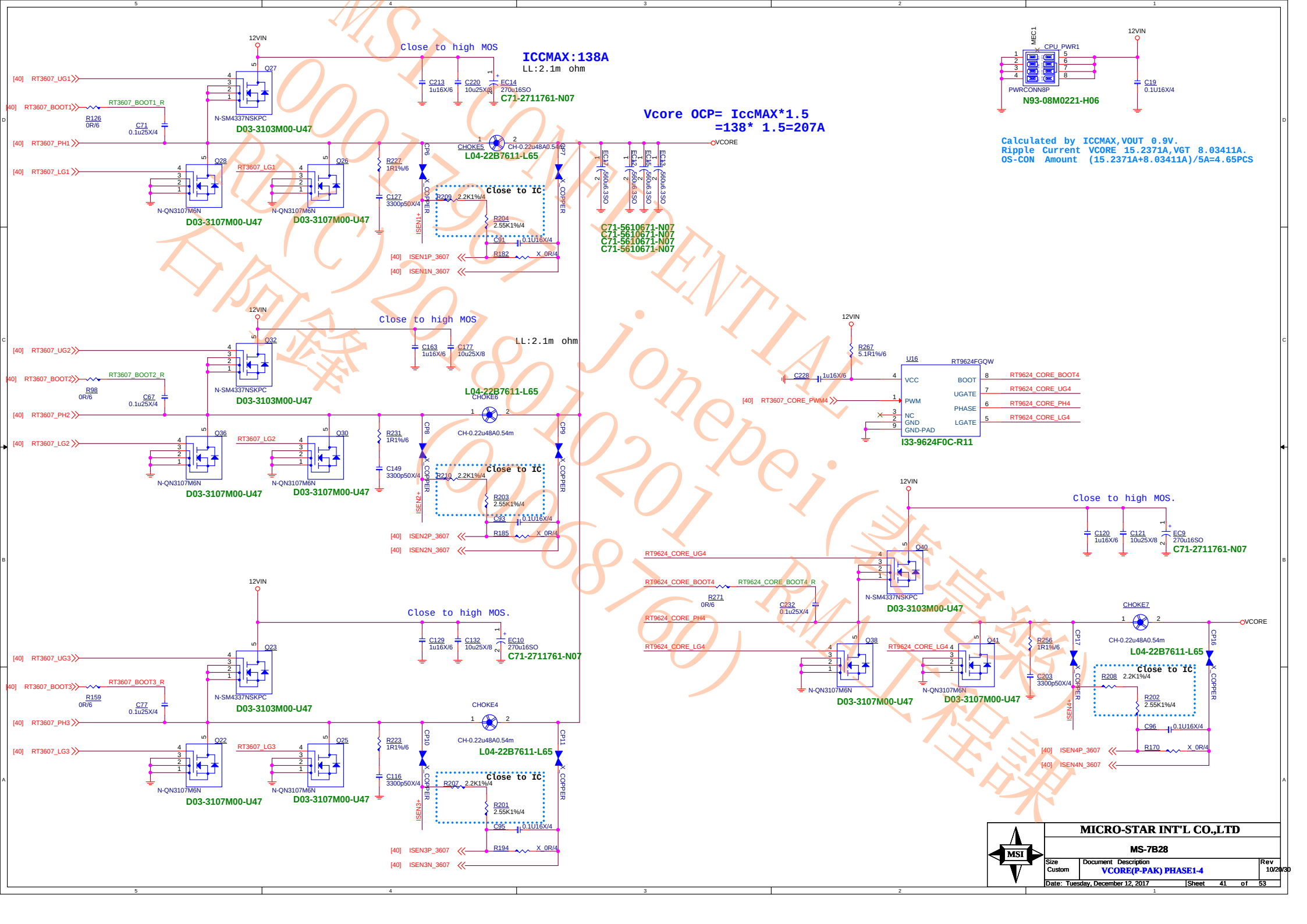
MS-7B28

Size: Custom | Document Description: PWM-RT3607BC | Rev: 10/20/30

Date: Tuesday, December 12, 2017 | Sheet 40 of 53


ICCMAX:138A
LL:2.1m ohm
Vcore OCP= IccMAX*1.5
=138* 1.5=207A
Calculated by ICCMAX,VOUT 0.9V.
Ripple Current VCORE 15.2371A,VGT 8.03411A.
OS-CON Amount (15.2371A+8.03411A)/5A=4.65PCS
Close to high MOS
Close to high MOS.
Close to IC
12VIN
VCORE
CHOKE5
CHOKE6
CHOKE4
CHOKE7
L04-22B7611-L65
CH-0.22u48A0.54m
C71-2711761-N07
C71-5610671-N07
D03-3103M00-U47
D03-3107M00-U47
N-SM4337NSKPC
N-QN3107M6N
I33-9624F0C-R11
RT9624FGQW
N93-08M0221-H06
PWRCONN8P
MSI CONFIDENTIAL
MICRO-STAR INT'L CO.,LTD
MS-7B28
VCORE(P-PAK) PHASE1-4
Date: Tuesday, December 12, 2017
Sheet 41 of 53
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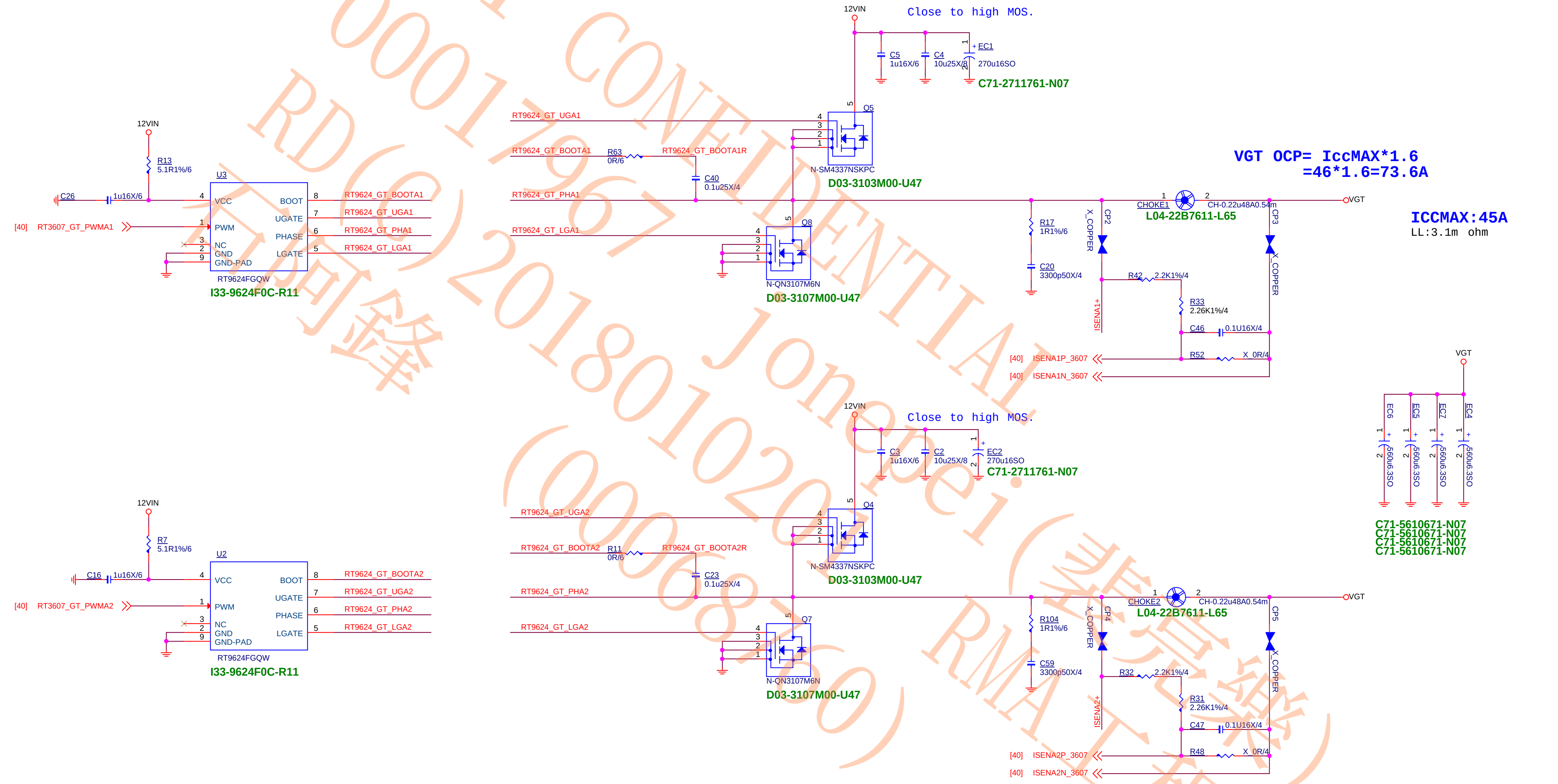

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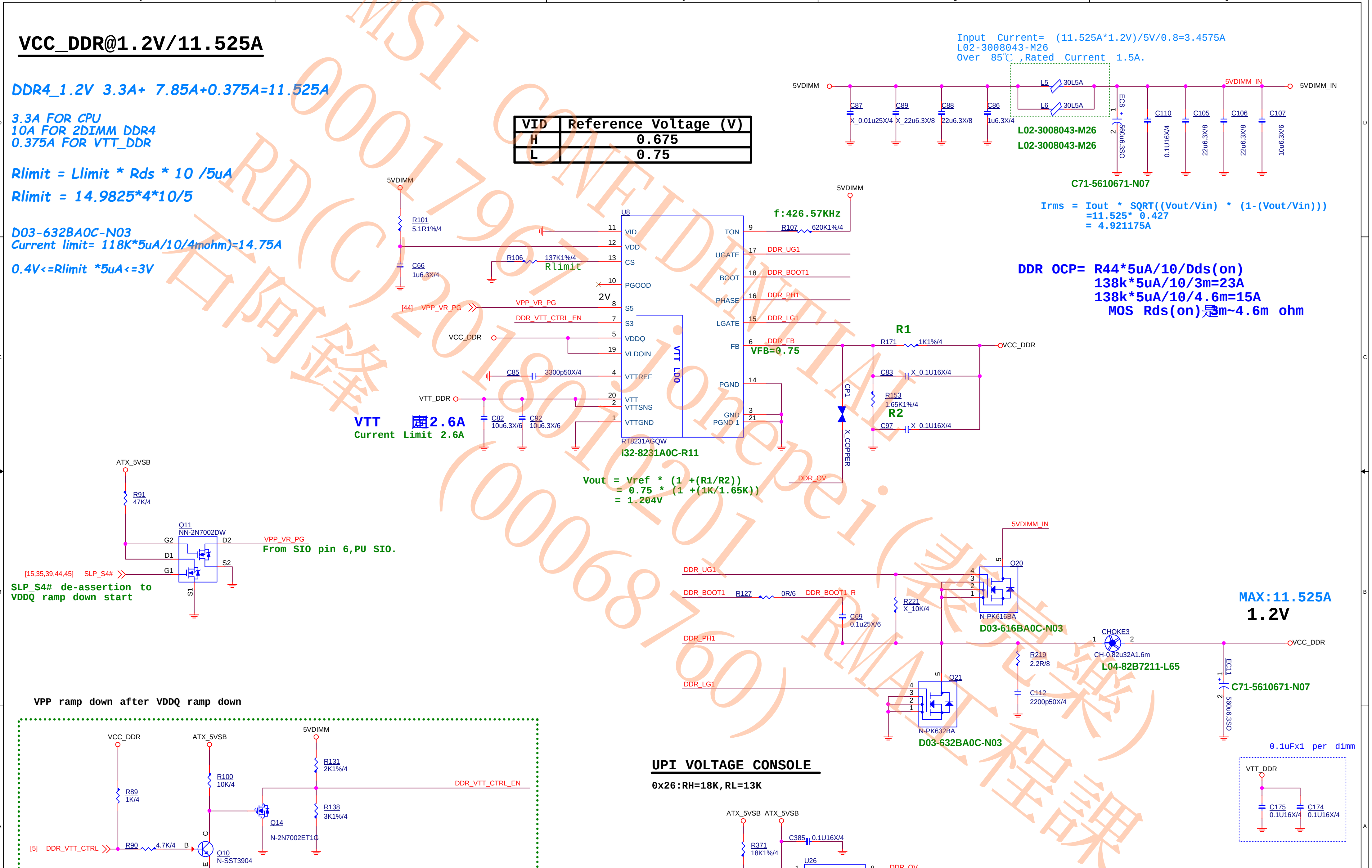
MS-7B28

Size	Document Description	Rev
Custom	VGT(P-PAK) PHASE1-2	10/20/30

Date: Tuesday, December 12, 2017 | Sheet 42 of 53


VCC_DDR@1.2V/11.525A
DDR4_1.2V 3.3A+ 7.85A+0.375A=11.525A
3.3A FOR CPU
10A FOR 2DIMM DDR4
0.375A FOR VTT_DDR
Rlimit = Llimit * Rds * 10 /5uA
Rlimit = 14.9825*4*10/5
D03-632BA0C-N03
Current limit= 118K*5uA/10/4mohm)=14.75A
0.4V<=Rlimit *5uA<=3V
Input Current= (11.525A*1.2V)/5V/0.8=3.4575A
L02-3008043-M26
Over 85℃ ,Rated Current 1.5A.
VID | Reference Voltage (V)
H | 0.675
L | 0.75
f:426.57KHz
Irms = Iout * SQRT((Vout/Vin) * (1-(Vout/Vin)))
=11.525* 0.427
= 4.921175A
DDR OCP= R44*5uA/10/Dds(on)
138k*5uA/10/3m=23A
138k*5uA/10/4.6m=15A
MOS Rds(on)是3m~4.6m ohm
VFB=0.75
R1
R2
Rlimit
VTT LDO
RT8231AGQW
I32-8231A0C-R11
VTT 最2.6A
Current Limit 2.6A
Vout = Vref * (1 +(R1/R2))
= 0.75 * (1 +(1K/1.65K))
= 1.204V
From SIO pin 6,PU SIO.
SLP_S4# de-assertion to
VDDQ ramp down start
MAX:11.525A
1.2V
D03-616BA0C-N03
D03-632BA0C-N03
L04-82B7211-L65
C71-5610671-N07
0.1uFx1 per dimm
VPP ramp down after VDDQ ramp down
Ib=(1.2-0.7)/5.7k=0.0877mA
IC=(5-0.2)/10k=0.48mA
MS-7981 Add. Package C-states above C8 function
UPI VOLTAGE CONSOLE
0x26:RH=18K,RL=13K
I34-3933U09-N62

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Size	Document Description	Rev
Custom	DDR-RT8231	10/20/30

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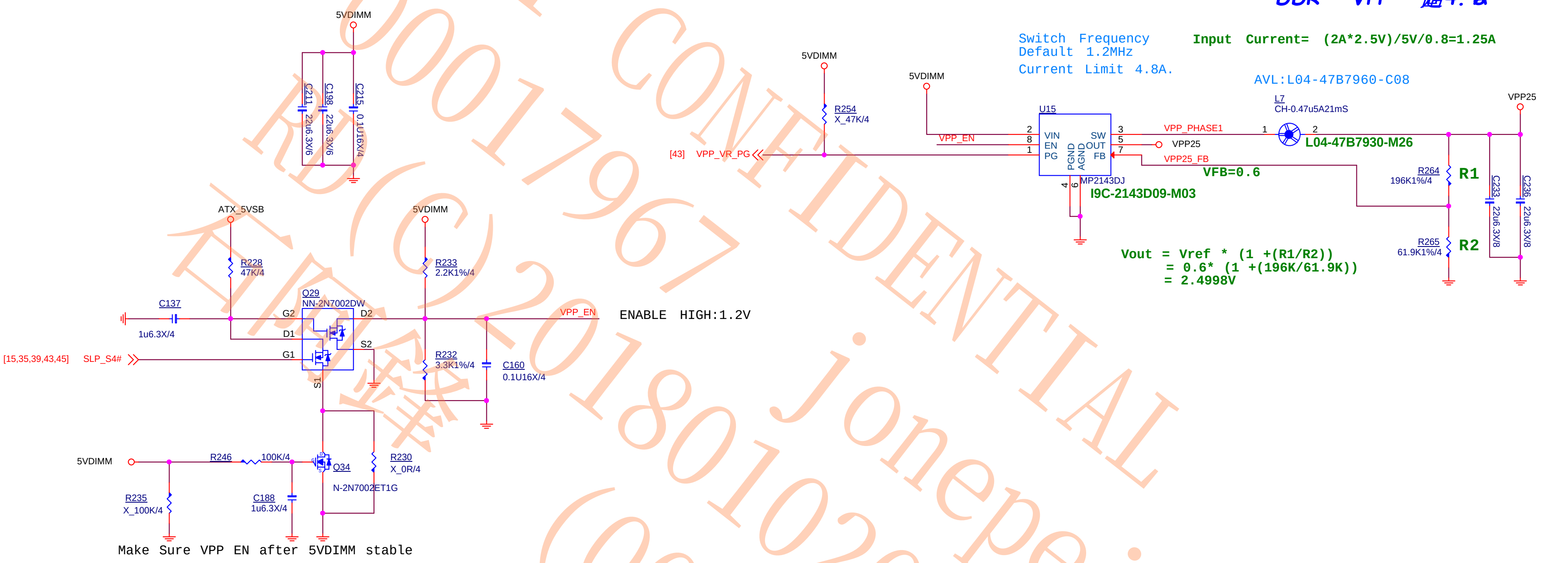
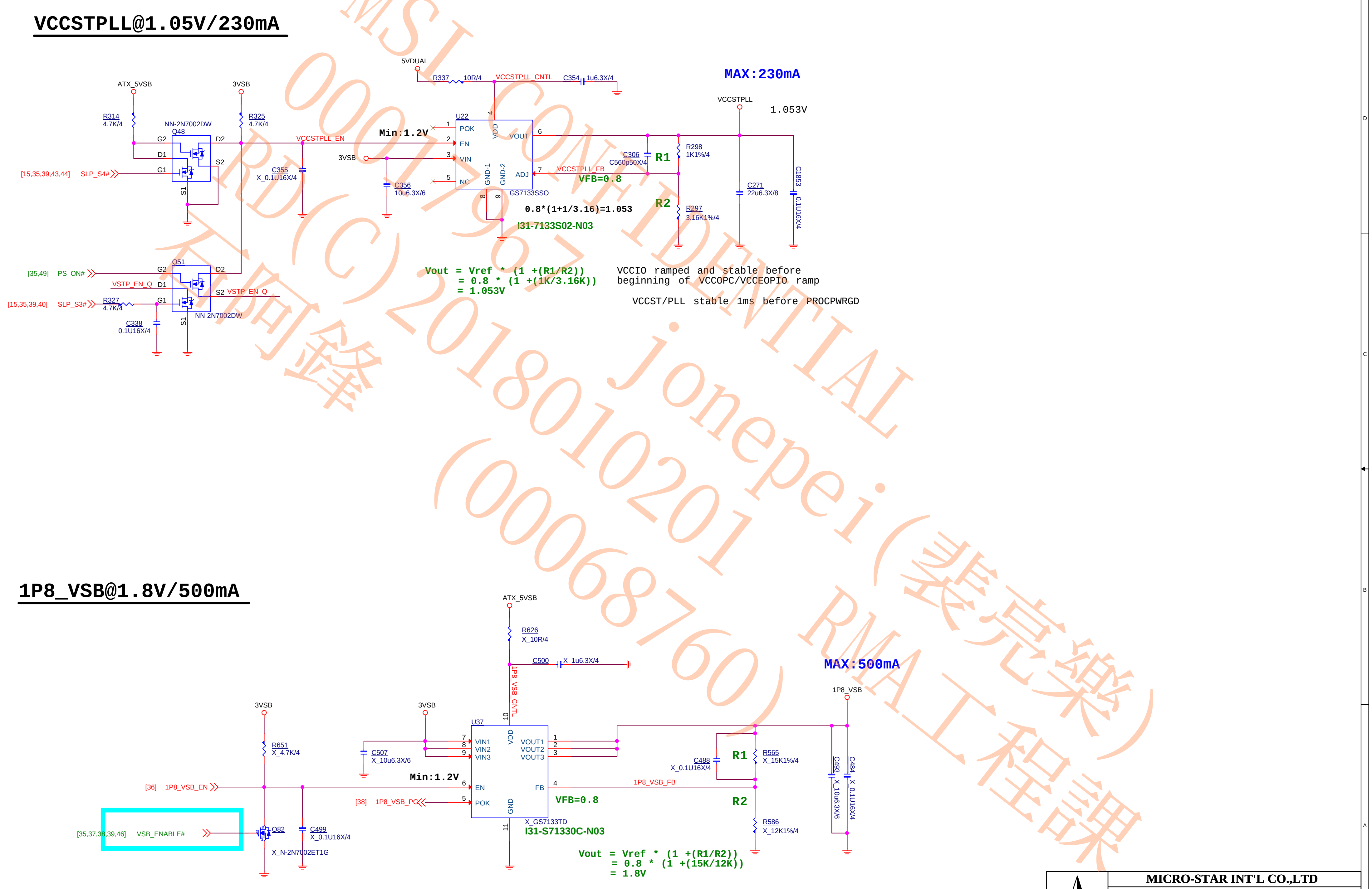
VPP25 @2.5V/2A

2DIMM :1.12A FOR DDR VPP2.5V



MICRO-STAR INT'L CO.,LTD		
MS-7B28		
Size: Custom	Document Description: DDR-MP2143-VPP25	Rev: 10/20/30
Date: Tuesday, December 12, 2017	Sheet 44 of 53	



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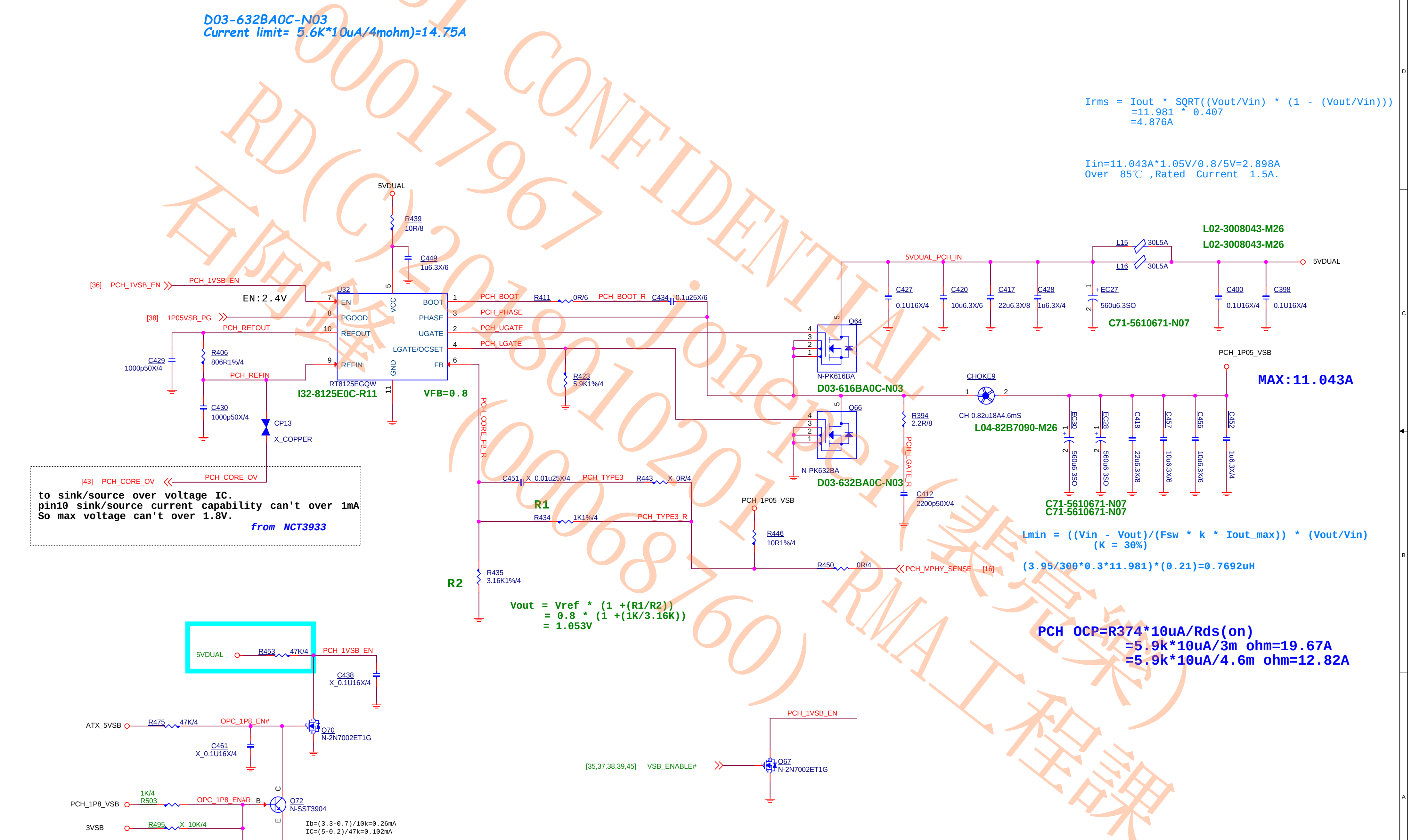
MS-7B28

Size: Custom | Document Description: CPU PWR_ST/PLL | Rev: 10/20/30

Date: Tuesday, December 12, 2017 | Sheet 45 of 53

PCH_1VSB@1.05V/11.981A



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Size: Custom | Document Description: PCH Core power | Rev 10/20/30

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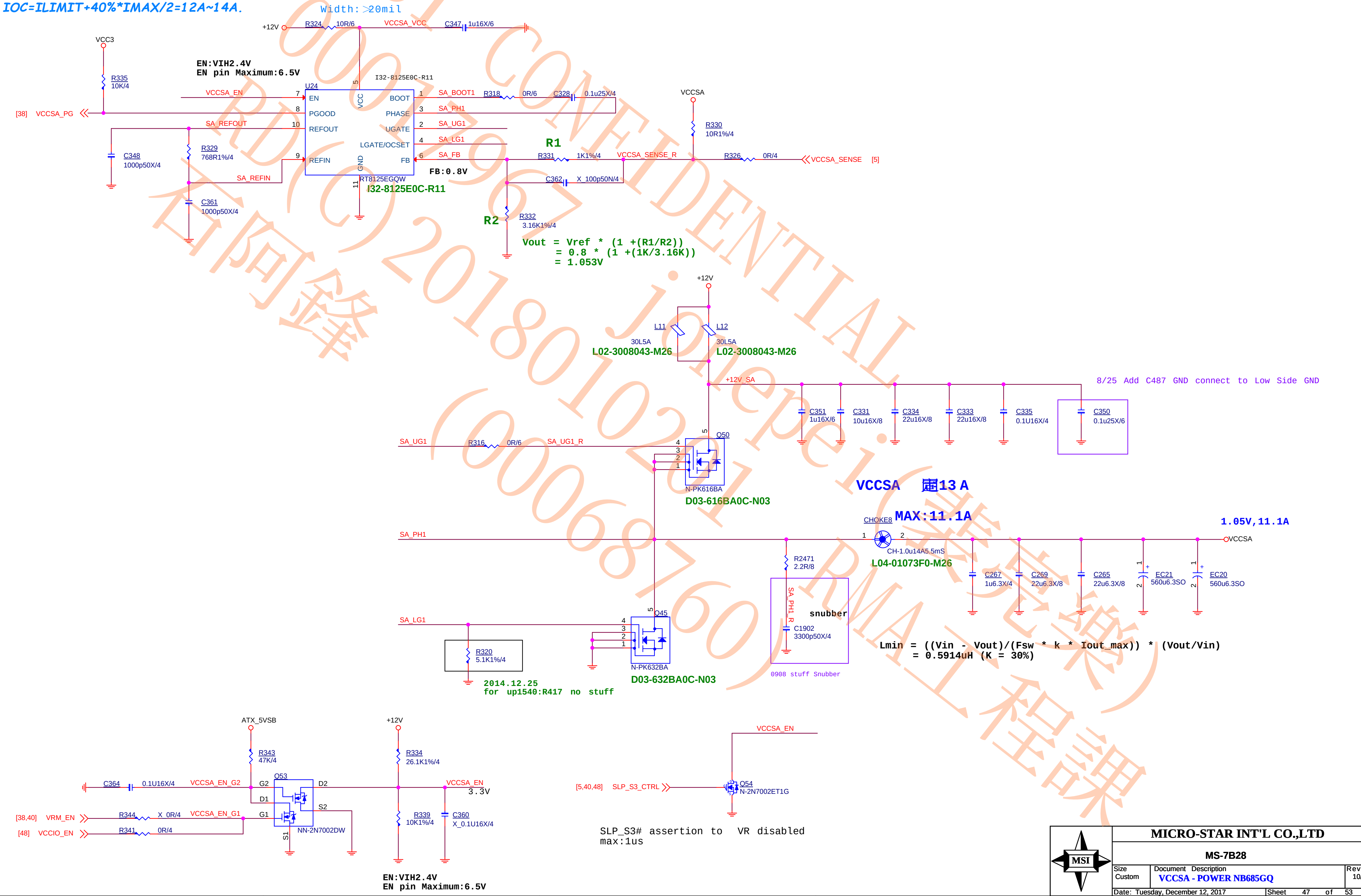
VCCSA@1.05V/11.1A

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



Width: >20mil
+12V
R324 10R/6
VCCSA_VCC
C347 1u16X/6
VCC3
R335 10K/4
EN:VIH2.4V
EN pin Maximum:6.5V
U24
I32-8125E0C-R11
VCCSA_EN
[38] VCCSA_PG
SA_REFOUT
EN
PGOOD
REFOUT
REFIN
VCC
GND
BOOT
PHASE
UGATE
LGATE/OCSET
FB
RT8125EGQW
I32-8125E0C-R11
SA_BOOT1
SA_PH1
SA_UG1
SA_LG1
SA_FB
R318 0R/6
C328 0.1u25X/4
C348 1000p50X/4
R329 768R1%/4
SA_REFIN
C361 1000p50X/4
FB:0.8V
R1
R331 1K1%/4
VCCSA_SENSE_R
C362 X_100p50N/4
R2
R332 3.16K1%/4
VCCSA
R330 10R1%/4
R326 0R/4
VCCSA_SENSE [5]
Vout = Vref * (1 +(R1/R2))
= 0.8 * (1 +(1K/3.16K))
= 1.053V
+12V
L11 30L5A L02-3008043-M26
L12 30L5A L02-3008043-M26
+12V_SA
8/25 Add C487 GND connect to Low Side GND
C351 1u16X/6
C331 10u16X/8
C334 22u16X/8
C333 22u16X/8
C335 0.1U16X/4
C350 0.1u25X/6
SA_UG1
R316 0R/6
SA_UG1_R
Q50
N-PK616BA
D03-616BA0C-N03
VCCSA 電13 A
MAX:11.1A
CHOKE8
CH-1.0u14A5.5mS
L04-01073F0-M26
1.05V,11.1A
VCCSA
SA_PH1
R2471 2.2R/8
SA_PH1_R
C1902 3300p50X/4
snubber
0908 stuff Snubber
C267 1u6.3X/4
C269 22u6.3X/8
C265 22u6.3X/8
EC21 560u6.3SO
EC20 560u6.3SO
SA_LG1
R320 5.1K1%/4
2014.12.25
for up1540:R417 no stuff
Q45
N-PK632BA
D03-632BA0C-N03
Lmin = ((Vin - Vout)/(Fsw * k * Iout_max)) * (Vout/Vin)
= 0.5914uH (K = 30%)
ATX_5VSB
R343 47K/4
+12V
R334 26.1K1%/4
C364 0.1U16X/4
VCCSA_EN_G2
Q53
NN-2N7002DW
[38,40] VRM_EN
R344 X_0R/4
VCCSA_EN_G1
[48] VCCIO_EN
R341 0R/4
VCCSA_EN
3.3V
R339 10K1%/4
C360 X_0.1U16X/4
EN:VIH2.4V
EN pin Maximum:6.5V
VCCSA_EN
[5,40,48] SLP_S3_CTRL
Q54 N-2N7002ET1G
SLP_S3# assertion to VR disabled
max:1us

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Size	Document Description	Rev
Custom	VCCSA - POWER NB685GQ	10/20/30

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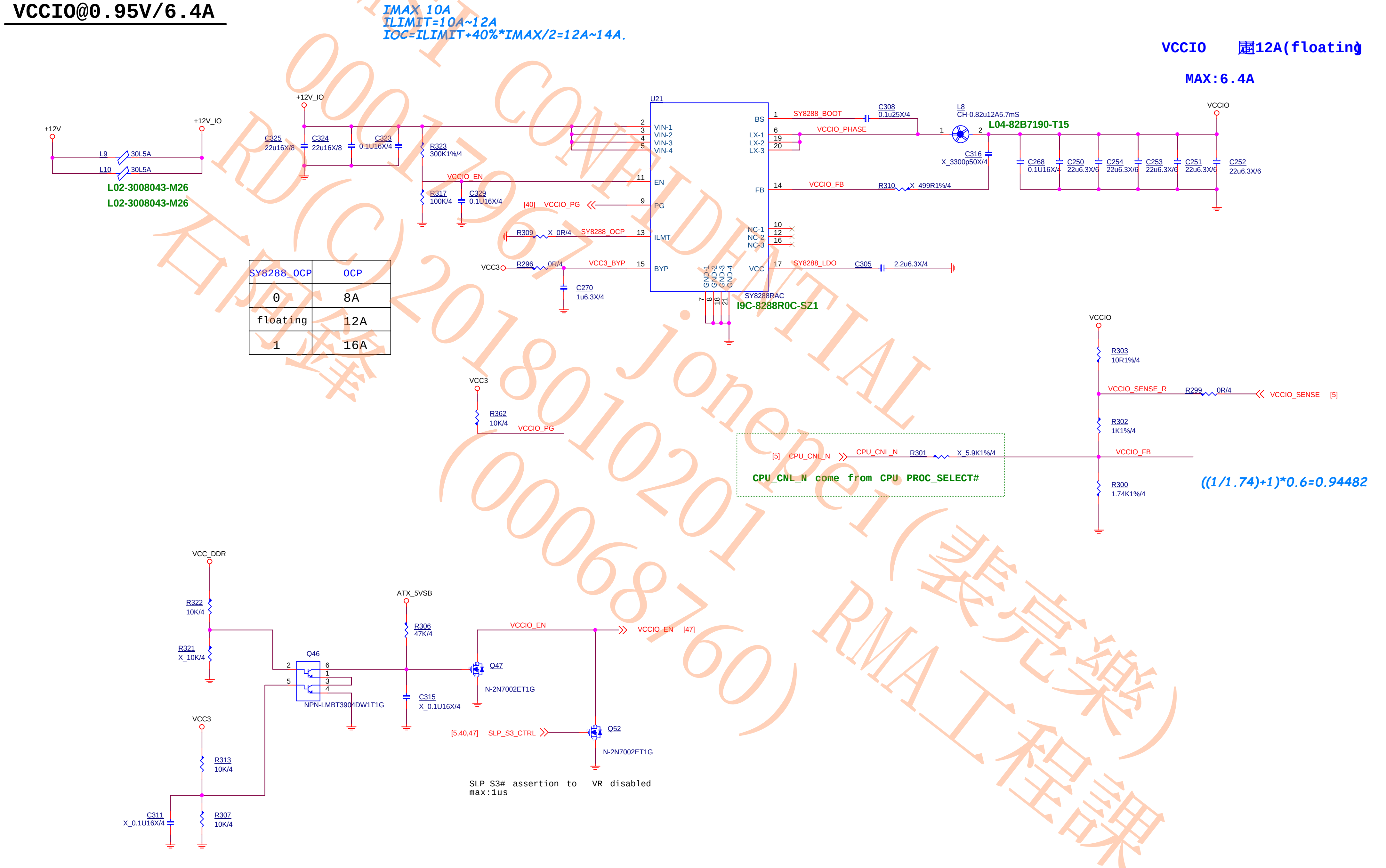
VCCIO@0.95V/6.4A



SY8288_OCP	OCP
0	8A
floating	12A
1	16A

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Size: Custom | Document Description: VCCIO - POWER SY8288 | Rev 10/20/30

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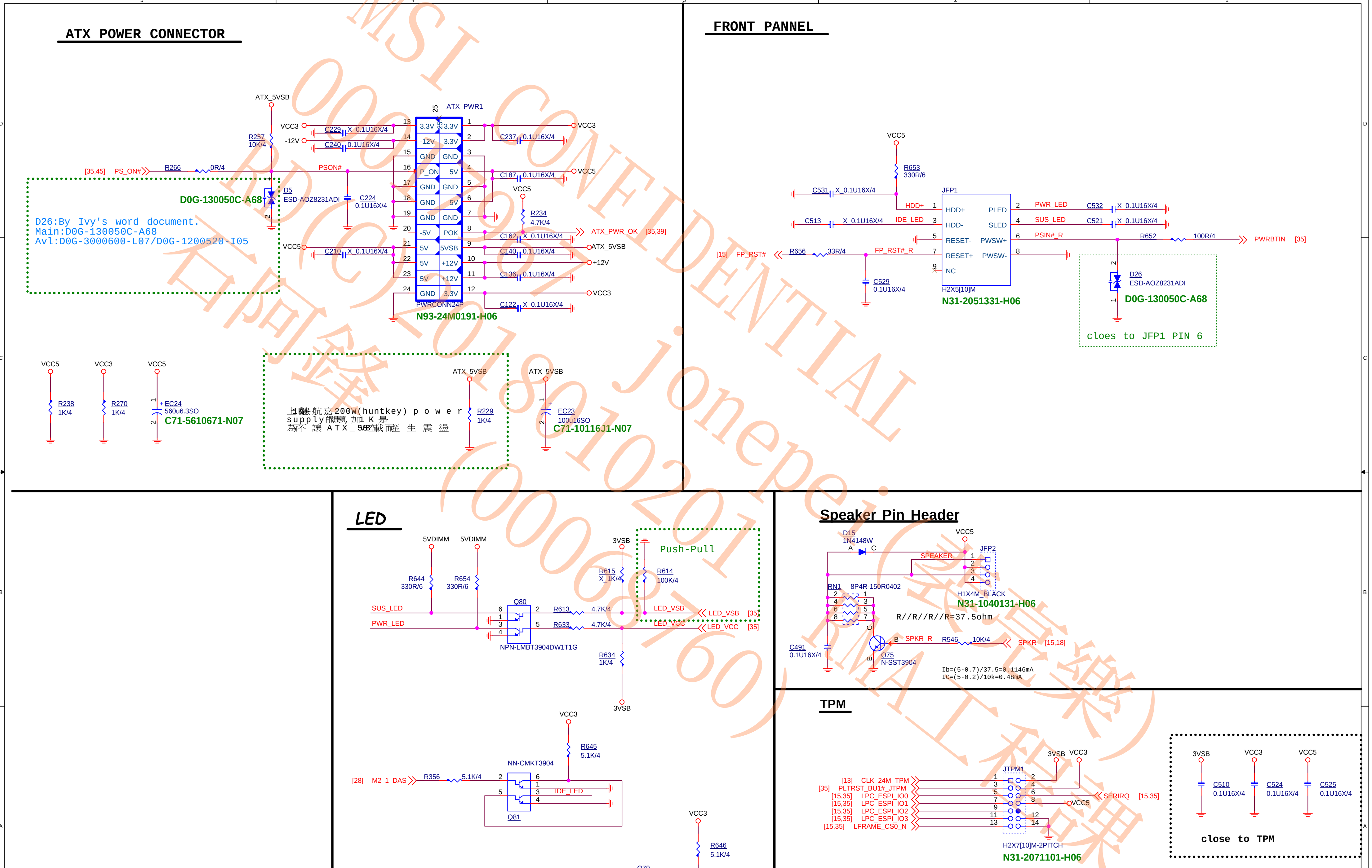

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MS-7B28

Size: Custom | Document Description: ATX F_Panel/TPM/MSI_LED | Rev: 10/20/30

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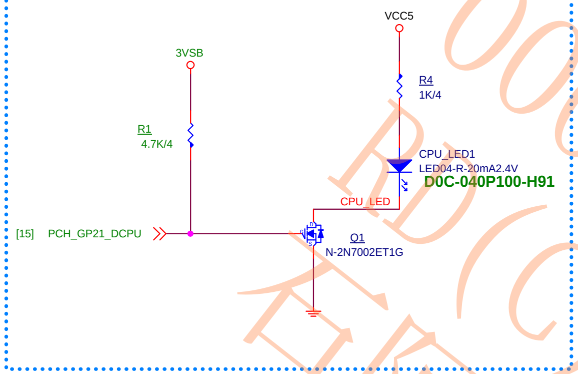
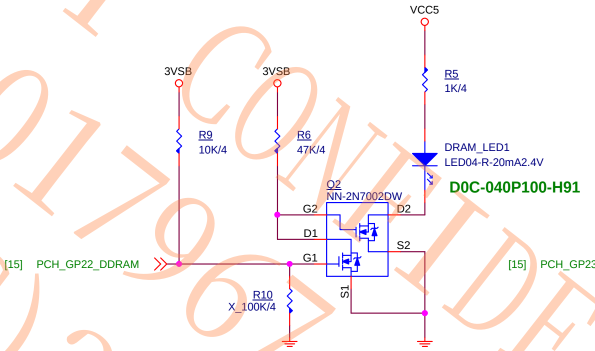
EZ DEBUG LED

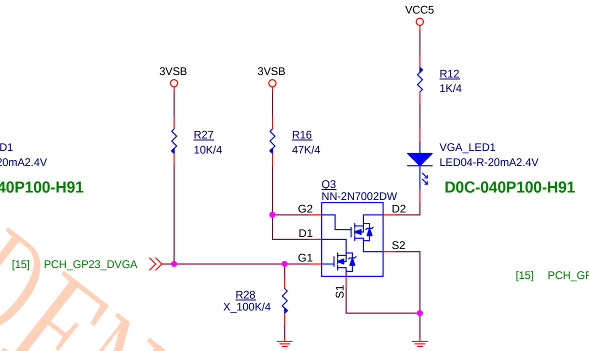
CPU



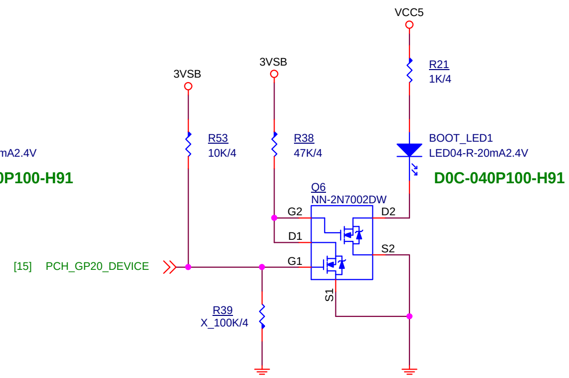
DRAM



VGA



DEVICE



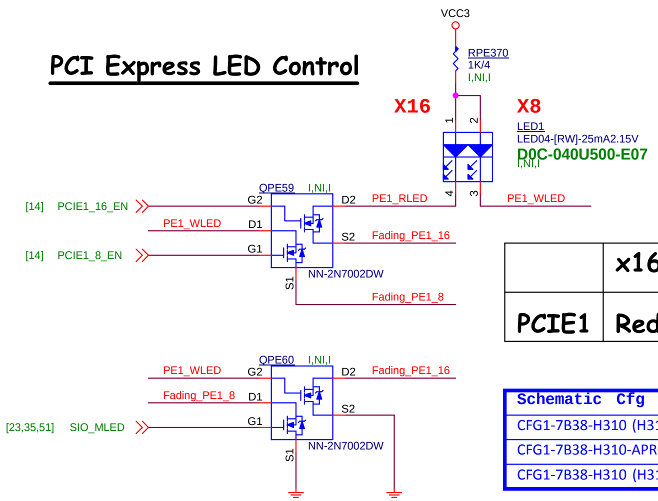
LED	PCH_GP20	PCH_GP21	PCH_GP22	PCH_GP23
亮	NATIVE PULL HIGH	GPO PULL HIGH	GPO PULL HIGH	NATIVE PULL HIGH
滅	NATIVE LOW	GPO LOW (default LOW)	GPO LOW (default LOW)	GPO LOW (default LOW)

LED
RED:D0C-040P100-H91
AVL:D0C-040S500-E07

WHI:D0C-040T200-H91
AVL:D0C-040S200-E07

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 check CPU 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，三個燈都是滅掉的。
(系統重啟或其他原因造成系統重開機則仍按上述行為動作

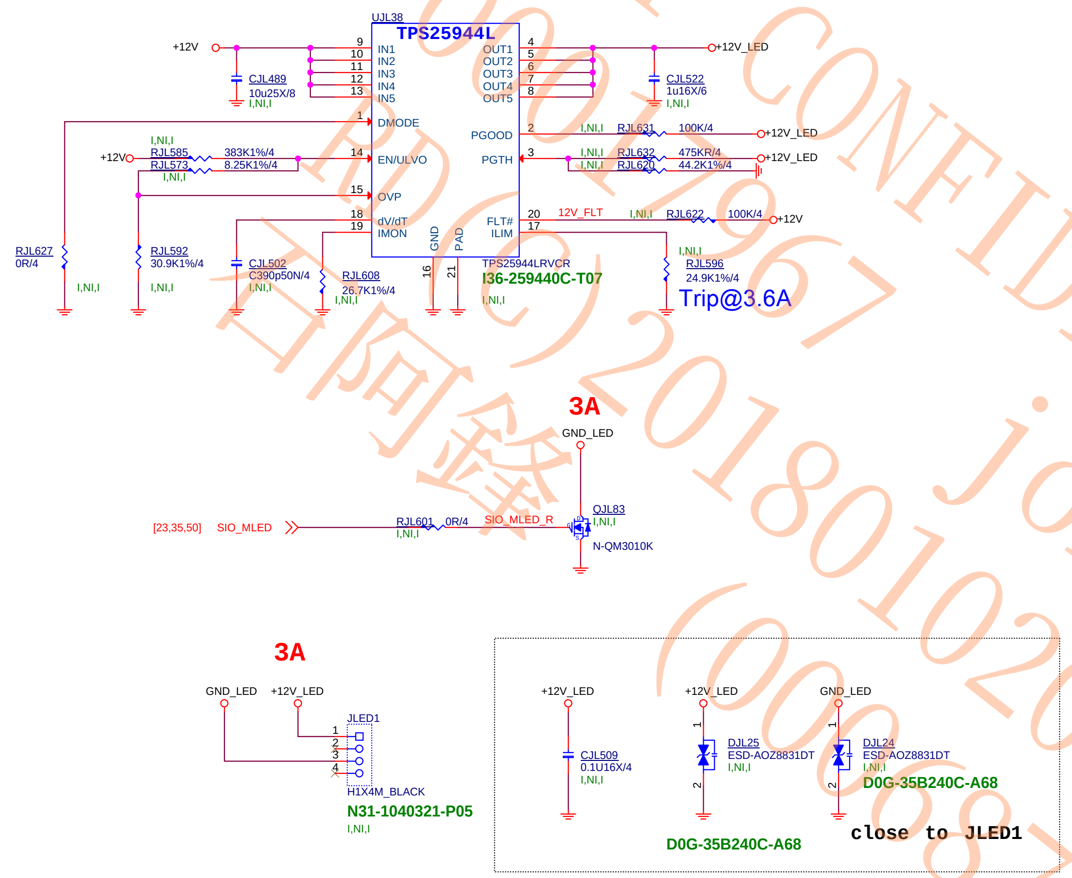
PCI Express LED Control



	x16	x8
PCIE1	Red	White

Schematic Cfg		Project
CFG1-7B38-H310 (H310M GAMING PLUS) ver.1.0	V	A
CFG1-7B38-H310-APRO (H310-A Pro) ver.2.0	X	B
CFG1-7B38-H310 (H310-A GAMING ARCTIC) ver.3.0	V	C

LED Control by SIO(JLED1)



Schematic Cfg	Project	
CFG1-7B38-H310 (H310M GAMING PLUS) ver.1.0	V	A
CFG1-7B38-H310-APRO (H310-A Pro) ver.2.0	X	B
CFG1-7B38-H310 (H310-A GAMING ARCTIC) ver.3.0	V	C

MICRO-STAR INT'L CO.,LTD

MS-7B28

Size: Custom | Document Description: JLED | Rev: 10/20/30

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OPTION BOM PARTS

Schematic Cfg	Project
CFG1-7B38-H310 (H310M GAMING PLUS) ver.1.0	A
CFG1-7B38-H310-APRO (H310-A Pro) ver.2.0	B
CFG1-7B38-H310 (H310-A GAMING ARCTIC) ver.3.0	C

5010 Level

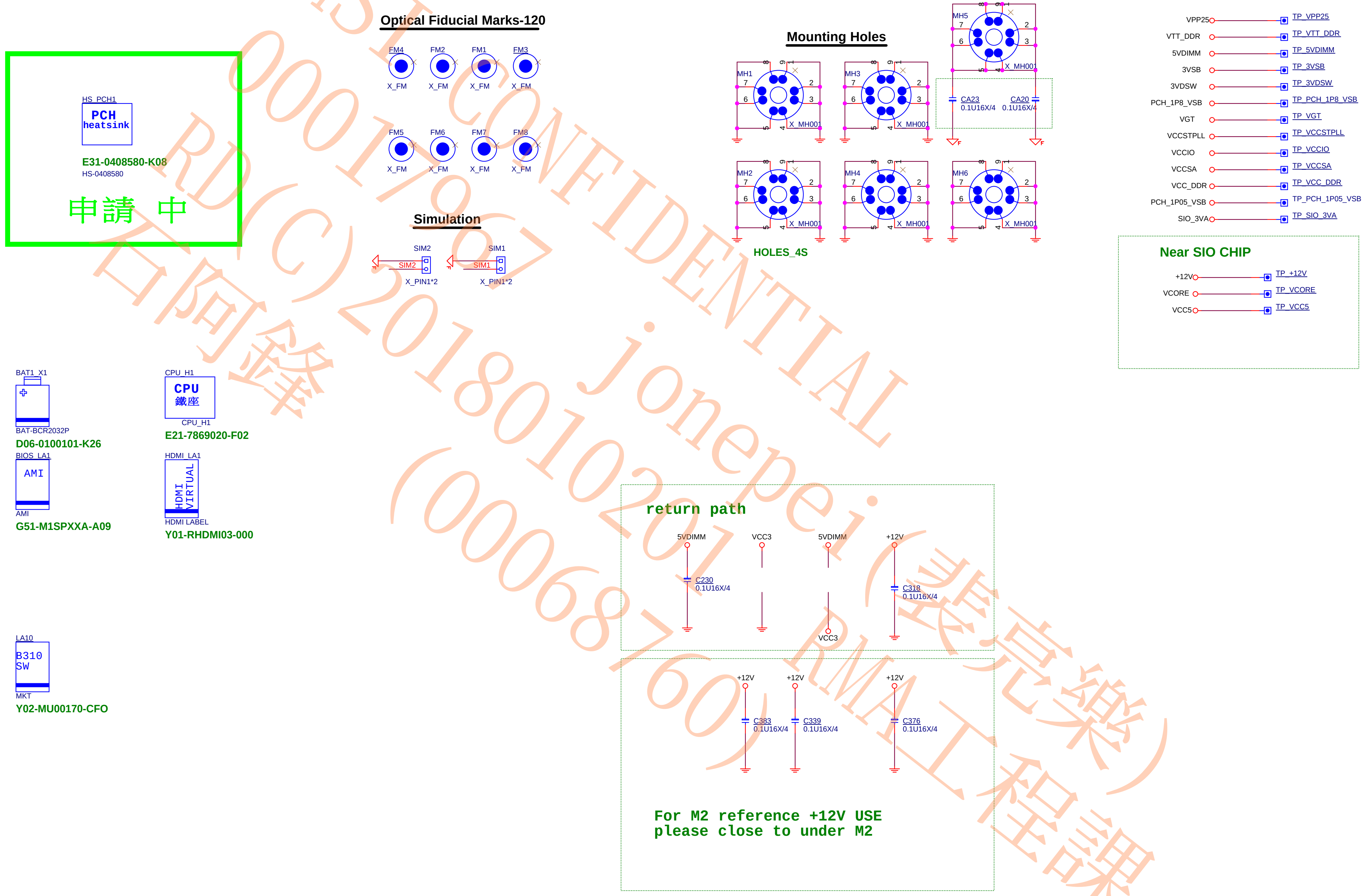
	A	B	C
EZ Debug LED	OPT_EZ_GPLUS Audio/bot LED LED04-R-20mA2.4V_1608-HF D0C-040P100-H91 Red	OPT_EZ_PRO Audio/bot LED LED04-R-20mA2.4V_1608-HF D0C-040T200-H91 White	OPT_EZ_GARCTIC Audio/bot LED LED04-R-20mA2.4V_1608-HF D0C-040T200-H91 White
PCB	PD0-07B2810-E48 PD0-07B2810-G37 OPT_PCB_GPLUS  7B28_10	PK0-07B2820-E48 PK0-07B2820-G37 OPT_PCB_PRO  7B28_20	PS0-07B2830-E48 PS0-07B2830-G37 OPT_PCB_GARCTIC  7B28_30

5020 Level

	A	B	C
AUDIO LED	OPT_AUDLED_GPLUS AUDIO LED X_LED04-W-20mA3.25V USB_C1_24_2 D0C-040S600-E07 Red	X	OPT_AUDLED_GARCTIC AUDIO LED LED04-W-20mA3.9V_1608-RH USB_C1_24_2 D0C-040T300-H91 White

60 Level

	A	B	C
REAR U3	OPT_REARU3_GPLUS LAN+ U3 USBAX2M_RED-RH-2 USB_C1_24_2 N53-18M0201-L06	OPT_REARU3_PRO LAN+ U3 USBAX2M_BLUE-RH-6 USB_C1_24_2 N53-18M0091-F02	OPT_REARU3_GARCTIC LAN+ U3 USBAX2M_RED-RH-2 USB_C1_24_2 N53-18M0201-L06
DDR Slot	OPT_DDRSLOT_GPLUS DDR Slot DDRIV-288P_RED-RH-1 DDRIV_D288 N13-2880681-L06	OPT_DDRSLOT_PRO DDR Slot DDRIV-288P_BLACK-RH-21 DDRIV_D288 N13-2880561-L06	OPT_DDRSLOT_GARCTIC DDR Slot DDRIV-288P_BLACK-RH-21 DDRIV_D288 N13-2880521-L06
PCIEx16 Slot	OPT_PCIEX16_GPLUS PCIE_16 SLOT-PCI164P_RED-2PITCH-RH-1 N11-1641671-L06	OPT_PCIEX16_PRO PCIE_16 SLOT-PCI164P_BLACK-2PITCH-RH-38 N11-1641221-L06	OPT_PCIEX16_GARCTIC PCIE_16 SLOT-PCI164P_WHITE-2PITCH-RH-4 N11-1641601-L06
DVI	OPT_VGA_GPLUS VGA DVI24P_BLACK-RH-17 N5B-24F0771-EB6		OPT_VGA_GARCTIC VGA DVI24P_BLACK-RH-17 N5B-24F0771-EB6
VGA+DVI		OPT_VGADVI_PRO VGA+DVI VGA_DVI-RH-31 N58-39F0371-EB6	
PACK LABEL	OPT_LA_GPLUS B310 Lable MKT G51-M1SPM62-Q13	OPT_LA_PRO B310 Lable MKT G51-M1SPM61-Q13	OPT_LA_GARCTIC B310 Lable MKT G51-M1SPM60-Q13



Optical Fiducial Marks-120
FM4 FM2 FM1 FM3
X_FM X_FM X_FM X_FM
FM5 FM6 FM7 FM8
X_FM X_FM X_FM X_FM
Simulation
SIM2 SIM1
X_PIN1*2 X_PIN1*2
Mounting Holes
MH1 MH3 MH5 MH2 MH4 MH6
X_MH001
HOLES_4S
CA23 0.1U16X/4
CA20 0.1U16X/4
HS_PCH1
PCH heatsink
E31-0408580-K08
HS-0408580
申請 中
BAT1_X1
BAT-BCR2032P
D06-0100101-K26
CPU_H1
CPU 鐵座
E21-7869020-F02
BIOS_LA1
AMI
G51-M1SPXXA-A09
HDMI_LA1
HDMI VIRTUAL
HDMI LABEL
Y01-RHDMI03-000
LA10
B310 SW
MKT
Y02-MU00170-CFO
VPP25 TP_VPP25
VTT_DDR TP_VTT_DDR
5VDIMM TP_5VDIMM
3VSB TP_3VSB
3VDSW TP_3VDSW
PCH_1P8_VSB TP_PCH_1P8_VSB
VGT TP_VGT
VCCSTPLL TP_VCCSTPLL
VCCIO TP_VCCIO
VCCSA TP_VCCSA
VCC_DDR TP_VCC_DDR
PCH_1P05_VSB TP_PCH_1P05_VSB
SIO_3VA TP_SIO_3VA
Near SIO CHIP
+12V TP_+12V
VCORE TP_VCORE
VCC5 TP_VCC5
return path
5VDIMM VCC3 5VDIMM +12V
C230 0.1U16X/4
C318 0.1U16X/4
VCC3
+12V +12V +12V
C383 0.1U16X/4
C339 0.1U16X/4
C376 0.1U16X/4
For M2 reference +12V USE
please close to under M2

MICRO-STAR INT'L CO.,LTD

MS-7B28

Size	Document Description	Rev
Custom	Manual Parts	10/20/30

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