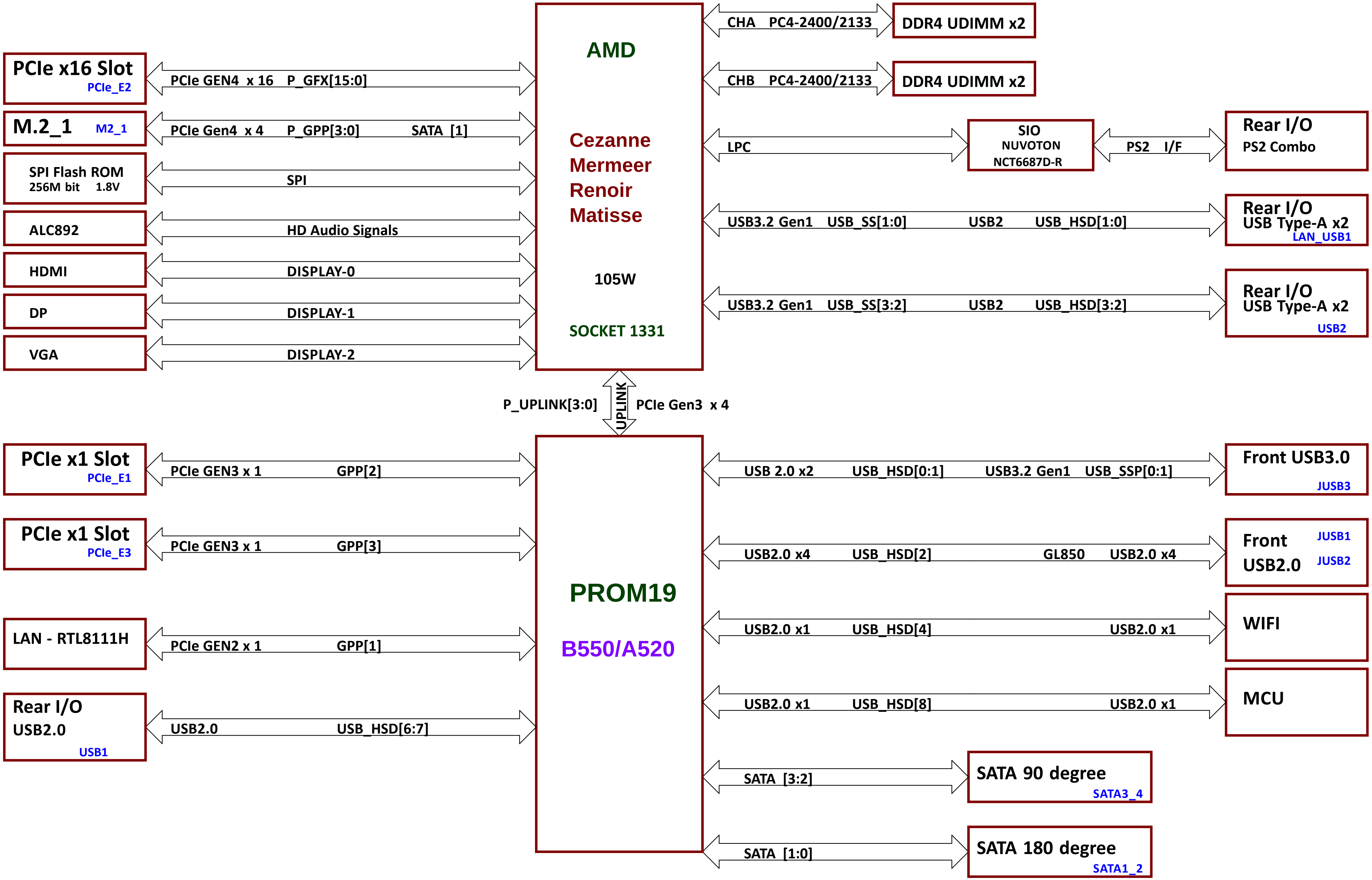
AMD AM4 B550

M-ATX (243.84 X 243.84)

MICRO-STAR INT'L CO.,LTD

MS-7D14

Size	Document Description	Rev
Custom	01 Cover Sheet	20
Date: Wednesday, July 08, 2020	Sheet 1 of 67	

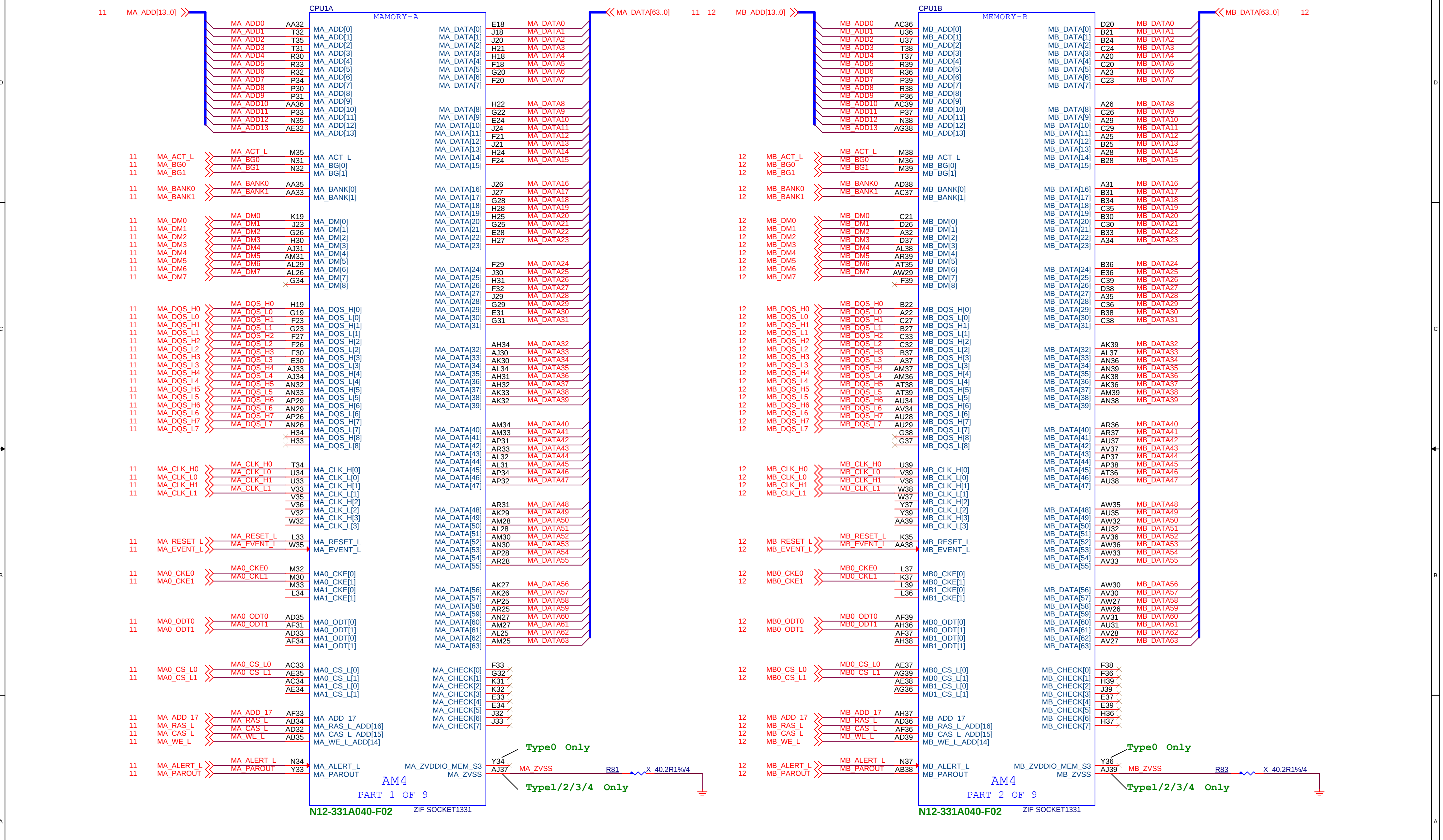


MICRO-STAR INT'L CO.,LTD

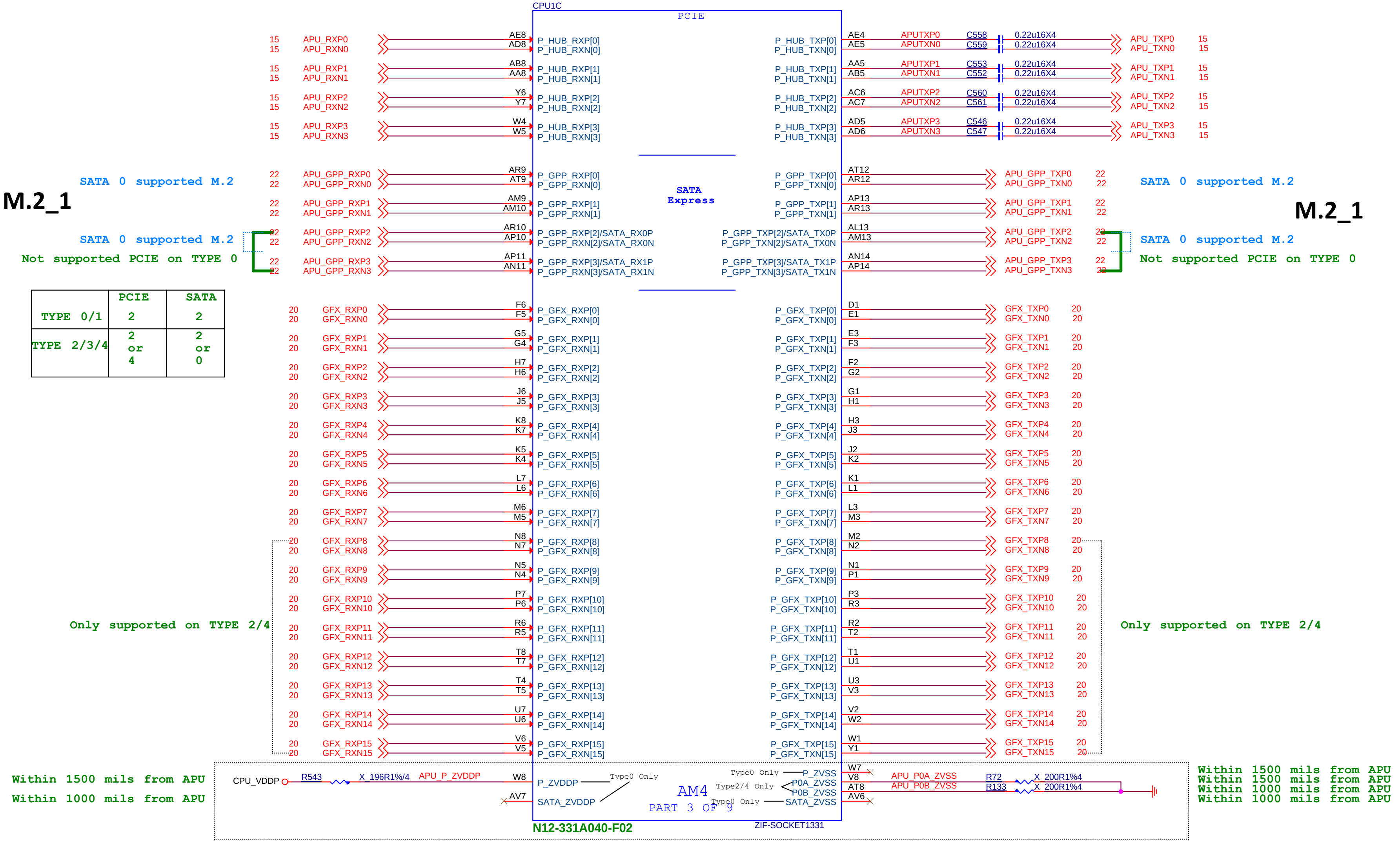
MS-7D14

Size	Document Description	Rev
Custom	02 Block Diagram	20

Date: Wednesday, July 08, 2020 | Sheet 2 of 67



MICRO-STAR INT'L CO.,LTD		
MS-7D14		
Size: Custom	Document Description: 03 AM4 DDR4 I / F	Rev: 20
Date: Wednesday, July 08, 2020	Sheet 3 of 67	



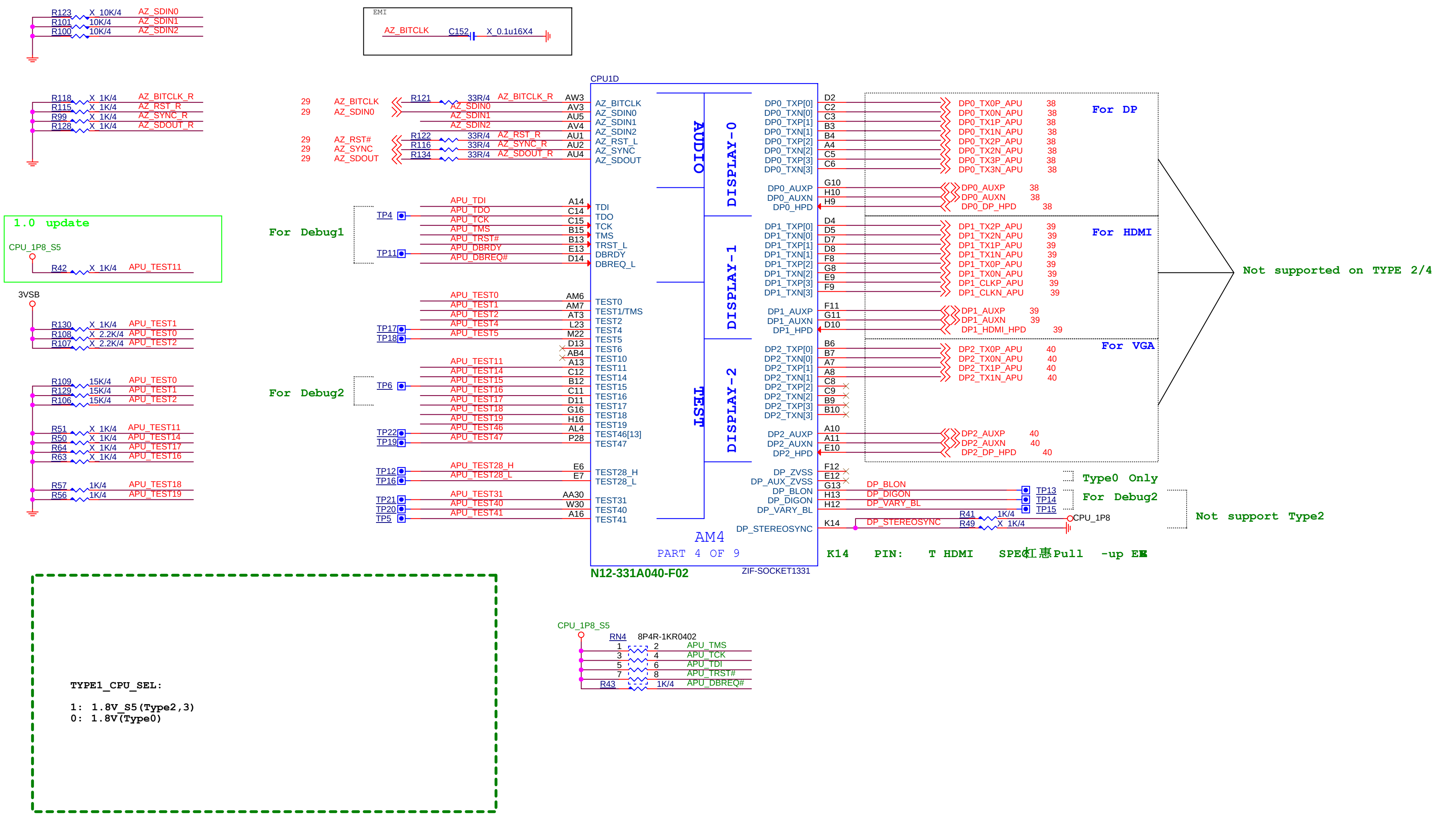
	PCIE	SATA
TYPE 0/1	2	2
TYPE 2/3/4	2 or 4	2 or 0

MICRO-STAR INT'L CO.,LTD

MS-7D14

Size	Document Description	Rev
Custom	04 AM4 PCIE / SATAE	20

Date: Wednesday, July 08, 2020 Sheet 4 of 67

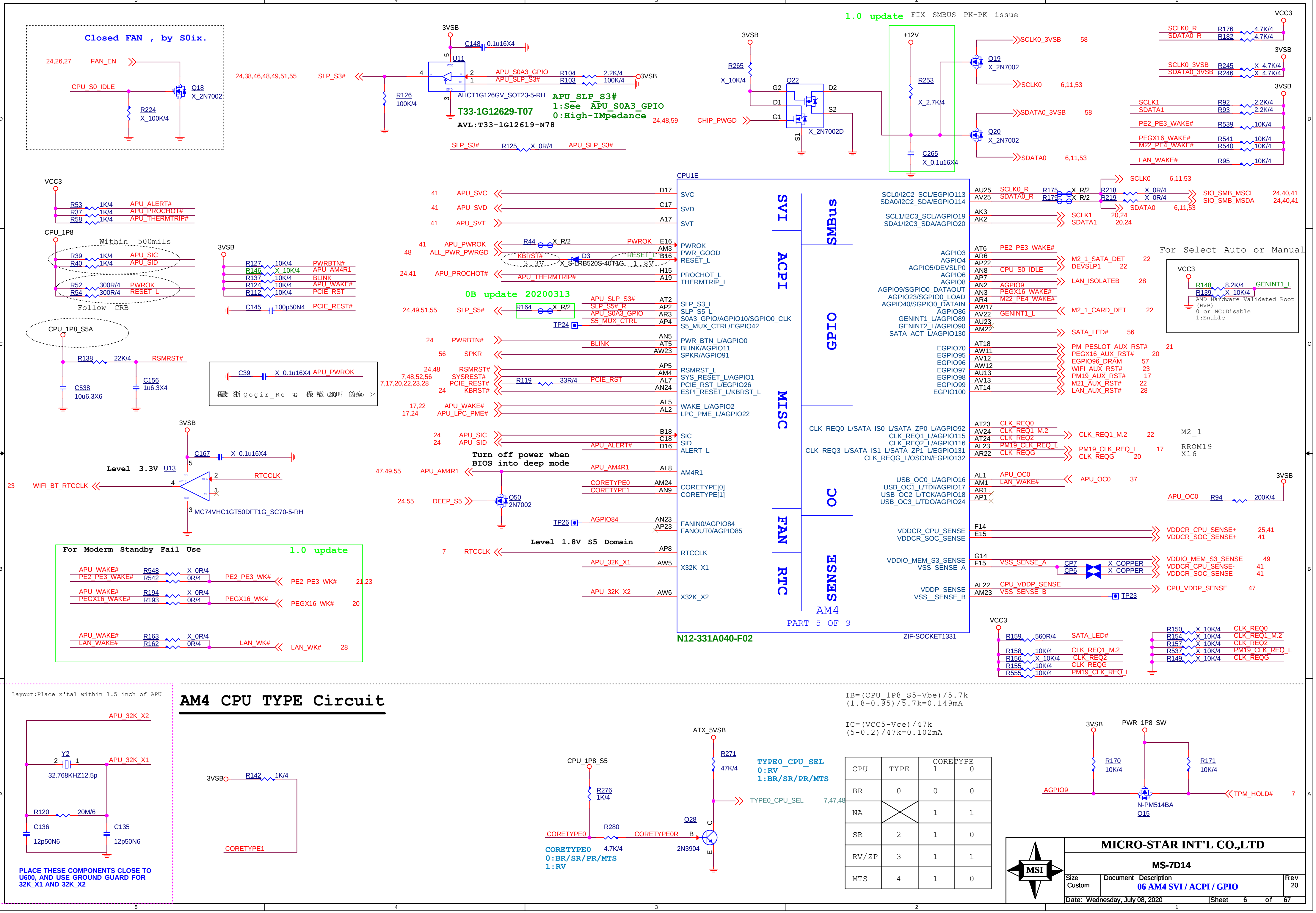


MICRO-STAR INT'L CO.,LTD

MS-7D14

Size	Document Description	Rev
Custom	05 AM4 Display / Audio	20

Date: Wednesday, July 08, 2020 Sheet 5 of 67



AM4 CPU TYPE Circuit

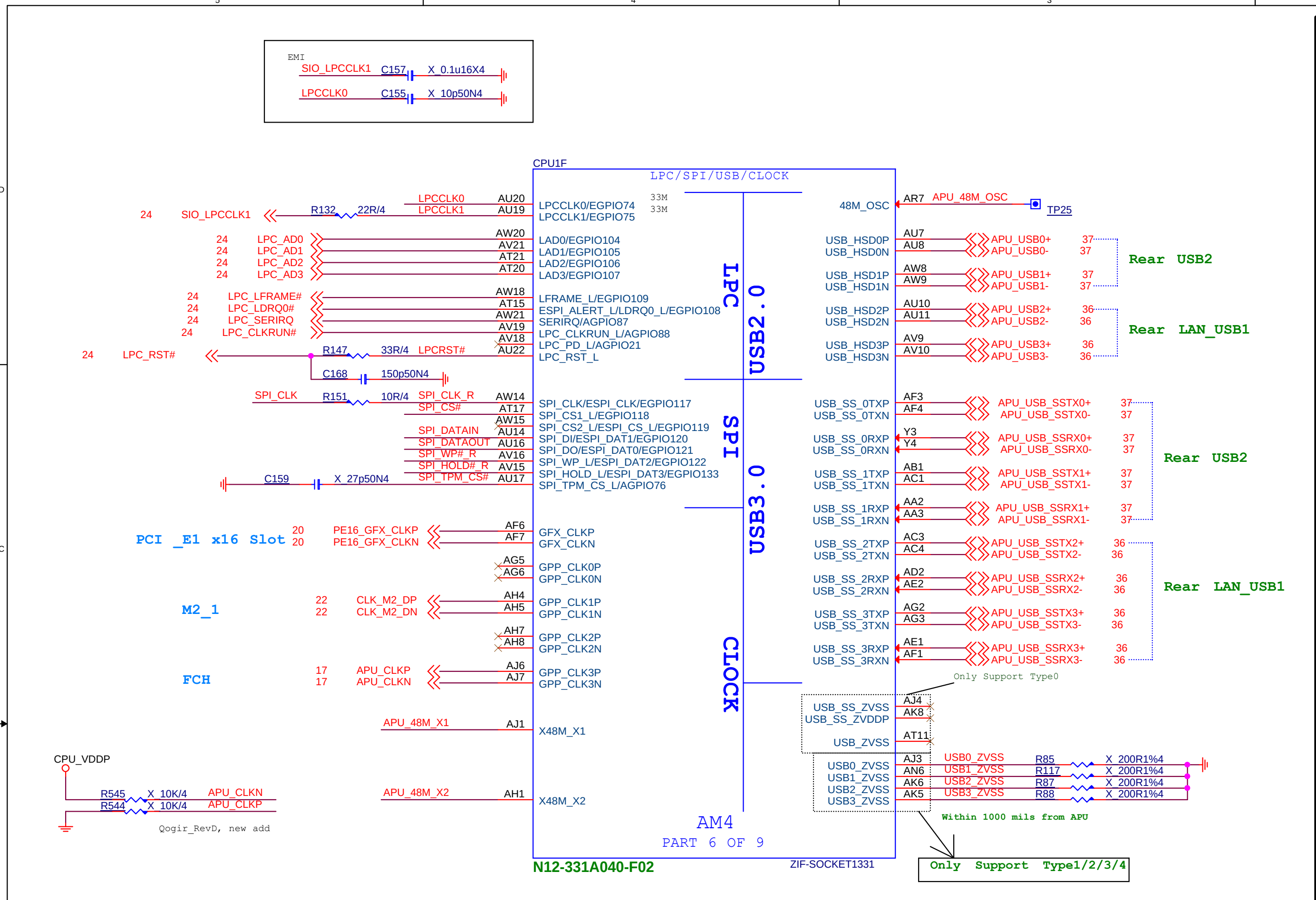
CPU	TYPE	CORETYPE 1	CORETYPE 0
BR	0	0	0
NA		1	1
SR	2	1	0
RV/ZP	3	1	1
MTS	4	1	0

MICRO-STAR INT'L CO.,LTD

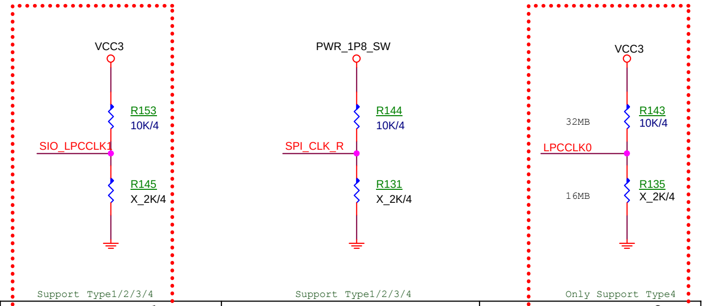
MS-7D14

Size	Document Description	Rev
Custom	06 AM4 SVI / ACPI / GPIO	20

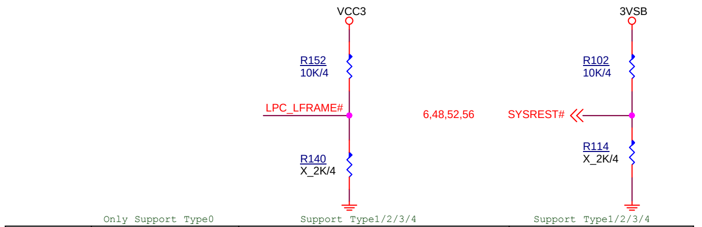
Date: Wednesday, July 08, 2020 Sheet 6 of 67



Strapping Options

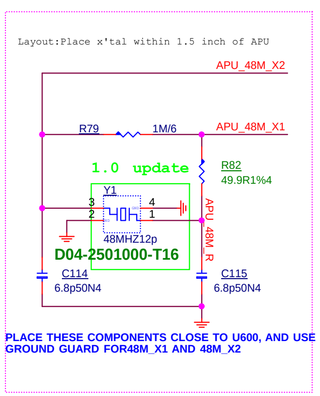


	LPCCLK1	SPI_CLK	LPCCLK0
PULL HIGH	Configured for Internal clock generator (Default)	Use 48Mhz crystal clock and generate both internal and external clocks (Default)	PSP should modify SPI page register bits [25:24] to remap physical ROM to upper image (Default)
PULL LOW	Configured for External clock generator ?????	Use 100Mhz PCIE clock as reference clock and generate internal clocks only	PSP should not modify SPI page register bits [25:24]

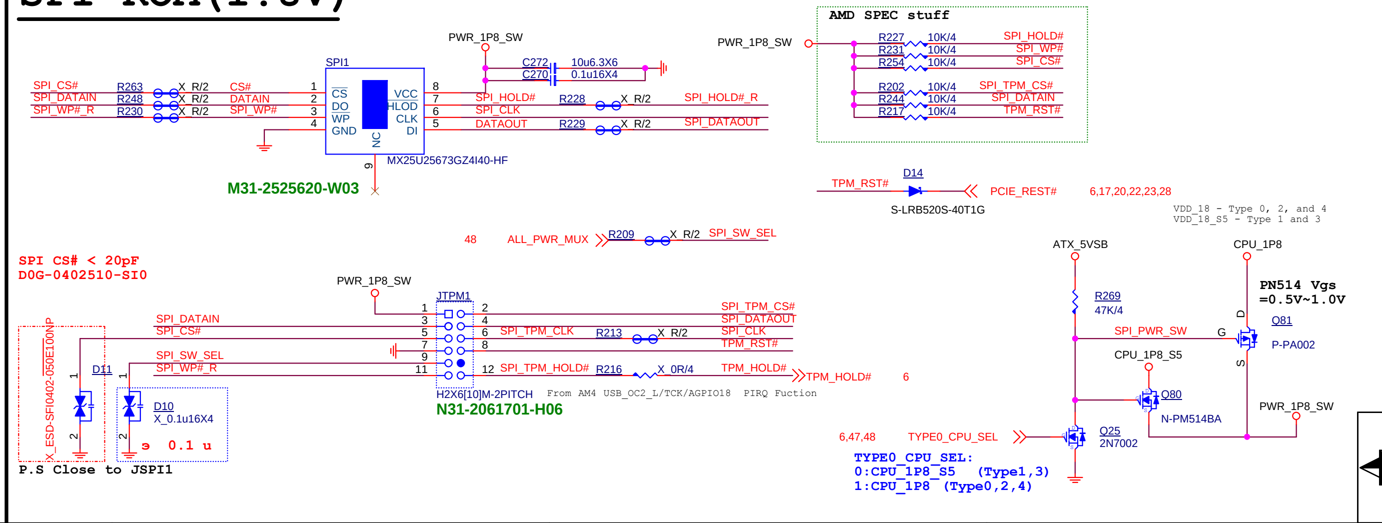


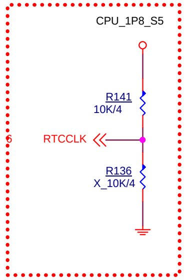
	AGPIO3	LFRAME	SYSREST#
PULL HIGH	Enhanced Reset logic	SPI ROM (Default)	Normal reset mode (Default)
PULL LOW	(Default) Traditional Reset logic	LPC ROM	short reset mode

D04-2501800-F07 (Main)
D04-2501000-T16 (AVL)

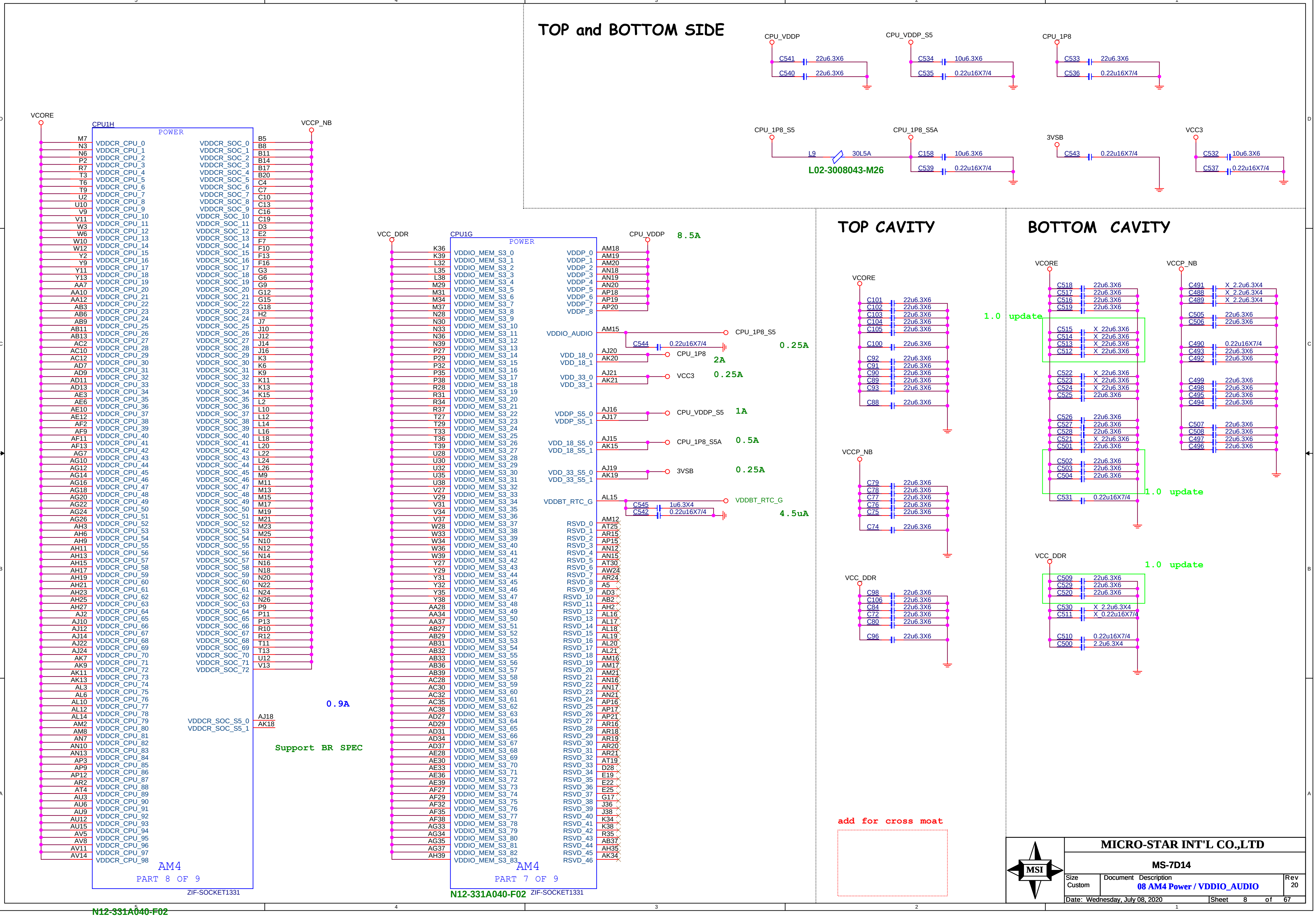


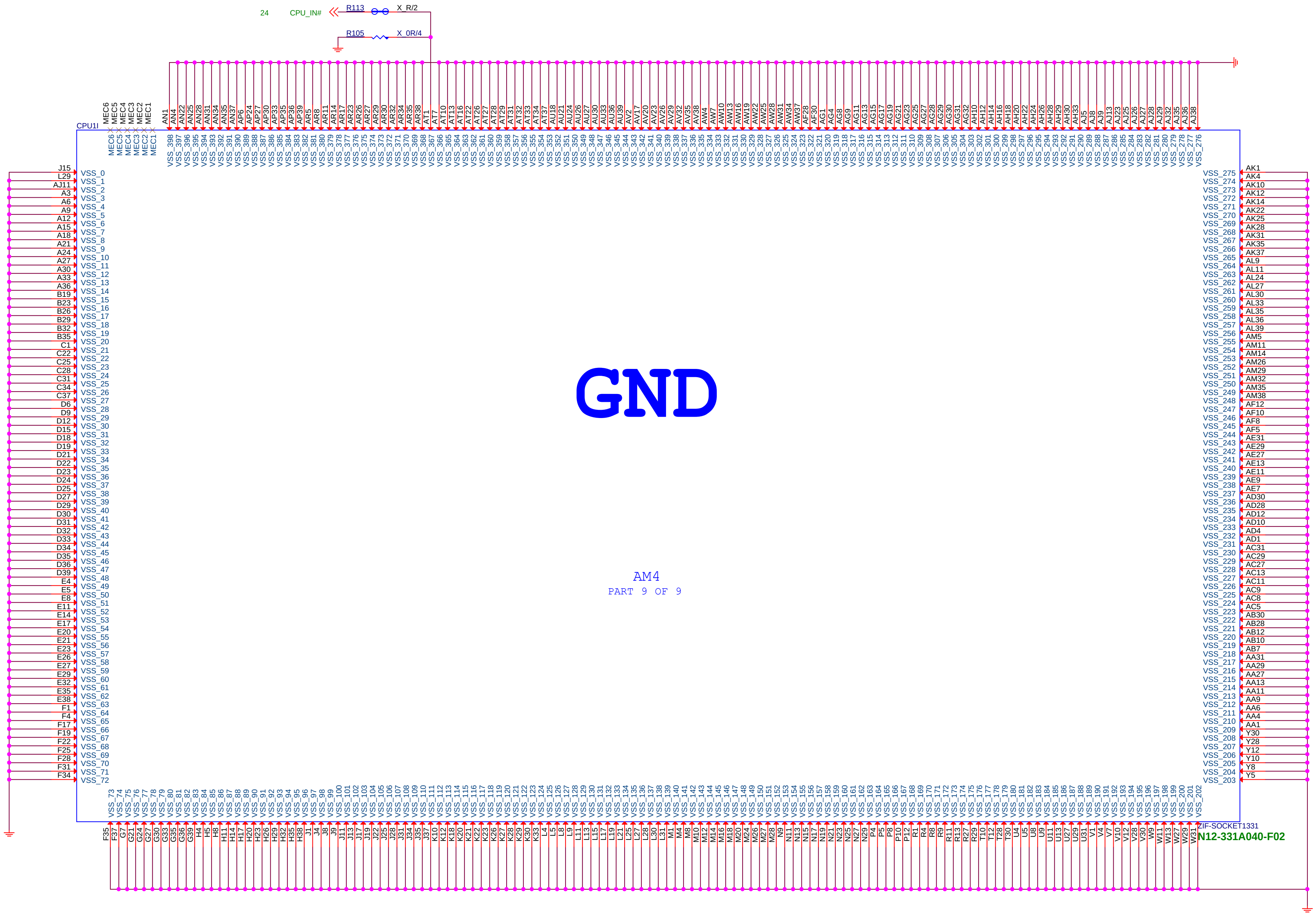
SPI ROM(1.8V)





	RTCCLK
PULL HIGH	RTCCLK is input and is used as the bypass clock (Default)
PULL LOW	Normal Mode: Use 32Khz xtal as the source of RTC clock


TOP and BOTTOM SIDE
CPU_VDDP
C541 22u6.3X6
C540 22u6.3X6
CPU_VDDP_S5
C534 10u6.3X6
C535 0.22u16X7/4
CPU_1P8
C533 22u6.3X6
C536 0.22u16X7/4
CPU_1P8_S5
L9 30L5A
L02-3008043-M26
CPU_1P8_S5A
C158 10u6.3X6
C539 0.22u16X7/4
3VSB
C543 0.22u16X7/4
VCC3
C532 10u6.3X6
C537 0.22u16X7/4
TOP CAVITY
VCORE
C101 C102 C103 C104 C105 22u6.3X6
C100 22u6.3X6
C92 C91 C90 C89 C93 22u6.3X6
C88 22u6.3X6
VCCP_NB
C79 C78 C77 C76 C75 22u6.3X6
C74 22u6.3X6
VCC_DDR
C98 C106 C84 C72 C80 22u6.3X6
C96 22u6.3X6
add for cross moat
BOTTOM CAVITY
VCORE
C518 C517 C516 C519 22u6.3X6
1.0 update
C515 C514 C513 C512 X_22u6.3X6
C522 C523 C524 X_22u6.3X6
C525 22u6.3X6
C526 C527 C528 22u6.3X6
C521 X_22u6.3X6
C501 22u6.3X6
C502 C503 C504 22u6.3X6
C531 0.22u16X7/4
1.0 update
VCCP_NB
C491 C488 C489 X_2.2u6.3X4
C505 C506 22u6.3X6
C490 0.22u16X7/4
C493 C492 22u6.3X6
C499 C498 C495 C494 22u6.3X6
C507 C508 C497 C496 22u6.3X6
VCC_DDR
1.0 update
C509 C529 C520 22u6.3X6
C530 X_2.2u6.3X4
C511 X_0.22u16X7/4
C510 0.22u16X7/4
C500 2.2u6.3X4
VCORE
VCCP_NB
CPU1H
POWER
VDDCR_CPU_0 … VDDCR_CPU_98
VDDCR_SOC_0 … VDDCR_SOC_72
VDDCR_SOC_S5_0 AJ18
VDDCR_SOC_S5_1 AK18
0.9A
Support BR SPEC
AM4
PART 8 OF 9
ZIF-SOCKET1331
N12-331A040-F02
VCC_DDR
CPU1G
POWER
VDDIO_MEM_S3_0 … VDDIO_MEM_S3_83
CPU_VDDP 8.5A
VDDP_0 … VDDP_8
VDDIO_AUDIO AM15 CPU_1P8_S5
C544 0.22u16X7/4
0.25A
VDD_18_0 AJ20
VDD_18_1 AK20
CPU_1P8 2A
VDD_33_0 AJ21
VDD_33_1 AK21
VCC3 0.25A
VDDP_S5_0 AJ16
VDDP_S5_1 AJ17
CPU_VDDP_S5 1A
VDD_18_S5_0 AJ15
VDD_18_S5_1 AK15
CPU_1P8_S5A 0.5A
VDD_33_S5_0 AJ19
VDD_33_S5_1 AK19
3VSB 0.25A
VDDBT_RTC_G AL15 VDDBT_RTC_G
C545 1u6.3X4
C542 0.22u16X7/4
4.5uA
RSVD_0 … RSVD_46
AM4
PART 7 OF 9
N12-331A040-F02
ZIF-SOCKET1331
MICRO-STAR INT'L CO.,LTD
MSI
MS-7D14
Size Custom
Document Description
08 AM4 Power / VDDIO_AUDIO
Rev 20
Date: Wednesday, July 08, 2020
Sheet 8 of 67



MICRO-STAR INT'L CO.,LTD

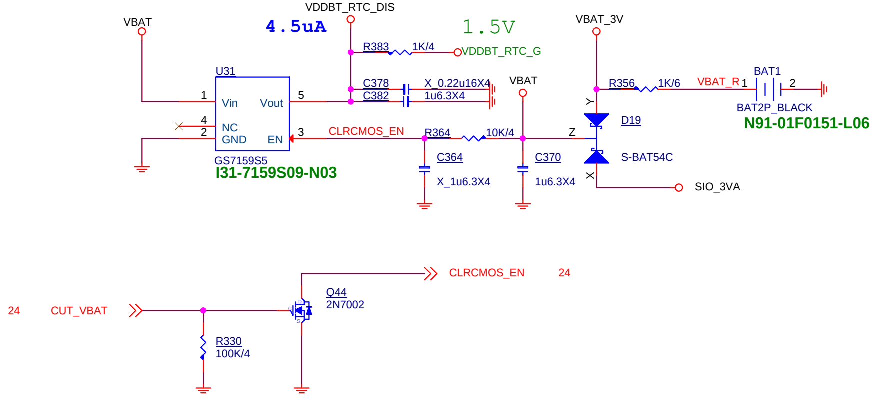
MS-7D14

Size	Document Description	Rev
Custom	09 AM4 GND	20

Date: Wednesday, July 08, 2020 Sheet 9 of 67

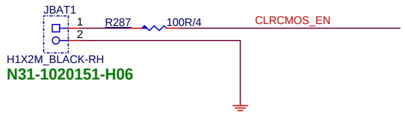
RTC & Clear CMOS Circuit

VDDBT_RTC_G	1.50	All	4.5uA	–	–



RTC Backup

Clear CMOS button

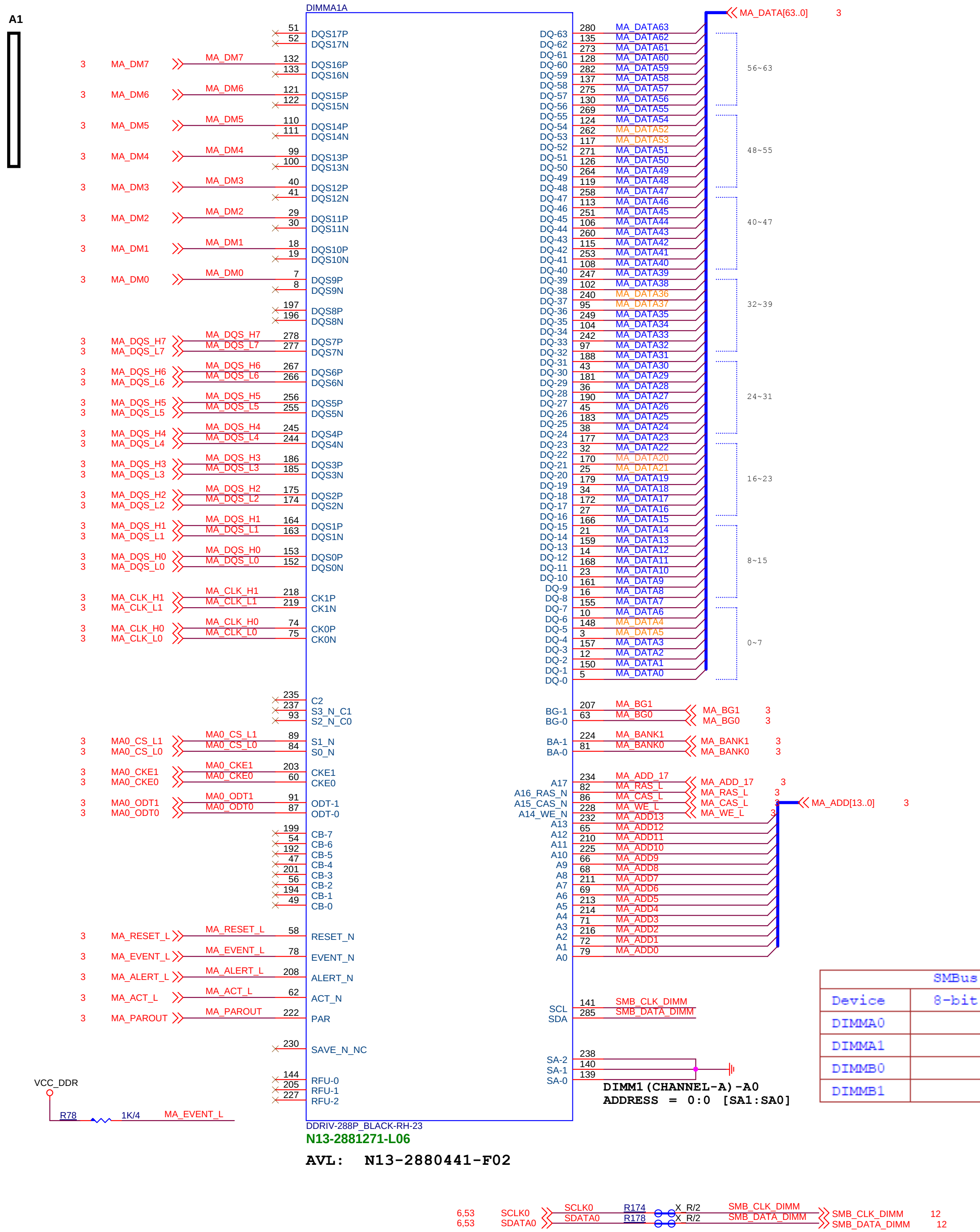


MICRO-STAR INT'L CO.,LTD

MS-7D14

Size: Custom | Document Description: 10 RTC / CMOS | Rev: 20

Date: Wednesday, July 08, 2020 | Sheet 10 of 67



SMBus 0	
Device	8-bit Address (hex)
DIMMA0	A0
DIMMA1	A4
DIMMB0	A2
DIMMB1	A6

MICRO-STAR INT'L CO.,LTD

MS-7D14

Size	Document Description	Rev
Custom	11 DDR4 - DIMM CH-A	20

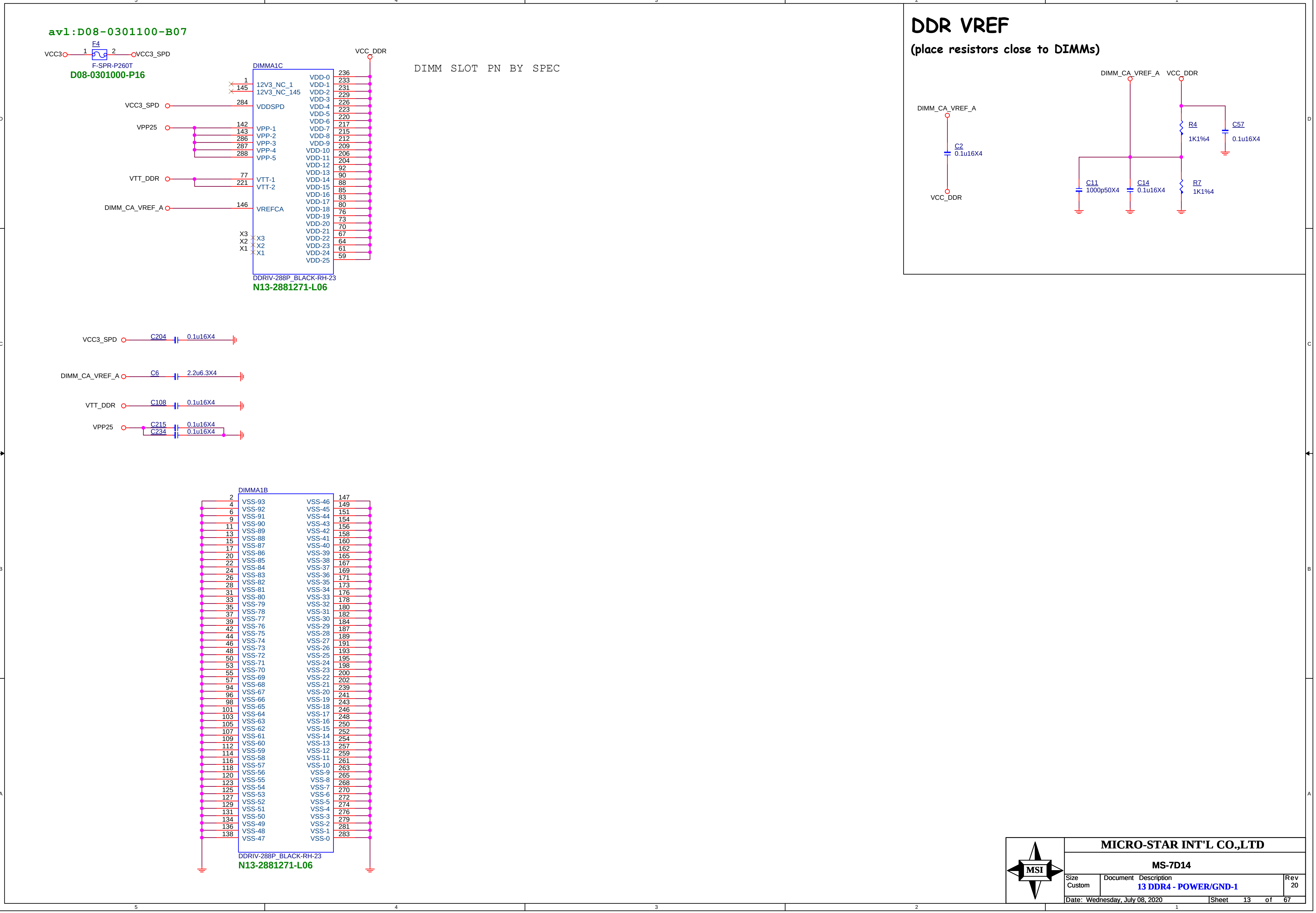
Date: Wednesday, July 08, 2020 | Sheet 11 of 67

MICRO-STAR INT'L CO.,LTD

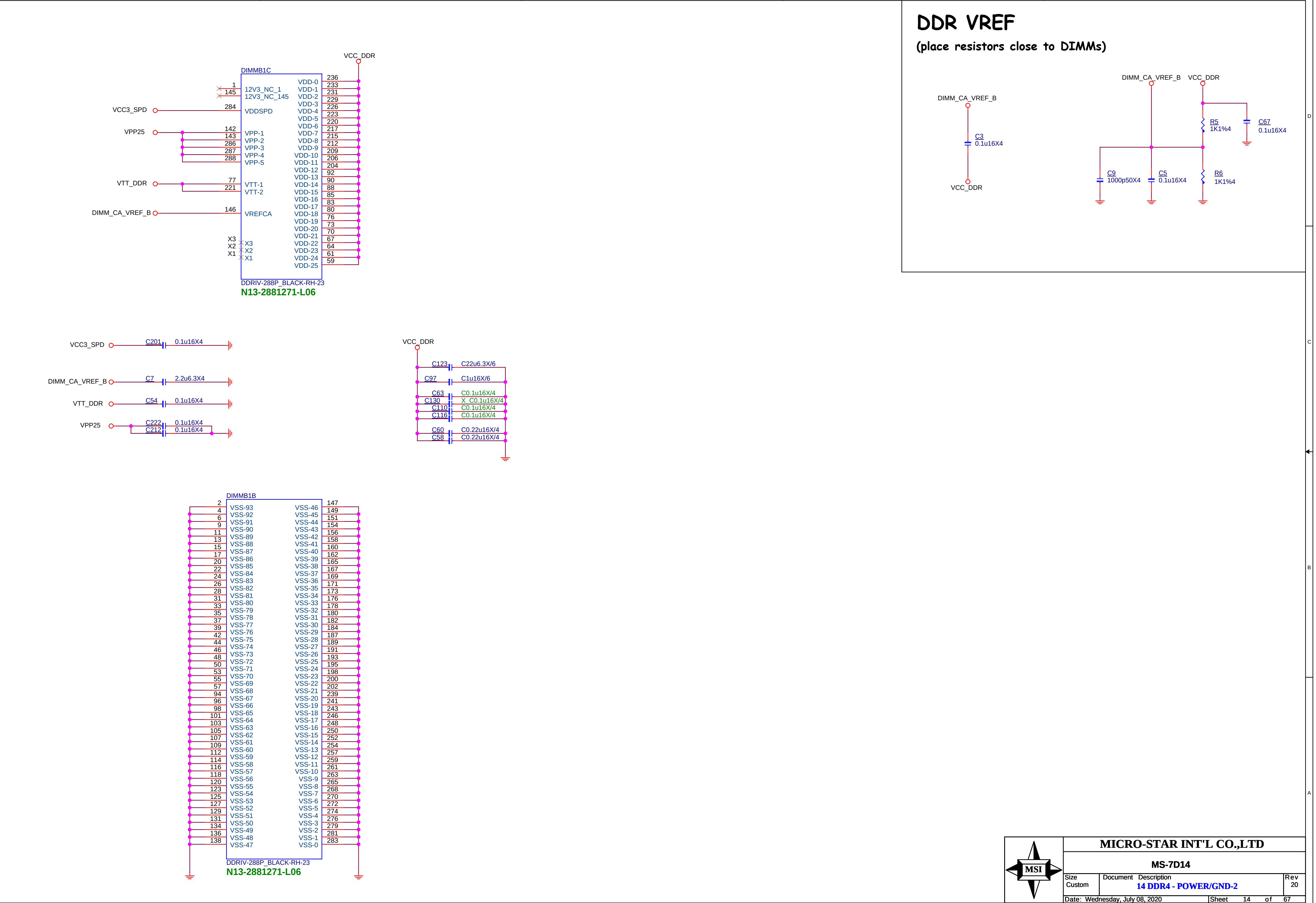
MS-7D14

Size	Document Description	Rev
Custom	12 DDR4 - DIMM CH-B	20

Date: Wednesday, July 08, 2020 Sheet 12 of 67

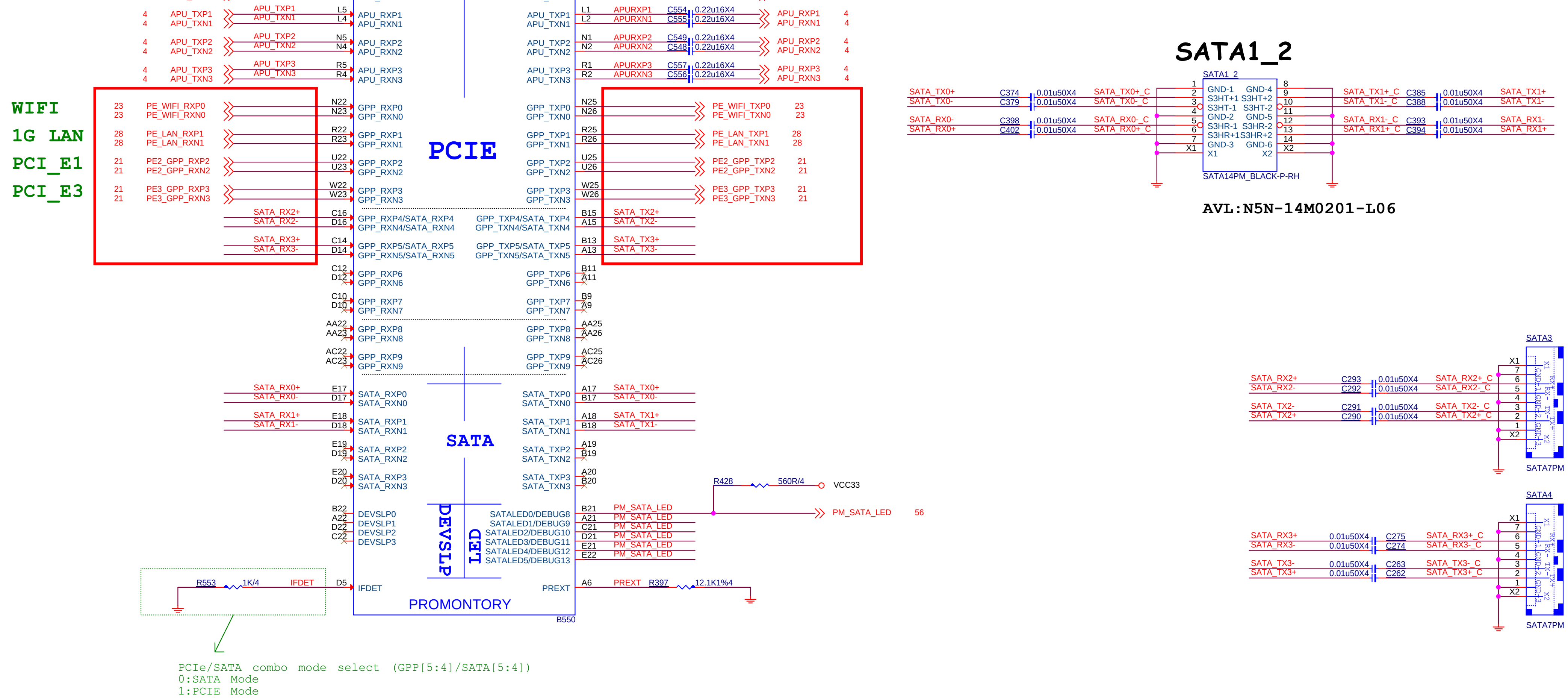


avl:D08-0301100-B07
F4
VCC3
VCC3_SPD
F-SPR-P260T
D08-0301000-P16
DIMMA1C
12V3_NC_1
12V3_NC_145
VDDSPD
VPP-1
VPP-2
VPP-3
VPP-4
VPP-5
VTT-1
VTT-2
VREFCA
X3
X2
X1
VDD-0
VDD-1
VDD-2
VDD-3
VDD-4
VDD-5
VDD-6
VDD-7
VDD-8
VDD-9
VDD-10
VDD-11
VDD-12
VDD-13
VDD-14
VDD-15
VDD-16
VDD-17
VDD-18
VDD-19
VDD-20
VDD-21
VDD-22
VDD-23
VDD-24
VDD-25
VCC_DDR
VPP25
VTT_DDR
DIMM_CA_VREF_A
DDRIV-288P_BLACK-RH-23
N13-2881271-L06
DIMM SLOT PN BY SPEC
DDR VREF
(place resistors close to DIMMs)
C2
0.1u16X4
R4
1K1%4
C57
0.1u16X4
C11
1000p50X4
C14
0.1u16X4
R7
1K1%4
C204
0.1u16X4
C6
2.2u6.3X4
C108
0.1u16X4
C215
0.1u16X4
C234
0.1u16X4
DIMMA1B
VSS-0 … VSS-93
DDRIV-288P_BLACK-RH-23
N13-2881271-L06
MSI
MICRO-STAR INT'L CO.,LTD
MS-7D14
Size
Custom
Document Description
13 DDR4 - POWER/GND-1
Rev
20
Date: Wednesday, July 08, 2020
Sheet 13 of 67

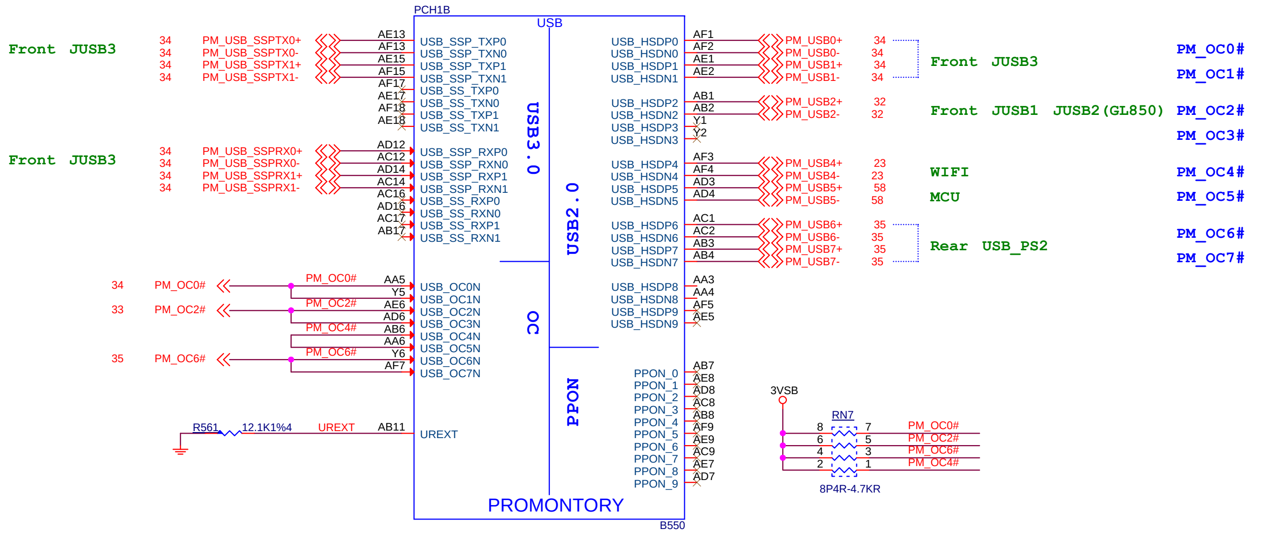


DDR VREF
(place resistors close to DIMMs)
DIMMB1C
VCC_DDR
VCC3_SPD
VPP25
VTT_DDR
DIMM_CA_VREF_B
12V3_NC_1
12V3_NC_145
VDDSPD
VPP-1
VPP-2
VPP-3
VPP-4
VPP-5
VTT-1
VTT-2
VREFCA
DDRIV-288P_BLACK-RH-23
N13-2881271-L06
C201 0.1u16X4
C7 2.2u6.3X4
C54 0.1u16X4
C222 0.1u16X4
C212 0.1u16X4
C123 C22u6.3X/6
C97 C1u16X/6
C63 C0.1u16X/4
C130 X_C0.1u16X/4
C110 C0.1u16X/4
C116 C0.1u16X/4
C60 C0.22u16X/4
C58 C0.22u16X/4
DIMMB1B
C3 0.1u16X4
R5 1K1%4
C67 0.1u16X4
C9 1000p50X4
C5 0.1u16X4
R6 1K1%4

SATA Connector



MICRO-STAR INT'L CO.,LTD		
MS-7D14		
Size: Custom	Document Description: 15 PROM19 - PCIE/SATA	Rev: 20
Date: Wednesday, July 08, 2020	Sheet 15 of 67	



USB mapping

USB_SSP_TX/RX[0] + USB_HSDP/N[0] + USB_OC0N
USB_SSP_TX/RX[1] + USB_HSDP/N[1] + USB_OC1N

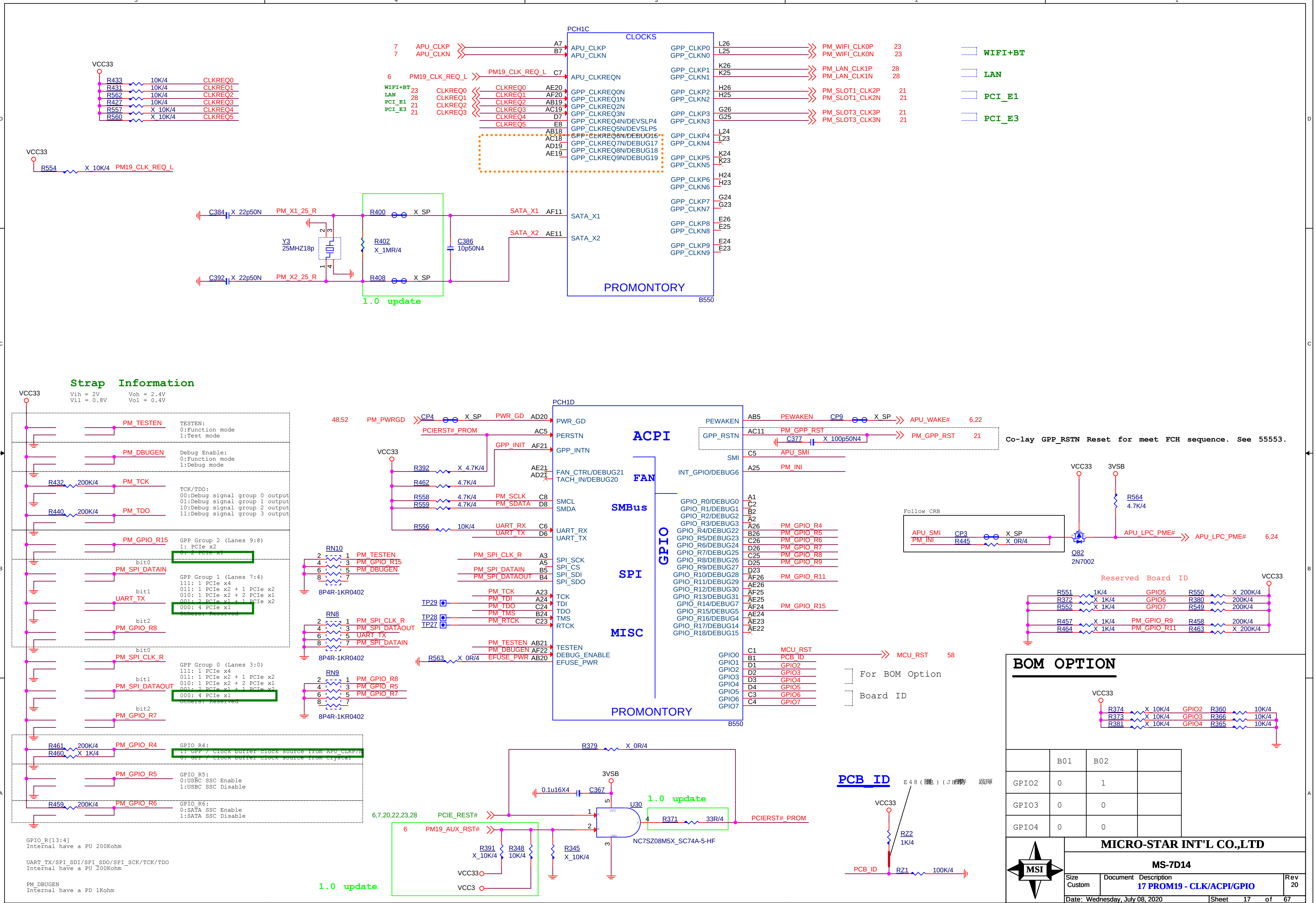
USB_SS_TX/RX[0] + USB_HSDP/N[2] + USB_OC2N
USB_SS_TX/RX[1] + USB_HSDP/N[3] + USB_OC3N
USB_HSDP/N[4] + USB_OC4N
USB_HSDP/N[5] + USB_OC5N
USB_HSDP/N[6] + USB_OC6N
USB_HSDP/N[7] + USB_OC7N
USB_HSDP/N[8] + USB_OC7N
USB_HSDP/N[9] + USB_OC7N

MICRO-STAR INT'L CO.,LTD

MS-7D14

Size	Document Description	Rev
Custom	16 PROM19 - USB/OC	20

Date: Wednesday, July 08, 2020 Sheet 16 of 67



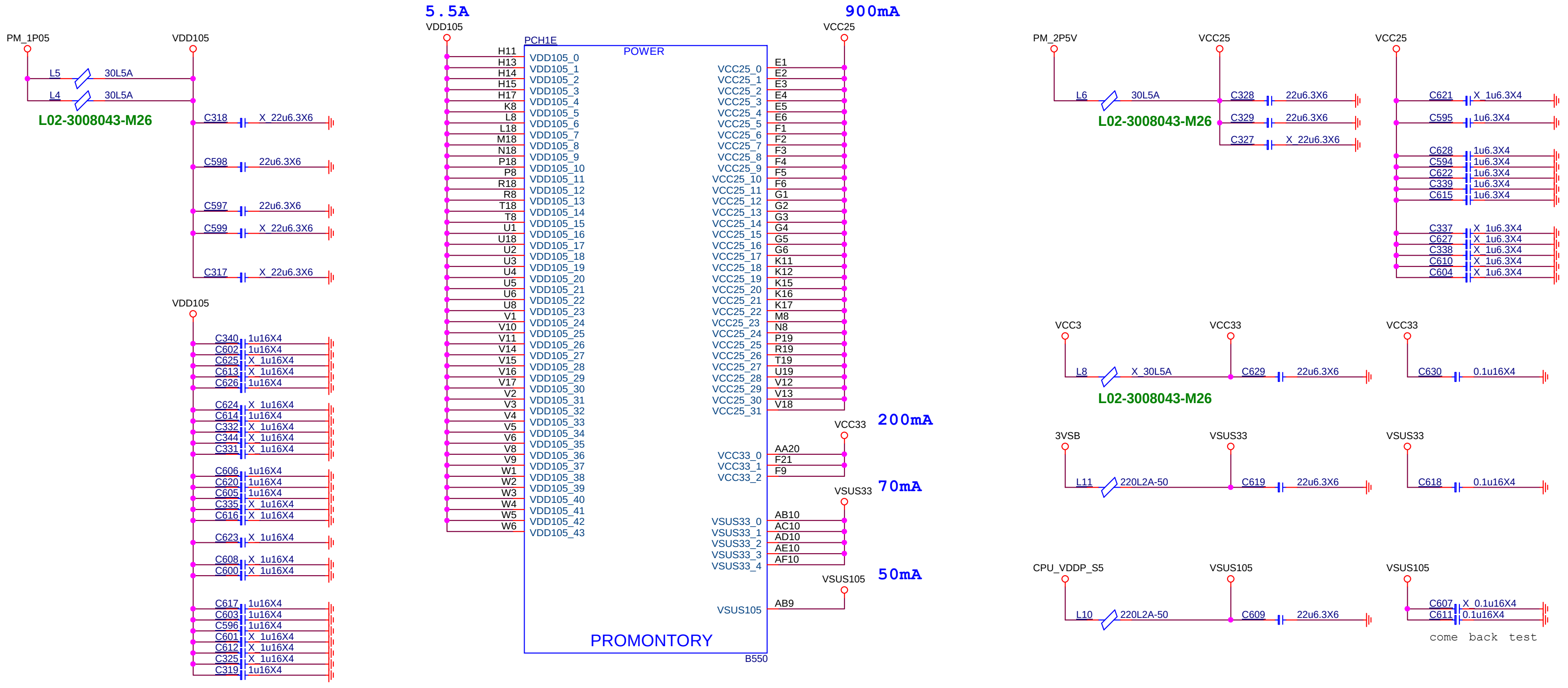
	B01	B02
GPIO2	0	1
GPIO3	0	0
GPIO4	0	0

MICRO-STAR INT'L CO.,LTD

MS-7D14

Size	Document Description	Rev
Custom	17 PROM19 - CLK/ACPI/GPIO	20

Date: Wednesday, July 08, 2020 Sheet 17 of 67

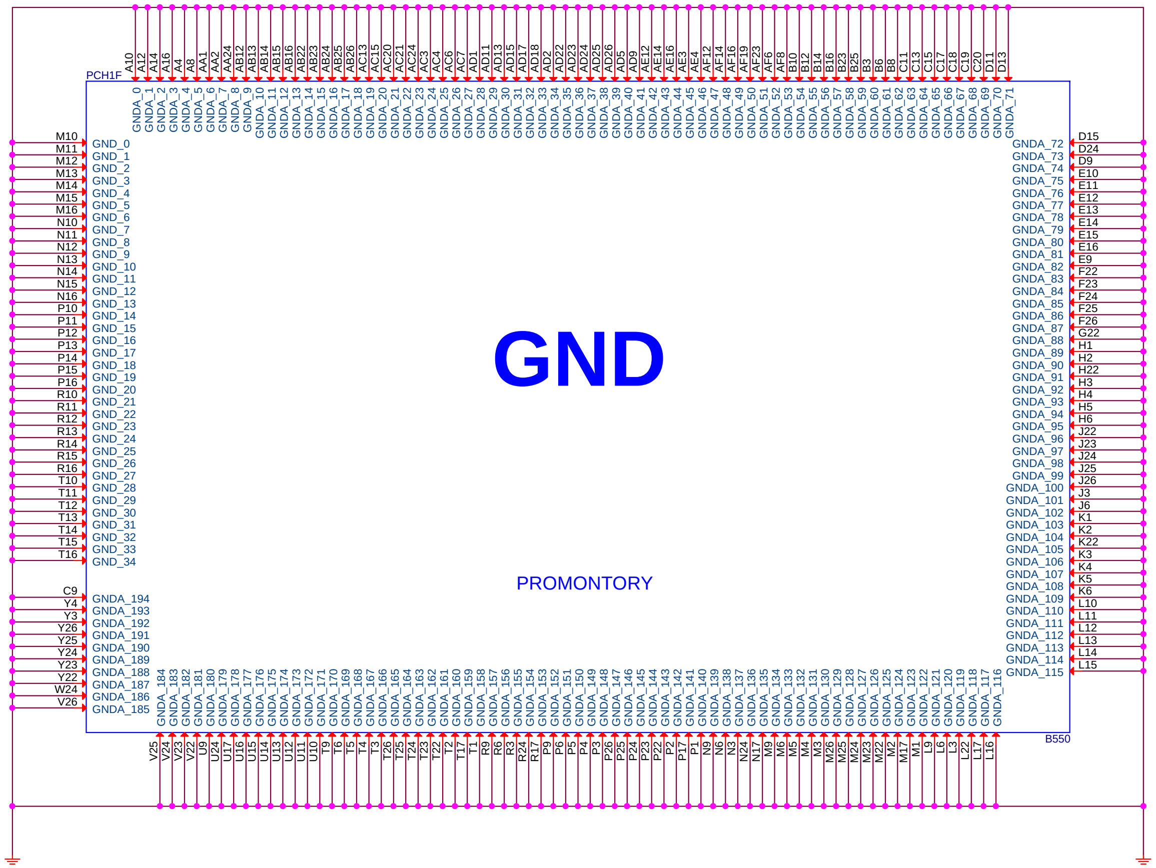


MICRO-STAR INT'L CO.,LTD

MS-7D14

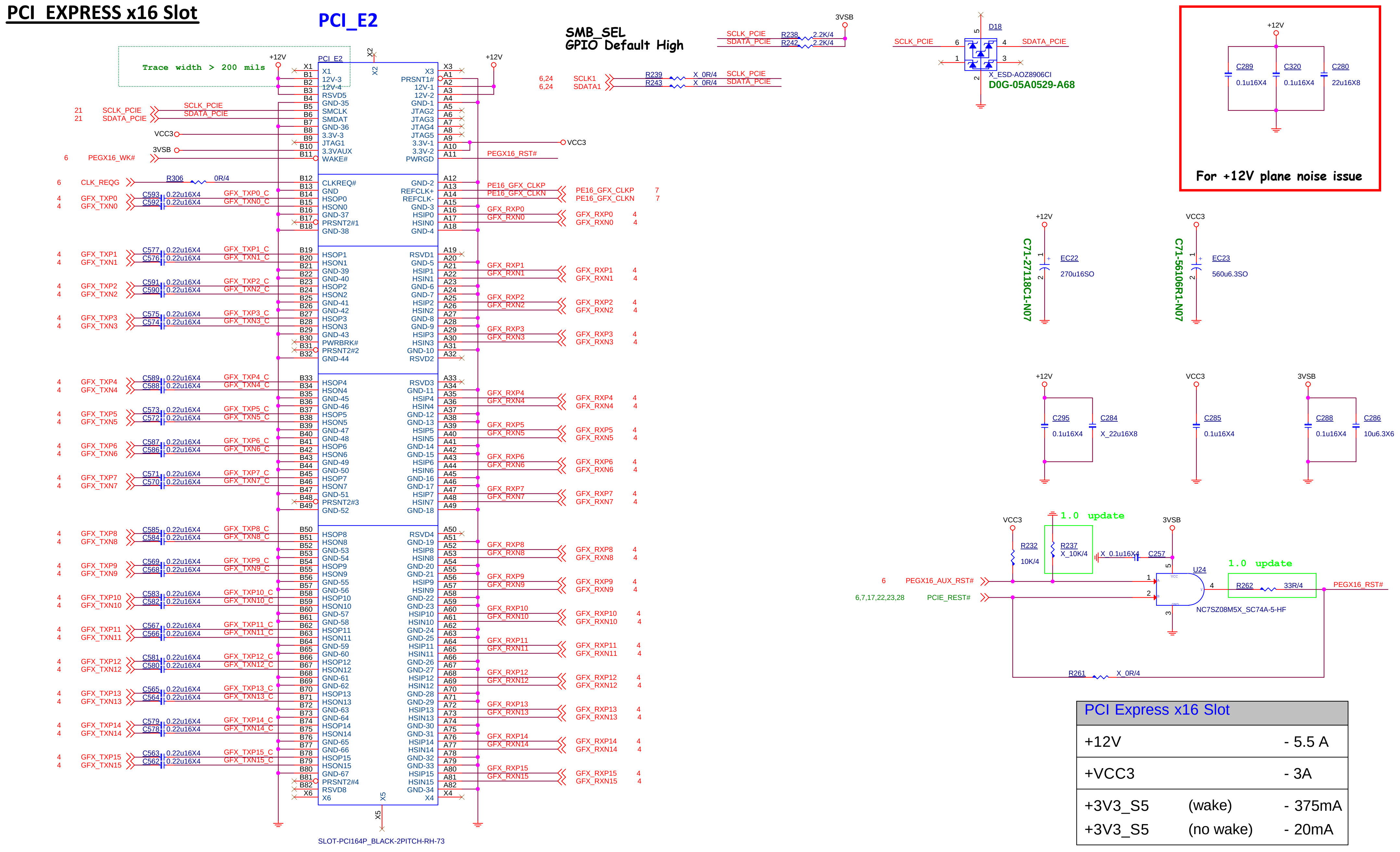
Size	Document Description	Rev
Custom	18 PROM19 - Power	20

Date: Wednesday, July 08, 2020 Sheet 18 of 67



MICRO-STAR INT'L CO.,LTD		
MS-7D14		
Size: Custom	Document Description: 19 PROM19 - GND	Rev: 20
Date: Wednesday, July 08, 2020	Sheet 19 of 67	

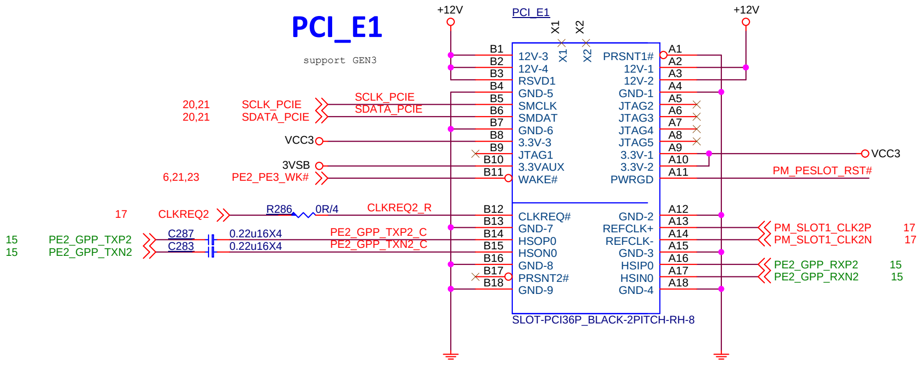
PCI EXPRESS x16 Slot



PCI Express x16 Slot		
+12V		- 5.5 A
+VCC3		- 3A
+3V3_S5	(wake)	- 375mA
+3V3_S5	(no wake)	- 20mA

MICRO-STAR INT'L CO.,LTD		
MS-7D14		
Size: Custom	Document Description: 20 PCI_E1 (X16)	Rev: 20
Date: Wednesday, July 08, 2020	Sheet 20 of 67	

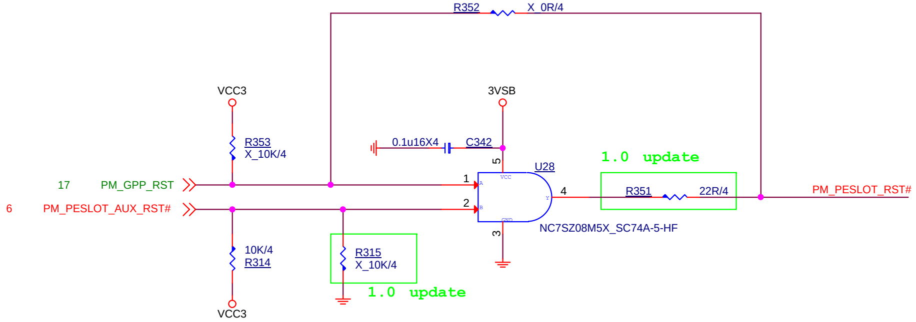
PCI EXPRESS X1 SLOT

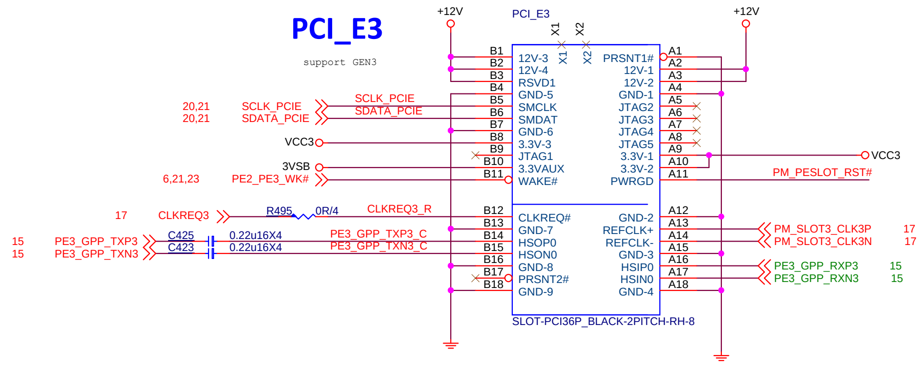


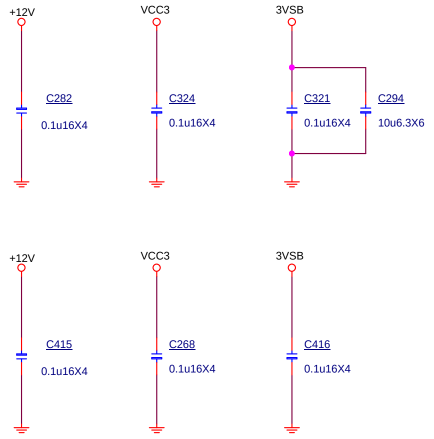
12V - 0.5A

VCC3 - 3A

3VSBV - 375mA

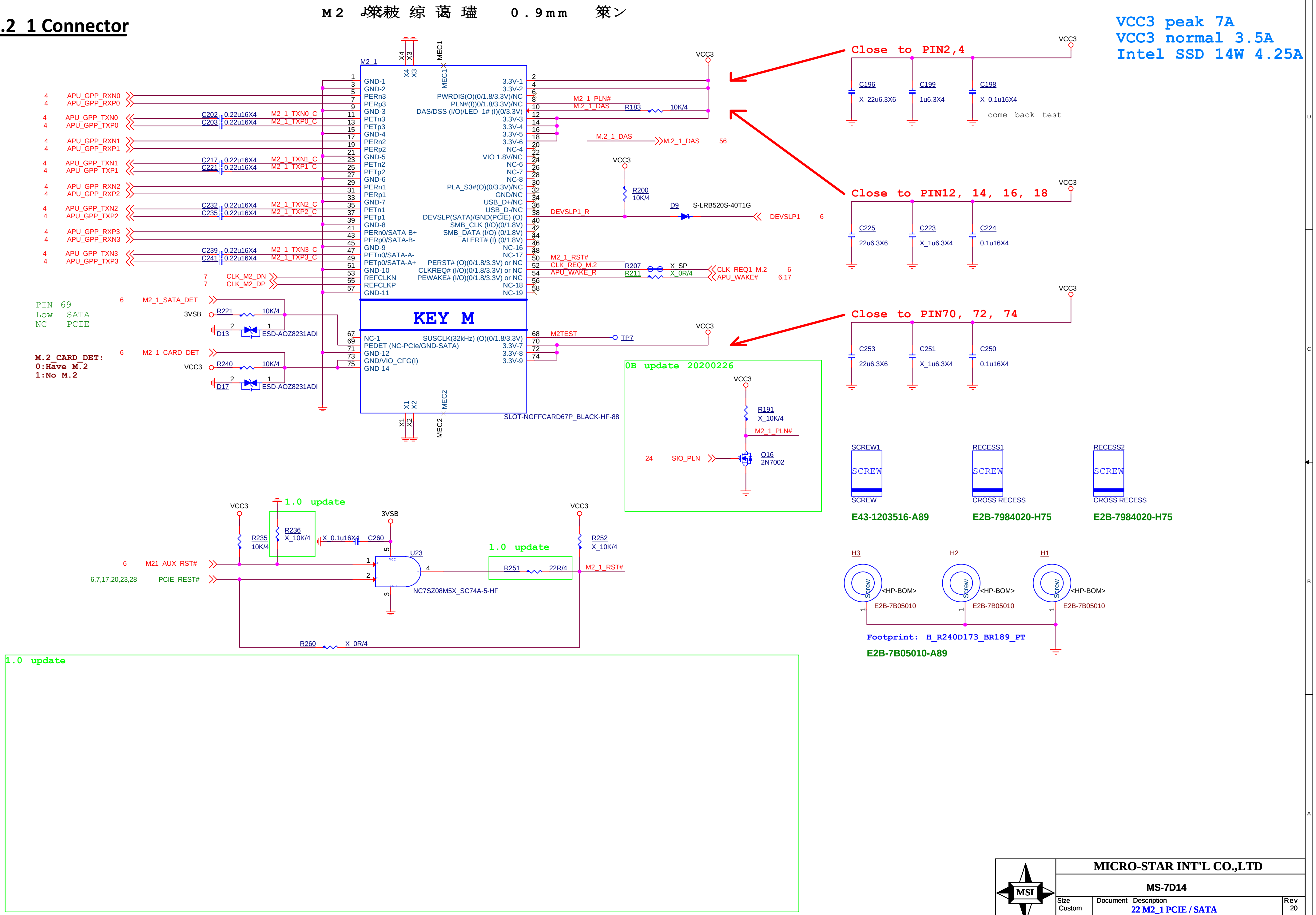




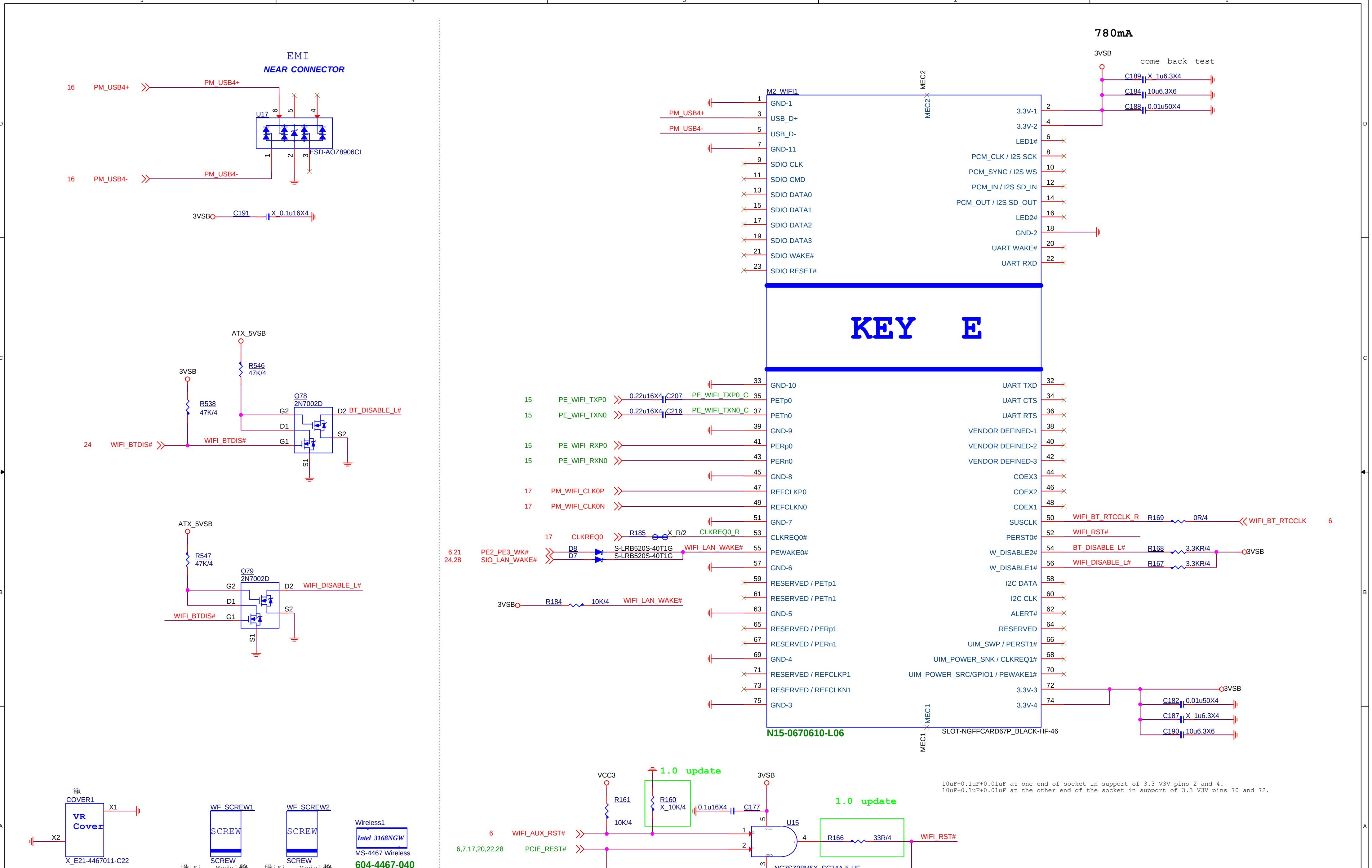


PCI Express x1 Slot *3	
+12V	- 1.5 A
+VCC3	- 9A
+3V3_S5 (wake)	- 1125mA
+3V3_S5 (no wake)	- 20mA

M.2_1 Connector



MICRO-STAR INT'L CO.,LTD		
MS-7D14		
Size: Custom	Document Description: 22 M2_1 PCIE / SATA	Rev: 20
Date: Wednesday, July 08, 2020	Sheet 22 of 67	

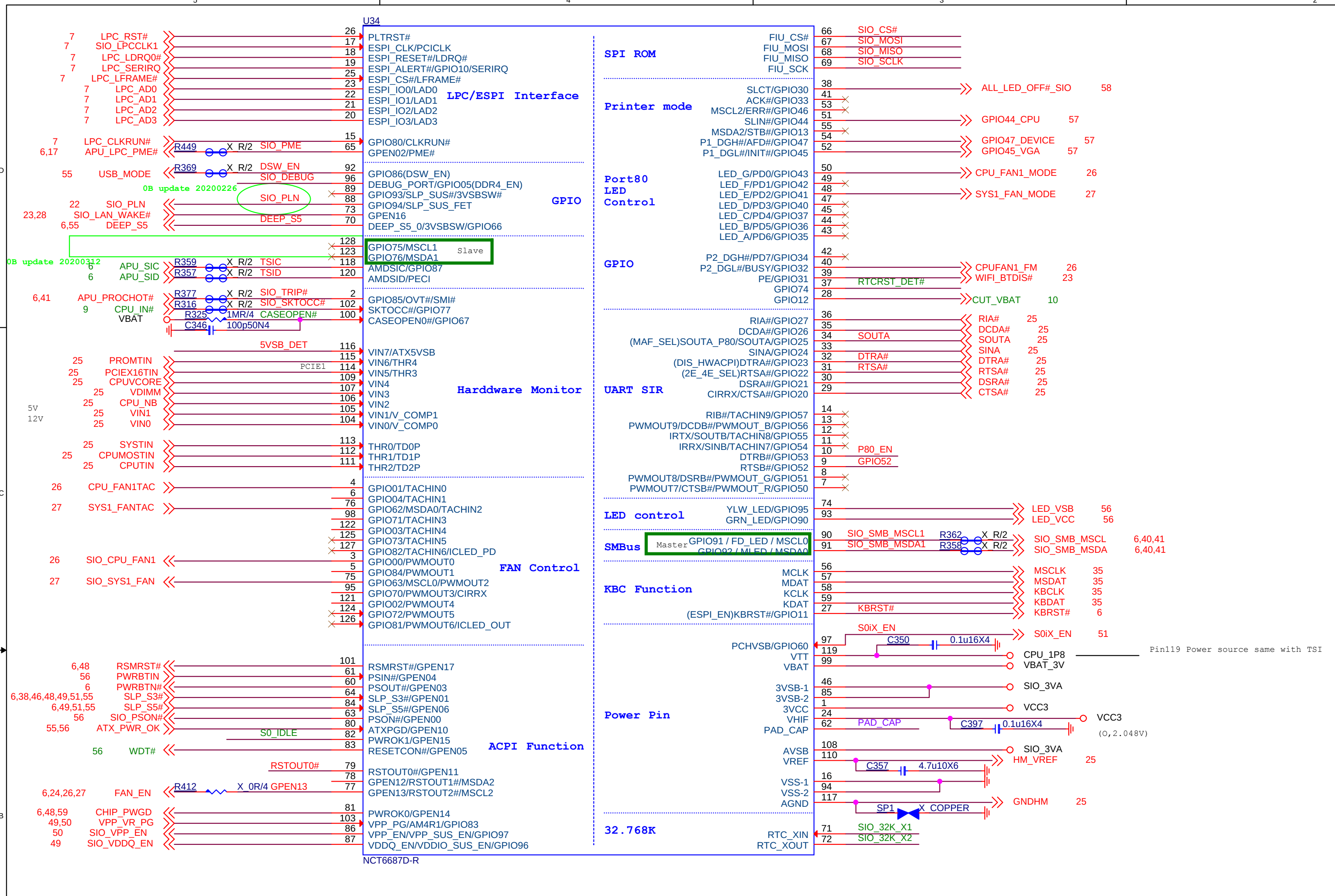


MICRO-STAR INT'L CO.,LTD

MS-7D14

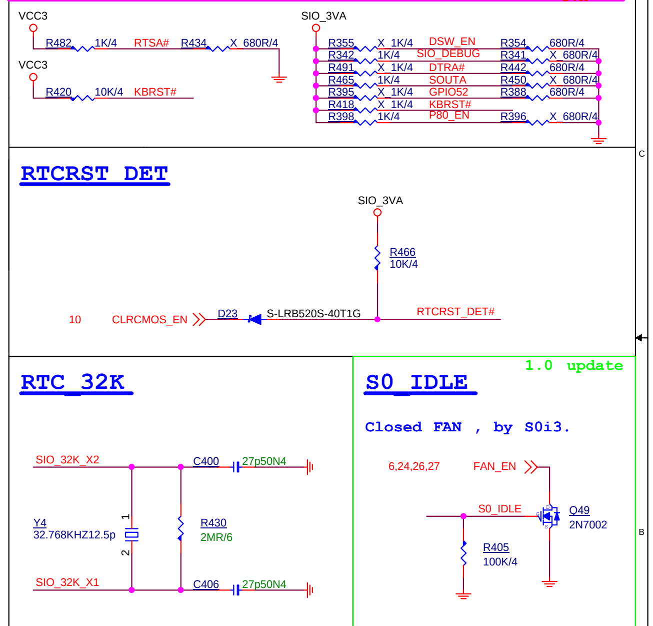
Size	Document Description	Rev
Custom	24 M2_WIFI1 (KEY_E)	20

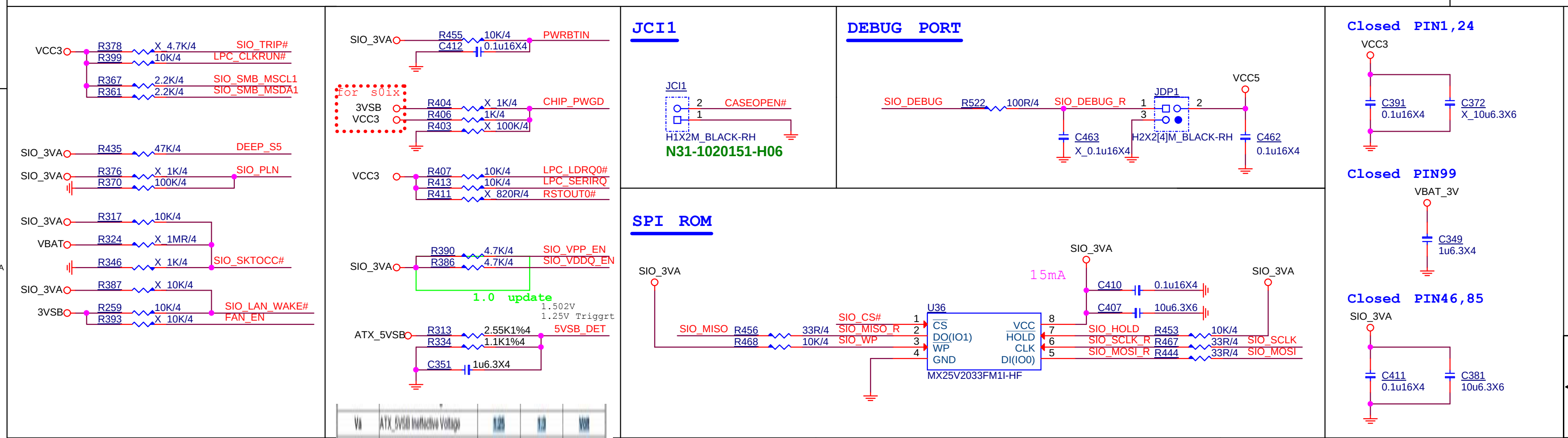
Date: Wednesday, July 08, 2020 Sheet 23 of 67



POWER ON STRAPPING PIN FOR NCT6687D-R

PIN	NAME	Circuit NAME	0	1	Strap Point
31	2E_4E_SEL	RTSA#	I/O ADDRESS 2E	I/O ADDRESS 4E	3VCC
32	DIS_HWACPI	DTRA#	HW ACPI enable	HW ACPI disable	3VA
34	MAF_SEL	SOUTA	MAF enable	MAF disable	3VA
92	DSW_EN	DSW_EN	DSW disable	DSW enable	3VA
96	DDR4_EN	SIO_DEBUG	DDR4 control disable	DDR4 control enable	3VA
9	FAN789_EN (FW setting)	GPIO52	FAN789 disable	FAN789 enable	3VA
10	P80_EN	GPIO46	Port80 LED	GPIO	3VA
PIN	NAME	Circuit NAME	VCC3	3VA	Strap Point
27	ESPI_EN	KBRST#	LPC	ESPI	VCC3 or 3VA



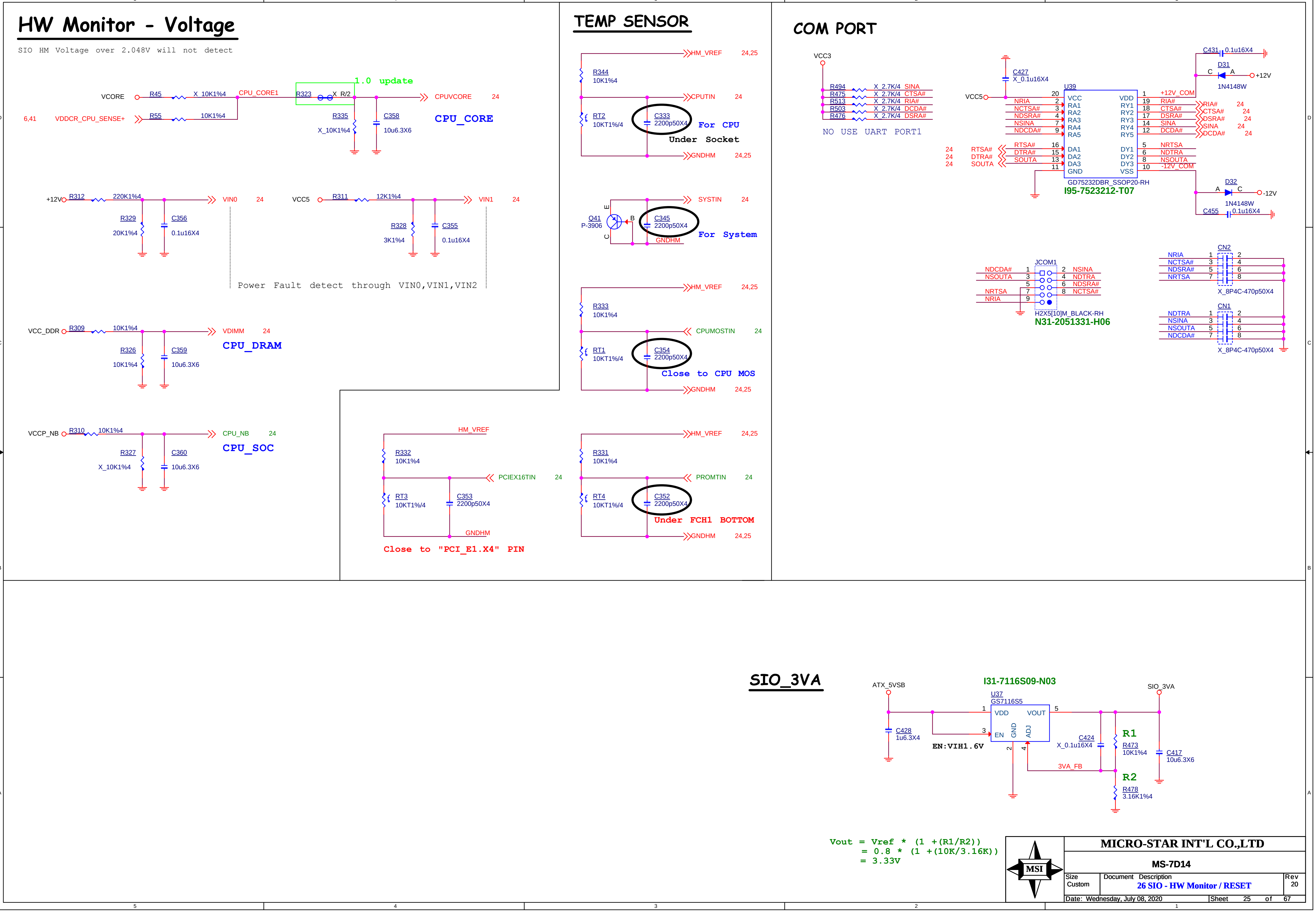


MICRO-STAR INT'L CO.,LTD

MS-7D14

Size	Document Description	Rev
Custom	25 SIO - NCT6687D-R	20

Date: Wednesday, July 08, 2020 Sheet 24 of 67

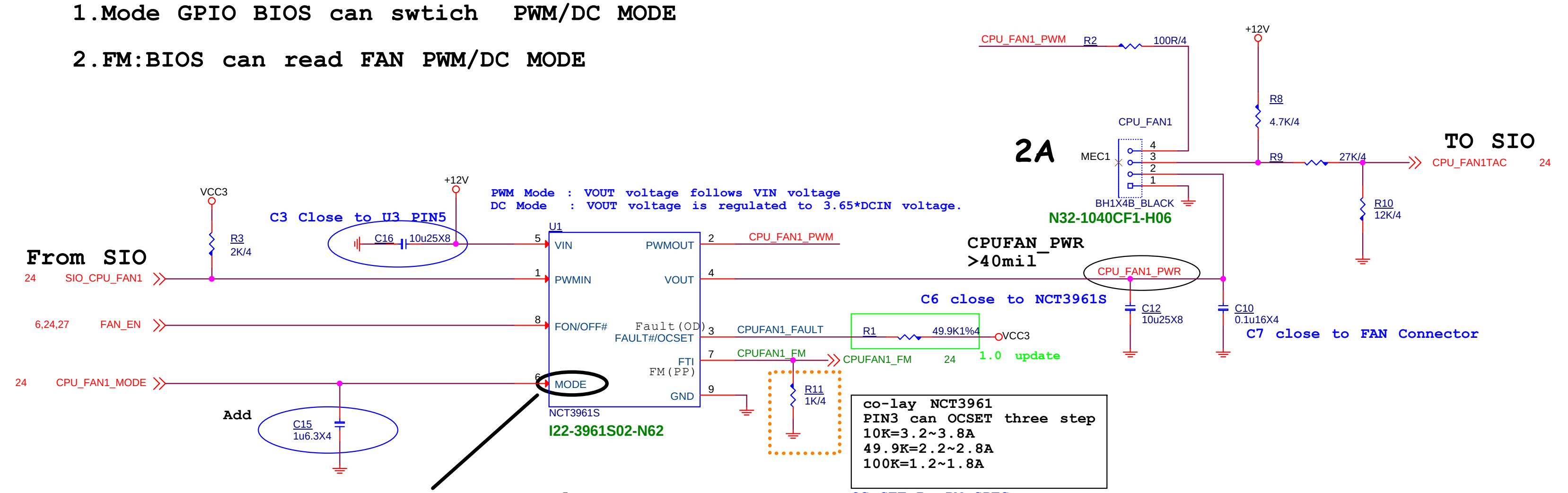

HW Monitor - Voltage
SIO HM Voltage over 2.048V will not detect
1.0 update
VCORE R45 X_10K1%4 CPU_CORE1 R323 X_R/2 CPUVCORE 24
6,41 VDDCR_CPU_SENSE+ R55 10K1%4
R335 X_10K1%4 C358 10u6.3X6
CPU_CORE
+12V R312 220K1%4 VIN0 24
R329 20K1%4 C356 0.1u16X4
VCC5 R311 12K1%4 VIN1 24
R328 3K1%4 C355 0.1u16X4
Power Fault detect through VIN0,VIN1,VIN2
VCC_DDR R309 10K1%4 VDIMM 24
R326 10K1%4 C359 10u6.3X6
CPU_DRAM
VCCP_NB R310 10K1%4 CPU_NB 24
R327 X_10K1%4 C360 10u6.3X6
CPU_SOC
TEMP SENSOR
HM_VREF 24,25
R344 10K1%4
CPUTIN 24
RT2 10KT1%/4 C333 2200p50X4
For CPU
Under Socket
GNDHM 24,25
SYSTIN 24
Q41 P-3906 E B C
C345 2200p50X4
For System
GNDHM
HM_VREF 24,25
R333 10K1%4
CPUMOSTIN 24
RT1 10KT1%/4 C354 2200p50X4
Close to CPU MOS
GNDHM 24,25
HM_VREF
R332 10K1%4
PCIEX16TIN 24
RT3 10KT1%/4 C353 2200p50X4
GNDHM
Close to "PCI_E1.X4" PIN
HM_VREF 24,25
R331 10K1%4
PROMTIN 24
RT4 10KT1%/4 C352 2200p50X4
Under FCH1 BOTTOM
GNDHM 24,25
COM PORT
VCC3
R494 X_2.7K/4 SINA
R475 X_2.7K/4 CTSA#
R513 X_2.7K/4 RIA#
R503 X_2.7K/4 DCDA#
R476 X_2.7K/4 DSRA#
NO USE UART PORT1
C427 X_0.1u16X4
VCC5
U39
VCC VDD RA1 RA2 RA3 RA4 RA5 RY1 RY2 RY3 RY4 RY5 DA1 DA2 DA3 DY1 DY2 DY3 GND VSS
NRIA NCTSA# NDSRA# NSINA NDCDA#
RIA# CTSA# DSRA# SINA DCDA# 24
+12V_COM -12V_COM
RTSA# DTRA# SOUTA 24
NRTSA NDTRA NSOUTA
GD75232DBR_SSOP20-RH
I95-7523212-T07
C431 0.1u16X4
D31 1N4148W +12V
D32 1N4148W -12V
C455 0.1u16X4
JCOM1
NDCDA# NSOUTA NRTSA NRIA NSINA NDTRA NDSRA# NCTSA#
H2X5[10]M_BLACK-RH
N31-2051331-H06
CN2 NRIA NCTSA# NDSRA# NRTSA X_8P4C-470p50X4
CN1 NDTRA NSINA NSOUTA NDCDA# X_8P4C-470p50X4
SIO_3VA
ATX_5VSB
I31-7116S09-N03
U37 GS7116S5
VDD VOUT EN GND ADJ
C428 1u6.3X4
EN:VIH1.6V
C424 X_0.1u16X4
3VA_FB
SIO_3VA
R1 R473 10K1%4
R2 R478 3.16K1%4
C417 10u6.3X6
Vout = Vref * (1 +(R1/R2))
= 0.8 * (1 +(10K/3.16K))
= 3.33V
MICRO-STAR INT'L CO.,LTD
MSI
MS-7D14
Size Custom
Document Description
26 SIO - HW Monitor / RESET
Rev 20
Date: Wednesday, July 08, 2020
Sheet 25 of 67

CPUFAN1

TYPE N : 4 PIN CPU FAN USE NCT3961S USE PCH GPIO CONTROL FAN MODE

1.Mode GPIO BIOS can swtich PWM/DC MODE

2.FM:BIOS can read FAN PWM/DC MODE



GPIO Control

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

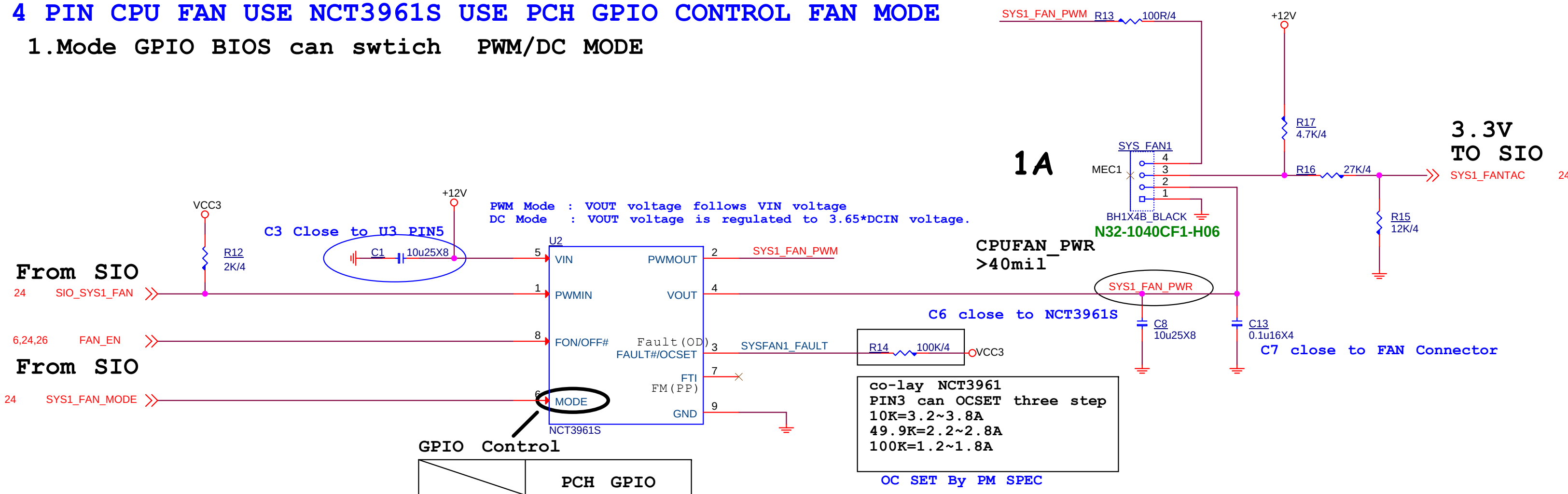
Default

MICRO-STAR INT'L CO.,LTD		
MS-7D14		
Size: Custom	Document Description: 27 FAN TYPE-N CPUFAN1	Rev: 20
Date: Wednesday, July 08, 2020	Sheet 26 of 67	

SYSFAN1

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

1.Mode GPIO BIOS can swtich PWM/DC MODE



GPIO Control

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

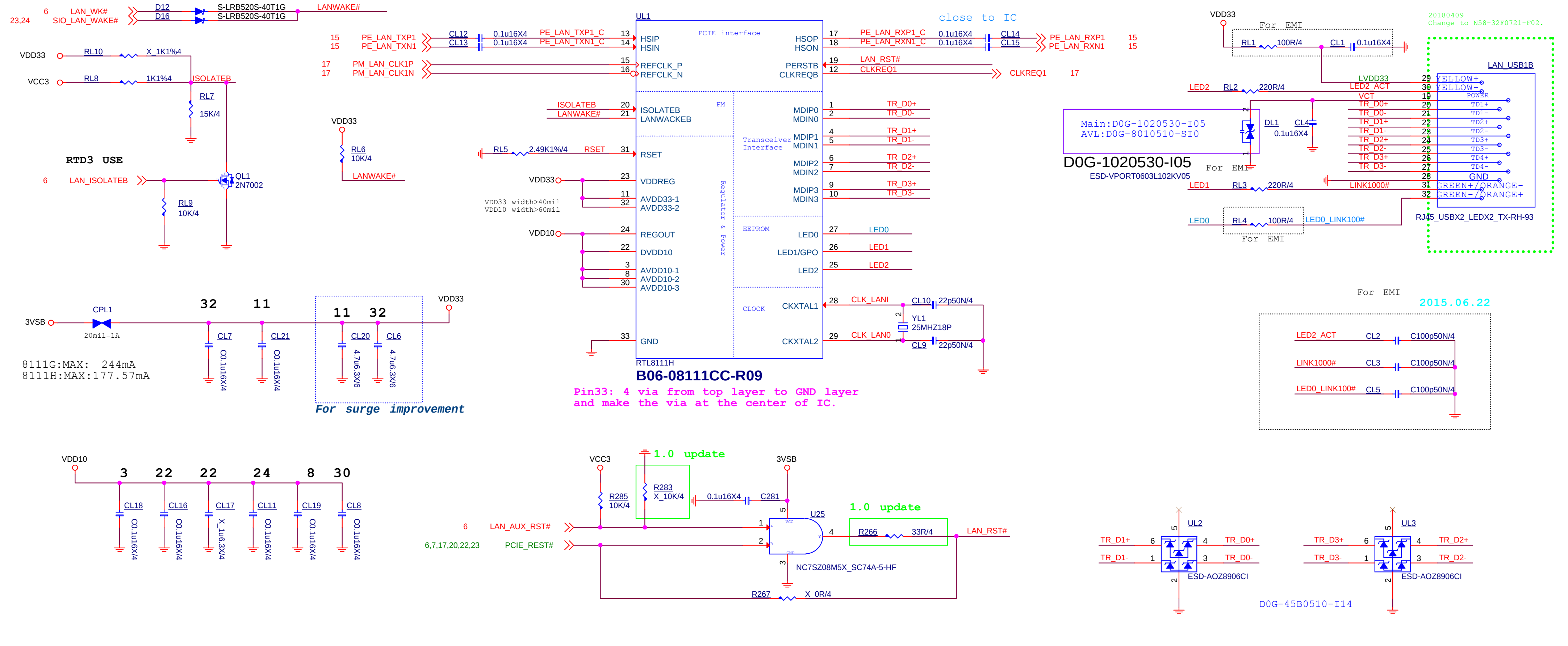
MICRO-STAR INT'L CO.,LTD

MS-7D14

Size	Document Description	Rev
Custom	29 FAN TYPE-M SYSFAN1 / 2	20

Date: Wednesday, July 08, 2020 Sheet 27 of 67

RTL8111G/RTL8111H Giga LAN

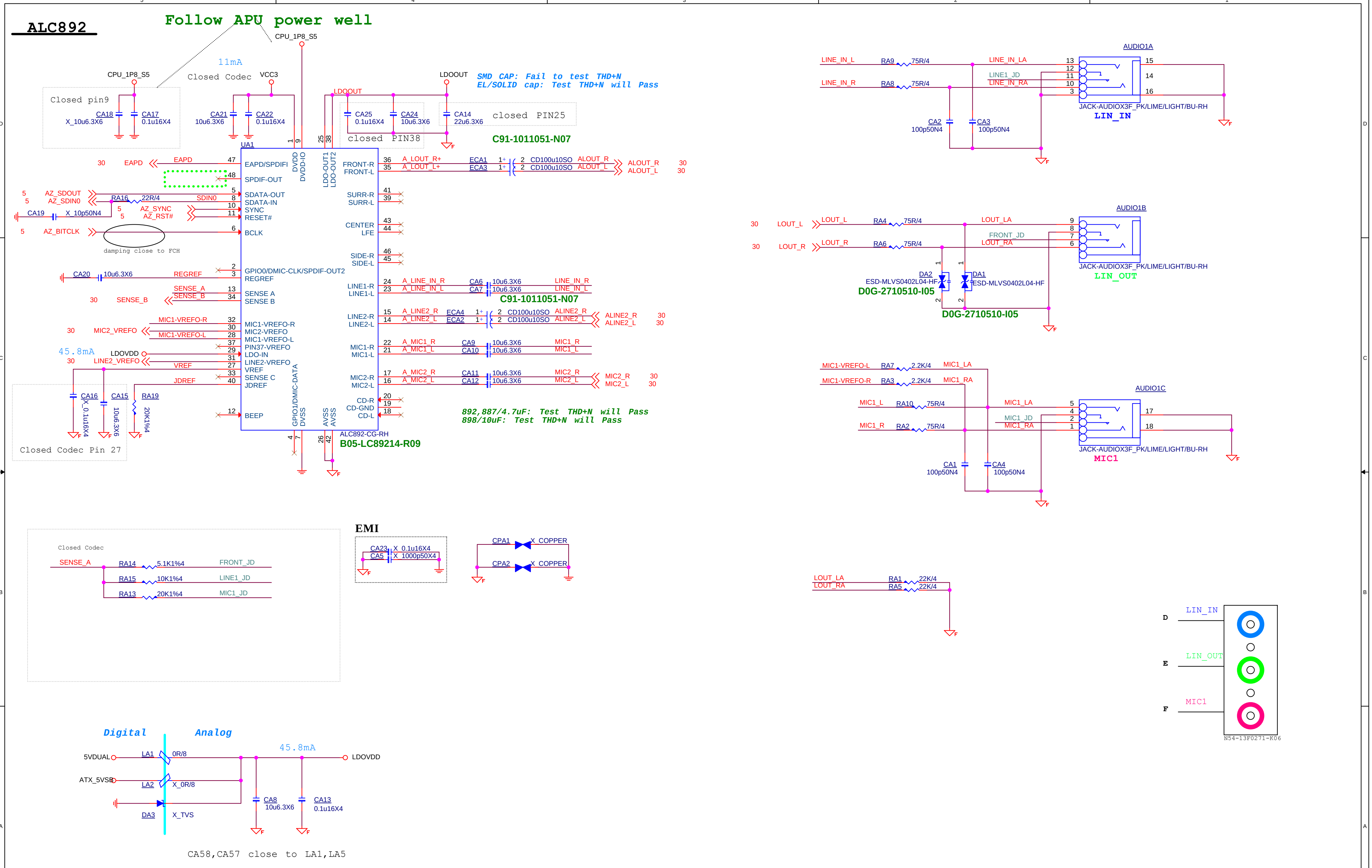


MICRO-STAR INT'L CO.,LTD

MS-7D14

Size	Document Description	Rev
Custom	31 LAN - RTL8111EPV co-lay HN	20

Date: Wednesday, July 08, 2020 Sheet 28 of 67

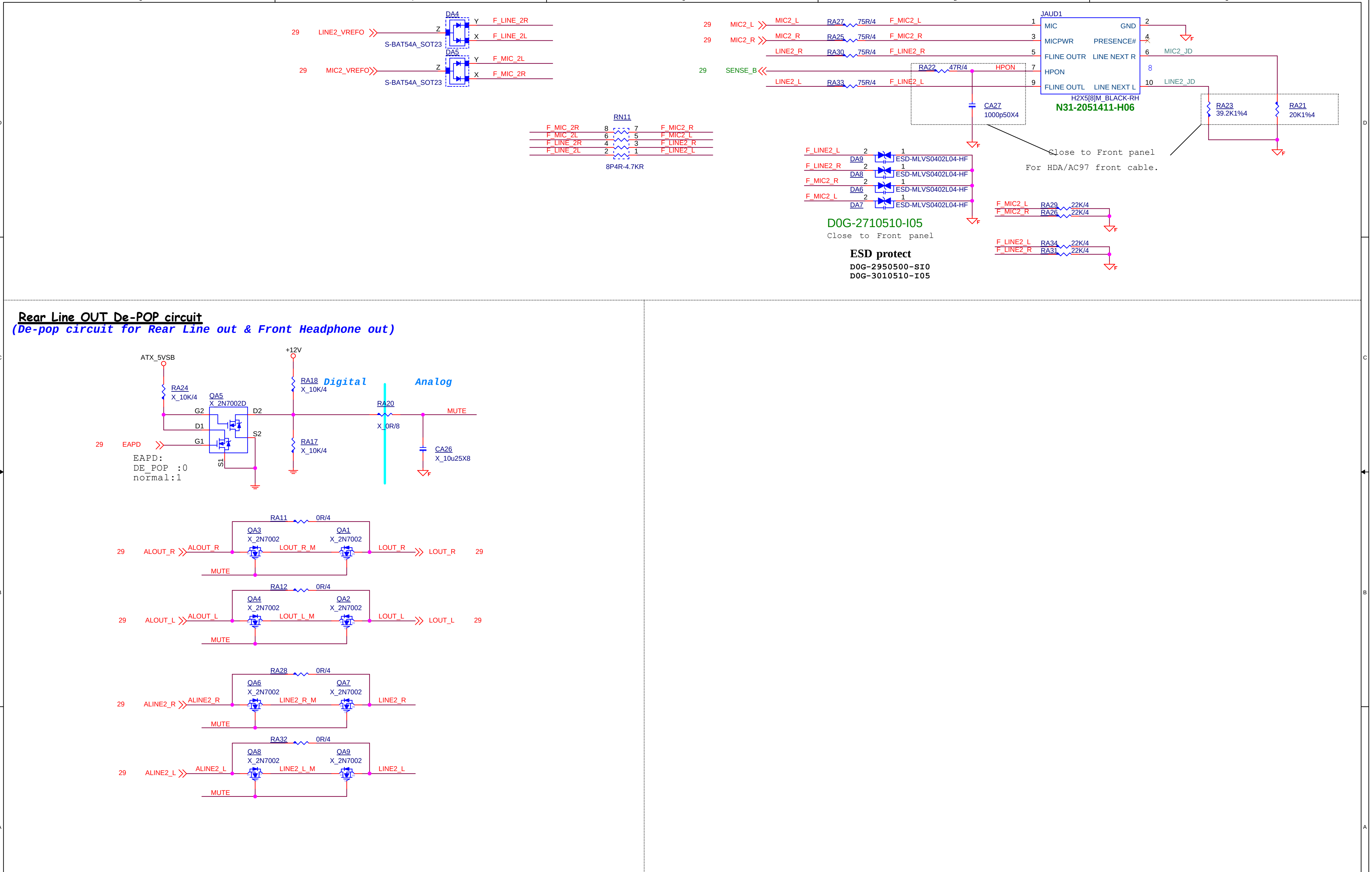


MICRO-STAR INT'L CO.,LTD

MS-7D14

Size	Document Description	Rev
Custom	32 Audio ALC892	20

Date: Wednesday, July 08, 2020 Sheet 29 of 67



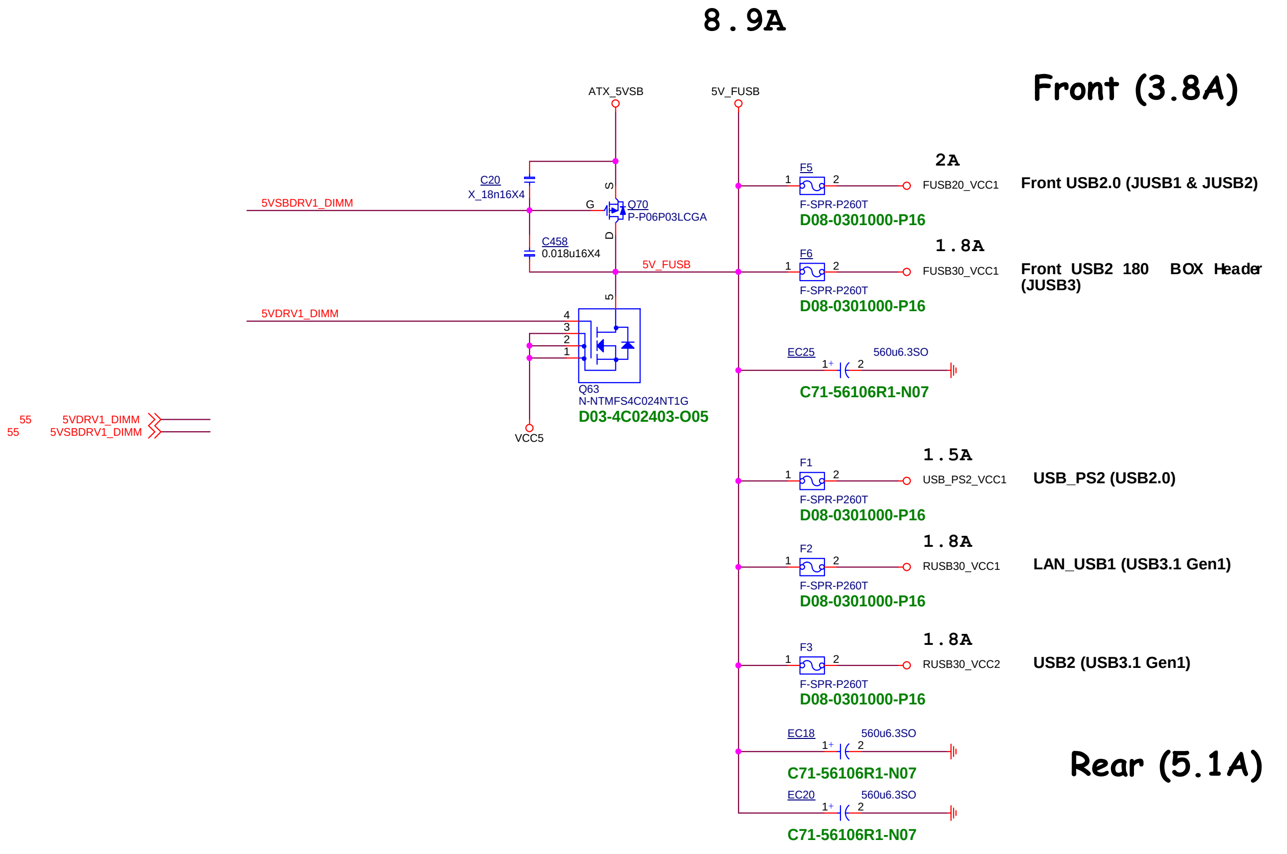
MICRO-STAR INT'L CO.,LTD

MS-7D14

Size	Document Description	Rev
Custom	33 Audio DePoP	20

Date: Wednesday, July 08, 2020 Sheet 30 of 67

USB Power



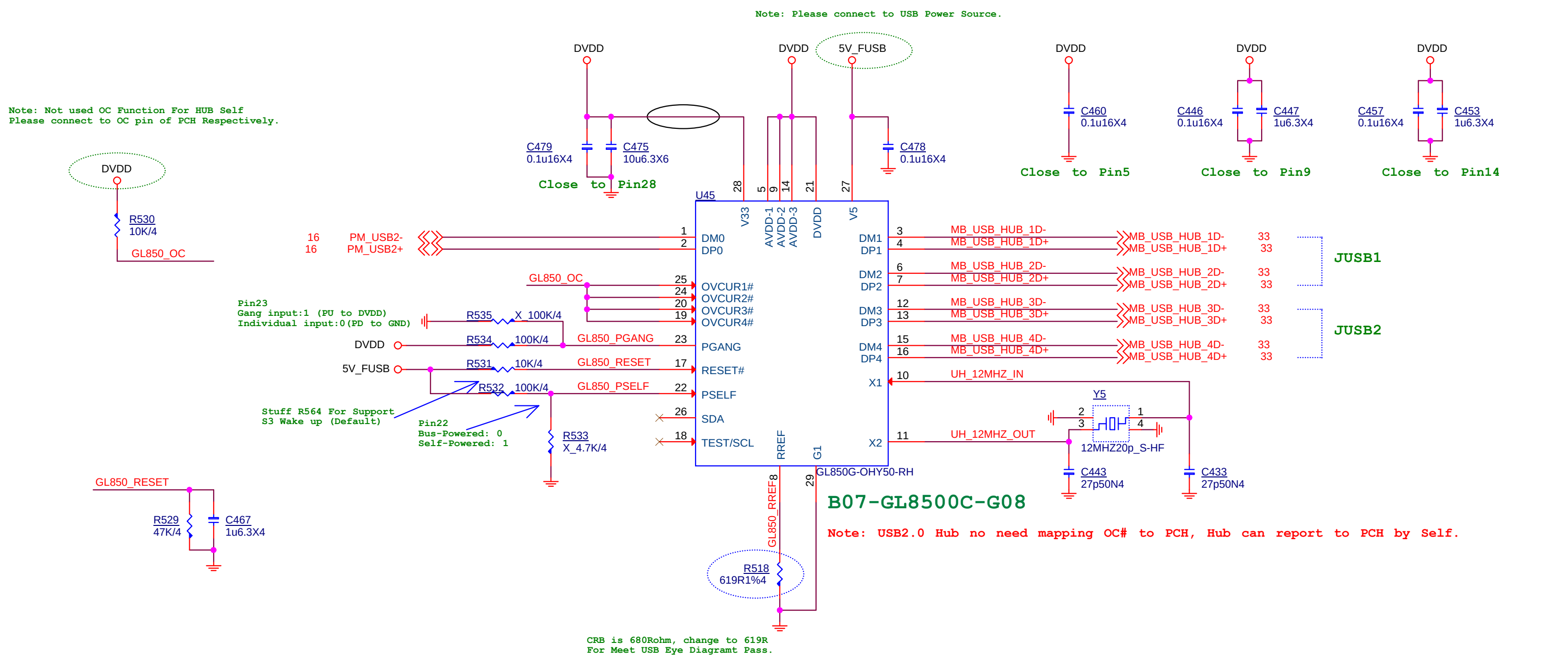
MICRO-STAR INT'L CO.,LTD

MS-7D14

Size	Document Description	Rev
Custom	34 USB Power - UP7501	20

Date: Wednesday, July 08, 2020 Sheet 31 of 67

GL850G USB2.0 HUB



MICRO-STAR INT'L CO.,LTD

MS-7D14

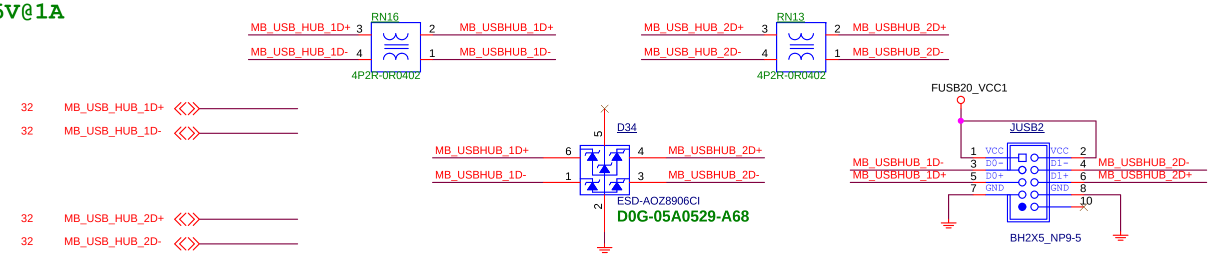
Size	Document Description	Rev
Custom	35 GL850G - USB2.0 HUB	20

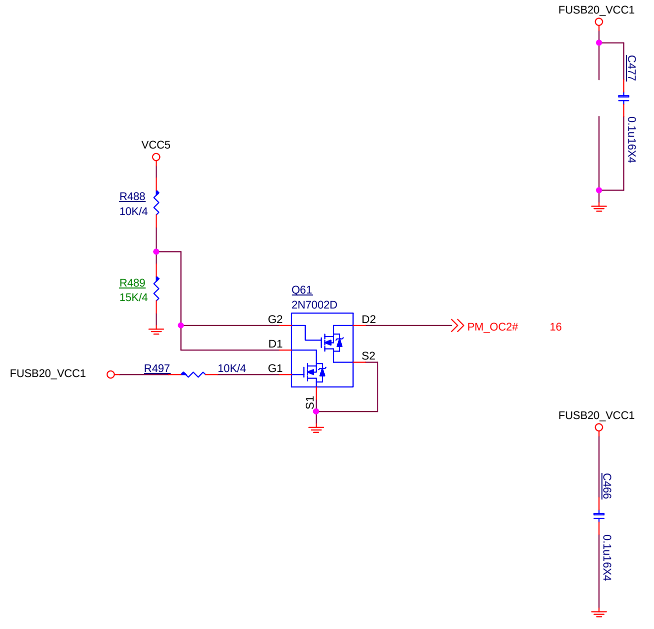
Date: Wednesday, July 08, 2020 Sheet 32 of 67

Front USB2.0(JUSB2)

Form GL850G USB2.0 HUB

5V@1A

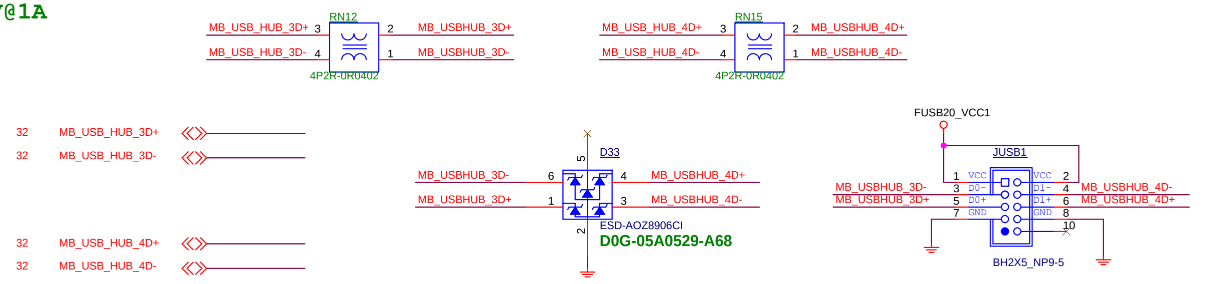




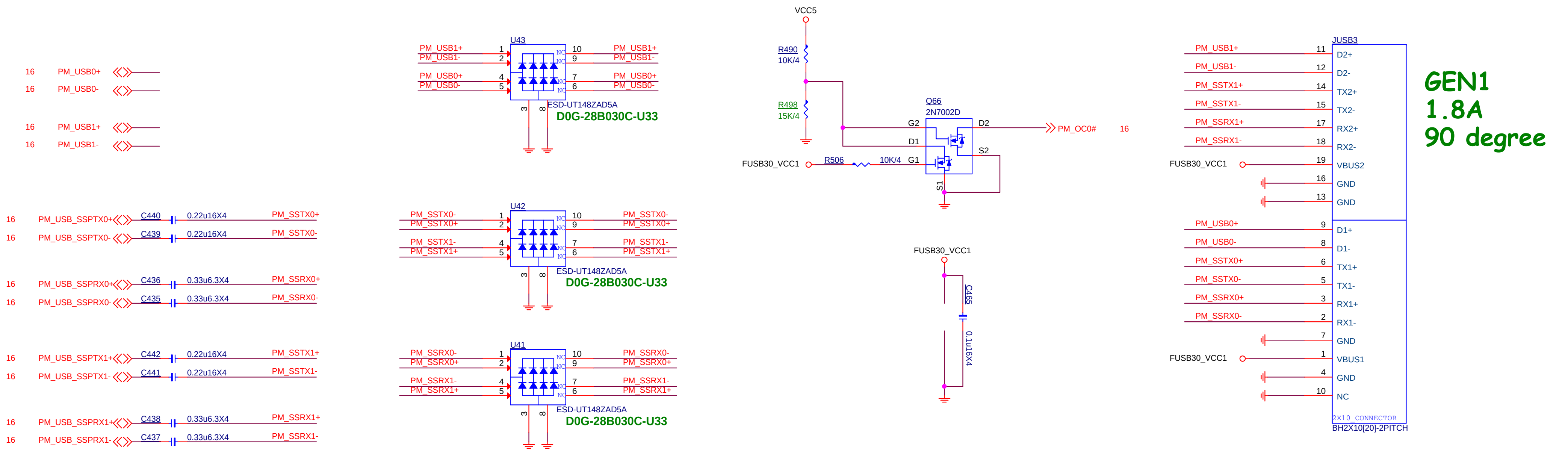
Front USB2.0(JUSB1)

Form GL850G USB2.0 HUB

5V@1A



MICRO-STAR INT'L CO.,LTD	
MS-7D14	
Size: Custom	Document Description: 36 Front USB2.0 Header — Rev 20
Date: Wednesday, July 08, 2020	Sheet 33 of 67



MICRO-STAR INT'L CO.,LTD

MS-7D14

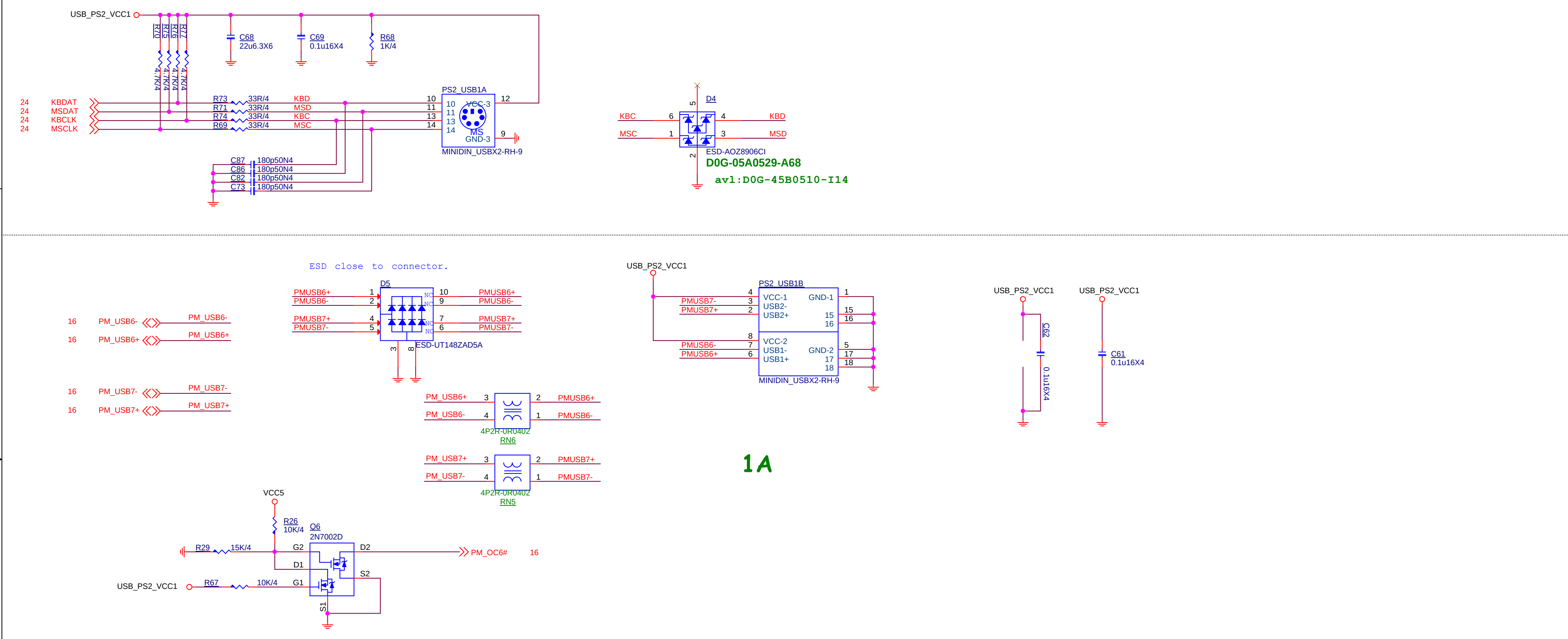
Size	Document Description	Rev
Custom	39 Front USB3.0 Header	20

Date: Wednesday, July 08, 2020 Sheet 34 of 67

PS2+USB (USB2.0)

5V@0.5A

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



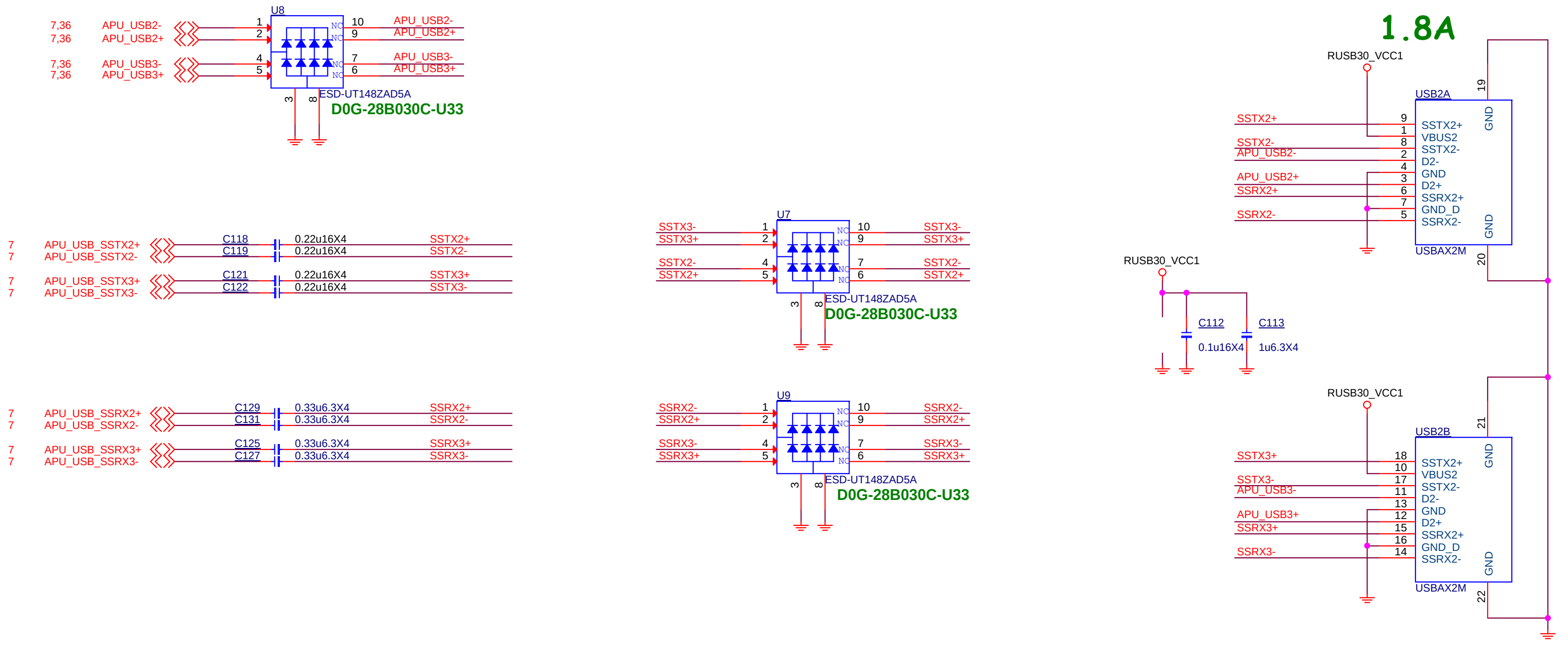
MICRO-STAR INT'L CO.,LTD

MS-7D14

Size	Document Description	Rev
Custom	41 Rear USB2.0_PS2 PS2_USB1	20

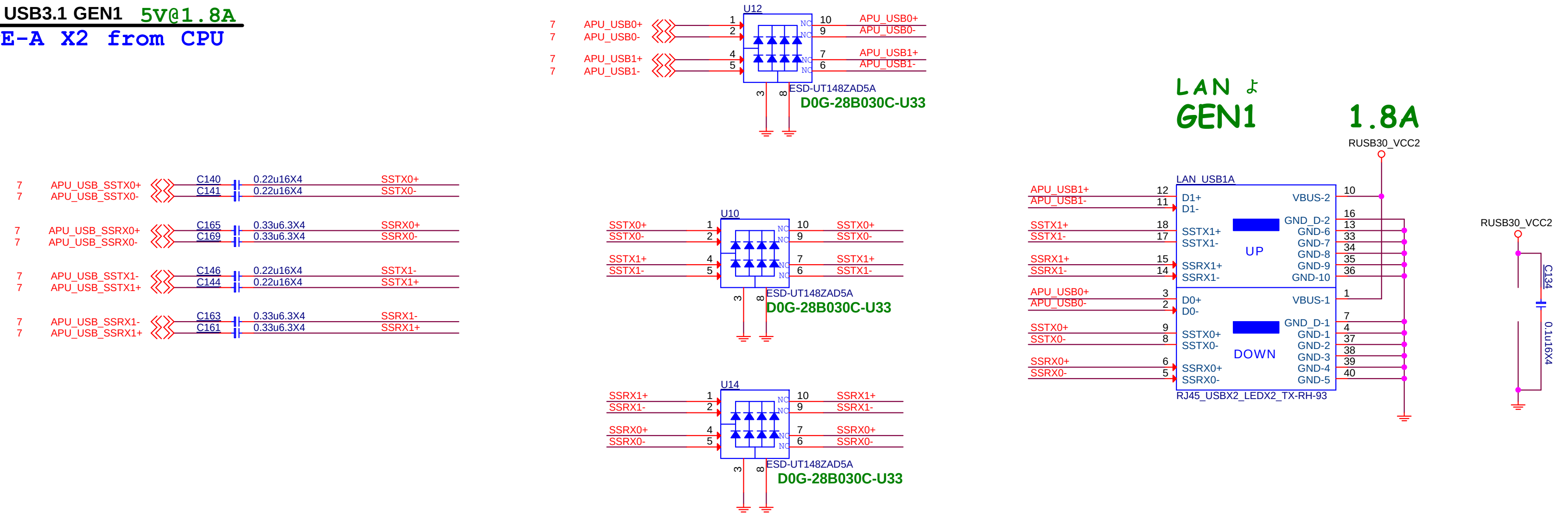
Date: Wednesday, July 08, 2020 Sheet 35 of 67

Rear USB3.2 GEN1 5V@1.8A

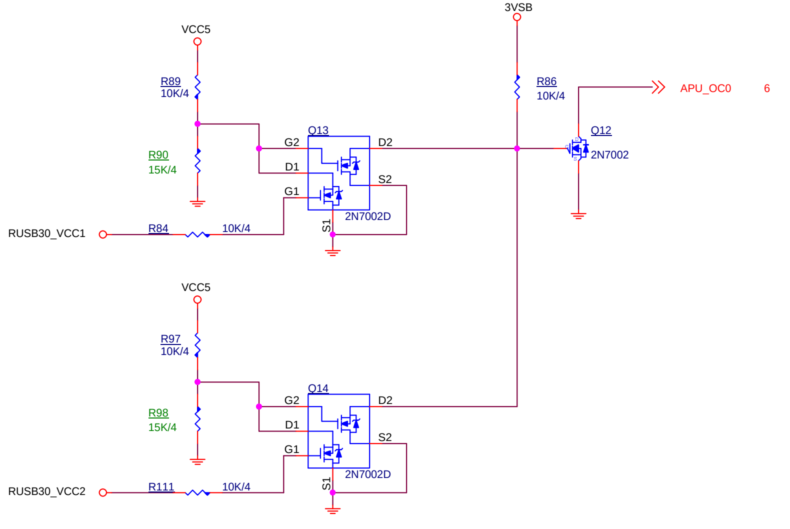


MICRO-STAR INT'L CO.,LTD		
MS-7D14		
Size: Custom	Document Description: 42 Rear USB3.0 Type A HDMI_USB1	Rev: 20
Date: Wednesday, July 08, 2020	Sheet 36 of 67	

Rear USB3.1 GEN1 5V@1.8A
TYPE-A X2 from CPU



CPU OC Logic

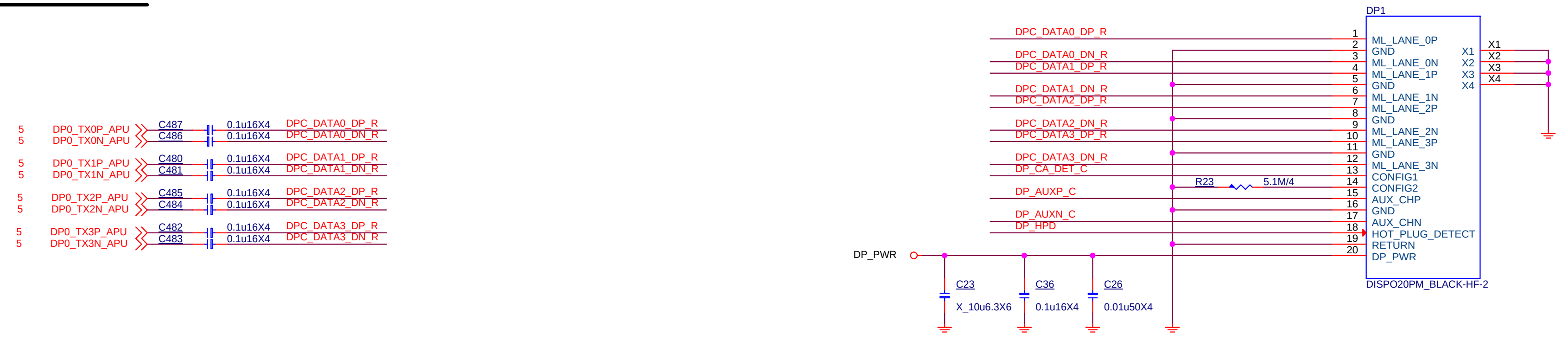


Type1/2/3/4 High Active

	CORETYPE1(A)	USB_PWR(B)	APU_USB_OC(Y)
BR	0	0	0
Act. Low	0	1	1
SR	1	0	1
Act. High	1	1	0

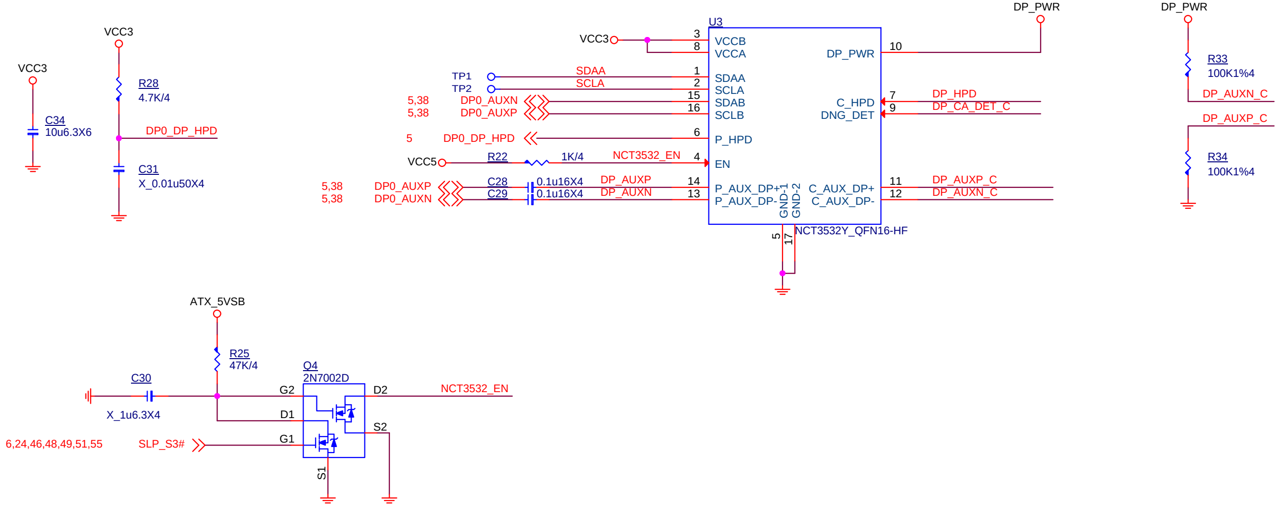
MICRO-STAR INT'L CO.,LTD
MS-7D14
Size: Custom | Document Description: 43 Rear USB3.0 Type A LAN_USB2 | Rev: 20
Date: Wednesday, July 08, 2020 | Sheet 37 of 67

DP CONNECTOR

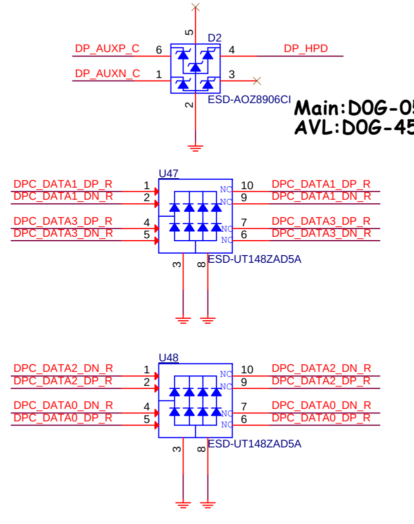


DP AUX & HPD Circuit

Support HDMI Dongle

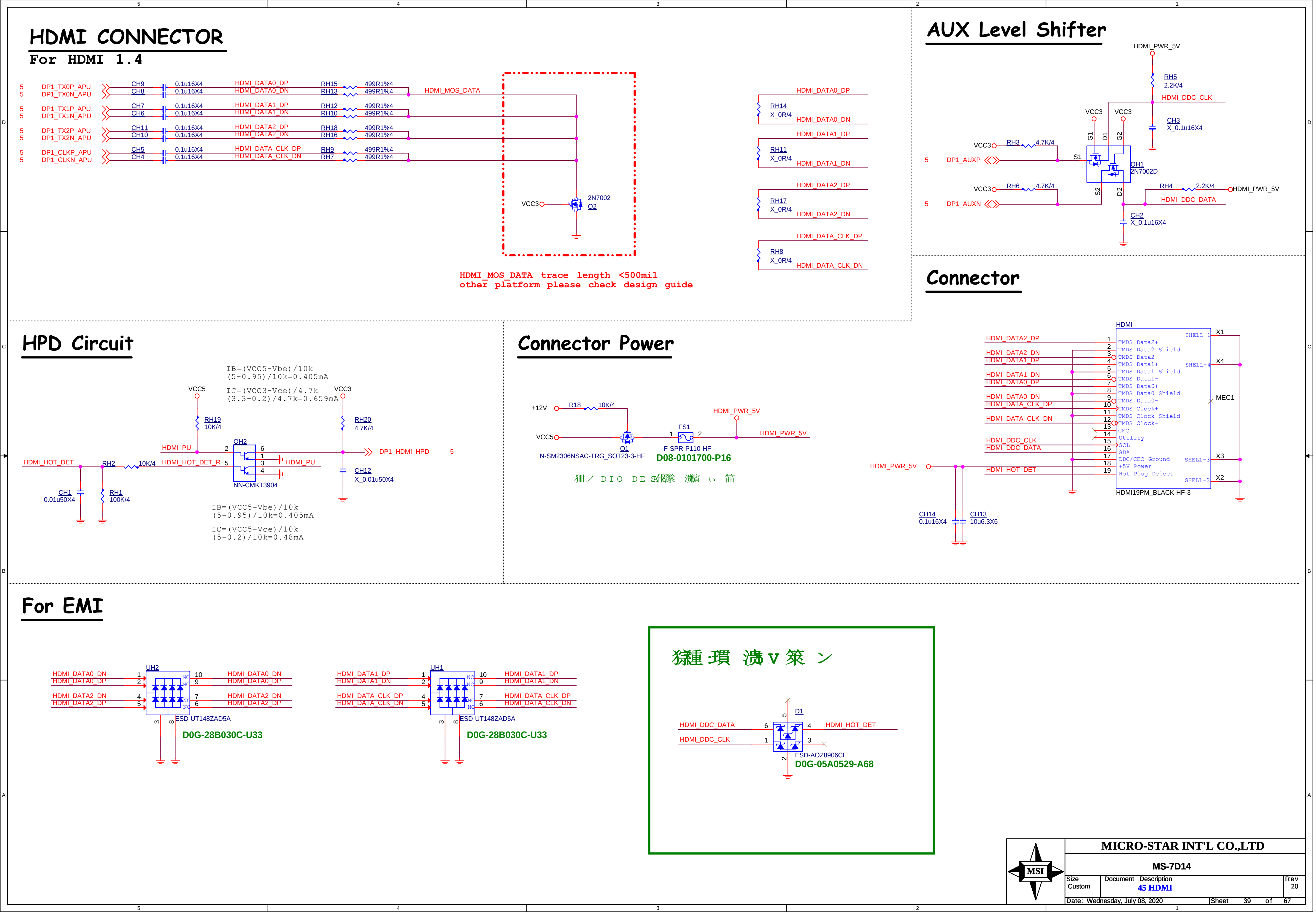


ESD



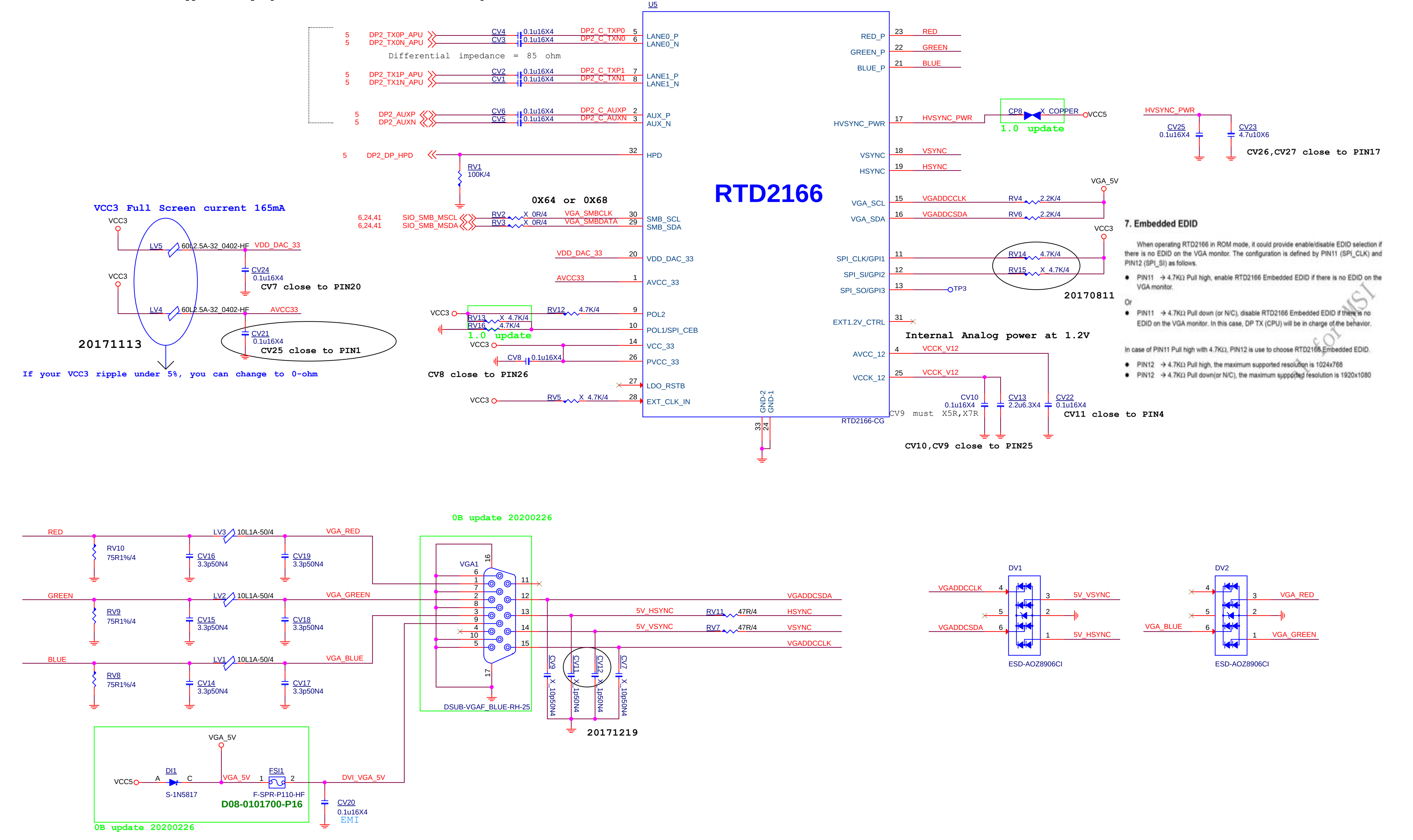
Main:D0G-05A0529-A68
AVL:D0G-45B0510-I14

MICRO-STAR INT'L CO.,LTD		
MS-7D14		
Size: Custom	Document Description: 44 DP	Rev: 20
Date: Wednesday, July 08, 2020	Sheet 38 of 67	


HDMI CONNECTOR
For HDMI 1.4
DP1_TX0P_APU
DP1_TX0N_APU
DP1_TX1P_APU
DP1_TX1N_APU
DP1_TX2P_APU
DP1_TX2N_APU
DP1_CLKP_APU
DP1_CLKN_APU
CH9 CH8 CH7 CH6 CH11 CH10 CH5 CH4
0.1u16X4
HDMI_DATA0_DP
HDMI_DATA0_DN
HDMI_DATA1_DP
HDMI_DATA1_DN
HDMI_DATA2_DP
HDMI_DATA2_DN
HDMI_DATA_CLK_DP
HDMI_DATA_CLK_DN
RH15 RH13 RH12 RH10 RH18 RH16 RH9 RH7
499R1%4
HDMI_MOS_DATA
VCC3
2N7002
Q2
HDMI_MOS_DATA trace length <500mil
other platform please check design guide
RH14 X_0R/4
RH11 X_0R/4
RH17 X_0R/4
RH8 X_0R/4
AUX Level Shifter
HDMI_PWR_5V
RH5 2.2K/4
HDMI_DDC_CLK
CH3 X_0.1u16X4
RH3 4.7K/4
DP1_AUXP
RH6 4.7K/4
DP1_AUXN
QH1 2N7002D
RH4 2.2K/4
HDMI_DDC_DATA
CH2 X_0.1u16X4
Connector
HDMI
TMDS Data2+
TMDS Data2 Shield
TMDS Data2-
TMDS Data1+
TMDS Data1 Shield
TMDS Data1-
TMDS Data0+
TMDS Data0 Shield
TMDS Data0-
TMDS Clock+
TMDS Clock Shield
TMDS Clock-
CEC
Utility
SCL
SDA
DDC/CEC Ground
+5V Power
Hot Plug Detect
SHELL-1 SHELL-4 SHELL-3 SHELL-2
X1 X4 X3 X2
MEC1
HDMI19PM_BLACK-HF-3
HDMI_HOT_DET
CH14 0.1u16X4
CH13 10u6.3X6
HPD Circuit
IB=(VCC5-Vbe)/10k
(5-0.95)/10k=0.405mA
IC=(VCC3-Vce)/4.7k
(3.3-0.2)/4.7k=0.659mA
VCC5
RH19 10K/4
HDMI_PU
RH2 10K/4
HDMI_HOT_DET_R
QH2
NN-CMKT3904
RH20 4.7K/4
DP1_HDMI_HPD
CH12 X_0.01u50X4
CH1 0.01u50X4
RH1 100K/4
IB=(VCC5-Vbe)/10k
(5-0.95)/10k=0.405mA
IC=(VCC5-Vce)/10k
(5-0.2)/10k=0.48mA
Connector Power
+12V
R18 10K/4
VCC5
Q1
N-SM2306NSAC-TRG_SOT23-3-HF
FS1
F-SPR-P110-HF
D08-0101700-P16
For EMI
UH2
ESD-UT148ZAD5A
D0G-28B030C-U33
UH1
ESD-UT148ZAD5A
D0G-28B030C-U33
D1
ESD-AOZ8906CI
D0G-05A0529-A68
MICRO-STAR INT'L CO.,LTD
MS-7D14
Size Custom
Document Description
45 HDMI
Rev 20
Date: Wednesday, July 08, 2020
Sheet 39 of 67

Note:

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



7. Embedded EDID

When operating RTD2166 in ROM mode, it could provide enable/disable EDID selection if there is no EDID on the VGA monitor. The configuration is defined by PIN11 (SPI_CLK) and PIN12 (SPI_SI) as follows.

- PIN11 → 4.7KΩ Pull high, enable RTD2166 Embedded EDID if there is no EDID on the VGA monitor.

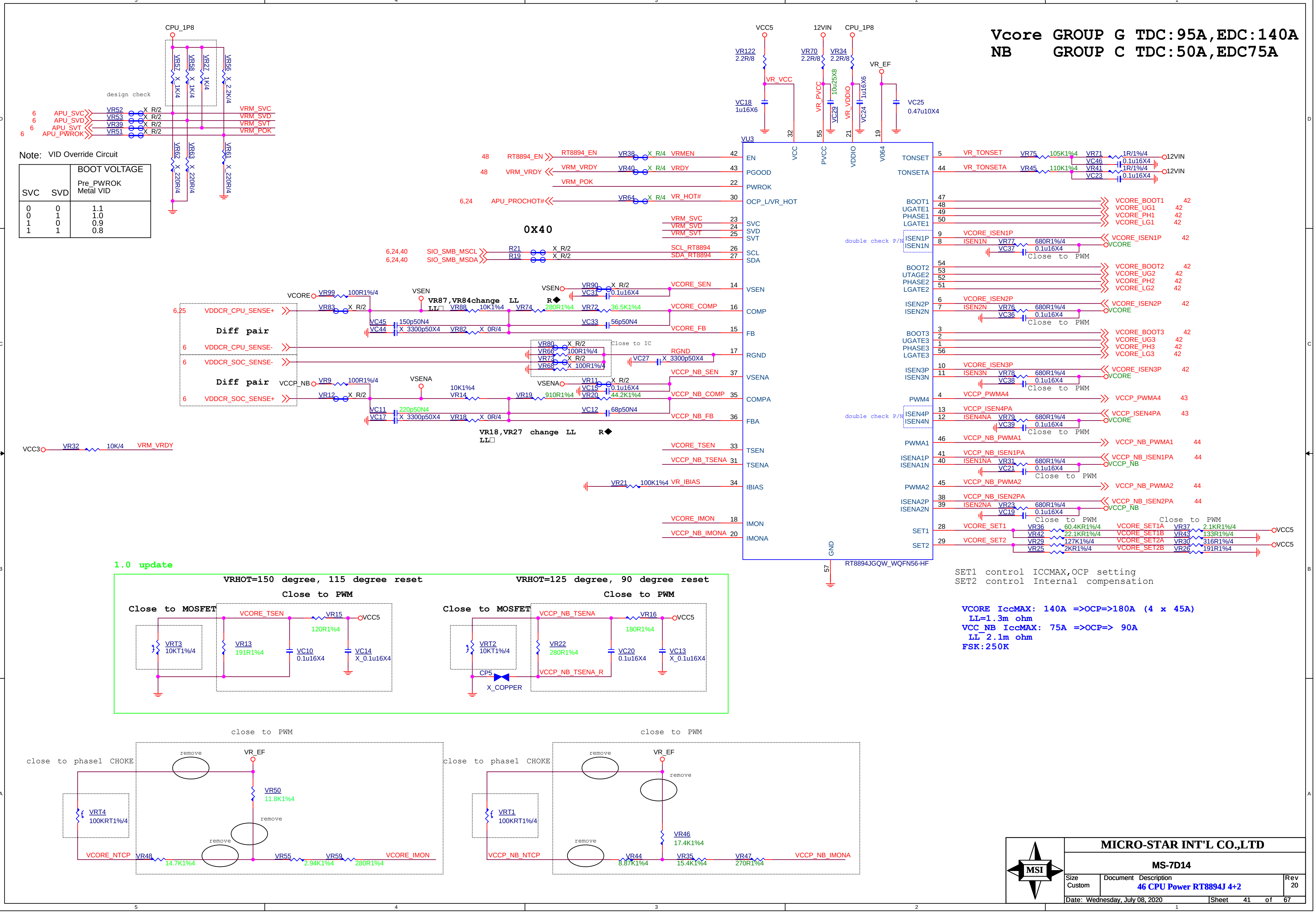
Or

- PIN11 → 4.7KΩ Pull down (or N/C), disable RTD2166 Embedded EDID if there is no EDID on the VGA monitor. In this case, DP TX (CPU) will be in charge of the behavior.

In case of PIN11 Pull high with 4.7KΩ, PIN12 is use to choose RTD2166 Embedded EDID.

- PIN12 → 4.7KΩ Pull high, the maximum supported resolution is 1024x768
- PIN12 → 4.7KΩ Pull down(or N/C), the maximum supported resolution is 1920x1080

MICRO-STAR INT'L CO.,LTD		
MS-7D14		
Size Custom	Document Description 45 HDMI	Rev 20
Date: Wednesday, July 08, 2020	Sheet 40 of 67	



Note: VID Override Circuit

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

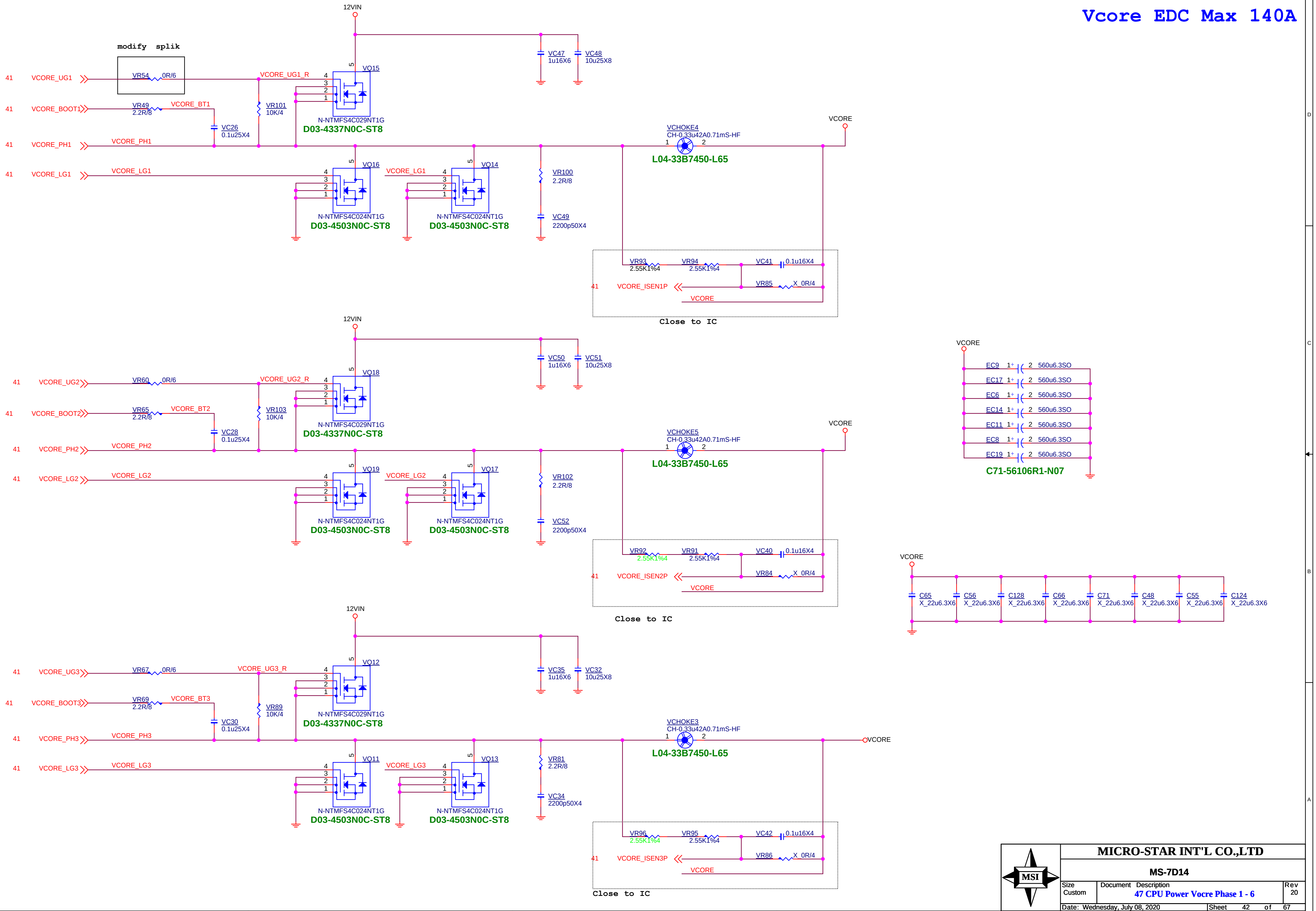
MICRO-STAR INT'L CO.,LTD

MS-7D14

Size	Document Description	Rev
Custom	46 CPU Power RT8894J 4+2	20

Date: Wednesday, July 08, 2020 Sheet 41 of 67

Vcore EDC Max 140A

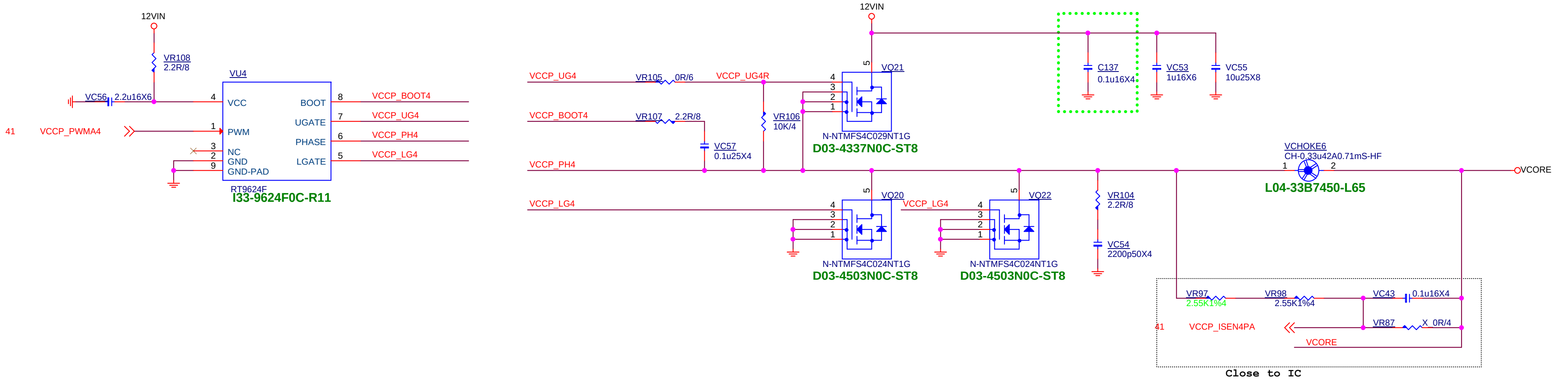


MICRO-STAR INT'L CO.,LTD

MS-7D14

Size	Document Description	Rev
Custom	47 CPU Power Vocre Phase 1 - 6	20

Date: Wednesday, July 08, 2020 Sheet 42 of 67



MICRO-STAR INT'L CO.,LTD

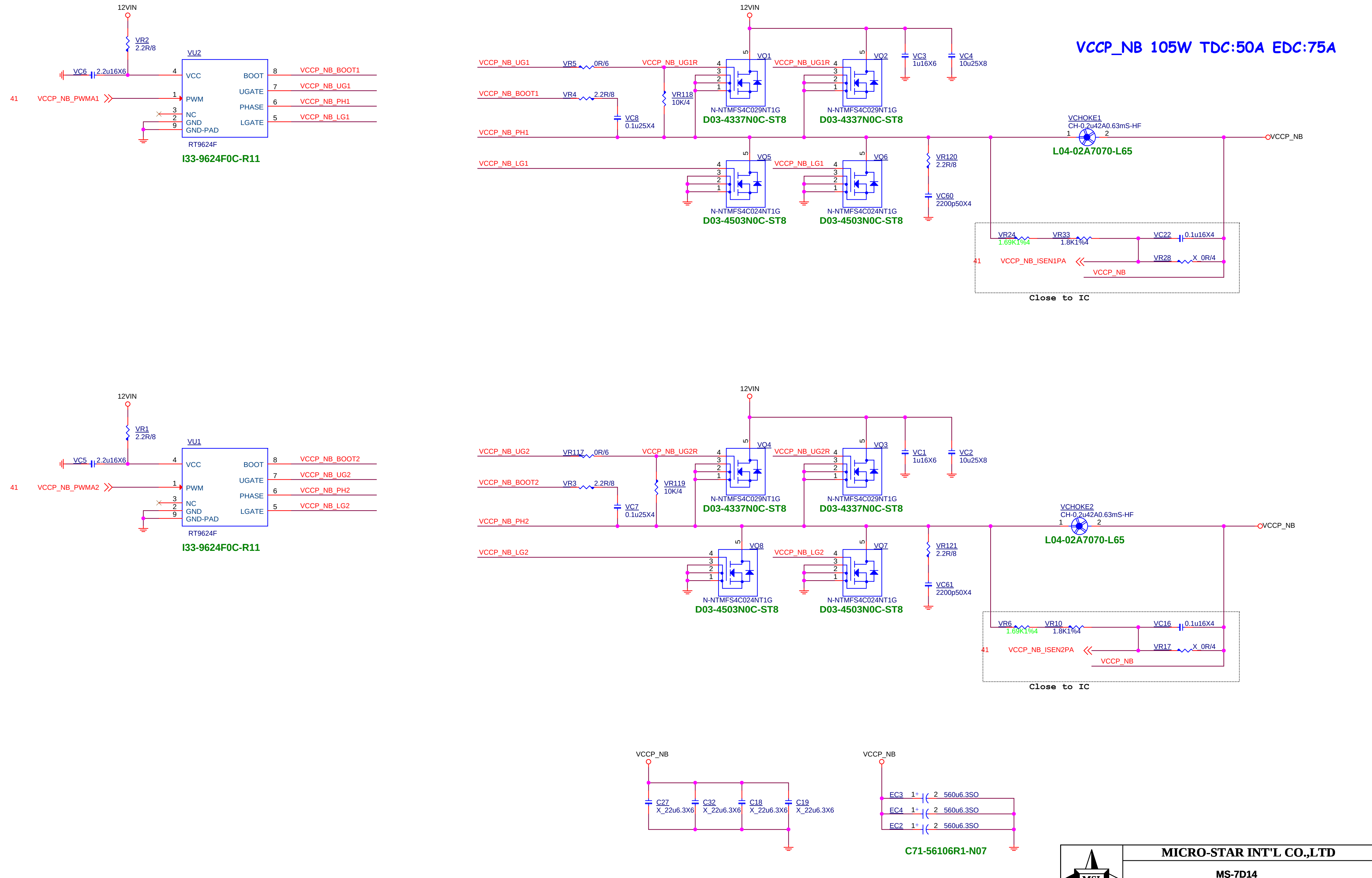
MS-7D14

Size	Document Description	Rev
Custom	48 CPU Power Vcore Phase 7 - 8	20

Date: Wednesday, July 08, 2020 Sheet 43 of 67

SOC EDC Max 75A

VCCP_NB 105W TDC:50A EDC:75A

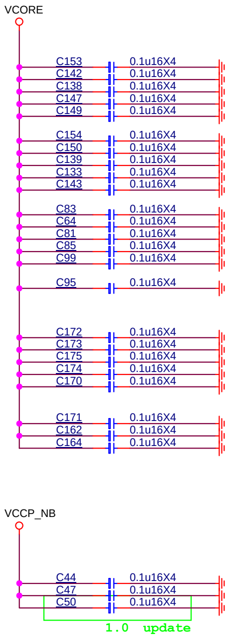


MICRO-STAR INT'L CO.,LTD

MS-7D14

Size	Document Description	Rev
Custom	49 CPU Power NB Phase 1-2	20

Date: Wednesday, July 08, 2020 Sheet 44 of 67



MICRO-STAR INT'L CO.,LTD

MS-7D14

Size	Document Description	Rev
Custom	50 Decoupling Capacitance	20

Date: Wednesday, July 08, 2020 Sheet 45 of 67

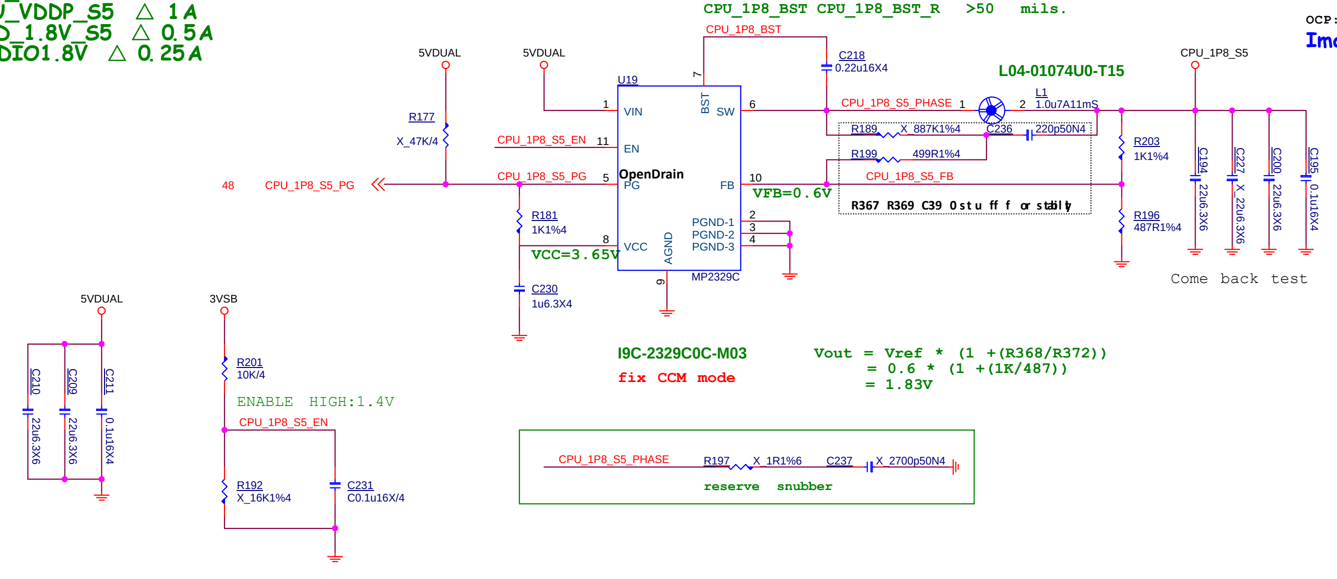
CPU 1.8V S5

CPU_1.8V △ 2A
CPU_VDDP_S5 △ 1A
VDD_1.8V_S5 △ 0.5A
AUDIO1.8V △ 0.25A

Continuous Conduction Mode (CCM)

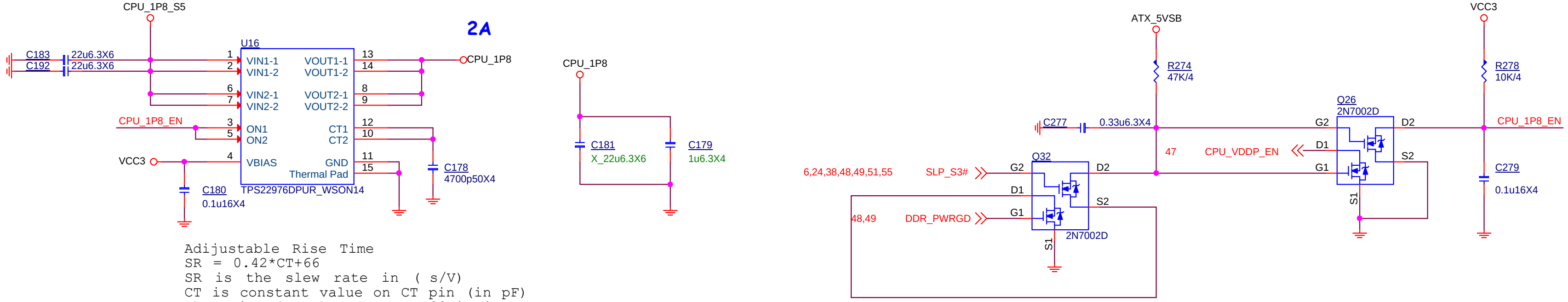
CPU_1P8_BST CPU_1P8_BST_R >50 mils.

OCP:6.5A
Imax=3.75A(S5+S0)

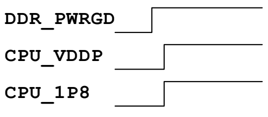


CPU 1.8V S0

CPU 1.8V_S0@2A



Adijustable Rise Time
SR = 0.42*CT+66
SR is the slew rate in (s/V)
CT is constant value on CT pin (in pF)
The units for the constant 66 is in
(s/V)



MICRO-STAR INT'L CO.,LTD		
MS-7D14		
Size: Custom	Document Description: 51 CPU Power 1.8_S0 / S5	Rev: 20
Date: Wednesday, July 08, 2020	Sheet 46 of 67	

CPU_VDDP_S0

0.9V@S0:8.5A

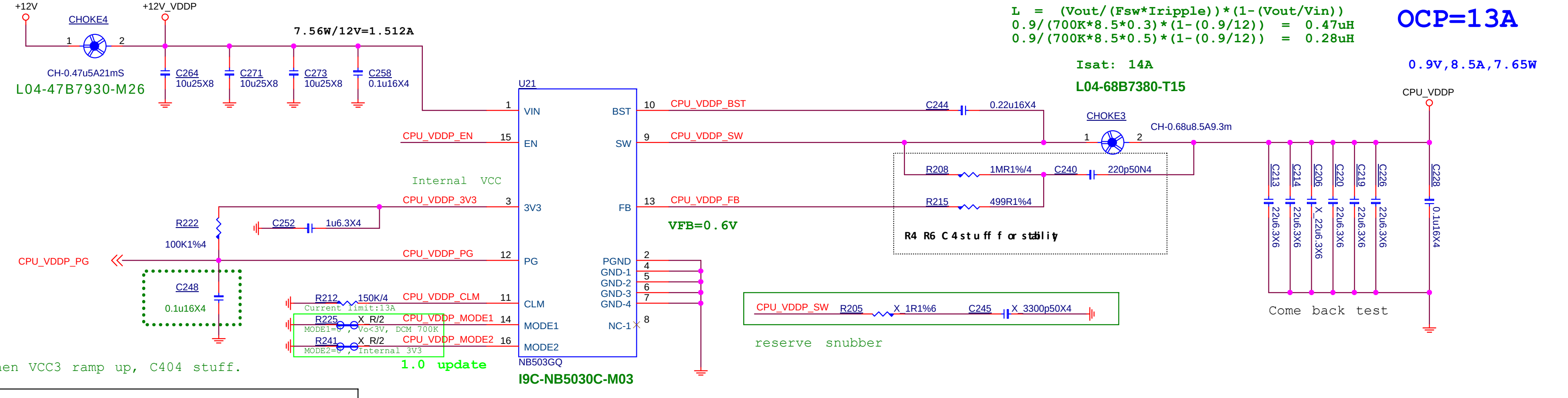
S0:8.5A

Input Current = (13A*0.9V)/12V/0.8 = 1.22A
Choke Isat = 8A
Irms=Iout*SQRT((Vo/Vi)*(1-(Vo/Vi)))
=13*SQRT((0.9/12)*(1-(0.9/12))) = 3.42A
Choke Irms =5 A

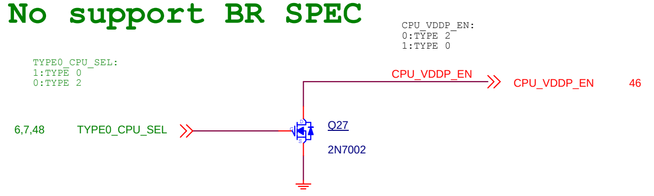
L = (Vout/(Fsw*Iripple))*(1-(Vout/Vin))
0.9/(700K*8.5*0.3)*(1-(0.9/12)) = 0.47uH
0.9/(700K*8.5*0.5)*(1-(0.9/12)) = 0.28uH

OCP=13A

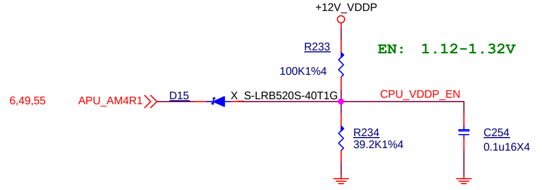
0.9V,8.5A,7.65W

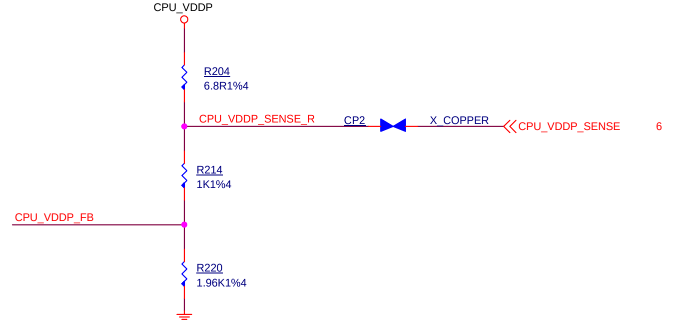


No support BR SPEC



CPU	TYPE	TYPE0_CPU_SEL	TYPE1_CPU_SEL	CPU_VDDP_EN	
BR	0	1	0	1	SPEC no Support
NA		0	0	0	
SR	2	1	1	0	NOT SUPPORT TYPE2
RV/ZP	3	0	1	1	
MTS	4	1	1	1	NOT SUPPORT TYPE4





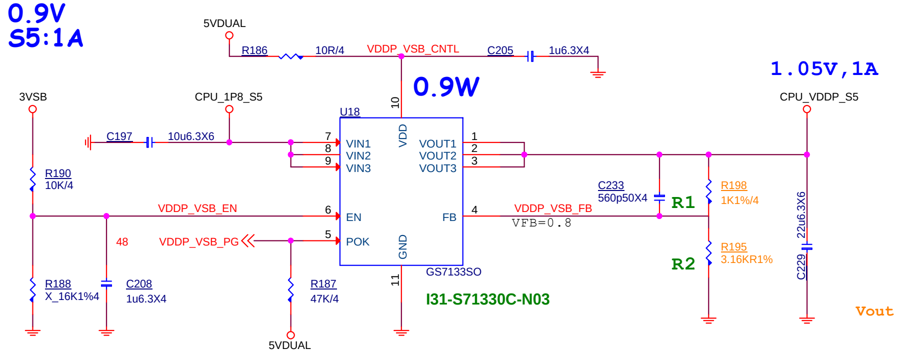
Vout = Vref + (R1*R4*Vref)/(R2*(R1+R4))
= 0.6+(1k*1000k*0.6)/(1.96K*(1k+1000k))
= 0.9058V

CPU_VDDP_S5

0.9V
S5:1A

1.05V,1A

0.9W

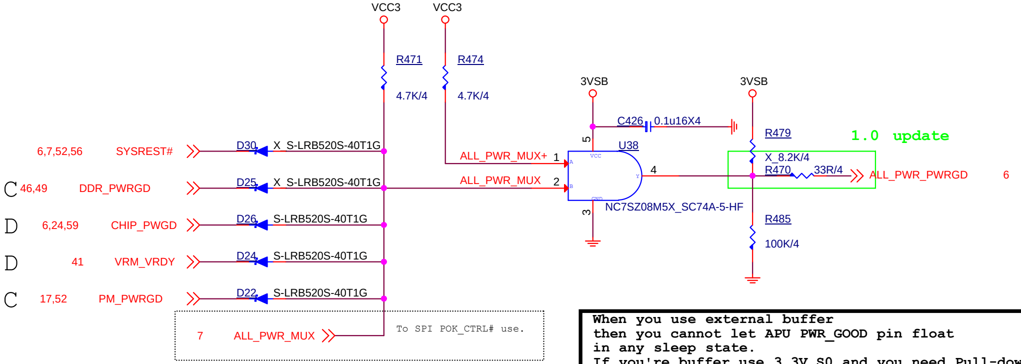


Vout = Vref * (1+R489/R488)
= 0.8 * (1+1K/3.16K)
= 1.053v

MICRO-STAR INT'L CO.,LTD		
MS-7D14		
Size: Custom	Document Description: 52 CPU Power VDDP-NB503/GS7133	Rev: 20
Date: Wednesday, July 08, 2020	Sheet 47 of 67	

ALL POWER GOOD MUX

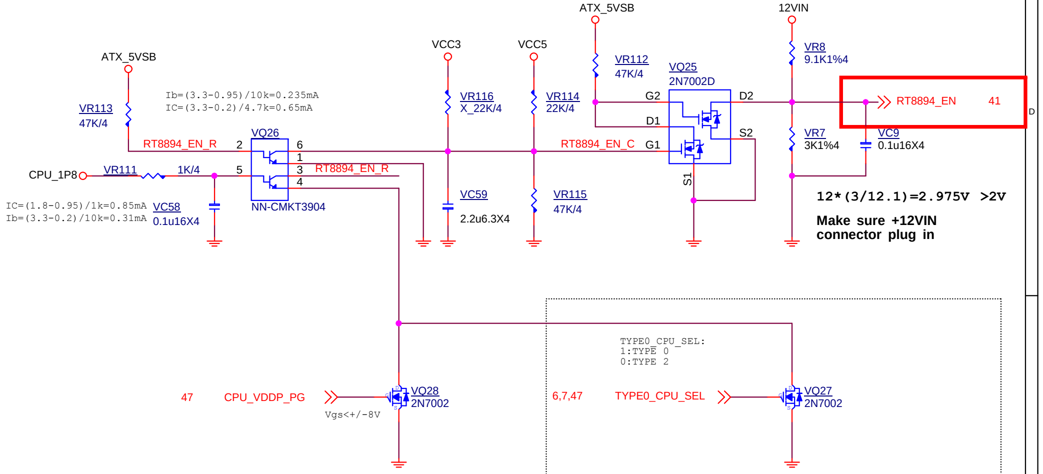
S0 PG



When you use external buffer
then you cannot let APU PWR_GOOD pin float
in any sleep state.
If you're buffer use 3.3V_S0 and you need Pull-down 100K
If you're buffer use 3.3V_S5 and you don't need PD.

VRM_Enable circuit

1.0 update — remove D3



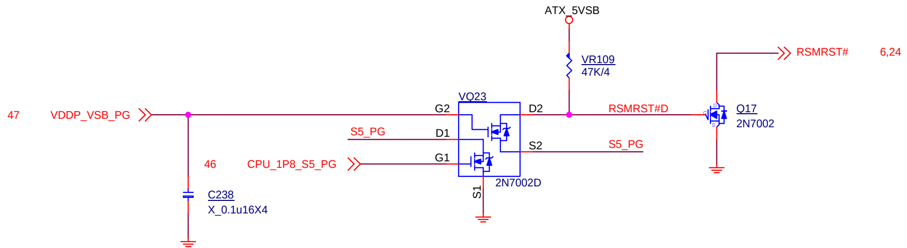
SPEC no Support

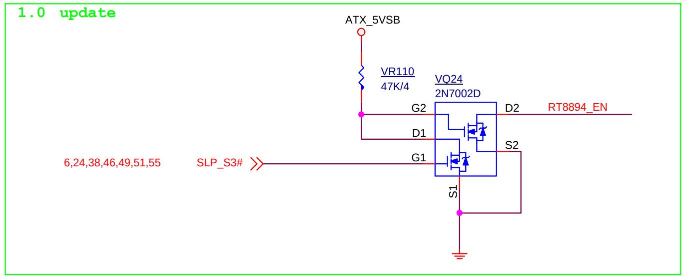
CPU VDDP NOT SUPPORT TYPE2

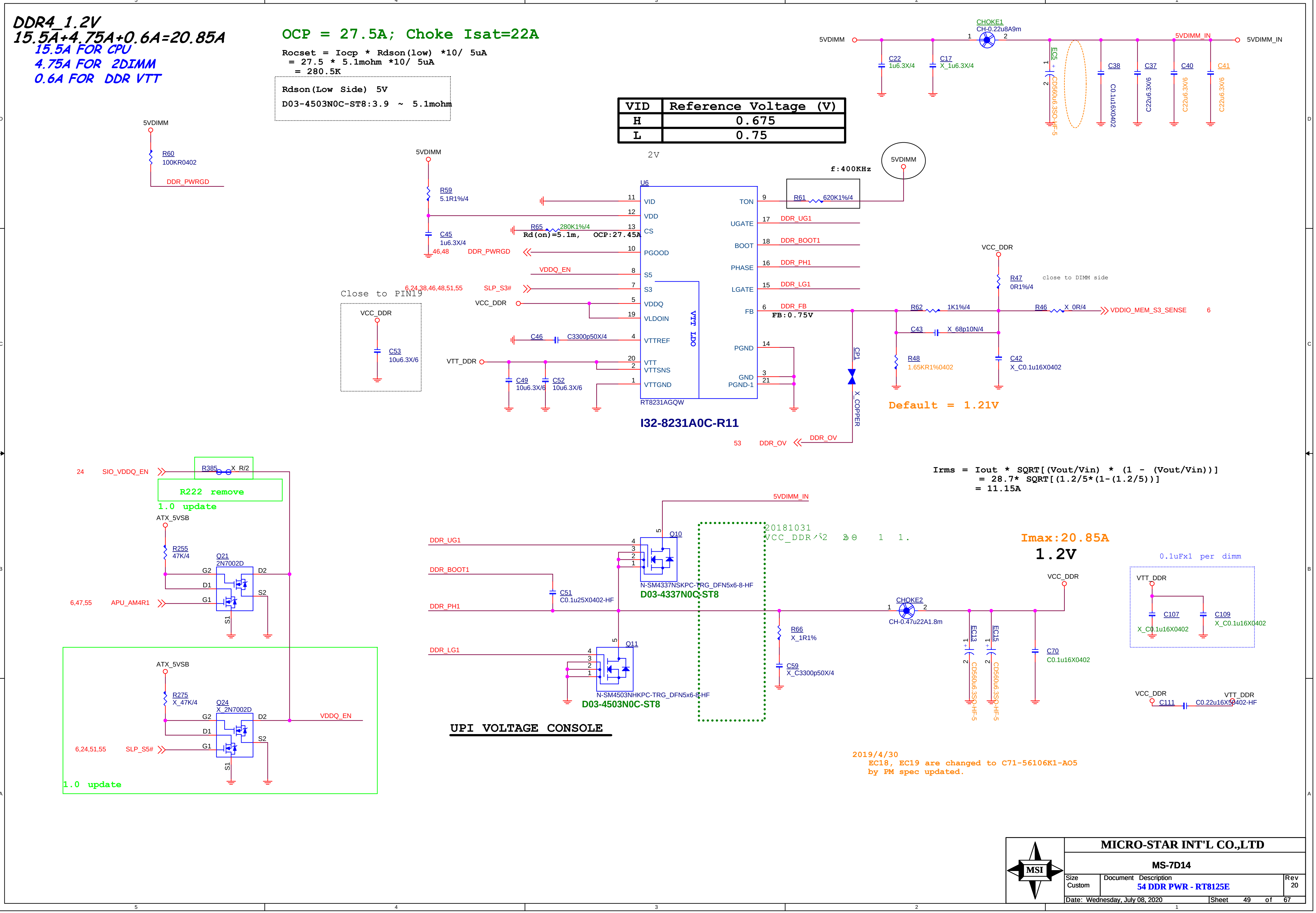
CPU VDDP NOT SUPPORT TYPE4

CPU	TYPE	TYPE1_CPU_SEL	TYPE0_CPU_SEL
BR	0	0	1
NA		0	0
SR	2	1	1
RV/ZP	3	1	0
MTS	4	1	1

S5 PG



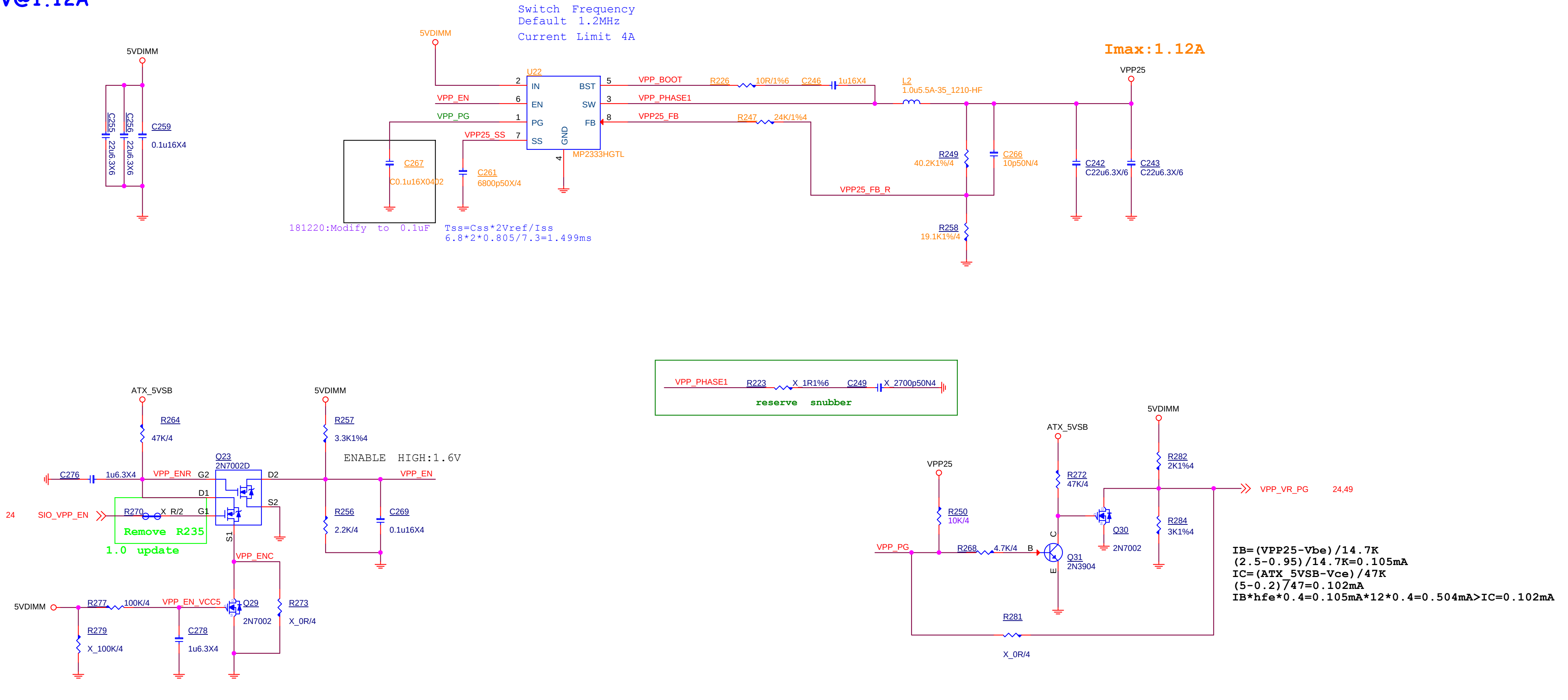




DDR4_1.2V
15.5A+4.75A+0.6A=20.85A
15.5A FOR CPU
4.75A FOR 2DIMM
0.6A FOR DDR VTT
OCP = 27.5A; Choke Isat=22A
Rocset = Iocp * Rdson(low) *10/ 5uA
= 27.5 * 5.1mohm *10/ 5uA
= 280.5K
Rdson(Low Side) 5V
D03-4503N0C-ST8:3.9 ~ 5.1mohm
VID
Reference Voltage (V)
H
0.675
L
0.75
f:400KHz
Close to PIN19
RT8231AGQW
I32-8231A0C-R11
Default = 1.21V
Rd(on)=5.1m, OCP:27.45A
FB:0.75V
close to DIMM side
R222 remove
1.0 update
Irms = Iout * SQRT[(Vout/Vin) * (1 - (Vout/Vin))]
= 28.7* SQRT[(1.2/5*(1-(1.2/5))]
= 11.15A
Imax:20.85A
1.2V
0.1uFx1 per dimm
UPI VOLTAGE CONSOLE
2019/4/30
EC18, EC19 are changed to C71-56106K1-A05
by PM spec updated.
D03-4337N0C-ST8
D03-4503N0C-ST8
MICRO-STAR INT'L CO.,LTD
MS-7D14
54 DDR PWR - RT8125E
Date: Wednesday, July 08, 2020
Sheet 49 of 67
Rev 20

2DIMM : VPP25

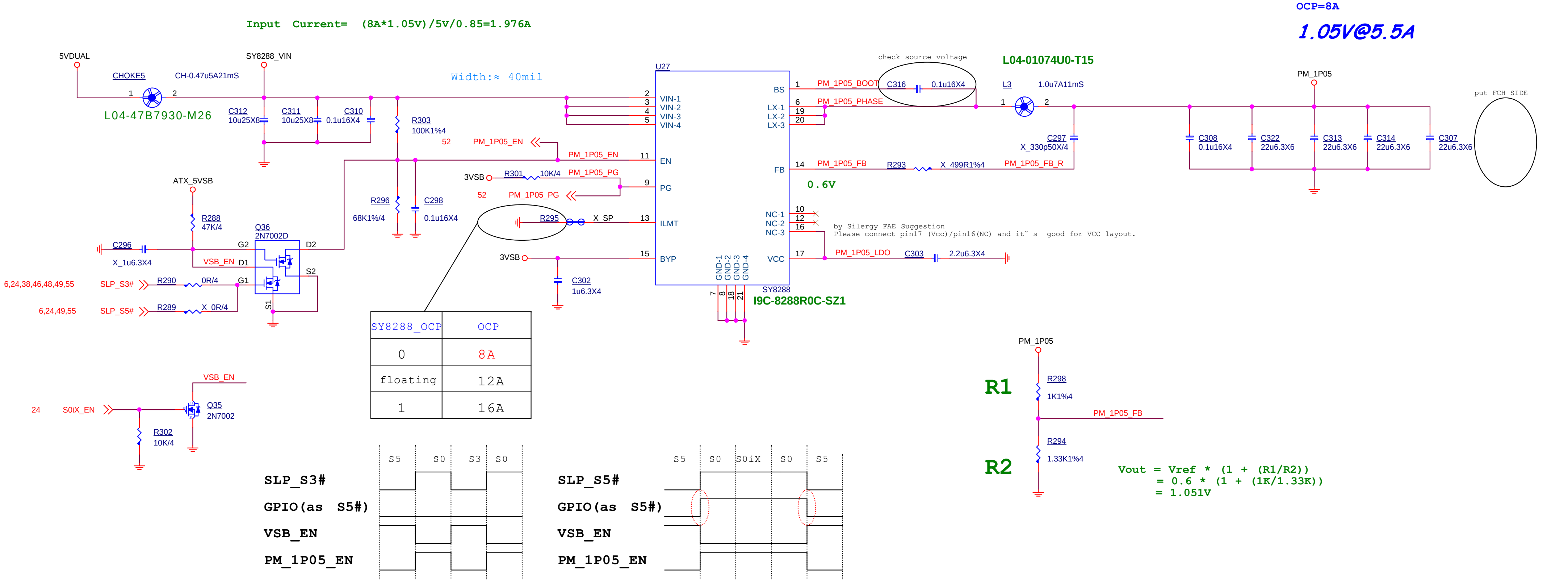
2.5V@1.12A



MICRO-STAR INT'L CO.,LTD		
MS-7D14		
Size: Custom	Document Description: 55 DDR PWR - VPP25 / VTT	Rev 20
Date: Wednesday, July 08, 2020	Sheet 50 of 67	

FOR Promontory 1.05V_S0

1.05V
S0:5.5A



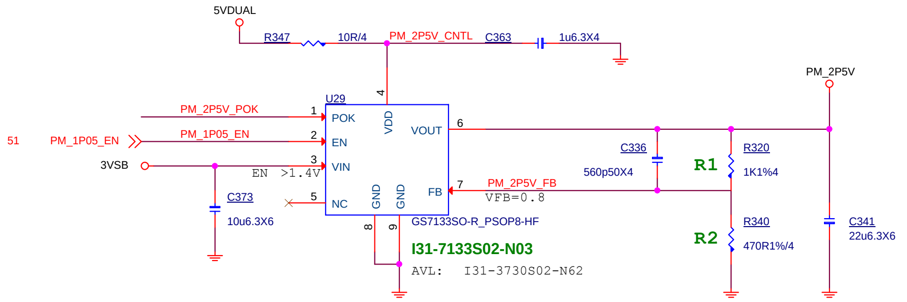
SY8288_OCP	OCP
0	8A
floating	12A
1	16A

FOR PROM PM_1P05_S5

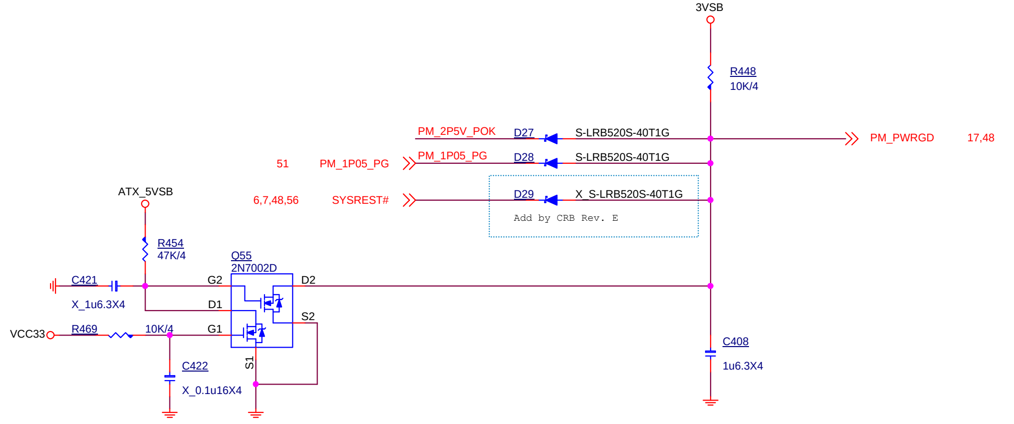
1.05V@0.05A

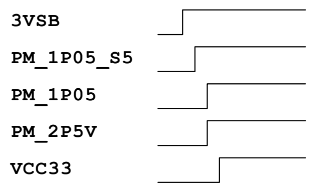
Promontory-2.5V

2.5V@900mA



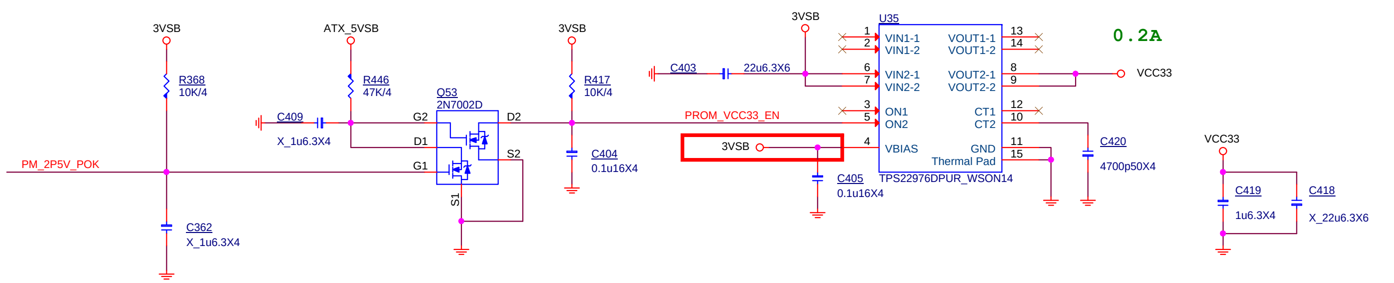
Vout = Vref * (1 +(R1/R2))
= 0.8 * (1 +(1K/0.47K))
= 2.502V





VCC33

VCC33@0.2A



Adjustable Rise Time
SR = 0.42*CT+66
SR is the slew rate in (s/V)
CT is constant value on CT pin (in pF)
The units for the constant 66 is in
(s/V)

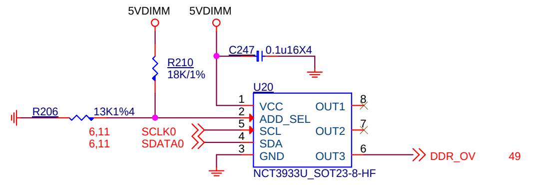
MICRO-STAR INT'L CO.,LTD	
MS-7D14	
Size: Custom	Document Description: 57 PM - GS7133/PM_2P5V/VCC33 — Rev 20
Date: Wednesday, July 08, 2020	Sheet 52 of 67

Over Voltage Control IC

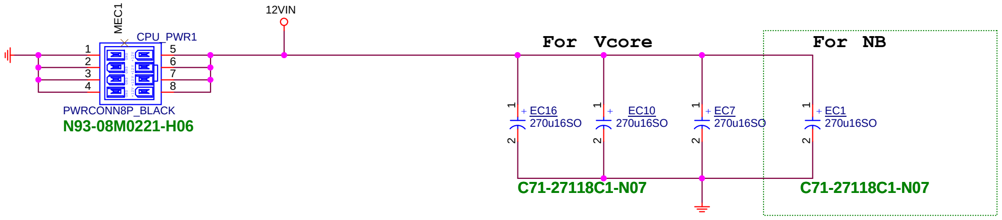
UPI VOLTAGE CONSOLE

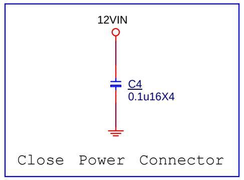
ADDRESS	0x2A	0X28	0x26	0x24	0x22	0x20
RH (KOhm)	OPEN	3.9	3	2.2	1.3	10
RL (KOhm)	10	1.3	2.3	3	3.9	OPEN
BUS_SEL	0%	25%	40%	60%	75%	100%

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



CPU POWER CONNECTOR





Vcore

D=Vout/Vin			
Vin	=	12	> input voltage
Vout	=	2	> output Vcore
D	=	0.166667	

I o = Icore(max)*0.8			
I core(max)	=	200	> Vcore current
I avg.	=	160	A

I ripple={ Io*√D*√(1-D)} / Phase			
Phase	=	10	phase
I ripple	=	5.962848	A

How many pcs. Of Cap.			
I ripple(cap)	=	4700	m A
COETEMP	=	1	
Input Cap.	=	2	pcs.

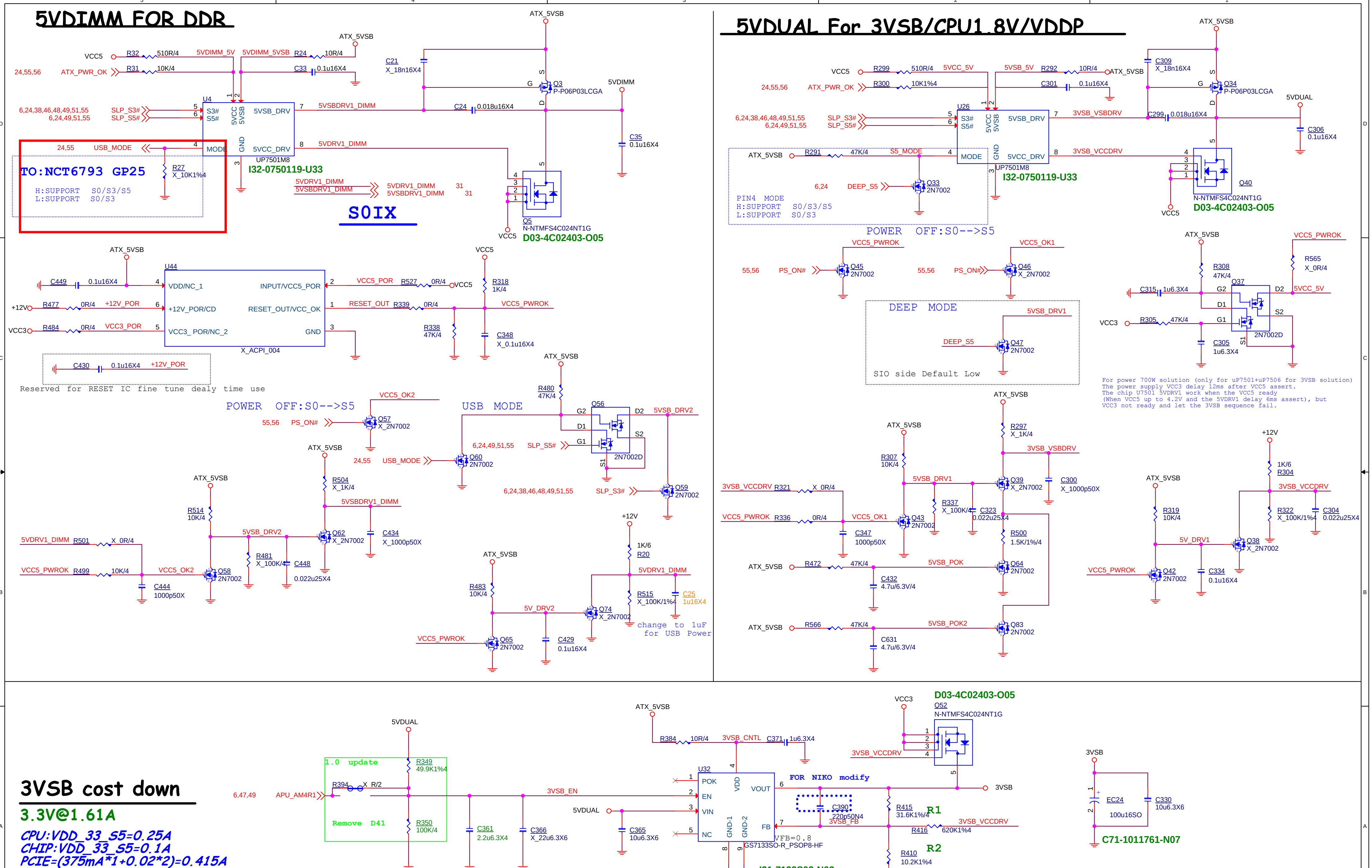
SOC

D=Vout/Vin			
Vin	=	12	> input voltage
Vout	=	1.55	> output Vcore
D	=	0.129167	

I o = Icore(max)*0.8			
I core(max)	=	75	> Vcore current
I avg.	=	60	A

I ripple={ Io*√D*√(1-D)} / Phase			
Phase	=	2	phase
I ripple	=	10.06153	A

How many pcs. Of Cap.			
I ripple(cap)	=	4700	m A
COETEMP	=	1	
Input Cap.	=	3	pcs.



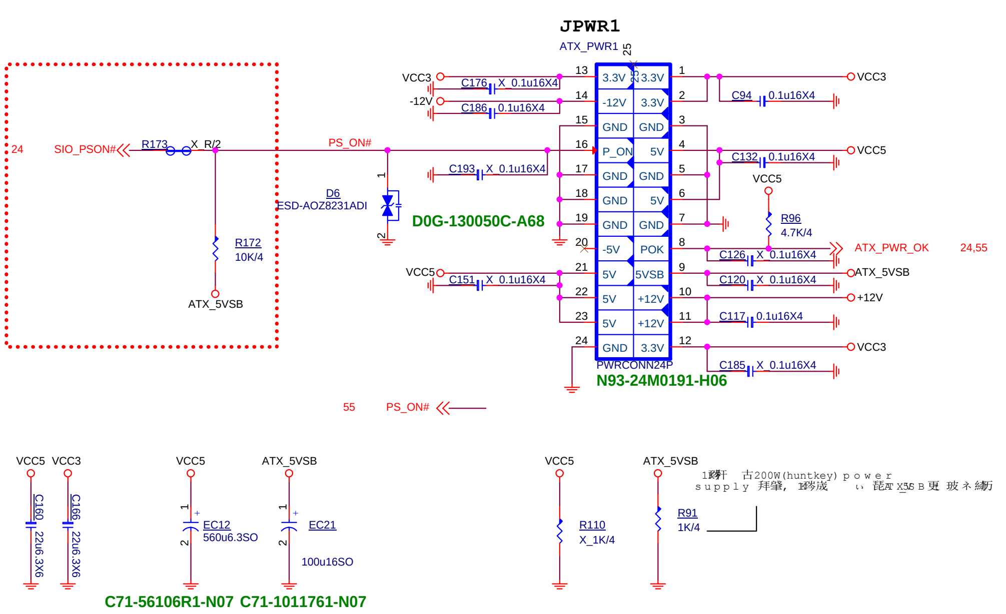
MICRO-STAR INT'L CO.,LTD

MS-7D14

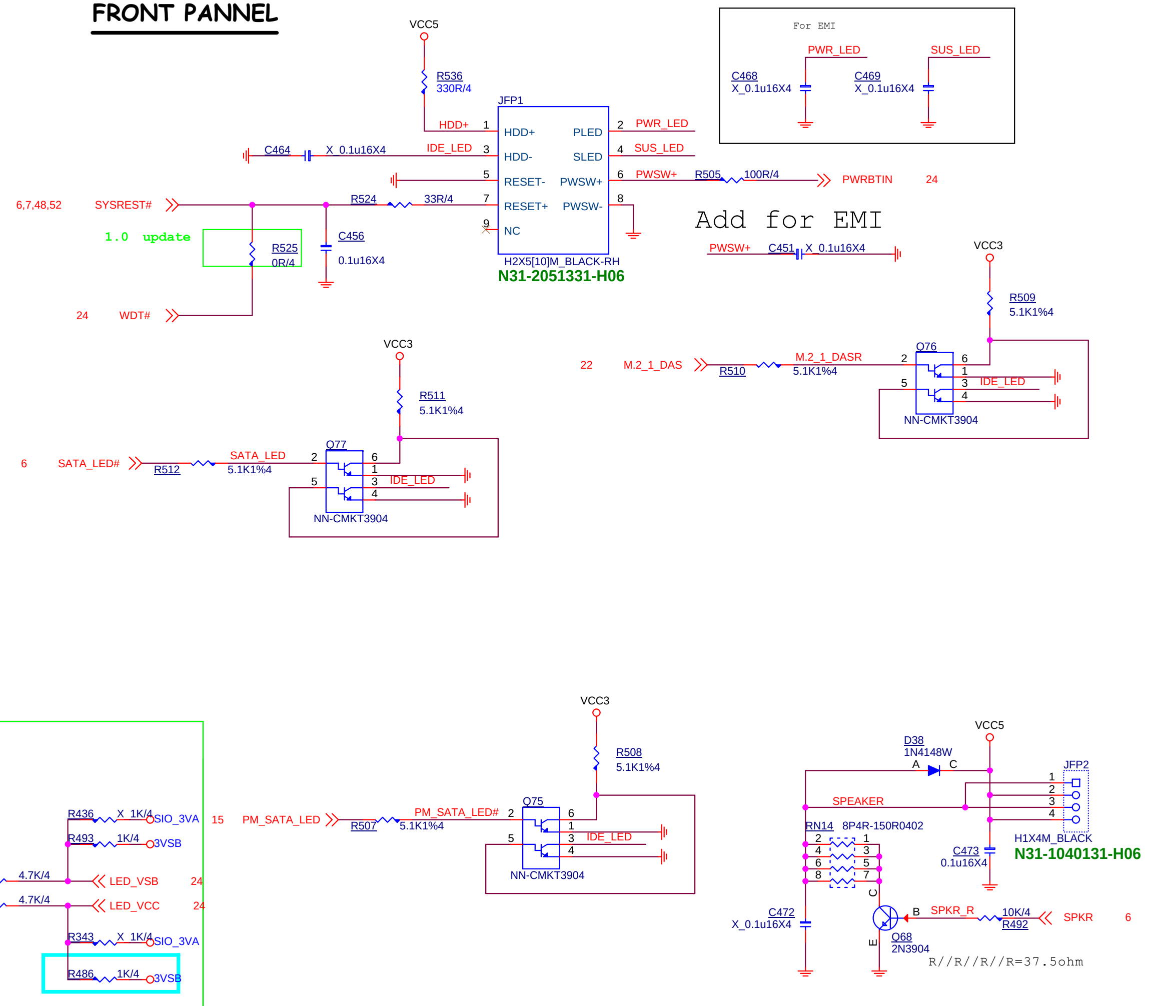
Size	Document Description	Rev
Custom	60 ACPI - 3VSB / 5VDIMM	20

Date: Wednesday, July 08, 2020 Sheet 55 of 67

ATX POWER CONNECTOR



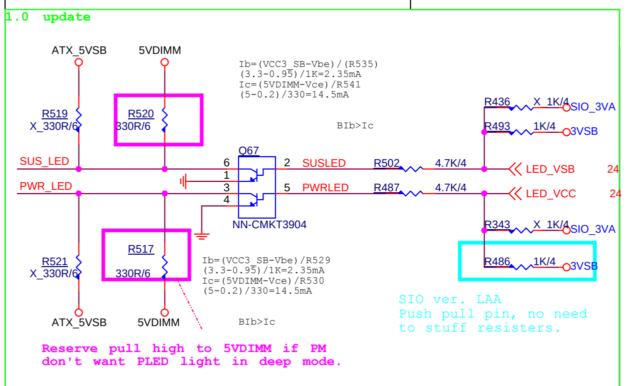
FRONT PANNEL



Voltage Mearsure Point

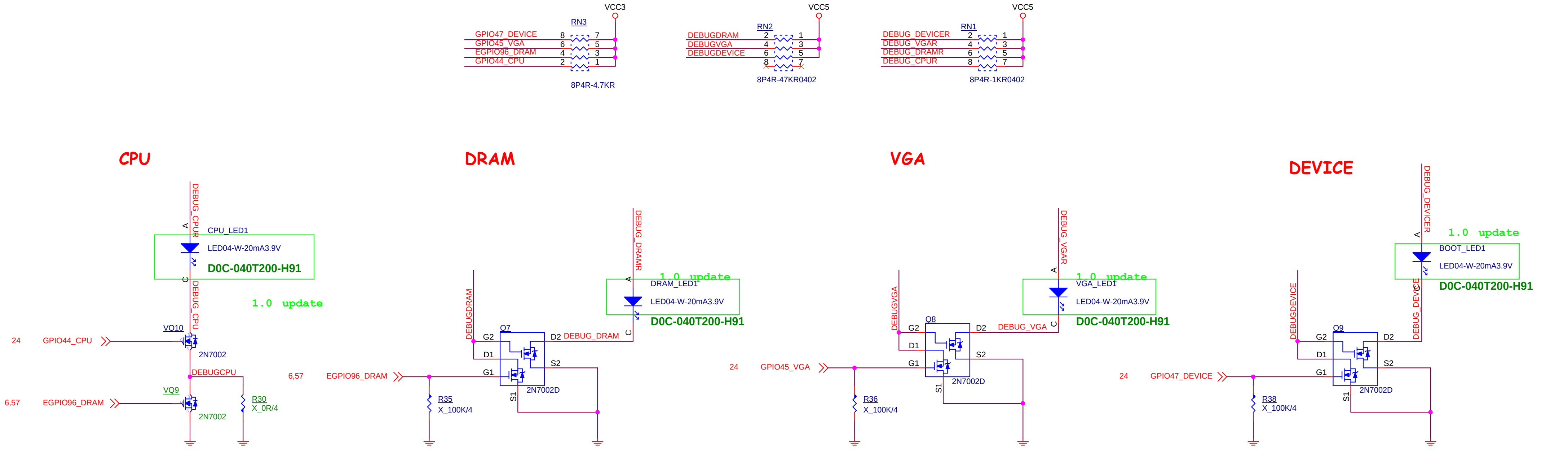
TPM

LED (for ESIO)



MSI	MICRO-STAR INT'L CO.,LTD	
	MS-7D14	
Size: Custom	Document Description: 61 ATX Power - FrontPanel / EMI	Rev 20
	Date: Wednesday, July 08, 2020	Sheet 56 of 67

EZ Debug LED



LEDGPIO	GPIO46	EGPIO96	GPIO44	GPIO13
獵	OPEN-Drain	GPO LOW	GPO LOW	GPO LOW
防滅	GPO LOW	GPO HIGH	OPEN-Drain	OPEN-Drain

default Input

ＬＥＤ獵蛸 蛸 豔ＣＰＵ Ｌ Ｅ闽 奔

DIMM_SLOT *FORM SIO*

D0C-040P100-H91/D0C-040S500-E07

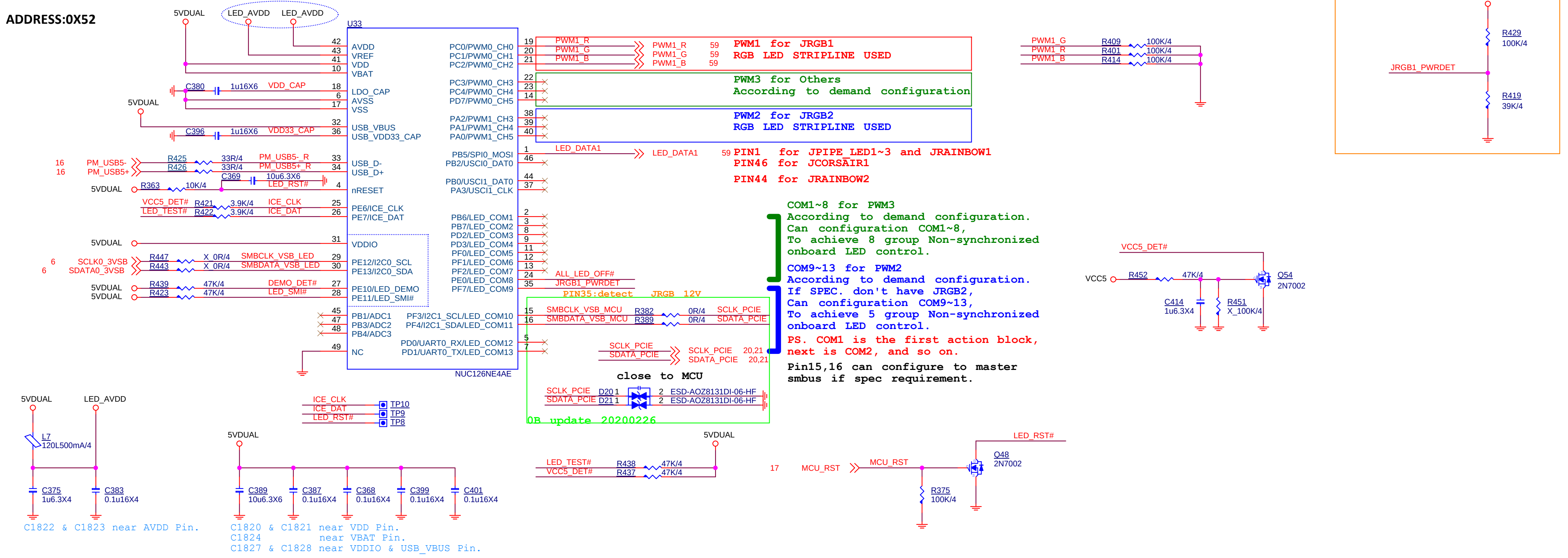
AMD AMP Detect LED

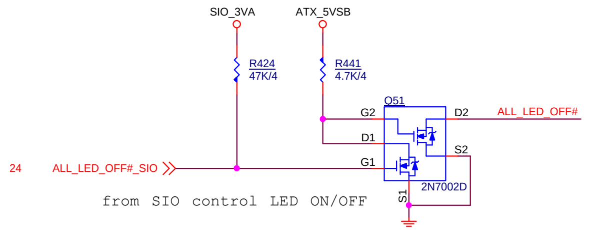
MICRO-STAR INT'L CO.,LTD		
MS-7D14		
Size Custom	Document Description 62 LED - EZ DEBUG / AMP	Rev 20
Date: Wednesday, July 08, 2020	Sheet 57 of 67	

48 PIN LED MCU

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

ADDRESS:0X52





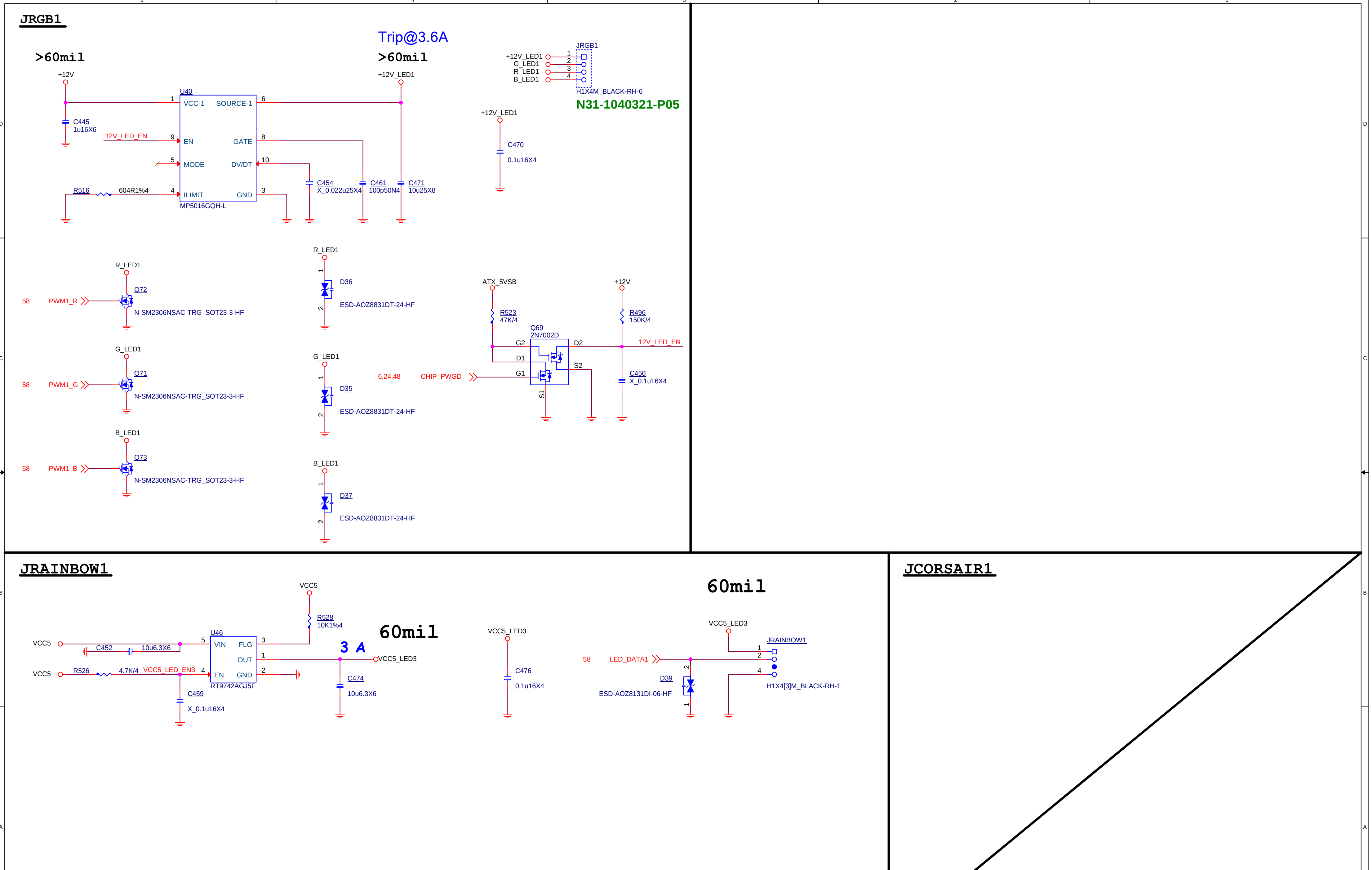
Control	Net Name	PWM USE
PCH	LED_DATA1	No Use
AUDIO Cover	LED_GPIO_01	No Use
MOS/IO cover	LED_GPIO_02	No Use
JRAINBOW1	LED_GPIO_03	No Use
JCORSAIR1	LED_DATA2	No Use
JRGB1/JRGB2	PWM1/ PWM2	PWM1/ PWM2
Board Side LED	COM 1~8	PWM3
Board Side LED	COM 9~13	PWM2

MICRO-STAR INT'L CO.,LTD

MS-7D14

Size	Document Description	Rev
Custom	63 MCU - LED Control	20

Date: Wednesday, July 08, 2020 Sheet 58 of 67



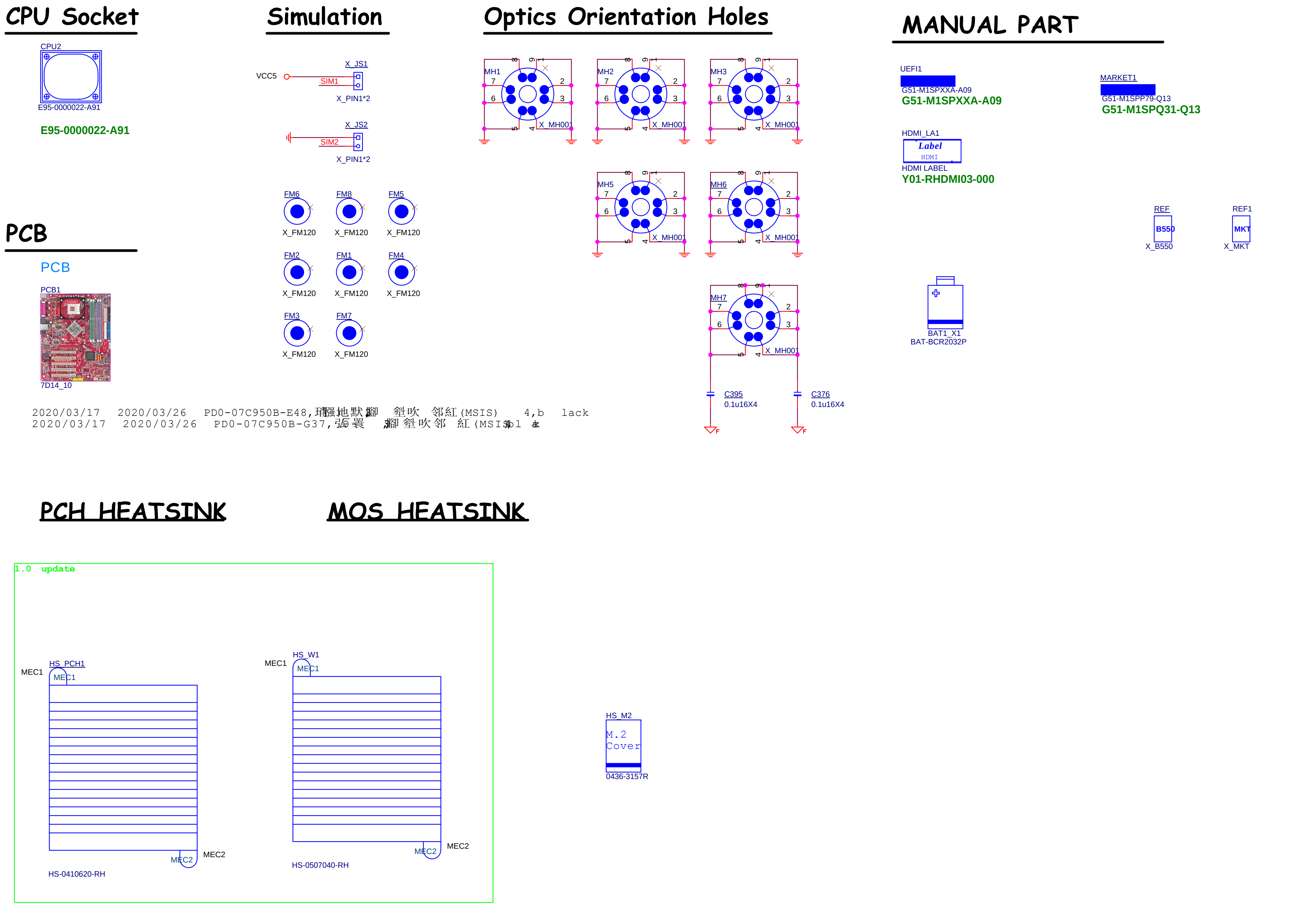
MICRO-STAR INT'L CO.,LTD

MS-7D14

Size	Document Description	Rev
Custom	64 LED - JRGB1/2 JRAINBO1/2	20

Date: Wednesday, July 08, 2020 Sheet 59 of 67

MICRO-STAR INT'L CO.,LTD		
MS-7D14		
Size: Custom	Document Description: 66 BOM Option	Rev: 20
Date: Wednesday, July 08, 2020	Sheet 60 of 67	



MICRO-STAR INT'L CO.,LTD

MS-7D14

Size	Document Description	Rev
Custom	67 Manual Parts	20

Date: Wednesday, July 08, 2020 Sheet 61 of 67