amd
am4

MS-7C02 BOM List

	Schematic Cfg	ERP NO.	Remark	BOM
*	CFG-7C02-01S-Arsenal Gaming	601-7C02-01S		A

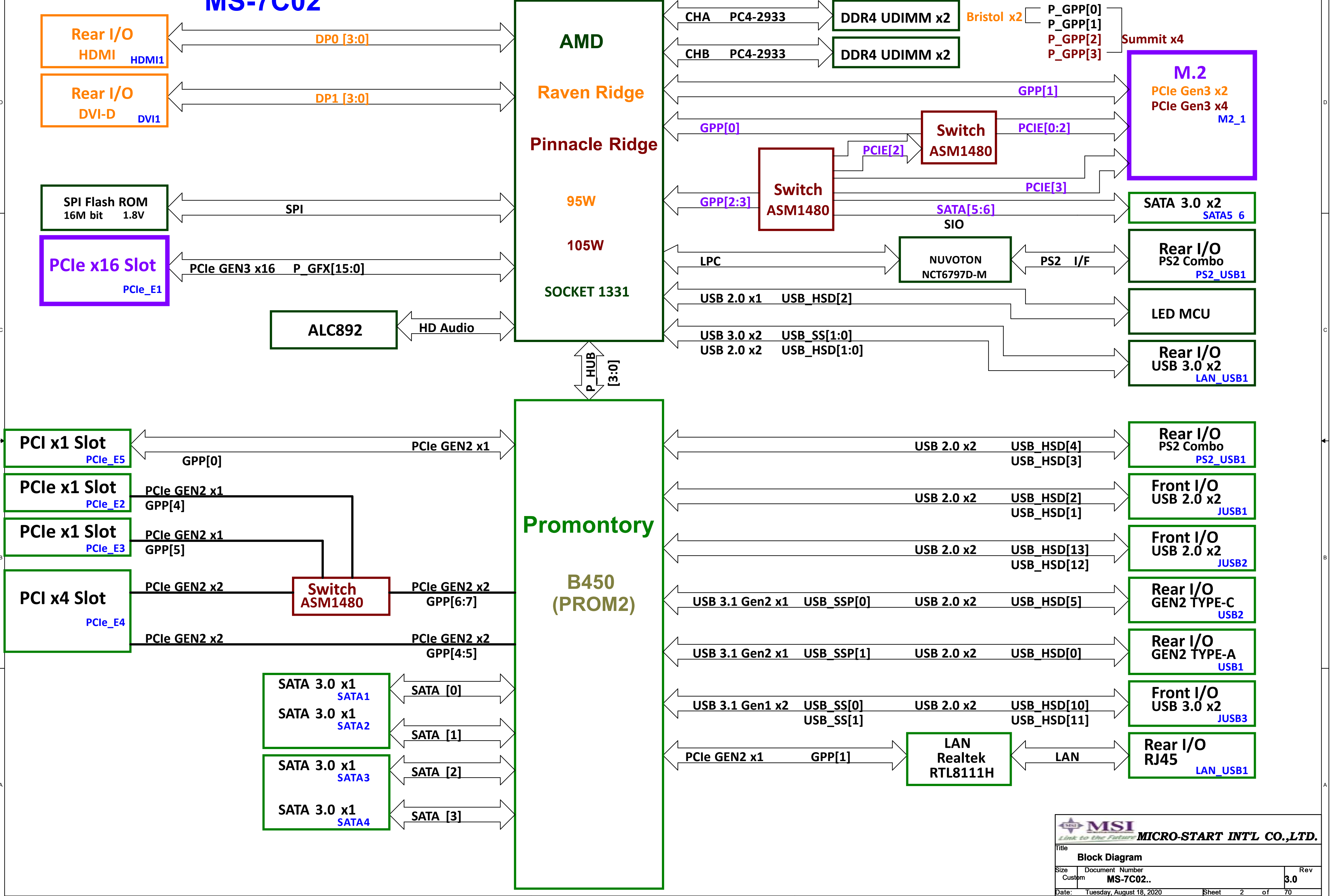
MSI Link to the Future MICRO-START INT'L CO.,LTD.

Title: COVER SHEET

Size: C | Document Number: MS-7C02.. | Rev: 3.0

Date: Tuesday, August 18, 2020 | Sheet 1 of 70

MS-7C02



MSI Link to the Future MICRO-START INT'L CO.,LTD.

Title	Block Diagram	
Size Custom	Document Number MS-7C02..	Rev 3.0
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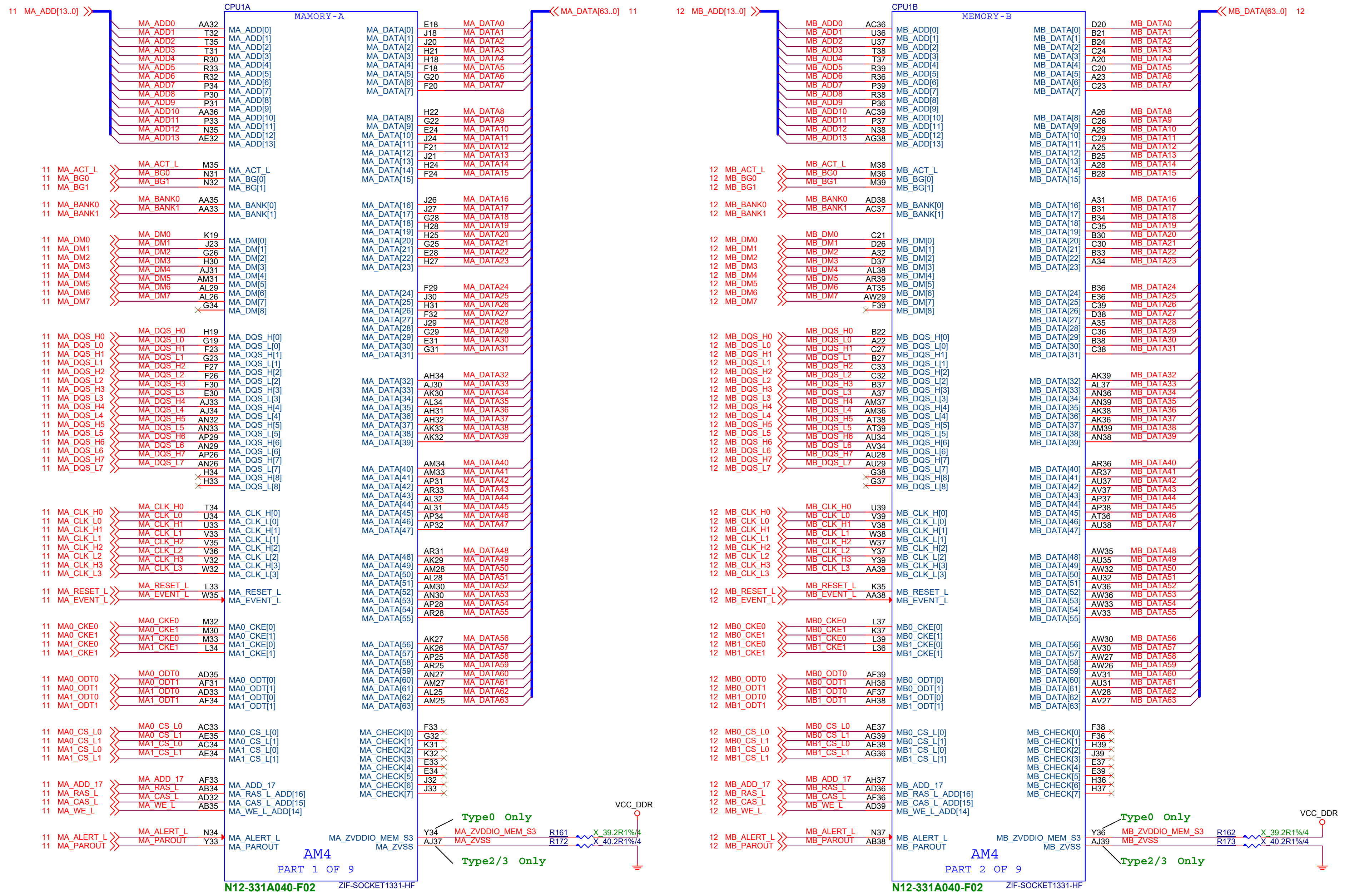

Schematic Cfg	Project	
CFG-7C02-***-Arsenal Gaming	V	A

MSI Link to the Future MICRO-START INT'L CO.,LTD.

Title	AM4 DDR4 I/F	
Size: Custom	Document Number: MS-7C02..	Rev: 3.0
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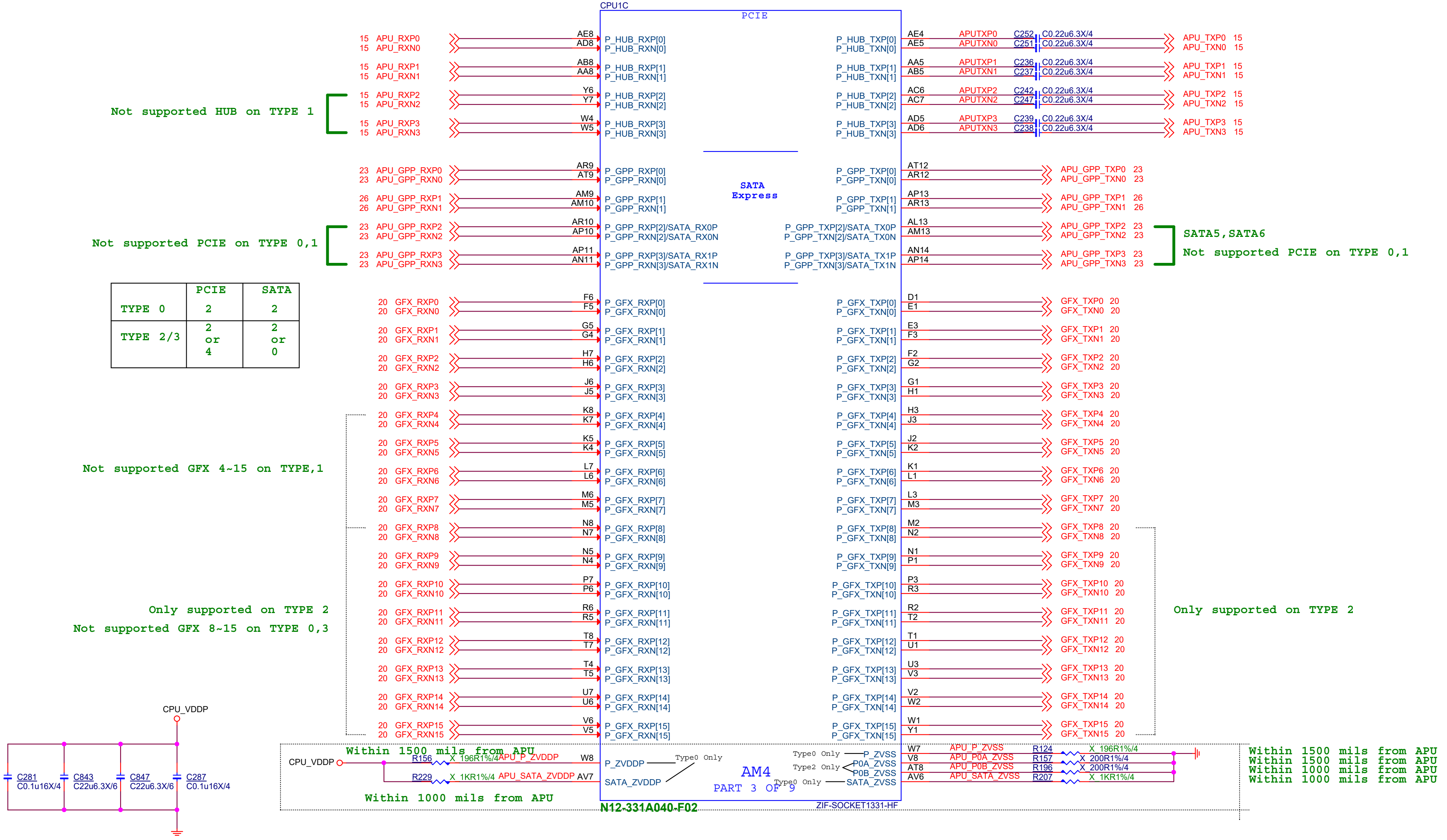

	PCIE	SATA
TYPE 0	2	2
TYPE 2/3	2 or 4	2 or 0

Schematic Cfg	Project	
CFG-7C02-***-Arsenal Gaming	V	A

MSI MICRO-START INT'L CO.,LTD.

Title: AM4 PCIE/SATAE

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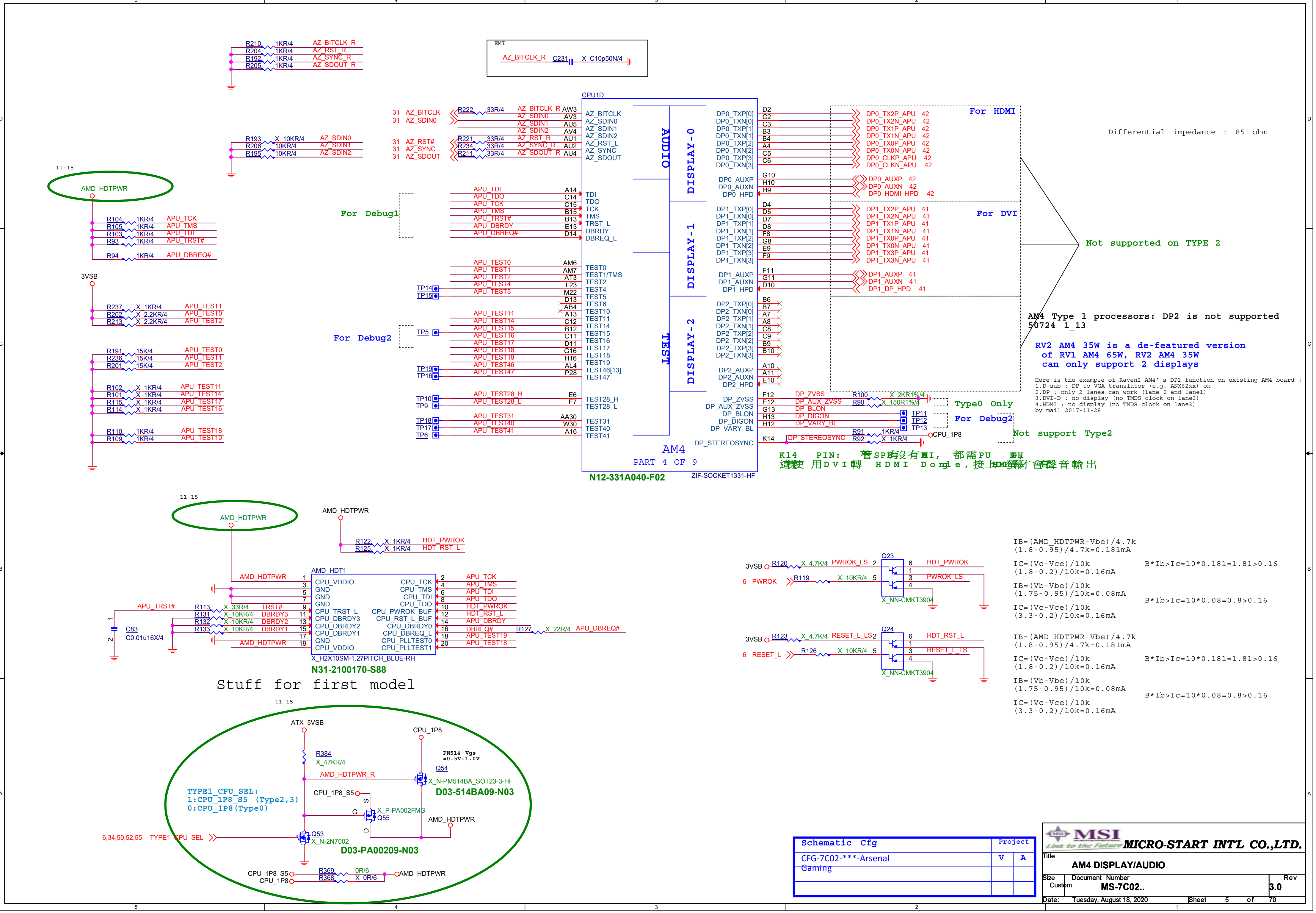

Schematic Cfg | Project
CFG-7C02-***-Arsenal Gaming | V | A

MSI MICRO-START INT'L CO.,LTD.

Title: AM4 DISPLAY/AUDIO

Size: Custom | Document Number: MS-7C02.. | Rev: 3.0

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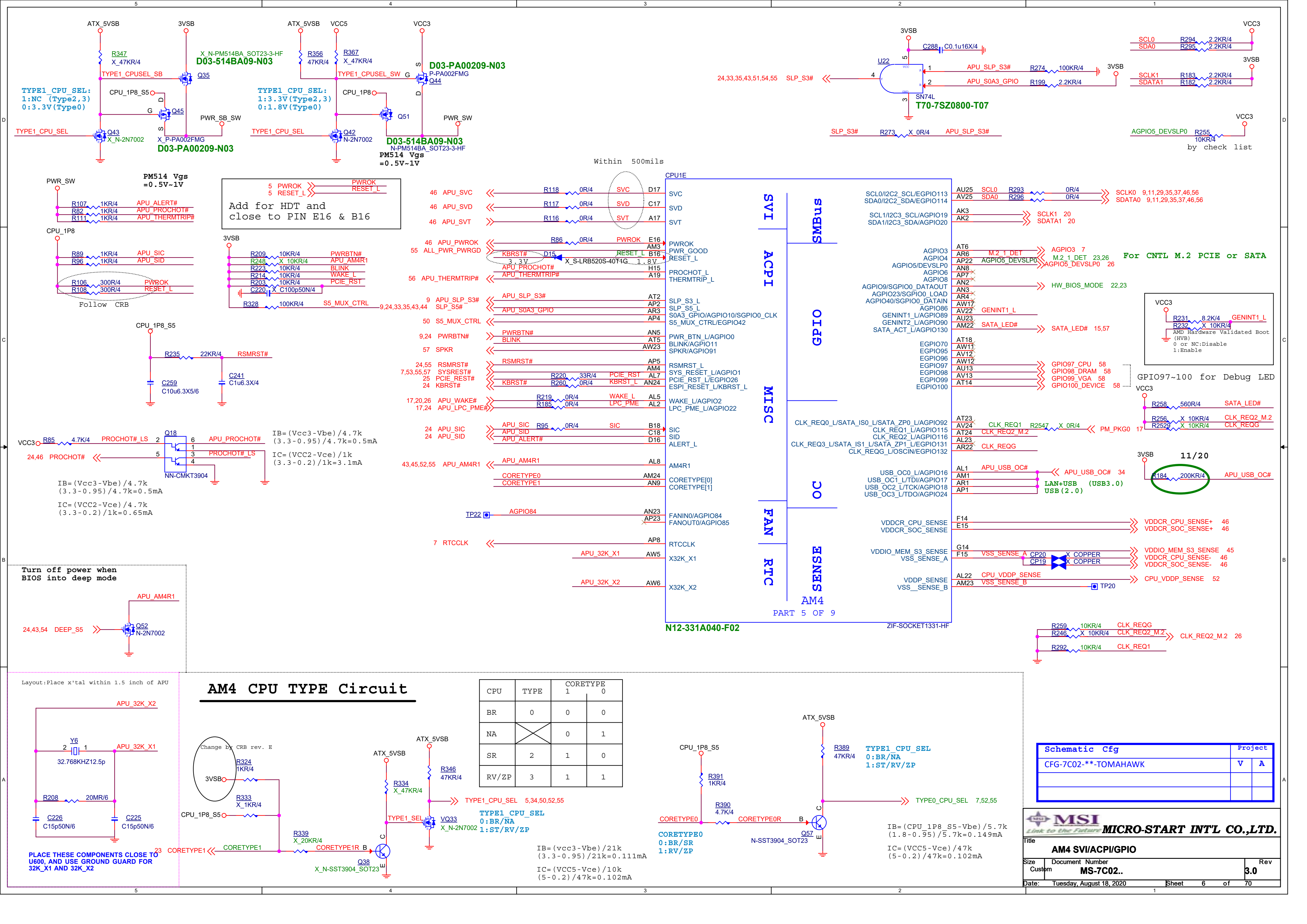
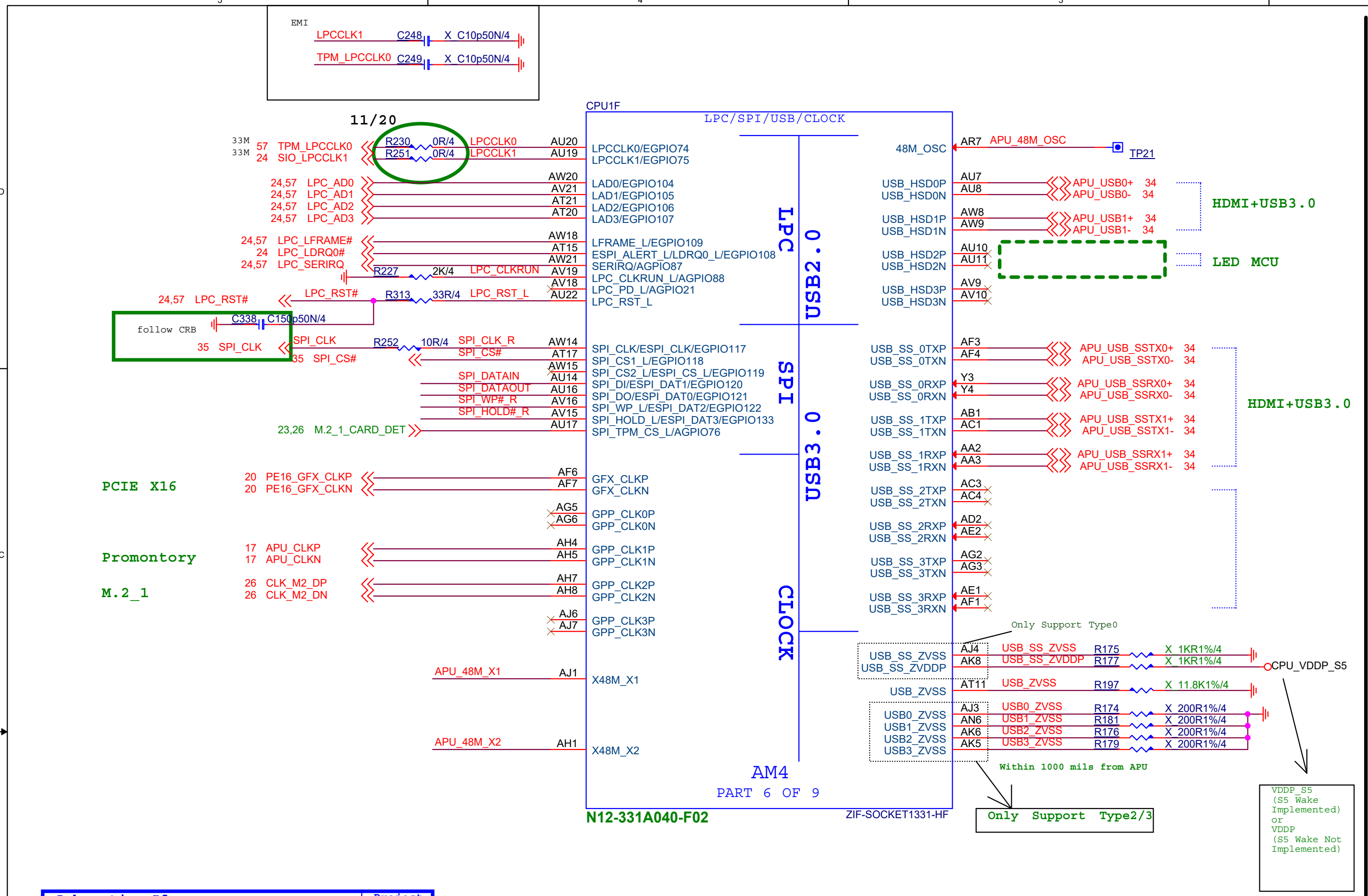
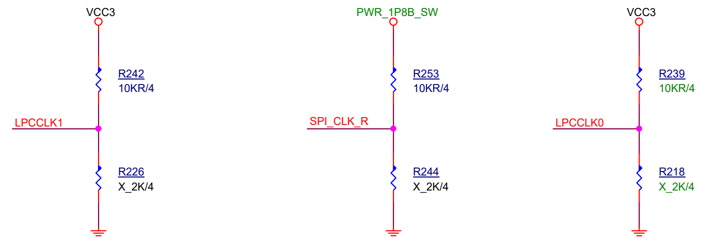


CPU	TYPE	CORETYPE 1	CORETYPE 0
BR	0	0	0
NA		0	1
SR	2	1	0
RV/ZP	3	1	1

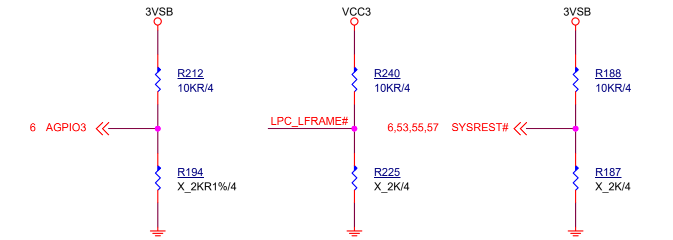


Schematic Cfg	Project	
CFG-7C02-**-Arsenal Gaming	V	A

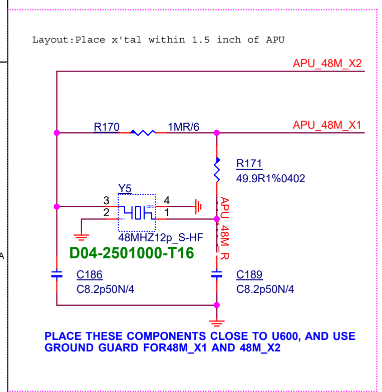
Strapping Options



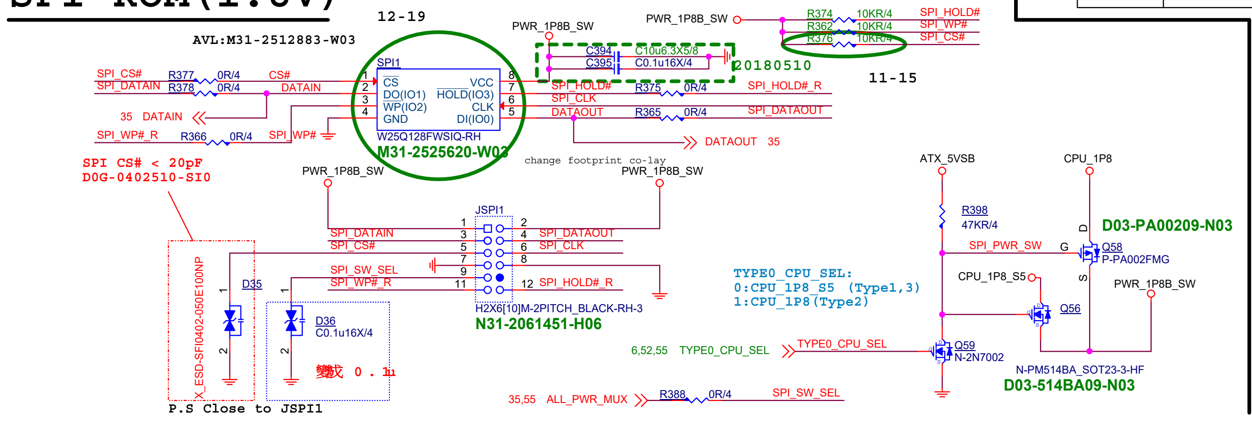
	LPCCLK1	SPI_CLK	LPCCLK0
PULL HIGH	Configured for Internal clock generator (Default)	Use 48Mhz crystal clock and generate both internal and external clocks (Default)	LPC device Boot Fail Timer Enabled
PULL LOW	Configured for External clock generator ?????	Use 100Mhz PCIE clock as reference clock and generate internal clocks only	LPC device Boot Fail Timer Disabled (Default)

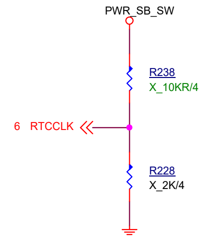


	AGPIO3	SIO_LFRAME	SYSREST#
PULL HIGH	Enhanced Reset logic (Default)	SPI ROM (Default)	Normal reset mode (Default)
PULL LOW	Traditional Reset logic	LPC ROM	short reset mode



SPI ROM(1.8V)





	RTCCLK
PULL HIGH	RTC Coin Battery is on board (Default)
PULL LOW	RTC Coin Battery is not on board

MSI MICRO-START INT'L CO.,LTD.

Title	AM4 LPC/SPI/USB/CLK/STRAP	
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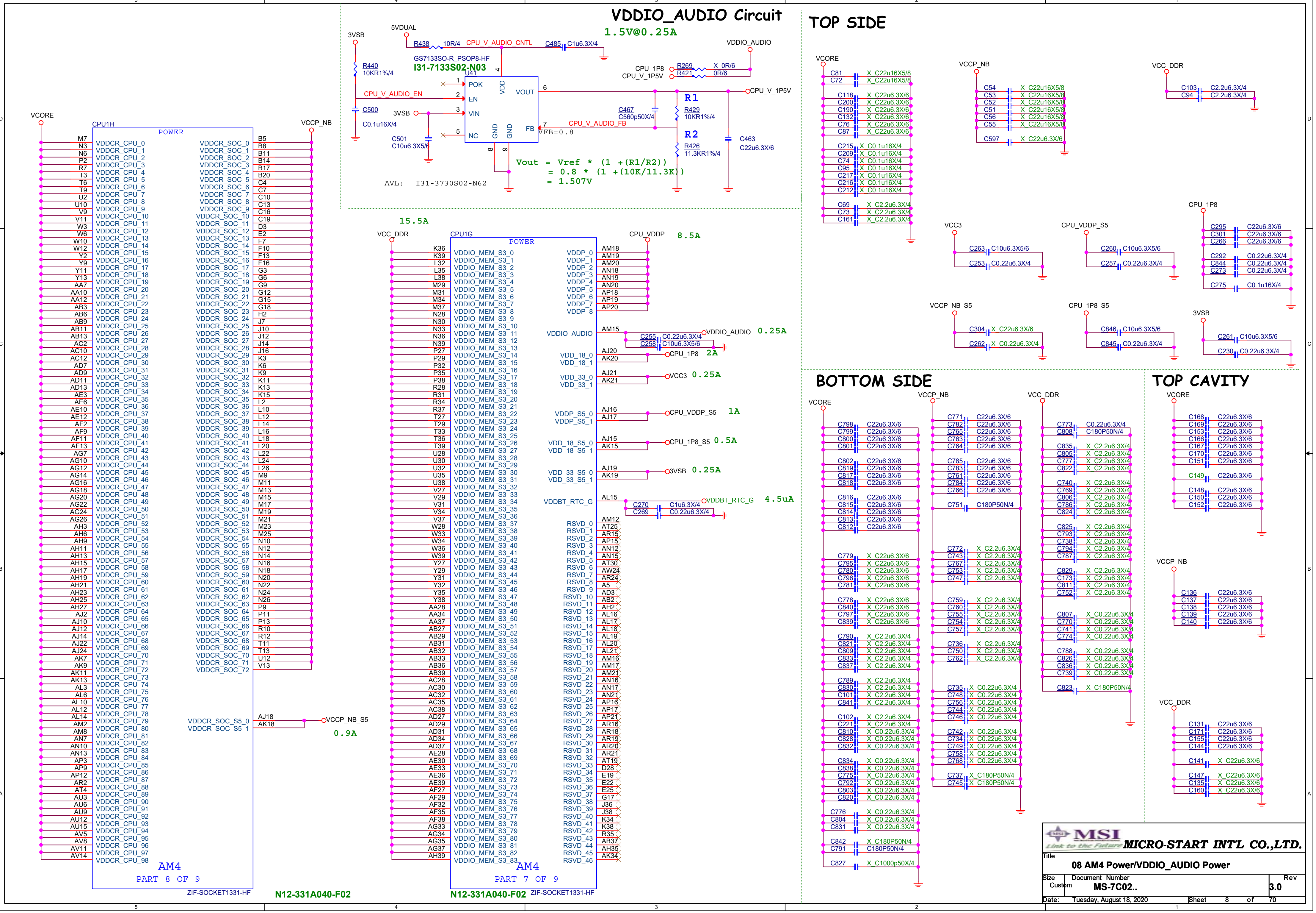
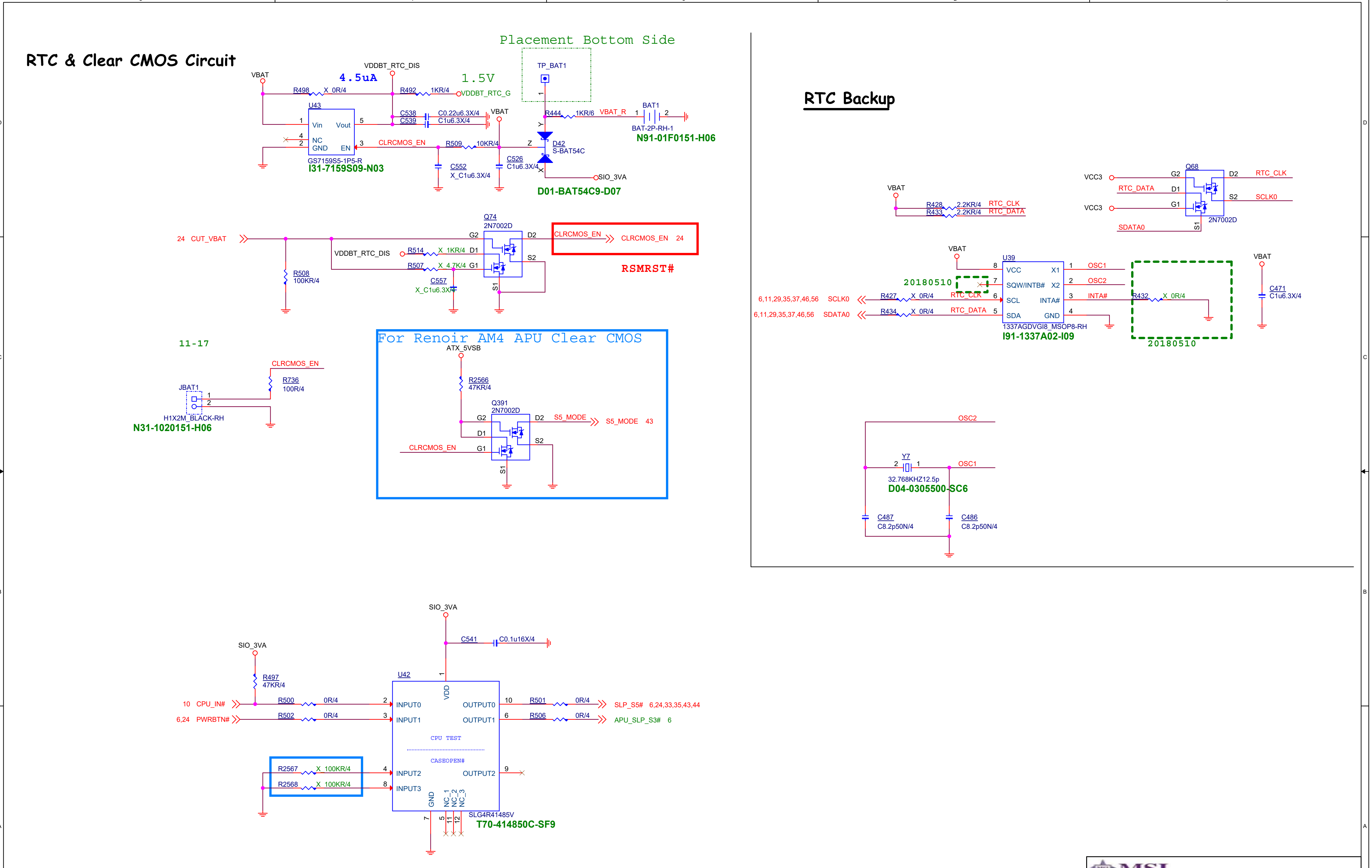


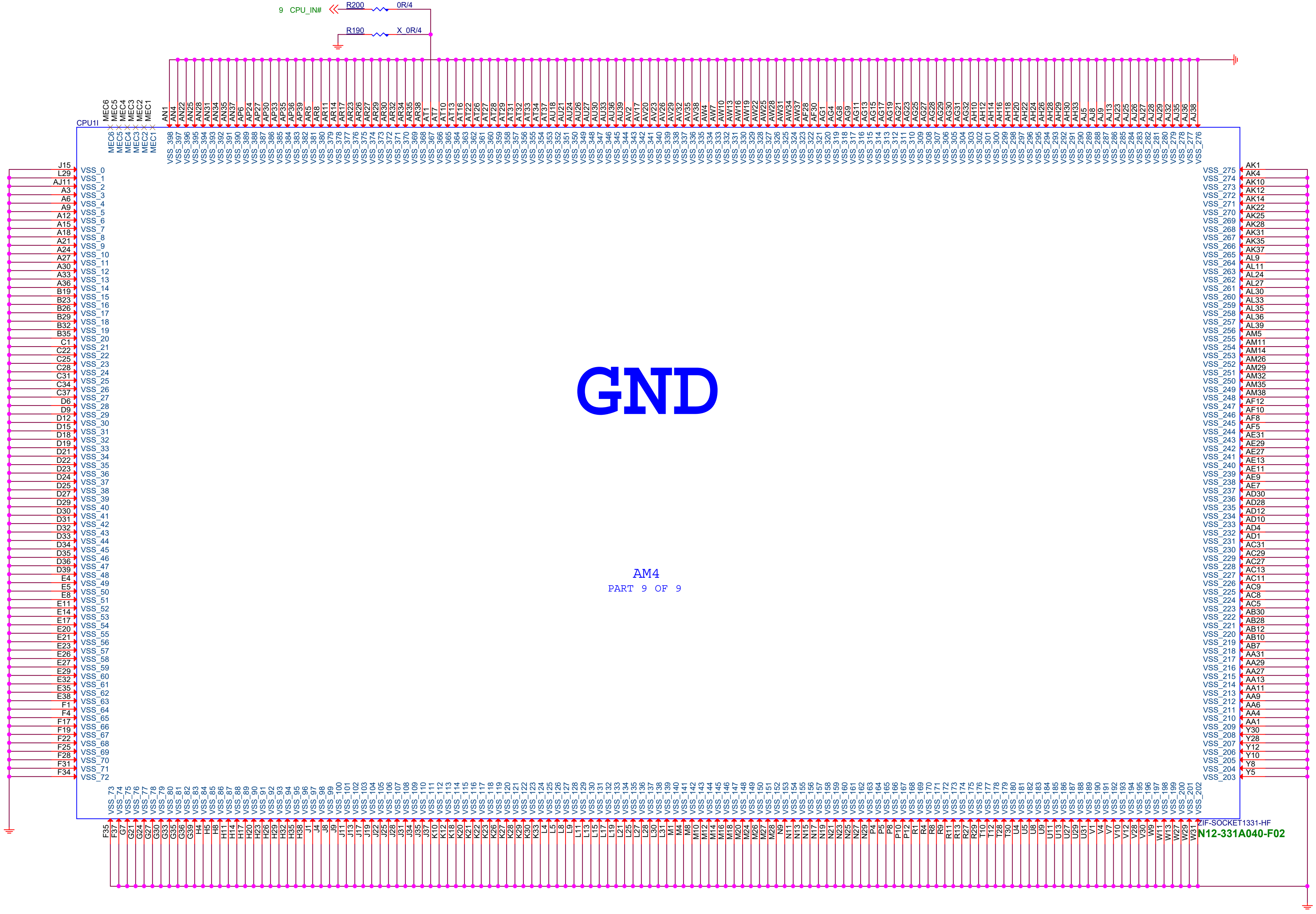
MSI MICRO-STAR INT'L CO.,LTD.

Title	08 AM4 Power/VDDIO_AUDIO Power		
Size: Custom	Document Number: MS-7C02..		Rev: 3.0
Date: Tuesday, August 18, 2020	Sheet 8 of 70		



MICRO-START INT'L CO.,LTD.

Title	RTC/Clear CMOS/RTC Power	
Size Custom	Document Number MS-7C02..	Rev 3.0
Date: Tuesday, August 18, 2020	Sheet 9 of 70	



MSI MICRO-START INT'L CO.,LTD.

Title	AM4 GND	
Size: Custom	Document Number: MS-7C02..	Rev: 3.0
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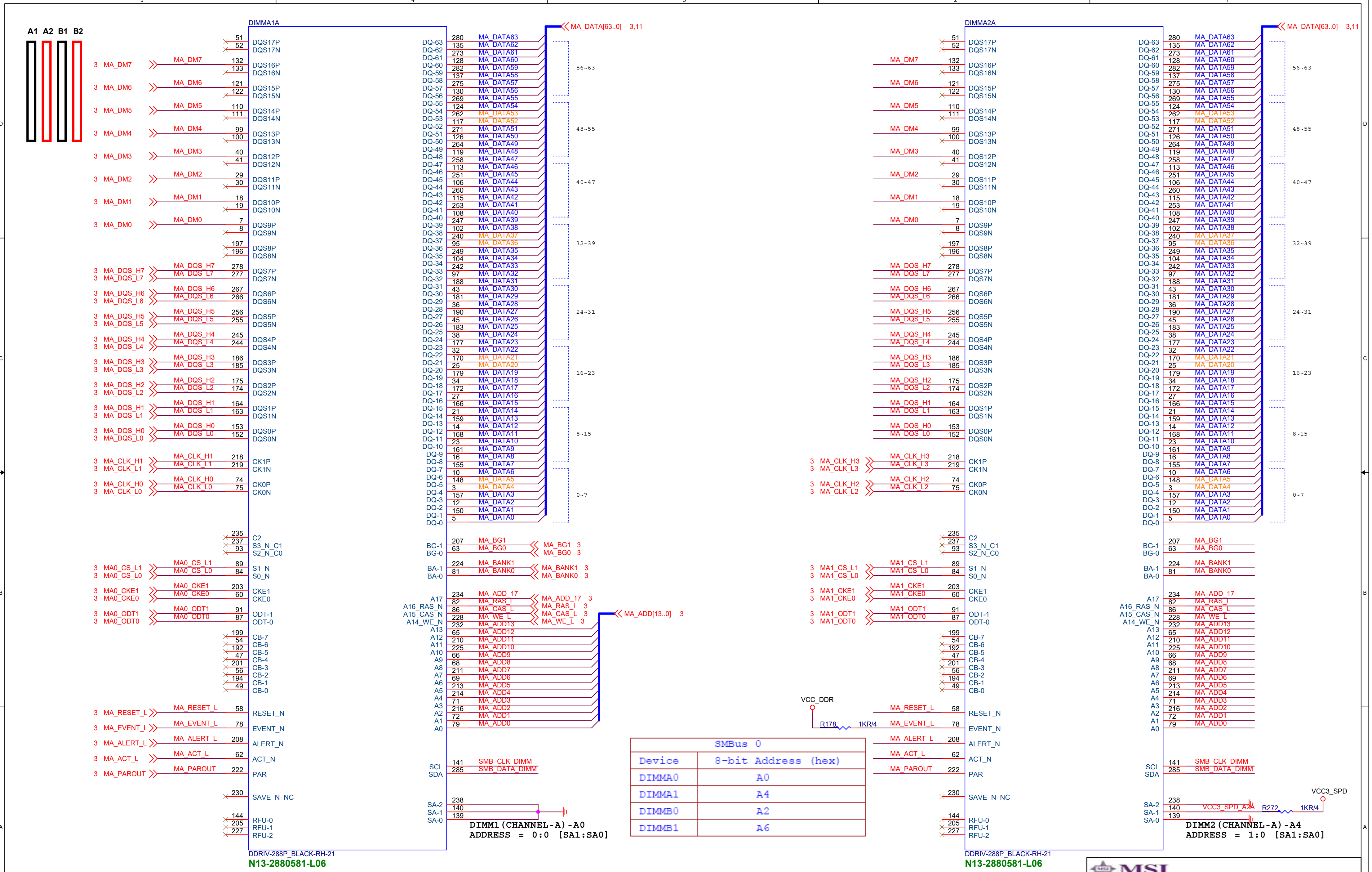

SMBus 0	
Device	8-bit Address (hex)
DIMMA0	A0
DIMMA1	A4
DIMMB0	A2
DIMMB1	A6

Schematic Cfg	Project	
CFG-7C02-***-Arsenal Gaming	V	A

MSI MICRO-START INT'L CO.,LTD.

Title: DDR4 DIMM CH-A

Size: Custom | Document Number: MS-7C02.. | Rev: 3.0

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Schematic Cfg	Project	
CFG-7C02-***-Arsenal Gaming	V	A

MSI MICRO-START INT'L CO.,LTD.

Title: DDR4 DIMM CH-B

Size: Custom | Document Number: MS-7C02.. | Rev: 3.0

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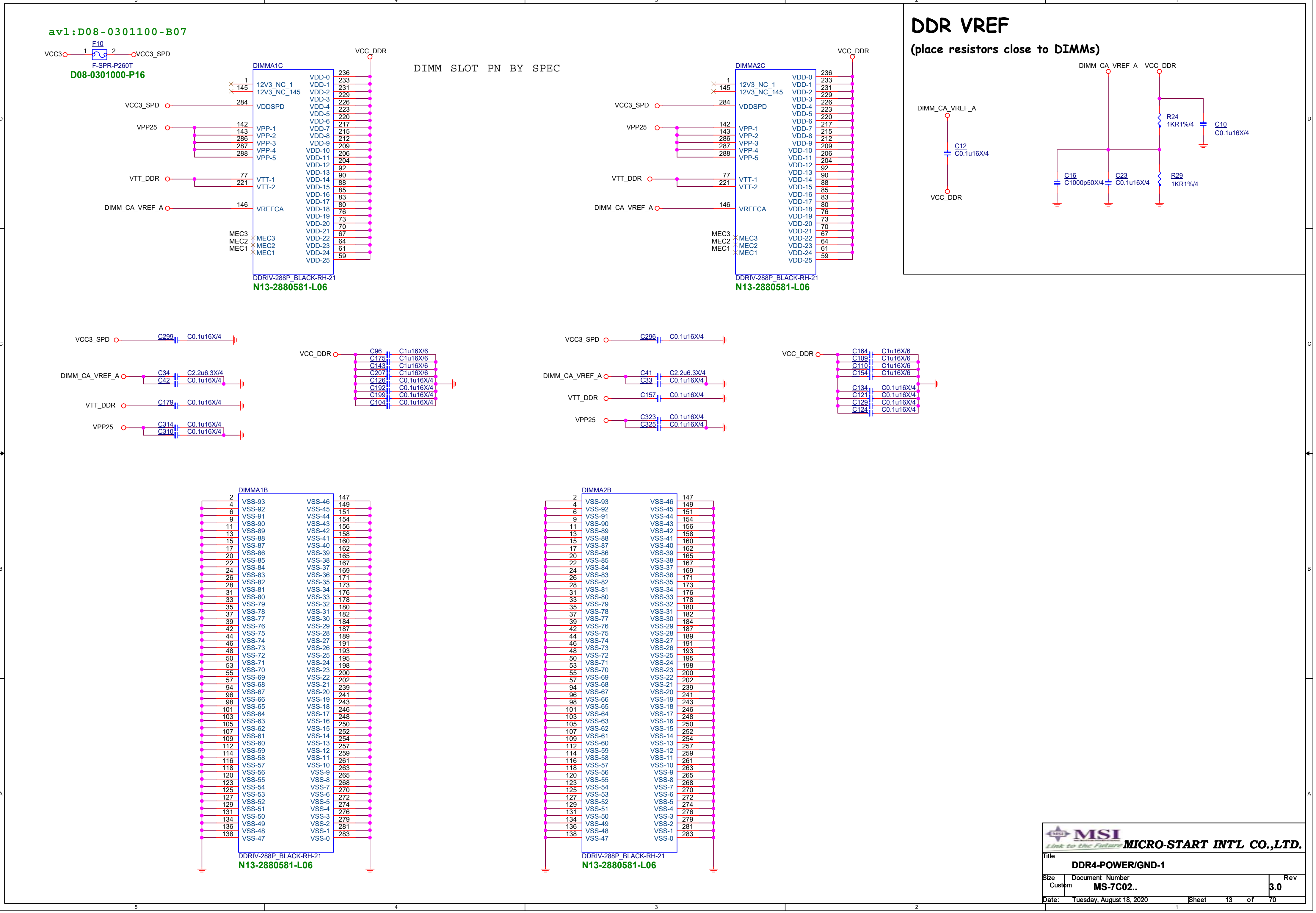
avl:D08-0301100-B07
F10
F-SPR-P260T
D08-0301000-P16
VCC3
VCC3_SPD
DIMM SLOT PN BY SPEC
DIMMA1C
DIMMA2C
DDRIV-288P_BLACK-RH-21
N13-2880581-L06
VCC_DDR
VPP25
VTT_DDR
DIMM_CA_VREF_A
DDR VREF
(place resistors close to DIMMs)
R24 1KR1%/4
R29 1KR1%/4
C10 C0.1u16X/4
C12 C0.1u16X/4
C16 C1000p50X/4
C23 C0.1u16X/4
DIMMA1B
DIMMA2B
MSI
Link to the Future
MICRO-START INT'L CO.,LTD.
Title
DDR4-POWER/GND-1
Size Custom
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MS-7C02..
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3.0
Date: Tuesday, August 18, 2020
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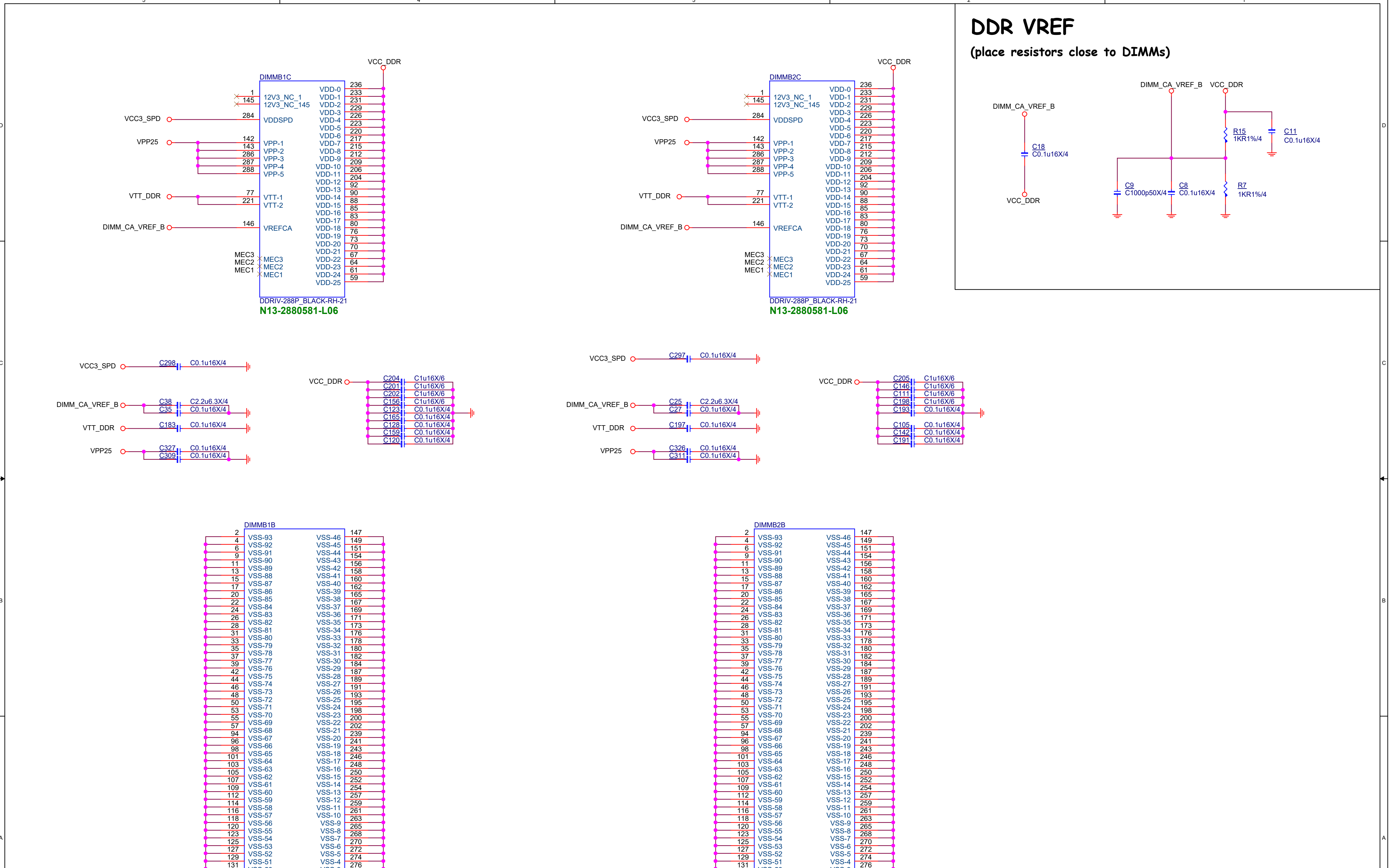

MICRO-START INT'L CO.,LTD.

Title: DDR4-POWER/GND-2

Size	Document Number	Rev
Custom	MS-7C02..	3.0

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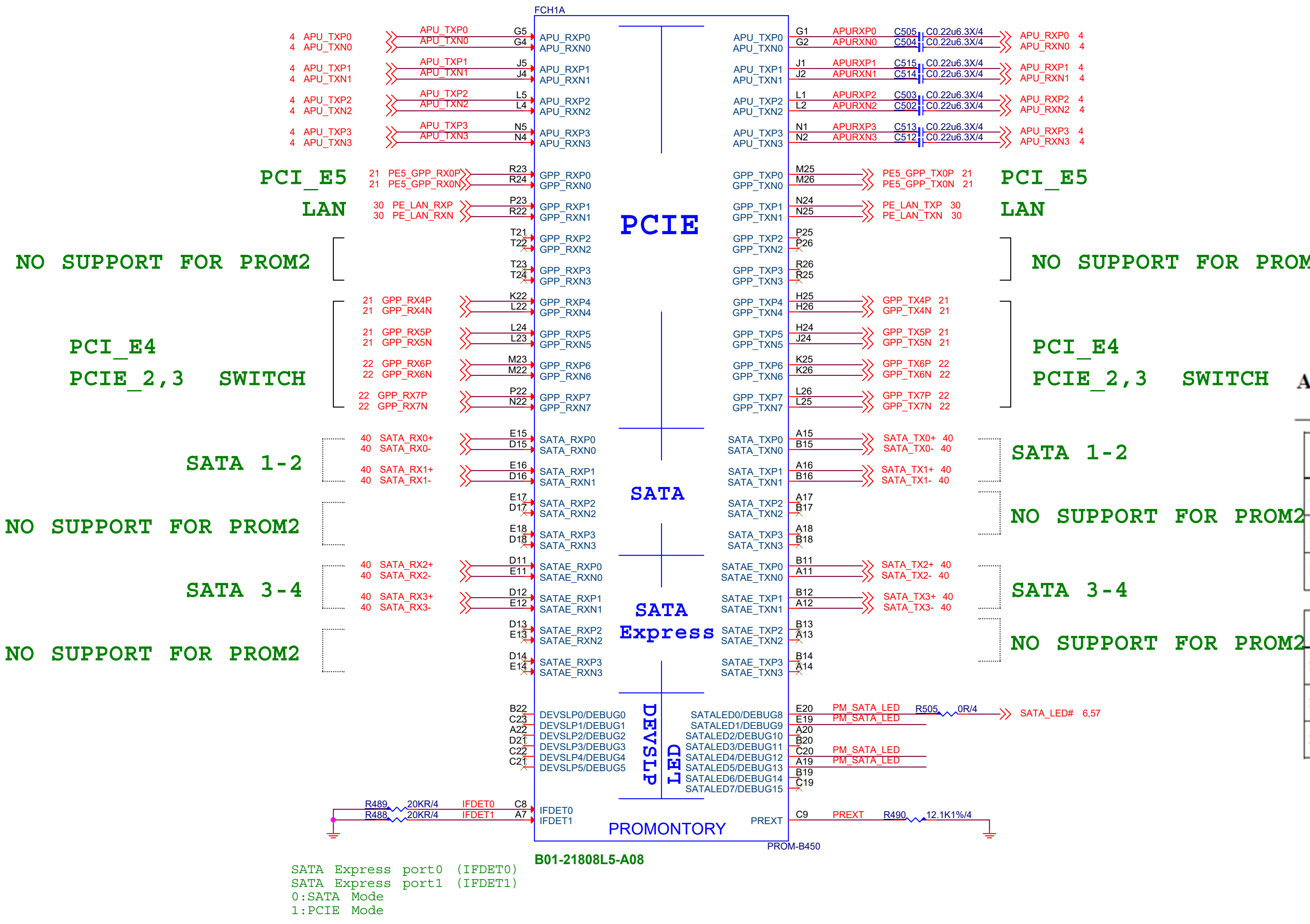

Appendix C Port Mapping for Different Bus Models

BUS Model	USB			
	3.1 Gen2 10 Gbps	3.1 Gen1 5 Gbps	2.0	Debug Port
PROM4	USB_SSP Port0~1	USB_SS Port 0~5	USB_HSD Port0~13	USB_SSP Port0
PROM2	USB_SSP Port0~1	USB_SS Port 0~1	USB_HSD Port0~5 USB_HSD Port10~13	USB_SSP Port0
PROM1	USB_SSP Port0	USB_SS Port0 USB_SSP Port1	USB_HSD Port0~5 USB_HSD Port10, 12~13	USB_SSP Port0

BUS Model	SATA 3.0	SATA Express	PCI Express® Gen2 GPP	PCI Express® CLK	
PROM4	SATA port0~3	SATAE port0~3	GPP lane0~7	CLK0~7	
PROM2	SATA port0~1	SATAE port0~1	GPP lane0~1 GPP lane4~7	CLK0~1 CLK4~7	CLK2.3不能用
PROM1	SATA port0~1	SATAE port0~1	GPP lane4~7	CLK4~7	CLK1-3不能用

MSI Link to the Future MICRO-START INT'L CO.,LTD.

Title	Promontory-PCIE/SATA/SATAE
Size	Custom
Document Number	MS-7C02..
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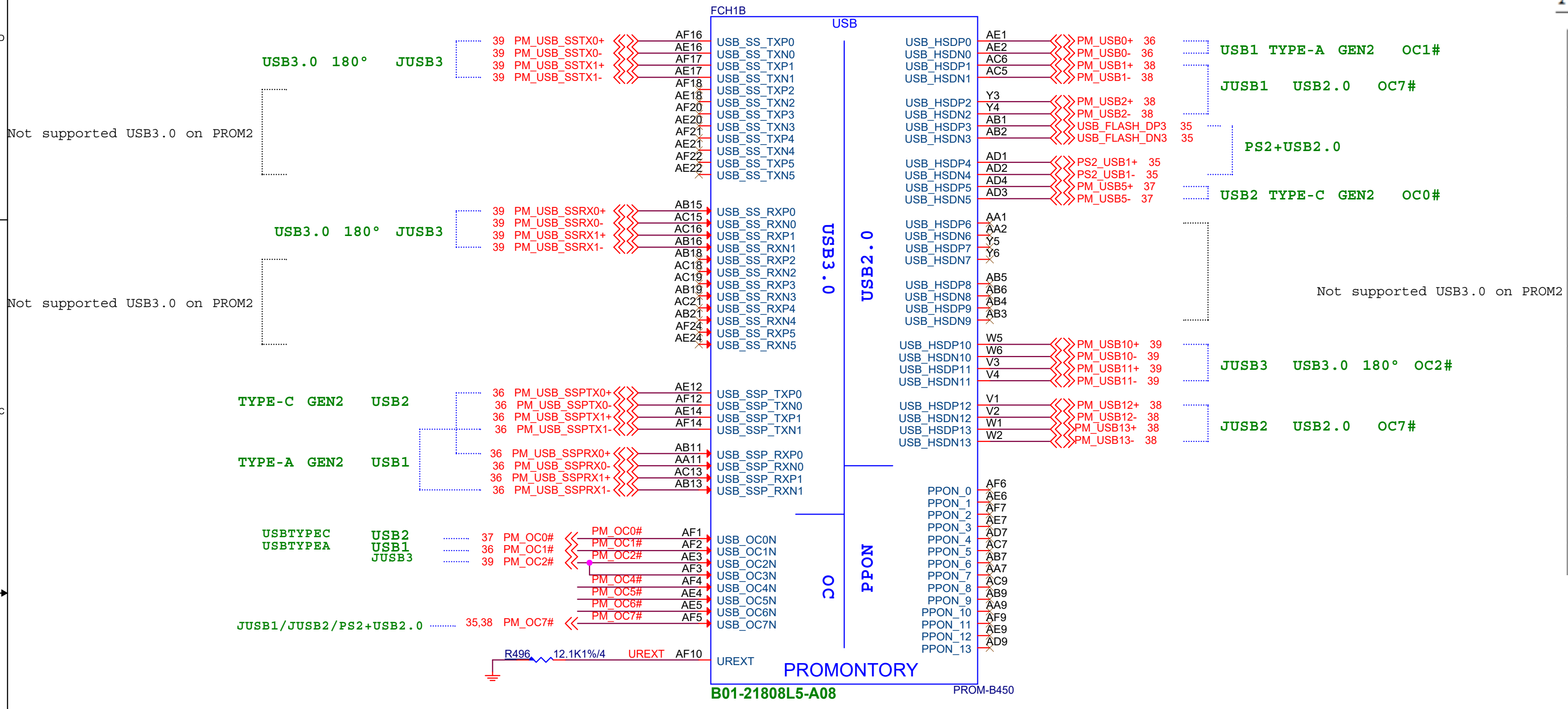

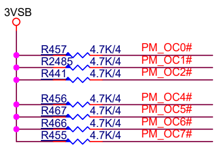

Appendix D USB Port to OC Pin Mapping

USB3.1	USB2.0	USB_OC
USB_SSP_TX/RXP/N[0]	USB_HSDP/N[5]	USB_OC0N
USB_SSP_TX/RXP/N[1]	USB_HSDP/N[0]	USB_OC1N
USB3.0	**USB2.0**	**USB_OC**
USB_SS_TX/RXP/N[0]	USB_HSDP/N[10]	USB_OC2N
USB_SS_TX/RXP/N[1]	USB_HSDP/N[11]	USB_OC3N
USB_SS_TX/RXP/N[2]	USB_HSDP/N[6]	USB_OC4N
USB_SS_TX/RXP/N[3]	USB_HSDP/N[7]	USB_OC5N
USB_SS_TX/RXP/N[4]	USB_HSDP/N[8]	USB_OC6N
USB_SS_TX/RXP/N[5]	USB_HSDP/N[9]	USB_OC7N
	USB_HSDP/N[1]	USB_OC7N
	USB_HSDP/N[2]	USB_OC7N
	USB_HSDP/N[3]	USB_OC7N
	USB_HSDP/N[4]	USB_OC7N
	USB_HSDP/N[12]	USB_OC7N
	USB_HSDP/N[13]	USB_OC7N

Appendix C Port Mapping for Different Bus Models

BUS Model	USB			
	3.1 Gen2 10 Gbps	3.1 Gen1 5 Gbps	2.0	Debug Port
PROM4	USB_SSP Port0~1	USB_SS Port 0~5	USB_HSD Port0~13	USB_SSP Port0
PROM2	USB_SSP Port0~1	USB_SS Port 0~1	USB_HSD Port0~5 USB_HSD Port10~13	USB_SSP Port0
PROM1	USB_SSP Port0	USB_SS Port0 USB_SSP Port1	USB_HSD Port0~5 USB_HSD Port10, 12~13	USB_SSP Port0

BUS Model	SATA 3.0	SATA Express	PCI Express® Gen2 GPP	PCI Express® CLK
PROM4	SATA port0~3	SATAE port0~3	GPP lane0~7	CLK0~7
PROM2	SATA port0~1	SATAE port0~1	GPP lane0~1 GPP lane4~7	CLK0~1 CLK4~7
PROM1	SATA port0~1	SATAE port0~1	GPP lane4~7	CLK4~7

CLK2.3不能用
CLK1-3不能用

MSI Link to the Future
MICRO-START INT'L CO.,LTD.

Title	Promontory-USB/OC	
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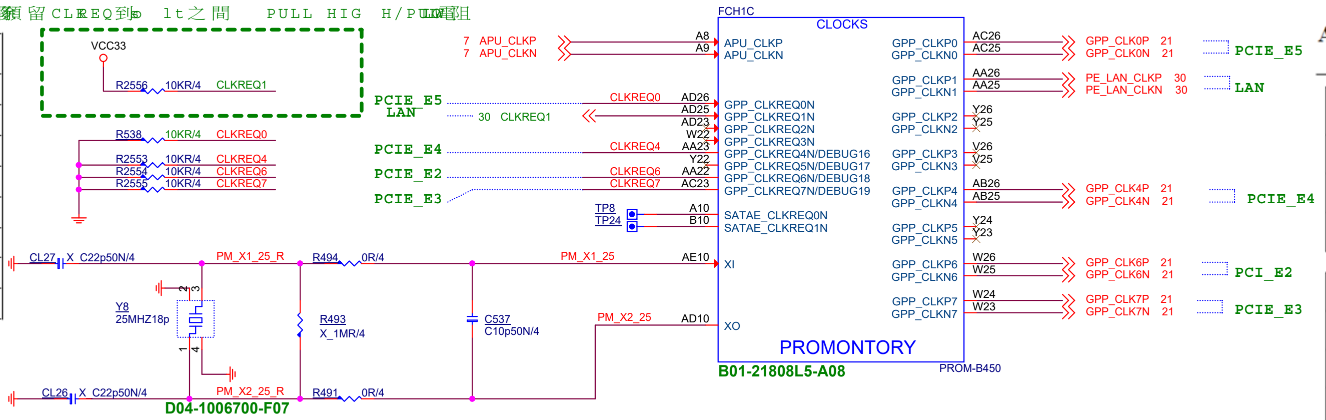
GPP Clock	CLKREQ#
GPP_CLKP/N[0]	GPP_CLKREQ0N
GPP_CLKP/N[1]	GPP_CLKREQ1N
GPP_CLKP/N[2]	GPP_CLKREQ2N
GPP_CLKP/N[3]	GPP_CLKREQ3N
GPP_CLKP/N[4]	GPP_CLKREQ4N
GPP_CLKP/N[5]	GPP_CLKREQ5N
GPP_CLKP/N[6]	GPP_CLKREQ6N
GPP_CLKP/N[7]	GPP_CLKREQ7N

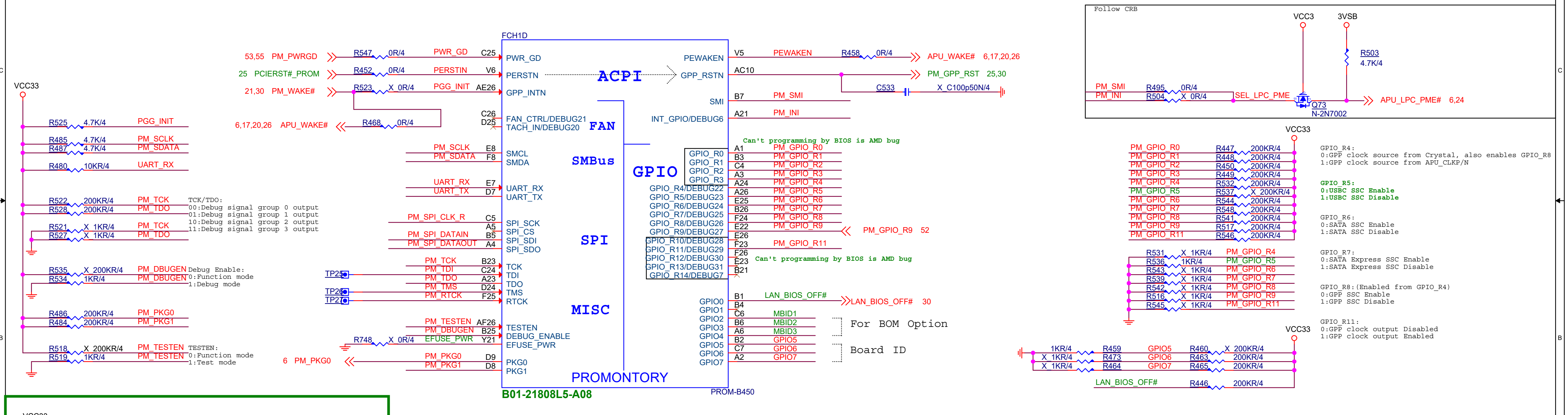


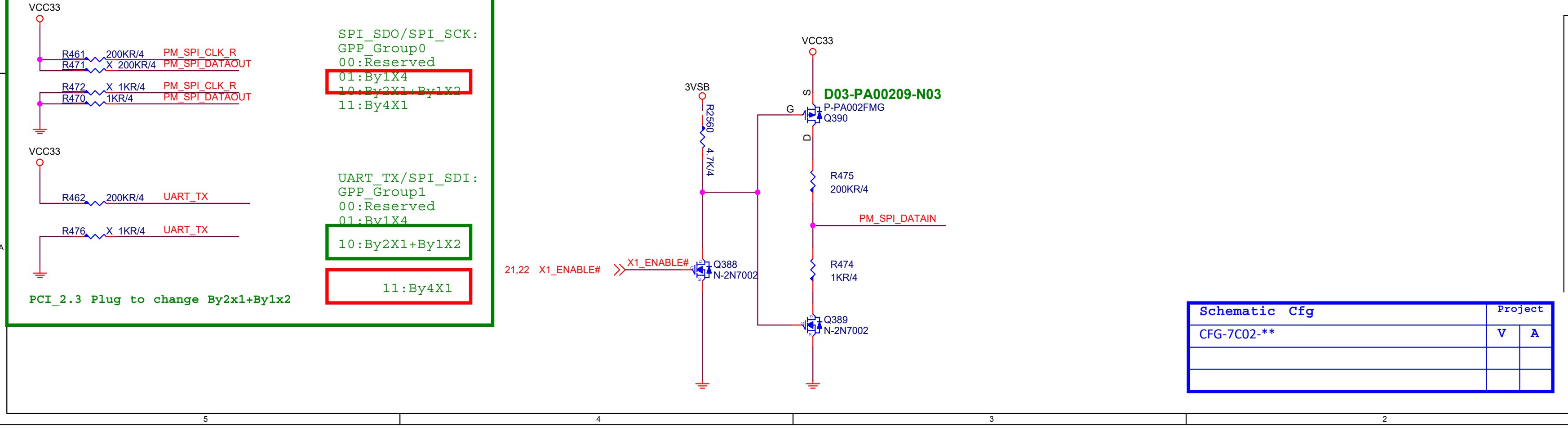
Appendix C Port Mapping for Different Bus Models

BUS Model	USB 3.1 Gen2 10 Gbps	USB 3.1 Gen1 5 Gbps	USB 2.0	USB Debug Port
PROM4	USB_SSP Port0~1	USB_SS Port 0~5	USB_HSD Port0~13	USB_SSP Port0
PROM2	USB_SSP Port0~1	USB_SS Port 0~1	USB_HSD Port0~5 USB_HSD Port10~13	USB_SSP Port0
PROM1	USB_SSP Port0	USB_SS Port0 USB_SSP Port1	USB_HSD Port0~5 USB_HSD Port10, 12~13	USB_SSP Port0

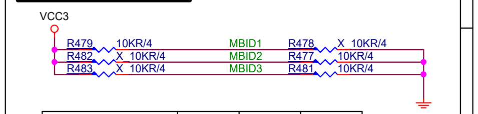
BUS Model	SATA 3.0	SATA Express	PCI Express® Gen2 GPP	PCI Express® CLK
PROM4	SATA port0~3	SATAE port0~3	GPP lane0~7	CLK0~7
PROM2	SATA port0~1	SATAE port0~1	GPP lane0~1 GPP lane4~7	CLK0~1 CLK4~7
PROM1	SATA port0~1	SATAE port0~1	GPP lane4~7	CLK4~7

CLK2.3不能用
CLK1-3不能用





BOM OPTION



	MBID1	MBID2	MBID3
B45-TOMAHAWK 601-7C02-A01	1	0	0
	0	0	0
	1	1	0

Schematic Cfg	Project	
CFG-7C02-**	V	A

MSI MICRO-START INT'L CO.,LTD.

Title: Promontory-CLK/ACPI/GPIO

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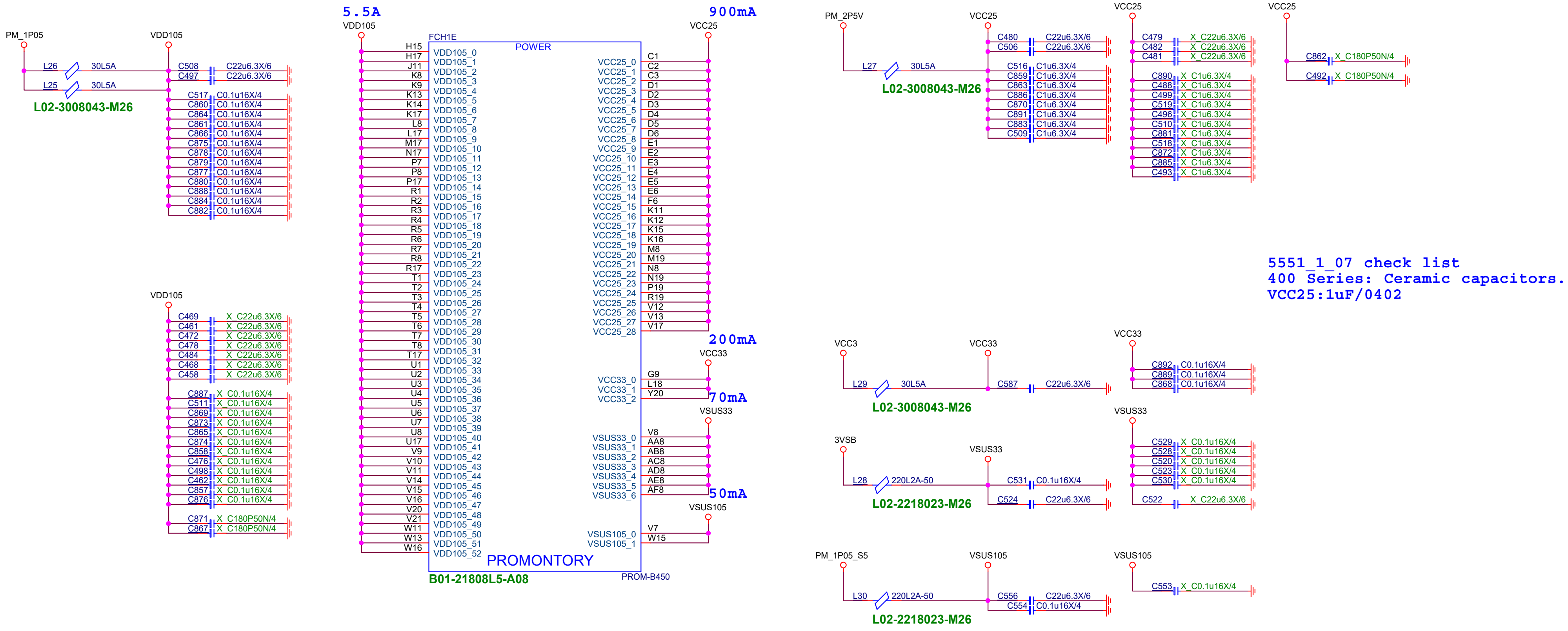

5551_1_07 check list
400 Series: Ceramic capacitors.
VCC25:1uF/0402

MICRO-START INT'L CO.,LTD.

Title	Promontory-Power	
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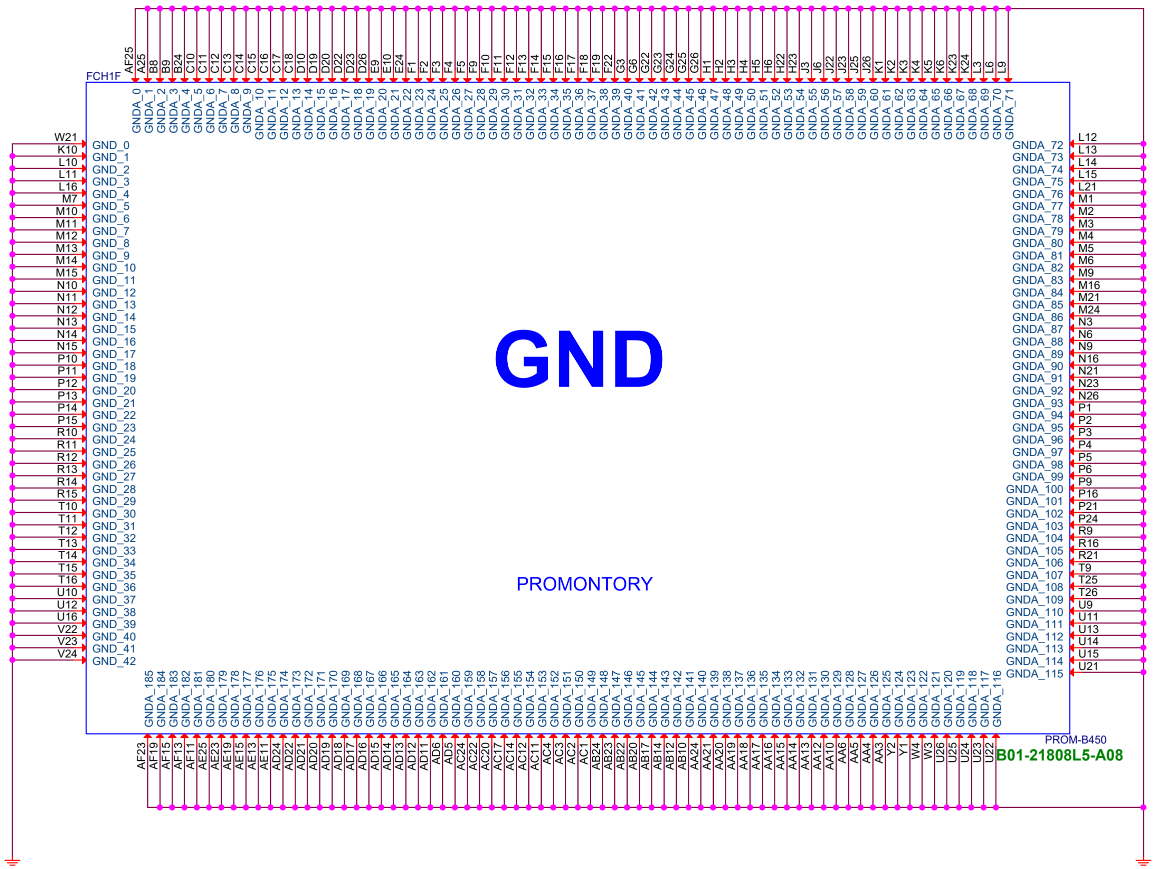

MSI Link to the Future MICRO-START INT'L CO.,LTD.

Title	Promontory-GND	
Size Custom	Document Number MS-7C02..	Rev 3.0
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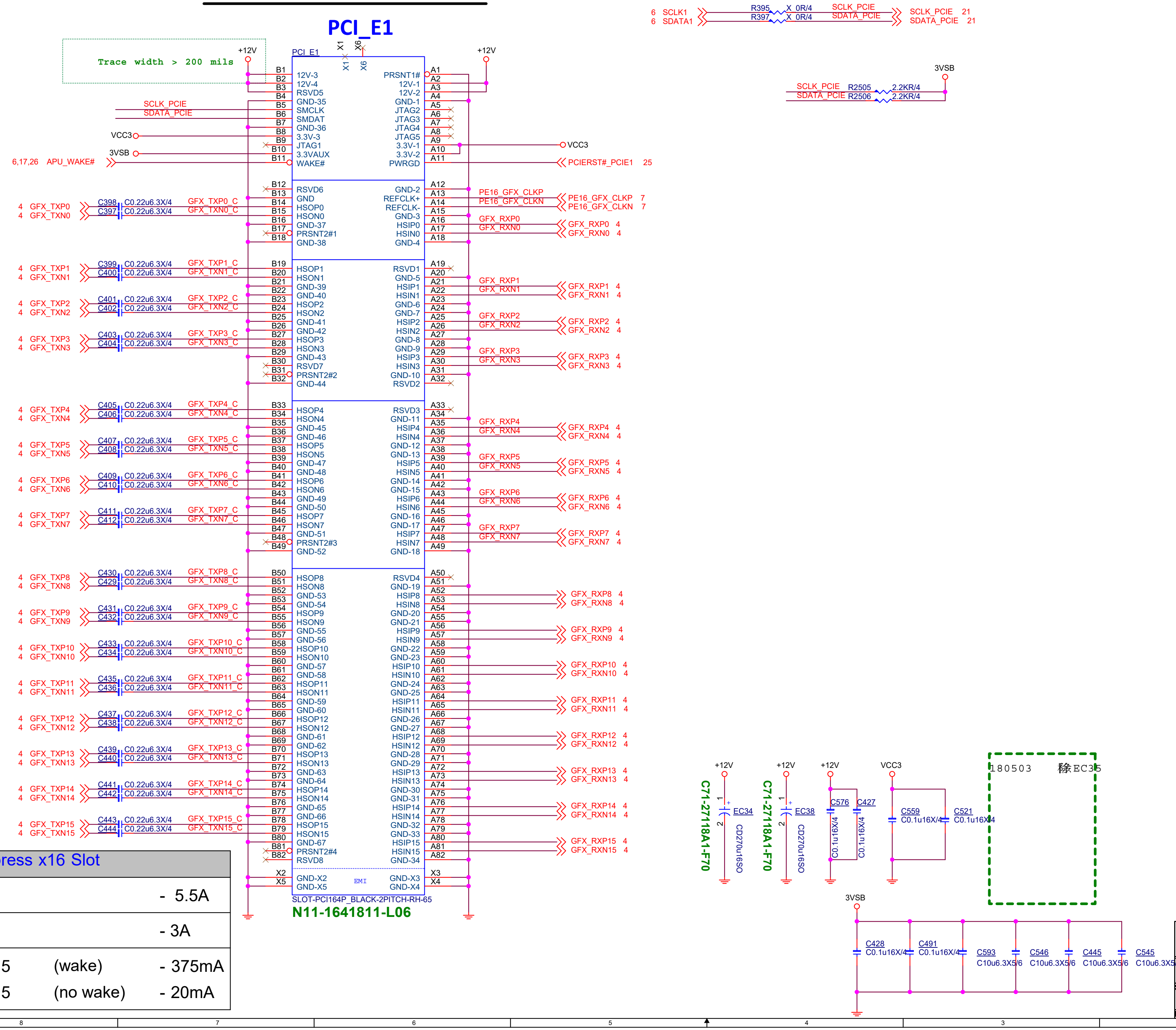
PCI EXPRESS x16 Slot



PCI Express x16 Slot

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

PCI Express x8 Slot

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

MSI Link to the Future — MICRO-START INT'L CO.,LTD.

Title: PCI_E1/E4 X16/X8

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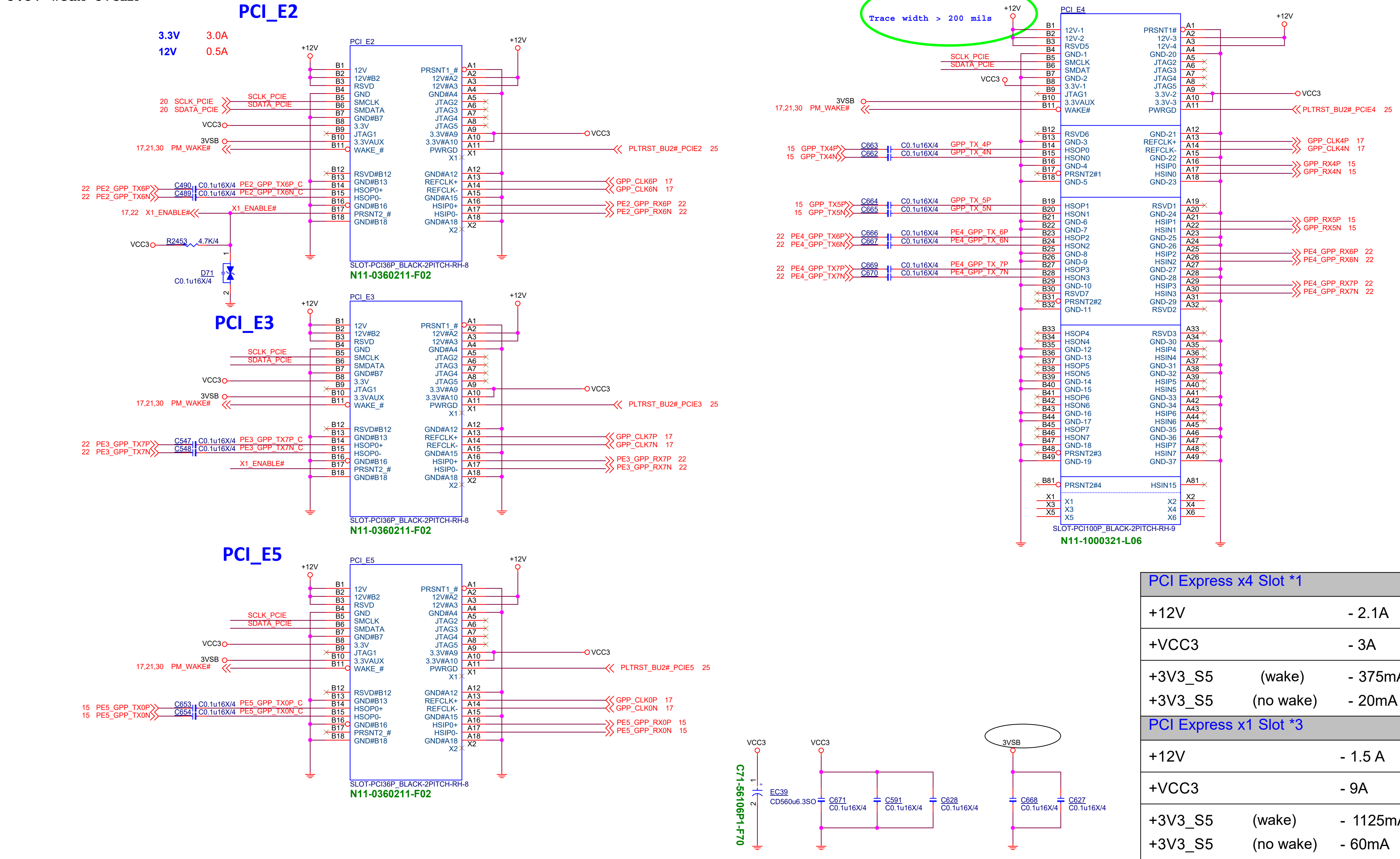
PCIEX1 12V 0.5A
3.3V weak 375mA



PCI Express x4 Slot *1

+12V		- 2.1A
+VCC3		- 3A
+3V3_S5	(wake)	- 375mA
+3V3_S5	(no wake)	- 20mA

PCI Express x1 Slot *3

+12V		- 1.5 A
+VCC3		- 9A
+3V3_S5	(wake)	- 1125mA
+3V3_S5	(no wake)	- 60mA

Schematic Cfg	Project	
CFG-7C02-***-Arsenal Gaming	V	A

MSI MICRO-START INT'L CO.,LTD.

Title: PCI_E2_E3_E5/E4 X1/X4

Size: Custom | Document Number: MS-7C02.. | Rev: 3.0

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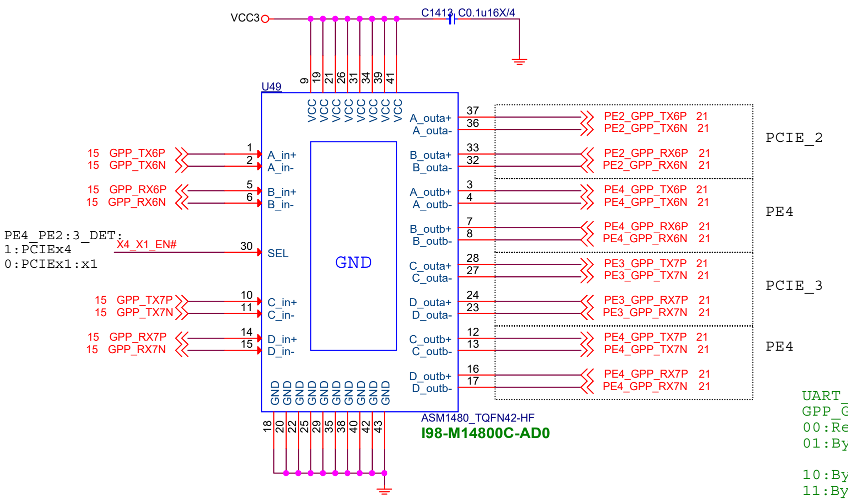
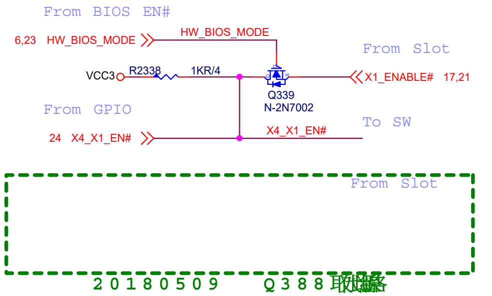
PCI_E4 and PCIE_2 :3 and Switch



SEL	Function
L	N_in +/1 to N_outa+/-
H	N_in +/1 to N_outb+/-

PCIE Lanes control circuit



UART_TX/SPI_SDI:
GPP_Group1
00:Reserved
01:By1X4

10:By2X1+By1X2
11:By4X1 (def)

	HW_BIOS_MODE	Q339	Q381	X1_ENABLE#	PM_SPI_DATAIN
Manual x4	**L**	OFF	OFF	**X**	11:By4x1 (def)
Manual x2, x1 ,x1	**L**	OFF	OFF	**L**	10:By2x1+By1x2
HW x4	**H**	ON	ON	H	11:By4X1 (def)
H/W x2,x1,x1	H	ON	ON	**L (Stuff PCIE_1)**	10:By2x1+By1x2

MSI Link to the Future MICRO-START INT'L CO.,LTD.

Title	PCIE Switch X4 / M2_2	
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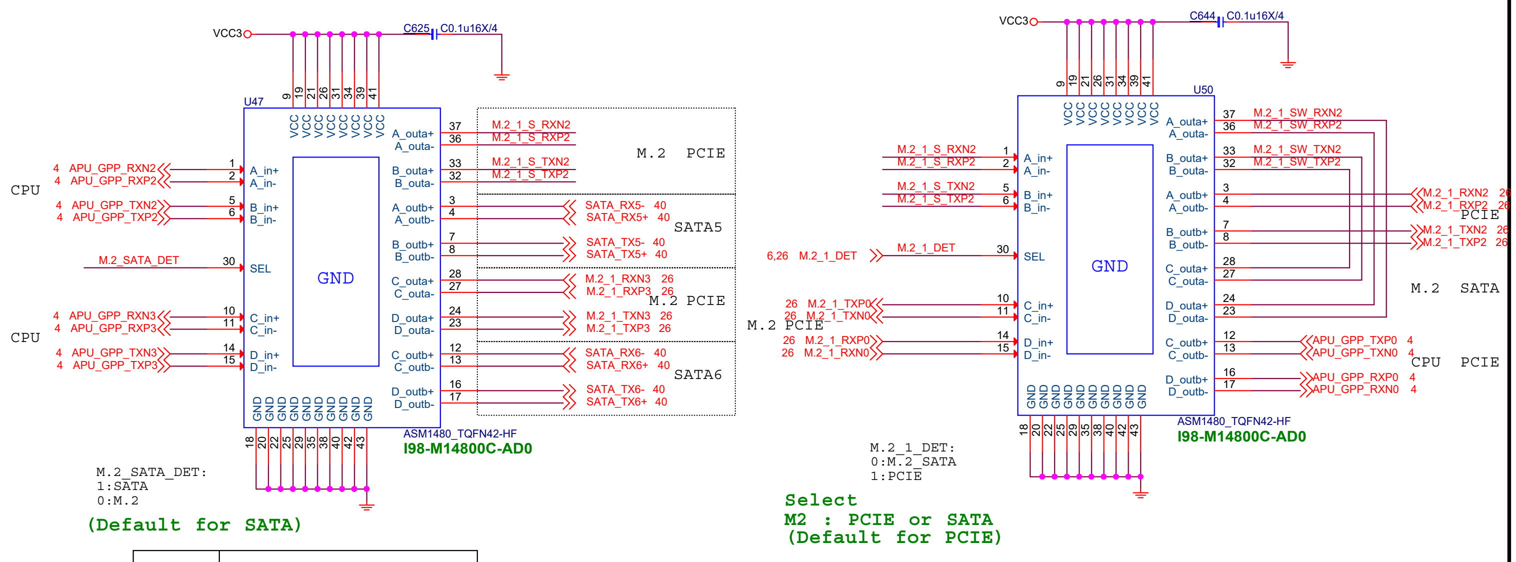
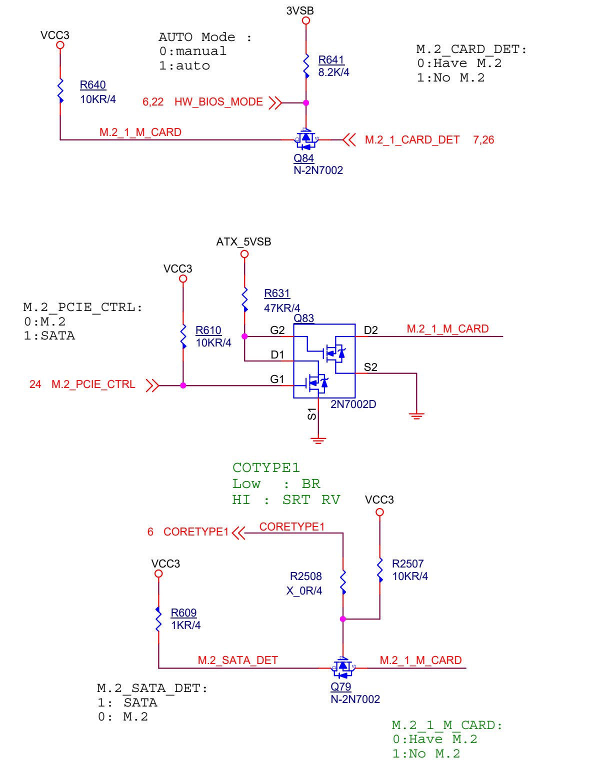
M2_1 and SATA5 6 Switch

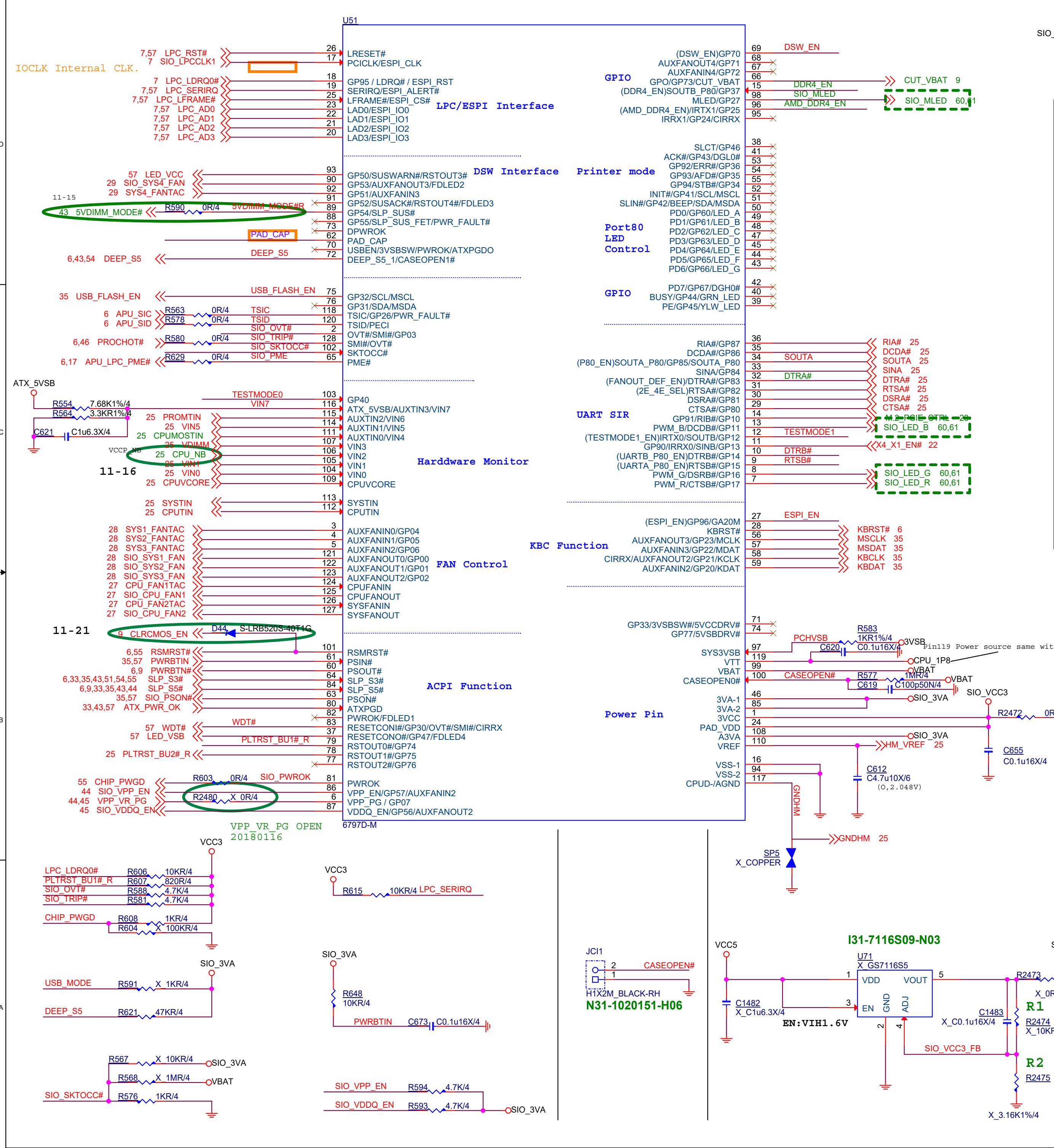


SEL	Function
L	N_in +/1 to N_outa+/-
H	N_in +/1 to N_outb+/-

	AUTO Mode	SATA CON	M.2(PCIE)	M.2(SATA)
HW_BIOS_MODE	1		0	0
M.2_PCIE_CTRL	1		0	0
M.2_1_CARD_DET		1	0	0
M.2_DET		X	1	0



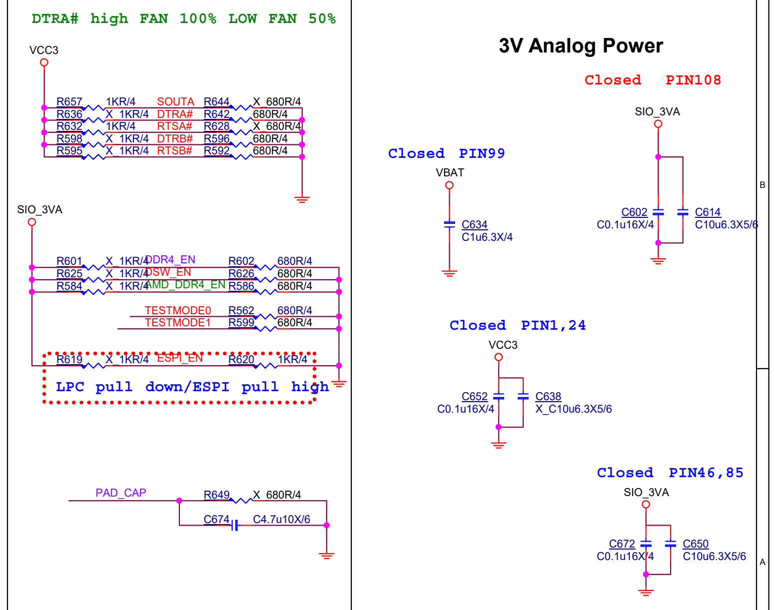
CPU	TYPE	CORETYPE 1	CORETYPE 0
BR	0	0	0
NA		0	1
SR	2	1	0
RV/ZP	3	1	1



POWER ON STRAPPING PIN FOR NCT6797/6795

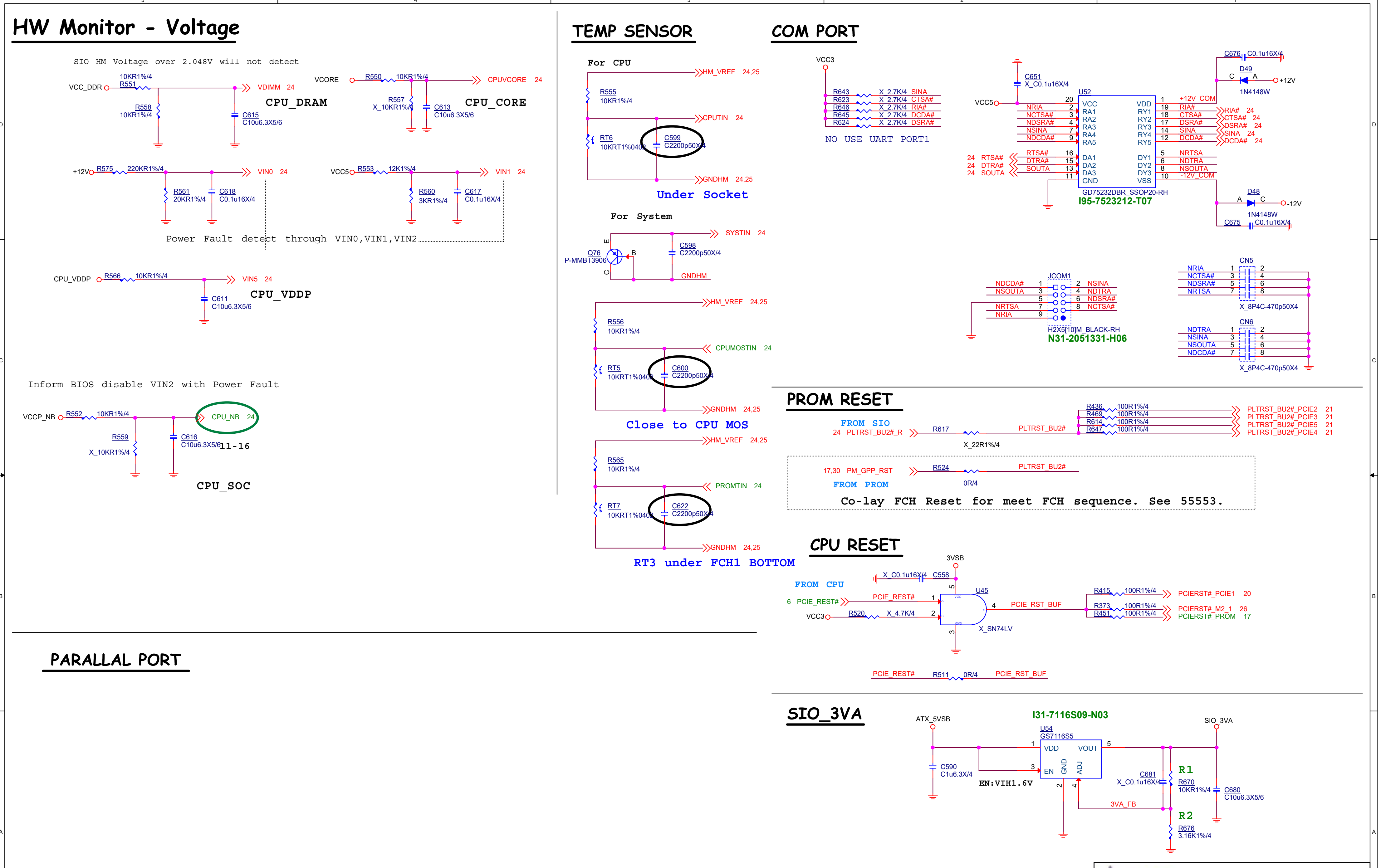
PIN	6797/6795 NAME	Circuit NAME	0	1	Strap Point
9	UARTA_P80_EN	RTSB#	DISABLE UARTA80	ENABLE UARTA80	LRESET
10	UARTB_P80_EN	DTRB#	DISABLE UARTB80	ENABLE UARTB80	LRESET
12	TESTMODE1_EN	TESTMODE1_EN	DISABLE TEST1MODE	ENABLE TEST1MODE	LRESET
15	DDR4_EN	DDR4_EN	Disable	Enable	
27	ESPI_EN	ESPI_EN	LPC	ESPI	
31	2E_4E_SEL	RTSA#	I/O ADDRESS 2E	I/O ADDRESS 4E	LRESET
32	FANOUT_DEF_EN	DTRA#	default 50%	default 100%	INTERNAL PWROK
34	P80_EN	SOUTA	ENABLE Non_PORT80	ENABLE PORT80	LRESET
69	DSW_EN	DSW_EN	DISABLE INTEL DSW	ENABLE INTEL DSW	INTERNAL RSMRST
96	AMDPWR_EN	AMDPWR_EN	DISABLE AMD PWR SEQ	ENABLE AMD PWR SEQ	INTERNAL RSMRST
103	6795 TESTMODE_EN 6797 GP40	6795 WDT# 6797 WDT#	6795 DISABLE TESTMODE	6795 ENABLE TESTMODE	INTERNAL RSMRST

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



MSI MICRO-START INT'L CO.,LTD.

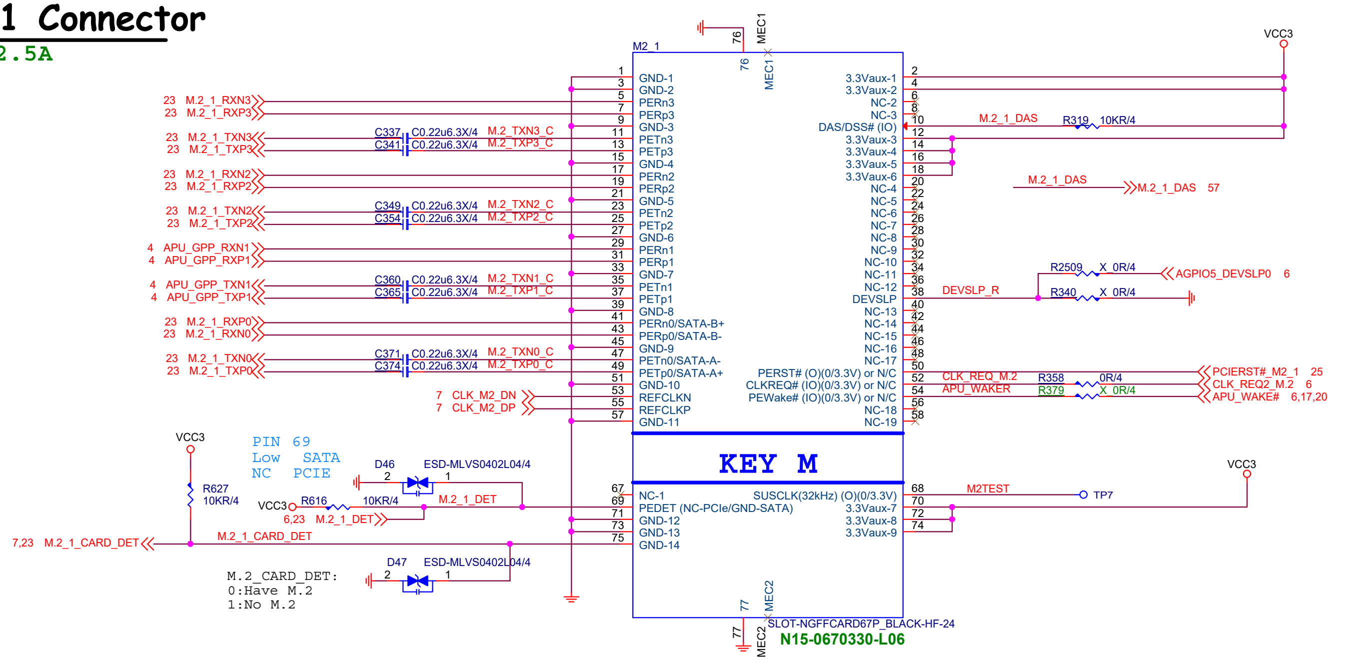
Title	SIO NCT6797D		
Size Custom	Document Number MS-7C02..		Rev 3.0
Date: Tuesday, August 18, 2020	Sheet 24 of 70		

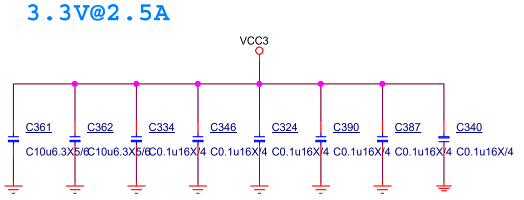


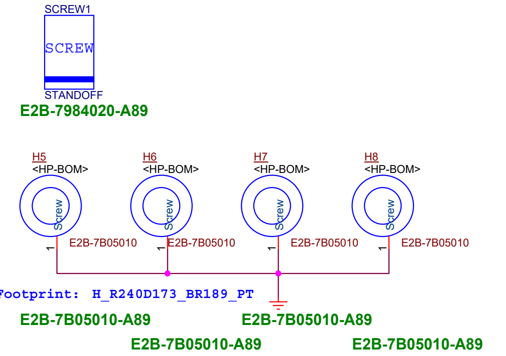
MICRO-START INT'L CO.,LTD.

Title	SIO HWM/COM	
Size: Custom	Document Number: MS-7C02..	Rev: 3.0
Date: Tuesday, August 18, 2020	Sheet 25 of 70	

M.2_1 Connector







Schematic Cfg	Project	
CFG-7C02-**-Arsenal Gaming	V	A

MSI MICRO-START INT'L CO.,LTD.

Title: M.2_1		
Size: Custom	Document Number: MS-7C02..	Rev: 3.0
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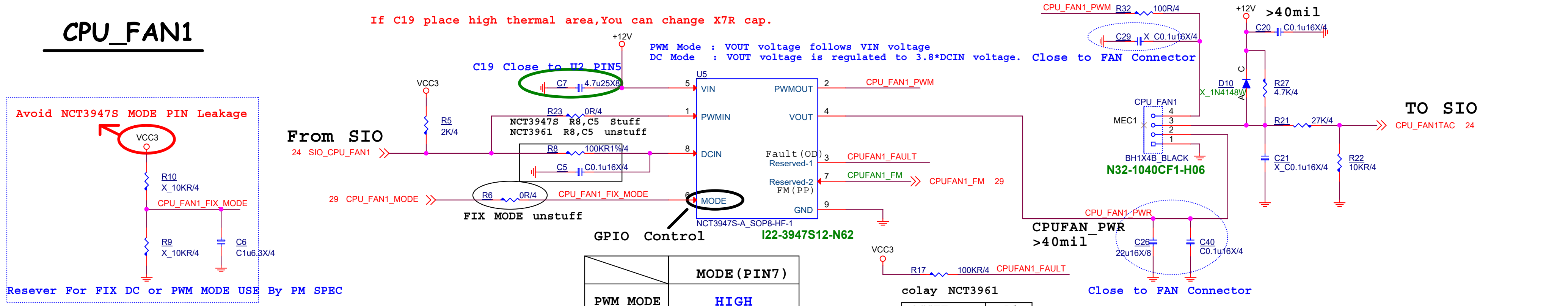
TYPE L : 4 PIN CPU FAN USE NCT3947S USE PCH GPIO CONTROL FAN MODE

1.Mode GPIO BIOS can swtich PWM/DC MODE
2.FM:BIOS can read FAN PWM/DC MODE

CPU_FAN1



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

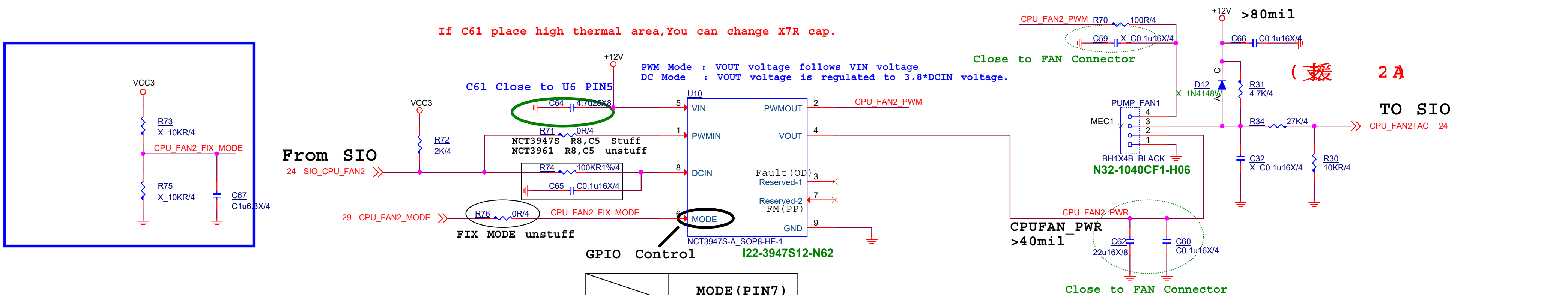
Internall pull up 1.65V

OCSET	R1
1.2~1.8A	100K
2.2~2.8A	49.9K
3.2~3.8A	10K

default

OC SET By PM SPEC
20170428

PUMP_FAN1



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

Internall pull up 1.65V

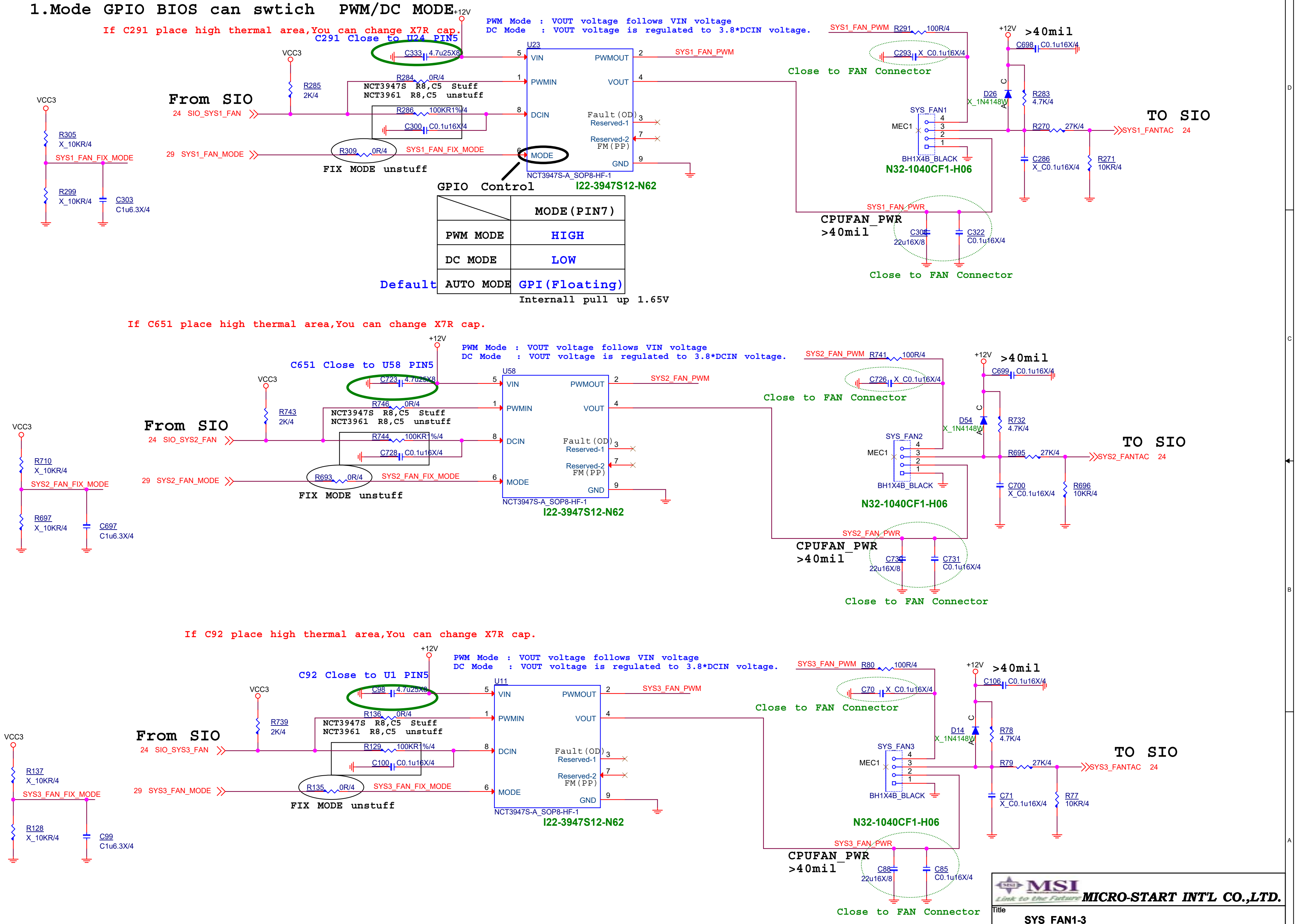
MSI Link to the Future MICRO-START INT'L CO.,LTD.

Title	CPU FAN1/PUMP FAN1	
Size: Custom	Document Number: MS-7C02..	Rev: 3.0
Date: Tuesday, August 18, 2020	Sheet 27 of 70	

SYSFAN

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

1.Mode GPIO BIOS can swtich PWM/DC MODE



GPIO Control

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

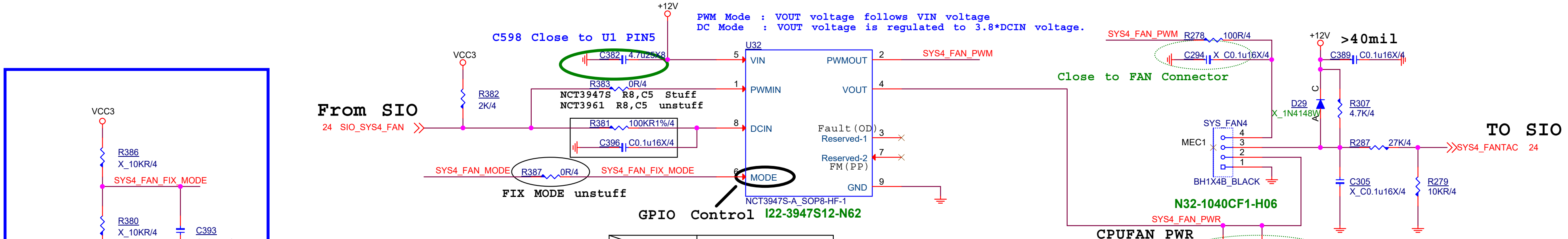
Internall pull up 1.65V

MICRO-START INT'L CO.,LTD.	
Title	SYS_FAN1-3
Size: Custom	Document Number: MS-7C02..
Rev	3.0
Date:	Tuesday, August 18, 2020
Sheet	28 of 70

SYSFAN 4

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

If C598 place high thermal area,You can change X7R cap.



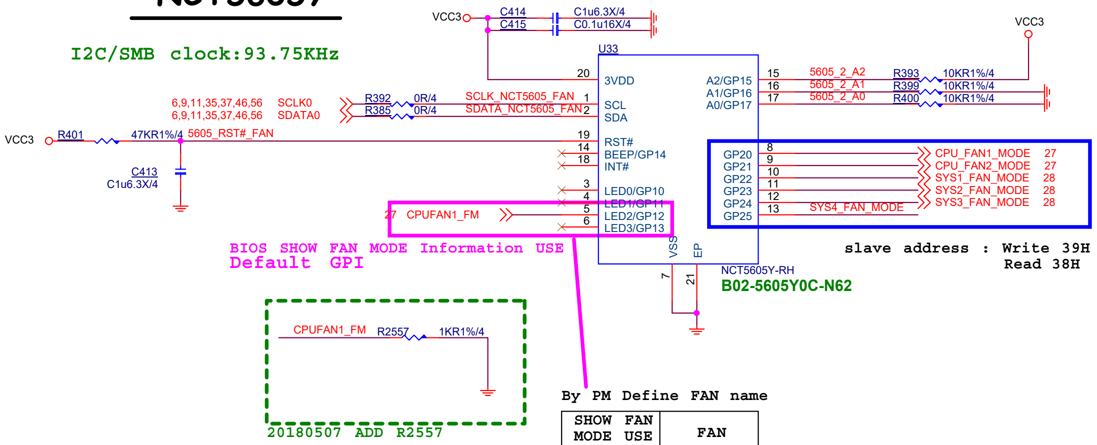
	MODE(PIN7)
PWM MODE	HIGH
DC MODE	LOW
AUTO MODE	GPI(Floating)

Default: AUTO MODE

Internall pull up 1.65V

NCT5605Y

I2C/SMB clock:93.75KHz



By PM Define FAN name

SHOW FAN MODE USE	FAN
GP12	CPUFAN1
GP13	CPUFAN2 PUMPFAN

By PM Define FAN name

FAN MODE USE	FAN
GP20	CPUFAN1
GP21	CPUFAN2 PUMPFAN
GP22	SYSFAN1
GP23	SYSFAN2
GP24	SYSFAN3
GP25	SYSFAN4

1. GENERAL DESCRIPTION

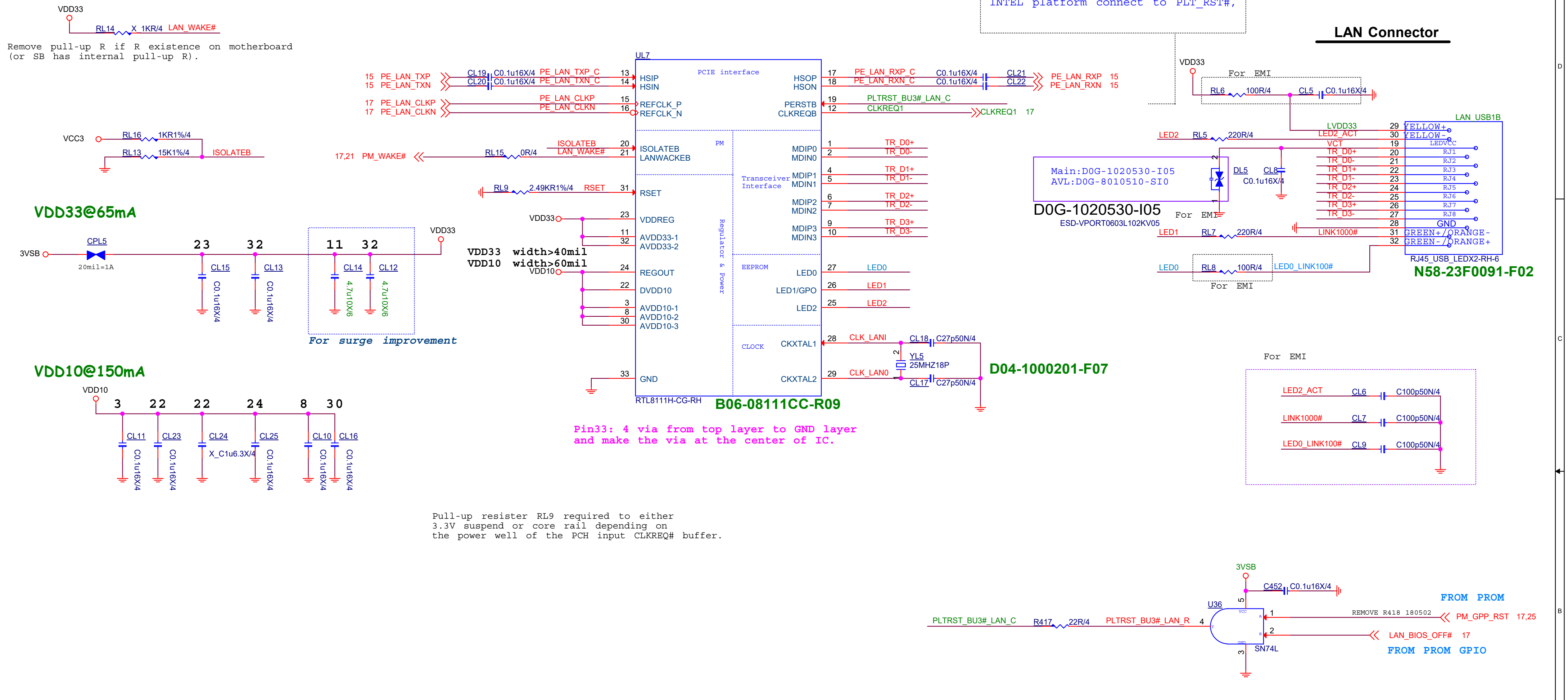
The NCT5605Y is a general purpose input/output IC with SMBus™ which provides 14 GPI/O pins. It also can provide SMBus™ address setting pins to set the address during power- on reset or from external reset.

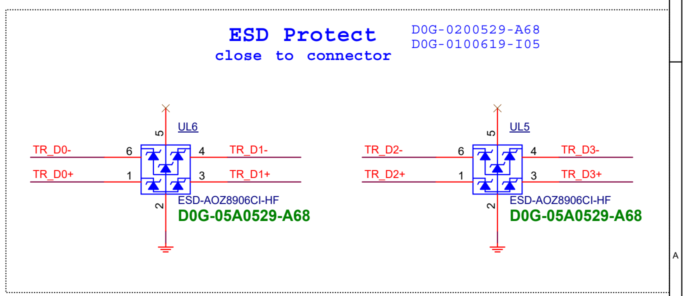
NCT5605Y SMBus™ Address is:

0	0	1	1	A2	A1	A0	R/W

R/W: 0 / 1

RTL8111H Giga LAN





8111H POWER Consumption

	3.3V @ mA	mW
10 M Idle/TxRx	9.9/84.69	32.67/279.48
100 M Idle/TxRx	48.11/92.44	158.76/305.05
Giga Idle/TxRx	124.5/177.57	410.85/585.98
ALDPS	5.50	18.15

MSI MICRO-START INT'L CO.,LTD.

Title	LAN 8111H	
Size: Custom	Document Number: MS-7C02..	Rev: 3.0
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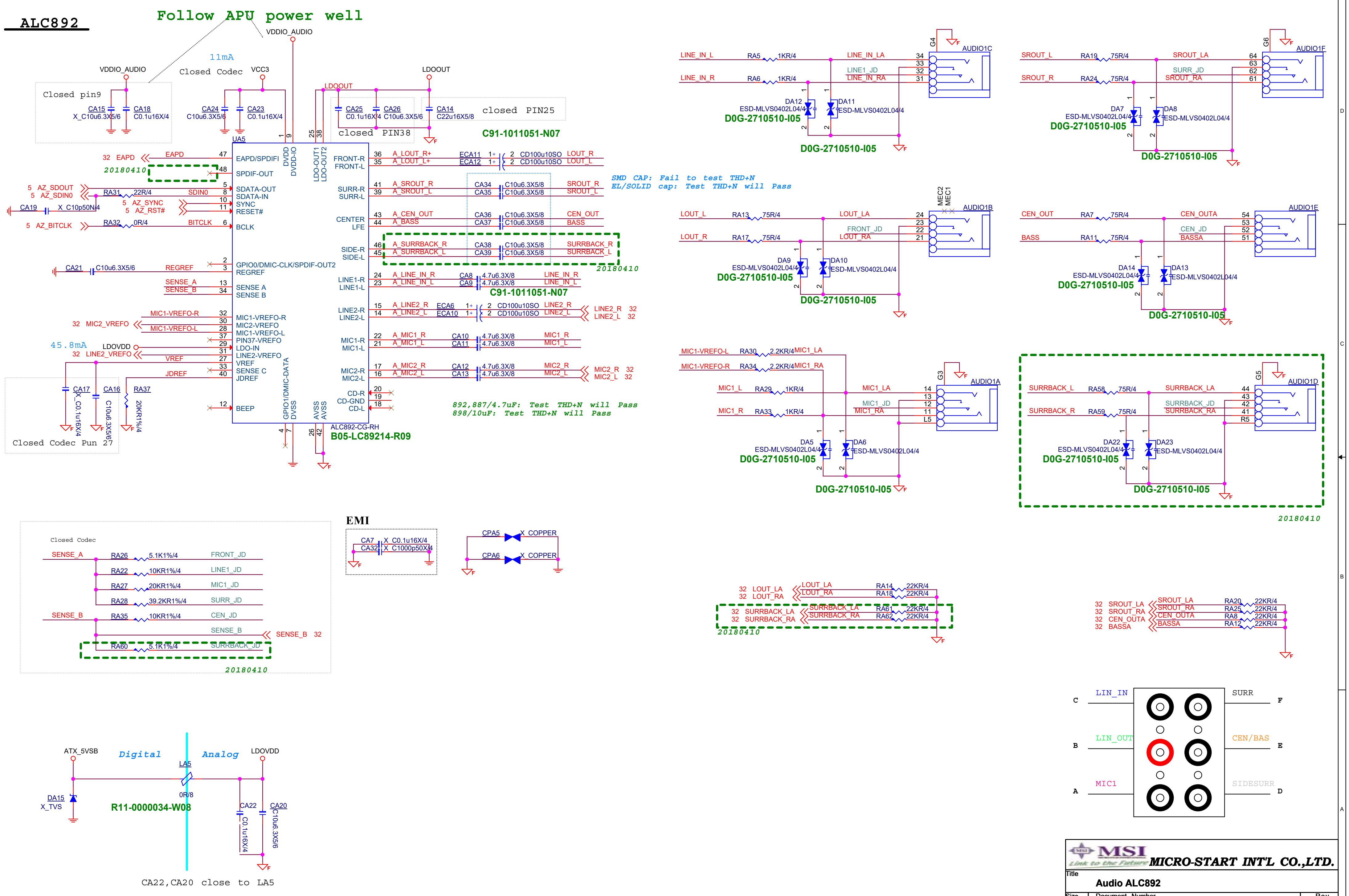

MICRO-START INT'L CO.,LTD.

Title: Audio ALC892

Size: Custom | Document Number: MS-7C02.. | Rev: 3.0

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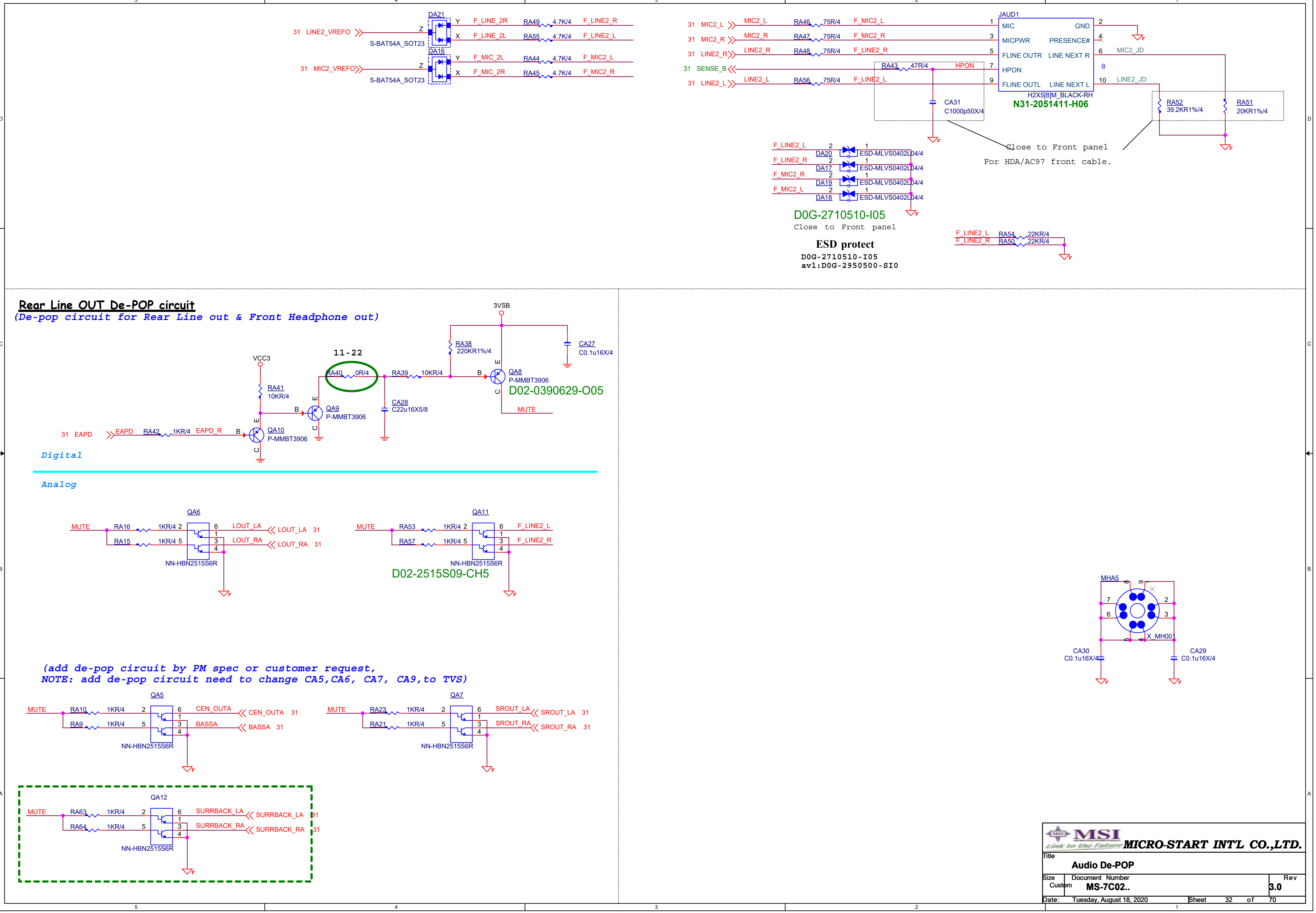

Rear Line OUT De-POP circuit
(De-pop circuit for Rear Line out & Front Headphone out)
LINE2_VREFO
MIC2_VREFO
DA21
DA16
S-BAT54A_SOT23
F_LINE_2R
F_LINE_2L
F_MIC_2L
F_MIC_2R
RA49 4.7K/4
RA55 4.7K/4
RA44 4.7K/4
RA45 4.7K/4
F_LINE2_R
F_LINE2_L
F_MIC2_L
F_MIC2_R
JAUD1
MIC
MICPWR
FLINE OUTR
HPON
FLINE OUTL
GND
PRESENCE#
LINE NEXT R
LINE NEXT L
H2X5[8]M_BLACK-RH
N31-2051411-H06
MIC2_L
MIC2_R
LINE2_R
SENSE_B
LINE2_L
RA46 75R/4
RA47 75R/4
RA48 75R/4
RA43 47R/4
RA56 75R/4
HPON
CA31
C1000p50X/4
MIC2_JD
LINE2_JD
RA52 39.2KR1%/4
RA51 20KR1%/4
Close to Front panel
For HDA/AC97 front cable.
DA20
DA17
DA19
DA18
ESD-MLVS0402L04/4
D0G-2710510-I05
Close to Front panel
ESD protect
D0G-2710510-I05
avl:D0G-2950500-SI0
RA54 22KR/4
RA50 22KR/4
3VSB
RA38 220KR1%/4
CA27 C0.1u16X/4
11-22
RA40 0R/4
RA39 10KR/4
QA8 P-MMBT3906
D02-0390629-O05
MUTE
VCC3
RA41 10KR/4
QA9 P-MMBT3906
CA28 C22u16X5/8
EAPD
RA42 1KR/4
EAPD_R
QA10 P-MMBT3906
Digital
Analog
QA6
RA16 1KR/4
RA15 1KR/4
LOUT_LA
LOUT_RA
NN-HBN2515S6R
QA11
RA53 1KR/4
RA57 1KR/4
D02-2515S09-CH5
MHA5
X_MH001
CA30 C0.1u16X/4
CA29 C0.1u16X/4
(add de-pop circuit by PM spec or customer request,
NOTE: add de-pop circuit need to change CA5,CA6, CA7, CA9,to TVS)
QA5
RA10 1KR/4
RA9 1KR/4
CEN_OUTA
BASSA
QA7
RA23 1KR/4
RA21 1KR/4
SROUT_LA
SROUT_RA
QA12
RA63 1KR/4
RA64 1KR/4
SURRBACK_LA
SURRBACK_RA
MSI
Link to the Future
MICRO-START INT'L CO.,LTD.
Title
Audio De-POP
Size Custom
Document Number MS-7C02..
Rev 3.0
Date: Tuesday, August 18, 2020
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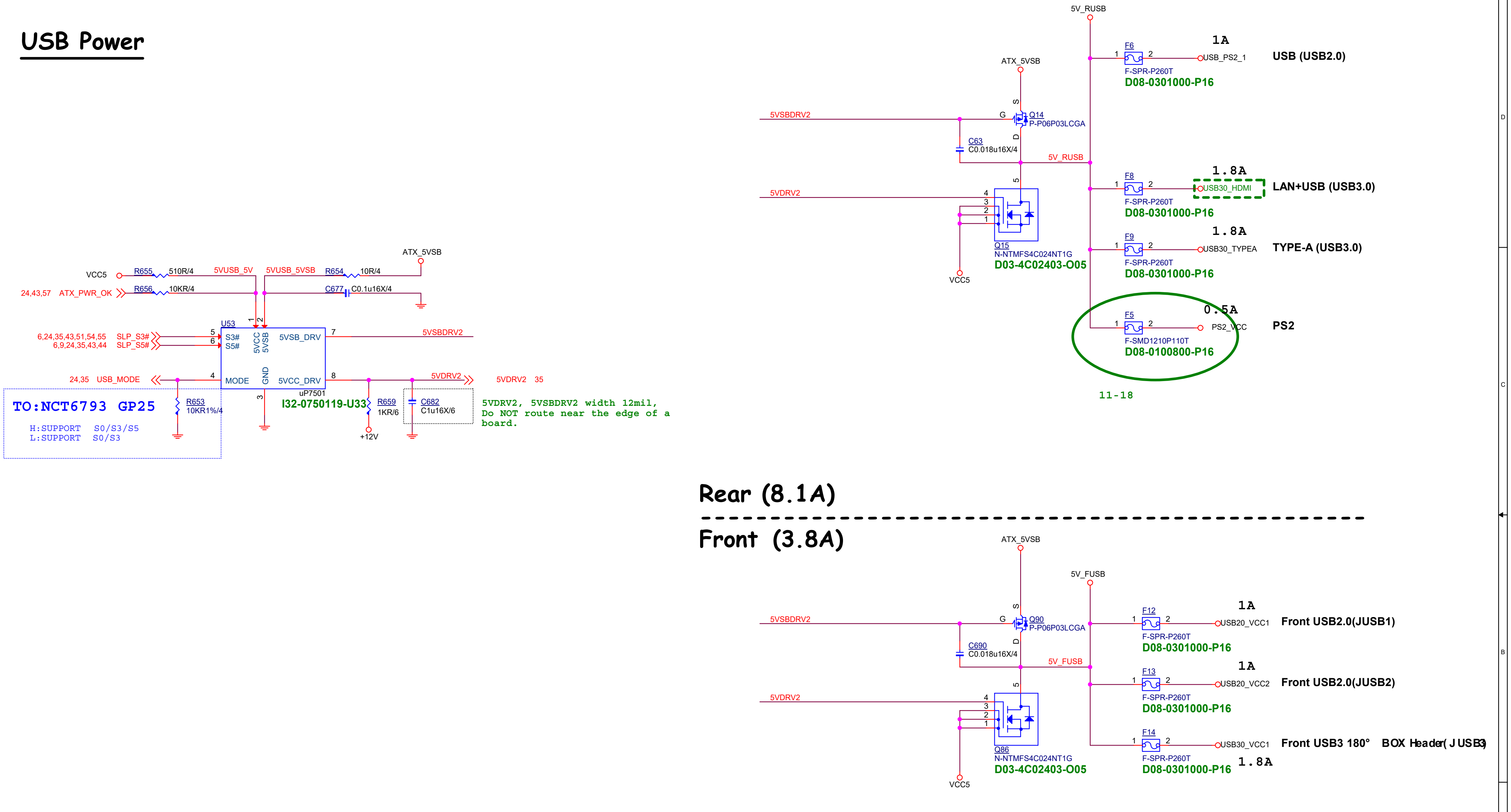
USB Power



MSI Link to the Future MICRO-START INT'L CO.,LTD.

Title	USB Power
Size: Custom	Document Number: MS-7C02..
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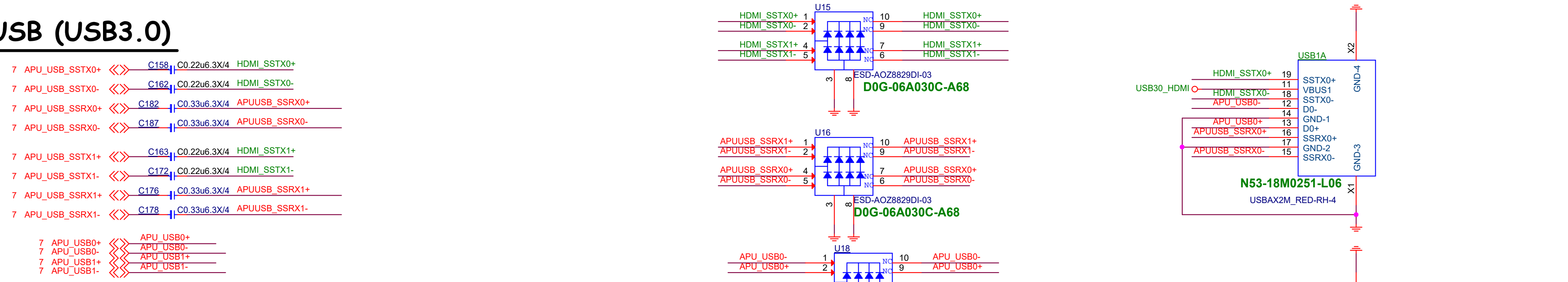
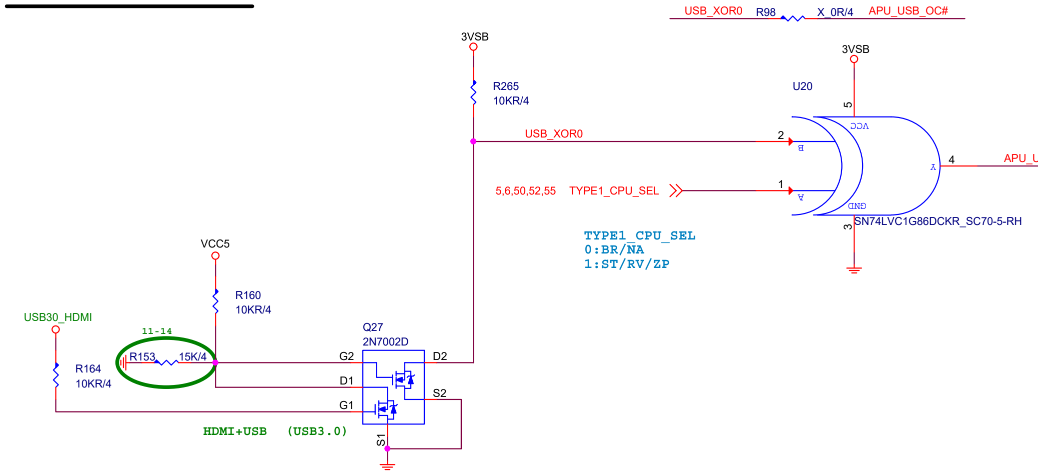
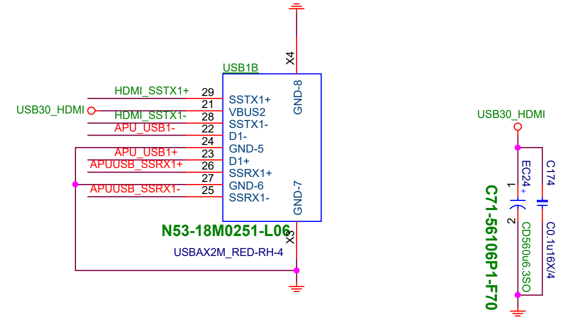
HDMI+USB (USB3.0)

5V@1A



APU_USB_OC





	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

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Title: Rear LAN_USB3.0

Size: Custom | Document Number: MS-7C02.. | Rev: 3.0

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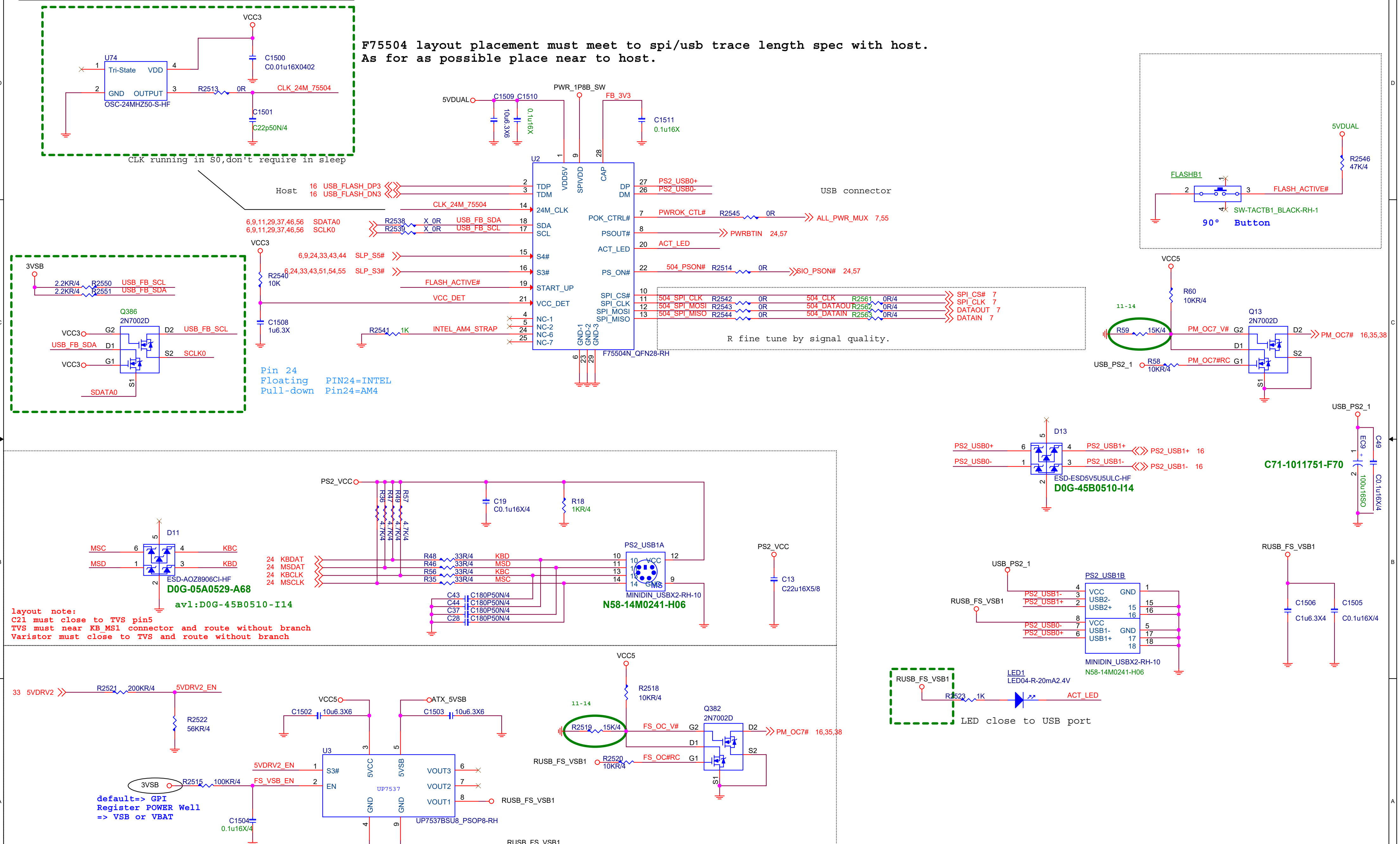
PS2+USB Flash BIOS (USB2.0)



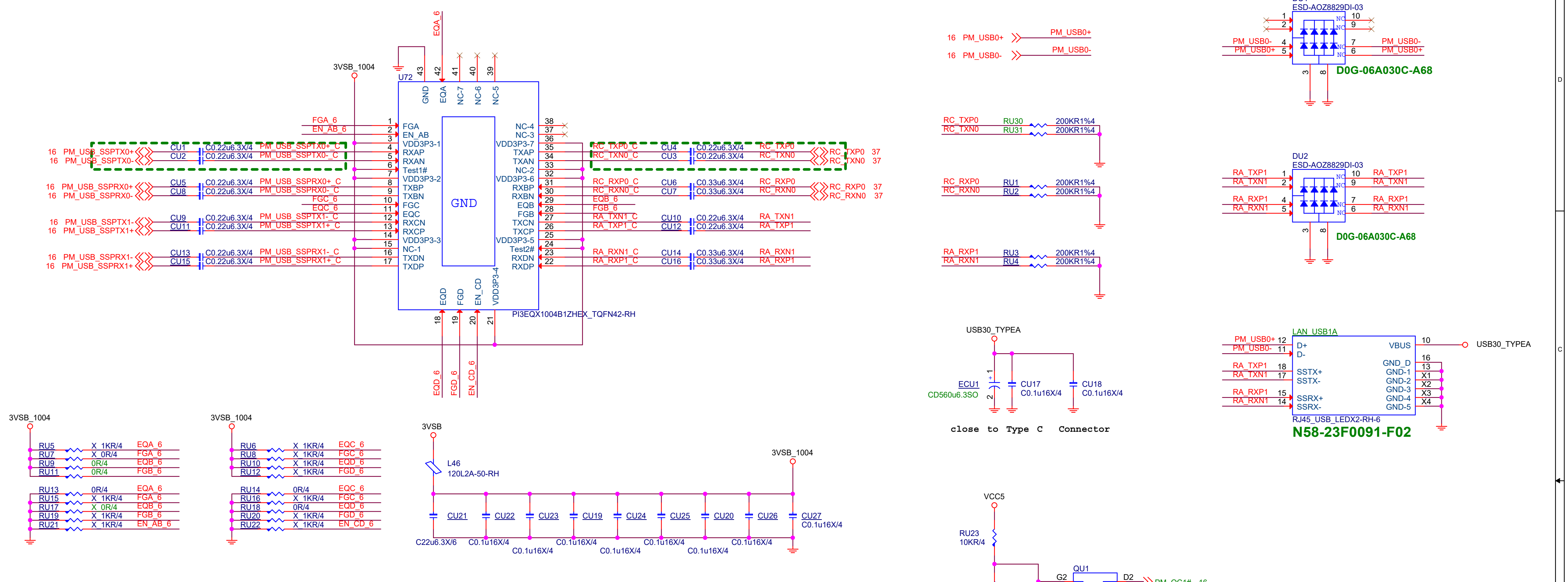
MICRO-STAR INT'L CO.,LTD

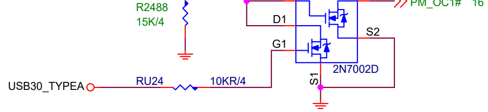
MS-7C02..

Size	Document Description	Rev
Custom	F75504	3.0

Date: Tuesday, August 18, 2020 Sheet 35 of 70

TYPE-A PI3EQX1004 Redriver





EQ	dB	
0	10.9	0 to GND
R	6.7	68K to GND
F	8.9	NC
1	13.1	0 to VDD

FG	dB	
0	-3	0 to GND
R	-1.5	68K to GND
F	0	NC
1	2	0 to VDD

MSI Link to the Future MICRO-START INT'L CO.,LTD.

Title	Rear USB3.1 Type A / redrive	
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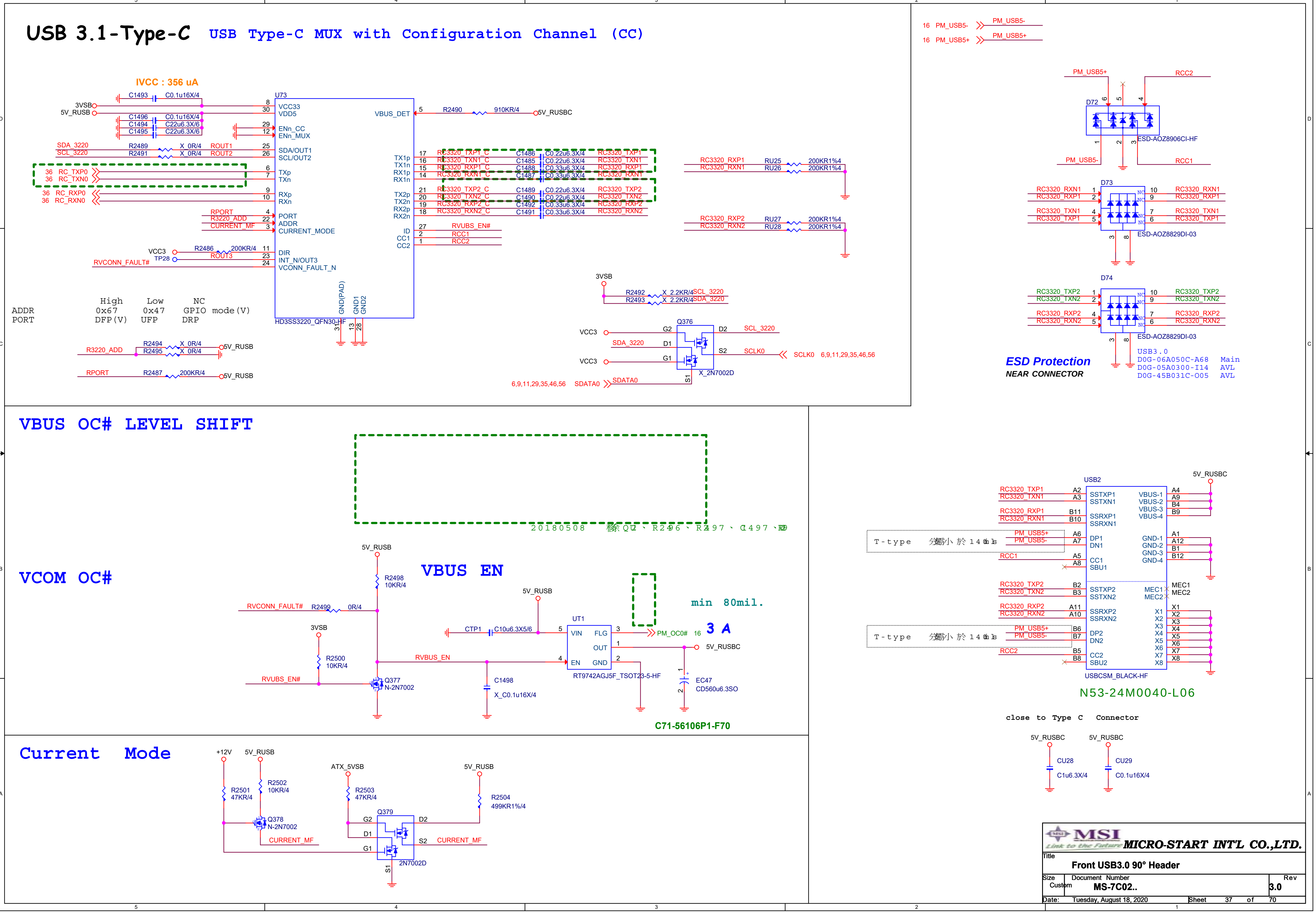

MICRO-START INT'L CO.,LTD.

Title	Front USB3.0 90° Header	
Size: Custom	Document Number: MS-7C02..	Rev: 3.0
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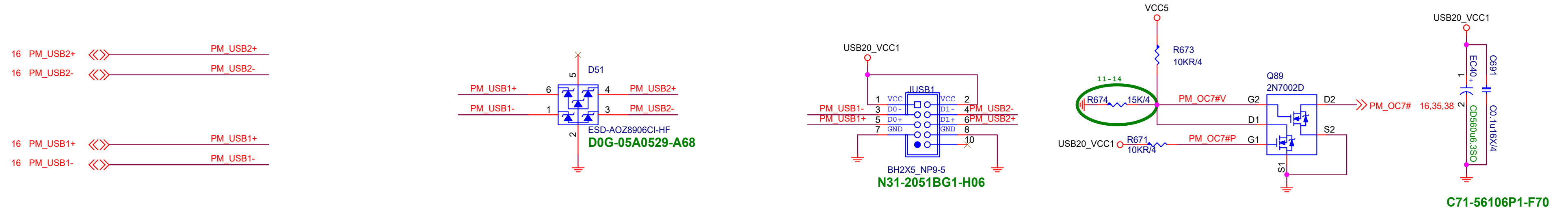
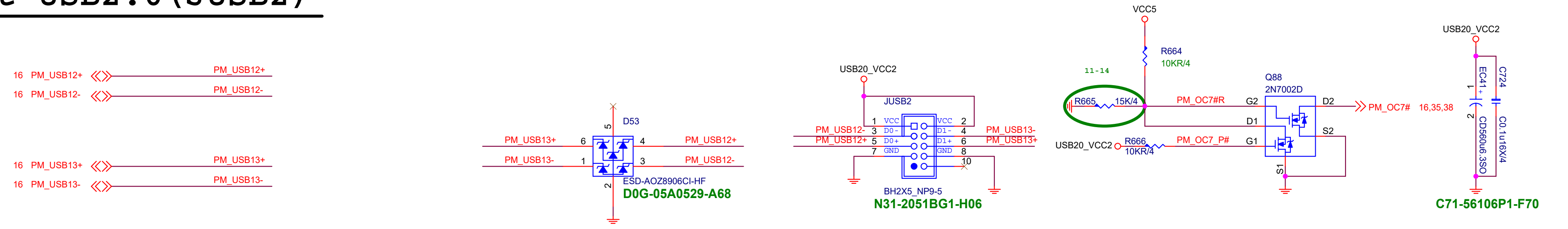
Front USB2.0(JUSB1)

5V@1A



Front USB2.0(JUSB2)

5V@1A



MSI MICRO-START INT'L CO.,LTD.

Title	Front USB2.0
Size: Custom	Document Number: MS-7C02..
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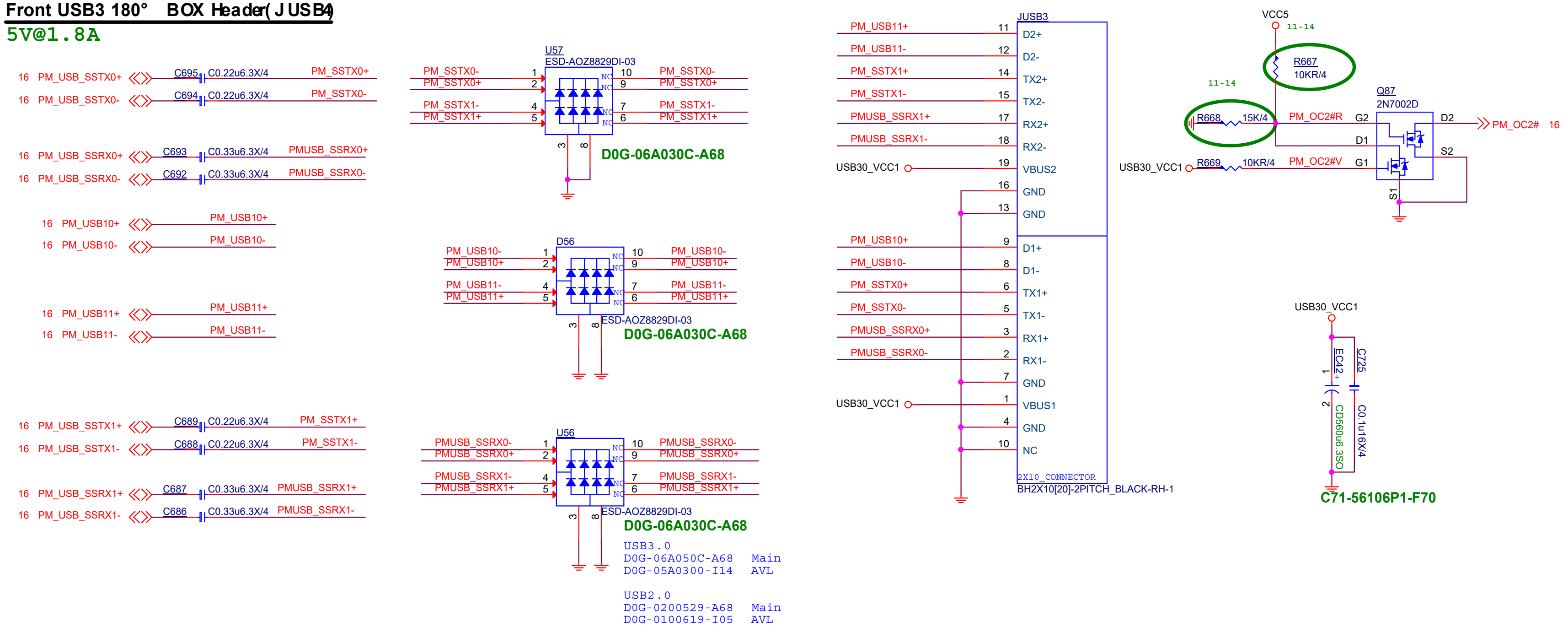
Front USB3 180° BOX Header(J USB4)

5V@1.8A



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Title	Front USB3.0 180° Header	
Size: Custom	Document Number: MS-7C02..	Rev: 3.0
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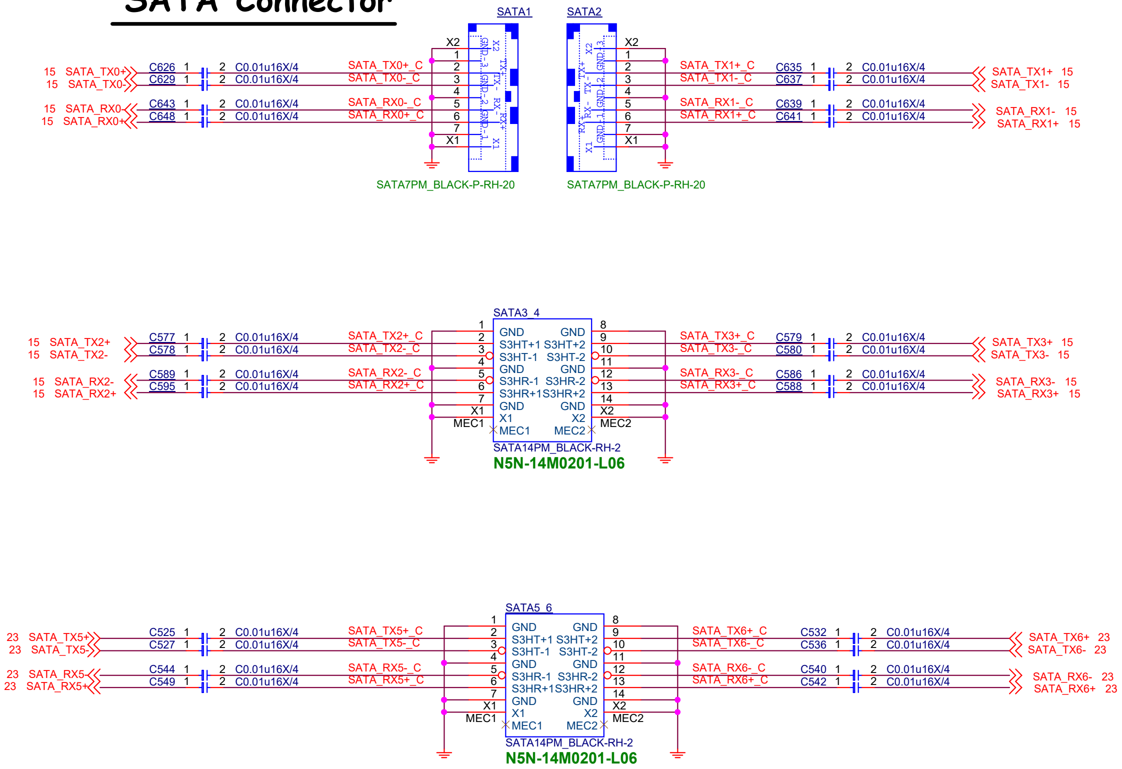
SATA Connector



Schematic Cfg	Project	
CFG-7C02-***-Arsenal Gaming	V	A

MSI Link to the Future MICRO-START INT'L CO.,LTD.

Title: SATA

Size: Custom | Document Number: MS-7C02.. | Rev: 3.0

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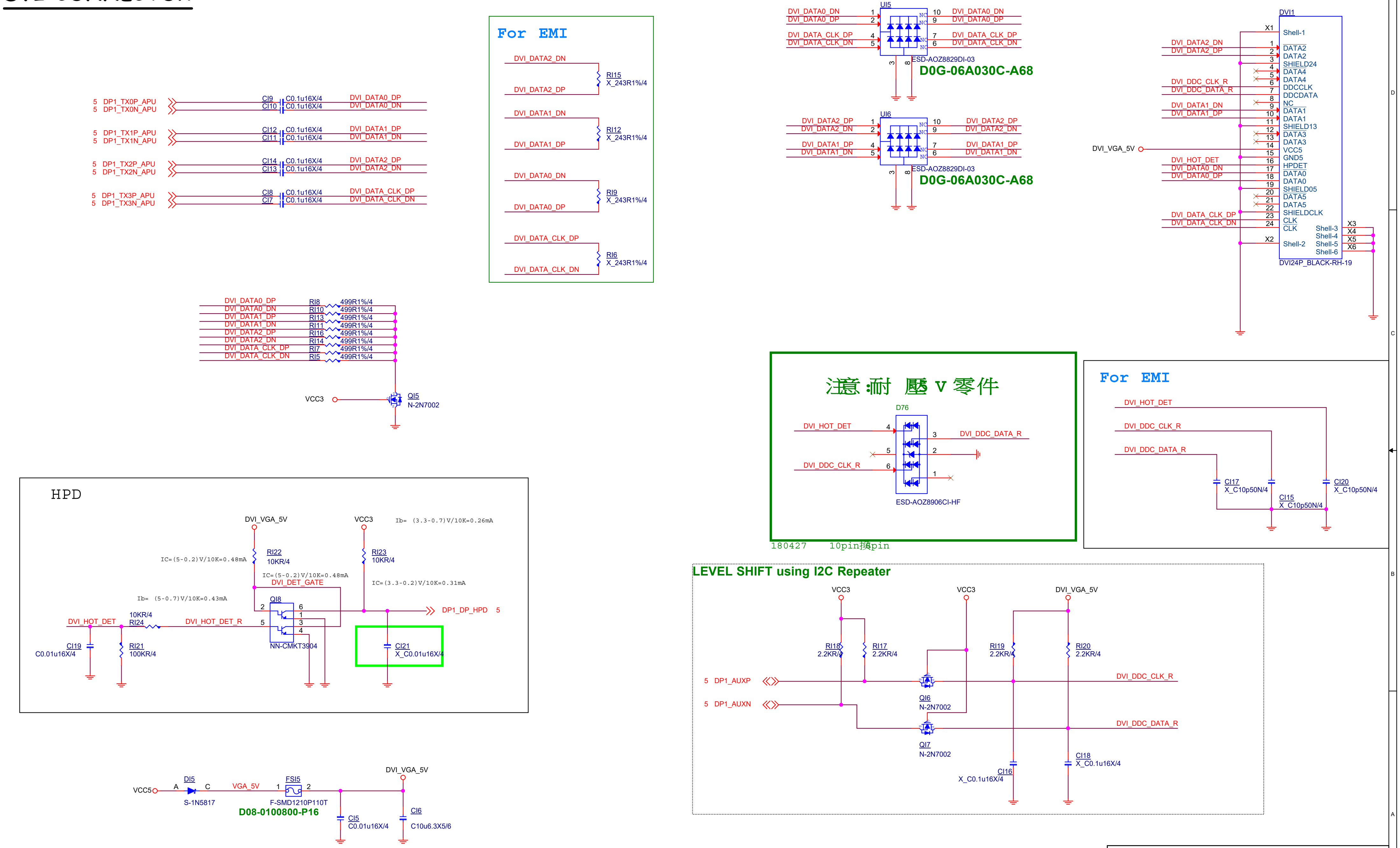
DVI CONNECTOR



MSI MICRO-START INT'L CO.,LTD.

Title	DVI
Size	Custom
Document Number	MS-7C02..
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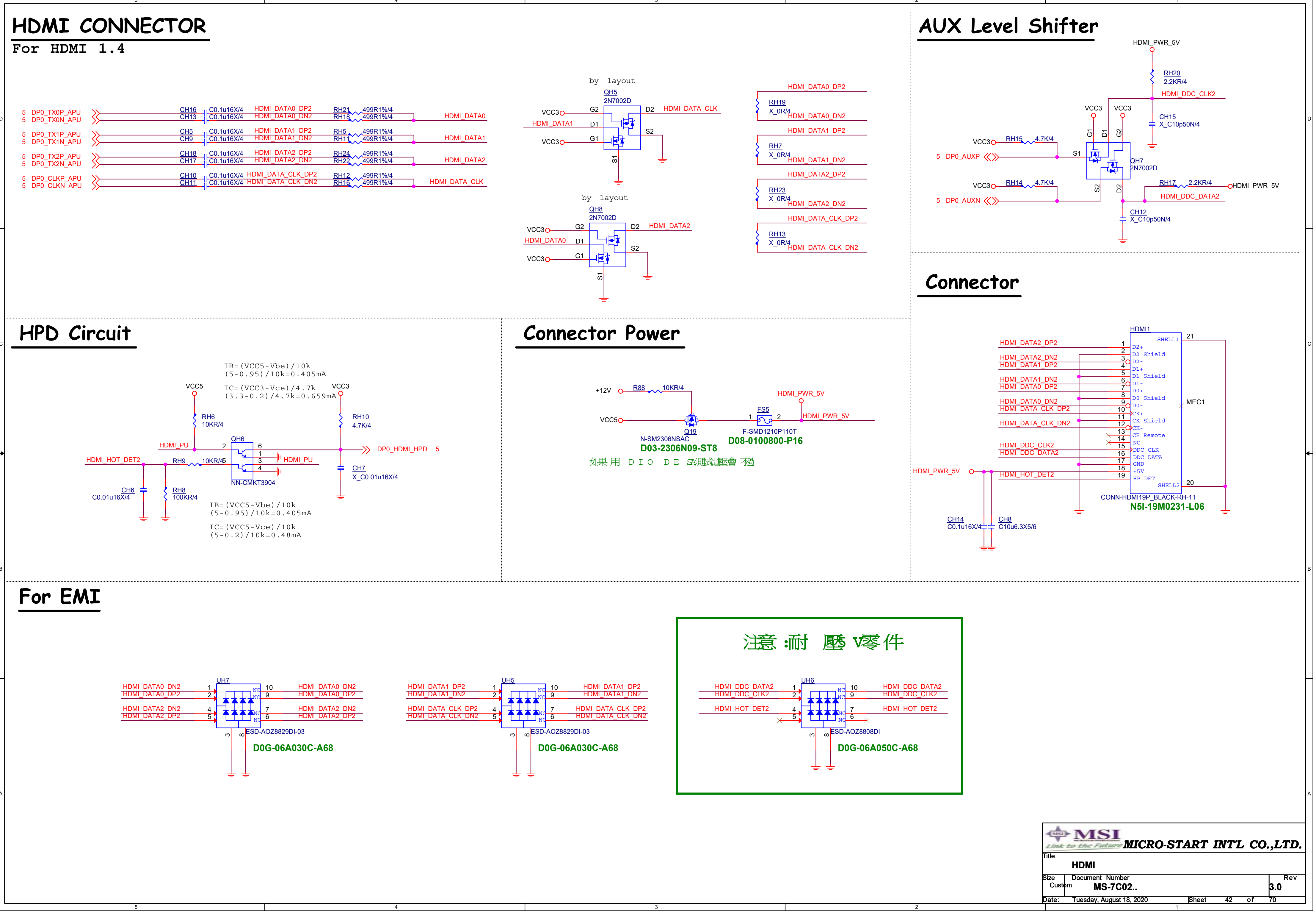

HDMI CONNECTOR
For HDMI 1.4
DP0_TX0P_APU
DP0_TX0N_APU
DP0_TX1P_APU
DP0_TX1N_APU
DP0_TX2P_APU
DP0_TX2N_APU
DP0_CLKP_APU
DP0_CLKN_APU
CH16 C0.1u16X/4
CH13 C0.1u16X/4
CH5 C0.1u16X/4
CH9 C0.1u16X/4
CH18 C0.1u16X/4
CH17 C0.1u16X/4
CH10 C0.1u16X/4
CH11 C0.1u16X/4
RH21 499R1%/4
RH18 499R1%/4
RH5 499R1%/4
RH11 499R1%/4
RH24 499R1%/4
RH22 499R1%/4
RH12 499R1%/4
RH16 499R1%/4
HDMI_DATA0
HDMI_DATA1
HDMI_DATA2
HDMI_DATA_CLK
by layout
QH5 2N7002D
QH8 2N7002D
RH19 X_0R/4
RH7 X_0R/4
RH23 X_0R/4
RH13 X_0R/4
AUX Level Shifter
HDMI_PWR_5V
RH20 2.2KR/4
HDMI_DDC_CLK2
CH15 X_C10p50N/4
RH15 4.7K/4
RH14 4.7K/4
DP0_AUXP
DP0_AUXN
QH7 2N7002D
RH17 2.2KR/4
HDMI_DDC_DATA2
CH12 X_C10p50N/4
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
RH6 10KR/4
RH10 4.7K/4
QH6 NN-CMKT3904
HDMI_PU
HDMI_HOT_DET2
RH9 10KR/4
DP0_HDMI_HPD
CH7 X_C0.01u16X/4
CH6 C0.01u16X/4
RH8 100KR/4
IB=(VCC5-Vbe)/10k
(5-0.95)/10k=0.405mA
IC=(VCC5-Vce)/10k
(5-0.2)/10k=0.48mA
Connector Power
+12V
R88 10KR/4
VCC5
Q19 N-SM2306NSAC
D03-2306N09-ST8
FS5 F-SMD1210P110T
D08-0100800-P16
Connector
HDMI1
CONN-HDMI19P_BLACK-RH-11
N5I-19M0231-L06
MEC1
CH14 C0.1u16X/4
CH8 C10u6.3X5/6
For EMI
UH7 ESD-AOZ8829DI-03
D0G-06A030C-A68
UH5 ESD-AOZ8829DI-03
D0G-06A030C-A68
UH6 ESD-AOZ8808DI
D0G-06A050C-A68
MSI
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Title HDMI
Size Custom
Document Number MS-7C02..
Rev 3.0
Date: Tuesday, August 18, 2020
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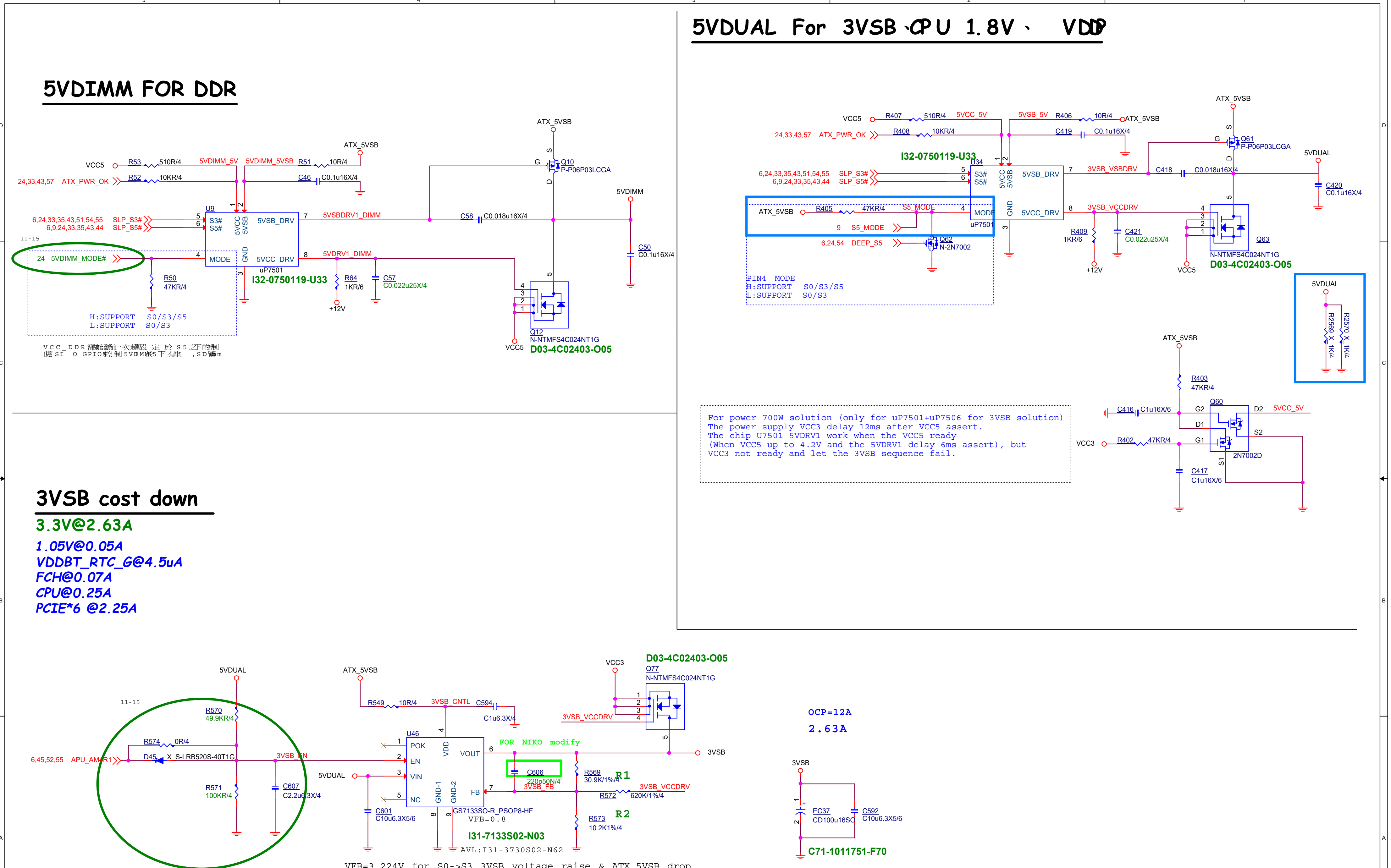

MSI MICRO-START INT'L CO.,LTD.

Title	ACPI 5VDIMM/3VSB	
Size: Custom	Document Number: MS-7C02..	Rev: 3.0
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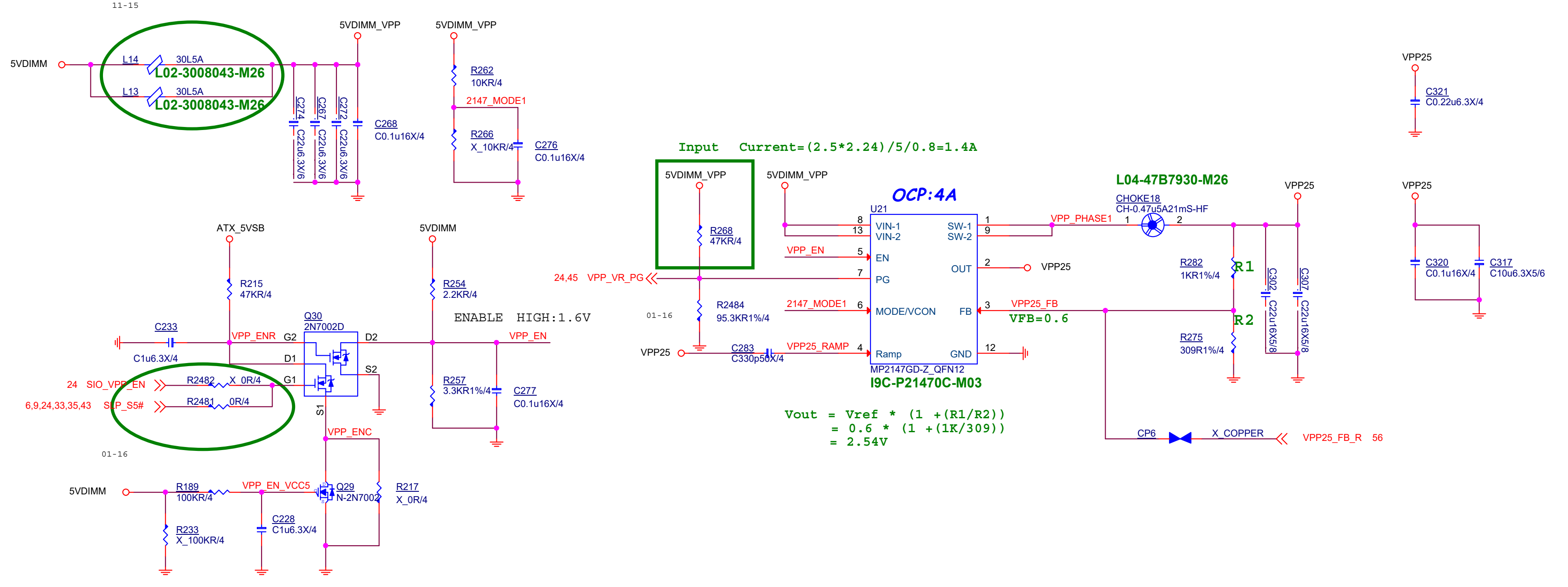
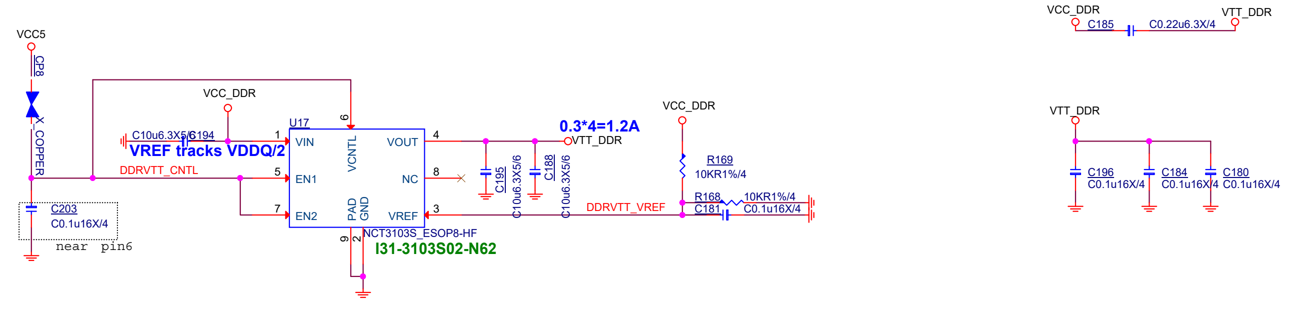
4DIMM : VPP25

2.5V@2.24A

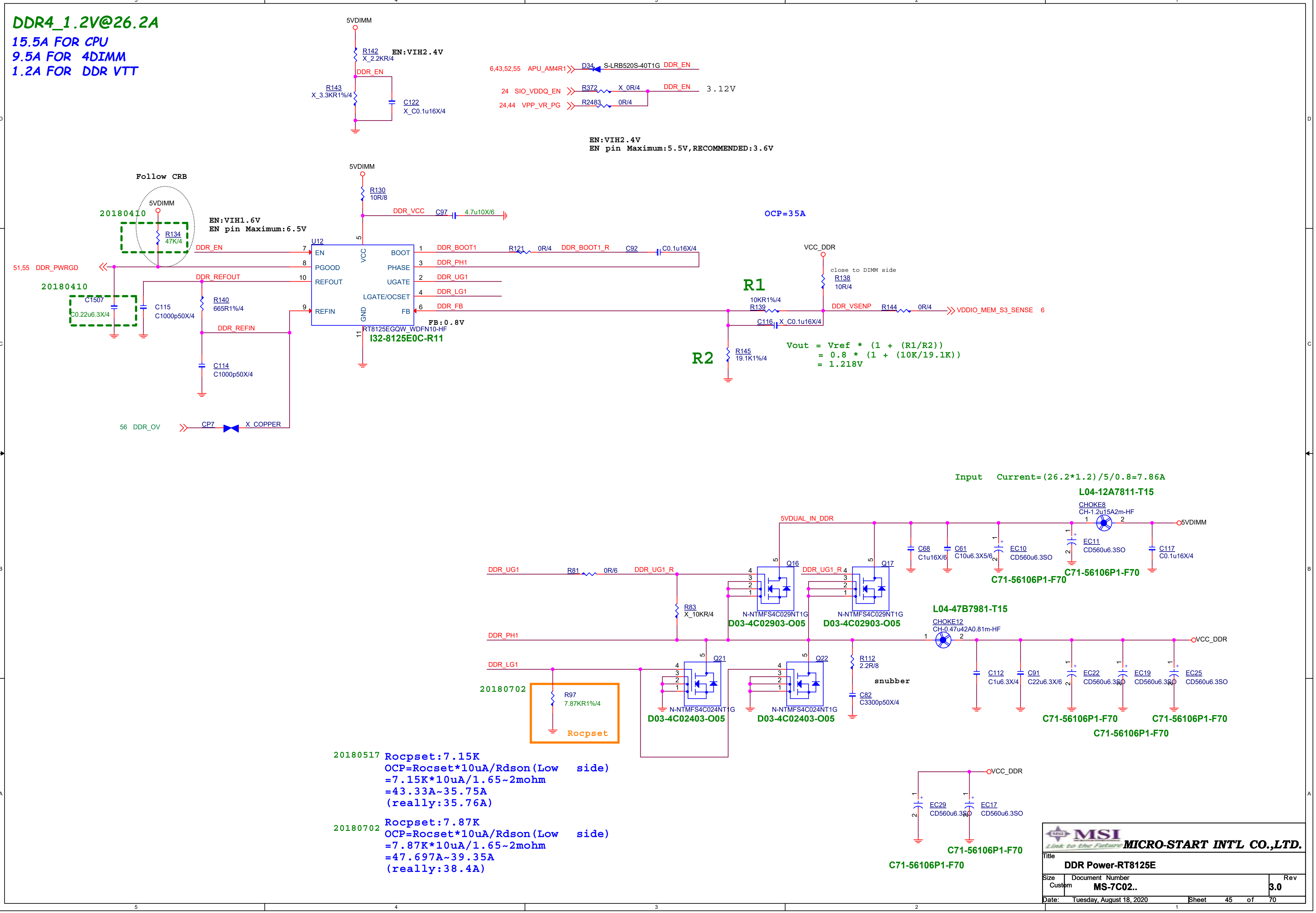


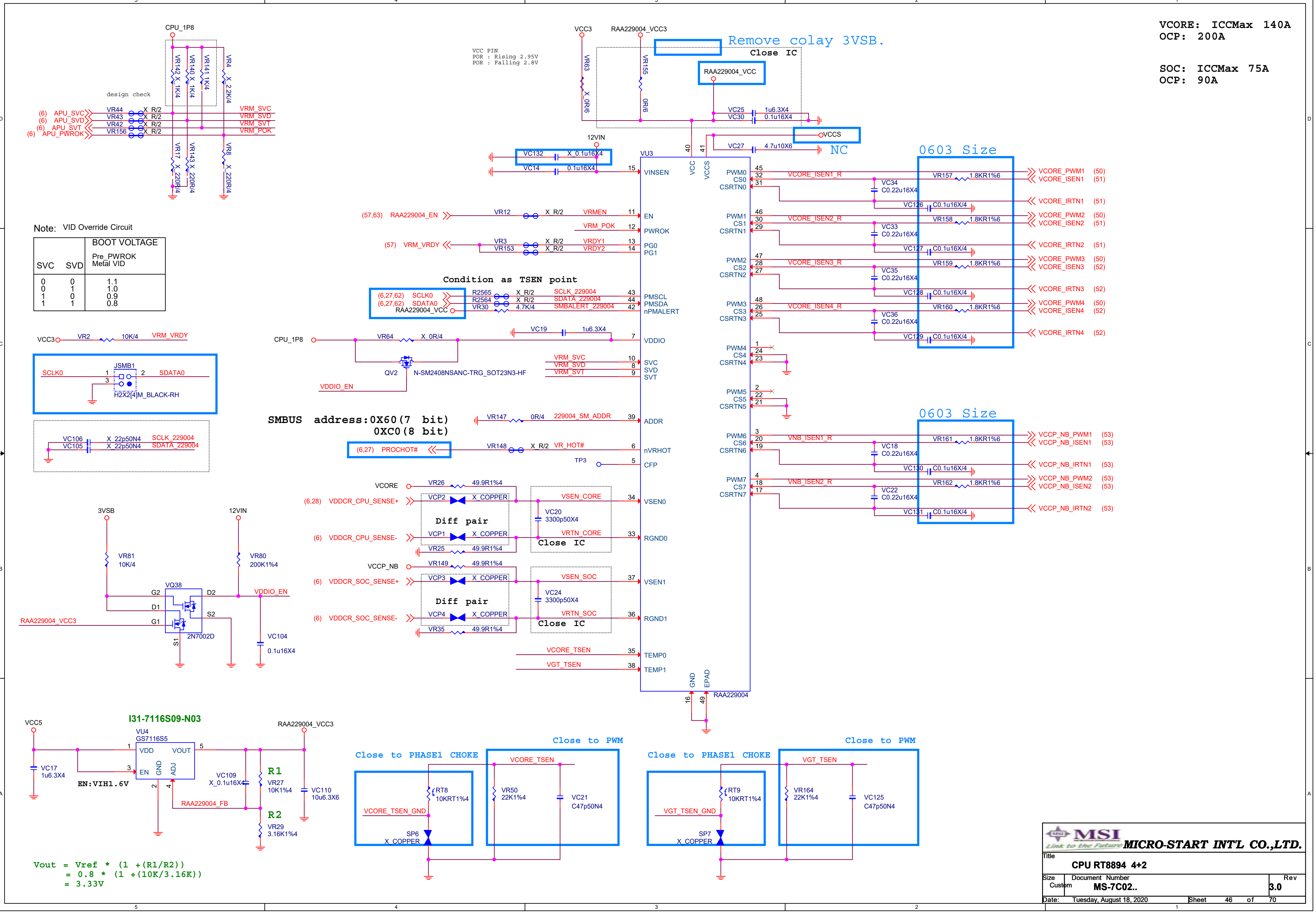
DDR VTT Power

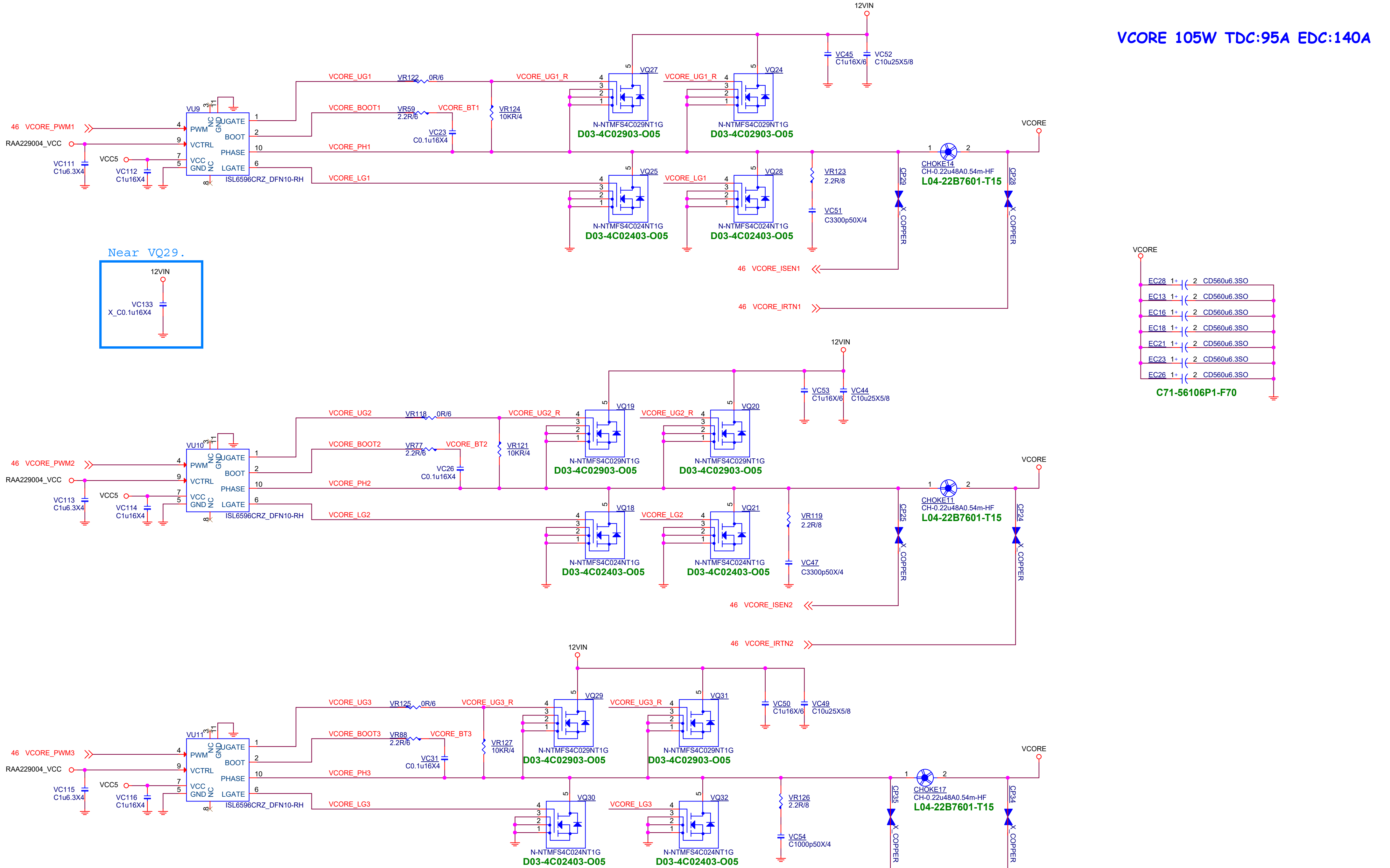
To CPU Copper trace width > 250mils , Fill island behind DIMM > 400mils .



MSI	MICRO-START INT'L CO.,LTD.
Title	DDR VPP25/VTT
Size: Custom	Document Number: MS-7C02.. Rev 3.0
Date: Tuesday, August 18, 2020	Sheet 44 of 70

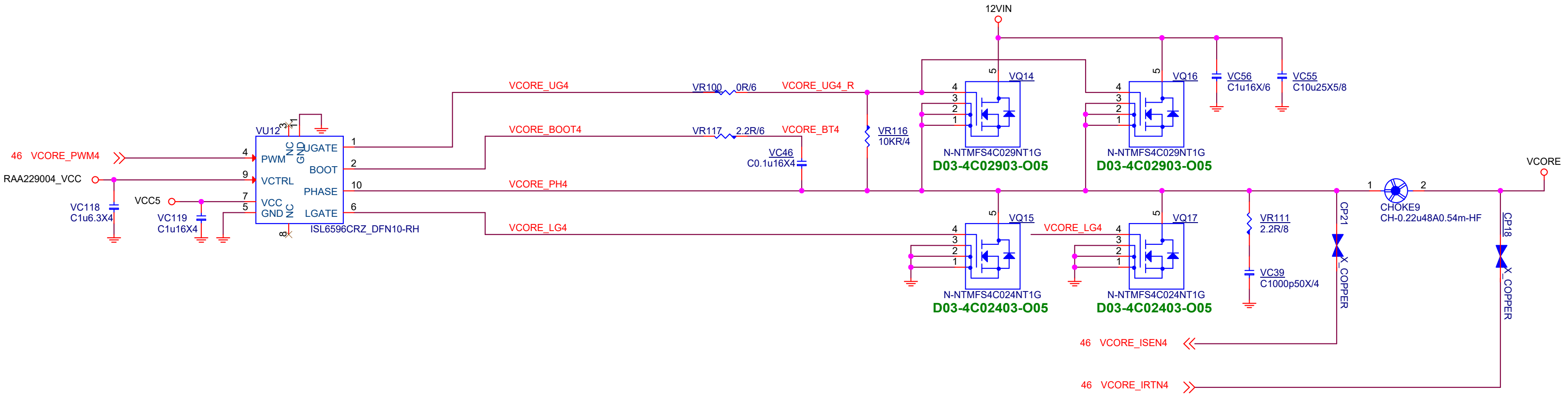

DDR4_1.2V@26.2A
15.5A FOR CPU
9.5A FOR 4DIMM
1.2A FOR DDR VTT
5VDIMM
R142
X_2.2KR/4
EN:VIH2.4V
DDR_EN
R143
X_3.3KR1%/4
C122
X_C0.1u16X/4
6,43,52,55 APU_AM4R1
D34
S-LRB520S-40T1G
DDR_EN
24 SIO_VDDQ_EN
R372
X_0R/4
DDR_EN
3.12V
24,44 VPP_VR_PG
R2483
0R/4
EN:VIH2.4V
EN pin Maximum:5.5V,RECOMMENDED:3.6V
Follow CRB
5VDIMM
R130
10R/8
DDR_VCC
C97
4.7u10X/6
20180410
5VDIMM
R134
47K/4
EN:VIH1.6V
EN pin Maximum:6.5V
OCP=35A
U12
DDR_EN
EN
VCC
BOOT
DDR_BOOT1
R121
0R/4
DDR_BOOT1_R
C92
C0.1u16X/4
51,55 DDR_PWRGD
PGOOD
PHASE
DDR_PH1
VCC_DDR
DDR_REFOUT
REFOUT
UGATE
DDR_UG1
close to DIMM side
R138
10R/4
20180410
R1
C1507
C0.22u6.3X/4
C115
C1000p50X/4
R140
665R1%/4
LGATE/OCSET
DDR_LG1
10KR1%/4
R139
DDR_VSENP
R144
0R/4
VDDIO_MEM_S3_SENSE 6
REFIN
GND
FB
DDR_FB
C116
X_C0.1u16X/4
DDR_REFIN
FB:0.8V
RT8125EGQW_WDFN10-HF
I32-8125E0C-R11
R2
R145
19.1K1%/4
Vout = Vref * (1 + (R1/R2))
= 0.8 * (1 + (10K/19.1K))
= 1.218V
C114
C1000p50X/4
56 DDR_OV
CP7
X_COPPER
Input Current=(26.2*1.2)/5/0.8=7.86A
L04-12A7811-T15
CHOKE8
CH-1.2u15A2m-HF
5VDIMM
5VDUAL_IN_DDR
C68
C1u16X/6
C61
C10u6.3X5/6
EC10
CD560u6.3SO
EC11
CD560u6.3SO
C117
C0.1u16X/4
C71-56106P1-F70
C71-56106P1-F70
DDR_UG1
R81
0R/6
DDR_UG1_R
Q16
DDR_UG1_R
Q17
R83
X_10KR/4
N-NTMFS4C029NT1G
D03-4C02903-O05
N-NTMFS4C029NT1G
D03-4C02903-O05
L04-47B7981-T15
CHOKE12
CH-0.47u42A0.81m-HF
DDR_PH1
VCC_DDR
DDR_LG1
Q21
Q22
R112
2.2R/8
snubber
C112
C1u6.3X/4
C91
C22u6.3X/6
EC22
CD560u6.3SO
EC19
CD560u6.3SO
EC25
CD560u6.3SO
20180702
R97
7.87KR1%/4
Rocpset
N-NTMFS4C024NT1G
D03-4C02403-O05
N-NTMFS4C024NT1G
D03-4C02403-O05
C82
C3300p50X/4
C71-56106P1-F70
C71-56106P1-F70
C71-56106P1-F70
20180517 Rocpset:7.15K
OCP=Rocset*10uA/Rdson(Low side)
=7.15K*10uA/1.65~2mohm
=43.33A~35.75A
(really:35.76A)
20180702 Rocpset:7.87K
OCP=Rocset*10uA/Rdson(Low side)
=7.87K*10uA/1.65~2mohm
=47.697A~39.35A
(really:38.4A)
VCC_DDR
EC29
CD560u6.3SO
EC17
CD560u6.3SO
C71-56106P1-F70
C71-56106P1-F70
MSI
MICRO-START INT'L CO.,LTD.
Title
DDR Power-RT8125E
Size
Custom
Document Number
MS-7C02..
Rev
3.0
Date: Tuesday, August 18, 2020
Sheet 45 of 70


VCORE: ICCMax 140A
OCP: 200A
SOC: ICCMax 75A
OCP: 90A
Remove colay 3VSB.
Close IC
RAA229004_VCC
NC
0603 Size
VCC PIN
POR : Rising 2.95V
POR : Falling 2.8V
design check
CPU_1P8
VCC3
RAA229004_VCC3
12VIN
(6) APU_SVC
(6) APU_SVD
(6) APU_SVT
(6) APU_PWROK
VRM_SVC
VRM_SVD
VRM_SVT
VRM_POK
Note: VID Override Circuit
BOOT VOLTAGE
SVC SVD Pre_PWROK Metal VID
0 0 1.1
0 1 1.0
1 0 0.9
1 1 0.8
Condition as TSEN point
(6,27,62) SCLK0
(6,27,62) SDATA0
SMBUS address:0X60(7 bit)
0XC0(8 bit)
(6,27) PROCHOT#
(57,63) RAA229004_EN
(57) VRM_VRDY
VDDIO_EN
N-SM2408NSANC-TRG_SOT23N3-HF
H2X2[4]M_BLACK-RH
VCORE
(6,28) VDDCR_CPU_SENSE+
(6) VDDCR_CPU_SENSE-
VCCP_NB
(6) VDDCR_SOC_SENSE+
(6) VDDCR_SOC_SENSE-
Diff pair
VSEN_CORE
VRTN_CORE
VSEN_SOC
VRTN_SOC
VCORE_TSEN
VGT_TSEN
RAA229004
VIN SEN EN PWROK PG0 PG1 PMSCL PMSDA nPMALERT VDDIO SVC SVD SVT ADDR nVRHOT CFP VSEN0 RGND0 VSEN1 RGND1 TEMP0 TEMP1 GND EPAD VCC VCCS
PWM0 CS0 CSRTN0 PWM1 CS1 CSRTN1 PWM2 CS2 CSRTN2 PWM3 CS3 CSRTN3 PWM4 CS4 CSRTN4 PWM5 CS5 CSRTN5 PWM6 CS6 CSRTN6 PWM7 CS7 CSRTN7
VCORE_PWM1 (50)
VCORE_ISEN1 (51)
VCORE_IRTN1 (51)
VCORE_PWM2 (50)
VCORE_ISEN2 (51)
VCORE_IRTN2 (51)
VCORE_PWM3 (50)
VCORE_ISEN3 (52)
VCORE_IRTN3 (52)
VCORE_PWM4 (50)
VCORE_ISEN4 (52)
VCORE_IRTN4 (52)
VCCP_NB_PWM1 (53)
VCCP_NB_ISEN1 (53)
VCCP_NB_IRTN1 (53)
VCCP_NB_PWM2 (53)
VCCP_NB_ISEN2 (53)
VCCP_NB_IRTN2 (53)
3VSB
2N7002D
RAA229004_VCC3
I31-7116S09-N03
VU4 GS7116S5
VCC5
EN:VIH1.6V
RAA229004_FB
R1
R2
Vout = Vref * (1 +(R1/R2))
= 0.8 * (1 +(10K/3.16K))
= 3.33V
Close to PHASE1 CHOKE
Close to PWM
VCORE_TSEN_GND
VGT_TSEN_GND
MICRO-START INT'L CO.,LTD.
Title CPU RT8894 4+2
Size Custom
Document Number MS-7C02..
Rev 3.0
Date: Tuesday, August 18, 2020
Sheet 46 of 70



MICRO-START INT'L CO.,LTD.

Title	CPU Phase1-3	
Size Custom	Document Number MS-7C02..	Rev 3.0
Date: Tuesday, August 18, 2020	Sheet 47 of 70	



MICRO-START INT'L CO.,LTD.

Title	CPU Phase4	
Size Custom	Document Number MS-7C02..	Rev 3.0
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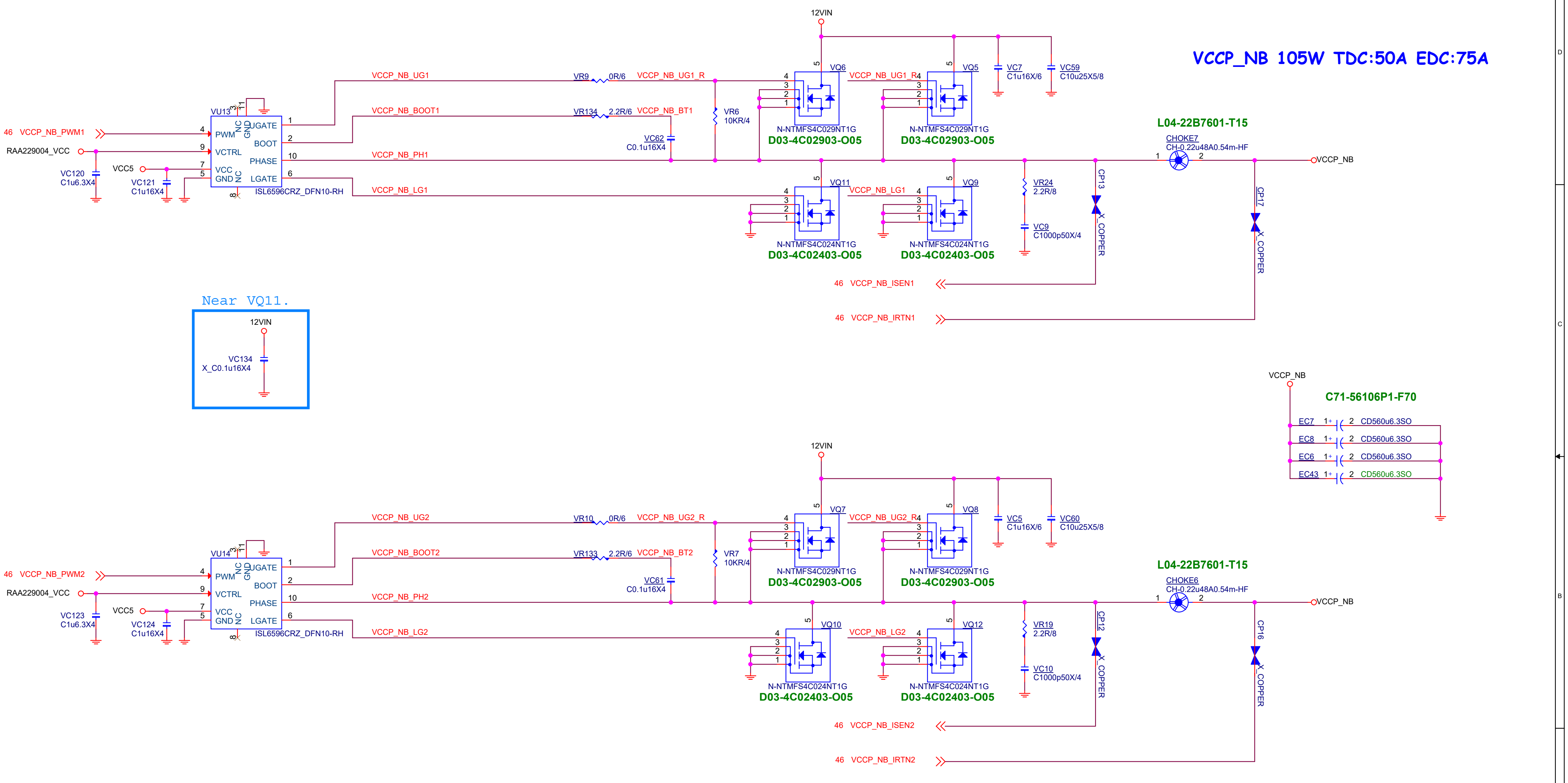
VCCP_NB 105W TDC:50A EDC:75A



MICRO-START INT'L CO.,LTD.

Title	CPU NB	
Size: Custom	Document Number: MS-7C02..	Rev: 3.0
Date: Tuesday, August 18, 2020	Sheet 49 of 70	

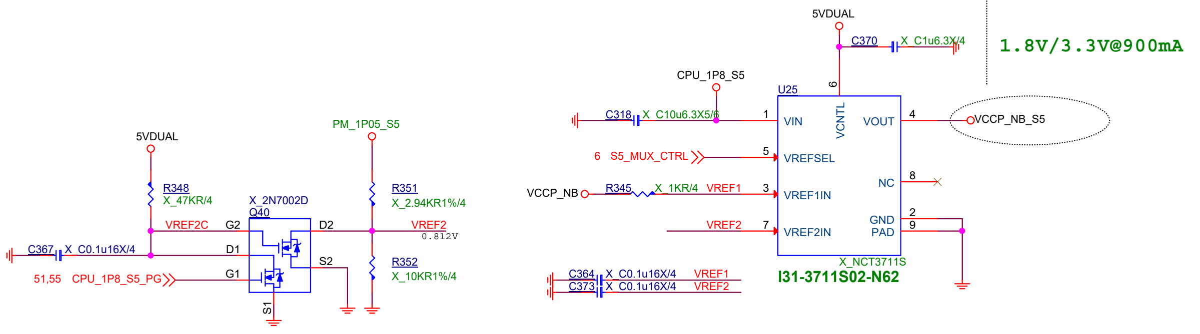
FOR VCCP_SOC_S5

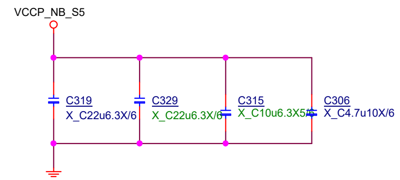
0.9A

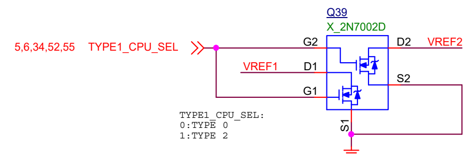
S5_MUX_CTRL
HIGH:S0
LOW: S3/S5

H: +VDDCR_FCH_ALW will track VDDNB
L: If VDDCR_SOC<0.775V (OR 0.85V),VDDCR_SOC_S5 =0.775V.
If VDDCR_SOC >= 0.775V (OR 0.85V) , VDDCR_SOC_S5 will track VDDCR_NB

(VDDCR_SOC_S5 is only used for AMD Family 15h Models 60h-6Fh processors)





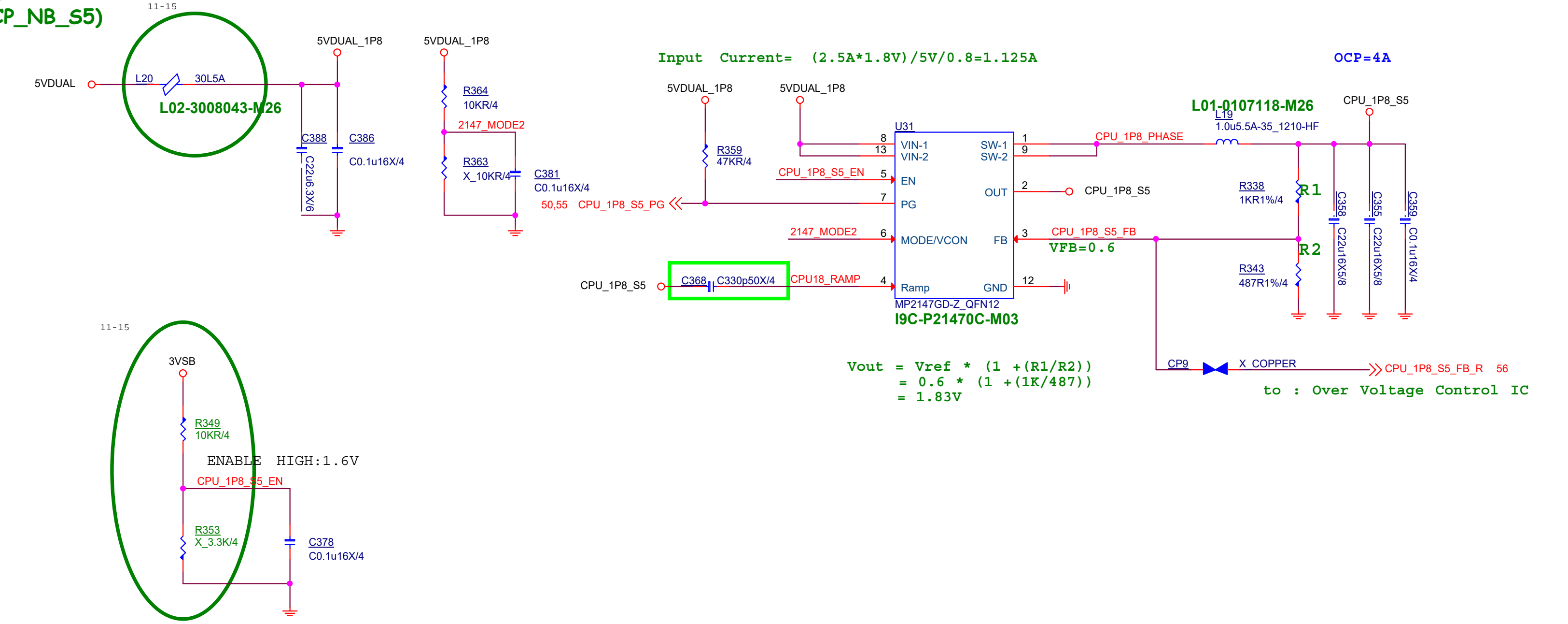


CPU	TYPE	TYPE1_CPU_SEL	TYPE0_CPU_SEL
BR	0	0	1
NA		0	0
SR	2	1	1
RV/ZP	3	1	0

CPU VCCP_NB_S5 ONLY SUPPORT TYPE0

CPU 1.8V S5 @3.4A

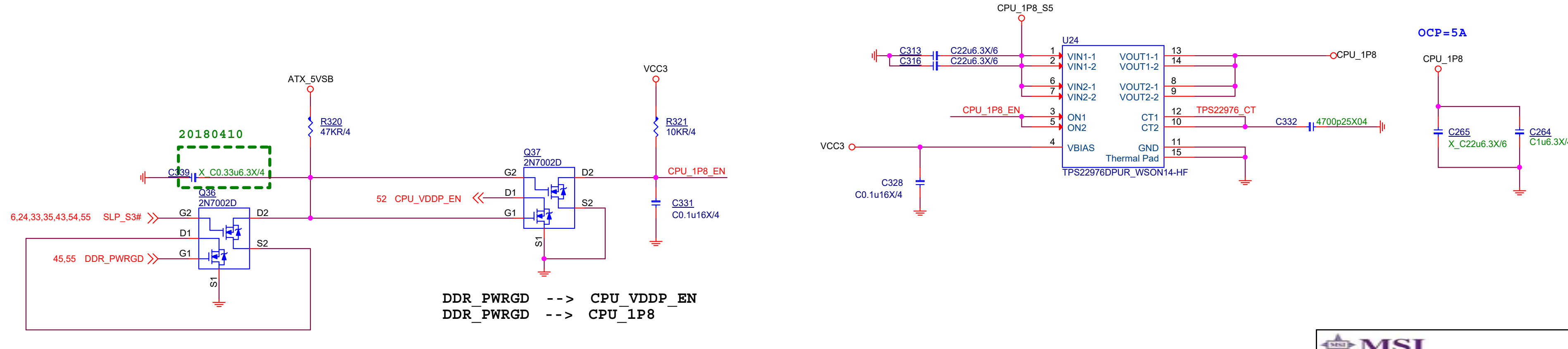
1.8V S5@0.5A
1.8V S0@2A
0.9A(VCCP_NB_S5)



CPU 1.8V S0

1.8V@2A

FOR VCCP_SOC@0.9A



MSI	MICRO-START INT'L CO.,LTD.
Title	CPU 1.8_S0/S5
Size: Custom	Document Number: MS-7C02..
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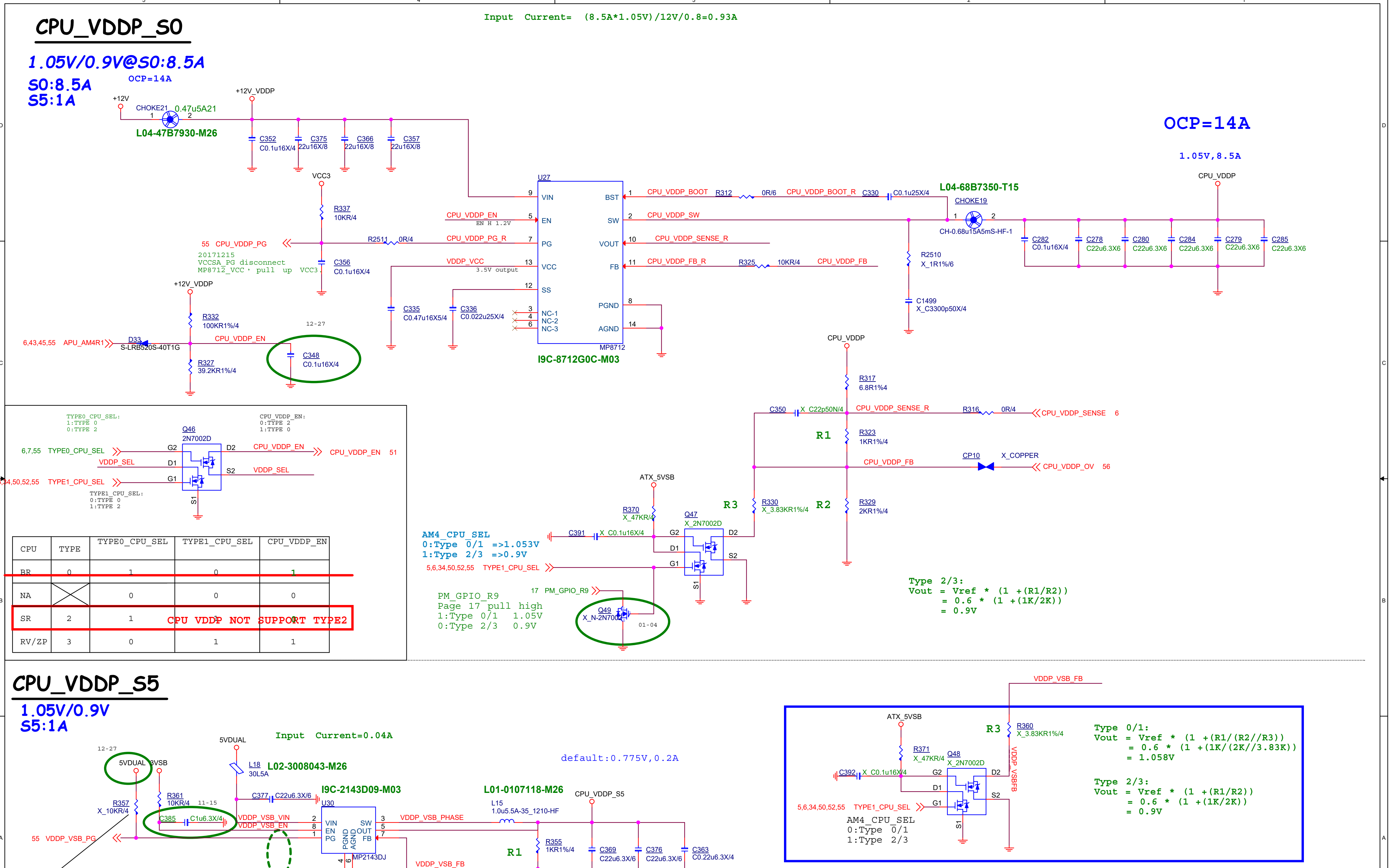

CPU	TYPE	TYPE0_CPU_SEL	TYPE1_CPU_SEL	CPU_VDDP_EN
~~BR~~	~~0~~	~~1~~	~~0~~	~~1~~
NA		0	0	0
SR	2	1	1	0
RV/ZP	3	0	1	1

CPU VDDP NOT SUPPORT TYPE2

MSI MICRO-START INT'L CO.,LTD.

Title	CPU Power VDDP	
Size Custom	Document Number MS-7C02..	Rev 3.0
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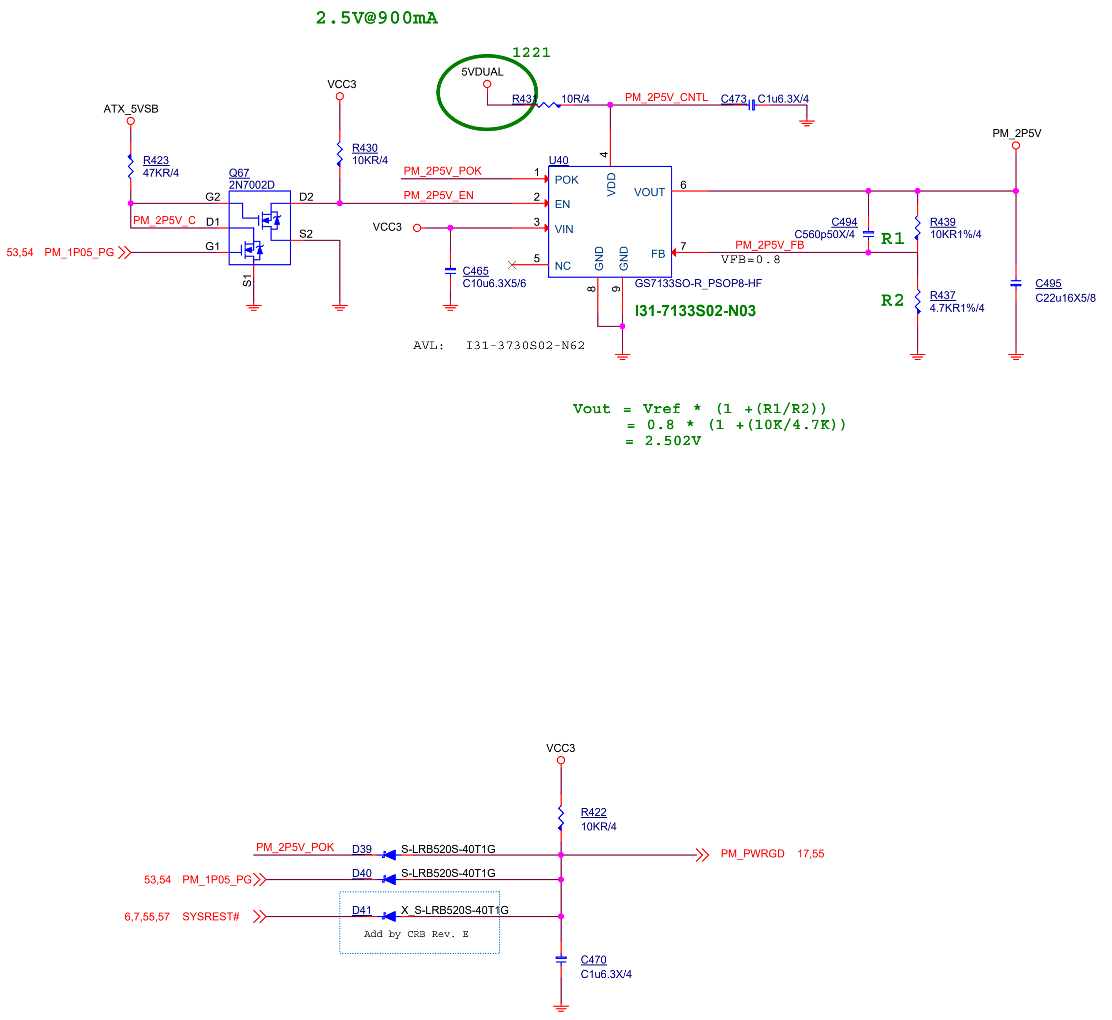
Promontory-2.5V



MSI MICRO-START INT'L CO.,LTD.

Title	Prom-GS7133/2.5V	
Size: Custom	Document Number: MS-7C02..	Rev: 3.0
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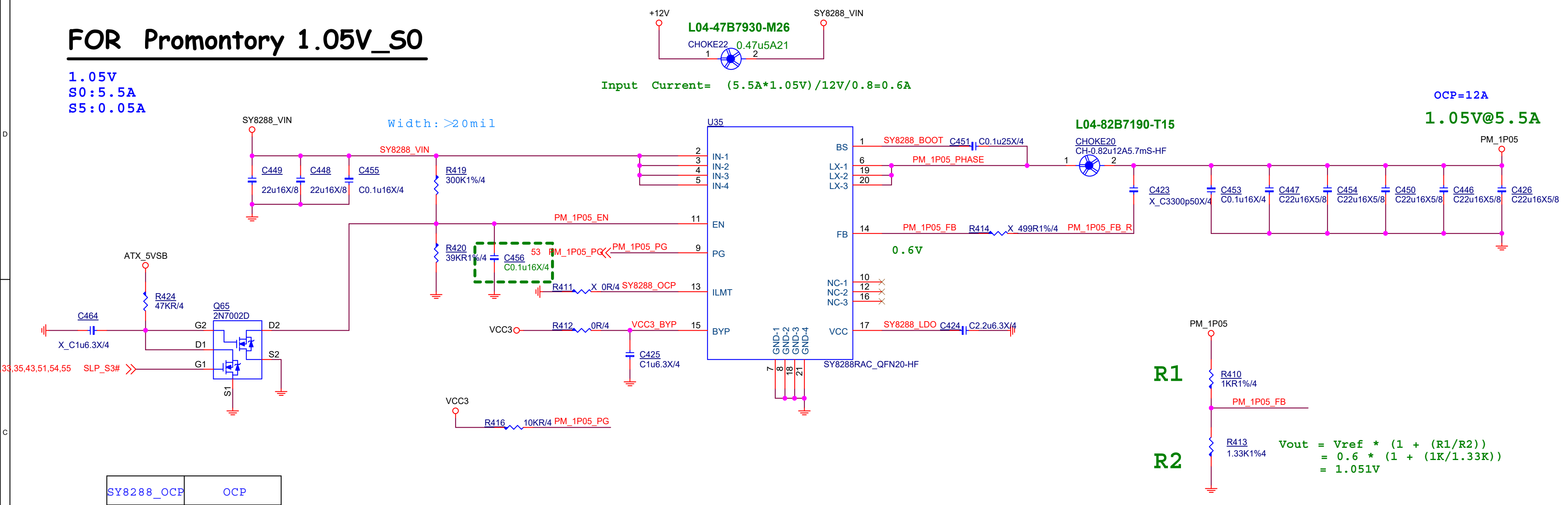
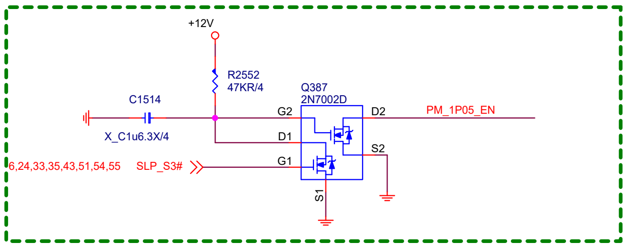
FOR Promontory 1.05V_S0

1.05V
S0:5.5A
S5:0.05A

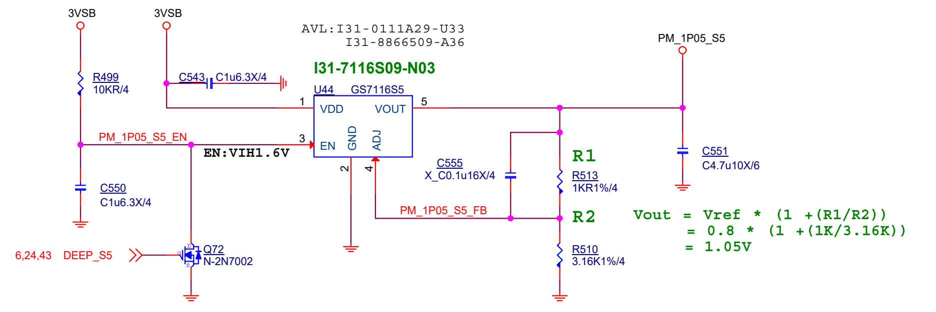


SY8288_OCP	OCP
0	8A
floating	12A
1	16A



FOR Promontory 1.05V_S5

1.05V@0.05A



MSI MICRO-START INT'L CO.,LTD.

Title	Prom- SY8288RAC / 1.05V	
Size: Custom	Document Number: MS-7C02..	Rev: 3.0
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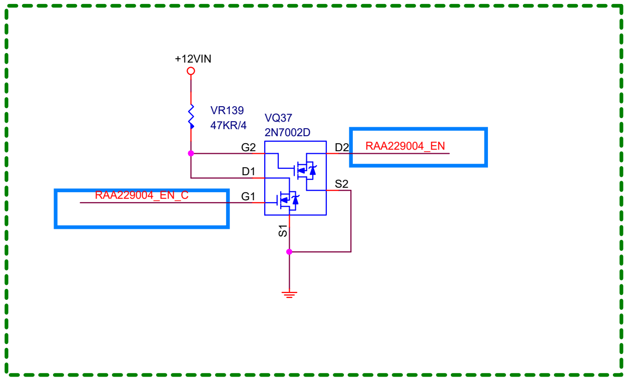
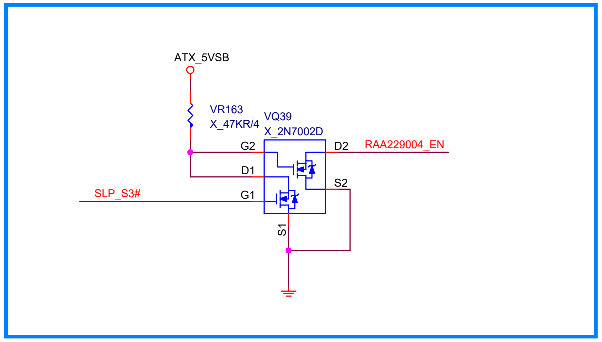
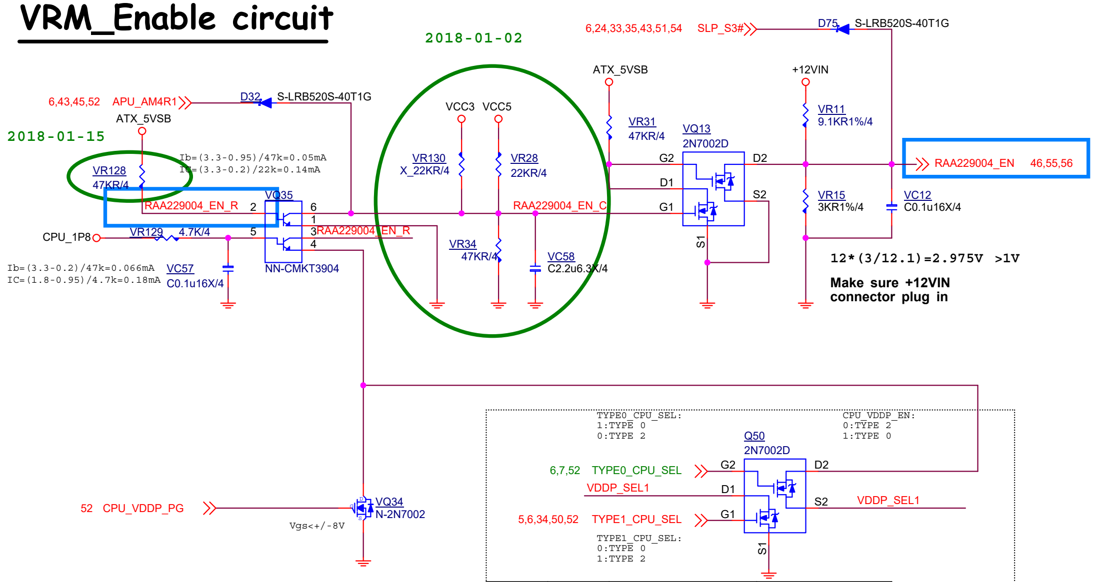
VRM_Enable circuit



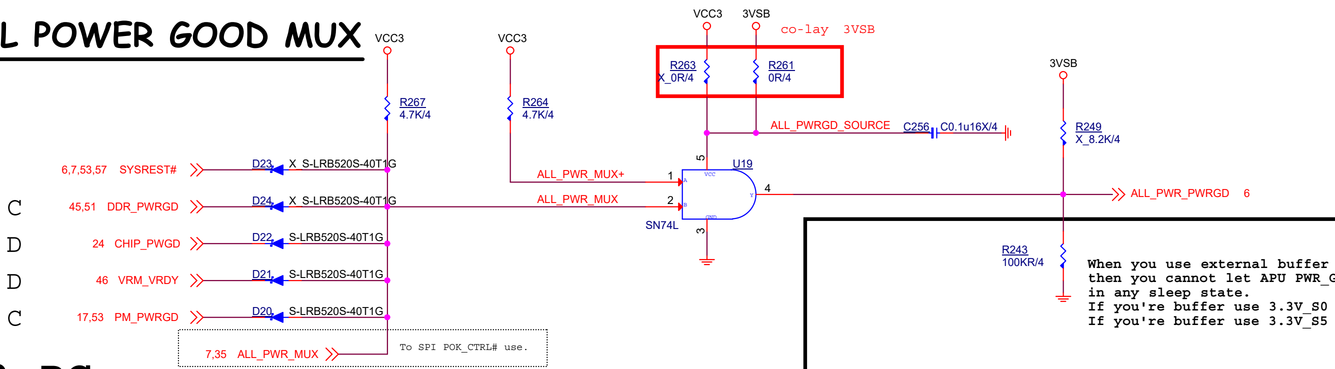




CPU VDDP NOT SUPPORT TYPE2

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

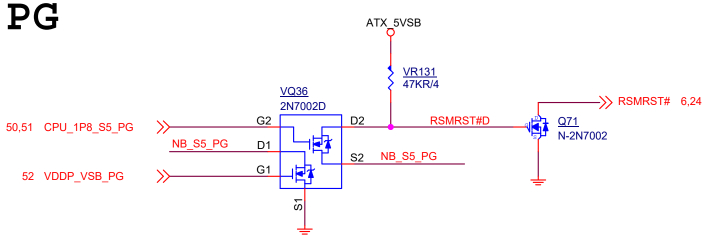
ALL POWER GOOD MUX



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.

S0 PG

S5 PG



MSI MICRO-START INT'L CO.,LTD.

Title	VRM-EN/PWRGD
Size	Custom
Document Number	MS-7C02..
Rev	3.0
Date	Tuesday, August 18, 2020
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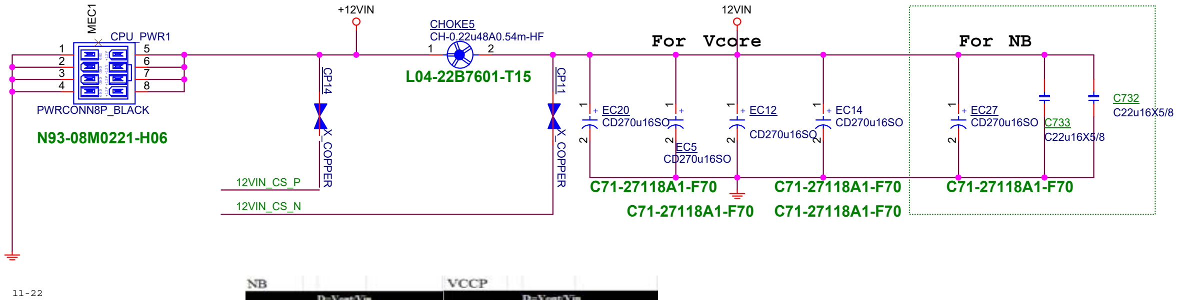
CPU POWER CONNECTOR



NB

D=Vout/Vin			
Vin	=	12	> input voltage
Vout	=	1.4	> output Vcore
D	=	0.116667	

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

I ripple={ Io*√D*√(1-D)} / Phase			
Phase	=	2	phase
I ripple	=	12.03835	A

How many pcs. Of Cap.			
I ripple(cap)	=	5000	m A
COEmo	=	1	
Input Cap.	=	3	pcs.

VCCP

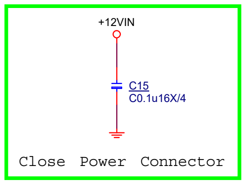
D=Vout/Vin			
Vin	=	12	> input voltage
Vout	=	1.4	> output Vcore
D	=	0.116667	

I o = Icore(max)*0.8			
I core(max)	=	125	> Vcore current
I avg.	=	125	A

I ripple={ Io*√D*√(1-D)} / Phase			
Phase	=	4	phase
I ripple	=	10.03196	A

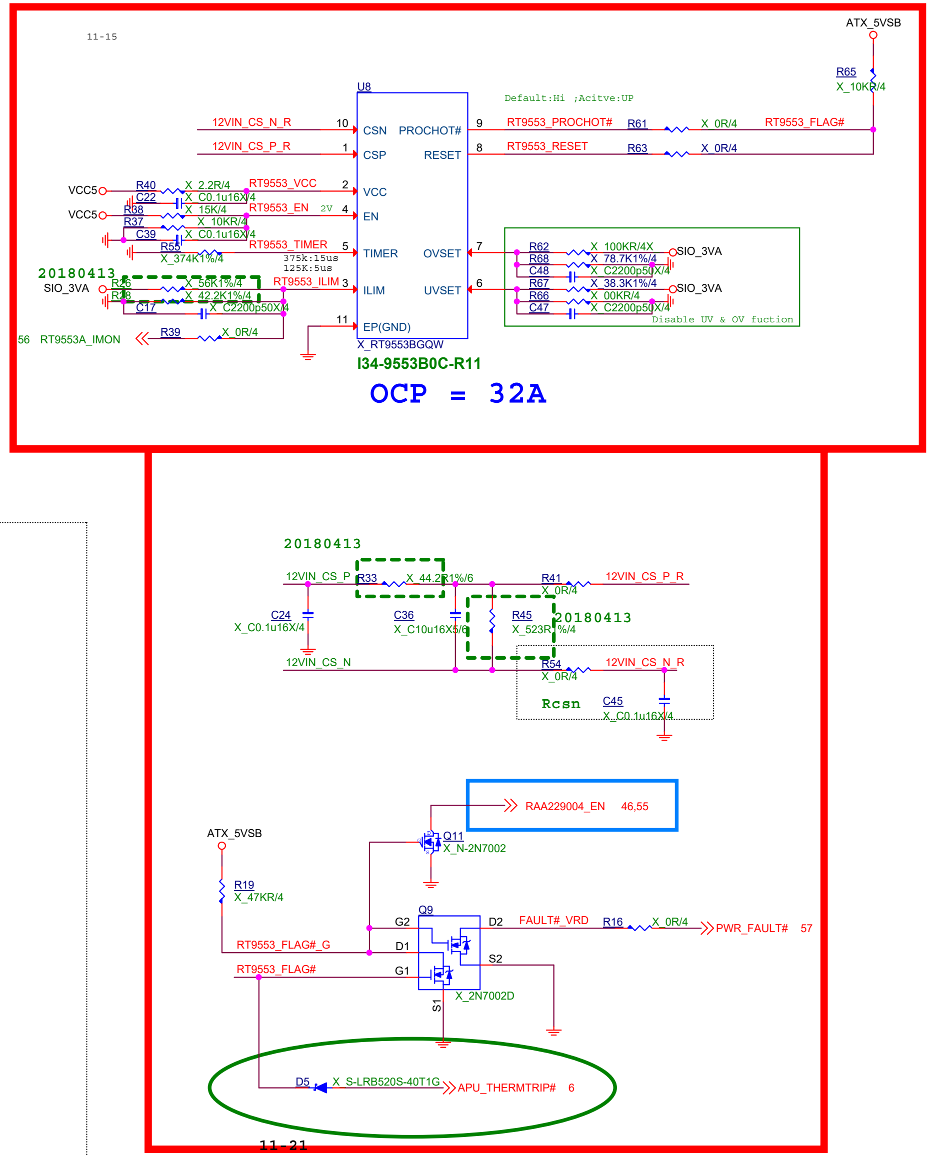
How many pcs. Of Cap.			
I ripple(cap)	=	5000	m A
COEmo	=	1	
Input Cap.	=	3	pcs.

11-15



RT9553B CURRENT SENSE

RT9553 PIN5: When start OV/UV, RESET delay time can meet SPEC 15us.

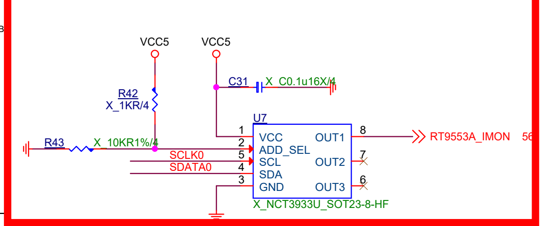


Over Voltage Control IC

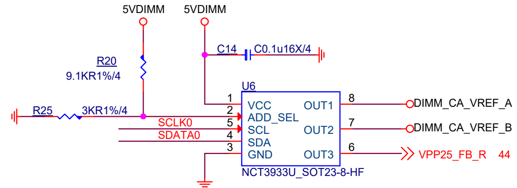
UPI VOLTAGE CONSOLE

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%

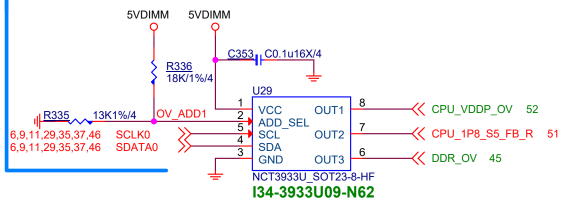
0x2A:RH=OPEN,RL=10K

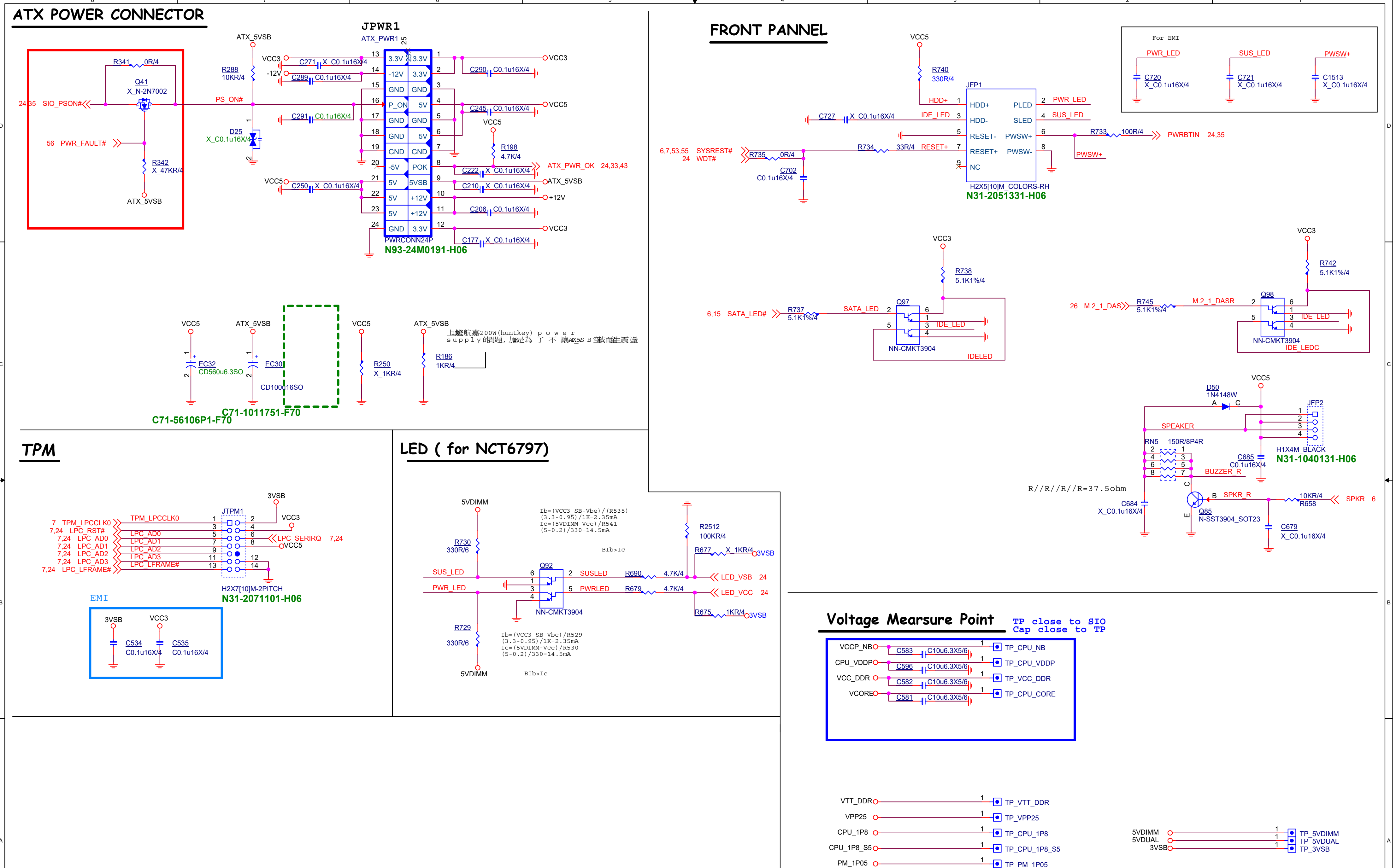


0x28:RH=9.1K,RL=3K



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





MSI MICRO-START INT'L CO.,LTD.

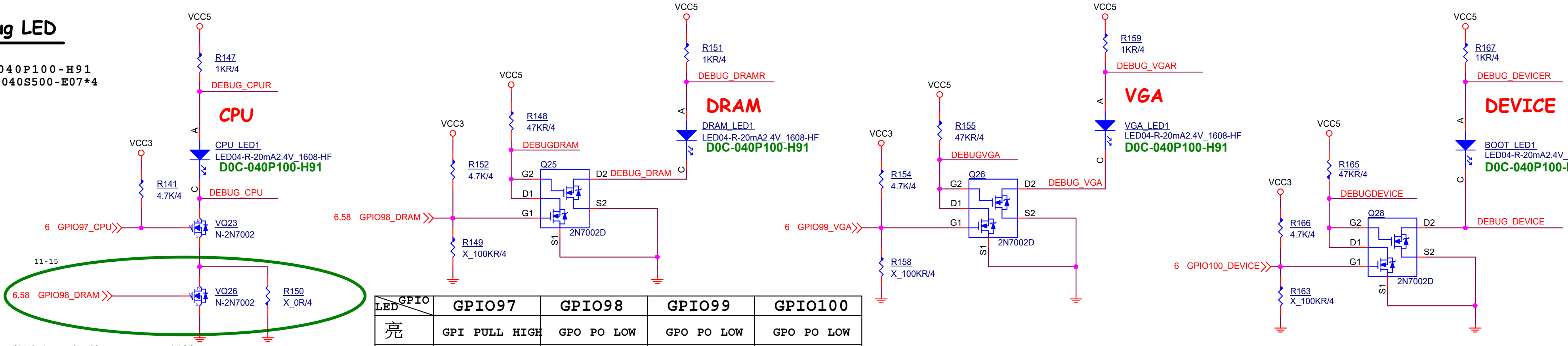
Title: ATX/Front Panel

Size	Document Number	Rev
Custom	MS-7C02..	3.0

Date: Tuesday, August 18, 2020 Sheet 57 of 70

EZ Debug LED

紅:M:D0C-040P100-H91
S:D0C-040S500-E07*4



L E D 亮時 同 時 將 C PU LED 關掉

LED \ GPIO	GPIO97	GPIO98	GPIO99	GPIO100
亮	GPI PULL HIGH	GPO PO LOW	GPO PO LOW	GPO PO LOW
滅	GPO LOW	GPO HIGH (default HIGH)	GPO HIGH (default HIGH)	GPO HIGH (default HIGH)

MSI Link to the Future MICRO-START INT'L CO.,LTD.

Title	ALL LED Control	
Size Custom	Document Number MS-7C02..	Rev 3.0
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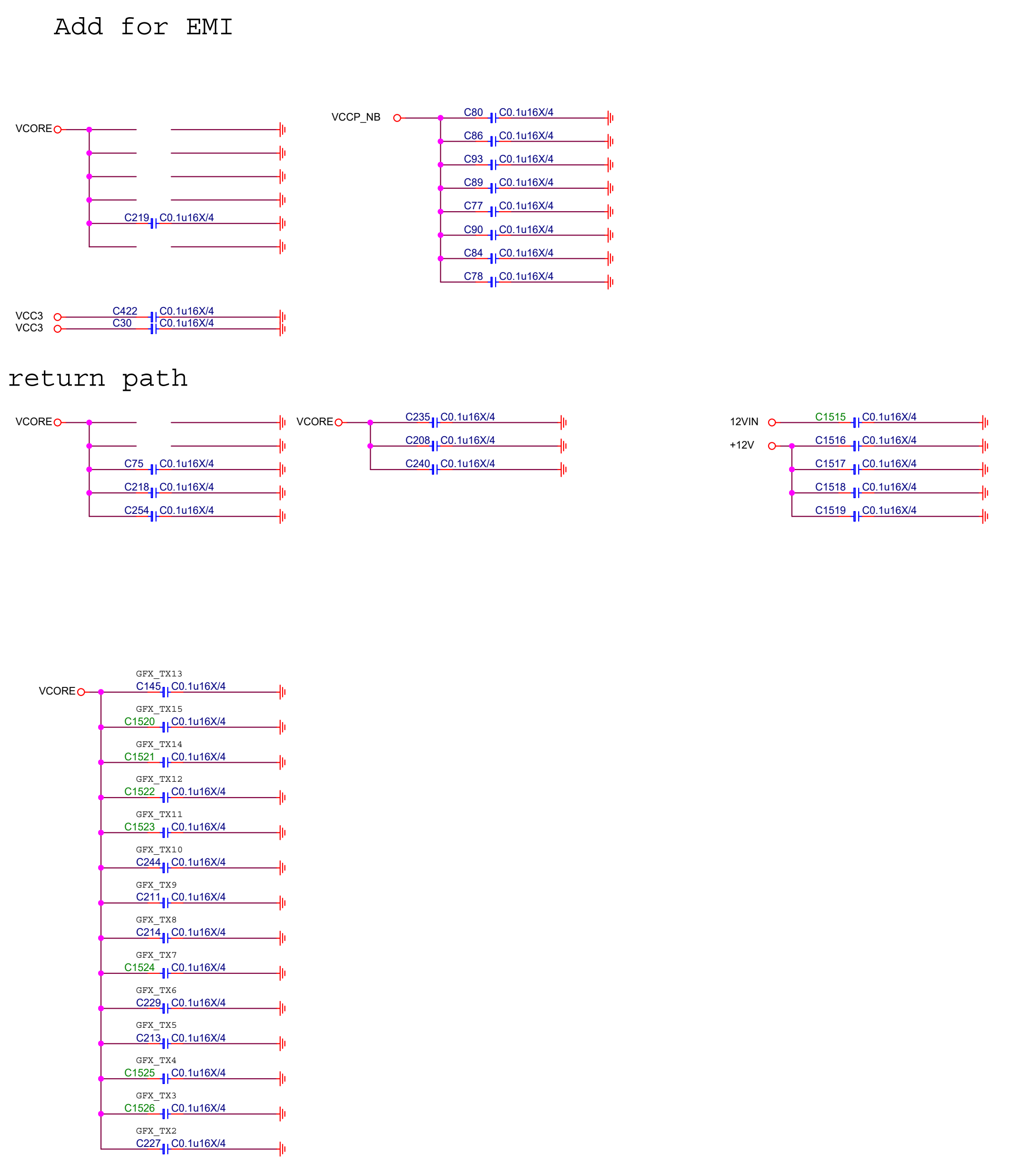
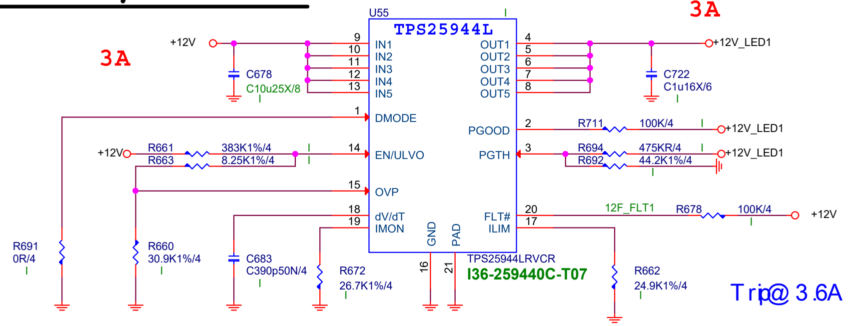


MSI Link to the Future MICRO-START INT'L CO.,LTD.

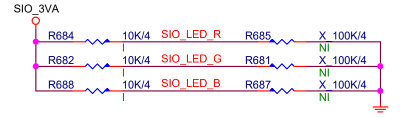
Title	NCT7718W temp sensor /EMI CAP	
Size: Custom	Document Number: MS-7C02..	Rev: 3.0
Date: Tuesday, August 18, 2020	Sheet 59 of 70	

JRGB1 by SIO

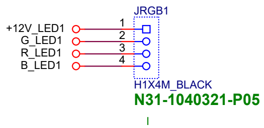
2016.07.06 Use TPS25944L



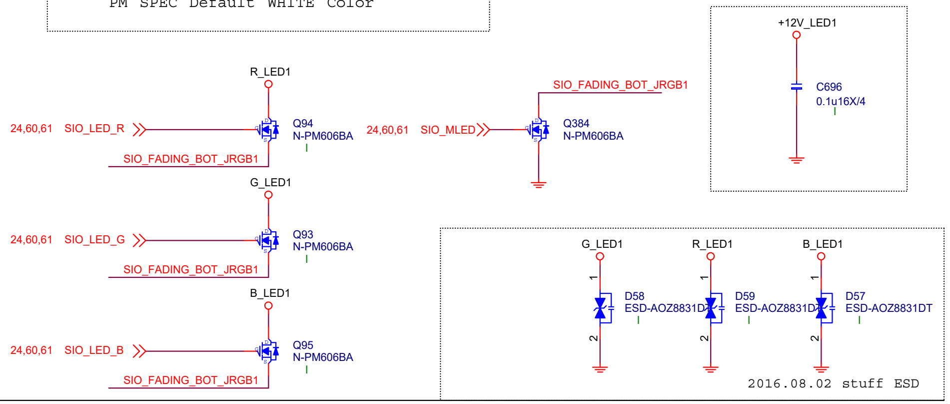
Color	SIO_LED_R	SIO_LED_G	SIO_LED_B
RED	1	0	0
GREEN	0	1	0
BLUE	0	0	1
WHITE	1	1	1



PM SPEC Default WHITE Color



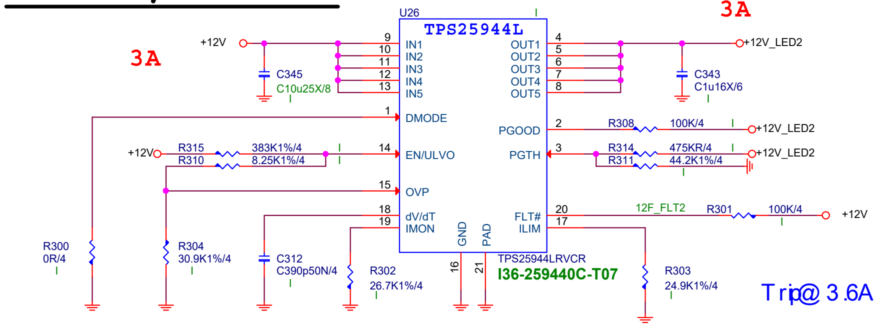
2016.08.02 Add +12V_LED 0.1uF



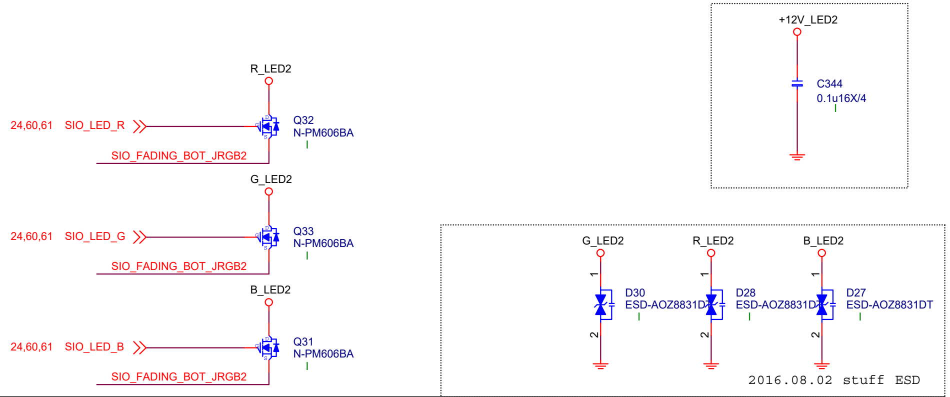
2016.08.02 stuff ESD

JRGB2 by SIO

2016.07.06 Use TPS25944L



2016.08.02 Add +12V_LED 0.1uF



2016.08.02 stuff ESD

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Title	JRGB1/JRGB2
Size: Custom	Document Number: MS-7C02..
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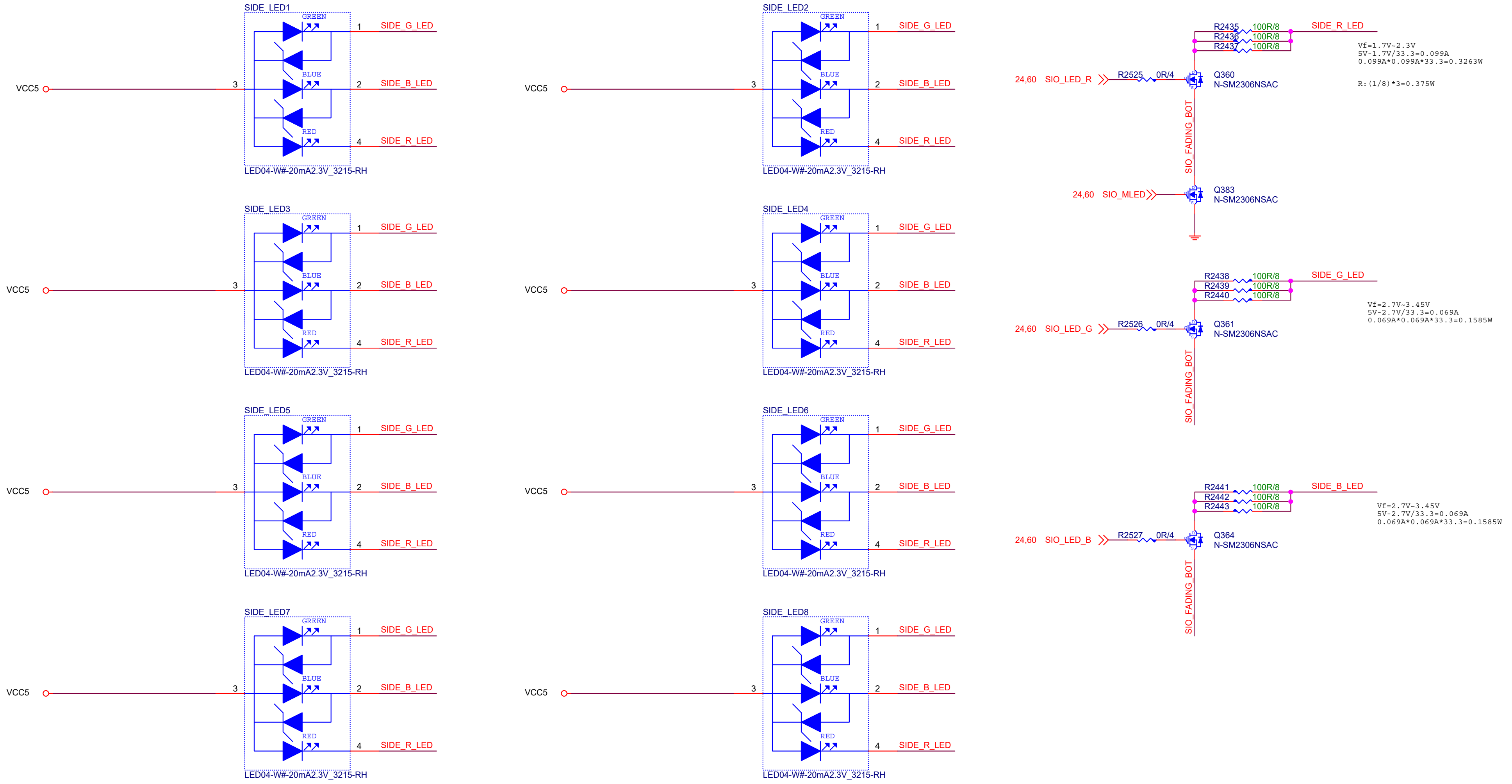
BOARD SIDE LED
*8



MSI Link to the Future MICRO-START INT'L CO.,LTD.

Title	RGB LED Control
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Size Custom	Document Number MS-7C02..	Rev 3.0
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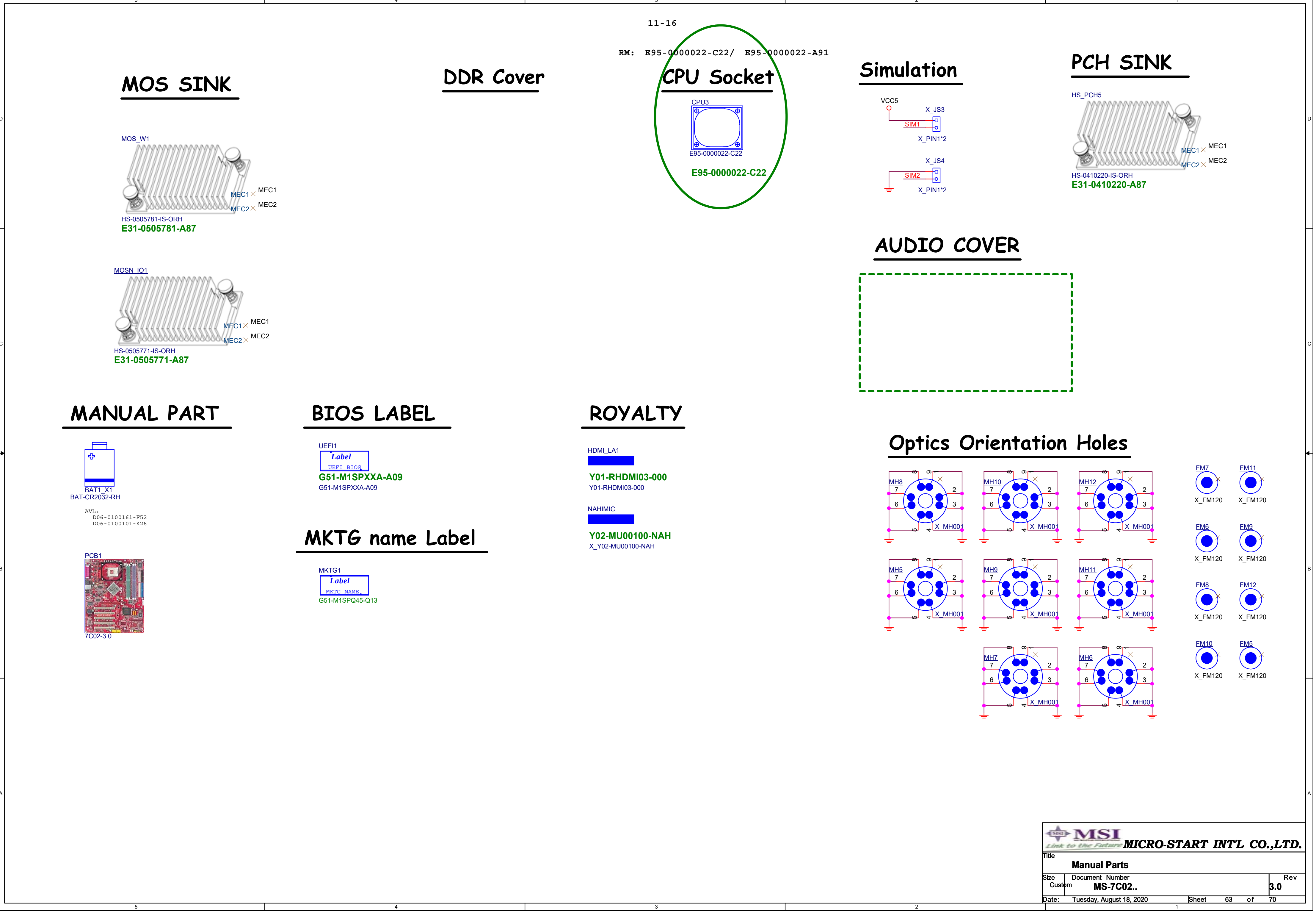
11-16
RM: E95-0000022-C22/ E95-0000022-A91
MOS SINK
MOS_W1
MEC1
MEC2
HS-0505781-IS-ORH
E31-0505781-A87
MOSN_IO1
HS-0505771-IS-ORH
E31-0505771-A87
DDR Cover
CPU Socket
CPU3
E95-0000022-C22
E95-0000022-C22
Simulation
VCC5
X_JS3
SIM1
X_PIN1*2
X_JS4
SIM2
X_PIN1*2
PCH SINK
HS_PCH5
HS-0410220-IS-ORH
E31-0410220-A87
AUDIO COVER
MANUAL PART
BAT1_X1
BAT-CR2032-RH
AVL:
D06-0100161-F52
D06-0100101-K26
PCB1
7C02-3.0
BIOS LABEL
UEFI1
Label
UEFI BIOS
G51-M1SPXXA-A09
G51-M1SPXXA-A09
MKTG name Label
MKTG1
Label
MKTG NAME
G51-M1SPQ45-Q13
ROYALTY
HDMI_LA1
Y01-RHDMI03-000
Y01-RHDMI03-000
NAHIMIC
Y02-MU00100-NAH
X_Y02-MU00100-NAH
Optics Orientation Holes
MH8
MH10
MH12
MH5
MH9
MH11
MH7
MH6
X_MH001
FM7
FM11
FM6
FM9
FM8
FM12
FM10
FM5
X_FM120
MSI
MICRO-START INT'L CO.,LTD.
Title
Manual Parts
Size
Custom
Document Number
MS-7C02..
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3.0
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