

TITLE	Page
Cover Sheet	1
Block Diagram	2
CPU-Memory, CPU-Control/MISC/CFG/Audio	3,4
CPU-PEG/Display/RSVD	5
CPU-Power,CPU-GND	6,7
DDR4 DIMM1&DDR4 DIMM2 & DDR4 POWER	8,9,10,11
PCH-LPC/SPI/SMBUS/MISC	12
PCH-Audio/Display/Clock	13
PCH-DMI/PCIE/USB/SATA	14
PCH-GPIO/RSVD/CNVI	15
PCH-Power/Gnd/Strip	16,17,18
PCIE SLOT-CPU(X16)	19
SIO-NCT6687D	20,21
SPI ROM BIOS/ FAN VBAT/CLR COMS	22,23,24,25
MCU JRAINBOW/DEBUG LED	26
AUDIO - ALC1220P	27,28
TR DP / PD	29,30,31,32
LAN - INTEL I255V	33
Rear LAN USB3.1&USB2.0	34
Rear-USB31 TYPEA+TYPE C/Front USB 3.2/2.0	35,36
Front USB31 TYPE C / USB POWER	37,38
M2 Connector/SATA/CNVI	39,40,41,42
HDMI Connector/DP	43,44
ACPI CONTROLLER	45
PWR-ISL69269/CORE-PH1-8/GT PH1/SA PH1	46,47,48
PWR-VCCIO-RT8125E/PWR-VCCST/PLL	49,50
DDR-RT8231/VPP25-MP2333	51,52
PCH RT8125E/1P8_VSB/PWR-VRM/PCH Sequence	53,54
OV-NCT3933/ATX F_Panel	55,56

MS-7C77

ITX:170*170

Ver: 1.2

CML Platform

CPU: Comet lake S

LGA1200

CPU POWER PAK *8 Phase

GT POWER PAK *1 Phase

System Chipset: Z490 PCH_H

Onboard Chip: SIO:NCT6687

HD Audio Codec:ALC1220

LAN-Intel I225-V

Flash ROM: SPI 128 MB X1

Main Memory: DDR4 * 2 (Dual Channel)

ACPI:

5VDAUL:uP7501

5VDIMM:uP7501

3VSB:TPS566235

3VDSW:GS7133

SIO_3VA:GS7116

Power:

VCORE/GT/SA - ISL69269

VCCIO -RT8125E

VCCST/VCCSTG-MP2333

VCCPLL/VCCPLL_OC-GS7133

DDR - RT8231

PCH(1.05V) - RT8125E

1P8_VSB - GS7133

Expansion Slots:

PCI Express (X16) Slot * 1

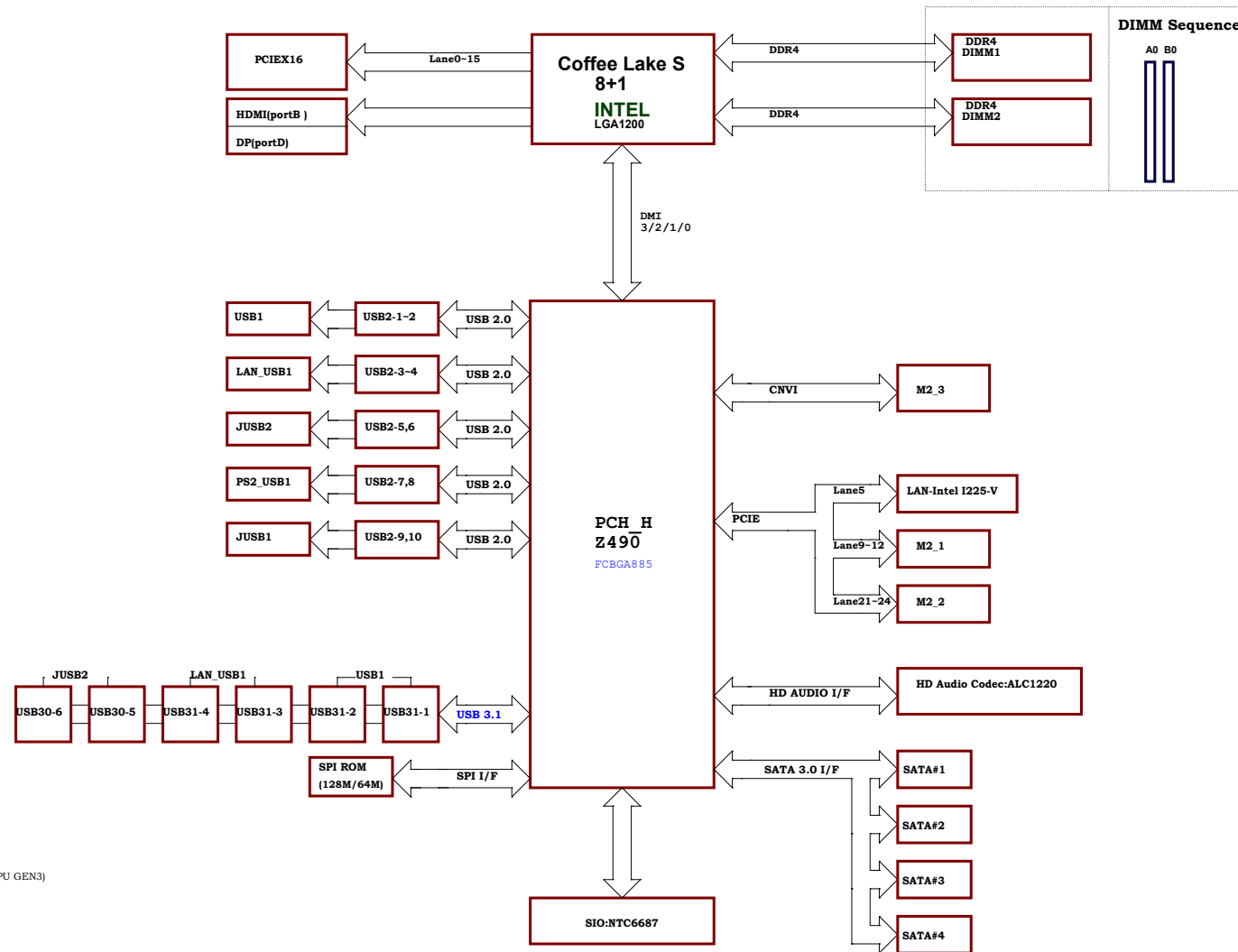


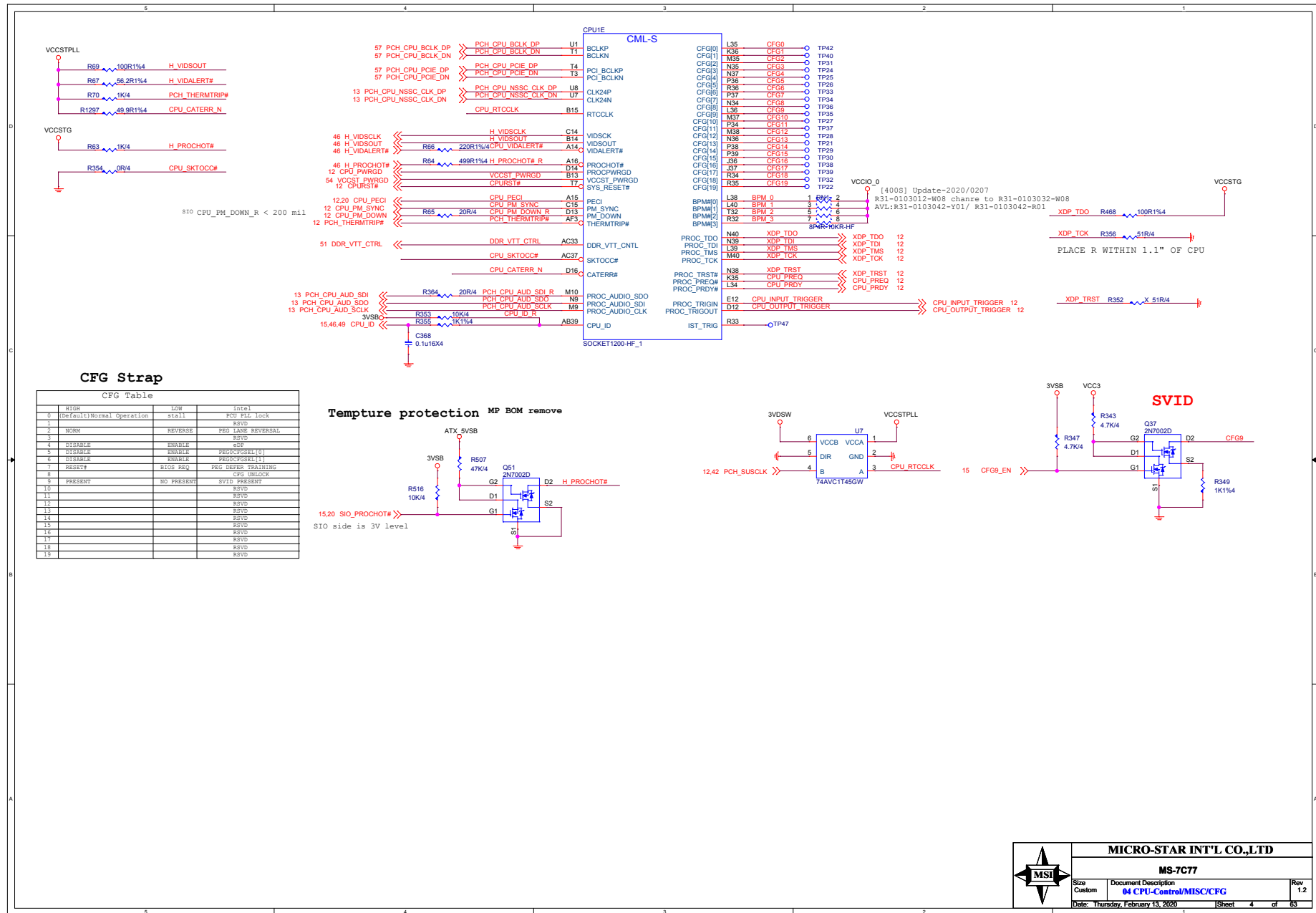
MICRO-STAR INT'L CO.,LTD

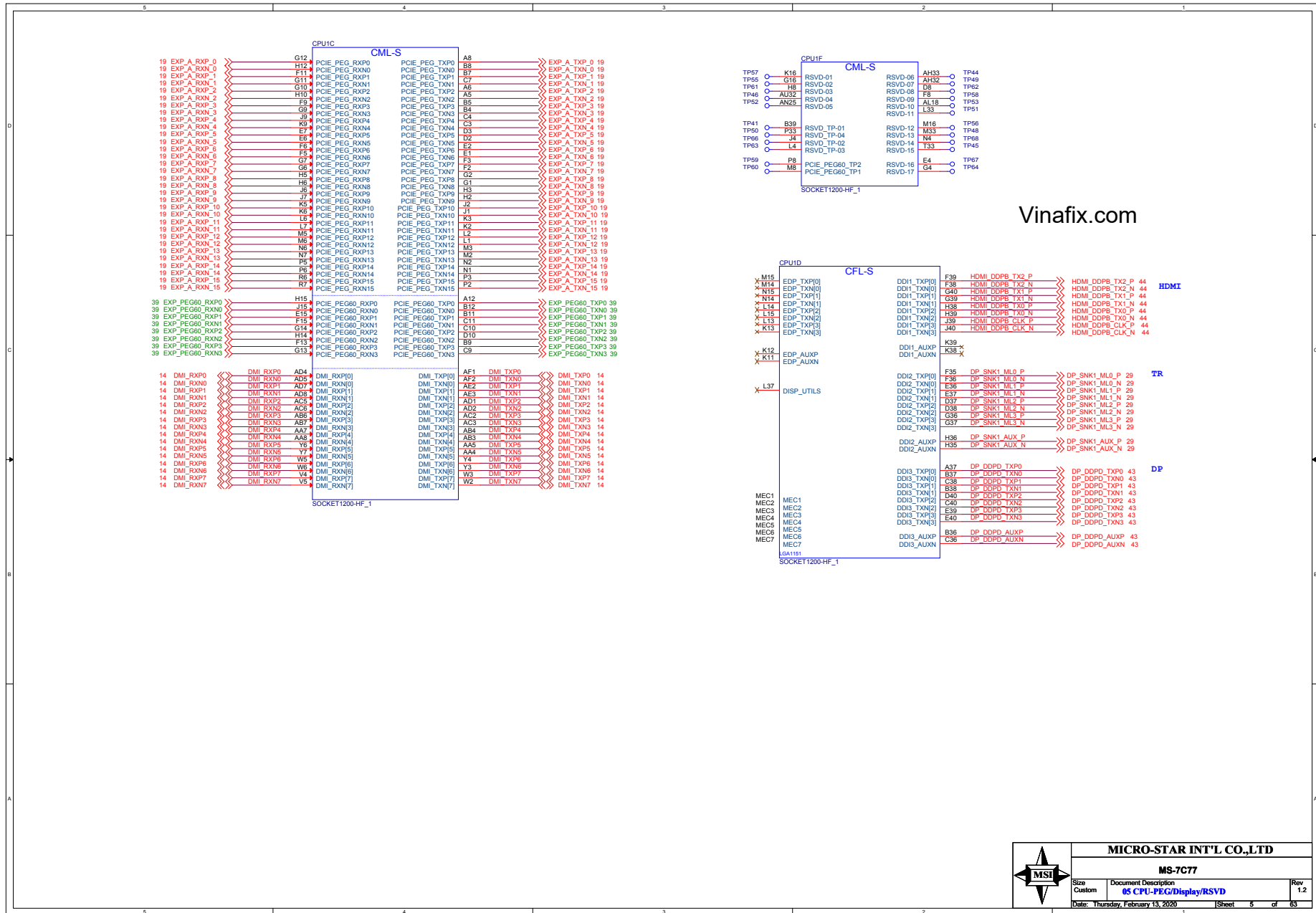
MS-7C77

Size Custom	Document Description 01 Cover Sheet.....	Rev 1.2
Date: Thursday, February 13, 2020	Sheet 1 of 63	

MS-7C77 Block Diagram







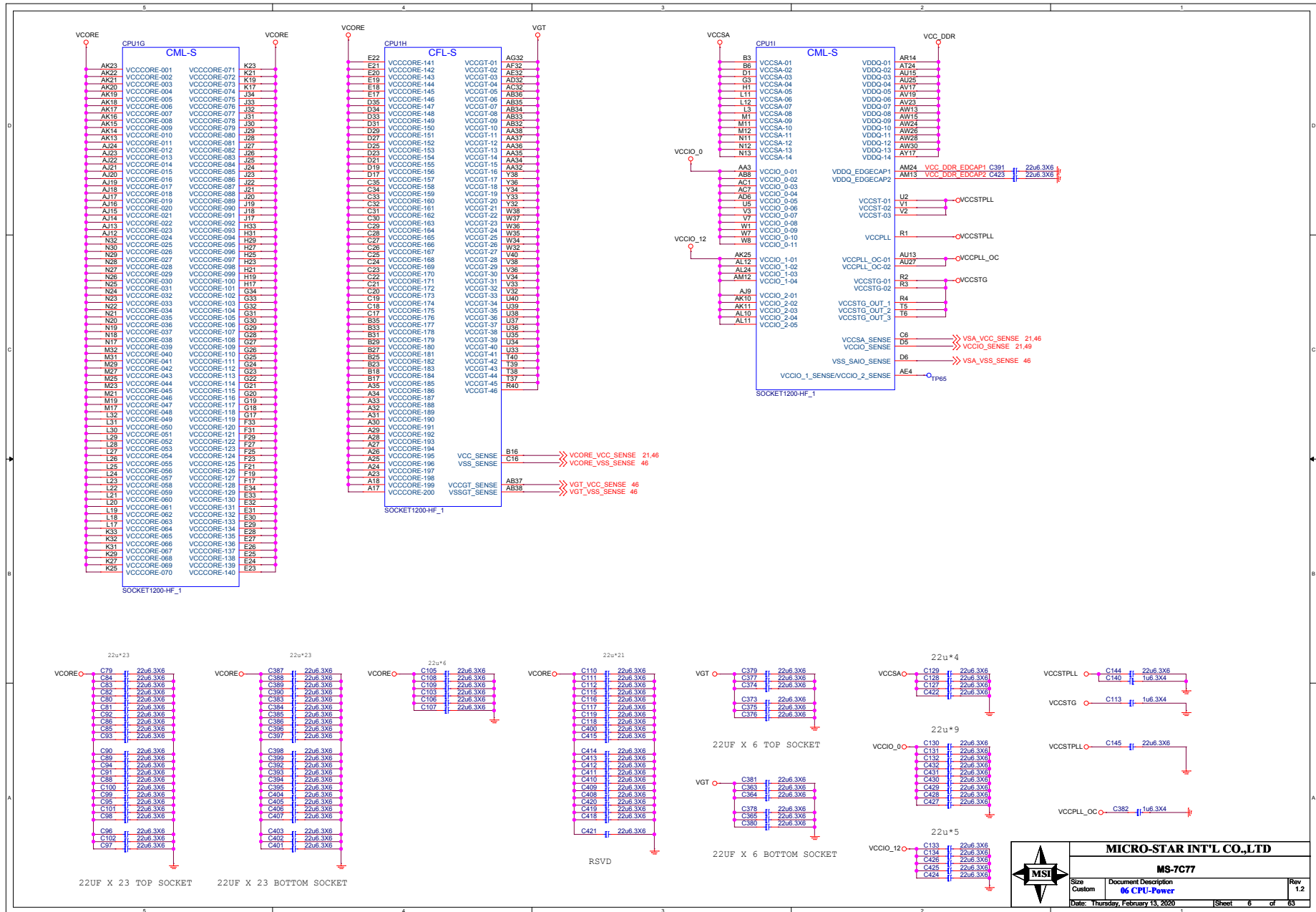
Vinafix.com

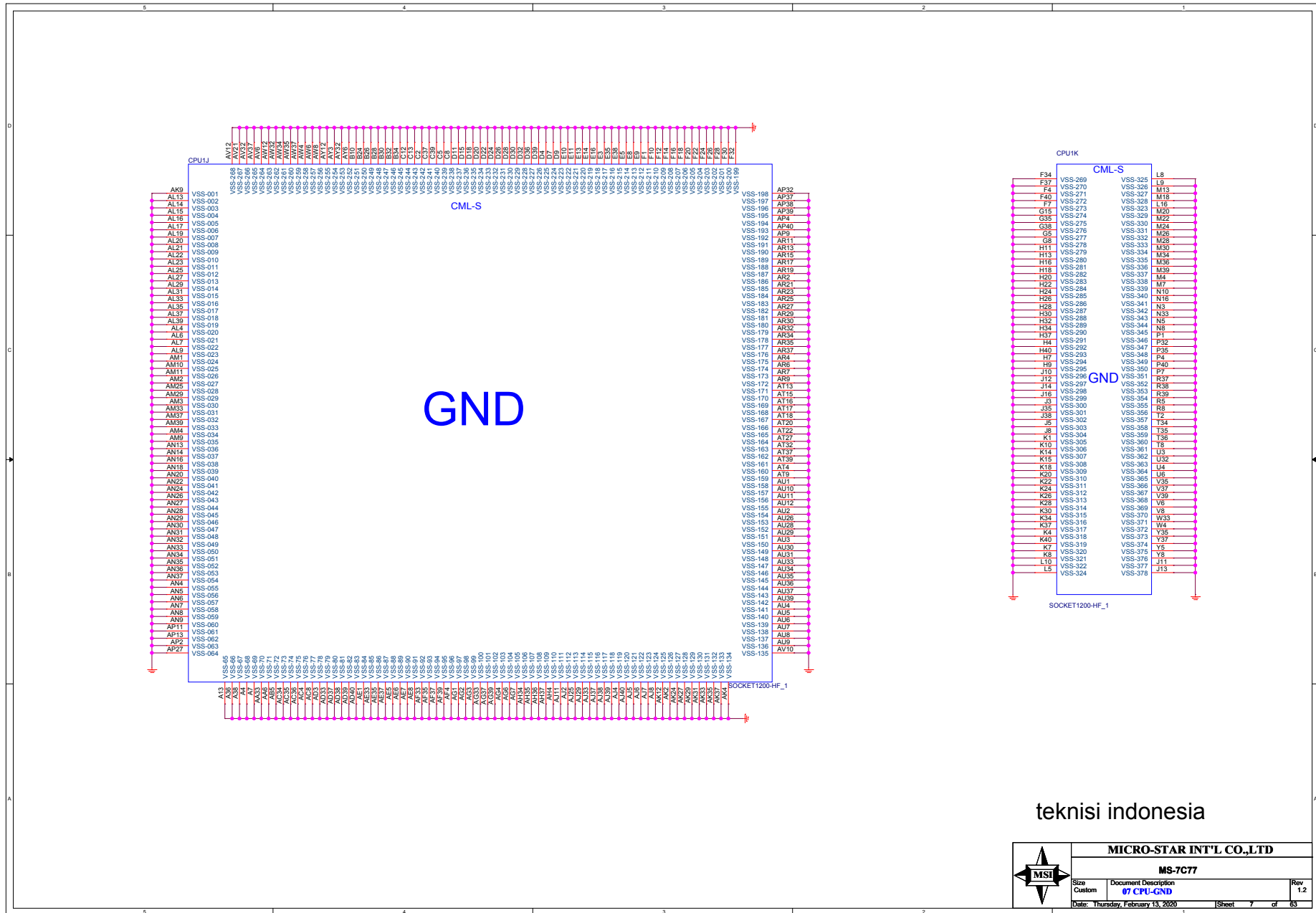


MICRO-STAR INT'L CO.,LTD

MS-7C77

Size	Document Description	Rev
Custom	65 CPU-PEG/Display/RSVD	1.2
Date:	Thursday, February 15, 2020	Sheet 5 of 63





teknisi indonesia

MICRO-STAR INT'L CO.,LTD			
MS-7C77			
Size Custom	Document Description 07 CPU-GND		Rev 1.2
Date: Thursday, February 15, 2020		Sheet 7 of	63

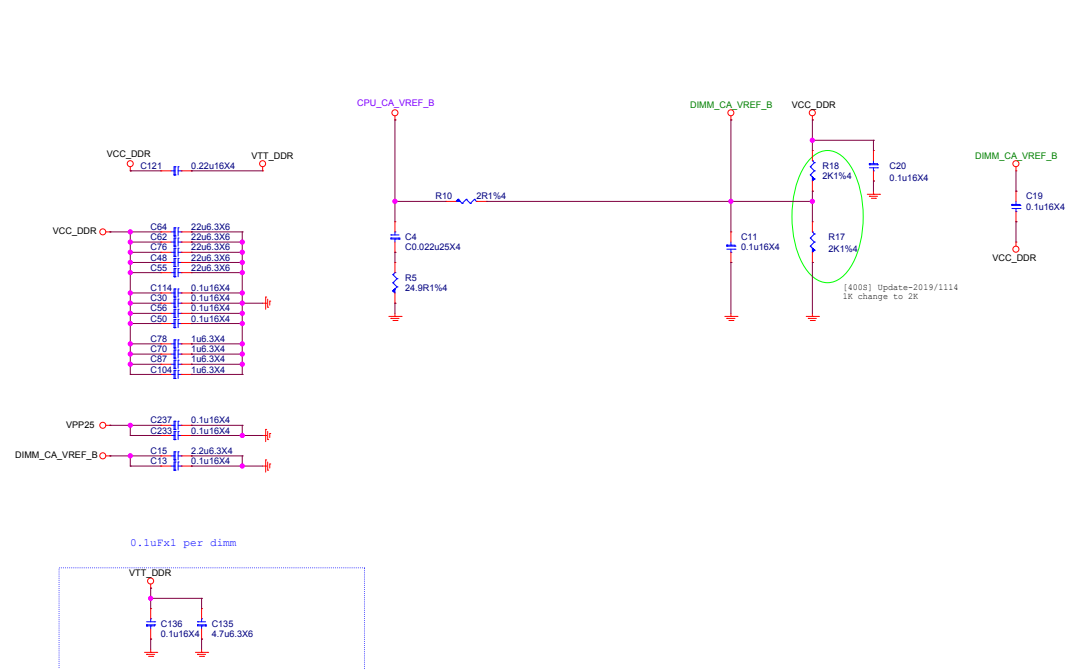
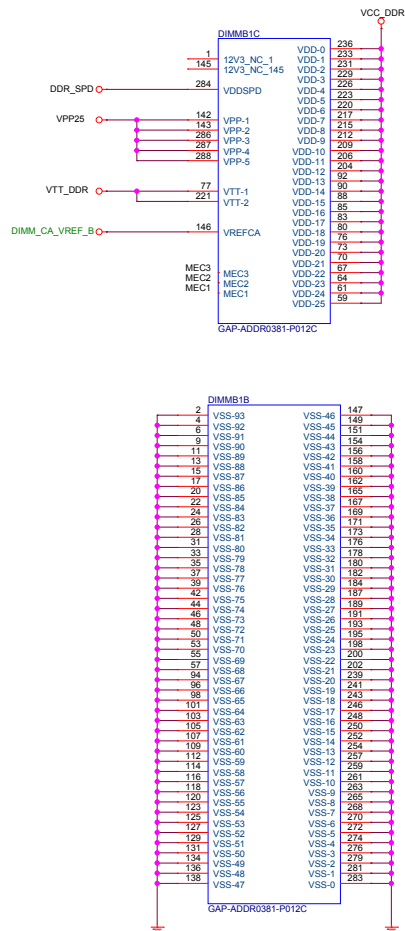
Vinafix.com



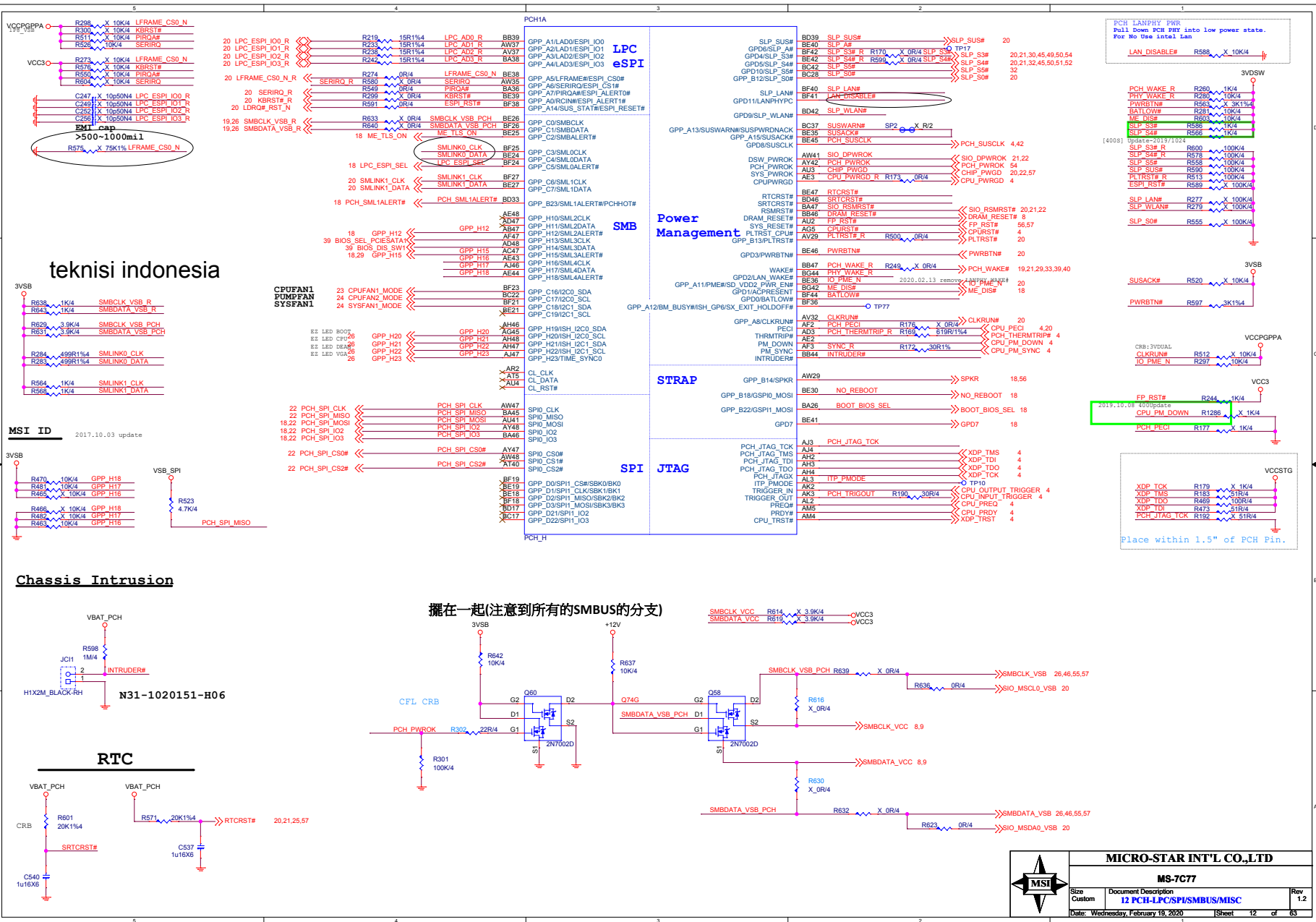
MICRO-STAR INT'L CO.,LTD

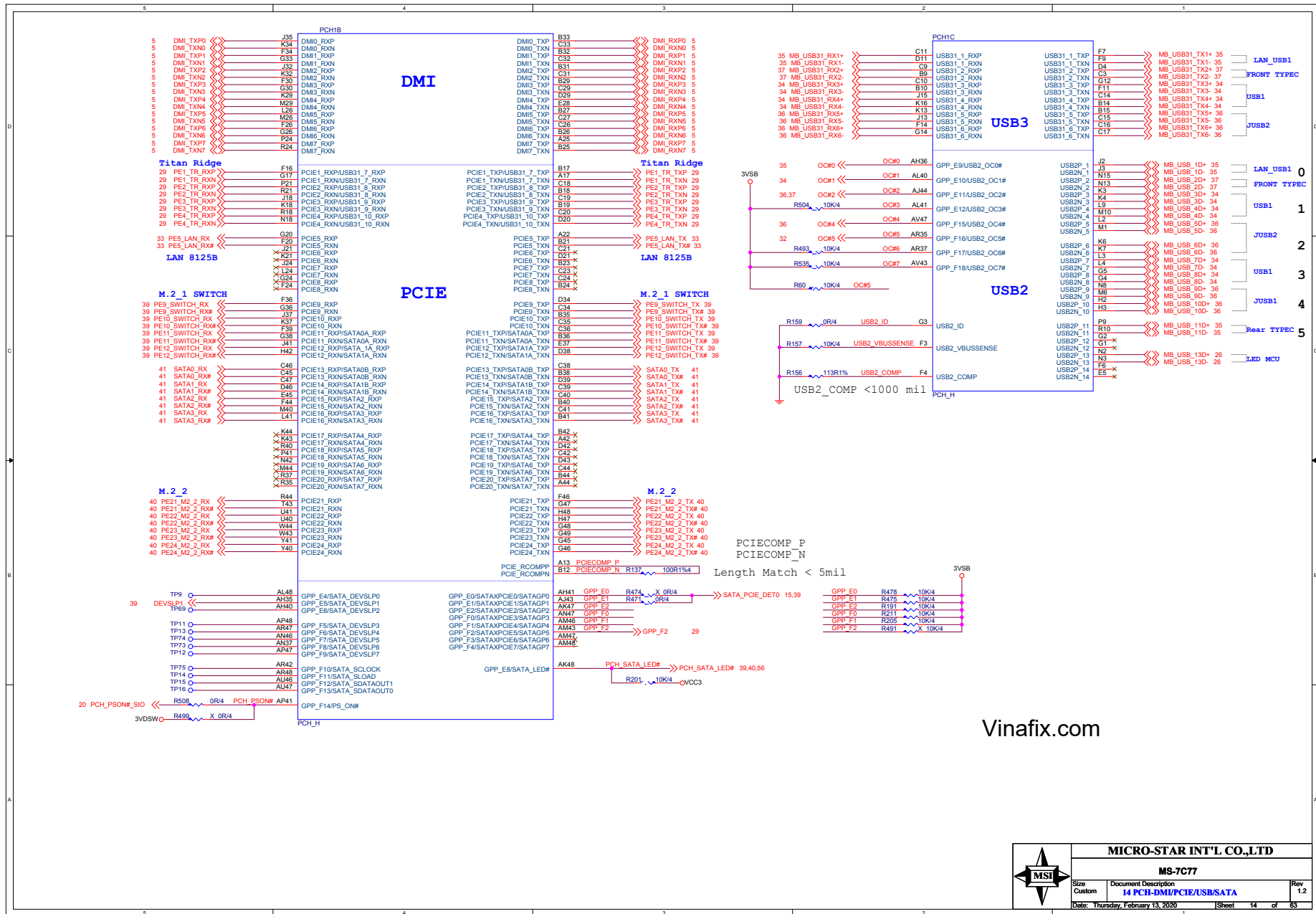
MS-7C77

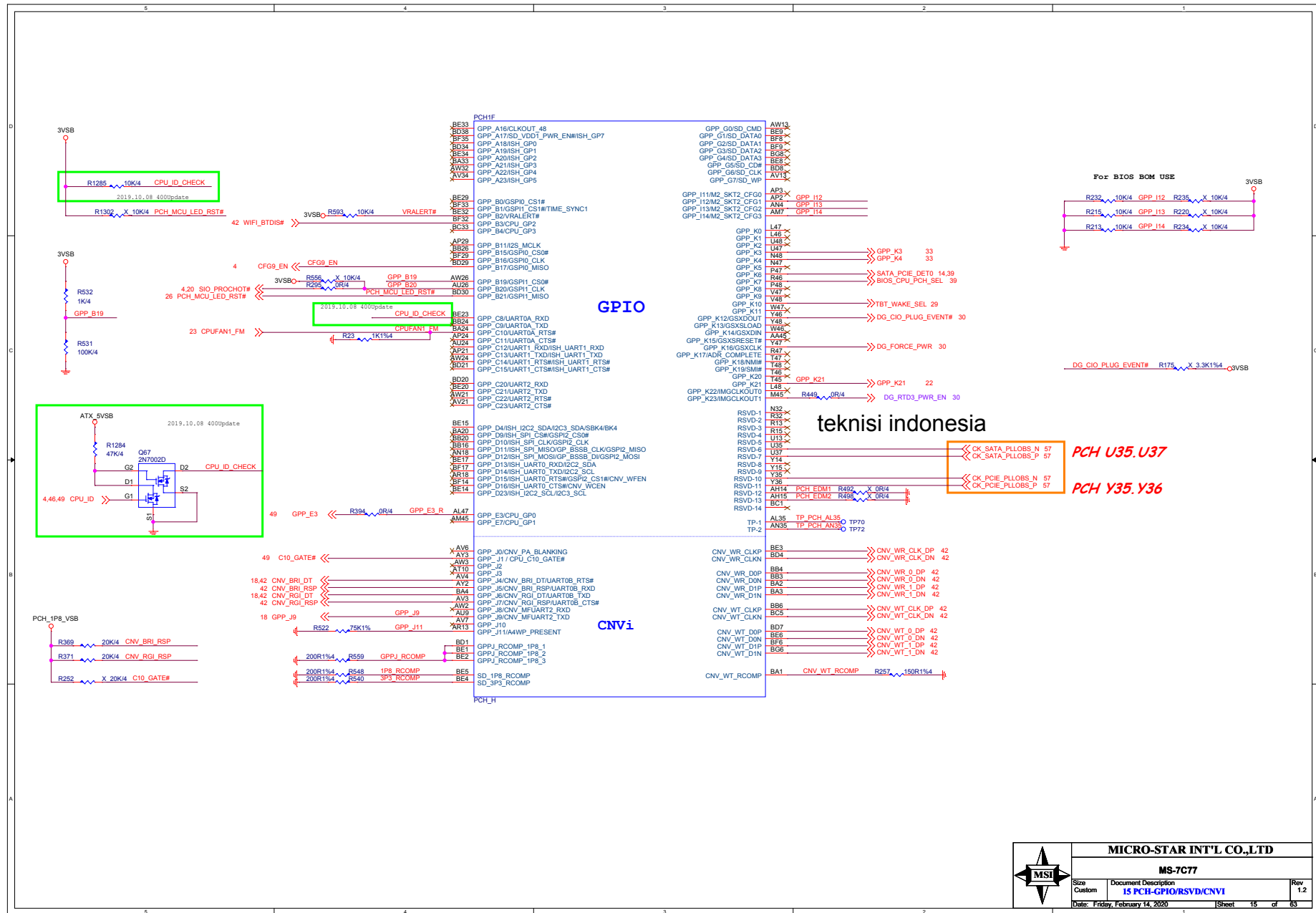
Size Custom	Document Description 09 DDR4 DIMM B1	Rev 1.2
Date: Thursday, February 15, 2020		Sheet 9 of 63



teknisi indonesia

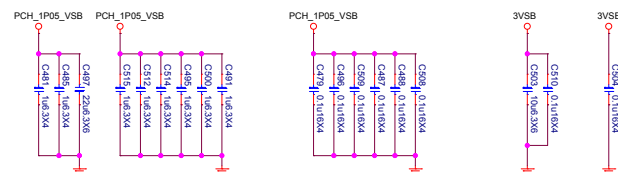
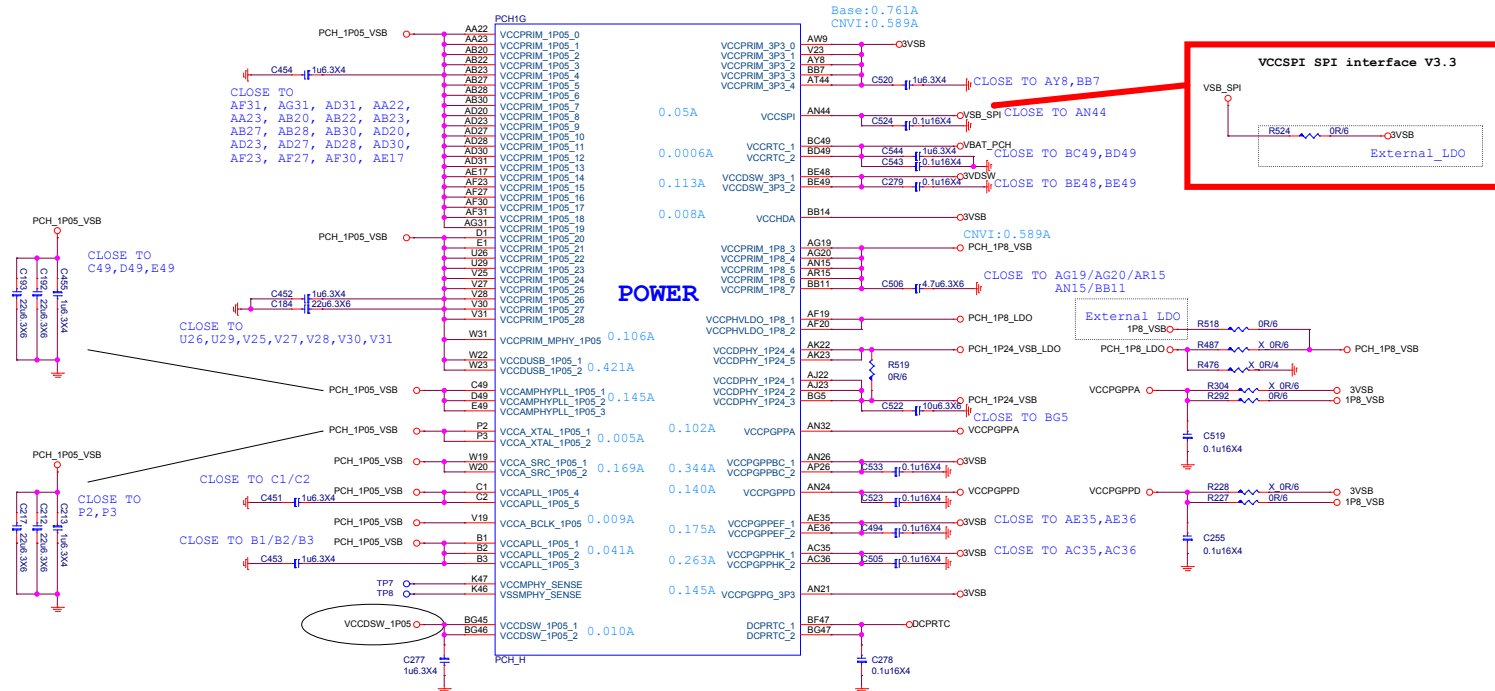






3VSB
Total $2.437A + 0.14A = 2.577A$
PCH 1P8 VSB
Total $0.772A + 0.14A = 0.912A$

```
Base 7.169A
Base other 1.089A
DMI Gen3 0.5A
PCIE Gen3 1.602A
USB3.1 Gen1 1.062A
SATA3.0 0.668A
```



MS-7C77

Size Custom	Document Description 16 PCH-Power	Rev 1.2
Date: Wednesday, February 19, 2020		Sheet 16 of 63



VSS

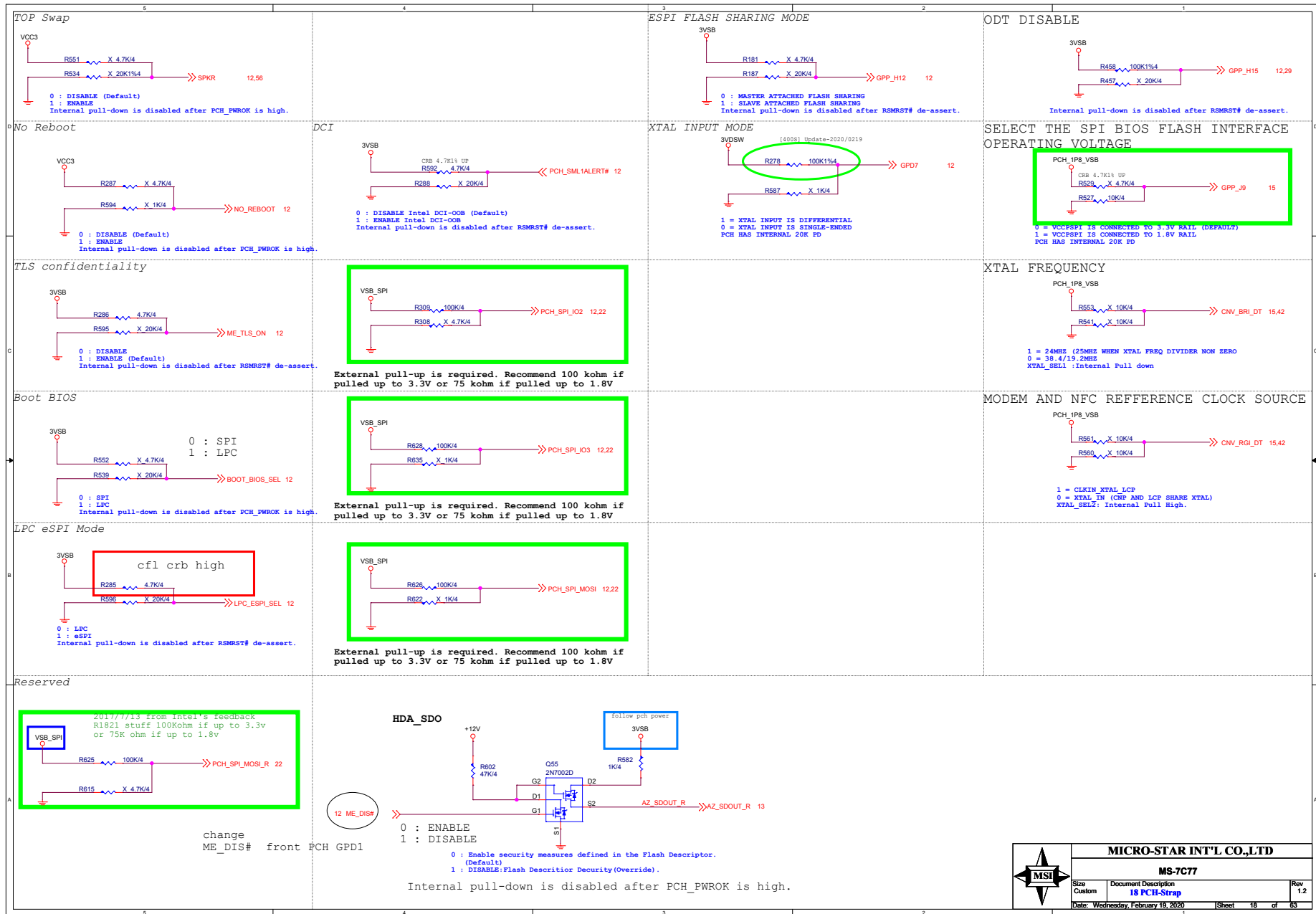
Vinafix.com

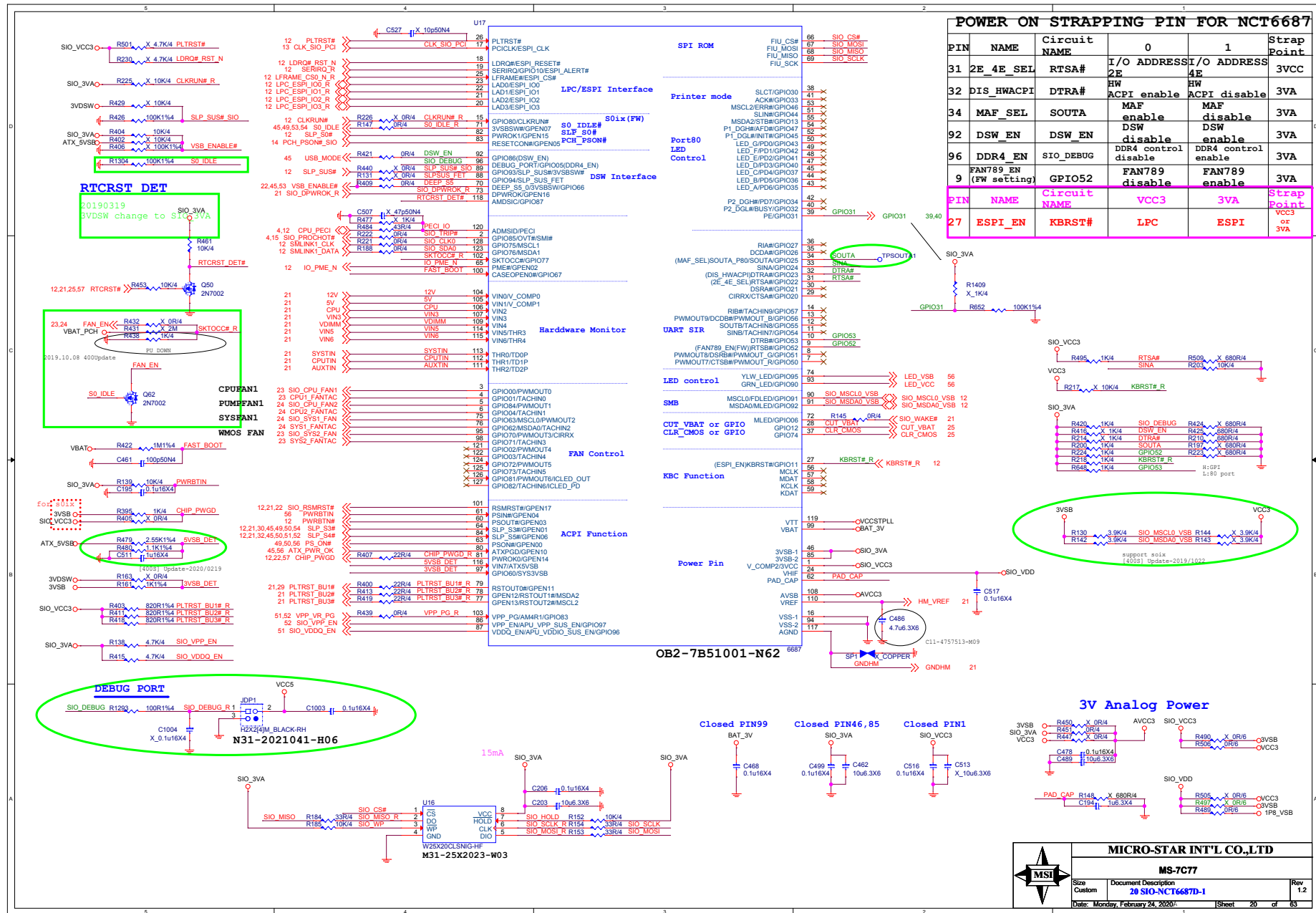


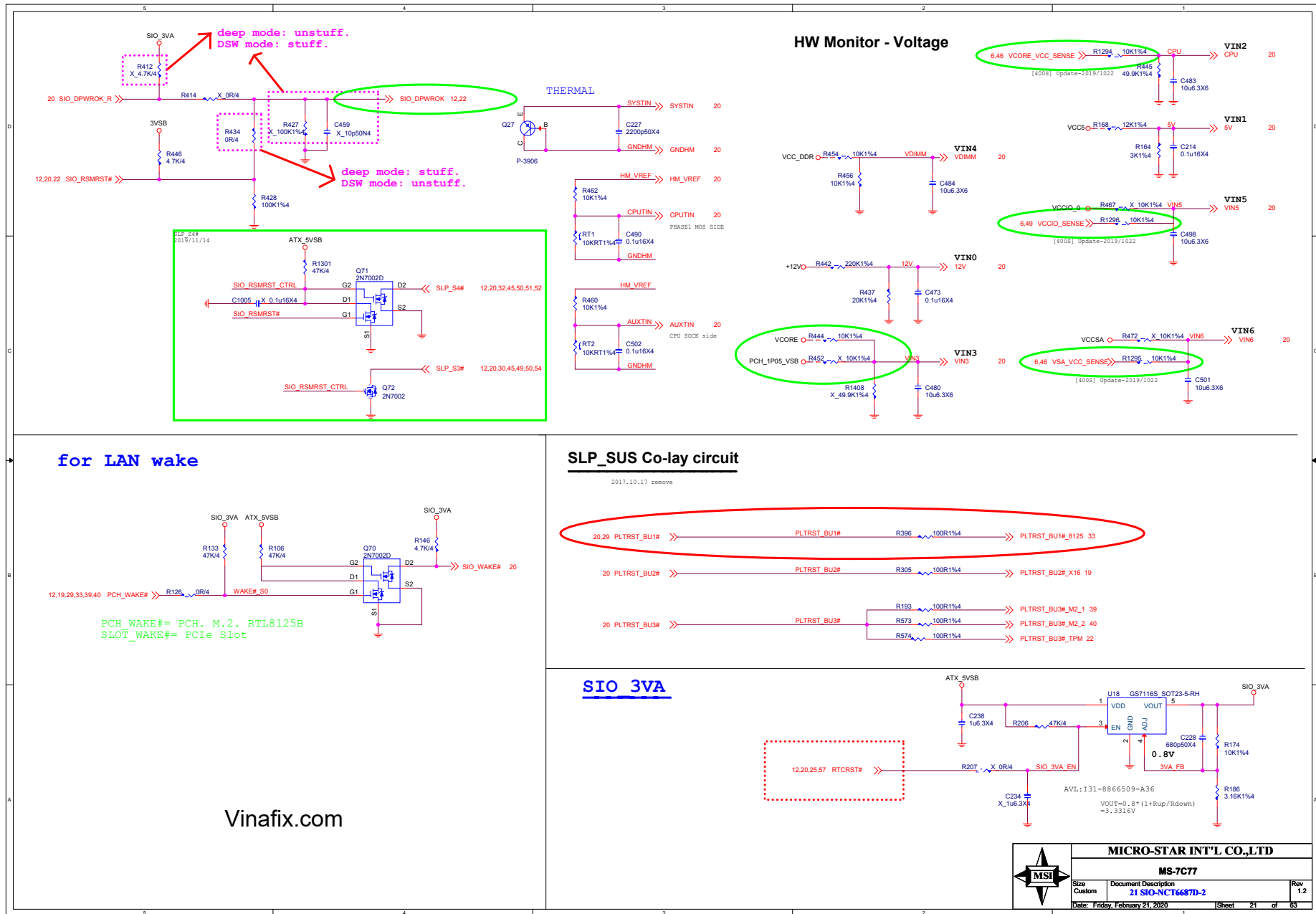
MICRO-STAR INT'L CO.,LTD

MS-7C77

Size	Document Description	Rev
Custom	17 PCH-GND	1.2
Date: Thursday, February 15, 2020		Sheet 17 of 63



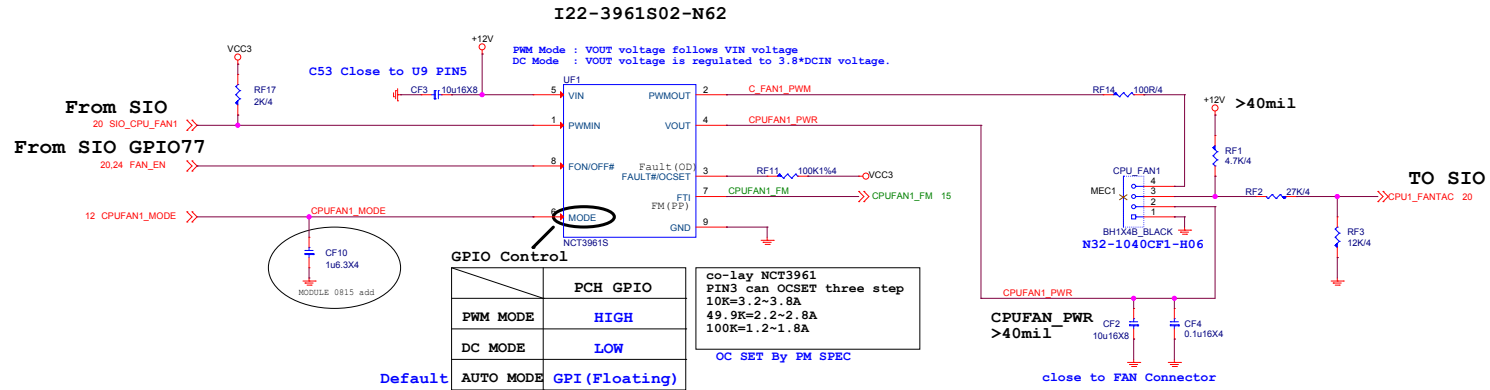




TYPE N : 4 PIN CPU FAN USE NCT3961S USE PCH GPIO CONTROL FAN MODE

1.Mode GPIO BIOS can swtich PWM/DC MODE

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



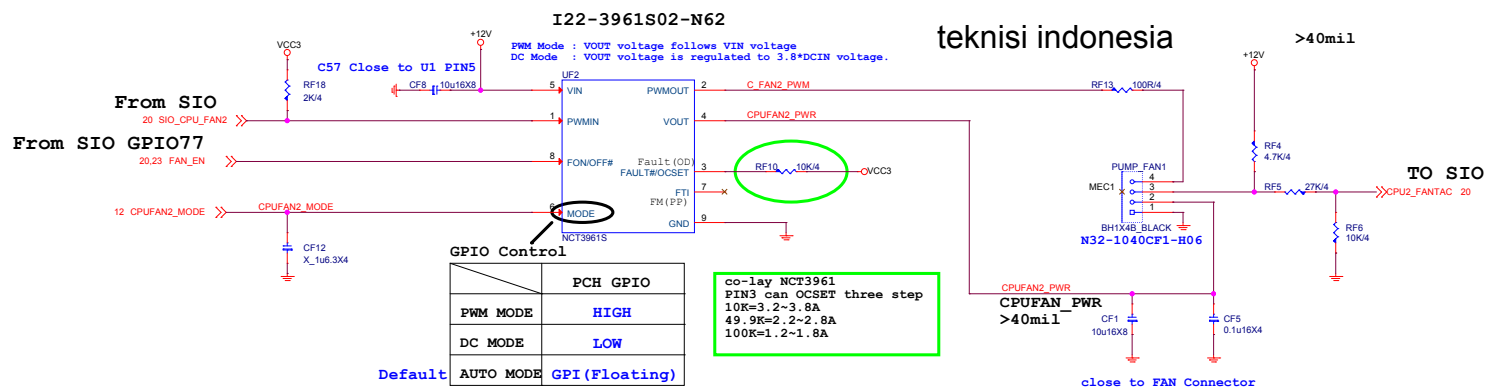
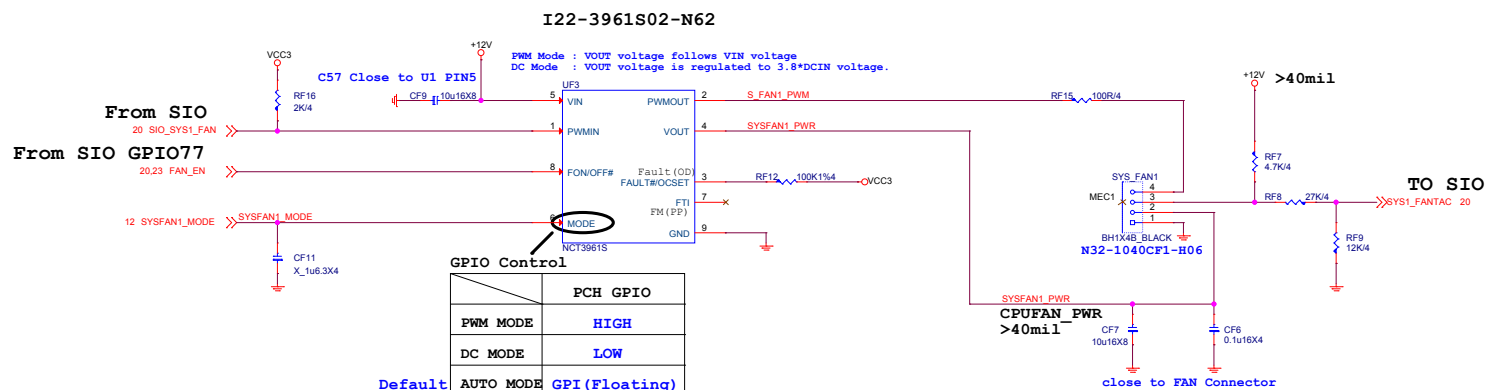
2019/11/11 add real IO fan

TYPE O : 4 PIN FAN ONLY PWM MODE

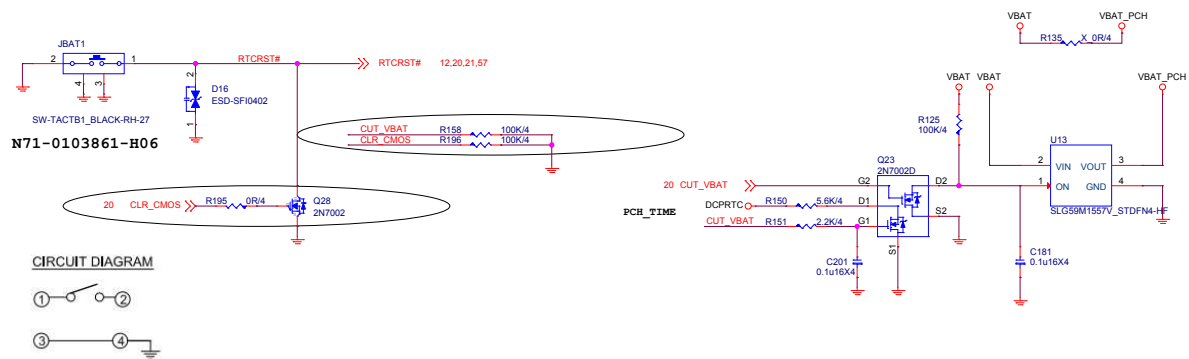


TYPE M : 4 PIN CPU FAN USE NCT3961S USE PCH GPIO CONTROL FAN MODE

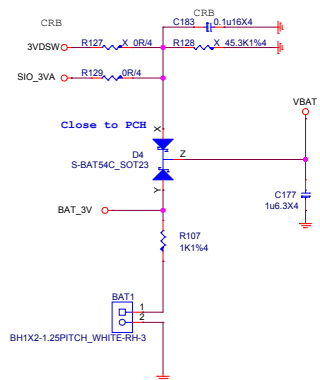
1.Mode GPIO BIOS can swtich PWM/DC MODE



CLR COMS



VBAT



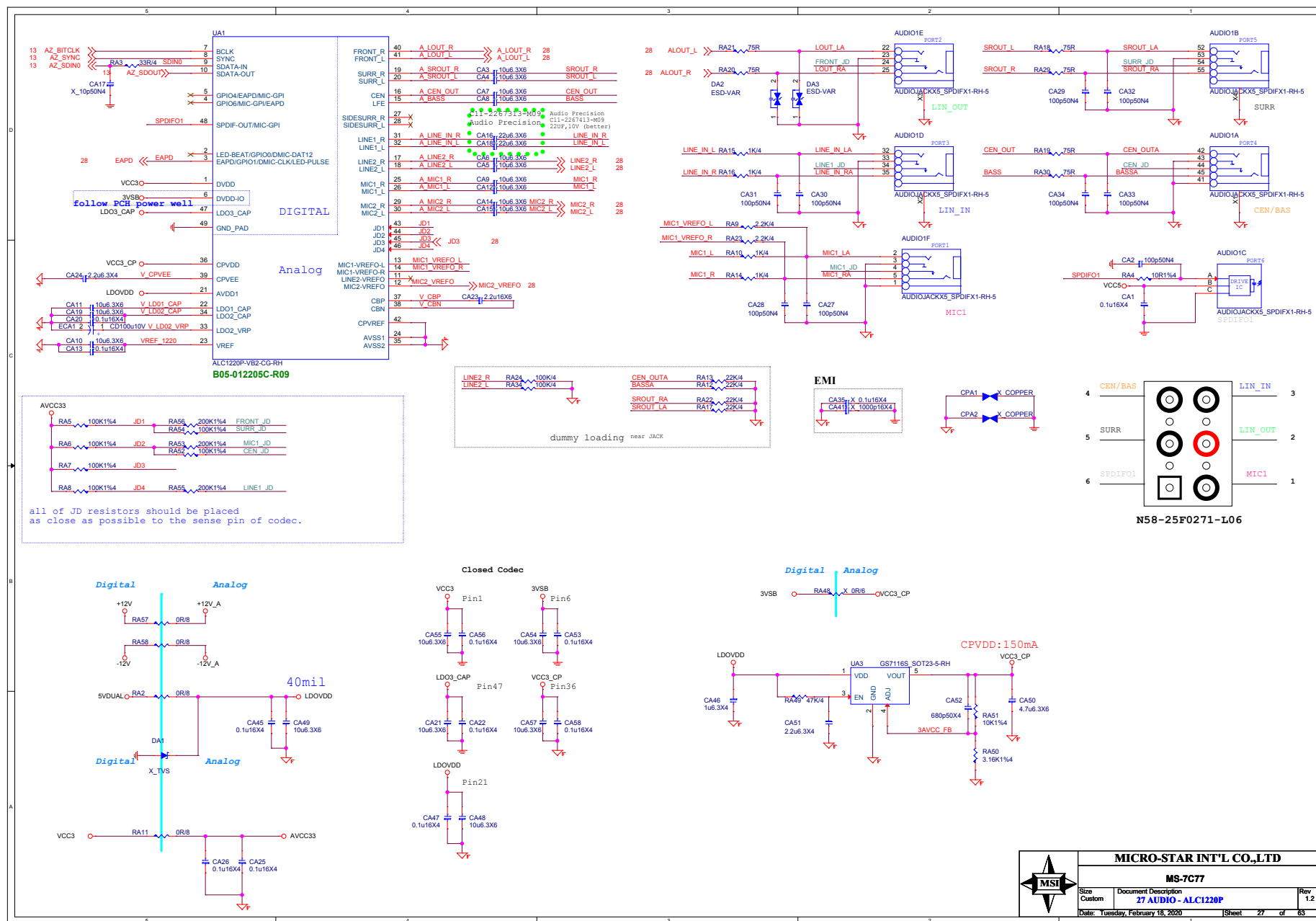
MICRO-STAR INT'L CO.,LTD

MS-7C70

Size Custom	Document Description 25 VBAT/CLR COMS
----------------	---

Date: Friday, February 21, 2020

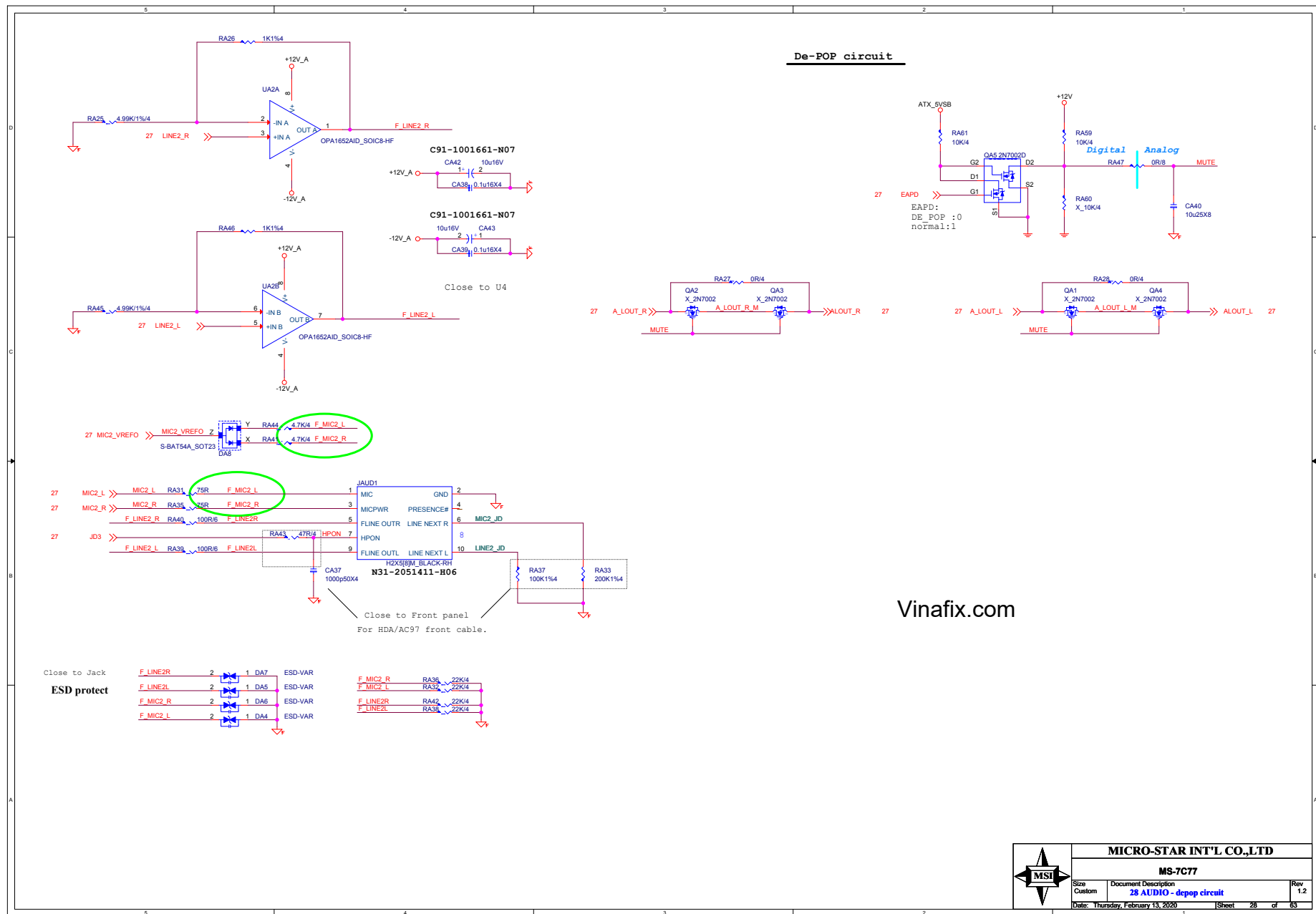
Sheet 25 of 63

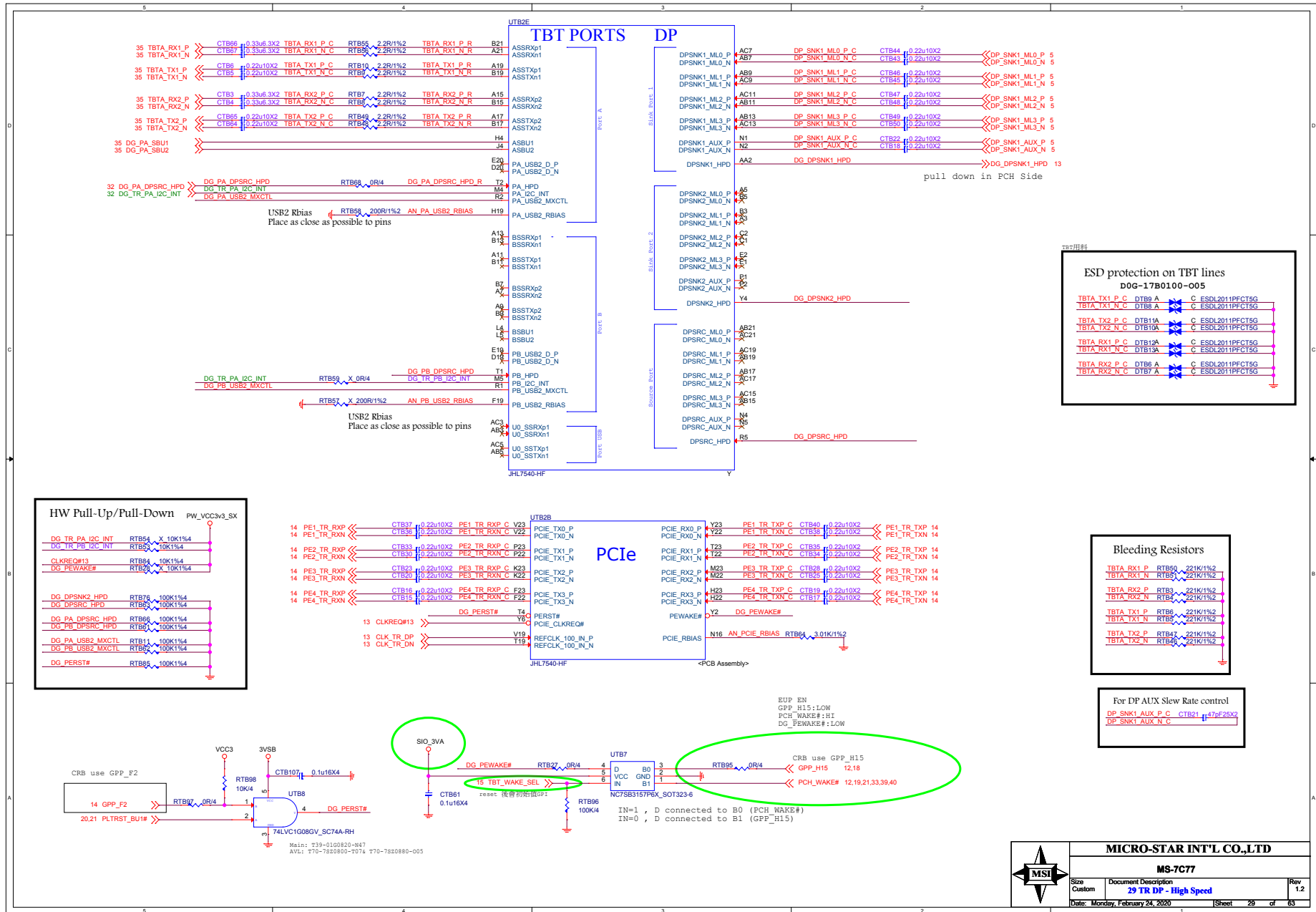


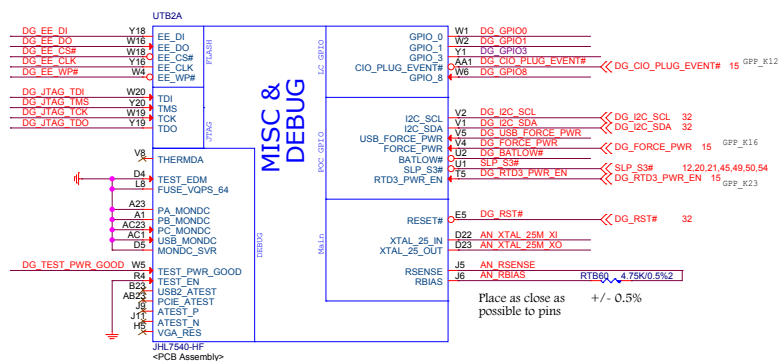
MICRO-STAR INT'L CO.,LTD

MS-7C77

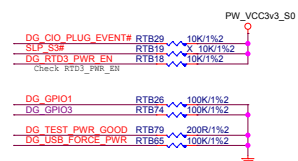
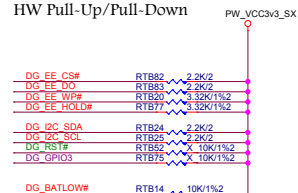
Size Custom	Document Description 27 AUDIO - ALC1220P	Rev 1.2
Date: Tuesday, February 18, 2020		Sheet 27 of 63



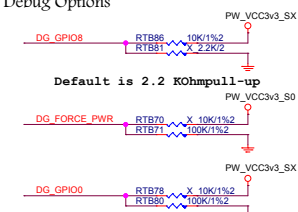




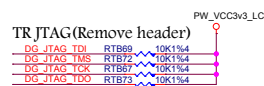
HW Pull-Up/Pull-Down



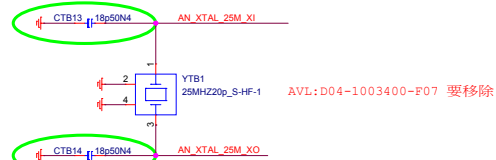
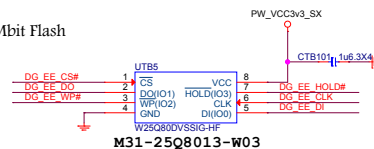
Debug Options

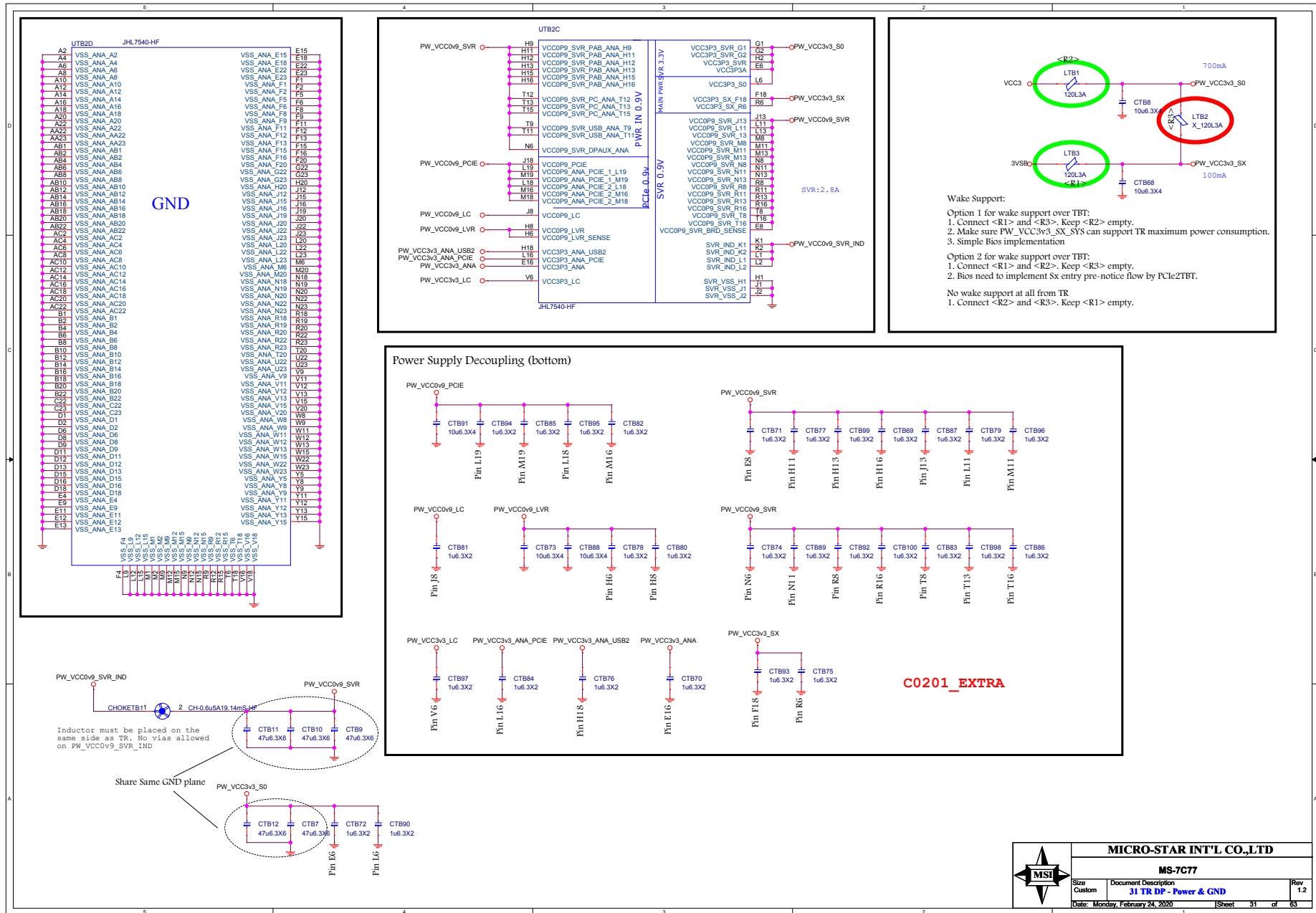


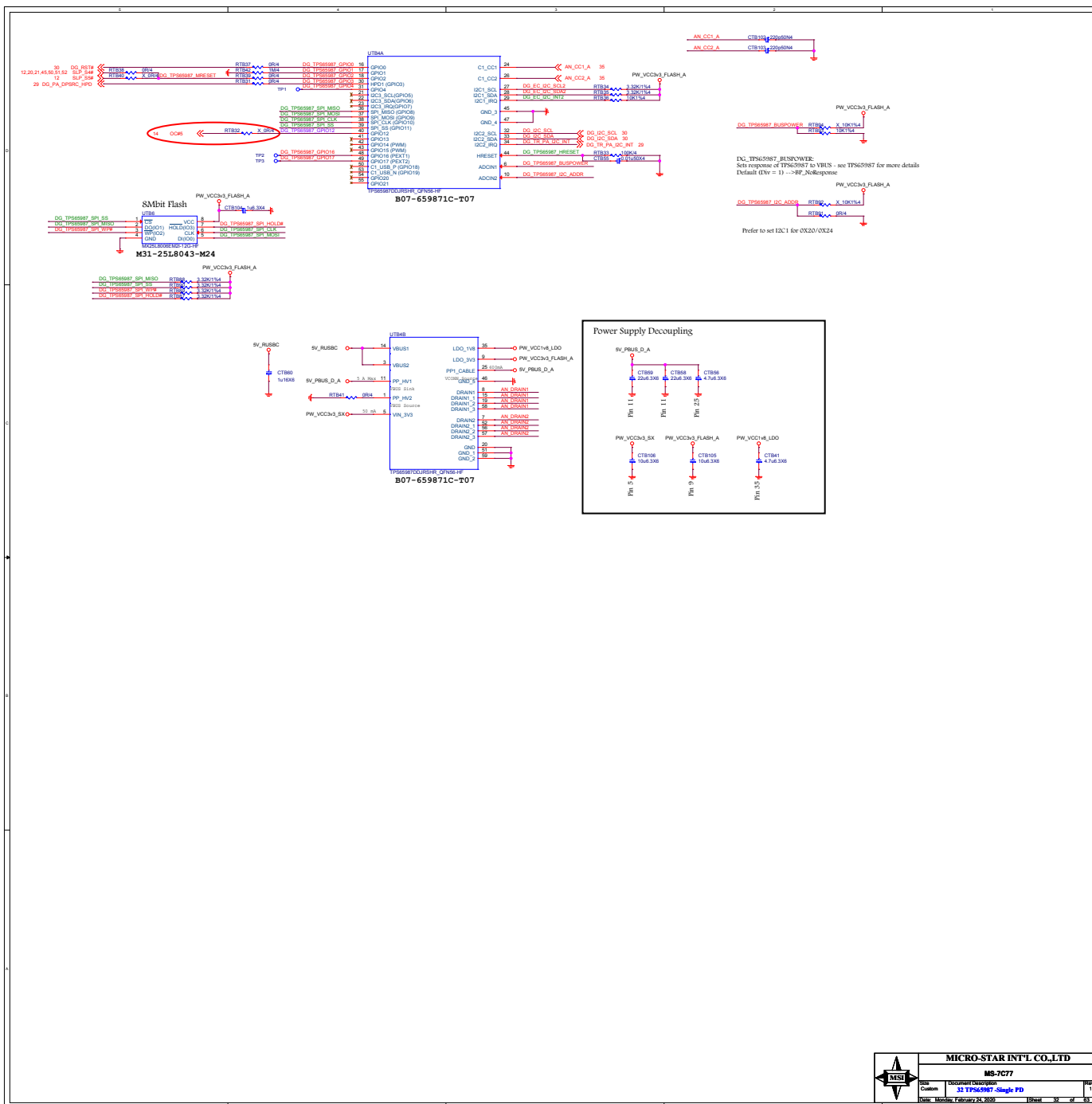
TR JTAG(Remove header)



8Mbit Flash







teknisi indonesia

100mA

600mA

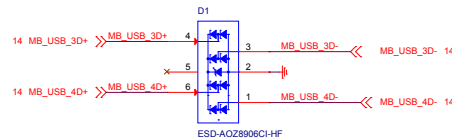
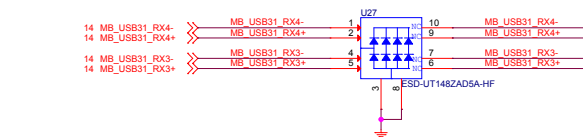
N58-23F0201-F02

For EMI

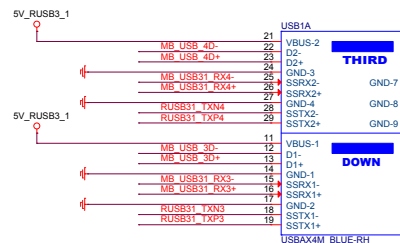
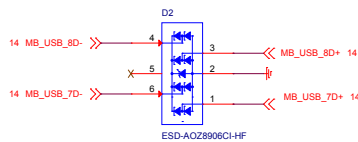
UL3&UL5 close to connector

Main:D0G-06A030C-A68
AVL:Follow LOB AVL

MICRO-STAR INT'L CO.,LTD			
MS-7C77			
Size	Document Description	Rev	
Custom	33 LAN - RTL8125B	1.2	
Date: Monday, February 24, 2020	Sheet	33	of 63



ESD Protection
NEAR CONNECTOR
D0G-05A0529-A68



CLOSE TO CONNECTOR

5V_RUSB3_1

5V_RUSB3_1

5V_RUSB3_1

5V_RUSB3_1

5V_RUSB3_1

5V_RUSB3_1

5V_RUSB3_1

5V_RUSB3_1

5V_RUSB3_1

5V_RUSB3_1

5V_RUSB3_1

5V_RUSB3_1

5V_RUSB3_1

5V_RUSB3_1

5V_RUSB3_1

5V_RUSB3_1

5V_RUSB3_1

5V_RUSB3_1

5V_RUSB3_1

5V_RUSB3_1

5V_RUSB3_1

5V_RUSB3_1

5V_RUSB3_1

5V_RUSB3_1

5V_RUSB3_1

5V_RUSB3_1

5V_RUSB3_1

5V_RUSB3_1

5V_RUSB3_1

5V_RUSB3_1

5V_RUSB3_1

5V_RUSB3_1

5V_RUSB3_1

5V_RUSB3_1

5V_RUSB3_1

5V_RUSB3_1

5V_RUSB3_1

5V_RUSB3_1

5V_RUSB3_1

5V_RUSB3_1

5V_RUSB3_1

5V_RUSB3_1

5V_RUSB3_1

5V_RUSB3_1

5V_RUSB3_1

5V_RUSB3_1

5V_RUSB3_1

5V_RUSB3_1

5V_RUSB3_1

5V_RUSB3_1

5V_RUSB3_1

5V_RUSB3_1

5V_RUSB3_1

5V_RUSB3_1

5V_RUSB3_1

5V_RUSB3_1

5V_RUSB3_1

5V_RUSB3_1

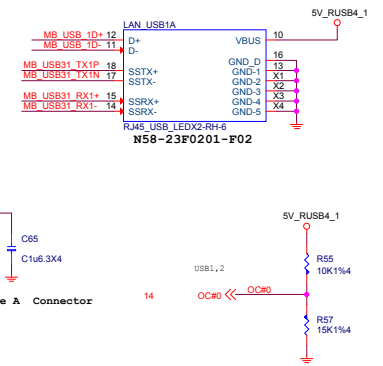
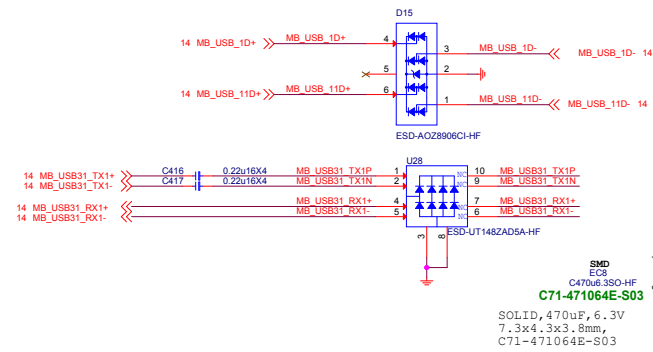
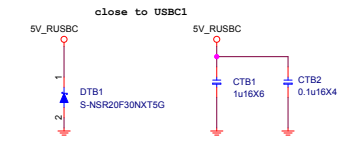
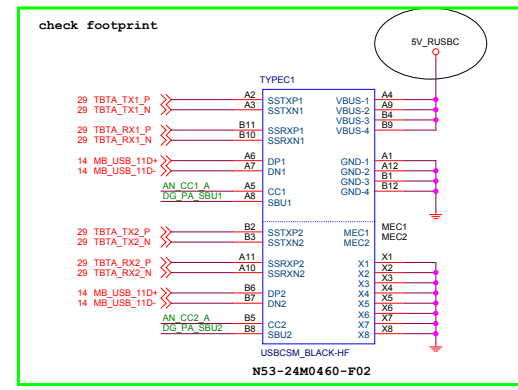
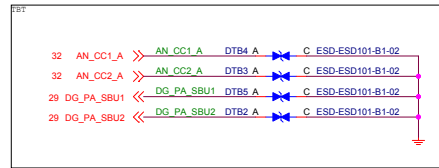
5V_RUSB3_1



MICRO-STAR INT'L CO.,LTD

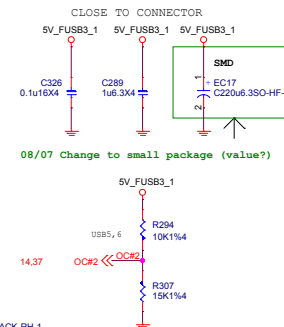
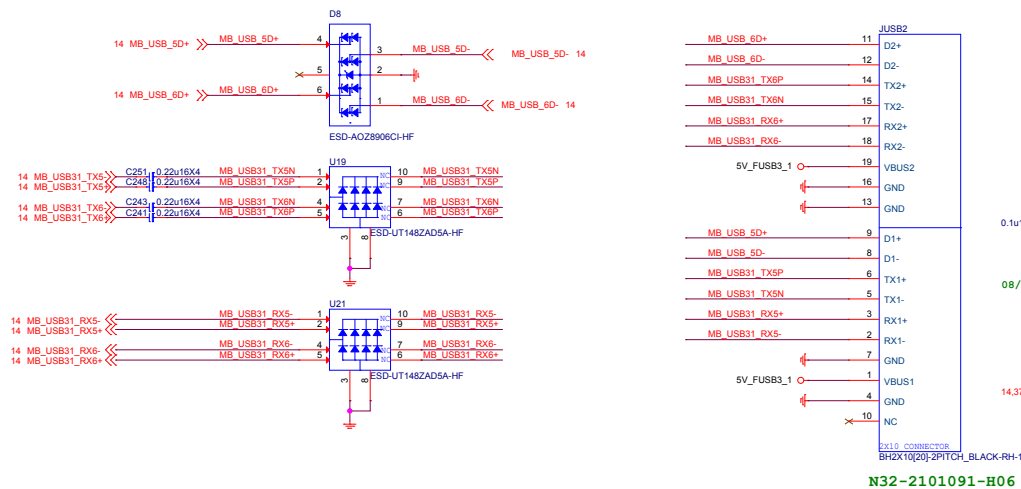
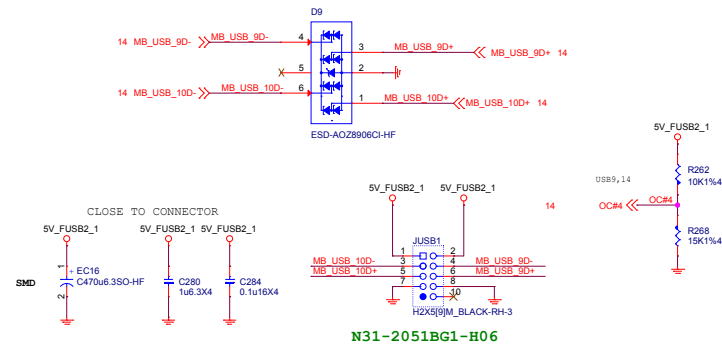
MS-7C77

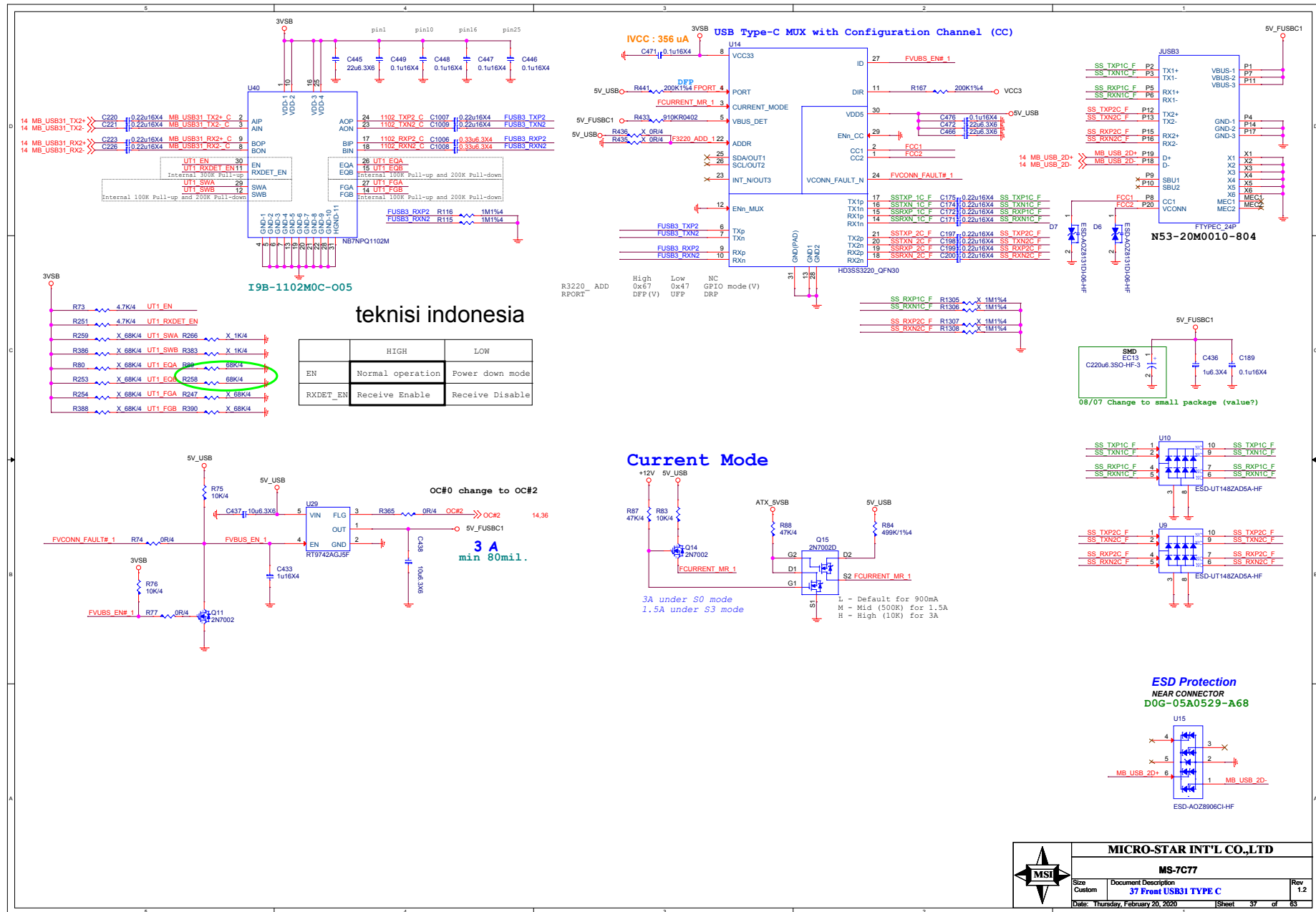
Size	Custom	Document Description	Rev
		34 Rear LAN USB3.1&USB2.0	1.2
Date:	Thursday, February 15, 2020	Sheet	34 of 63



www.teknisi-indonesia.com

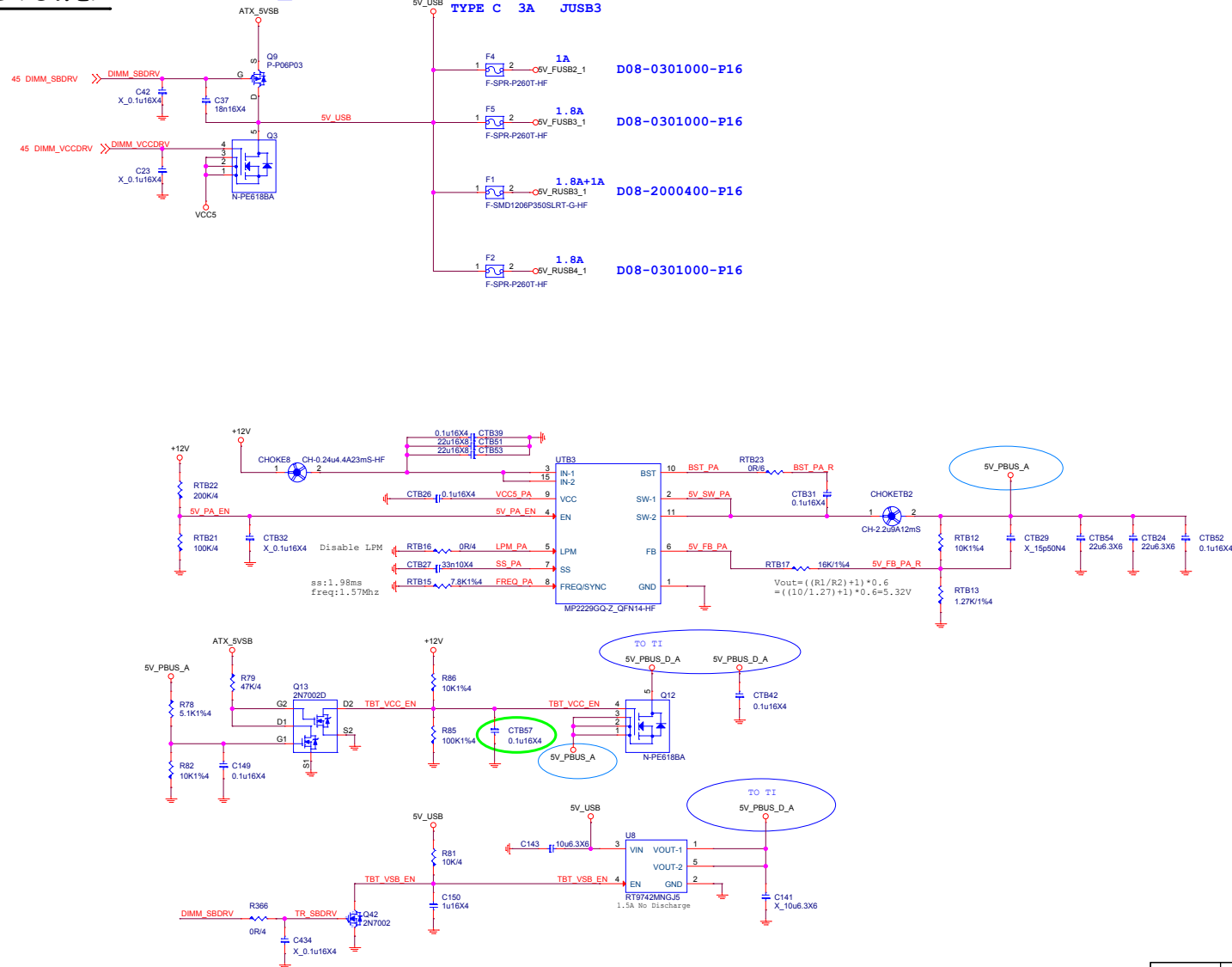
MICRO-STAR INT'L CO.,LTD			
MS-7C77			
Size Custom	Document Description	Rev 1.2	
	35 Rear-USB31 TYPEA+TYPE C		
Date: Monday, February 24, 2020	Sheet 35	of 63	

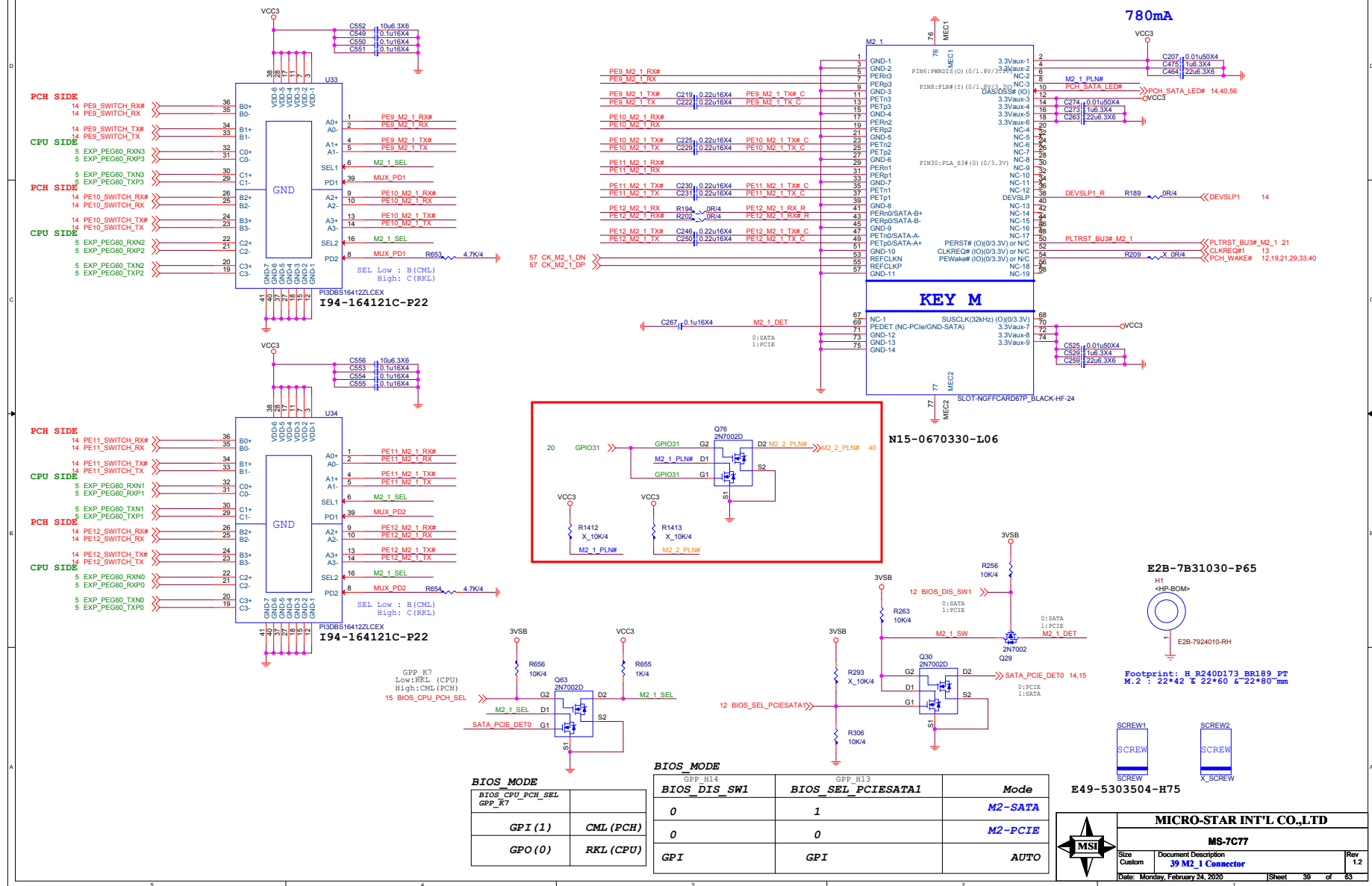




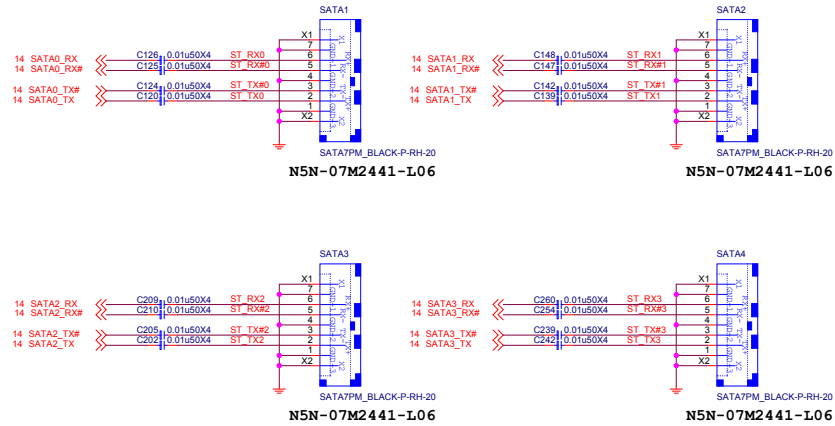
USB POWER

5V_USB:10.4A



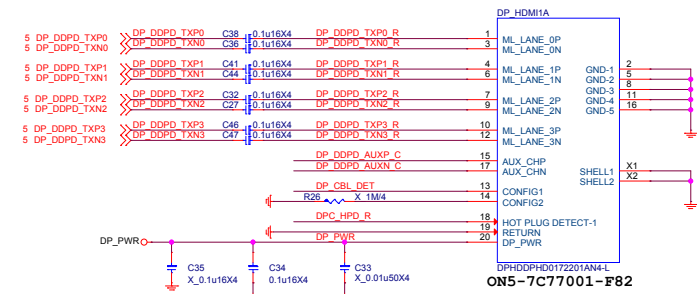
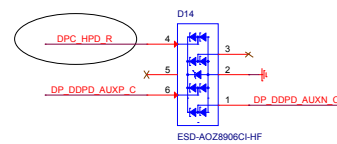


SATA GEN3



Vinafix.com

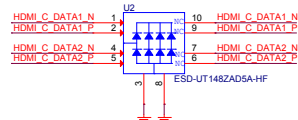
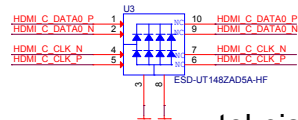
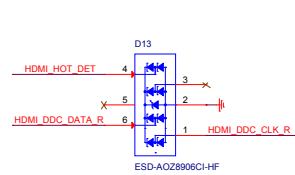
MICRO-STAR INT'L CO.,LTD			
MS-7C77			
Size	Document Description	Rev	
Custom	41 SATA connector	1.2	
Date:	Thursday, February 13, 2020	Sheet	41 of 63



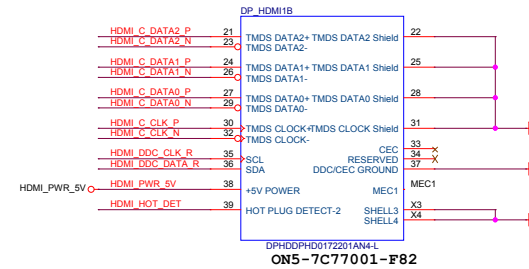
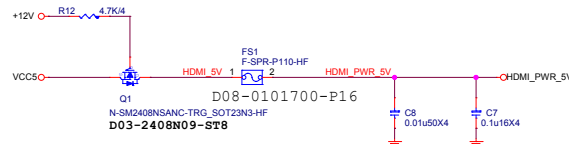
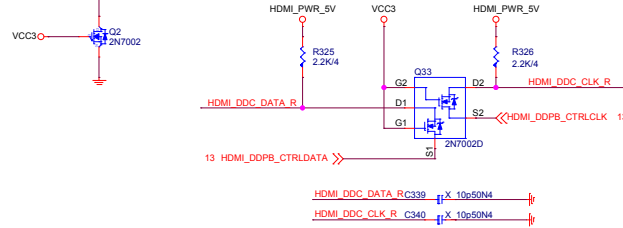
HDMI, DVI : 1920x1200 at 60 Hz (16:10 WUXGA)

5 HDMI_DDPB_CLK_P < C17 0.1u16X4 HDMI_C_CLK_P R19 470R/4 HDMI_MOS_DATA
 5 HDMI_DDPB_CLK_N < C18 0.1u16X4 HDMI_C_CLK_N R21 470R/4
 5 HDMI_DDPB_TX2_P < C3 0.1u16X4 HDMI_C_DATA2_P R1 470R/4
 5 HDMI_DDPB_TX2_N < C3 0.1u16X4 HDMI_C_DATA2_N R4 470R/4
 5 HDMI_DDPB_TX1_P < C6 0.1u16X4 HDMI_C_DATA1_P R7 470R/4
 5 HDMI_DDPB_TX1_N < C9 0.1u16X4 HDMI_C_DATA1_N R14 470R/4
 5 HDMI_DDPB_TX0_P < C26 0.1u16X4 HDMI_C_DATA0_P R27 470R/4
 5 HDMI_DDPB_TX0_N < C26 0.1u16X4 HDMI_C_DATA0_N R24 470R/4

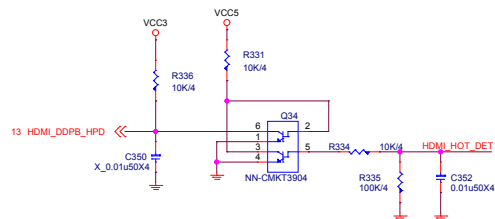
HDMI_MOS_DATA trace length < 500mil
 Other platform please check your design guide length



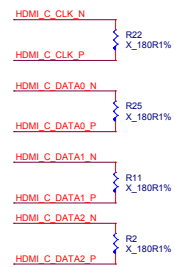
teknisi indonesia



HPD



For EMI

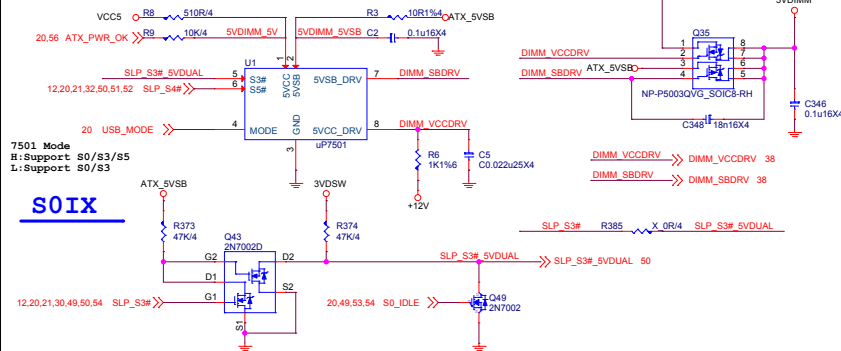


MICRO-STAR INT'L CO.,LTD

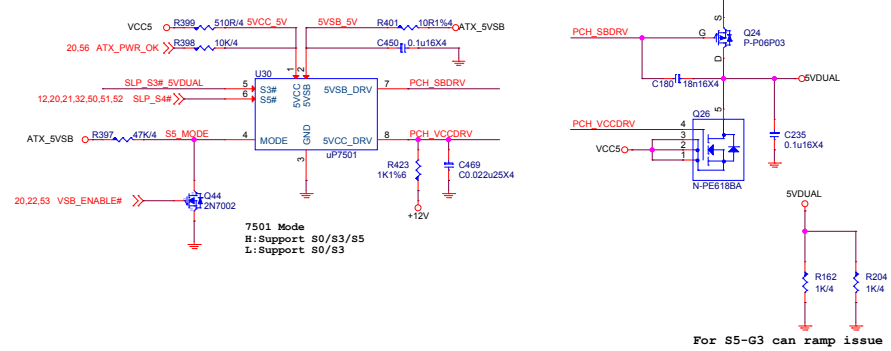
MS-7C77

Size Custom Document Description 44 HDMI Connector Rev 1.2
 Date: Thursday, February 15, 2020 Sheet 44 of 63

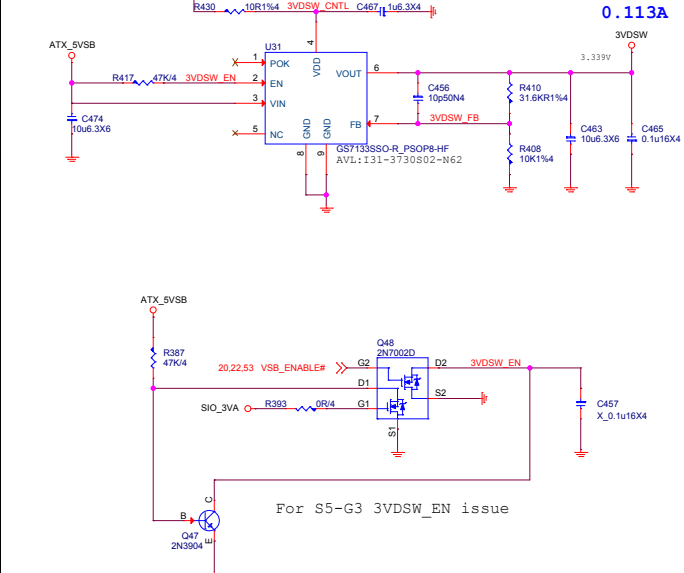
5VDIMM& USB POWER



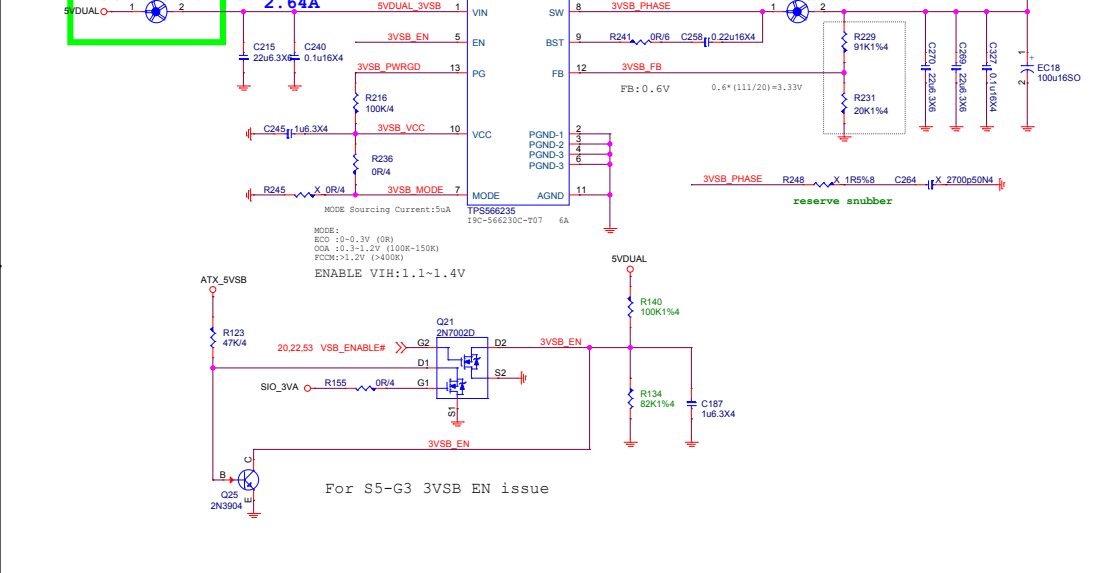
5VDUAL

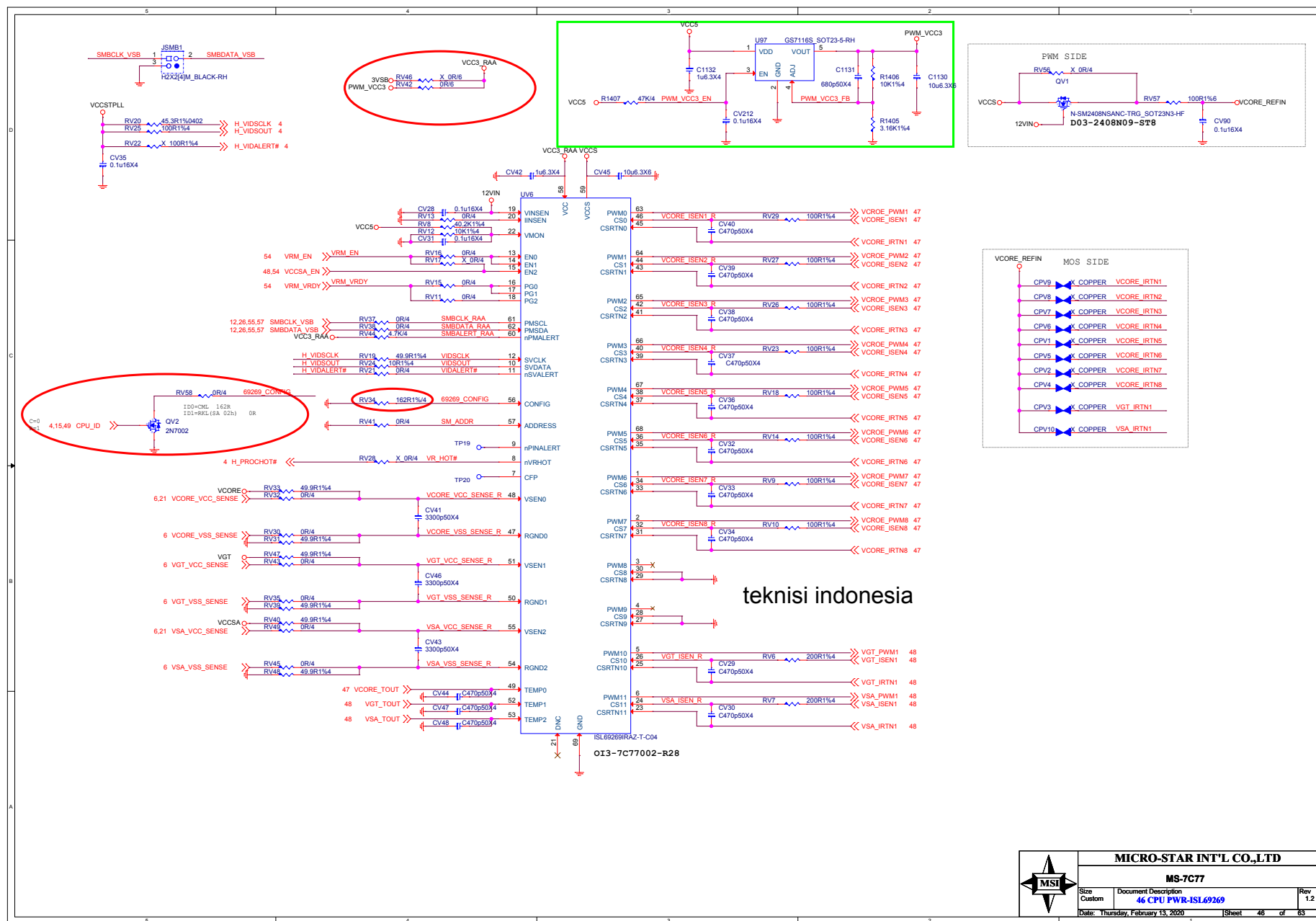


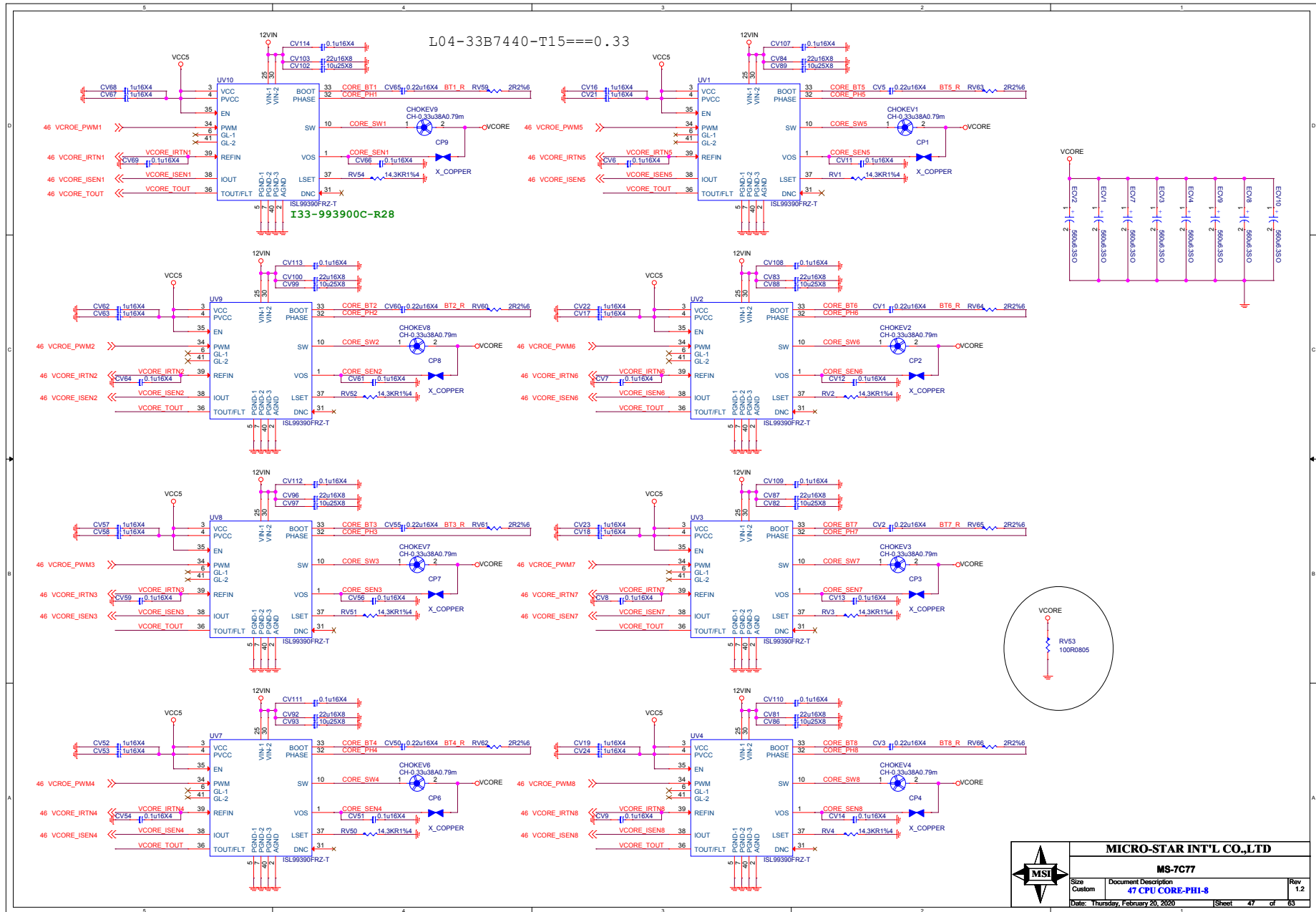
3VDSW



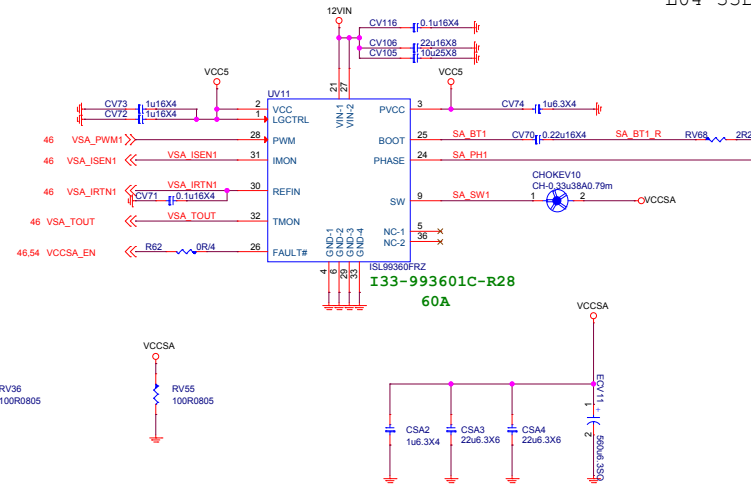
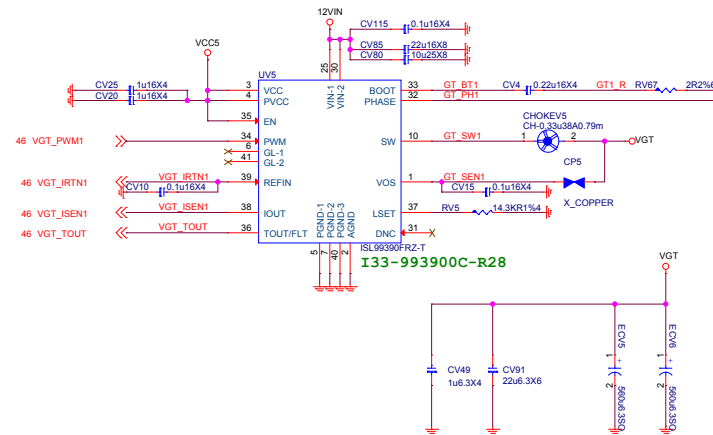
3VSB



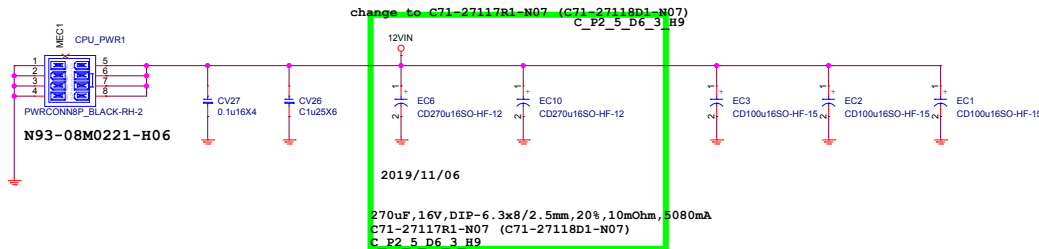




L04-33B7440-T15==0.33



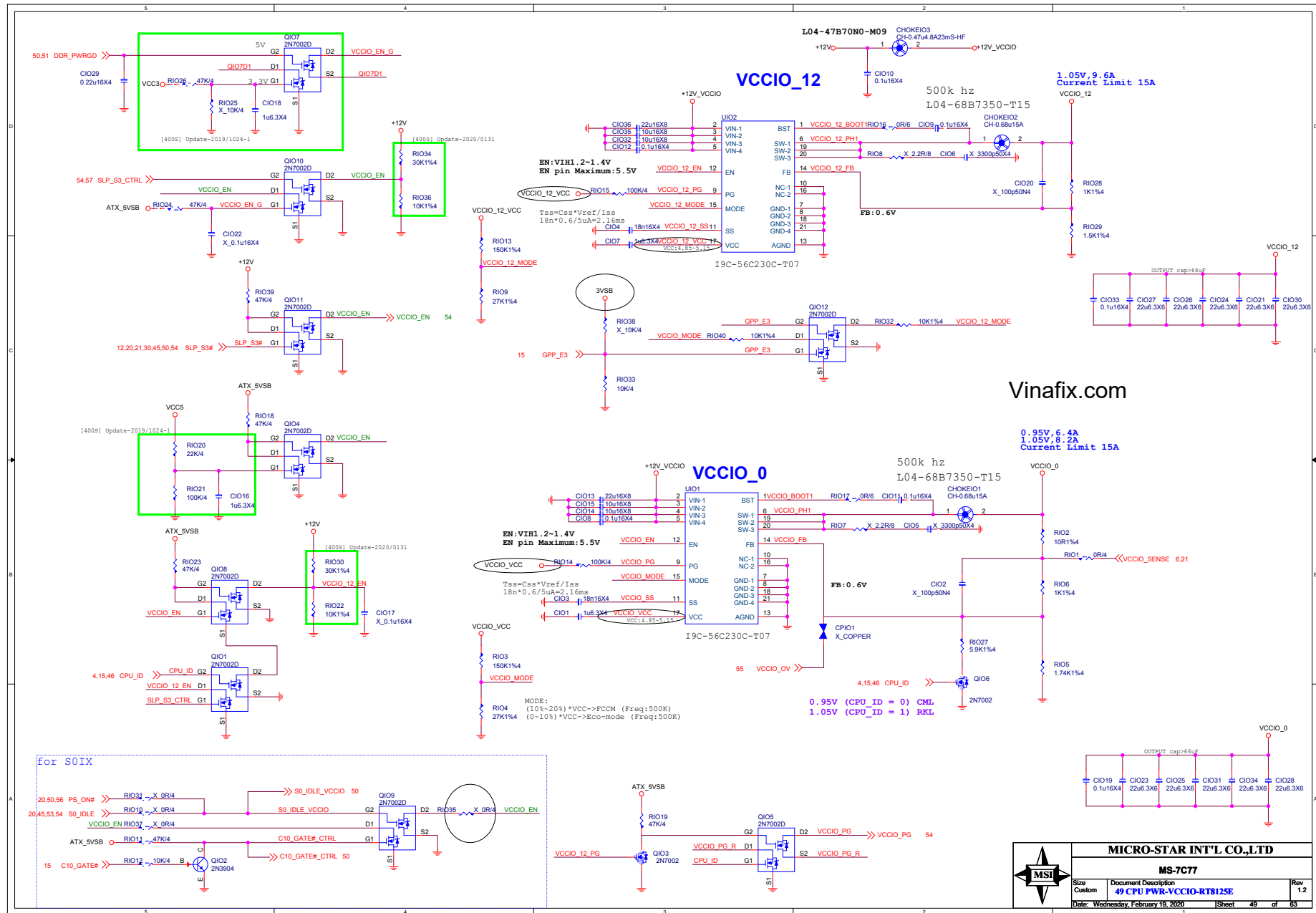
CPU Power connector

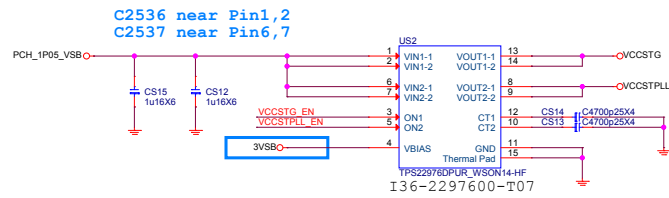


12VIN:22.84A+1.143A=23.983A

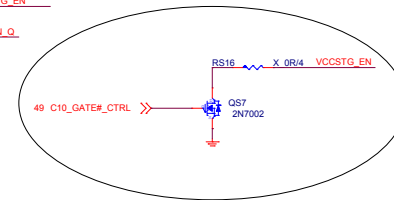
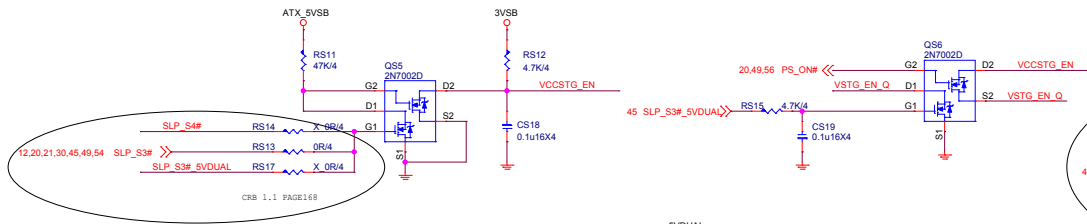
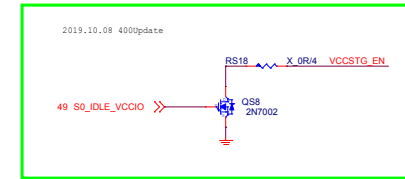
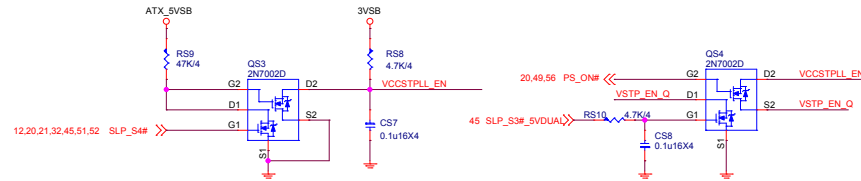
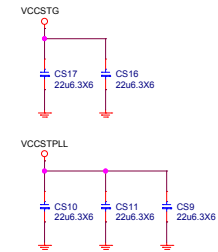
CPU 12VIN=(193+40)*1/0.85/12=22.84A

MICRO-STAR INT'L CO.,LTD			
MS-7C77			
Size	Document Description	Rev	
Custom	48 CPU GT PH/SA PH1	1.2	
Date: Thursday, February 20, 2020		Sheet	48 of 63



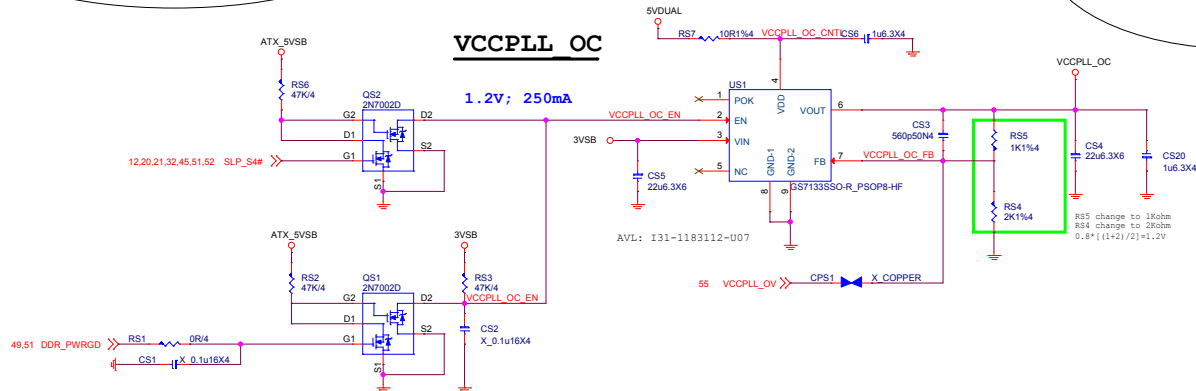


VCCSTG
1.05V; 0.2A/0.9A
VCCSTPLL
1.05V; 0.92A/2.3A+0.23A=2.53A
VCCST VCCPLL



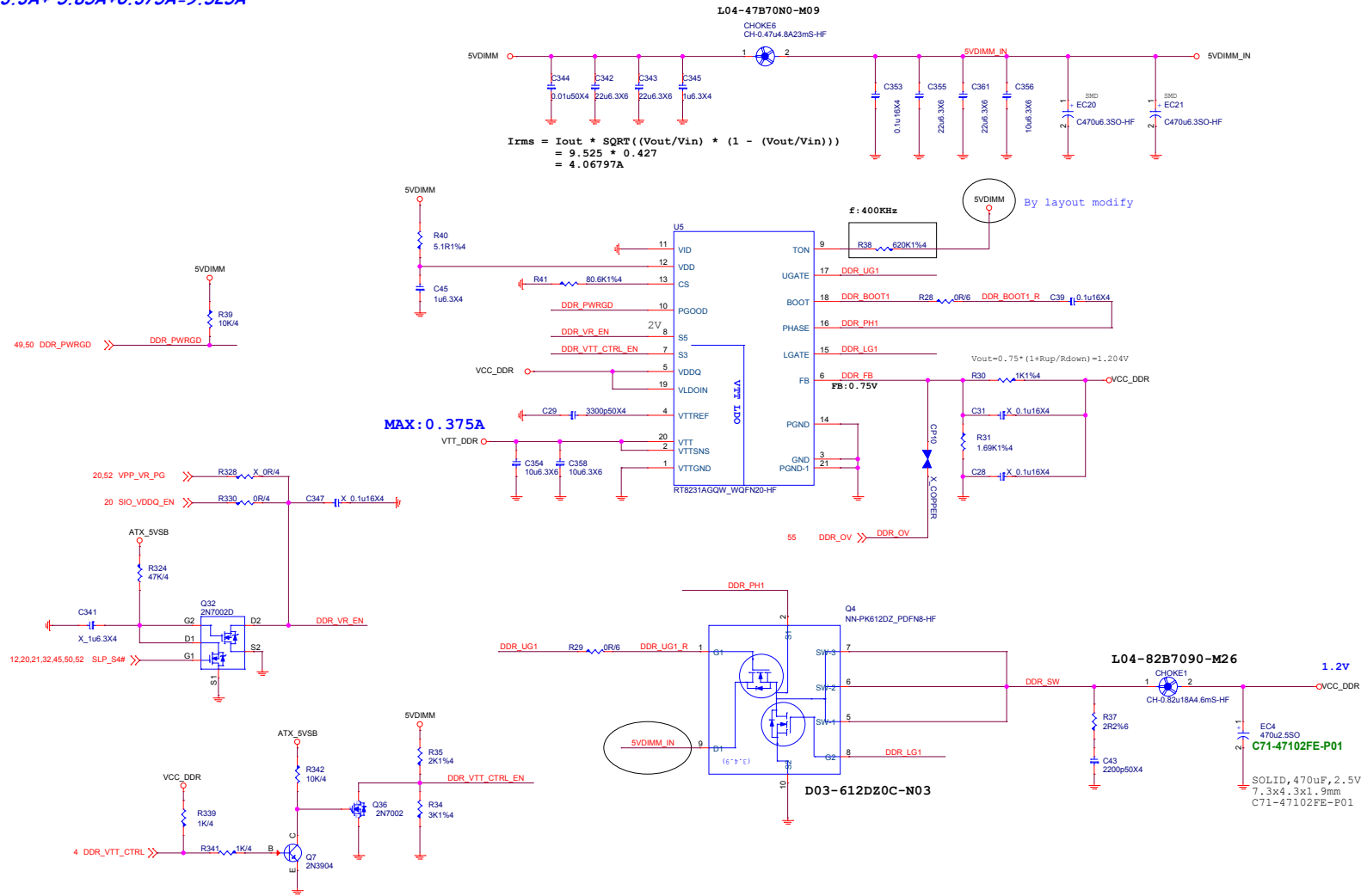
VCCPLL OC

1.2V; 250mA

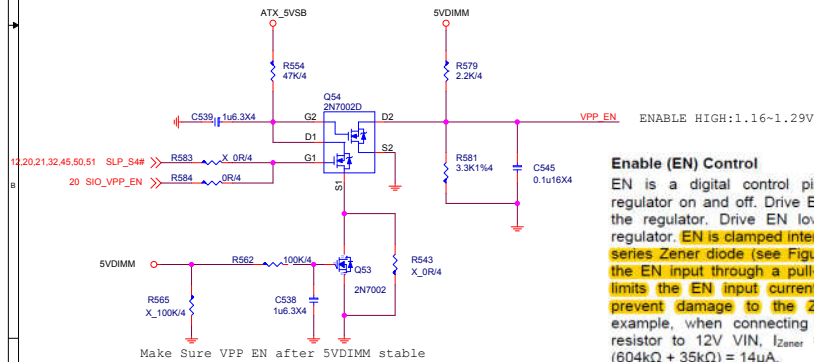


VDDQ Power:1.2V;9.525A

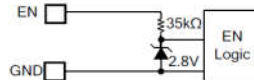
$$3.3A + 5.85A + 0.375A = 9.525A$$



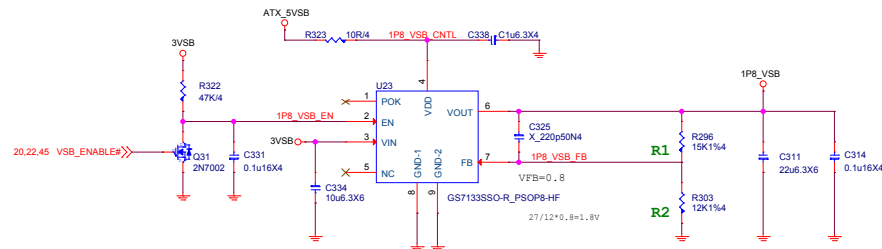
Vinafix.com



EN is a digital control pin that turns the regulator on and off. Drive EN high to turn on the regulator. Drive EN low to turn off the regulator. EN is clamped internally using a 2.8V series Zener diode (see Figure 2). Connecting the EN input through a pull-up resistor to VIN limits the EN input current below 40µA to prevent damage to the Zener diode. For example, when connecting a 604kΩ pull-up resistor to 12V VIN, $I_{Zener} = (12V - 2.8V) / (604k\Omega + 35k\Omega) = 14\mu A$.

[illegible]

D03-612DZ0C-N03 2.2~3.1mohm@5V
OCP=1.6A*1.3=20.8A

$$\begin{aligned} \text{IOCSET} &= 10\mu\text{A} \\ \text{OCP_max} &= \text{Iocset} * \text{Rocset} / \text{Rdson}(\text{min}) \\ &= 10\mu\text{A} * 6.8\text{k} / 2.2\text{mohm} \\ &= 21.9\text{A} \end{aligned}$$
$$\begin{aligned} \text{OCP_max} &= \text{Iocset} * \text{Rocset} / \text{Rdson (min)} \\ &= 10\mu\text{A} * 6.8\text{k} / 2.2\text{mohm} \\ &= 21.9\text{A} \end{aligned}$$


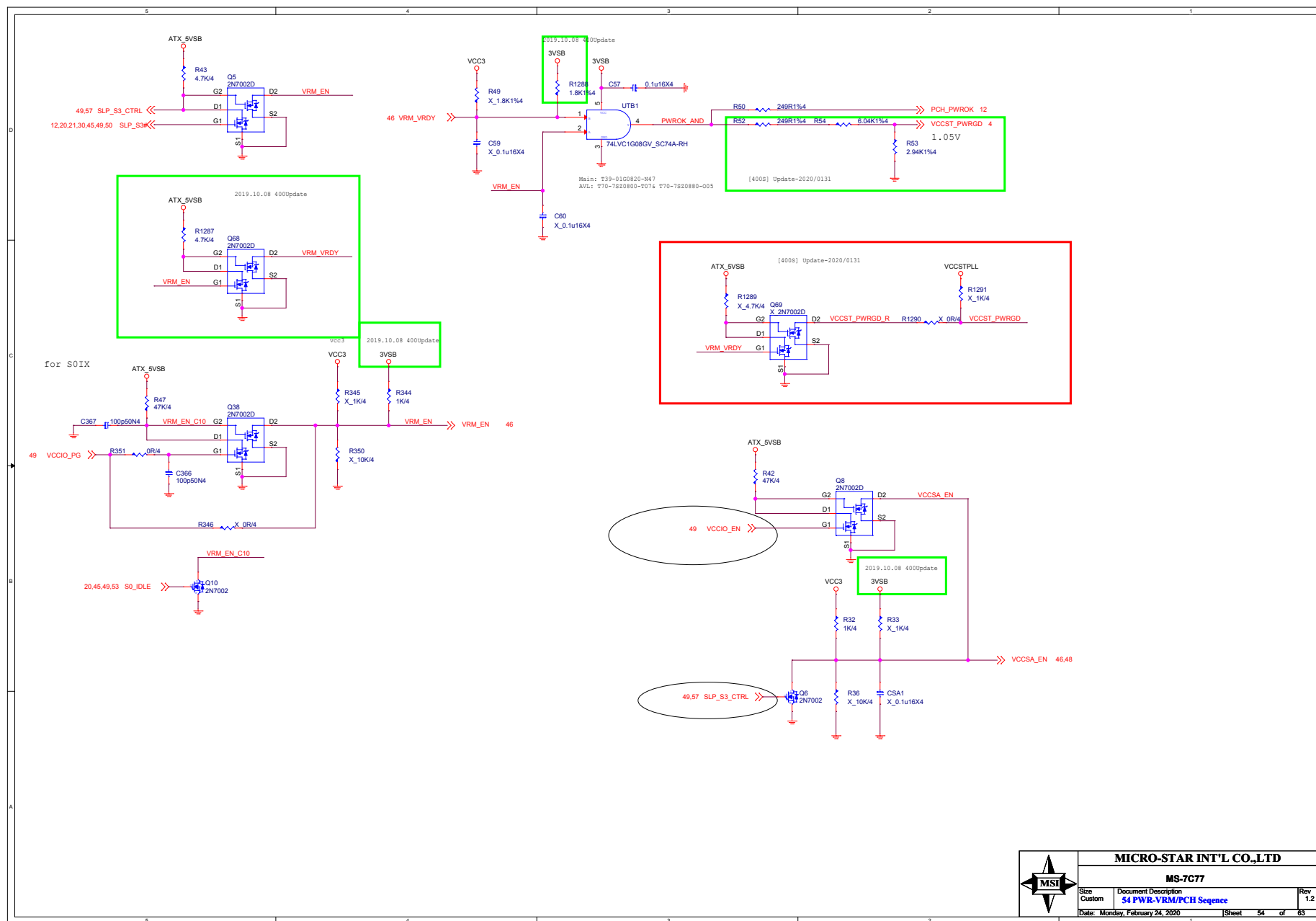
MICRO-STAR INT'L CO.,LTD

MS-7C77

Size	Document Description
------	----------------------

Custom	53 PCH POW
Date: Friday, February 21, 2020	

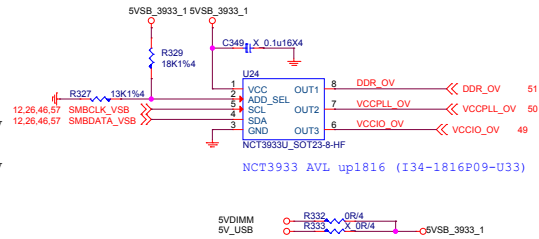
Rev	1.2
63	



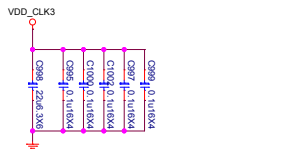
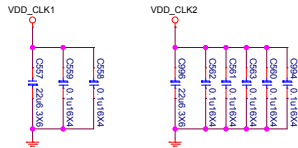
UPI VOLTAGE CONSOLE

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

NCT3933 source 10uA
 $V_{out} = [V_{REF} * (1 + R173/R1056)] + 10\mu A * R173$
 $= 0.75V * (1 + 1K/3.16K) + 10\mu A * 1K = 1.204V + 0.010V = 1.214V$
NCT3933 sink 10uA
 $V_{out} = [V_{REF} * (1 + R173/R1056)] - 10\mu A * R173$
 $= 0.75V * (1 + 1K/3.16K) - 10\mu A * 1K = 1.204V - 0.010V = 1.194V$

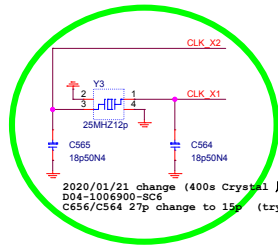


2.20mA
VCC3_CLK ○ R485 0R/6 ○ VDD_CLK1
VCC3_CLK ○ R657 0R/6 ○ VDD_CLK2
VCC3_CLK ○ R1254 0R/6 ○ VDD_CLK3

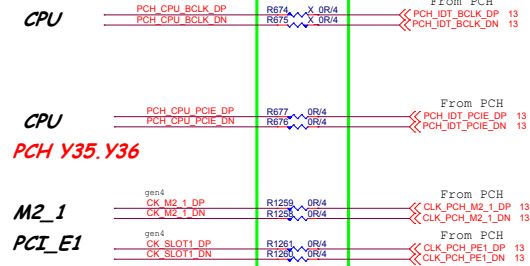
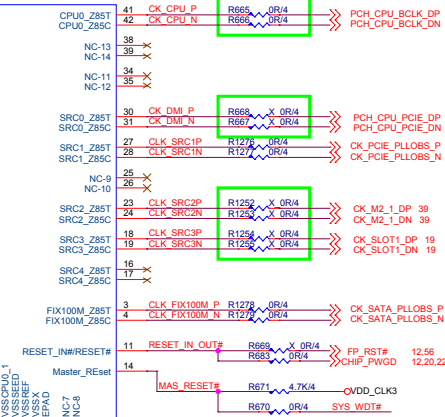
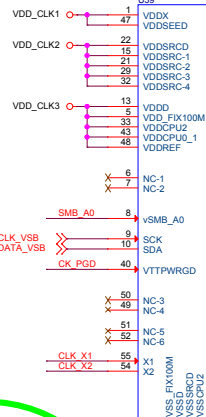


VDD_CLK3 ○ R659 4.7K/4 ○ SMB_A0
R659 4.7K/4

SMB_A0	ADDR
0	D2/D3
1	D8/D9

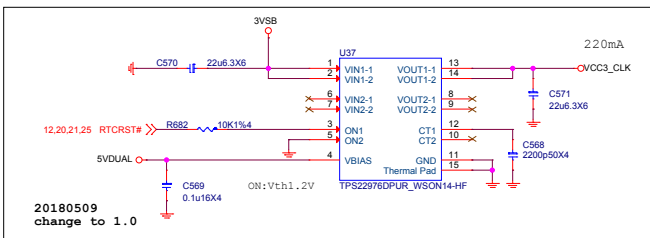
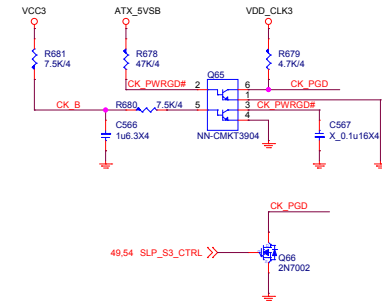


2020/01/21 change (400s Crystal) 用料問題-for Clock gen)
D04-1006900-9C6
C656/C564 27p change to 15p (try 18p for SA)



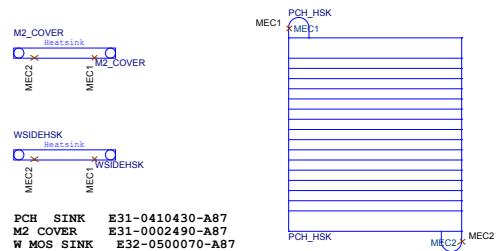
Layout注意擺放，不可分枝

teknisi indonesia

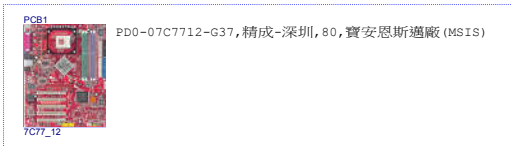
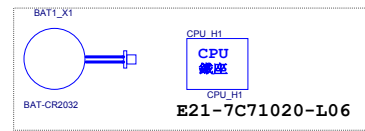
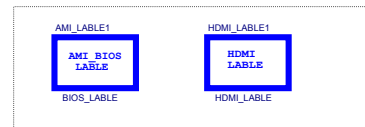


20180509
change to 1.0

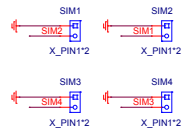
MICRO-STAR INT'L CO.,LTD			
MS-7C77			
Size	Document Description	Rev	
Custom	57 Clock Gen-6V41821	1.2	
Date:	Monday, February 24, 2020	Sheet	57 of 63



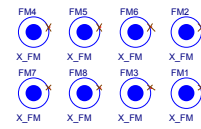
PCH_SINK E31-0410430-A87
M2_COVER E31-0002490-A87
W MOS SINK E32-0500070-A87



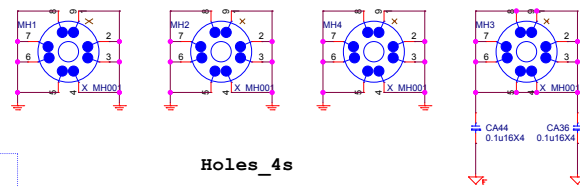
Simulation



Optical Fiducial Marks-120



Mounting Holes



Holes_4s