MS-7712 Version : 0C

CPU :

INTEL Sandy Bridge-E Processor

System Chipset :

INTEL Patsburg Chipset

On Board Chipset :

VRM 12 -- ISL6366 6 Phase
Gigabit LAN -- RTL8111E
USB 3.0 -- UPD720202
HDA Codec -- Realtek ALC892
Super I/O -- F71889AD
SPI Flash 64Mb

Main Memory :

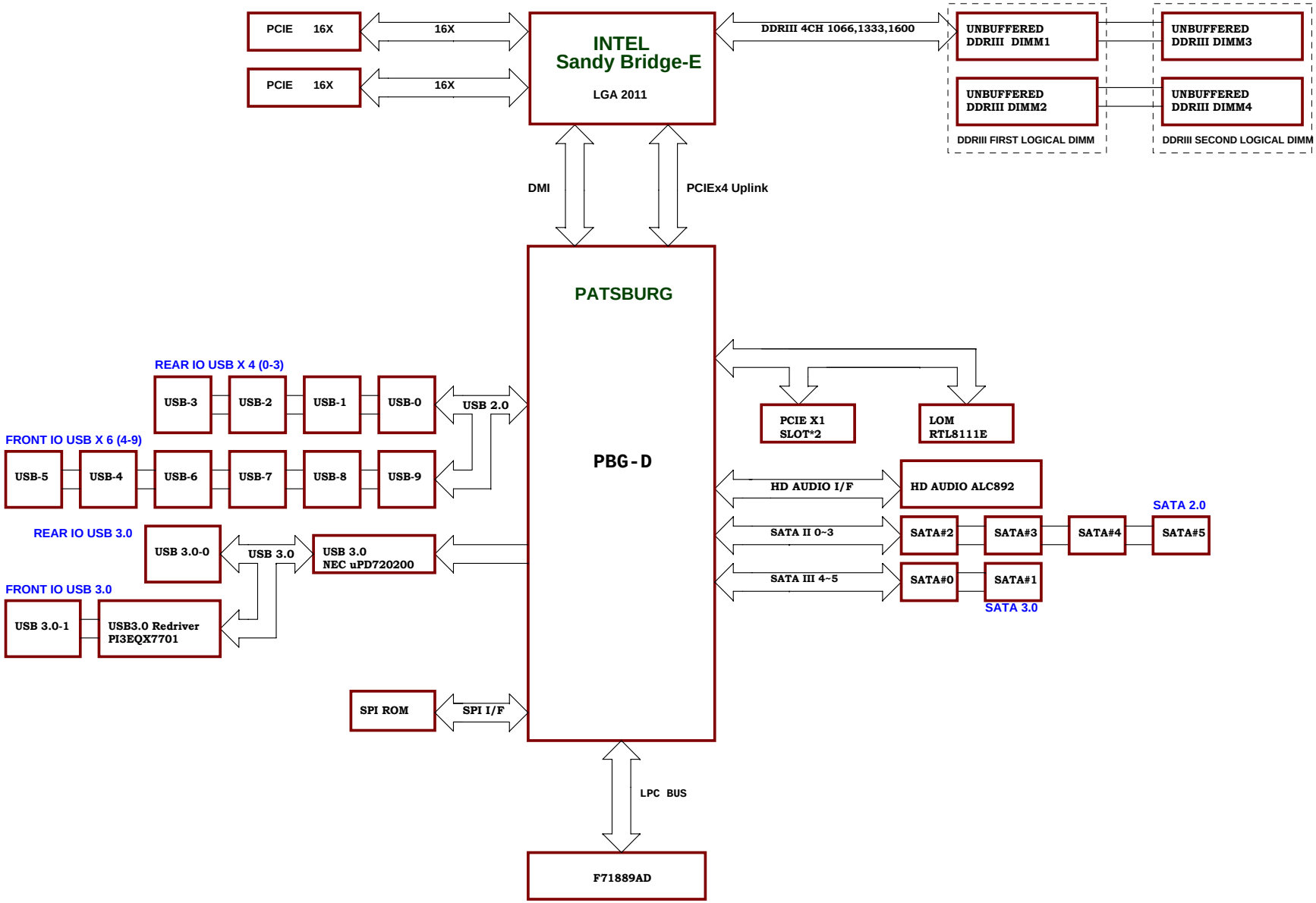
4 Channel DDR III * 4 (Max 16GB)

Expansion Slot :

PCI Express x16 Slot * 2
PCI Express x1 Slot * 2

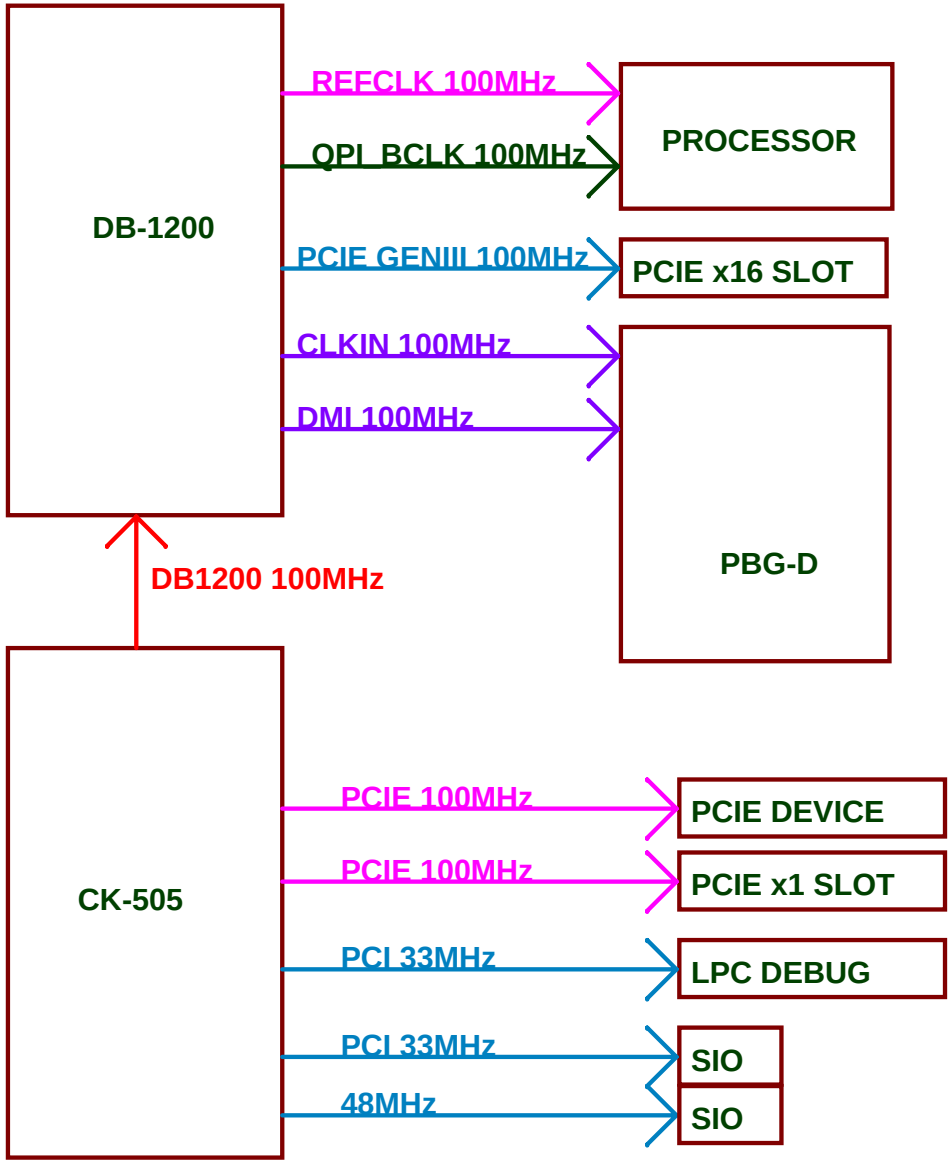
MSI Link to the Future **MICRO-START INT'L CO.,LTD.**

Title: Cover Sheet		
Size	Document Number: MS-7712	Rev: 0C
Date: Tuesday, August 16, 2011	Sheet 1 of 45	



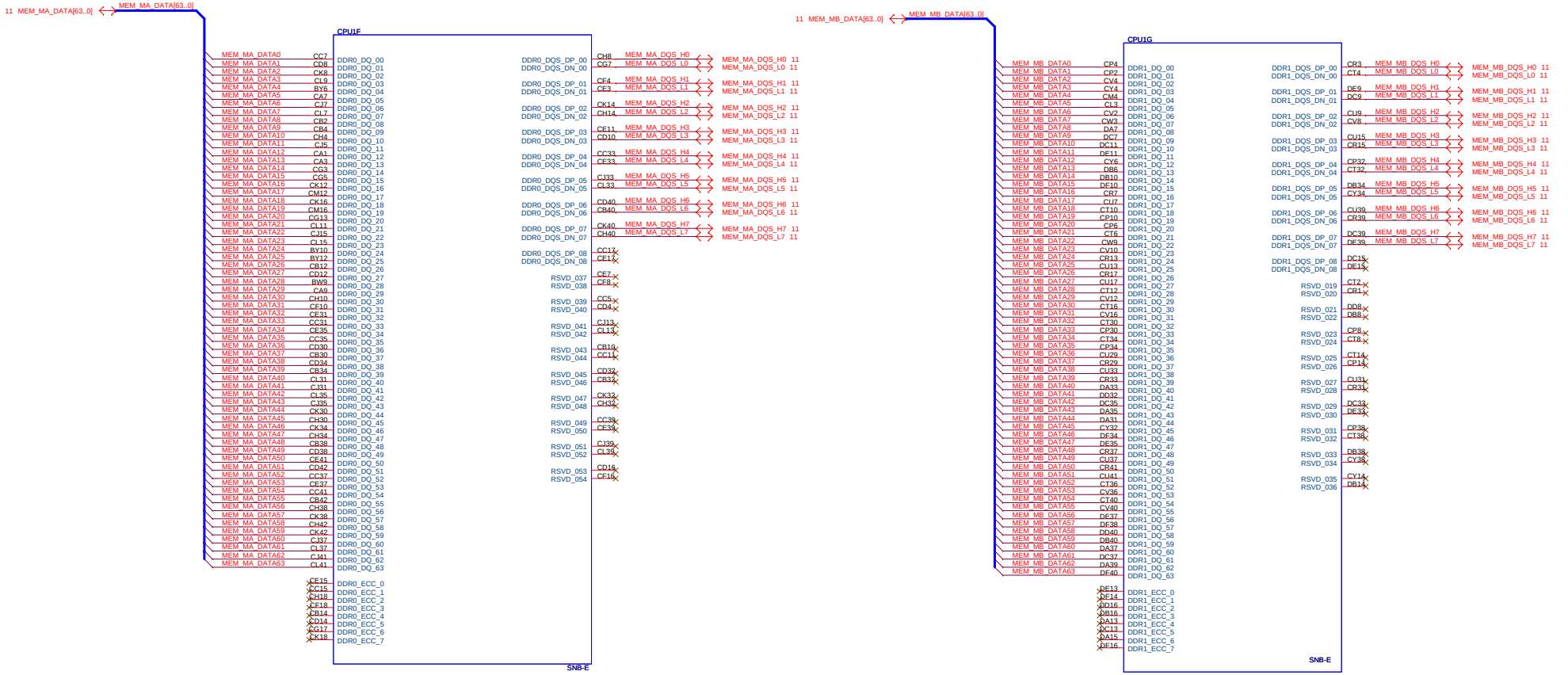
MSI Link to the Future MICRO-START INT'L CO.,LTD.

Title: Block Diagram		
Size	Document Number: MS-7712	Rev: 0C
Date: Tuesday, August 16, 2011	Sheet 2 of 45	



MICRO-START INT'L CO.,LTD.

Title: Clock Distribution		
Size	Document Number: MS-7712	Rev: 0C
Date: Tuesday, August 16, 2011	Sheet 3 of 45	

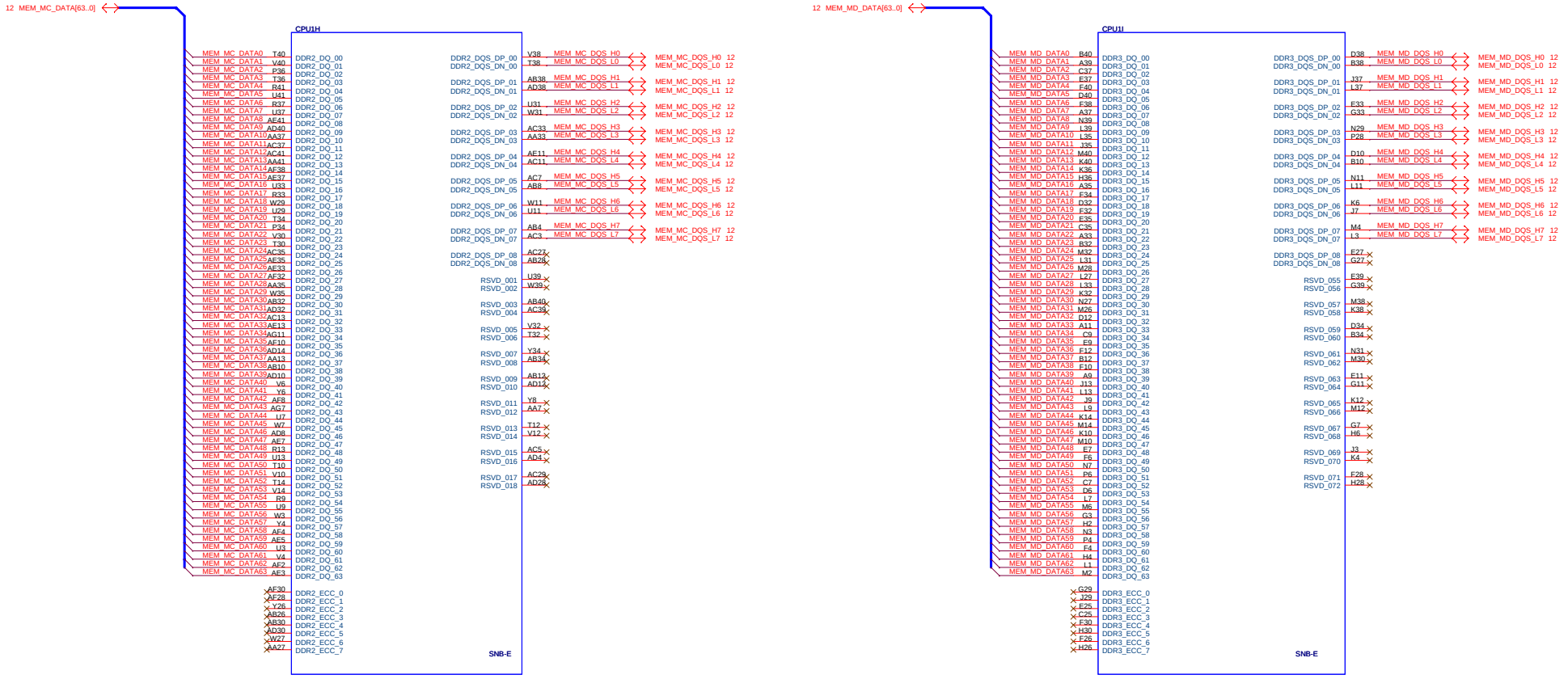


MICRO-START INT'L CO.,LTD.

Title: SNB-E MEMORY 1 & 2

Size	Document Number	Rev
	MS-7712	0C

Date: Tuesday, August 16, 2011 Sheet 4 of 45

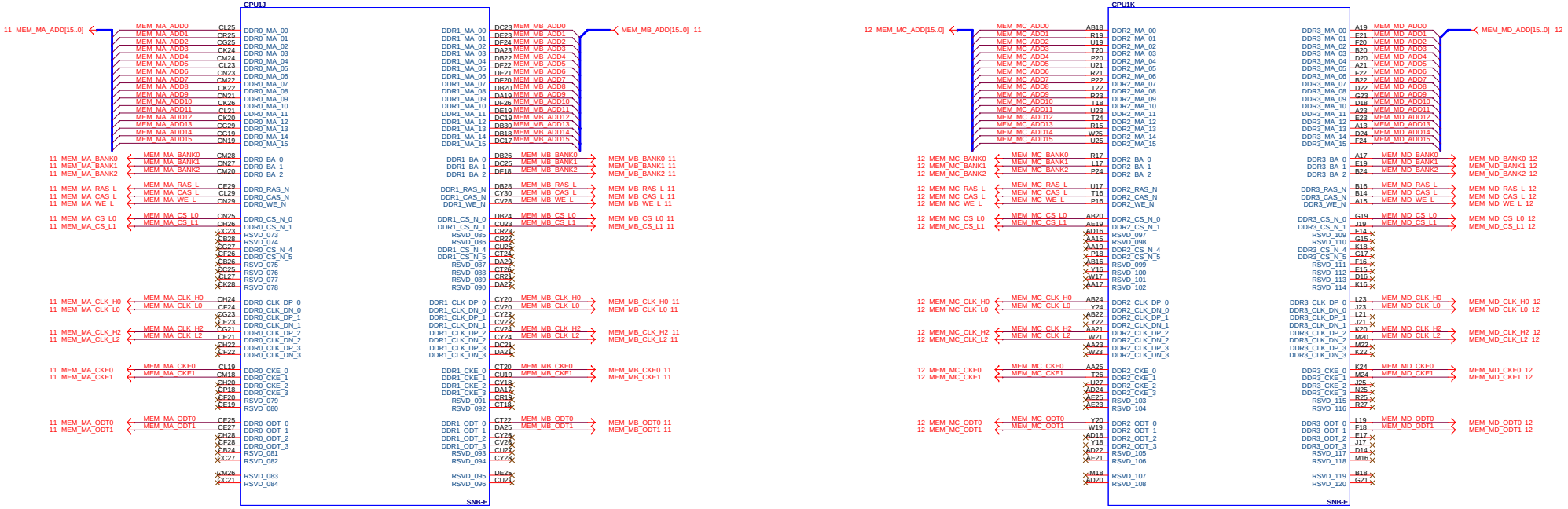


MICRO-START INT'L CO.,LTD.

Title: SNB-E MEMORY 3 & 4

Size	Document Number	Rev
	MS-7712	0C

Date: Tuesday, August 16, 2011 Sheet 5 of 45

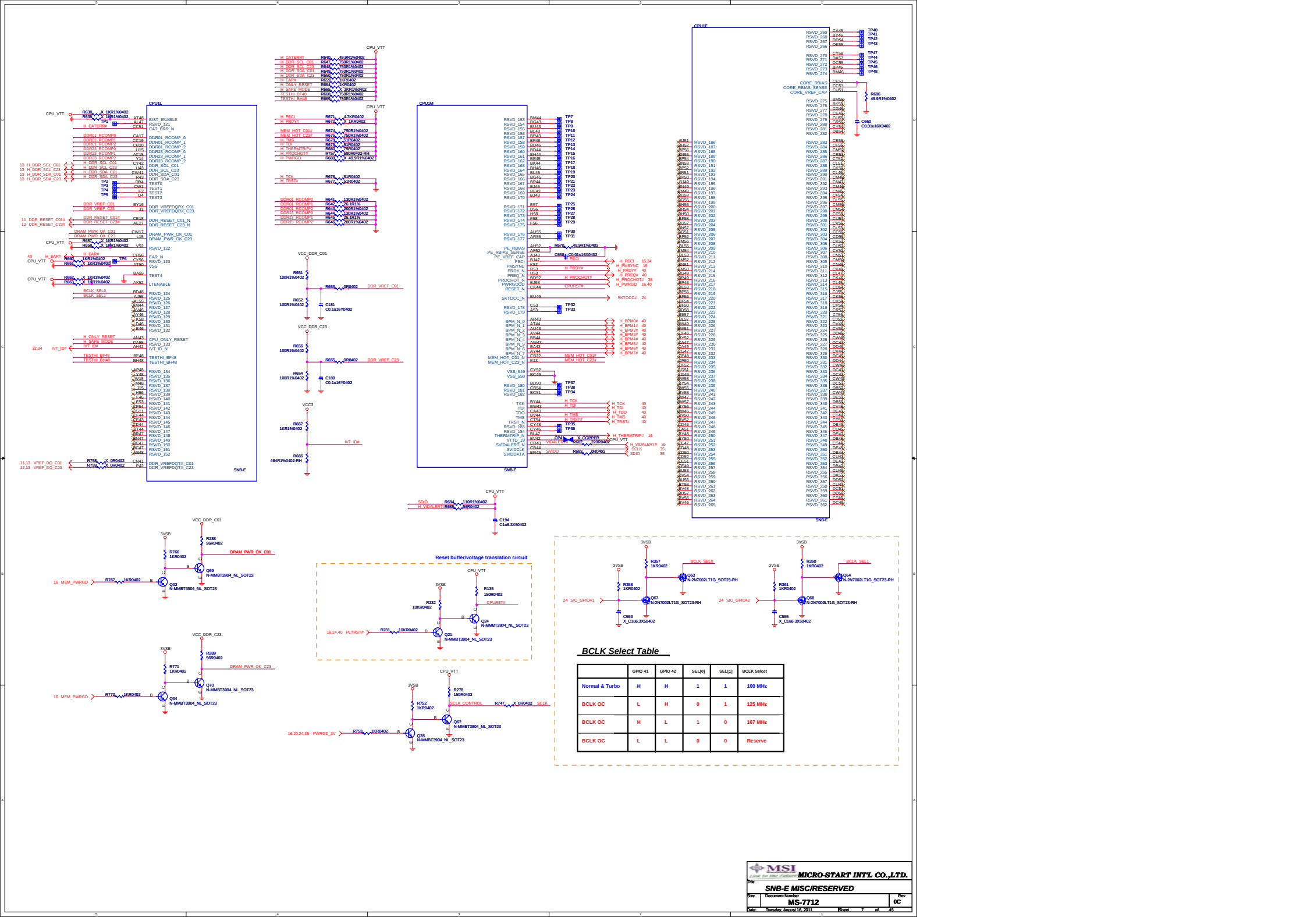


MICRO-START INTL CO.,LTD.

Title: SNB-E MEMORY CONTROLLER

Size	Document Number	Rev
	MS-7712	0C

Date: Tuesday, August 16, 2011 Sheet 6 of 45


CPU1L
CPU1M
CPU1E
SNB-E
CPU_VTT
VCC_DDR_C01
VCC_DDR_C23
VCC3
3VSB
Reset buffer/voltage translation circuit
BCLK Select Table
GPIO 41
GPIO 42
SEL[0]
SEL[1]
BCLK Selcet
Normal & Turbo
BCLK OC
Reserve
MICRO-START INT'L CO.,LTD.
SNB-E MISC/RESERVED
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MICRO-START INT'L CO.,LTD.

Title	SNB-E PCIE/DMI	
Size	Document Number: MS-7712	Rev: 0C
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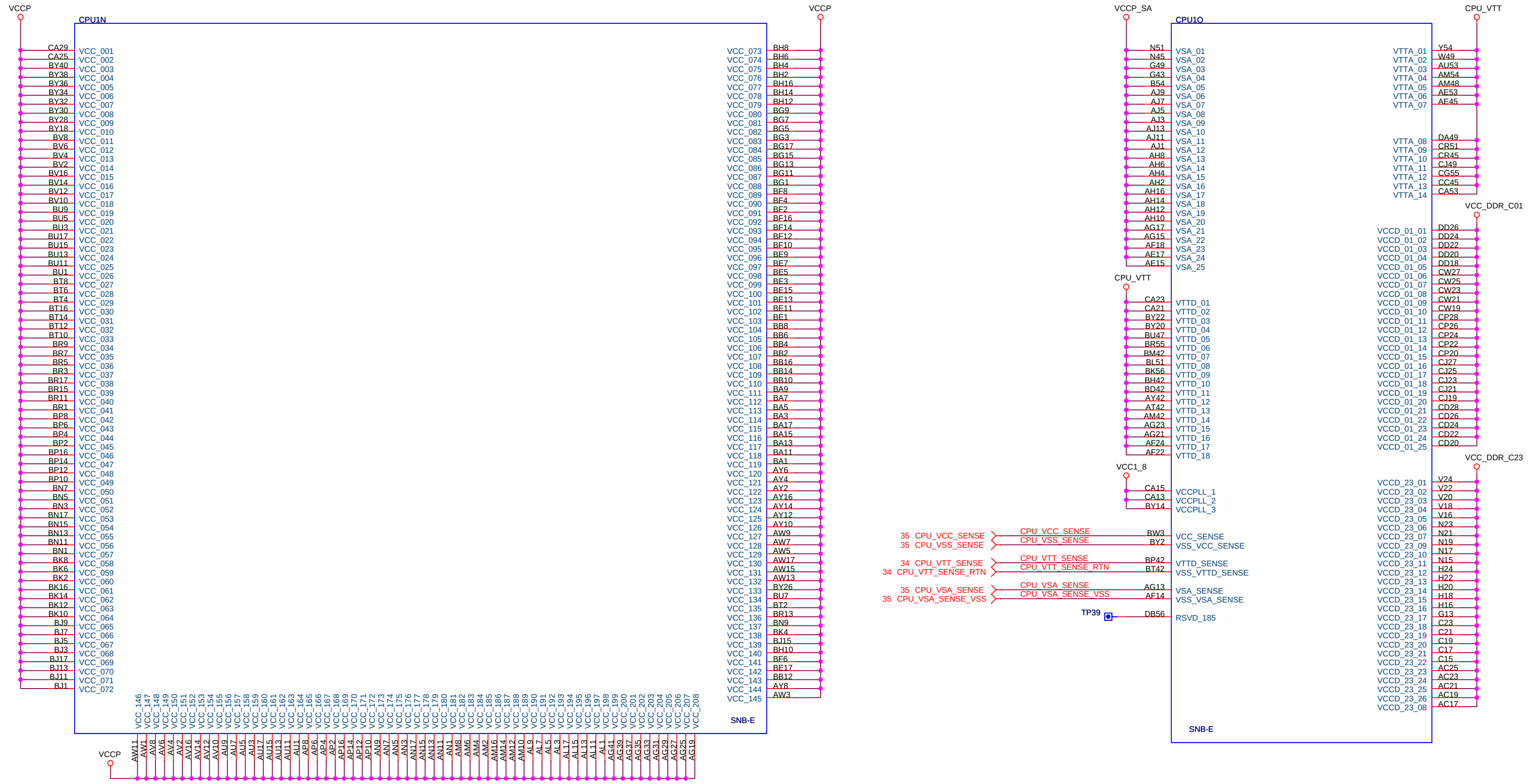

MICRO-START INT'L CO.,LTD.

Title: **SNB-E POWER**

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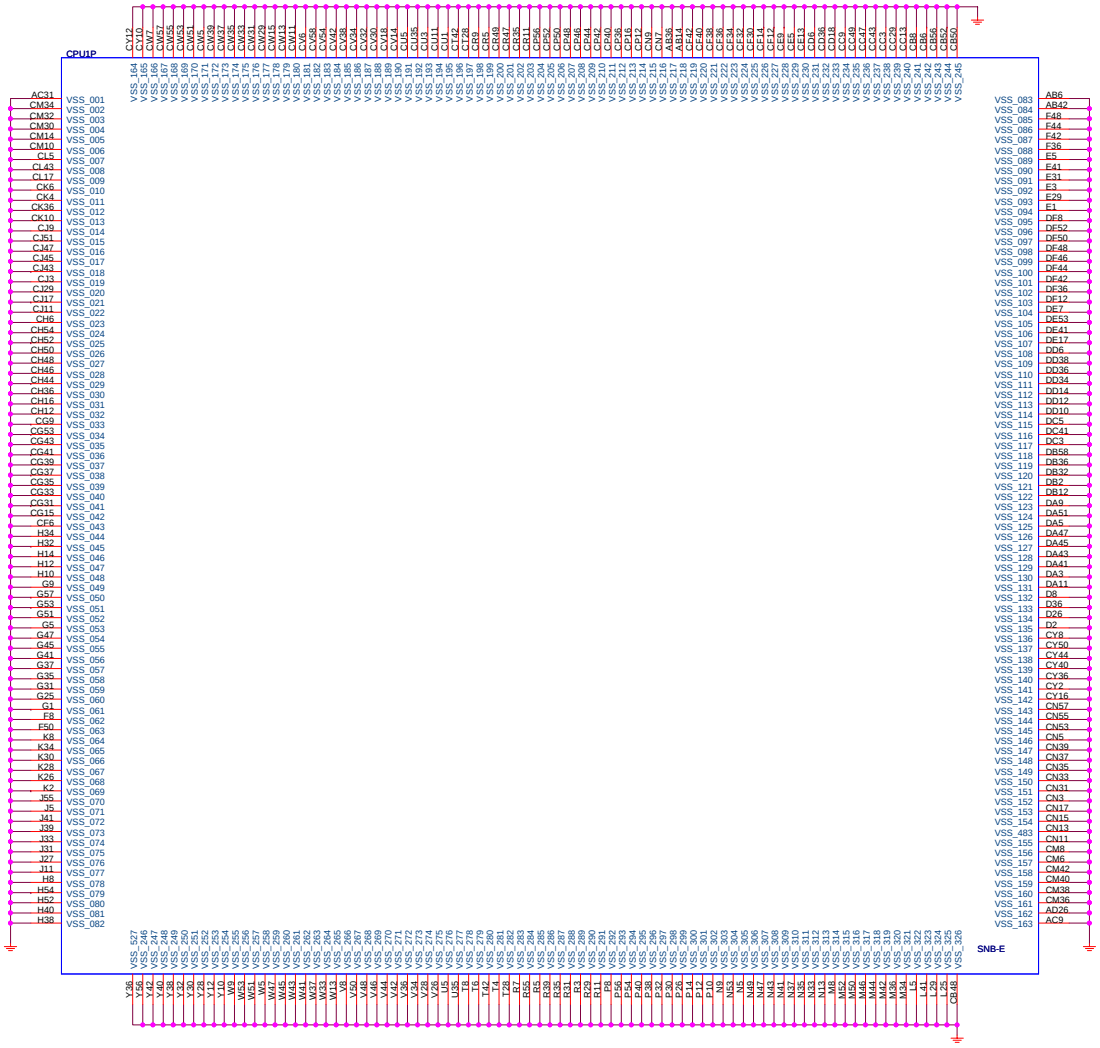
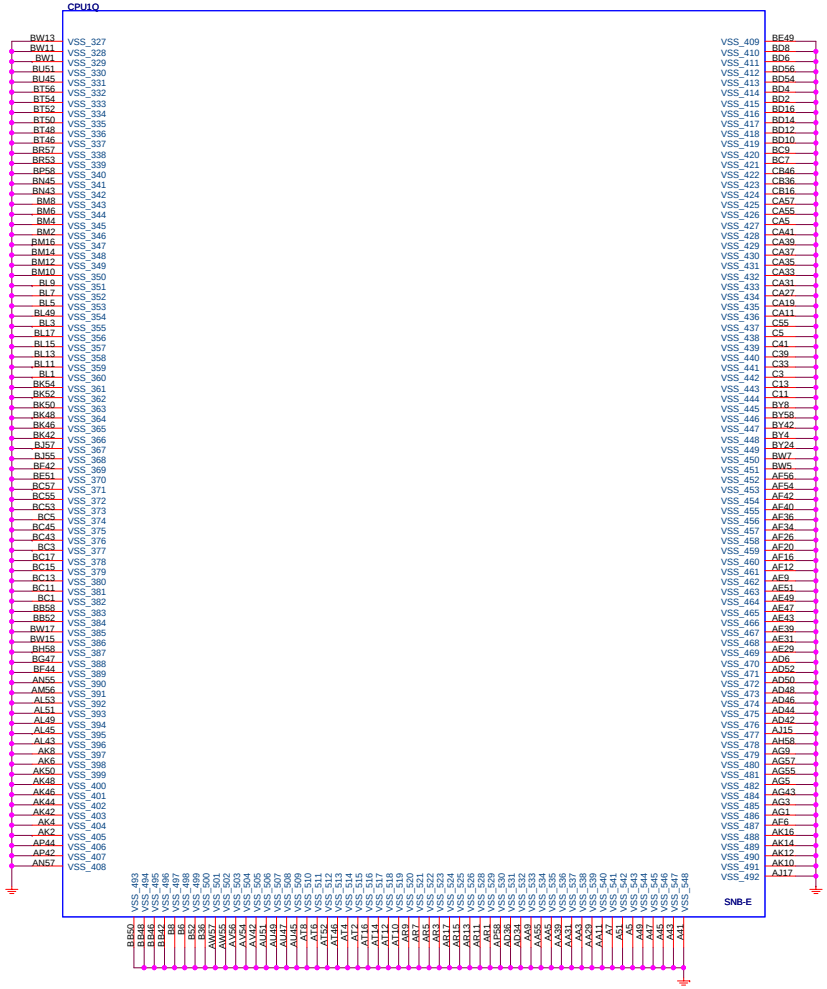
Date: Tuesday, August 16, 2011 Sheet 9 of 45





MSI Link to the Future	MICRO-START INT'L CO.,LTD.		
Title	SNB-E GND		
Size	Document Number MS-7712		Rev 0C
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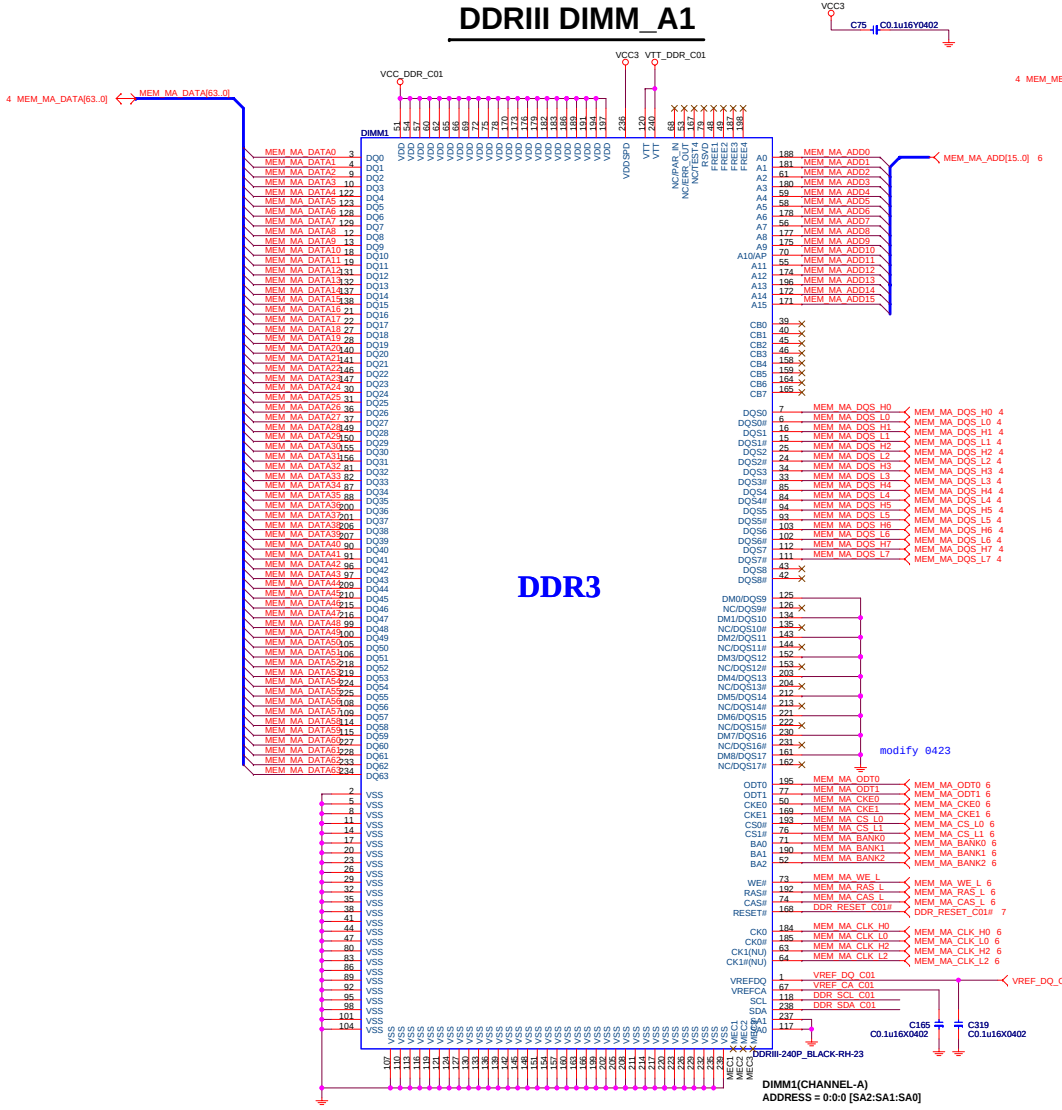
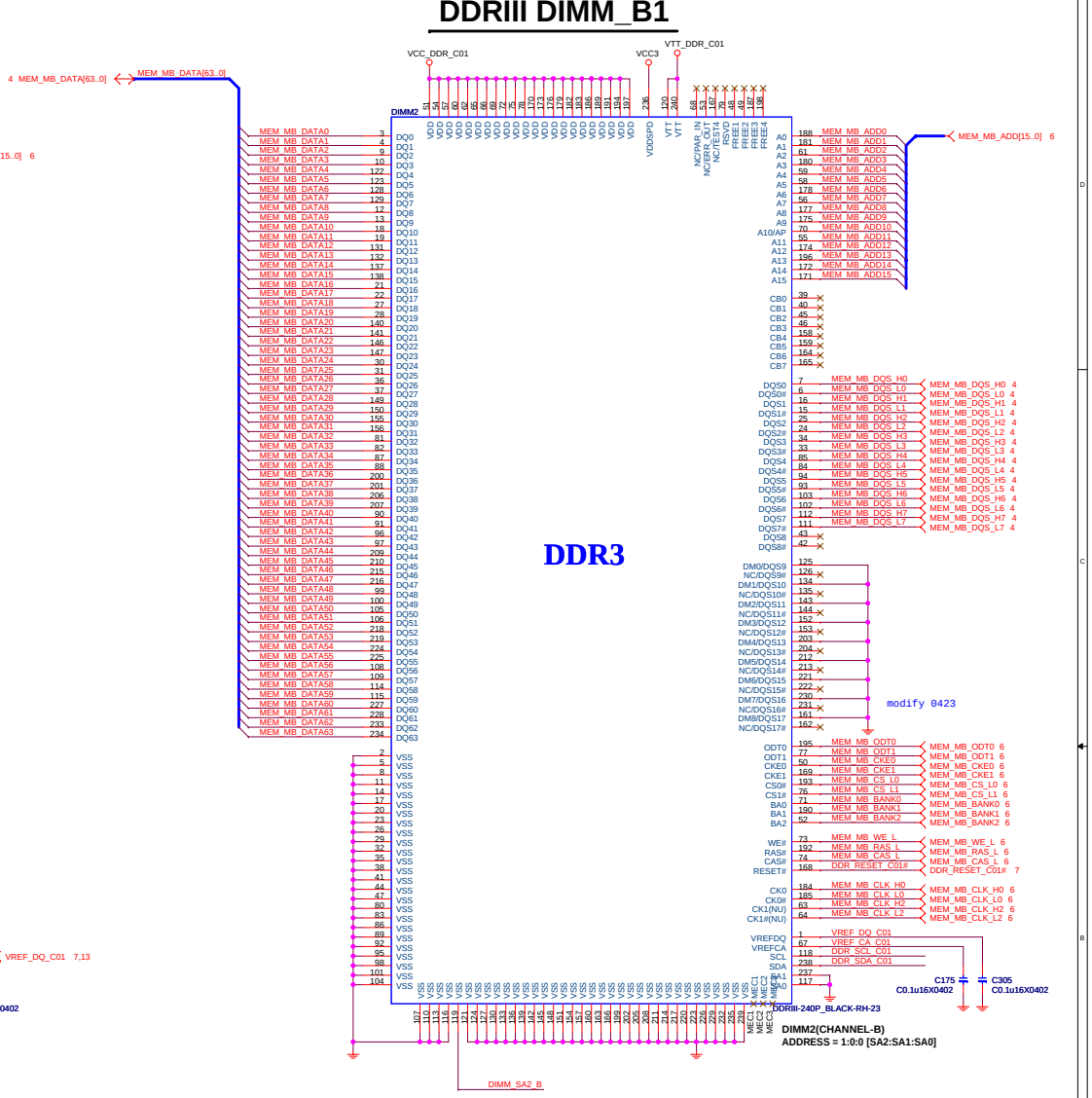
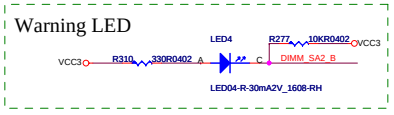
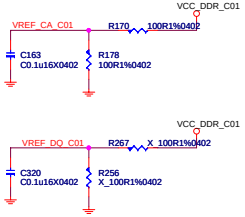
DDRIII DIMM_A1



DDRIII DIMM_B1



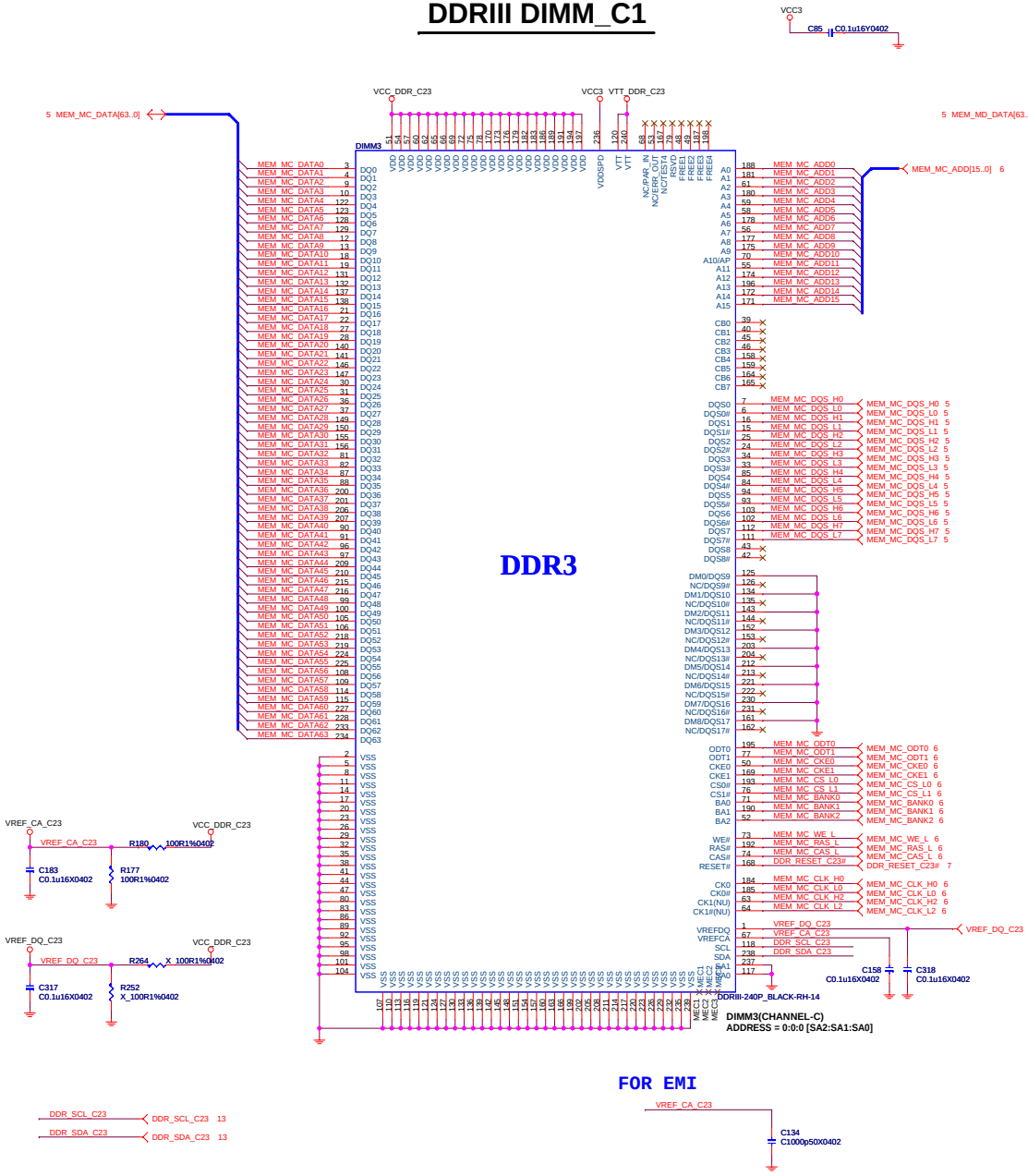




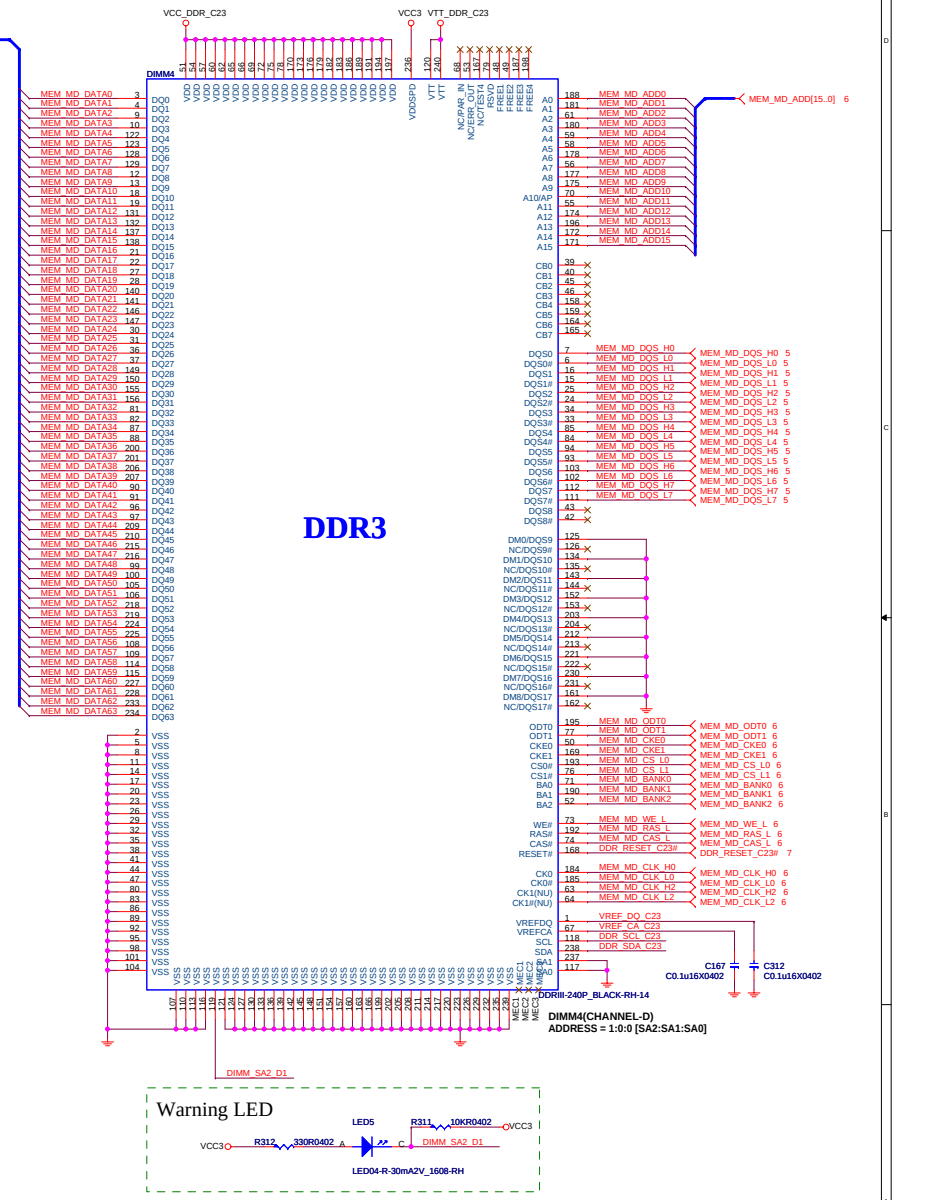
MSI MICRO-START INTL CO.,LTD.

Title	DDR3 Chanel-A & Chanel-B		
Size	Document Number MS-7712		Rev 0C
Date: Tuesday, August 16, 2011	Sheet 11 of 45		

DDRIII DIMM_C1



DDRIII DIMM_D1



MSI Link to the Future	MICRO-START INTL CO.,LTD.		
Title	DDR3 Channel-B & Channel-C		
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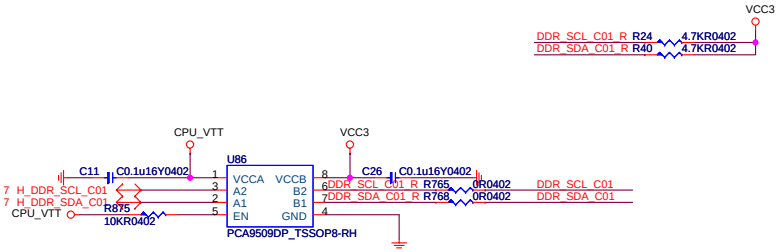

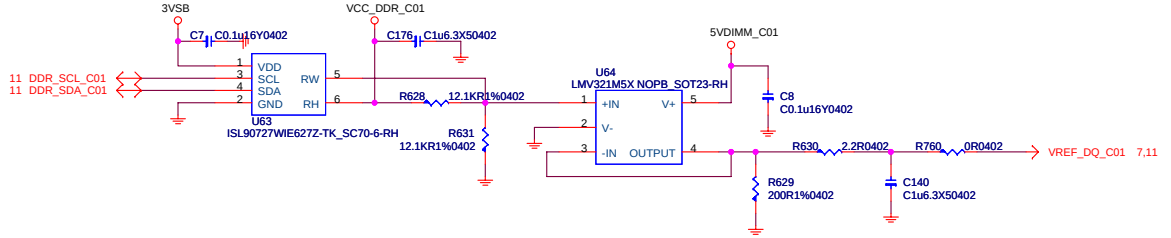

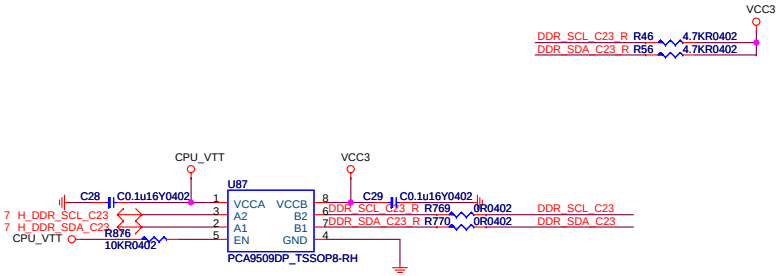

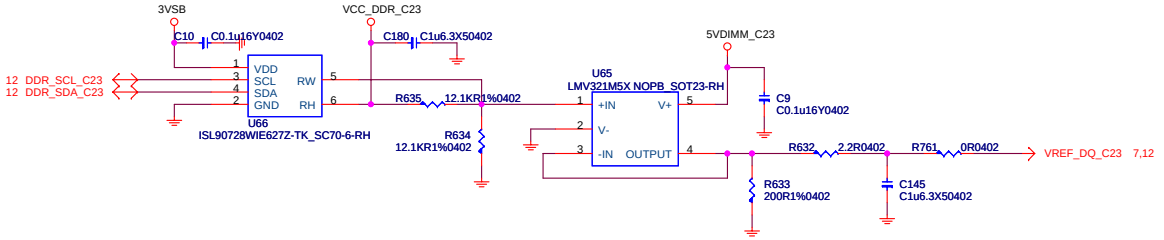

MICRO-START INT'L CO.,LTD.

Title: DDR3 DQ VREF

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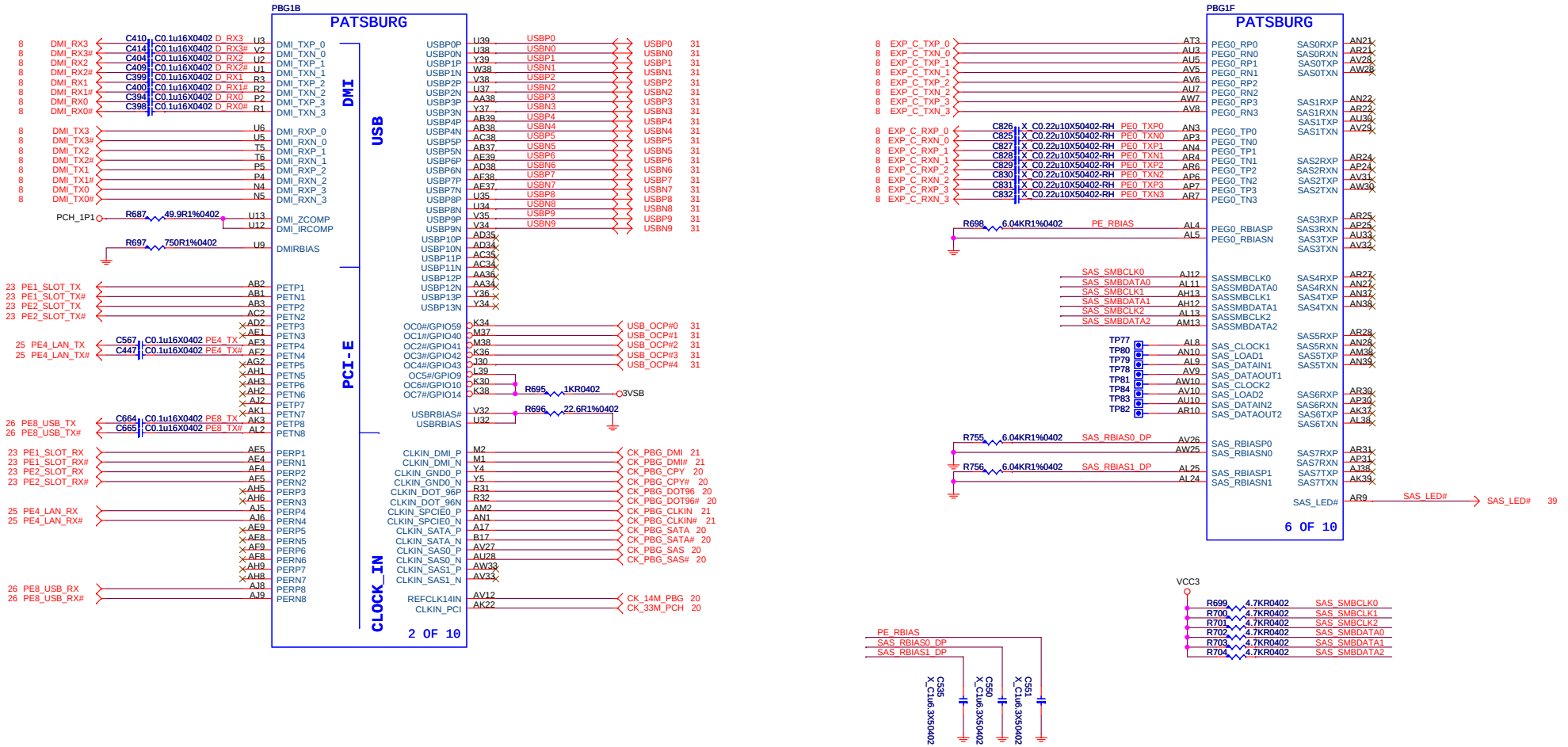
PBG1B
PATSBURG
DMI
USB
PCI-E
CLOCK_IN
2 OF 10
PBG1F
PATSBURG
6 OF 10
MICRO-START INT'L CO.,LTD.
PBG-PCIE/USB/DMI/SAS
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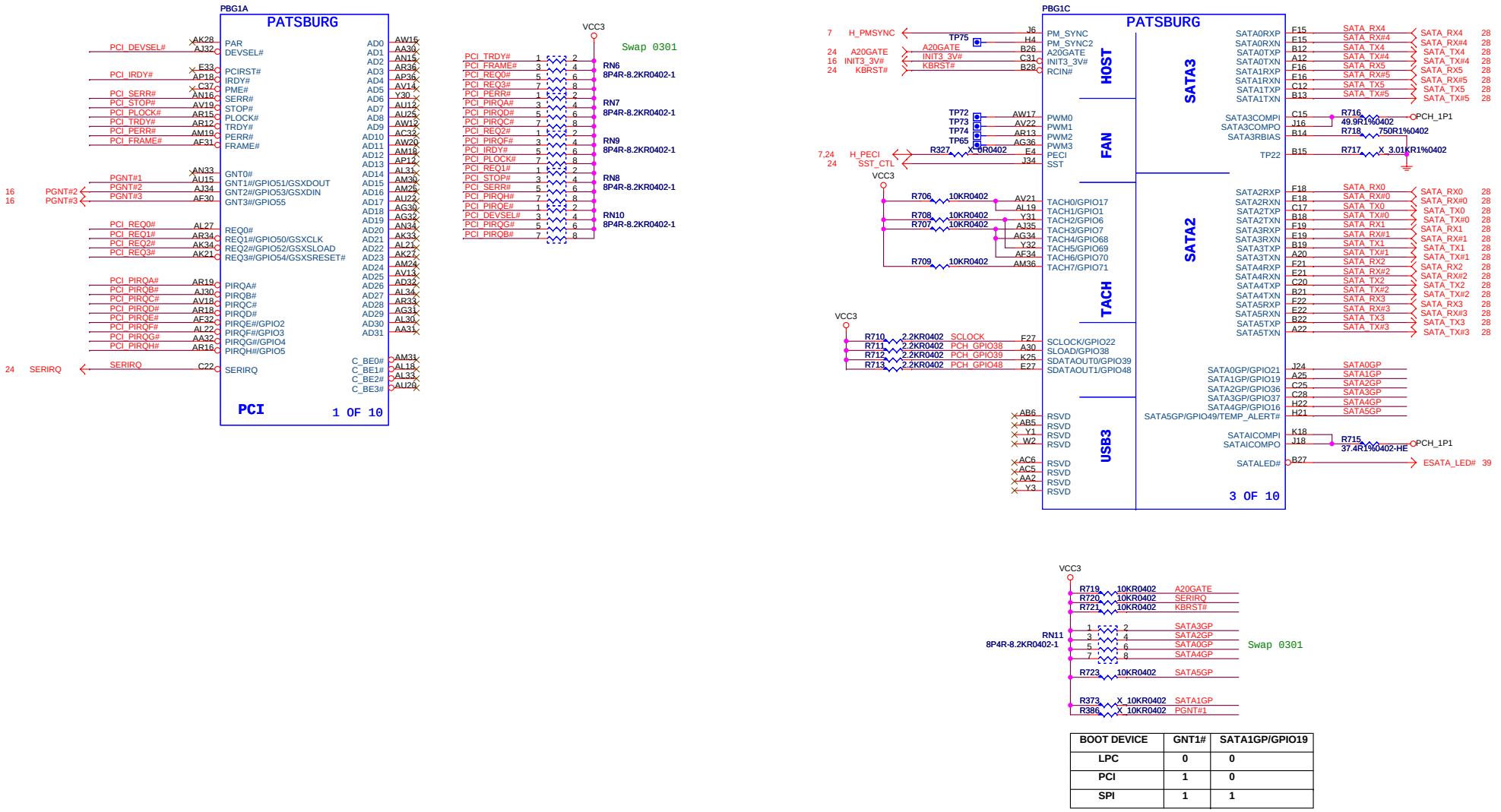

BOOT DEVICE	GNT1#	SATA1GP/GPIO19
LPC	0	0
PCI	1	0
SPI	1	1

MICRO-START INT'L CO.,LTD.

Title: PBG-PCI/SATA

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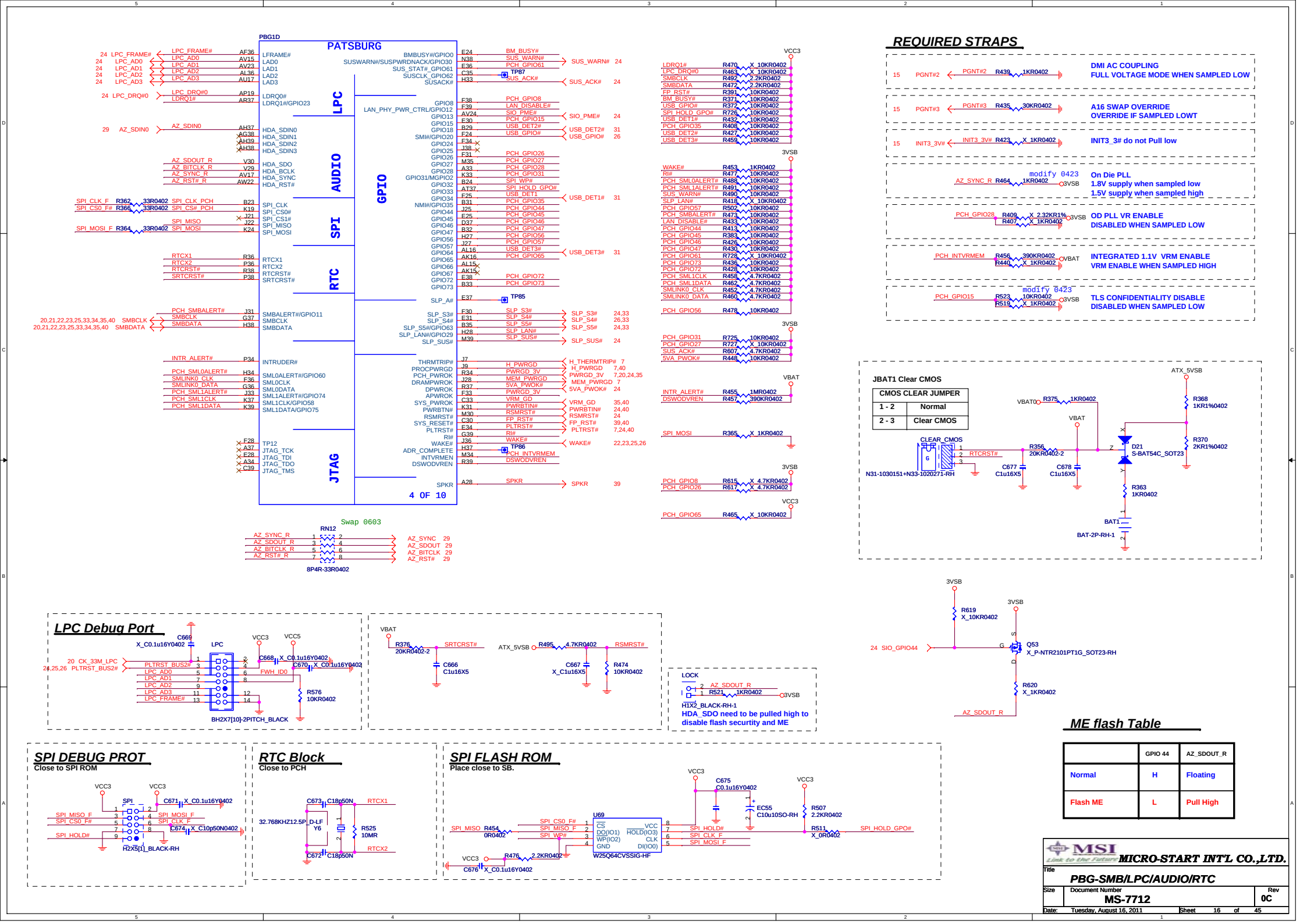

	GPIO 44	AZ_SDOUT_R
Normal	H	Floating
Flash ME	L	Pull High

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

Title: PBG-SMB/LPC/AUDIO/RTC

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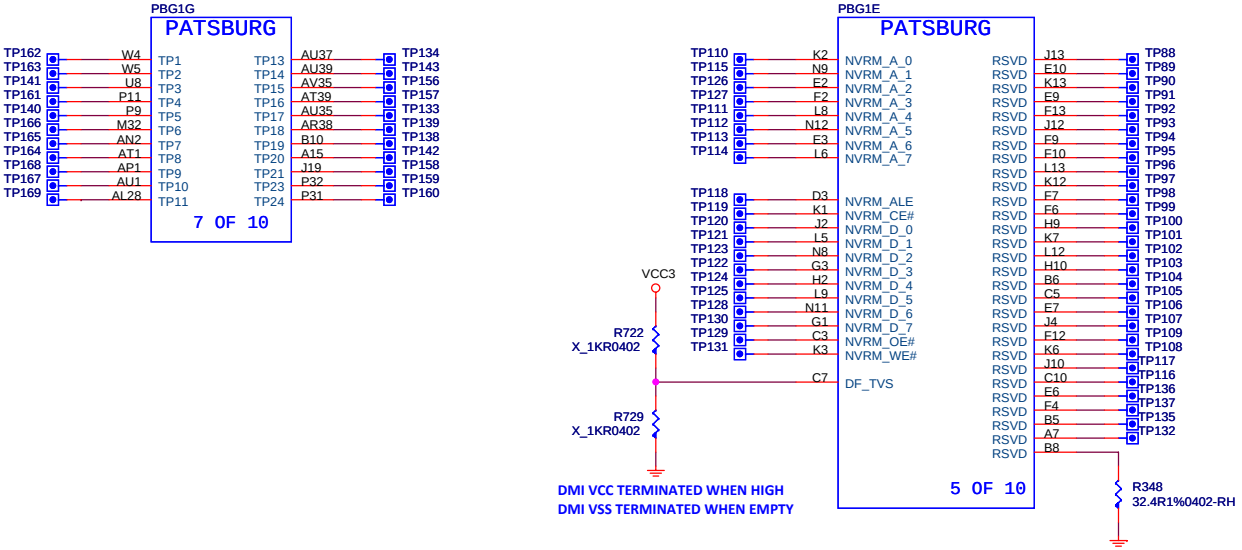

MSI Link to the Future **MICRO-START INT'L CO.,LTD.**

Title	**PBG-NVRM**	
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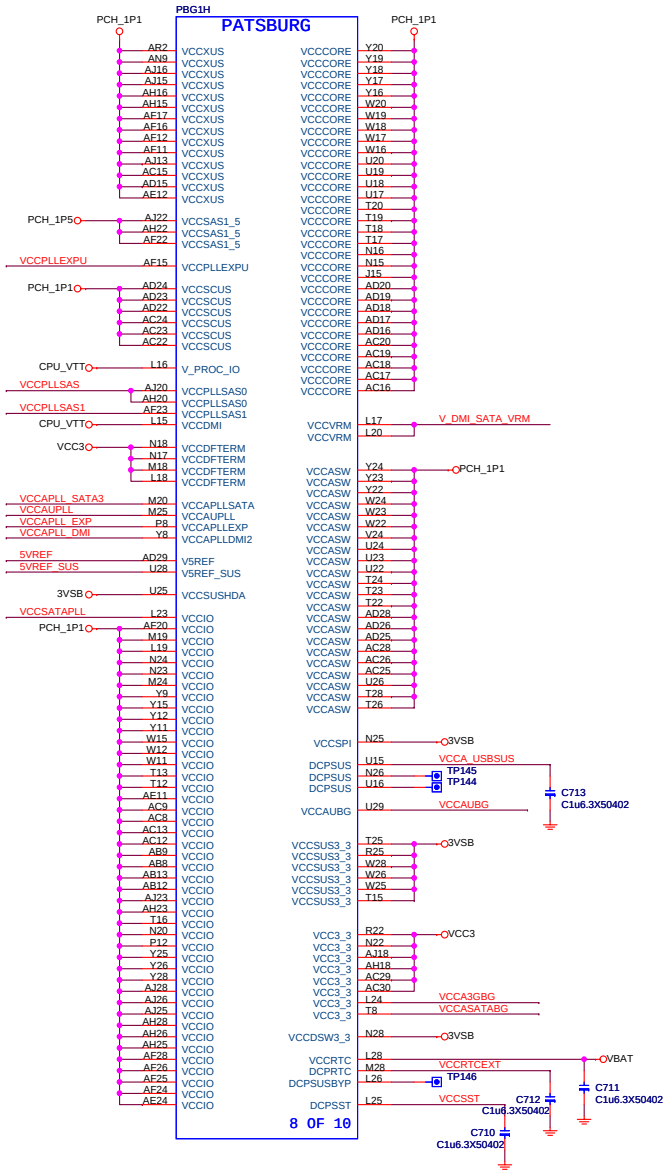

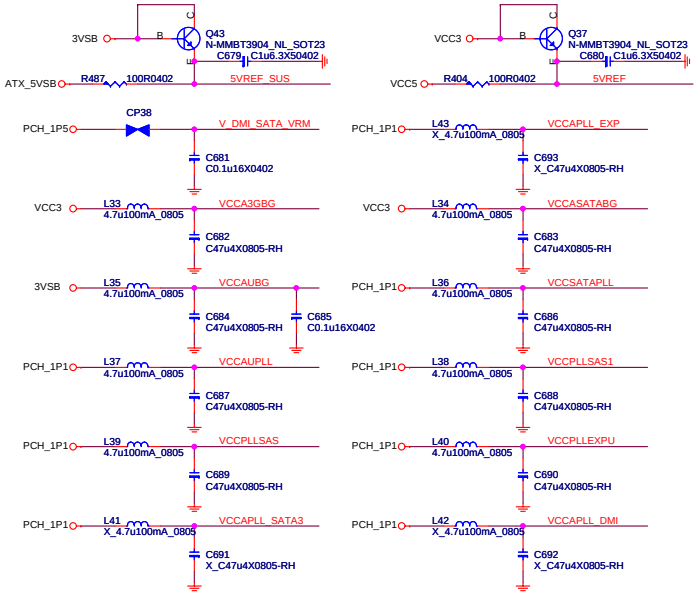

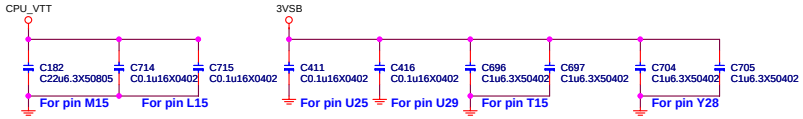

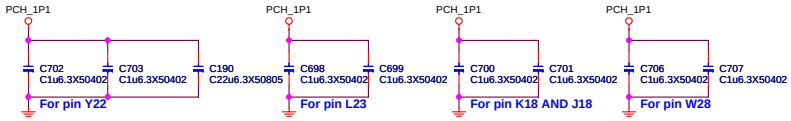

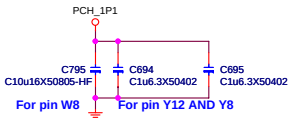

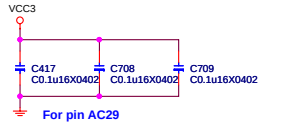

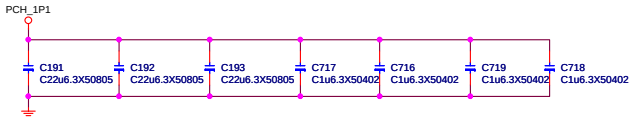

MSI MICRO-START INT'L CO.,LTD.

Title: PBG-POWER

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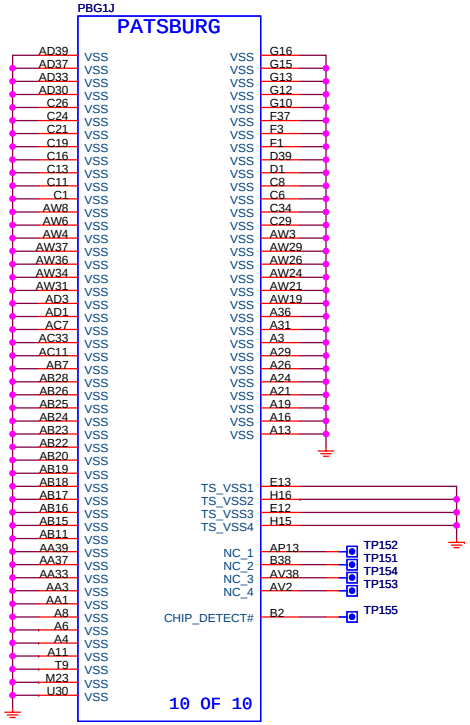

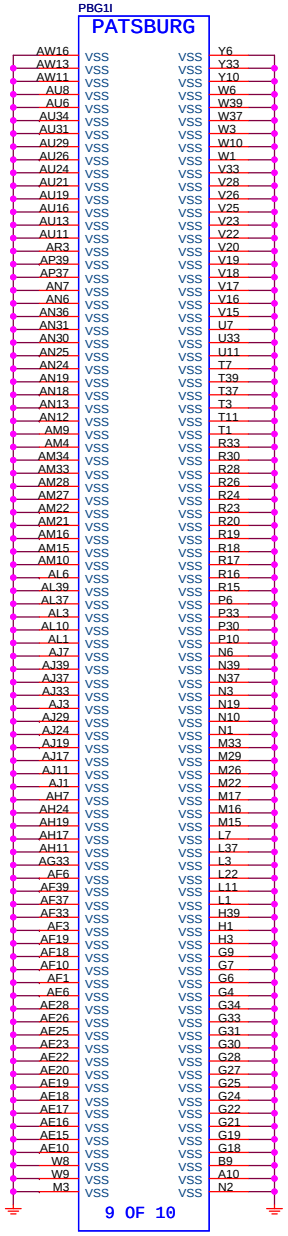

MSI Link to the Future **MICRO-START INT'L CO.,LTD.**

Title	**PBG-GND**	
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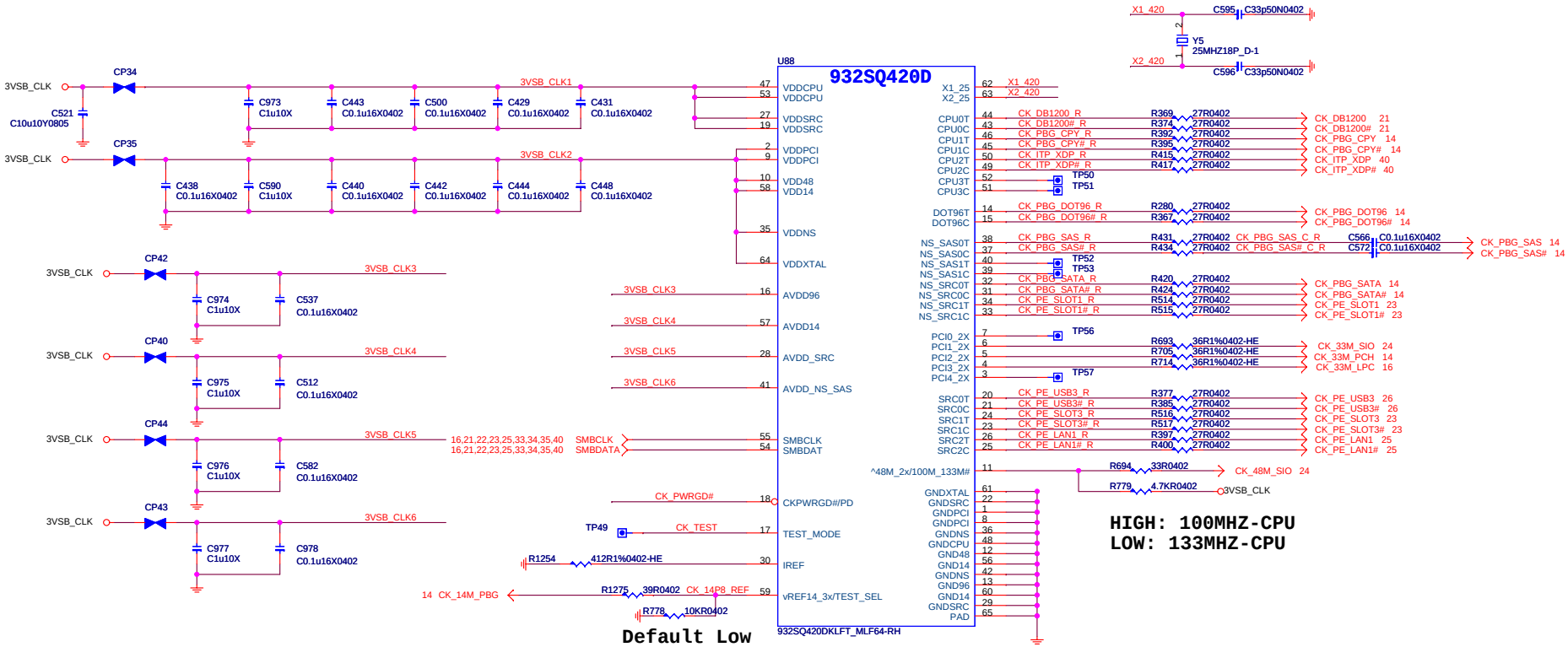
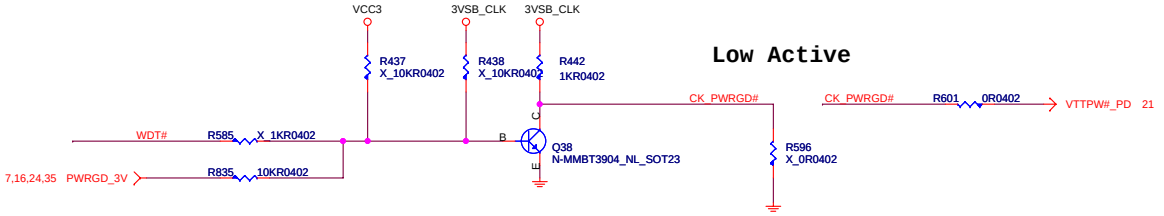
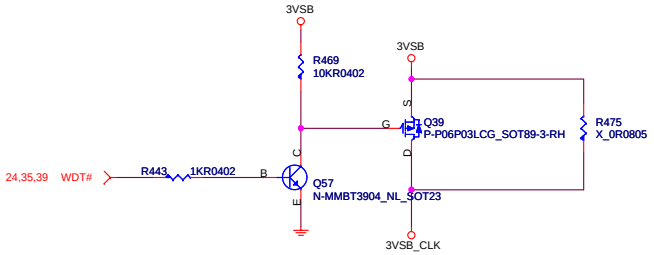
Clock Gen 932SQ420D







CK_DB1200	R401	43.2R1%0402
CK_DB1200#	R402	43.2R1%0402
CK_PBG_CPY	R447	43.2R1%0402
CK_PBG_CPY#	R482	43.2R1%0402
CK_ITP_XDP	R484	43.2R1%0402
CK_ITP_XDP#	R485	43.2R1%0402
CK_PBG_DOT96	R486	43.2R1%0402
CK_PBG_DOT96#	R489	43.2R1%0402
CK_PBG_SAS_C_R	R493	43.2R1%0402
CK_PBG_SAS#_C_R	R494	43.2R1%0402
CK_PBG_SATA	R532	43.2R1%0402
CK_PBG_SATA#	R540	43.2R1%0402
CK_PE_SLOT1	R518	43.2R1%0402
CK_PE_SLOT1#	R530	43.2R1%0402
CK_PE_USB3	R497	43.2R1%0402
CK_PE_USB3#	R503	43.2R1%0402
CK_PE_SLOT3	R583	43.2R1%0402
CK_PE_SLOT3#	R546	43.2R1%0402
CK_PE_LAN1	R504	43.2R1%0402
CK_PE_LAN1#	R513	43.2R1%0402

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

Title	CK505 932SQ420D	
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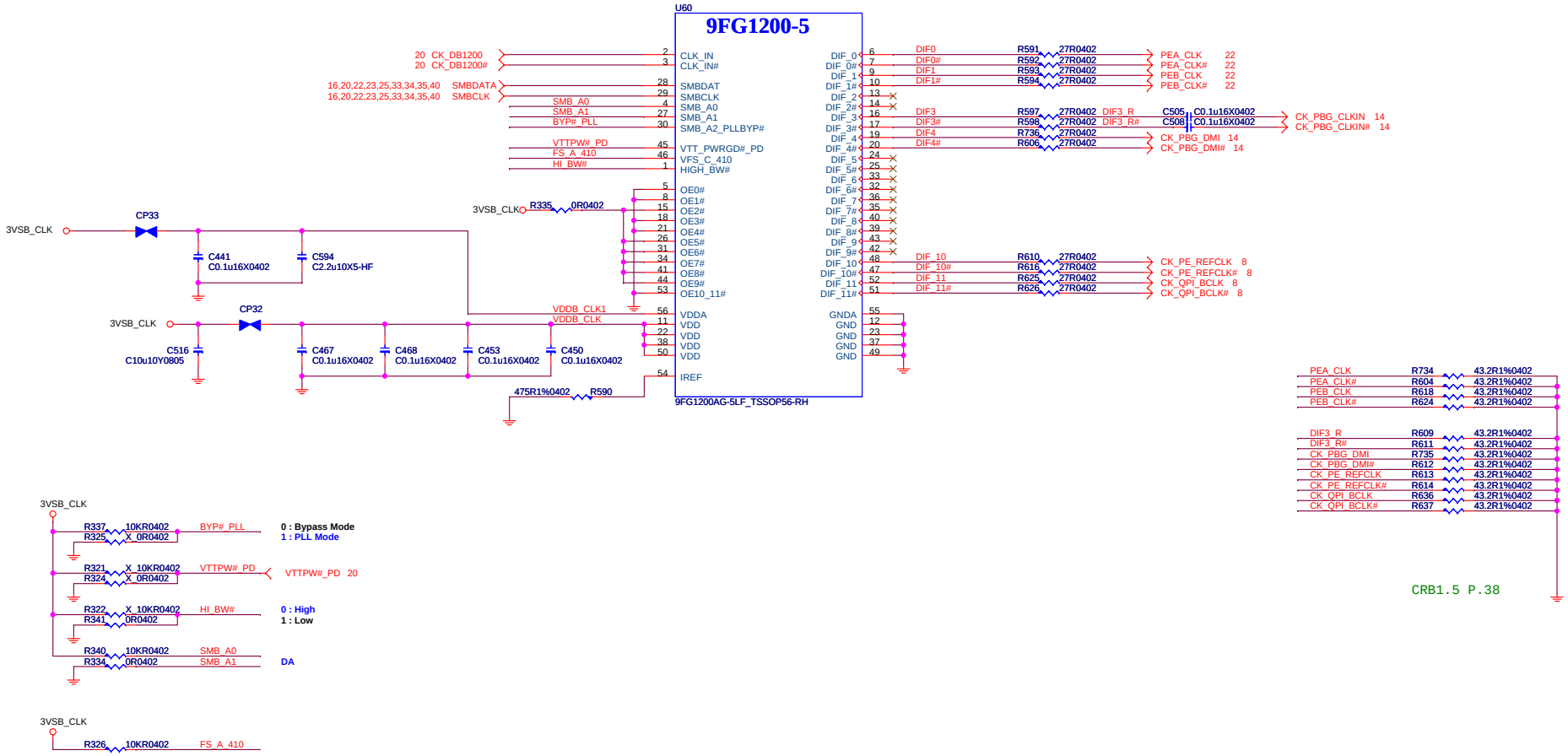
Clock Buffer 9FG1200D



MICRO-START INT'L CO.,LTD.

Title	Clock Buffer DB1200	
Size	Document Number: MS-7712	Rev: 0C
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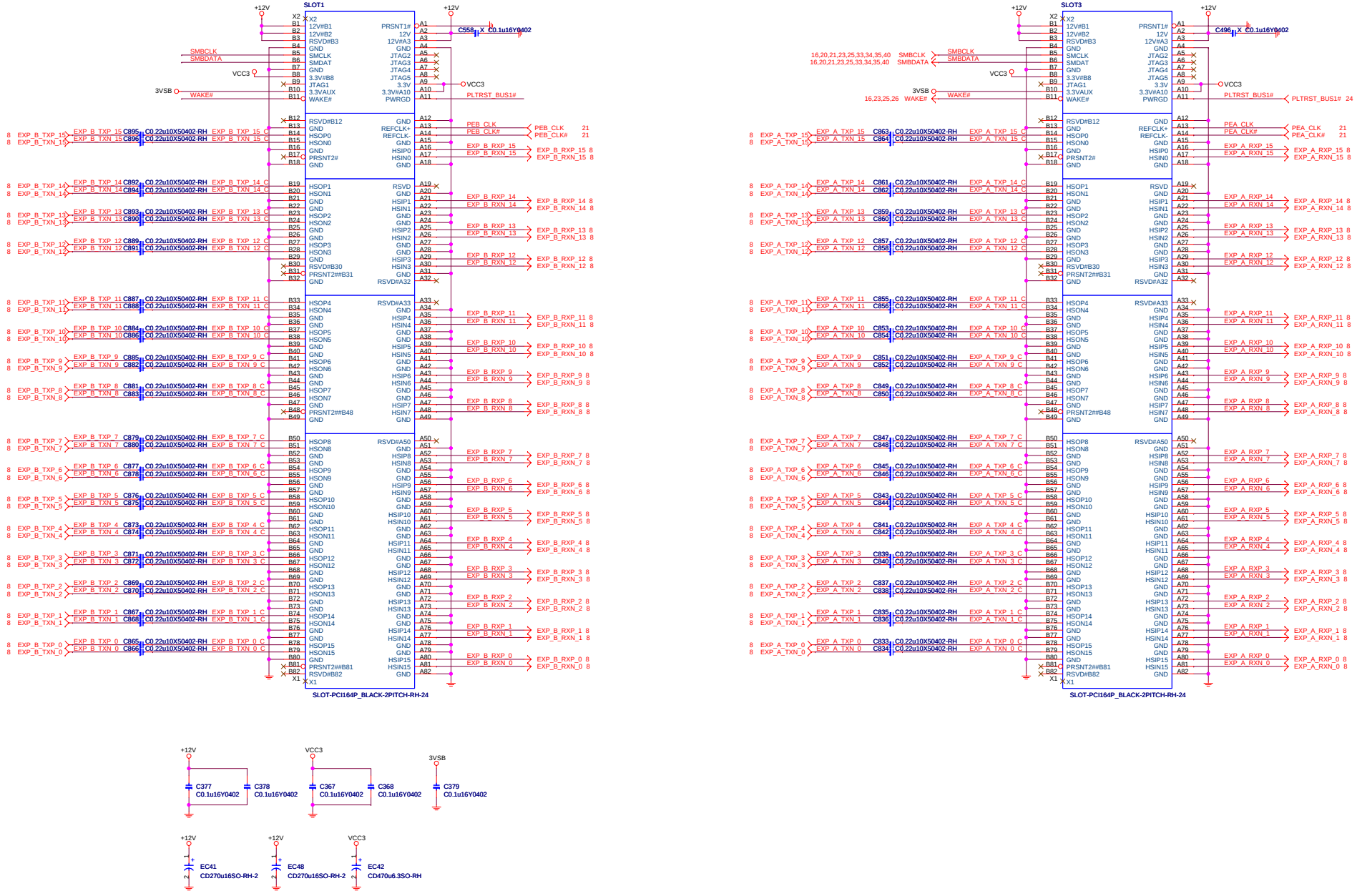
PCI_EXPRESS X16 SLOT



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

Title: PCIE X16 slot		
Size	Document Number: MS-7712	Rev: 0C
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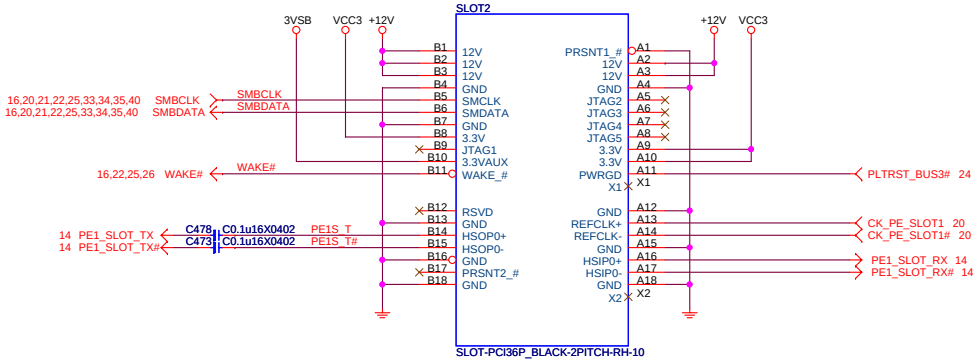
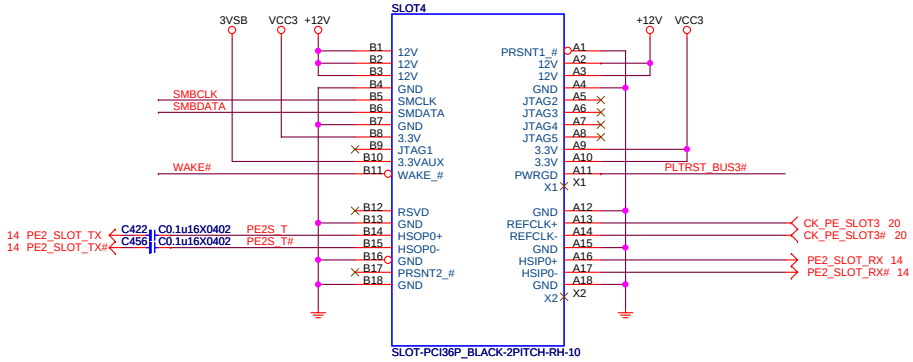
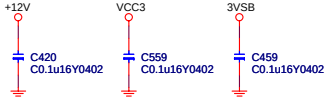
PCI EXPRESS X1 SLOT







MICRO-START INT'L CO.,LTD.

Title: PCIE x1 SLOTS		
Size	Document Number: MS-7712	Rev: 0C
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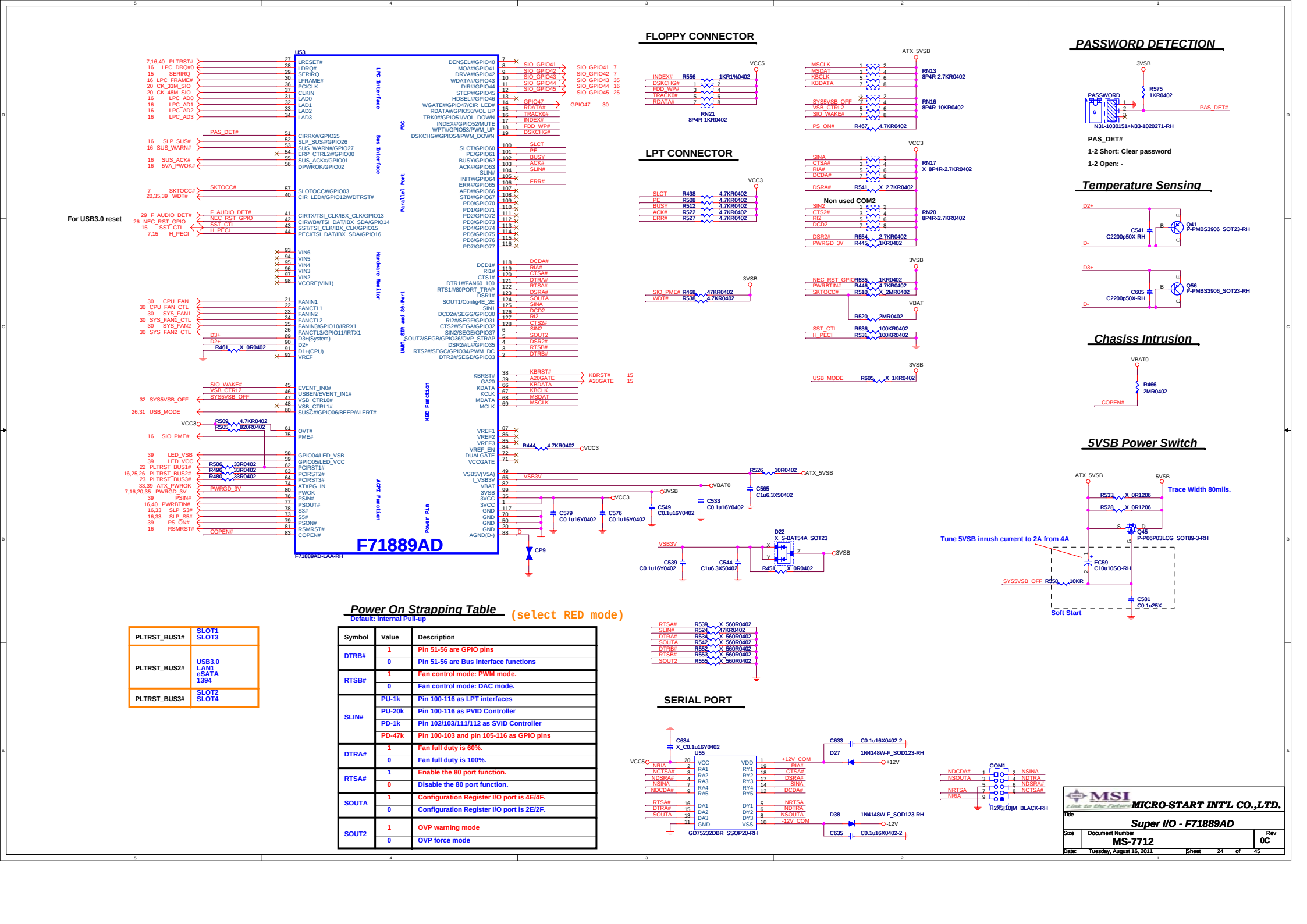
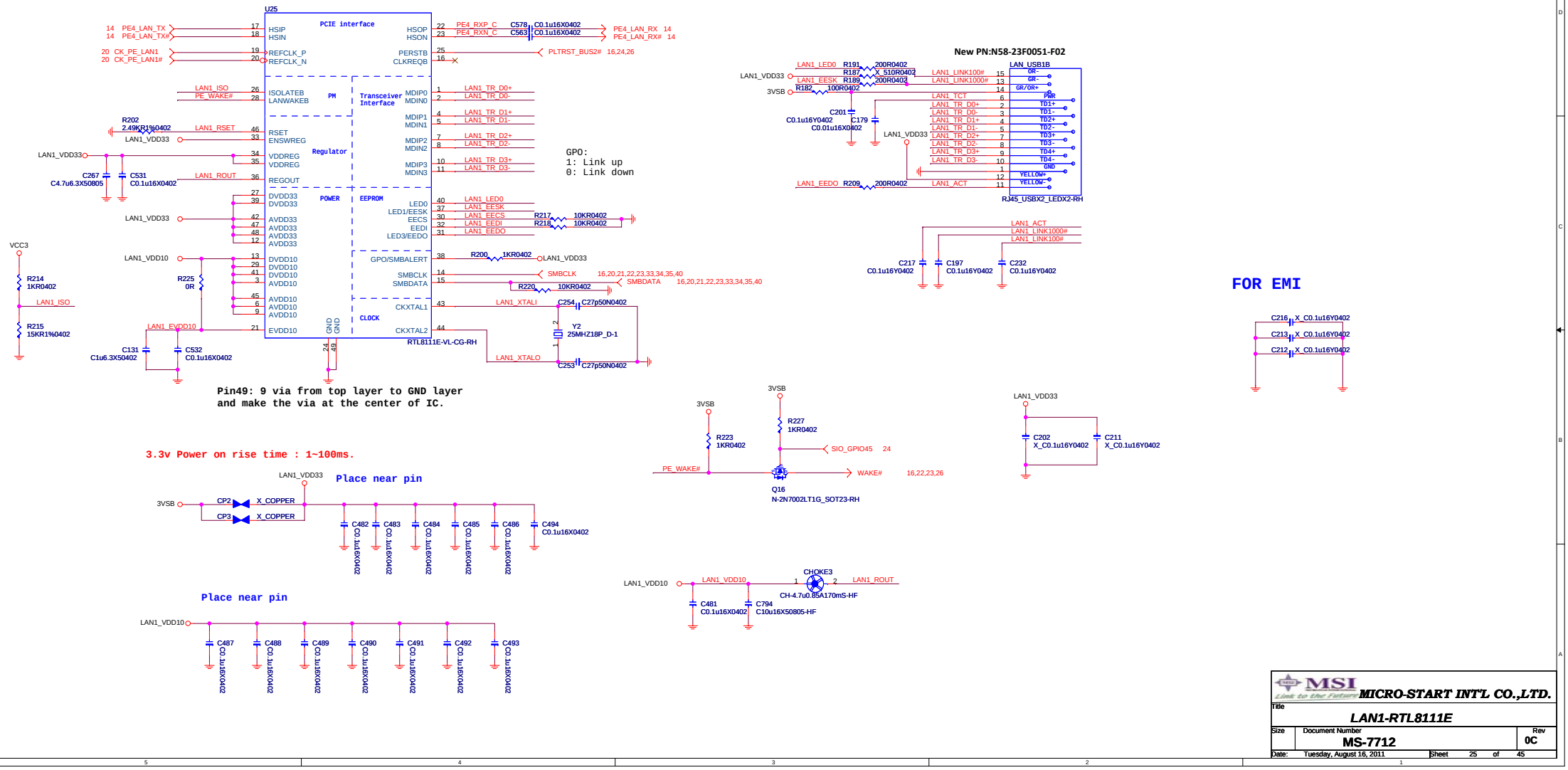


Power On Strapping Table

Default: Internal Pull-up (select RED mode)

Symbol	Value	Description
DTRB#	1	Pin 51-56 are GPIO pins
	0	Pin 51-56 are Bus Interface functions
RTSB#	1	Fan control mode: PWM mode.
	0	Fan control mode: DAC mode.
SLIN#	PU-1k	Pin 100-116 as LPT interfaces
	PU-20k	Pin 100-116 as PVID Controller
	PD-1k	Pin 102/103/111/112 as SVID Controller
	PD-47k	Pin 100-103 and pin 105-116 as GPIO pins
DTRA#	1	Fan full duty is 60%.
	0	Fan full duty is 100%.
RTSA#	1	Enable the 80 port function.
	0	Disable the 80 port function.
SOUTA	1	Configuration Register I/O port is 4E/4F.
	0	Configuration Register I/O port is 2E/2F.
SOUT2	1	OVP warning mode
	0	OVP force mode

PLTRST_BUS1#	SLOT1 SLOT3
PLTRST_BUS2#	USB3.0 LAN1 eSATA 1394
PLTRST_BUS3#	SLOT2 SLOT4



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

Title: LAN1-RTL8111E

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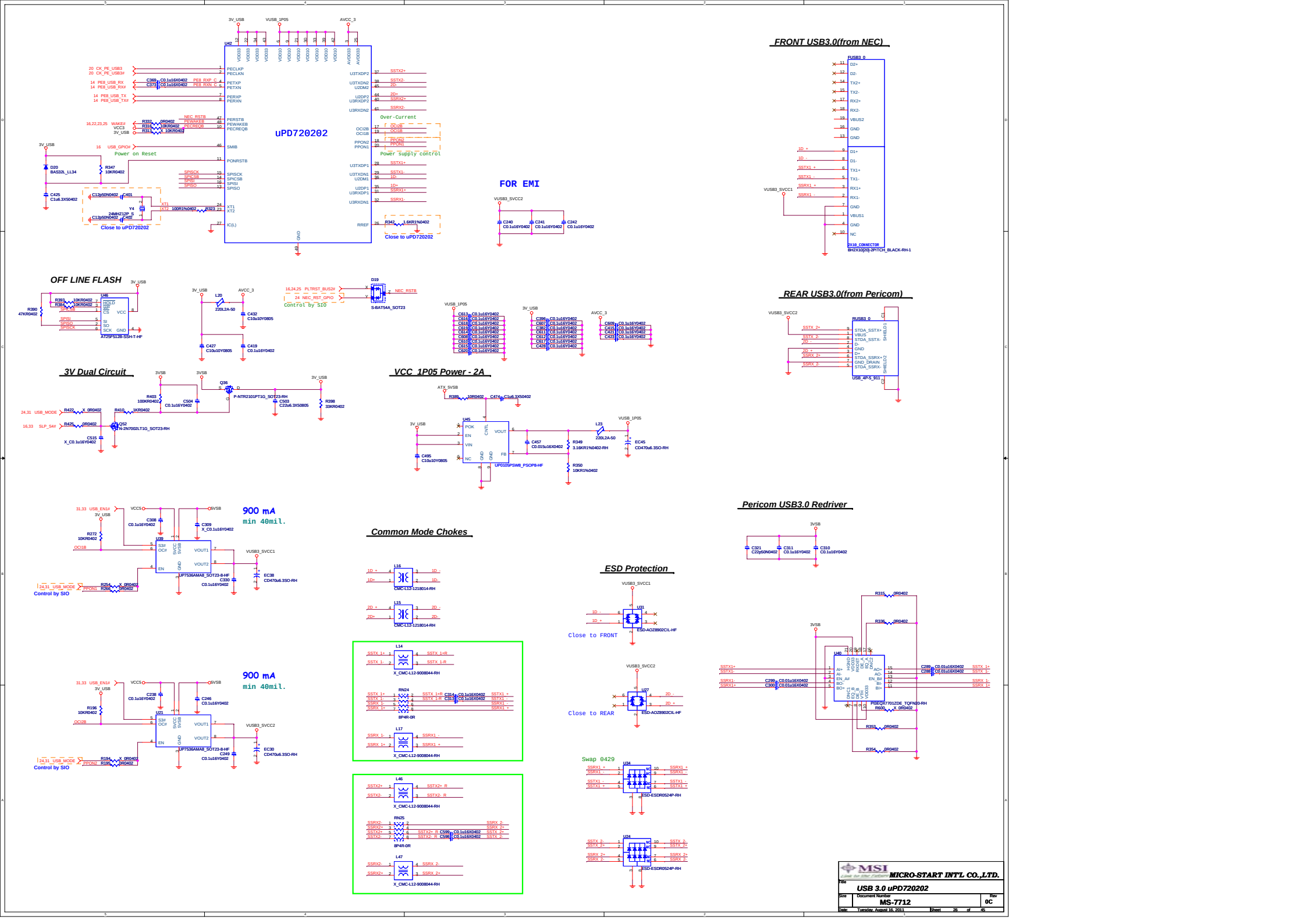
uPD720202
FRONT USB3.0(from NEC)
FOR EMI
OFF LINE FLASH
REAR USB3.0(from Pericom)
3V Dual Circuit
VCC_1P05 Power - 2A
Pericom USB3.0 Redriver
Common Mode Chokes
ESD Protection
900 mA
min 40mil.
Close to uPD720202
Power on Reset
Over-Current
Power supply control
Control by SIO
Close to FRONT
Close to REAR
Swap 0429
MICRO-START INT'L CO.,LTD.
USB 3.0 uPD720202
MS-7712
Tuesday, August 16, 2011

MICRO-START INT'L CO.,LTD.

Title: N/A

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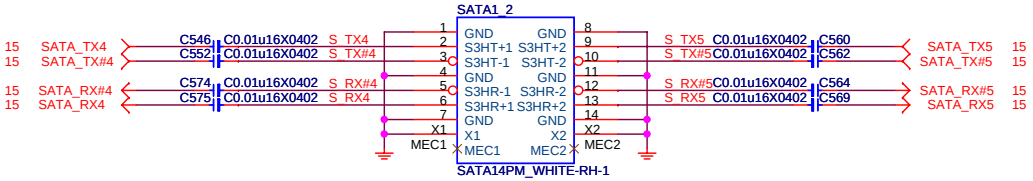
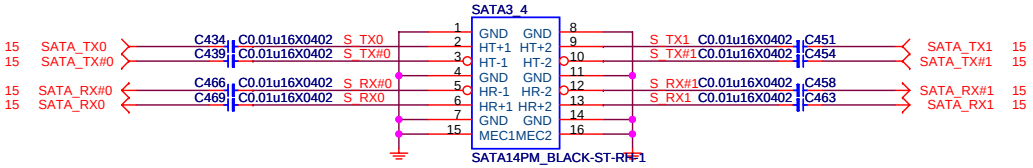
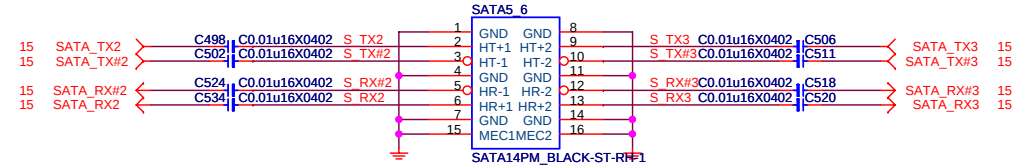
SATA Connector







MICRO-START INT'L CO.,LTD.

Title: SATA Port

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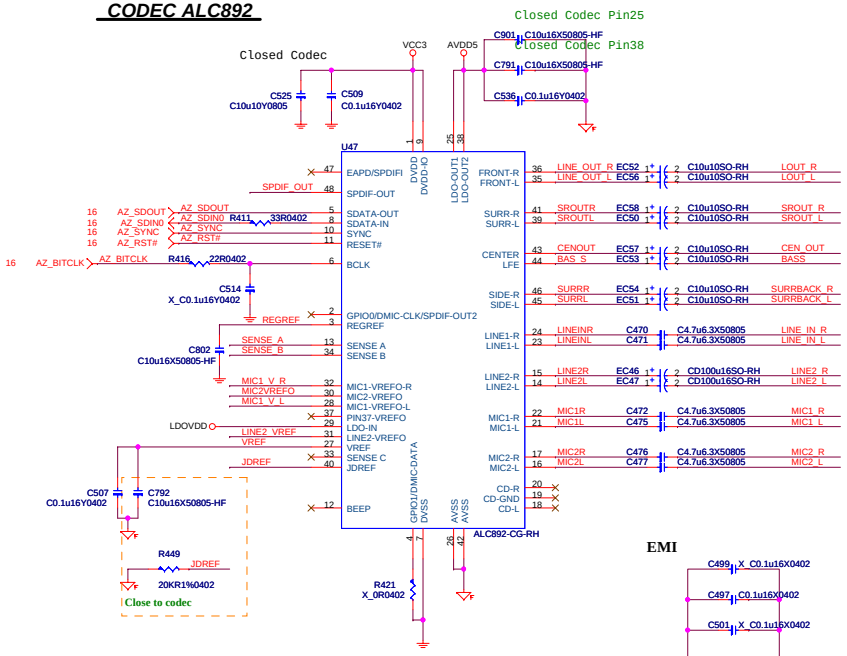
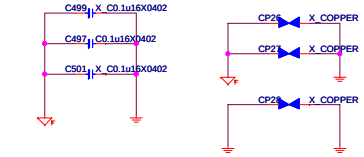
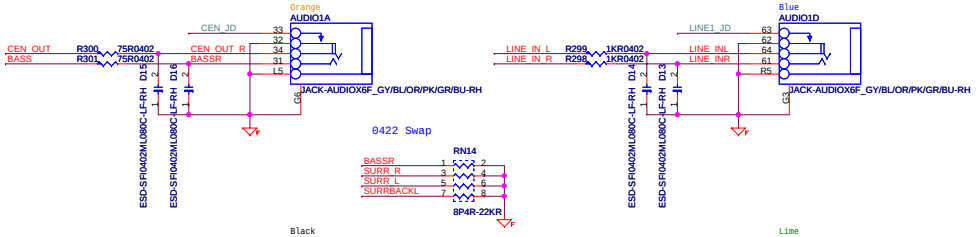
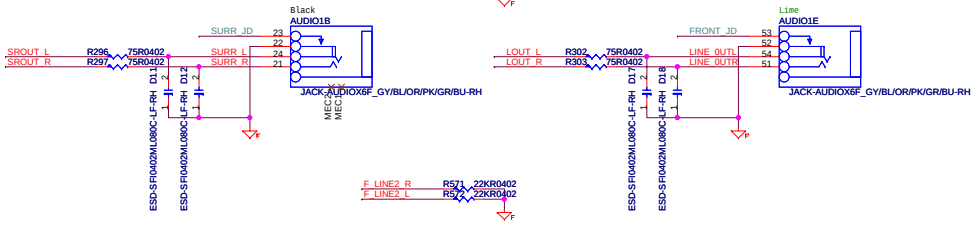
CODEC ALC892

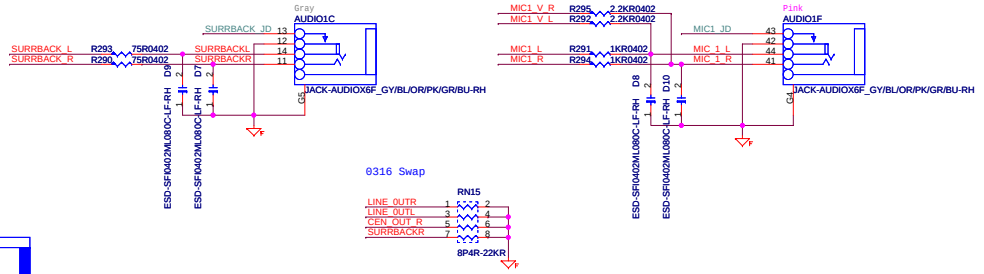


EMI

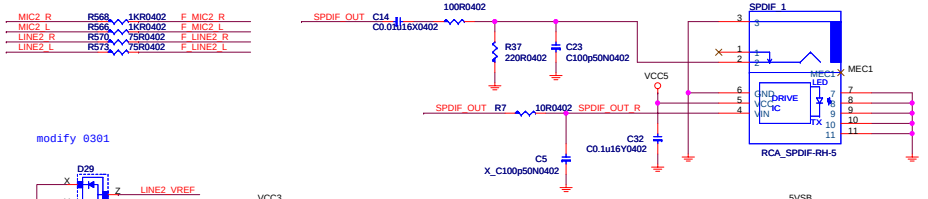


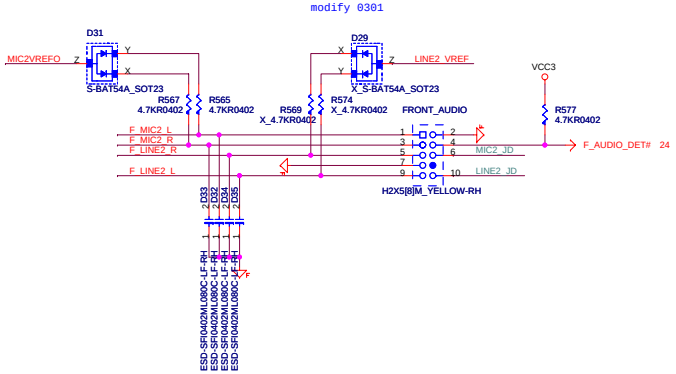


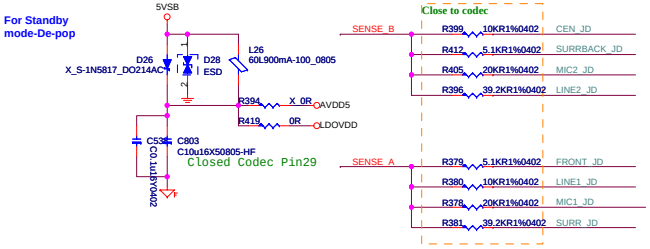


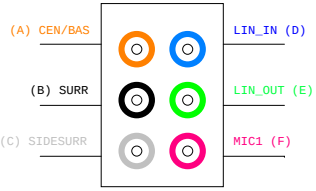


SPDIF OUT OPT+RCA









MICRO-START INT'L CO.,LTD.

Title: Azalia Codec - ALC892		
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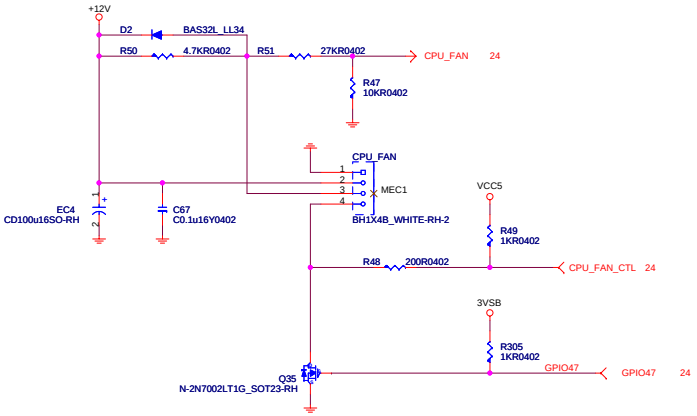
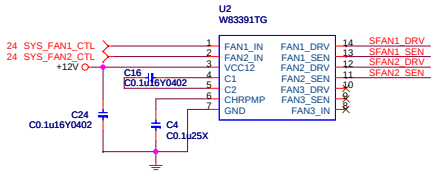
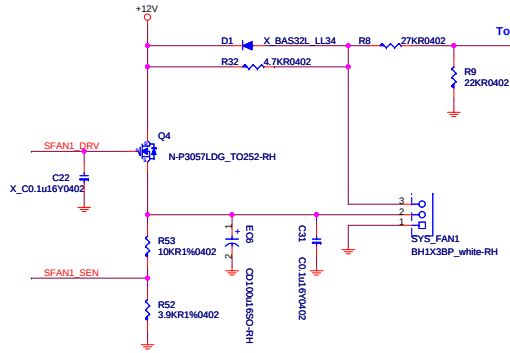
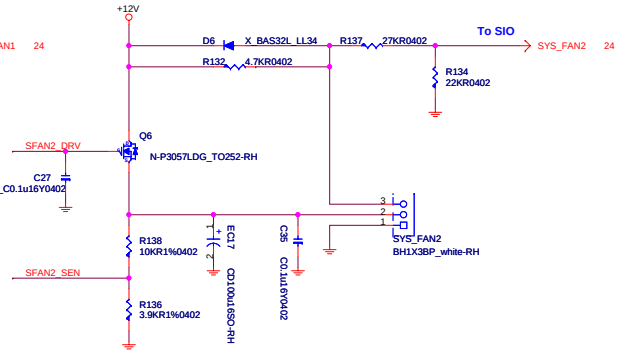
CPU Fan





System Fan





MICRO-START INT'L CO.,LTD.

Title	FAN PORT	
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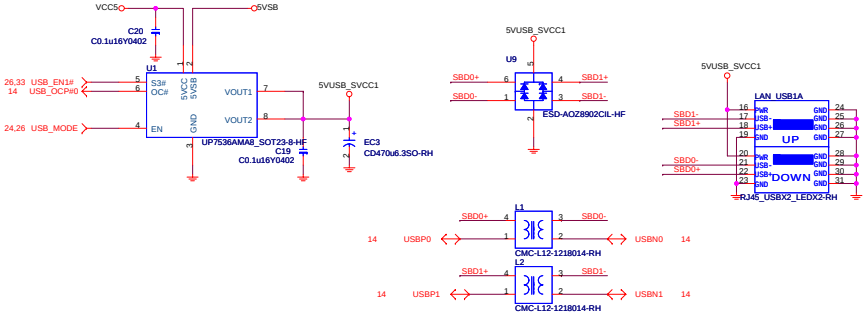
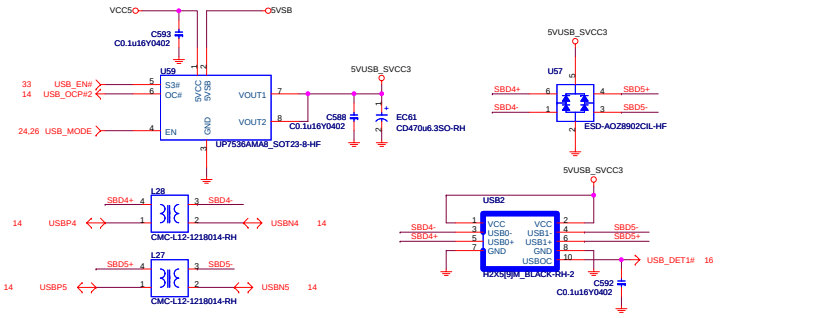
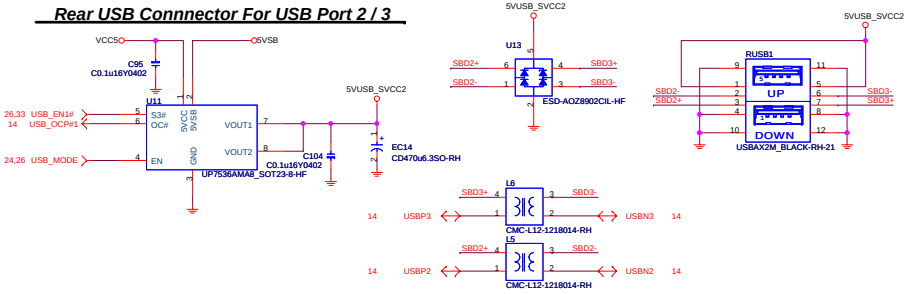
Rear USB Connnector For USB Port 0 / 1



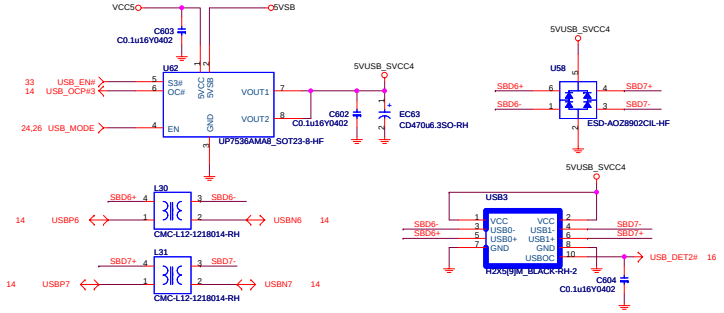
Front Panel USB Connnector For USB Port 4 / 5



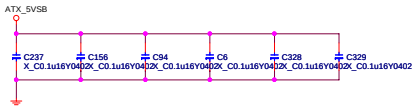
Rear USB Connnector For USB Port 2 / 3

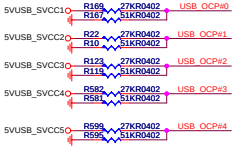


Front Panel USB Connnector For USB Port 6 / 7



FOR EMI





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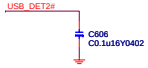

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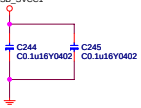
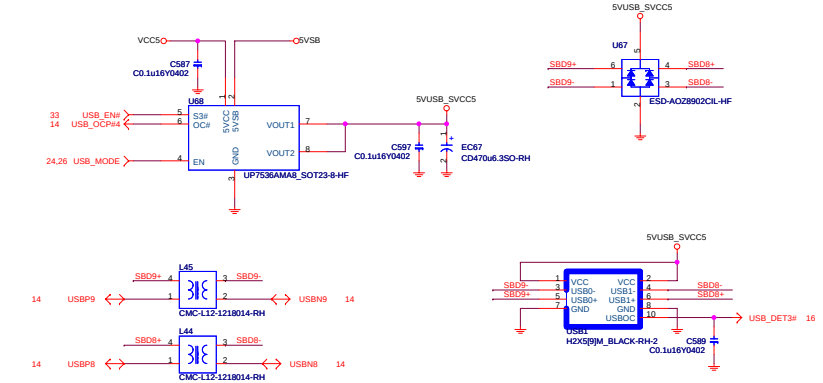


Front Panel USB Connnector For USB Port 8 / 9



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

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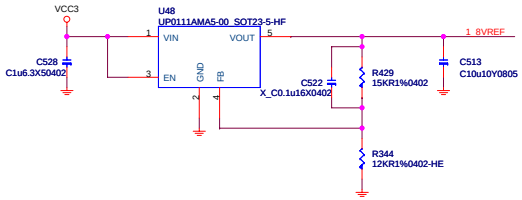
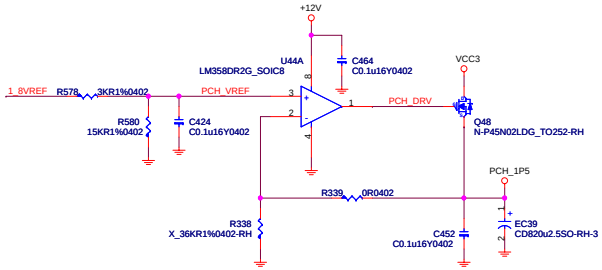
1.8V Reference Power



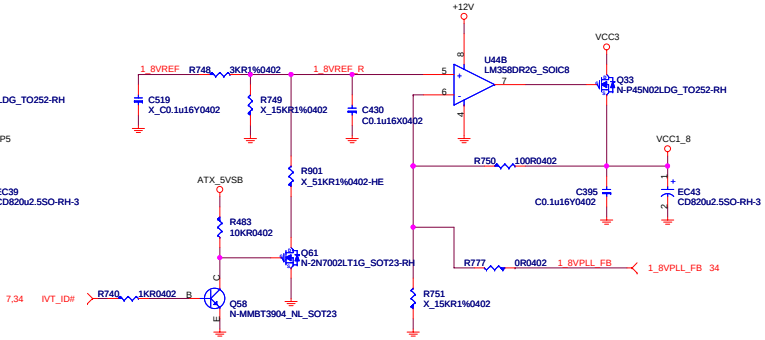
PBG 1.5V Power Rail

Linear 1.5V, 0.512A Imax



VCCPLL Power Rail

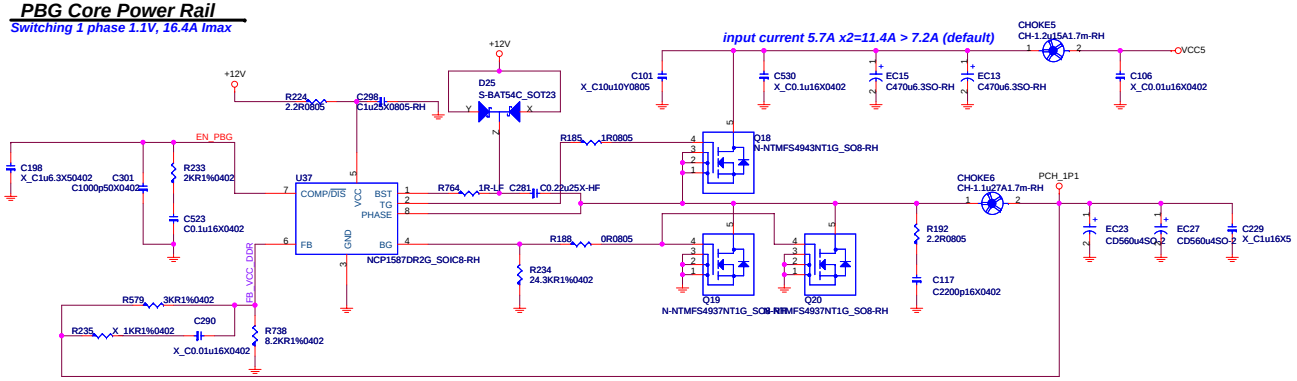
Linear 1.8V, 2A Imax



PBG Core Power Rail

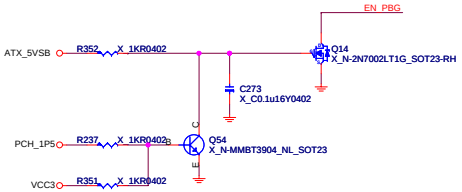
Switching 1 phase 1.1V, 16.4A Imax

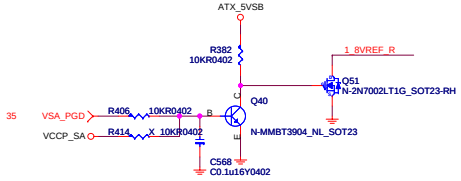
input current 5.7A x2=11.4A > 7.2A (default)



Vout = 0.8[(R738(GND)+R579)/R738]
=0.8[(8.2+3)/8.2]
=1.09268(V)

Iocth=(Iocset*Rocset)/Rdson
=(10uA*24.3K)/7.2m
=33.75A(>1.5*16.64A)

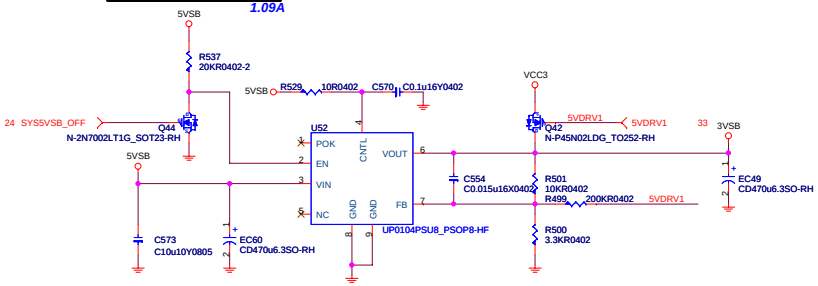




IVT_ID#		VOLTAGE
H	SNB-E	1.8V(normal)
L	IVB-E	1.7V

3VSB Power Rail

1.09A



MSI Link to the Future	MICRO-START INT'L CO.,LTD.		
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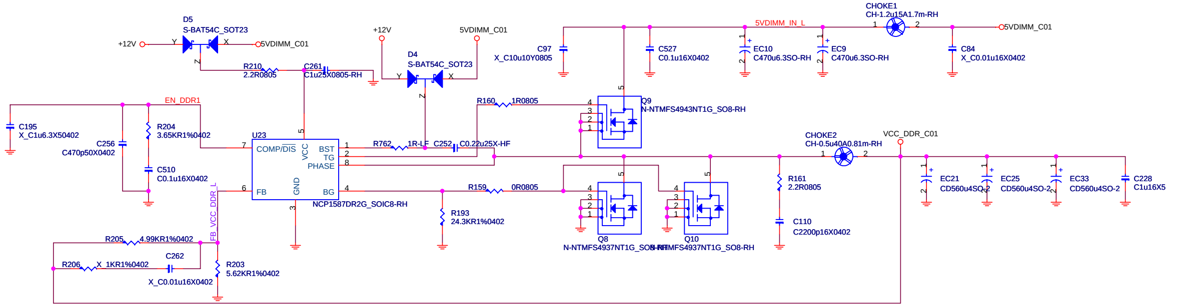
DDR III 1.5V POWER

Switch 1 Phase 1.5V 17A

input current 5.7A x2=11.4A > 7.8A (default)

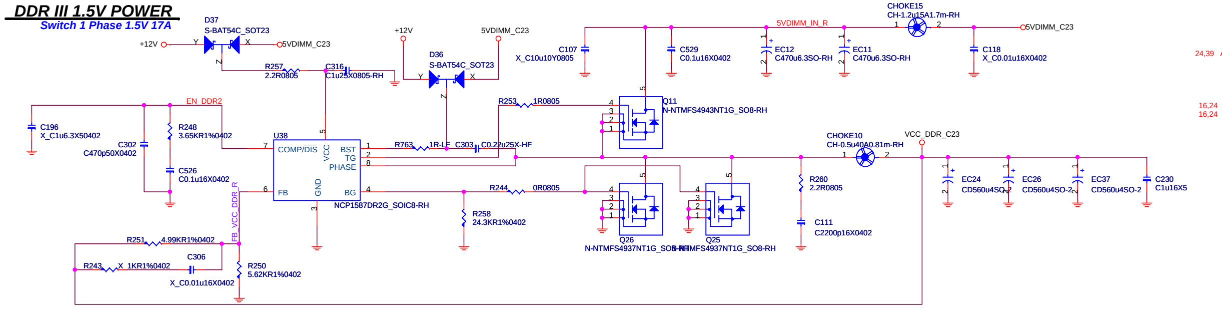


Vout = 0.8[(R203(GND)+R205)/R203]

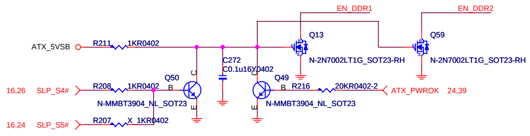
DDR III 1.5V POWER

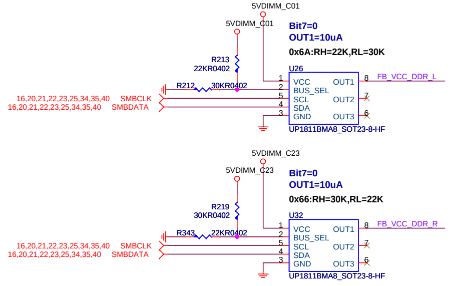
Switch 1 Phase 1.5V 17A

input current 5.7A x2=11.4A > 7.8A (default)



Vout = 0.8[(R250(GND)+R251)/R250]





UPI VOLTAGE CONSOLE

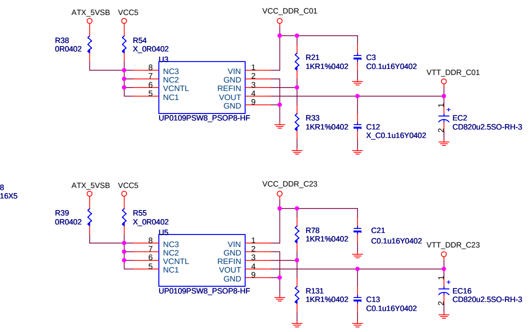
ADDRESS	0x2A	0X28	0x26	0x24	0x22	0x20
RH (KOhm)	OPEN	3.9	3	2.2	1.3	10
RL (KOhm)	10	1.3	2.3	3	3.9	OPEN
BUS_SEL	0%	25%	40%	60%	75%	100%

UPI VOLTAGE CONSOLE

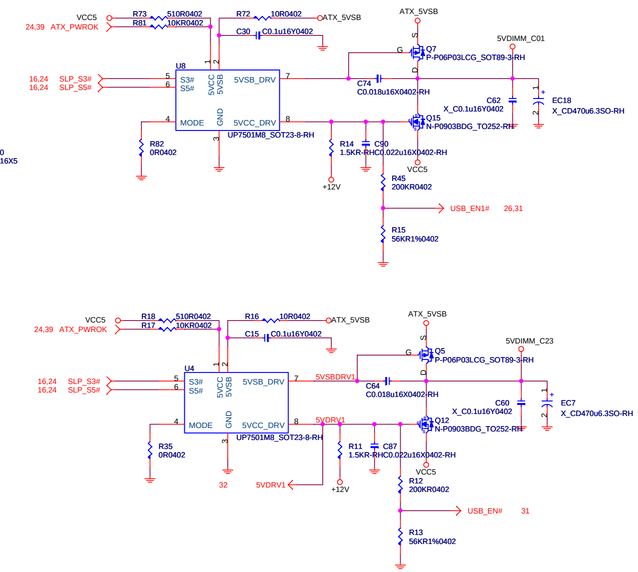
ADDRESS	0x2A	0X28	0x26	0x24	0x22	0x20
RH (KOhm)	OPEN	3.9	3	2.2	1.3	10
RL (KOhm)	10	1.3	2.3	3	3.9	OPEN
BUS_SEL	0%	25%	40%	60%	75%	100%

DDRIII Termination Power

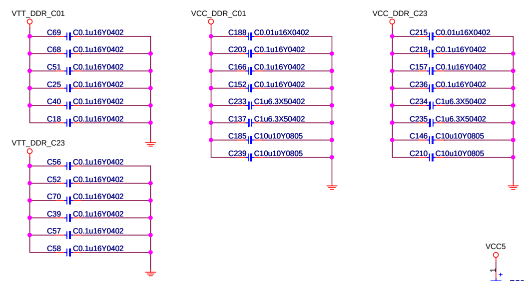
Linear, 0.75V - 1A



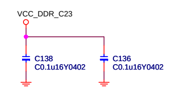
DDRIII Regulator Power Source



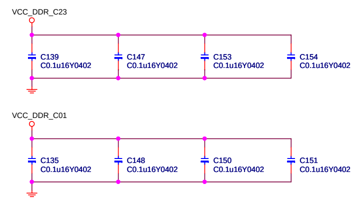
DDRIII I/O Power Decoupling Caps.

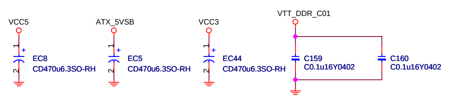


EMI CAPs



FOR EMI





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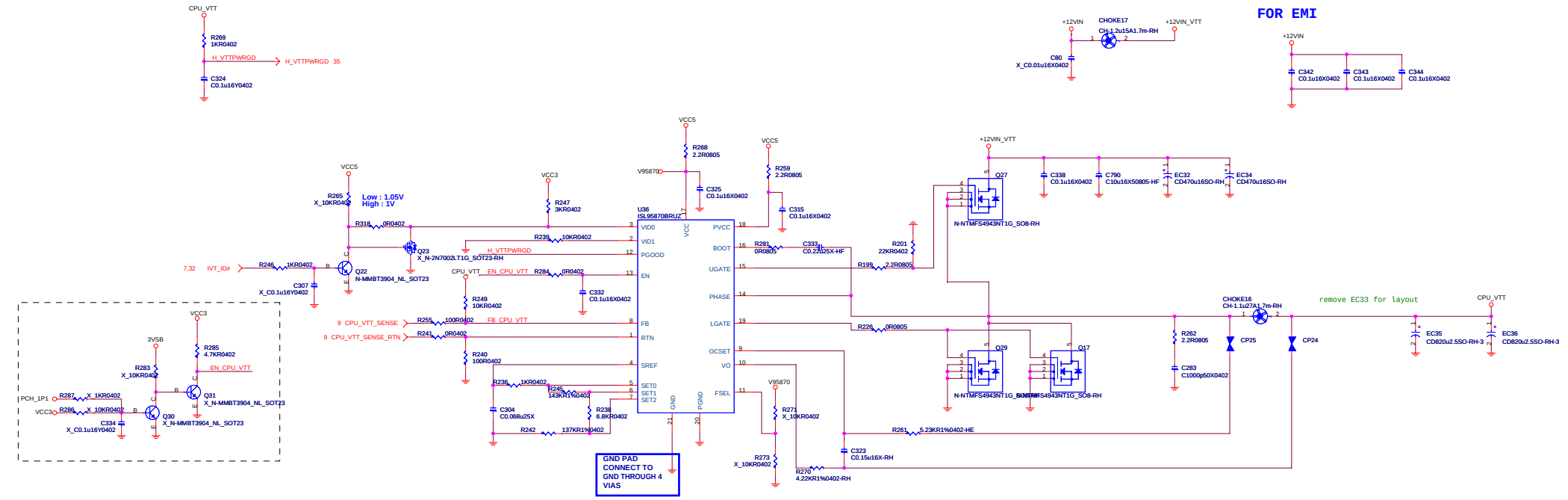
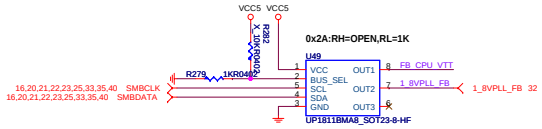
CPU VTT Power Rail

Switch 1 Phase 1.05V 22A



GND PAD CONNECT TO GND THROUGH 4 VIAS

1. Rocest = Iout*DCR/Iocset ; Iocset = 10uA
   If DCR = 1m ; Iout = 20A, Rocset = 20A*1m/10uA --> Rocset = 2K
2. Csen = L/Rocset*DCR
   If DCR = 1m ; L = 1U, Csen = 1U/2K*1m --> Csen = 0.5U



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%

MSI — MICRO-START INT'L CO.,LTD.

Title: CPU VTT VR

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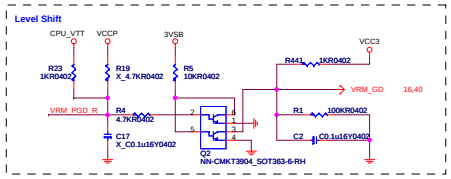
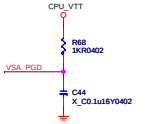
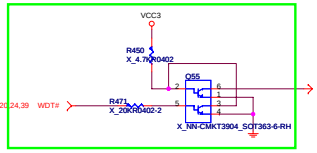
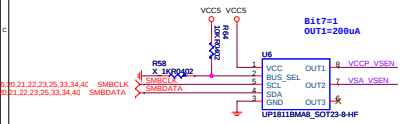
Voltage Regular Module (VRD12)







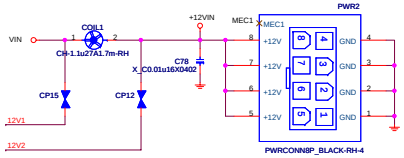


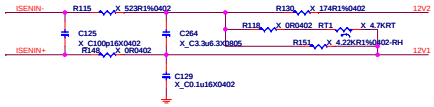
UPI VOLTAGE CONSOLE

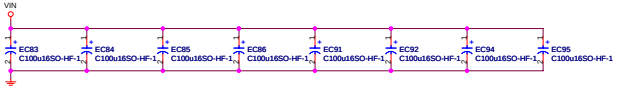
0x20:RH=10K,RL=open;Bit7=1

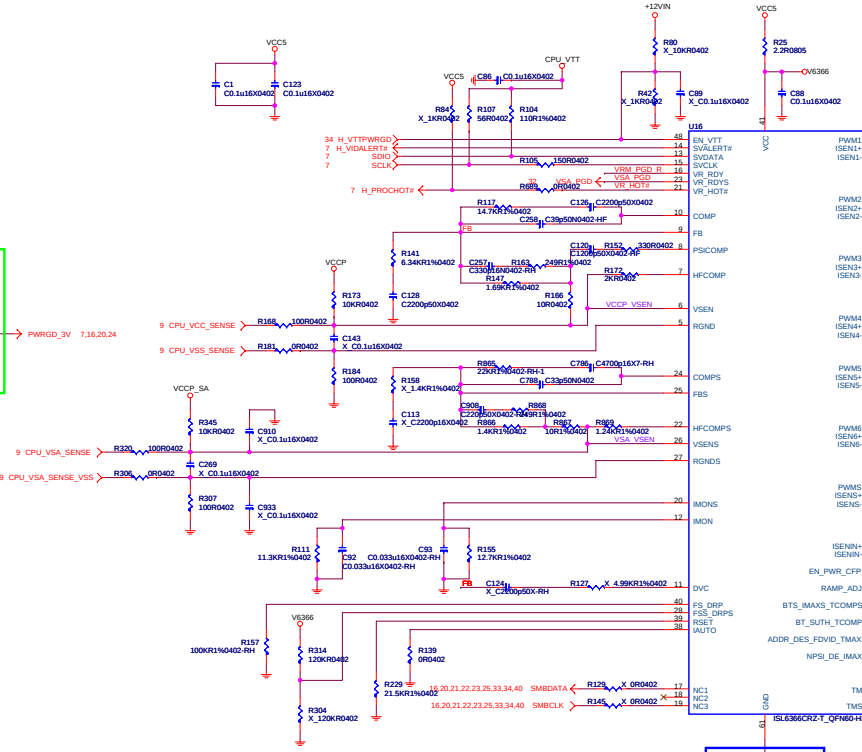
ADDRESS	0x2A	0X28	0x26	0x24	0x22	0x20
RH (KOhm)	OPEN	3.9	3	2.2	1.3	10
RL (KOhm)	10	1.3	2.3	3	3.9	OPEN
BUS_SEL	0%	25%	40%	60%	75%	100%

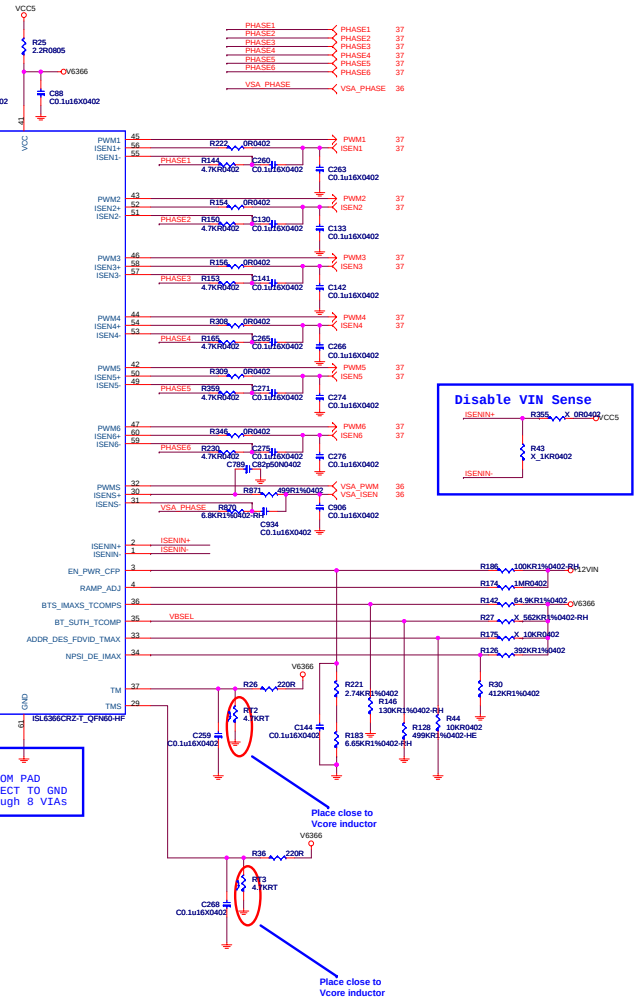
CPU Core Power +12V Input





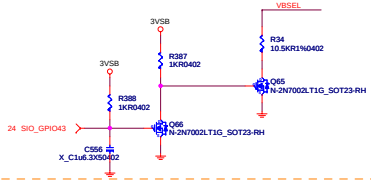






Vboot Select Table

	GPIO 43	Resistor	Vboot
Normal & Turbo	H	Floating	0V
BCLK OC	L	499//10.5 =10 Kohm	1V



Title	MICRO-START INT'L CO.,LTD.		
	VRM12 ISL6366		
Size	Document Number MS-7712		Rev 0C
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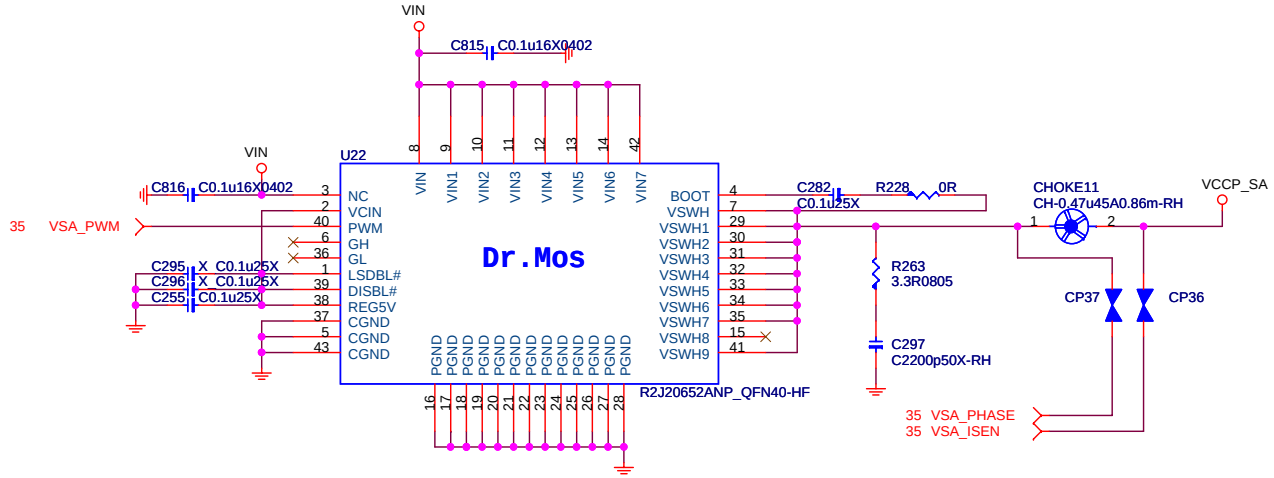

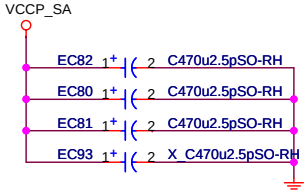

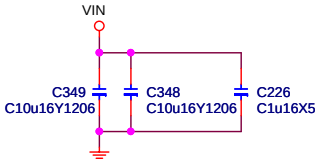

MICRO-START INT'L CO.,LTD.

Title: PHASE EXTENDER

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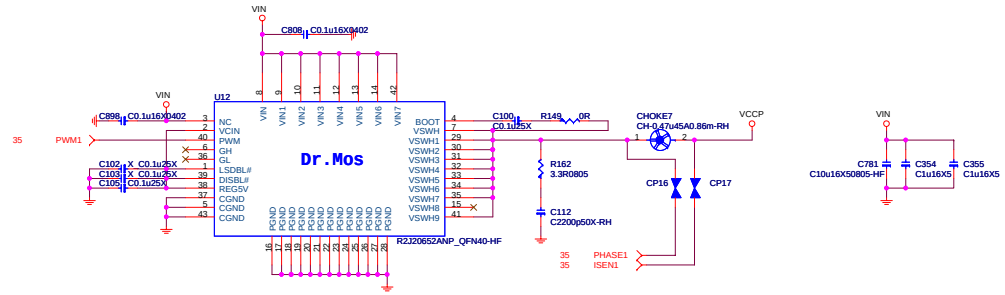

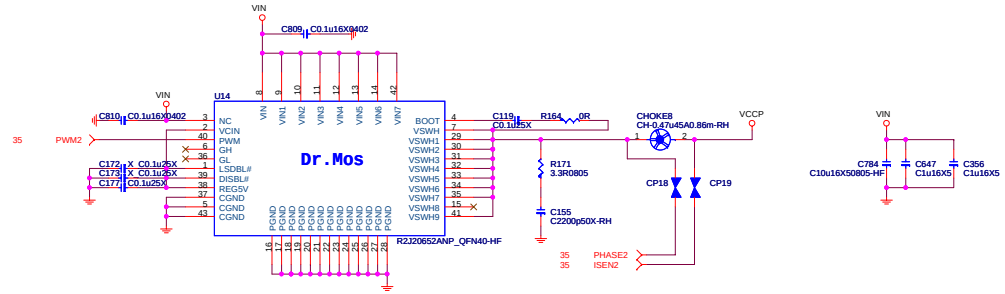

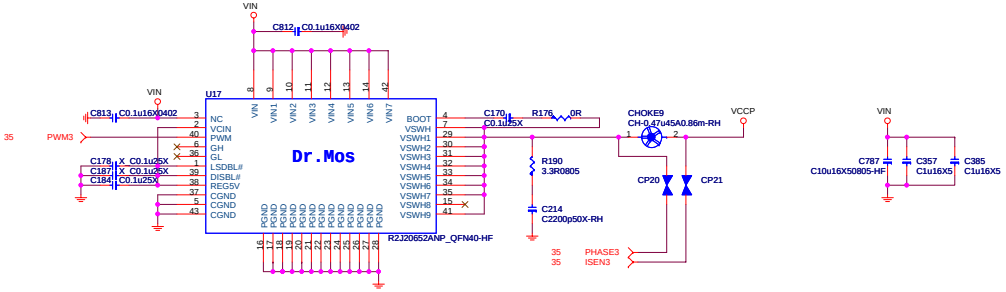

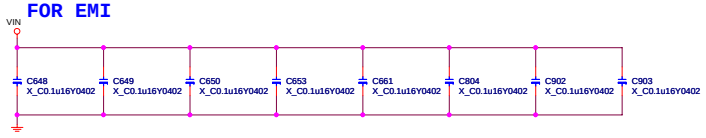

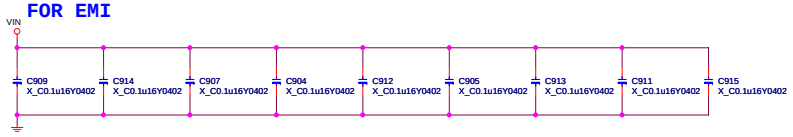

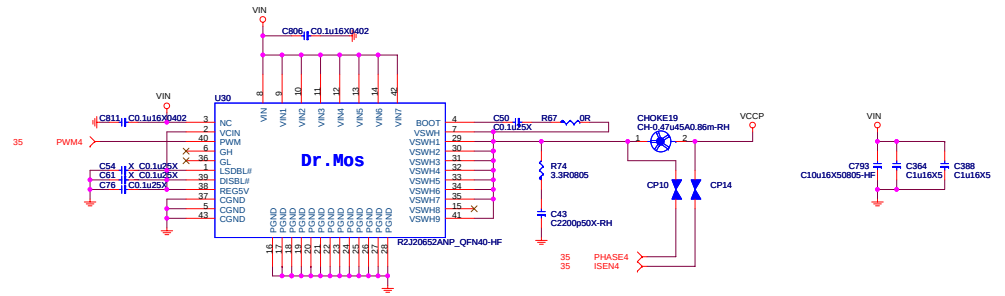

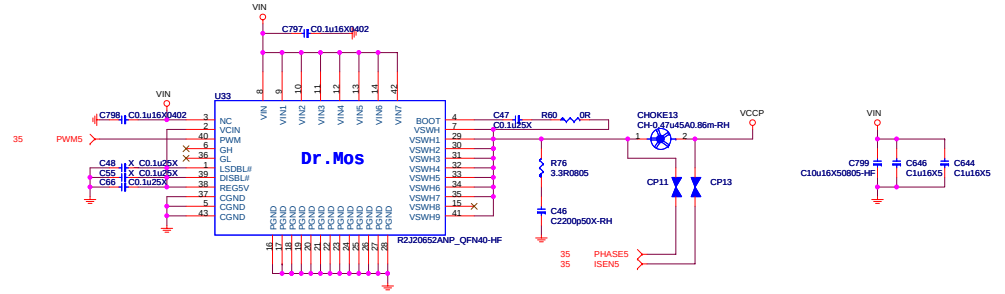

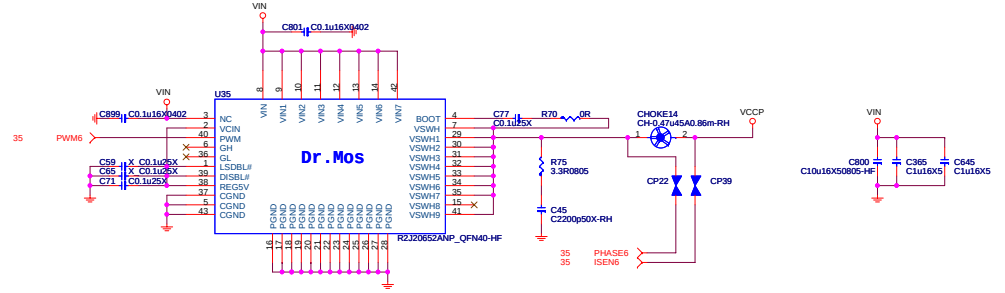

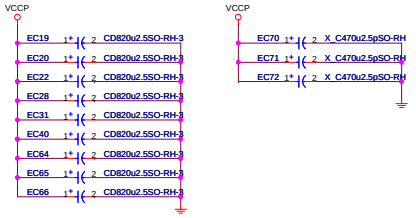

MICRO-START INTL CO.,LTD.

Title: VCCP POWER

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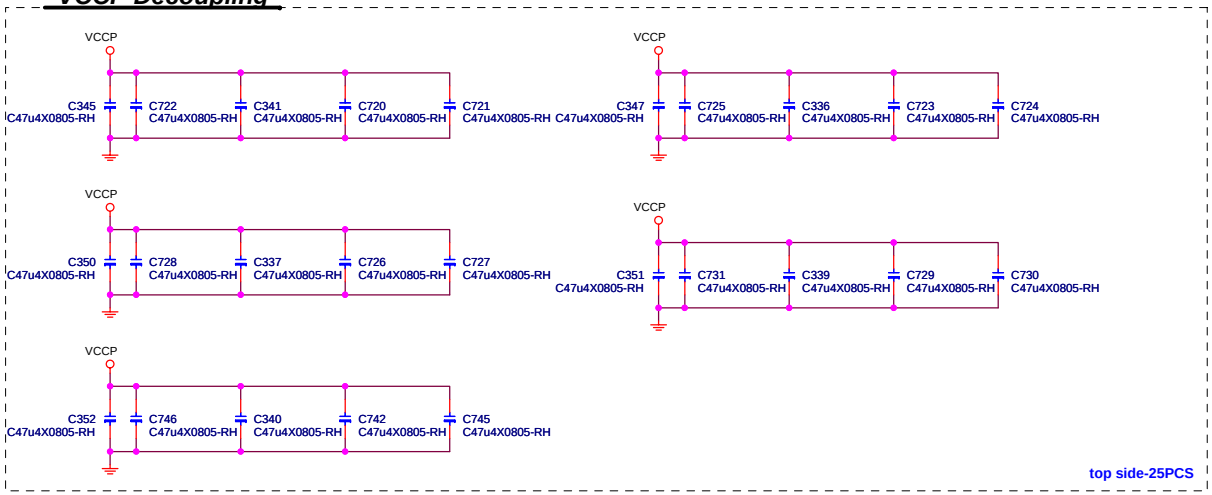
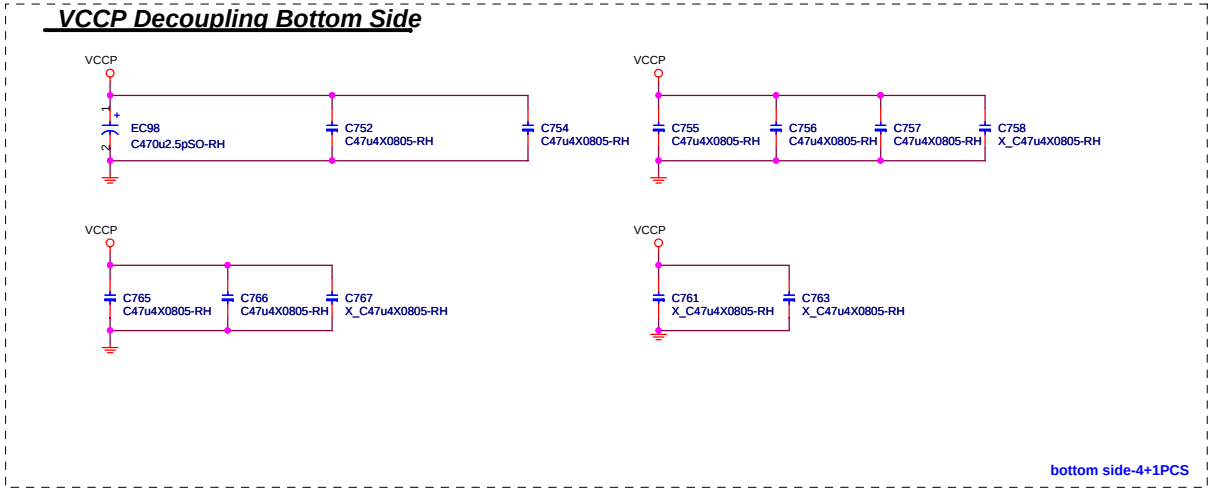
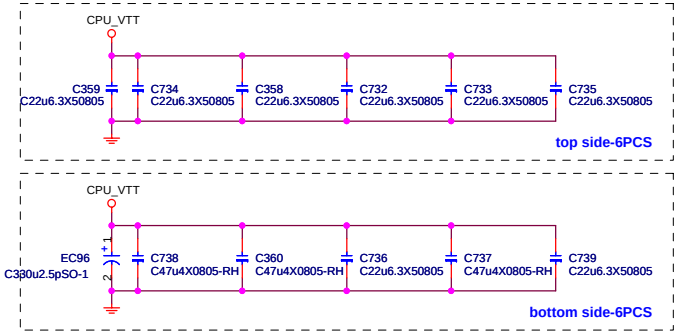
VCCP Decoupling



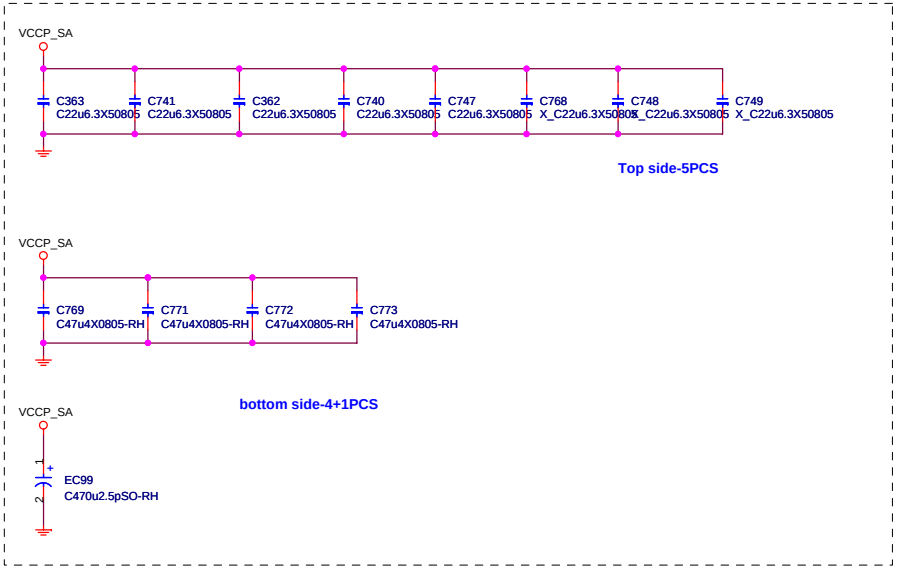
VCCP Decoupling Bottom Side



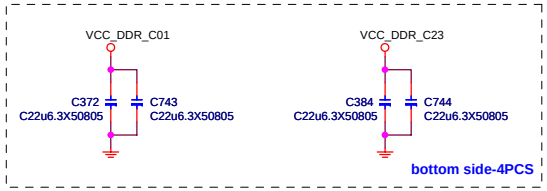
CPU VTT Decoupling



CPU VSA Decoupling



CPU VCC DDR Decoupling



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

Title	VCCP & VSA POWER	
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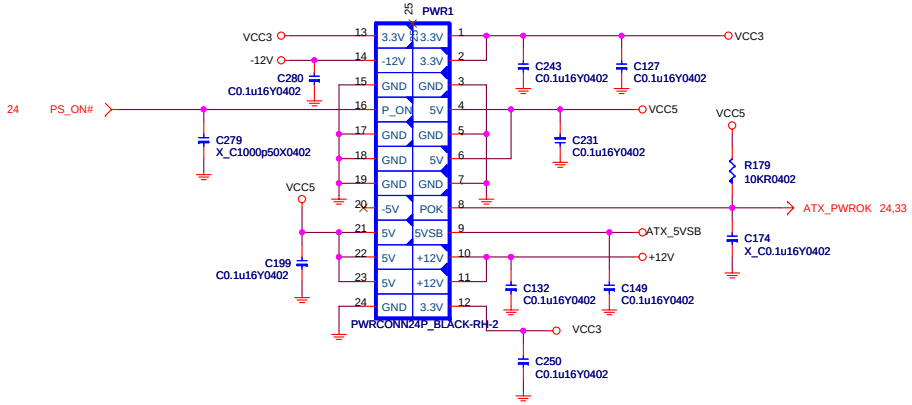
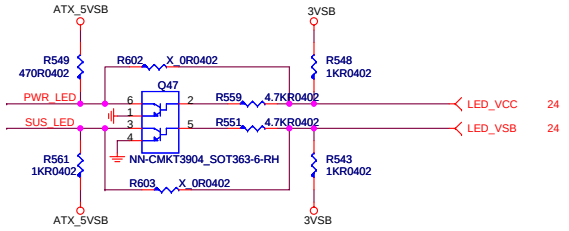
ATX Power Connector / Front Panel / LED

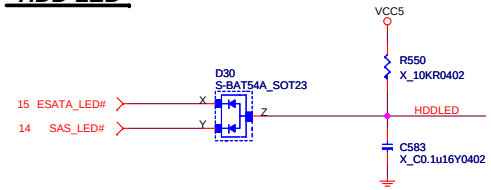
24 Pin ATX Power Connector



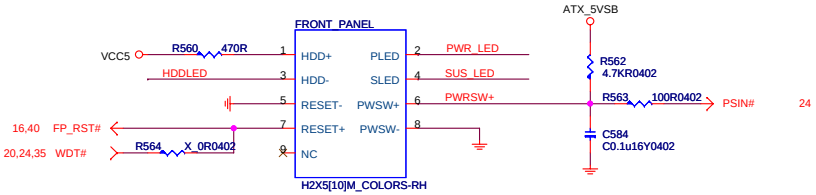
Power LED



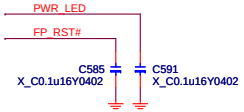
HDD LED



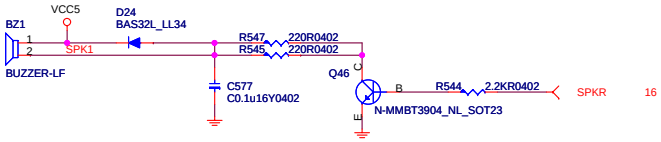
Front Panel



For EMI
(close pin header)



Buzzer Circuit



FOR EMI

MICRO-START INT'L CO.,LTD.

Title	ATX Connector / Front Panel / LED	
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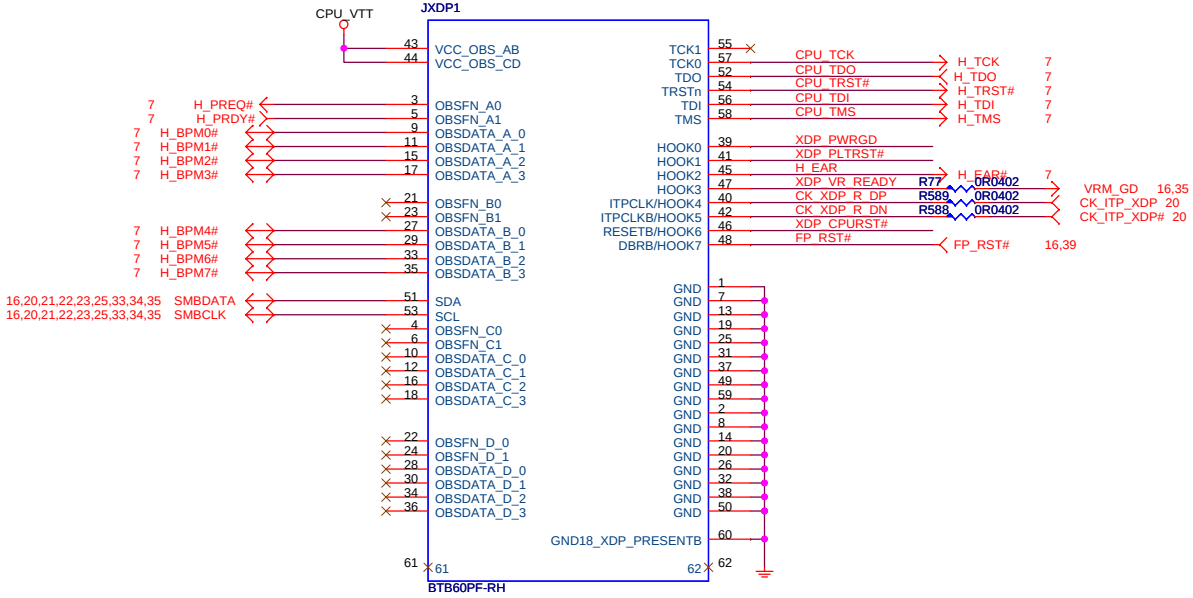
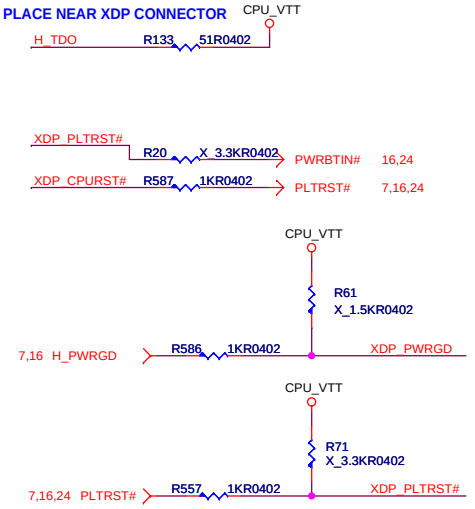
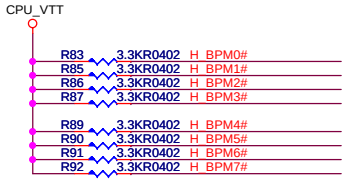
CPU XDP PORT







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

Title: **CPU/PCH XDP**		
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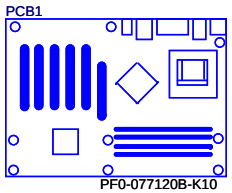
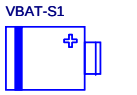
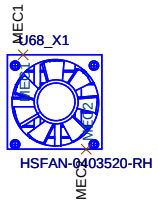
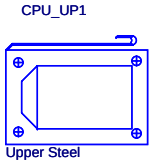
Manual Parts

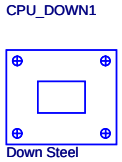


慶生PF0-077120B-K10

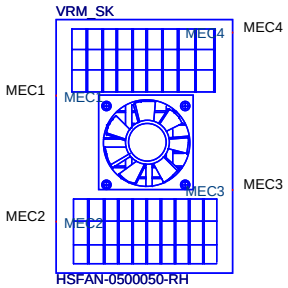






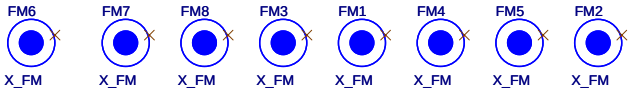


Simulation



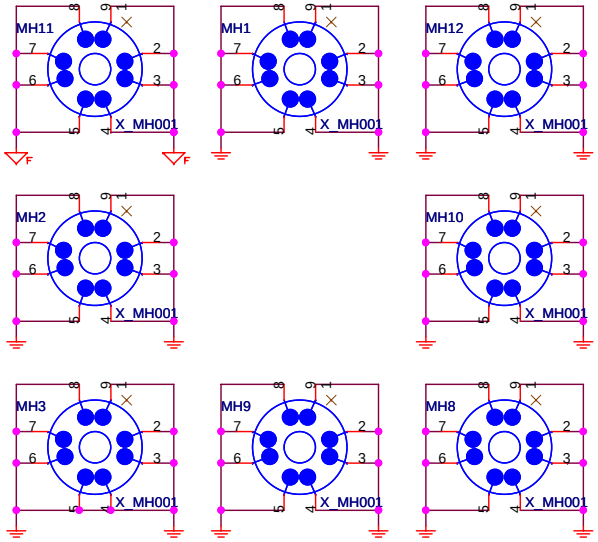
Optics Orientation Holes

Optical Fiducial Marks-120



PCB Mounting Holes

Mounting Holes



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