Q170/Q150 Version : 0F

CPU :

Intel Skylake-S

System Chipset :

Intel Skylake-H Chipset

On Board Chipset :

IMVP8 -- NCP81203+NCP5230 6Phase
Gigabit LAN -- I219-LM
HDA Codec -- Realtek ALC662VD
Super I/O --NCT6685D
SPI Flash 128Mb

Main Memory :

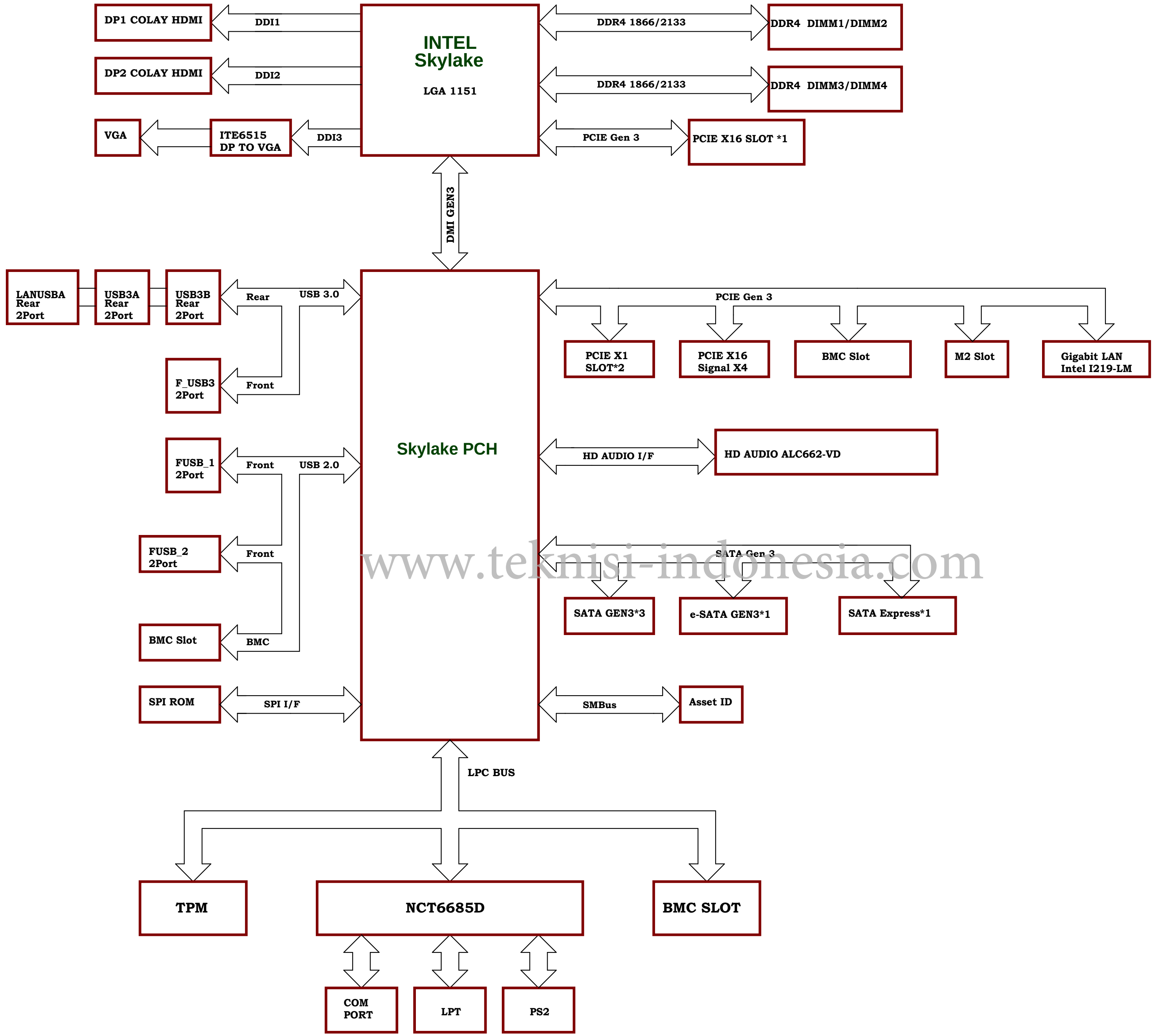
2 Channel DDR 4 * 4 (Max 64GB)

Expansion Slot :

PCI Express x16 Slot * 1
PCI Express x4 Slot * 1
PCI Express x1 Slot * 2
BMC_SLOT * 1

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

Title	Cover Sheet	
Size	Document Number: Q170/Q150	Rev: 0F
Date: Friday, August 14, 2015	Sheet 1 of 43	

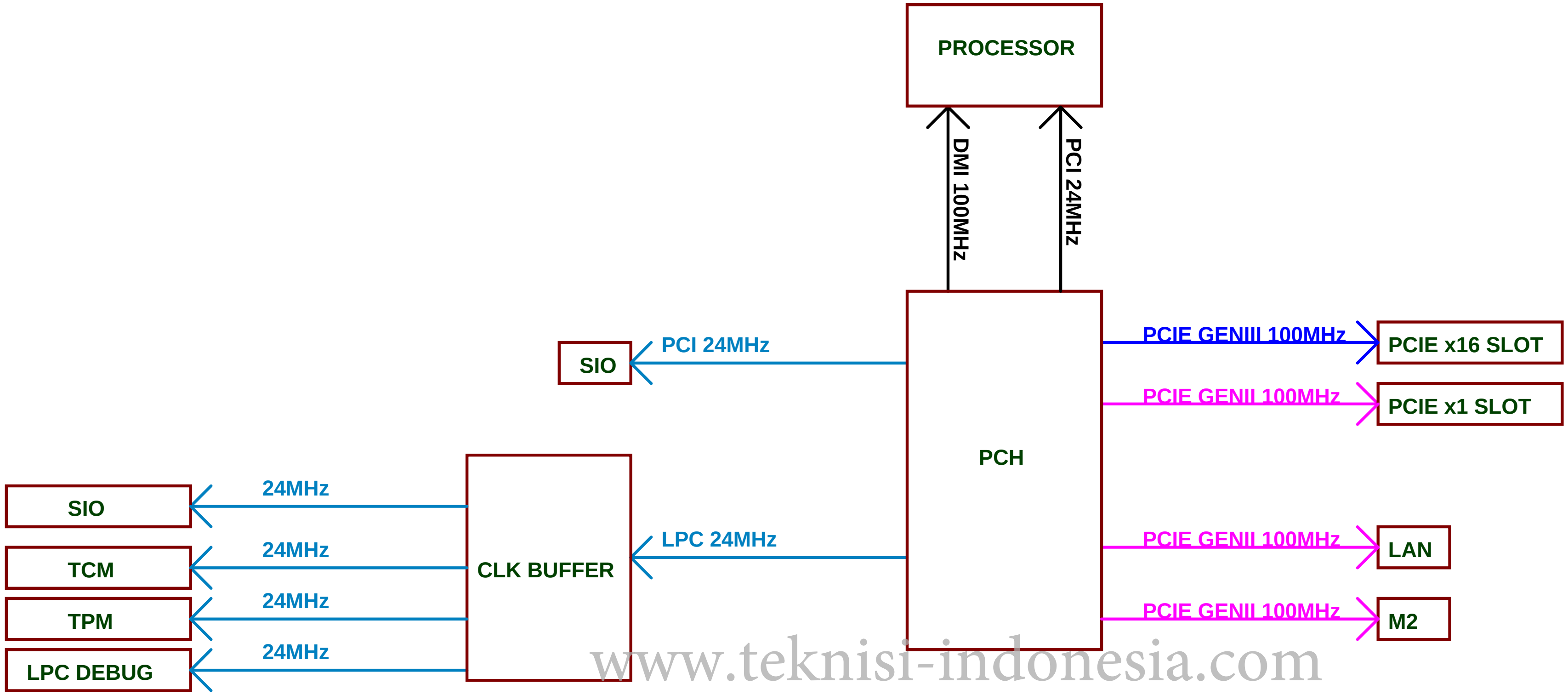


Slot Sequence:

- PCIE X16
- PCIE X16(signal x4)
- PCIE X1
- BMC SLOT

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

Title	Block Diagram	
Size	Document Number: Q170/Q150	Rev: 0F
Date: Friday, August 14, 2015	Sheet 2 of 43	

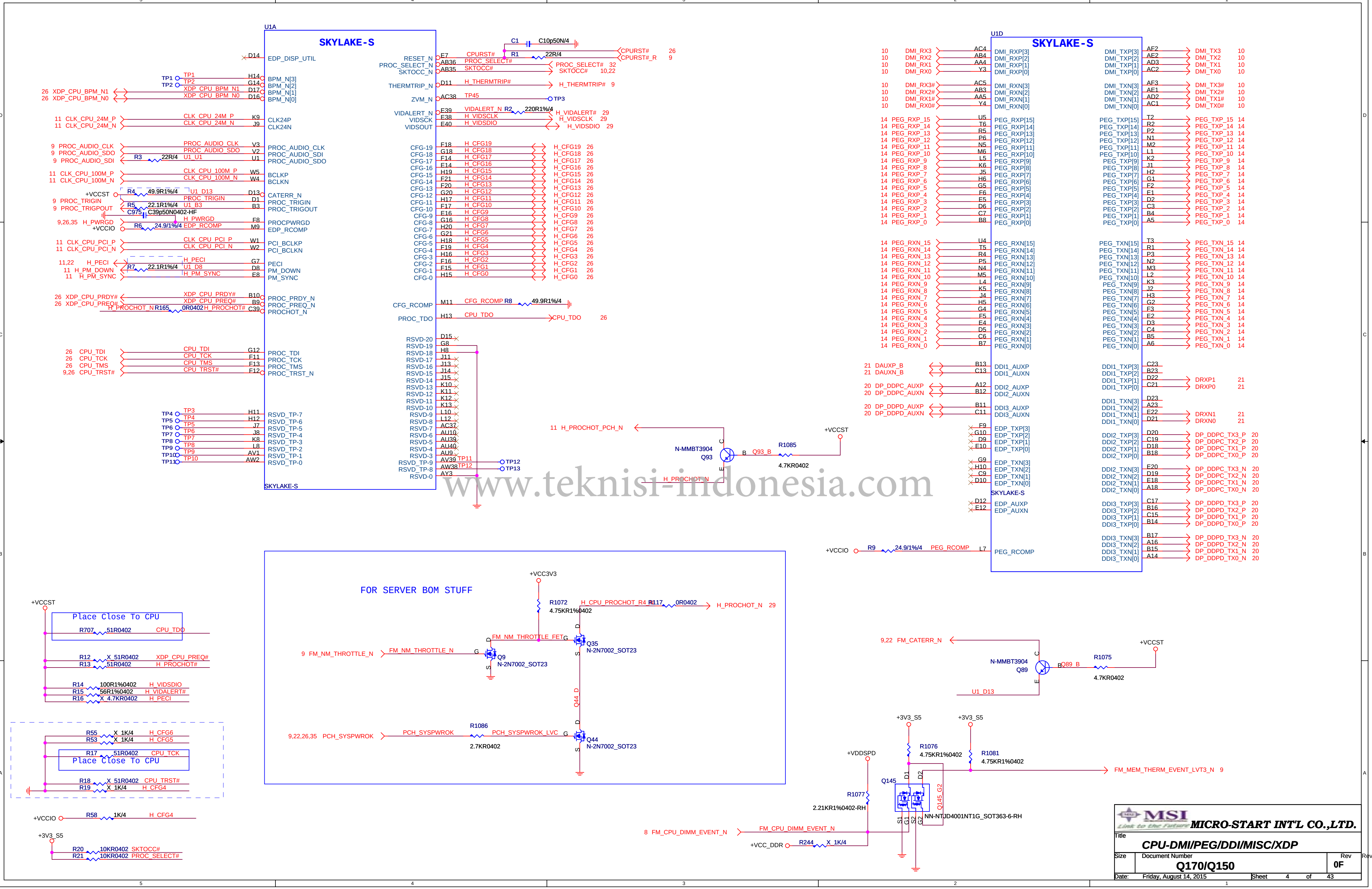


MSI Link to the Future **MICRO-START INT'L CO.,LTD.**

Title: *Clock Distribution*

Size | Document Number: Q170/Q150 | Rev: 0F

Date: Friday, August 14, 2015 | Sheet 3 of 43

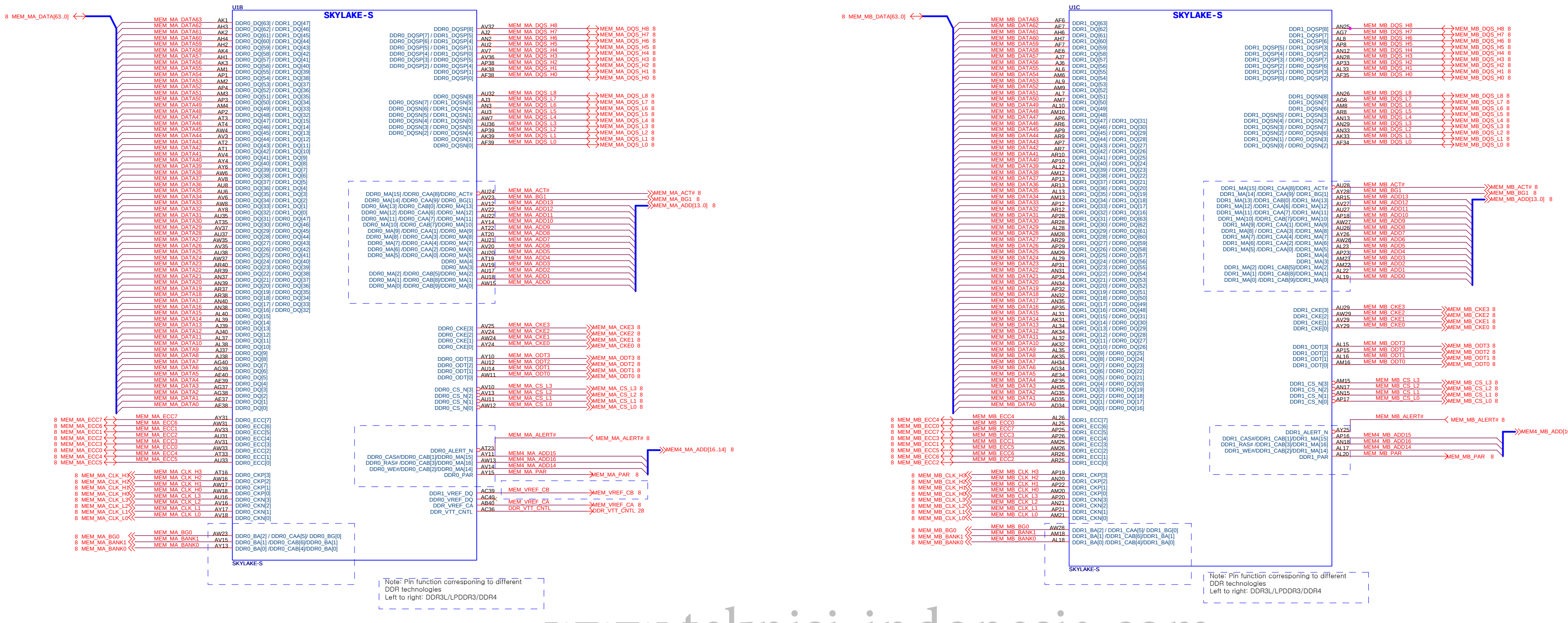


MICRO-START INT'L CO.,LTD.

Title: CPU-DMI/PEG/DDI/MISC/XDP

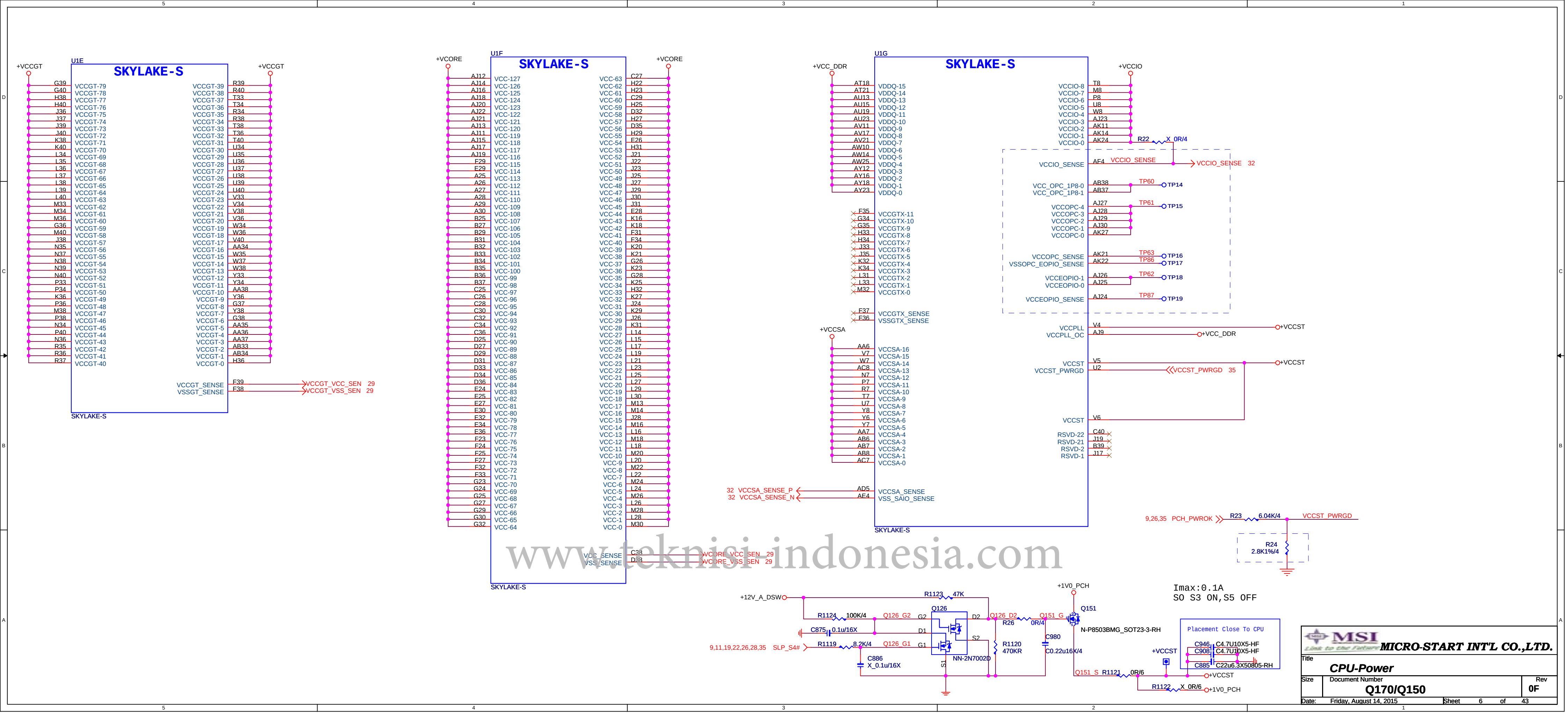
Size	Document Number	Rev
	Q170/Q150	0F

Date: Friday, August 14, 2015 | Sheet 4 of 43



MICRO-START INT'L CO.,LTD.

Title	CPU-Memory	
Size	Document Number: Q170/Q150	Rev: 0F
Date: Friday, August 14, 2015	Sheet 5 of 43	


U1E
SKYLAKE-S
+VCCGT
VCCGT_SENSE
VSSGT_SENSE
VCCGT_VCC_SEN 29
VCCGT_VSS_SEN 29
U1F
SKYLAKE-S
+VCORE
VCC_SENSE
VSS_SENSE
VCORE_VCC_SEN 29
VCORE_VSS_SEN 29
U1G
SKYLAKE-S
+VCC_DDR
+VCCIO
VCCIO_SENSE
VCCIO_SENSE 32
R22 X_0R/4
VCC_OPC_1P8-0
VCC_OPC_1P8-1
VCCOPC_SENSE
VSSOPC_EOPIO_SENSE
VCCEOPIO_SENSE
TP14
TP15
TP16
TP17
TP18
TP19
+VCCSA
VCCGTX_SENSE
VSSGTX_SENSE
VCCPLL
VCCPLL_OC
+VCCST
+VCC_DDR
VCCST
VCCST_PWRGD
VCCST_PWRGD 35
32 VCCSA_SENSE_P
32 VCCSA_SENSE_N
VCCSA_SENSE
VSS_SAIO_SENSE
9,26,35 PCH_PWROK
R23 6.04K/4
VCCST_PWRGD
R24 2.8K1%/4
Imax:0.1A
S0 S3 ON,S5 OFF
+12V_A_DSW
R1123 47K
+1V0_PCH
Q151
R1124 100K/4
Q126
Q126_G2
Q126_D2
R26 0R/4
Q151_G
N-P8503BMG_SOT23-3-RH
C875 0.1u/16X
9,11,19,22,26,28,35 SLP_S4#
R1119 8.2K/4
Q126_G1
R1120 470KR
C980 C0.22u16X/4
NN-2N7002D
C886 X_0.1u/16X
Q151_S R1121 0R/6
+VCCST
R1122 X_0R/6
+1V0_PCH
Placement Close To CPU
C946 C4.7U10X5-HF
C908 C4.7U10X5-HF
C885 C22u6.3X50805-RH
MSI
MICRO-STAR INT'L CO.,LTD.
Title
CPU-Power
Size
Document Number
Q170/Q150
Rev
0F
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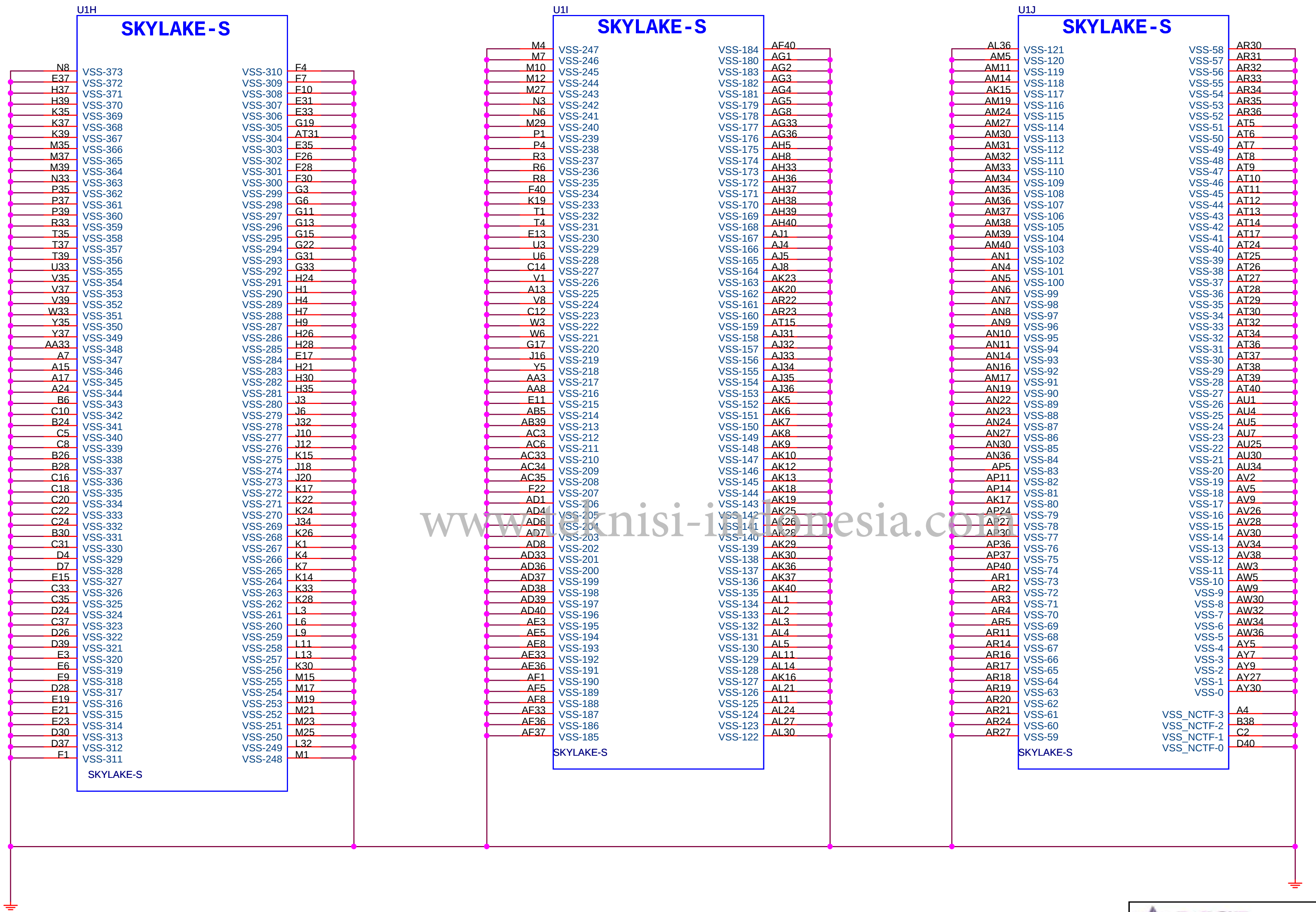
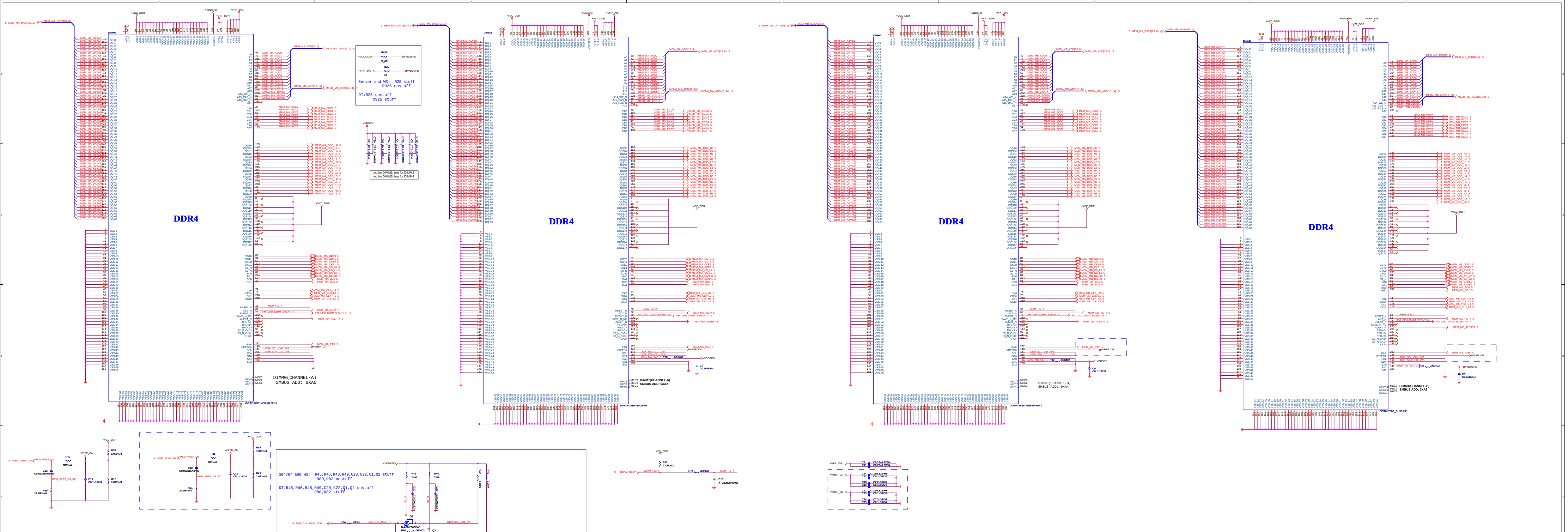
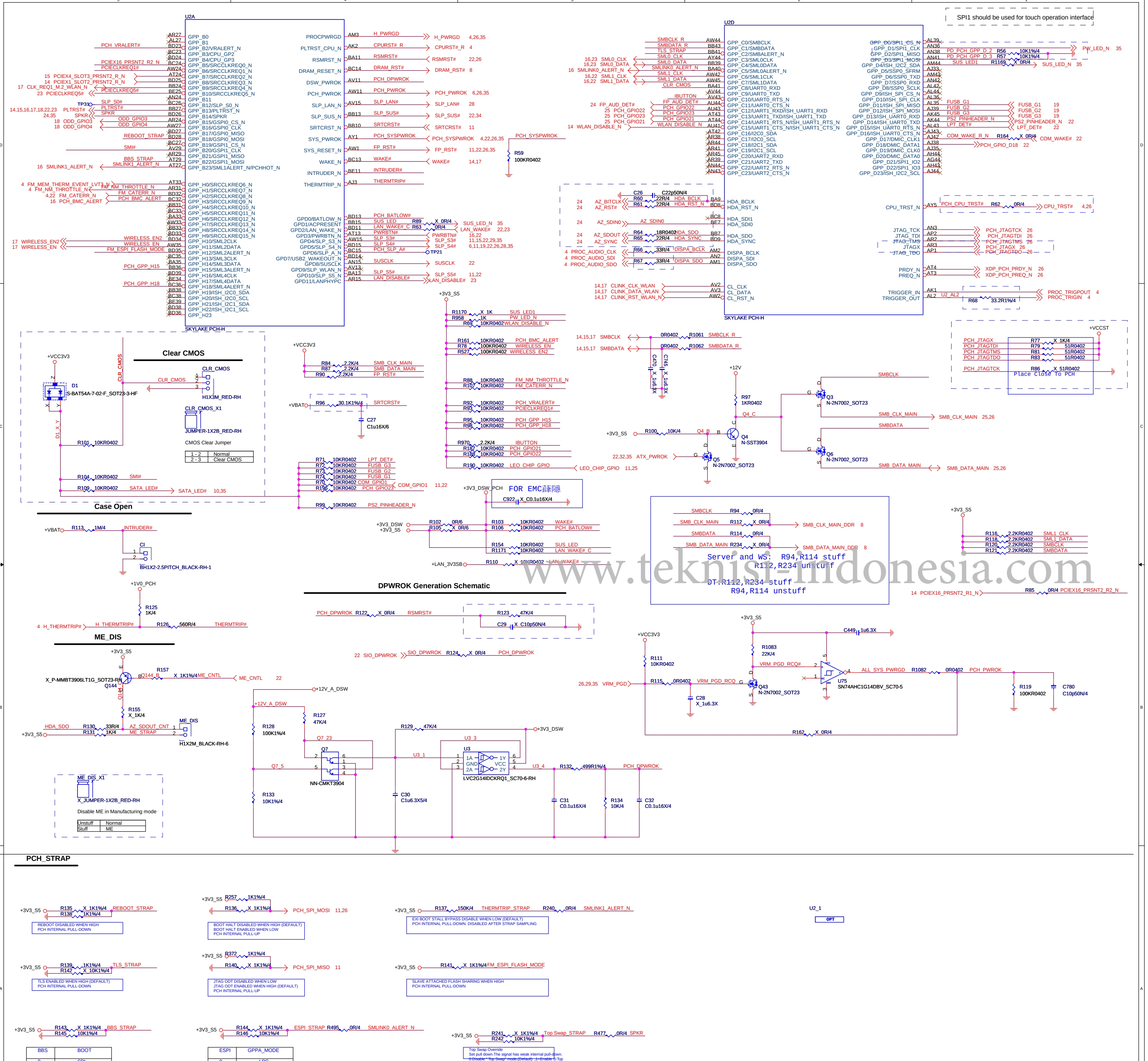


MSI Link to the Future MICRO-START INT'L CO.,LTD.

Title	CPU-GND	
Size	Document Number Q170/Q150	Rev 0F
Date: Friday, August 14, 2015	Sheet 7 of 43	

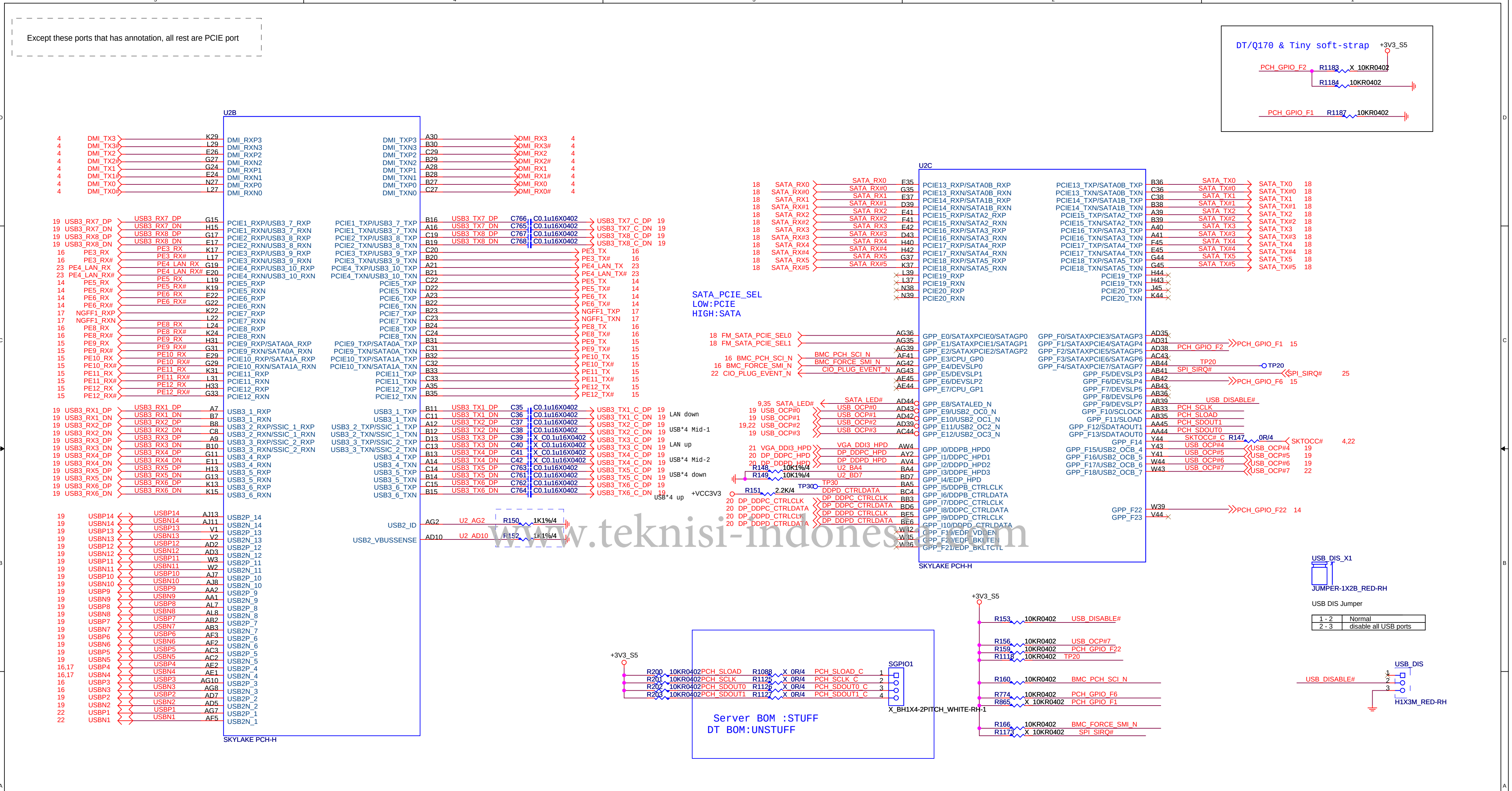


MICRO-START INT'L CO.,LTD.		
Title: DDR4-DIMM1/DIMM2/DIMM3/DIMM4		
Size	Document Number: Q170/Q150	Rev: 0F
Date: Friday, August 14, 2015	Sheet 8	of 43



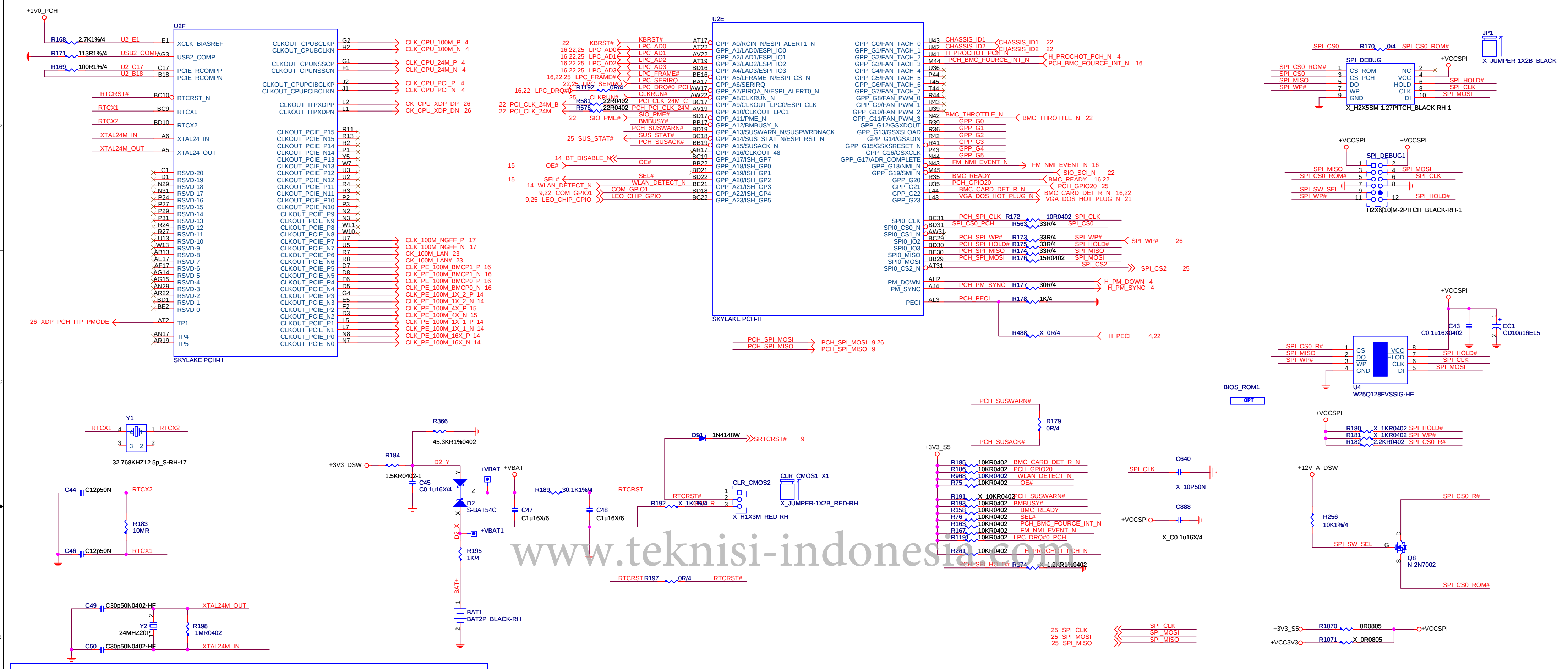
MSI MICRO-START INT'L CO.,LTD.

Title	PCH-PME/SMBUS/UART/I2C/HDA	
Size	Document Number Q170/Q150	Rev 0F
Date: Friday, August 14, 2015	Sheet 9 of 43	

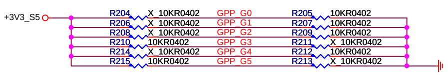


MSI MICRO-START INT'L CO.,LTD.

Title	PCH-DMI/PCIE/USB/SATA/DDI	
Size	Document Number: Q170/Q150	Rev: 0F
Date: Friday, August 14, 2015	Sheet 10 of 43	



Bom Option



Board ID	GPIO
GPP_G5	GPP_G17
GPP_G4	GPP_G16
GPP_G3	GPP_G15
GPP_G2	GPP_G14
GPP_G1	GPP_G13
GPP_G0	GPP_G12

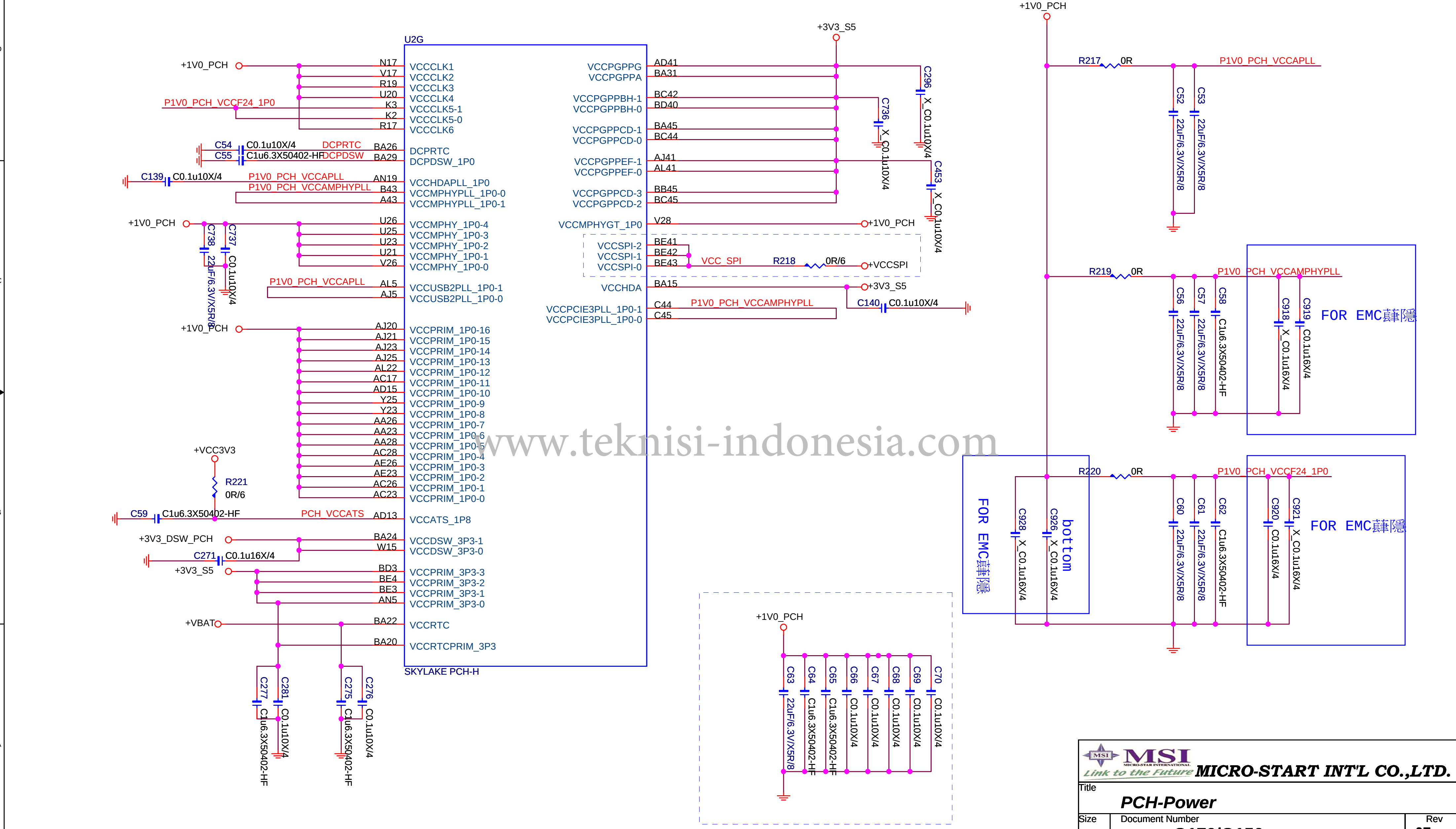
GPP_G5	GPP_G4	GPP_G3	GPP_G2	GPP_G1	GPP_G0	Project	BOM Opt
1	0	0	0	0	0	Q170 LI (Perth)	
1	0	0	0	0	1	Q170 LC (Perth)	
1	0	0	0	1	0	Q150 LI (Province)	
1	0	0	0	1	1	Q150 LC (Province)	
1	0	0	1	0	0	Q170 ME NEC	
1	0	0	1	0	1	Q150 MB/LV NEC	
1	0	0	1	1	0	H170 Malibu	
1	0	1	0	0	0	C236 Paris&Havana LI	
1	0	1	0	0	1	C236 Paris&Havana LC-TBD	
1	0	1	0	1	0	C236 server Wolverine AMT-LI	
1	0	1	0	1	1	C236 server Wolverine-AMT-LC-TBD	
1	0	1	1	0	0	C236 server Thor-AMT-LI	
1	0	1	1	0	1	C236 server Thor-AMT-LC-TBD	
1	0	1	1	1	0	C236 server Aztek-AMT-LI	
1	0	1	1	1	1	C236 server Aztek-AMT-LC-TBD	

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

Title: PCH-Clock/LPC/FAN/SPI/PECI

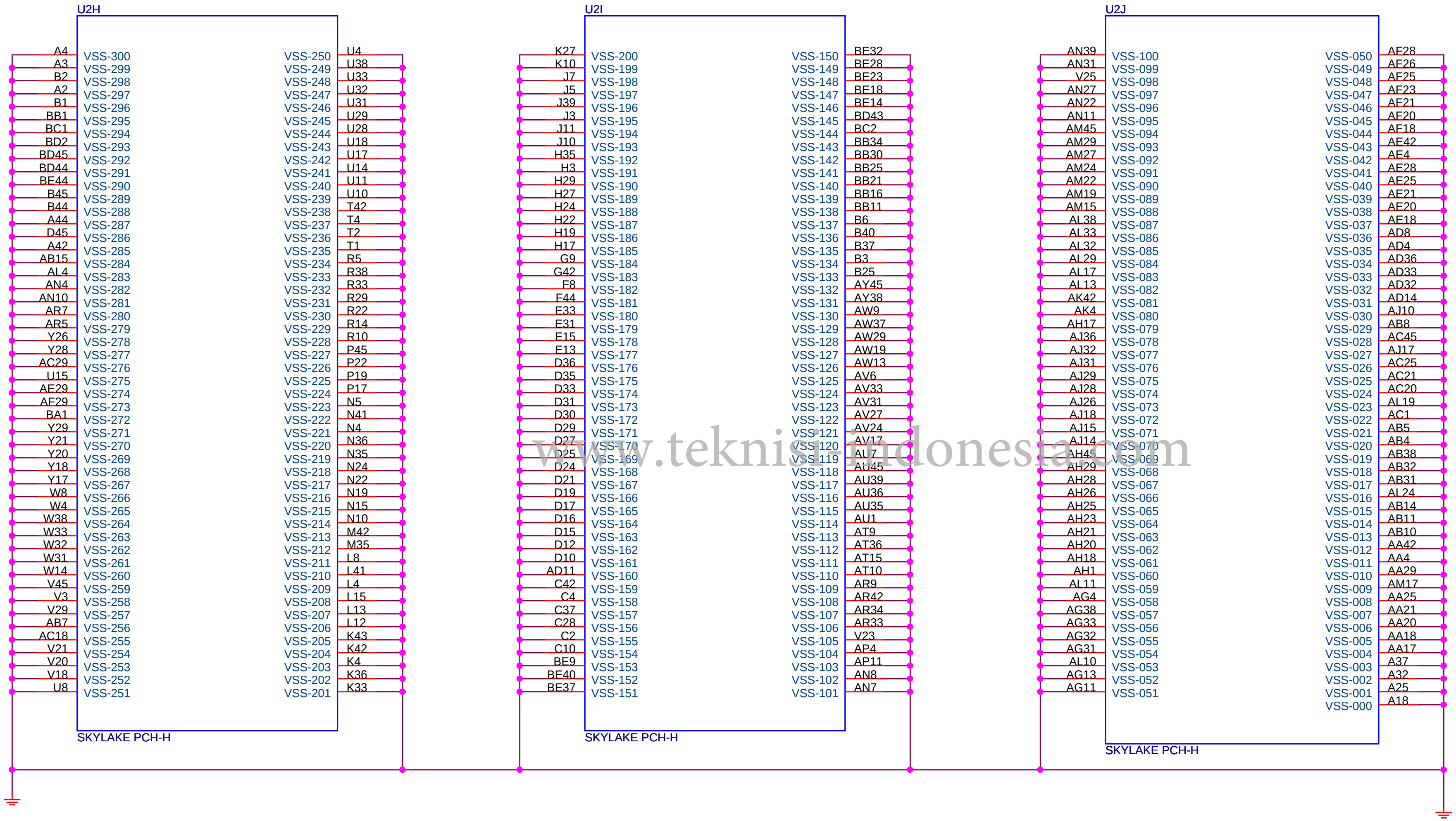
Size | Document Number: Q170/Q150 | Rev: 0F

Date: Friday, August 14, 2015 | Sheet 11 of 43



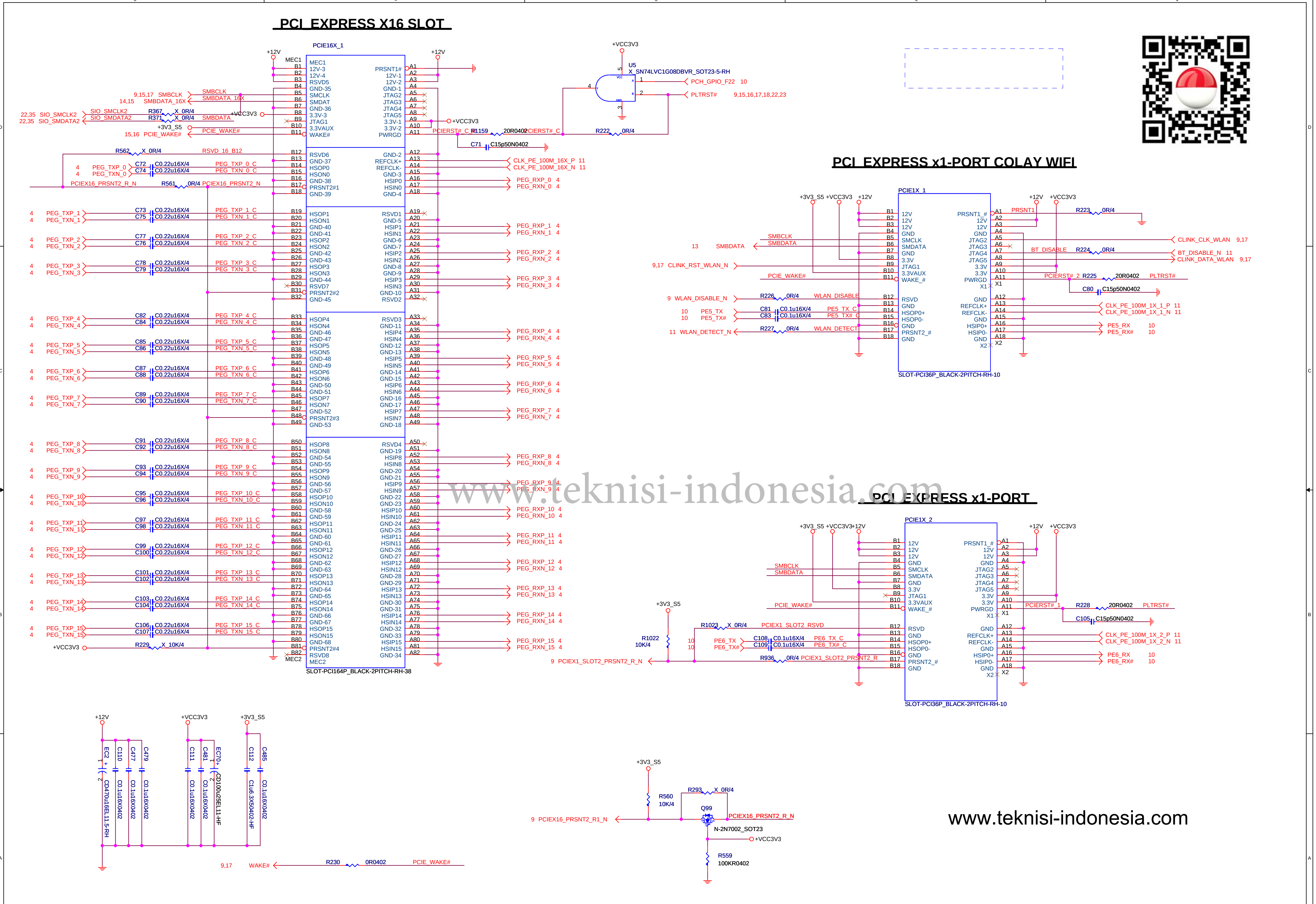
MSI Link to the Future **MICRO-START INT'L CO.,LTD.**

Title	PCH-Power	
Size	Document Number: Q170/Q150	Rev: 0F
Date: Friday, August 14, 2015	Sheet 12 of 43	



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

Title	PCH-GND	
Size	Document Number: Q170/Q150	Rev: 0F
Date: Friday, August 14, 2015	Sheet 13 of 43	



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

Title	PCIE x16/x1 slot	
Size	Document Number: Q170/Q150	Rev: 0F
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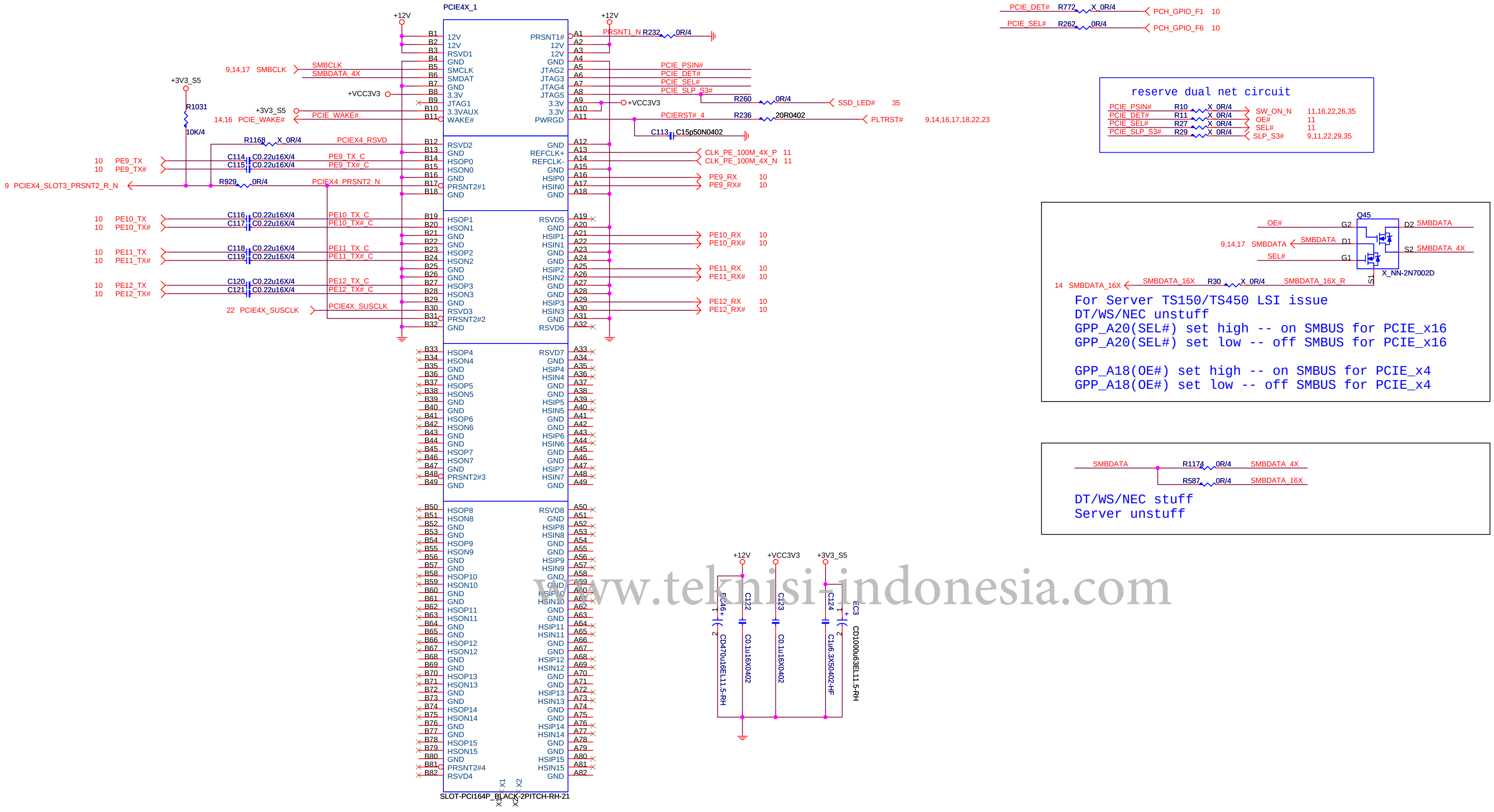
PCI_EXPRESS X4 SLOT



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

Title	PCIE 4X	
Size	Document Number: Q170/Q150	Rev: 0F
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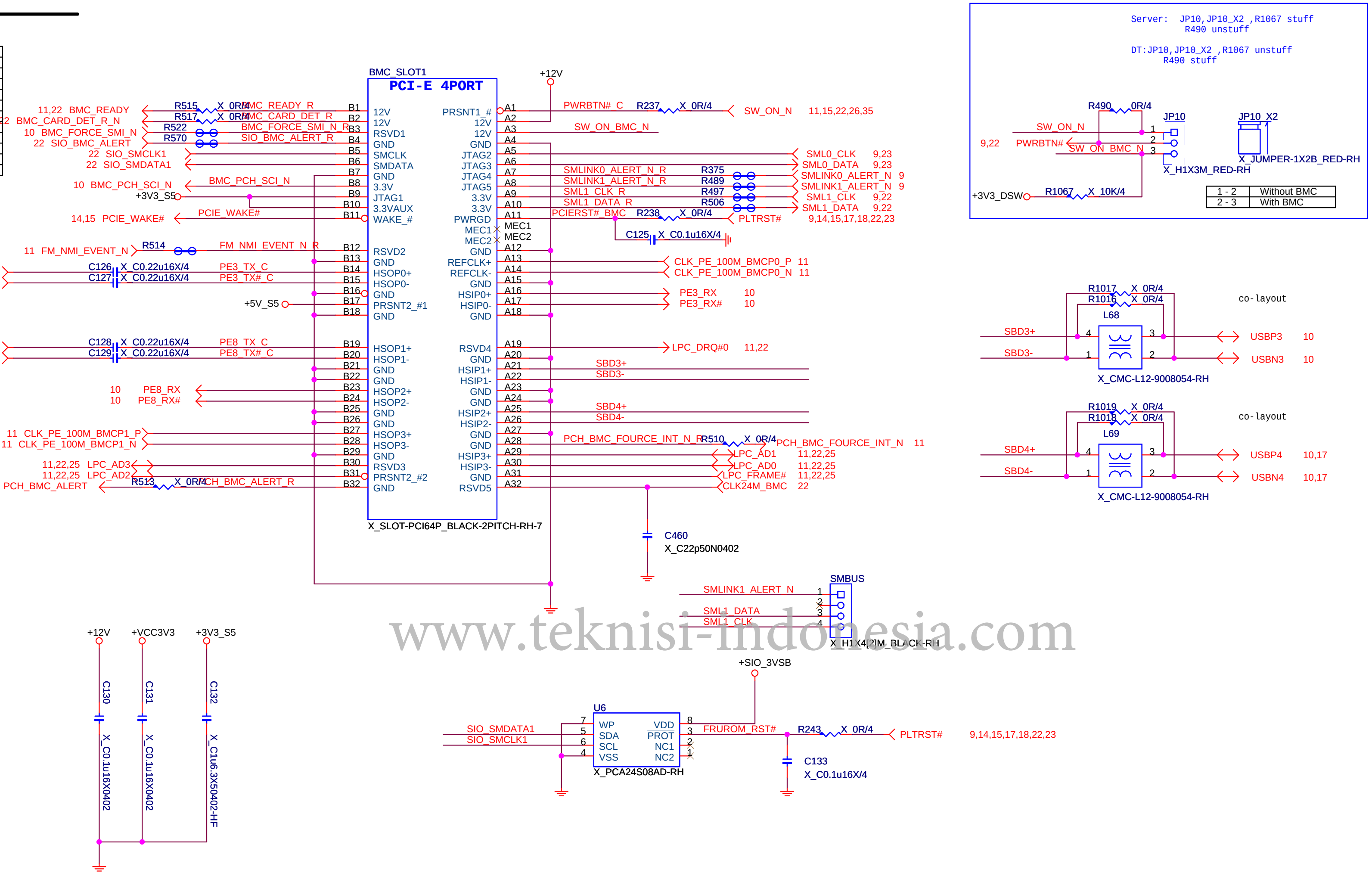
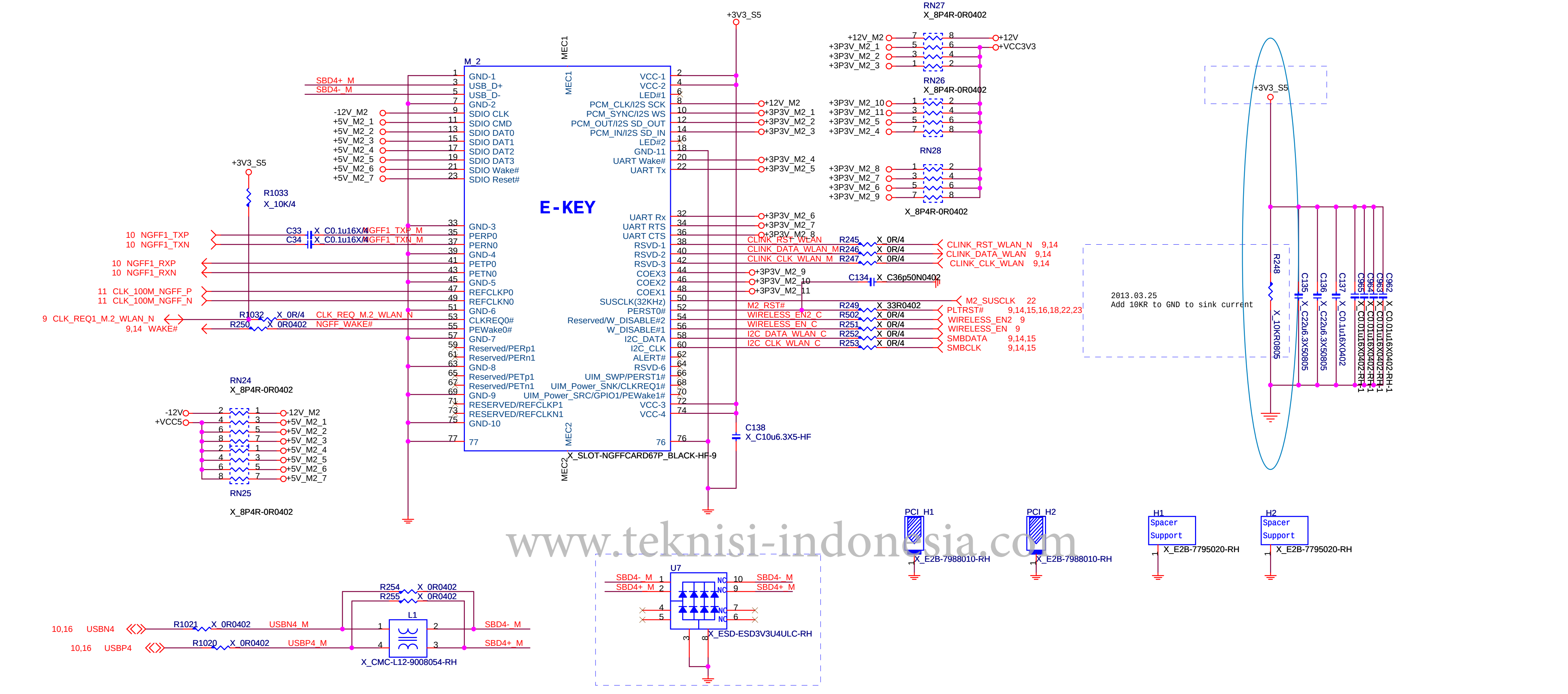
BMC SLOT

GPIO PIN	From/TO
BMC_READY	PCH
BMC_CATERR_IRQ_N	PCH
BMC_FORCE_SMI_N	PCH
SIO_BMC_ALERT	IO
BMC_PCH_SCI_N	PCH
FM_NMI_EVENT_N	PCH
PCH_BMC_ALERT	PCH
PWRBTN_BMC_OUT	PCH
SMLINK0_ALERT_N	PCH
SMLINK1_ALERT_N	PCH
PCH_BMC_FOURCE_INT_N	PCH





MSI
Link to the Future

MICRO-START INT'L CO.,LTD.

Title		
M2 Connector		
Size	Document Number	Rev
	Q170/Q150	0F
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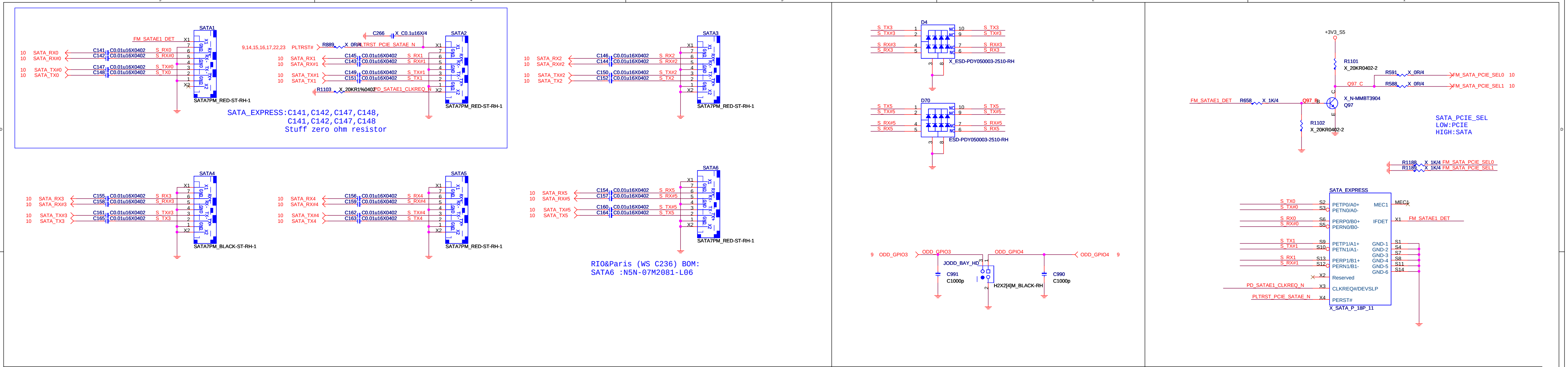
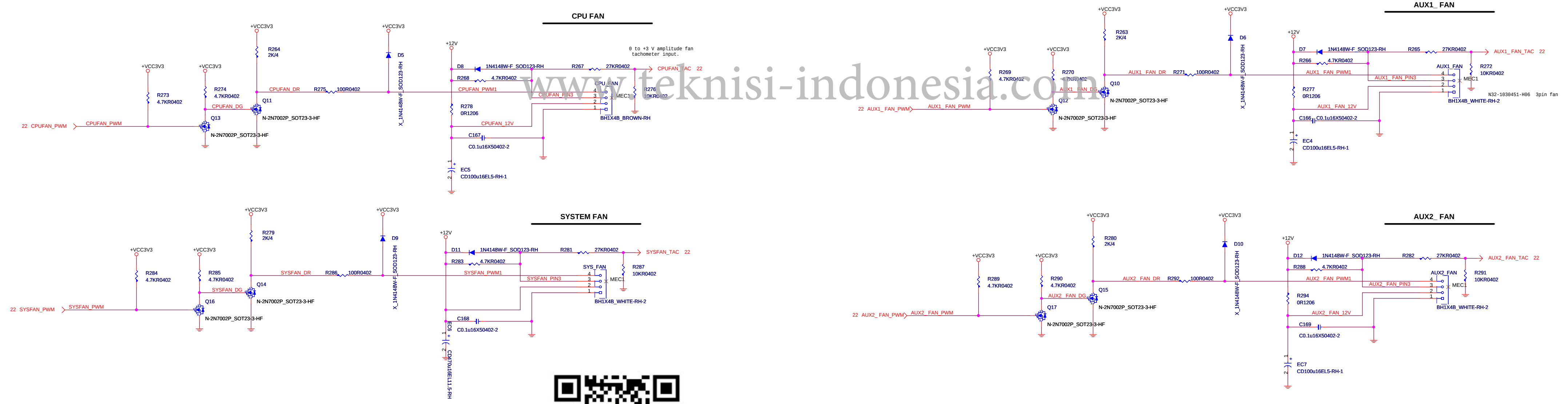
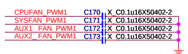
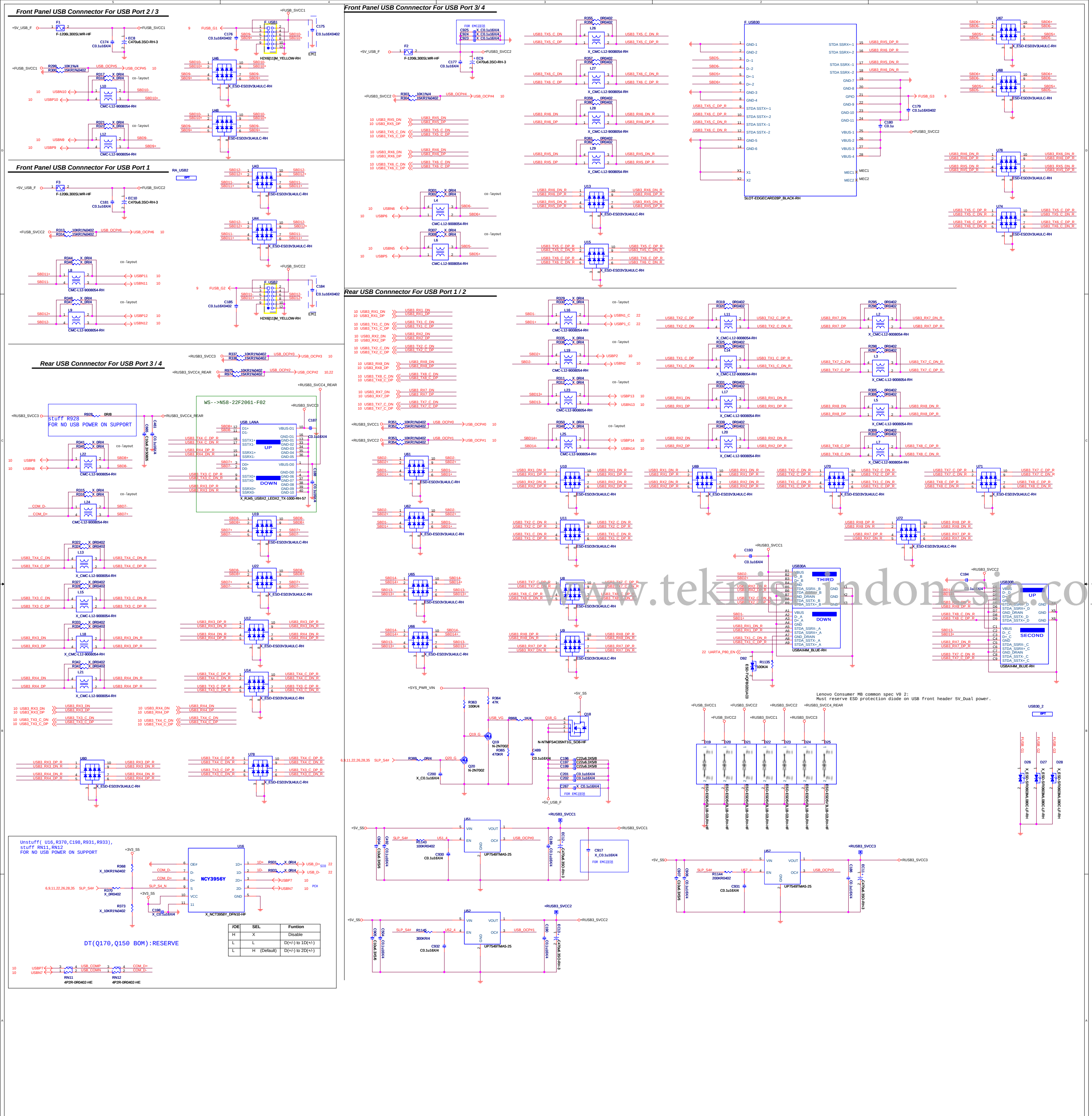


CPU FAN /SYSTEM FAN /POWER FAN





Title	SATA/FAN	
Size	Document Number: Q170/Q150	Rev: 0F
Date: Friday, August 14, 2015	Sheet 18 of 43	

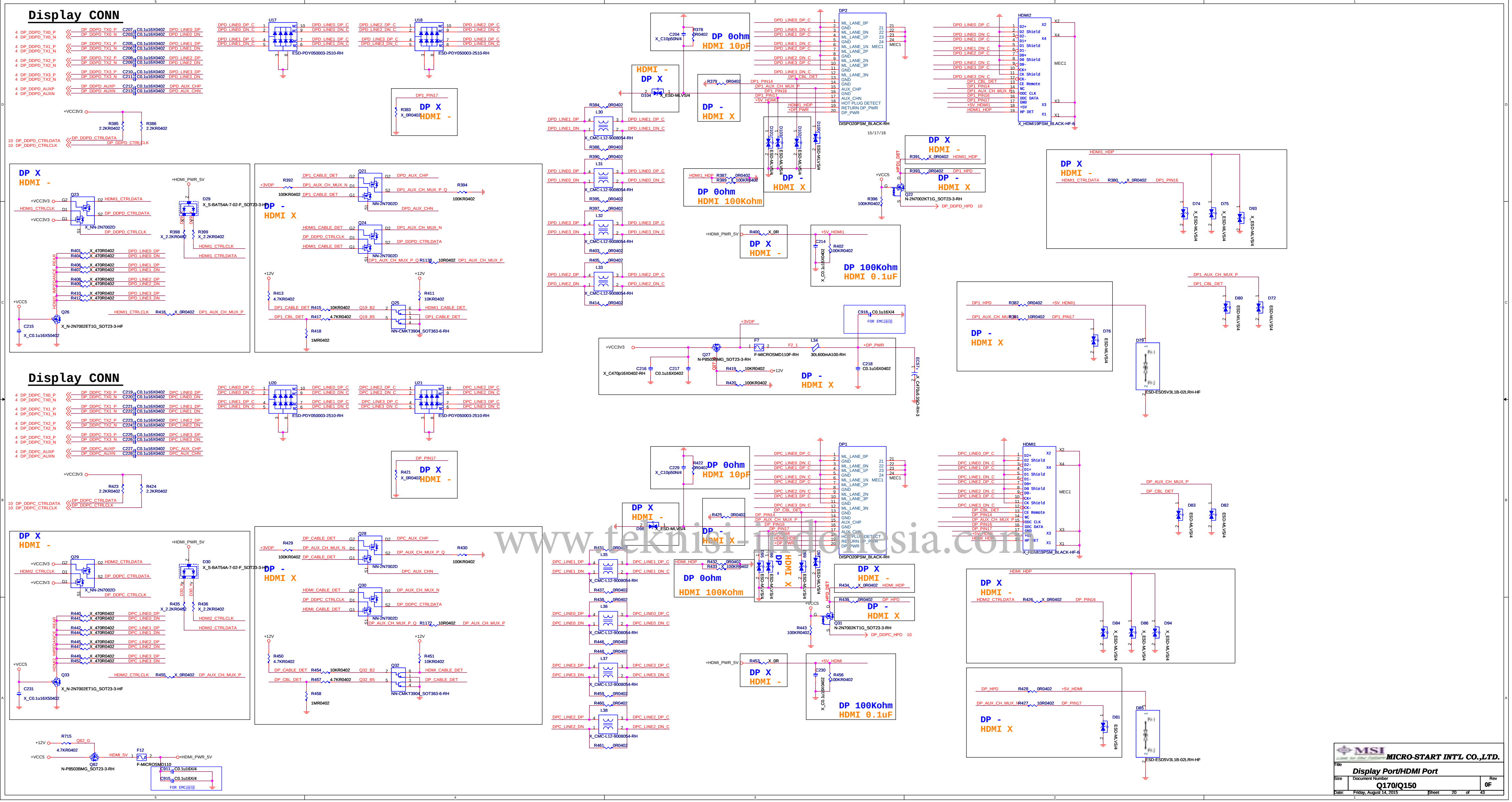


MICRO-START INT'L CO.,LTD.

Title: Front / Rear USB Connectors

Size	Document Number	Rev
	Q170/Q150	0F

Date: Friday, August 14, 2015 Sheet 19 of 43



Display CONN
Display CONN
DP X
HDMI -
DP -
HDMI X
DP 0ohm
HDMI 10pF
DP 0ohm
HDMI 100Kohm
DP 100Kohm
HDMI 0.1uF
FOR EMC
DISPO20PSM_BLACK-RH
X_HDMI19PSM_BLACK-HF-6
ESD-PDY050003-2510-RH
X_CMC-L12-9008054-RH
NN-CMKT3904_SOT363-6-RH
N-2N7002KT1G_SOT23-3-RH
F-MICROSMD110F-RH
MICRO-START INT'L CO.,LTD.
Title
Display Port/HDMI Port
Size
Document Number
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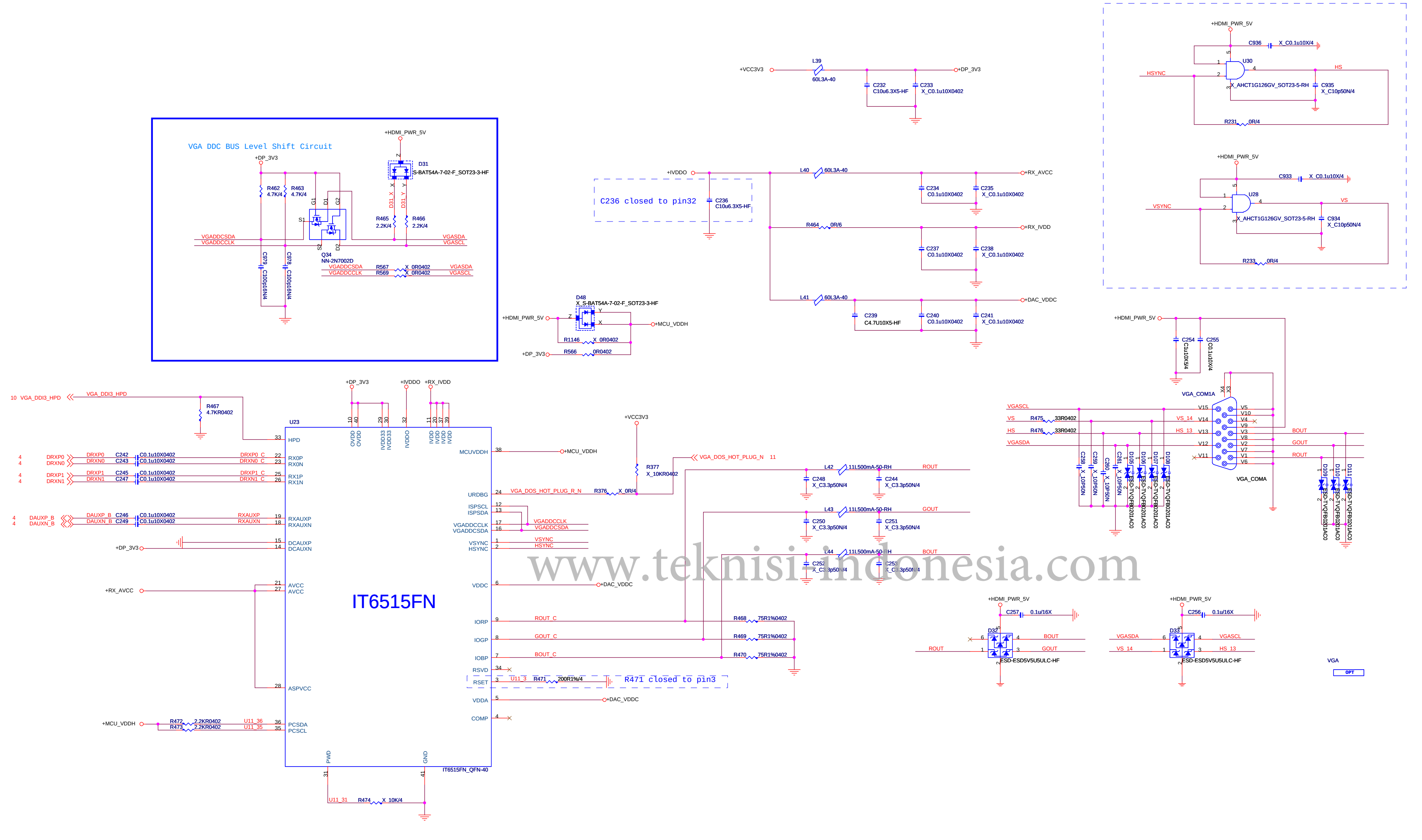
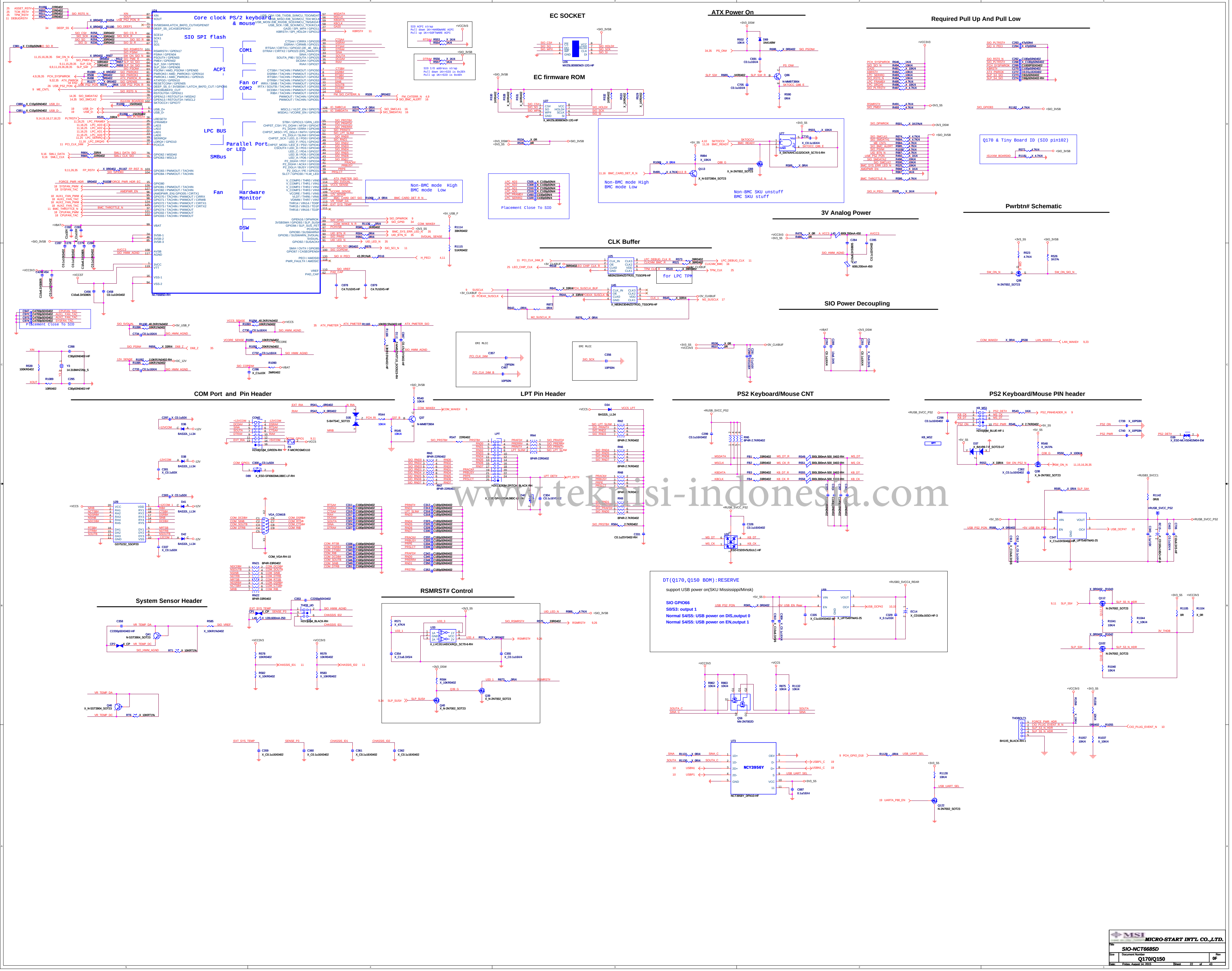

VGA DDC BUS Level Shift Circuit
IT6515FN
C236 closed to pin32
R471 closed to pin3
IT6515FN_QFN-40
VGA_COMA
+HDMI_PWR_5V
+DP_3V3
+VCC3V3
+IVDDO
+RX_AVCC
+RX_IVDD
+DAC_VDDC
+MCU_VDDH


EC SOCKET
ATX Power On
Required Pull Up And Pull Low
EC firmware ROM
Core clock PS/2 keyboard & mouse
SIO SPI flash
COM1
ACPI
Fan or COM2
LPC BUS
Parallel Port or LED
SMBus
Fan
Hardware Monitor
DSW
Non-BMC mode High
BMC mode Low
Non-BMC SKU unstuff
BMC SKU stuff
Q170 & Tiny Board ID (SIO pin102)
Placement Close To SIO
3V Analog Power
Pwrbtn# Schematic
CLK Buffer
for LPC TPM
SIO Power Decoupling
COM Port and Pin Header
LPT Pin Header
PS2 Keyboard/Mouse CNT
PS2 Keyboard/Mouse PIN header
System Sensor Header
RSMRST# Control
DT(Q170,Q150 BOM):RESERVE
support USB power on(SKU Mississippi/Minsk)
SIO GPIO66
S0/S3: output 1
Normal S4/S5: USB power on DIS,output 0
Normal S4/S5: USB power on EN,output 1
NCT6685D
NCY3956Y
MSI MICRO-START INT'L CO.,LTD.
SIO-NCT6685D
Q170/Q150
Rev 0F
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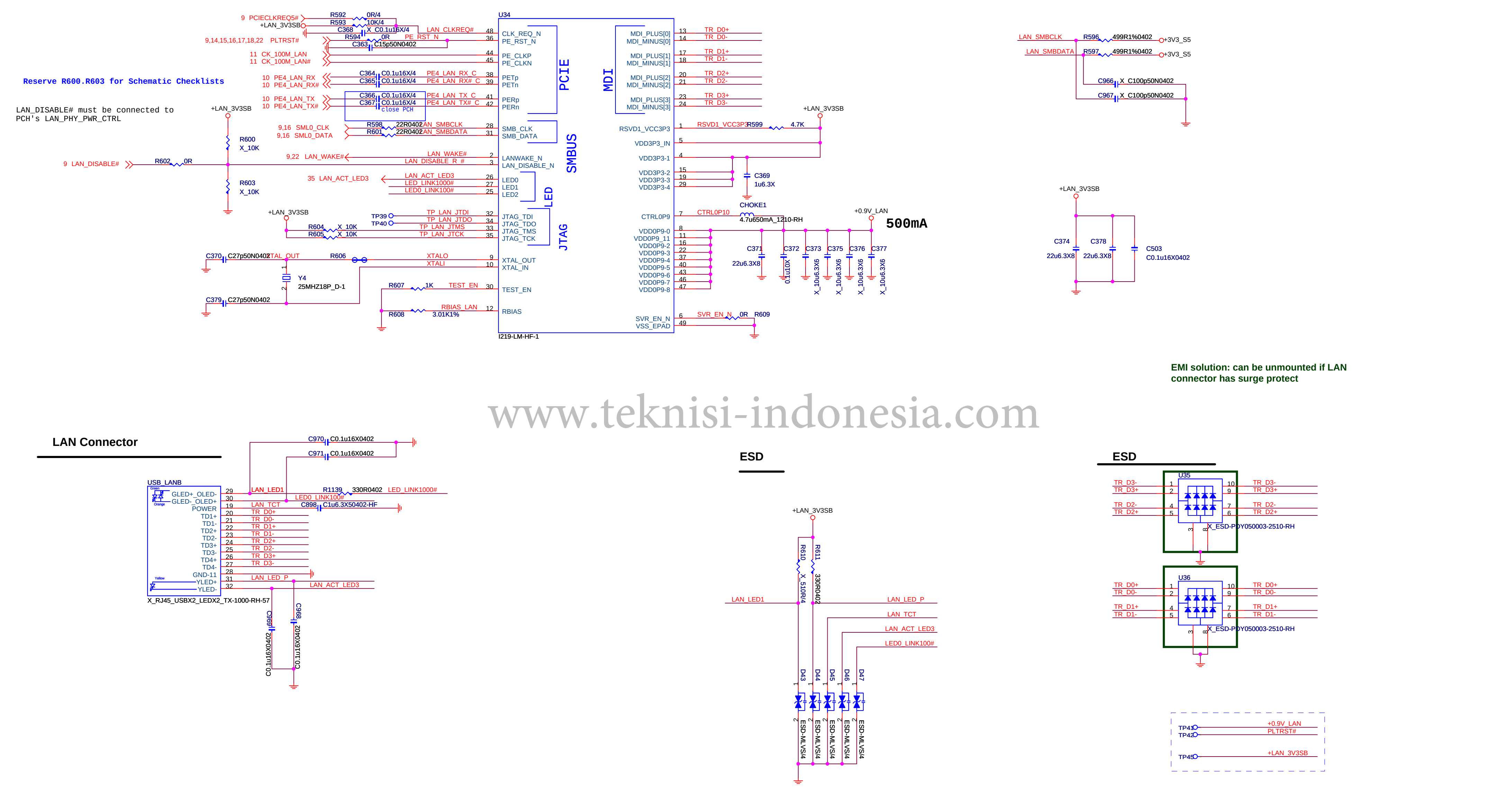

MICRO-START INT'L CO.,LTD.

Title	LAN-I219-LM
Size / Document Number	Q170/Q150
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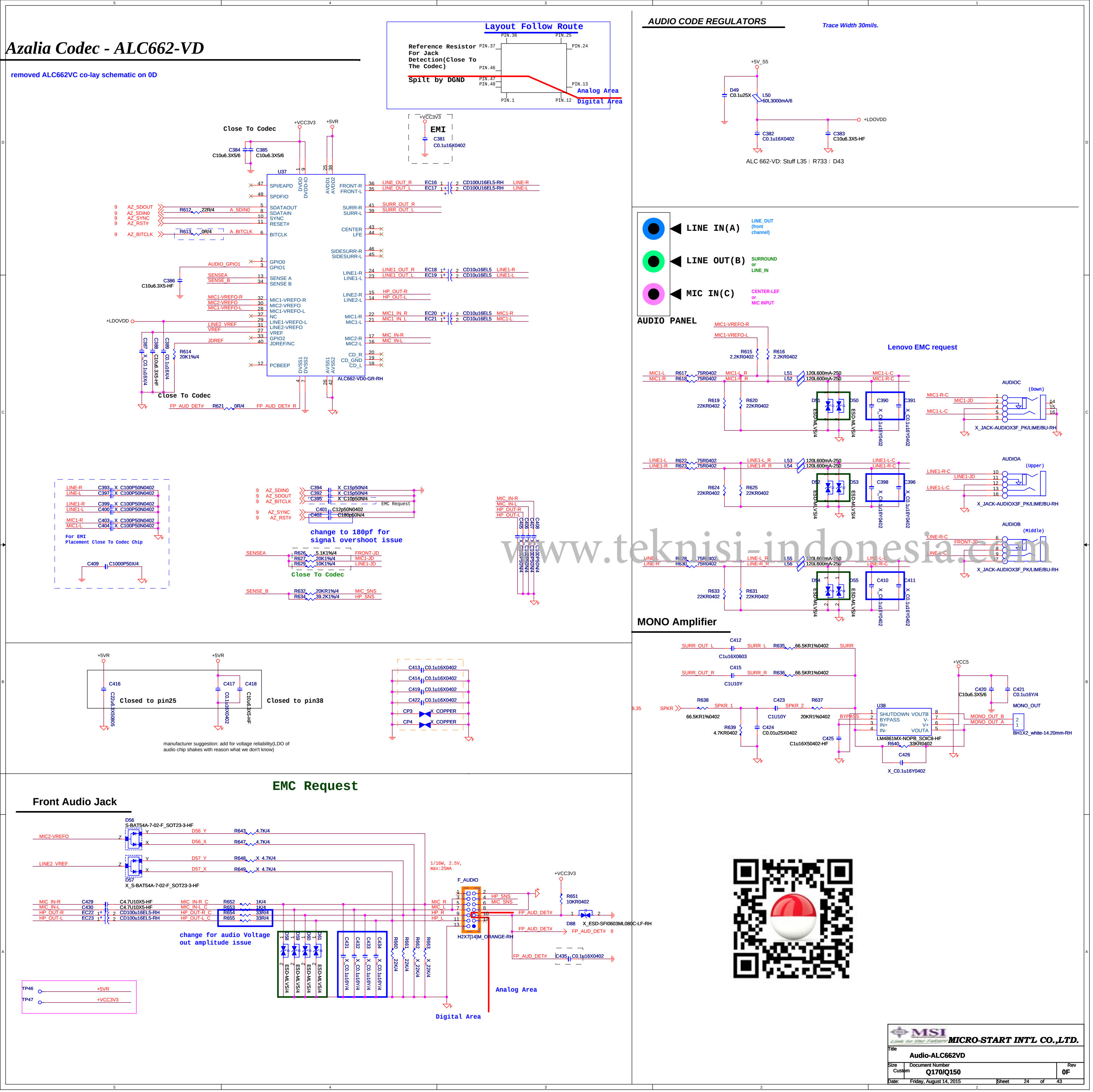
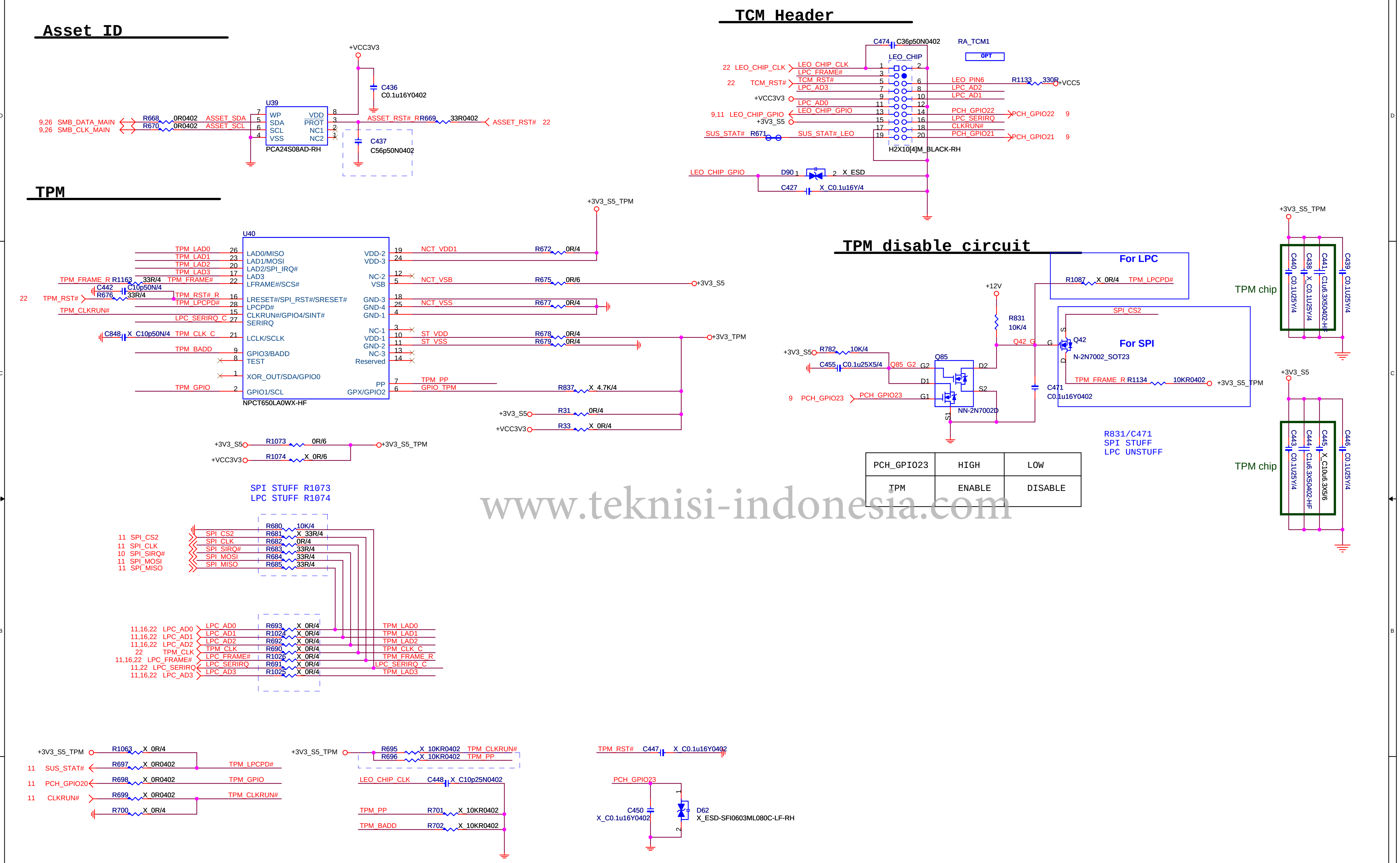
Azalia Codec - ALC662-VD

removed ALC662VC co-lay schematic on 0D





PCH_GPIO23	HIGH	LOW
TPM	ENABLE	DISABLE

	R837	R673	R676	R672	R675	R677	R681	R682	R683	R684	R685	R693	R1024	R692	R690	R1026	R691	R1025	R1063	R697	R698	R699	R700	R695	R696	R701	R702	R680	C442	C438	C414	C439	C440	C443	C444	C446	C445
ST----ST33HTPM0028ASTL(SPI)	X	X	V	X	X	X	X	V	V	V	V	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	V	X	V	X	V	V	V	X	X
NPC----NPCT650LA0WX(SPI)	X	X	V	V	V	V	X	V	V	V	V	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	V	V	X	V	V	V	V	V	V	X
NPC----NPCT650LA0WX(LPC)	X	X	V	V	V	V	X	X	X	X	X	V	V	V	V	V	V	V	X	X	X	X	X	V	X	X	X	X	V	X	V	V	V	V	V	V	X
Nationz----ZH320TC(LPC)	X	X	V	V	X	V	X	X	X	X	X	V	V	V	V	V	V	V	V	X	X	X	V	X	X	V	X	X	V	X	V	V	V	V	V	V	X
Infineon----SLB9660(LPC)	V	V	V	V	X	V	X	X	X	X	X	V	V	V	V	V	V	V	X	X	X	X	X	X	X	V	X	X	V	X	V	V	V	V	V	V	X

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

Title: TPM & Asset ID

Size | Document Number: Q170/Q150 | Rev: 0F

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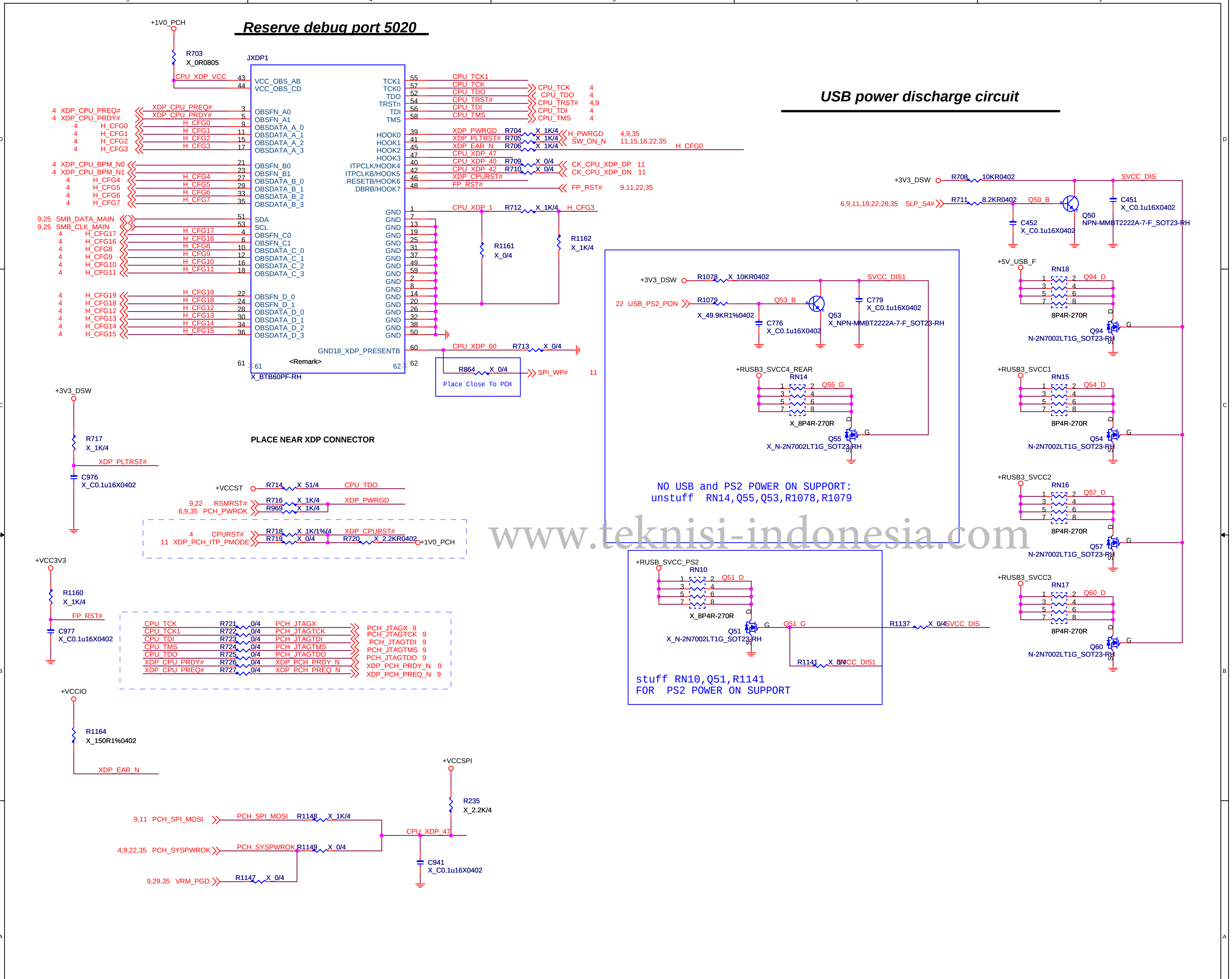

MSI Link to the Future
MICRO-START INT'L CO.,LTD.

Title		
XDP/USB Power Dischage		
Size	Document Number: Q170/Q150	Rev: 0F
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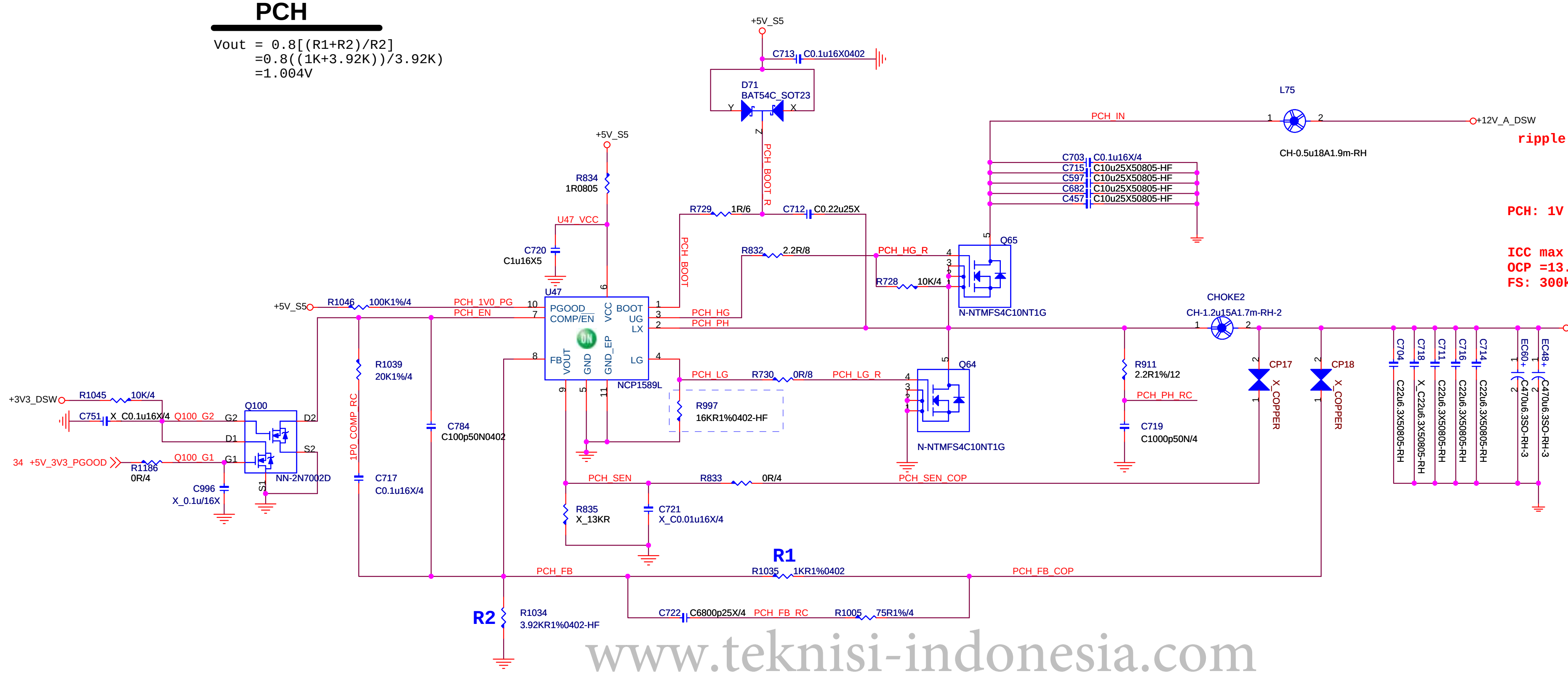
PCH

Vout = 0.8[(R1+R2)/R2]
=0.8((1K+3.92K))/3.92K)
=1.004V



ripple Irms=2.55A

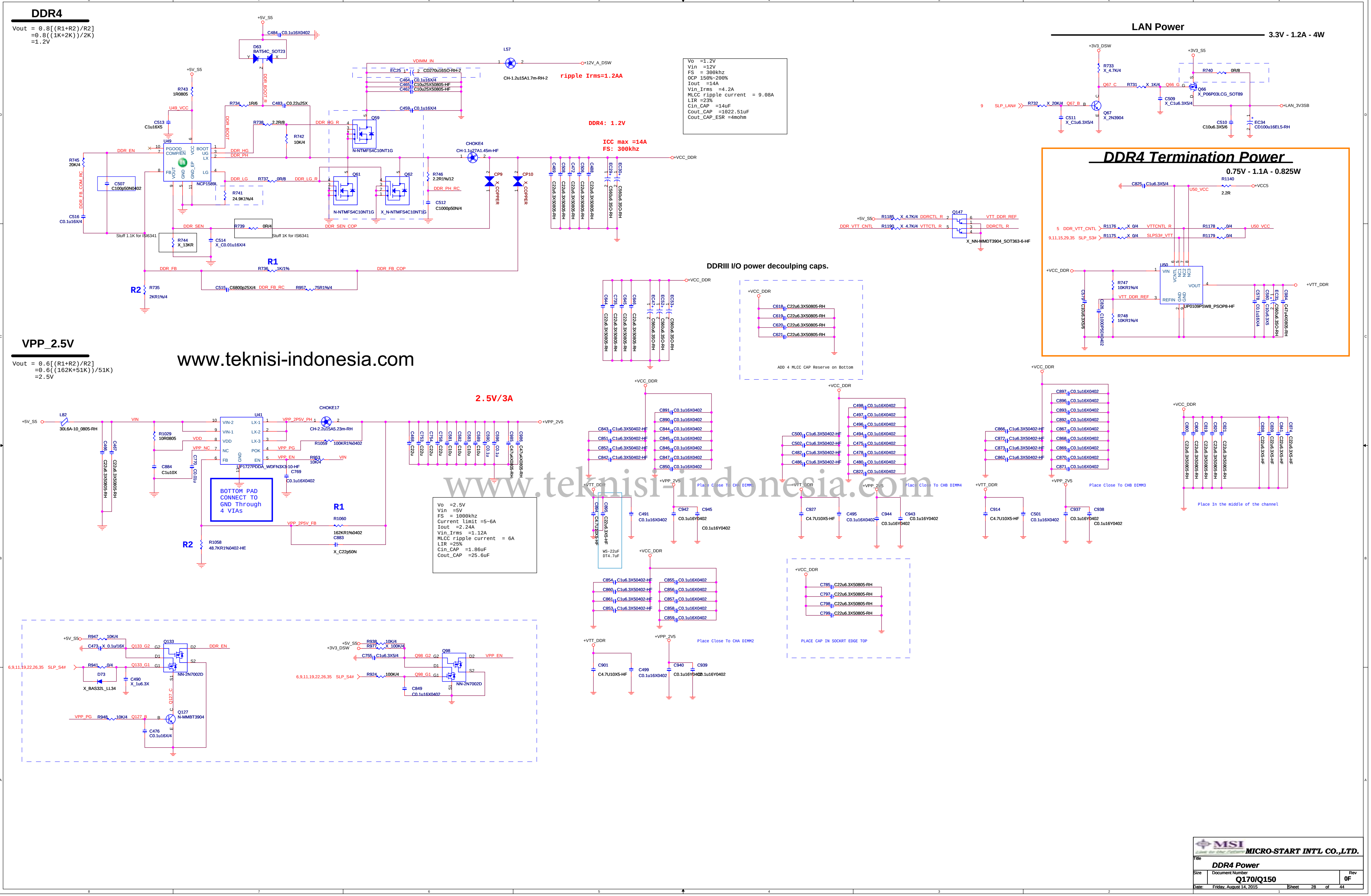
PCH: 1V

ICC max =9.24A
OCP =13.86A
FS: 300khz

Vo =1V
Vin =12V
FS = 300khz
OCP 150%~200%
Iout =9.24A
Vin_Irms =2.55A
MLCC ripple current = 5A
LIR =28%
Cin_CAP =7.84uF
Cout_CAP =606.15uF
Cout_CAP_ESR =4mohm

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

Title	PCH Core Power	
Size	Document Number: Q170/Q150	Rev: 0F
Date: Friday, August 14, 2015	Sheet 27 of 43	



DDR4
Vout = 0.8[(R1+R2)/R2]
=0.8((1K+2K))/2K)
=1.2V
ripple Irms=1.2AA
DDR4: 1.2V
ICC max =14A
FS: 300khz
Vo =1.2V
Vin =12V
FS = 300khz
OCP 150%~200%
Iout =14A
Vin_Irms =4.2A
MLCC ripple current = 9.08A
LIR =23%
Cin_CAP =14uF
Cout_CAP =1022.51uF
Cout_CAP_ESR =4mohm
LAN Power
3.3V - 1.2A - 4W
DDR4 Termination Power
0.75V - 1.1A - 0.825W
DDRIII I/O power decoupling caps.
ADD 4 MLCC CAP Reserve on Bottom
VPP_2.5V
Vout = 0.6[(R1+R2)/R2]
=0.6((162K+51K))/51K)
=2.5V
www.teknisi-indonesia.com
2.5V/3A
BOTTOM PAD
CONNECT TO
GND Through
4 VIAs
Vo =2.5V
Vin =5V
FS = 1000khz
Current limit =5~6A
Iout =2.24A
Vin_Irms =1.12A
MLCC ripple current = 6A
LIR =25%
Cin_CAP =1.86uF
Cout_CAP =25.6uF
Place Close To CHB DIMM4
Place Close To CHB DIMM3
Place In the middle of the channel
Place Close To CHA DIMM2
PLACE CAP IN SOCKRT EDGE TOP
MSI
MICRO-START INT'L CO.,LTD.
Title
DDR4 Power
Size
Document Number
Q170/Q150
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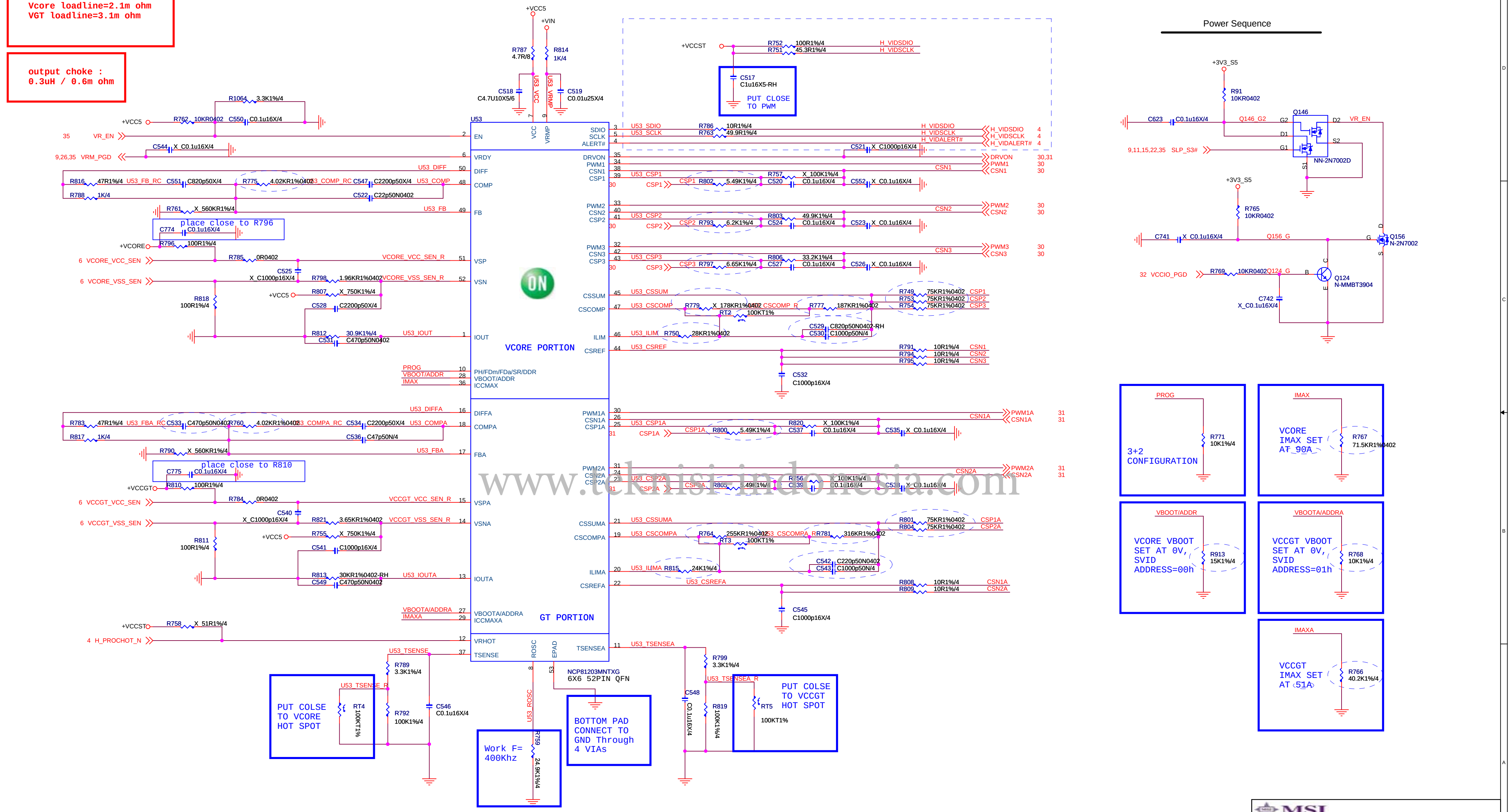
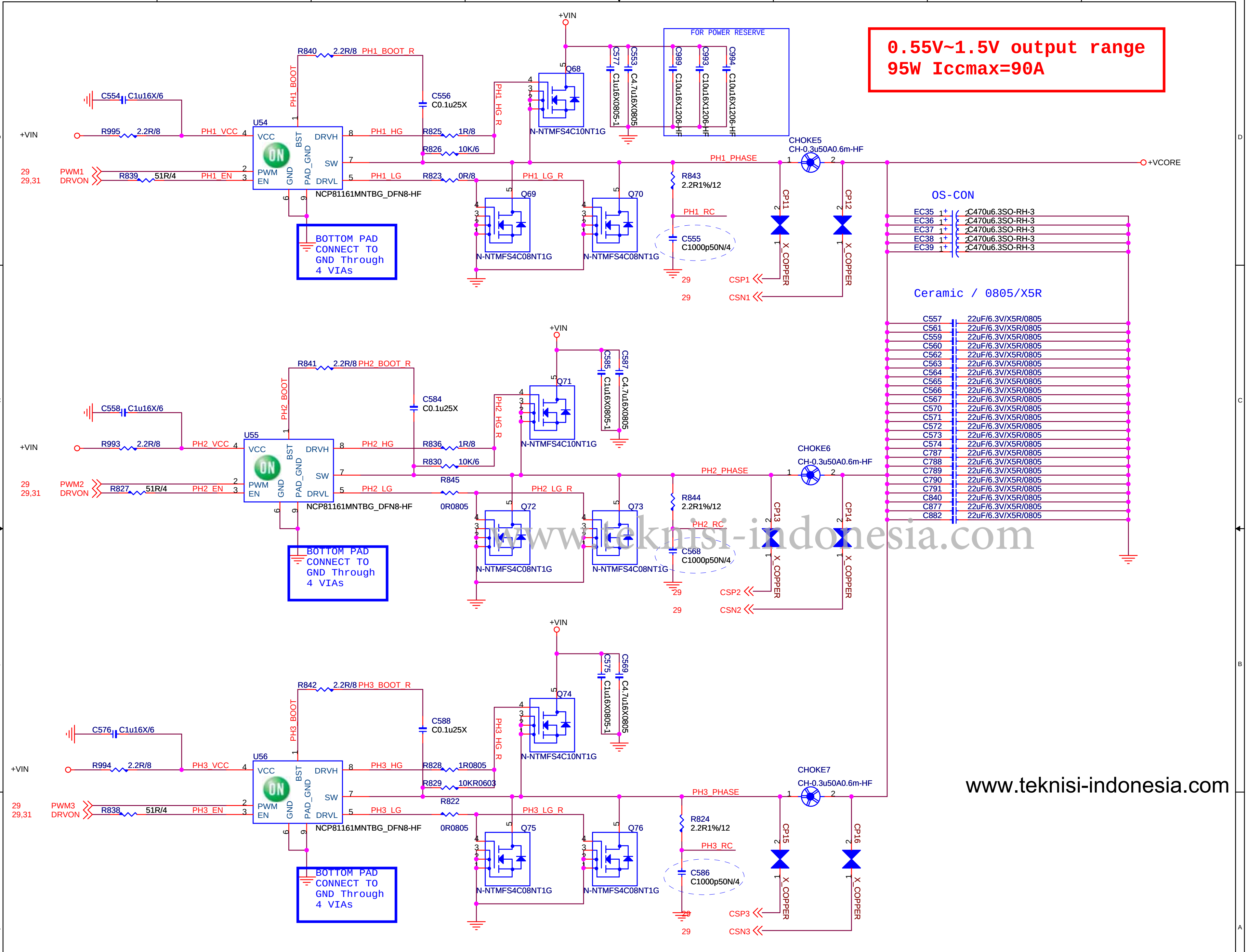
Intel SKYLAKE IMVP8 POWER CKT - 3+2 PHASE

S-line 42 95W
Vcore loadline=2.1m ohm
VGT loadline=3.1m ohm

output choke :
0.3uH / 0.6m ohm

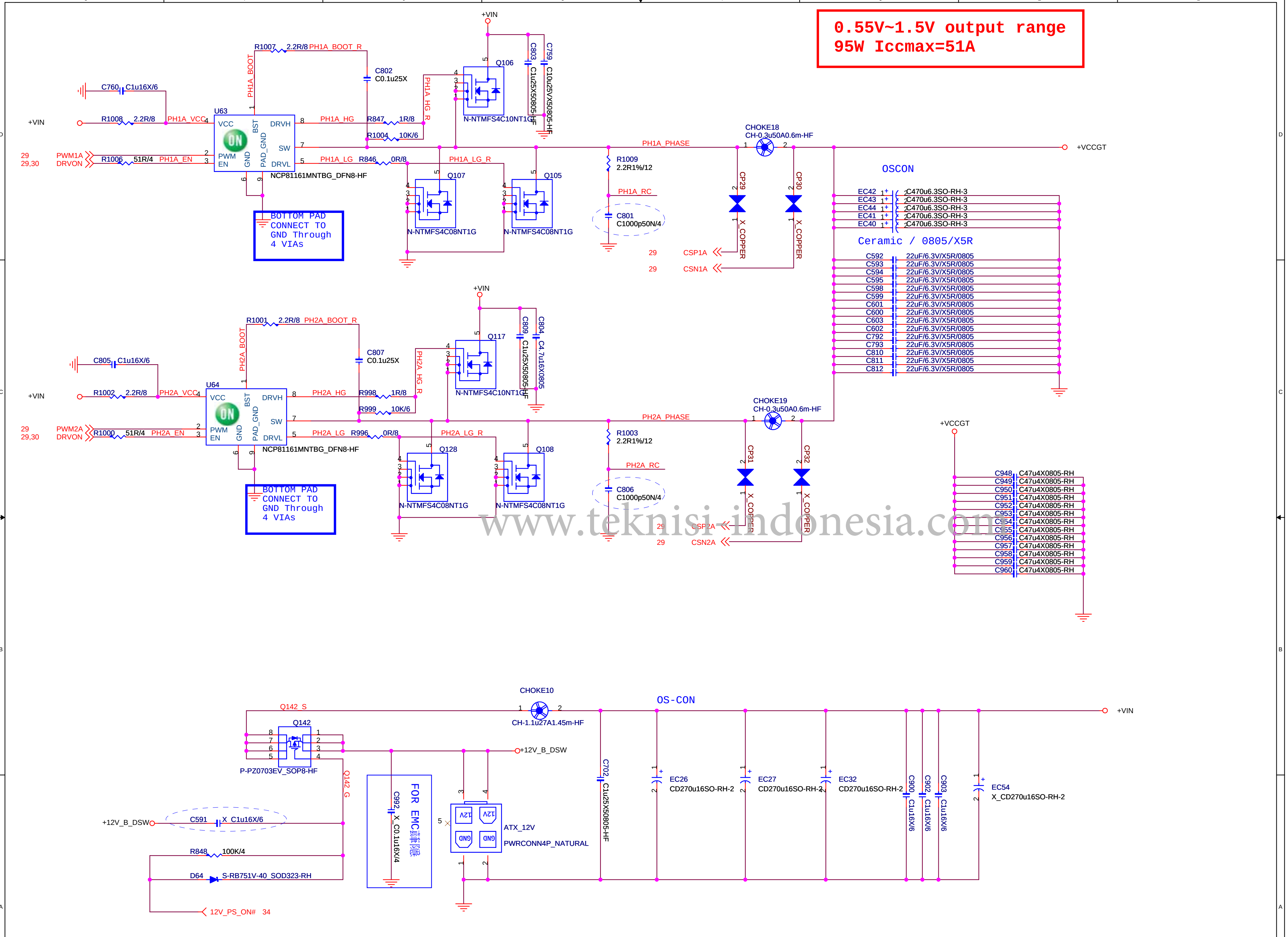


MSI MICRO-START INT'L CO.,LTD.		
Title	IMVP8-NCP81203 5 Phase	
Size	Document Number: Q170/Q150	Rev: 0F
Date: Friday, August 14, 2015	Sheet 29 of 43	



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

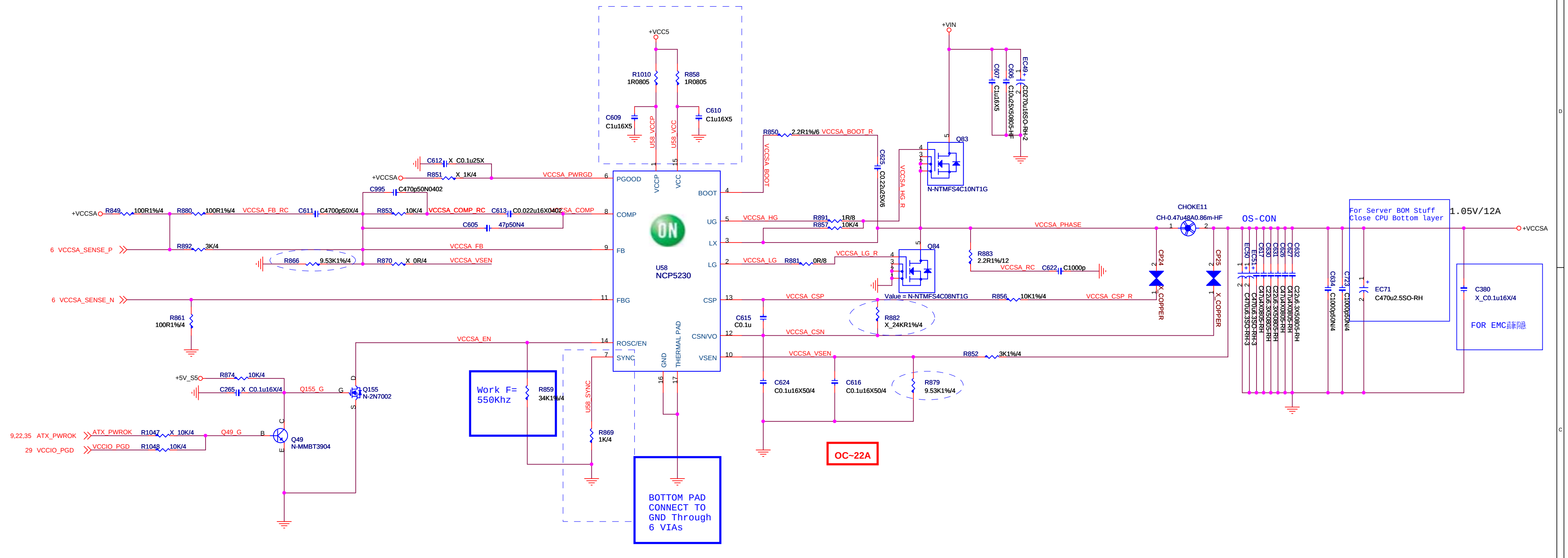
Title	VCORE OUTPUT STAGE	
Size	Document Number Q170/Q150	Rev 0F
Date: Friday, August 14, 2015	Sheet 30 of 43	



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

Title	VCCGT OUTPUT STAGE	
Size	Document Number: Q170/Q150	Rev: 0F
Date: Friday, August 14, 2015	Sheet 31 of 43	

VCCSA



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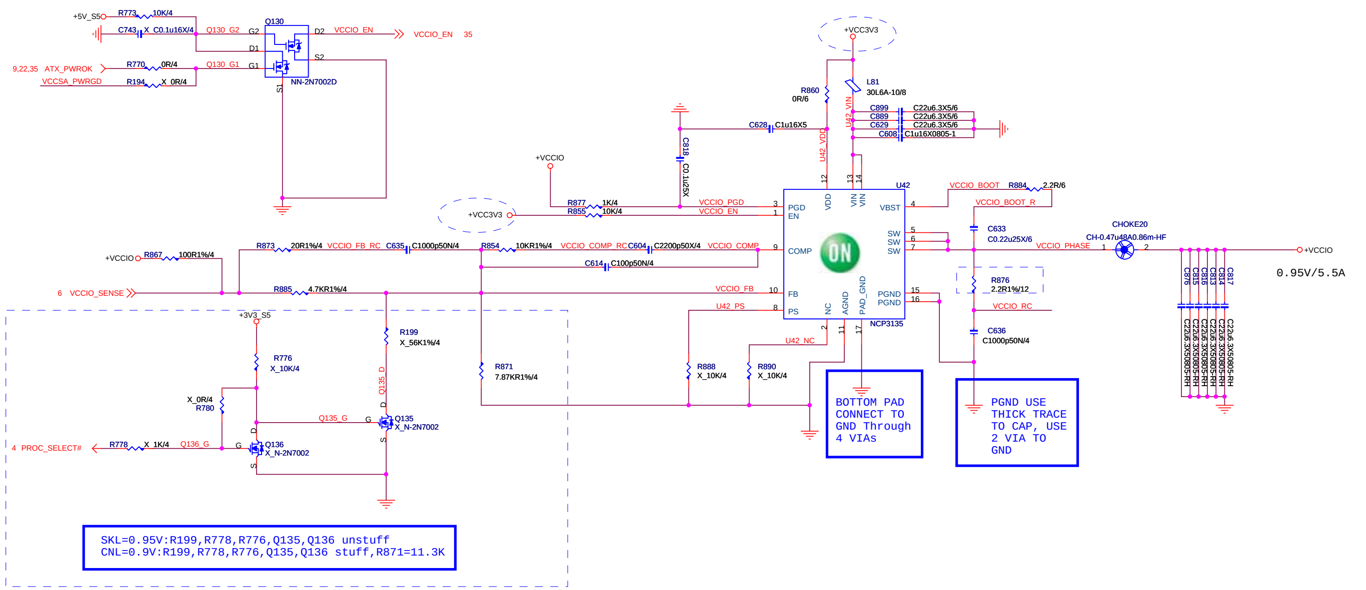
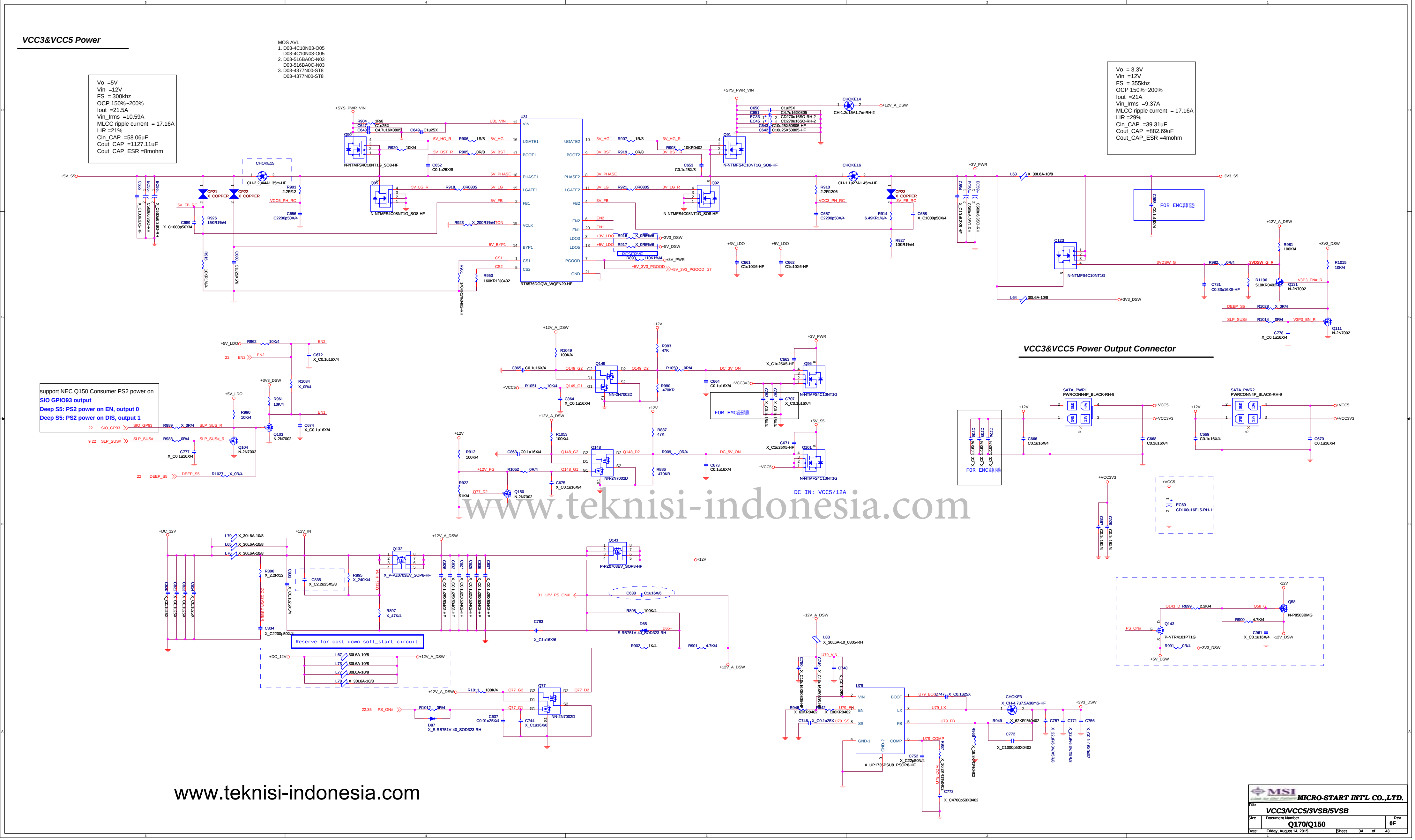
VCCIO



MSI	MICRO-START INT'L CO.,LTD.
Title	VccSA/VccIO
Size / Document Number	Q170/Q150
Rev	0F
Date:	Friday, August 14, 2015
Sheet	32 of 43



VCC3&VCC5 Power
MOS AVL
1. D03-4C10N03-O05
D03-4C10N03-O05
2. D03-516BA0C-N03
D03-516BA0C-N03
3. D03-4377N00-ST8
D03-4377N00-ST8
Vo =5V
Vin =12V
FS = 300khz
OCP 150%~200%
Iout =21.5A
Vin_Irms =10.59A
MLCC ripple current = 17.16A
LIR =21%
Cin_CAP =58.06uF
Cout_CAP =1127.11uF
Cout_CAP_ESR =8mohm
Vo = 3.3V
Vin =12V
FS = 355khz
OCP 150%~200%
Iout =21A
Vin_Irms =9.37A
MLCC ripple current = 17.16A
LIR =29%
Cin_CAP =39.31uF
Cout_CAP =882.69uF
Cout_CAP_ESR =4mohm
RT6576DGQW_WQFN20-HF
support NEC Q150 Consumer PS2 power on
SIO GPIO93 output
Deep S5: PS2 power on EN, output 0
Deep S5: PS2 power on DIS, output 1
VCC3&VCC5 Power Output Connector
FOR EMC
DC IN: VCC5/12A
Reserve for cost down soft_start circuit
X_UP1735PSU8_PSOP8-HF
MICRO-START INT'L CO.,LTD.
Title
VCC3/VCC5/3VSB/5VSB
Size
Document Number
Q170/Q150
Rev
0F
Date: Friday, August 14, 2015
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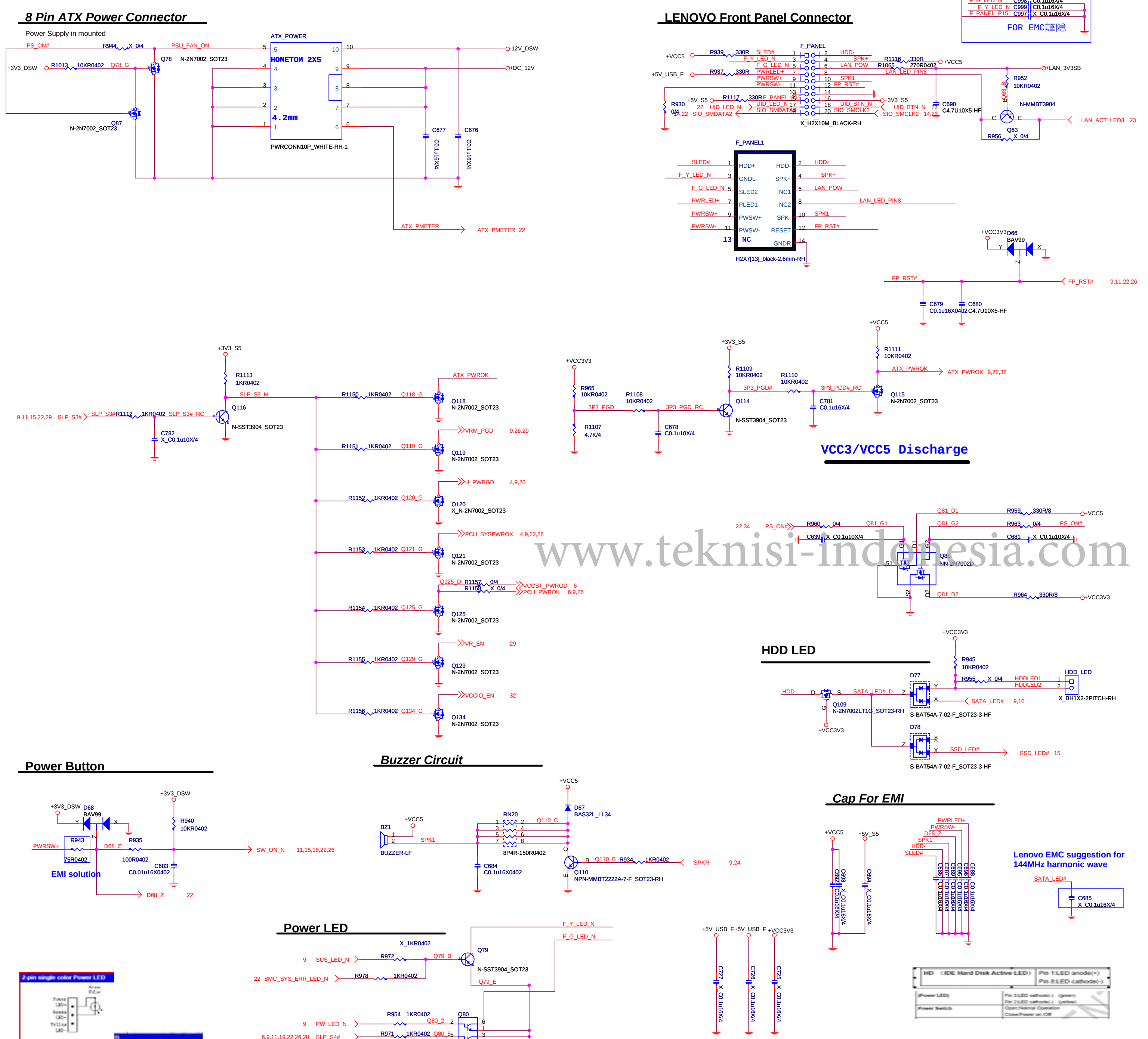
ATX Power Connector / Front Panel / LED/DSW

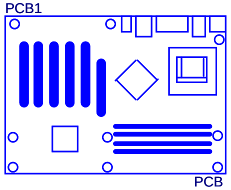


MSI MICRO-START INT'L CO.,LTD.

Title	ATX/F_Panel/EMI/LED	
Size	Document Number: Q170/Q150	Rev: 0F
Date: Friday, August 14, 2015	Sheet 35 of 43	

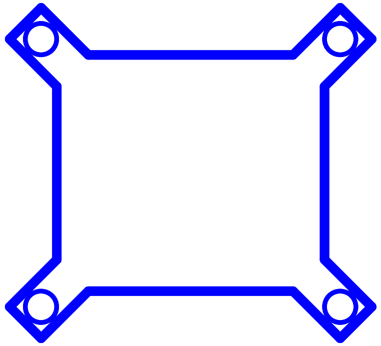
Manual Parts

PCB1



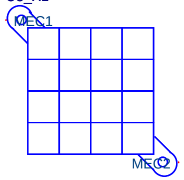
PCB

XU1_X2



X_CPU Backplate

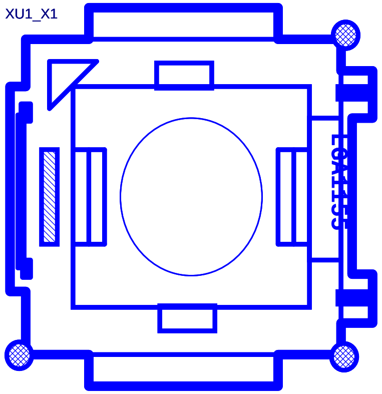
MEC1 U3_X1



MEC2

HS-0406830-RH

XU1_X1



CPU SOCKET

USB_LAN1 OPT 6KV

with surge single LED +USB3.0 X2 connector: N58-30F0081-F02

USB_LAN2 OPT

without surge +USB3.0 X2 connector: N58-32F0221-F02

USB_LAN3 OPT 6KV

with surge single LED +USB2.0 X2 connector: N58-20F0551-F02

USB_LAN4 OPT

without surge +USB2.0 X2 connector: N58-22F2061-F02

Simulation

SIP1 SIM2 X_PIN1*2

SIP2 SIM1 X_PIN1*2

VBAT-S1 BAT-BCR2032P-RH

USB_LAN OPT

AUDIO OPT

LABEL1 OPT

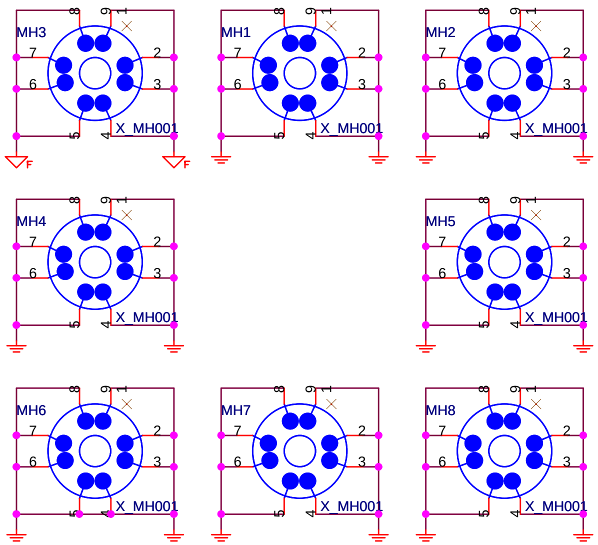
HDMI_LABEL OPT

WIN8KEY1 OPT

WIN8KEY2 OPT

AMI_KEY1 OPT

Mounting Holes



For EMI For Moat CAP

+VCC5 C697 C0.1u16X0402

+VCC3V3 C698 X_C0.1u16X0402 +1V0_PCH

+VCC3V3 C699 X_C0.1u16X0402 +1V0_PCH

+5V_S5 C700 X_C0.1u16X0402

+12V C701 X_C0.1u16X0402

EMI Suggestion
VRM part has high frequence noise

Optics Orientation Holes

Optical Fiducial Marks-120

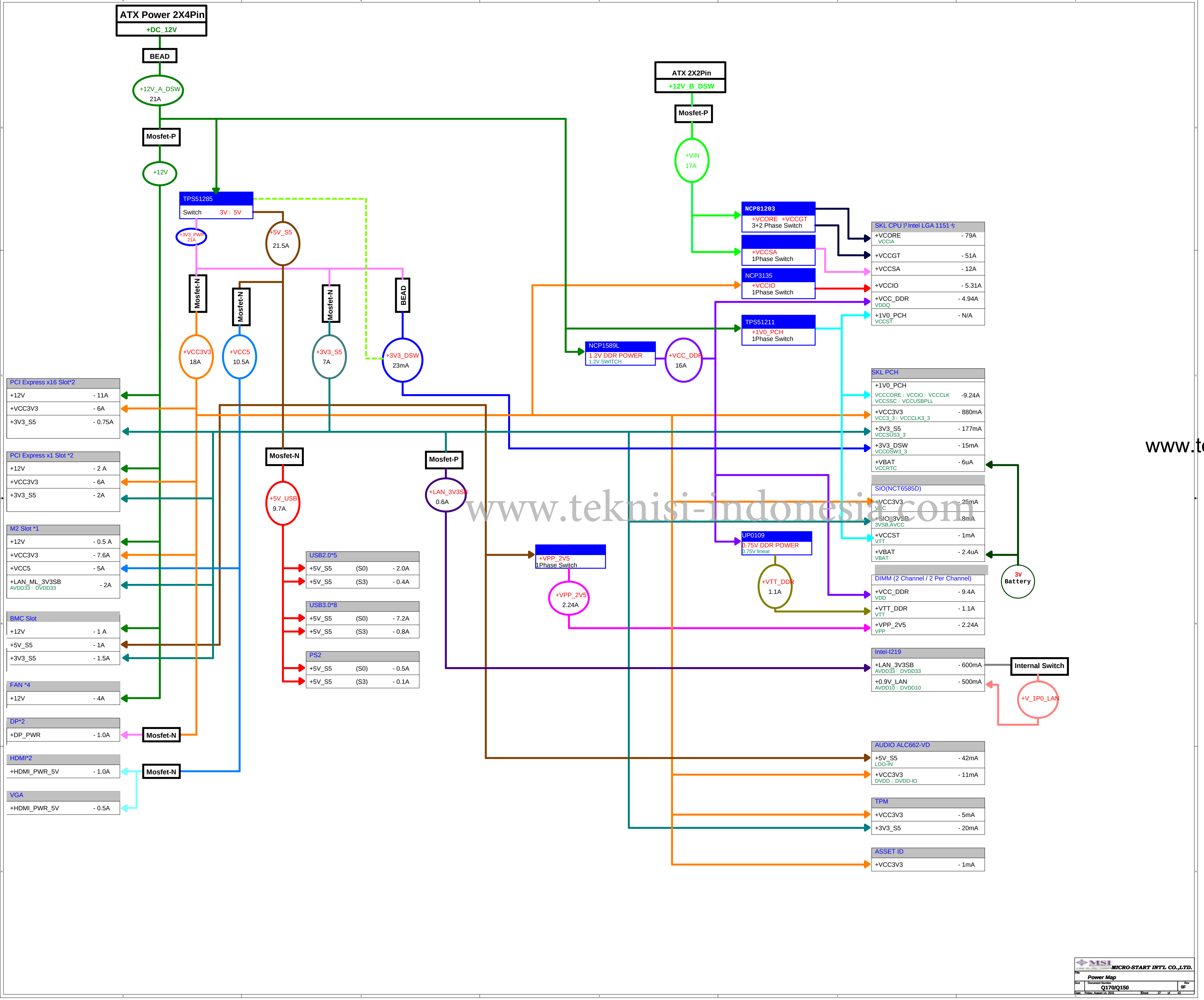
FM1 X_FM, FM2 X_FM, FM3 X_FM, FM4 X_FM, FM5 X_FM, FM6 X_FM, FM7 X_FM, FM8 X_FM

+3V3_S5 C728 X_C0.1u16X0402

+12V C729 X_C0.1u16X0402

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

Title	Manual & Option Parts	
Size	Document Number: Q170/Q150	Rev: 0F
Date: Friday, August 14, 2015	Sheet 36 of 43	



ATX Power 2X4Pin
+DC_12V
BEAD
+12V_A_DSW 21A
Mosfet-P
+12V
TPS51285
Switch 3V | 5V
+3V3_PWR 21A
+5V_S5 21.5A
Mosfet-N
Mosfet-N
Mosfet-N
BEAD
+VCC3V3 18A
+VCC5 10.5A
+3V3_S5 7A
+3V3_DSW 23mA
ATX 2X2Pin
+12V_B_DSW
Mosfet-P
+VIN 17A
NCP81203
+VCORE +VCCGT
3+2 Phase Switch
+VCCSA
1Phase Switch
NCP3135
+VCCIO
1Phase Switch
TPS51211
+1V0_PCH
1Phase Switch
NCP1589L
1.2V DDR POWER
1.2V SWITCH
+VCC_DDR 16A
SKL CPU Intel LGA 1151
+VCORE - 79A
VCCIA
+VCCGT - 51A
+VCCSA - 12A
+VCCIO - 5.31A
+VCC_DDR - 4.94A
VDDQ
+1V0_PCH - N/A
VCCST
SKL PCH
+1V0_PCH
VCCCORE | VCCIO | VCCCLK
VCCSSC | VCCUSBPLL
-9.24A
+VCC3V3 - 880mA
VCC3_3 | VCCCLK3_3
+3V3_S5 - 177mA
VCCSUS3_3
+3V3_DSW - 15mA
VCCDSW3_3
+VBAT - 6uA
VCCRTC
SIO(NCT6585D)
+VCC3V3 - 25mA
VCC
+SIO_3VSB - 8mA
3VSB,AVCC
+VCCST - 1mA
VTT
+VBAT - 2.4uA
VBAT
3V Battery
UP0109
0.75V DDR POWER
0.75V linear
+VTT_DDR 1.1A
DIMM (2 Channel / 2 Per Channel)
+VCC_DDR - 9.4A
VDD
+VTT_DDR - 1.1A
VTT
+VPP_2V5 - 2.24A
VPP
+VPP_2V5
1Phase Switch
+VPP_2V5 2.24A
Intel-I219
+LAN_3V3SB - 600mA
AVDD33 | DVDD33
+0.9V_LAN - 500mA
AVDD10 | DVDD10
Internal Switch
+V_1P0_LAN
PCI Express x16 Slot*2
+12V - 11A
+VCC3V3 - 6A
+3V3_S5 - 0.75A
PCI Express x1 Slot *2
+12V - 2 A
+VCC3V3 - 6A
+3V3_S5 - 2A
M2 Slot *1
+12V - 0.5 A
+VCC3V3 - 7.6A
+VCC5 - 5A
+LAN_ML_3V3SB - 2A
AVDD33 | DVDD33
BMC Slot
+12V - 1 A
+5V_S5 - 1A
+3V3_S5 - 1.5A
FAN *4
+12V - 4A
DP*2
+DP_PWR - 1.0A
Mosfet-N
HDMI*2
+HDMI_PWR_5V - 1.0A
Mosfet-N
VGA
+HDMI_PWR_5V - 0.5A
Mosfet-N
+5V_USB 9.7A
Mosfet-P
+LAN_3V3SB 0.6A
USB2.0*5
+5V_S5 (S0) - 2.0A
+5V_S5 (S3) - 0.4A
USB3.0*8
+5V_S5 (S0) - 7.2A
+5V_S5 (S3) - 0.8A
PS2
+5V_S5 (S0) - 0.5A
+5V_S5 (S3) - 0.1A
AUDIO ALC662-VD
+5V_S5 - 42mA
LDO-IN
+VCC3V3 - 11mA
DVDD | DVDD-IO
TPM
+VCC3V3 - 5mA
+3V3_S5 - 20mA
ASSET ID
+VCC3V3 - 1mA
MSI MICRO-START INT'L CO.,LTD.
Power Map
Q170/Q150
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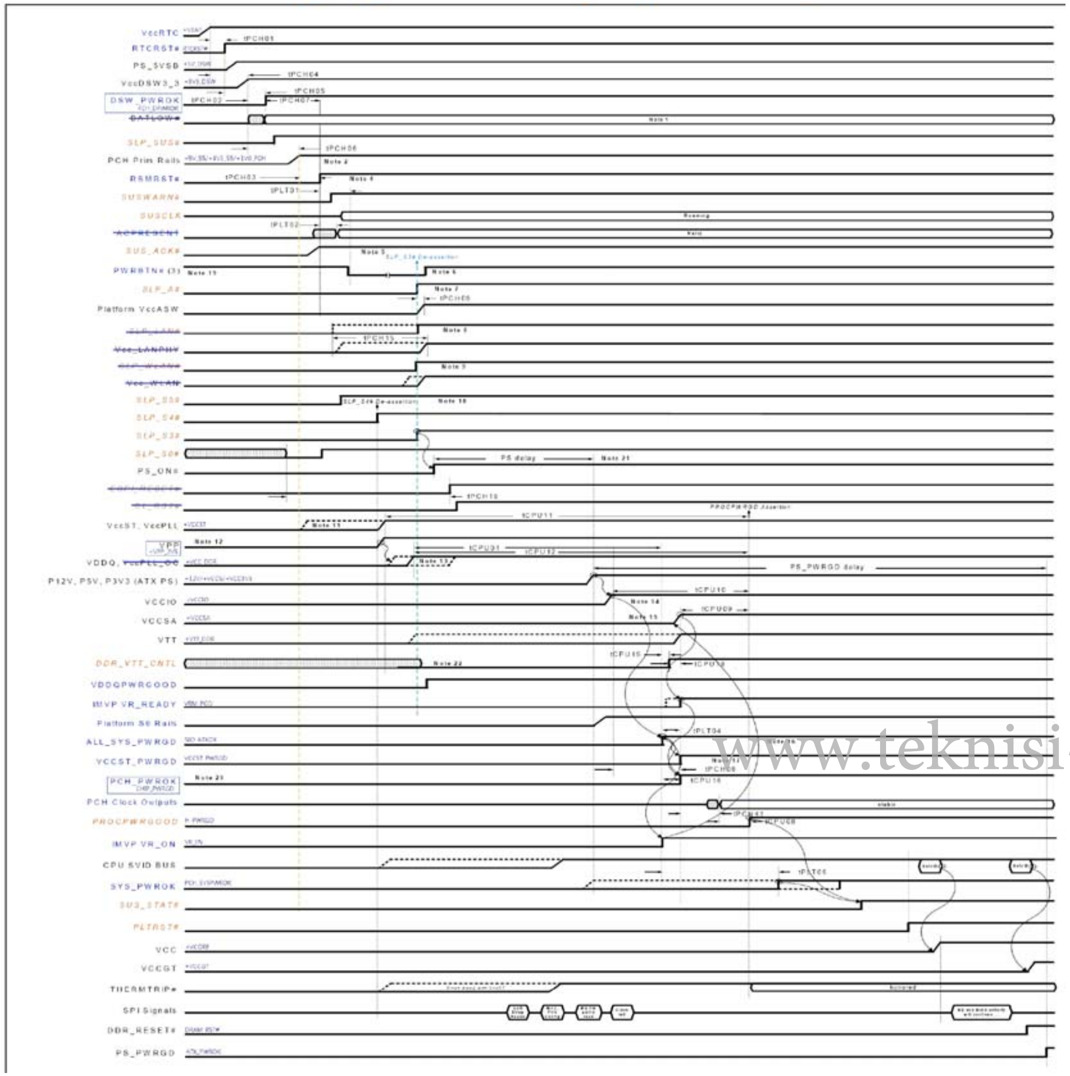
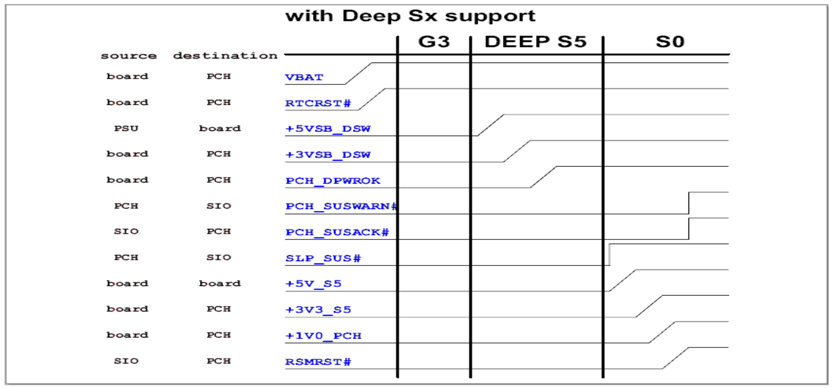
SKL-S Timing Diagram for G3 to S0 [Deep Sx Platform]



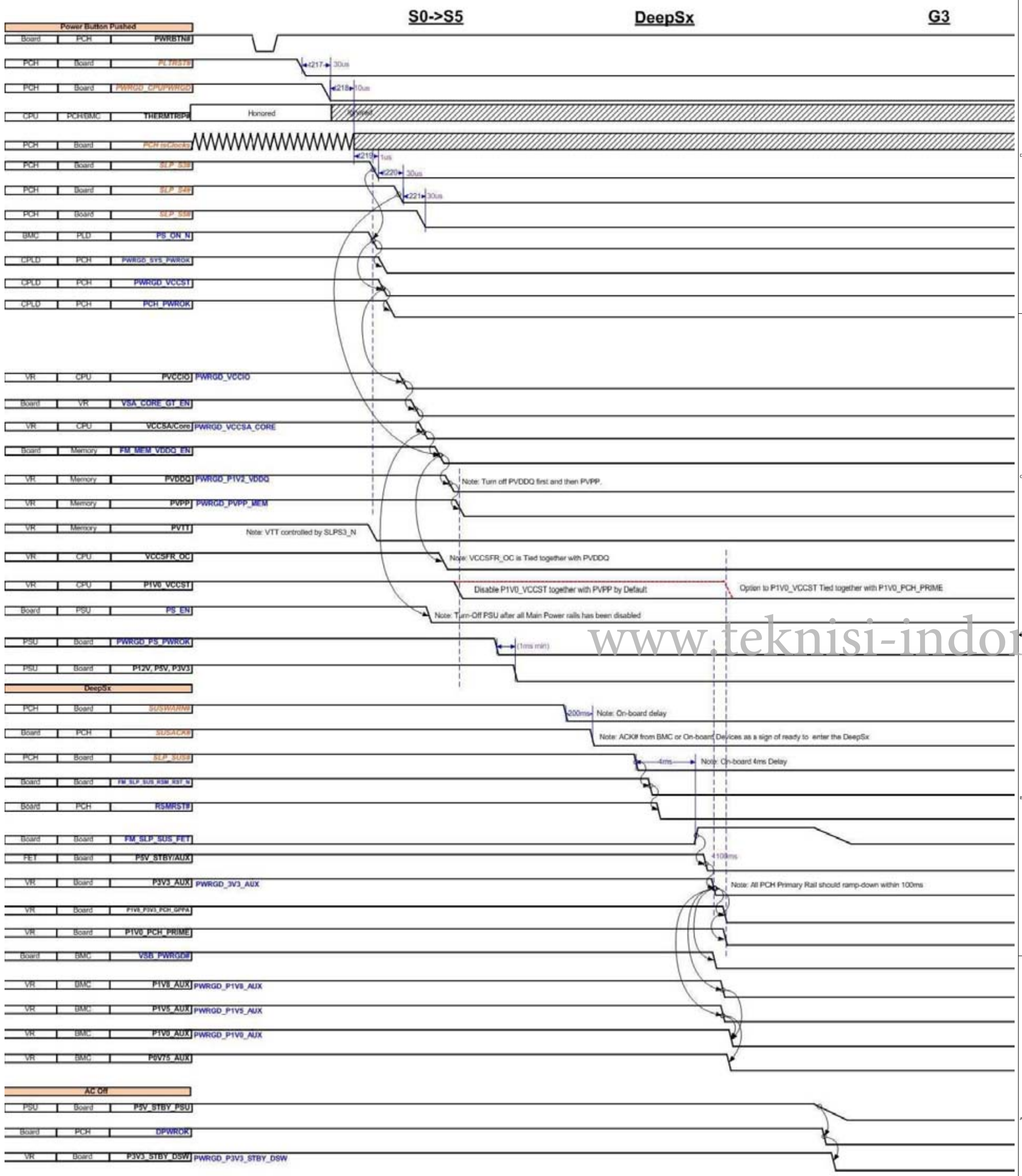


MSI MICRO-START INT'L CO.,LTD.

Title: Power Sequence1

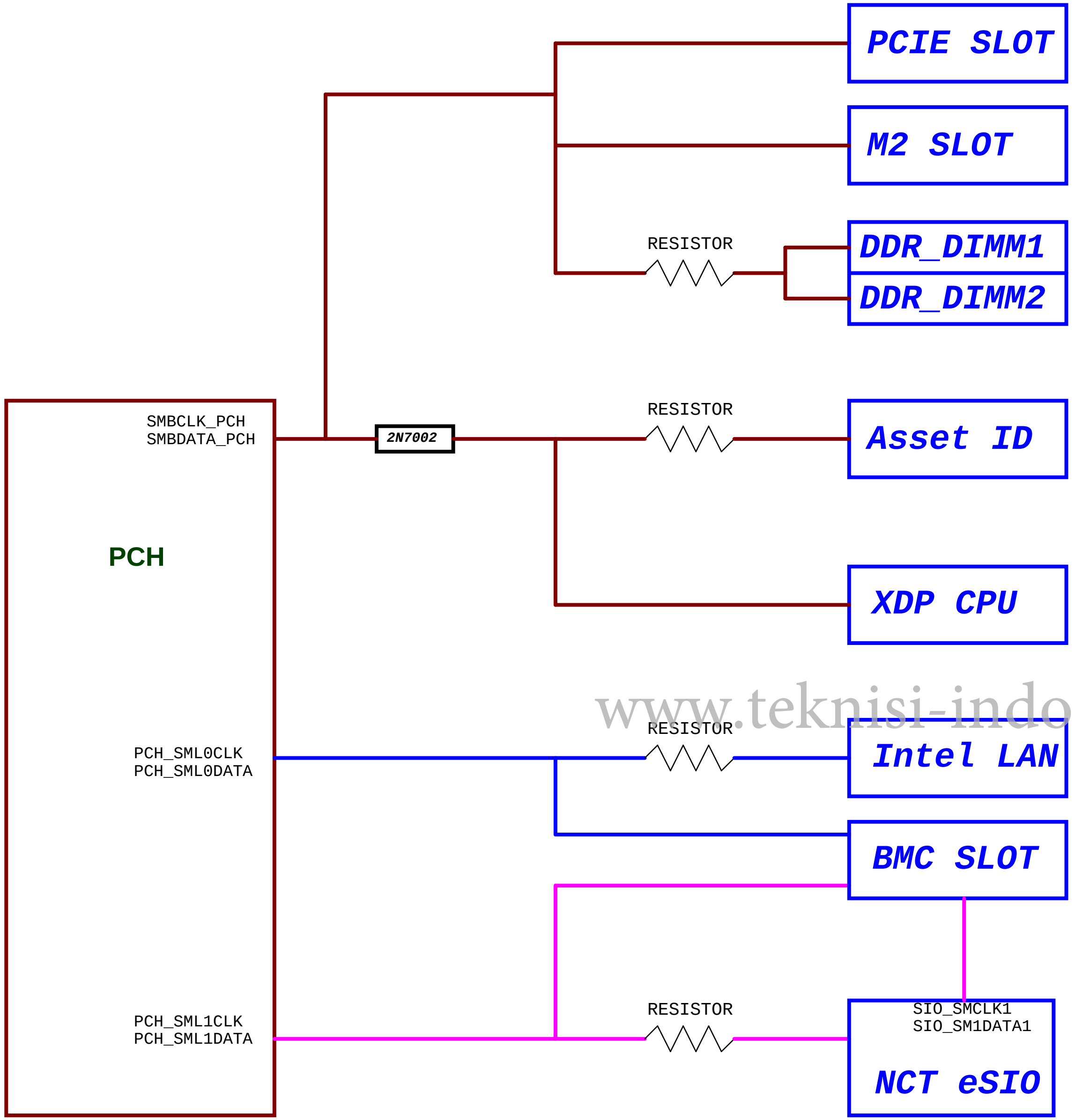
Document Number: Q170/Q150 Rev: 0F

Date: Friday, August 14, 2015 Sheet 38 of 43

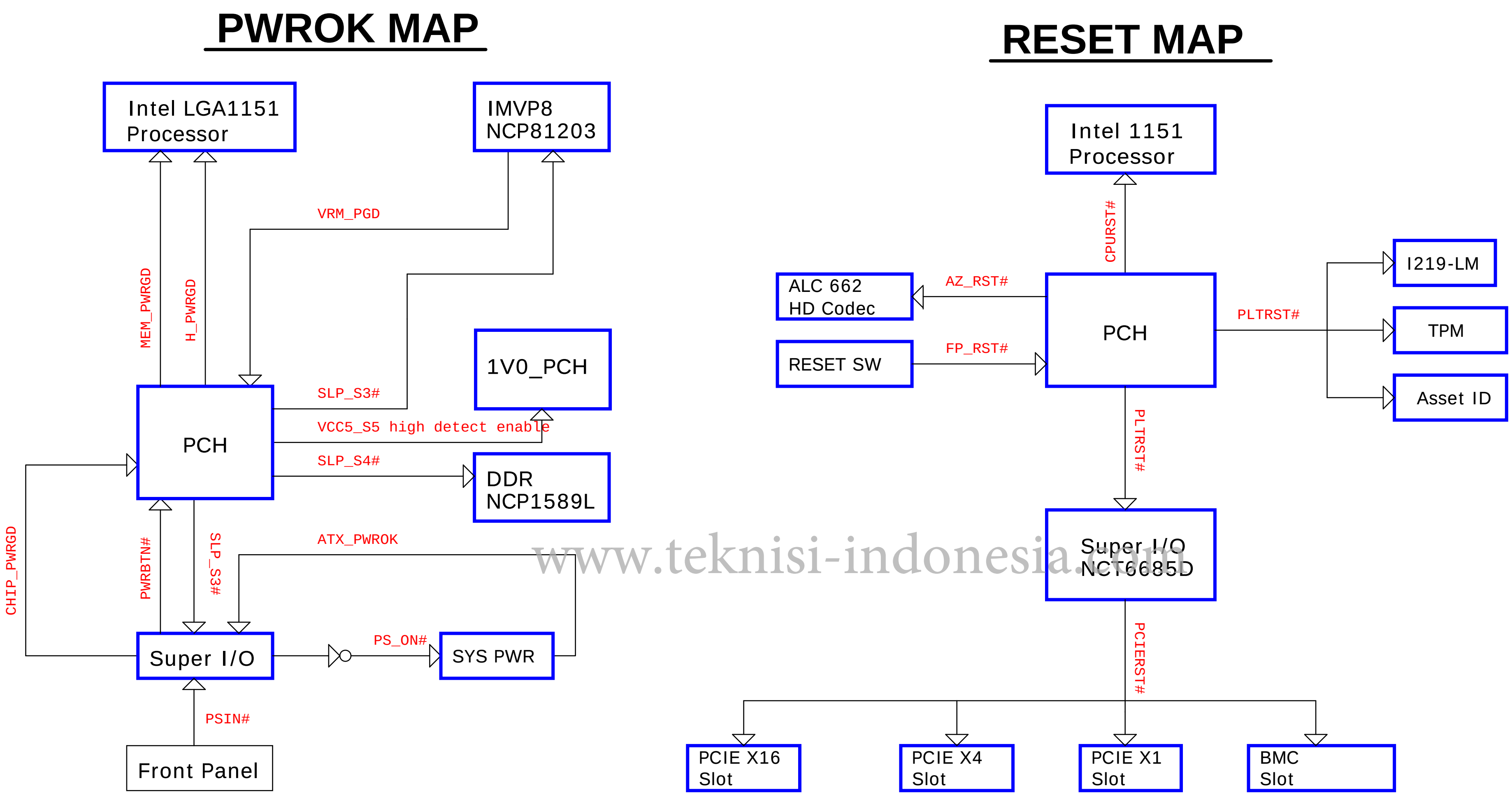


MSI MICRO-START INT'L CO.,LTD.

Title	Power Sequence2	
Size	Document Number Q170/Q150	Rev 0F
Date: Friday, August 14, 2015	Sheet 39 of 43	



MSI MICRO-START INT'L CO.,LTD.		
Title: SMBUS Block Diagram		
Size	Document Number: Q170/Q150	Rev: 0F
Date: Friday, August 14, 2015	Sheet 40 of 43	


PWROK MAP
Intel LGA1151 Processor
IMVP8 NCP81203
VRM_PGD
MEM_PWRGD
H_PWRGD
1V0_PCH
PCH
SLP_S3#
VCC5_S5 high detect enable
SLP_S4#
DDR NCP1589L
ATX_PWROK
CHIP_PWRGD
PWRBTN#
SLP_S3#
Super I/O
PS_ON#
SYS PWR
PSIN#
Front Panel
RESET MAP
Intel 1151 Processor
CPURST#
ALC 662 HD Codec
AZ_RST#
RESET SW
FP_RST#
PCH
PLTRST#
I219-LM
TPM
Asset ID
PLTRST#
Super I/O NCT6685D
PCIERST#
PCIE X16 Slot
PCIE X4 Slot
PCIE X1 Slot
BMC Slot

GPIO	Signal Name	Power Well	In/Out	Usage
GPP_A0	GPP_A0_RCIN_N_ESPI_ALERT1_N	SB3V	NATIVE	KBRST#
GPP_A1	GPP_A1_LAD0_ESPI_IO0	SB3V	NATIVE	LPC_AD0
GPP_A2	GPP_A2_LAD1_ESPI_IO1	SB3V	NATIVE	LPC_AD1
GPP_A3	GPP_A3_LAD2_ESPI_IO2	SB3V	NATIVE	LPC_AD2
GPP_A4	GPP_A4_LAD3_ESPI_IO3	SB3V	NATIVE	LPC_AD3
GPP_A5	GPP_A5_LFRAME_N_ESPI_CS_N	SB3V	NATIVE	LPC_FRAME#
GPP_A6	GPP_A6_SERIRQ	SB3V	NATIVE	LPC_SERIRQ
GPP_A7	GPP_A7_PIRQA_N_ESPI_ALERT0_N	SB3V	NATIVE	LPC_DRQ#0
GPP_A8	GPP_A8_CLKRUN_N	SB3V	NATIVE	CLKRUN#
GPP_A9	GPP_A9_CLKOUT_LPC0_ESPI_CLK	SB3V	NATIVE	PCI_CLK_24M_B
GPP_A10	GPP_A10_CLKOUT_LPC1	SB3V	NATIVE	PCI_CLK_24M
GPP_A11	GPP_A11_PME_N	SB3V	NATIVE	SIO_PME#
GPP_A12	GPP_A12_BMBUSY_N	SB3V	NATIVE	BMBUSY#
GPP_A13	GPP_A13_SUSWARN_N_SUSPWRDNACK	SB3V	NATIVE	PCH_SUSWARN#
GPP_A14	GPP_A14_SUS_STAT_N_ESPI_RST_N	SB3V	NATIVE	SUS_STAT#
GPP_A15	GPP_A15_SUSACK_N	SB3V	NATIVE	PCH_SUSACK#
GPP_A16	GPP_A16_CLKOUT_48	SB3V	NATIVE	NC
GPP_A17	GPP_A17_ISH_GP7	SB3V	OUT	BT_DISABLE_N
GPP_A18	GPP_A18_ISH_GP0	SB3V	IN	OE#
GPP_A19	GPP_A19_ISH_GP1	SB3V	NATIVE	NC
GPP_A20	GPP_A20_ISH_GP2	SB3V	OUT	SEL#
GPP_A21	GPP_A21_ISH_GP3	SB3V	IN	WLAN_DETECT_N
GPP_A22	GPP_A22_ISH_GP4	SB3V	IN	COM_GPIO1
GPP_A23	GPP_A23_ISH_GP5	SB3V	IN	LEO_CHIP_GPIO
GPP_B0	GPP_B0	SB3V	NATIVE	NC
GPP_B1	GPP_B1	SB3V	NATIVE	NC
GPP_B2	GPP_B2_VRALERT_N	SB3V	NATIVE	PCH_VRALERT#
GPP_B3	GPP_B3_CPU_GP2	SB3V	NATIVE	NC
GPP_B4	GPP_B4_CPU_GP3	SB3V	NATIVE	NC
GPP_B5	GPP_B5_SRCCLKREQ0_N	SB3V	NATIVE	NC
GPP_B6	GPP_B6_SRCCLKREQ1_N	SB3V	NATIVE	PCIECLKREQ1#
GPP_B7	GPP_B7_SRCCLKREQ2_N	SB3V	NATIVE	NC
GPP_B8	GPP_B8_SRCCLKREQ3_N	SB3V	NATIVE	NC
GPP_B9	GPP_B9_SRCCLKREQ4_N	SB3V	NATIVE	NC
GPP_B10	GPP_B10_SRCCLKREQ5_N	SB3V	NATIVE	PCIECLKREQ5#
GPP_B11	GPP_B11	SB3V	NATIVE	NC
GPP_B12	GPP_B12_SLP_S0_N	SB3V	NATIVE	SLP_S0#
GPP_B13	GPP_B13_PLTRST_N	SB3V	NATIVE	PLTRST#
GPP_B14	GPP_B14_SPKR	SB3V	NATIVE	SPKR
GPP_B15	GPP_B15_GSPI0_CS_N	SB3V	NATIVE	NC
GPP_B16	GPP_B16_GSPI0_CLK	SB3V	NATIVE	NC
GPP_B17	GPP_B17_GSPI0_MISO	SB3V	NATIVE	NC
GPP_B18	GPP_B18_GSPI0_MOSI	SB3V	NATIVE	REBOOT_STRAP
GPP_B19	GPP_B19_GSPI1_CS_N	SB3V	NATIVE	NC
GPP_B20	GPP_B20_GSPI1_CLK	SB3V	NATIVE	SMI#
GPP_B21	GPP_B21_GSPI1_MISO	SB3V	NATIVE	NC
GPP_B22	GPP_B22_GSPI1_MOSI	SB3V	NATIVE	BBS_STRAP
GPP_B23	GPP_B23_SML1ALERT_N_PCHHOT_N	SB3V	NATIVE	SMLINK1_ALERT_N
GPP_G0	GPP_G0_FAN_TACH_0	SB3V	IN	CHASSIS_ID1
GPP_G1	GPP_G1_FAN_TACH_1	SB3V	IN	CHASSIS_ID2
GPP_G2	GPP_G2_FAN_TACH_2	SB3V	IN	H_PROCHOT_PCH_N
GPP_G3	GPP_G3_FAN_TACH_3	SB3V	OUT	PCH_BMC_FOURCE_INT_N
GPP_G4	GPP_G4_FAN_TACH_4	SB3V	NATIVE	NC
GPP_G5	GPP_G5_FAN_TACH_5	SB3V	NATIVE	NC
GPP_G6	GPP_G6_FAN_TACH_6	SB3V	NATIVE	NC
GPP_G7	GPP_G7_FAN_TACH_7	SB3V	NATIVE	NC
GPP_G8	GPP_G8_FAN_PWM_0	SB3V	NATIVE	NC
GPP_G9	GPP_G9_FAN_PWM_1	SB3V	NATIVE	NC
GPP_G10	GPP_G10_FAN_PWM_2	SB3V	NATIVE	NC
GPP_G11	GPP_G11_FAN_PWM_3	SB3V	IN	BMC_THROTTLE_N
GPP_G12	GPP_G12_GSXDOUT	SB3V	IN	GPP_G0
GPP_G13	GPP_G13_GSXSLOAD	SB3V	IN	GPP_G1
GPP_G14	GPP_G14_GSXDIN	SB3V	IN	GPP_G2
GPP_G15	GPP_G15_GSXSRESET_N	SB3V	IN	GPP_G3
GPP_G16	GPP_G16_GSXCLK	SB3V	IN	GPP_G4
GPP_G17	GPP_G17_ADR_COMPLETE	SB3V	IN	GPP_G5
GPP_G18	GPP_G18_NMI_N	SB3V	OUT	FM_NMI_EVENT_N
GPP_G19	GPP_G19_SMI_N	SB3V	IN	SIO_SCI_N
GPP_G20	GPP_G20	SB3V	IN	BMC_READY
GPP_G21	GPP_G21	SB3V	IN	PCH_GPIO20
GPP_G22	GPP_G22	SB3V	IN	BMC_CARD_DET_R_N
GPP_G23	GPP_G23	SB3V	IN	VGA_DOS_HOT_PLUG_N

GPIO	Signal Name	Power Well	In/Out	Usage
GPP_C0	GPP_C0_SMBCLK	SB3V	NATIVE	SMBCLK
GPP_C1	GPP_C1_SMBDATE	SB3V	NATIVE	SMBDATA
GPP_C2	GPP_C2_SMBALERT_N	SB3V	NATIVE	TLS_STRAP
GPP_C3	GPP_C3_SML0CLK	SB3V	NATIVE	SML0_CLK
GPP_C4	GPP_C4_SML0DATA	SB3V	NATIVE	SML0_DATA
GPP_C5	GPP_C5_SML0ALERT_N	SB3V	NATIVE	SMLINK0_ALERT_N
GPP_C6	GPP_C6_SML1CLK	SB3V	NATIVE	SML1_CLK
GPP_C7	GPP_C7_SML1DATA	SB3V	NATIVE	SML1_DATA
GPP_C8	GPP_C8_UART0_RXD	SB3V	IN	CLR_CMOS
GPP_C9	GPP_C9_UART0_TXD	SB3V	NATIVE	NC
GPP_C10	GPP_C10_UART0_RTS	SB3V	IN/OUT	IBUTTON
GPP_C11	GPP_C11_UART0_CTS_N	SB3V	IN	FP_AUD_DET#
GPP_C12	GPP_C12_UART1_RXD_ISH_UART1_RXD	SB3V	IN	PCH_GPIO22
GPP_C13	GPP_C13_UART1_TXD_ISH_UART1_TXD	SB3V	IN	PCH_GPIO23
GPP_C14	GPP_C14_UART1_RTS_N_ISH_UART1_RT	SB3V	IN	PCH_GPIO21
GPP_C15	GPP_C15_UART1_CTS_N_ISH_UART1_CT	SB3V	IN	WLAN_DISABLE_N
GPP_C16	GPP_C16_I2C0_SDA	SB3V	NATIVE	NC
GPP_C17	GPP_C17_I2C0_SCL	SB3V	NATIVE	NC
GPP_C18	GPP_C18_I2C1_SDA	SB3V	NATIVE	NC
GPP_C19	GPP_C19_I2C1_SCL	SB3V	NATIVE	NC
GPP_C20	GPP_C20_UART2_RXD	SB3V	NATIVE	NC
GPP_C21	GPP_C21_UART2_TXD	SB3V	NATIVE	NC
GPP_C22	GPP_C22_UART2_RTS_N	SB3V	NATIVE	NC
GPP_C23	GPP_C23_UART2_CTS_N	SB3V	NATIVE	NC
GPP_D0	GPP_D0_SPI1_CS_N	SB3V	NATIVE	NC
GPP_D1	GPP_D1_SPI1_CLK	SB3V	NATIVE	NC
GPP_D2	GPP_D2_SPI1_MISO	SB3V	NATIVE	PD_PCH_GPP_D_2
GPP_D3	GPP_D3_SPI1_MOSI	SB3V	NATIVE	PD_PCH_GPP_D_3
GPP_D4	GPP_D4_ISH_I2C2_SDA	SB3V	NATIVE	NC
GPP_D5	GPP_D5_SSP0_SFRM	SB3V	NATIVE	NC
GPP_D6	GPP_D6_SSP0_TXD	SB3V	NATIVE	NC
GPP_D7	GPP_D7_SSP0_RXD	SB3V	NATIVE	NC
GPP_D8	GPP_D8_SSP0_SCLK	SB3V	NATIVE	NC
GPP_D9	GPP_D9_ISH_SPI_CS_N	SB3V	NATIVE	NC
GPP_D10	GPP_D10_ISH_SPI_CLK	SB3V	NATIVE	NC
GPP_D11	GPP_D11_ISH_SPI_MISO	SB3V	IN	FUSB_G1
GPP_D12	GPP_D12_ISH_SPI_MOSI	SB3V	IN	FUSB_G2
GPP_D13	GPP_D13_ISH_UART0_RXD	SB3V	IN	FUSB_G3
GPP_D14	GPP_D14_ISH_UART0_TXD	SB3V	IN	PS2_PINHEADER_N
GPP_D15	GPP_D15_ISH_UART0_RTS_N	SB3V	IN	LPT_DET#
GPP_D16	GPP_D16_ISH_UART0_CTS_N	SB3V	OUT	PW_LED_N
GPP_D17	GPP_D17_DMIC_CLK1	SB3V	IN	COM_WAKE#
GPP_D18	GPP_D18_DMIC_DATA1	SB3V	OUT	PCH_GPIO_D18
GPP_D19	GPP_D19_DMIC_CLK0	SB3V	NATIVE	NC
GPP_D20	GPP_D20_DMIC_DATA0	SB3V	NATIVE	NC
GPP_D21	GPP_D21_SPI1_IO2	SB3V	NATIVE	NC
GPP_D22	GPP_D22_SPI1_IO3	SB3V	NATIVE	NC
GPP_D23	GPP_D23_ISH_I2C2_SCL	SB3V	NATIVE	NC
GPP_H0	GPP_H0_SRCCLKREQ6_N	SB3V	IN	M_MEM_THERM_EVENT_LVT3
GPP_H1	GPP_H1_SRCCLKREQ7_N	SB3V	OUT	FM_NM_THROTTLE_N
GPP_H2	GPP_H2_SRCCLKREQ8_N	SB3V	IN	FM_CATERR_N
GPP_H3	GPP_H3_SRCCLKREQ9_N	SB3V	OUT	PCH_BMC_ALERT
GPP_H4	GPP_H4_SRCCLKREQ10_N	SB3V	NATIVE	NC
GPP_H5	GPP_H5_SRCCLKREQ11_N	SB3V	NATIVE	NC
GPP_H6	GPP_H6_SRCCLKREQ12_N	SB3V	NATIVE	NC
GPP_H7	GPP_H7_SRCCLKREQ13_N	SB3V	NATIVE	NC
GPP_H8	GPP_H8_SRCCLKREQ14_N	SB3V	NATIVE	NC
GPP_H9	GPP_H9_SRCCLKREQ15_N	SB3V	NATIVE	NC
GPP_H10	GPP_H10_SML2CLK	SB3V	NATIVE	NC
GPP_H11	GPP_H11_SML2DATA	SB3V	NATIVE	WIRELESS_EN
GPP_H12	GPP_H12_SML2ALERT_N	SB3V	NATIVE	FM_ESPI_FLASH_MODE
GPP_H13	GPP_H13_SML3CLK	SB3V	NATIVE	NC
GPP_H14	GPP_H14_SML3DATA	SB3V	NATIVE	NC
GPP_H15	GPP_H15_SML3ALERT_N	SB3V	NATIVE	PCH_GPP_H15
GPP_H16	GPP_H16_SML4CLK	SB3V	NATIVE	NC
GPP_H17	GPP_H17_SML4DATA	SB3V	NATIVE	NC
GPP_H18	GPP_H18_SML4ALERT_N	SB3V	NATIVE	PCH_GPP_H18
GPP_H19	GPP_H19_ISH_I2C0_SDA	SB3V	NATIVE	NC
GPP_H20	GPP_H20_ISH_I2C0_SCL	SB3V	NATIVE	NC
GPP_H21	GPP_H21_ISH_I2C1_SDA	SB3V	NATIVE	NC
GPP_H22	GPP_H22_ISH_I2C1_SCL	SB3V	NATIVE	NC
GPP_H23	GPP_H23	SB3V	NATIVE	NC

GPIO	Signal Name	Power Well	In/Out	Usage
GPP_E0	GPP_E0_SATAXPCIE0_SATAGP0	SB3V	NATIVE	NC
GPP_E1	GPP_E1_SATAXPCIE1_SATAGP1	SB3V	NATIVE	NC
GPP_E2	GPP_E2_SATAXPCIE2_SATAGP2	SB3V	NATIVE	NC
GPP_E3	GPP_E3_CPU_GP0	SB3V	IN	BMC_PCH_SCI_N
GPP_E4	GPP_E4_DEVSLP0	SB3V	IN	BMC_FORCE_SMI_N
GPP_E5	GPP_E5_DEVSLP1	SB3V	OUT	CIO_PLUG_EVENT_N
GPP_E6	GPP_E6_DEVSLP2	SB3V	NATIVE	NC
GPP_E7	GPP_E7_CPU_GP1	SB3V	NATIVE	NC
GPP_E8	GPP_E8_SATALED_N	SB3V	OUT	SATA_LED#
GPP_E9	GPP_E9_USB2_OC0_N	SB3V	IN	USB_OCP#0
GPP_E10	GPP_E10_USB2_OC1_N	SB3V	IN	USB_OCP#1
GPP_E11	GPP_E11_USB2_OC2_N	SB3V	IN	USB_OCP#2
GPP_E12	GPP_E12_USB2_OC3_N	SB3V	IN	USB_OCP#3
GPP_F0	GPP_F17_USB2_OCB_6	SB3V	NATIVE	NC
GPP_F1	GPP_F1_SATAXPCIE4_SATAGP4	SB3V	NATIVE	NC
GPP_F2	GPP_F2_SATAXPCIE5_SATAGP5	SB3V	NATIVE	NC
GPP_F3	GPP_F3_SATAXPCIE6_SATAGP6	SB3V	NATIVE	NC
GPP_F4	GPP_F4_SATAXPCIE7_SATAGP7	SB3V	IN	NC
GPP_F5	GPP_F5_DEVSLP3	SB3V	NATIVE	SPI_SIRQ#
GPP_F6	GPP_F6_DEVSLP4	SB3V	NATIVE	NC
GPP_F7	GPP_F7_DEVSLP5	SB3V	NATIVE	NC
GPP_F8	GPP_F8_DEVSLP6	SB3V	NATIVE	NC
GPP_F9	GPP_F9_DEVSLP7	SB3V	IN	USB_DISABLE#
GPP_F10	GPP_F10_SCLOCK	SB3V	NATIVE	PCH_SCLK
GPP_F11	GPP_F11_SLOAD	SB3V	NATIVE	PCH_SLOAD
GPP_F12	GPP_F12_SDATAOUT1	SB3V	NATIVE	PCH_SDOUT1
GPP_F13	GPP_F13_SDATAOUT0	SB3V	NATIVE	PCH_SDOUT0
GPP_F14	GPP_F14	SB3V	IN	SKTOCC#
GPP_F15	GPP_F15_USB2_OCB_4	SB3V	NATIVE	USB_OCP#4
GPP_F16	GPP_F16_USB2_OCB_5	SB3V	NATIVE	USB_OCP#5
GPP_F17	GPP_F17_USB2_OCB_6	SB3V	NATIVE	USB_OCP#6
GPP_F18	GPP_F18_USB2_OCB_7	SB3V	NATIVE	USB_OCP#7
GPP_F19	GPP_F19_EDP_VDDEN	SB3V	NATIVE	NC
GPP_F20	GPP_F20_EDP_BKLTEN	SB3V	NATIVE	NC
GPP_F21	GPP_F21_EDP_BKLTCTL	SB3V	NATIVE	NC
GPP_F22	GPP_F22	SB3V	OUT	PCH_GPIO_F22
GPP_F23	GPP_F23	SB3V	NATIVE	NC
GPP_I0	GPP_I0_DDPB_HPD0	SB3V	NATIVE	VGA_DDI3_HPD
GPP_I1	GPP_I1_DDPC_HPD1	SB3V	NATIVE	DP_DDPC_HPD
GPP_I2	GPP_I2_DDPD_HPD2	SB3V	NATIVE	DP_DDPD_HPD
GPP_I3	GPP_I3_DDPE_HPD3	SB3V	NATIVE	U2_BA4
GPP_I4	GPP_I4_EDP_HPD	SB3V	NATIVE	U2_BD7
GPP_I5	GPP_I5_DDPB_CTRLCLK	SB3V	NATIVE	TP30
GPP_I6	GPP_I6_DDPB_CTRLDATA	SB3V	NATIVE	DDPD_CTRLDATA
GPP_I7	GPP_I7_DDPC_CTRLCLK	SB3V	NATIVE	DP_DDPC_CTRLCLK
GPP_I8	GPP_I8_DDPC_CTRLDATA	SB3V	NATIVE	DP_DDPC_CTRLDATA
GPP_I9	GPP_I9_DDPD_CTRLCLK	SB3V	NATIVE	DP_DDPD_CTRLCLK
GPP_I10	GPP_I10_DDPD_CTRLDATA	SB3V	NATIVE	DP_DDPD_CTRLDATA
GPD0	GPD0_BATLOW_N	SB3V_DSW	NATIVE	PCH_BATLOW#
GPD1	GPD1_ACPRESENT	SB3V_DSW	OUT	SUS_LED_N
GPD2	GPD2_LAN_WAKE_N	SB3V_DSW	NATIVE	LAN_WAKE#
GPD3	GPD3_PWRBTN_N	SB3V_DSW	NATIVE	PWRBTN#
GPD4	GPD4_SLP_S3_N	SB3V_DSW	NATIVE	SLP_S3#
GPD5	GPD5_SLP_S4_N	SB3V_DSW	NATIVE	SLP_S4#
GPD6	GPD6_SLP_A	SB3V_DSW	NATIVE	PCH_SLP_A#
GPD7	GPD7_USB2_WAKEOUT_N	SB3V_DSW	NATIVE	NC
GPD8	GPD8_SUSCL	SB3V_DSW	NATIVE	SUSCLK
GPD9	GPD9_SLP_WLAN_N	SB3V_DSW	NATIVE	NC
GPD10	GPD10_SLP_S5_N	SB3V_DSW	NATIVE	SLP_S5#
GPD11	GPD11_LANPHYPC	SB3V_DSW	NATIVE	LAN_DISABLE#

SIO GPIO (NCT6685D)

GPIO	Signal Name	PIN	Power Well	In/Out	Usage
GPIO00	PWMOUT/TACHIN/GPIO00	3	SB3V	IN	FM_CATERR_N
GPIO95	GPIO95/BKFD_CUT	74	SB3V	OUT	ME_CNTL
GPIO90	GPIO90/SUSWARN#	93	SB3V	OUT	BMC_SYS_ERR_LED_N
GPIO85	SMI#/OVT#/GPIO85	2	SB3V	----	SIO_SCI_N
GPIO74	GPIO74 / TACHIN / PWMOUT	37	SB3V	OD	BMC_THROTTLE_N
GPIO77	SKTOCC# / GPIO77	102	SB3V	IN	IS1XXM_BOARDID
GPIO01	PWMOUT / TACHIN / GPIO01	4	SB3V	OUT	SIO_BMC_ALERT
GPIO91	GPIO91 / SUSWARN_5VDUAL	90	SB3V	OUT	UID_BTN_N
GPIO92	GPIO92 / SUSACK#	91	SB3V	IN	UID_LED_N
GPIO66	DEEP_S5_0 / 3VSBSW / LATCH_BKFD_CUT / GPIO66	70	SB3V	OUT	USB_PS2_PON
GPIO92	GPIO92 / SUSACK#	91	SB3V	IN	UID_LED_N
GPIO80	GPIO80	15	SB3V	IN	FORCE_PWR_HDR
GPIO93	3VSBSW#/GPIO93/SLP_SUS#	89	3V_DSW	OUT	SIO_GP93
GPIO94	GPIO94/SLP_SUS_FET	88	3V_DSW	IN	COM_WAKE#

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