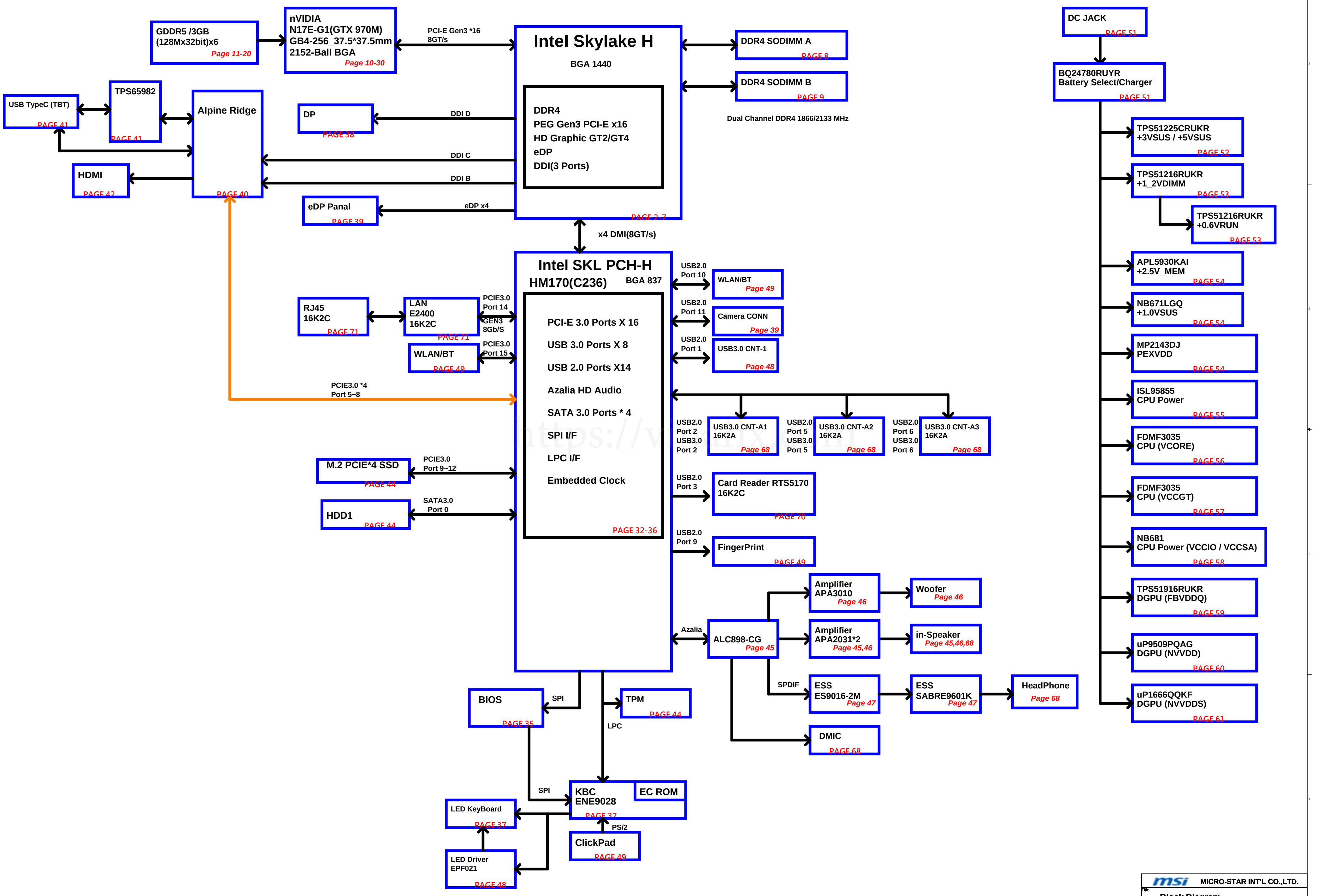
MS-16K2/17B1 Ver: 0B Intel Skylake platform

Friday, April 01, 2016



MICRO-STAR INT'L CO.,LTD.

Title: Block Diagram

Document Number: MS-16K21 Rev: 0B

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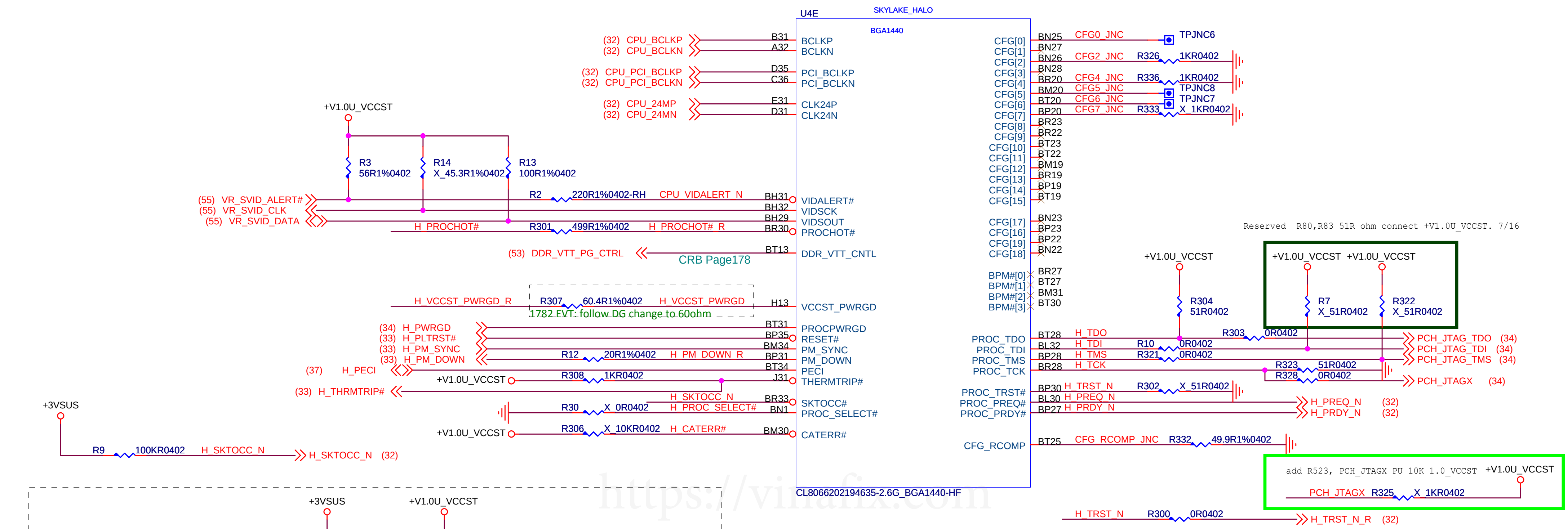

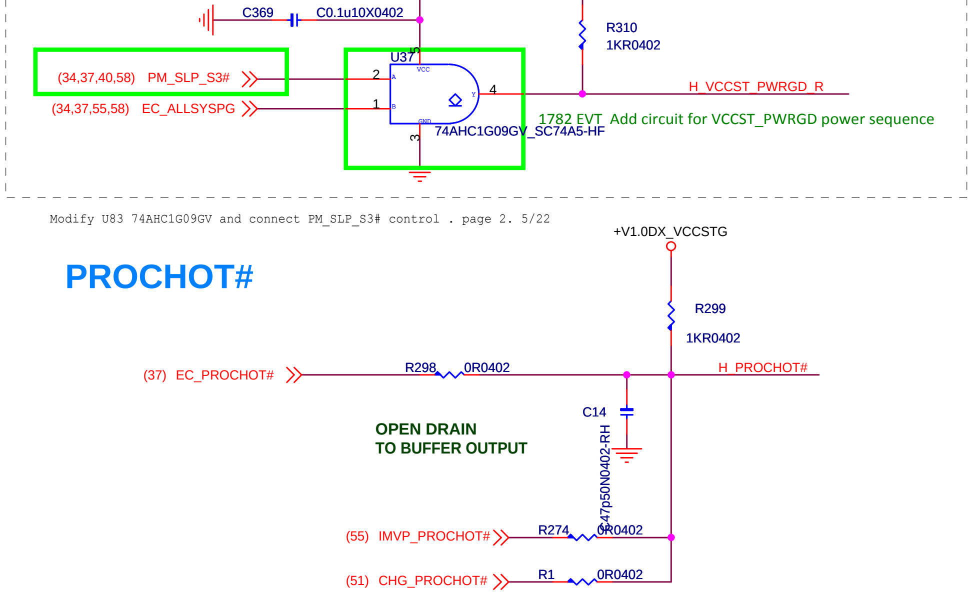

MSR Privacy Bit Feature	
CFG3	1 = Debug capability is determined by IA32_Debug_Interface_MSR (0xC80) bit[0] setting 0 = IA32_Debug_Interface_MSR (0xC80) bit[0] default setting overridden

eDP Enable	
CFG4	1 = Disabled 0 = Enabled

PEG DEFER TRAINING	
CFG7	1: (Default) PEG Train immediately following xxRESETB de assertion 0: PEG Wait for BIOS for training

PCIE Express * Static X16 Lane Numbering Reversal	
CFG2	CFG[2]: PCI Express* Static x16 Lane Numbering Reversal. 1 = Normal operation 0 = Lane numbers reversed.

PCI Express* Bifurcation	
CFG[6:5]	00 = 1 x8, 2 x4 PCI Express* 01 = reserved 10 = 2 x8 PCI Express* 11 = 1 x16 PCI Express*

MICRO-STAR INT'L CO.,LTD.

Title	Skylake(HOST)	
Size Custom	Document Number MS-16K21	Rev 0B
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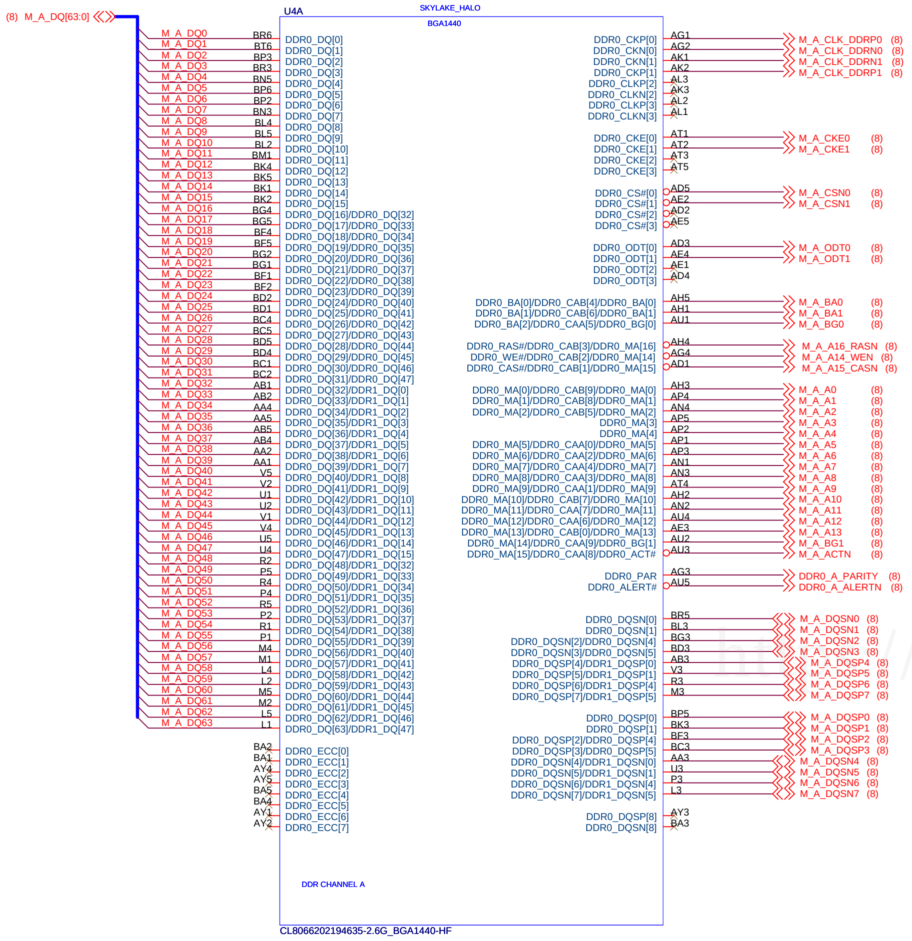
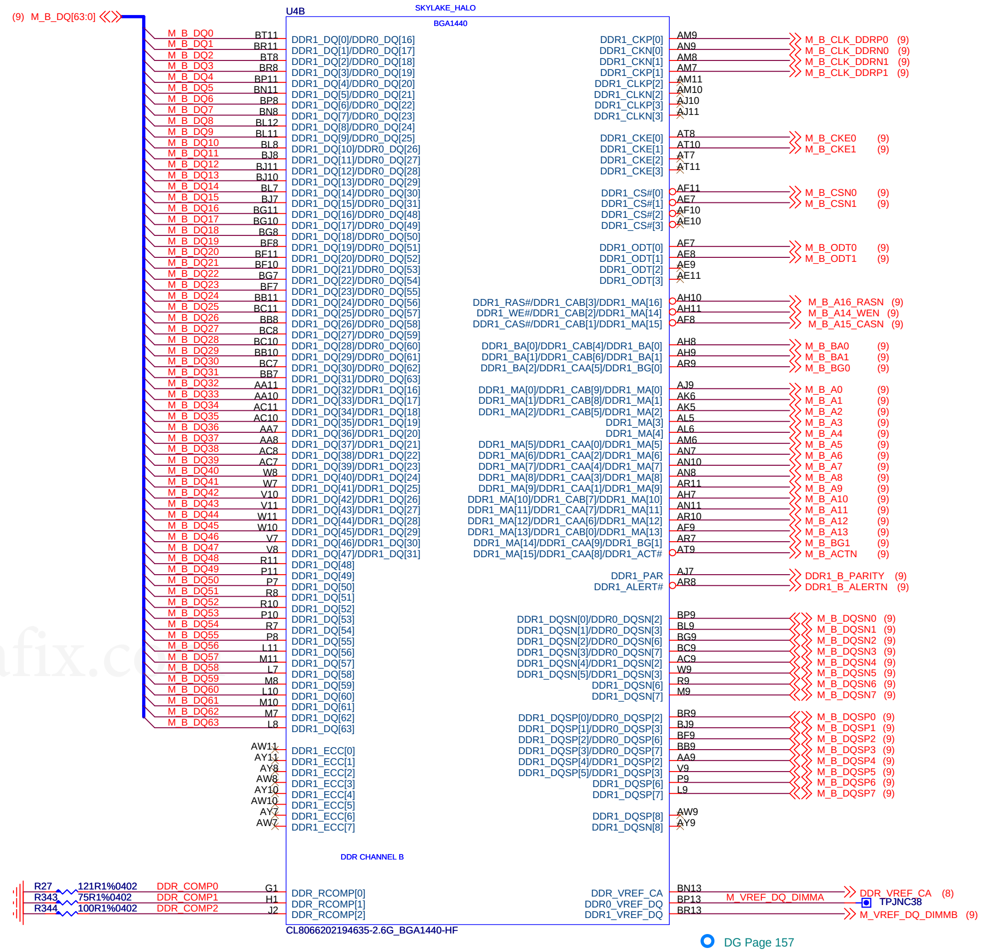
DDR Channel A



DDR Channel B



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MICRO-STAR INT'L CO.,LTD.

Title	Skylake(DDR4)	
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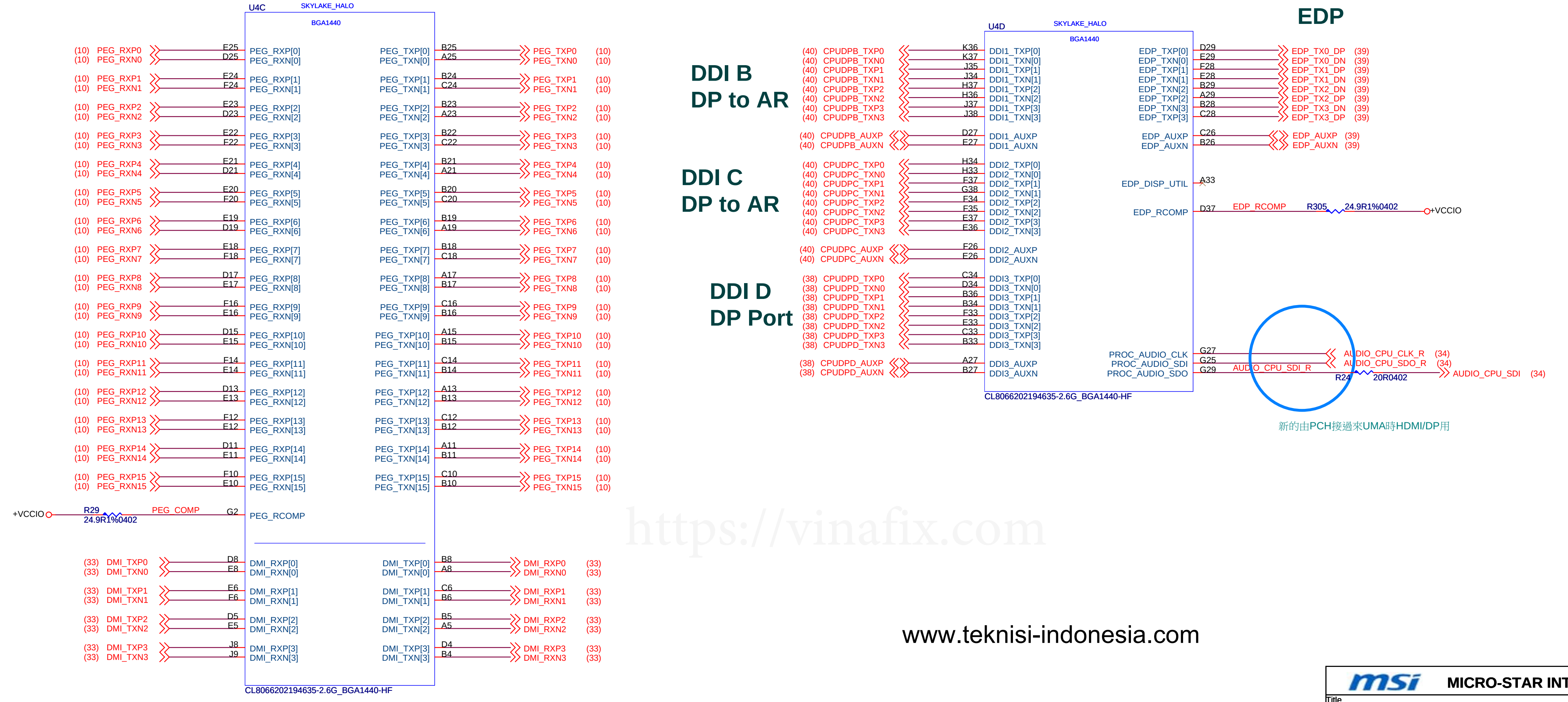
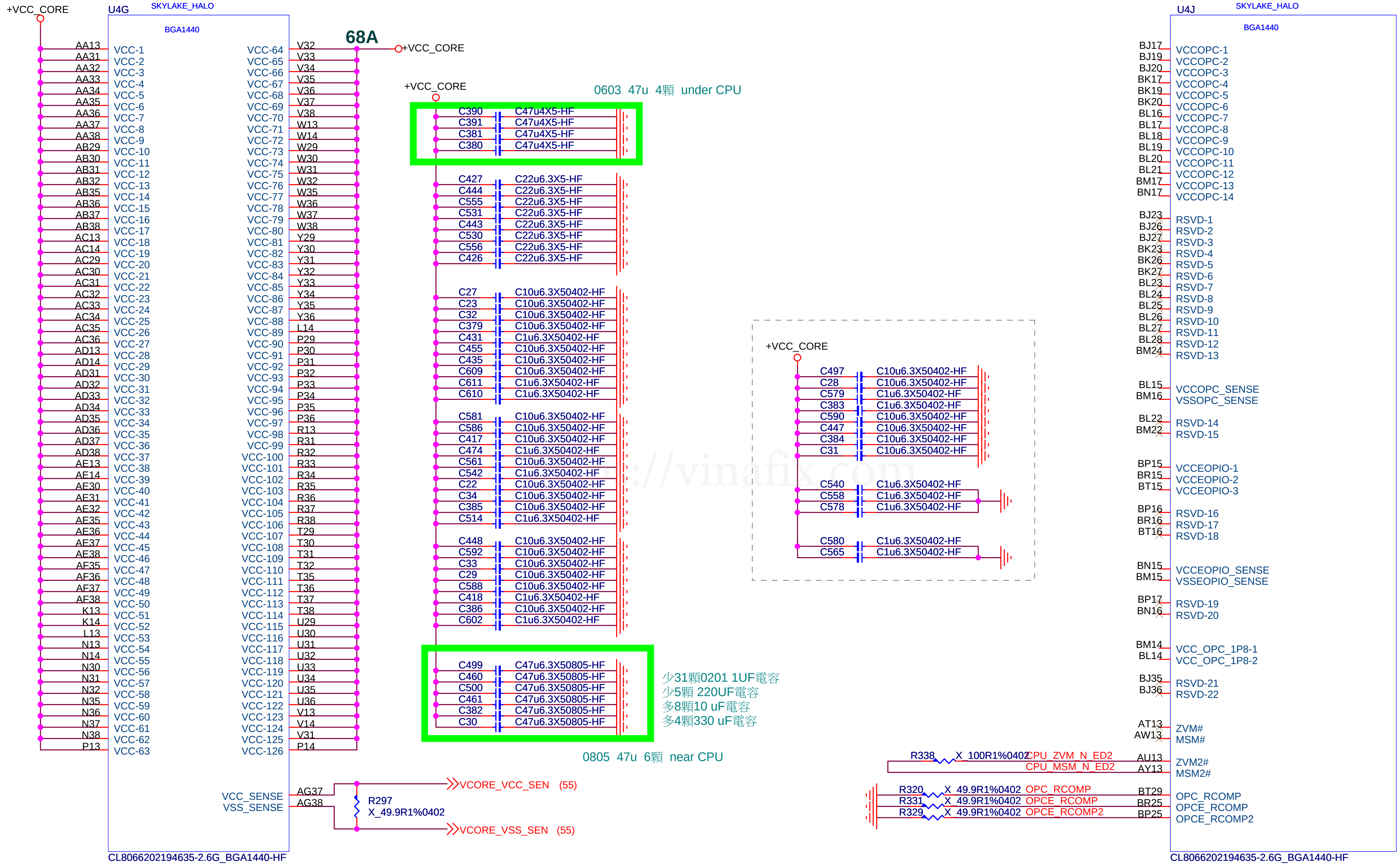


MICRO-STAR INT'L CO.,LTD.

Title	Skylake(DMI/Display)	
Size Custom	Document Number MS-16K21	Rev 0B
Date: Friday, April 01, 2016	Sheet 4 of 73	



MICRO-STAR INT'L CO.,LTD.

Title: **Skylake(Power1)**

Size	Document Number	Rev
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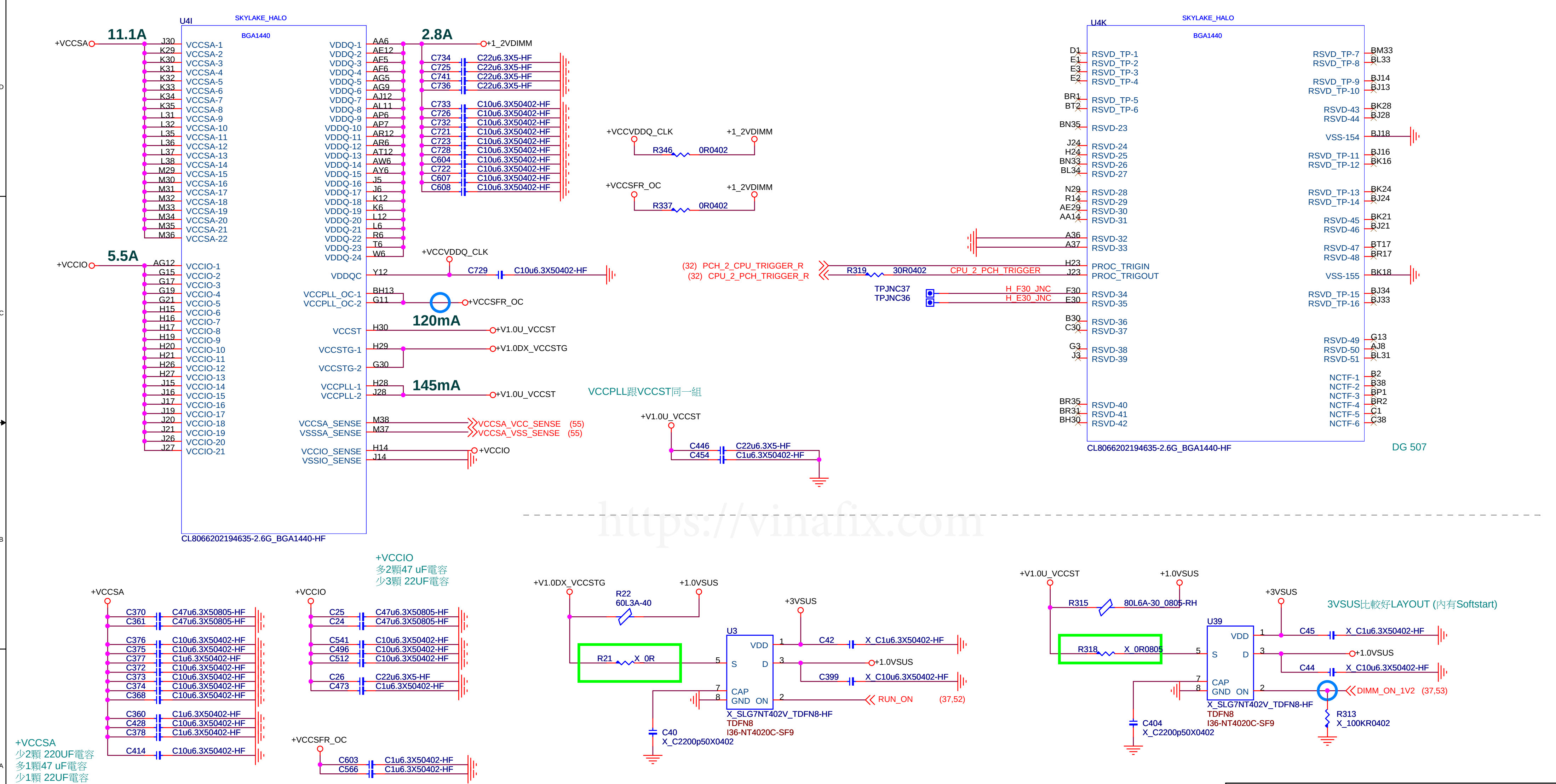
Date: Friday, April 01, 2016 — Sheet 5 of 73

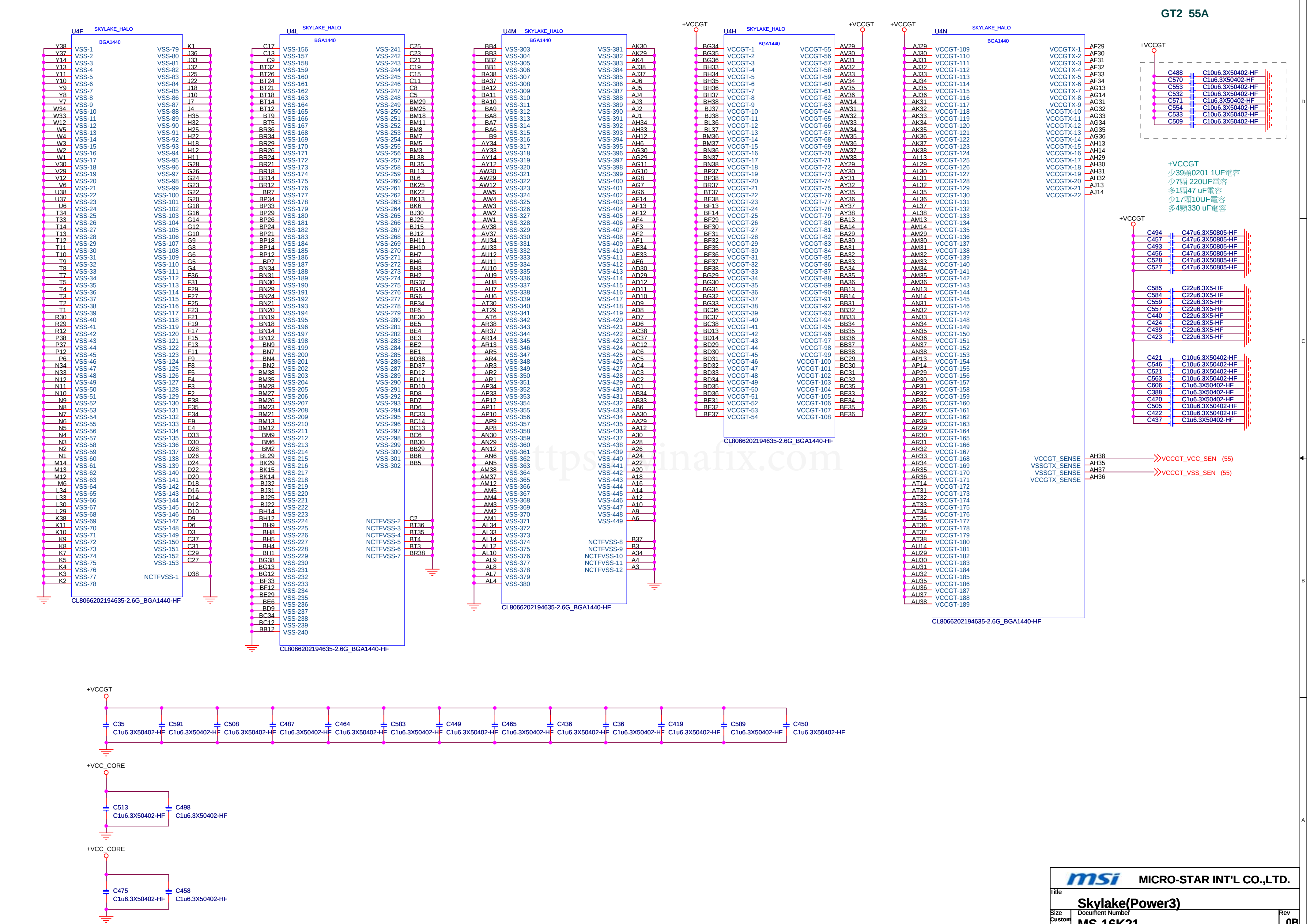


MICRO-STAR INT'L CO.,LTD.

Title: Skylake(Power2)

Size: Custom | Document Number: MS-16K21 | Rev: 0B

Date: Friday, April 01, 2016 | Sheet 6 of 73



MICRO-STAR INT'L CO.,LTD.

Title	Skylake(Power3)	
Size Custom	Document Number MS-16K21	Rev 0B
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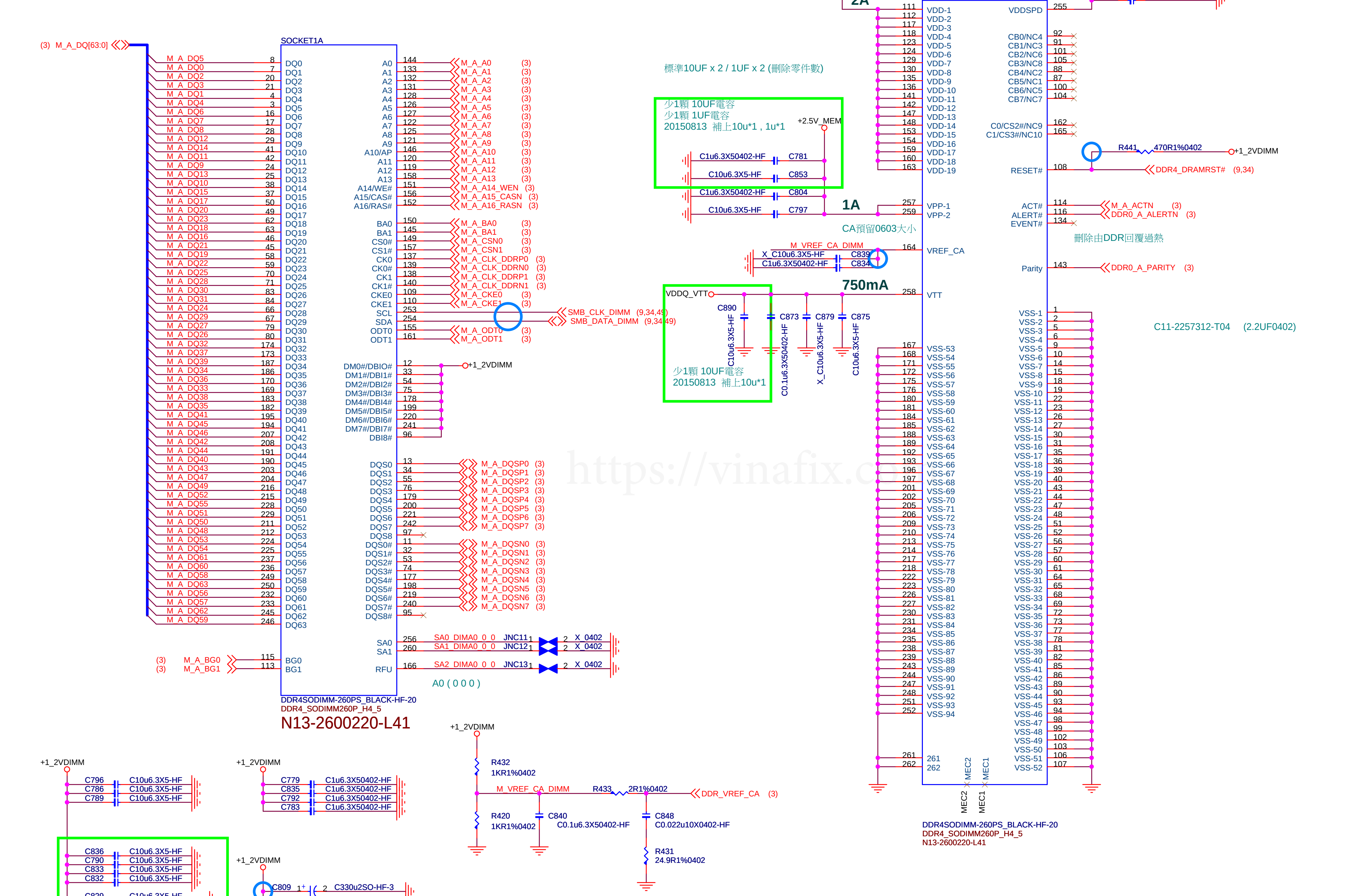
SODIMM_A0 (TOP-Standard)



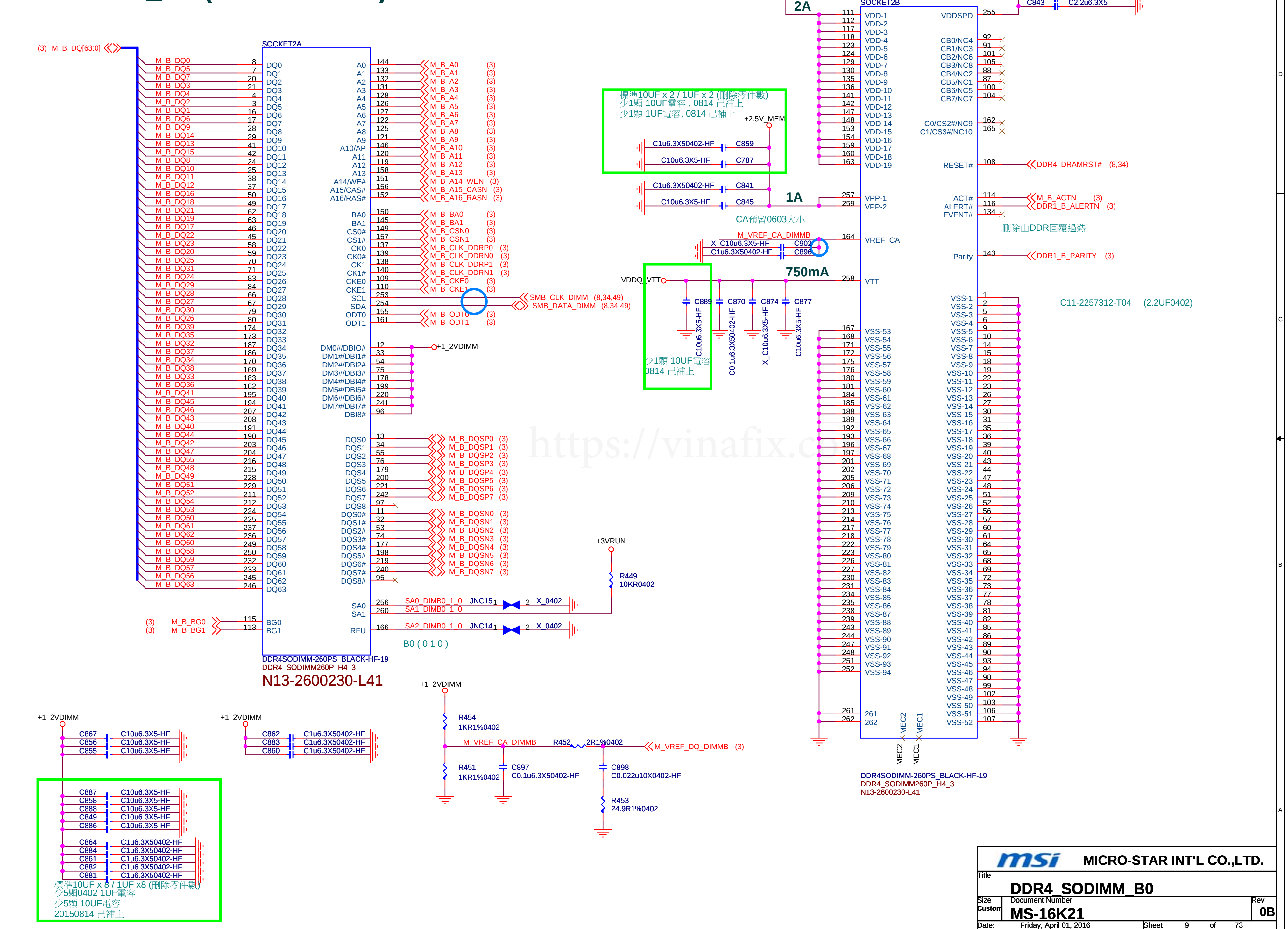
MICRO-STAR INT'L CO.,LTD.

Title: DDR4_SODIMM_A0

Size: Custom | Document Number: MS-16K21 | Rev: 0B

Date: Friday, April 01, 2016 | Sheet 8 of 73

SODIMM_B0 (TOP-Reverse)



MICRO-STAR INT'L CO.,LTD.

Title: DDR4_SODIMM_B0

Size	Document Number	Rev
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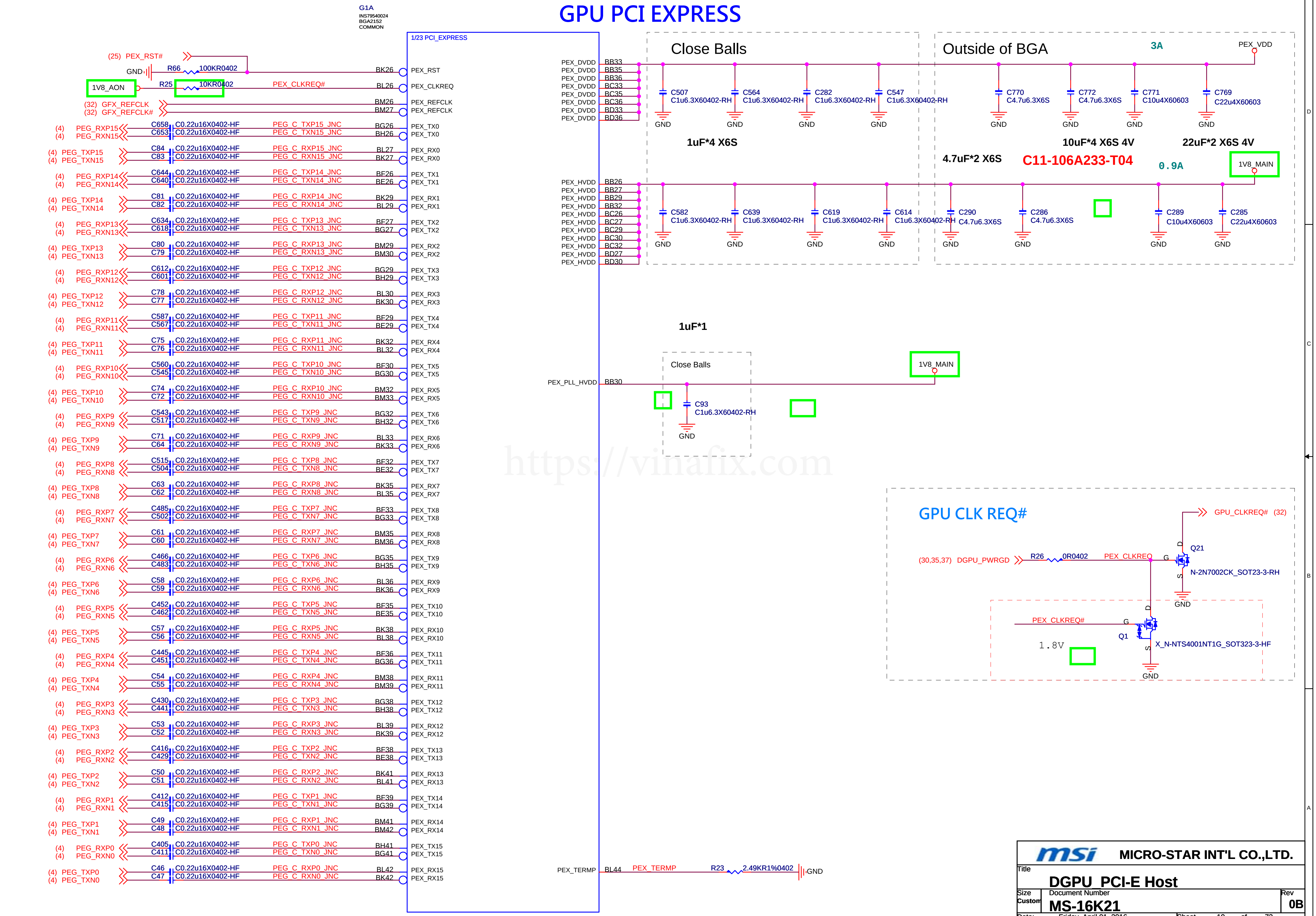
GPU PCI EXPRESS



MICRO-STAR INT'L CO.,LTD.

Title	DGPU_PCI-E Host	
Size Custom	Document Number MS-16K21	Rev 0B
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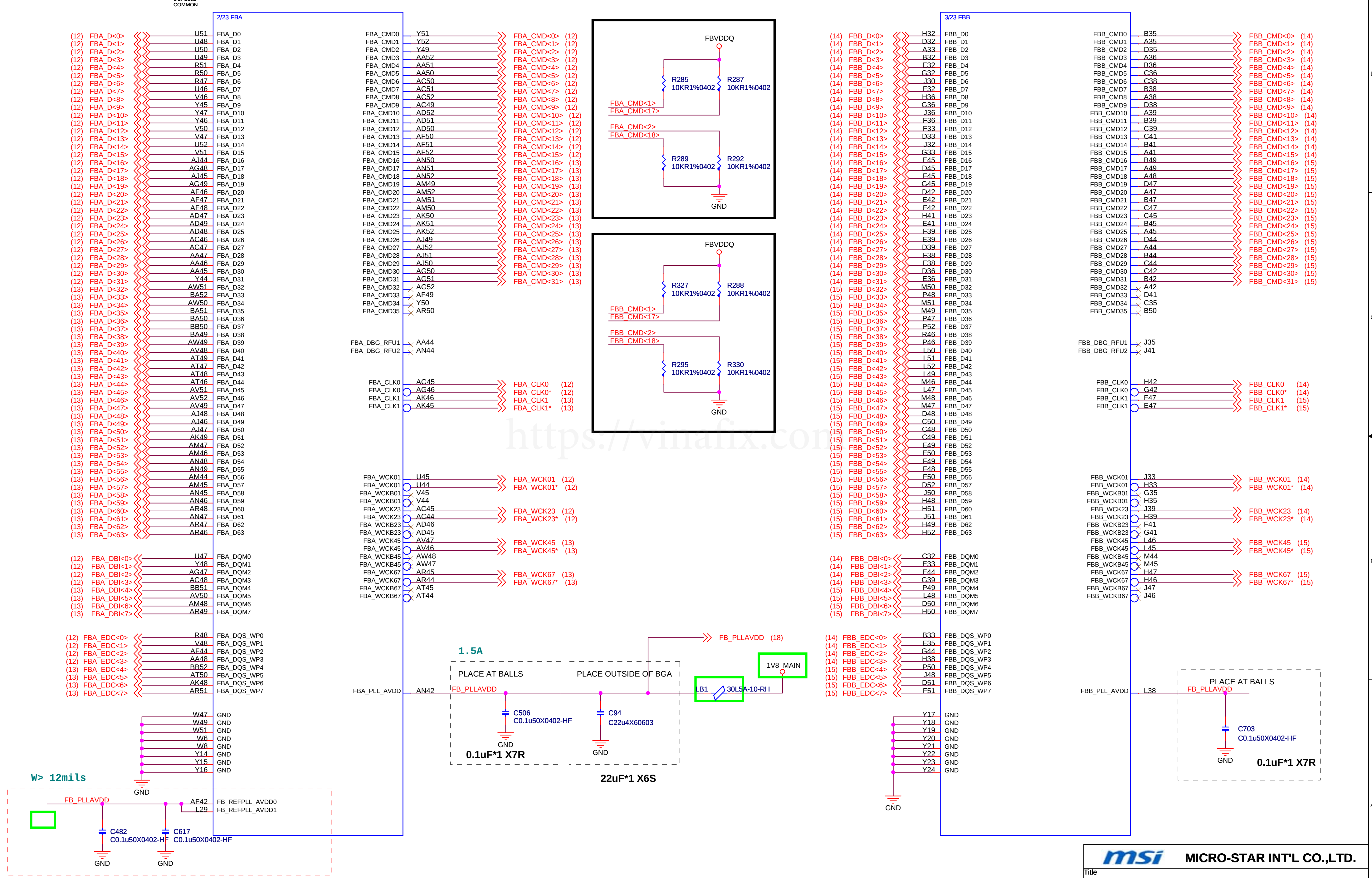
GPU Frame Buffer Partition A/B



MICRO-STAR INT'L CO.,LTD.

Title: DGPU_MEM IF A/B

Size	Document Number	Rev
Custom	MS-16K21	0B

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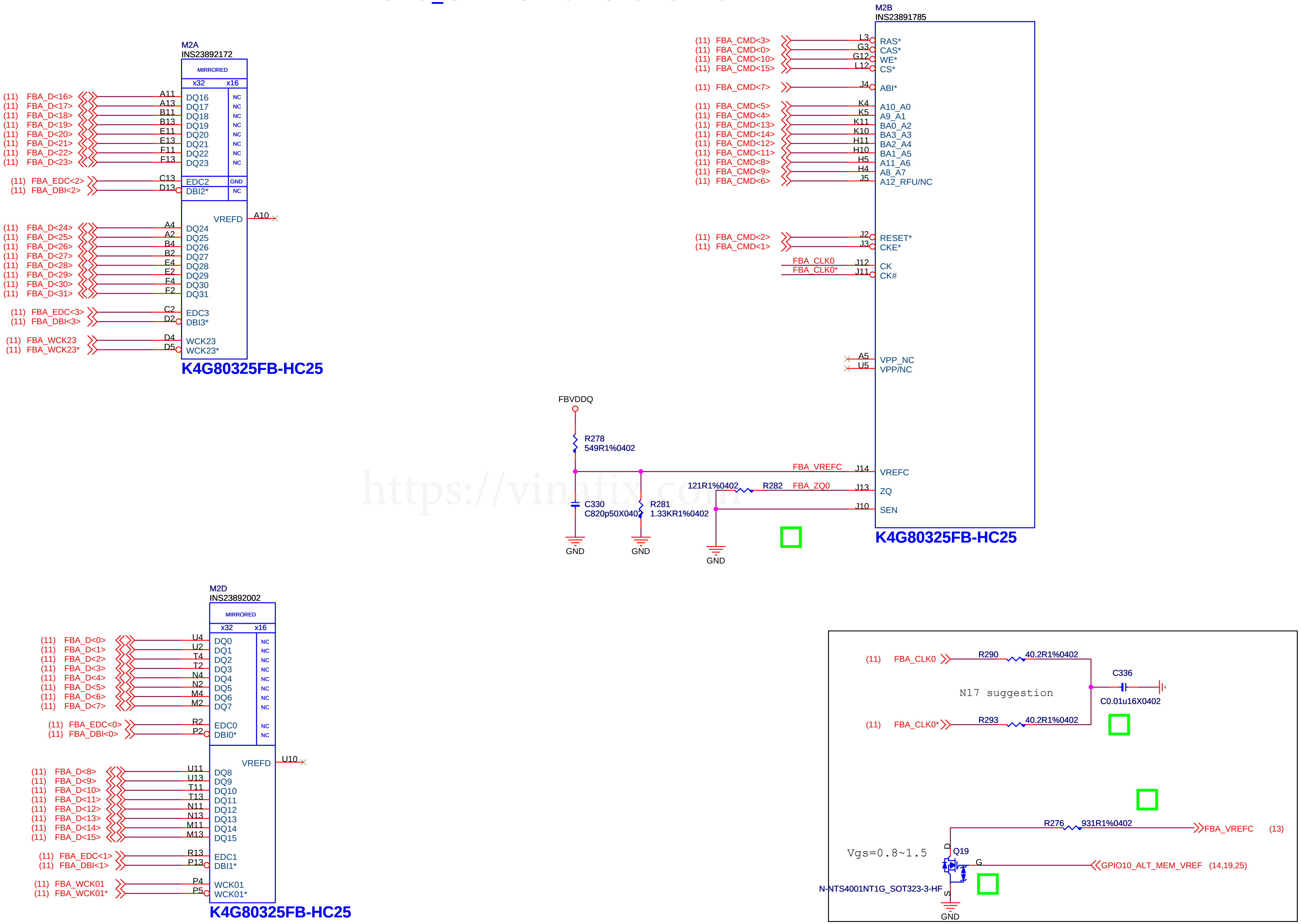
DGPU_GDDR5 FrameBuffer A0



Hynix PN : M12-5GC2H05-H23 2G(64Mx32bit)

Samsung PN : M12-2032585-S02 2G(64Mx32bit)

MICRO-STAR INT'L CO.,LTD.

Title: DGPU_GDDR5 FrameBuffer A0

Size	Document Number	Rev
A3	MS-16K21	0B

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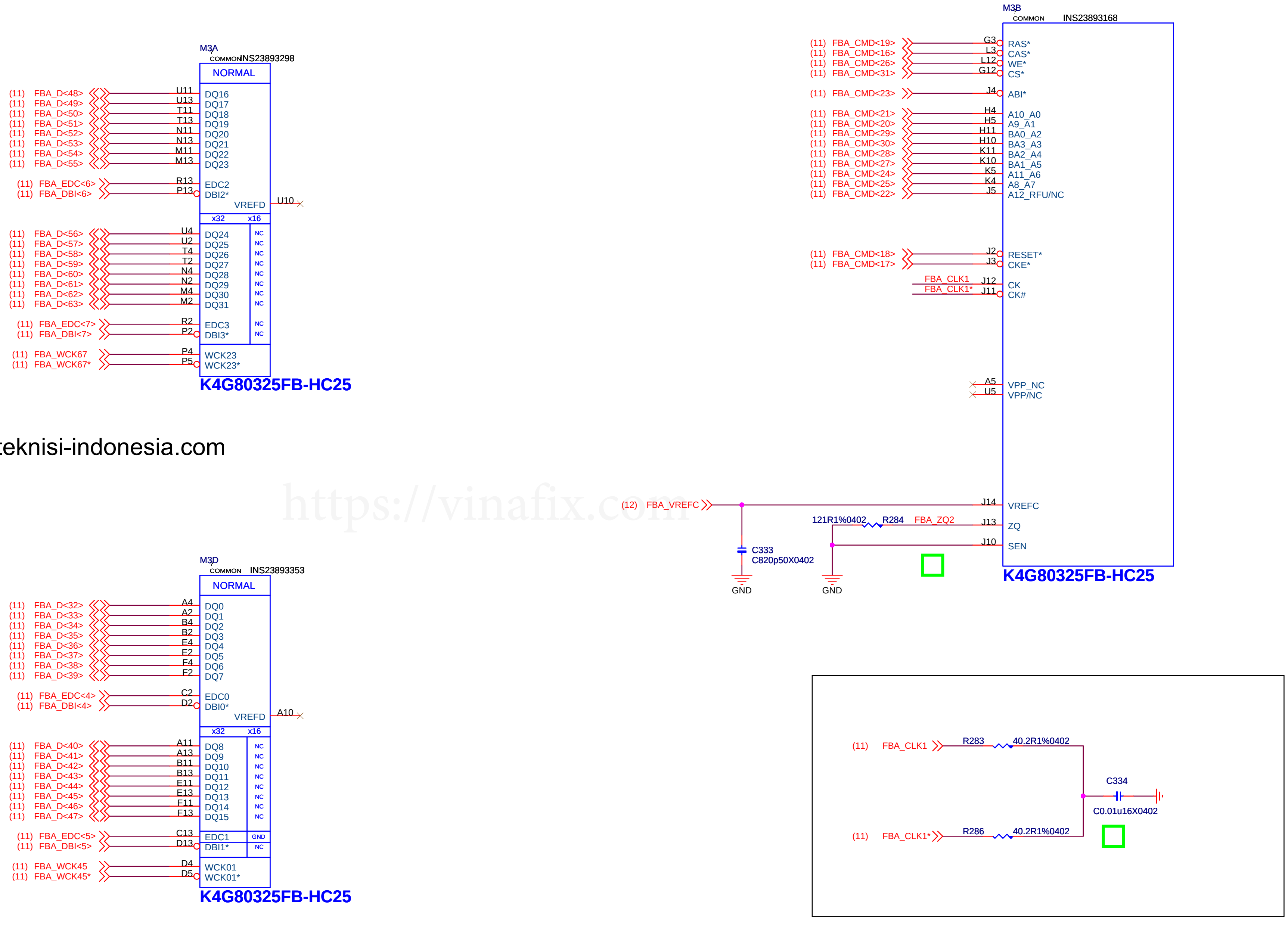
DGPU_GDDR5 FrameBuffer A1



MICRO-STAR INT'L CO.,LTD.

Title: DGPU_GDDR5 FrameBuffer A1

Size	Document Number	Rev
A3	MS-16K21	0B

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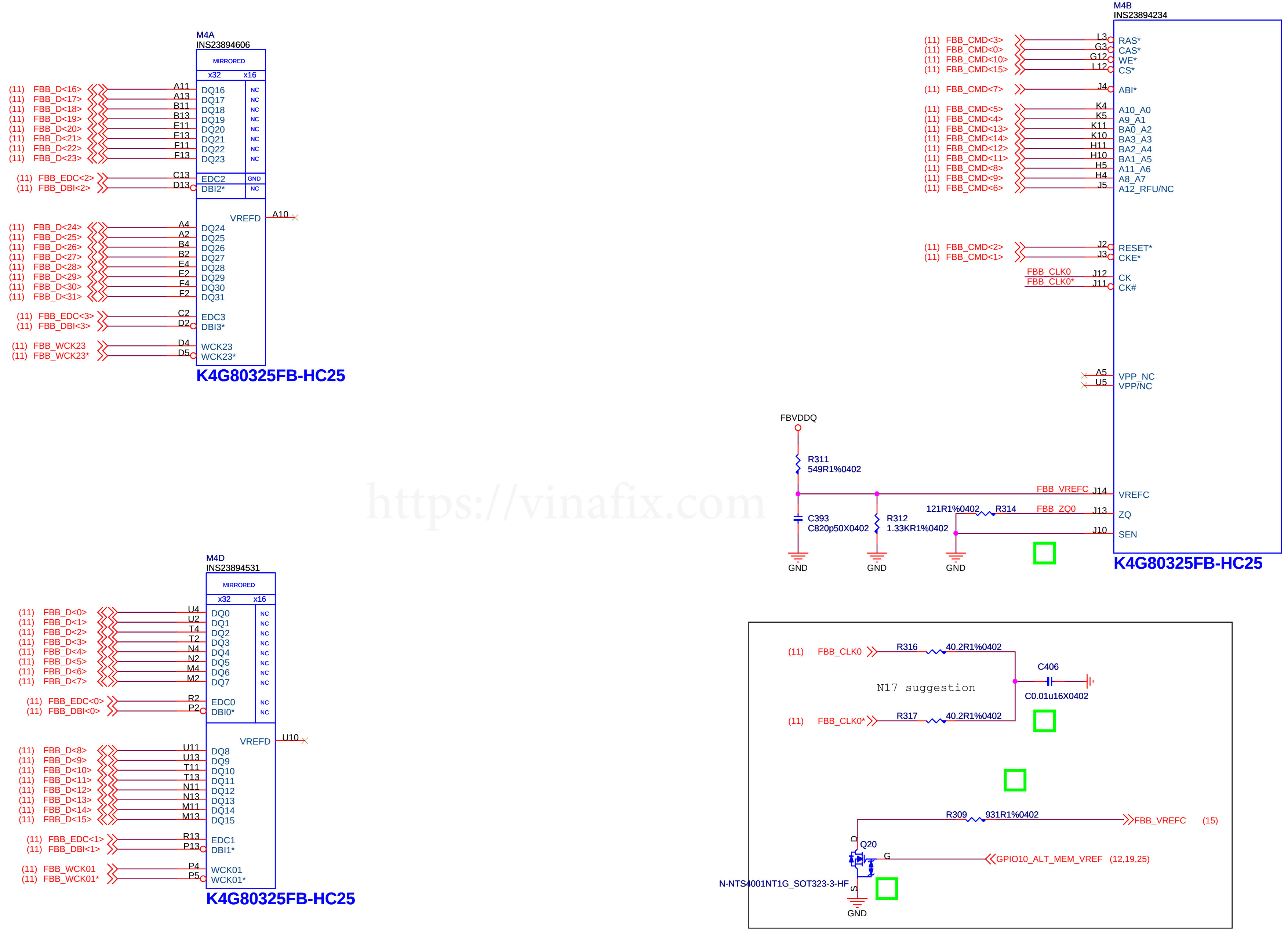
DGPU_GDDR5 FrameBuffer B0



MICRO-STAR INT'L CO.,LTD.		
Title: DGPU_GDDR5 FrameBuffer B0		
Size: A3	Document Number: MS-16K21	Rev: 0B
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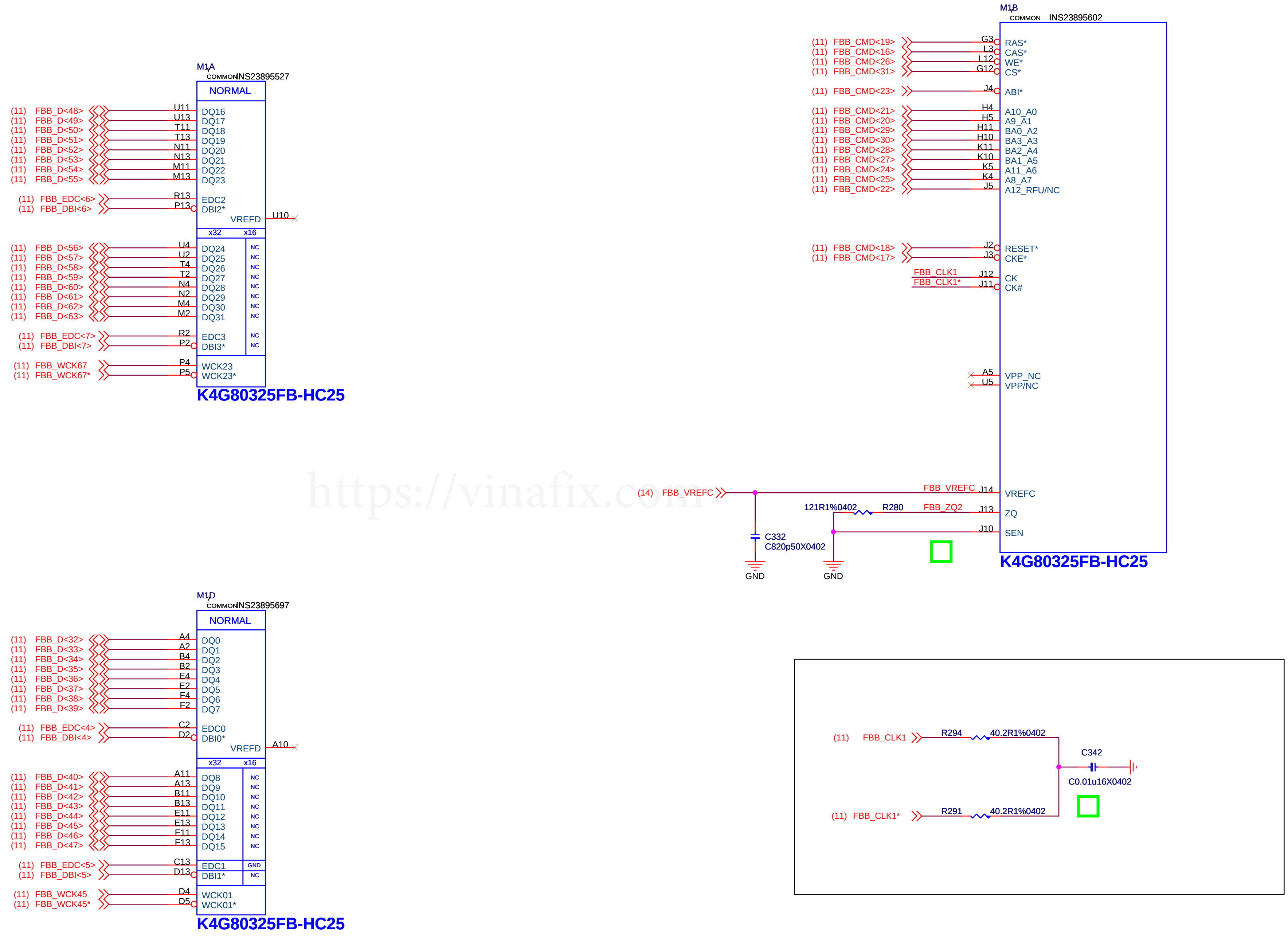
DGPU_GDDR5 FrameBuffer B1



msi	MICRO-STAR INT'L CO.,LTD.	
Title	DGPU_GDDR5 FrameBuffer B1	
Size A3	Document Number MS-16K21	Rev 0B
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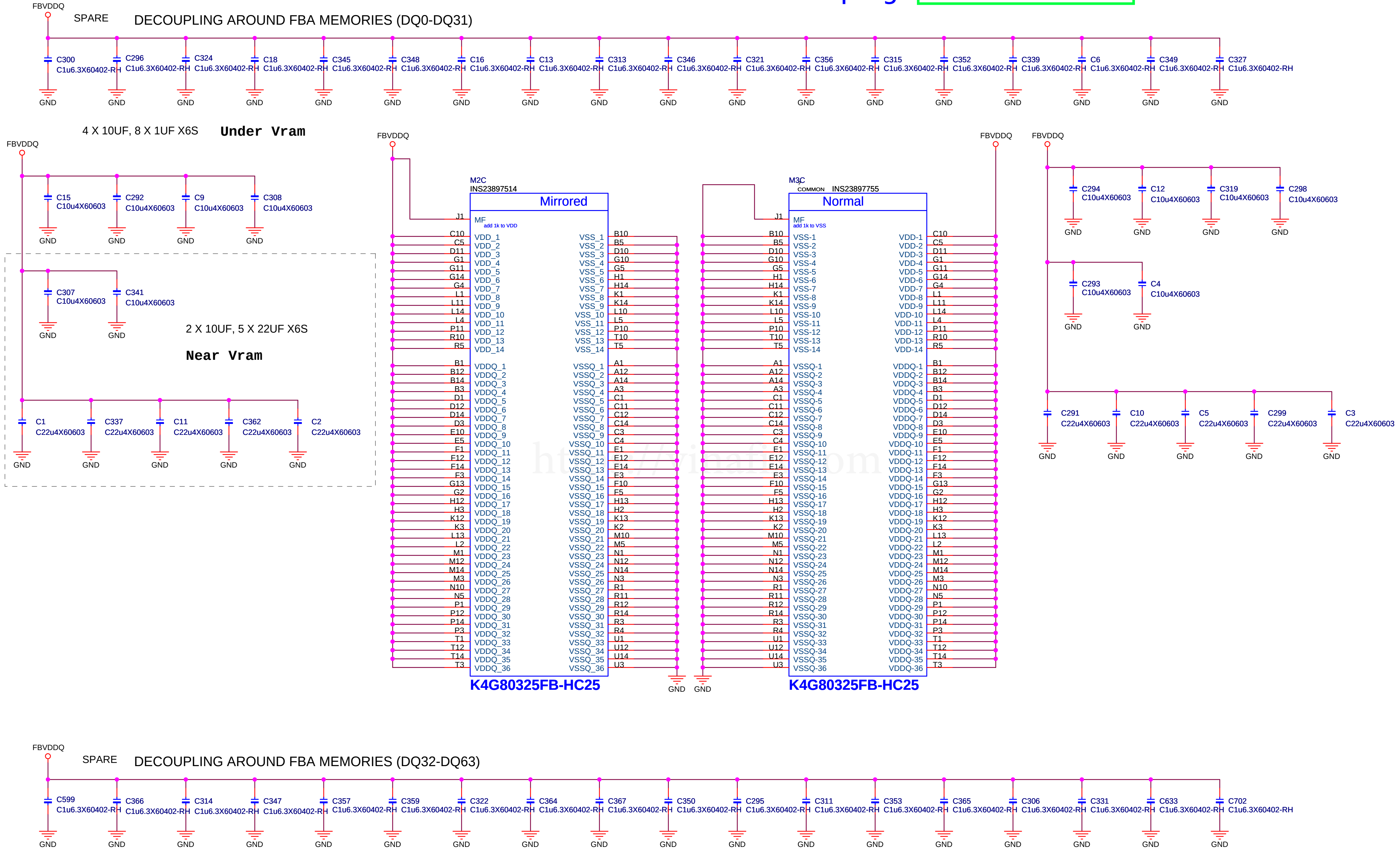
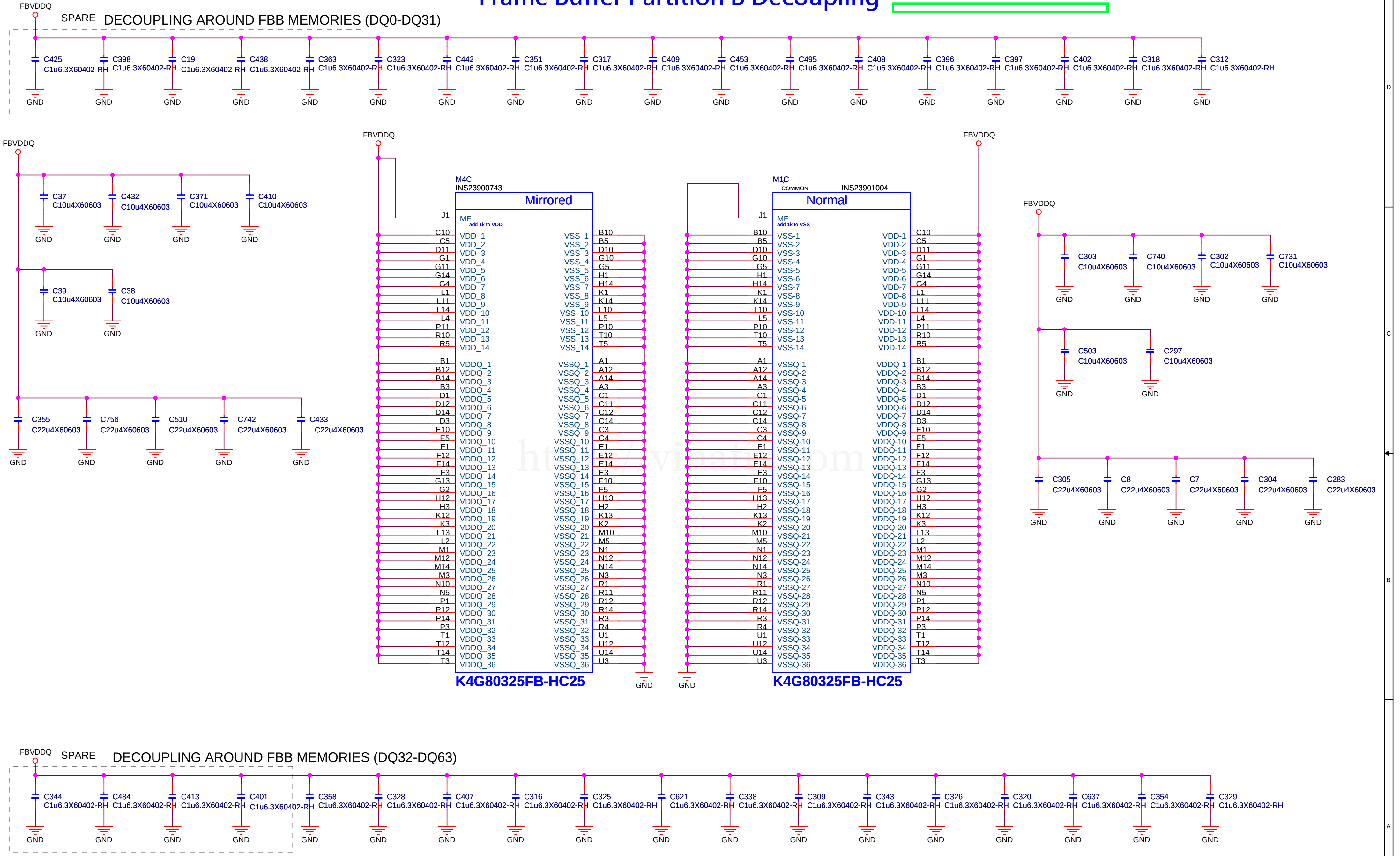
Frame Buffer Partition A Decoupling



MICRO-STAR INT'L CO.,LTD.

Title	DGPU_GDDR5 FB-A_DECOUPLING	
Size A3	Document Number MS-16K21	Rev 0B
Date: Friday, April 01, 2016	Sheet 16 of 73	

Frame Buffer Partition B Decoupling



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

Title	DGPU_GDDR5 FB-B_DECOUPLING		
Size A3	Document Number MS-16K21		Rev 0B
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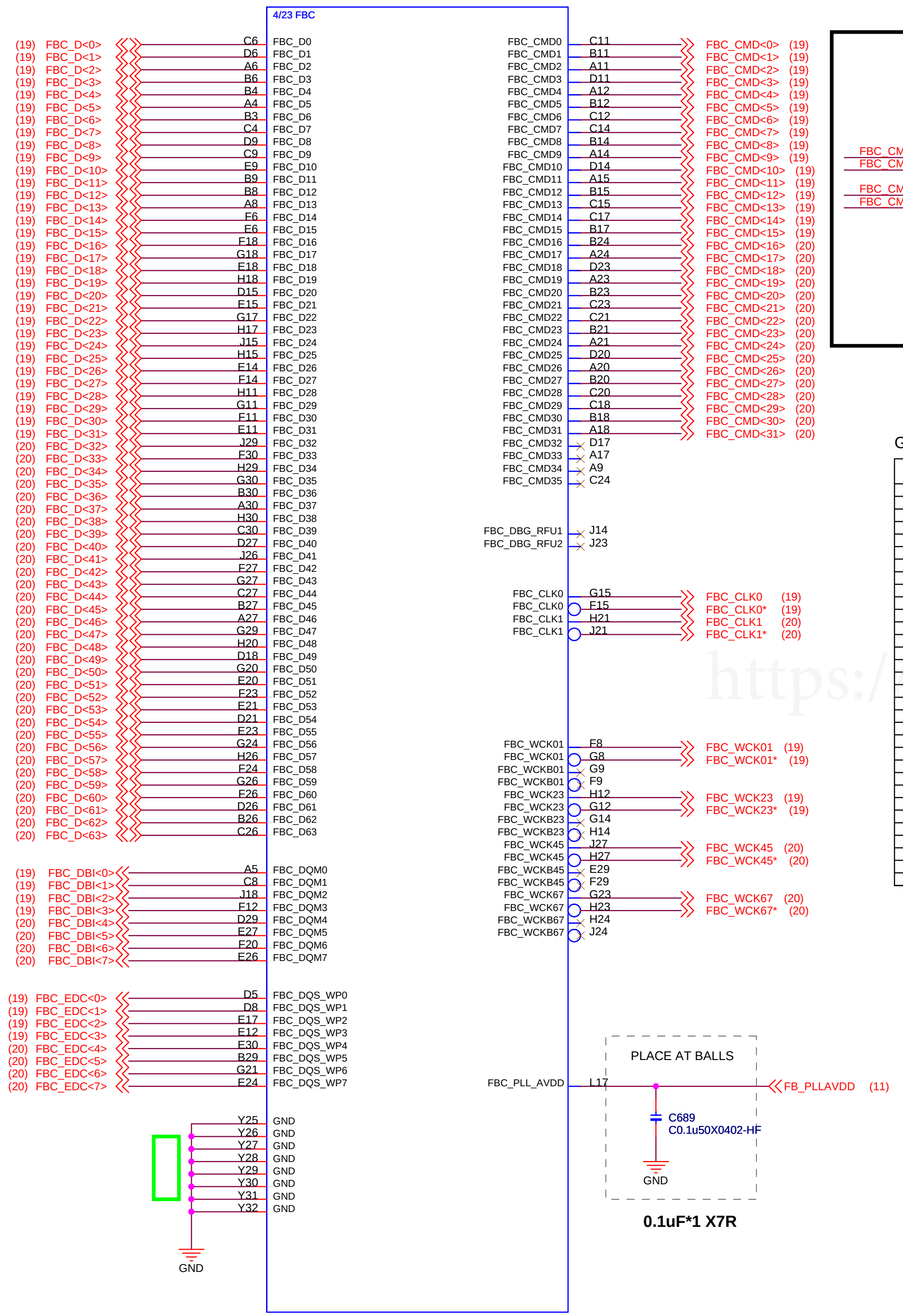
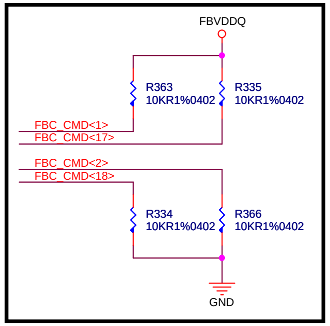
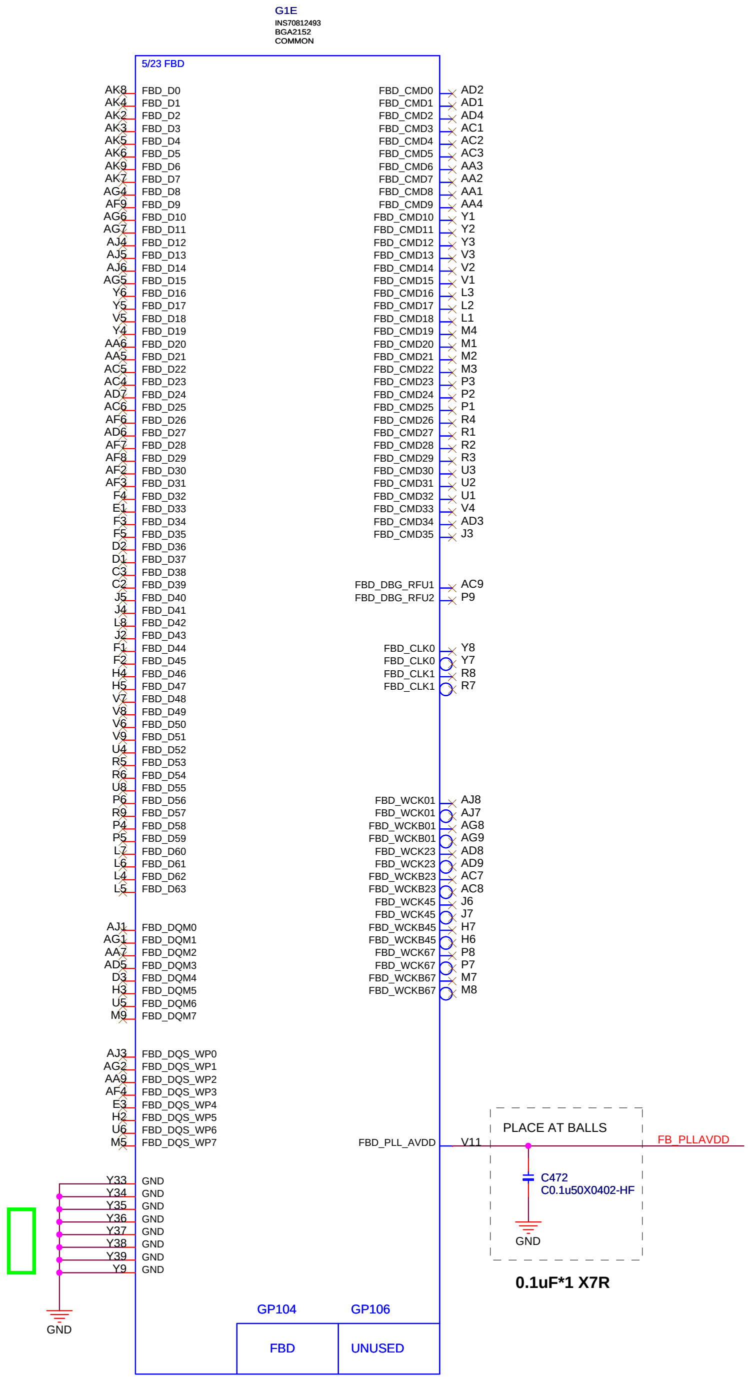
GPU Frame Buffer Partition C/D





GDDR5 Mapping By GB4-256

	0..31	32..63
CMD0	CAS*	
CMD1	CKE*	
CMD2	RST*	
CMD3	RAS*	
CMD4	A1_A9	
CMD5	A0_A10	
CMD6	A12_RFU	
CMD7	ABI*	
CMD8	A6_A11	
CMD9	A7_A8	
CMD10	WE*	
CMD11	A5_BA1	
CMD12	A4_BA2	
CMD13	A2_BA0	
CMD14	A3_BA3	
CMD15	CS*	
CMD16		CAS*
CMD17		CKE*
CMD18		RST*
CMD19		RAS*
CMD20		A1_A9
CMD21		A0_A10
CMD22		A12_RFU
CMD23		ABI*
CMD24		A6_A11
CMD25		A7_A8
CMD26		WE*
CMD27		A5_BA1
CMD28		A4_BA2
CMD29		A2_BA0
CMD30		A3_BA3
CMD31		CS*



MICRO-STAR INT'L CO.,LTD.

Title: DGPU_MEM IF C/D

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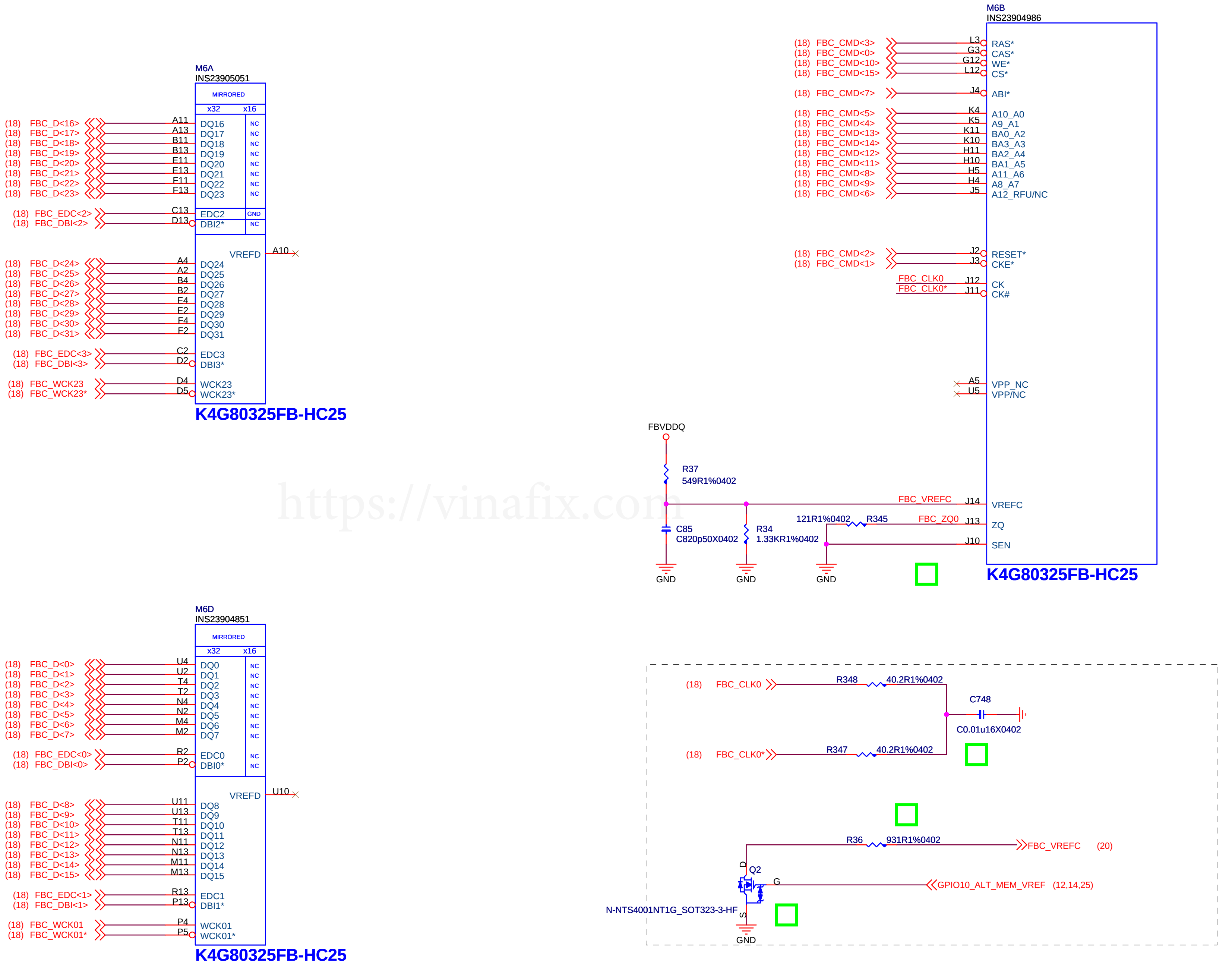
DGPU_GDDR5 FrameBuffer C0



msi	MICRO-STAR INT'L CO.,LTD.		
Title	DGPU_GDDR5 FrameBuffer C		
Size A3	Document Number MS-16K21		Rev 0B
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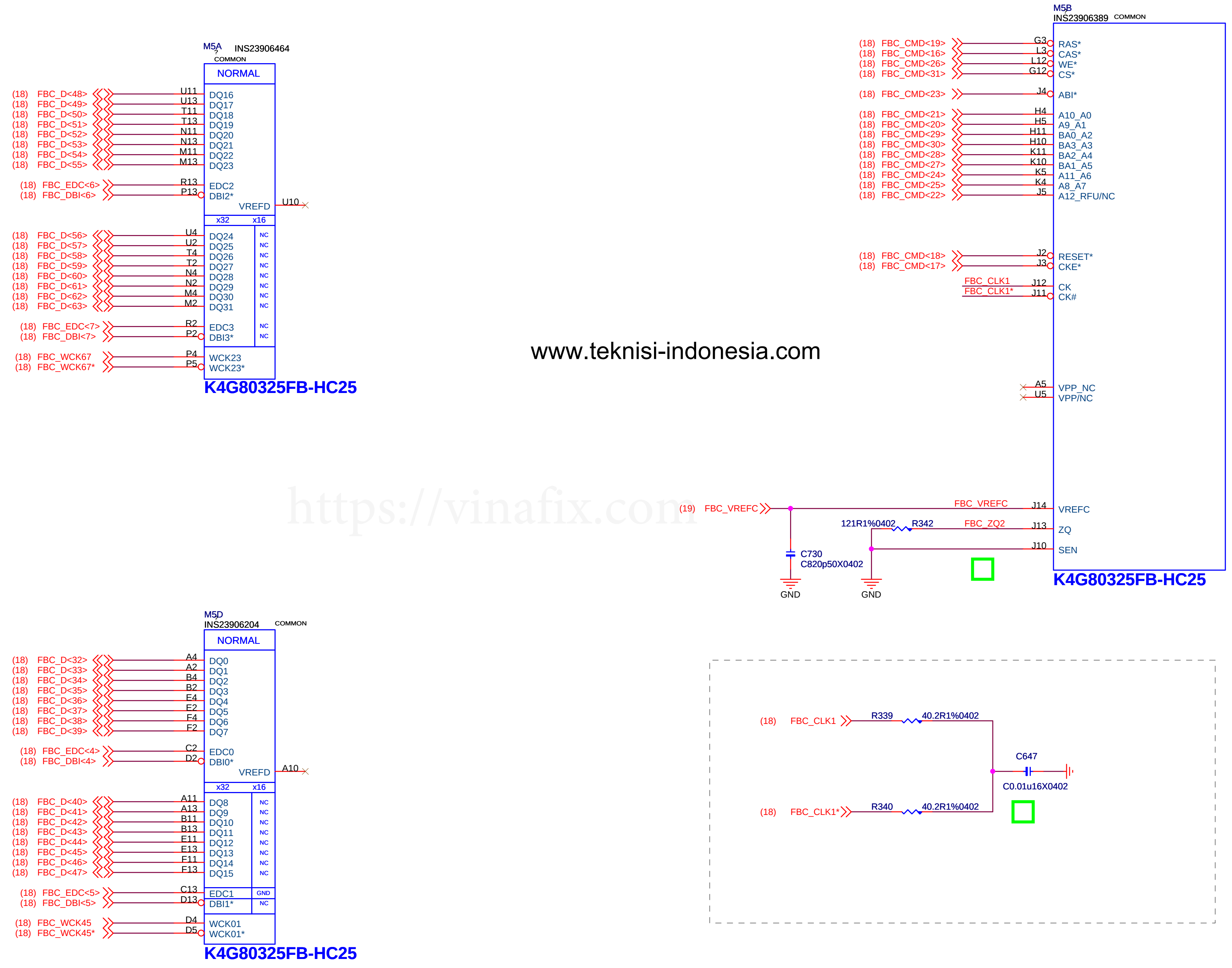
DGPU_GDDR5 FrameBuffer C1



msi	MICRO-STAR INT'L CO.,LTD.	
Title	DGPU_GDDR5 FrameBuffer C	
Size A3	Document Number MS-16K21	Rev 0B
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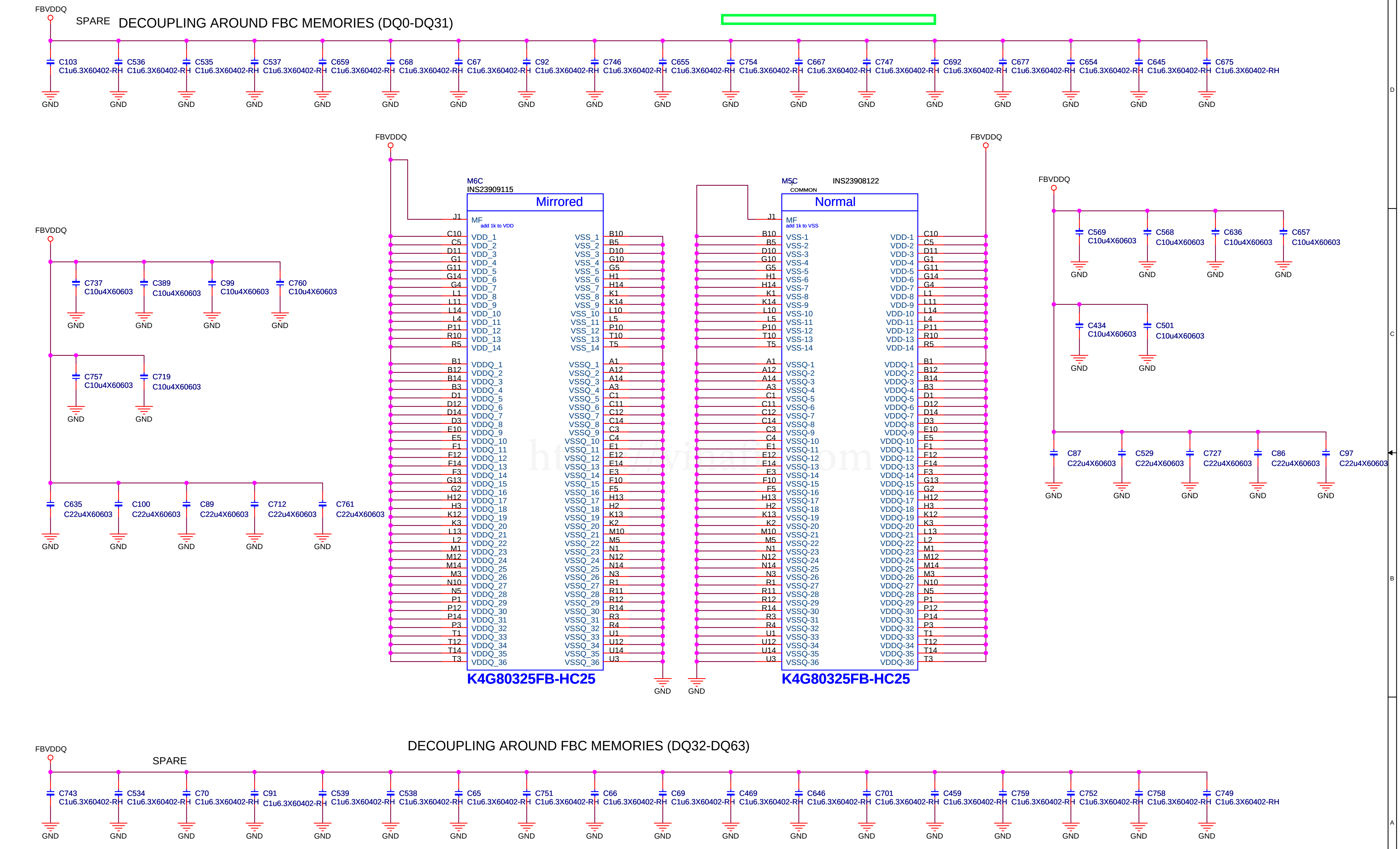
Frame Buffer Partition C Decoupling



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

Title	DGPU_GDDR5 FB-C_DECOUPLING
Size A3	Document Number MS-16K21
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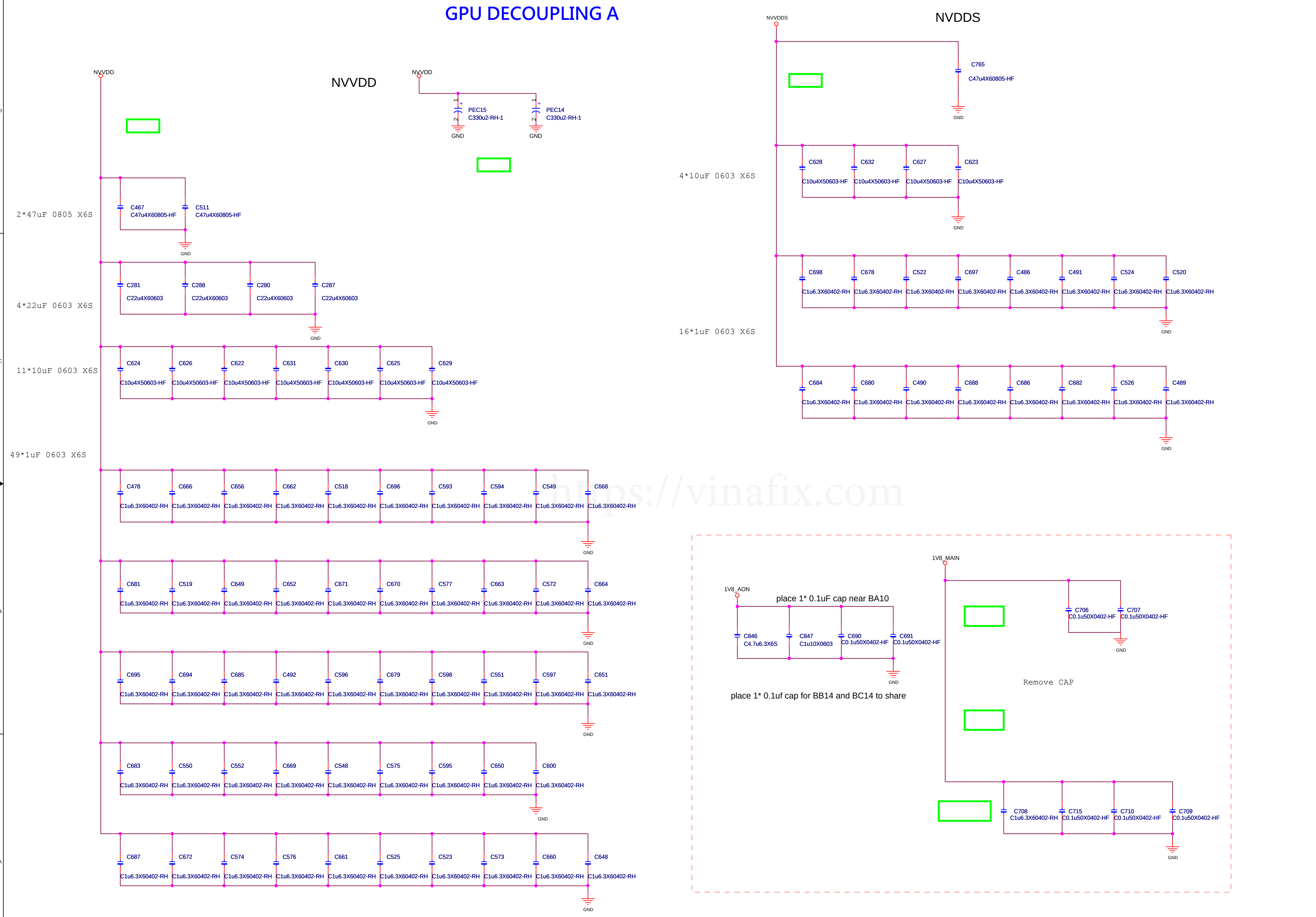
GPU DECOUPLING A



msi	MICRO-STAR INT'L CO.,LTD.	
Title	DGPU_GPU DECOUPLING A	
Size: Custom	Document Number: MS-16K21	Rev: 0B
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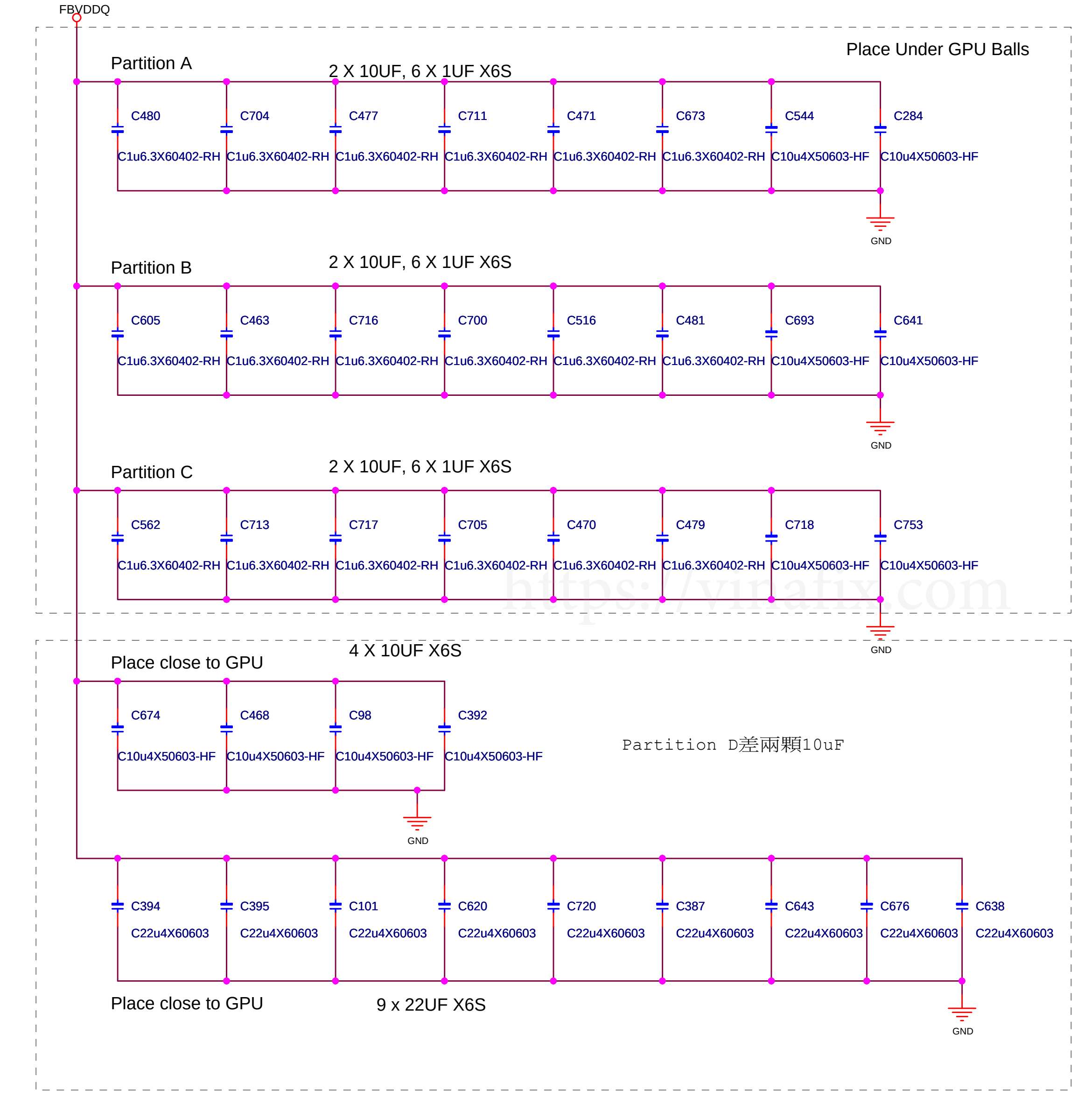
GPU DECOUPLING B

FBVDDQ



MICRO-STAR INT'L CO.,LTD.

Title	DGPU_GPU DECOUPLING B	
Size B	Document Number MS-16K21	Rev 0B
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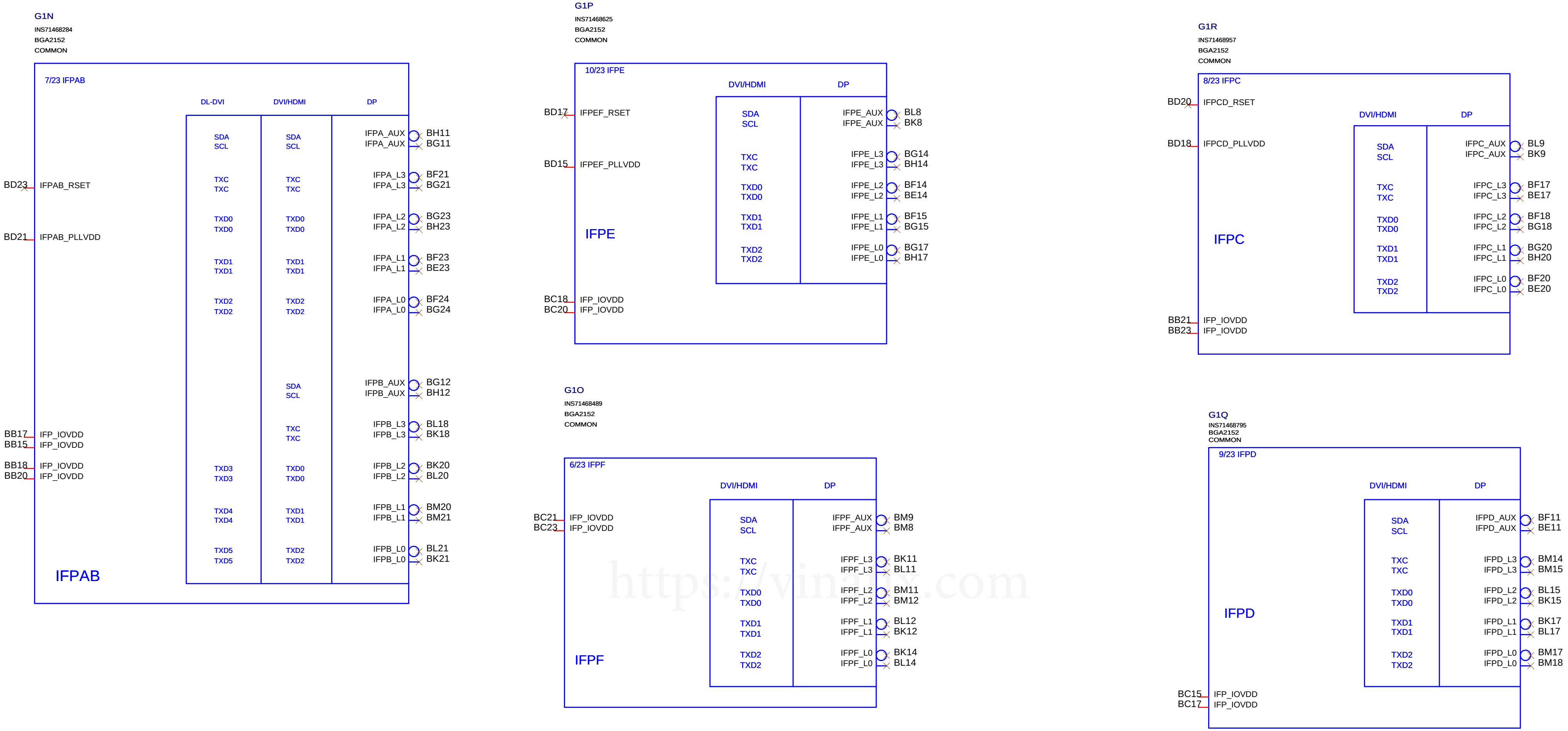

msi	MICRO-STAR INT'L CO.,LTD.		
Title	DGPU_DACA,Display IF		
Size A3	Document Number MS-16K21		Rev 0B
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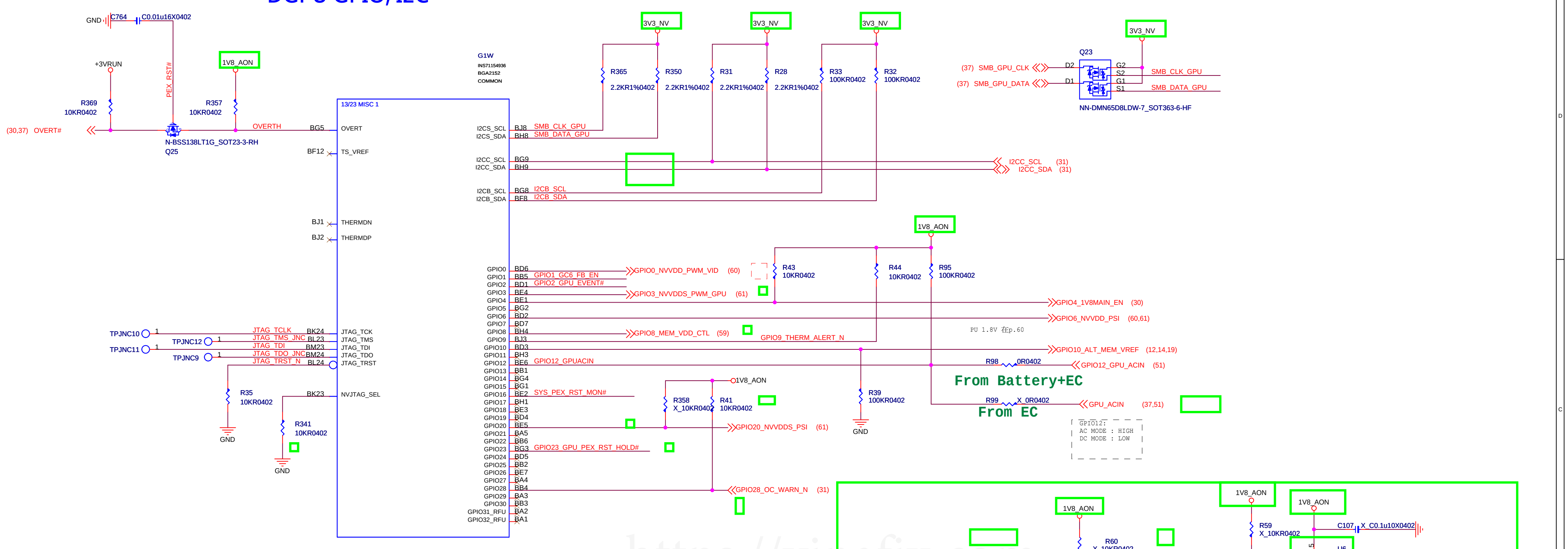
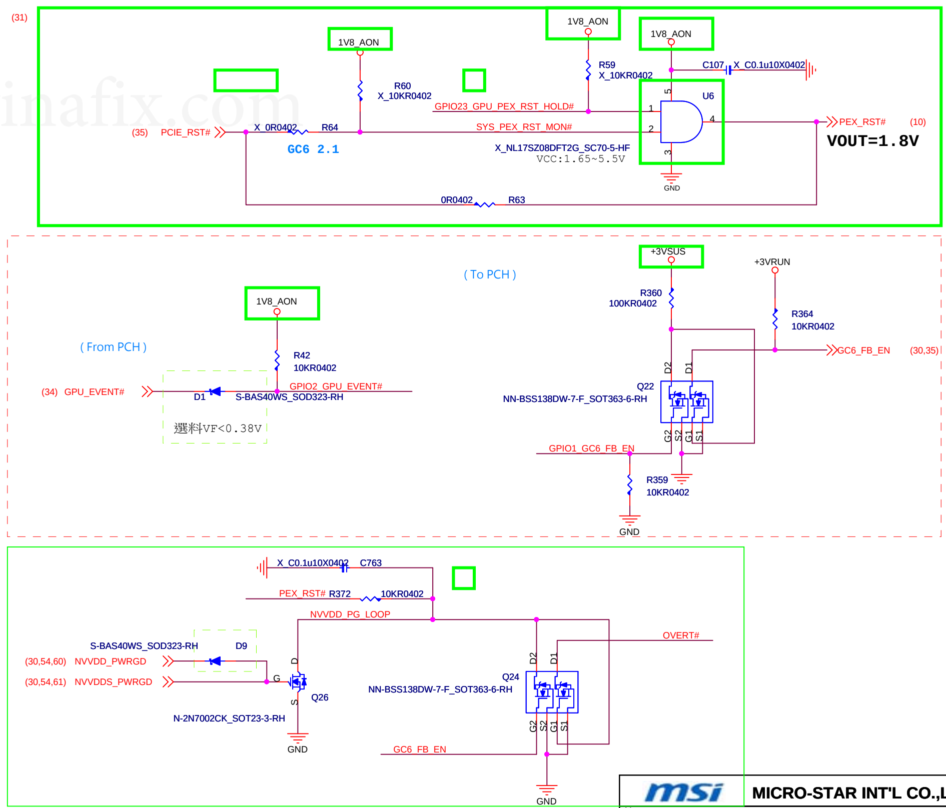
DGPU GPIO, I2C



Pin Name	Normal function	I/O	Functional Description	Recommended Default Pull-up or Pull-down
GPIO0	PWR_VID	O	GPU Core VDD PWM control signal	0 to 1V8 PWM output
GPIO1	GC6_FB_EN	O	FB Enable for GC6 2.1	10K pull-down
GPIO2	GPU_EVENT#	I	GPU wake signal for GC6 2.1	10K pull-up to 1V8 _AON
GPIO3	**NVVDD_SRAM_PWM**	O	PWM output to control the SRAM power supply	
GPIO4	**1V8_MAIN_EN**	O	GPU POWER Sequencing for GC6 2.1	10K pull-up to 1V8 _AON
GPIO5	**FRM_LCK**	I	Active low Fram Lock	1V8 pull-up to 1V8 _AON
GPIO6	PSI	O	Phase shedding	10K pull-up to 1V8 _AON
GPIO7	LCD_BL_PWM	O	Panel Backlight PWM Brightness Control	100K pull-down
GPIO8	**MEM_VDD_CTL**	O	Memory Voltage Control	pull-up/pull-down to set the FBVDD/Q power-on voltage
GPIO9	THERM_ALERT	I/O	Active Low Thermal Alert	10K pull-up to 1V8_AON
GPIO10	MEM_VREF_CTL	O	Memory VREF Control	100K pull-down
GPIO11	LCD_VCC	O	Panel Power Enable	100K pull-down
GPIO12	PWR_LEVEL	I	AC power detect or power supply overdraw input	100K pull-up to 1V8_AON
GPIO13	LCD_BLEN	O	Panel Backlight Enable	100K pull-down
GPIO14	HPD_A	I	Hot Plug Detect for IFPA	
GPIO15	**HPD_B**	I	Hot Plug Detect for IFPB	
GPIO16	SYS_PEX_RST_MON#	I	System side PCI reset Monitor	10K pull-up to 1V8 _AON
GPIO17	HPD_D	I	Hot Plug Detect for IFPD	
GPIO18	HPD_E	I	Hot Plug Detect for IFPE	
GPIO19	3DVision	O	3D Vision L/R signal	100K pull-down
GPIO20	**NVVDDS_PSI GC5_MODE**			
GPIO21	SLI_RASTER_SYNC	I	SLI Raster Sync	100K pull-down
GPIO22	SLI_SWAP_DRY	I	SLI Swap Ready	
GPIO23	GPU_PEX_RST_HOLD	O	GPU PCIE self-reset control	OD 10K pull-up to 3V3
GPIO24	HPD_F	I	Hot Plug Detect for IFPDF	
GPIO25	RESERVED			
GPIO26	RESERVED			
GPIO27	HPD_C	I	Hot Plug Detect for IFPC	
GPIO28	OC_WARN	I	Over current throttling	10K pull-up to 1V8 _AON
GPIO29	EDPc_OUTPUT_CAP	I	Input from power supply	0 to 1V8
GPIO30	RESERVED			



MICRO-STAR INT'L CO.,LTD.

Title: DGPU_GPIO,I2C

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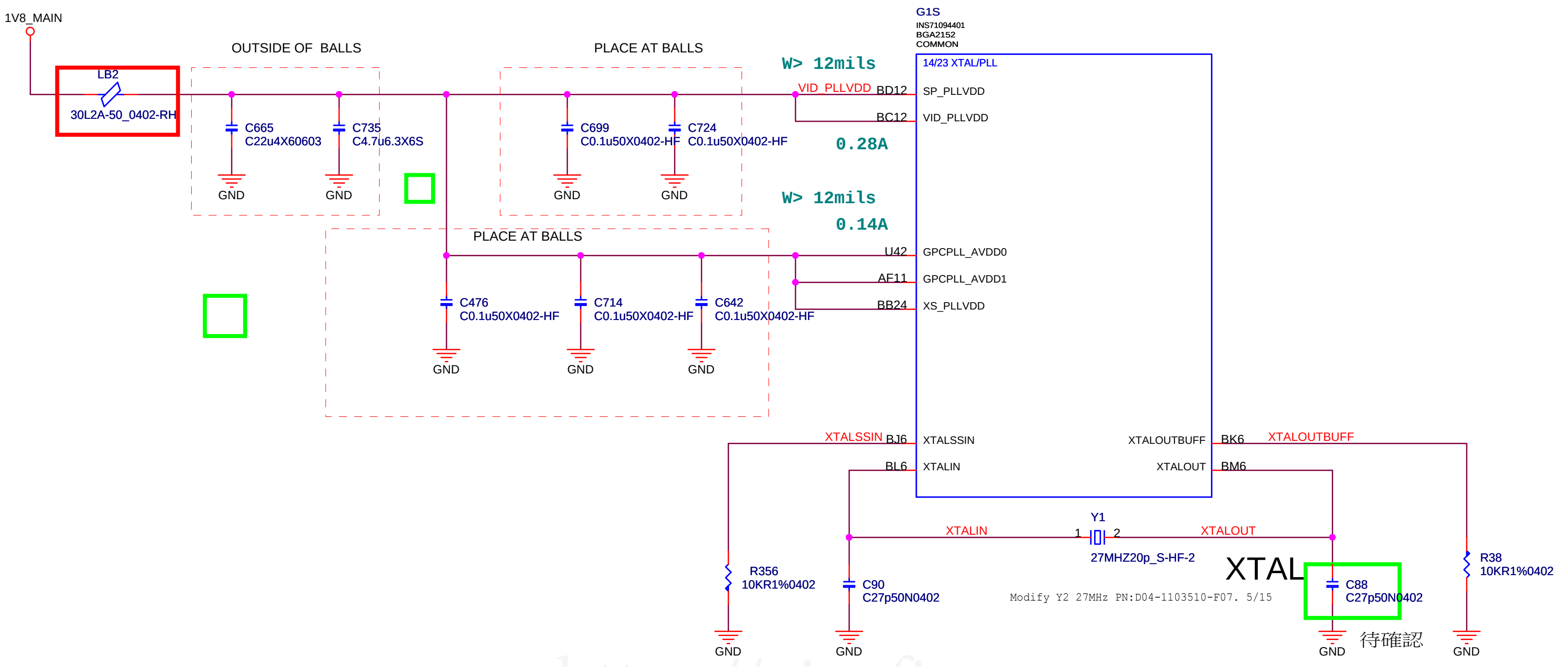
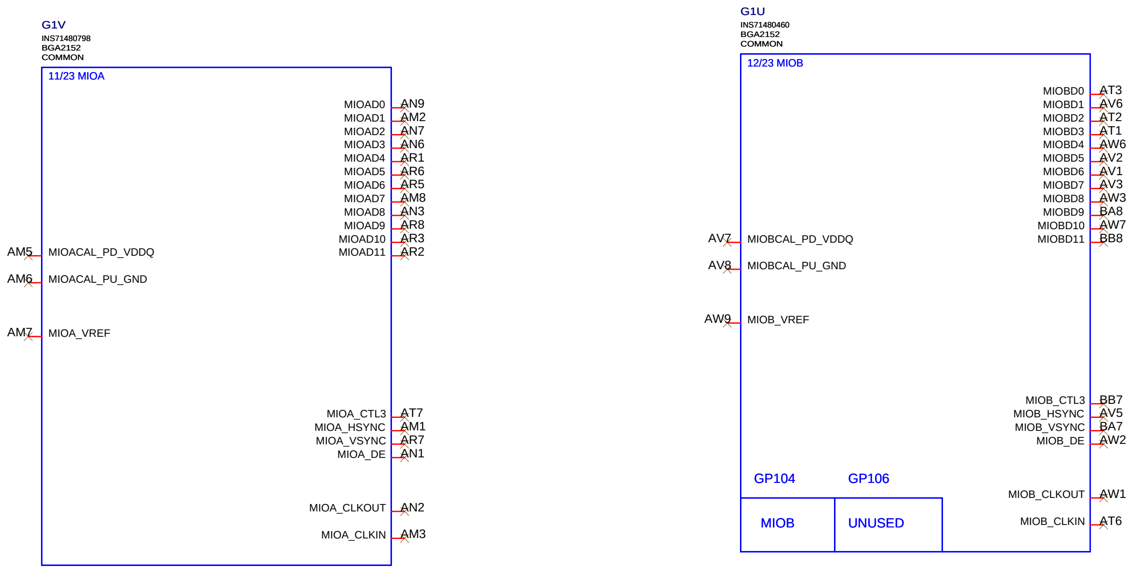
DGPU MIO & XTAL



Multi-use IO(MIO) Interface



MICRO-STAR INT'L CO.,LTD.

Title	DGPU MIO & XTAL	
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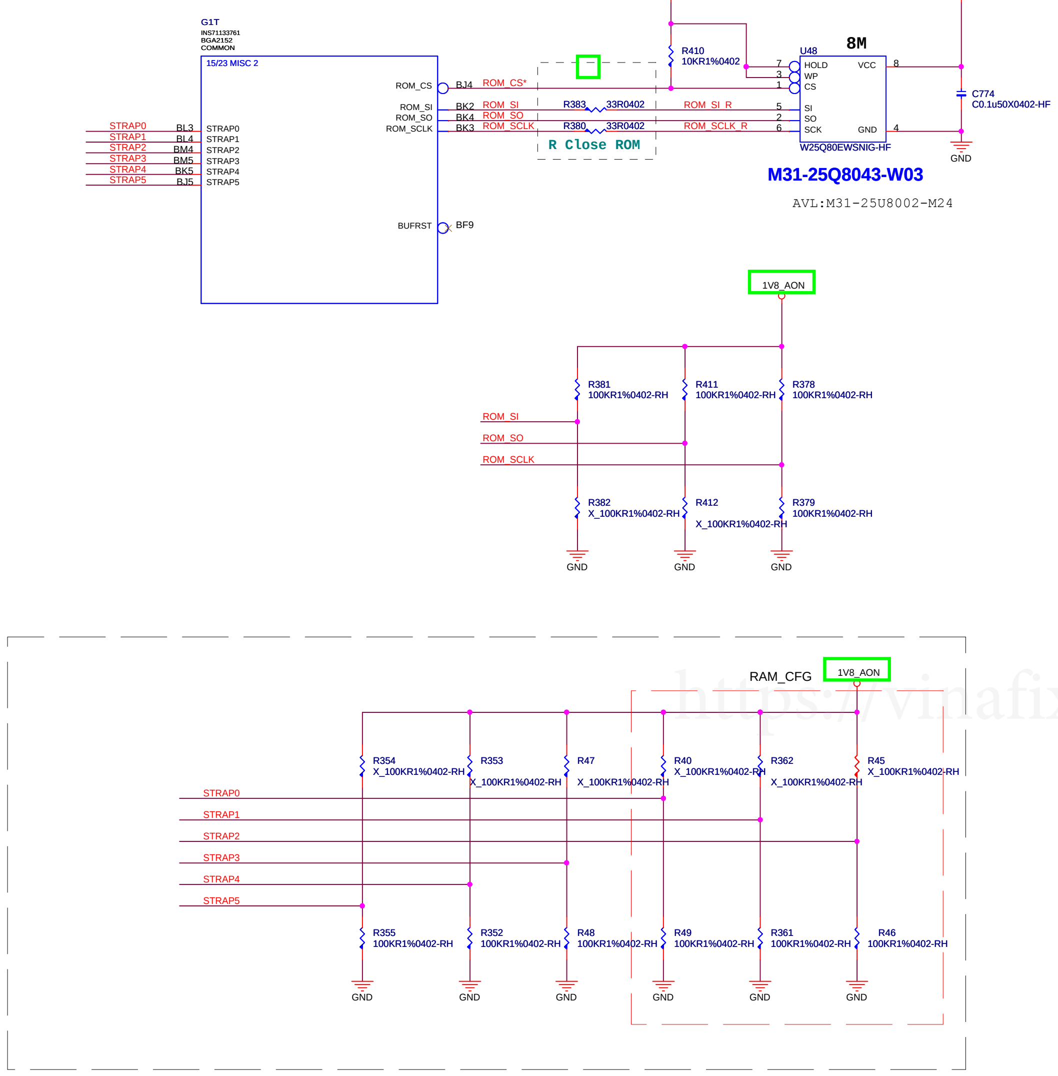
ROM, MULTI-LEVEL STRAPS



STRAP2	STRAP1	STRAP0	RAMCFG[4:0]	
L	L	L	00000	V
L	L	H	00001	V
L	H	L	00010	
L	H	H	00011	
H	H	L	00110	
H	H	H	00111	

H=High :Tied to 1.8V
M=Middle:Tied to 0.9V
L=Low :Tied to 0V

SAMSUNG 0X0
MICRON 0X1
HYNIX 0X2

ROM_SO	ROM_SI	ROM_SCLK	SOR_EXPOSED[3:0]	1:ENABLE 0:DISABLE
L	L	L	1111 DEFAULT	SOR0/1/2/3 ENABLE
L	L	H	1110	
L	H	L	1101	
L	H	H	1100	
H	L	L	1011	
H	L	H	1010	
H	H	L	1001	
H	H	H	1000	
L	L	M	0111	
L	M	L	0110	
L	M	H	0101	
L	H	M	0100	
H	L	M	0011	
H	M	L	0010	
H	M	H	0001	
H	H	M	0000	V

SOR_EXPOSED :GPU AUDIO SETTING

STRAP5	STRAP4	STRAP3	SMB_ALT_ADDR	DEVID_SEL	PCIE_CFG	VGA_DEVICE	
M	H	H	1	1	1	1	
M	H	L	1	1	1	0	
M	L	H	1	1	0	1	
M	L	L	1	1	0	0	
L	H	M	1	0	1	1	
L	M	H	1	0	1	0	
L	M	L	1	0	0	1	
L	L	M	1	0	0	0	
H	H	H	0	1	1	1	
H	H	L	0	1	1	0	
H	L	H	0	1	0	1	
H	L	L	0	1	0	0	
L	H	H	0	0	1	1	
L	H	L	0	0	1	0	
L	L	H	0	0	0	1 DEFAULT	
L	L	L	0	0	0	0	V

1:SMB_ALT_ADDR ENABLE (DUAL GPU)
0:SMB_ALT_ADDR DISABLE (SINGLE GPU)

1:DEVID_SEL REBRAND
0:DEVID_SEL ORIGNAL

1:PCIE_CFG LOW SWING POWER
0:PCIE_CFG HIGH SWING POWER

1:VGA_DEVICE ENABLE
0:VGA_DEVICE DISABLE

DEFAULT SETTING

V_TOP1
5010
M12-8032535-S02
X_K4G80325FB-HC25

V_TOP2
5010
M12-2563215-M30
X_MT51J256M32HF-80:A

V_TOP3
5010
M12-5GC2H05-H23
X_H5GC2H24BFR-T2C

MICRO-STAR INT'L CO.,LTD.

Title: DGPU_ROM,HW Straps

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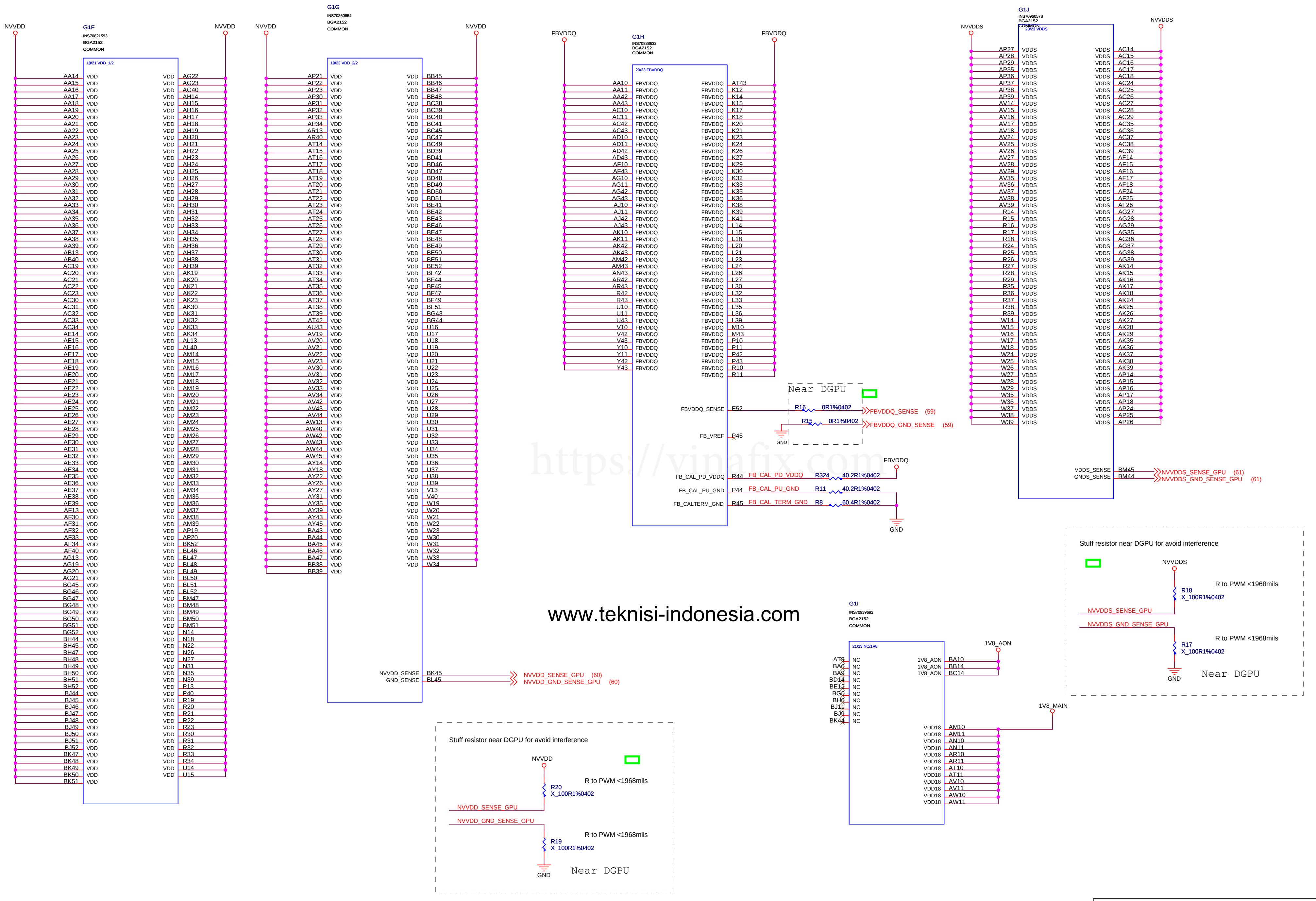
GPU NVVDD, FBVDDQ



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

Title	DGPU NVVDD, FBVDDQ	
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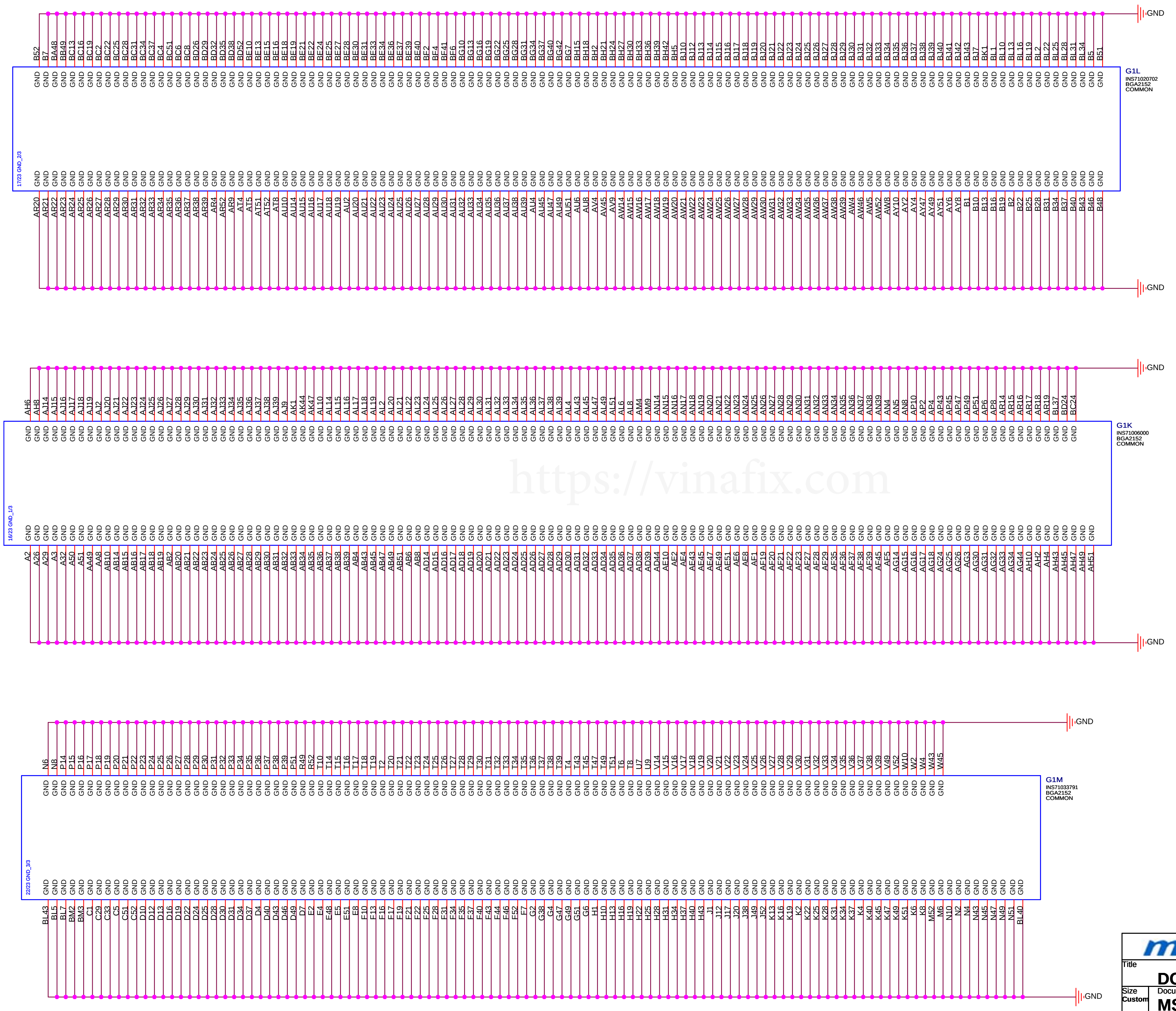
DGPU GND



msi	MICRO-STAR INT'L CO.,LTD.	
Title	DGPU GND	
Size Custom	Document Number MS-16K21	Rev 0B
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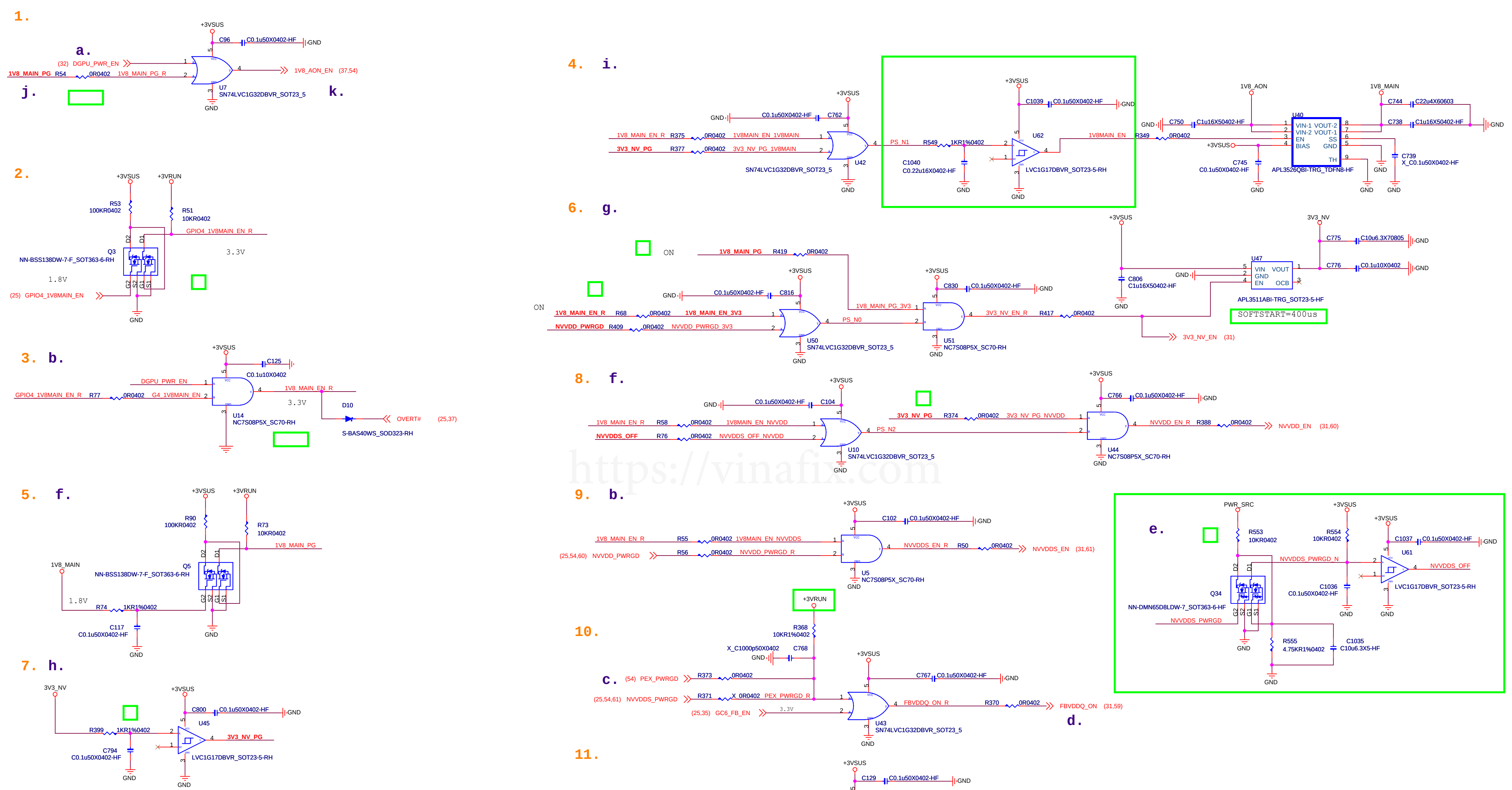
nVIDIA Power Sequence Control

Power on = 1V8_AON ->1V8_MAIN->3V3_NV -> NVVDD ->NVVDDS/PEX_VDD -> FBVDDQ -> DGPUPWRGD

Power off= DGPUPWREN->(NVVDDS->PEX_VDD->FBVDDQ)->(NVVDD->3V3_NV)->1V8_MAIN->1V8_AON



msi	MICRO-STAR INT'L CO.,LTD.
Title	DGPU_Power Sequence
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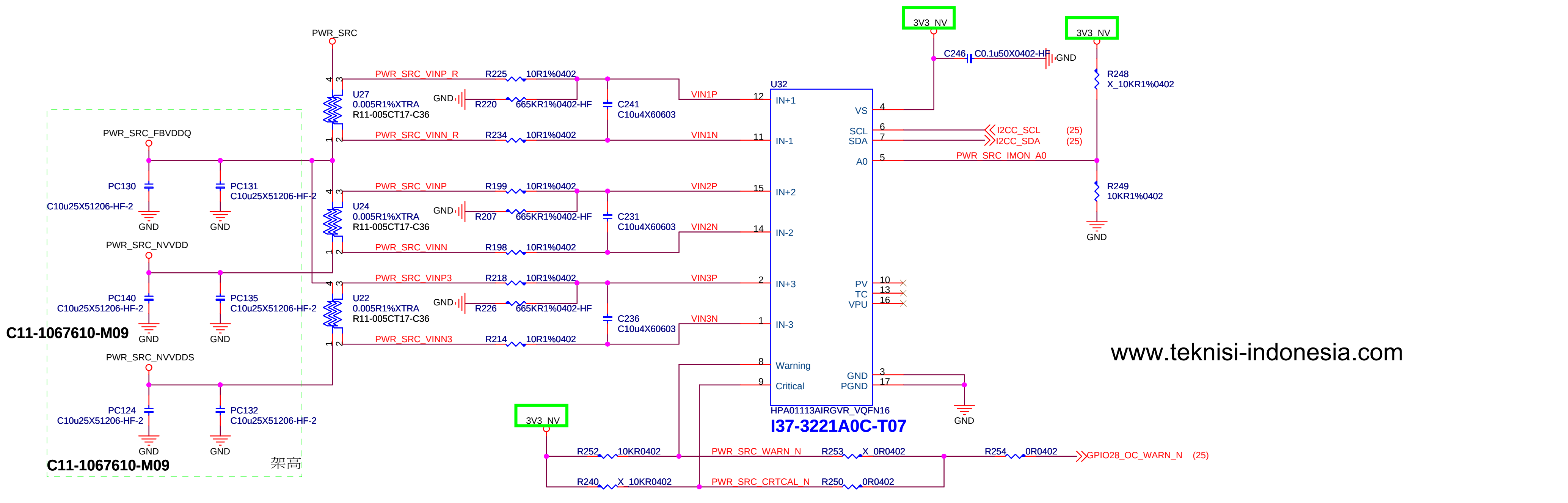
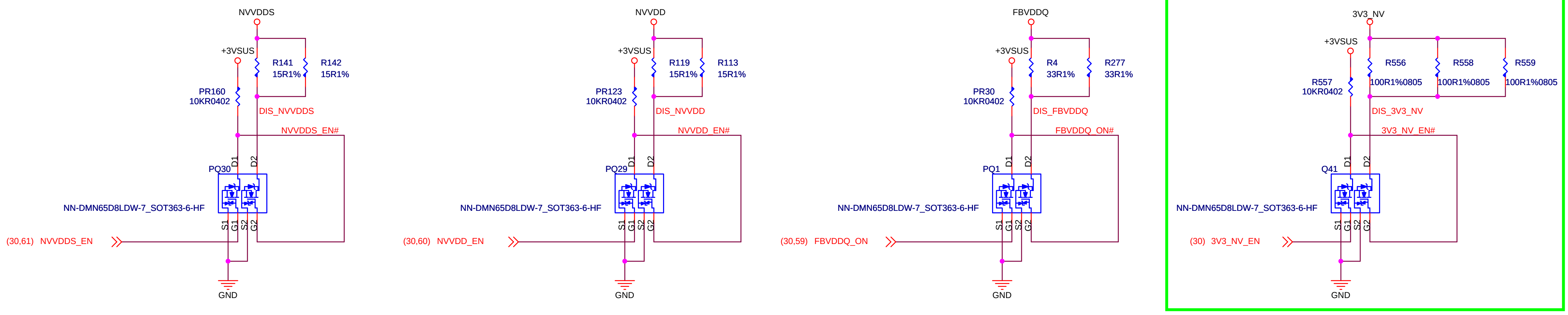
DGPU_Power Control



Discharge



PEX_VDD 内部放電4ms

3V3_AON内部放電 2ms

1V8AON内部放電2ms

1V8_MAIN内部放電320us

MICRO-STAR INT'L CO.,LTD.

Title: DGPU_Discharge

Size: A3 | Document Number: MS-16K21 | Rev: 0B

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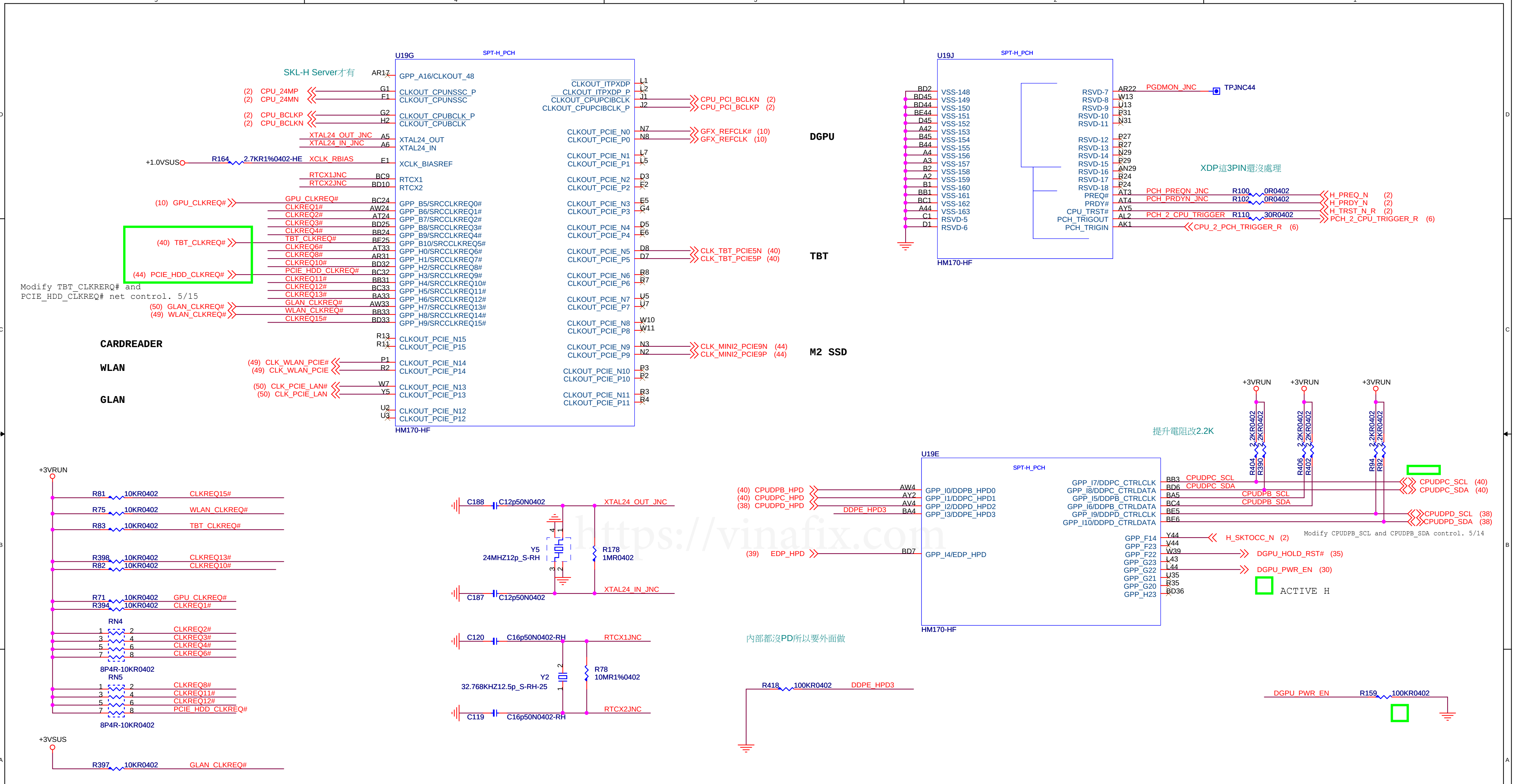

MICRO-STAR INT'L CO.,LTD.

Title: Skylake(HOST)

Size	Document Number	Rev
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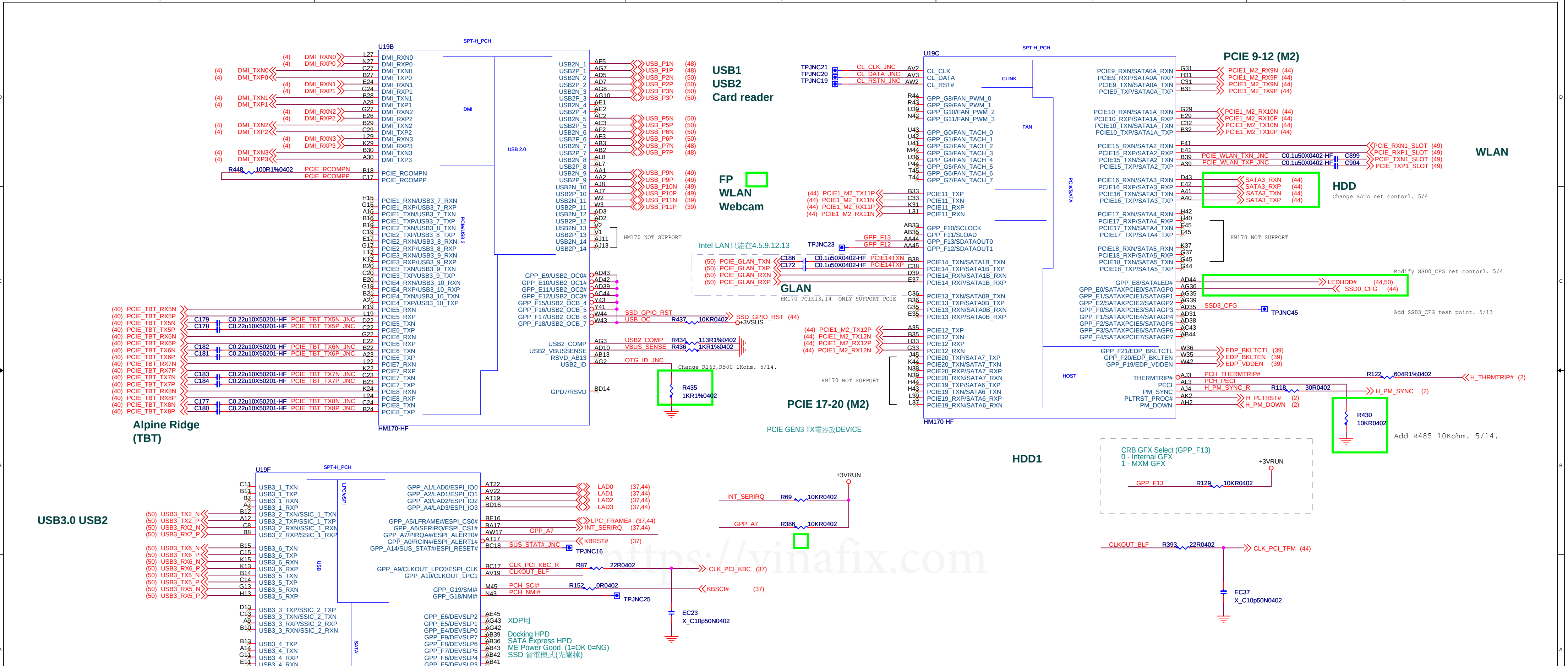
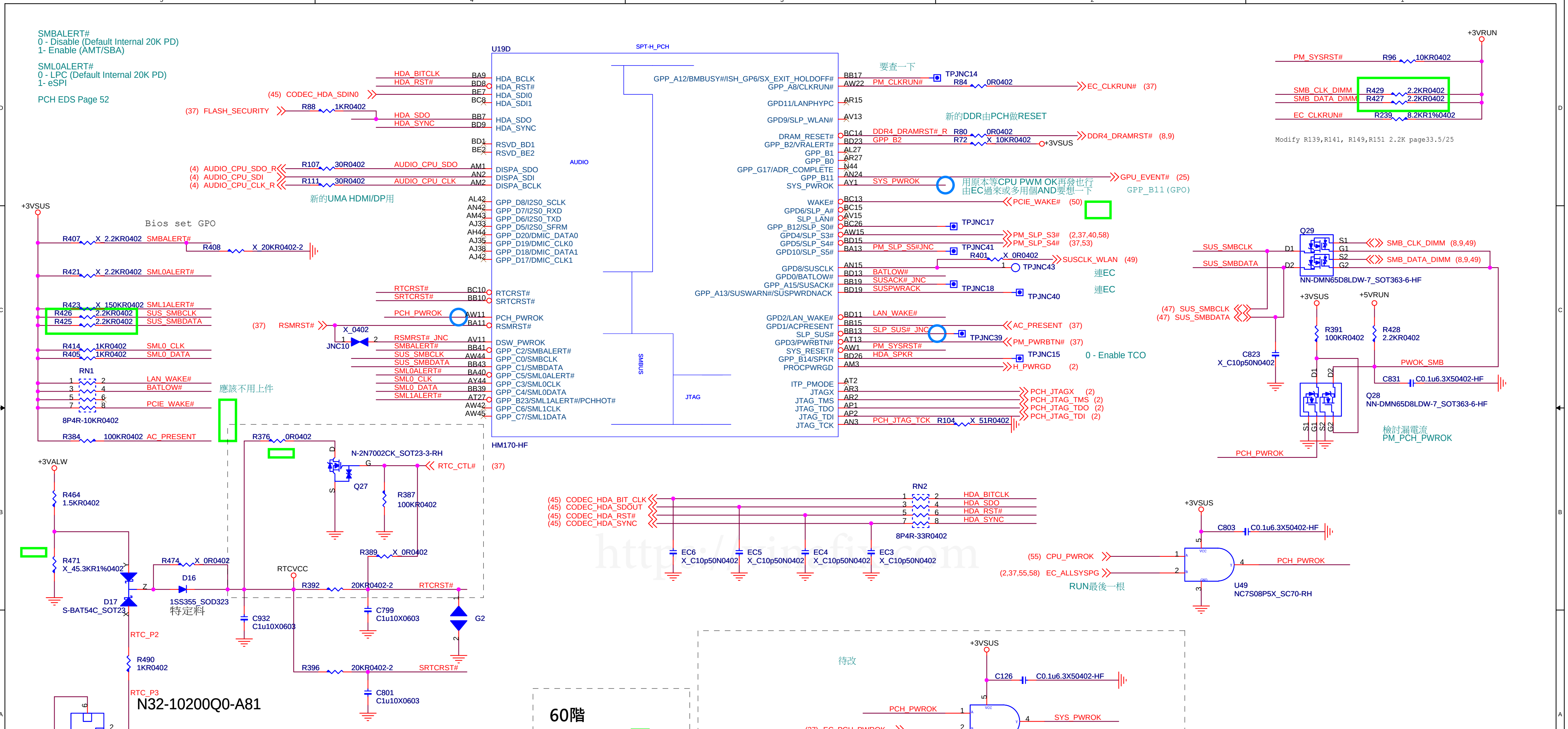


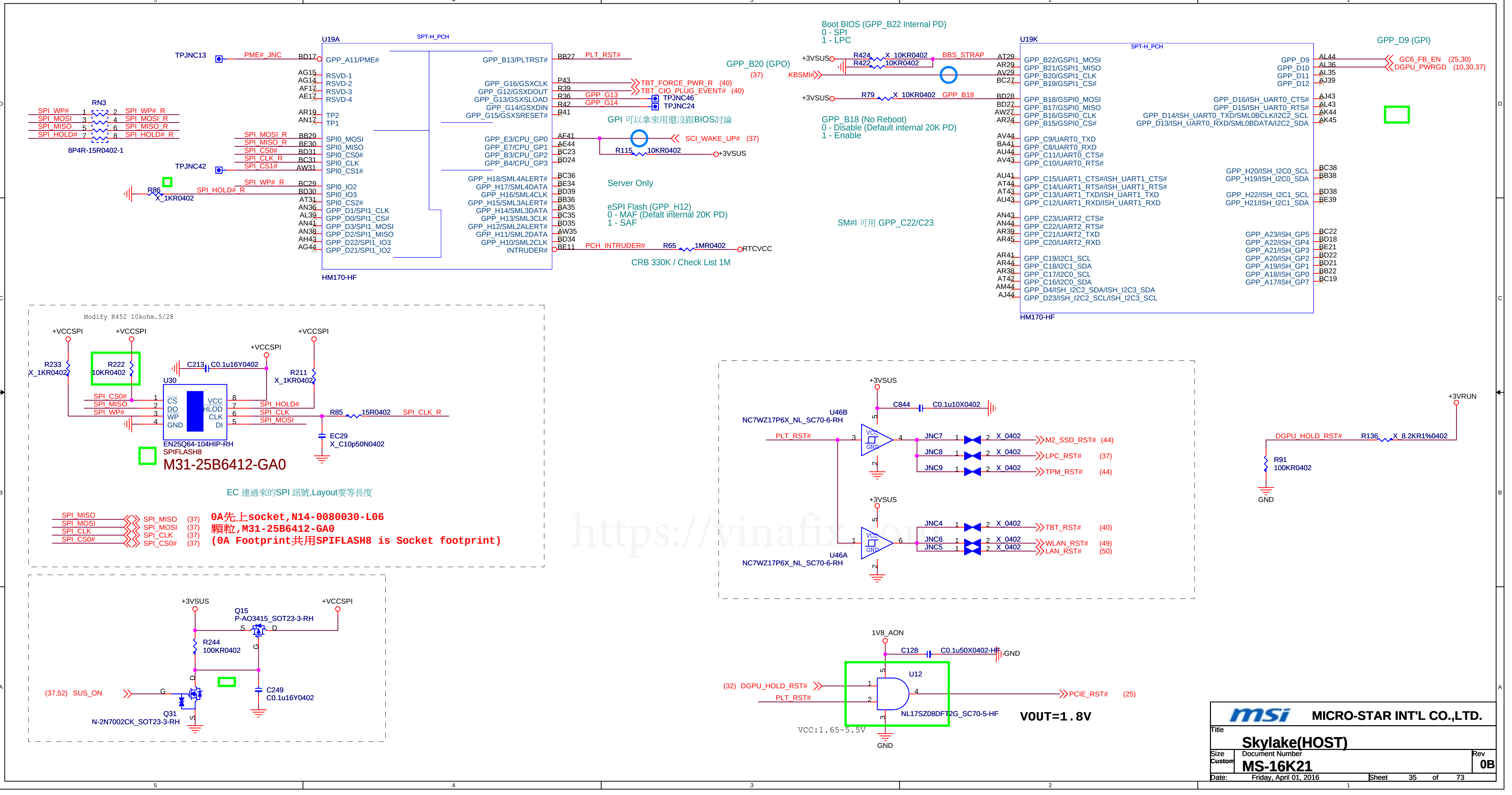
msi MICRO-STAR INT'L CO.,LTD.

Title	Skylake(HOST)	
Size: Custom	Document Number: MS-16K21	Rev: 0B
Date: Friday, April 01, 2016	Sheet 33 of 73	



MICRO-STAR INT'L CO.,LTD.

Title	Skylake(HOST)	
Size: Custom	Document Number: MS-16K21	Rev: 0B
Date: Friday, April 08, 2016	Sheet 34 of 73	



U19A
SPT-H_PCH
TPJNC13
PME#_JNC
GPP_A11/PME#
GPP_B13/PLTRST#
PLT_RST#
RSVD-1
RSVD-2
RSVD-3
RSVD-4
TP2
TP1
GPP_G16/GSXCLK
GPP_G12/GSXDOUT
GPP_G13/GSXSLOAD
GPP_G14/GSXDIN
GPP_G15/GSXSRESET#
TBT_FORCE_PWR_R (40)
TBT_CIO_PLUG_EVENT# (40)
GPP_G13
GPP_G14
TPJNC46
TPJNC24
GPI 可以拿來用還沒跟BIOS討論
RN3
SPI_WP#
SPI_MOSI
SPI_MISO
SPI_HOLD#
SPI_WP#_R
SPI_MOSI_R
SPI_MISO_R
SPI_HOLD#_R
8P4R-15R0402-1
SPI_MOSI_R
SPI_MISO_R
SPI_CS0#
SPI_CLK_R
SPI_CS1#
SPI0_MOSI
SPI0_MISO
SPI0_CS0#
SPI0_CLK
SPI0_CS1#
GPP_E3/CPU_GPO
GPP_E7/CPU_GP1
GPP_B3/CPU_GP2
GPP_B4/CPU_GP3
SCI_WAKE_UP# (37)
R115
10KR0402
+3VSUS
TPJNC42
R86
X_1KR0402
SPI_WP#_R
SPI_HOLD#_R
SPI0_IO2
SPI0_IO3
SPI0_CS2#
GPP_D1/SPI1_CLK
GPP_D0/SPI1_CS#
GPP_D3/SPI1_MOSI
GPP_D2/SPI1_MISO
GPP_D22/SPI1_IO3
GPP_D21/SPI1_IO2
GPP_H18/SML4ALERT#
GPP_H17/SML4DATA
GPP_H16/SML4CLK
GPP_H15/SML3ALERT#
GPP_H14/SML3DATA
GPP_H13/SML3CLK
GPP_H12/SML2ALERT#
GPP_H11/SML2DATA
GPP_H10/SML2CLK
INTRUDER#
Server Only
eSPI Flash (GPP_H12)
0 - MAF (Defalt internal 20K PD)
1 - SAF
PCH_INTRUDER#
R65
1MR0402
RTCVCC
CRB 330K / Check List 1M
HM170-HF
Boot BIOS (GPP_B22 Internal PD)
0 - SPI
1 - LPC
GPP_B20 (GPO)
(37)
KBSMI#
+3VSUS
R424
X_10KR0402
R422
10KR0402
BBS_STRAP
R79
X_10KR0402
GPP_B18
GPP_B18 (No Reboot)
0 - Disable (Default internal 20K PD)
1 - Enable
U19K
SPT-H_PCH
GPP_B22/GSPI1_MOSI
GPP_B21/GSPI1_MISO
GPP_B20/GSPI1_CLK
GPP_B19/GSPI1_CS#
GPP_B18/GSPI0_MOSI
GPP_B17/GSPI0_MISO
GPP_B16/GSPI0_CLK
GPP_B15/GSPI0_CS#
GPP_C9/UART0_TXD
GPP_C8/UART0_RXD
GPP_C11/UART0_CTS#
GPP_C10/UART0_RTS#
GPP_C15/UART1_CTS#/ISH_UART1_CTS#
GPP_C14/UART1_RTS#/ISH_UART1_RTS#
GPP_C13/UART1_TXD/ISH_UART1_TXD
GPP_C12/UART1_RXD/ISH_UART1_RXD
SM#I 可用 GPP_C22/C23
GPP_C23/UART2_CTS#
GPP_C22/UART2_RTS#
GPP_C21/UART2_TXD
GPP_C20/UART2_RXD
GPP_C19/I2C1_SCL
GPP_C18/I2C1_SDA
GPP_C17/I2C0_SCL
GPP_C16/I2C0_SDA
GPP_D4/ISH_I2C2_SDA/ISH_I2C3_SDA
GPP_D23/ISH_I2C2_SCL/ISH_I2C3_SCL
GPP_D9
GPP_D10
GPP_D11
GPP_D12
GPP_D9 (GPI)
GC6_FB_EN (25,30)
DGPU_PWRGD (10,30,37)
GPP_D16/ISH_UART0_CTS#
GPP_D15/ISH_UART0_RTS#
GPP_D14/ISH_UART0_TXD/SML0BCLK/I2C2_SCL
GPP_D13/ISH_UART0_RXD/SML0BDATA/I2C2_SDA
GPP_H20/ISH_I2C0_SCL
GPP_H19/ISH_I2C0_SDA
GPP_H22/ISH_I2C1_SCL
GPP_H21/ISH_I2C1_SDA
GPP_A23/ISH_GP5
GPP_A22/ISH_GP4
GPP_A21/ISH_GP3
GPP_A20/ISH_GP2
GPP_A19/ISH_GP1
GPP_A18/ISH_GP0
GPP_A17/ISH_GP7
HM170-HF
Modify R452 10kohm.5/28
+VCCSPI
R233
X_1KR0402
R222
10KR0402
C213
C0.1u16Y0402
R211
X_1KR0402
U30
SPI_CS0#
SPI_MISO
SPI_WP#
CS
DO
WP
GND
VCC
HLOD
CLK
DI
SPI_HOLD#
SPI_CLK
SPI_MOSI
R85
15R0402
SPI_CLK_R
EC29
X_C10p50N0402
EN25Q64-104HIP-RH
SPIFLASH8
M31-25B6412-GA0
EC 連過來的SPI 訊號,Layout要等長度
SPI_MISO (37)
SPI_MOSI (37)
SPI_CLK (37)
SPI_CS0# (37)
0A先上socket,N14-0080030-L06
顆粒,M31-25B6412-GA0
(0A Footprint共用SPIFLASH8 is Socket footprint)
+3VSUS
Q15
P-AO3415_SOT23-3-RH
R244
100KR0402
C249
C0.1u16Y0402
(37,52) SUS_ON
Q31
N-2N7002CK_SOT23-3-RH
U46B
NC7WZ17P6X_NL_SC70-6-RH
C844
C0.1u10X0402
PLT_RST#
JNC7
JNC8
JNC9
X_0402
M2_SSD_RST# (44)
LPC_RST# (37)
TPM_RST# (44)
U46A
NC7WZ17P6X_NL_SC70-6-RH
JNC4
JNC6
JNC5
TBT_RST# (40)
WLAN_RST# (49)
LAN_RST# (50)
+3VRUN
DGPU_HOLD_RST#
R136
X_8.2KR1%0402
R91
100KR0402
GND
1V8_AON
C128
C0.1u50X0402-HF
U12
(32) DGPU_HOLD_RST#
NL17SZ08DFT2G_SC70-5-HF
PCIE_RST# (25)
VOUT=1.8V
VCC:1.65~5.5V
msi
MICRO-STAR INT'L CO.,LTD.
Title
Skylake(HOST)
Size
Custom
Document Number
MS-16K21
Rev
0B
Date: Friday, April 01, 2016
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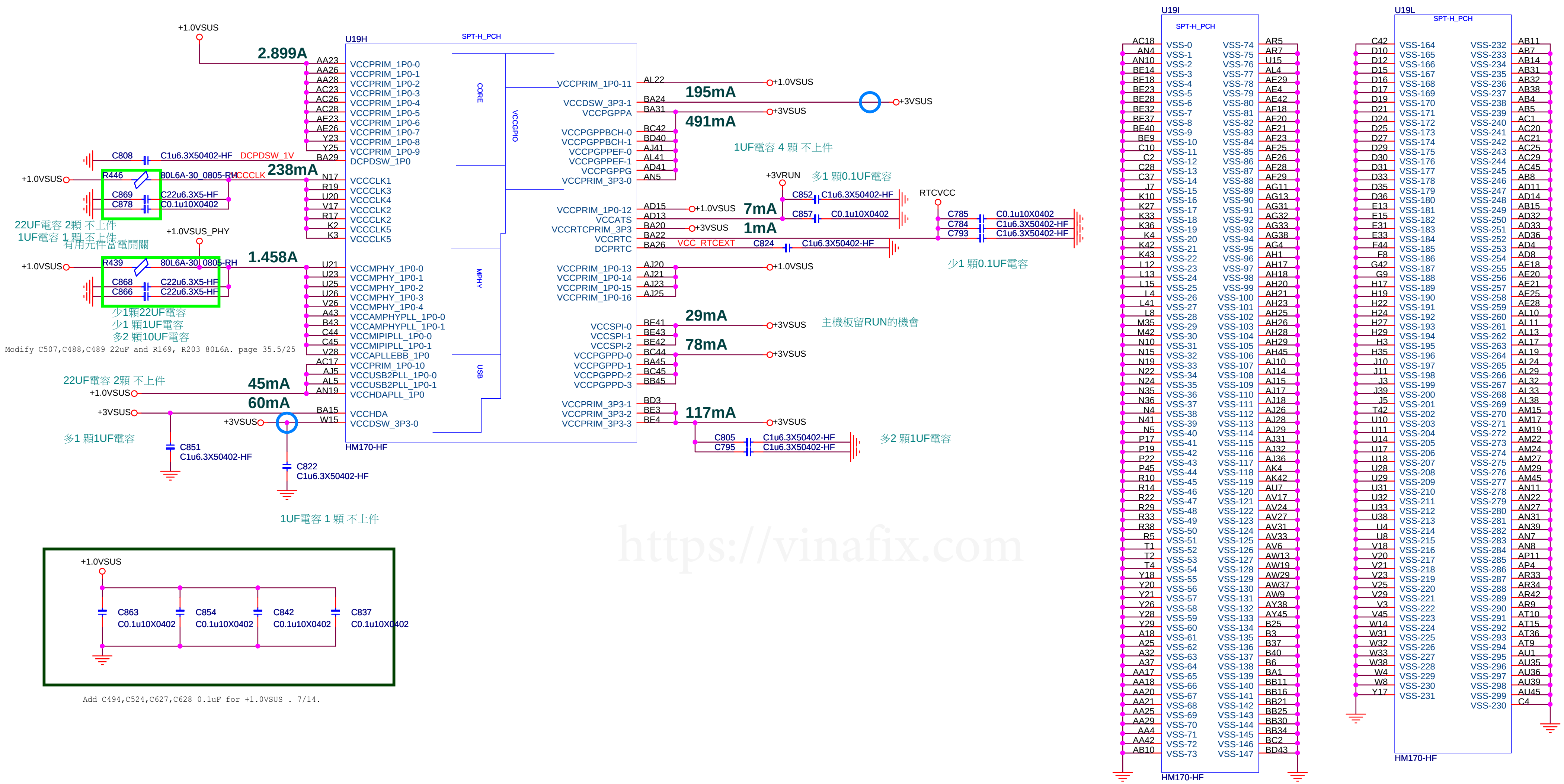
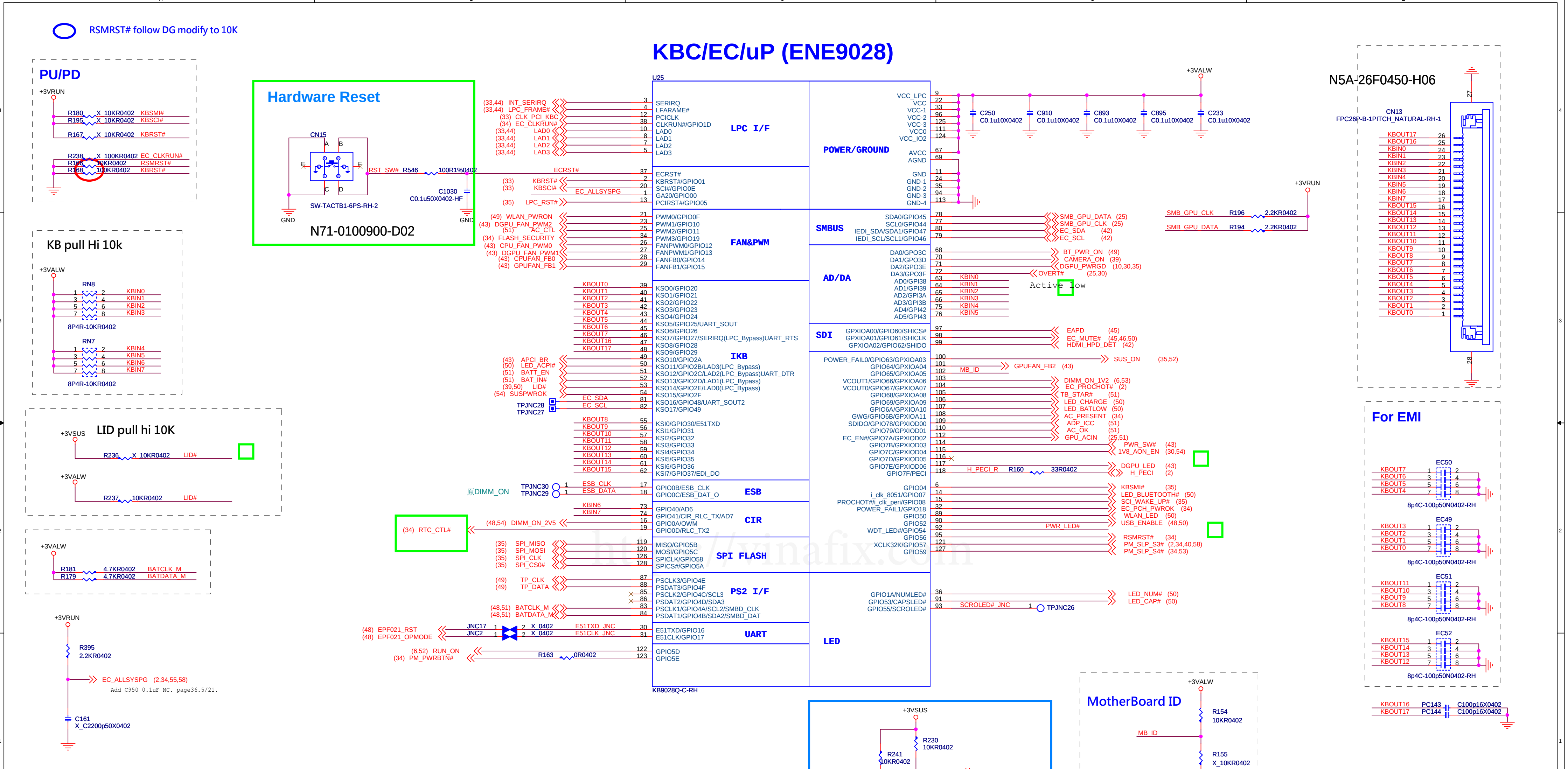


U19H
SPT-H_PCH
+1.0VSUS
2.899A
VCCPRIM_1P0-0
VCCPRIM_1P0-1
VCCPRIM_1P0-2
VCCPRIM_1P0-3
VCCPRIM_1P0-4
VCCPRIM_1P0-5
VCCPRIM_1P0-6
VCCPRIM_1P0-7
VCCPRIM_1P0-8
VCCPRIM_1P0-9
DCPDSW_1P0
C808 C1u6.3X50402-HF DCPDSW_1V
R446 80L6A-30_0805-RH VCCCLK
238mA
C869 C22u6.3X5-HF
C878 C0.1u10X0402
VCCCLK1
VCCCLK3
VCCCLK4
VCCCLK2
VCCCLK2
VCCCLK5
VCCCLK5
22UF電容 2顆 不上件
1UF電容 1顆 不上件
有用元件當電開關
+1.0VSUS_PHY
R439 80L6A-30_0805-RH
1.458A
C868 C22u6.3X5-HF
C866 C22u6.3X5-HF
VCCMPHY_1P0-0
VCCMPHY_1P0-1
VCCMPHY_1P0-2
VCCMPHY_1P0-3
VCCMPHY_1P0-4
VCCAMPHYPLL_1P0-0
VCCAMPHYPLL_1P0-1
VCCMIPIPLL_1P0-0
VCCMIPIPLL_1P0-1
VCCAPLLEBB_1P0
VCCPRIM_1P0-10
VCCUSB2PLL_1P0-0
VCCUSB2PLL_1P0-1
VCCHDAPLL_1P0
少1顆22UF電容
少1 顆1UF電容
多2 顆10UF電容
Modify C507,C488,C489 22uF and R169, R203 80L6A. page 35.5/25
22UF電容 2顆 不上件
45mA
60mA
+3VSUS
VCCHDA
VCCDSW_3P3-0
多1 顆1UF電容
C851 C1u6.3X50402-HF
C822 C1u6.3X50402-HF
1UF電容 1 顆 不上件
HM170-HF
CORE
VCCGPIO
MPHY
USB
VCCPRIM_1P0-11
VCCDSW_3P3-1
VCCPGPPA
195mA
491mA
VCCPGPPBCH-0
VCCPGPPBCH-1
VCCPGPPEF-0
VCCPGPPEF-1
VCCPGPPG
VCCPRIM_3P3-0
1UF電容 4 顆 不上件
+3VRUN
多1 顆0.1UF電容
C852 C1u6.3X50402-HF
C857 C0.1u10X0402
VCCPRIM_1P0-12
VCCATS
VCCRTCPRIM_3P3
VCCRTC
DCPRTC
7mA
1mA
VCC_RTCEXT
C824 C1u6.3X50402-HF
RTCVCC
C785 C0.1u10X0402
C784 C1u6.3X50402-HF
C793 C1u6.3X50402-HF
少1 顆0.1UF電容
VCCPRIM_1P0-13
VCCPRIM_1P0-14
VCCPRIM_1P0-15
VCCPRIM_1P0-16
VCCSPI-0
VCCSPI-1
VCCSPI-2
29mA
78mA
主機板留RUN的機會
VCCPGPPD-0
VCCPGPPD-1
VCCPGPPD-2
VCCPGPPD-3
VCCPRIM_3P3-1
VCCPRIM_3P3-2
VCCPRIM_3P3-3
117mA
C805 C1u6.3X50402-HF
C795 C1u6.3X50402-HF
多2 顆1UF電容
+1.0VSUS
C863 C0.1u10X0402
C854 C0.1u10X0402
C842 C0.1u10X0402
C837 C0.1u10X0402
Add C494,C524,C627,C628 0.1uF for +1.0VSUS . 7/14.
U19I
SPT-H_PCH
VSS-0 … VSS-147
HM170-HF
U19L
SPT-H_PCH
VSS-164 … VSS-299
HM170-HF



MICRO-STAR INT'L CO.,LTD.

Title: KBC/EC/up (ENE3930)

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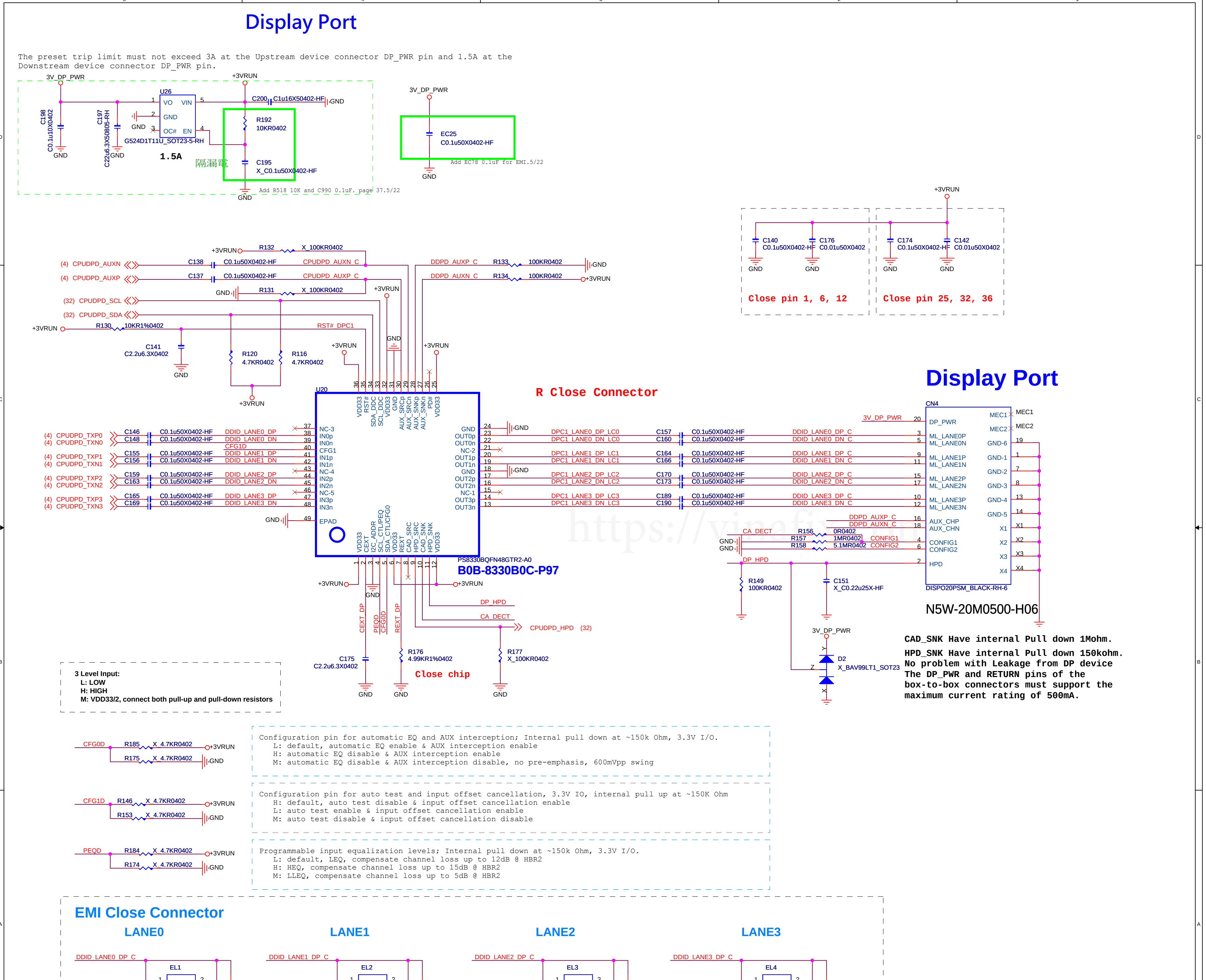

MICRO-STAR INT'L CO.,LTD.

Title	DP	
Size: Custom	Document Number: MS-16K21	Rev: 0B
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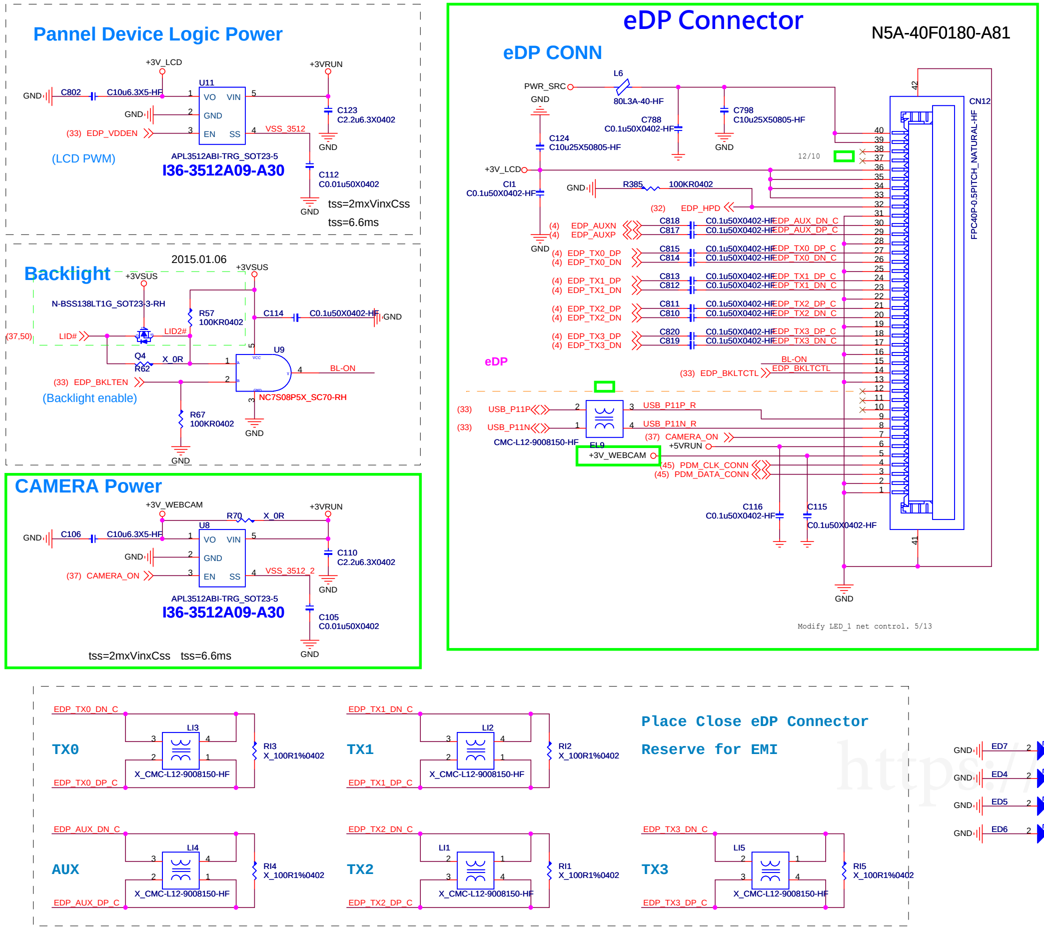

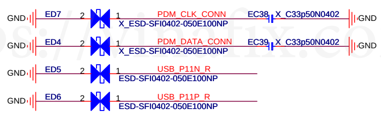

LCD Module Pin Define FOR FULL HD PANEL

Pin No	Symbol	Description
1	Vcom SDA	Vcom IIC SDA
2	H_GND	High Speed Ground
3	LAN1_N	Complement Signal-Lane 1
4	LAN1_P	True Signal-Main Lane 1
5	H_GND	High Speed Ground
6	LAN0_N	Complement Signal-Lane 0
7	LAN0_P	True Signal-Main Lane 0
8	H_GND	High Speed Ground
9	AUX+	True Signal-Auxiliary Channel
10	AUX-	Complement Signal-Auxiliary Channel
11	H_GND	High Speed Ground
12	LCD_VCC	Power Supply +3.3 V (typical)
13	LCD_VCC	Power Supply +3.3 V (typical)
14	NC	No Connection (Reserved for CMI test)
15	H_GND	Ground
16	H_GND	Ground
17	HPD	Hot Plug Detect
18	BL_GND	BL Ground
19	BL_GND	BL Ground
20	BL_GND	BL Ground
21	BL_GND	BL Ground
22	BL_EN	BL_Enable Signal of LED Converter
23	BL_PWM	PWM Dimming Control Signal of LED Converter
24	Vcom SCL	Vcom IIC SCL
25	NC	No Connection (Reserved)
26	LED_VCCS	BL Power
27	LED_VCCS	BL Power
28	LED_VCCS	BL Power
29	LED_VCCS	BL Power
30	NC	No Connection (Reserved)

LCD Module Pin Define FOR WQHD PANEL

Pin No	Symbol	Description
1	NC	Reserved for LCD manufacturereer's use
2	H_GND	High Speed Ground
3	Lane3_N	Complement Signal Link Lane 3
4	Lane3_P	True Signal Link Lane 3
5	H_GND	High Speed Ground
6	Lane2_N	Complement Signal Link Lane 2
7	Lane2_P	True Signal Link Lane 2
8	H_GND	High Speed Ground
9	Lane1_N	Complement Signal Link Lane 1
10	Lane1_P	True Signal Link Lane 1
11	H_GND	High Speed Ground
12	Lane0_N	Complement Signal Link Lane 0
13	Lane0_P	True Signal Link Lane 0
14	H_GND	High Speed Ground
15	AUX_CH_P	True Signal Auxiliary Channel
16	AUX_CH_N	Complement Signal Auxiliary Channe
17	H_GND	High Speed Ground
18	VDD	LCD logic and driver power(3.3V)
19	VDD	LCD logic and driver power(3.3V)
20	VDD	LCD logic and driver power(3.3V)
21	VDD	LCD logic and driver power(3.3V)
22	BIST	BIST patterns selection L : Disable [default] , H : Enable
23	LCD_GND	LCD logic and driver ground
24	LCD_GND	LCD logic and driver ground
25	LCD_GND	LCD logic and driver ground
26	LCD_GND	LCD logic and driver ground
27	HPD	HPD signal pin
28	BL_GND	Backlight ground
29	BL_GND	Backlight ground
30	BL_GND	Backlight ground
31	BL_GND	Backlight ground
32	BL_ENABLE	Backlight On/Off
33	BL_PWM_DIM	System PWM
34	NC	Reserved for LCD manufacturer's use
35	NC	Reserved for LCD manufacturer's use
36	VBL	Backlight power
37	VBL	Backlight power
38	VBL	Backlight power
39	VBL	Backlight power
40	NC	No Connection (Reserved)

LCD Module Pin Define FOR QHD+ PANEL

Pin No	Symbol	Description
1	NC	Reserved for LCD manufacturer's use
2	H_GND	High Speed Ground
3	Lane3_N	Complement Signal Link Lane 3
4	Lane3_P	True Signal Link Lane 3
5	H_GND	High Speed Ground
6	Lane2_N	Complement Signal Link Lane 2
7	Lane2_P	True Signal Link Lane 2
8	H_GND	High Speed Ground
9	Lane1_N	Complement Signal Link Lane 1
10	Lane1_P	True Signal Link Lane 1
11	H_GND	High Speed Ground
12	Lane0_N	Complement Signal Link Lane 0
13	Lane0_P	True Signal Link Lane 0
14	H_GND	High Speed Ground
15	AUX_CH_P	True Signal Auxiliary Channel
16	AUX_CH_N	Complement Signal Auxiliary Channe
17	H_GND	High Speed Ground
18	NC	Reserved for LCD manufacturer's use
19	NC	Reserved for LCD manufacturer's use
20	VDD	LCD logic and driver power(3.3V)
21	VDD	LCD logic and driver power(3.3V)
22	VDD	LCD logic and driver power(3.3V)
23	VDD	LCD logic and driver power(3.3V)
24	VDD	LCD logic and driver power(3.3V)
25	NC	Reserved for LCD manufacturer's use
26	LCD_GND	LCD logic and driver ground
27	LCD_GND	LCD logic and driver ground
28	LCD_GND	LCD logic and driver ground
29	LCD_GND	LCD logic and driver ground
30	LCD_GND	LCD logic and driver ground
31	HPD	Backlight ground
32	NC	Reserved for LCD manufacturer's use
33	PWM_OUT	PWM_OUT
34	PWM_IN	PWM_IN
35	NC	Reserved for LCD manufacturer's use
36	NC	Reserved for LCD manufacturer's use
37	NC	Reserved for LCD manufacturer's use
38	VBL	LED Anode
39	VBL	LED Anode
40	NC	Reserved for LCD manufacturer's use
41	LED_C1	LED Cathode 1
42	LED_C2	LED Cathode 2
43	LED_C3	LED Cathode 3
44	LED_C4	LED Cathode 4
45	LED_C5	LED Cathode 5
46	LED_C6	LED Cathode 6
47	LED_C7	LED Cathode 7
48	LED_C8	LED Cathode 8
49	NC	Reserved for LCD manufacturer's use
50	NC	Reserved for LCD manufacturer's use

MICRO-STAR INT'L CO.,LTD.

Title: eDP Connector/Camera

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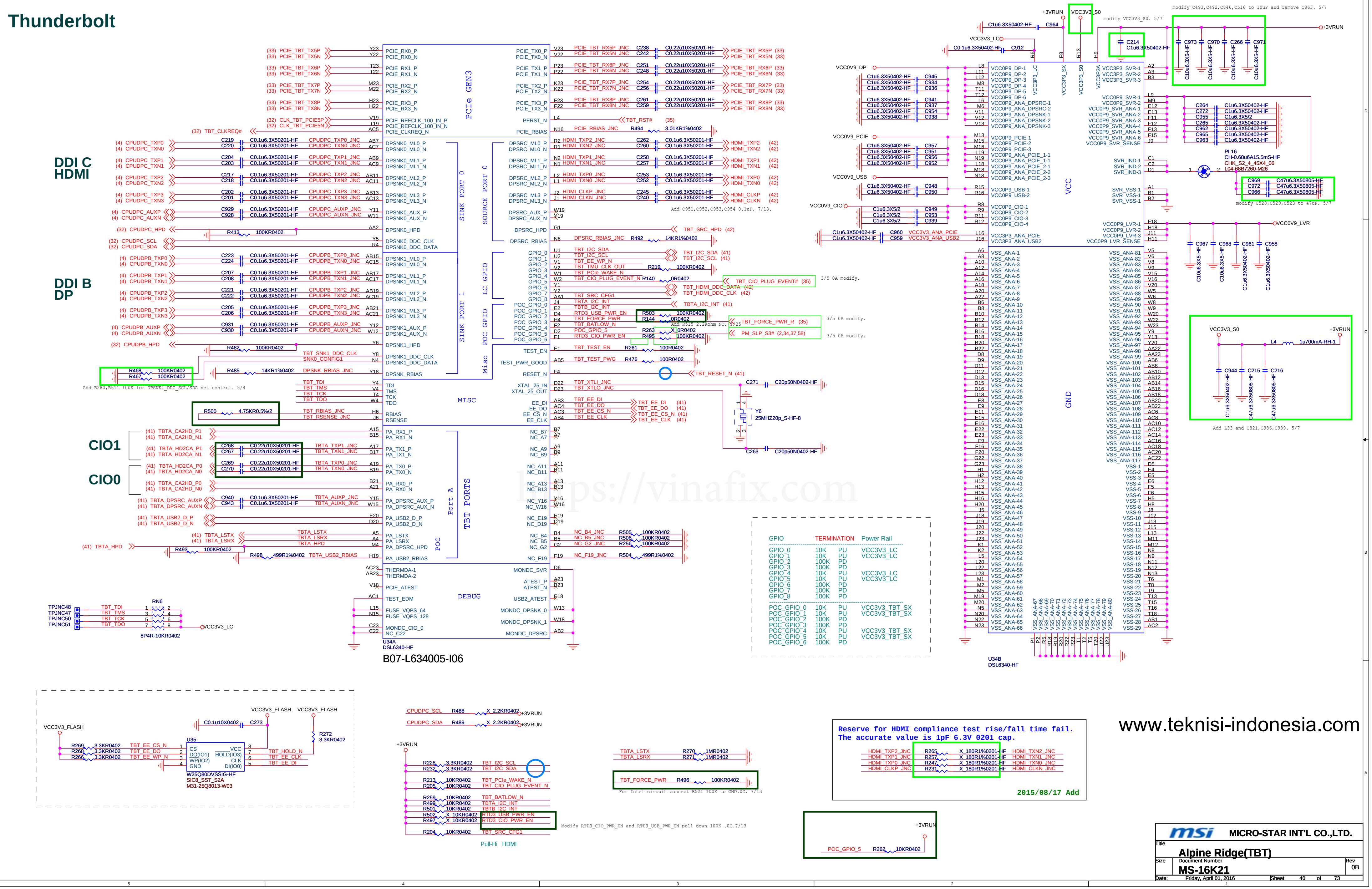
Thunderbolt



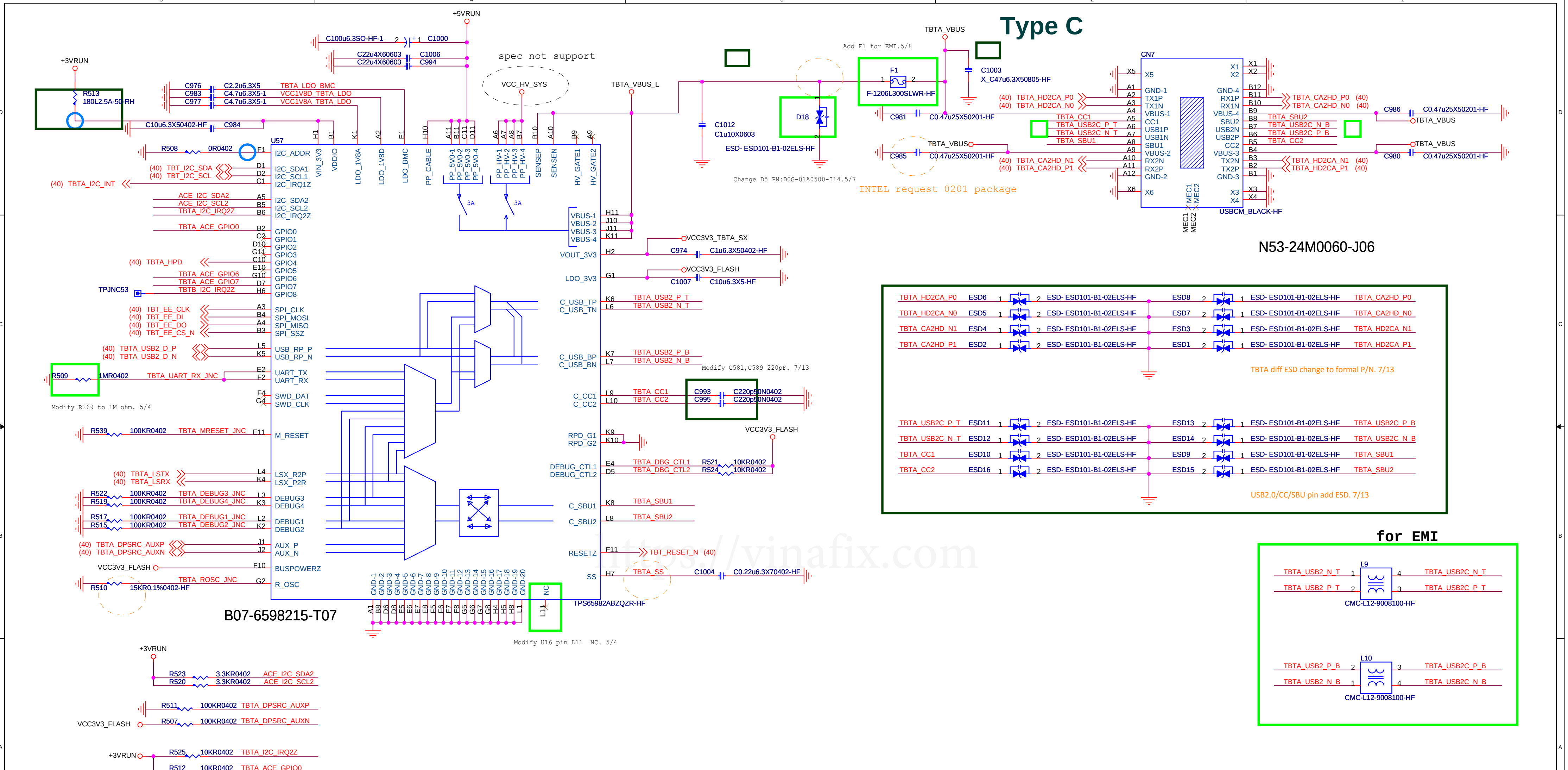
GPIO	TERMINATION		Power Rail
GPIO_0	10K	PU	VCC3V3_LC
GPIO_1	10K	PU	VCC3V3_LC
GPIO_2	100K	PD	
GPIO_3	100K	PD	
GPIO_4	10K	PU	VCC3V3_LC
GPIO_5	10K	PU	VCC3V3_LC
GPIO_6	100K	PD	
GPIO_7	100K	PD	
GPIO_8	100K	PD	
POC_GPIO_0	10K	PU	VCC3V3_TBT_SX
POC_GPIO_1	10K	PU	VCC3V3_TBT_SX
POC_GPIO_2	100K	PD	
POC_GPIO_3	100K	PD	
POC_GPIO_4	10K	PU	VCC3V3_TBT_SX
POC_GPIO_5	10K	PU	VCC3V3_TBT_SX
POC_GPIO_6	100K	PD	

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

Title: Alpine Ridge(TBT)

Size | Document Number: MS-16K21 | Rev 0B

Date: Friday, April 01, 2016 | Sheet 40 of 73



MICRO-STAR INT'L CO.,LTD.

Title: Apline Ridge

Size	Document Number	Rev
Custom	MS-16K21	0B

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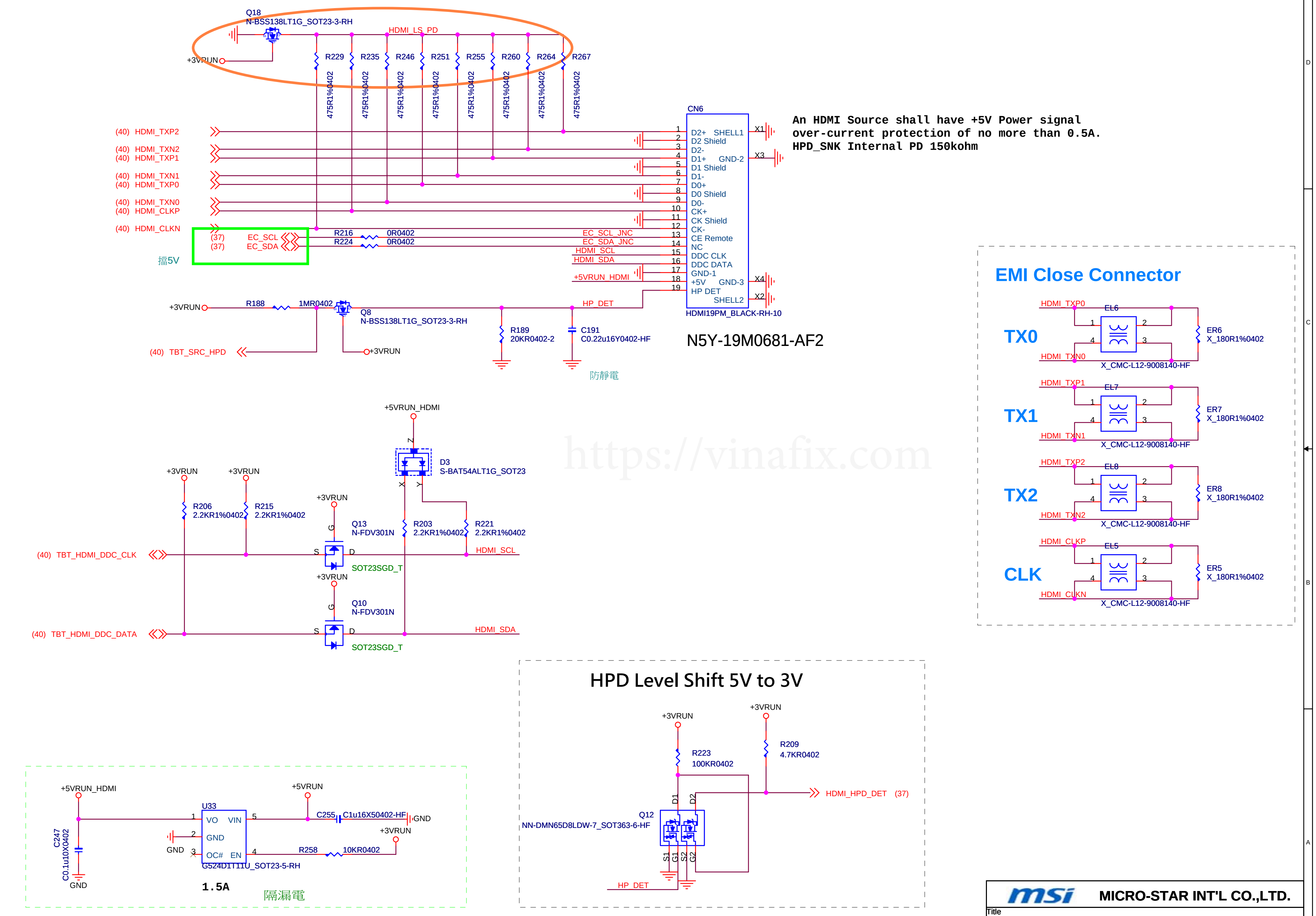
HDMI connector



MICRO-STAR INT'L CO.,LTD.

Title	HDMI
Size: Custom	Document Number: MS-16K21
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Date:	Friday, April 01, 2016
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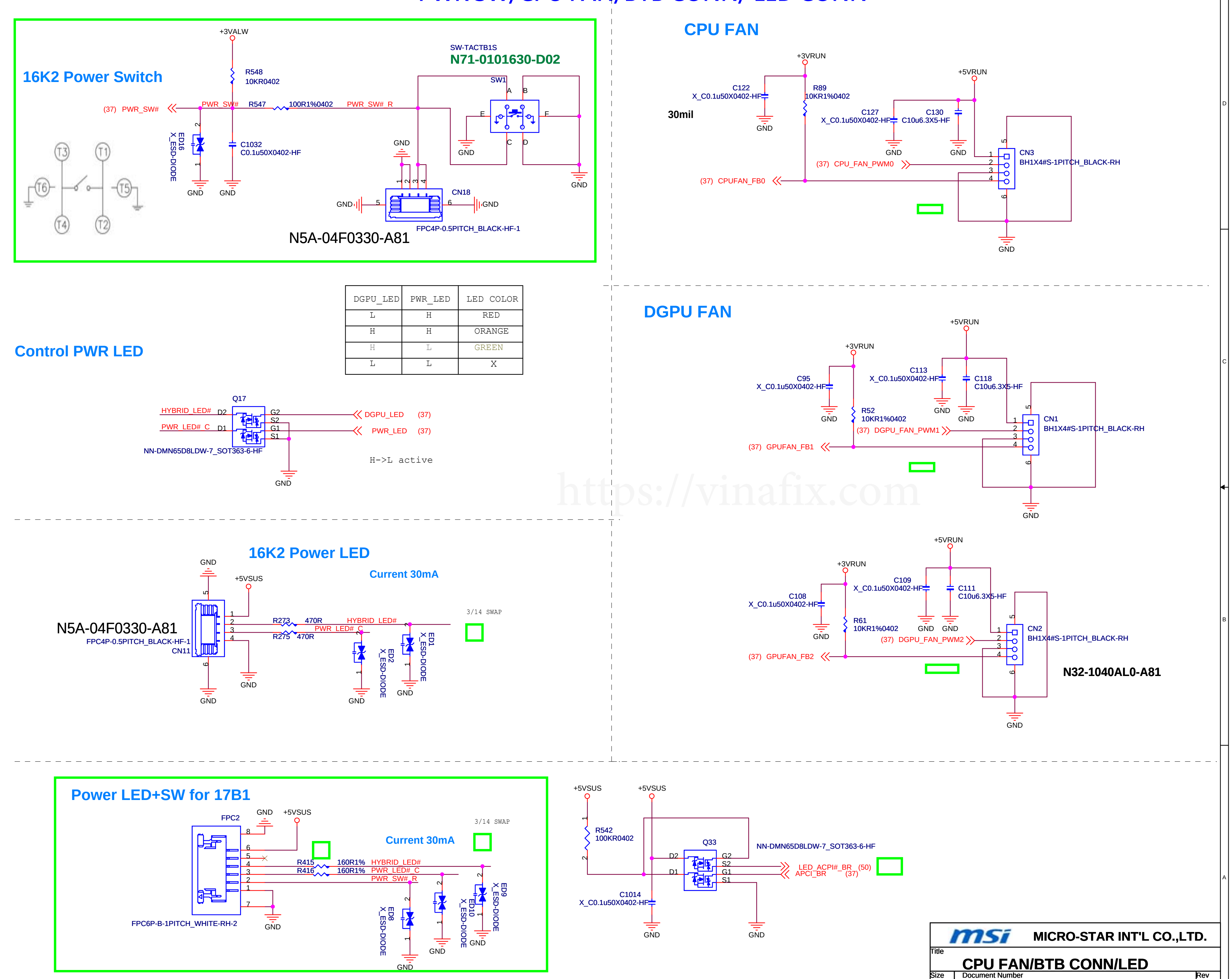
PWR SW/CPU FAN/BTB CONN/ LED CONN



DGPU_LED	PWR_LED	LED COLOR
L	H	RED
H	H	ORANGE
H	L	GREEN
L	L	X

MICRO-STAR INT'L CO.,LTD.

Title: CPU FAN/BTB CONN/LED

Size: Custom | Document Number: MS-16K21 | Rev: 0B

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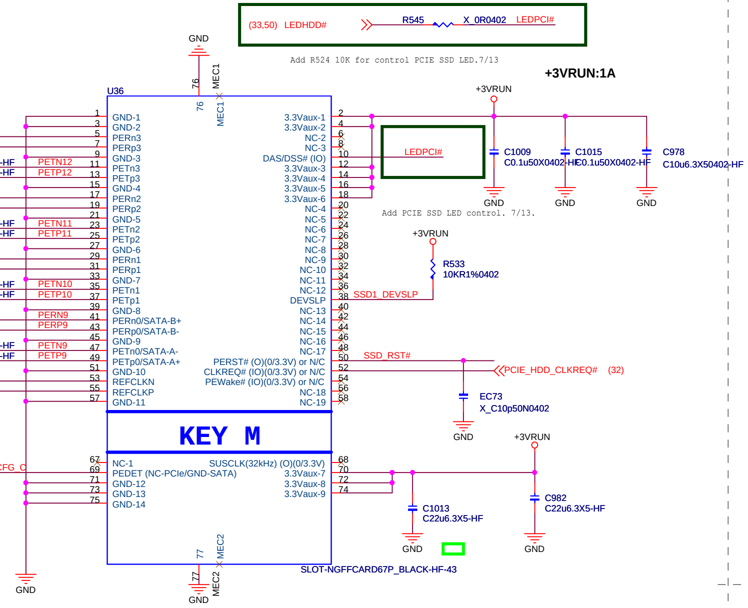
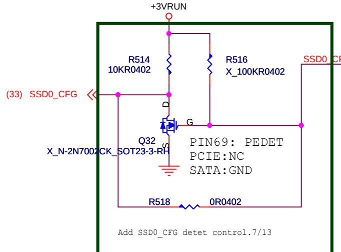
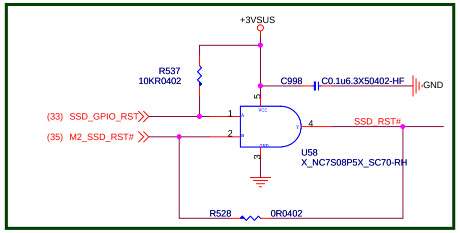
M2 SSD



N15-0670530-L41

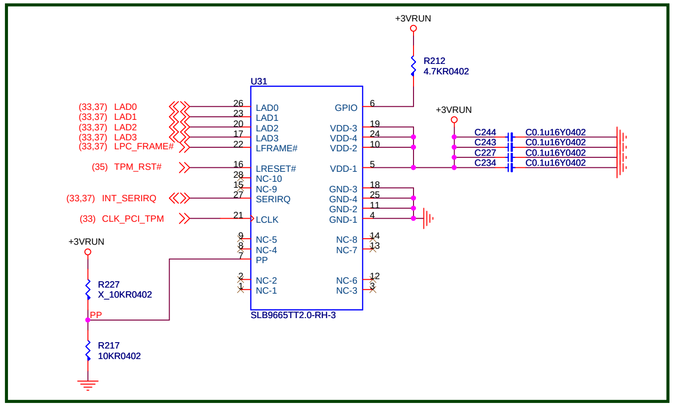


PCIEx4 /SATA SSD3



40	NC	No Connect
41	SATA-B+/PERn0	Host receiver differential signal pair
42	NC	No Connect
43	SATA-B-/PERp0	Host receiver differential signal pair
44	NC	No Connect
45	GND	Ground
46	NC	No Connect
47	SATA-A-/PETn0	Host Transmitter differential signal pair
48	NC	No Connect
49	SATA-A+/PETp0	Host transmitter differential signal pair

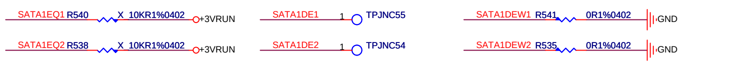
TPM



Physical Presence(PP)
The standard position of the jumper should connect the pin to GND. If the pin is connect to VDD, some special commands are enabled .

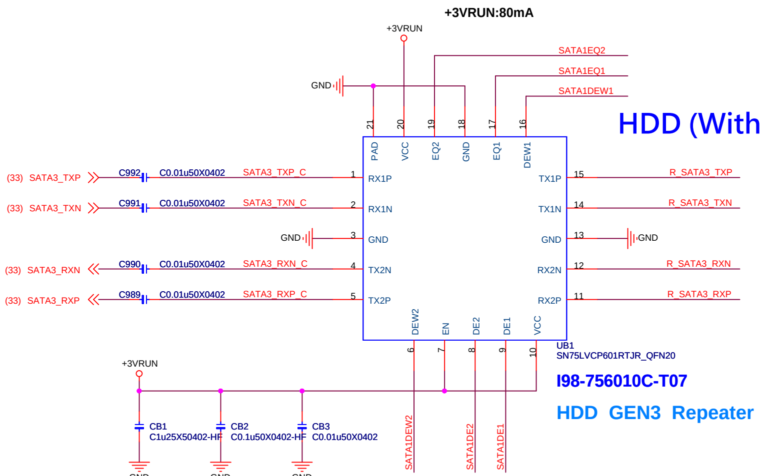
DE1/DE2	CH1/CH2De-Emphasis dB (at 6Gbps)	EQ1/EQ2	CH1/CH2Equalization dB (at 6Gbps)
NC (*default*)	–4	NC (*default*)	0
0	0	0	7
1	–2	1	14

DEW1/DEW2	Device Function → DE Width for CH1/CH2
0	De-emphasis pulse duration, short (recommended setting when link operates at SATA 1.5/3/6 Gbps)
1 (*default*)	De-emphasis pulse duration, long (recommended setting when link operates at SATA 1.5/3 Gbps speed only)



TI SN75LVCP601RTJR HW Setting

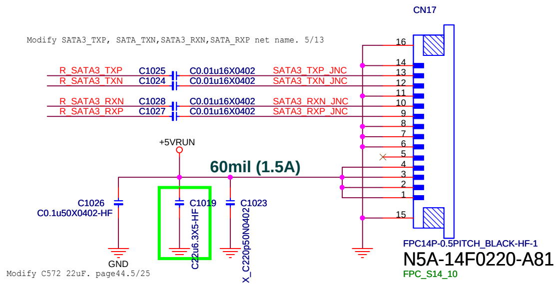
HDD2



HDD (With Repeater)

I98-756010C-T07

HDD GEN3 Repeater



N5A-14F0220-A81

(Must used the gold fresh type)

MICRO-STAR INT'L CO.,LTD.

Title	M2 SSD/HDD/TPM	
Size: Custom	Document Number: MS-16K21	Rev: 0B
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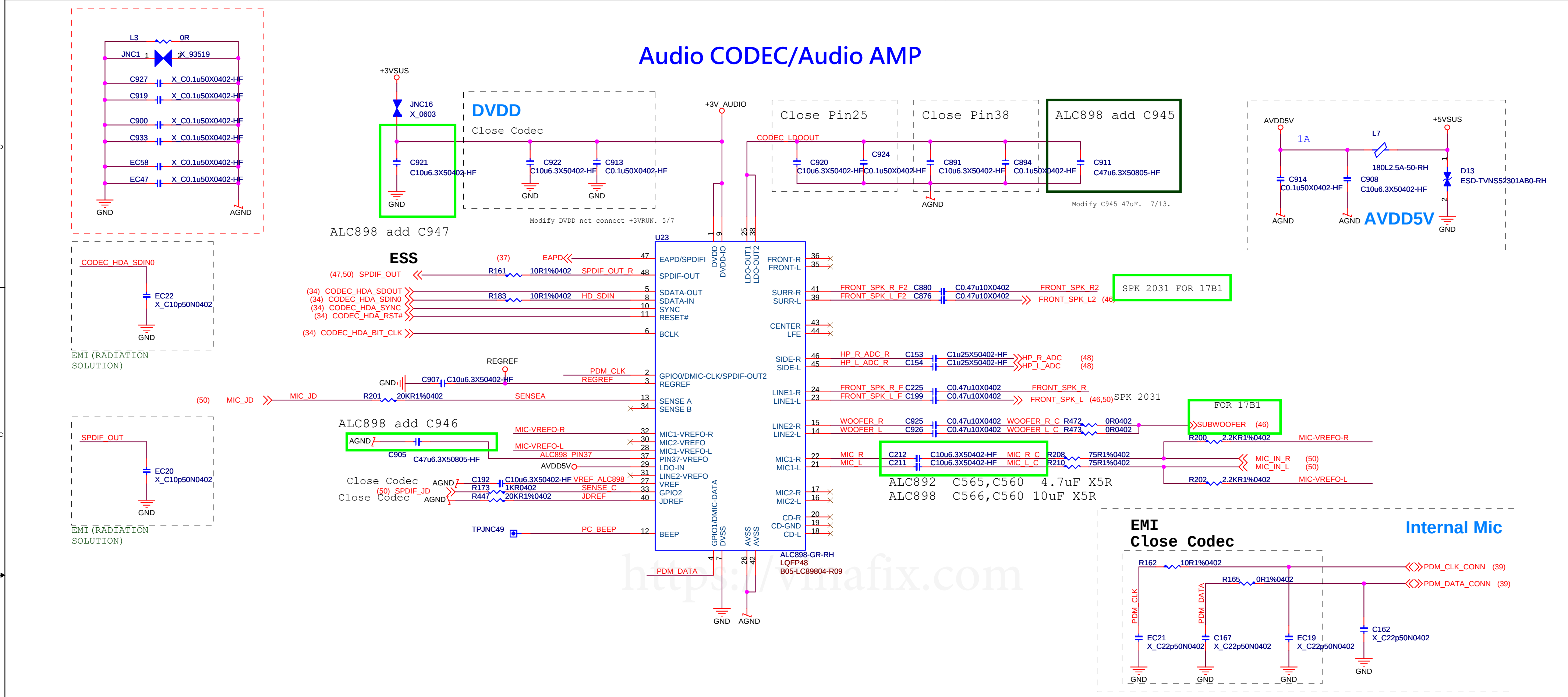
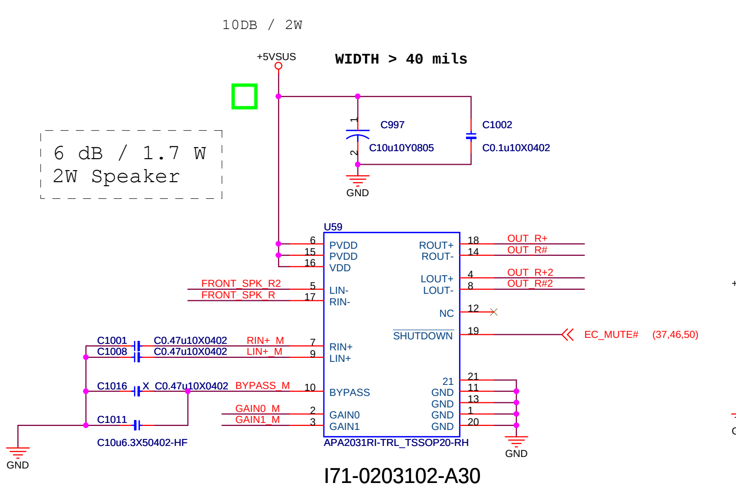
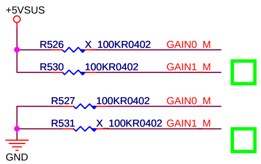
Audio CODEC/Audio AMP

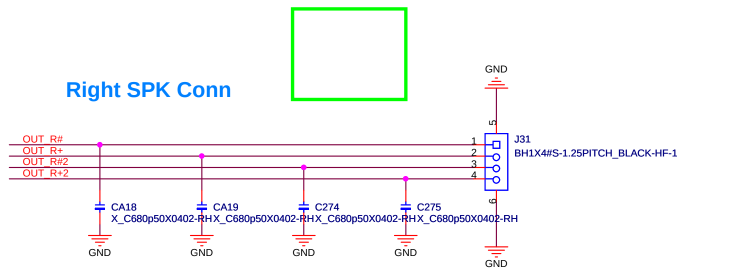




For APA2031

Av	GAIN0	GAIN1
6dB	0	0
10dB	0	1
15.6dB	1	0
21.6dB	1	1
4.3dB	X	X





MICRO-STAR INT'L CO.,LTD.

Title: AUDIO CODEC/AMP/MIC

Size	Document Number	Rev
Custom	MS-16K21	0B

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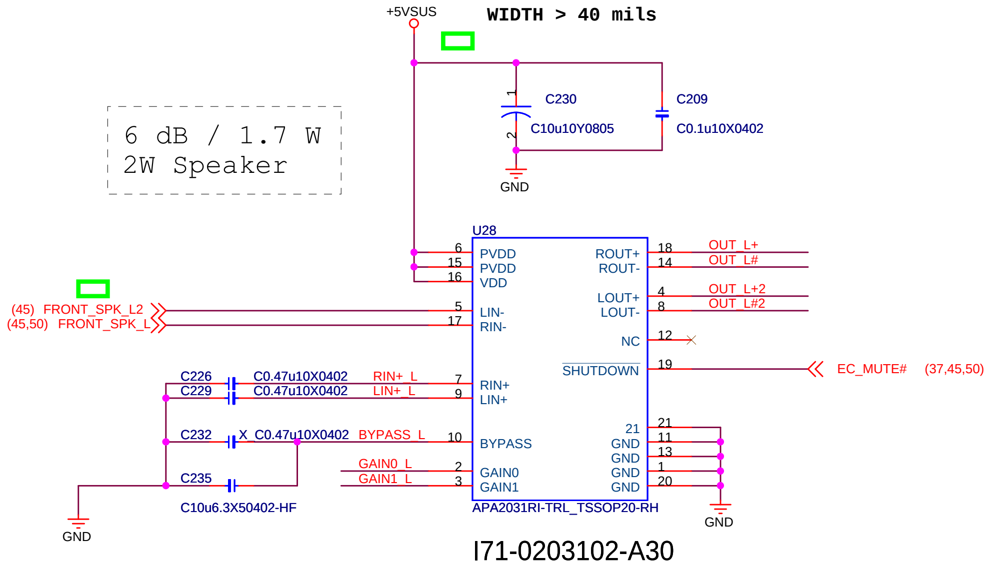
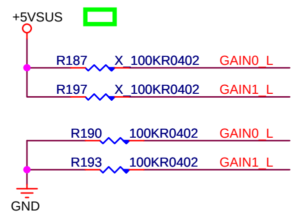
SPK LEFT /Woffer FOR 17B1

10DB / 2W

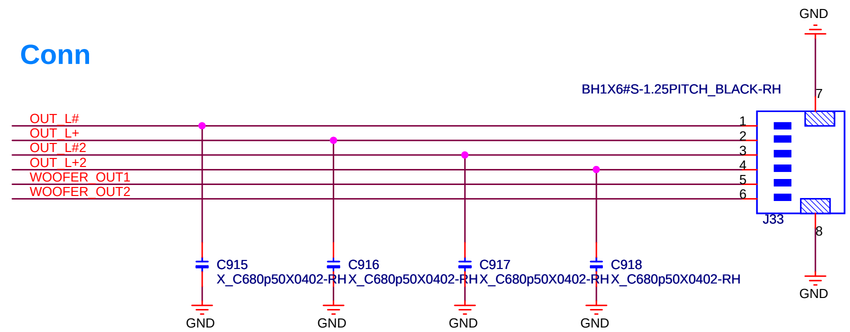


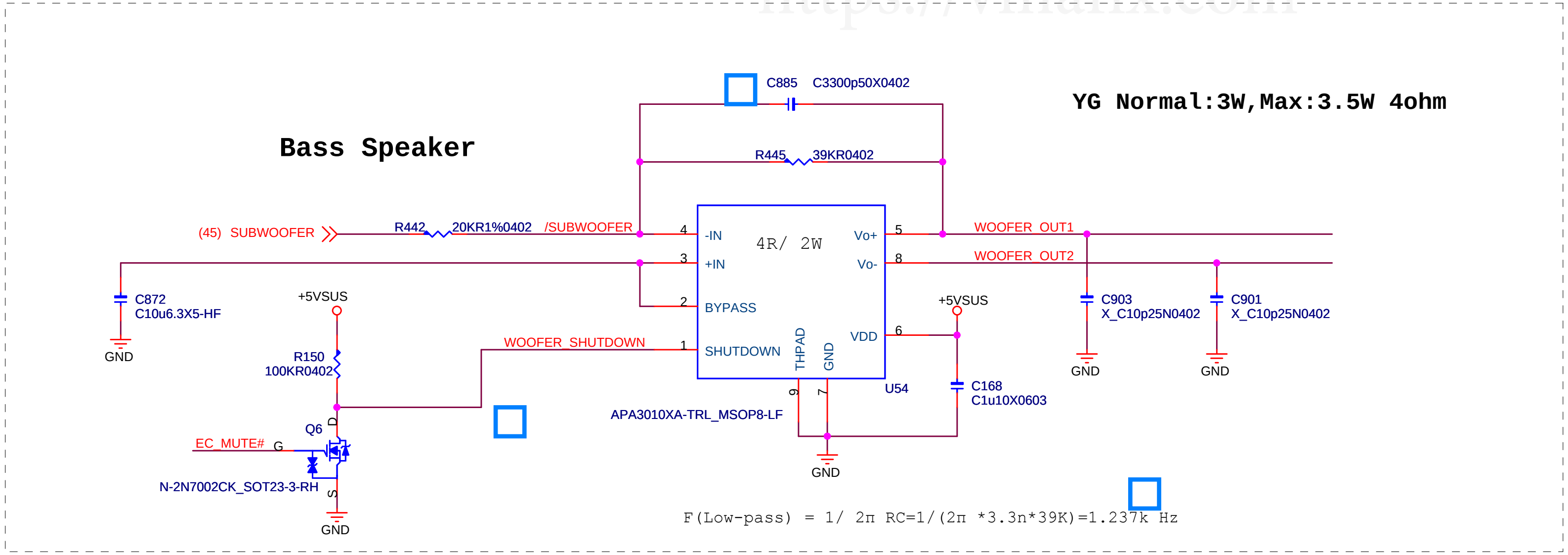


For APA2031

Av	GAIN0	GAIN1
6dB	0	0
10dB	0	1
15.6dB	1	0
21.6dB	1	1
4.3dB	X	X

Conn





MICRO-STAR INT'L CO.,LTD.

Title: SPK LEFT/WOOFER

Size: B | Document Number: MS-16K21 | Rev: 0B

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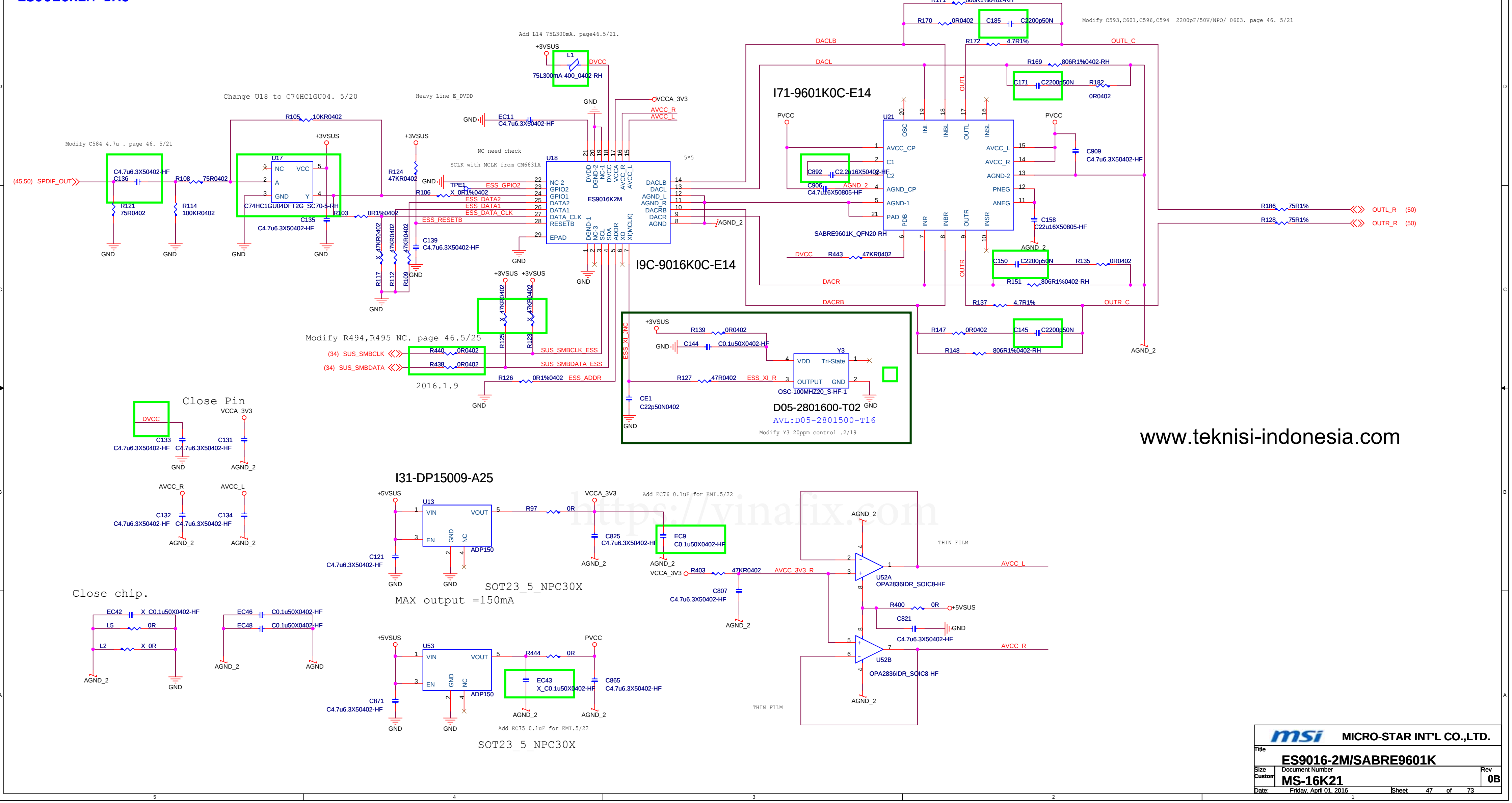
ES9016K2M DAC



MICRO-STAR INT'L CO.,LTD.

Title: ES9016-2M/SABRE9601K

Size: Custom | Document Number: MS-16K21 | Rev: 0B

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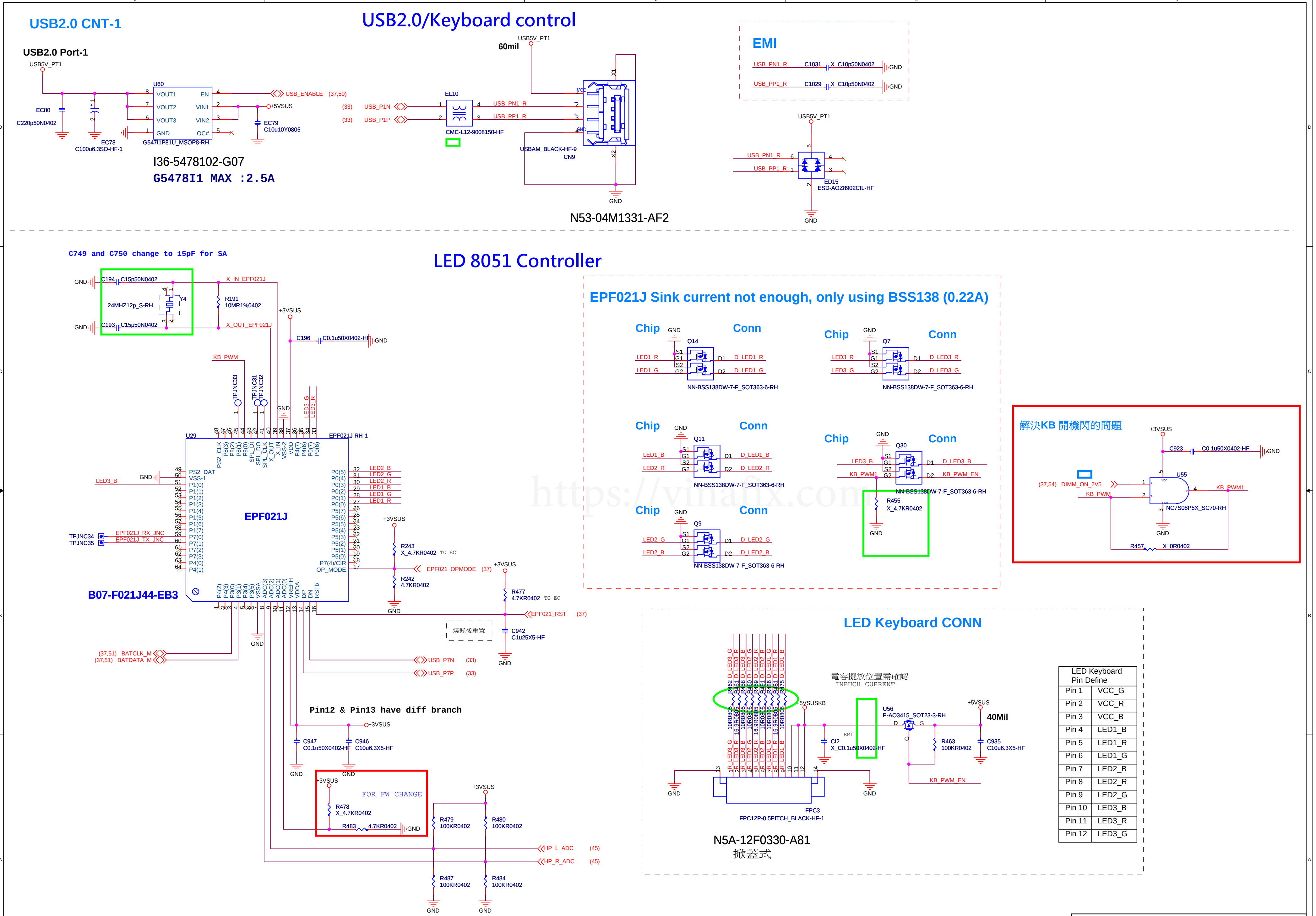

LED Keyboard Pin Define	
Pin 1	VCC_G
Pin 2	VCC_R
Pin 3	VCC_B
Pin 4	LED1_B
Pin 5	LED1_R
Pin 6	LED1_G
Pin 7	LED2_B
Pin 8	LED2_R
Pin 9	LED2_G
Pin 10	LED3_B
Pin 11	LED3_R
Pin 12	LED3_G

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

Title: USB 3.0 connector

Size: C | Document Number: MS-16K21 | Rev: 0B

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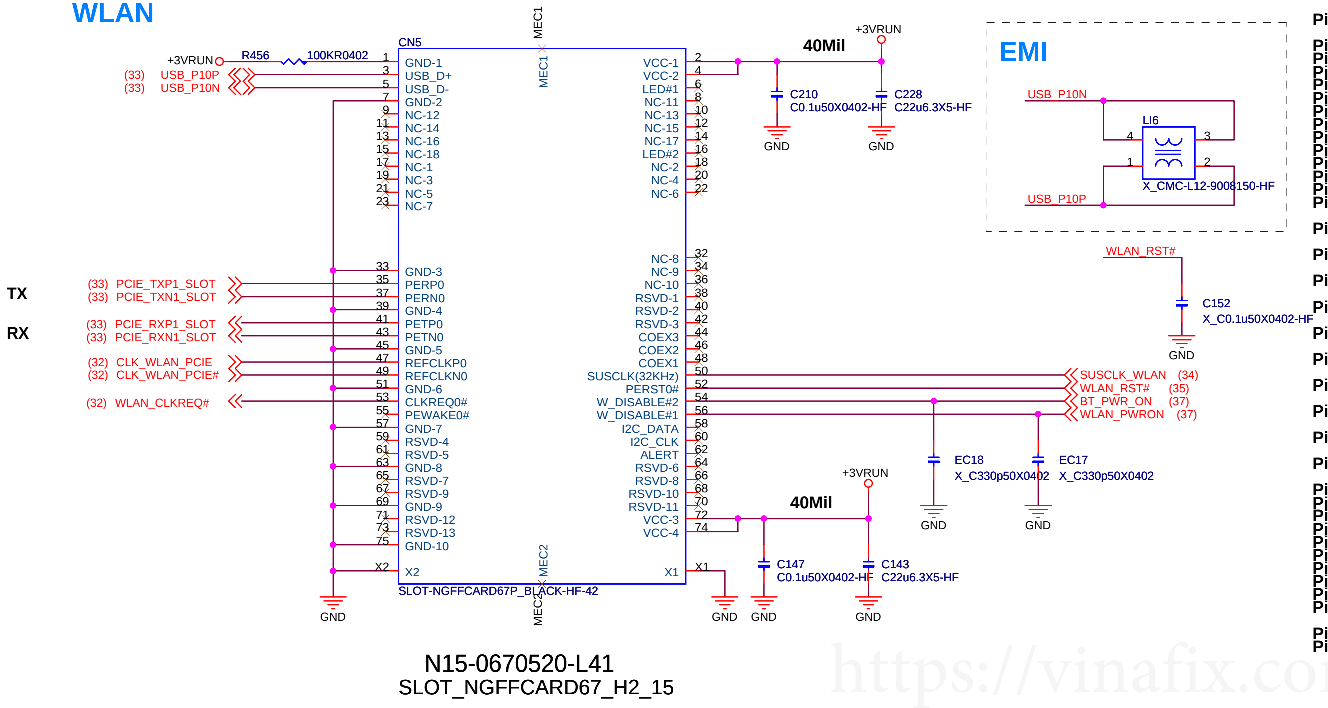
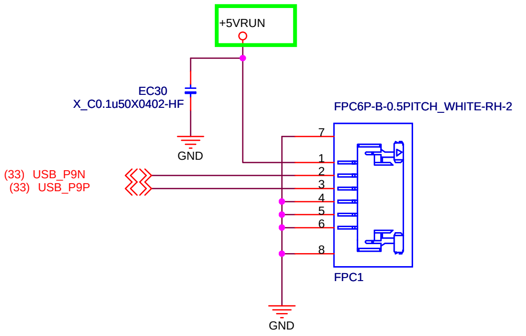
WLAN /ClickPad/FP

WLAN

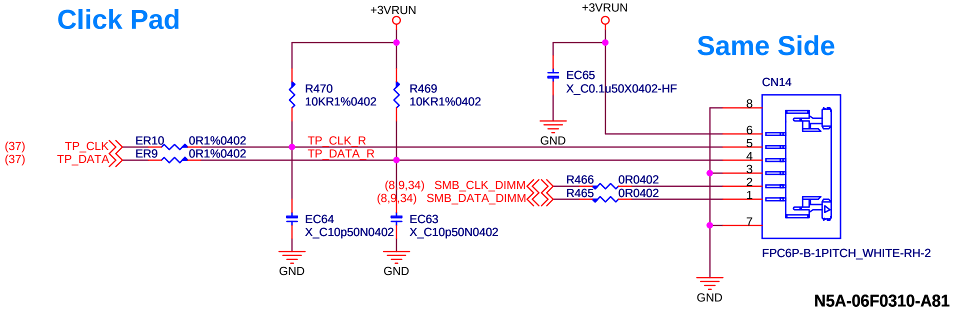


Pin 1	GND		
Pin 3	USB_D+	Pin 2	3.3V
Pin 5	USB_D-	Pin 4	3.3V
Pin 7	GND	Pin 6	LED1#
Pin 9	Module Key	Pin 8	Module Key
Pin 11	Module Key	Pin 10	Module Key
Pin 13	Module Key	Pin 12	Module Key
Pin 15	Module Key	Pin 14	Module Key
Pin 17	N/C	Pin 16	LED2#
Pin 19	N/C	Pin 18	GND
Pin 21	N/C	Pin 20	N/C
Pin 23	N/C	Pin 22	N/C
Pin 25	Module Key	Pin 24	Module Key
Pin 27	Module Key	Pin 26	Module Key
Pin 29	Module Key	Pin 28	Module Key
Pin 31	Module Key	Pin 30	Module Key
Pin 33	GND	Pin 32	N/C
Pin 35	PERP0	Pin 34	N/C
Pin 37	PERN0	Pin 36	N/C
Pin 39	GND	Pin 38	Clink Reset (I 3.3V)
Pin 41	PETP0	Pin 40	N/C
Pin 43	PETN0	Pin 42	N/C
Pin 45	GND	Pin 44	N/C
Pin 47	REFCLKP0	Pin 46	N/C
Pin 49	REFCLKN0	Pin 48	N/C
Pin 51	GND	Pin 50	N/C (SUSCLK (32kHz) for DSx)
Pin 53	CLKREQ0#	Pin 52	PERST0#
Pin 55	PEWAKE0#	Pin 54	BT_EN (W_DISABLE2#)
Pin 57	GND	Pin 56	WLAN_EN (W_DISABLE2#)
Pin 59	N/C	Pin 58	N/C
Pin 61	N/C	Pin 60	N/C
Pin 63	GND	Pin 62	N/C
Pin 65	N/C	Pin 64	Resever
Pin 67	N/C	Pin 66	N/C
Pin 69	GND	Pin 68	N/C
Pin 71	N/C	Pin 70	N/C
Pin 73	N/C	Pin 72	3.3V
Pin 75	GND	Pin 74	3.3V

Finger Print



Click Pad



N5A-06F0310-A81

R473 , R479 0ohm on part for TP SMBus function. 7/15

MICRO-STAR INT'L CO.,LTD.

Title	WLAN /ClickPad/FP
Size	Custom
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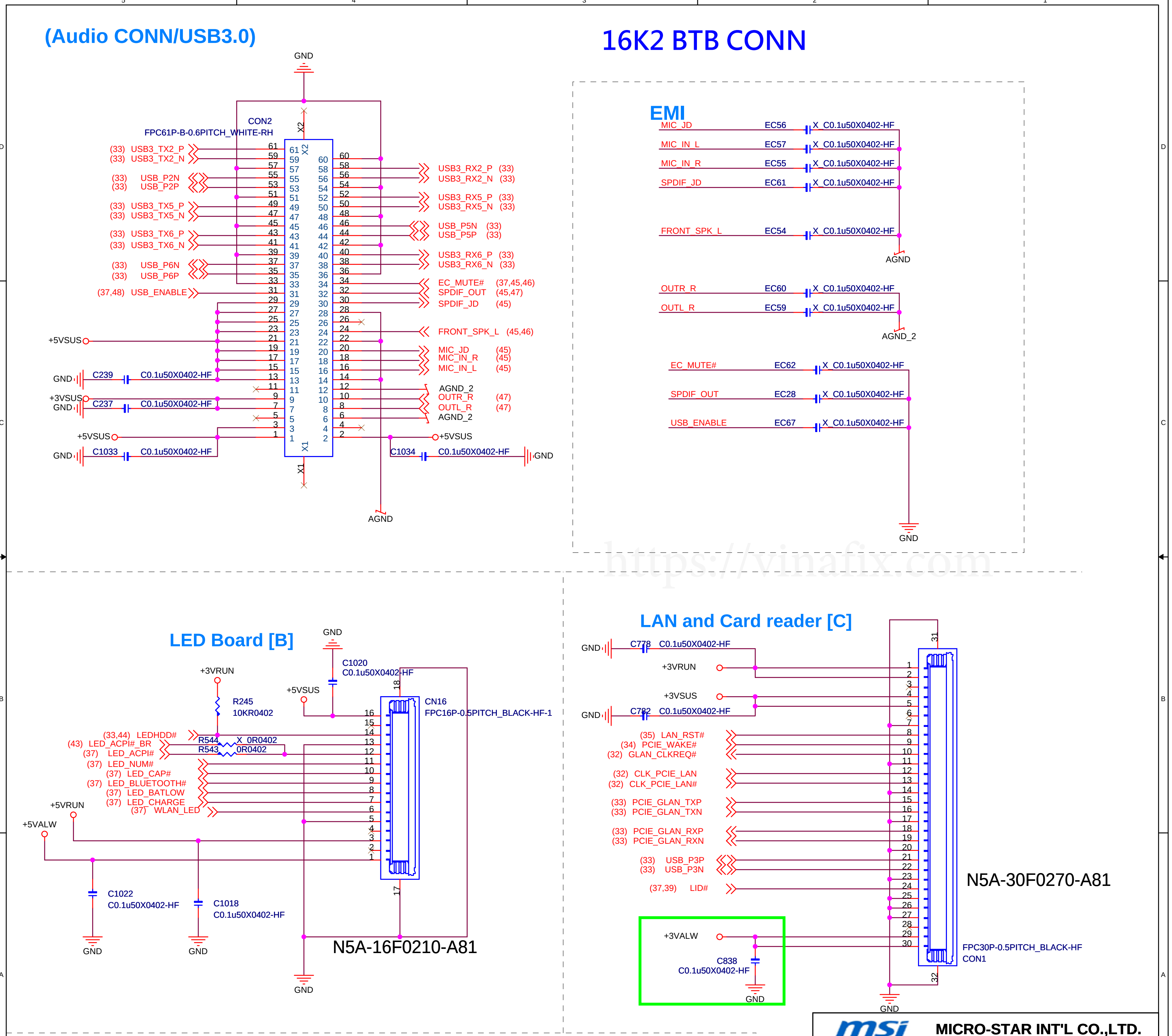

MICRO-STAR INT'L CO.,LTD.

Title: **CPU FAN/BTB CONN**

Size	Document Number	Rev
Custom	MS-16K21	0B

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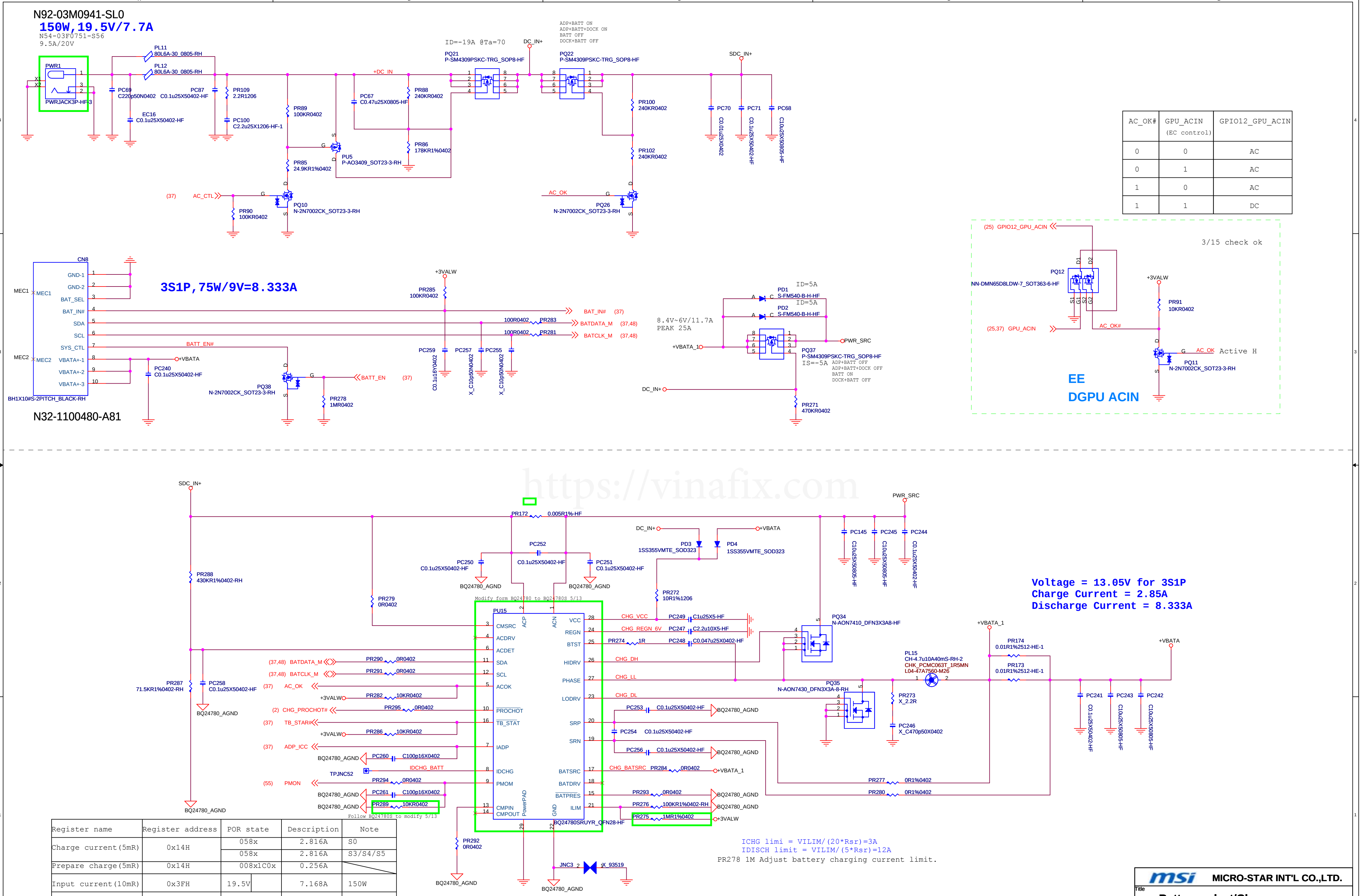

AC_OK#	GPU_ACIN (EC control)	GPIO12_GPU_ACIN
0	0	AC
0	1	AC
1	0	AC
1	1	DC

Register name	Register address	POR state		Description	Note
Charge current(5mR)	0x14H	058x		2.816A	S0
		058x		2.816A	S3/S4/S5
Prepare charge(5mR)	0x14H	008x1C0x		0.256A	
Input current(10mR)	0x3FH	19.5V		7.168A	150W
Charge voltage	0x15H	330x		13.056V	3S1P
Discharge current(5mR)	0x39H	06xx		3.072A	BOOST current

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

Title: Battery select/Charger

Size: Custom | Document Number: MS-16K21 | Rev: 0B

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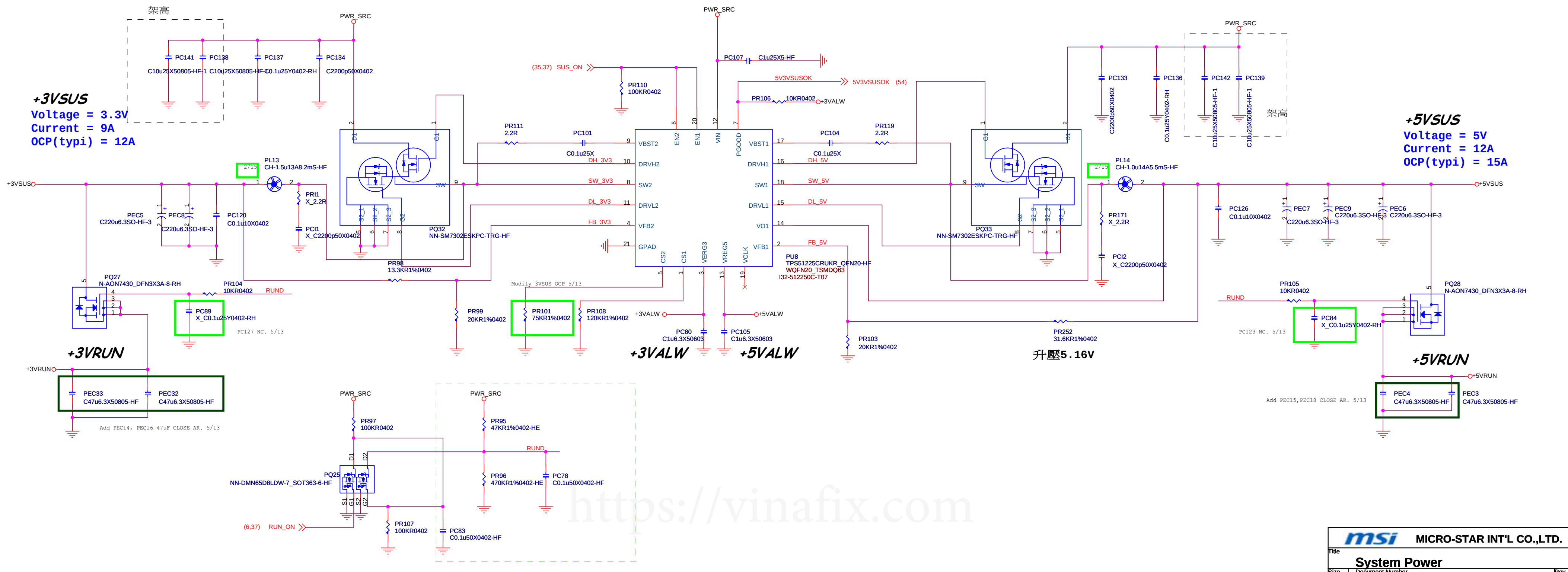
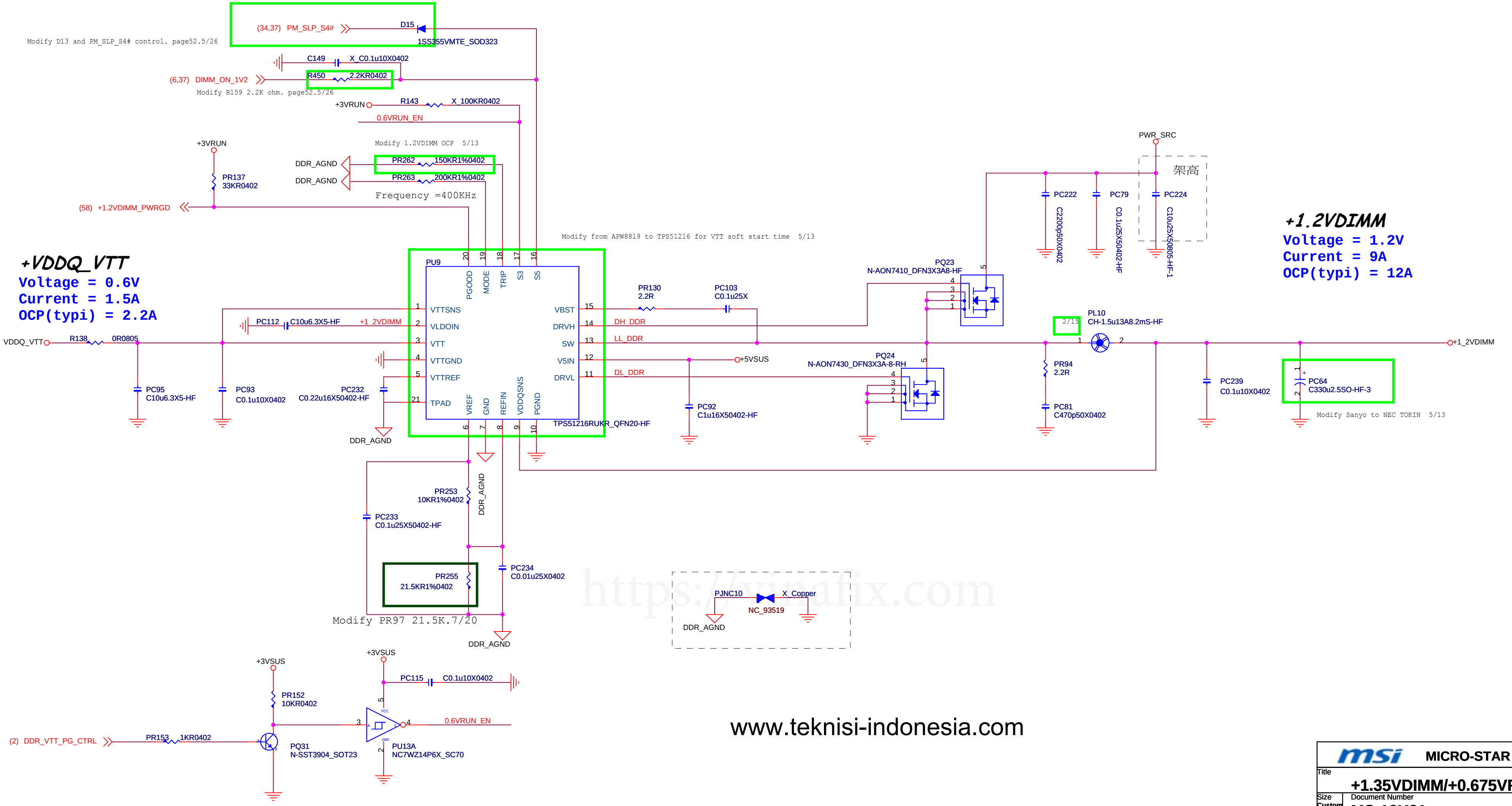
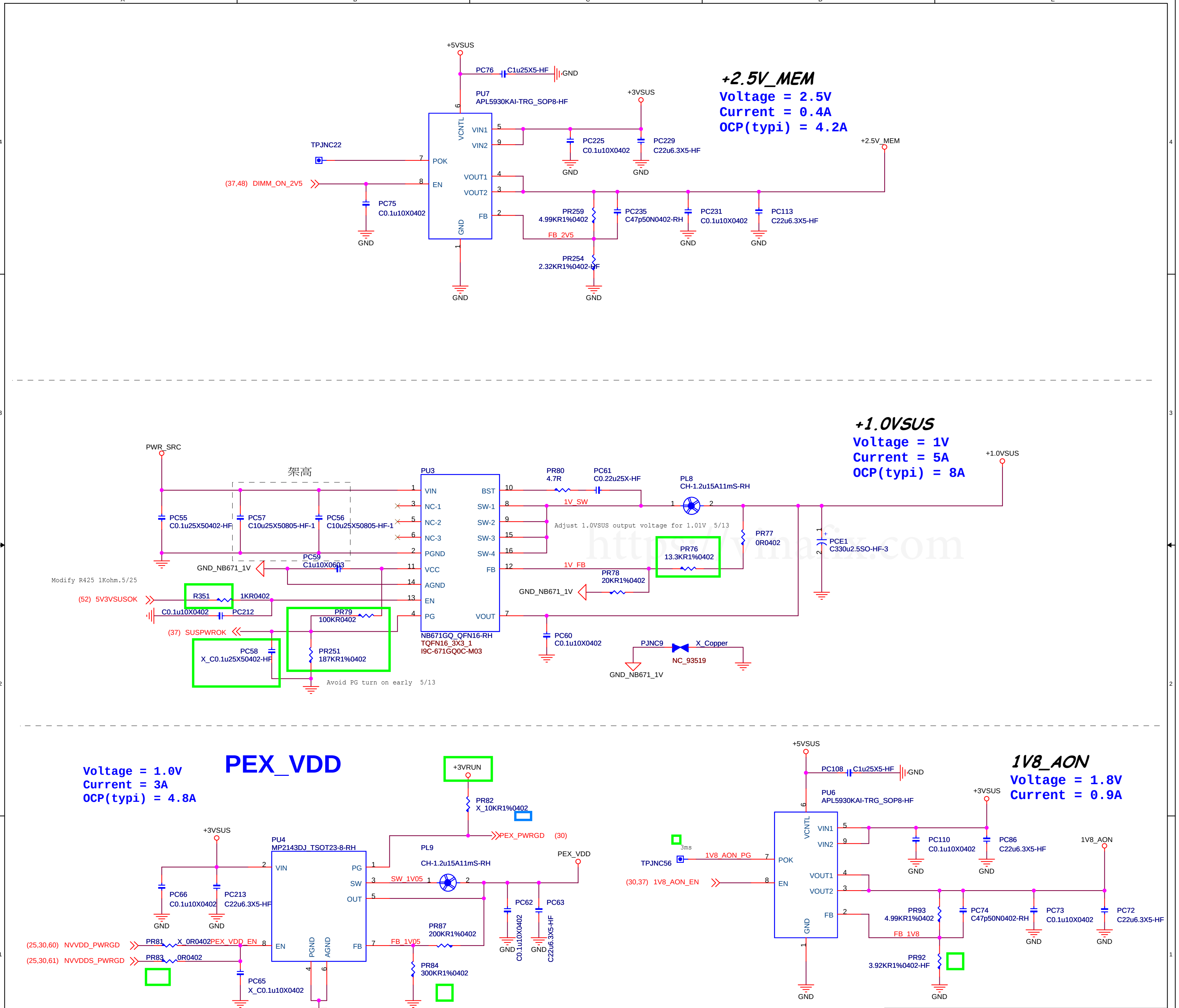


msi MICRO-STAR INT'L CO.,LTD.

Title	System Power	
Size Custom	Document Number MS-16K21	Rev 0B
Date: Wednesday, April 06, 2016	Sheet 52 of 73	



msi	MICRO-STAR INT'L CO.,LTD.		
Title	+1.35VDIMM/+0.675VRUN		
Size Custom	Document Number MS-16K21		Rev 0B
Date: Wednesday, April 06, 2016	Sheet 53	of 73	



MICRO-STAR INT'L CO.,LTD.

Title
2.5VMEM/1VSUS/PEX_VDD/1.8V

Size	Document Number	Rev
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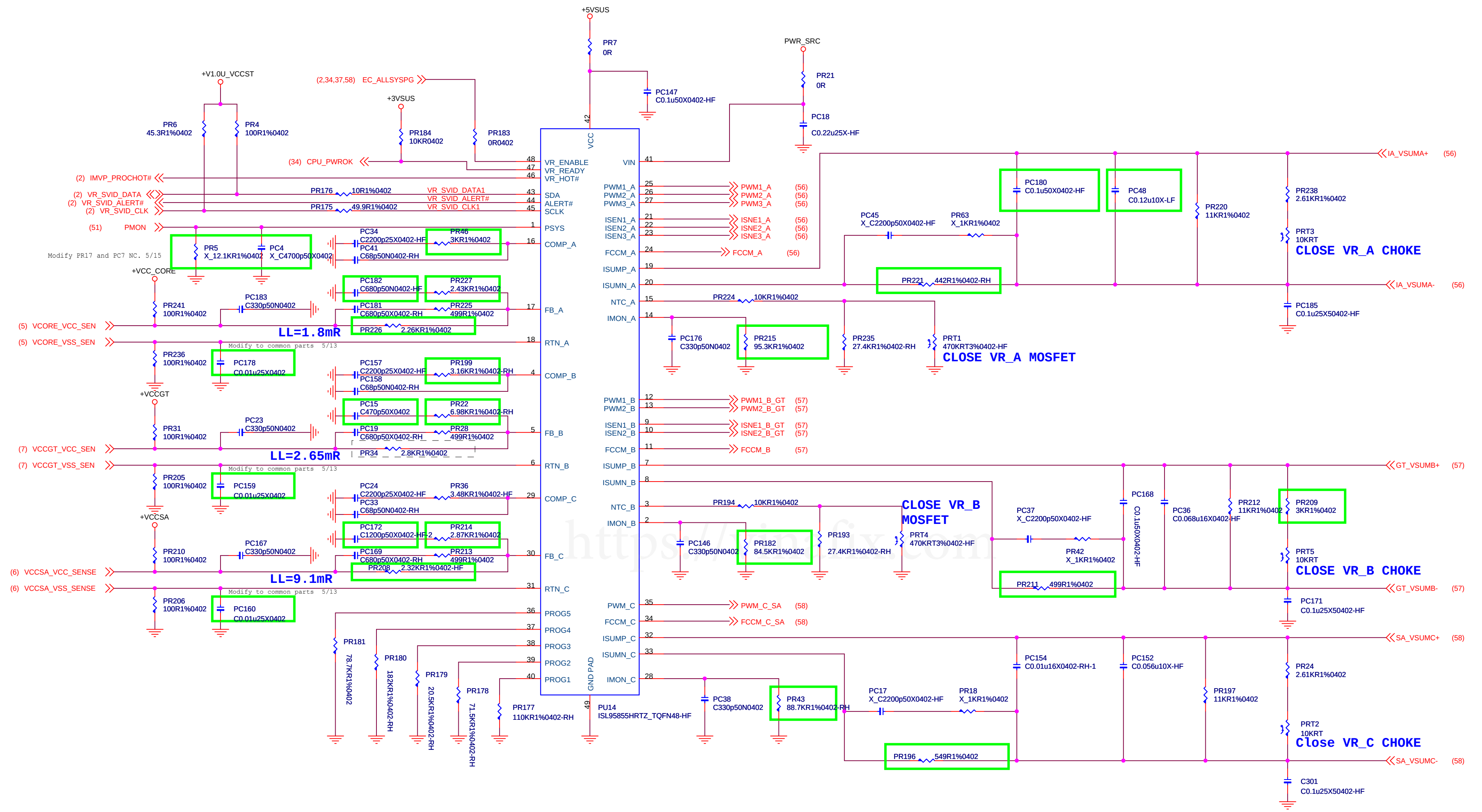
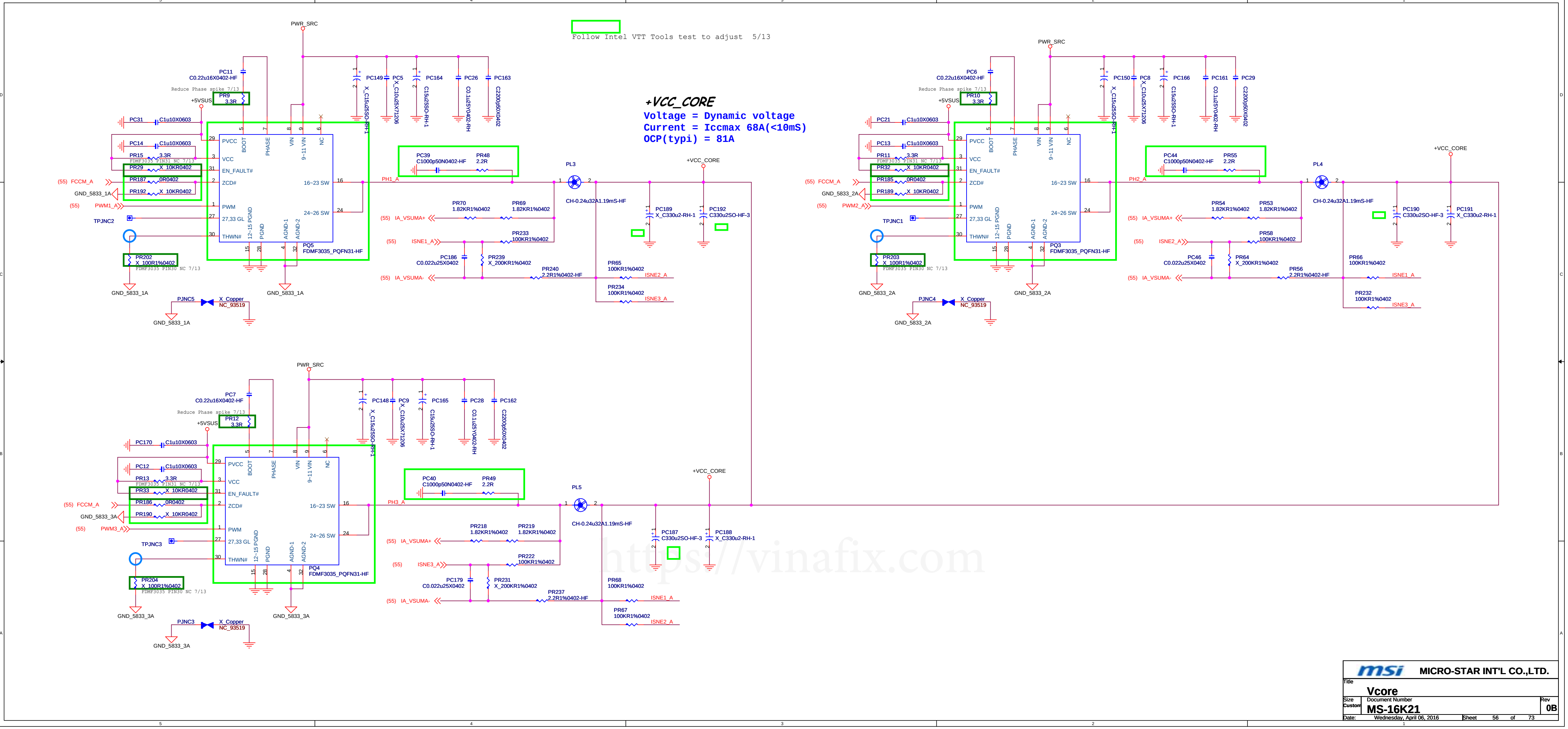
Skylake H-line 42 45W ISL95855

Follow Intel VTT Tools test result to adjust 5/13



SKL-H(4+2)

PROG1	110KR	Vboot=0V, Selw rate=30mV/us, VR_A=IA, VR_B=GT, VR_C=SA
PROG2	71.5KR	IMAX VR_A=70A, VR_A PSI1=1PH
PROG3	20.5KR	IMAX VR_B=60A, DROOP VR_B Active
PROG4	182KR	DROOP VR_A Active, DROOP VR_C Active, VR_A VR_B Frequency=750kHz
PROG5	78.7KR	IMAX VR_C=12A, Frequency=583kHz


Follow Intel VTT Tools test to adjust 5/13
+VCC_CORE
Voltage = Dynamic voltage
Current = Iccmax 68A(<10mS)
OCP(typi) = 81A
PWR_SRC
Reduce Phase spike 7/13
FDMF3035 PIN31 NC 7/13
FDMF3035 PIN30 NC 7/13
PQ5 FDMF3035_PQFN31-HF
PQ3 FDMF3035_PQFN31-HF
PQ4 FDMF3035_PQFN31-HF
PL3 CH-0.24u32A1.19mS-HF
PL4 CH-0.24u32A1.19mS-HF
PL5 CH-0.24u32A1.19mS-HF
MICRO-STAR INT'L CO.,LTD.
Title
Vcore
Size Custom
Document Number
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Rev
0B
Date: Wednesday, April 06, 2016
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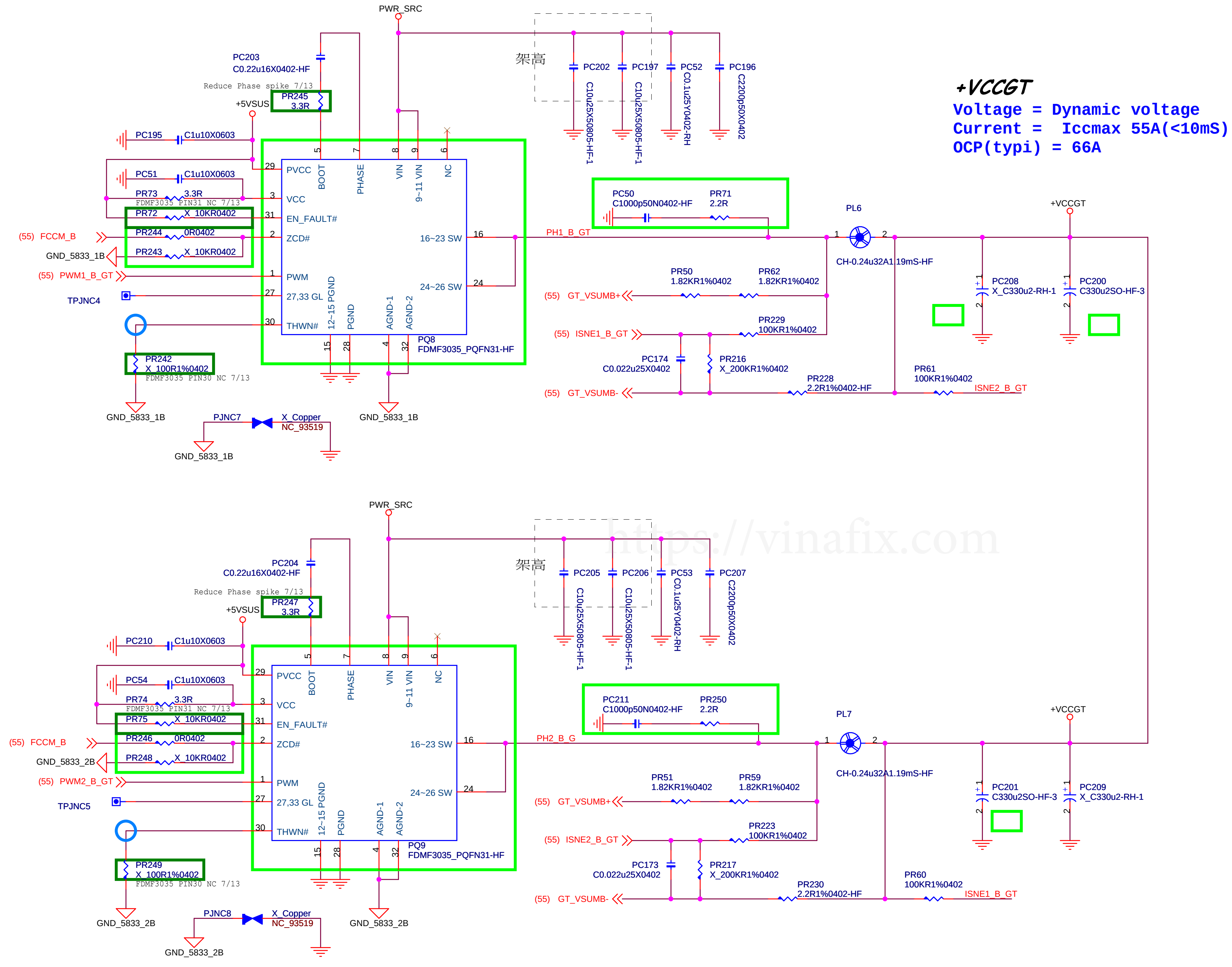
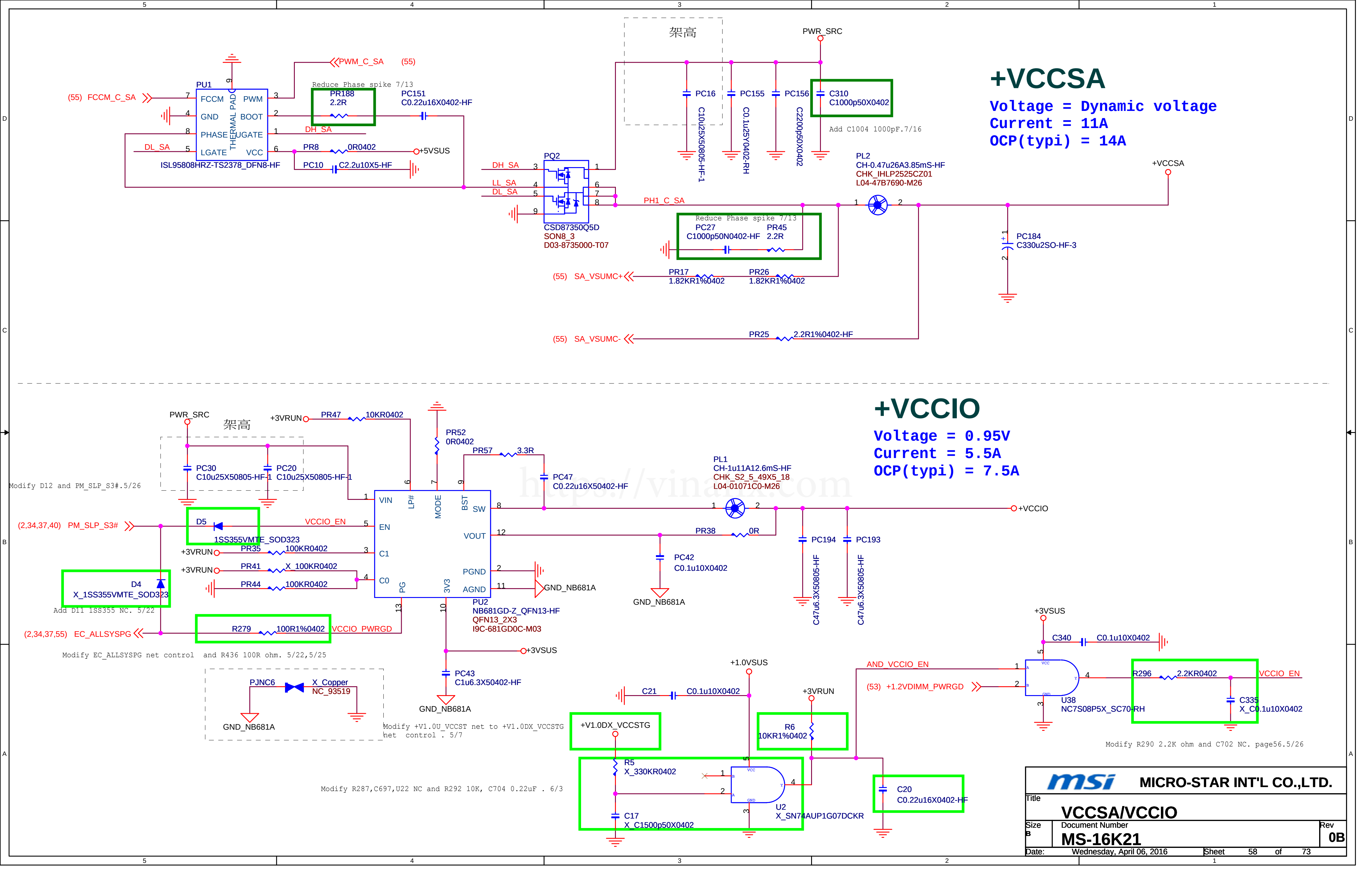
+VCCGT
Voltage = Dynamic voltage
Current = Iccmax 55A(<10mS)
OCP(typi) = 66A



MICRO-STAR INT'L CO.,LTD.

Title	VCCGT	
Size: Custom	Document Number: MS-16K21	Rev: 0B
Date: Wednesday, April 06, 2016	Sheet 57 of 73	



+VCCSA
Voltage = Dynamic voltage
Current = 11A
OCP(typi) = 14A
架高
PWR_SRC
PWM_C_SA (55)
(55) FCCM_C_SA
PU1
FCCM PWM
GND BOOT
PHASE UGATE
LGATE VCC
THERMAL PAD
ISL95808HRZ-TS2378_DFN8-HF
Reduce Phase spike 7/13
PR188
2.2R
PC151
C0.22u16X0402-HF
DH_SA
DL_SA
PR8 0R0402 +5VSUS
PC10 C2.2u10X5-HF
PC16 PC155 PC156 C310
C1000p50X0402
Add C1004 1000pF.7/16
C10u25X50805-HF-1
C0.1u25Y0402-RH
C2200p50X0402
PQ2
CSD87350Q5D
SON8_3
D03-8735000-T07
LL_SA
PH1_C_SA
PL2
CH-0.47u26A3.85mS-HF
CHK_IHLP2525CZ01
L04-47B7690-M26
+VCCSA
PC184
C330u2SO-HF-3
Reduce Phase spike 7/13
PC27
C1000p50N0402-HF
PR45
2.2R
(55) SA_VSUMC+
PR17 1.82KR1%0402
PR26 1.82KR1%0402
(55) SA_VSUMC-
PR25 2.2R1%0402-HF
+VCCIO
Voltage = 0.95V
Current = 5.5A
OCP(typi) = 7.5A
PWR_SRC
架高
+3VRUN PR47 10KR0402
PR52 0R0402
PR57 3.3R
PC47 C0.22u16X50402-HF
PC30 C10u25X50805-HF-1
PC20 C10u25X50805-HF-1
Modify D12 and PM_SLP_S3#.5/26
PL1
CH-1u11A12.6mS-HF
CHK_S2_5_49X5_18
L04-01071C0-M26
+VCCIO
VIN LP# MODE BST SW
EN VOUT C1 C0 PGND AGND PG 3V3
(2,34,37,40) PM_SLP_S3#
D5 1SS355VMTE_SOD323
VCCIO_EN
+3VRUN PR35 100KR0402
+3VRUN PR41 X_100KR0402
PR44 100KR0402
PR38 0R
PC42 C0.1u10X0402
PC194 PC193
C47u6.3X50805-HF
GND_NB681A
D4 X_1SS355VMTE_SOD323
Add D11 1SS355 NC. 5/22
(2,34,37,55) EC_ALLSYSPG
R279 100R1%0402
VCCIO_PWRGD
PU2
NB681GD-Z_QFN13-HF
QFN13_2X3
I9C-681GD0C-M03
+3VSUS
PC43 C1u6.3X50402-HF
Modify EC_ALLSYSPG net control and R436 100R ohm. 5/22,5/25
PJNC6 X_Copper NC_93519
GND_NB681A
Modify +V1.0U_VCCST net to +V1.0DX_VCCSTG net control . 5/7
+1.0VSUS
C21 C0.1u10X0402
+3VRUN
+V1.0DX_VCCSTG
R6 10KR1%0402
R5 X_330KR0402
C17 X_C1500p50X0402
U2 X_SN74AUP1G07DCKR
C20 C0.22u16X0402-HF
Modify R287,C697,U22 NC and R292 10K, C704 0.22uF . 6/3
AND_VCCIO_EN
(53) +1.2VDIMM_PWRGD
+3VSUS
C340 C0.1u10X0402
U38 NC7S08P5X_SC70-RH
R296 2.2KR0402
VCCIO_EN
C335 X_C0.1u10X0402
Modify R290 2.2K ohm and C702 NC. page56.5/26
msi MICRO-STAR INT'L CO.,LTD.
Title VCCSA/VCCIO
Size B Document Number MS-16K21 Rev 0B
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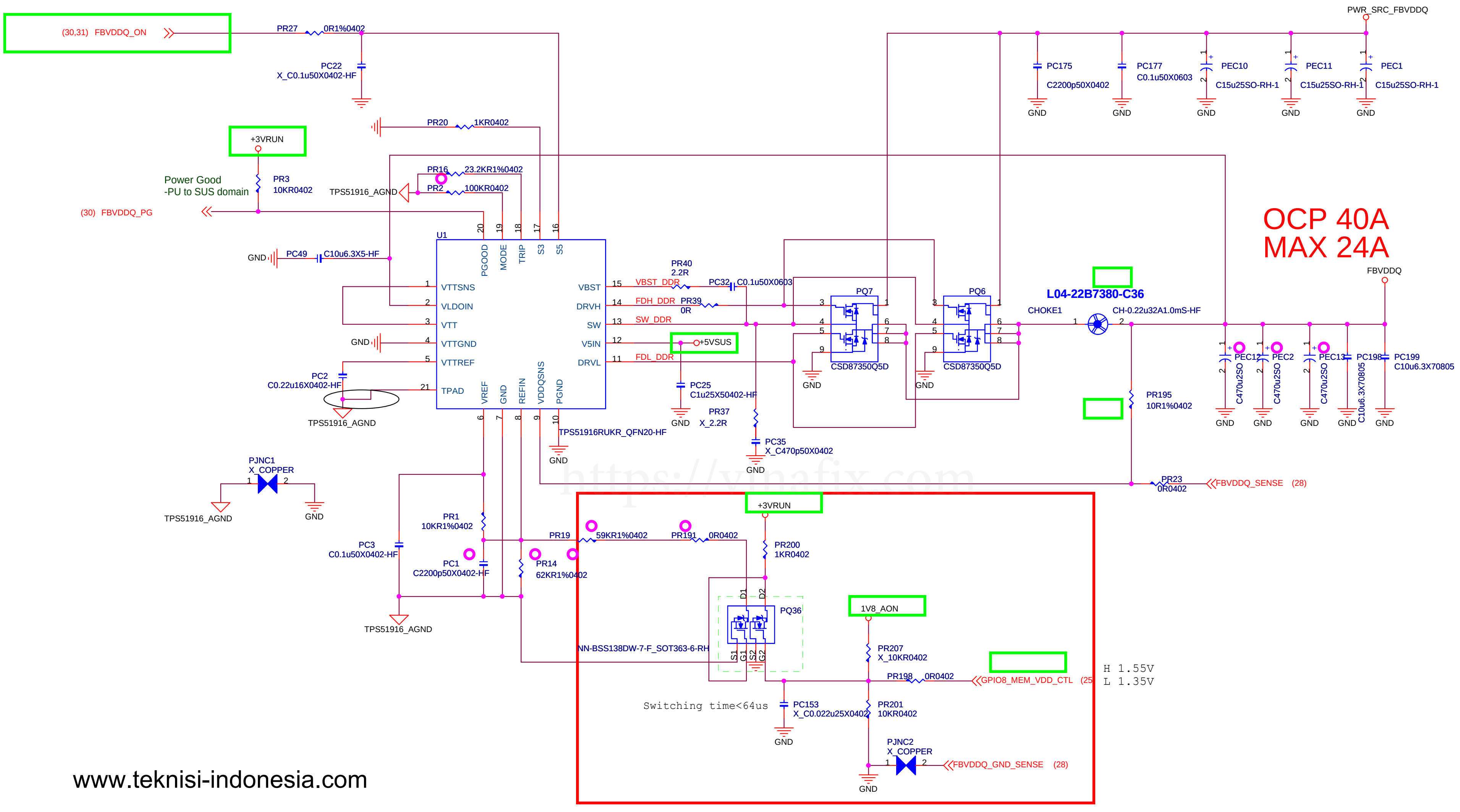
PAGE23: FBVDDQ



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msi	MICRO-STAR INT'L CO.,LTD.	
Title	DGPU POWER FBVDDQ	
Size	Document Number MS-16K21	Rev 0B
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DGPU POWER / UP9509P

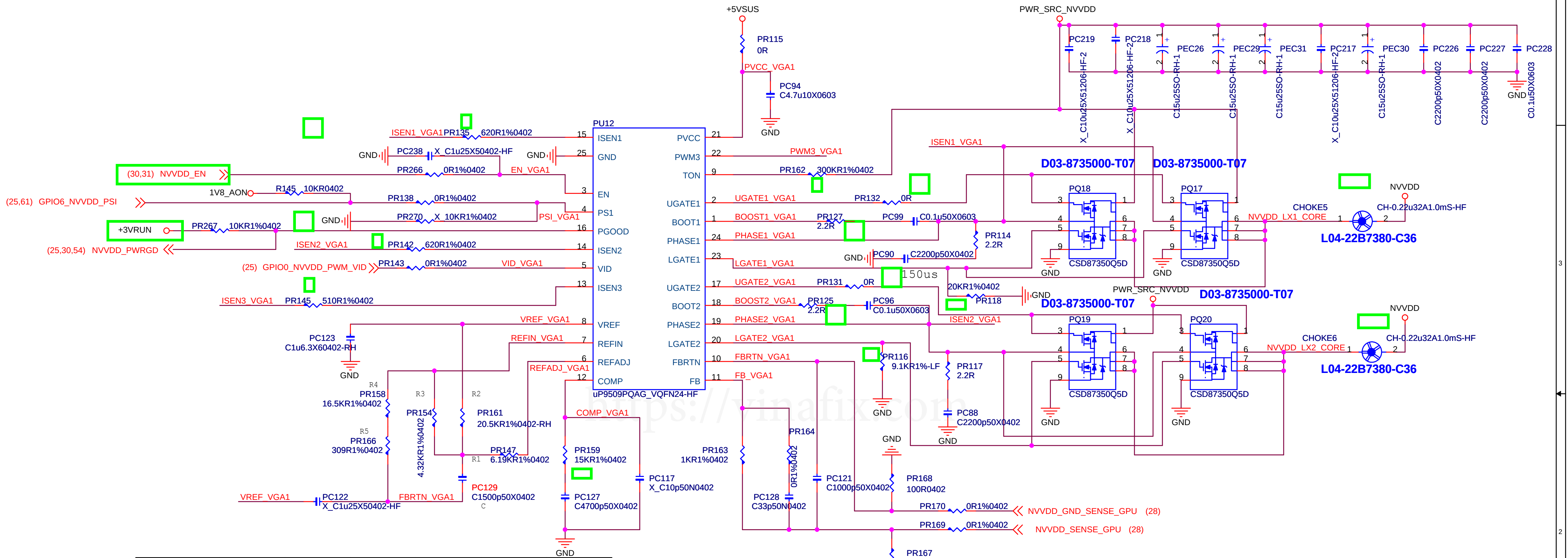
EDP-Peak 136A

EDP-Con 58A

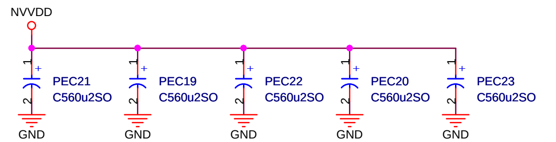
DGPU POWER NVVDD

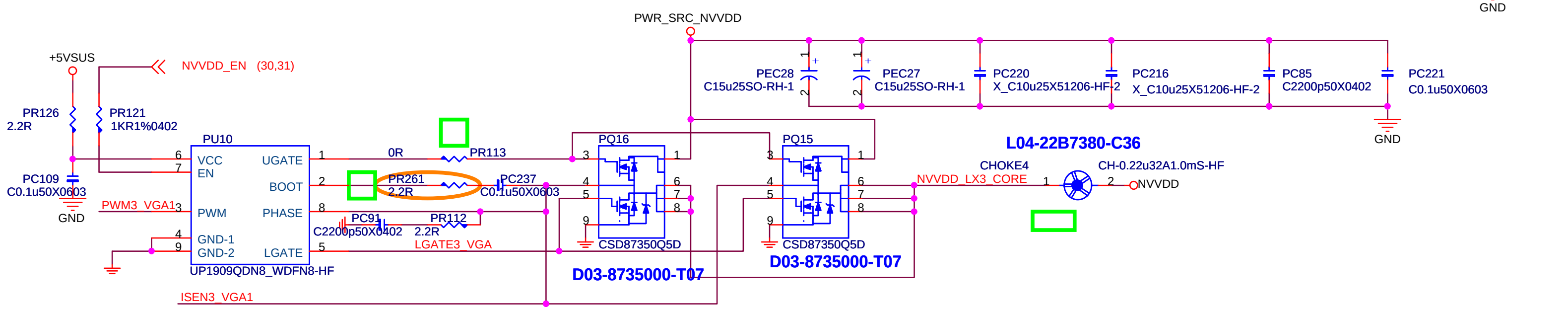
VBoot:0.8V

Vmin:0.3V / Vmax:1.3V



	PR885	PR897	PR92	PR104	PR1208	PC76
CONFIG	R1	R2	R3	R4	R5	C
N17E-G1	6.19K	20.5K	4.32K	16.5K	309R	1.5nF





MICRO-STAR INT'L CO.,LTD.

Title: NVVDD PWM IC (UP9509)

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DGPU POWER / UP1666P

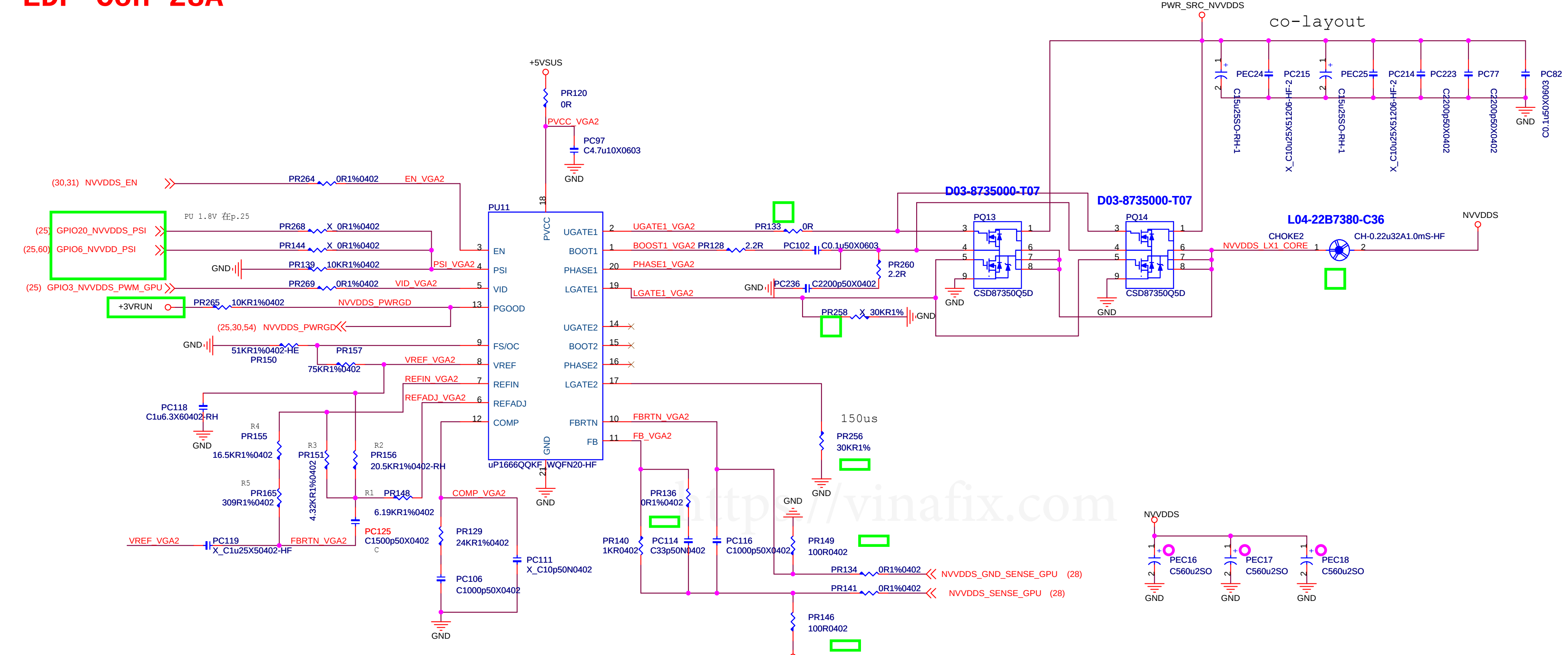
EDP-Peak 74A

EDP-Con 28A

DGPU POWER NVVDDS

VBoot:0.8V

Vmin:0.3V / Vmax:1.3V



	PR25	PR826	PR27	PR1113	PR828	PC83
CONFIG	R1	R2	R3	R4	R5	C
N17E-G1	6.19K	20.5K	4.32K	16.5K	309R	1.5nF

MICRO-STAR INT'L CO.,LTD.

Title: **NVVDDS PHASE 1~4**

Size | Document Number: **MS-16K21** | Rev: **0B**

Date: | Sheet 61 of 73

MICRO-STAR INT'L CO.,LTD.

Title: EMI

Size: Custom | Document Number: MS-16K21 | Rev: 0B

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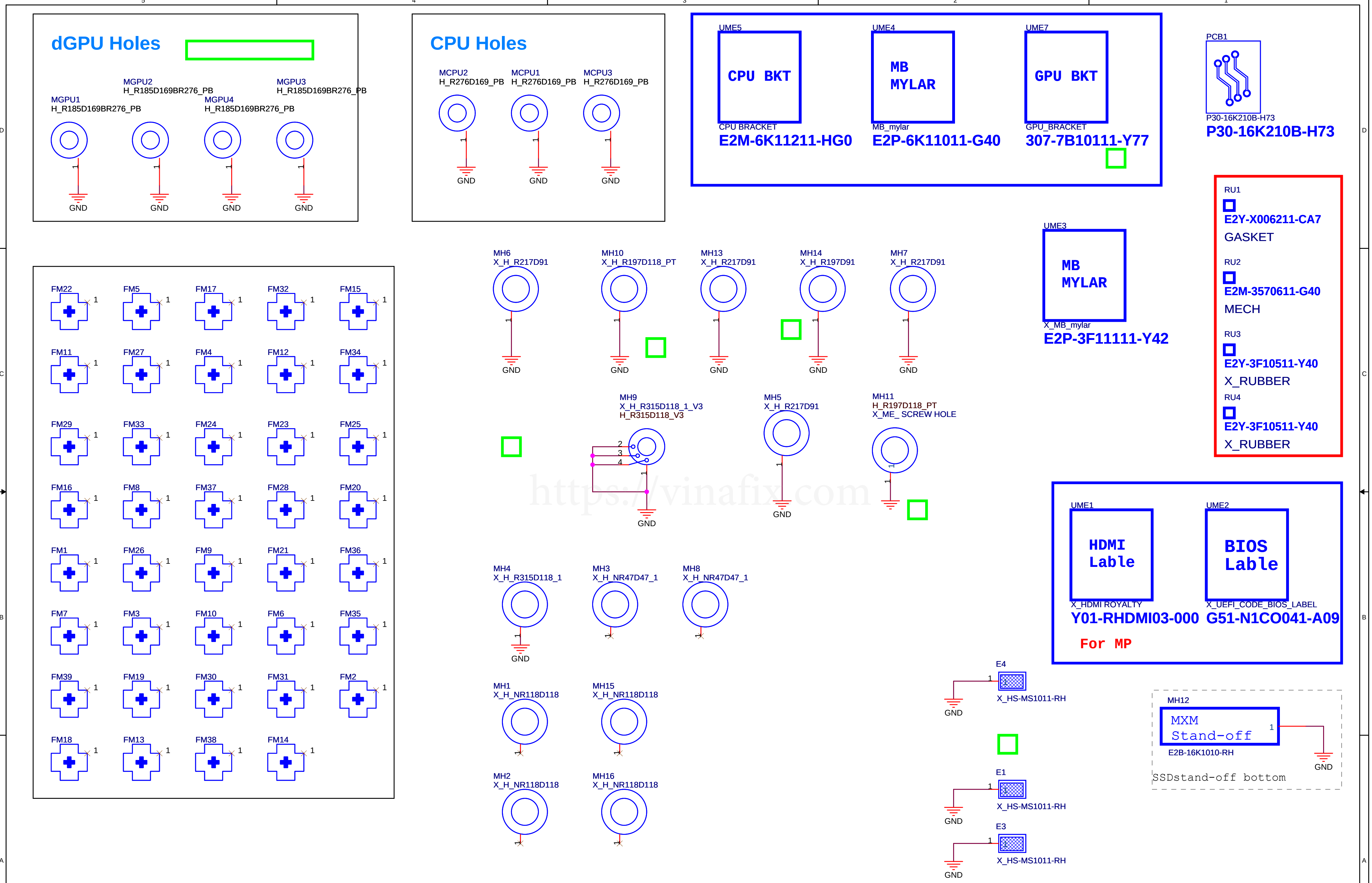

msi MICRO-STAR INT'L CO.,LTD.

Title	Screw/ME	
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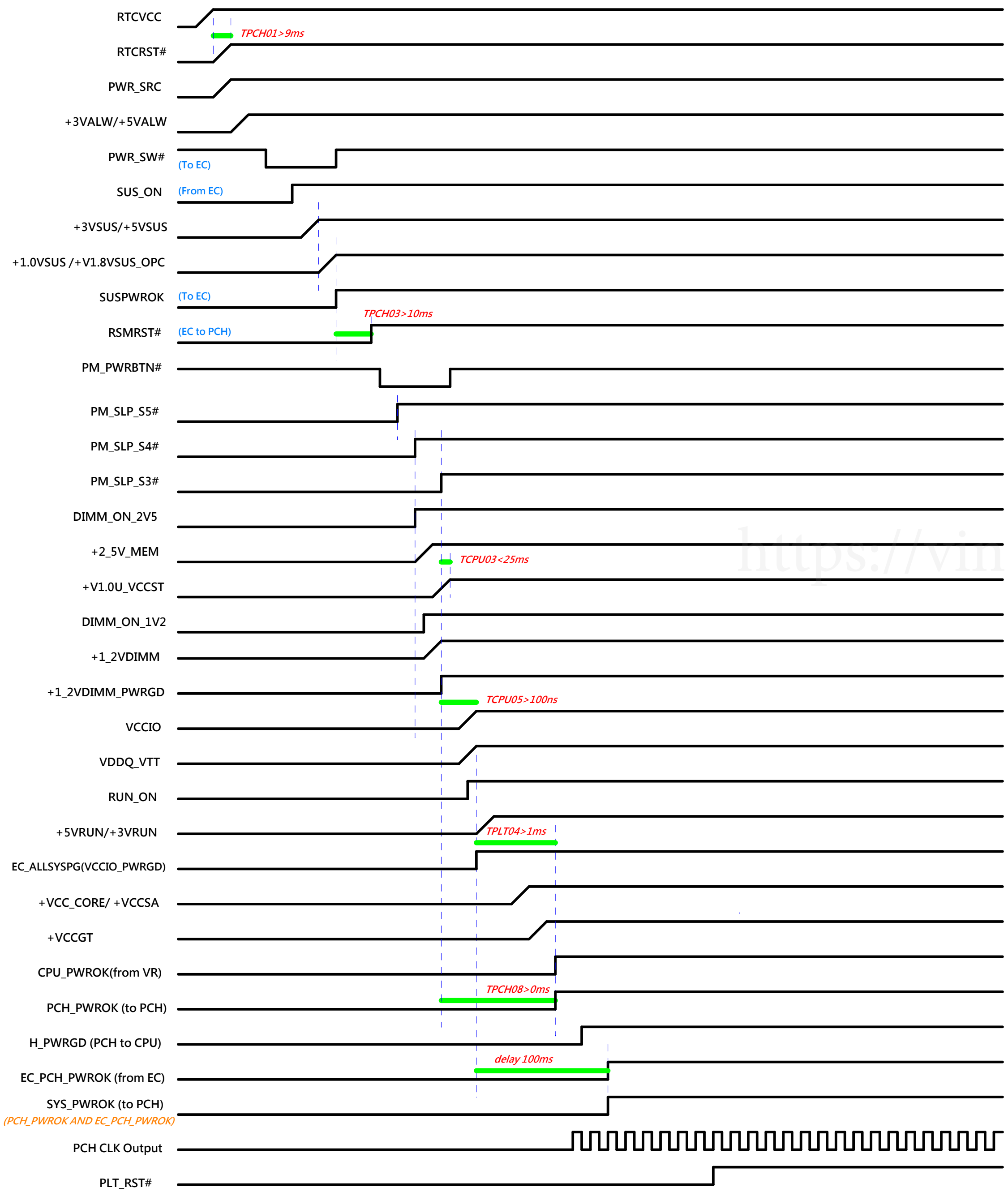
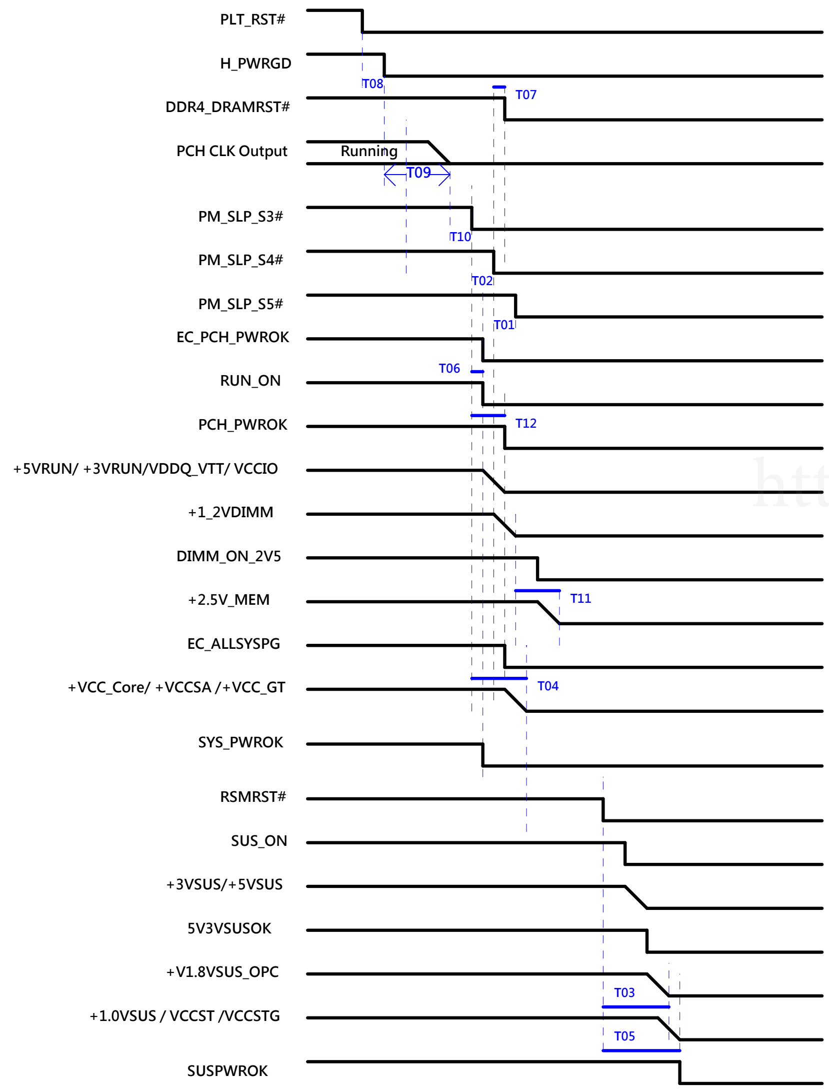
Power on Sequence

G3 -> S0



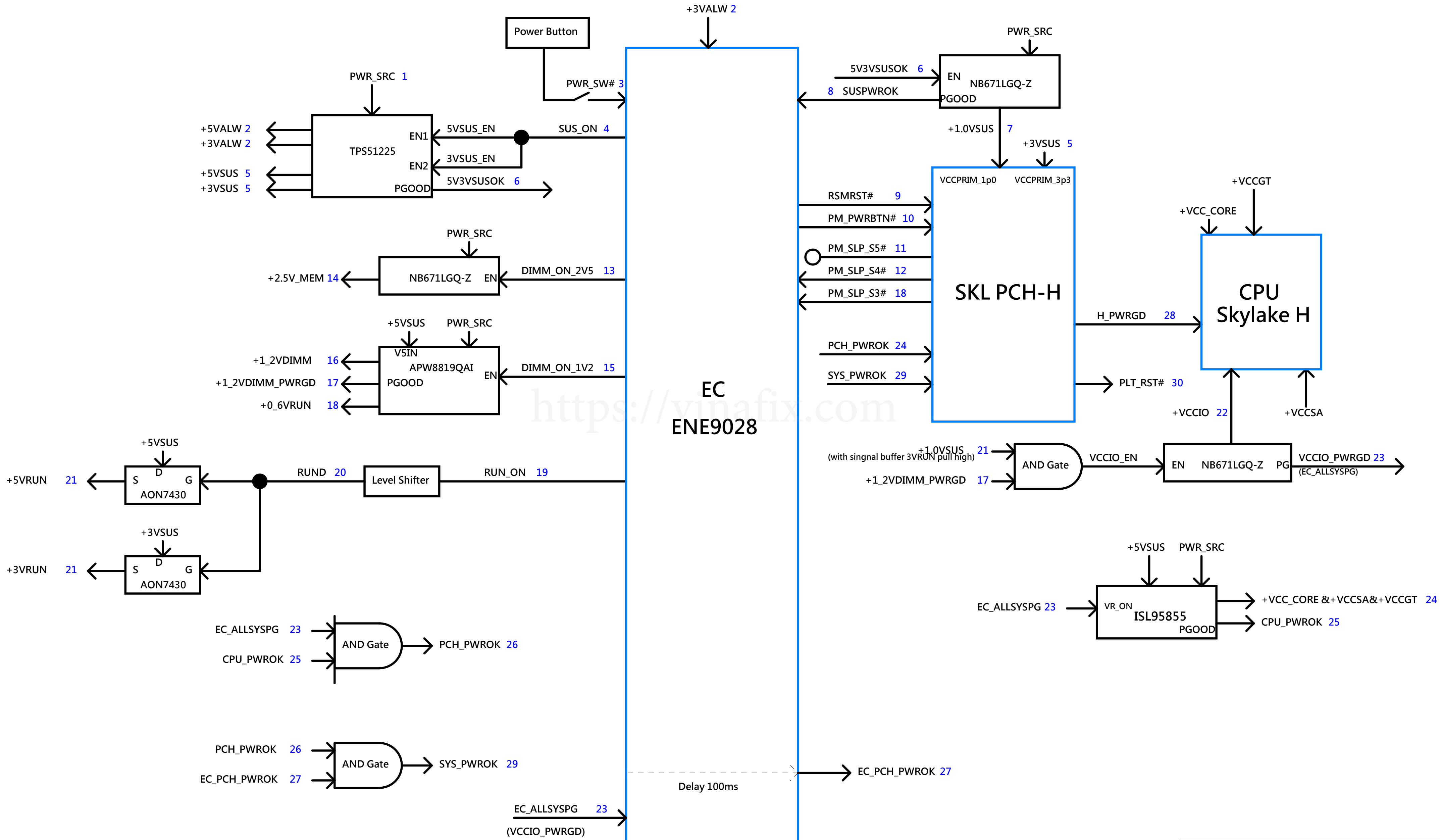
Power down Sequence

S0 -> G3



	MIN	MAX	Units	Description
T01	30		us	SLP_S5# assertion to SLP_S4#
T02	30		us	SLP_S4# assertion to SLP_S3#
T03	1		us	RSMRST# asserting to VccPRIM dropping 5% of nominal value
T04		500	ms	SLP_S3# assertion to VCC, VCCGT, VCCIO and VCCSA rails completely off.
T05	1		us	RSMRST# asserting to VccPRIM dropping 5% of nominal value
T06		1	us	SLP_S3# assertion to VCCIO VR disabled
T07	-100		ns	DDR_RESET# assertion to SLP_S4# assertion
T08	30		us	PLTRST# assertion to PROCPWRGD deassertion
T09	10		us	PROCPWRGD de-assertion to CLKOUT_BCLK turning OFF.
T10	1		us	CLKOUT_BCLK turning OFF to SLP_S3# assertion
T11	30		ms	VDDQ ramped down to VPP ramp down
T12	0		ms	SLP_S3# assertion to PCH_PWROK deassertion

MS-16K2 Power on Block Diagram



msi	MICRO-STAR INT'L CO.,LTD.	
Title	Power on Block Diagram	
Size: Custom	Document Number: MS-16K21	Rev: 0B
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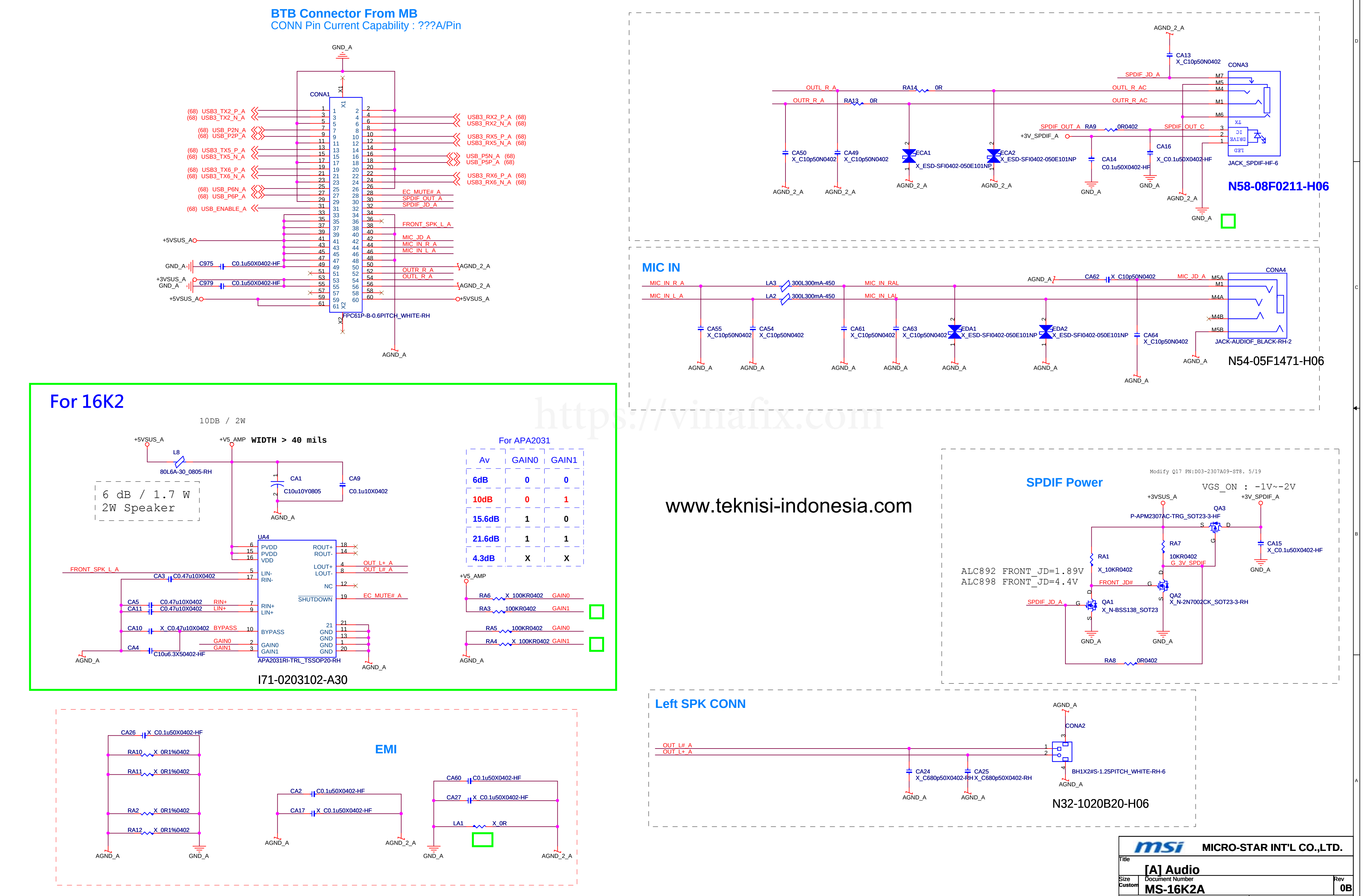
16K2-A Board (Audio CONN)



Av	GAIN0	GAIN1
6dB	0	0
10dB	0	1
15.6dB	1	0
21.6dB	1	1
4.3dB	X	X

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Title: [A] Audio

Size: Custom | Document Number: MS-16K2A | Rev: 0B

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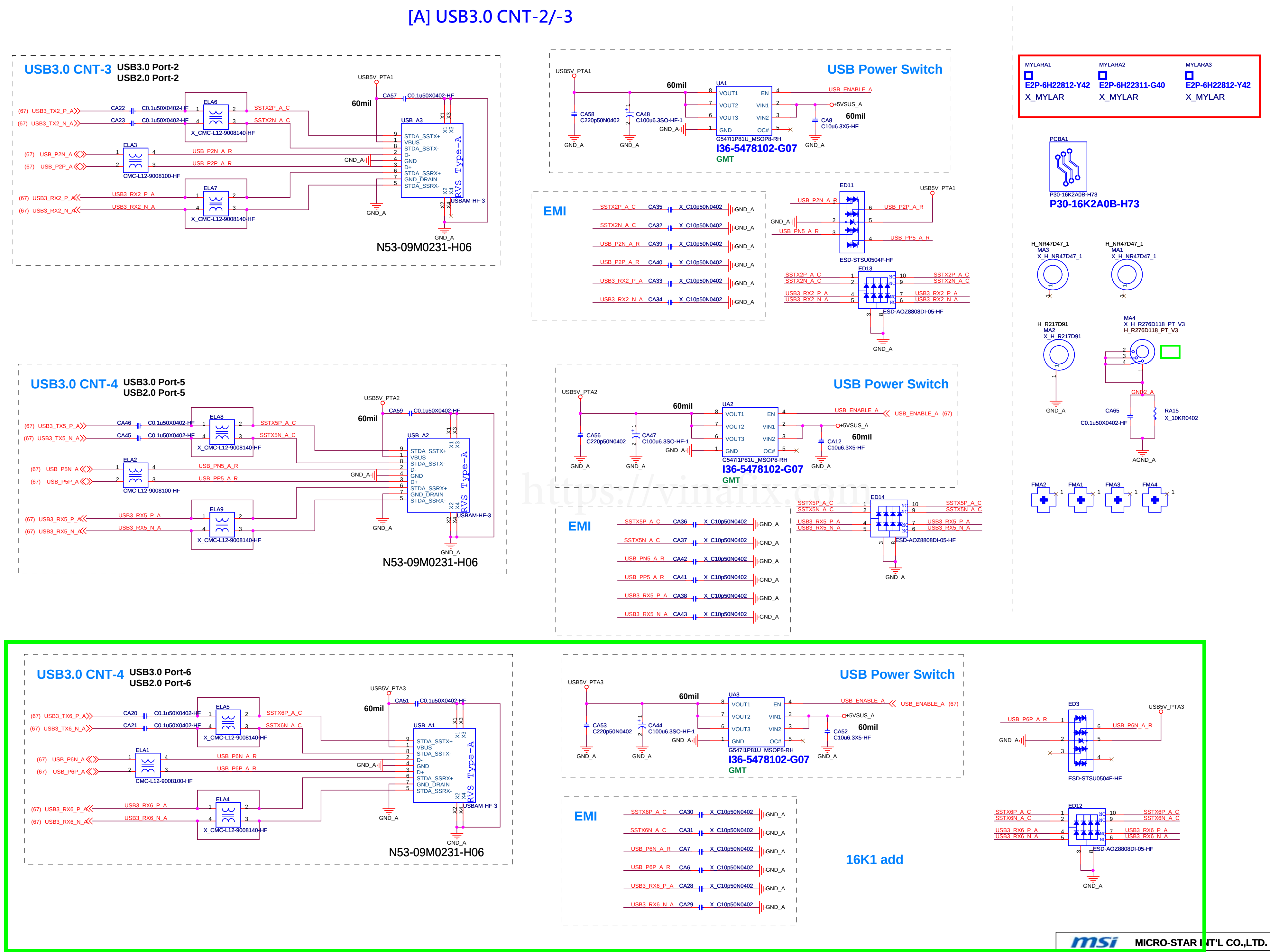
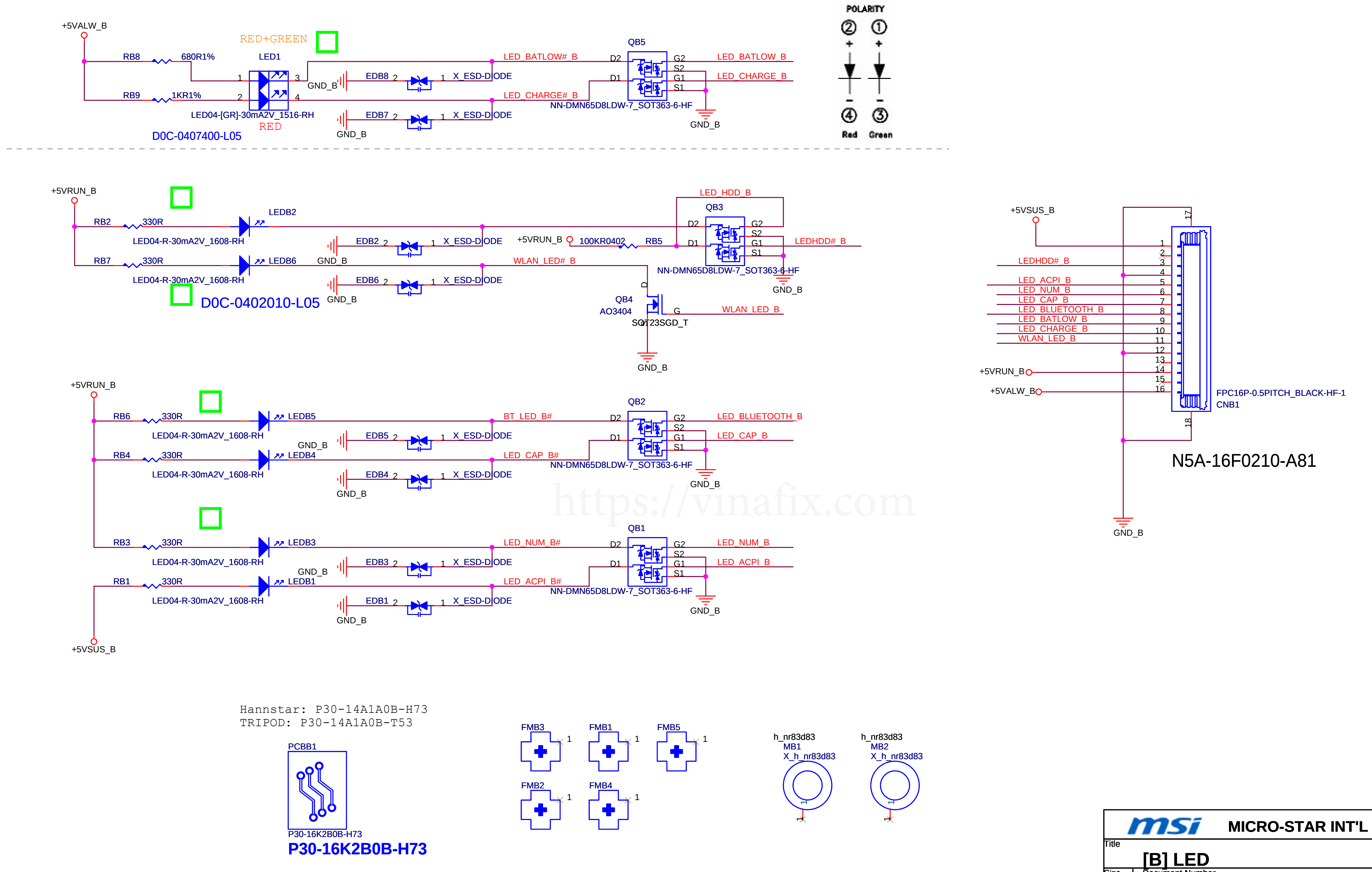
[A] USB3.0 CNT-2/-3

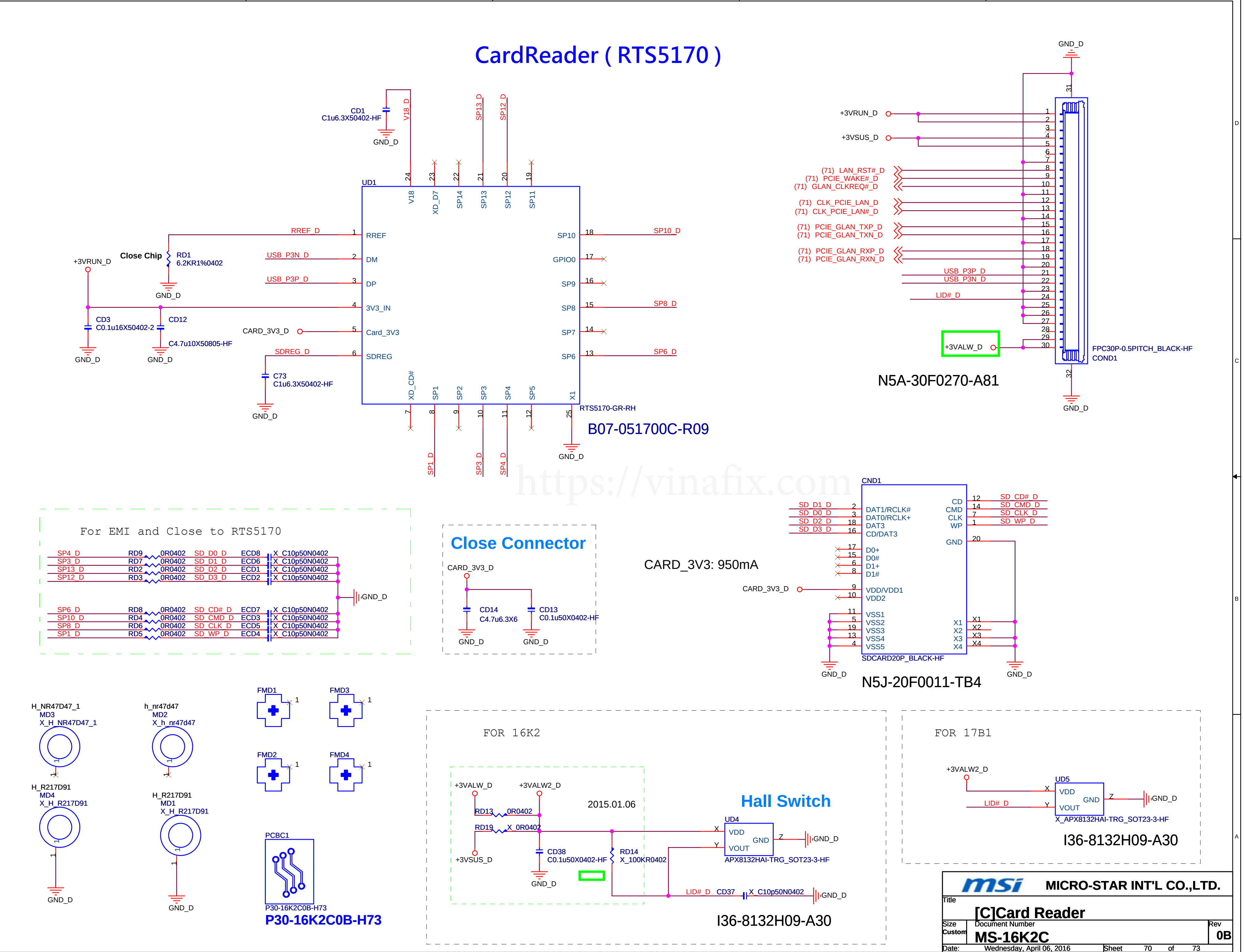


msi	MICRO-STAR INT'L CO.,LTD.	
Title	[A] USB3.0 CNT-3/-4	
Size Custom	Document Number MS-16K2A	Rev 0B
Date: Wednesday, April 06, 2016	Sheet 68 of 73	



MICRO-STAR INT'L CO.,LTD.

Title	[B] LED	
Size B	Document Number MS-16K2B	Rev 0B
Date:	Thursday, April 07, 2016	Sheet 69 of 73



msi	MICRO-STAR INT'L CO.,LTD.
Title	[C]Card Reader
Size: Custom	Document Number: MS-16K2C
Rev	0B
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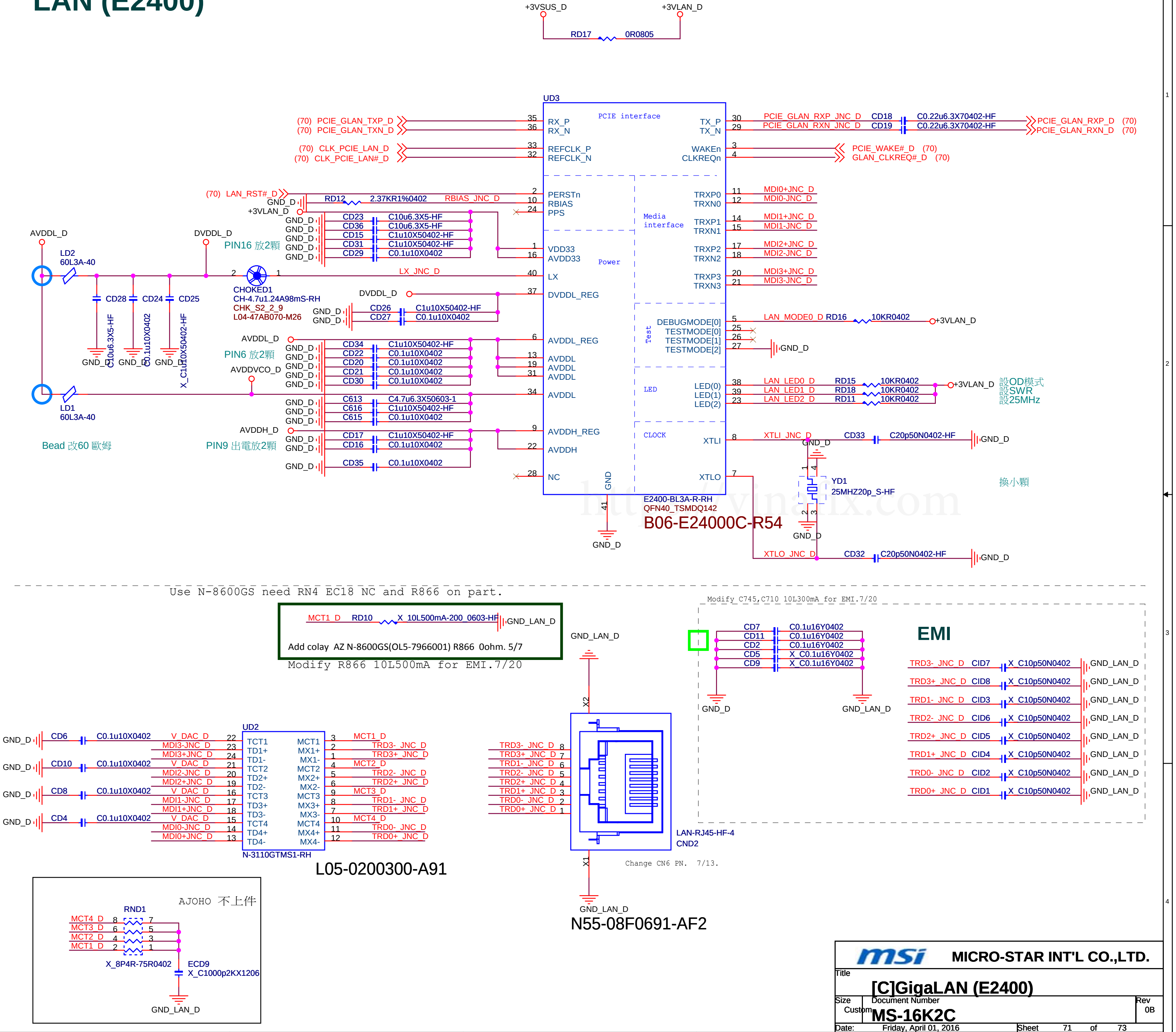
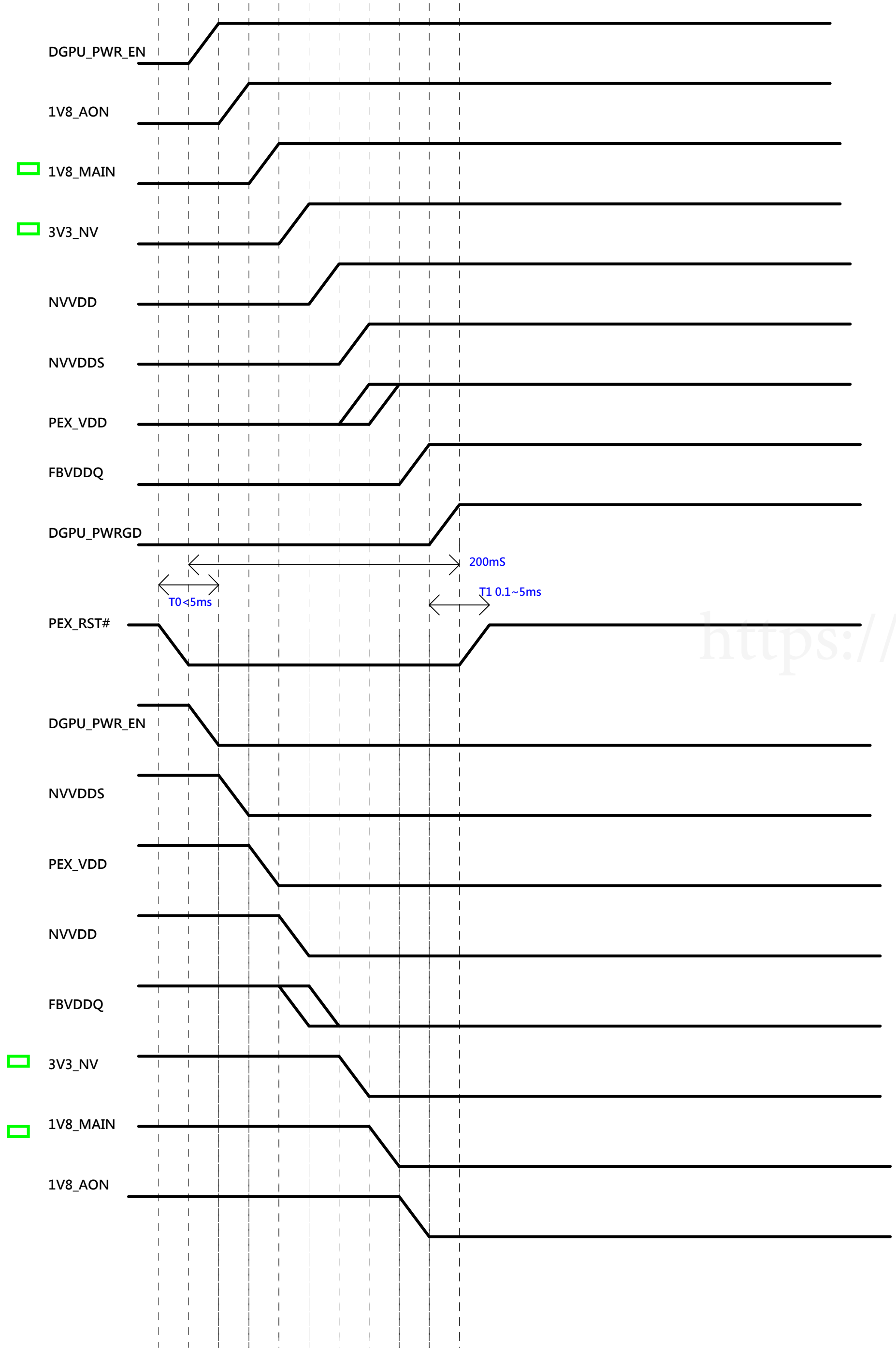
LAN (E2400)



MICRO-STAR INT'L CO.,LTD.

Title	[C]GigaLAN (E2400)	
Size: Custom	Document Number: MS-16K2C	Rev: 0B
Date: Friday, April 01, 2016	Sheet 71 of 73	

GPU Sequence



msi	MICRO-STAR INT'L CO.,LTD.	
Title: GPU Sequence		
Size: C	Document Number: MS-16K2	Rev: 0B
Date: Friday, April 01, 2016	Sheet 72 of 73	

History

0B

DATE	PAGE	DESCRIPTION
0217	60,61	1. REMOVE CHOKE3,PR124,PC98,PR122,PC230,PR257 NVVDDS 2相改1相 2. CHOKE1,CHOKE2,CHOKE4,CHOKE5,CHOKE6 CHANGE TO 10*10mm
	63	1. REMOVE E2
0219	47	1. Change Y3 PN
	54	1. PR92 CHANGE TO 3.92KOhm 2. PR84 CHANGE TO 300KOhm
0301	30	1. ADD R549 1KOhm
	30	1. CIRCUIT CHANGE TO PIN2
0302	35	1. CHANGE U12 PN ,VCC CHANGE TO 1.8V
0304	67	1. LA1 NO STUFF
0307	51	1. PR172 CHANGE TO 0.005Ohm
	34	1. CN10 CHANGE +/- ,CHANGE BAT2 PN
	59,60,61	1. CHOKE1,2,4,5,6 CHANGE PN
0309	69	1. CHANGE LED PN
	32	1. R159 STUFF AND PU CHANGE TO PD
0311	37	1. ADD R241,Q40
	43	1. CHANGE PWR LED CIRCUIT ,REMOVE Q16

DATE	PAGE	DESCRIPTION
0311	55,56 57	1. Vcore PC182 → 680 pF (C11-6811812-W08) PC189 → NC PR215 → 95.3kohm (R11-9532T12-W08) PR46 → 3kohm (R11-0302T12-W08) Vgt PR182 → 84.5kohm (R11-8452T12-W08) PC15 → 470 pF (C11-4712012-T04) PC208 → NC PR199 → 3.16kohm (R11-3161T12-W08) Vsa PR43 → 88.7kohm (R11-8872T12-R01) PC172 → 1200 pF (C11-1222832-W08) NVVDDS PR258不上件 PR256上件
0314	39,48	1. CHANGE EL9,EL10 FOOTPRINT
	43	1. CN11 PIN2&PIN3 SWAP 2. FPC2 PIN3&PIN4 SWAP
0316	56,57	1. PC187,PC190,PC192,PC200,PC201 改 C71-331037E-P01
0318	30	1. CHANGE 1V8MAIN & 3V3 SEQUENCE 2. ADD NVVDDS_PG DELAY CIRCUIT
	31	1. ADD 3V3_AON DISCHARGE CIRCUIT,ADD R559
0322	35	1. U30 CHANGE TO BIOS PN,REMOVE BIOS1
0325	30	1. ADD 1V8MAIN_EN DELAY CIRCUIT
0330	45 67	1. OUT_R 6dB->10dB 2. OUT_L 6dB->10dB ONLY FOR 16K2

DATE	PAGE	DESCRIPTION
0311	60	1.PR116 改9.1K R11-0912T23-W08 (For ramp up time) 2.PR142,PR135 改 620ohm R11-0621T12-W08 3.PR162 改300K R11-0304T12-W08 4.PR159 改15K R11-0153T12-W08 5.PR118 改20K R11-0203T12-R01 6.PR145 改 510ohm R11-0511T12-W08 7.PR129 改24K R11-0243T12-W08
	69	1. CHANGE LED R TO 330R