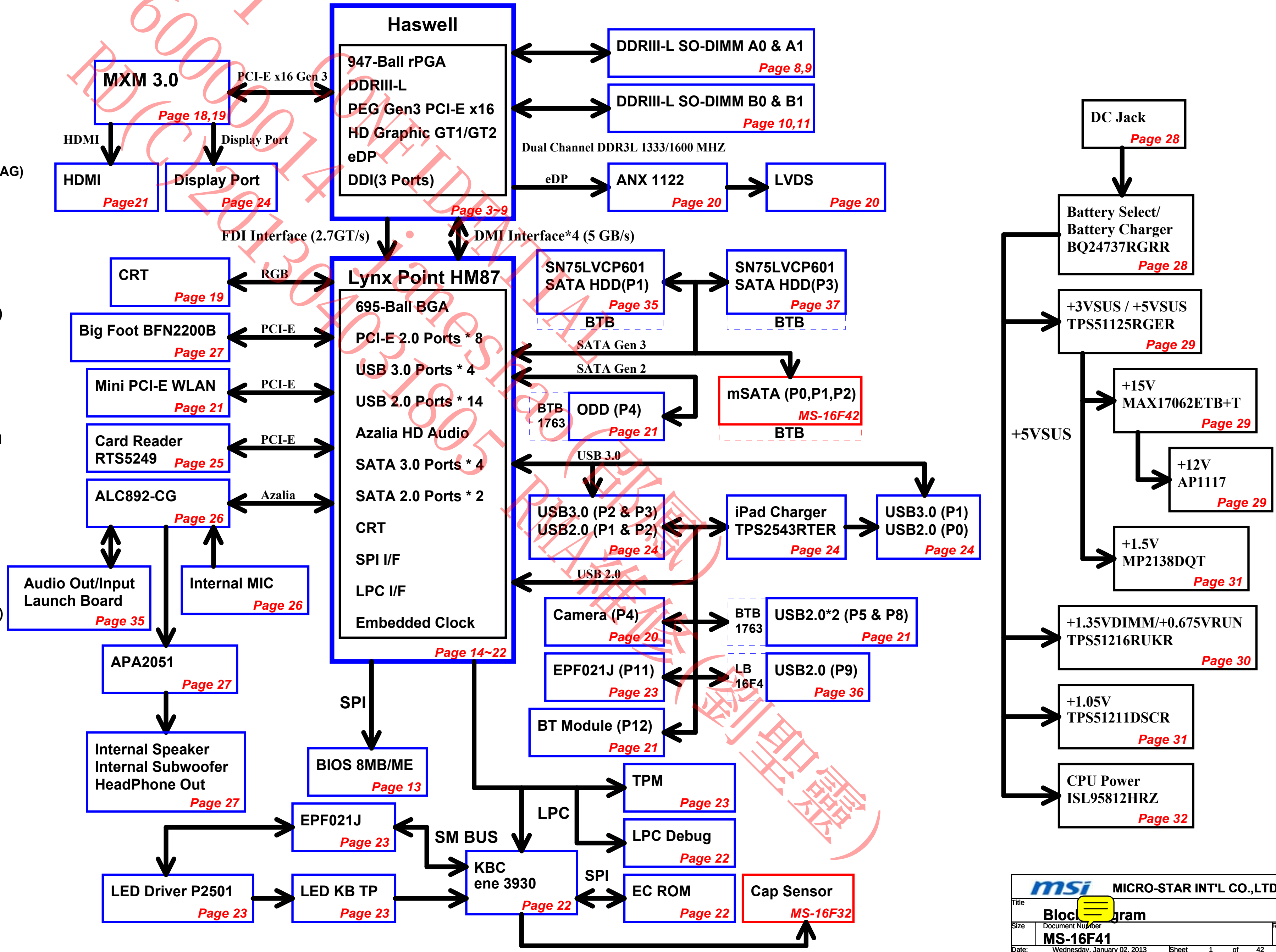
Shark Bay Platform

MS-16F4 Ver.0B 2013/01/02



Haswell
947-Ball rPGA
DDRIII-L
PEG Gen3 PCI-E x16
HD Graphic GT1/GT2
eDP
DDI(3 Ports)
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+5VSUS
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+12V
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+1.5V
MP2138DQT
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+1.35VDIMM/+0.675VRUN
TPS51216RUKR
Page 30
+1.05V
TPS51211DSCR
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CPU Power
ISL95812HRZ
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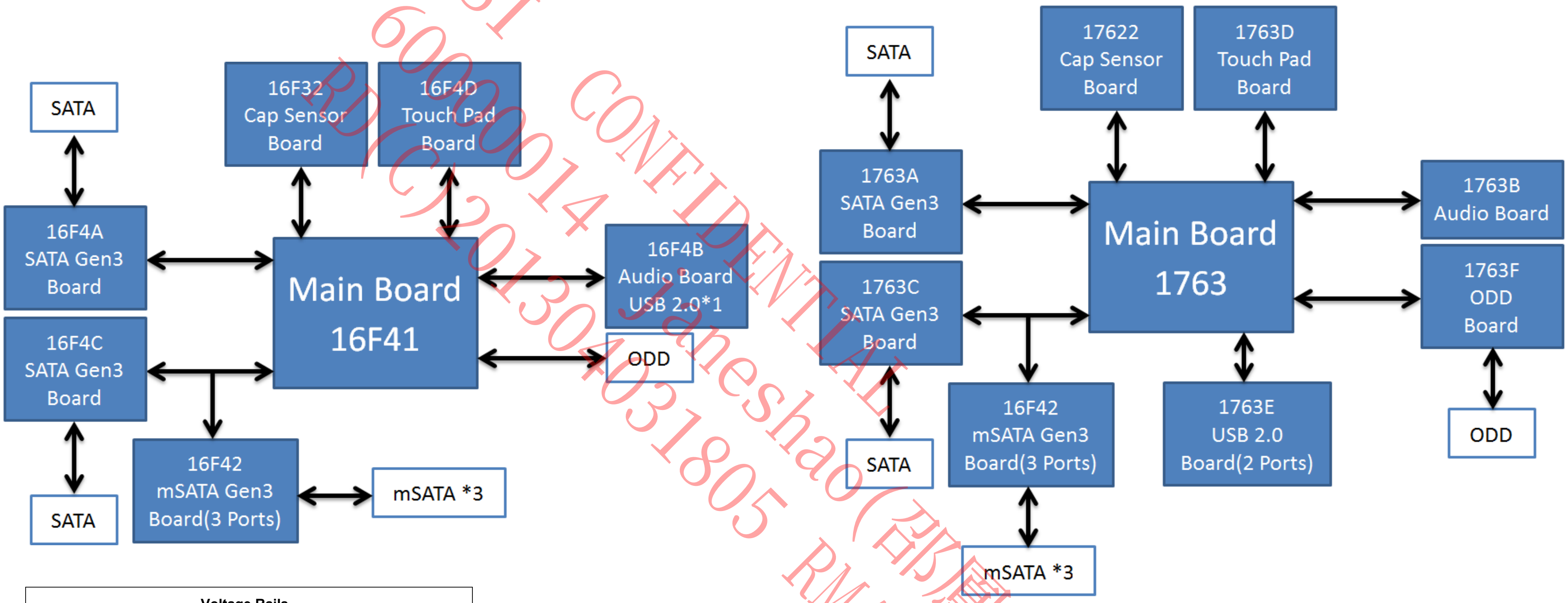
Schematic Annotations and Board Informations

Board Diagram



Voltage Rails			
Power Plane	**Voltage**	**Active In**	**Description**
PWR_SRC	19V or 12 V	S0, S3-S5	Power Source
+5VALW	5V	S0, S3-S5	
+3VALW	3.3V	S0, S3-S5	
+5VSUS	5V	S0, S3	
+3VSUS	3.3V	S0, S3	
+1_35VDIMM	1.35V	S0, S3	DDR3L Power
+5VRUN	5V	S0	
+3VRUN	3.3V	S0	
+1_5VRUN	1.5V	S0	PCH Power for I/O
+12V_FAN	12V	S0	Fan Power
+15V	15V	S0	LED Keyboard Power
+0_675VRUN	0.675V	S0	
+1_05VRUN	1.05V	S0	
+VCC_CORE	1.2V	S0	Processor Core Power Rail

Net Naming Conventions

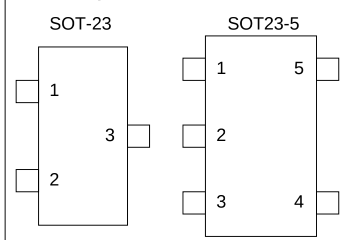
Suffix

= Active Low Signal

Prefix

H = Host
M = DDR Memory
TP = Test Point (does not connect anywhere else)

PCB Footprints



As seen from top

Power States						
	SLP_S3#	SLP_S4#	SLP_S5#	+V*ALW	+V*SUS	+V*RUN
S0 (Full on)	**High**	**High**	**High**	**On**	**On**	**On**
S3 (Suspend to RAM)	Low	**High**	**High**	**On**	**On**	Off
S4 (Suspend to Disk)	Low	Low	**High**	**On**	Off	Off
S5 (Soft off)	Low	Low	Low	**On**	Off	Off

MS-16F41 Change List

Date	Page	Description
2012.09.27	12	Change SATA Port Design
	12	R126.R133.R132.R136.R137.R128.R129 Unstuff
2012.10.04	10	C143 Stuff
	28	Update Battery Charger Schematic
	09	Remove C555
	22	Add NVidia GC6 Function
2012.10.08	20	Change ANX1122 Package & Modify Power Sequence
	12	C399 & C409 Change to 15pF
	23	C395 & C375 Change to 15pF
	22	R172 Unstuff
	04	R205 Unstuff
	20	U30 Change to 2K bytes EEPROM
	25	CardReader Change to RTS5227 and Colay RTS 5249
2012.10.08		Modify DDR3L Vref CA & DQ
		Remove SATA by Pass
2012.10.18	32	Add PR123 4.7MR
2012.10.22	28	PR90 Change to 100K ohm 1%(R11-0114T12-W08)
	32	PR36 Change to 6.04K ohm 1%(R11-6041T12-W08)
	32	PR97 Change to 549 ohm 1%(R11-5490T12-W08)
	32	PR98 Change to 3.09K ohm 1%(R11-3091T12-W08)
	32	PR100 Change to 2K ohm 1%(R11-0202T12-W08)
	32	PR109 Change to 97.6K ohm 1%(R11-9762T12-W08)
	32	PR112 Change to 9.31K ohm 1%(R11-9311T12-W08)
	32	PR113 Change to 3.24K ohm 1%(R11-3241T12-W08)
	32	PR114 Change to 21K ohm 1%(R11-0213T12-W08)
	32	PC84 Change to 0.068uF(C11-6832512-W08)
	32	PC93 Change to 220pF(C11-2212012-W08)
		Remove eDP AUX Channel Pull High & Pull Low Resistor
	12	R407 Unstuff
	12	PR107 Unstuff
	20	R310 Unstuff
2012.10.23	28	Add Charger Schematic
2012.10.24	28	U9 Change to 74AHC1G
	14	Modify PCH PWROK
	19	Add FB_CLAMP_REQ & FB_CLAMP MOSFET Gate
	17	Change PCH VSS Power to 1.05VRUN
2012.11.02	28	Modify AC_Interrupt Resistor
		Ver. Change to 0B
2012.11.07	04	Modify EC_PROCHOT# Pull up Resistor
2012.11.16	14	R335 Unstuff
2012.11.20	20	Change U30 SDA & SCL Pin
2013.01.02	33	Add MYLAR10
	21	Change R280 R281 R282 R283 to 180 ohm(For EMI)
2013.01.14	25	CardReader Change to RTS 5249
	18	Modify MXM 5VRUN Power
	19	Modify MXM GC6
	20	Modify ANX 1122 SMB Channel
		Ver. Change to 0C
2013.01.21	28	PQ13 & PQ14 Change to D03-0444703-A68

MICRO-STAR INT'L CO.,LTD.

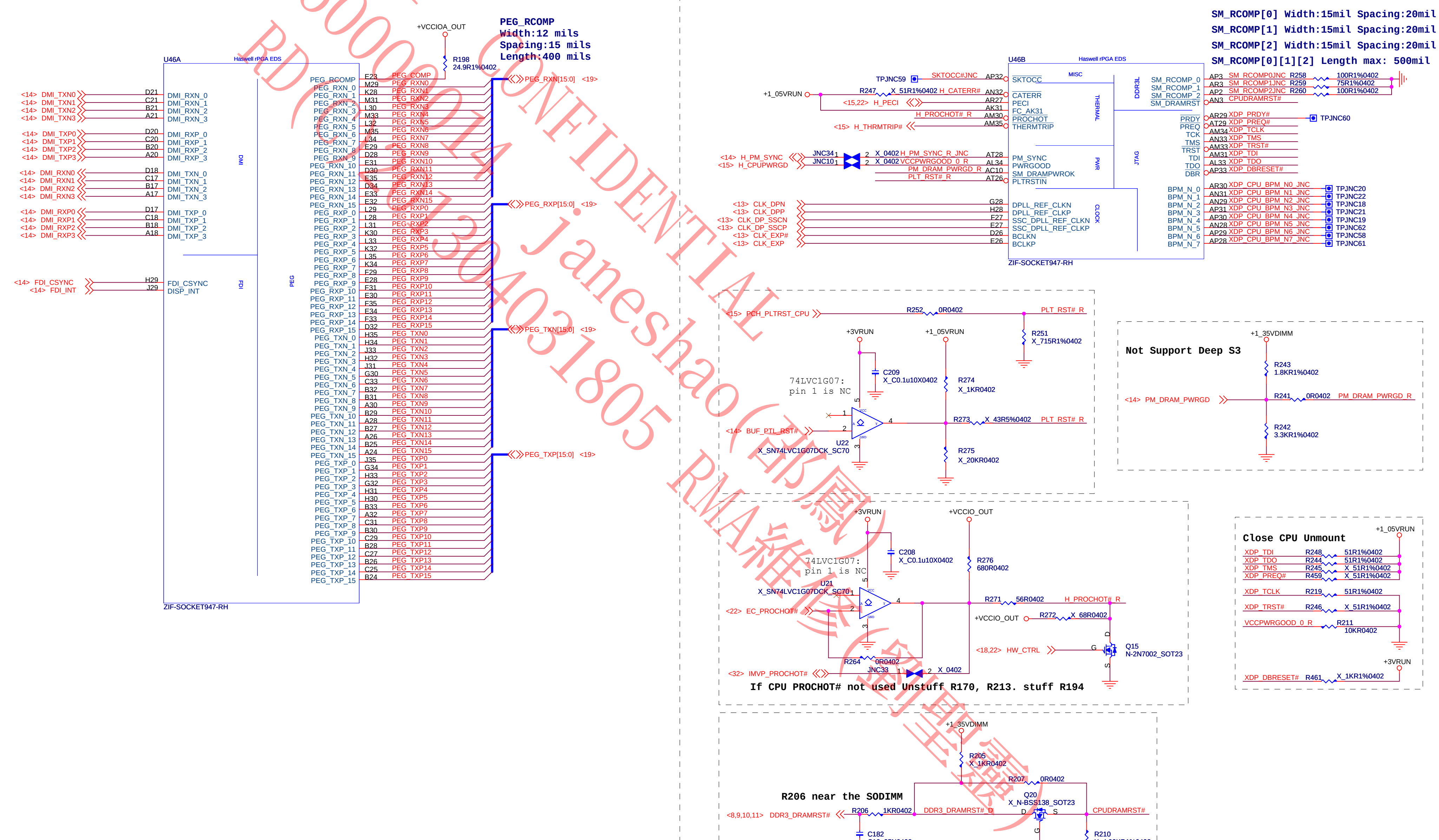
Title: History

Size | Document Number: MS-16F41 | Rev: 0A

Date: Monday, January 21, 2013 | Sheet 3 of 42

Haswell Processor (DMI,PEG,FDI)

Haswell Processor (CLK,MISC,JTAG)



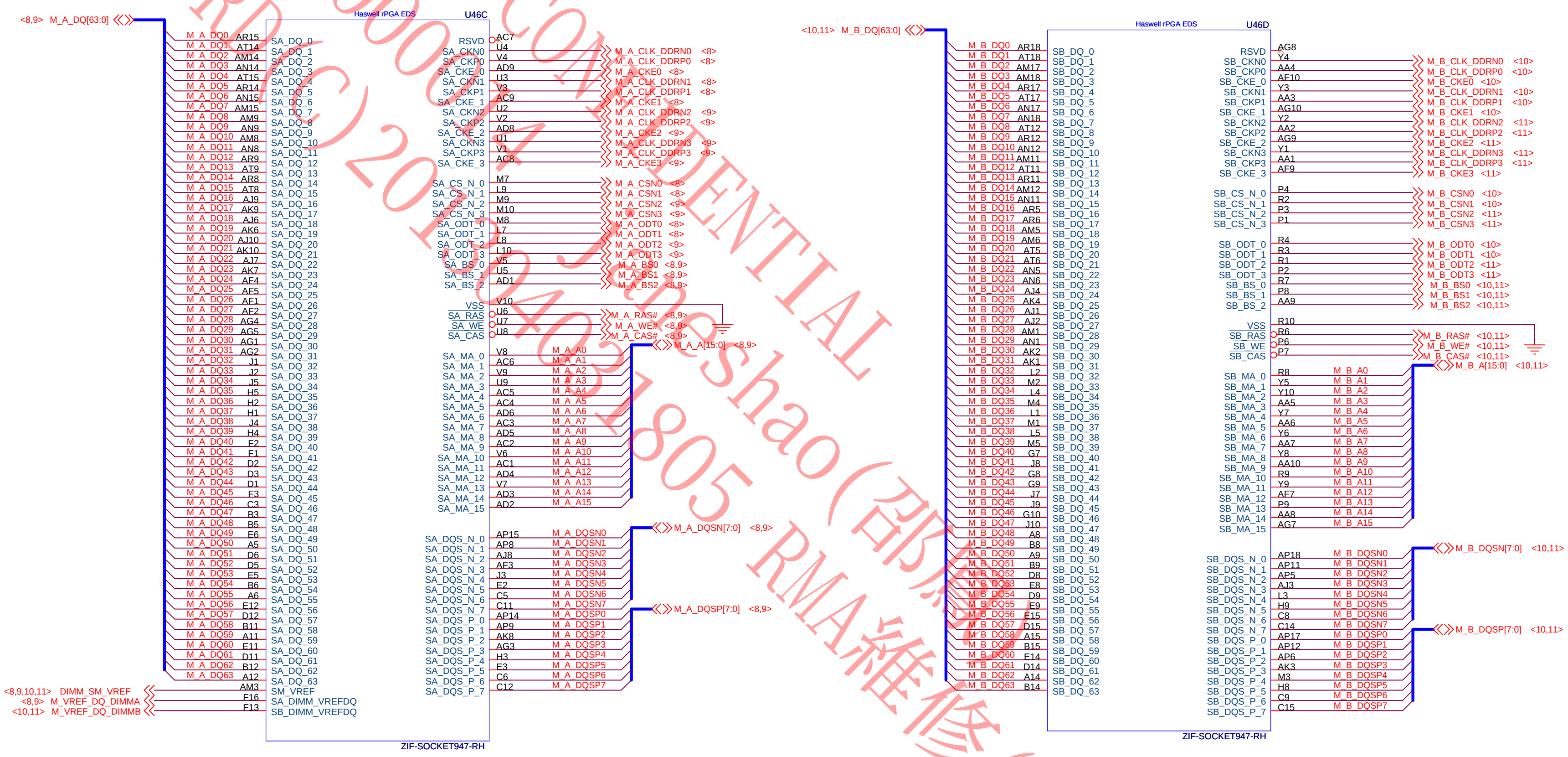
MICRO-STAR INT'L CO.,LTD.

Title: CPU(DMI,PEG,FDI/CLK,MISC,JTAG)

Size | Document Number: MS-16F41 | Rev: 0A

Date: Monday, January 21, 2013 | Sheet 4 of 42

Haswell Processor (DDR3)



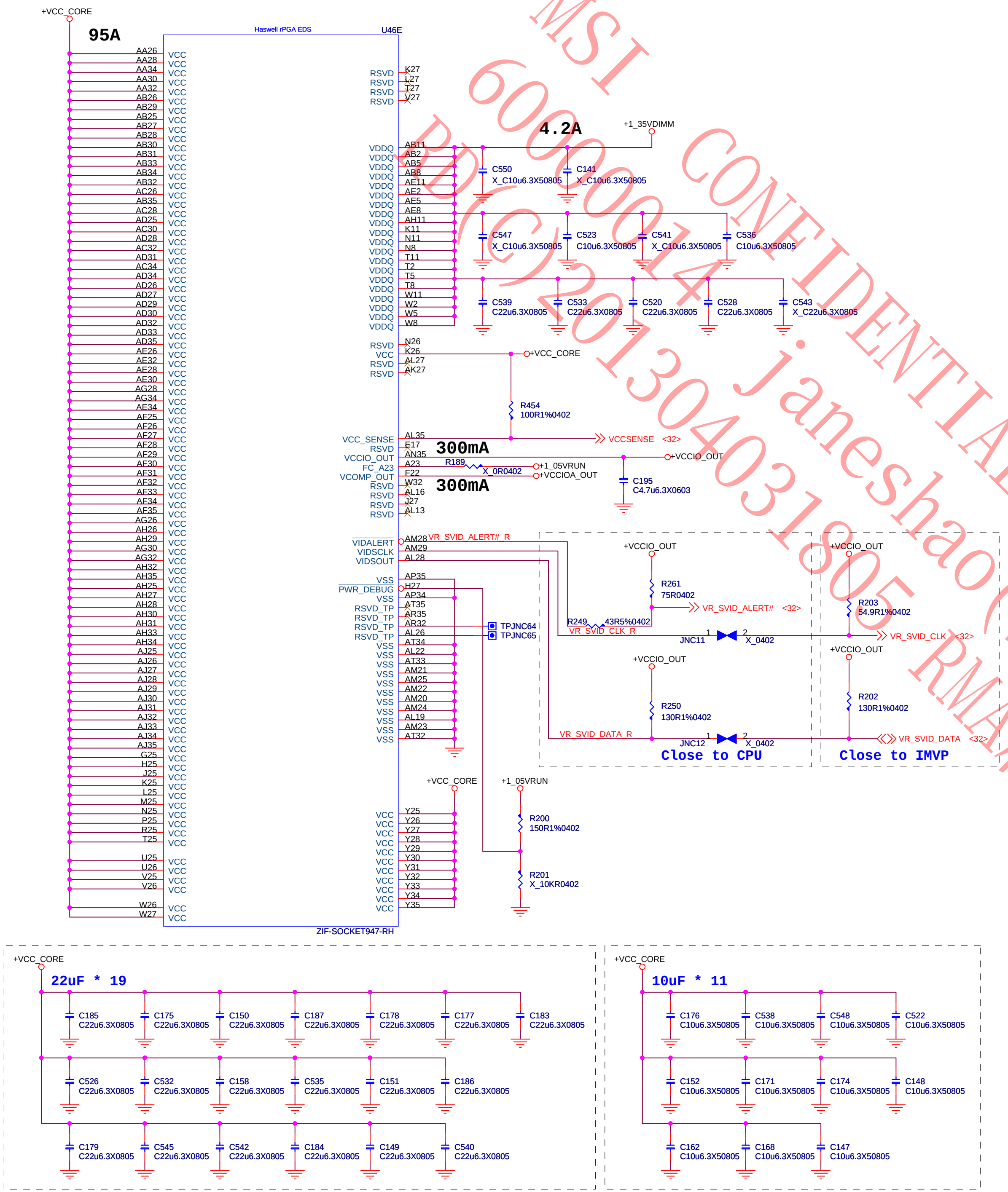
MICRO-STAR INT'L CO.,LTD.

Title: Processor (DDR3)

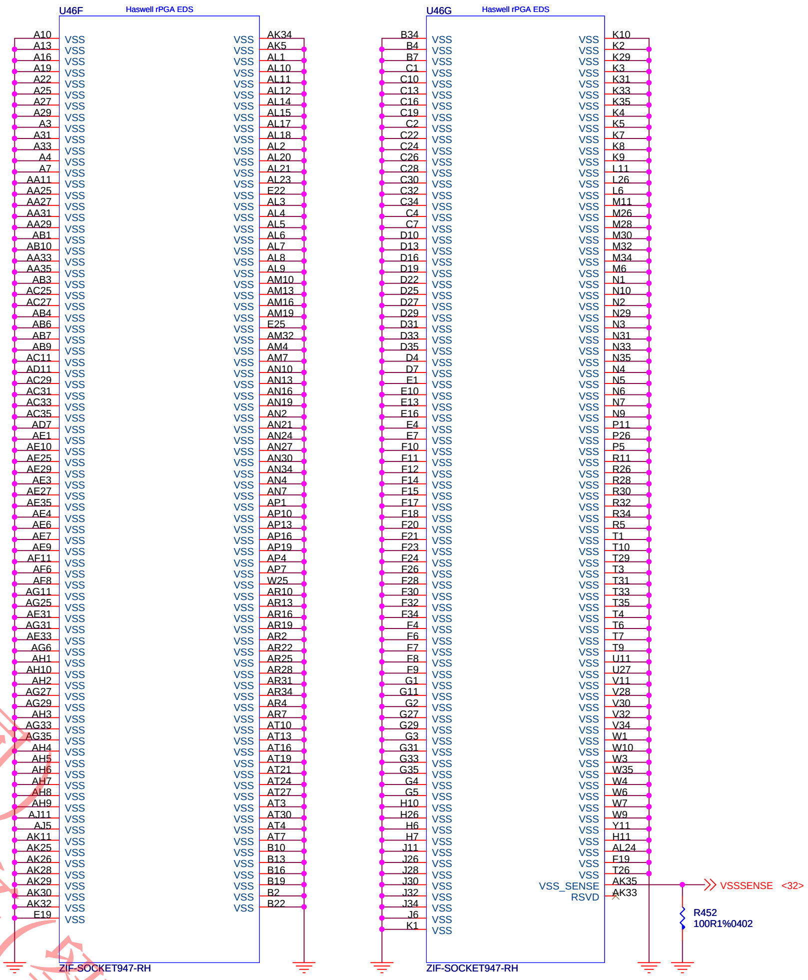
Size | Document Number: MS-16F41 | Rev 0A

Date: Monday, January 21, 2013 | Sheet 5 of 42

Haswell Processor (Power)



Haswell Processor (Gnd)



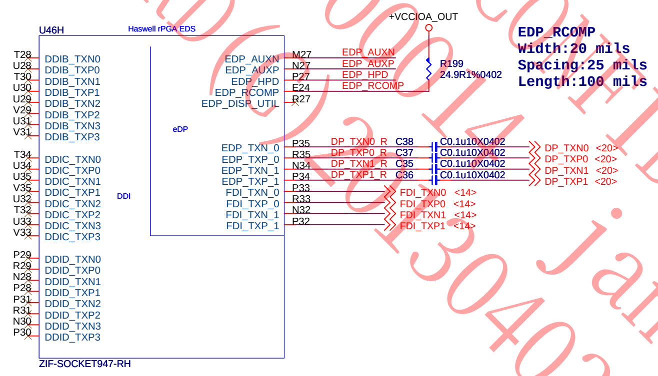
MICRO-STAR INT'L CO.,LTD.

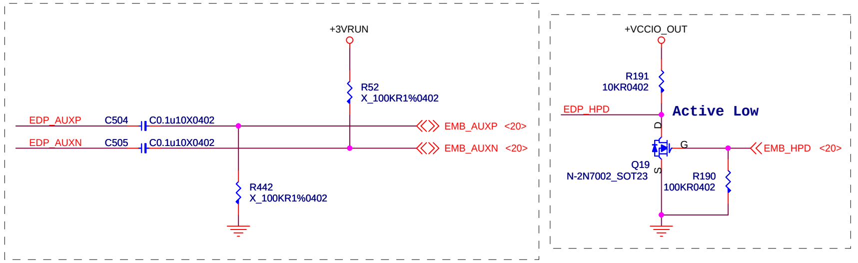
Title: Processor (Power/Gnd)

Size | Document Number: MS-16F41 | Rev: 0A

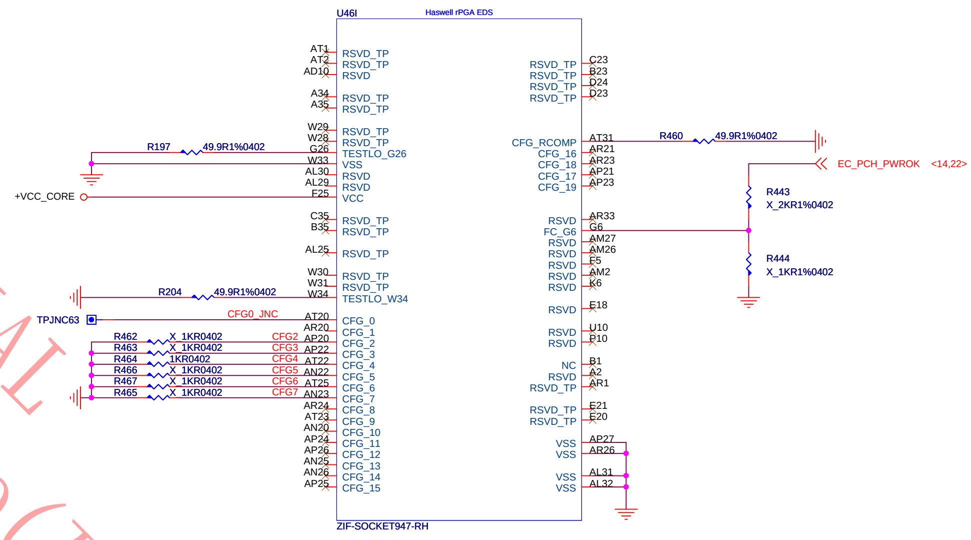
Date: Monday, January 21, 2013 | Sheet 6 of 42

Haswell Processor (Display)





Haswell Processor (Reserved)



PCI Express* Static x16 Lane Numbering Reversal	
CFG2	1 = Normal operation 0 = Lane numbers reversed.

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

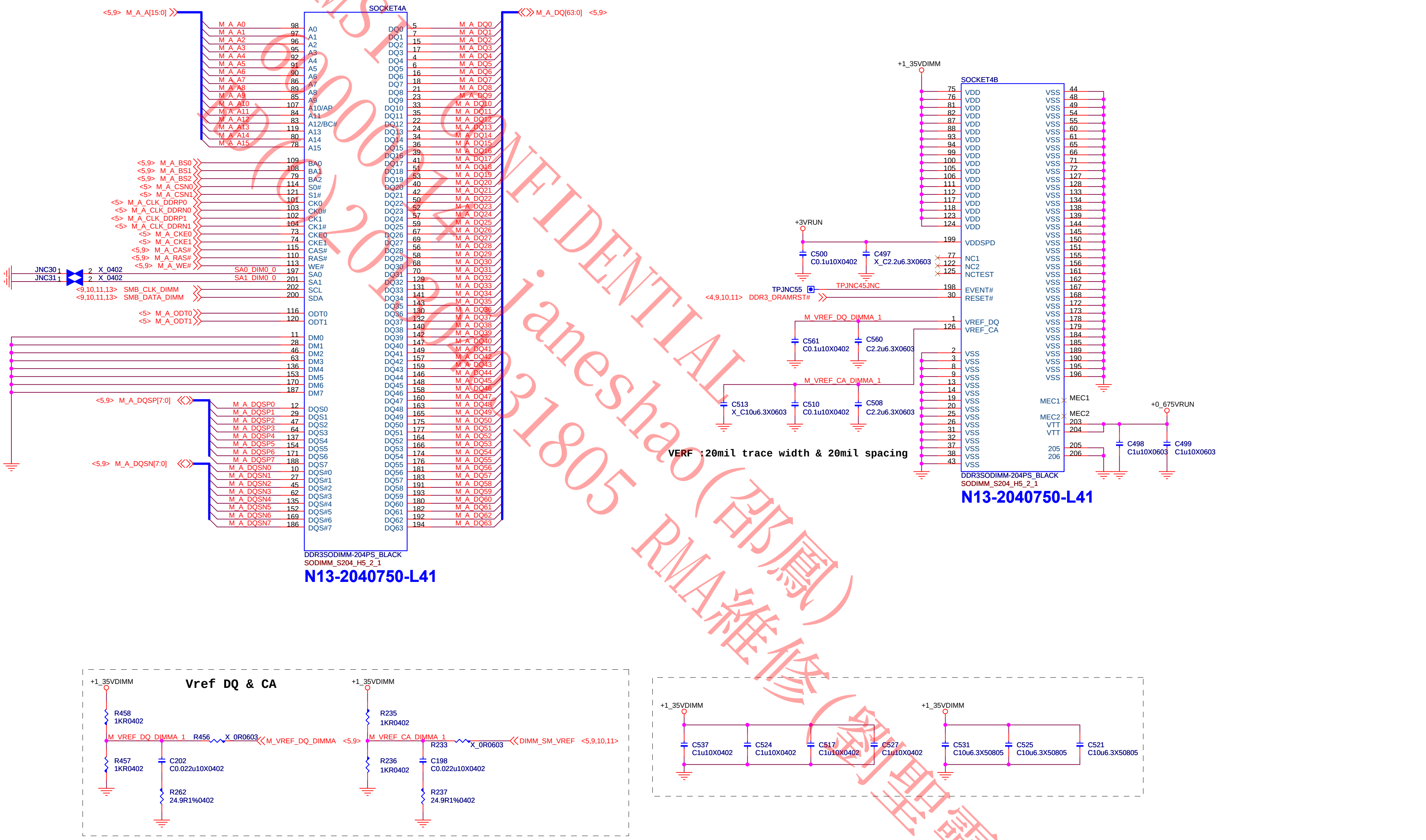
PCI Express* Bifurcation	
CFG[5:6]	00 = 1 x8, 2 x4 PCI Express 01 = reserved 10 = 2 x8 PCI Express 11 = 1 x16 PCI Express

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

MICRO-STAR INT'L CO.,LTD.

Title	Processor (Display/Reserved)	
Size	Document Number: MS-16F41	Rev: 0A
Date: Monday, January 21, 2013	Sheet 7 of 42	

SODIMM #A0



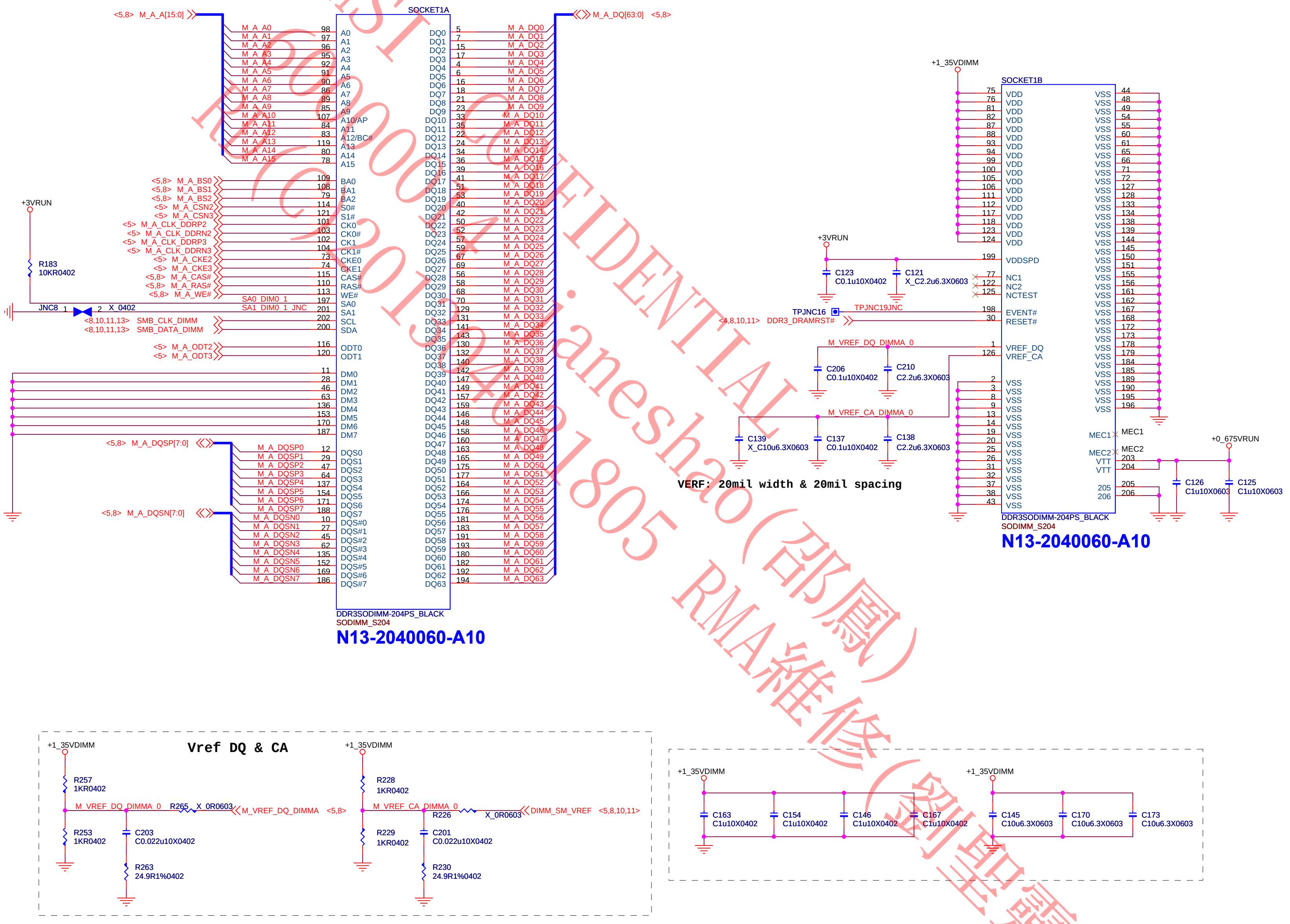
MICRO-STAR INT'L CO.,LTD.

Title: DDR3 SODIMM A0

Size | Document Number: MS-16F41 | Rev: 0A

Date: Monday, January 21, 2013 | Sheet 8 of 42

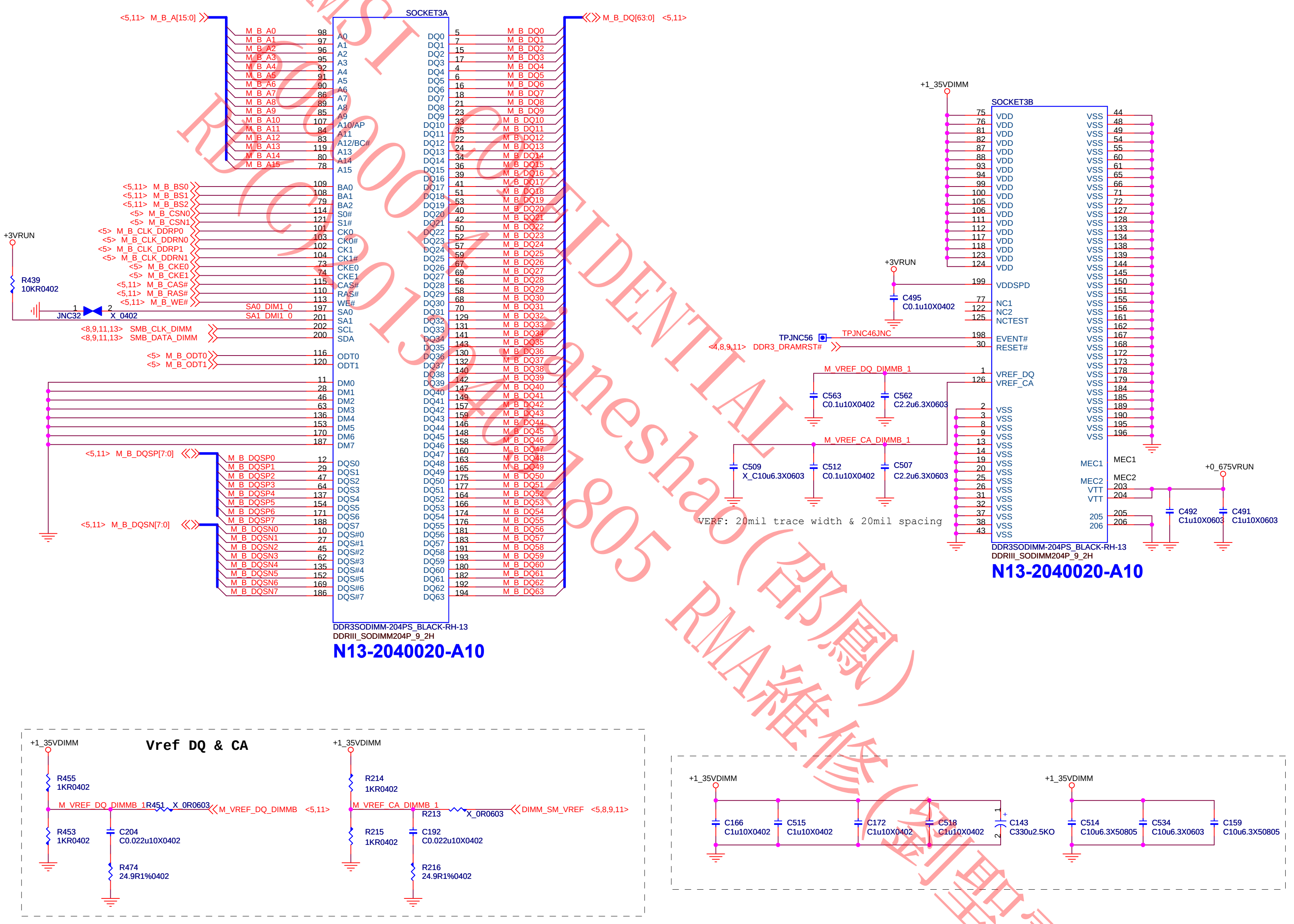
SODIMM #A1



MICRO-STAR INT'L CO.,LTD.

Title	DDR3 SODIMM A1
Size / Document Number	MS-16F41
Rev	0A
Date:	Monday, January 21, 2013
Sheet	9 of 42

SODIMM #B0



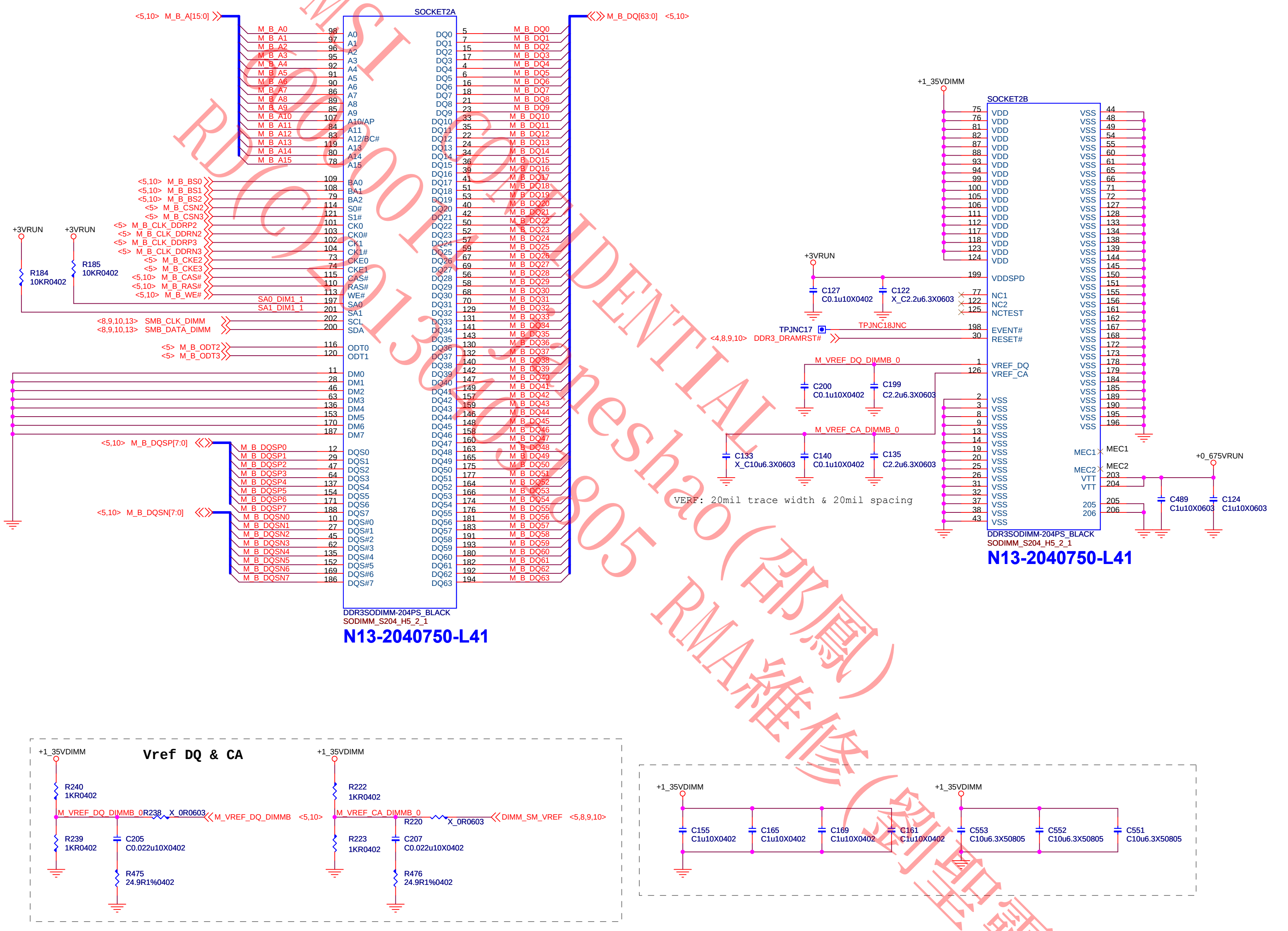
MICRO-STAR INT'L CO.,LTD.

Title: DDR3 SODIMM B0

Size | Document Number: MS-16F41 | Rev: 0A

Date: Monday, January 21, 2013 | Sheet 10 of 42

SODIMM #B1



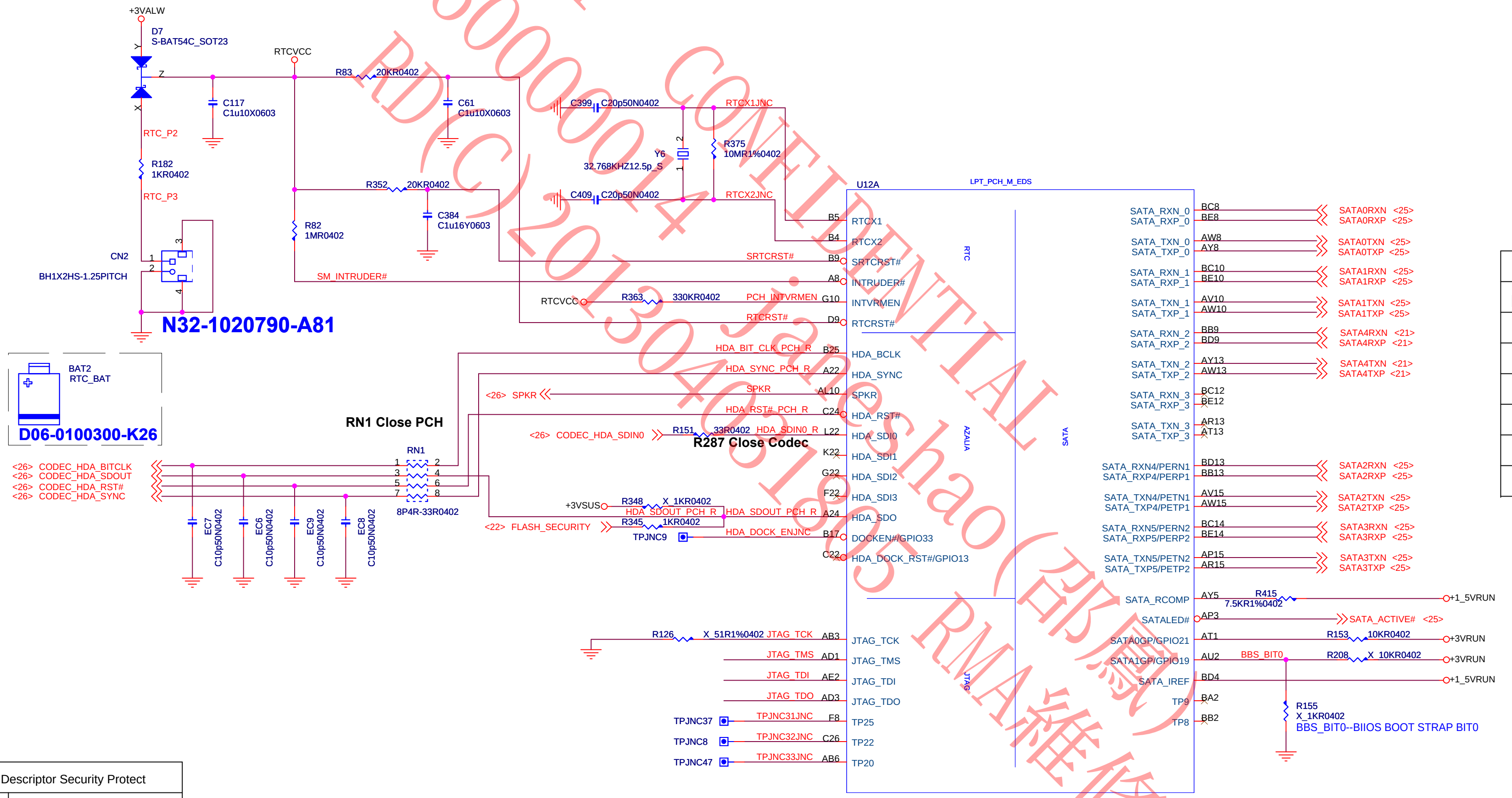
MICRO-STAR INT'L CO.,LTD.

Title: DDR3 SODIMM B1

Size | Document Number: MS-16F41 | Rev: 0A

Date: Monday, January 21, 2013 | Sheet 11 of 42

Lynx Point (HDA,JTAG,SATA)



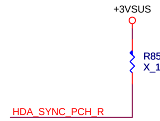
SATA	
Port	Device
0	mSATA Gen3(6Gb/s)
1	mSATA Gen3(6Gb/s)
2	ODD(Gen2)
3	NC
4	mSATA Gen3(6Gb/s)
5	To A board(Gen3)

Flash Descriptor Security Protect	
HDA_SDO	Low = Enable High = Disable

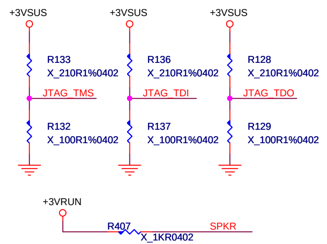
Signal has a weak internal pull-down
Note: The weak internal pull-down is disabled after PLTRST# deasserts.

SPK	The Signal has a weak internal pull-down Note: the internal pull-down is disabled after PLTRST# deasserts. If the signal is sampled high, this indicates that the system is strapped to the "No Reboot" mode (Panther Point will disable the TCO Timer system reboot feature)

Reserved for Codec use RUN.

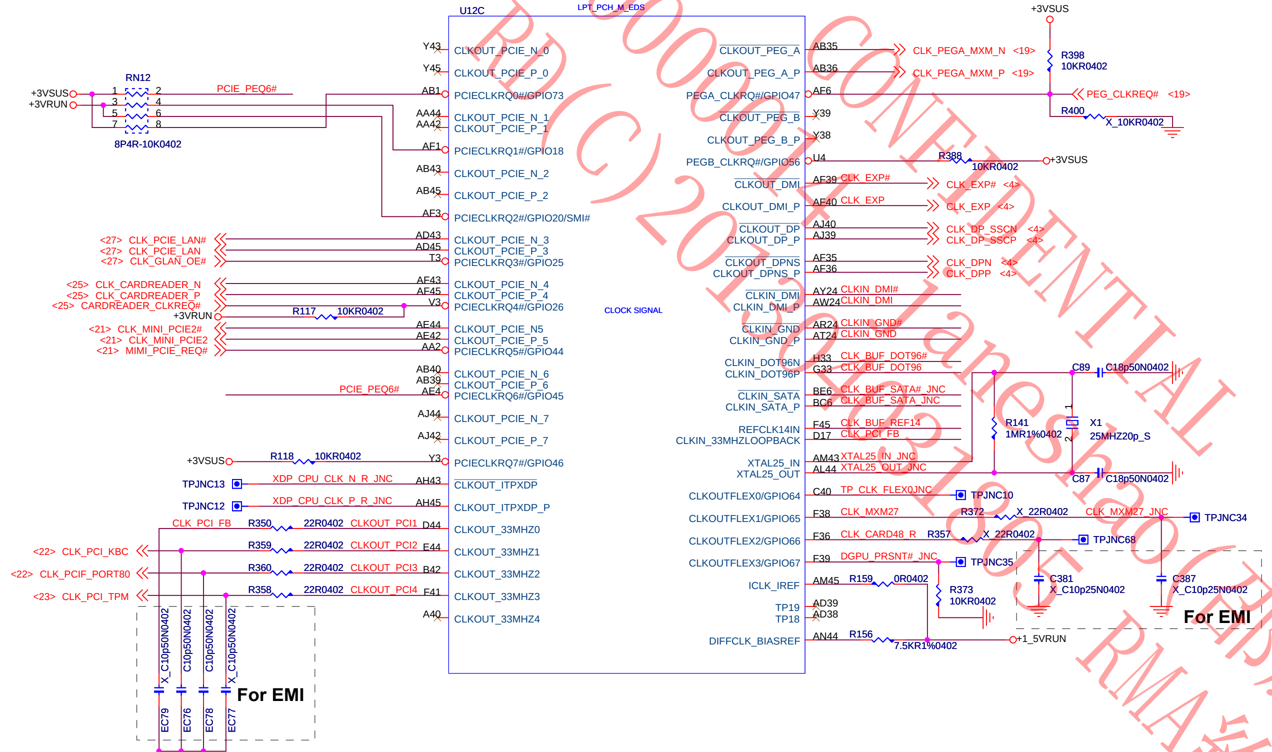


HDA_SYNC signal also serves as a strap for selecting VRM voltage to the PCH.
The strap is sampled on the rising edge of RSMRST# signal.
Due to potential leakage on the codec (path to GND), the strap may not be able to achieve the Vihmin at PCH input.
Therefore, platform may need to isolate this signal from the codec during the strap
phase. The following example circuits maybe used to achieve this purpose.



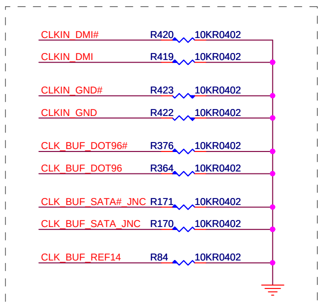
msi	MICRO-STAR INT'L CO.,LTD.	
Title	Lynx Point (HDA,JTAG,SATA)	
Size	Document Number MS-16F41	Rev 0A
Date: Monday, January 21, 2013	Sheet 12 of 42	

Lynx Point (Clock)

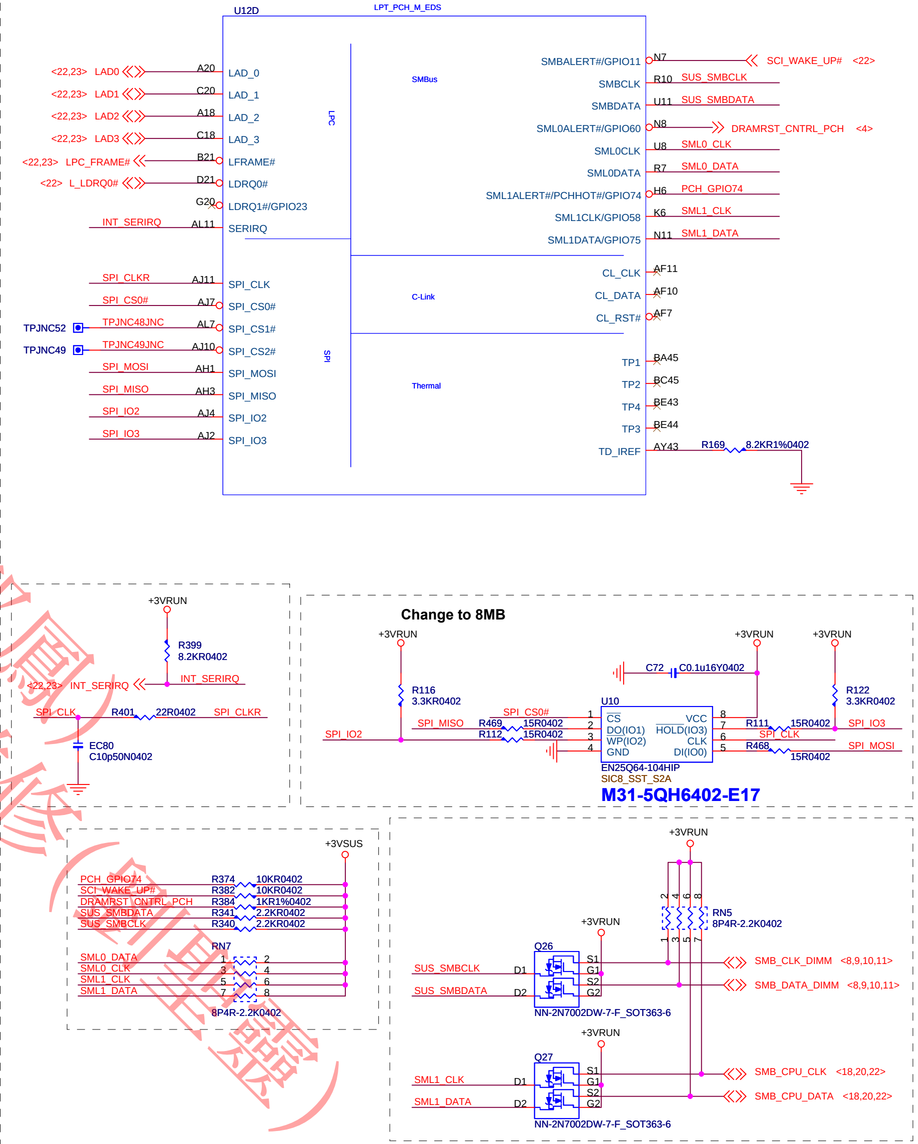


PCIe devices or addin cards that do NOT support CLKREQ# functionality should not route this signal to PCH.
Intel recommends terminating PCIECLKRQx# pin on PCH with 10 kΩ ±10% external pull-up resistor instead of No Connect.
Only PCIECLKRQ[2:1]# on PCH are core well powered. All other PCIECLKRQx# are suspend well powered.

***Disable PCIE OBFF(BIOS)**



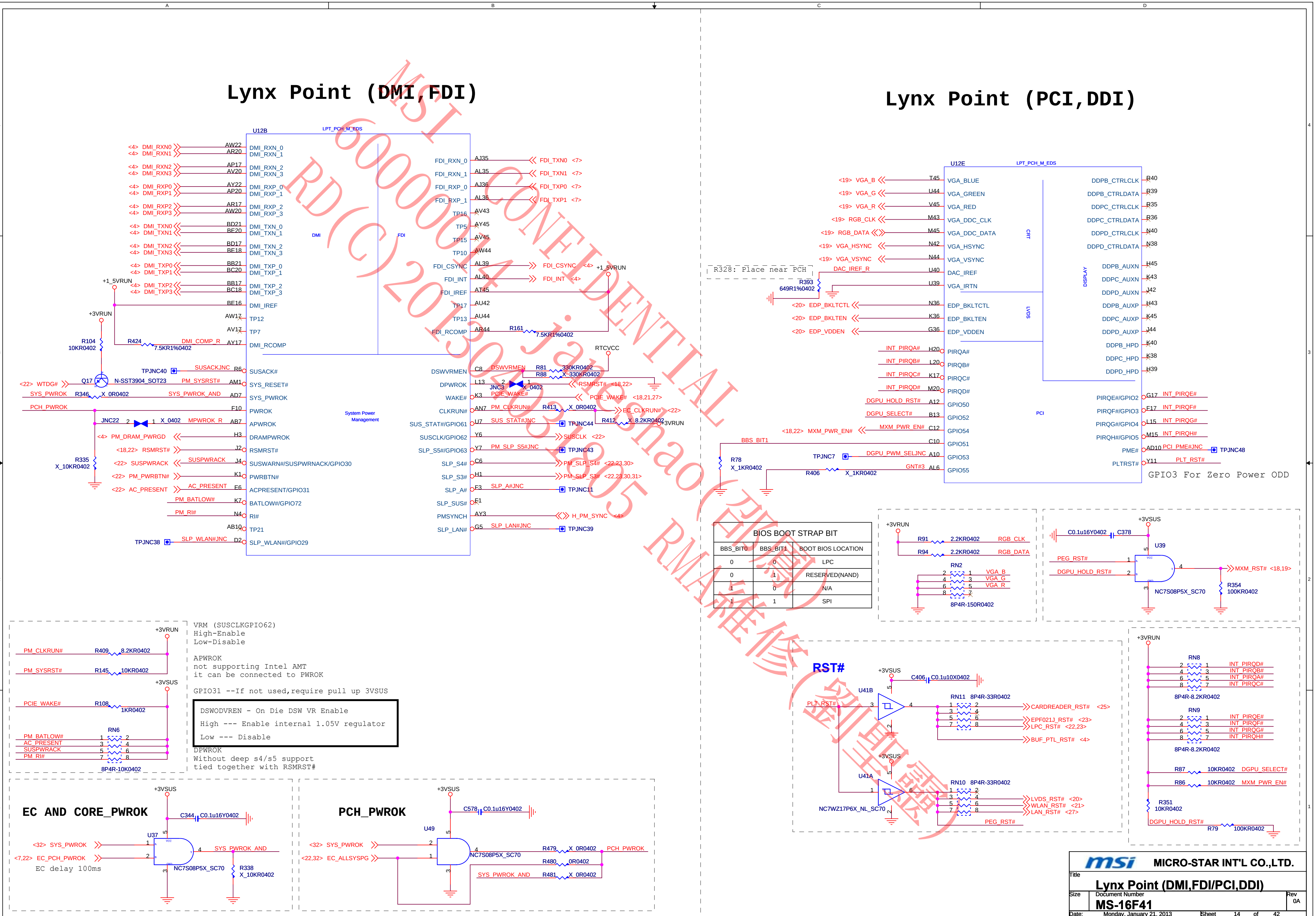
Lynx Point (LPC,SMBUS)



msi	MICRO-STAR INT'L CO.,LTD.
Title	Lynx Point (Clock/LPC,SMBUS)
Size / Document Number	MS-16F41
Rev	0A
Date:	Monday, January 21, 2013
Sheet	13 of 42

Lynx Point (DMI,FDI)

Lynx Point (PCI,DDI)



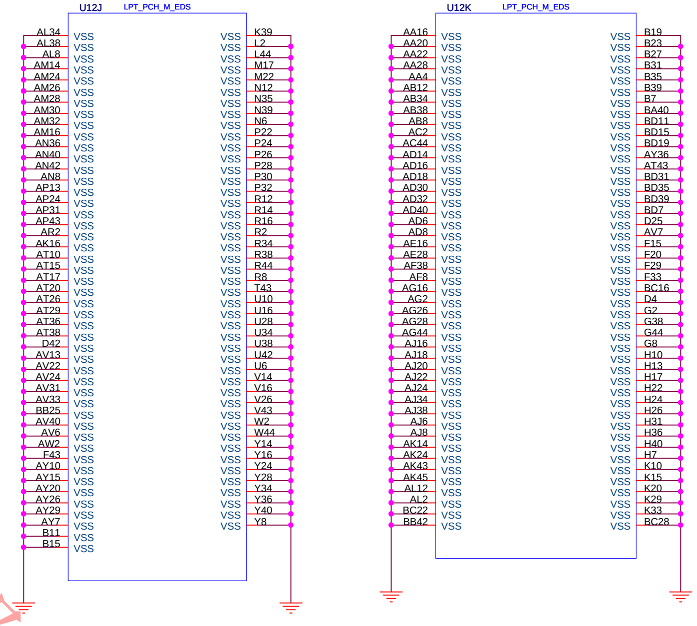
U12B
LPT_PCH_M_EDS
DMI_RXN_0
DMI_RXN_1
DMI_RXN_2
DMI_RXN_3
DMI_RXP_0
DMI_RXP_1
DMI_RXP_2
DMI_RXP_3
DMI_TXN_0
DMI_TXN_1
DMI_TXN_2
DMI_TXN_3
DMI_TXP_0
DMI_TXP_1
DMI_TXP_2
DMI_TXP_3
DMI_IREF
DMI_RCOMP
FDI_RXN_0
FDI_RXN_1
FDI_RXP_0
FDI_RXP_1
FDI_CSYNC
FDI_INT
FDI_IREF
FDI_RCOMP
System Power Management
SUSACK#
SYS_RESET#
SYS_PWROK
PWROK
APWROK
DRAMPWROK
RSMRST#
SUSWARN#/SUSPWRNACK/GPIO30
PWRBTN#
ACPRESENT/GPIO31
BATLOW#/GPIO72
RI#
SLP_WLAN#/GPIO29
DSWVRMEN
DPWROK
WAKE#
CLKRUN#
SUS_STAT#/GPIO61
SUSCLK/GPIO62
SLP_S5#/GPIO63
SLP_S4#
SLP_S3#
SLP_A#
SLP_SUS#
PMSYNCH
SLP_LAN#
U12E
VGA_BLUE
VGA_GREEN
VGA_RED
VGA_DDC_CLK
VGA_DDC_DATA
VGA_HSYNC
VGA_VSYNC
DAC_IREF
VGA_IRTN
EDP_BKLTCTL
EDP_BKLTEN
EDP_VDDEN
PIRQA#
PIRQB#
PIRQC#
PIRQD#
GPIO50
GPIO52
GPIO54
GPIO51
GPIO53
GPIO55
DDPB_CTRLCLK
DDPB_CTRLDATA
DDPC_CTRLCLK
DDPC_CTRLDATA
DDPD_CTRLCLK
DDPD_CTRLDATA
DDPB_AUXN
DDPC_AUXN
DDPD_AUXN
DDPB_AUXP
DDPC_AUXP
DDPD_AUXP
DDPB_HPD
DDPC_HPD
DDPD_HPD
PIRQE#/GPIO2
PIRQF#/GPIO3
PIRQG#/GPIO4
PIRQH#/GPIO5
PME#
PLTRST#
R328: Place near PCH
GPIO3 For Zero Power ODD
VRM (SUSCLKGPIO62)
High-Enable
Low-Disable
APWROK
not supporting Intel AMT
it can be connected to PWROK
GPIO31 --If not used,require pull up 3VSUS
DSWODVREN - On Die DSW VR Enable
High --- Enable internal 1.05V regulator
Low --- Disable
DPWROK
Without deep s4/s5 support
tied together with RSMRST#
EC AND CORE_PWROK
EC delay 100ms
PCH_PWROK
RST#

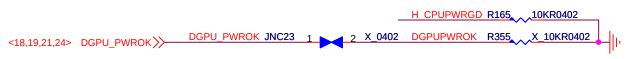
BIOS BOOT STRAP BIT

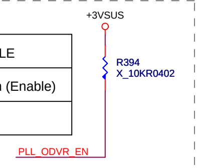
BBS_BIT0	BBS_BIT1	BOOT BIOS LOCATION
0	0	LPC
0	1	RESERVED(NAND)
1	0	N/A
1	1	SPI

Lynx Point (GPIO,MISC)

Lynx Point (Gnd)





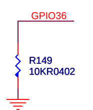


PLL ON DIE VR_ENABLE	
GPIO28	Internal pull high (Enable)
	Low: Disable

GPIO28 has a weak internal pull-up.
The internal pull-up is disabled after RSMRST# deasserts.

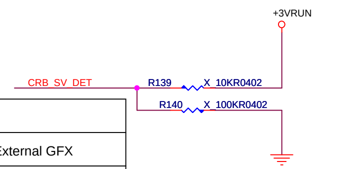
SATA3GP/GPIO37
This signal has a weak internal pull-down.
NOTE:
The internal pull-down is disabled after PLTRST# deasserts.
NOTE:
This signal should not be pulled high when strap is sampled.

This signal has a weak internal pull-down.
NOTE:
The internal pull-down is disabled after PLTRST# deasserts.



GPIO36 --CRB connector to 3V

No USED



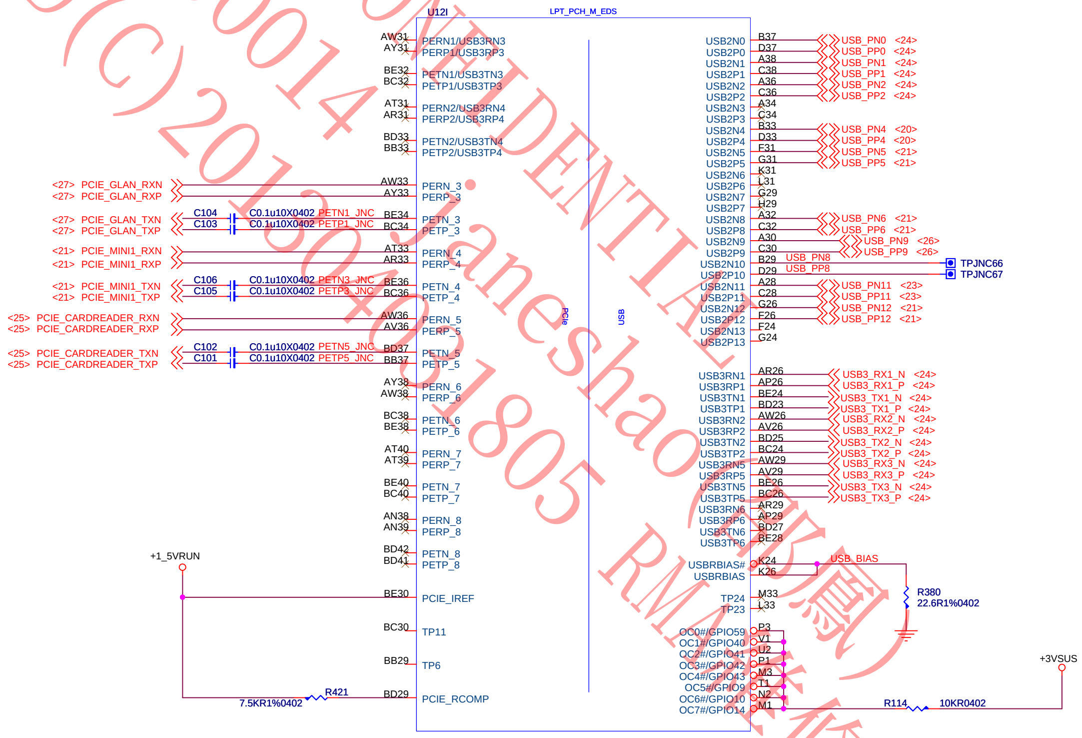
CRB_SV_DET	
GPIO39	High: External GFX
	Low: Internal GFX

GPIO0 & 6 & 16 & 17 & 22 & 34 & 38 & 48 --If not used,require pull up 3VRUN
GPIO57 --If not used,require pull up 3VSUS
GPIO15--Not support AMT,Transport Layer Security Disable(High is support TLS,internal pull-down)
GPIO27 is deep S4 & S5 weak up event,internal pull high.& It's VCCFDIPLL internal VRM strapping pin
GPIO35 --Define to EDID Select (If not used,require pull down)

SATA2GP/GPIO36 (net name: FDI_OVRVLTG) & SATA3GP/GPIO37 (net name: SATA_ODD_PRSNT#)
Sampled at Rising edge of PWROK.
Weak internal pull-down. (weak internal pull-down is disabled after PLTRST# de-asserts)
NOTE: This signal should NOT be pulled high when strap is sampled

Lynx Point (PCIE,USB)

PCI-E	
Port	**Device**
3	Giga Lan
4	Mini PCIE-WLAN
5	Card Reader



USB			
USB 2.0	**USB 3.0**	**Device**	**Note**
0	1	USB 3.0 Port 1	
1	2	USB 3.0 Port 2	Debug Port
2	5	USB 3.0 Port 3	
3			NC
4		WebCam (LVDS)	
5		USB 2.0 Port 5 (1763)	
6			NC
7			NC
8		USB 2.0 Port 5 (1763)	
9		USB 2.0 Port 5 (16F4)	Debug Port
10		TestPad	
11		EPF LED (8051)	
12		Mini PCIE-BT	
13			NC
	3		NC
	4		NC
	6		NC

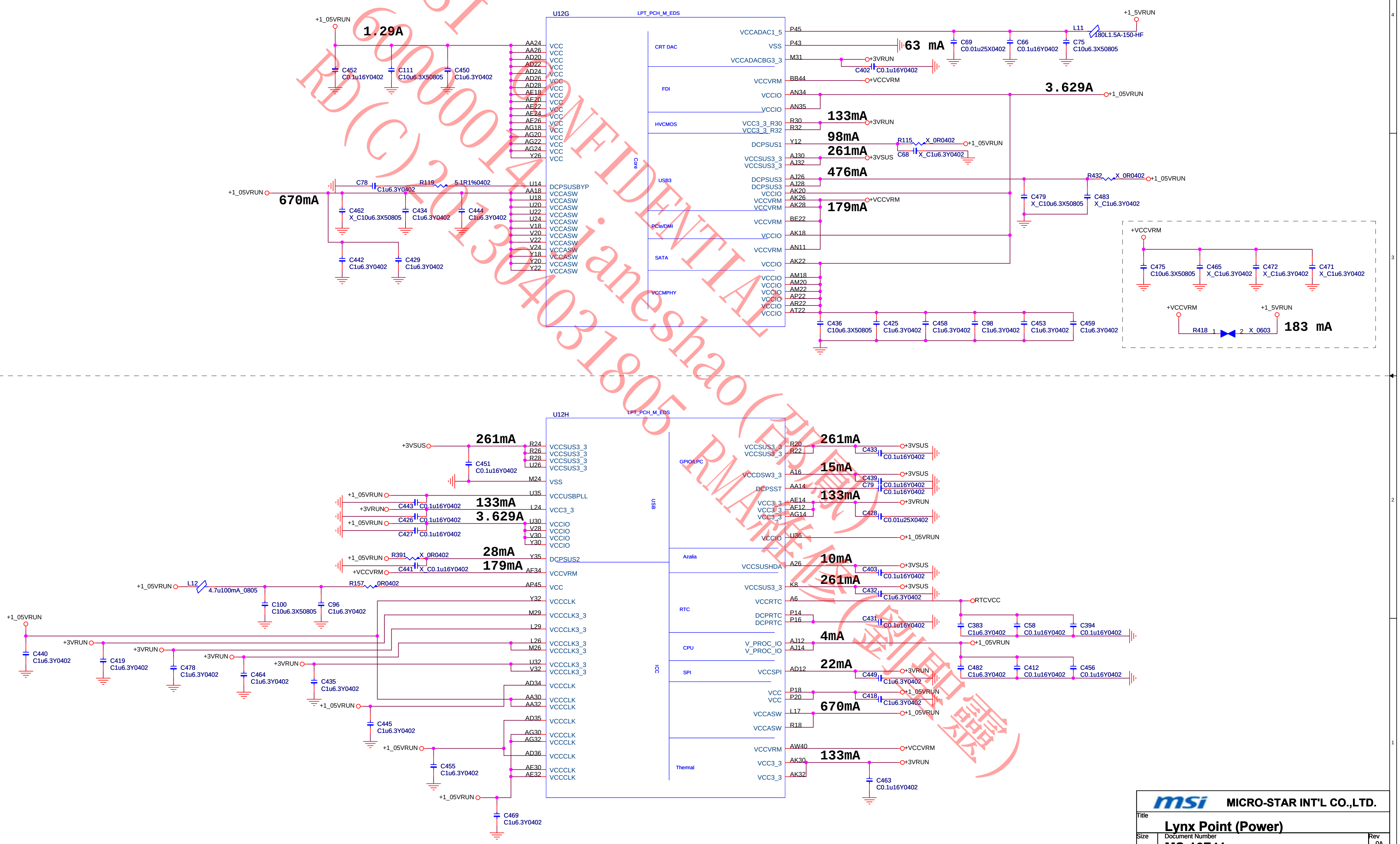
msi MICRO-STAR INT'L CO.,LTD.

Title: Lynx Point (PCIE,USB)

Size | Document Number: MS-16F41 | Rev: 0A

Date: Monday, January 21, 2013 | Sheet 16 of 42

Lynx Point (Power)



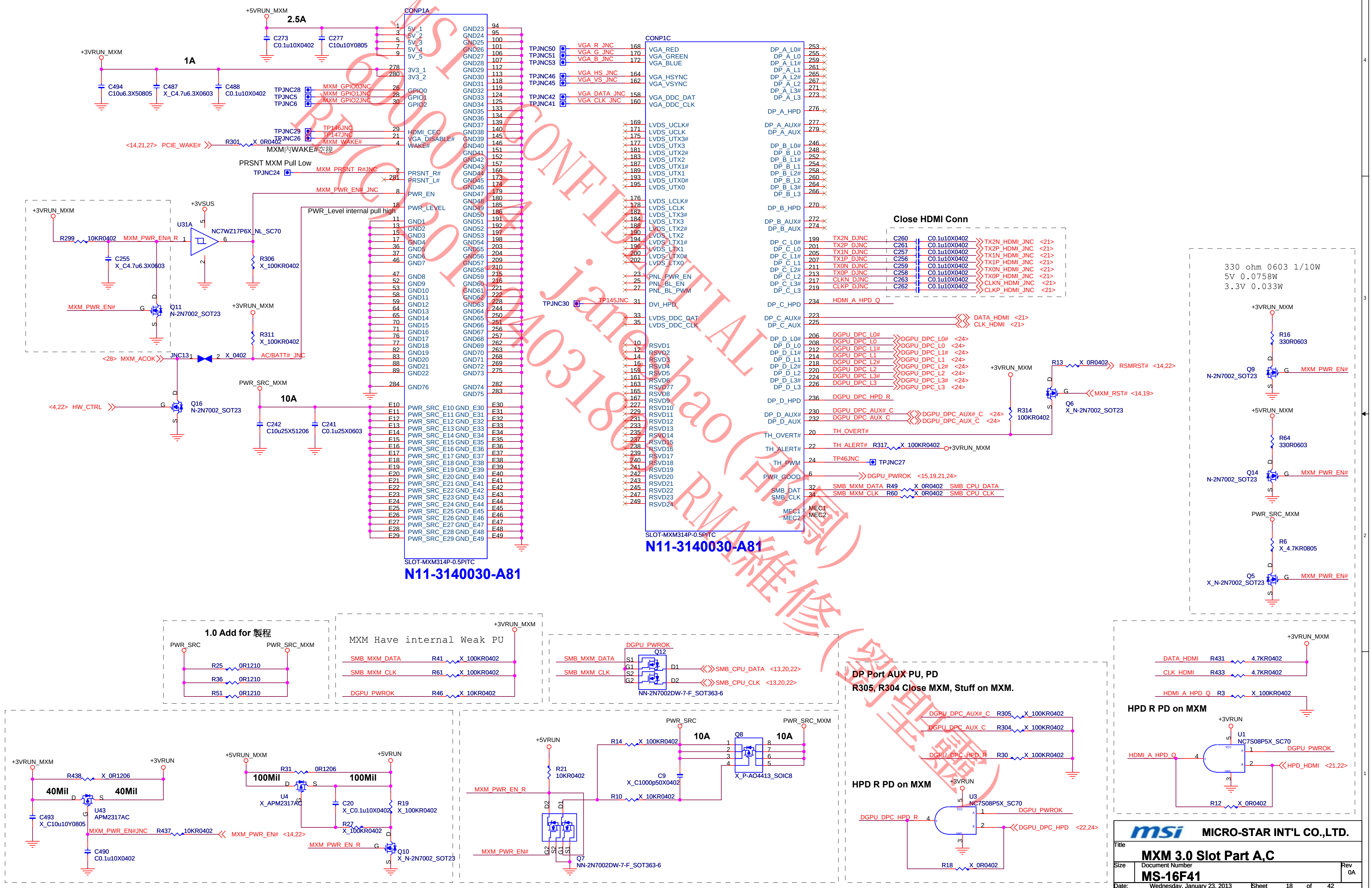
MICRO-STAR INT'L CO.,LTD.

Title: Lynx Point (Power)

Size | Document Number: MS-16F41 | Rev: 0A

Date: Monday, January 21, 2013 | Sheet 17 of 42

MXM 3.0 (x16 PEG Gen 3)



MICRO-STAR INT'L CO.,LTD.

Title	MXM 3.0 Slot Part A,C
Size / Document Number	MS-16F41
Rev	0A
Date:	Wednesday, January 23, 2013
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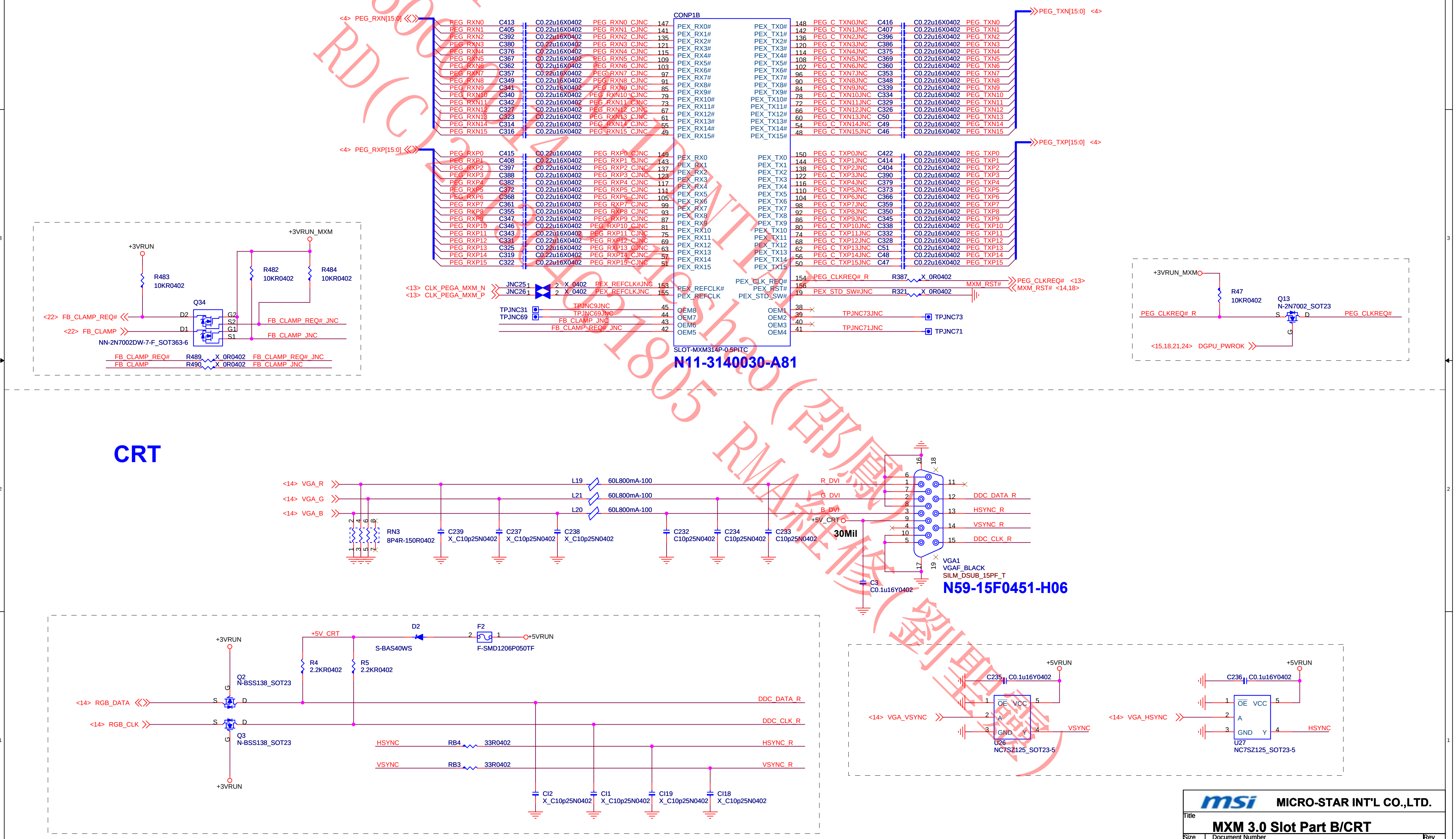
MXM 3.0 (x16 PEG Gen 3)

n'VIDIA Comments: NV11 can't support PCIE GEN3,so used 0.1uf CAP

The change in AC capacitor value from 0.1uf to 0.22uf is to enable compatibility with futrue platforms having PCIE GEN3(8GT/s)



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

Title: MXM 3.0 Slot Part B/CRT

Size | Document Number: MS-16F41 | Rev: 0A

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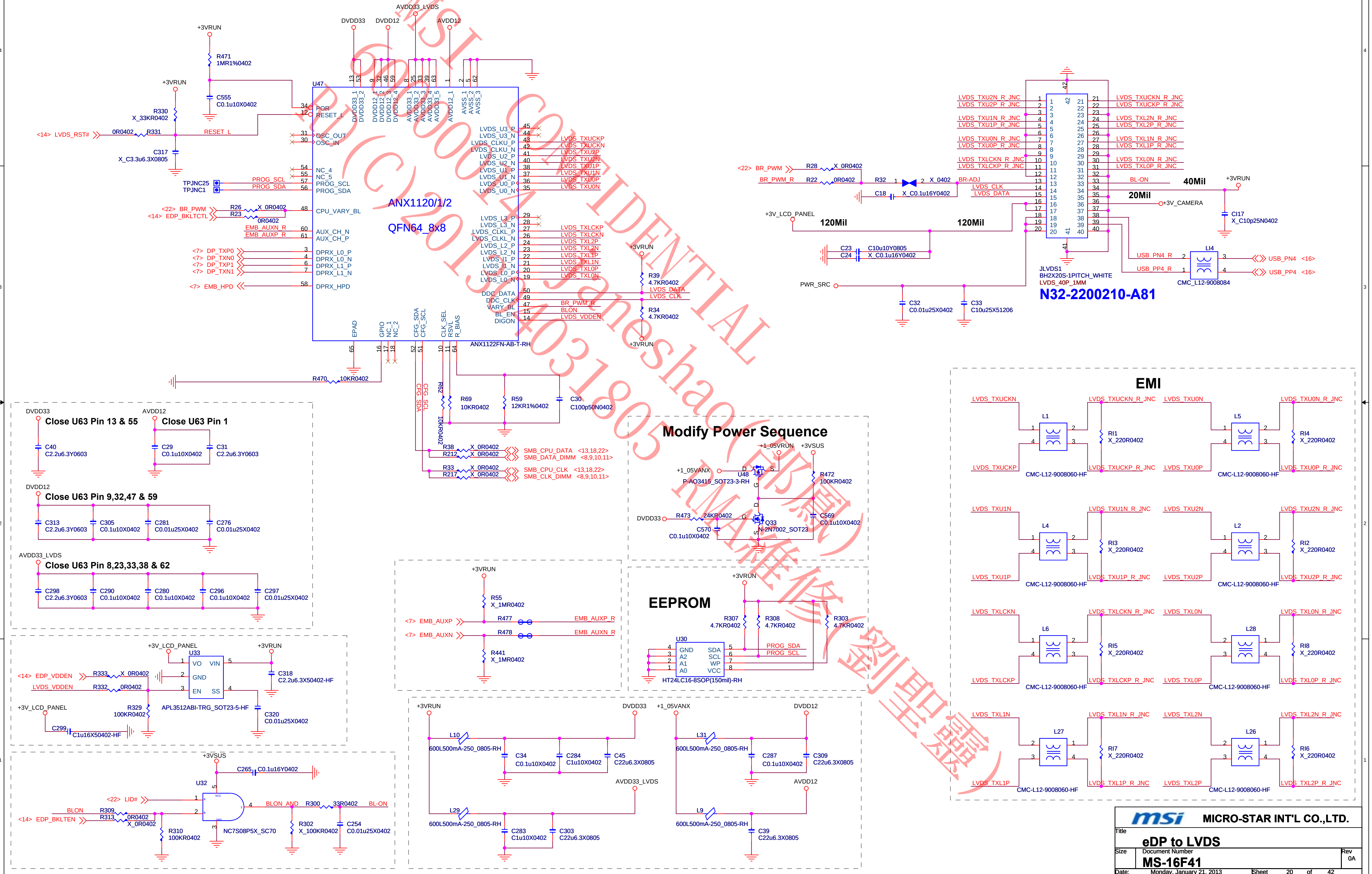
eDP to LVDS



MICRO-STAR INT'L CO.,LTD.

Title: eDP to LVDS

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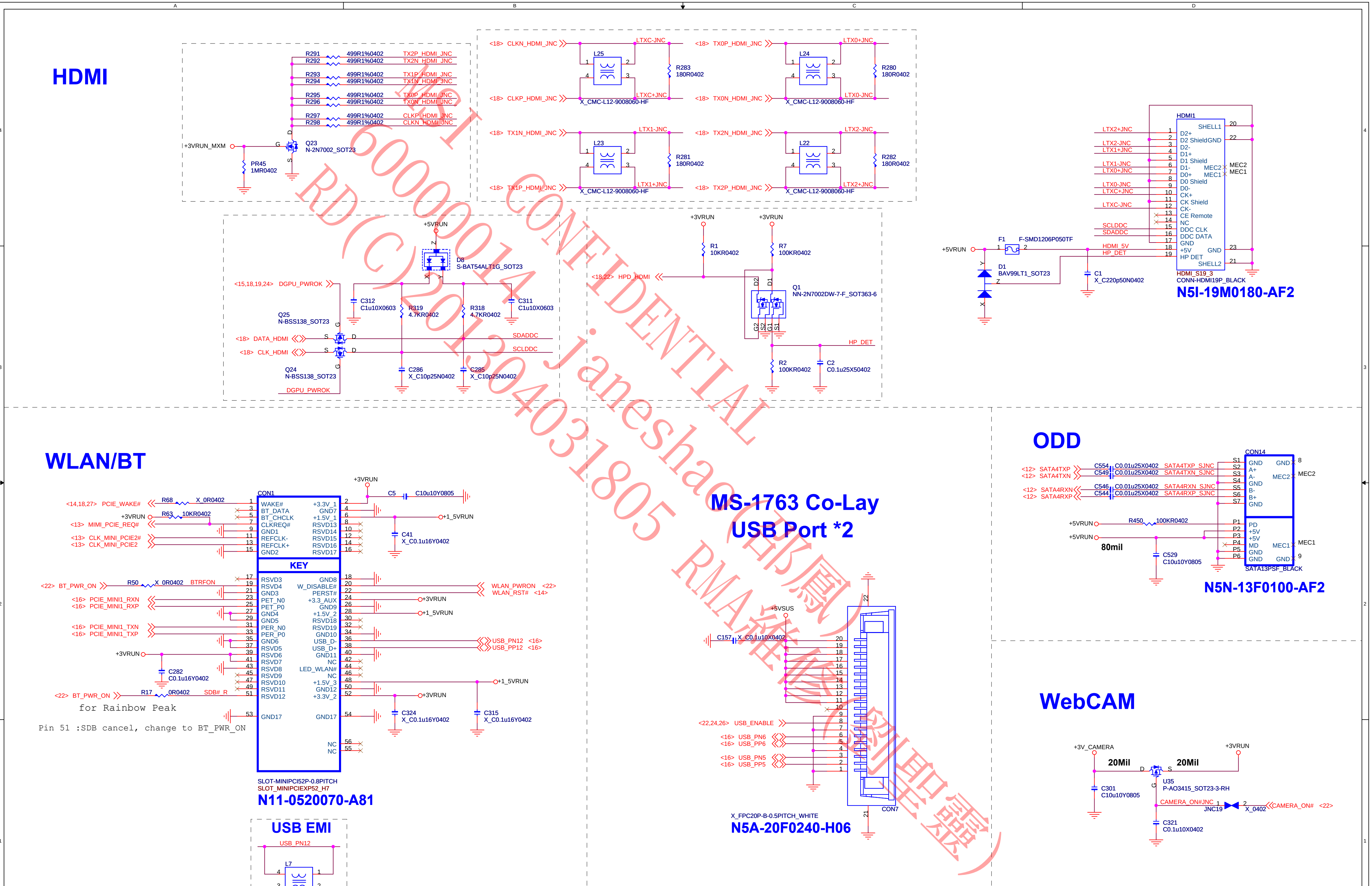
Date: Monday, January 21, 2013 | Sheet 20 of 42



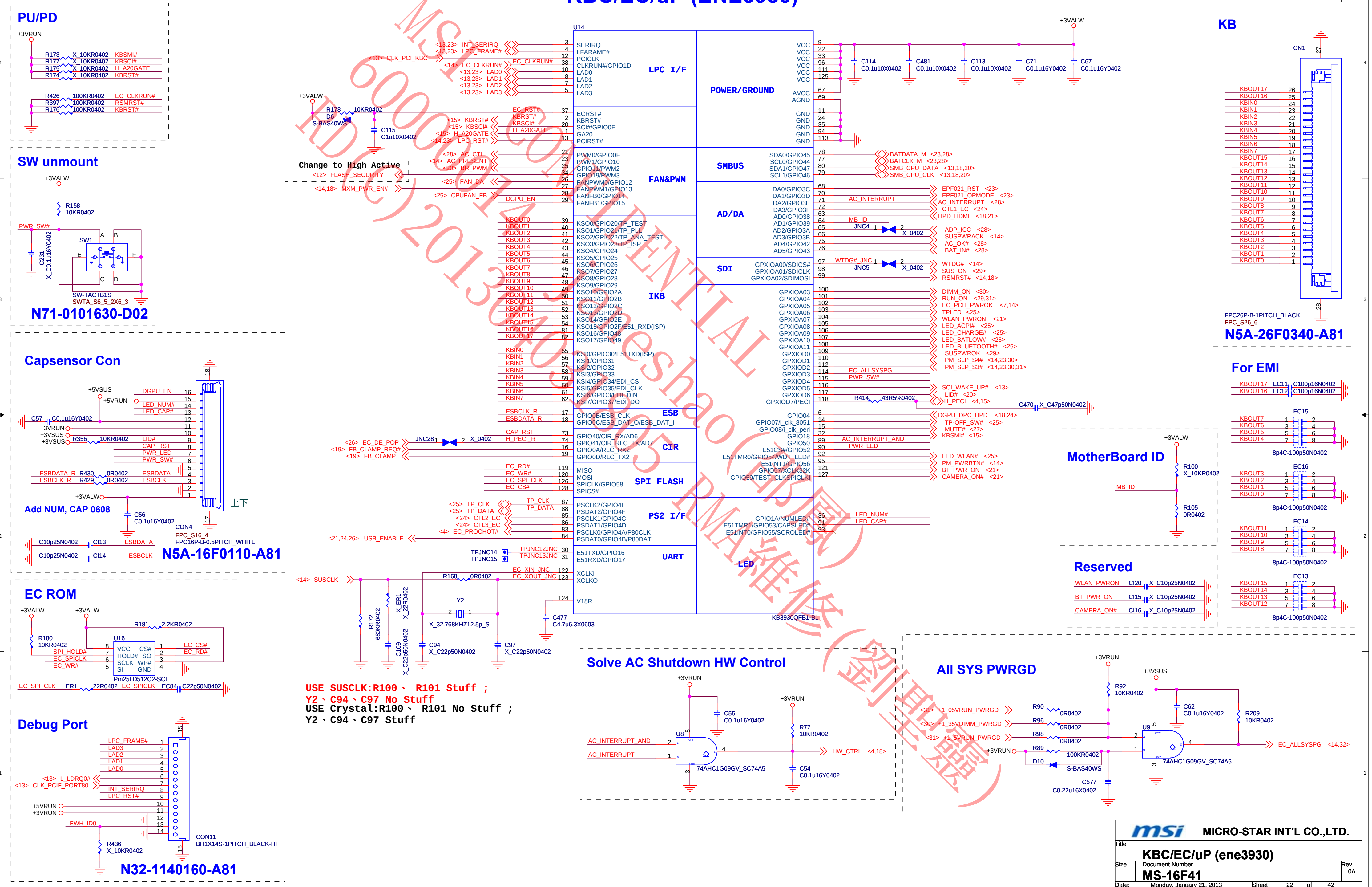
MICRO-STAR INT'L CO.,LTD.

Title: HDMI/WLAN/BT/USB/ODD/CAM

Size | Document Number: MS-16F41 | Rev 0A

Date: Monday, January 21, 2013 | Sheet 21 of 42

KBC/EC/uP (ENE3930)


PU/PD
SW unmount
N71-0101630-D02
Capsensor Con
Add NUM, CAP 0608
N5A-16F0110-A81
EC ROM
Debug Port
N32-1140160-A81
Change to High Active
LPC I/F
POWER/GROUND
FAN&PWM
SMBUS
AD/DA
SDI
IKB
ESB
CIR
SPI FLASH
PS2 I/F
UART
LED
KB3930QFB1-B1
USE SUSCLK:R100、 R101 Stuff ;
Y2、C94、C97 No Stuff
USE Crystal:R100、 R101 No Stuff ;
Y2、C94、C97 Stuff
Solve AC Shutdown HW Control
All SYS PWRGD
KB
N5A-26F0340-A81
For EMI
MotherBoard ID
Reserved

MICRO-STAR INT'L CO.,LTD.

Title	KBC/EC/uP (ene3930)
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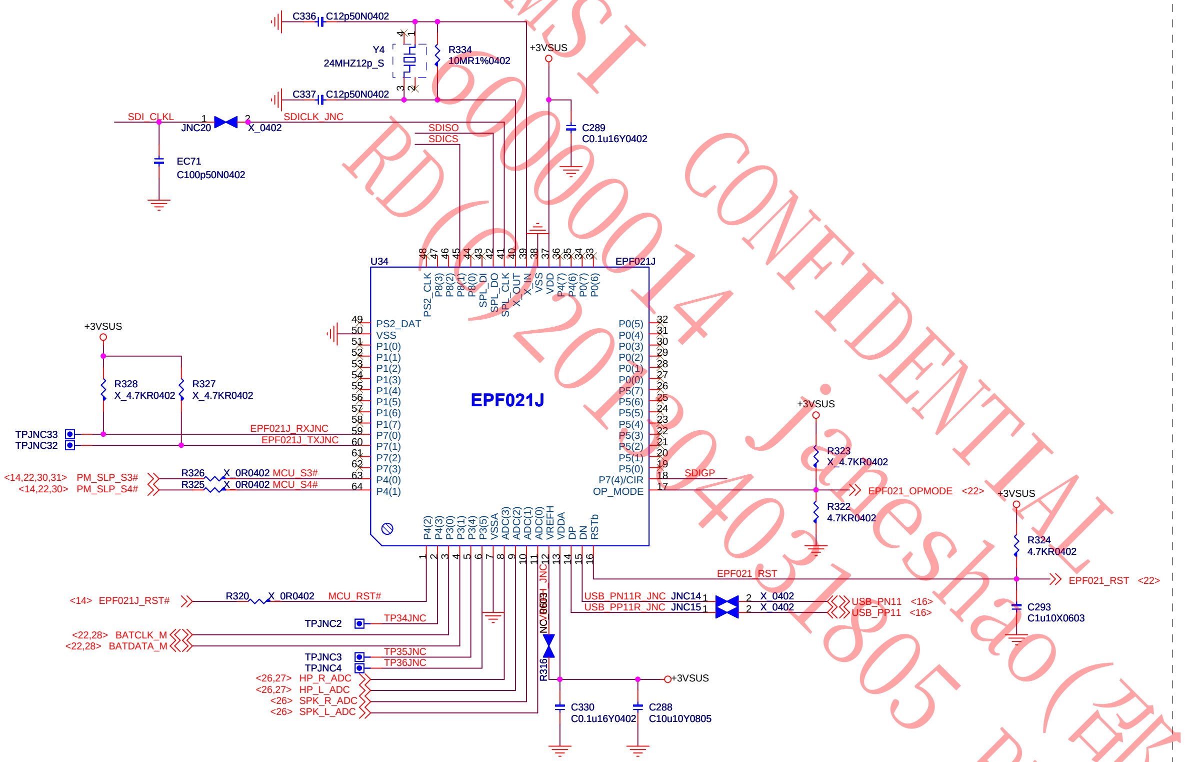
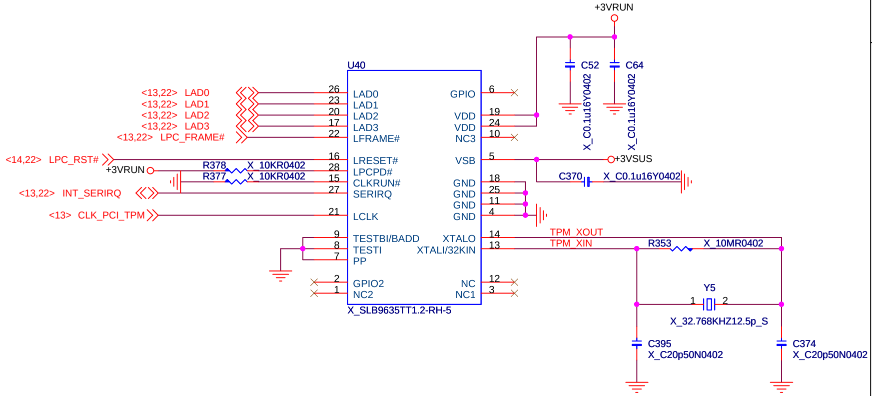
LED 8051 Controller(EPF021J)



TPM

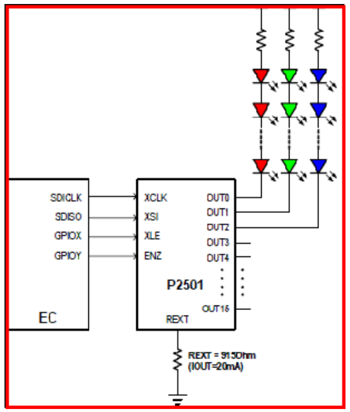


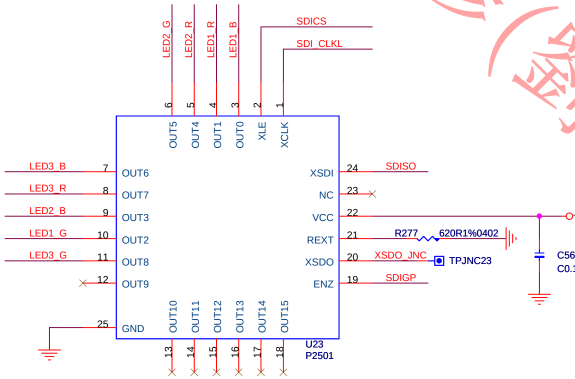
LED Driver IC

LED Forward Voltage	
R_Max	2.4V x 4 pcs = 9.6V
G_Max	3.3V x 4 pcs = 13.2V
B_Max	3.3V x 4 pcs = 13.2V

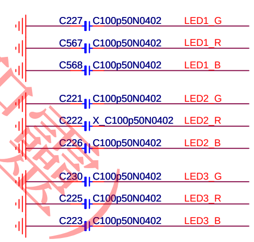
Constant current programing through the R258 resistor		
REXT	IOUT=(Vrext / Rext) x 15 30mA=(1.22 / 620) x 15	
BR1	BR0	Average_ I OUT (ON/OFF)
0	0	3.75mA
0	1	11.25mA
1	0	18.75mA
1	1	26.25mA

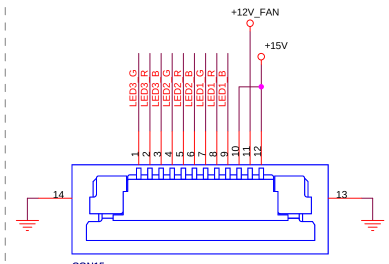
LED Keyboard Pin Define	
Pin 1	VCC_G
Pin 2	VCC_R
Pin 3	VCC_B
Pin 4	LED1_B
Pin 5	LED1_R
Pin 6	LED1_G
Pin 7	LED2_B
Pin 8	LED2_R
Pin 9	LED2_G
Pin 10	LED3_B
Pin 11	LED3_R
Pin 12	LED3_G





For EMI





CON15
FPC12P-B-0.5PITCH_WHITE
FPC_S12_3
N5A-12F0200-A81

msi	MICRO-STAR INT'L CO.,LTD.
Title	LED Driver IC/Controller/TPM
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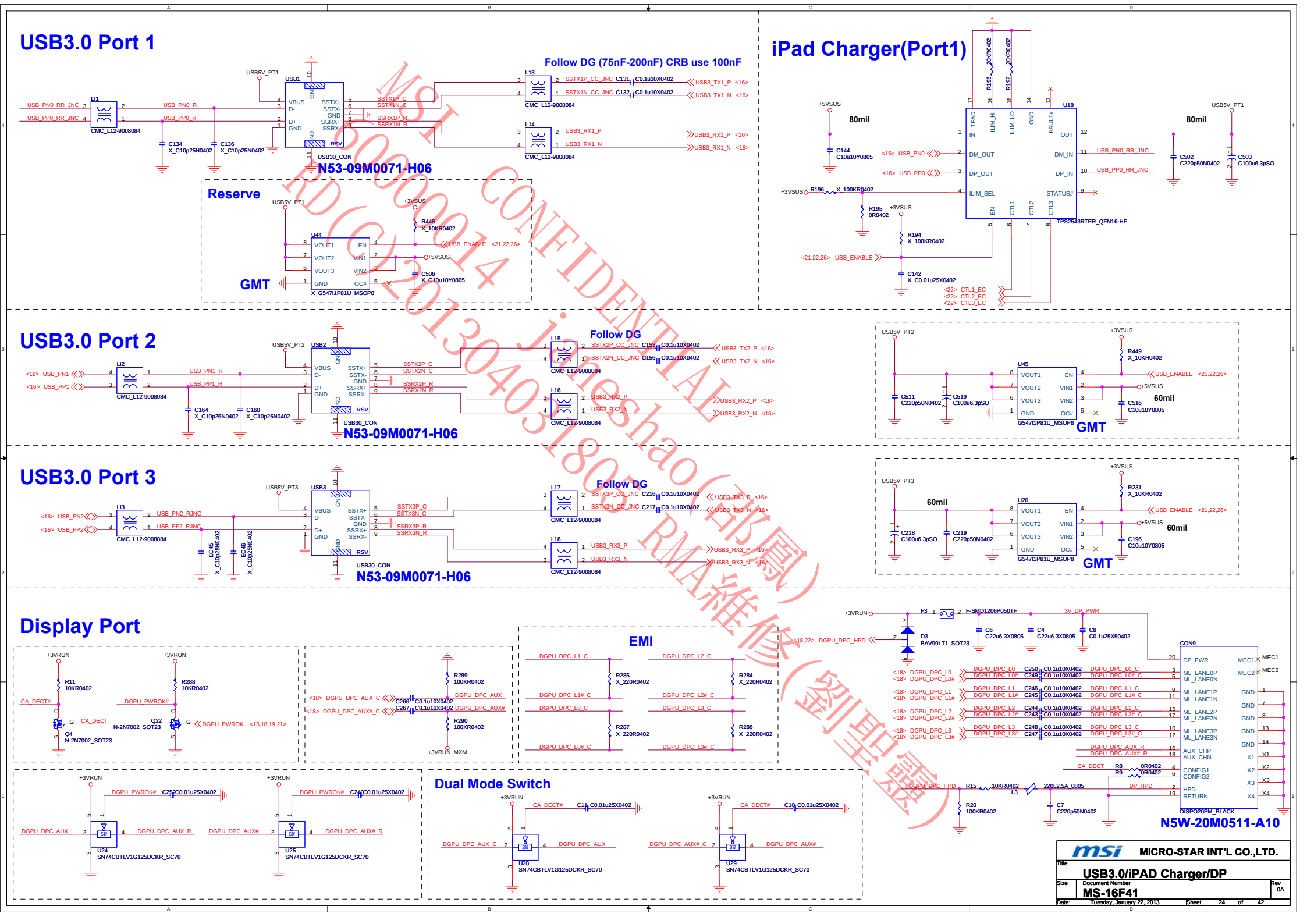
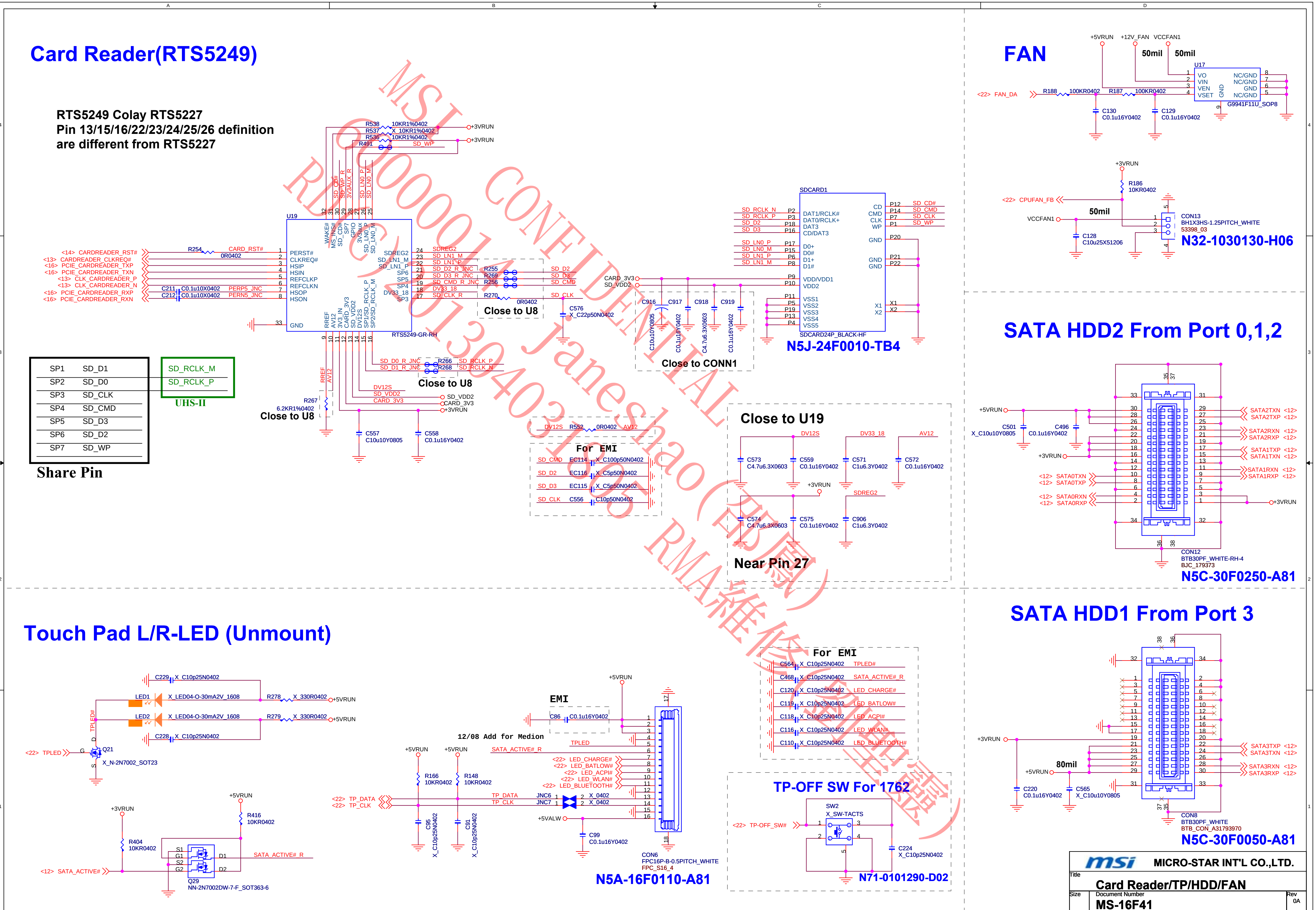


msi	MICRO-STAR INT'L CO.,LTD.		
Title	USB3.0/iPAD Charger/DP		
Size	Document Number		Rev
	MS-16F41		0A
Date:	Tuesday, January 22, 2013	Sheet 24 of 42	



Card Reader(RTS5249)
RTS5249 Colay RTS5227
Pin 13/15/16/22/23/24/25/26 definition
are different from RTS5227
U19
RTS5249-GR-RH
Close to U8
SDCARD1
SDCARD24P_BLACK-HF
N5J-24F0010-TB4
Close to CONN1
Close to U19
Near Pin 27
For EMI
SP1 SD_D1
SP2 SD_D0
SP3 SD_CLK
SP4 SD_CMD
SP5 SD_D3
SP6 SD_D2
SP7 SD_WP
SD_RCLK_M
SD_RCLK_P
UHS-II
Share Pin
FAN
50mil
U17
G9941F11U_SOP8
CON13
BH1X3HS-1.25PITCH_WHITE
N32-1030130-H06
SATA HDD2 From Port 0,1,2
CON12
BTB30PF_WHITE-RH-4
N5C-30F0250-A81
SATA HDD1 From Port 3
CON8
BTB30PF_WHITE
N5C-30F0050-A81
Touch Pad L/R-LED (Unmount)
EMI
12/08 Add for Medion
CON6
FPC16P-B-0.5PITCH_WHITE
N5A-16F0110-A81
TP-OFF SW For 1762
SW2
X_SW-TACTS
N71-0101290-D02

msi	MICRO-STAR INT'L CO.,LTD.
Title	Card Reader/TP/HDD/FAN
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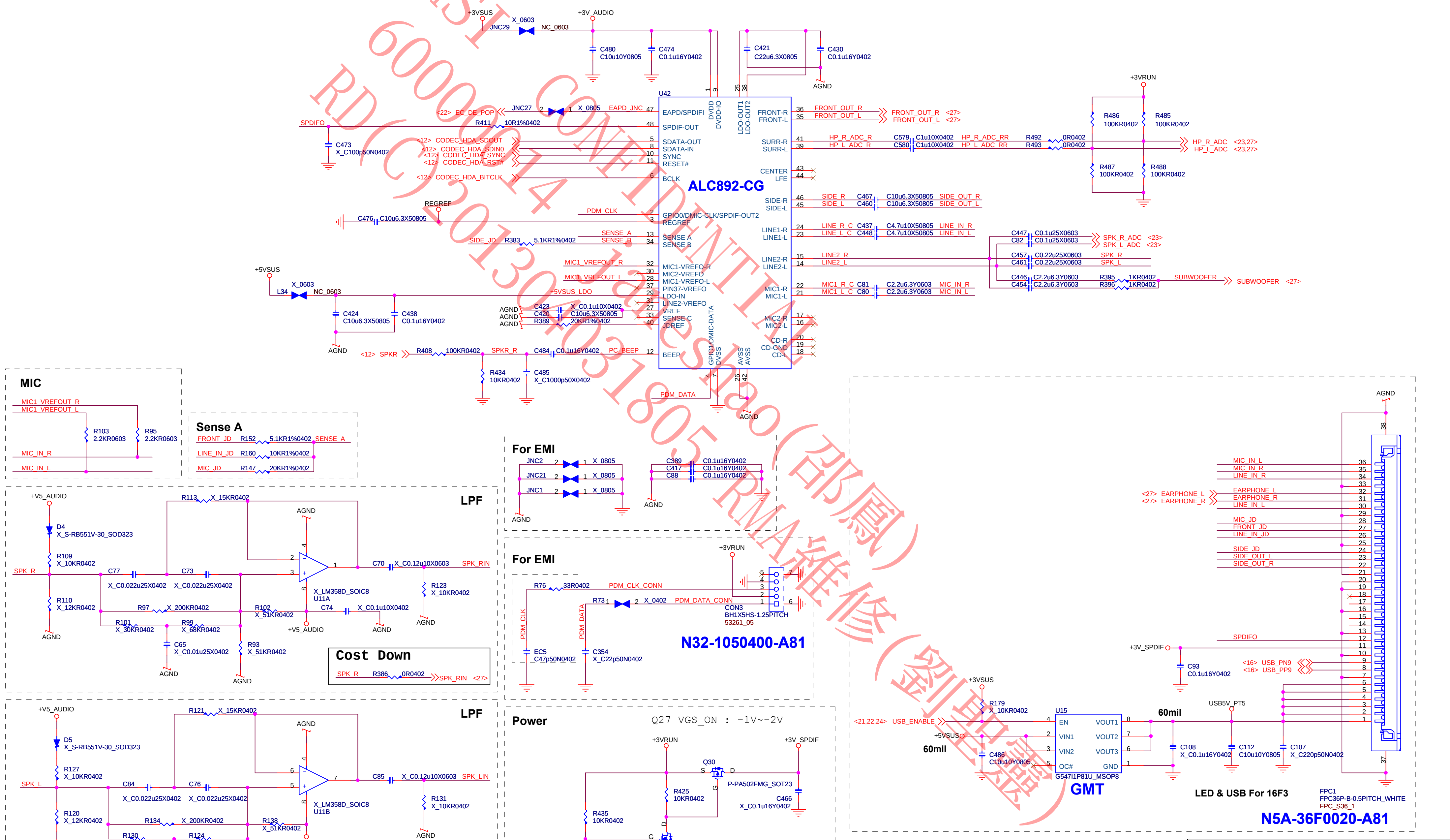
Azailia Codec(ALC892)



MICRO-STAR INT'L CO.,LTD.

Title: Azailia Codec(ALC892)

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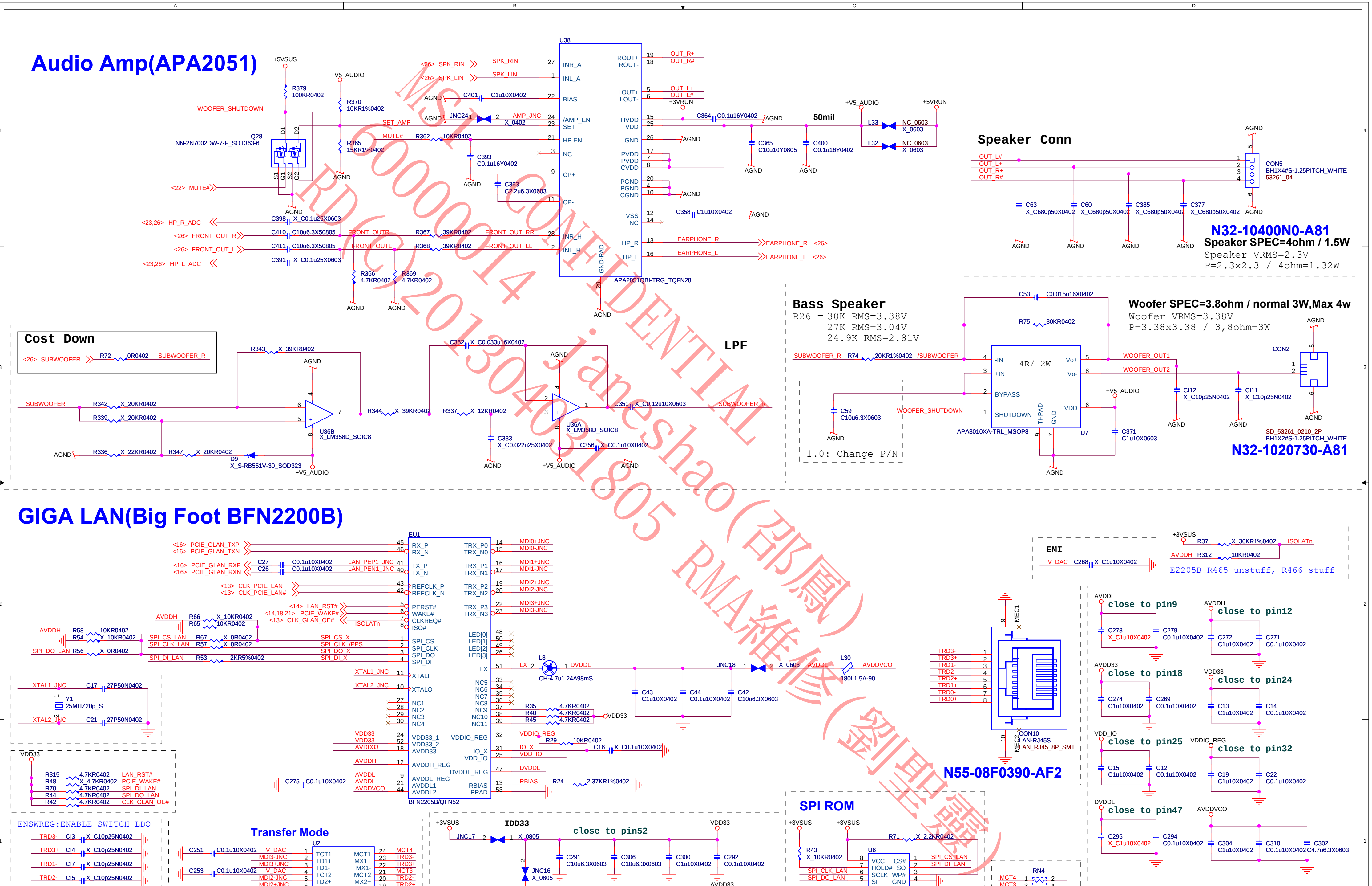

MICRO-STAR INT'L CO.,LTD.

Title	Audio Amp/Giga LAN
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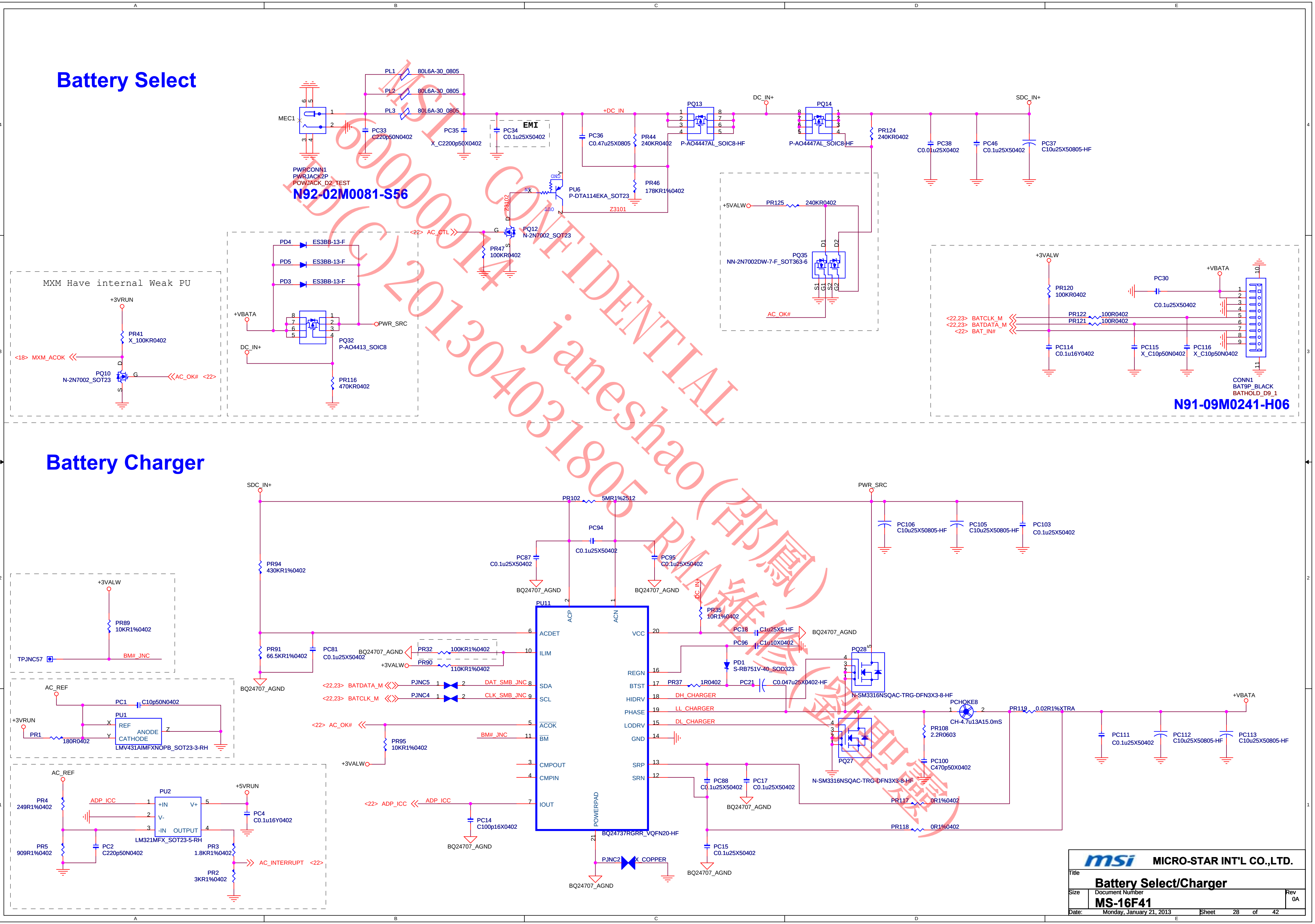
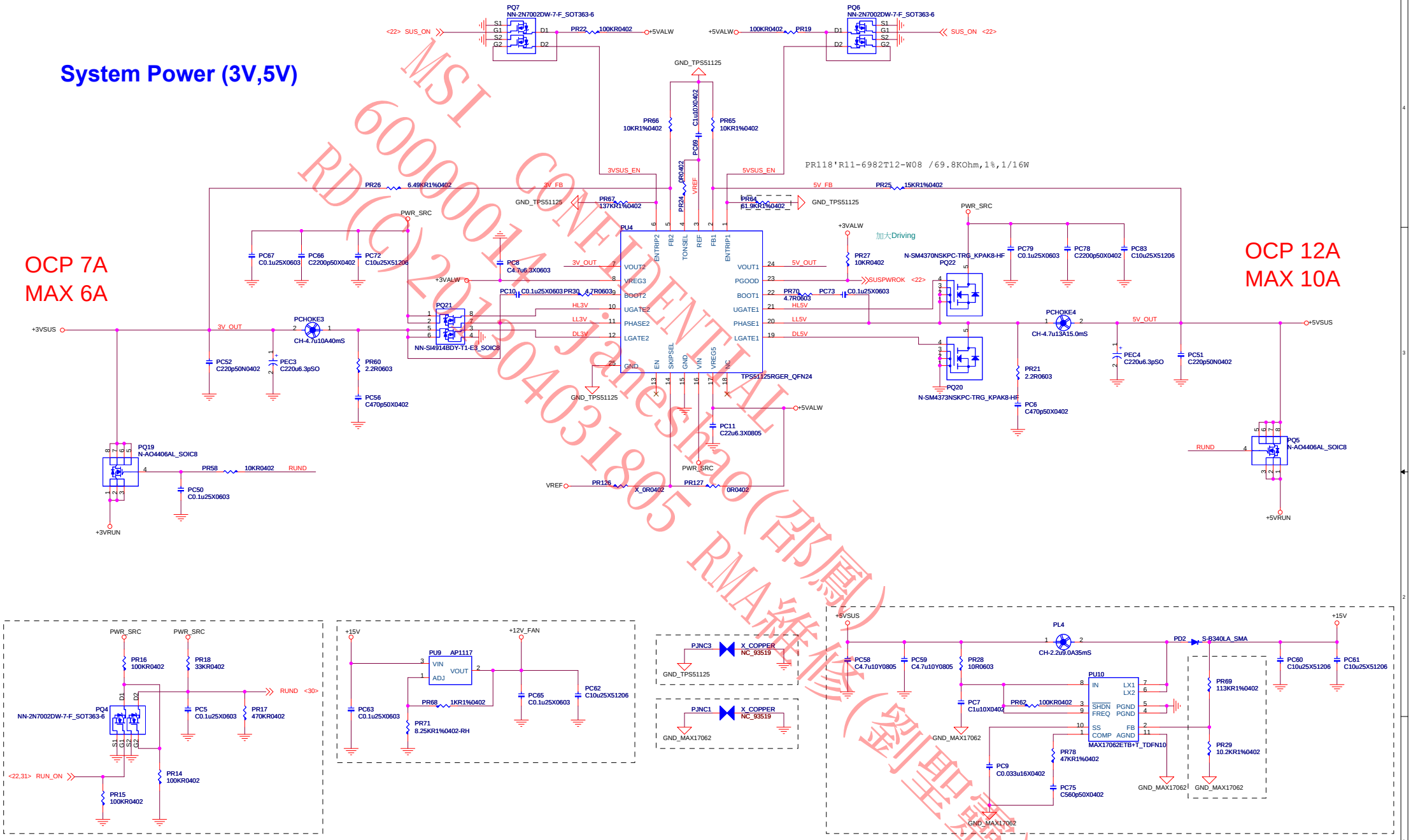

Battery Select
Battery Charger
MXM Have internal Weak PU
+3VRUN
PR41
X_100KR0402
<18> MXM_ACOK
PQ10
N-2N7002_SOT23
AC_OK# <22>
MEC1
PWRCONN1
PWRJACK2P
POWJACK_D2_TEST
N92-02M0081-S56
PL1 80L6A-30_0805
PL2 80L6A-30_0805
PL3 80L6A-30_0805
PC33 C220p50N0402
PC35 X_C2200p50X0402
PC34 C0.1u25X50402
EMI
+DC_IN
PC36 C0.47u25X0805
PR44 240KR0402
PR46 178KR1%0402
PU6 P-DTA114EKA_SOT23
PQ12 N-2N7002_SOT23
<22> AC_CTL
PR47 100KR0402
PD4 ES3BB-13-F
PD5 ES3BB-13-F
PD3 ES3BB-13-F
+VBATA
DC_IN+
PQ32 P-AO4413_SOIC8
PWR_SRC
PR116 470KR0402
PQ13 P-AO4447AL_SOIC8-HF
PQ14 P-AO4447AL_SOIC8-HF
DC_IN+
SDC_IN+
PR124 240KR0402
PC38 C0.01u25X0402
PC46 C0.1u25X50402
PC37 C10u25X50805-HF
+5VALW
PR125 240KR0402
PQ35 NN-2N7002DW-7-F_SOT363-6
AC_OK#
+3VALW
PR120 100KR0402
+VBATA
PC30 C0.1u25X50402
<22,23> BATCLK_M
<22,23> BATDATA_M
<22> BAT_IN#
PR122 100R0402
PR121 100R0402
PC114 C0.1u16Y0402
PC115 X_C10p50N0402
PC116 X_C10p50N0402
CONN1
BAT9P_BLACK
BATHOLD_D9_1
N91-09M0241-H06
SDC_IN+
PR102 5MR1%2512
PWR_SRC
PC94 C0.1u25X50402
PC87 C0.1u25X50402
PC95 C0.1u25X50402
BQ24707_AGND
PC106 C10u25X50805-HF
PC105 C10u25X50805-HF
PC103 C0.1u25X50402
PR94 430KR1%0402
PR91 66.5KR1%0402
PC81 C0.1u25X50402
PR32 100KR1%0402
PR90 110KR1%0402
+3VALW
PU11
ACDET
ILIM
SDA
SCL
ACOK
BM
CMPOUT
CMPIN
IOUT
POWERPAD
VCC
REGN
BTST
HIDRV
PHASE
LODRV
GND
SRP
SRN
BQ24737RGRR_VQFN20-HF
PR35 10R1%0402
PC18 C1u25X5-HF
PC96 C1u10X0402
PD1 S-RB751V-40_SOD323
PR37 1R0402
PC21 C0.047u25X0402-HF
DH_CHARGER
LL_CHARGER
DL_CHARGER
PQ28 N-SM3316NSQAC-TRG-DFN3X3-8-HF
PQ27 N-SM3316NSQAC-TRG-DFN3X3-8-HF
PCHOKE8 CH-4.7u13A15.0mS
PR108 2.2R0603
PC100 C470p50X0402
PR119 0.02R1%XTRA
+VBATA
PC111 C0.1u25X50402
PC112 C10u25X50805-HF
PC113 C10u25X50805-HF
PR117 0R1%0402
PR118 0R1%0402
PC88 C0.1u25X50402
PC17 C0.1u25X50402
PC15 C0.1u25X50402
PJNC2 X_COPPER
<22,23> BATDATA_M PJNC5 DAT_SMB_JNC
<22,23> BATCLK_M PJNC4 CLK_SMB_JNC
<22> AC_OK#
PR95 10KR1%0402
BM#_JNC
<22> ADP_ICC
PC14 C100p16X0402
+3VALW
PR89 10KR1%0402
TPJNC57
BM#_JNC
AC_REF
PC1 C10p50N0402
PU1
REF ANODE CATHODE
LMV431AIMFXNOPB_SOT23-3-RH
PR1 180R0402
+3VRUN
AC_REF
PR4 249R1%0402
PR5 909R1%0402
PC2 C220p50N0402
PU2
+IN V+ V- -IN OUTPUT
LM321MFX_SOT23-5-RH
+5VRUN
PC4 C0.1u16Y0402
PR3 1.8KR1%0402
PR2 3KR1%0402
AC_INTERRUPT <22>
MICRO-STAR INT'L CO.,LTD.
Title
Battery Select/Charger
Size Document Number
MS-16F41
Rev 0A
Date: Monday, January 21, 2013 Sheet 28 of 42

System Power (3V,5V)

OCP 7A
MAX 6A

OCP 12A
MAX 10A



msi	MICRO-STAR INT'L CO.,LTD.	
Title	System Power	
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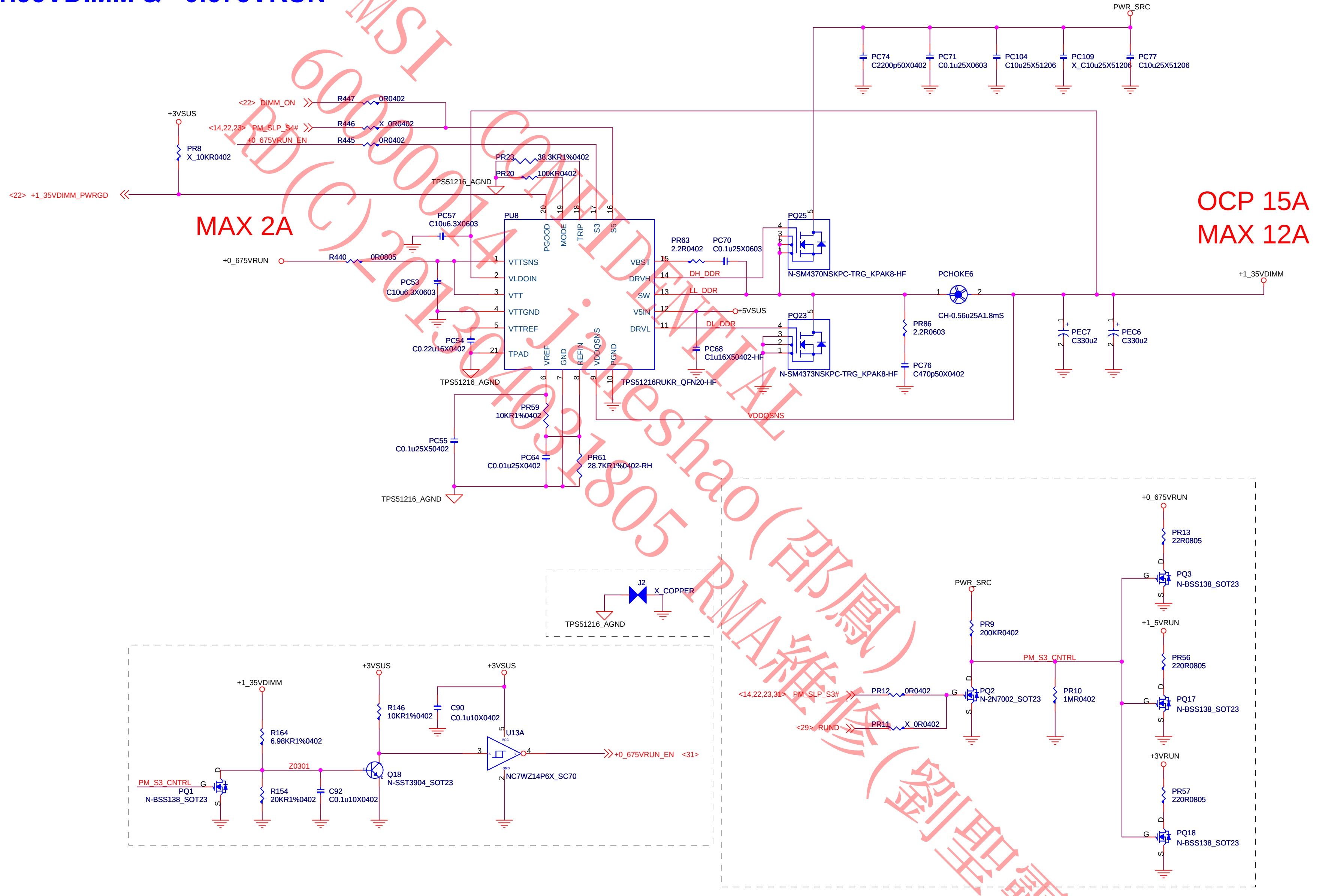
Date: Monday, January 21, 2013	Sheet 29 of 42	

+1.35VDIMM & +0.675VRUN



MICRO-STAR INT'L CO.,LTD.

Title	+1.35VDIMM/+0.675VRUN
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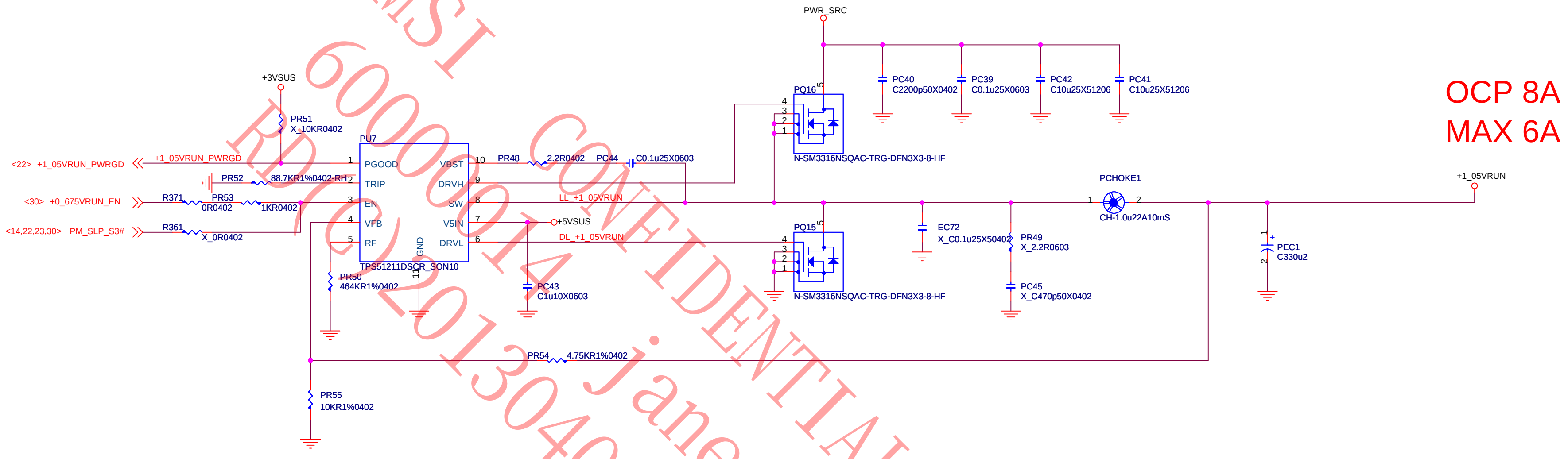
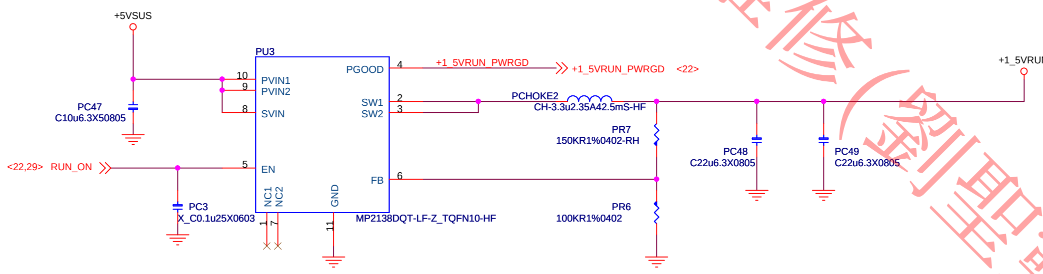
+1.05VRUN

OCP 8A
MAX 6A



+1.5VRUN

OCP 4A
MAX 1.5A



MICRO-STAR INT'L CO.,LTD.

Title: +1.05VRUN/+1.5VRUN

Size	Document Number	Rev
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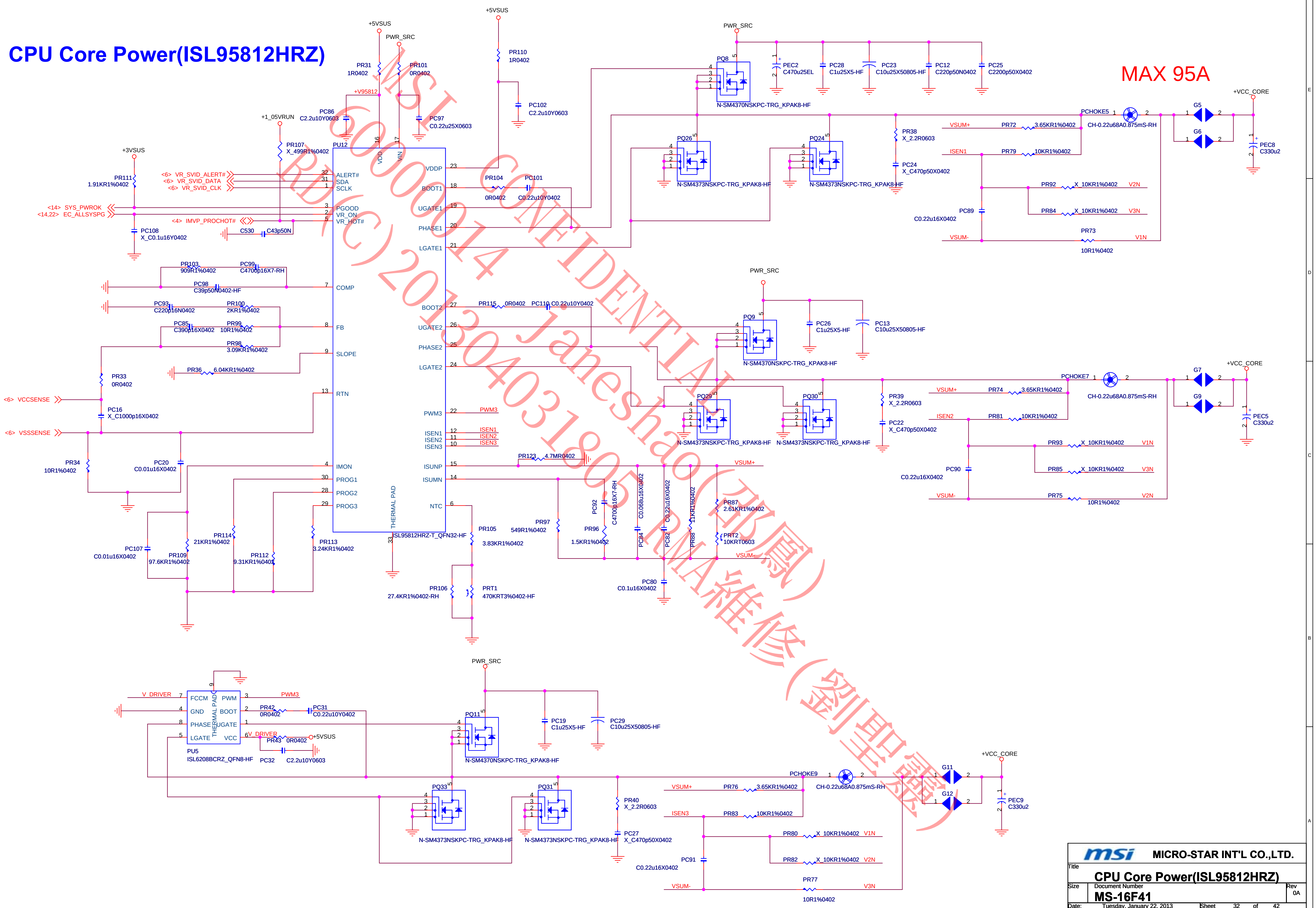
CPU Core Power(ISL95812HRZ)

MAX 95A



msi	MICRO-STAR INT'L CO.,LTD.
Title	CPU Core Power(ISL95812HRZ)
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EMI

+5VSUS
EC27 C0.1u10X0402
EC36 X_C0.1u10X0402
EC47 X_C0.1u10X0402
EC104 C0.1u10X0402
EC100 C0.1u10X0402
EC50 X_C0.1u10X0402
EC19 C0.1u10X0402
EC25 C0.1u10X0402
EC26 C0.1u10X0402
EC43 X_C0.1u10X0402
EC48 C0.1u10X0402
EC23 C0.1u10X0402

+3VSUS
EC49 X_C0.1u10X0402
EC44 X_C0.1u10X0402
EC74 X_C0.1u10X0402
EC18 X_C0.1u10X0402
C335 X_C0.1u16Y0402

PWR_SRC_MXM
EC56 C0.1u25X0603
EC55 C0.1u25X0603
EC66 C0.1u25X0603
EC57 C0.1u25X0603
EC62 C0.1u25X0603
EC67 C0.1u25X0603

+3VRUN
EC95 X_C0.1u25X50402
EC92 X_C0.1u25X50402
EC60 X_C0.1u10X0402
EC75 X_C0.1u10X0402
EC85 X_C0.1u10X0402
EC20 C0.1u10X0402
EC64 X_C0.1u10X0402
EC4 X_C0.1u10X0402

+5VALW
EC21 C0.1u10X0402

+1_5VRUN
EC3 C0.1u10X0402
EC81 X_C0.1u10X0402

SDC_IN+
EC98 C0.1u25X50402

DC_IN+
EC68 C0.1u25X50402

+1_35VDIMM
EC32 C0.1u10X0402
EC29 C0.1u10X0402
EC35 C0.1u10X0402
EC99 C0.1u10X0402
EC101 C0.1u10X0402
EC105 C0.1u10X0402
EC107 C0.1u10X0402
EC33 C0.1u10X0402
EC37 C0.1u10X0402
EC28 C0.1u10X0402
EC102 C0.1u10X0402
EC31 C0.1u10X0402

+5VRUN
EC53 X_C0.1u10X0402
EC73 X_C0.1u10X0402
EC52 C0.1u10X0402
EC1 X_C0.1u10X0402
EC10 C0.1u10X0402
EC17 C0.1u10X0402
EC123 C0.1u10X0402
EC51 C0.1u10X0402
EC109 C0.1u10X0402
EC2 X_C0.1u10X0402
EC83 X_C0.1u10X0402
EC120 C0.1u10X0402
EC93 C0.1u10X0402
EC97 X_C0.1u10X0402
EC94 X_C0.1u10X0402
EC122 C0.1u10X0402
EC121 C0.1u10X0402
EC113 C0.1u10X0402
EC119 C0.1u10X0402
EC124 C0.1u10X0402
EC70 C0.1u10X0402
EC108 X_C0.1u10X0402
EC61 C0.1u10X0402
EC58 X_C0.1u10X0402
EC54 X_C0.1u10X0402

PWR_SRC
EC40 C0.1u25X0603
EC112 X_C0.1u25X0603
EC103 C0.1u25X0603
EC96 C0.1u25X0603
EC59 C0.1u25X0603
EC82 C0.1u25X0603
EC39 C0.1u25X0603
EC118 C0.1u25X0603
EC65 X_C0.1u25X0603
EC117 C0.1u25X0603
EC106 C0.1u25X0603
EC38 C0.1u25X0603
EC22 C0.1u25X0603
EC41 C0.1u25X0603
EC34 C0.1u25X0603
EC30 C0.1u25X0603
EC24 C0.1u25X0603

+3V_LCD_PANEL
EC69 X_C0.1u10X0402

Screw

GPU Hold
GPUH1 E2B-16F3010-L63 HOLES_R276D185P_PT E2B-16F3010-L63
GPUH3 E2B-16F3010-L63 HOLES_R276D185P_PT E2B-16F3010-L63
GPUH2 E2B-16F3010-L63 HOLES_R276D185P_PT E2B-16F3010-L63
GPUH5 E2B-16F3010-L63 HOLES_R276D185P_PT E2B-16F3010-L63
GPUH4 E2B-16F3010-L63 HOLES_R276D185P_PT E2B-16F3010-L63

MiniCard
BTBH1 E2B-1034020 HOLES_R177D91
H=4.4

HDD1
BTBH2 E2B-1634020 HOLES_R177D91
H=3

MH3 X_NPTH_98 NPTH_98
MH10 X_NPTH_98 NPTH_98
MH13 X_NPTH_98 NPTH_98

CPU Hold
CPUH3 E2B-16F3010-L63 E2B-16F3010-L63 HOLES_R276D185P_PT
CPUH1 E2B-16F3010-L63 E2B-16F3010-L63 HOLES_R276D185P_PT
CPUH2 E2B-16F3010-L63 HOLES_R276D185P_PT E2B-16F3010-L63

Board Hold
MH1 X_ME_ SCREW HOLE X NPTH118
MH2 X_ME_ SCREW HOLE X NPTH118
MH15 X_ME_ SCREW HOLE X NPTH118
MH16 X_ME_ SCREW HOLE X NPTH118

HDD2
BTBH3 HOLES_R177D91 HOLES_R177D91
BTBH4 HOLES_R177D91 HOLES_R177D91

ODD
SCREW3 E43-1205003-H29
SCREW4 E43-1205003-H29

PAD4 X_E23-1029060 ATE_C006_106
PAD1 X_E23-1029060 ATE_C006_106
PAD3 MS1719 SME_ATEC048 EMI
PAD2 MS1003 SME_ATEC048 EMI

PCH Hold
PCHH2 E2B-163B010-L63 HOLES_R193D138_PT E2B-163B010-L63
PCHH1 E2B-163B010-L63 HOLES_R193D138_PT E2B-163B010-L63
THERMAL1 THERMAL_PCH E31-0403231-TA9
SCREW1 E43-1203003-H29
SCREW2 E43-1203003-H29

FM
FM2 FM1 FM3 FM5 FM7 FM8 FM6 FM10 FM9 FM11 FM12 FM14 FM17 FM16 FM15 FM4 FM13
X_FM

MH4 HOLES_8X8_D3MM_VIA5 X_8x8
MH7 HOLES_8X8_D3MM_VIA3
MH8 HOLES_8X8_D3MM_VIA5 X_8x8
MH9 HOLES_8X8_D3MM_VIA5 X_8x8
MH11 HOLES_8X8_D3MM_VIA5 X_8x8
MH5 HOLES_8X8_D3MM_VIA3
MH6 HOLES_8X8_D3MM_VIA3
MH14 HOLES_8X8_D3MM_VIA3
MH12 X_8x8 HOLES_8X8_D3MM

MYLAR
MYLAR1 MYLAR E2P-1212311-G40
MYLAR2 MYLAR E2Y-6F30211-Y40
MYLAR3 MYLAR E2P-6F13011-G40
MYLAR4 MYLAR E2Y-6F12812-G40
MYLAR5 MYLAR E2P-5220111-G40
MYLAR6 MYLAR E2P-6921011-G40
MYLAR7 MYLAR E2P-6921011-G40
MYLAR8 RTC_MYLAR E2Y-0114812-Y42
MYLAR9 MYLAR E2P-6330211-G40
MYLAR10 MYLAR E2Y-6FK0111-Y40

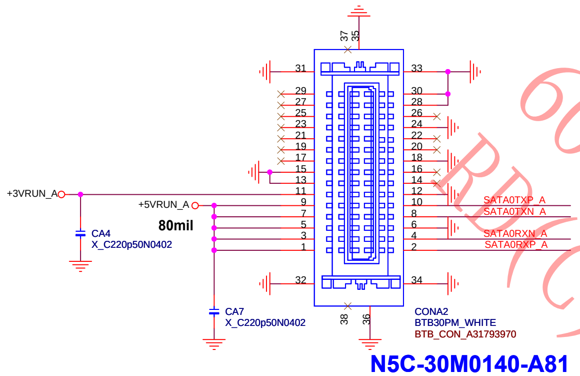
GASKET & RUBBER
GASKET1 USB_GASKET E2Y-X029911-CA7
GASKET2 USB_GASKET E2Y-X029911-CA7
RUBBER1 MXM_RUBBER E2Y-6F11611-Y40
RUBBER2 MXM_RUBBER E2Y-6F11711-Y40
RUBBER3 MXM_RUBBER E2Y-6F11711-Y40
RUBBER4 MXM_RUBBER E2Y-6F11711-Y40
RUBBER5 MXM_RUBBER E2Y-6G12311-Y42

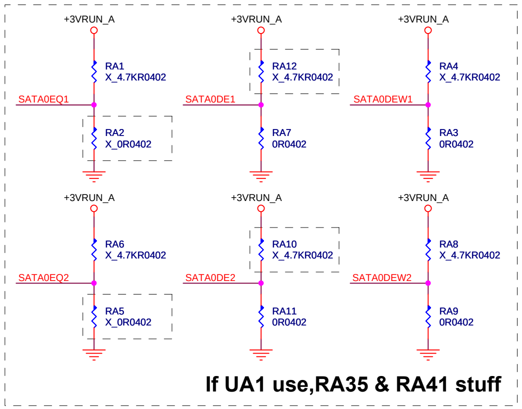
MP
UME7 BIOS LABEL
UME8 HDMI LABEL
X_BIOS_LABEL X_HDMI_LABEL

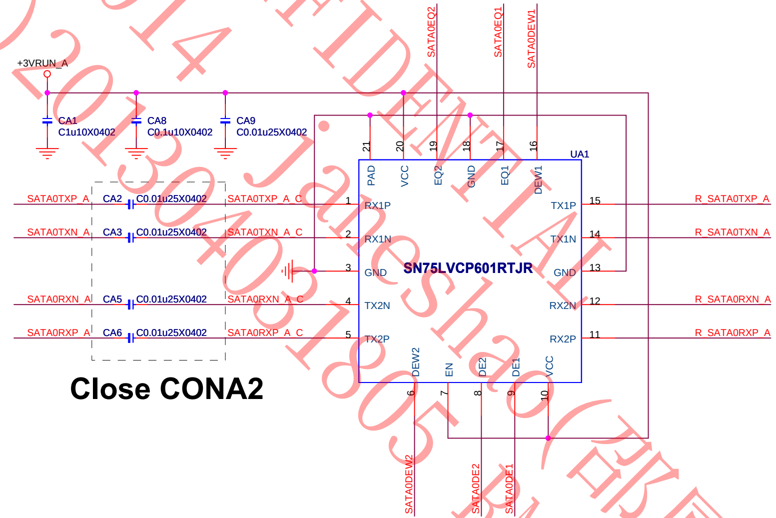
PCB1
P30-16F410C-H73
P30-16F410C-H73

MICRO-STAR INT'L CO.,LTD.
Title: EMI/Screw
Size: Document Number: MS-16F41 Rev: 0A
Date: Wednesday, January 23, 2013 Sheet 33 of 42

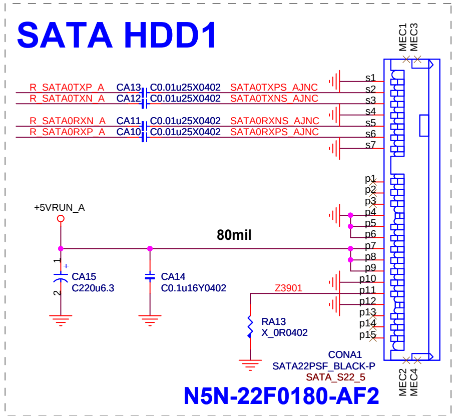
BTB Conn From Port 3

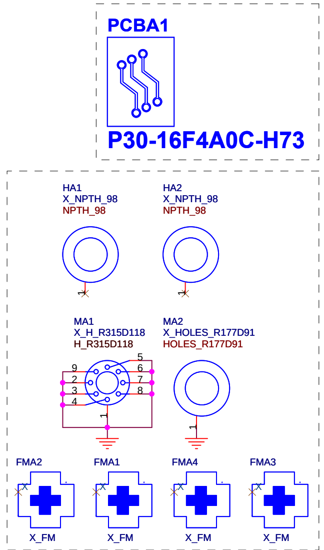






SATA HDD1





TI SN75LVCP601RTJR HW Setting

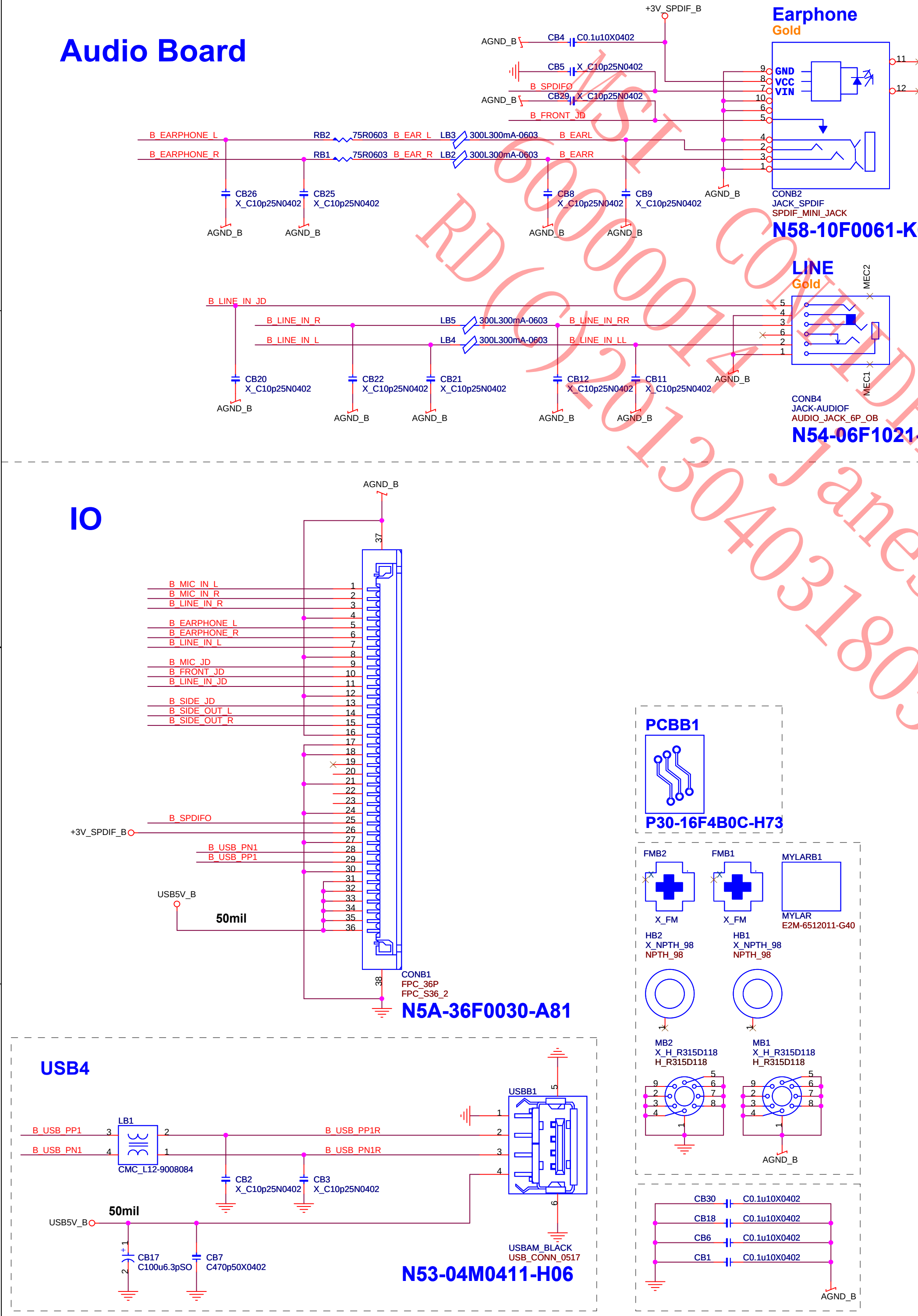
EQ1/EQ2	CH1/CH2Equalization dB (@6Gbps)
NC (*default*)	0
0	7
1	14

DE1/DE2	CH1/CH2De-Emphasis dB(@6Gbps
NC (*default*)	-6
0	0
1	-3

DEW1/DEW2	Device Function→ DE Width for CH1/CH2
0	De-Emphasis Pulse Width Short (recommended setting when link operates at SATA 1.5/3.0/6.0 Gbps)
1 (*default*)	De-Emphasis Pulse Width Long (recommended setting when link operates at SATA 1.5/3.0 Gbps speed only)

MS-16F4A Change List

Date	Page	Description	Date	Page	Description	Date	Page	Description



MS-16F4B Change List

Date	Page	Description	Date	Page	Description

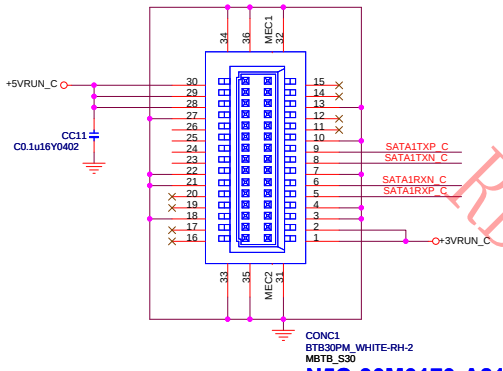
MICRO-STAR INT'L CO.,LTD.

Title: **IO/Audio Board**

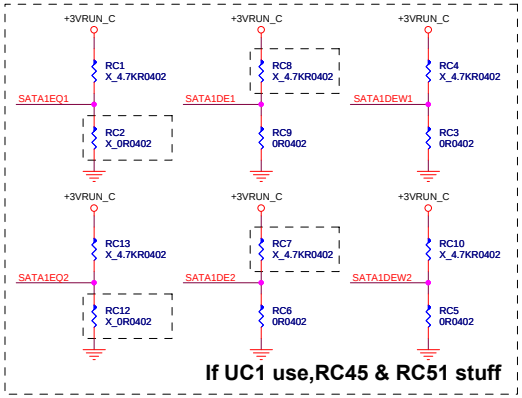
Size | Document Number: **MS-16F4B** | Rev: 0A

Date: Monday, January 21, 2013 | Sheet 35 of 42

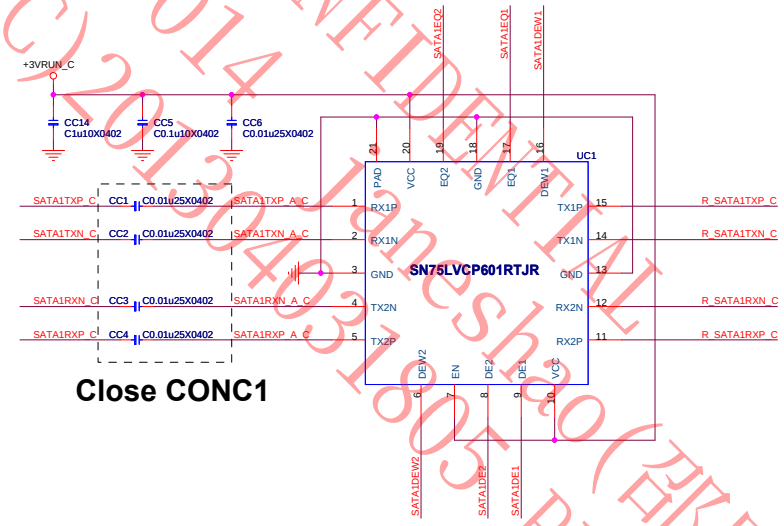
BTB Conn From Port 1



N5C-30M0170-A81

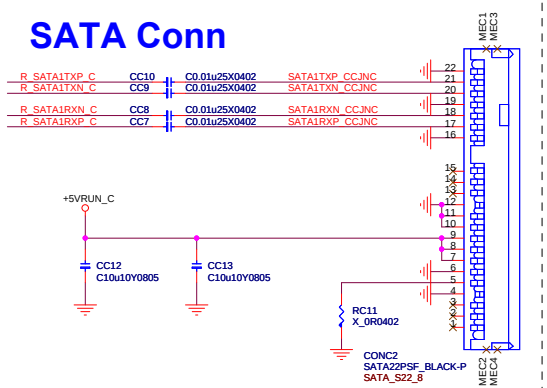


If UC1 use,RC45 & RC51 stuff



Close CONC1

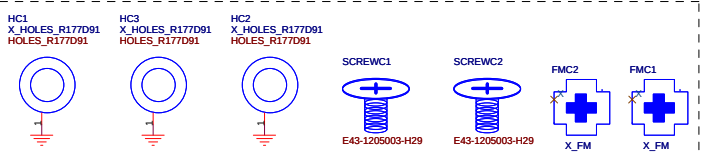
SATA Conn



N5N-22F0210-A81

PCBC1

P30-16F4C0C-H73



TI SN75LVCP601RTJR HW Setting

EQ1/EQ2	CH1/CH2Equalization dB (@6Gbps)
NC (*default*)	0
0	7
1	14

DE1/DE2	CH1/CH2De-Emphasis dB(@6Gbps
NC (*default*)	-6
0	0
1	-3

DEW1/DEW2	Device Function→ DE Width for CH1/CH2
0	De-Emphasis Pulse Width Short (recommended setting when link operates at SATA 1.5/3.0/6.0 Gbps)
1 (*default*)	De-Emphasis Pulse Width Long (recommended setting when link operates at SATA 1.5/3.0 Gbps speed only)

MS-16F4C Change List

Date	Page	Description

Date	Page	Description

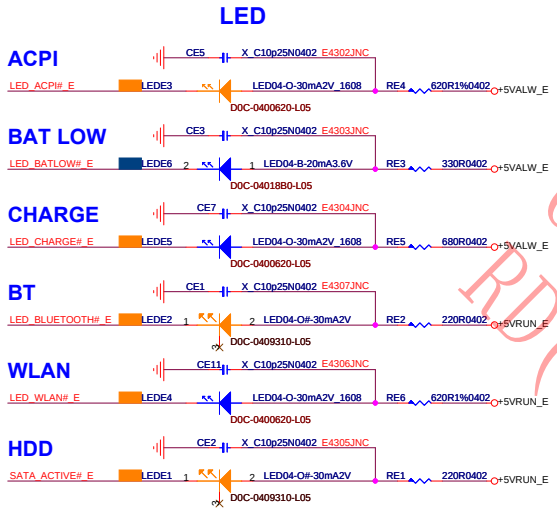
Date	Page	Description

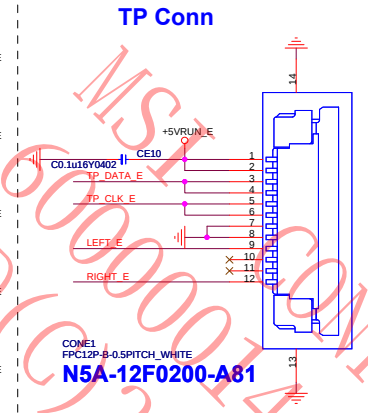
MICRO-STAR INT'L CO.,LTD.

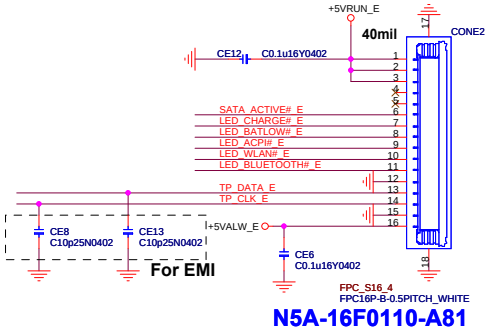
Title: HDD2

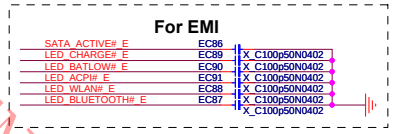
Size | Document Number: MS-16F4C | Rev: 0A

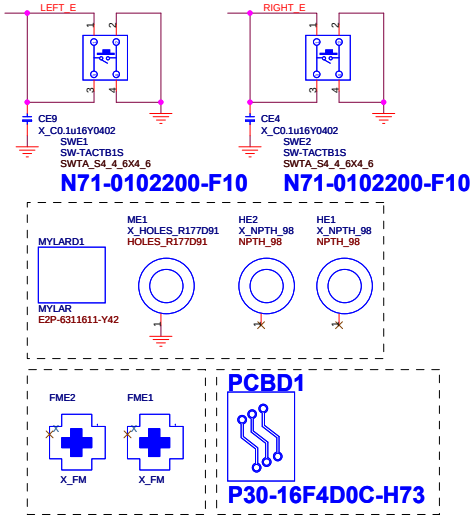
Date: Monday, January 21, 2013 | Sheet 36 of 42











MS-16F4D Change List

Date	Page	Description

Date	Page	Description

Date	Page	Description

MICRO-STAR INT'L CO.,LTD.

Title: Touch Pad L/R Key

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Impedance

Single End

35 ohm

J41 L1_9mil_35_Ohm GND2 X_H1X2M_BLACK	J39 L8_9mil_35_Ohm GND7 X_H1X2M_BLACK	J16 L3_9.5mil_35_Ohm GND2 X_H1X2M_BLACK	J40 L6_8.5mil_35_Ohm GND7 X_H1X2M_BLACK

40 ohm

J42 L1_7mil_40_Ohm GND2 X_H1X2M_BLACK	J20 L3_7mil_40_Ohm GND2 X_H1X2M_BLACK	J38 L6_7mil_40_Ohm GND7 X_H1X2M_BLACK	J4 L8_7mil_40_Ohm GND7 X_H1X2M_BLACK

42 ohm

J35 L1_6.5mil_42_Ohm GND2 X_H1X2M_BLACK	J10 L3_6.5mil_42_Ohm GND2 X_H1X2M_BLACK	J34 L6_6mil_42_Ohm GND7 X_H1X2M_BLACK	J6 L8_6.5mil_42_Ohm GND7 X_H1X2M_BLACK

50 ohm

J7 L1_4.5mil_50_Ohm GND2 X_H1X2M_BLACK	J25 L3_4.5mil_50_Ohm GND2 X_H1X2M_BLACK	J1 L4_4.5mil_50_Ohm GND5 X_H1X2M_BLACK	J29 L6_4.5mil_50_Ohm GND7 X_H1X2M_BLACK	J11 L8_4.5mil_50_Ohm GND7 X_H1X2M_BLACK

Differential

75 ohm

J9 L1_DIFF_6/4/12_75_Ohm+ L1_DIFF_6/4/12_75_Ohm- GND2 X_H1X4_black-RH	J27 L3_DIFF_6/4/12_75_Ohm+ L3_DIFF_6/4/12_75_Ohm- GND2 X_H1X4_black-RH	J26 L8_DIFF_6/4/12_75_Ohm+ L8_DIFF_6/4/12_75_Ohm- GND7 X_H1X4_black-RH	J23 L6_DIFF_5.5/4/12_75_Ohm+ L6_DIFF_5.5/4/12_75_Ohm- GND7 X_H1X4_black-RH

80 ohm

J28 L1_DIFF_5/4/15_80_Ohm+ L1_DIFF_5/4/15_80_Ohm- GND2 X_H1X4_black-RH	J36 L8_DIFF_5/4/15_80_Ohm+ L8_DIFF_5/4/15_80_Ohm- GND7 X_H1X4_black-RH	J14 L6_DIFF_4/3.5/15_80_Ohm+ L6_DIFF_4/3.5/15_80_Ohm- GND7 X_H1X4_black-RH

85 ohm

J19 L1_DIFF_4/4/15_85_Ohm+ L1_DIFF_4/4/15_85_Ohm- GND2 X_H1X4_black-RH	J17 L8_DIFF_4/4/15_85_Ohm+ L8_DIFF_4/4/15_85_Ohm- GND7 X_H1X4_black-RH	J37 L3_DIFF_4/4.5/15_85_Ohm+ L3_DIFF_4/4.5/15_85_Ohm- GND2 X_H1X4_black-RH	J5 L4_DIFF_4/4.5/15_85_Ohm+ L4_DIFF_4/4.5/15_85_Ohm- GND5 X_H1X4_black-RH

J21 L6_DIFF_4/4.5/15_85_Ohm+ L6_DIFF_4/4.5/15_85_Ohm- GND7 X_H1X4_black-RH

88 ohm

J33 L1_DIFF_4.5/5/25_88_Ohm+ L1_DIFF_4.5/5/25_88_Ohm- GND2 X_H1X4_black-RH	J32 L3_DIFF_4.5/5/25_88_Ohm+ L3_DIFF_4.5/5/25_88_Ohm- GND2 X_H1X4_black-RH	J31 L8_DIFF_4.5/5/25_88_Ohm+ L8_DIFF_4.5/5/25_88_Ohm- GND7 X_H1X4_black-RH	J30 L6_DIFF_4.5/5.5/25_88_Ohm+ L6_DIFF_4.5/5.5/25_88_Ohm- GND7 X_H1X4_black-RH

90 ohm

J24 L1_DIFF_4/6/15_90_Ohm+ L1_DIFF_4/6/15_90_Ohm- GND2 X_H1X4_black-RH	J18 L3_DIFF_4/6/15_90_Ohm+ L3_DIFF_4/6/15_90_Ohm- GND2 X_H1X4_black-RH	J3 L4_DIFF_4/6/15_90_Ohm+ L4_DIFF_4/6/15_90_Ohm- GND5 X_H1X4_black-RH	J13 L6_DIFF_4/6/15_90_Ohm+ L6_DIFF_4/6/15_90_Ohm- GND7 X_H1X4_black-RH

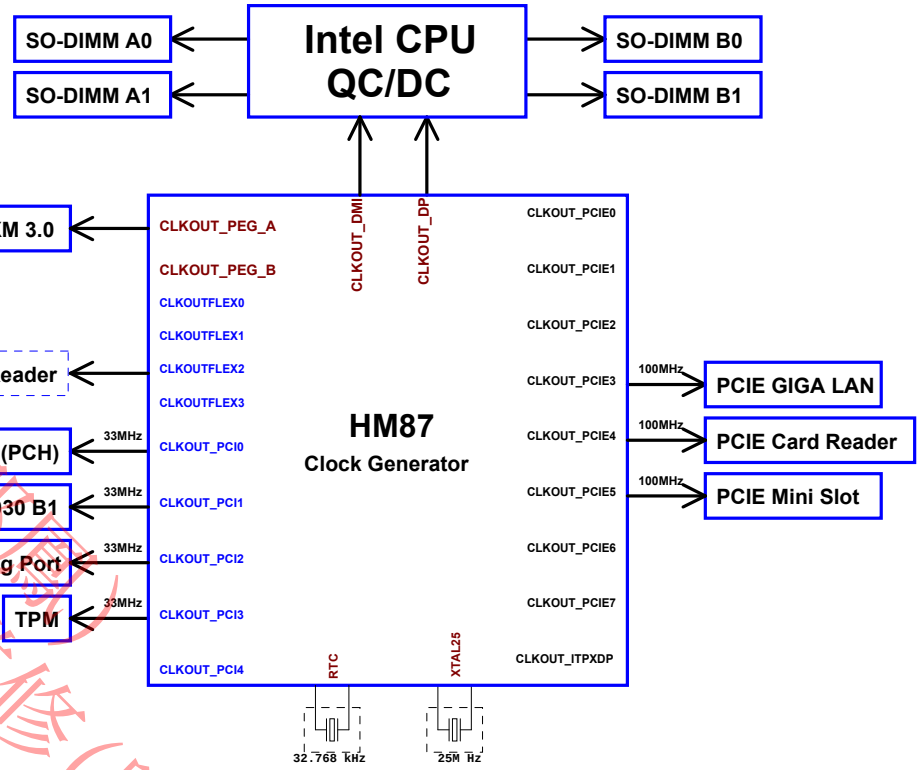
J22 L8_DIFF_4/6/15_90_Ohm+ L8_DIFF_4/6/15_90_Ohm- GND7 X_H1X4_black-RH

100 ohm

J15 L1_DIFF_3.5/7.5/16_100_Ohm+ L1_DIFF_3.5/7.5/16_100_Ohm- GND2 X_H1X4_black-RH	J8 L3_DIFF_3.5/7.5/16_100_Ohm+ L3_DIFF_3.5/7.5/16_100_Ohm- GND2 X_H1X4_black-RH	J12 L8_DIFF_3.5/7.5/16_100_Ohm+ L8_DIFF_3.5/7.5/16_100_Ohm- GND7 X_H1X4_black-RH

Clock Distribution

Internal Clock Mode



msi	MICRO-STAR INT'L CO.,LTD.
Title	Impedance/Clock Distribution
Size	Document Number: MS-16F41 Rev: 0A
Date:	Monday, January 21, 2013 Sheet 38 of 42

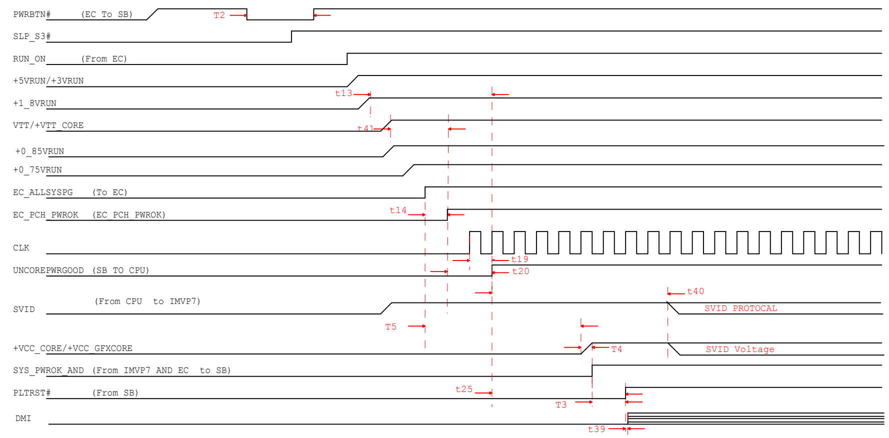
Power on Sequence

S5-S0

EC programming timing

S3-S0

EC programming timing

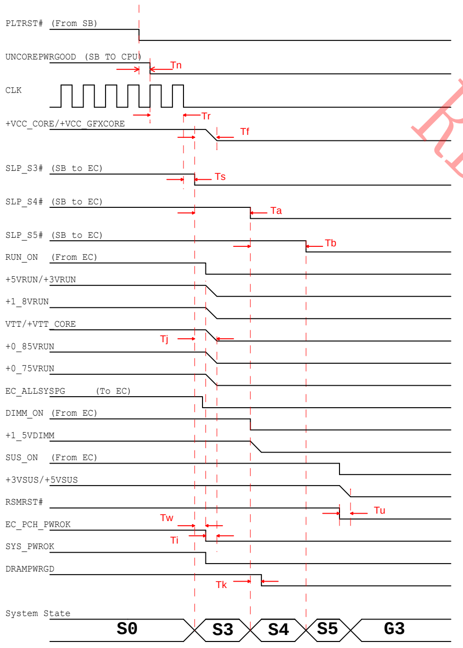


	Min	Max	Unit	Description
T1	150		mS	
T2	16		mS	
T3	1		mS	Timing set by PCH
t04	10		mS	
t07	100		mS	
t08		90	mS	
t09	30		uS	
t10	30		uS	
t13	5	650	mS	
t14	99		mS	EC Delay
t17	2	650	mS	
t18	1		mS	Timing set by PCH
t19	41		mS	Timing set by PCH
t20	2		mS	Timing set by PCH
t25	1	100	mS	
T5		800	uS	Follow MVP Spec
T4	2.5		mV/uS	Follow MVP Spec
t39		200	uS	
t40		500	uS	
t41	10		mS	

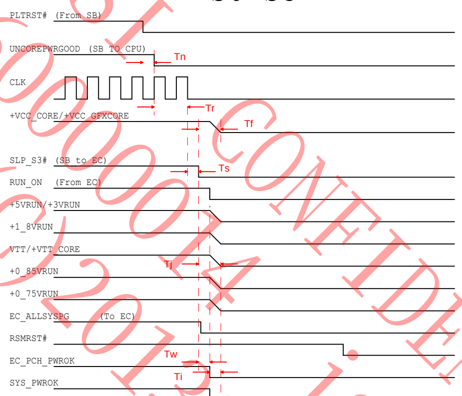
Power down Sequence

S0-S5

EC programming timing

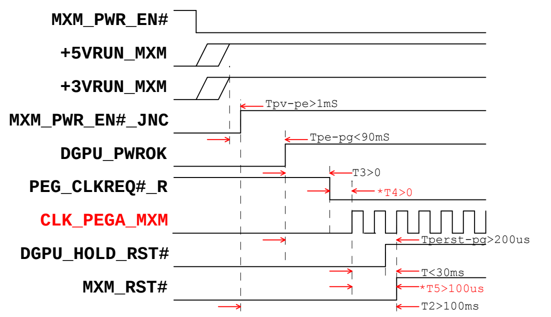


S0-S3



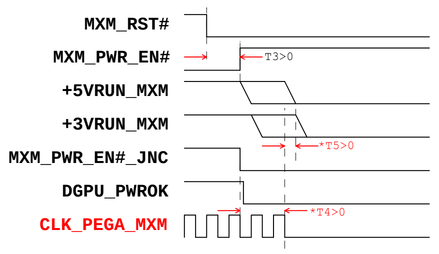
	Min	Max	Unit	Description
Ta	30		uS	
Tb	30		uS	
Tf		500	mS	
Ti	40		nS	
Tj	5		uS	
Tk	100		nS	
Tn	30		uS	
Tp	500		uS	Sx-RSMRST#
Tr	10		uS	
Ts	1		uS	
Tu	40		nS	
Tw	0		mS	

Power-Up Sequence For Optimus On MXM



P.S. Clock alway on

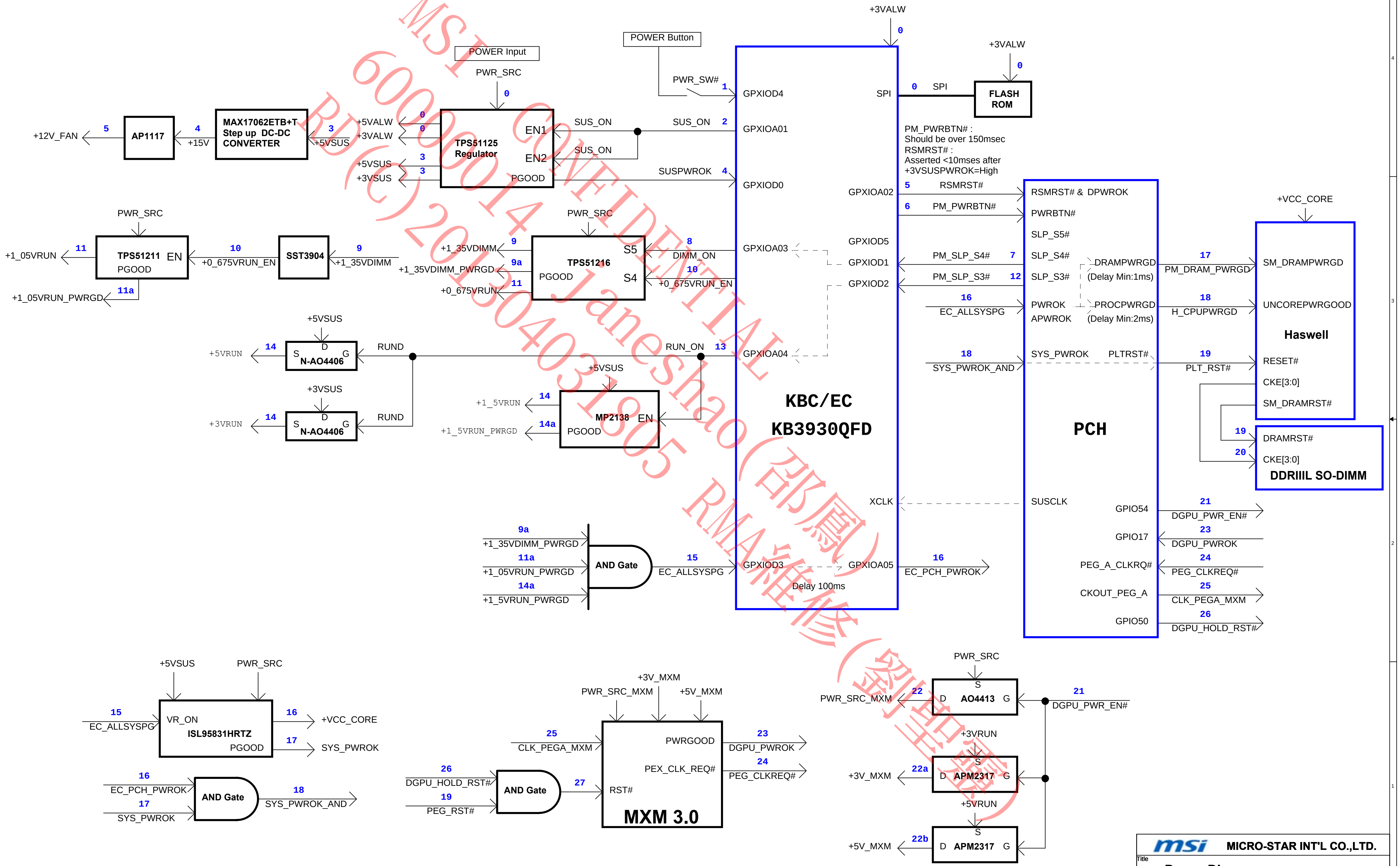
Power-Down Sequence For Optimus On MXM



P.S. Clock alway on

MICRO-STAR INT'L CO.,LTD.
Title: Power Down & MXM Sequence
Size | Document Number: MS-16F4 | Rev 0A
Date: Wednesday, October 24, 2012 | Sheet 40 of 42

Power Diagram



MICRO-STAR INT'L CO.,LTD.

Title: Power Diagram

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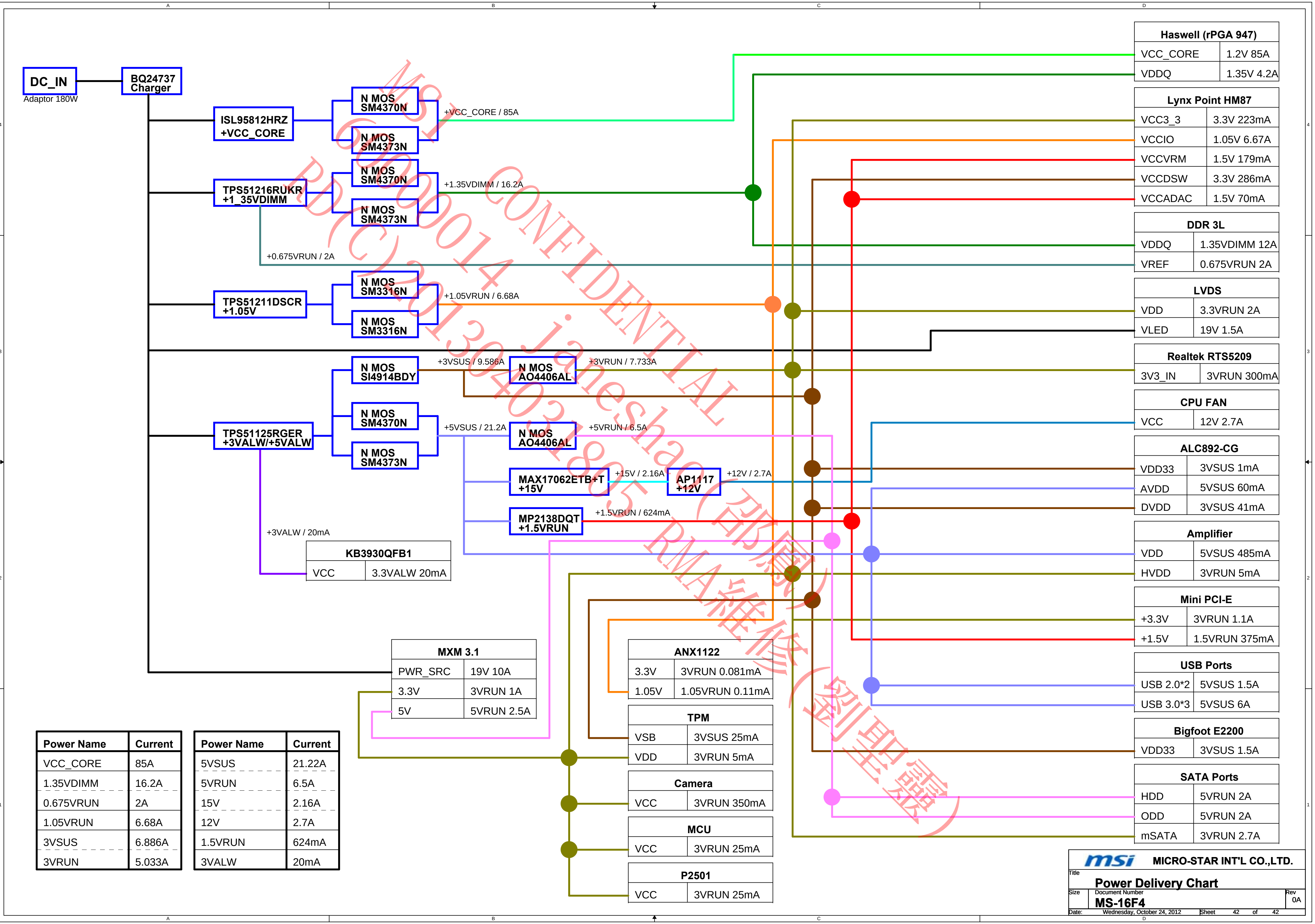

Power Name	Current
VCC_CORE	85A
1.35VDIMM	16.2A
0.675VRUN	2A
1.05VRUN	6.68A
3VSUS	6.886A
3VRUN	5.033A

Power Name	Current
5VSUS	21.22A
5VRUN	6.5A
15V	2.16A
12V	2.7A
1.5VRUN	624mA
3VALW	20mA

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

Title: **Power Delivery Chart**

Size | Document Number: **MS-16F4** | Rev 0A

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