

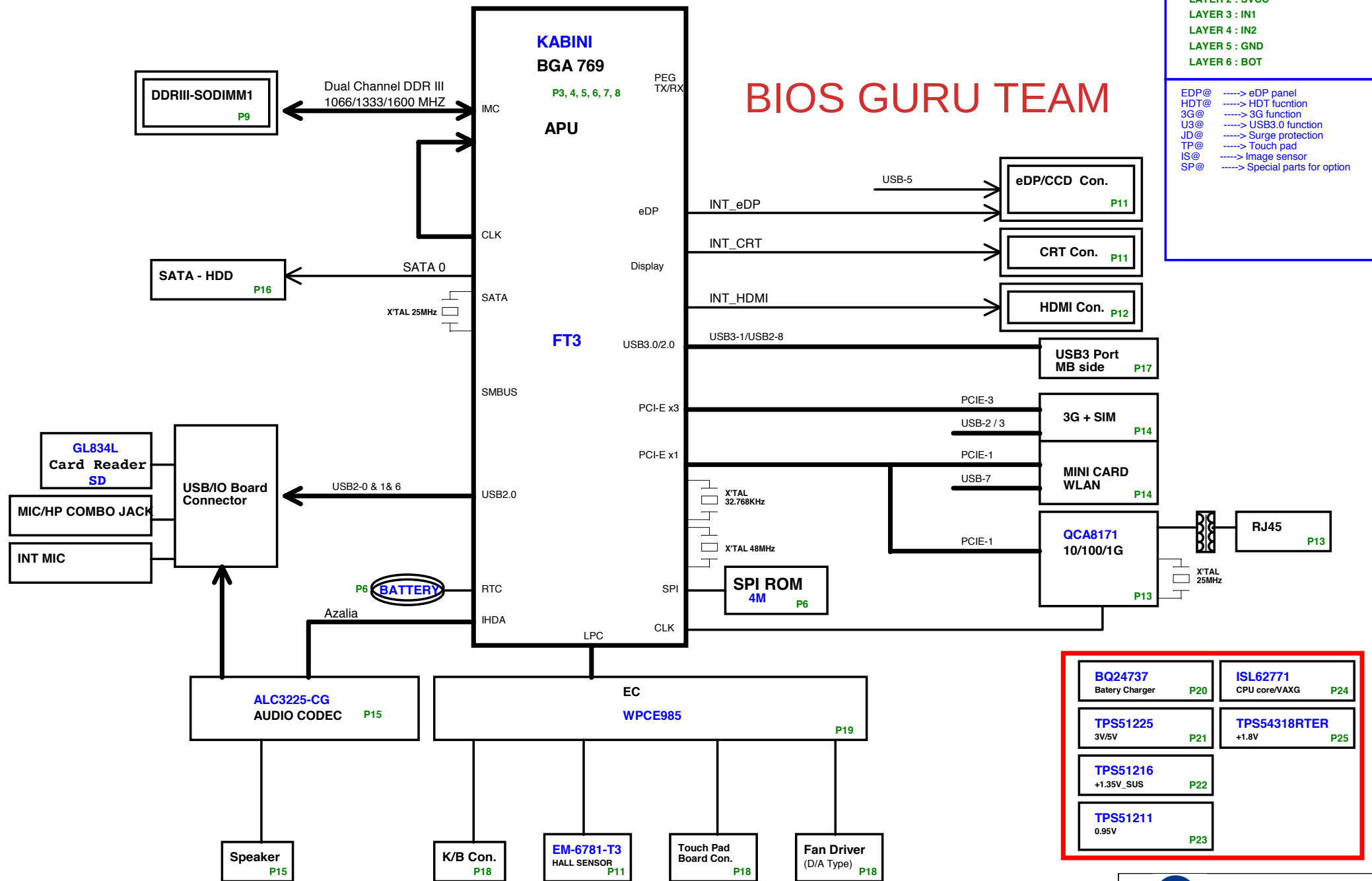
# ZHL KABINI SYSTEM BLOCK DIAGRAM

BIOS GURU TEAM

**PCB STACK UP**

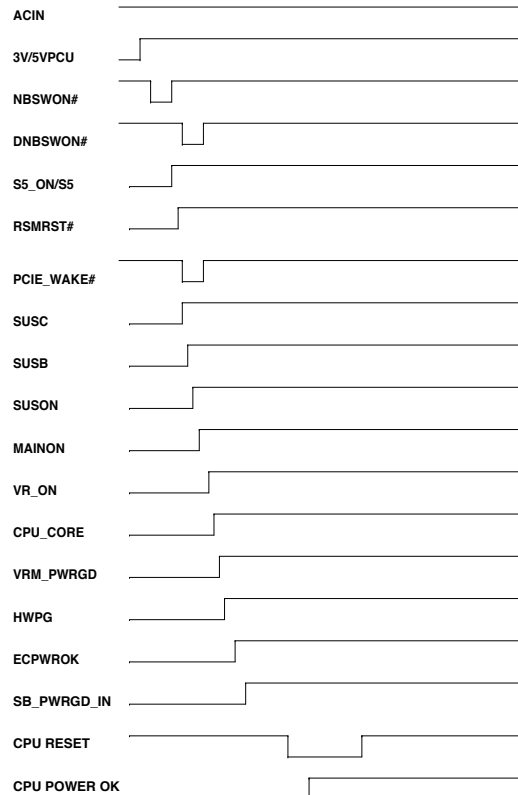
LAYER 1 : TOP  
 LAYER 2 : SVCC  
 LAYER 3 : IN1  
 LAYER 4 : IN2  
 LAYER 5 : GND  
 LAYER 6 : BOT

EDP@ -----> eDP panel  
 HDT@ -----> HDT function  
 3G@ -----> 3G function  
 U3@ -----> USB3.0 function  
 JD@ -----> Surge protection  
 TP@ -----> Touch pad  
 IS@ -----> Image sensor  
 SP@ -----> Special parts for option



<b>BQ24737</b> Battery Charger P20	<b>ISL62771</b> CPU core/VAXG P24
<b>TPS51225</b> 3V/5V P21	<b>TPS54318RTER</b> +1.8V P25
<b>TPS51216</b> +1.35V_SUS P22	
<b>TPS51211</b> 0.95V P23	

## Power Sequence



## KABINI FT3 SMBUS

SMBUS	Pin NO.	SMBUS Function Define	
CLK_SCLK CLK_SDATA (+3V)	AU25 AV25	DDR / Touch Pad/ WLAN	
SCL1 SDA1 (+3V_S5)	AY11 BA11	Battery / Charger/ EC	MBCLK MBDATA (+3VPCU)
SVC SVD (+3V_S5)	D27 E29	+VDDNB_CORE	
APU_SIC APU_SID (+3V)	B22 B21	APU / EC	

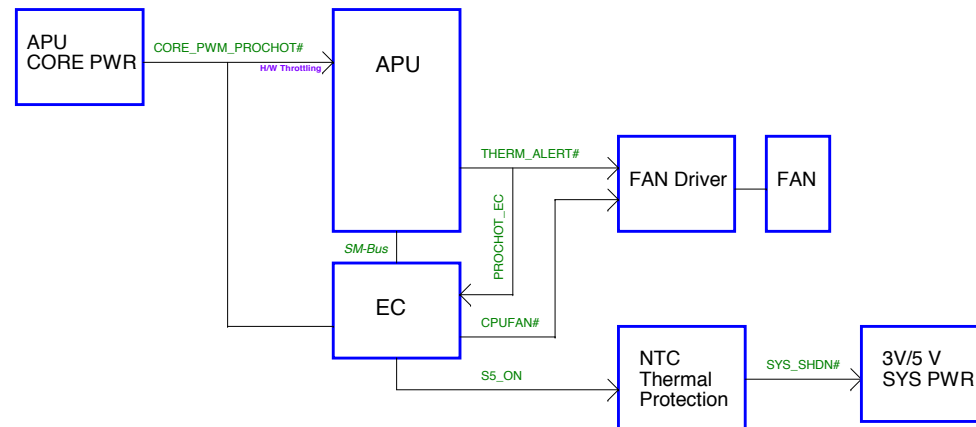
## Power States

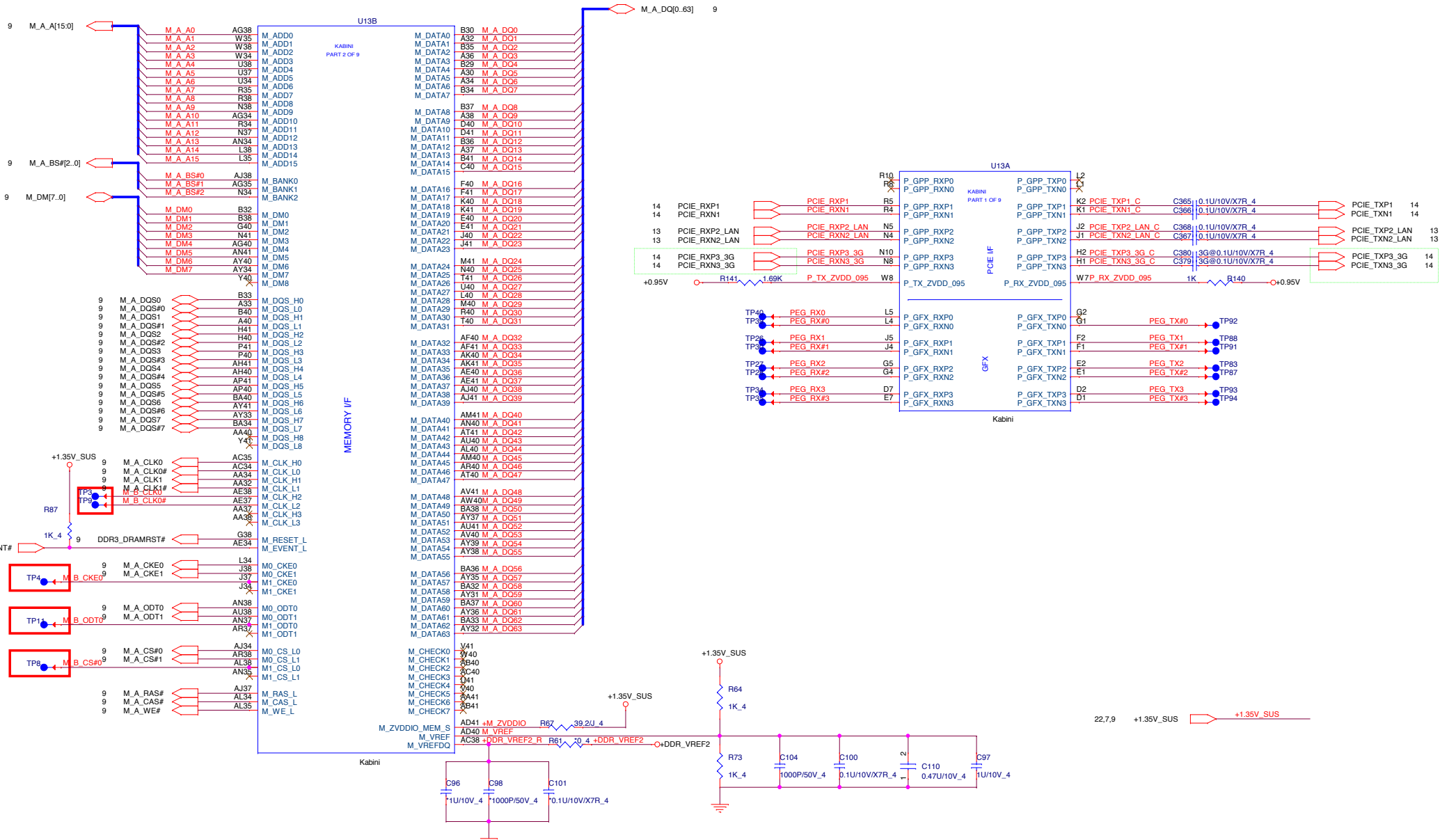
POWER PLANE	VOLTAGE	DESCRIPTION	CONTROL SIGNAL	ACTIVE IN
VIN	+10V~+19V	MAIN POWER	ALWAYS	ALWAYS
+1.5V_RTC	+1.5V	RTC POWER	ALWAYS	ALWAYS
+3VPCU	+3.3V	EC POWER	ALWAYS	ALWAYS
+5VPCU	+5V	CHARGE POWER	ALWAYS	ALWAYS
+15V	+15V	CHARGE PUMP POWER	ALWAYS	ALWAYS
+3V_S5	+3.3V	LAN/ TPM POWER	S5_ON	S0-S5
+5V_S5	+5V	USB POWER	S5_ON	S0-S5
+1.8V_S5	+1.8V	APU/PCH/Braidwood POWER	S5_ON	S0-S5
+1.5V_S5	+1.5V	MINI CARD/NEW CARD POWER	S5_ON	S0-S5
+0.95V_S5	+0.95V	APU CORE POWER	S5_ON	S0-S5
+5V	+5V	HDD/ODD/Coddec/TP/CRT/HDMI POWER	MAINON	S0
+3V	+3.3V	APU/Peripheral component /WLAN POWER	MAINON	S0
+1.5VSUS	+1.5V	CPU/SODIMM CORE POWER	SUSON	S0-S3
+0.75V_DDR_VTT	+0.75V	SODIMM Termination POWER	MAINON	S0
+1.8V	+1.8V	APU/PCH/Braidwood POWER	MAINON	S0
+1.5V	+1.5V	MINI CARD/NEW CARD POWER	MAINON	S0
+0.95V	+0.95V	APU CORE POWER	MAINON	S0
+VDDNB_CORE	variation	APU CORE POWER	VRON	S0
LCDVCC	+3.3V	LCD POWER	LVDS_VDDEN	S0


## KBC(EC) SMBUS

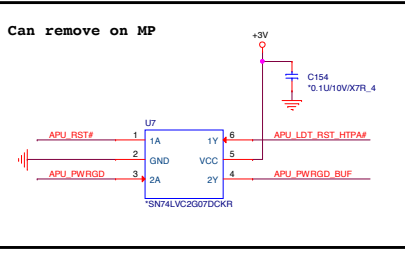
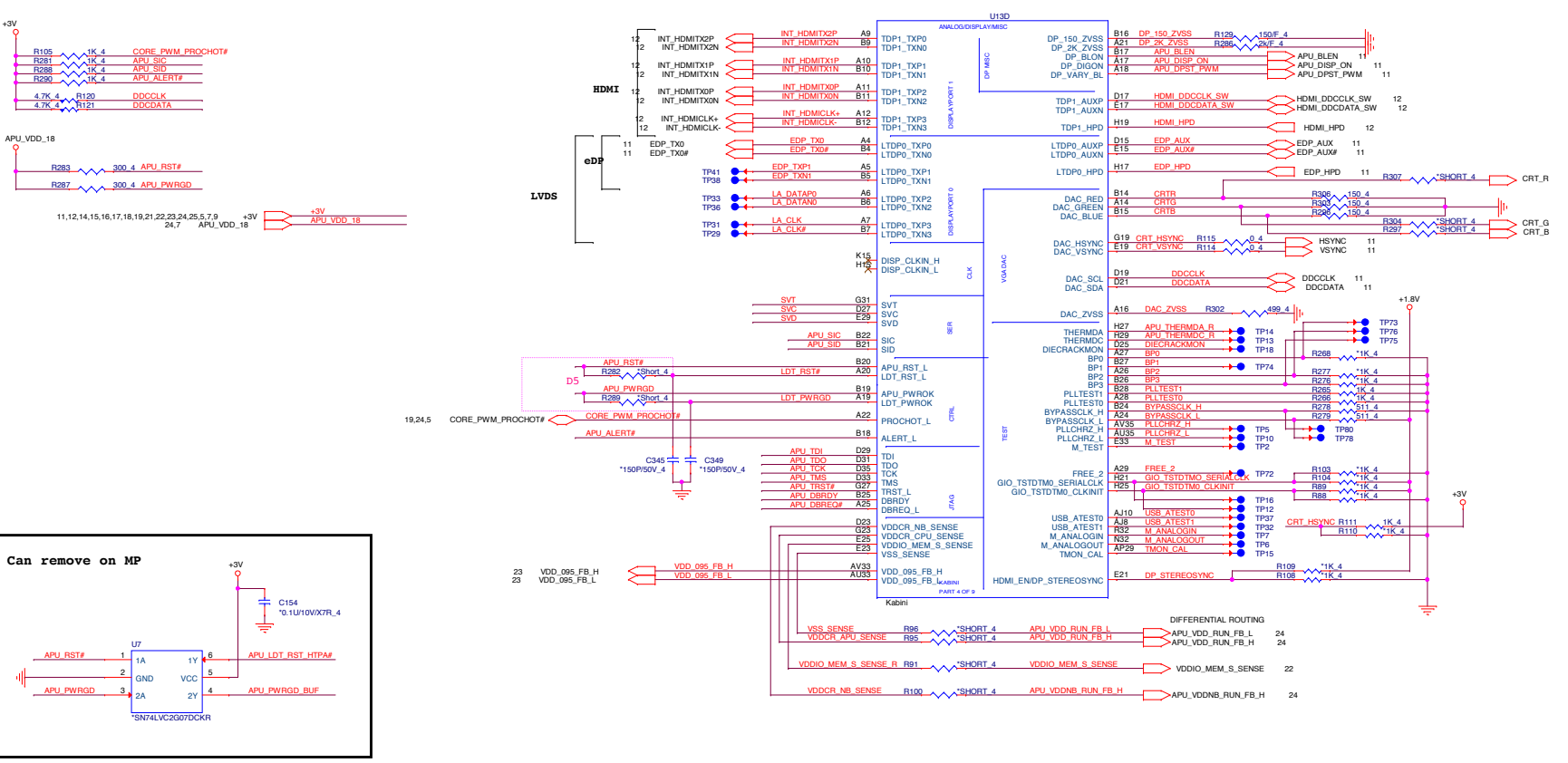
NPCE985 SMBUS	Pin NO.	SMBUS Function Define	
MBCLK MBDATA (+3VPCU)	70 69	Battery / Charger/ EC	
APU_SIC_EC APU_SID_EC (+3VPCU)	67 68	APU / EC	

## Thermal Follow Chart

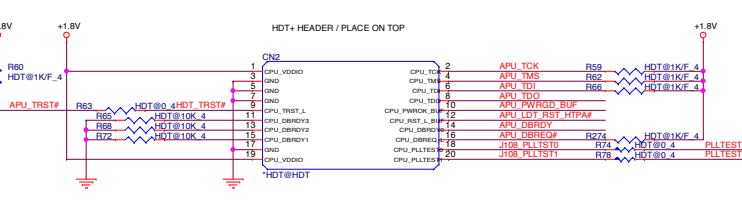




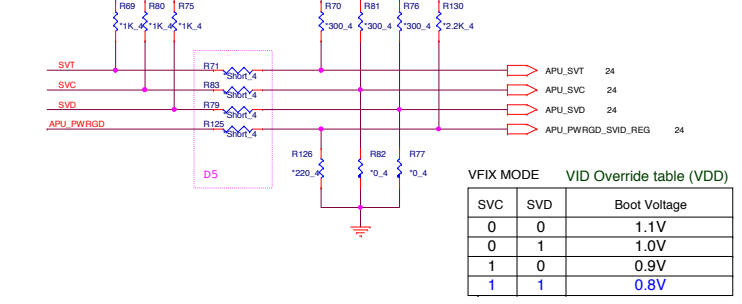
			<b>PROJECT : KABINI FT3</b> Quanta Computer Inc.	
Date: Thursday, July 11, 2013		Sheet 3 of 26		



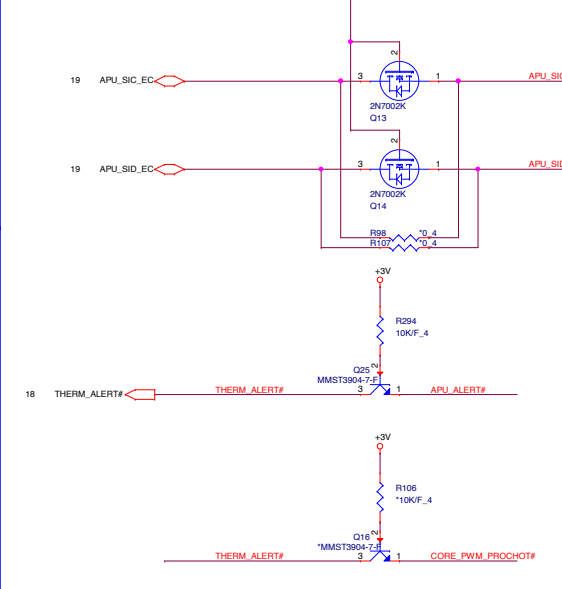
**HDT(Hardware Debug Tool ) Connector**



**Serial VID**

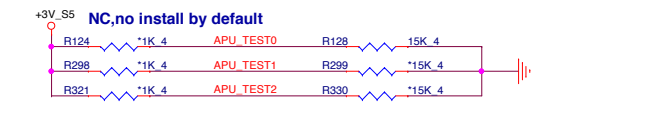
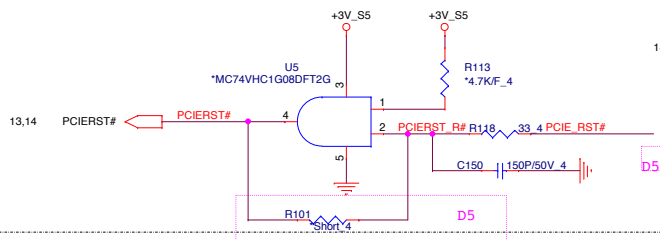


**SMBUS**

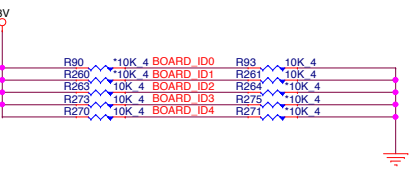
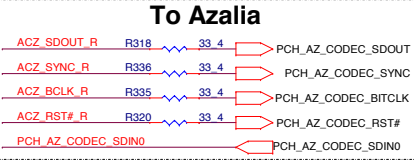
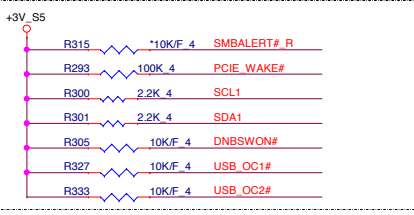
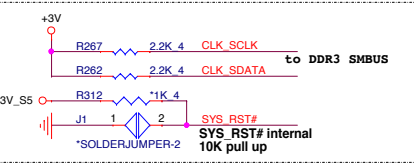


**PROJECT : KABINI FT3**  
Quanta Computer Inc.

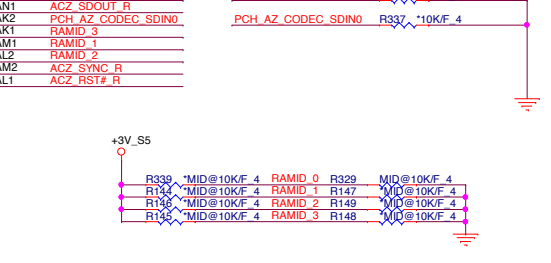
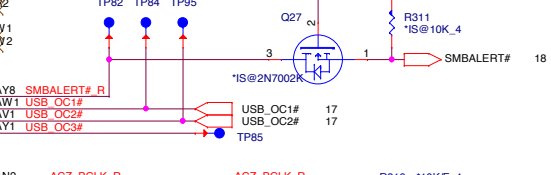
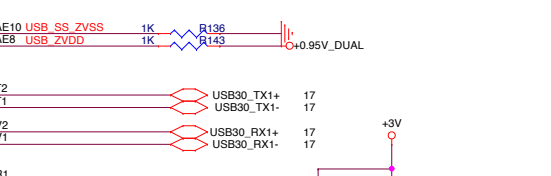
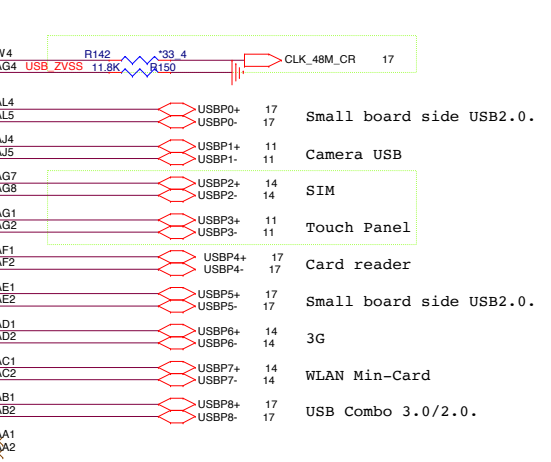
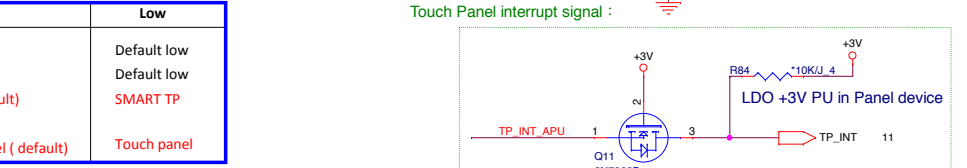
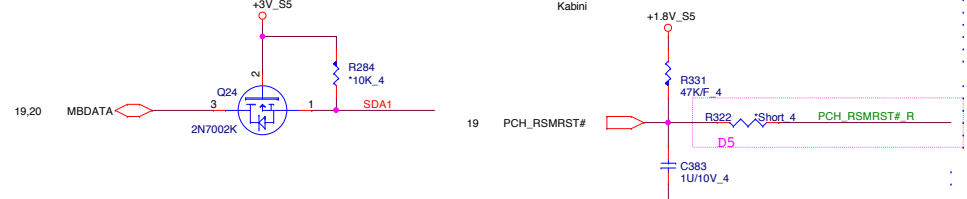
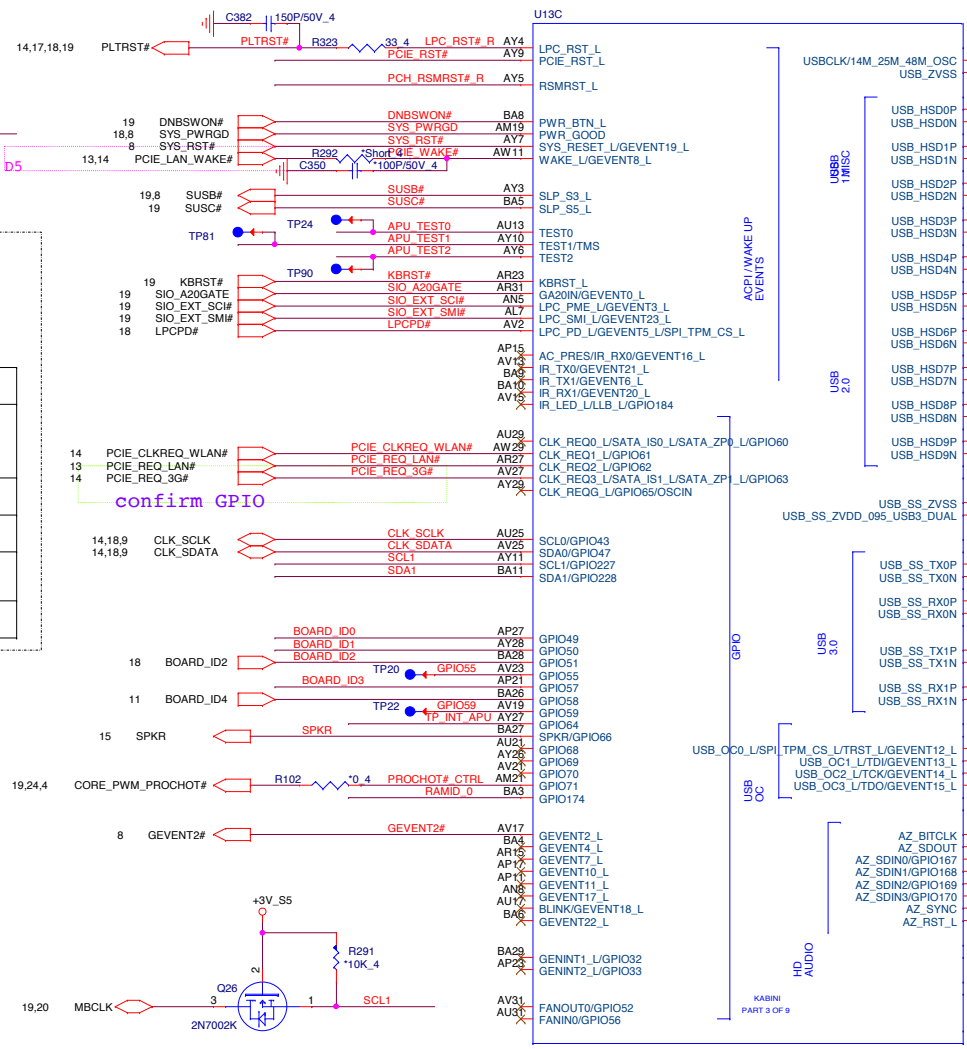
Size	Document Number	Rev
	<b>DIS/M (2/6)</b>	1A
Date:	Thursday, July 11, 2013	Sheet 4 of 26



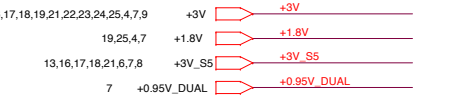
TEST2	TEST1	TEST0	Description
0	0	0	FCH TAP accessible from APU when TAPEN is asserted. FCH JTAG pins are overloaded for multiple functions, in this configuration the FCH JTAG are used as non-JTAG pins.
0	0	1	Reserved
0	1	X	Reserved
1	TMS	0	FCH JTAG multi-function pins are configured as JTAG pins, in this configuration the FCH TAP can be accessed from FCH JTAG pins.
1	TMS	1	Use on ATE only. Yuba JTAG enabled.



GPIO	High	Low
BOARD_ID0		Default low
BOARD_ID1		Default low
BOARD_ID2	CLICK TP (default)	SMART TP
BOARD_ID3	Default High	
BOARD_ID4	No Touch Panel ( default)	Touch panel



RAM	RAMID_0	RAMID_1	RAMID_2	RAMID_3
Elpida 1333 AKD5JG5T407	0	0	0	0

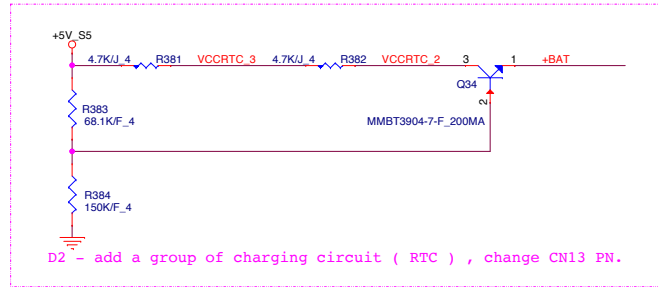
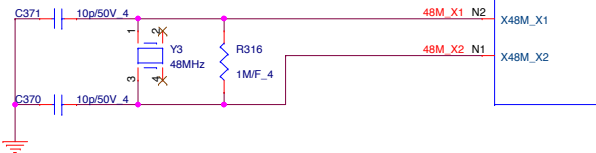
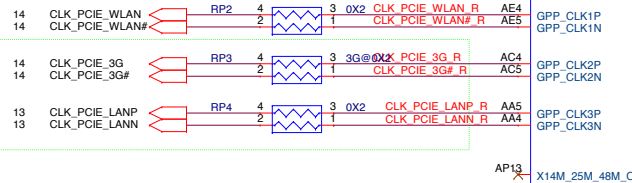
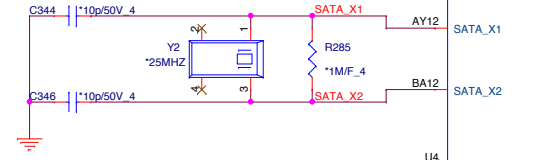
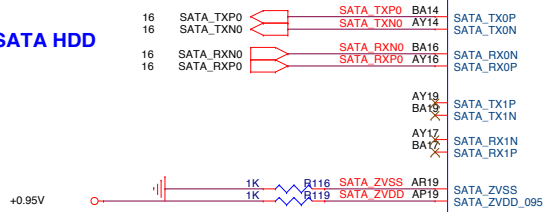


**PROJECT : KABINI FT3**  
**Quanta Computer Inc.**

Size	Document Number	Rev
	<b>GPIO/USB/AZ (3/6)</b>	1A
Date:	Thursday, July 11, 2013	Sheet 5 of 26



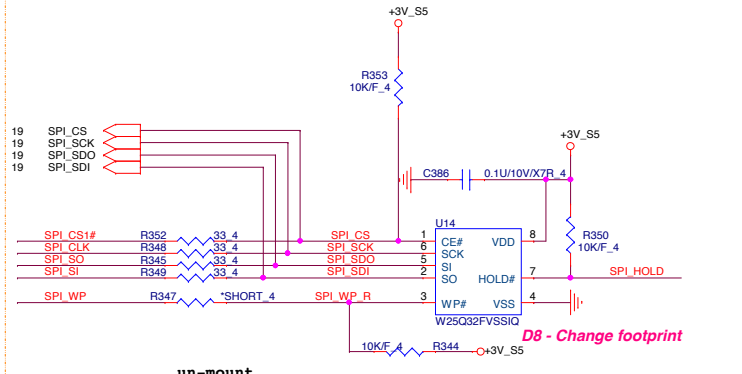
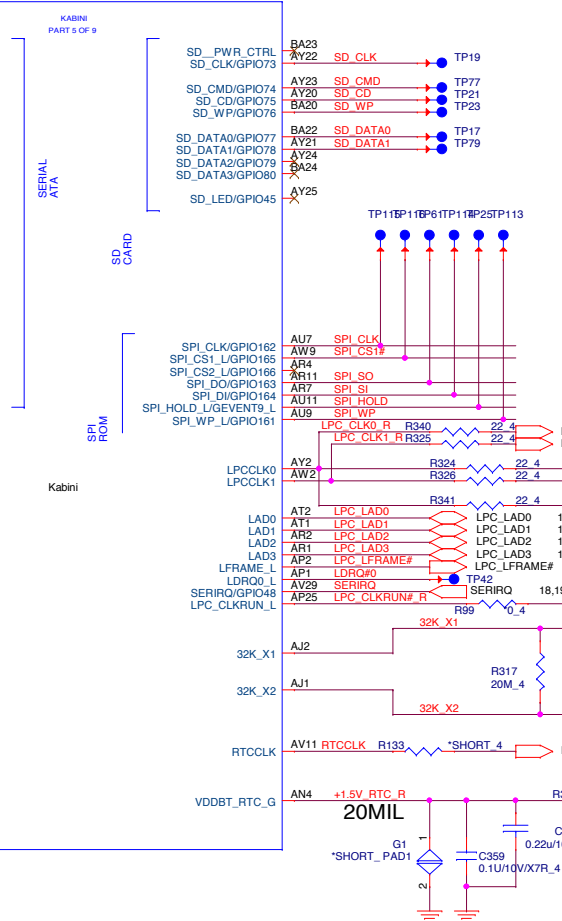
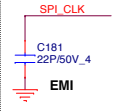
**SATA HDD**



**APU SPI ROM**

Replace to MX25L6436E

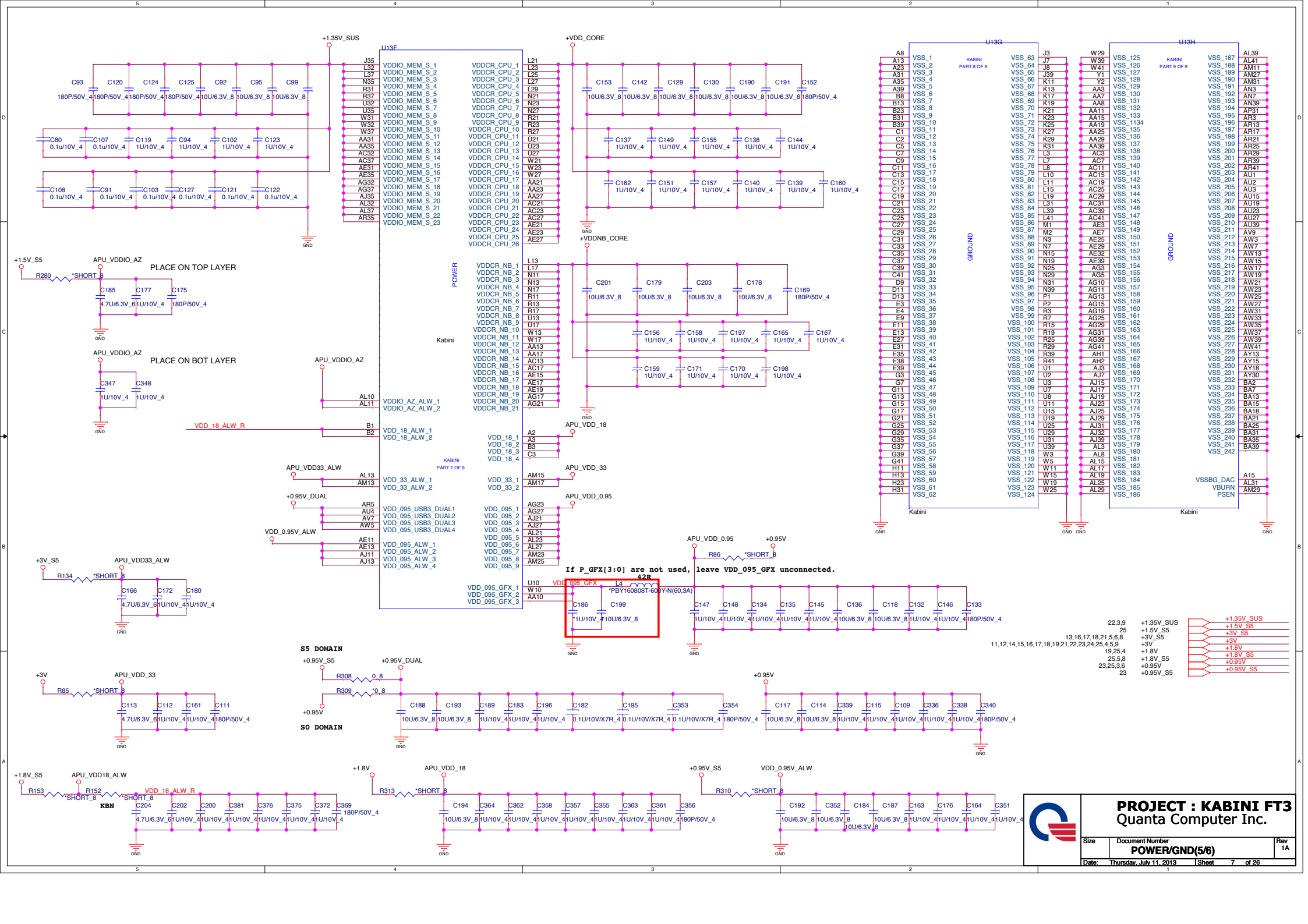
Vender	Size	P/N
AMIC		
WINBOND	4M	AKE39FN0N01



w/o 3G ----> mount SP@RTC\_CON2

**PROJECT : KABINI FT3**  
Quanta Computer Inc.

Size	Document Number	Rev
	<b>SATA/CLK (4/6)</b>	1A
Date:	Thursday, July 11, 2013	Sheet 6 of 26



**PROJECT : KABINI FT3**  
**Quanta Computer Inc.**

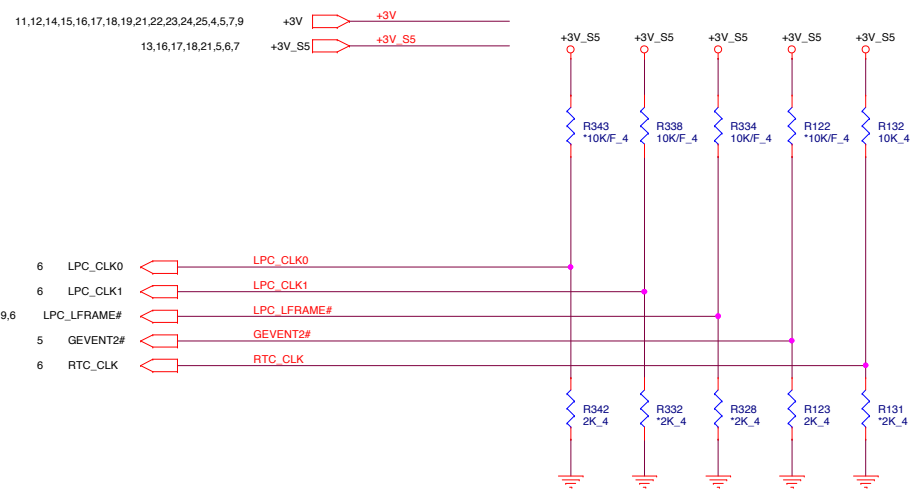
Size	Document Number	Rev
	<b>POWER/GND(5/6)</b>	1A
Date:	Thursday, July 11, 2013	Sheet 7 of 26

- +1.35V\_SUS
- +1.5V\_S5
- +3V\_S5
- +3V
- +1.8V
- +1.8V\_S5
- +0.95V
- +0.95V\_S5

If P\_GFX[3:0] are not used, leave VDD\_095\_GFX unconnected.

# STRAPS PINS

OVERLAP COMMON PADS WHERE POSSIBLE FOR DUAL-OP RESISTORS.

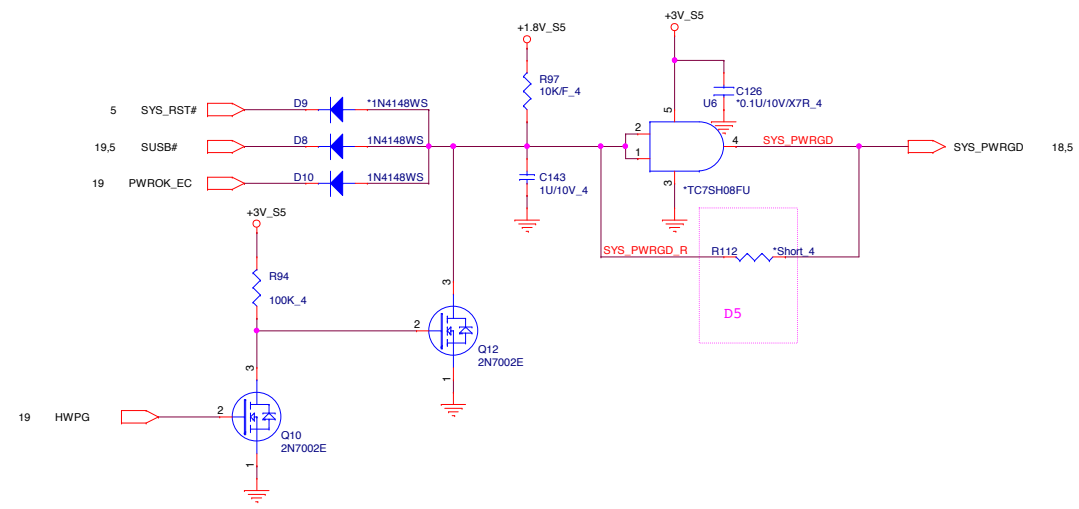


## REQUIRED STRAPS

					LPC_CLK0	LPC_CLK1	LFRAME#	GEVENT2#
PULL HIGH					BOOT FAIL TIMER ENABLED	CLKGEN ENABLED DEFAULT	SPI ROM DEFAULT	1.8V SPI ROM
PULL LOW					BOOT FAIL TIMER DISABLED DEFAULT	CLKGEN DISABLED	LPC ROM	3.3V SPI ROM DEFAULT

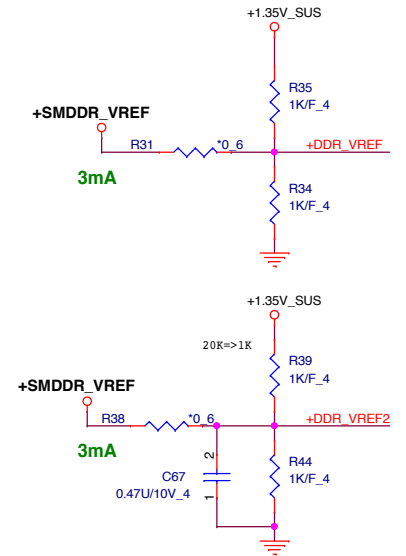
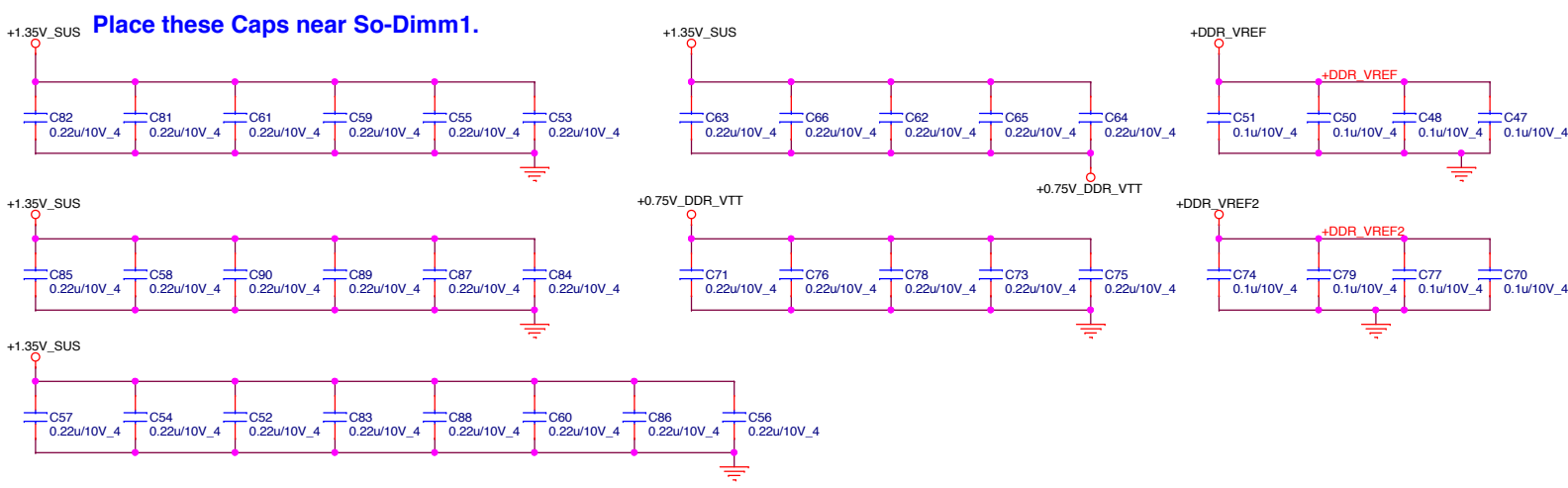
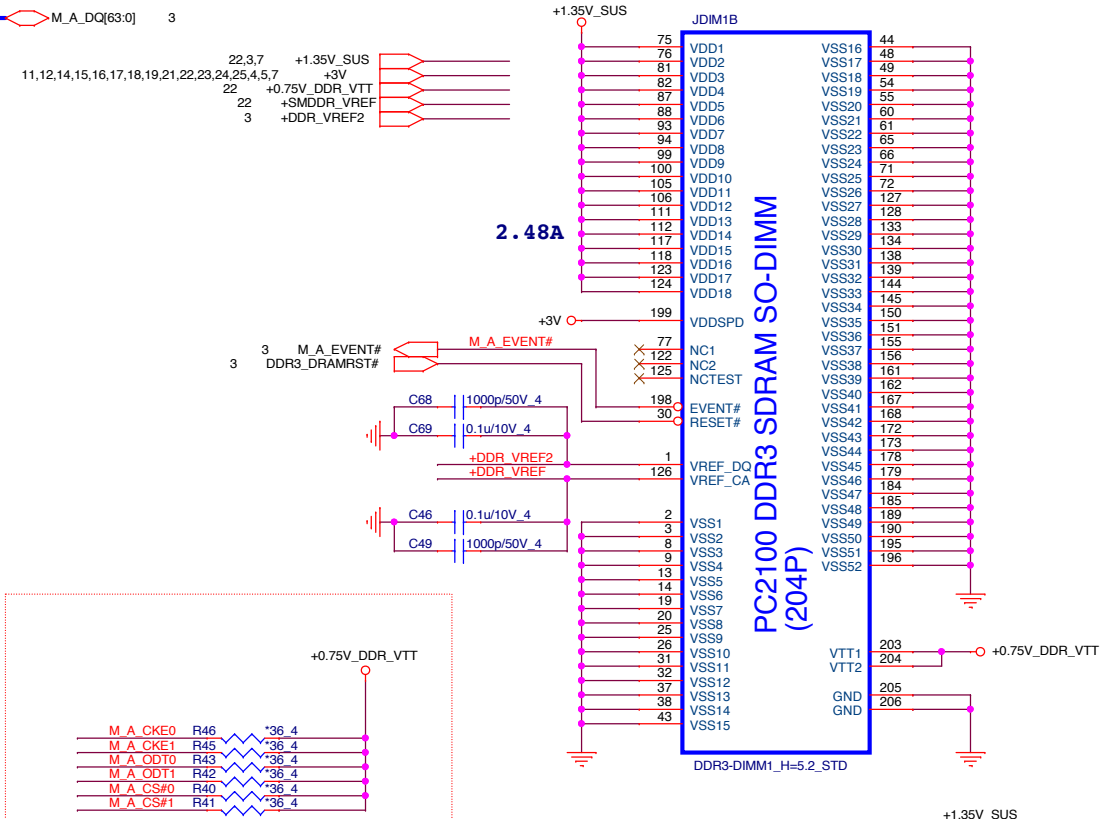
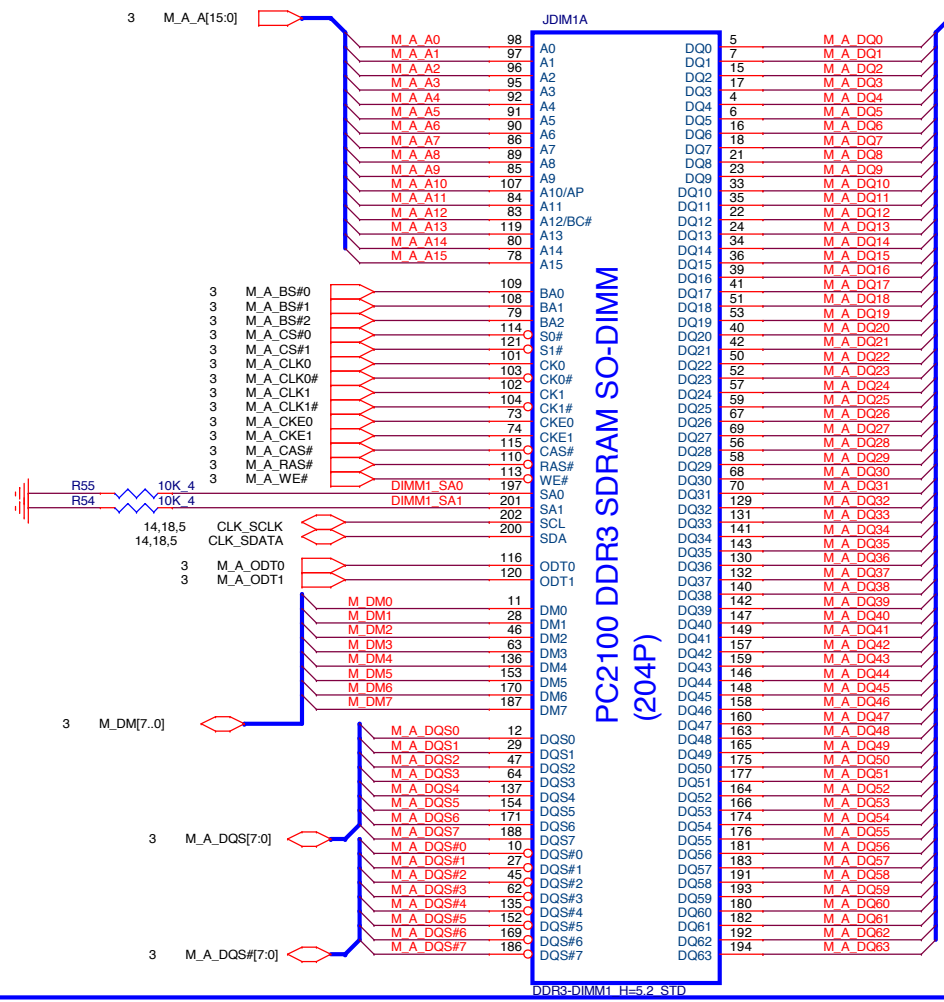
# DEBUG STRAPS

## SYS\_PWRGD




	<b>PROJECT : KABINI FT3</b>		
	Quanta Computer Inc.		
	Size	Document Number	Rev
	<b>STRAP (6/6)</b>	1A	
Date:	Thursday, July 11, 2013	Sheet	8 of 26

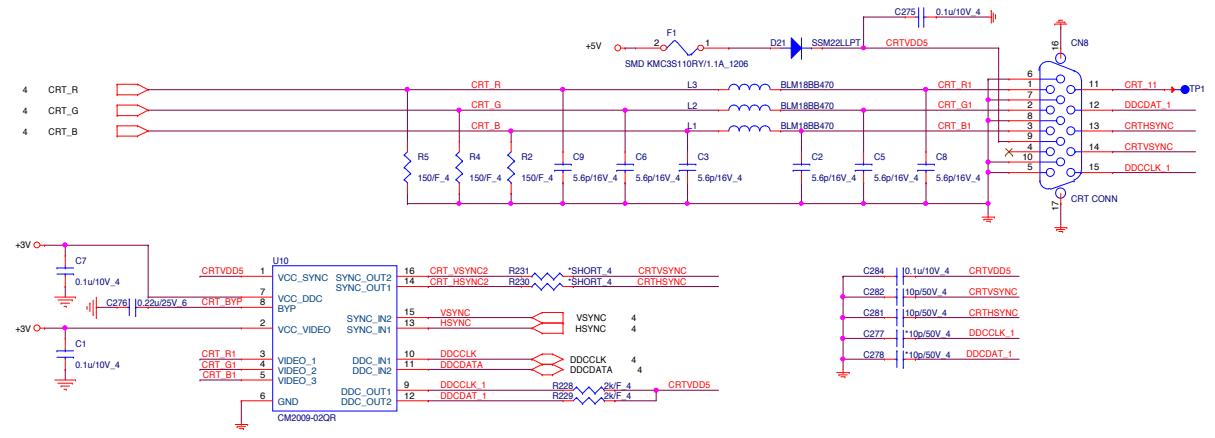




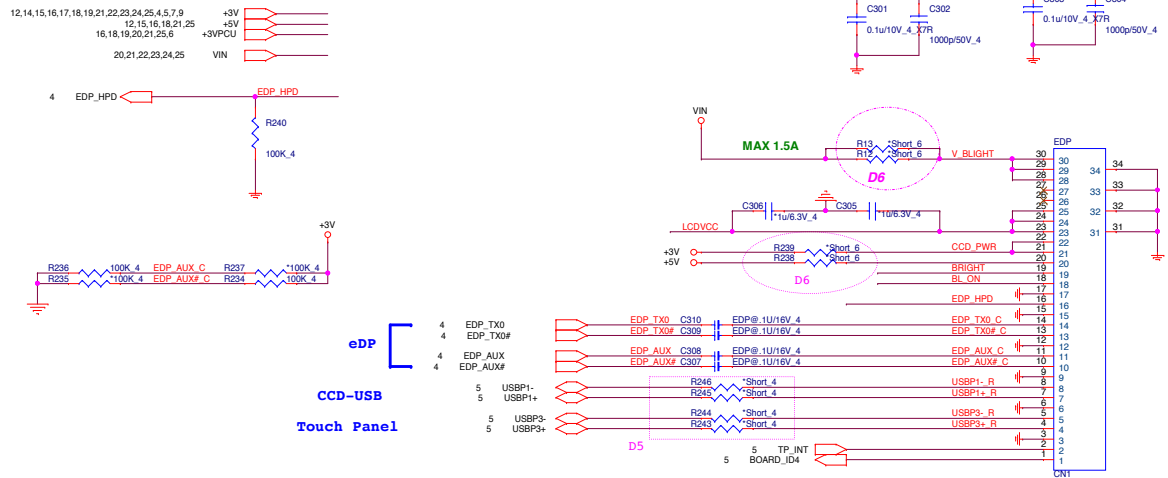
**Quanta Computer Inc.**  
**PROJECT : ZHL**

Size	Document Number	Rev
	<b>DDR3 SO-DIMM-1</b>	1A
Date:	Thursday, July 11, 2013	Sheet 9 of 26

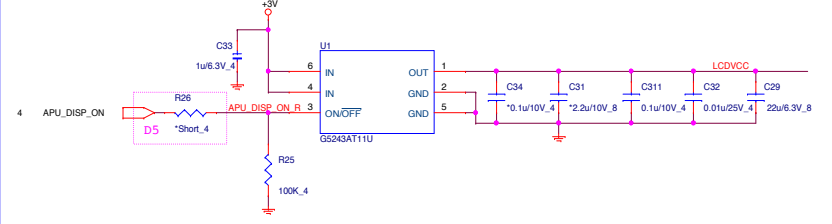
		<b>Quanta Computer Inc.</b>
		<b>PROJECT : ZBL</b>
Size	Document Number	Rev
	<b>DDR3 MEMORY DOWN X 16</b>	<b>1A</b>
Date	Thursday, July 11, 2014	Sheet 10 of 28



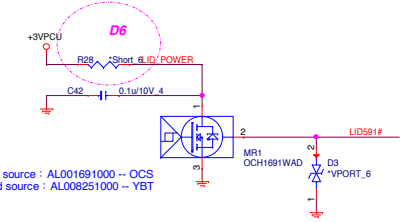
LCD CONNECTOR



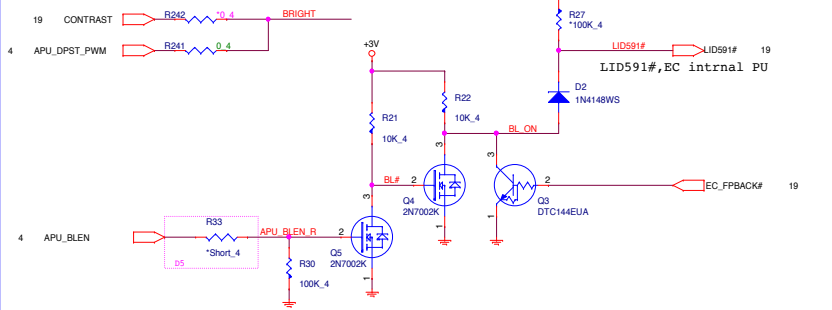
LCD Power



Lid Switch (Hall sensor)

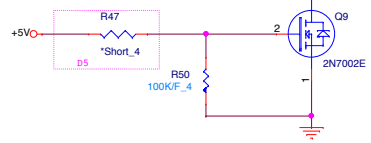
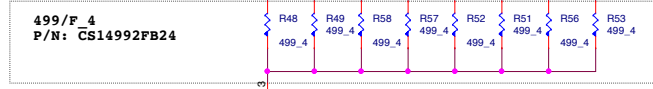
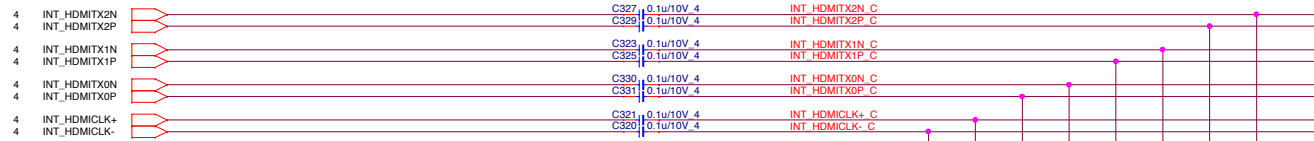


Backlight Control

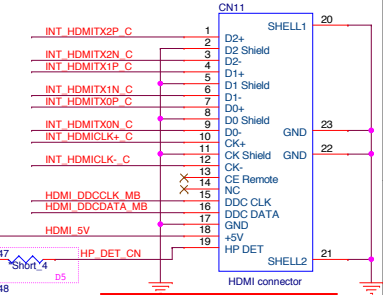


# HDMI

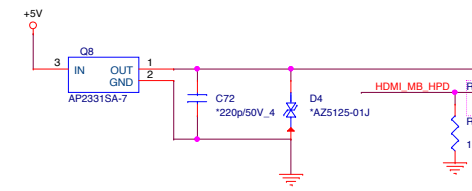
## From PCH



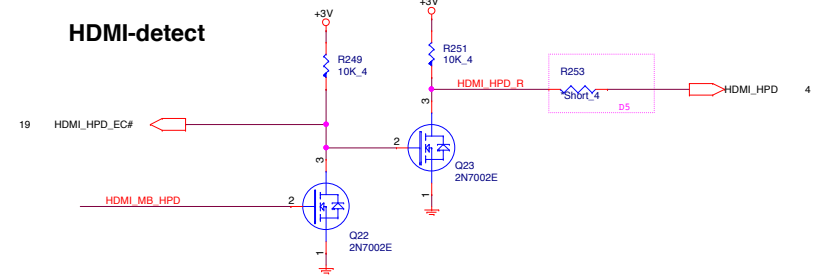
## HDMI connector



C01- change footprint

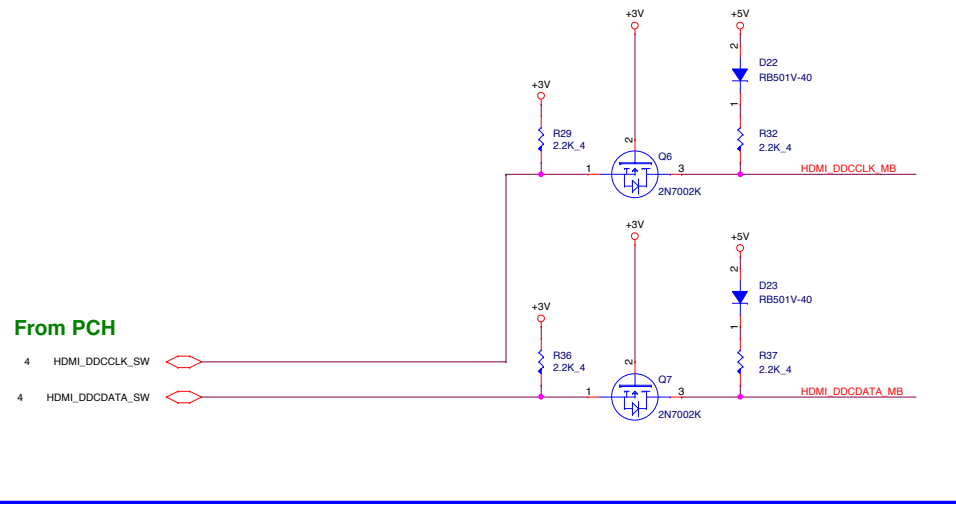


## HDMI-detect

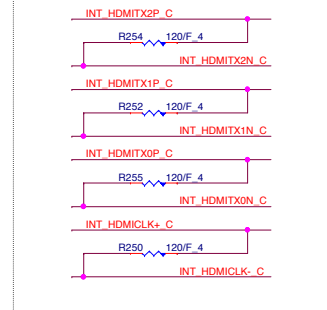



## I2C

### From PCH



## EMI




**Quanta Computer Inc.**  
**PROJECT : ZHL**  
**HDMI (PS8101)**  
 Date: Thursday, July 11, 2013 Sheet 12 of 26

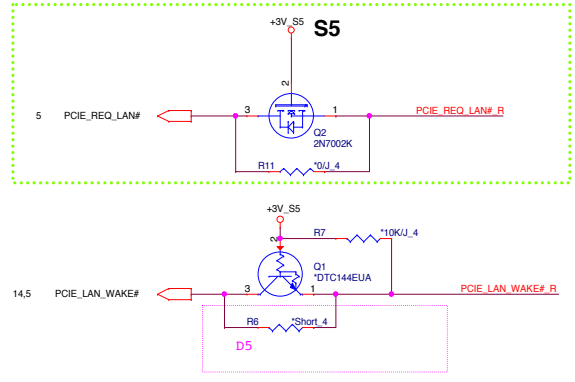
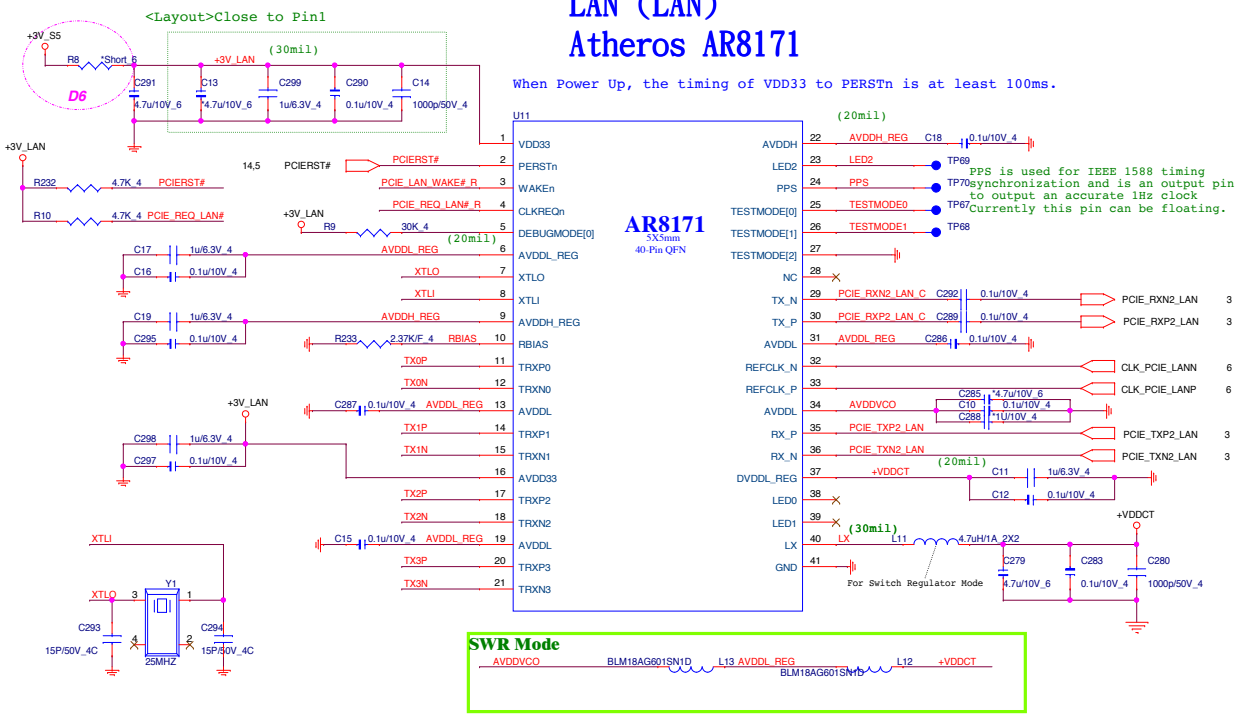
11,14,15,16,17,18,19,21,22,23,24,25,4,5,7,9  
11,15,16,18,21,25

+3V  
+5V

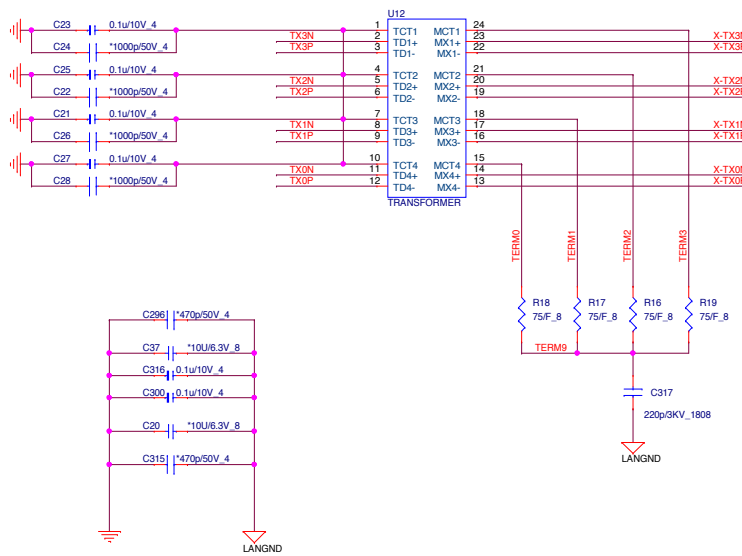


# LAN (LAN) Atheros AR8171

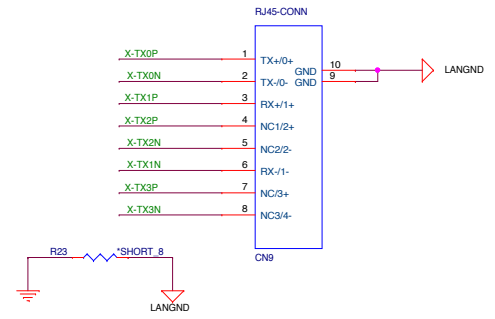
When Power Up, the timing of VDD33 to PERSTn is at least 100ms.



## TRANSFORMER(LAN)



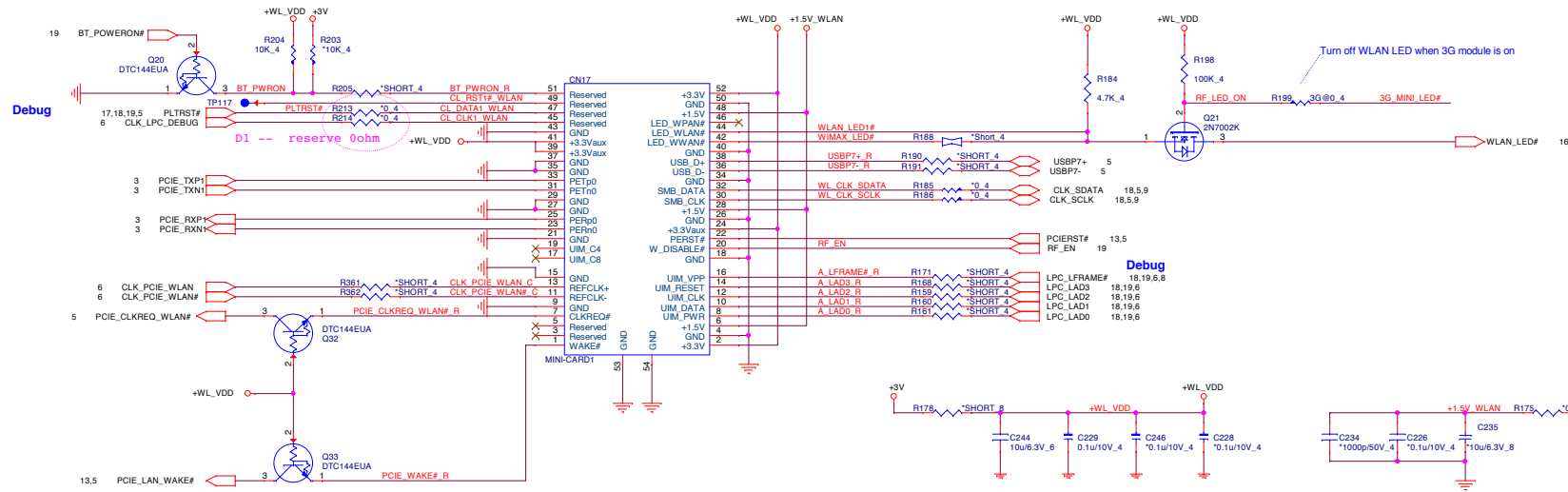
## RJ45(LAN)



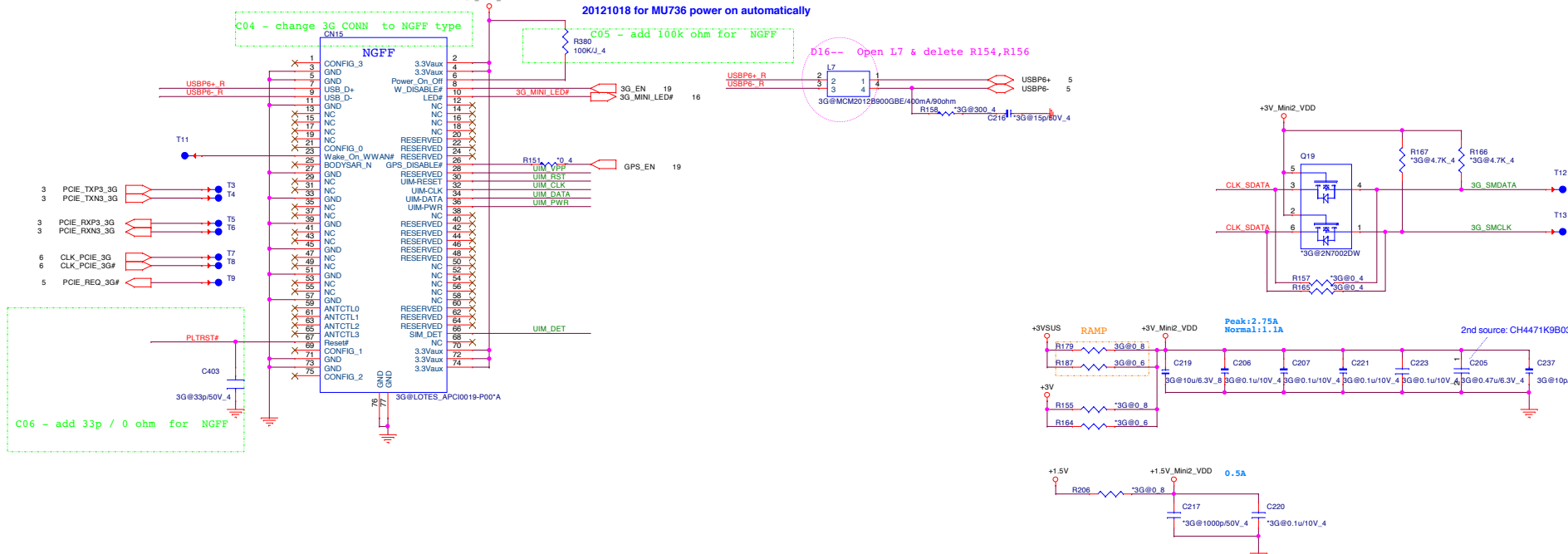
**Quanta Computer Inc.**  
PROJECT : ZHL

Size	Document Number	Rev
	LAN/LED/EMI/HOLE	1A
Date:	Thursday, July 11, 2013	Sheet 13 of 25

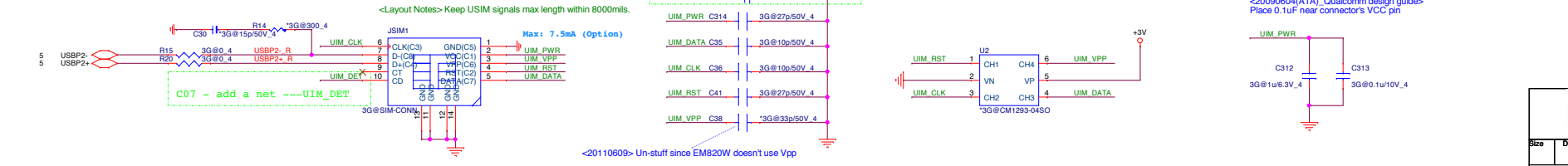
# Mini Card 1 (MPC)



# NGFF 3G (MNC)

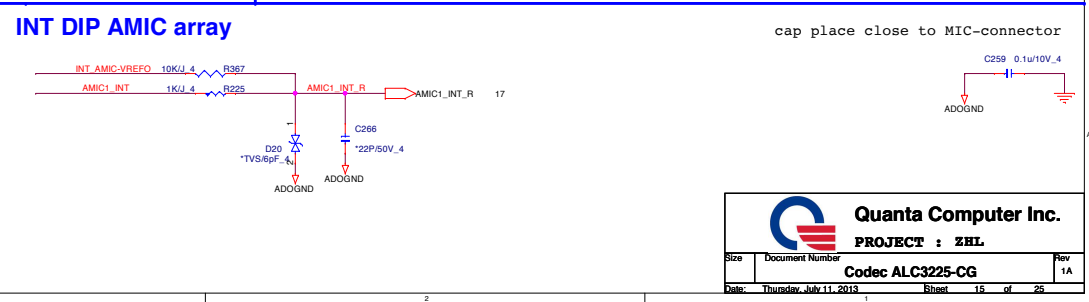
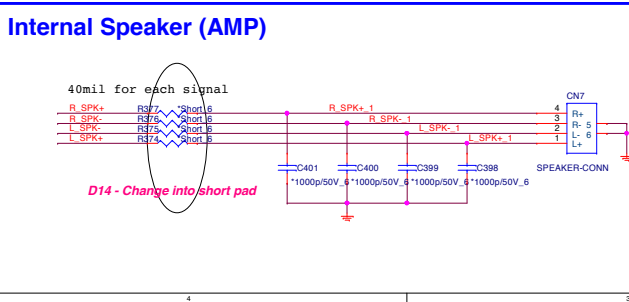
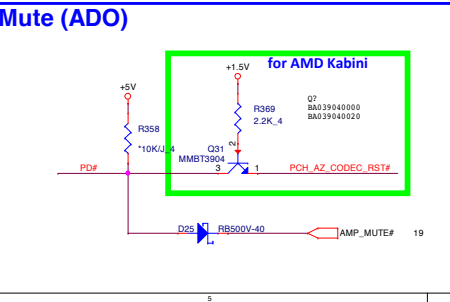
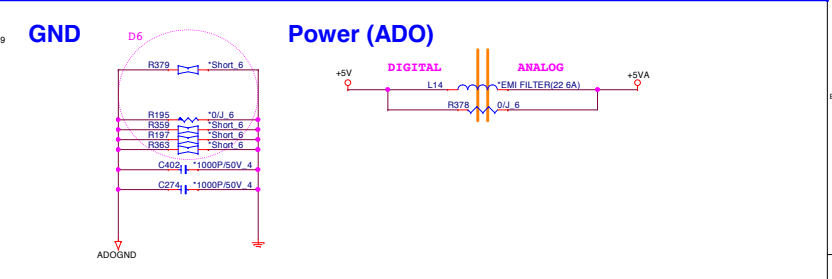
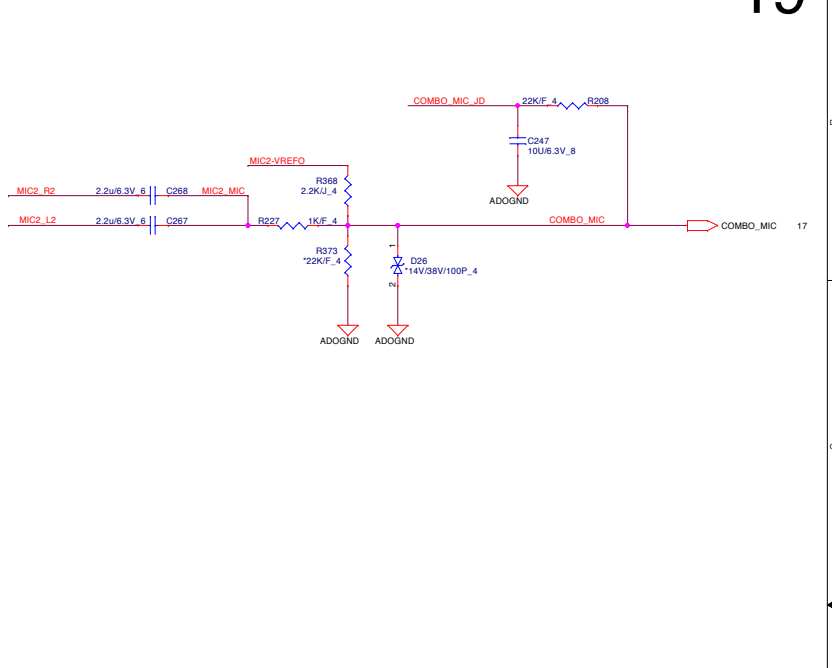
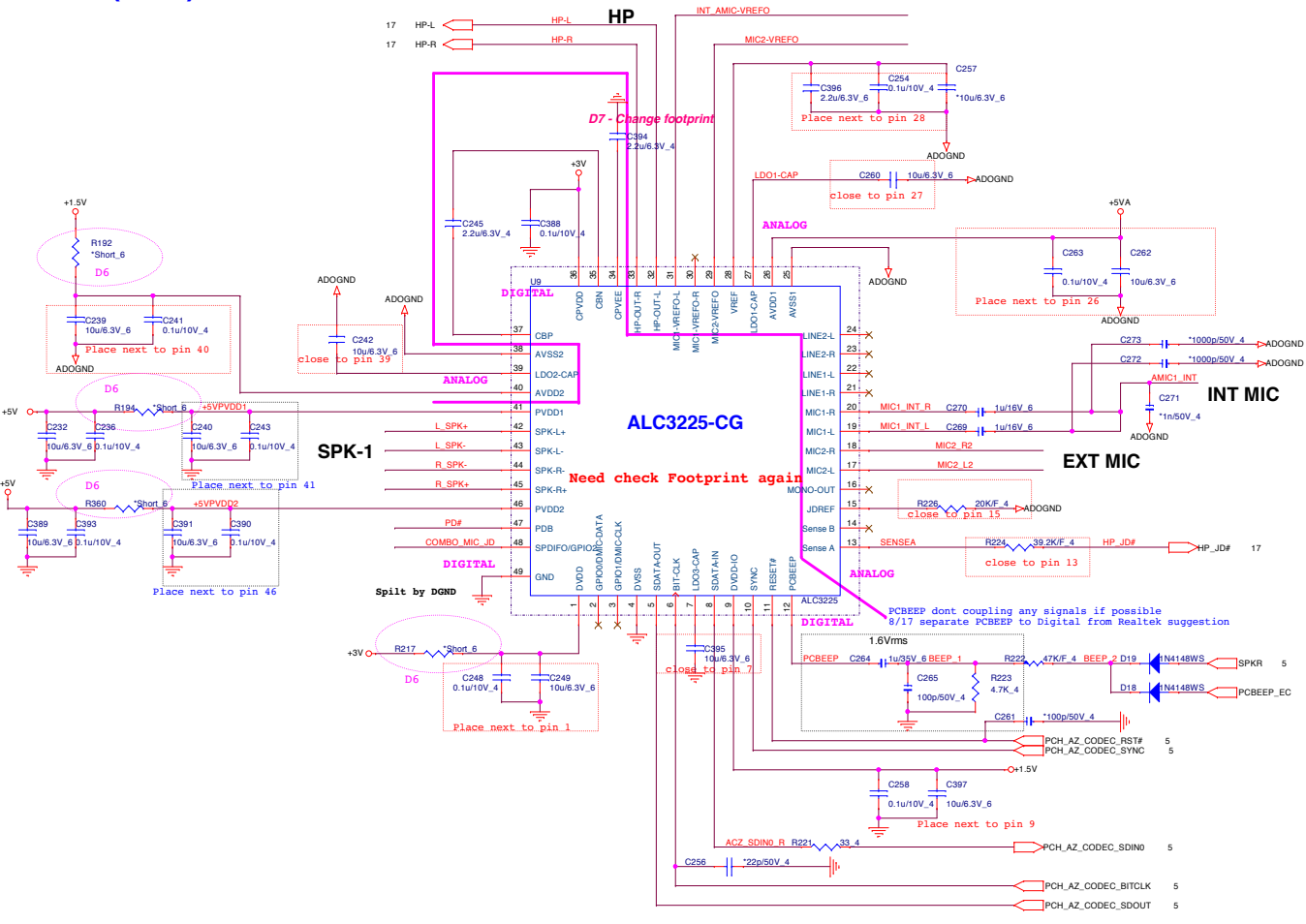


# MultiMedia SIM (MNC)



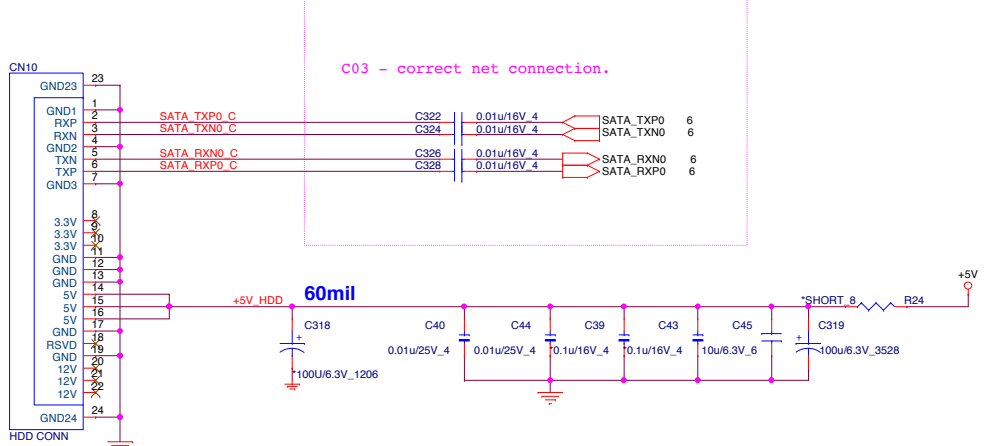
Codec (ADO)

HEADPHONE/Mic combo



**Quanta Computer Inc.**  
**PROJECT : ZHL**  
**Codec ALC3225-CG**  
 Date: Thursday, July 11, 2013  
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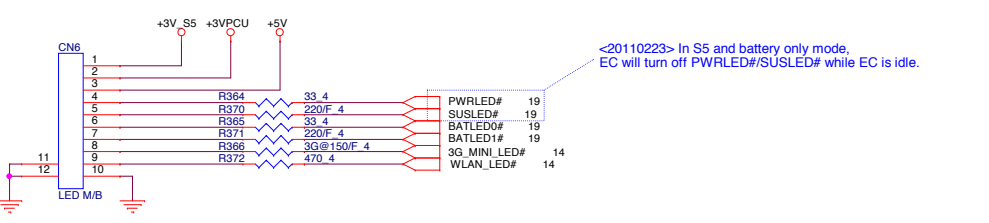
# 2.5" SATA HDD (HDD)



# Power Sequence Connector(CPU)

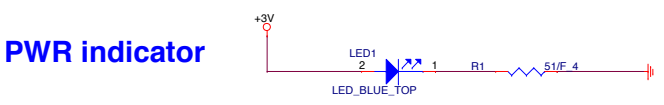
1	GND	11	SUSON	21	VRON
2	NBSWON#	12	MAINON	22	RESERVE
3	S5_ON	13	RESERVE	23	CPU_COREPG
4	RESERVE	14	RESERVE	24	PWROK_EC
5	RESERVE	15	RESERVE	25	RESERVE
6	RESERVE	16	RESERVE	26	APU_PWRGD
7	PCH_RSMRST#	17	RESERVE	27	RESERVE
8	DNBSWON#	18	RESERVE	28	LDT_RST#
9	SUSC#	19	RESERVE	29	A_RST#_R
10	SUSB#	20	HWPG	30	RESERVE


# LED DB (UIF)



# Stitching Cap(EMC)

# POWER LED(UIF)

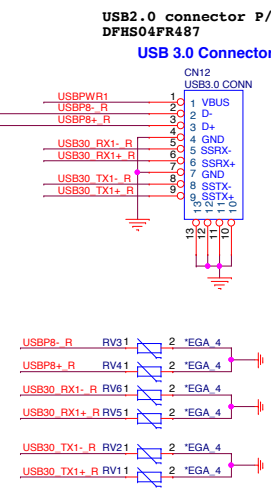
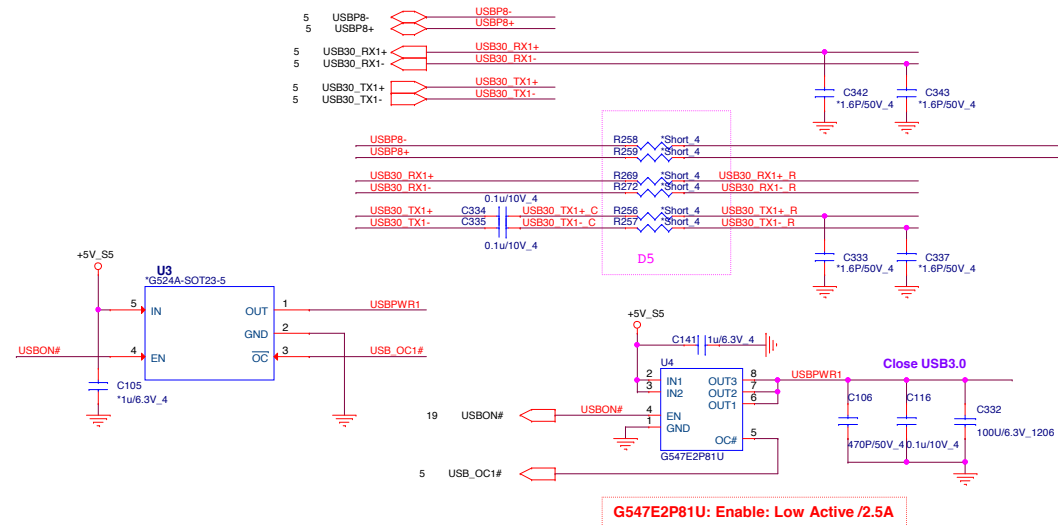




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PROJECT : ZHL

Size	Document Number	Rev
	<b>SATA HDD/LED/SW</b>	1A
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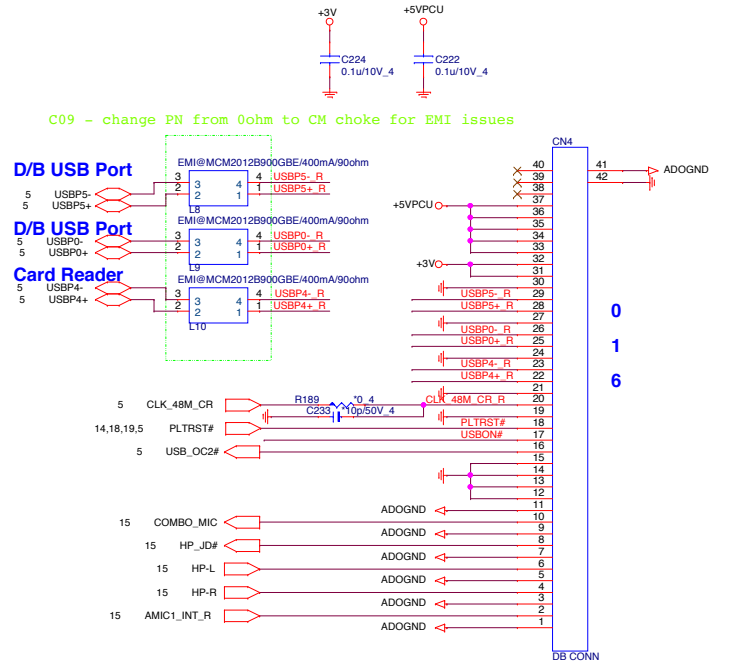




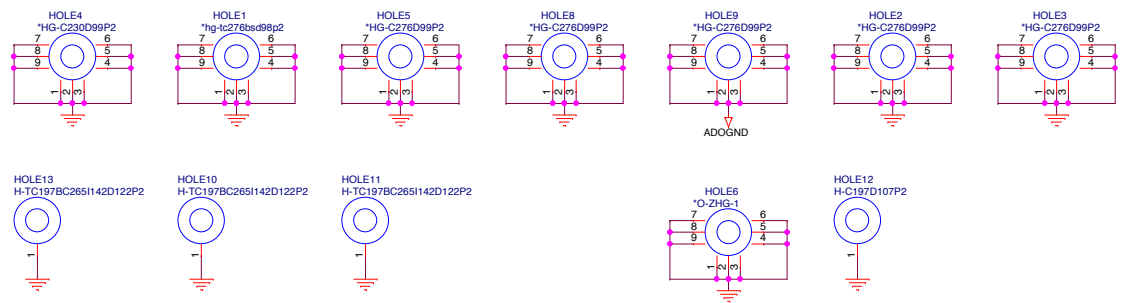
C02 - change USB 3.0 Footprint

G547E2P81U: Enable: Low Active /2.5A

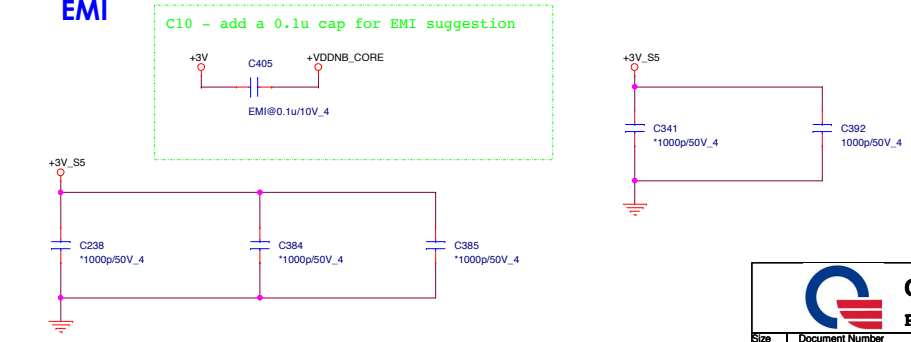
**IO D/B (UIF)**



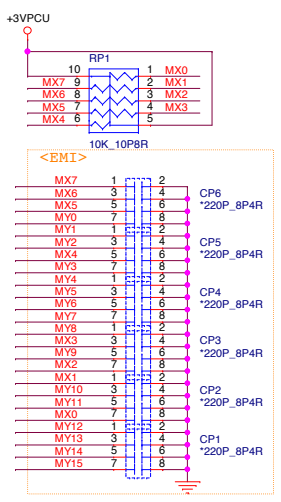
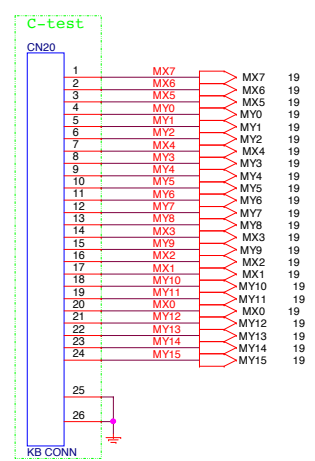
**HOLE(OTH)**



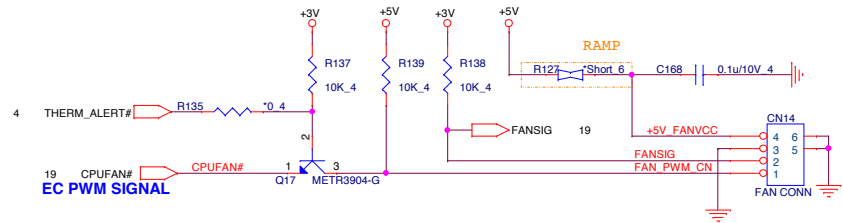
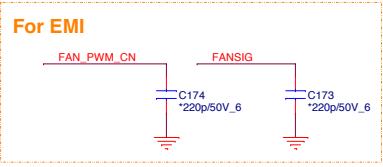
**EMI**



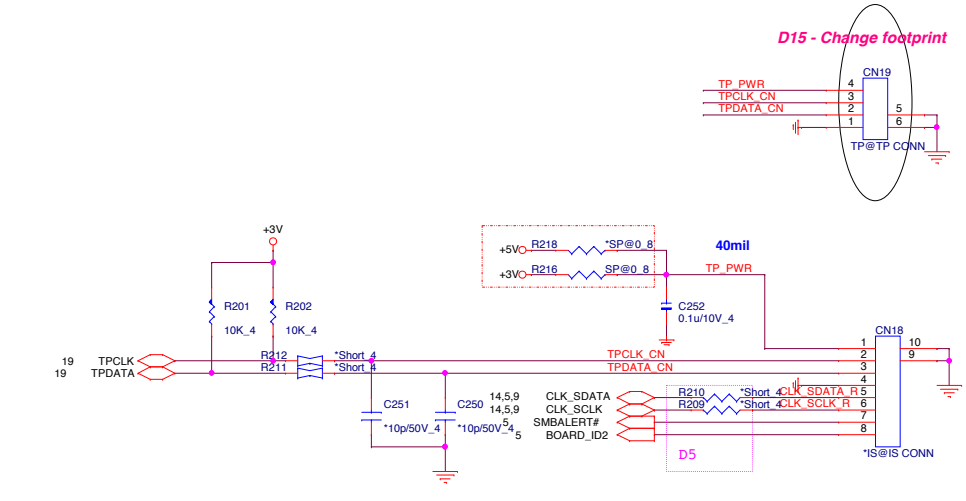
# KEYBOARD (KBC)



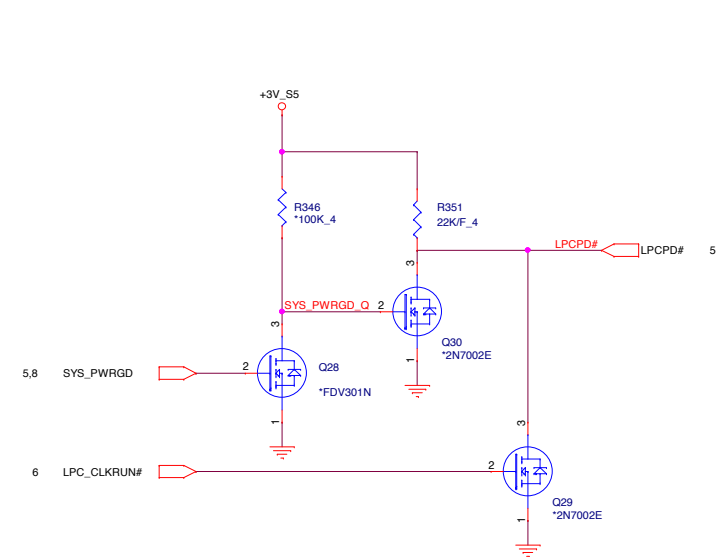
# CPU FAN CTRL (THM)



# TOUCH PAD (TPD)



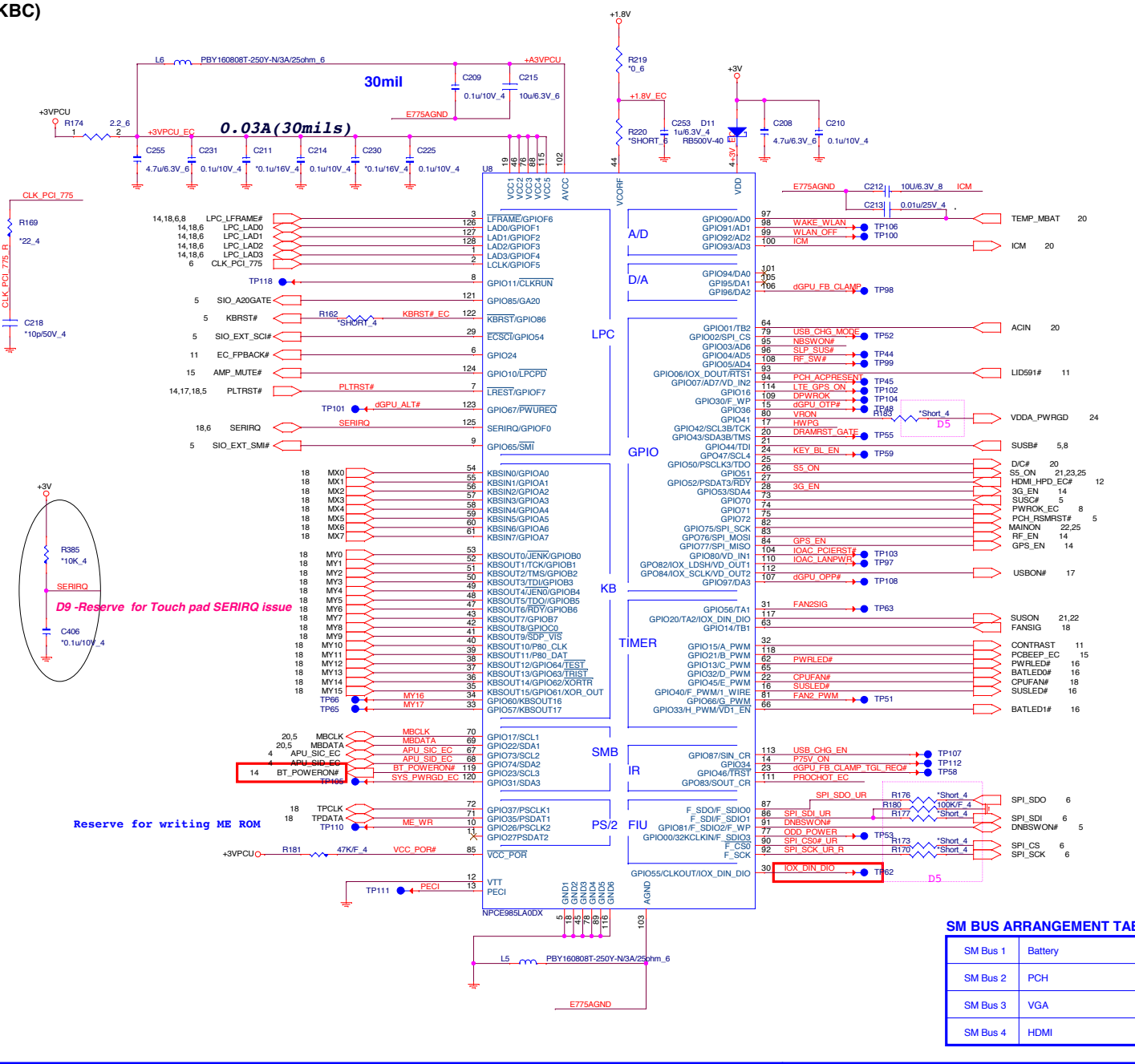
# TPM (TPM)



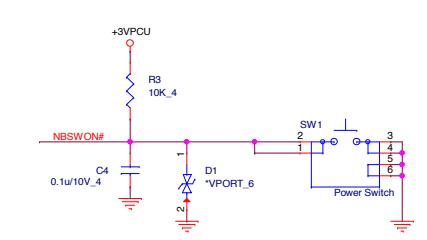
**Quanta Computer Inc.**  
**PROJECT : ZHL**

Size	Document Number	Rev
	<b>KB/BT/TP/LED/Power Connector</b>	<b>1A</b>
Date:	Thursday, July 11, 2013	Sheet 18 of 26

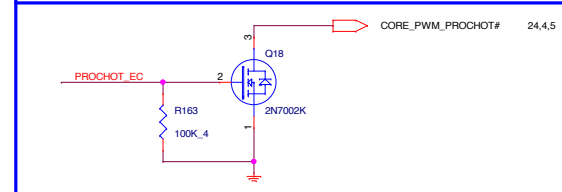
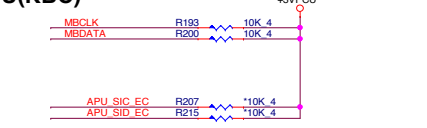
EC(KBC)



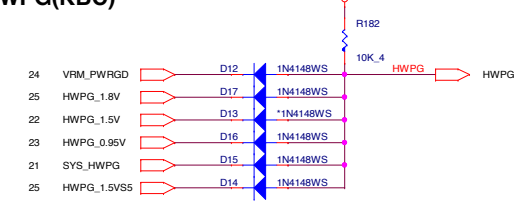
Power on button



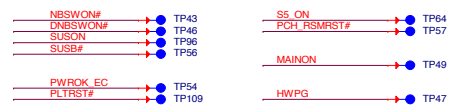
SM BUS PU(KBC)



HWPG(KBC)



Power sequence

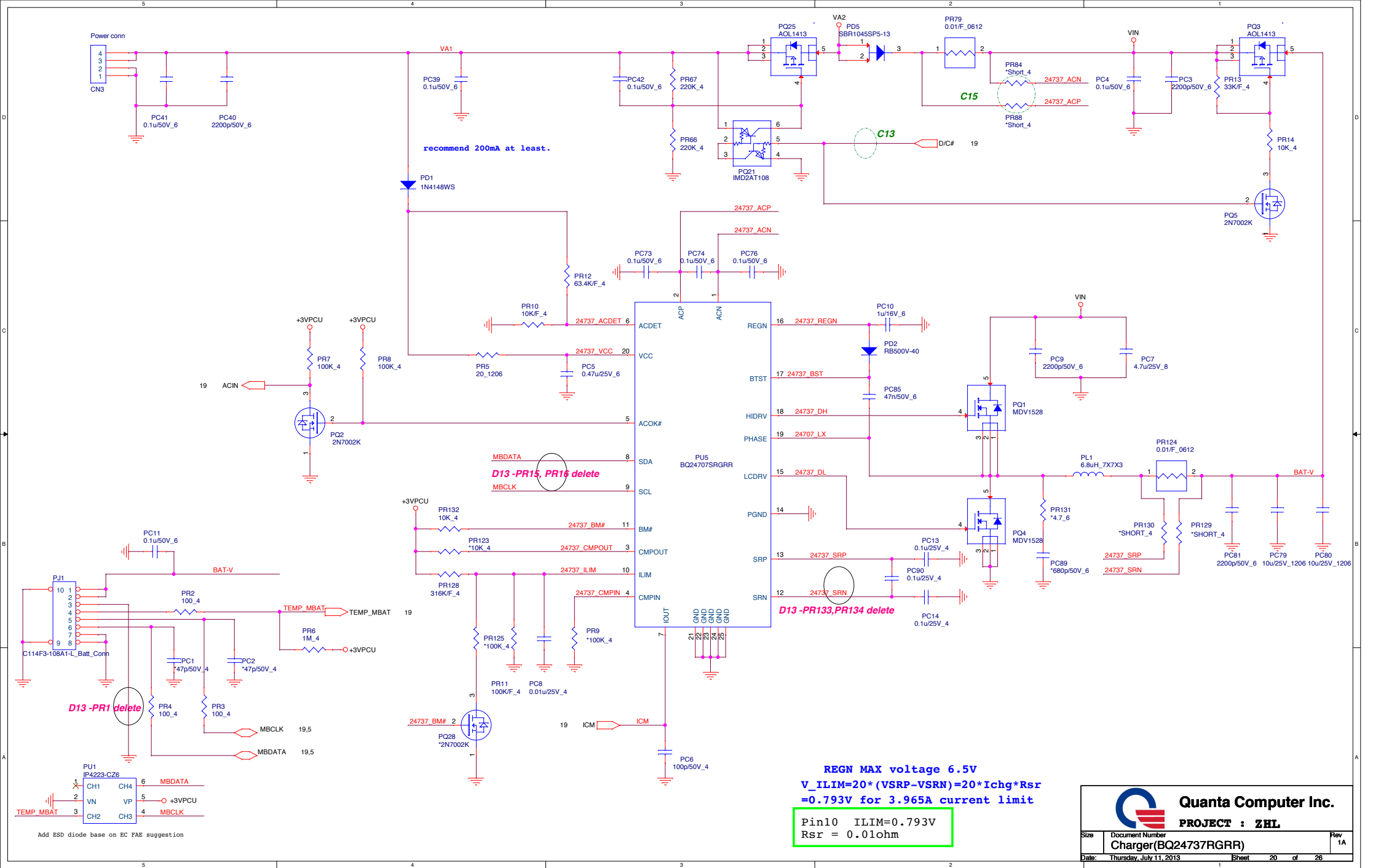


[www.vinafix.vn](http://www.vinafix.vn)

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**PROJECT : ZHL**

Size: Document Number: **WPCE885 & FLASH** Rev: 1A

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recommend 200mA at least.

~~D13 -PR15, PR16 delete~~  
~~MBDATA~~  
~~MBCLK~~

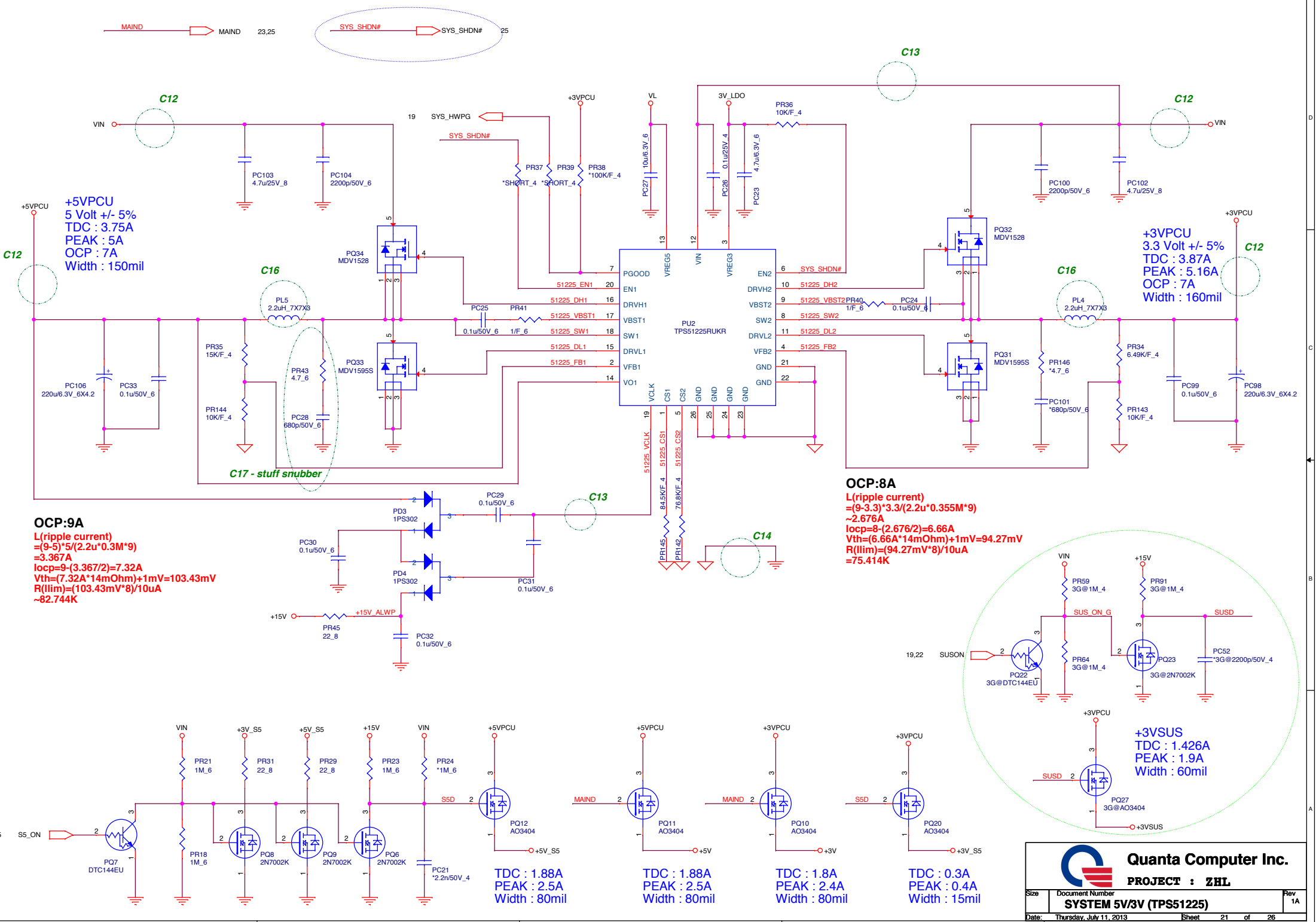
~~D13 -PR133, PR134 delete~~

**REGN MAX voltage 6.5V**  
 **$V_{ILIM} = 20 * (V_{SRP} - V_{SRN}) = 20 * I_{chg} * R_{sr}$**   
**= 0.793V for 3.965A current limit**

**Pin10 ILIM=0.793V**  
**Rsr = 0.01ohm**

		<b>Quanta Computer Inc.</b> <b>PROJECT : ZHL</b>	
Date: Thursday, July 11, 2013		Charger (BQ24737RGR)	
Sheet 20 of 26		Rev 1A	

Add ESD diode base on EC FAB suggestion

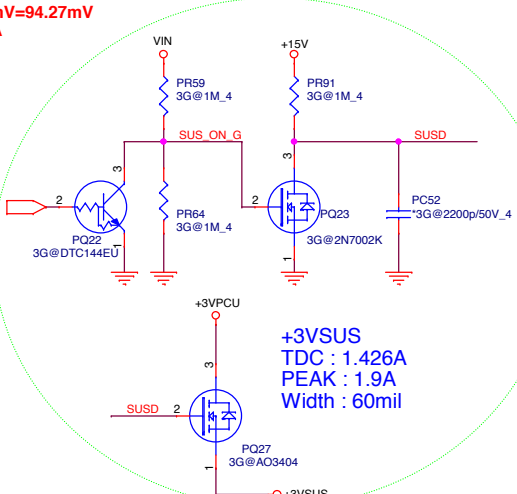


**+5VPCU**  
 5 Volt +/- 5%  
 TDC : 3.75A  
 PEAK : 5A  
 OCP : 7A  
 Width : 150mil

**+3VPCU**  
 3.3 Volt +/- 5%  
 TDC : 3.87A  
 PEAK : 5.16A  
 OCP : 7A  
 Width : 160mil

**OCP:9A**  
 L(ripple current)  
 $= (9-5) \cdot 5 / (2.2 \mu \cdot 0.3M \cdot 9)$   
 $= 3.367A$   
 $I_{ocp} = 9 - (3.367/2) = 7.32A$   
 $V_{th} = (7.32A \cdot 14m\Omega) + 1mV = 103.43mV$   
 $R(I_{lim}) = (103.43mV \cdot 8) / 10\mu A$   
 $\approx 82.744K$

**OCP:8A**  
 L(ripple current)  
 $= (9-3.3) \cdot 3.3 / (2.2 \mu \cdot 0.355M \cdot 9)$   
 $\approx 2.676A$   
 $I_{ocp} = 8 - (2.676/2) = 6.66A$   
 $V_{th} = (6.66A \cdot 14m\Omega) + 1mV = 94.27mV$   
 $R(I_{lim}) = (94.27mV \cdot 8) / 10\mu A$   
 $= 75.414K$



**+3VSUS**  
 TDC : 1.426A  
 PEAK : 1.9A  
 Width : 60mil

TDC : 1.88A  
 PEAK : 2.5A  
 Width : 80mil

TDC : 1.88A  
 PEAK : 2.5A  
 Width : 80mil

TDC : 1.8A  
 PEAK : 2.4A  
 Width : 80mil

TDC : 0.3A  
 PEAK : 0.4A  
 Width : 15mil

**Quanta Computer Inc.**

**PROJECT : ZHL**

Size	Document Number	Rev
	<b>SYSTEM 5V/3V (TPS51225)</b>	1A
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TDC : 0.45A  
PEAK : 0.6A  
Width : 20mil

TDC : 0.008A  
PEAK : 0.01A  
Width : 10mil

+SMDDR\_VREF

+0.75V\_DDR\_VTT

PC94 10u/6.3V\_6 PC20 10u/6.3V\_6

PC18 0.22u/10V\_4

+3V

PR28 100K/F\_4

19 HWPG\_1.5V

19,25 MAINON PR139 \*SHORT\_4 51216 S3 17

19,21 SUSON PR140 \*SHORT\_4 51216 S5 16

PR26 200K/F\_4 51216\_MODE 19

PR27 133K/F\_4 51216\_TRIP 18

VREF=1.8V

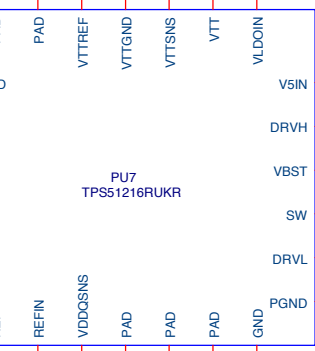
PC15 0.1u/10V\_4 51216\_REF

PR19 10K/F\_4 51216\_REFIN 8

PR22 30.1K/F\_4

PC16 0.01u/25V\_4

51216\_S3 PR30 \*0\_4 51216\_S5



Greater than or equal 40mil

+5V\_S5

PC95 10u/6.3V\_6

PC17 1u/10V\_4

C12

+1.35V\_SUS  
1.35 Volt +/- 5%  
TDC : 6.43A  
PEAK : 8.57A  
OCP : 10A  
Width : 260mil

C12

PQ30 MDV1528

PC75 2200p/50V\_4

PC77 4.7u/25V\_8

PR25 2\_6

PC19 0.1u/50V\_6

51216\_DRVH

51216\_VBST

51216\_SW

51216\_DRVL

PQ29 MDV1595S

PR17 4.7\_6

PC12 680p/50V\_6

PC97 0.1u/50V\_6

PC96 560u/2.5V\_6X5.7

PL3 1uH\_7X7X3

RDSon=14mohm

C17 - stuff snubber

10/1 Change

PC22 0.1u/50V\_6

PR33 \*Short\_4

C15

PR32 \*100\_4

VDDIO\_MEM\_S\_SENSE 4

Mode	Frequency	Discharge mode
200K	400K	Tracking Discharge
100K	300K	Tracking Discharge

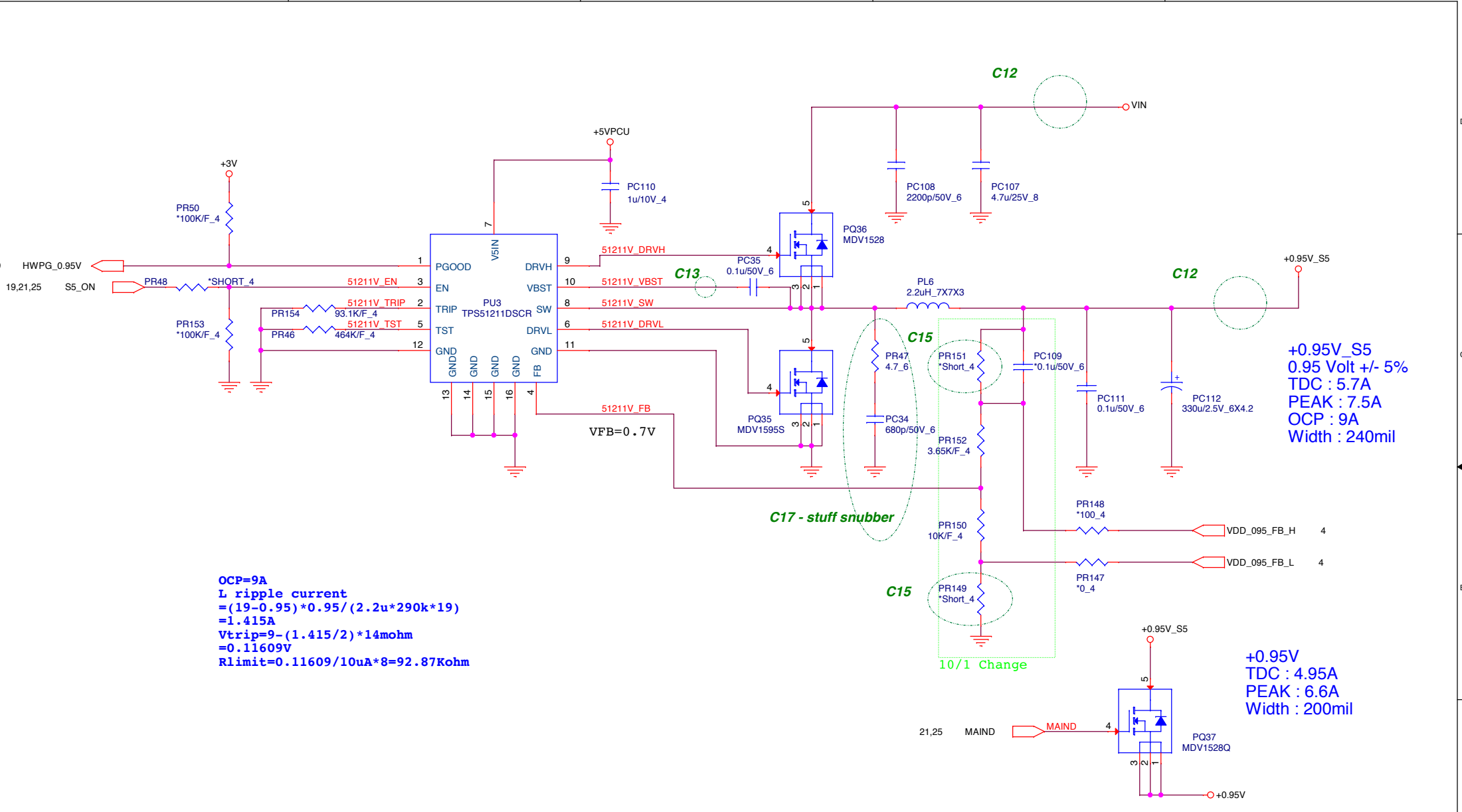
	S3	S5	+1.35VSUS	REF	VTT
S0	1	1	ON	ON	ON
S3 (mainon off)	0	1	ON	ON	OFF
S4/S5	0	0	OFF	OFF	OFF

OCP=11A  
L ripple current  
= $(19-1.35) * 1.35 / (2.2u * 400k * 19)$   
=1.425A  
Vtrip=11-(1.425/2)\*14mohm  
=10.98967V  
Rlimit=10.98967/10uA\*8=137.37Kohm

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Size	Document Number	Rev
	DDR 1.5V(TPS51216)	1A

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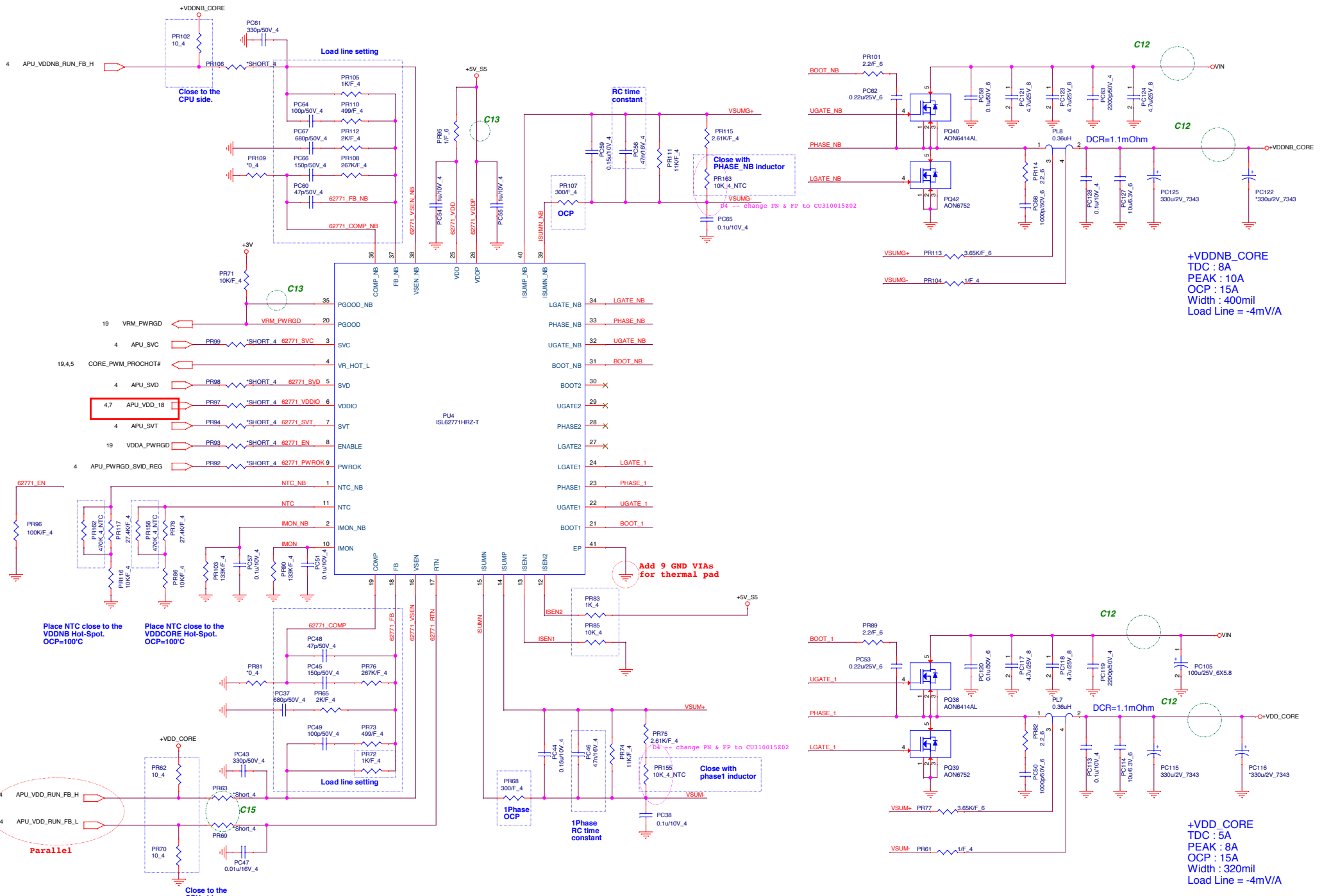
**OCP=9A**  
**L ripple current**  
 $= (19 - 0.95) * 0.95 / (2.2u * 290k * 19)$   
 $= 1.415A$   
 $V_{trip} = 9 - (1.415 / 2) * 14mohm$   
 $= 0.11609V$   
 $R_{limit} = 0.11609 / 10uA * 8 = 92.87Kohm$

**+0.95V\_S5**  
 0.95 Volt +/- 5%  
 TDC : 5.7A  
 PEAK : 7.5A  
 OCP : 9A  
 Width : 240mil

**+0.95V**  
 TDC : 4.95A  
 PEAK : 6.6A  
 Width : 200mil

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**PROJECT : ZHL**

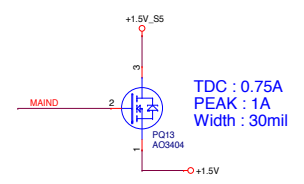
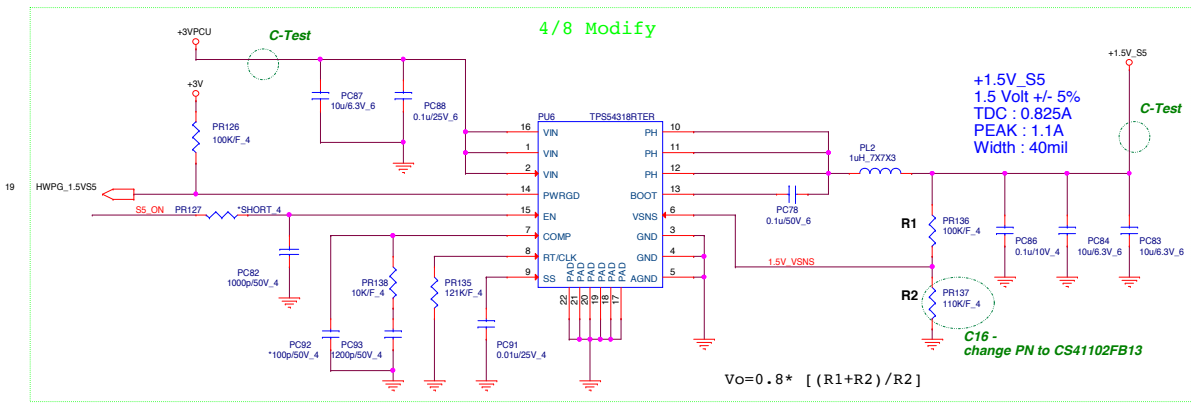
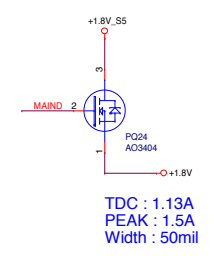
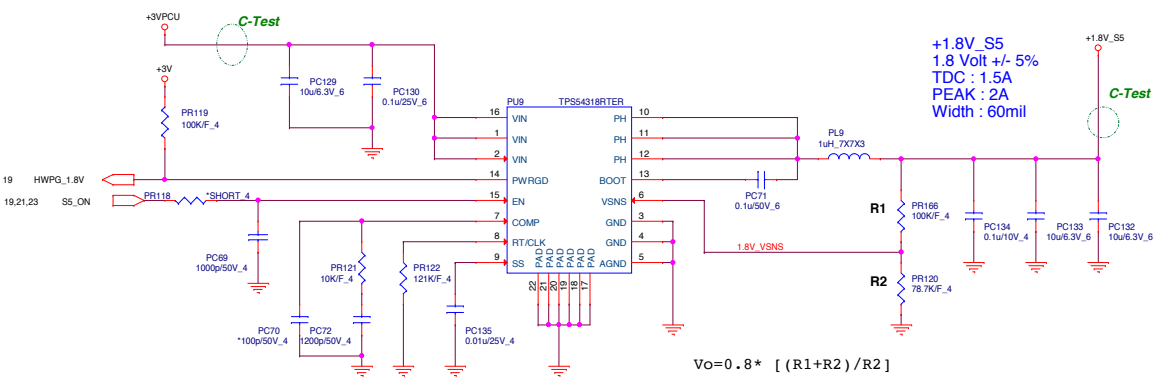
Size	Document Number	Rev
	<b>+0.95V_S5(TPS51211)</b>	1A
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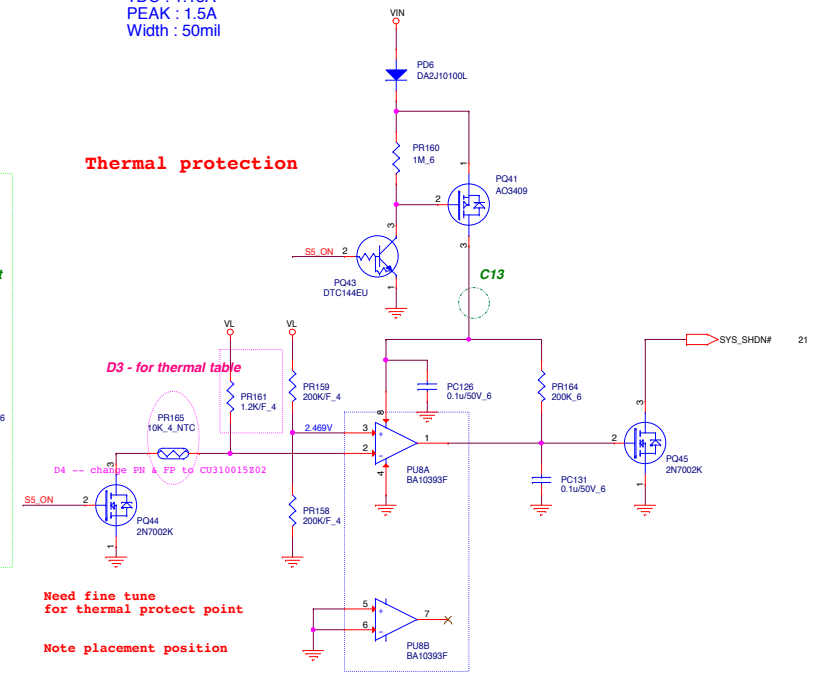
+VDDNB\_CORE  
 TDC : 8A  
 PEAK : 10A  
 OCP : 15A  
 Width : 400mil  
 Load Line = -4mV/A

+VDD\_CORE  
 TDC : 5A  
 PEAK : 8A  
 OCP : 15A  
 Width : 320mil  
 Load Line = -4mV/A

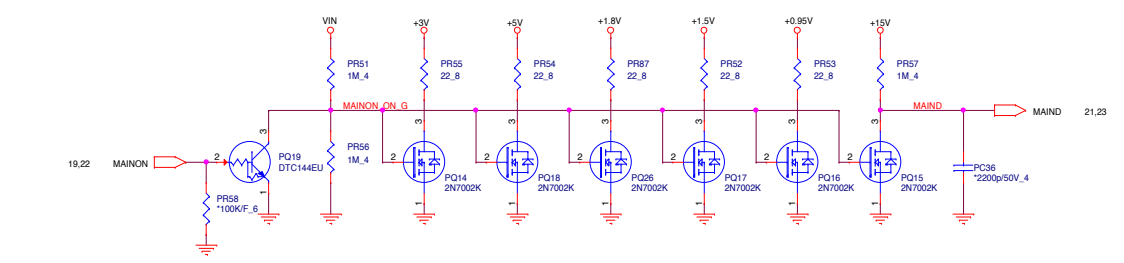




**Thermal protection**




For EC control thermal protection (output 3.3V)



MODEL	REV	CHANGE LIST	Model	ZHL MB BOARD	
			Page	From	To
ZHL M/B	A	First Release	1	1A	3A
			2	1A	3A
			3	1A	3A
	C	C01 - Change HDMI footprint C02 - Change USB3.0 footprint C03 - correct net connection. C04 - change 3G CONN to NGFF type C05 - add 100k ohm for NGFF C06 - add 33p for NGFF C07 - add a net --- UIM_DET C08 - add a cap ---- 470pF C09 - change PN from 0ohm to CM choke for EMI issues C10 - add a 0.1u cap for EMI suggestion C11 - Change CN13 FP & PN C12 - Delete JP12,JP3,JP2,JP11,JP1,JP10,JP4,JP13,JP6,JP15,JP5,JP14,JP16,JP7,JP8,JP9 C13 - Delete PR42,PR44,PR49,PR100,PR80,PR157,PR60 C14 - Change PR141,PR20 to *Short_6 C15 - Change PR149,PR151,PR33,PR84,PR88,PR63,PR69 to *Short_4 C16 - change PL5/PL4 from 3.3uH to 2.2uH C17 - stuff snubber	4	1A	3A
			5	1A	3A
			6	1A	3A
			7	1A	3A
			8	1A	3A
			9	1A	3A
			10	1A	3A
			11	1A	3A
			12	1A	3A
			13	1A	3A
			14	1A	3A
			15	1A	3A
			16	1A	3A
			17	1A	3A
			18	1A	3A
			19	1A	3A
			20	1A	3A
			21	1A	3A
			22	1A	3A
			23	1A	3A
			24	1A	3A
			25	1A	3A
			26	1A	3A
			27	1A	3A
			28	1A	3A
			29		
			30		
			31		
			32		
			33		
			34		
			35		
			36		
			37		
38					
39					
40					
41					
	RAMP	D1 - reserve 0ohm D2 - add a group of charging circuit ( RTC ) , change CN13 PN. D3 - for thermal table D4 - change PN & FP to CU310015Z02 D5 - Change 00HM 0402 SIZE to *Short_4 D6 - Change R12,R13,R238,R239,R28,R8,R192,R194,R217,R360 to *Short_6 D7 - Change C394 footprint from 0603 to 0402 size D8 - Change U14 footprint D9 - Add C406 (100p) & R385 (10K) for Touch pad serirq issue (Reserve ). D10 - Remove TPM connector & some parts D11 - Change footprint to short pad (R178,R347,R133,R220,R23,R134,R152,R153,R280,R313,R310,R85,R86)  D12 - Change power footprint to short pad (PR37,PR39,PR48,PR92,PR93,PR94,PR97,PR98,PR99,PR106,PR118,PR127,PR129,PR130,PR139,PR140) D13 - Delete / Directly short (PR1,PR5,PR16,PR133,PR134) D14 - Change R374,R375,R376,R377 into short pad D15 - Change CN19 footprint for EOL D16 - Open L7 & delete R154,R156			

ZHL	PCBA NO : 31ZHLMB0010	REV: A	DOC. NO : 206
APPROVED BY : Johnny O	CHECK BY : Pony Kao	DRAWING BY : Kenneth Huang	DATE : 2013/06/13



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PROJECT : ZHL

Size Document Number Rev  
**CHANGE LIST** 1A

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