

Compal Confidential

KAWF0/KAWH0 M/B Schematics Document

Intel Penryn Processor with Cantiga + DDRII + ICH9M

2009-01-21

REV:1.0

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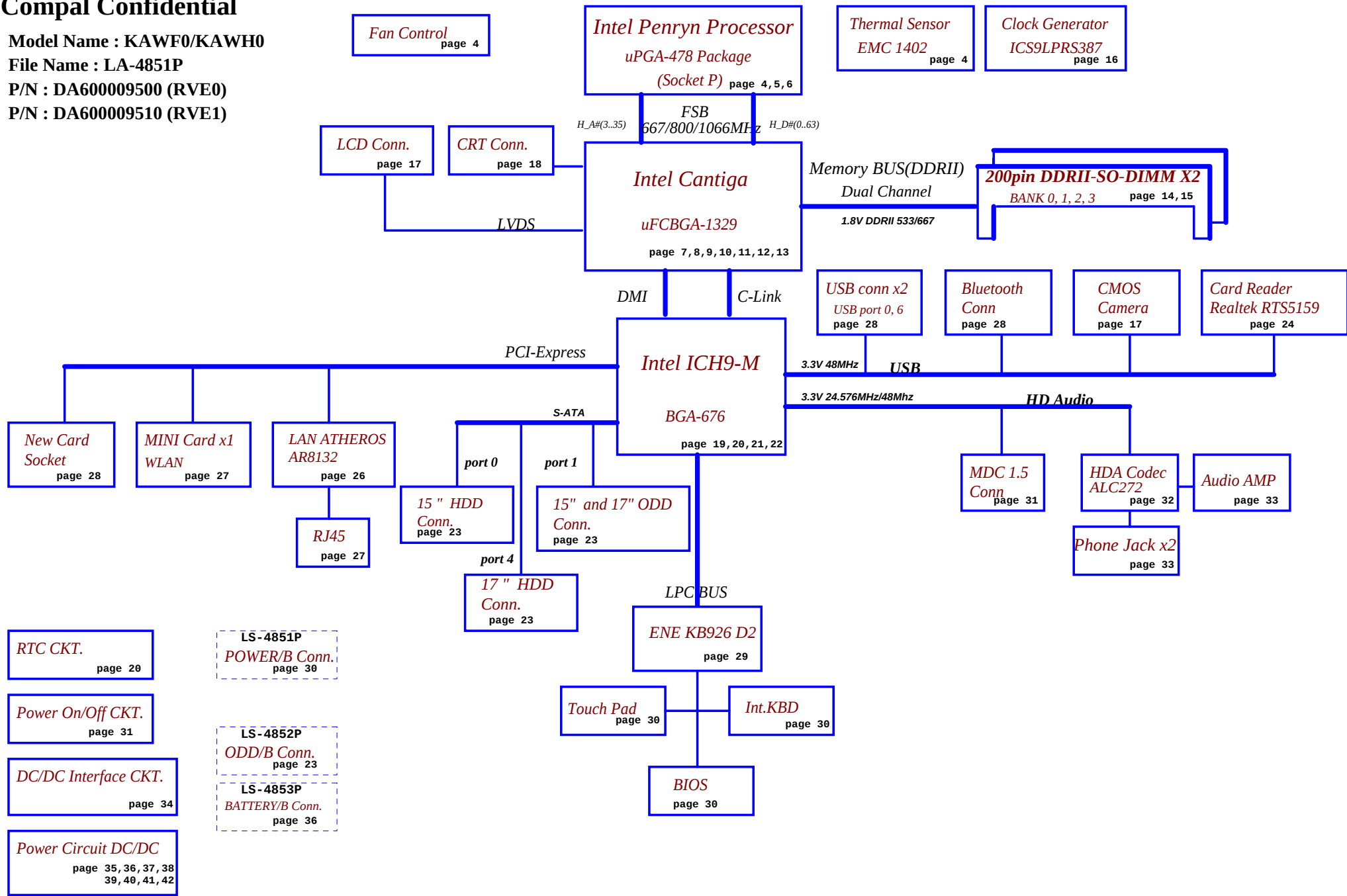
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Model Name : KAWF0/KAWH0

File Name : LA-4851P

P/N : DA600009500 (RVE0)

P/N : DA600009510 (RVE1)



Voltage Rails

Power Plane	Description	S1	S3	S5
VIN	Adapter power supply (19V)	N/A	N/A	N/A
B+	AC or battery power rail for power circuit.	N/A	N/A	N/A
+CPU_CORE	Core voltage for CPU	ON	OFF	OFF
+0.9VS	0.9V switched power rail for DDR terminator	ON	OFF	OFF
+1.05VS	1.05V switched power rail	ON	OFF	OFF
+1.5V	1.5V power rail for HDA	ON	ON	OFF
+1.5VS	1.5V switched power rail	ON	OFF	OFF
+1.8V	1.8V power rail for DDR	ON	ON	OFF
+2.5VS	2.5V switched power rail	ON	OFF	OFF
+3VALW	3.3V always on power rail	ON	ON	ON*
+3V	3.3V power rail for SB	ON	ON	OFF
+3V_LAN	3.3V power rail for LAN	ON	ON	ON
+3VS	3.3V switched power rail	ON	OFF	OFF
+5VALW	5V always on power rail	ON	ON	ON*
+5VS	5V switched power rail	ON	OFF	OFF
+VSB	VSB always on power rail	ON	ON	ON*
+RTCVCC	RTC power	ON	ON	ON

Note : ON* means that this power plane is ON only with AC power available, otherwise it is OFF.

External PCI Devices

Device	IDSEL#	REQ#/GNT#	Interrupts
--------	--------	-----------	------------

EC SM Bus1 address

Device	Address	Device	Address
Smart Battery	0001 011X b	ADI ADT7421	1001 100X b
EEPROM(24C16/02)	1010 000X b		
GMT G781-1	1001 101X b		

EC SM Bus2 address

ICH9M SM Bus address

Device	Address
Clock Generator (ICS9LPRS387, SLG8SP556V)	1101 001Xb
DDR DIMM0	1001 000Xb
DDR DIMM2	1001 010Xb

STATE	SIGNAL	SLP_S1#	SLP_S3#	SLP_S4#	SLP_S5#	+VALW	+V	+VS	Clock
Full ON		HIGH	HIGH	HIGH	HIGH	ON	ON	ON	ON
S1(Power On Suspend)		LOW	HIGH	HIGH	HIGH	ON	ON	ON	LOW
S3 (Suspend to RAM)		LOW	LOW	HIGH	HIGH	ON	ON	OFF	OFF
S4 (Suspend to Disk)		LOW	LOW	LOW	HIGH	ON	OFF	OFF	OFF
S5 (Soft OFF)		LOW	LOW	LOW	LOW	ON	OFF	OFF	OFF

Board ID / SKU ID Table for AD channel

Vcc	3.3V +/- 5%			
Ra/Rc/Re	100K +/- 5%			
Board ID	Rb / Rd / Rf	VAD_BID min	VAD_BID typ	VAD_BID max
0	0	0 V	0 V	0 V
1	8.2K +/- 5%	0.216 V	0.250 V	0.289 V
2	18K +/- 5%	0.436 V	0.503 V	0.538 V
3	33K +/- 5%	0.712 V	0.819 V	0.875 V
4	56K +/- 5%	1.036 V	1.185 V	1.264 V
5	100K +/- 5%	1.453 V	1.650 V	1.759 V
6	200K +/- 5%	1.935 V	2.200 V	2.341 V
7	NC	2.500 V	3.300 V	3.300 V

BOARD ID Table

Board ID	PCB Revision
0	0.1
1	0.2
2	0.3
3	1.0
4	1A
5	
6	
7	

BTO Option Table

BTO Item	BOM Structure
GM45	GM@
GL40	GL@
15"	15@
17"	17@
8114	8114@
8132	8132@

PCIE table

PCIE port1	Express Card(Reserved)
PCIE port2	Wireless Card
PCIE port3	PCIE LAN
PCIE port4	
PCIE port5	
PCIE port6	

SATA table

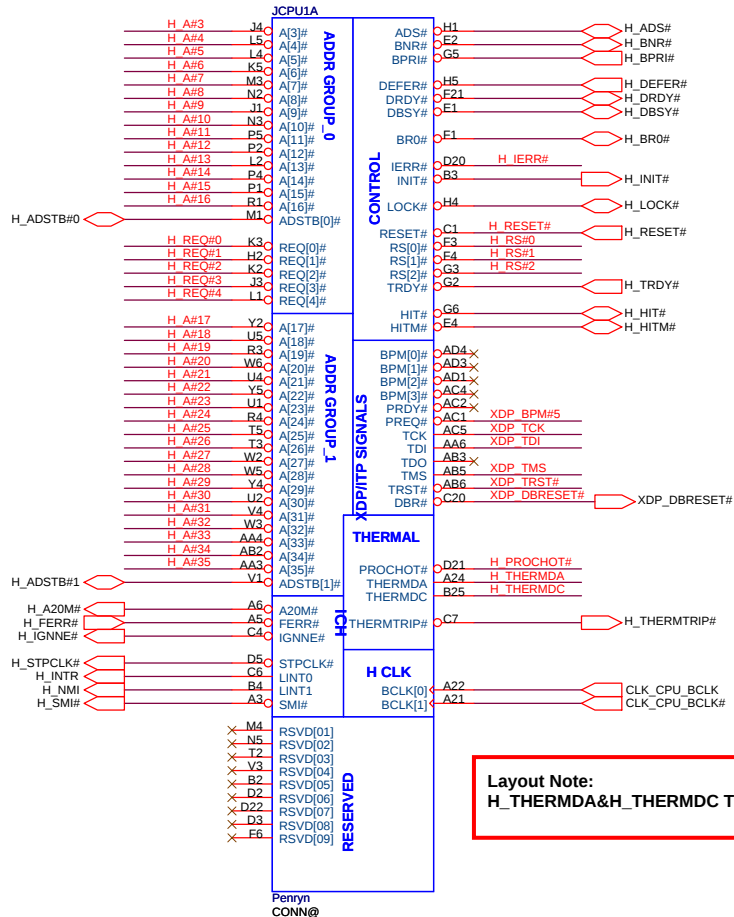
SATA port0	HDD
SATA port1	ODD
SATA port2	
SATA port3	
SATA port4	for 17" 2nd HDD
SATA port5	

USB table

EHCI1	UHCI1	Port0	MB USB Conn.
		Port1	
	UHCI2	Port2	
		Port3	CMOS Camera
EHCI2	UHCI3	Port4	Card Reader
		Port5	New Card(Reserved)
	UHCI4	Port6	MB USB Conn.
		Port7	
	UHCI5	Port8	Blue Tooth
		Port9	
	UHCI6	Port10	Wireless Card
		Port11	

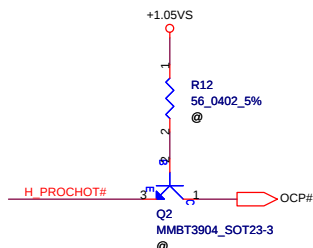
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H_A#[3..35]  H_A#(3..35)
H_REQ#(0..4)  H_REQ#(0..4)
H_RS#(0..2)  H_RS#(0..2)

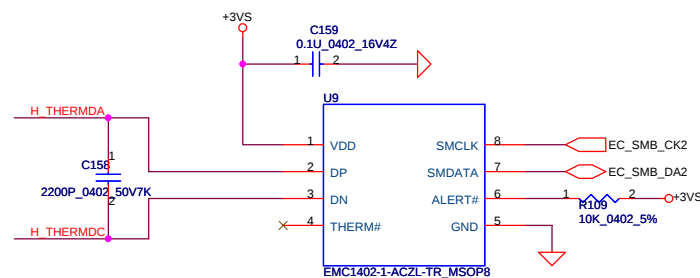
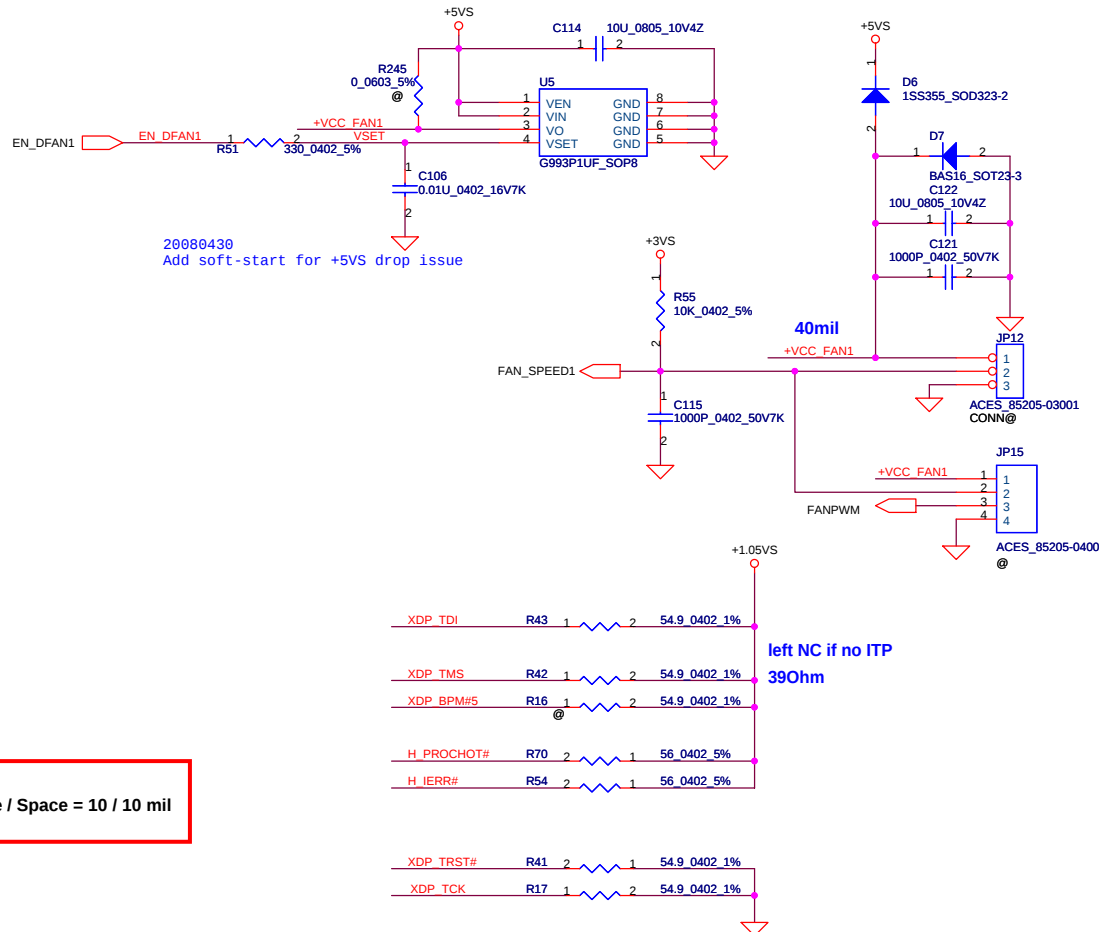


Layout Note:
H_THERMDA&H_THERMDC Trace / Space = 10 / 10 mil

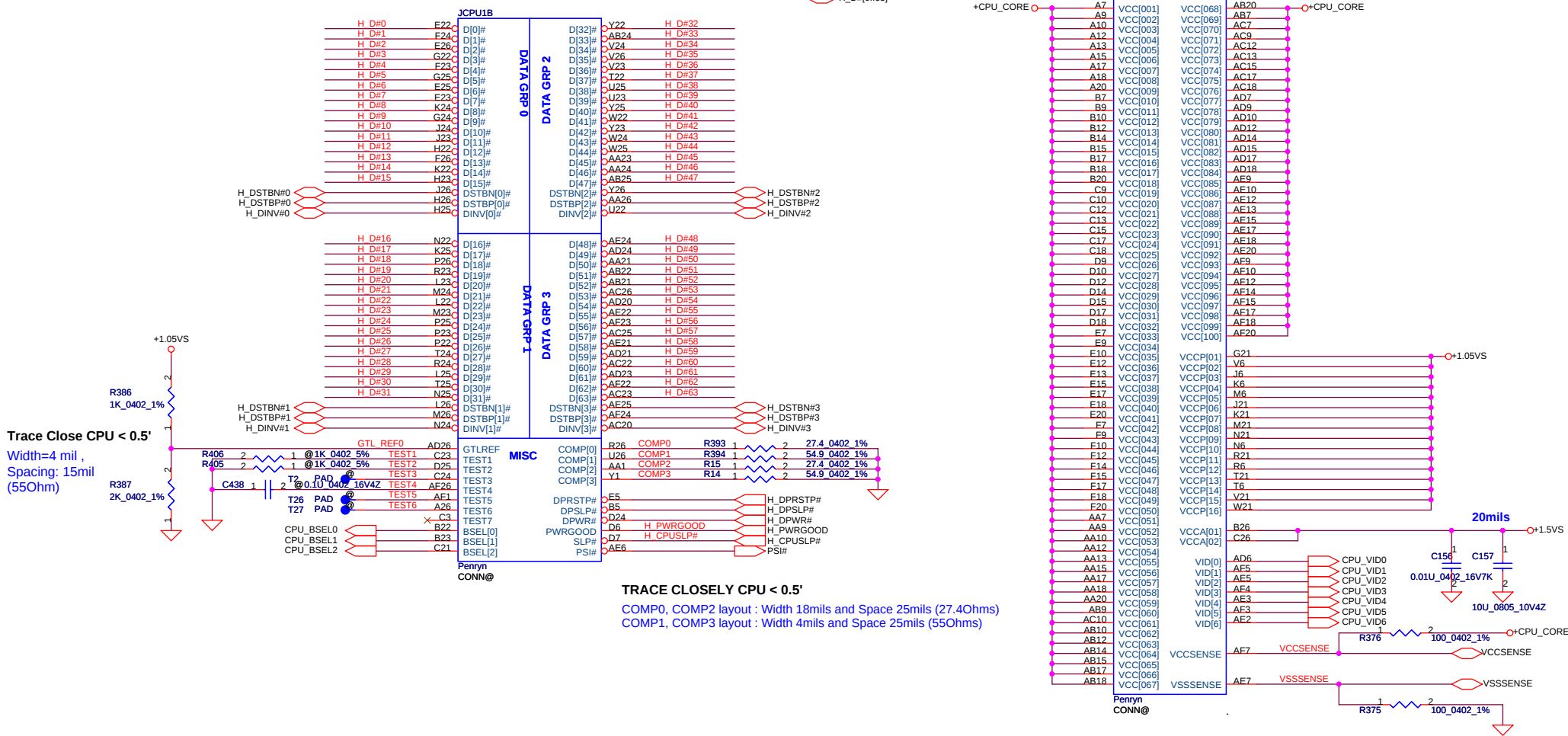
BSEL2	BSEL1	BSEL0	BCLK
0	0	0	266
0	1	0	200
0	1	1	166

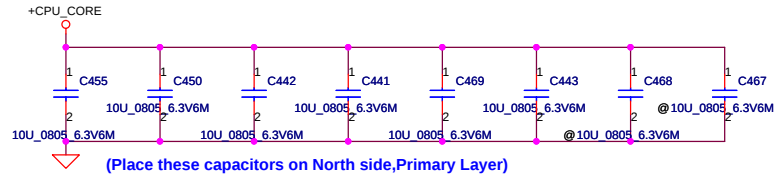
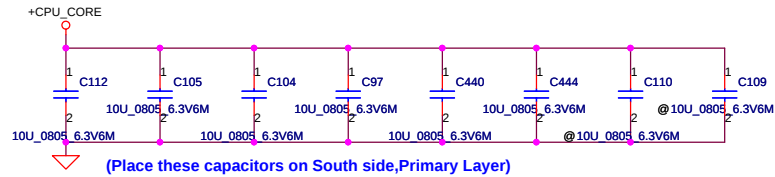
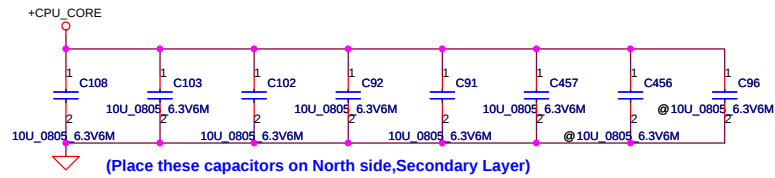
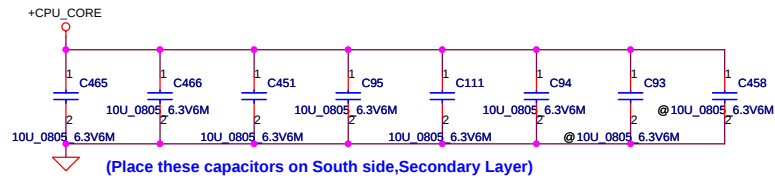
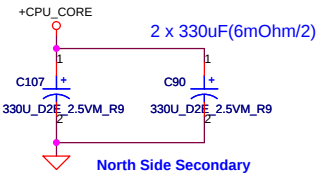
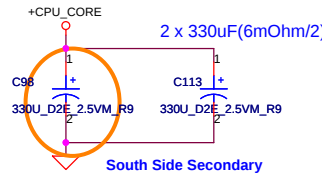
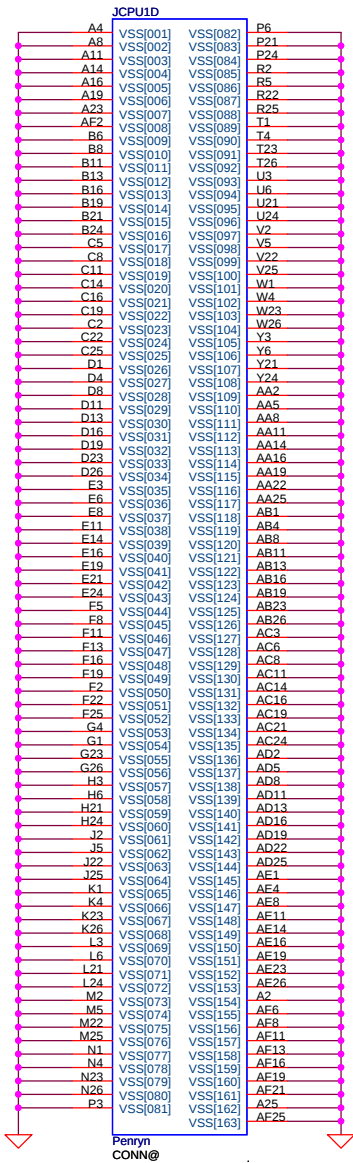


FAN1 Conn

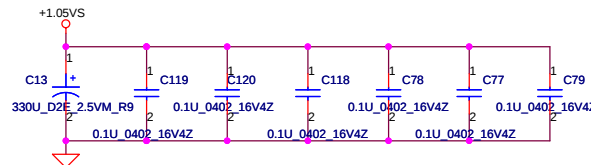


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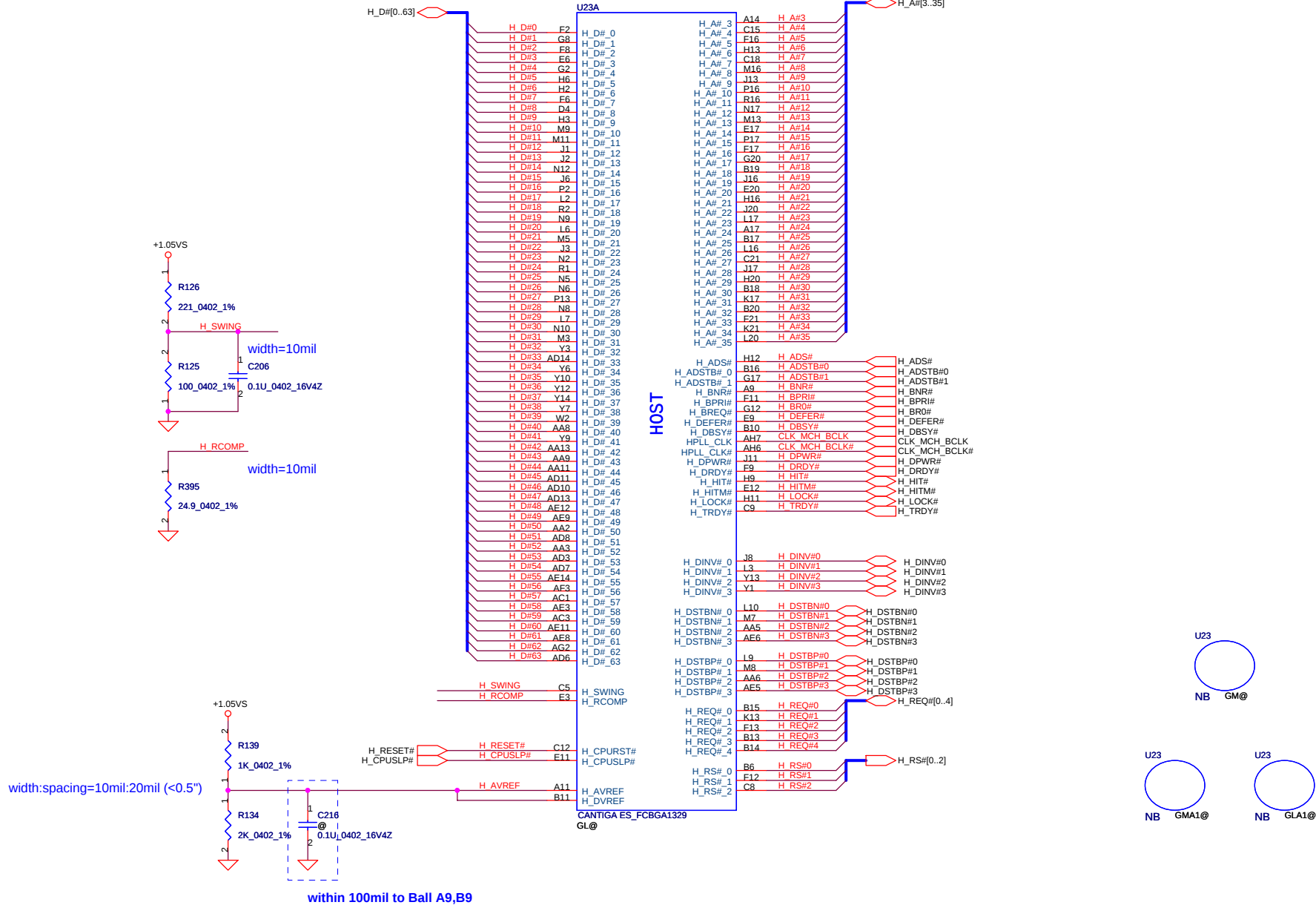




+CPU-CORE Decoupling	C,uF	ESR, mohm	ESL,nH
SPCAP,Polymer	4X330uF	6m ohm/4	1.8nH/6
MLCC 0805 X5R	32X22uF	3m ohm/32	0.6nH/32
	32X10uF	3m ohm/32	0.6nH/32

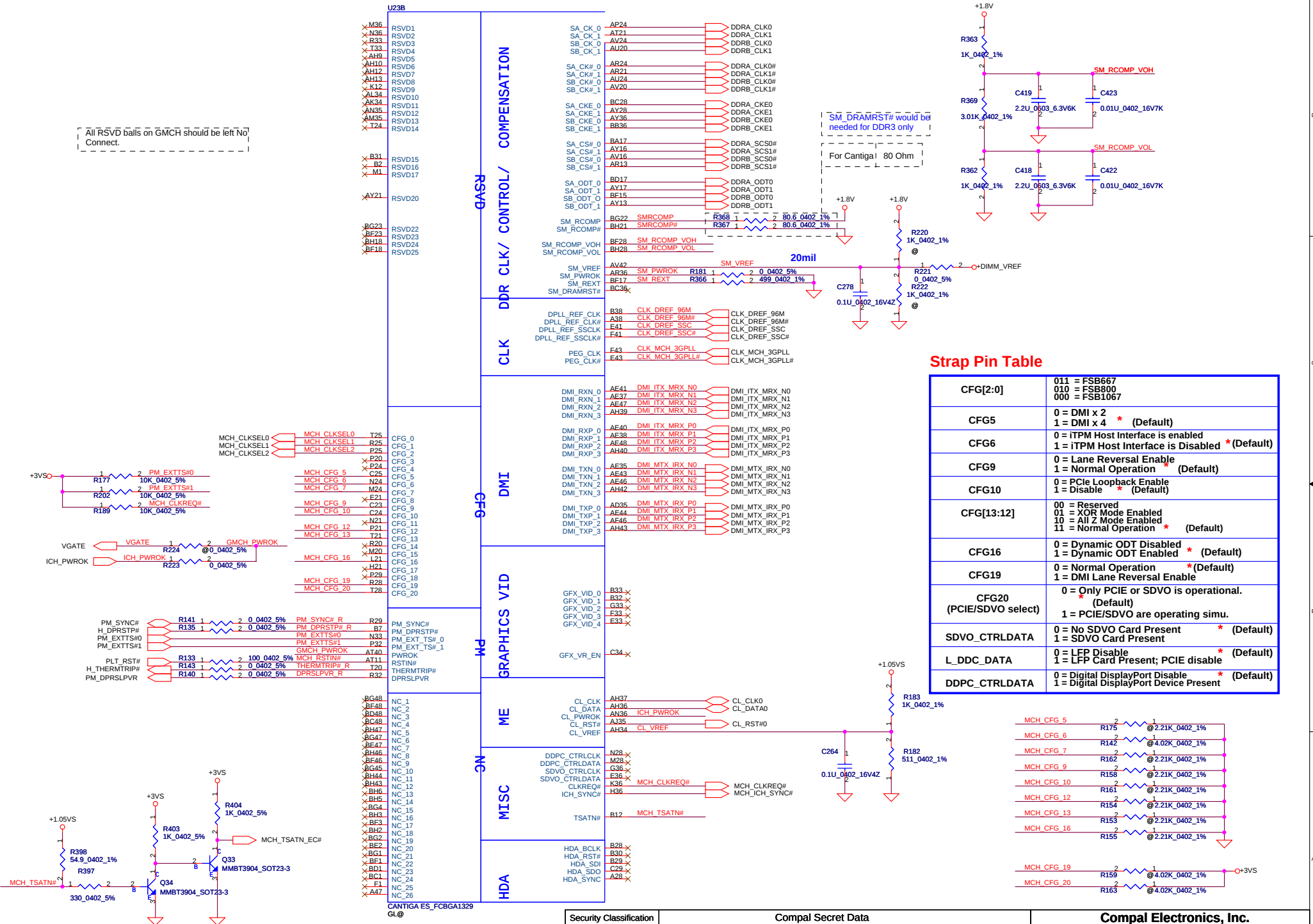


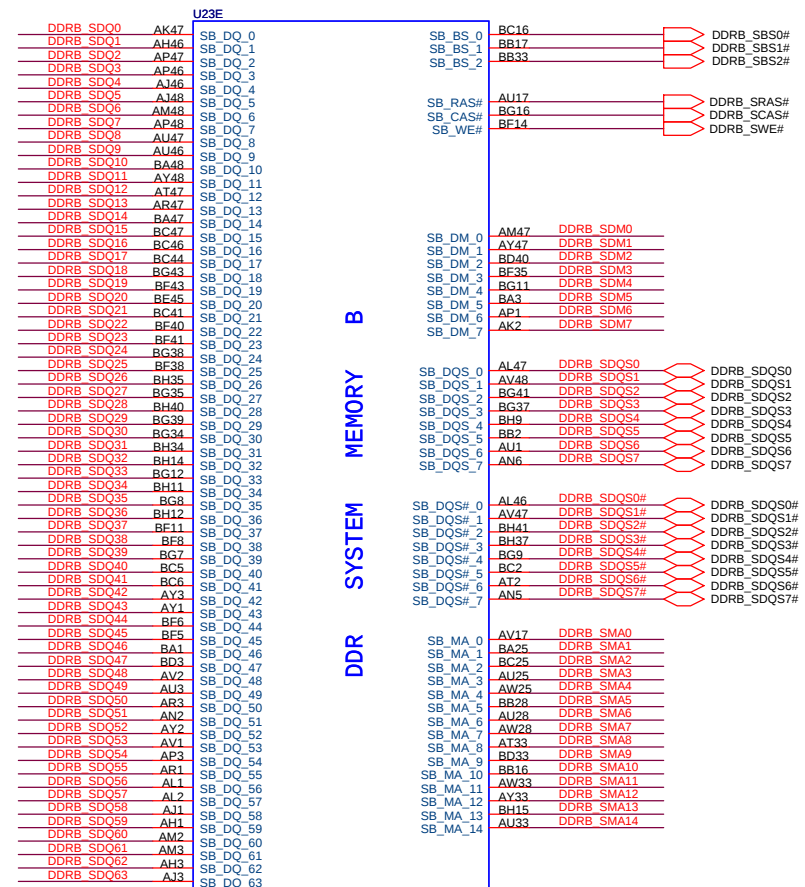
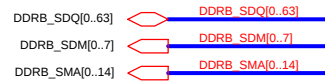
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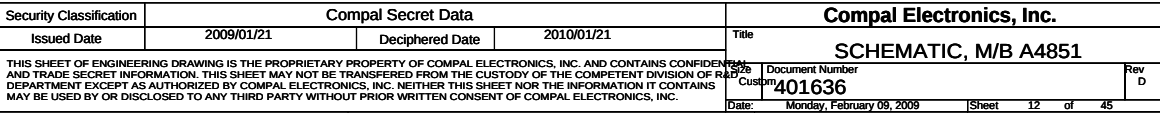


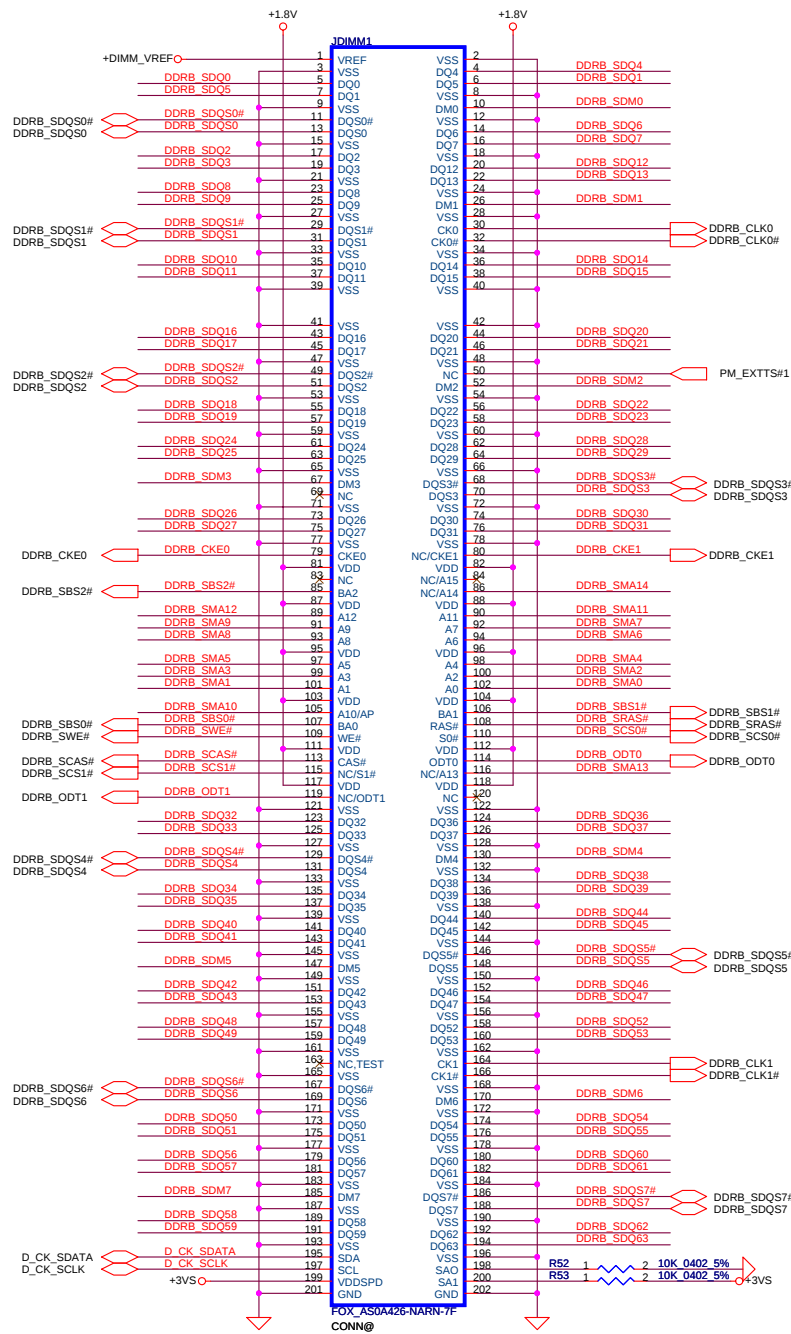
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All RSVD balls on GMCH should be left No Connect.

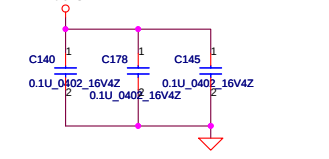
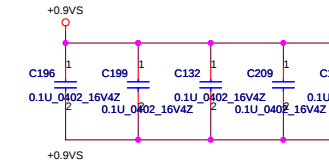
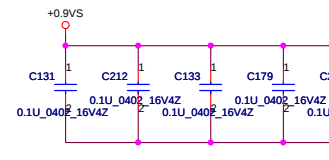
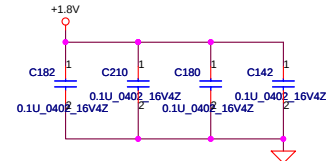
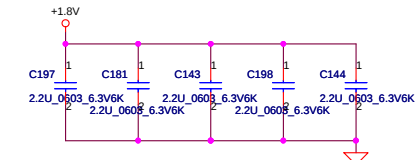
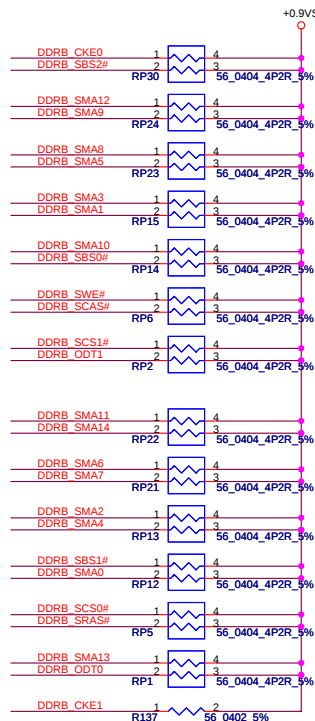
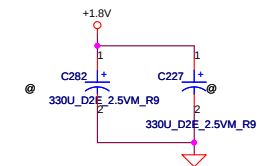
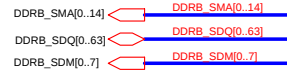
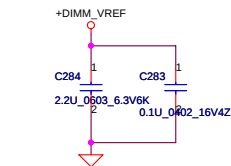








DIMM1 REV H:9.2mm (BOT)



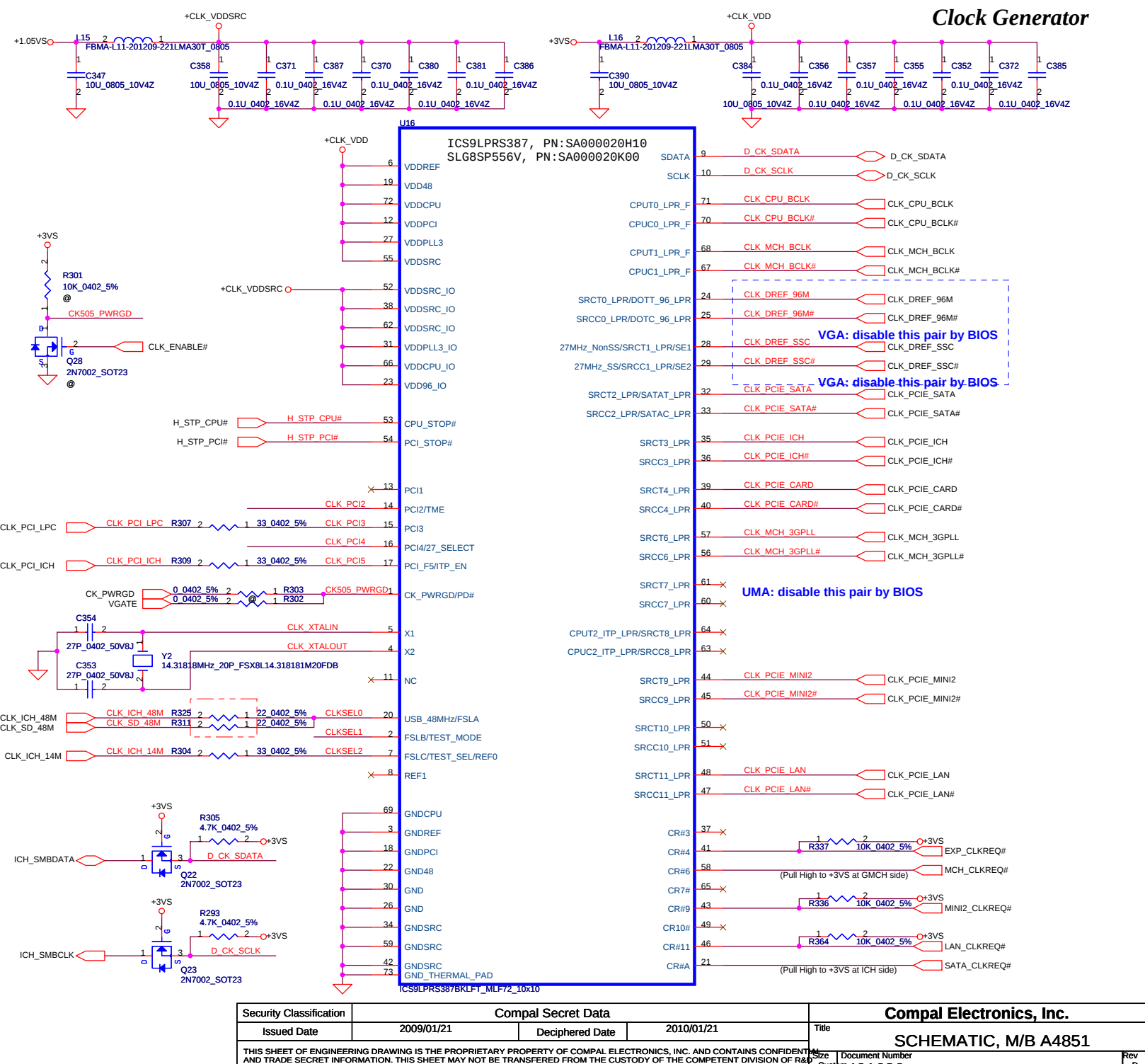
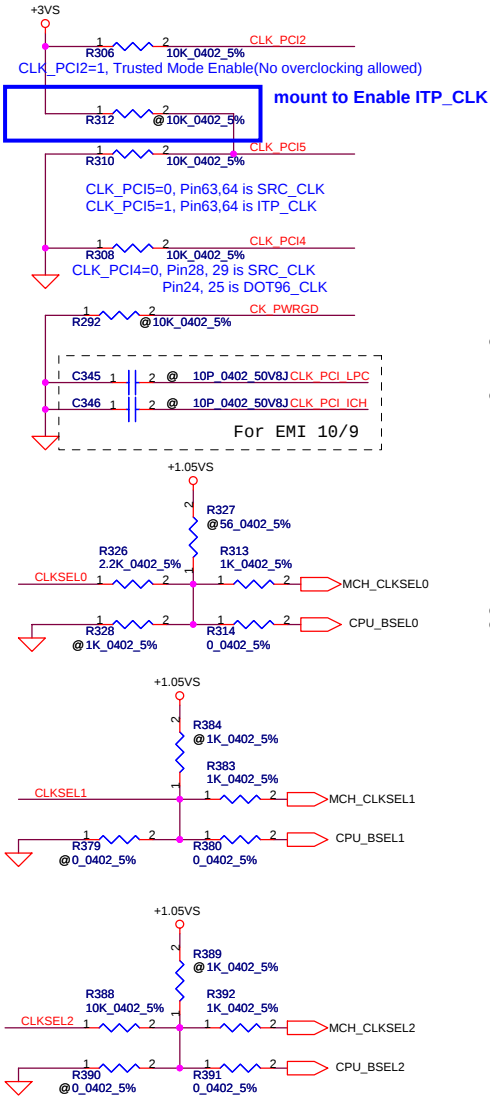
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FSLC	FSLB	FSLA	CPU	SRC	PCI
CLKSEL2	CLKSEL1	CLKSEL0	MHz	MHz	MHz
0	0	0	266	100	33.3
0	1	0	200	100	33.3
0	1	1	166	100	33.3

Table : ICS9LPRS387

CLK_REQ#	Control	Free-Run
CR#_10(WLAN)	PCIEX10	PCIEX0
CR#_6(MCH)	PCIEX6	PCIEX1
CR#_4(NEW CARD)	PCIEX4	
CR#_9(MINI CARDII)	PCIEX9	

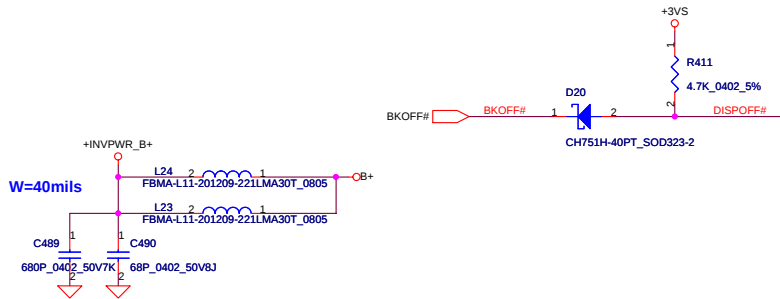
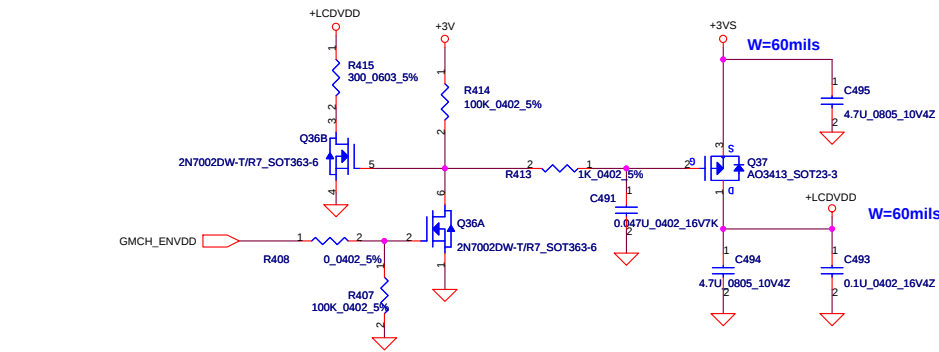
SRC7(VGA_CLK): Discrete VGA[Enable] UMA[Disable]



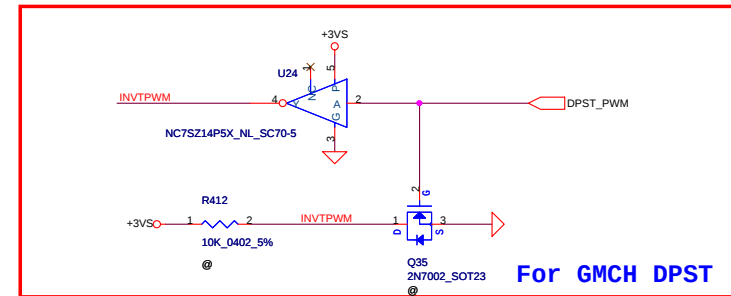
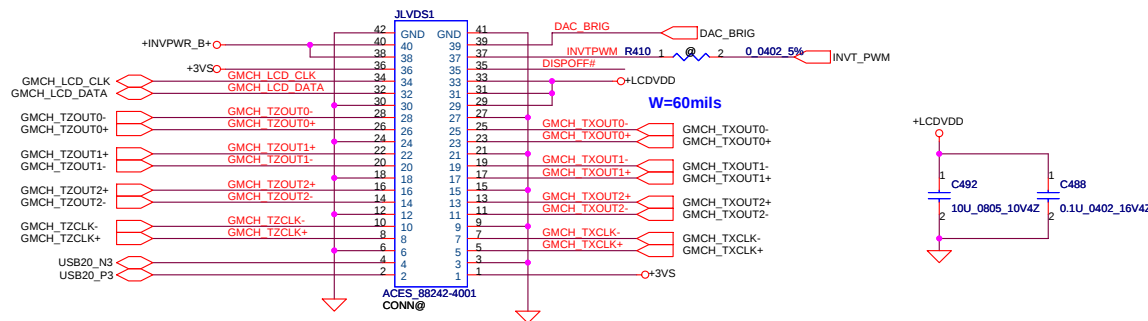
Clock Generator

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LCD POWER CIRCUIT



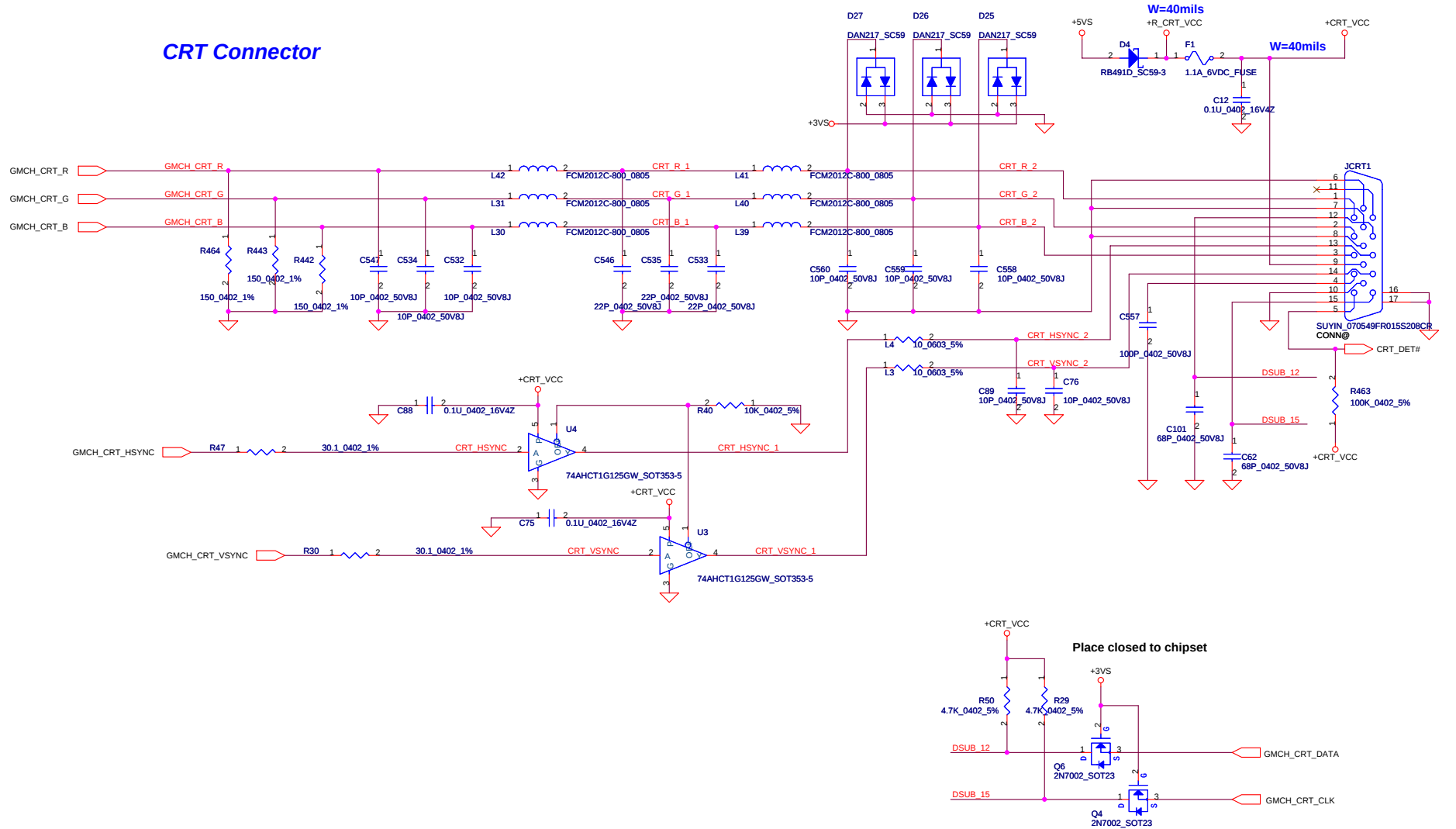
LCD/PANEL BD. Conn.



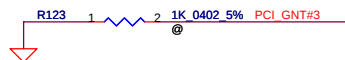
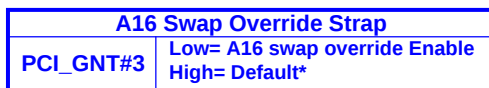
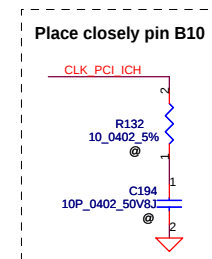
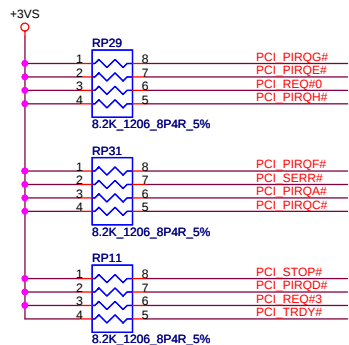
For GMCH DPST

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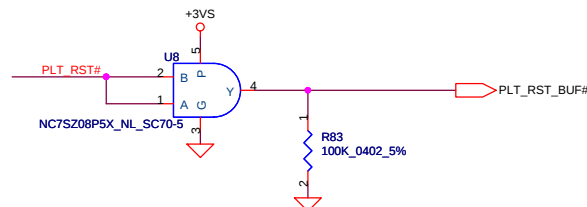
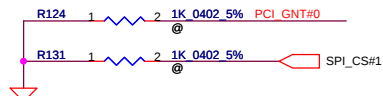
CRT Connector



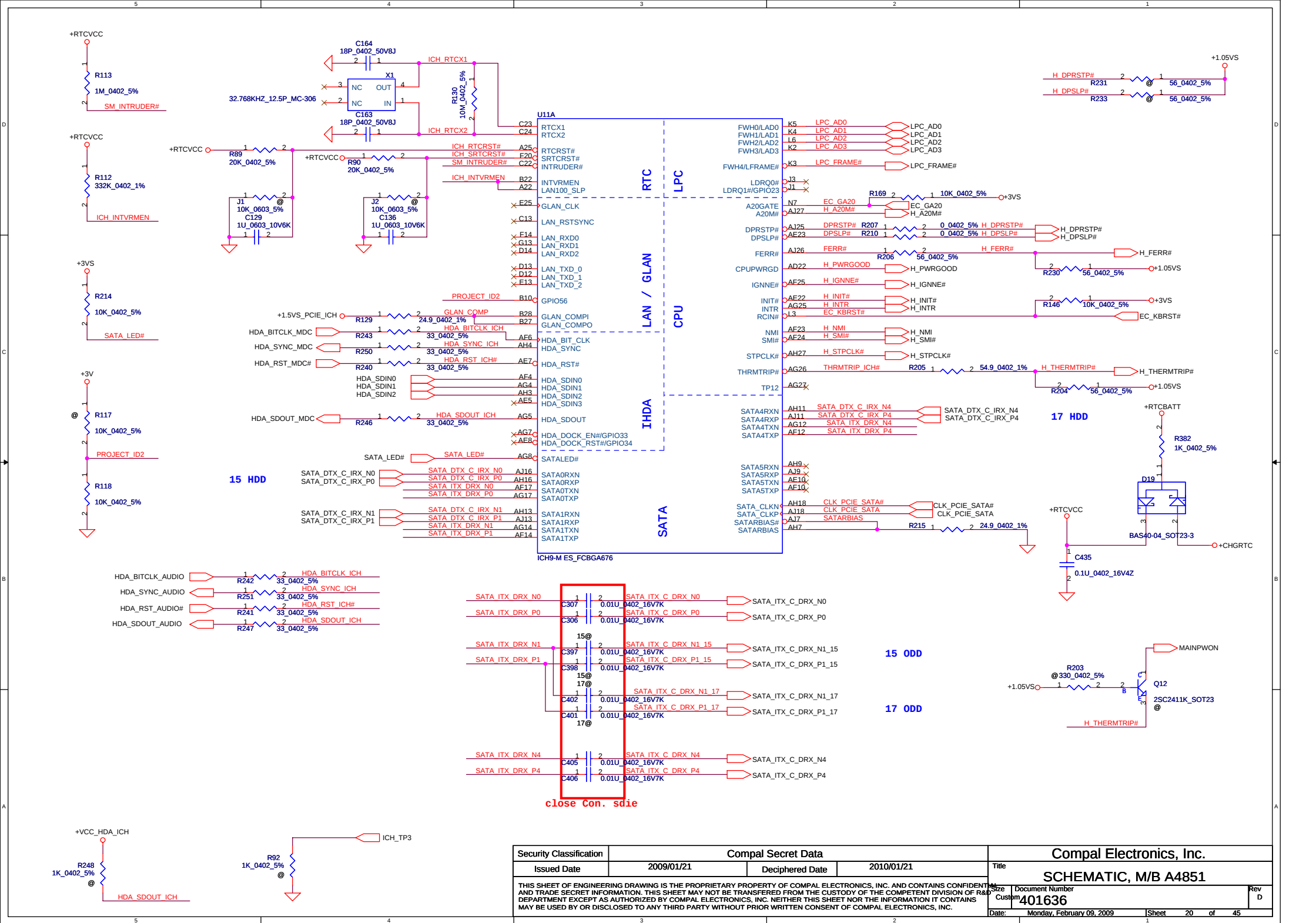
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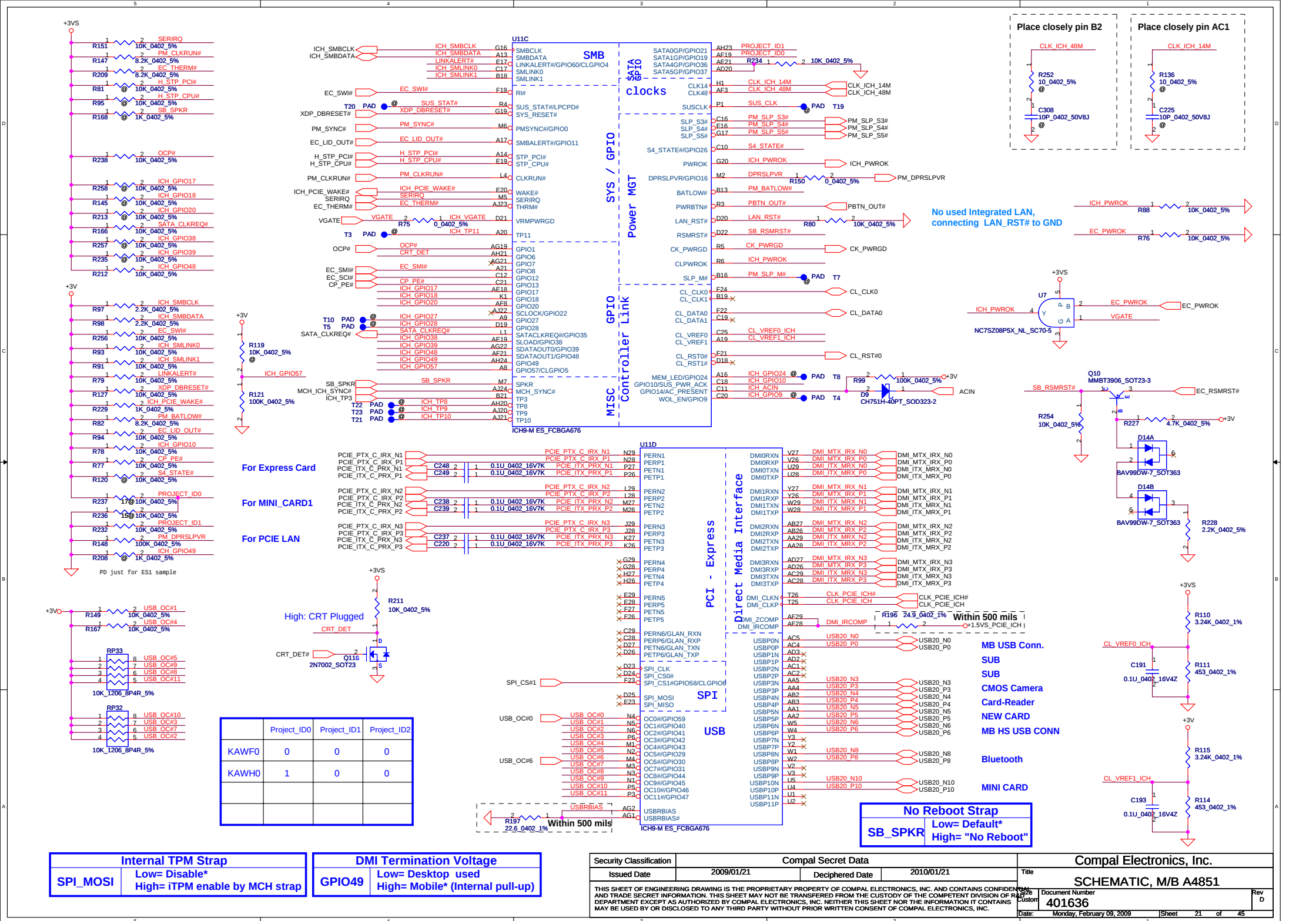


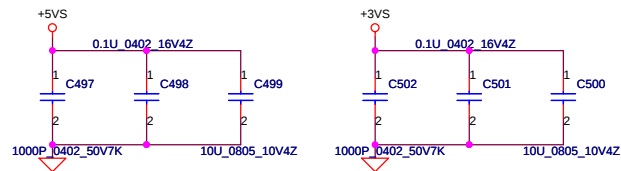
Boot BIOS Strap		
PCI_GNT#0	SPI_CS#1	Boot BIOS Loaction
0	1	SPI
1	0	PCI
1	1	LPC*



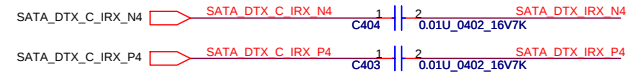
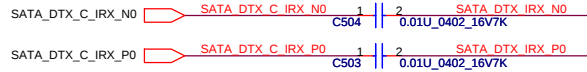
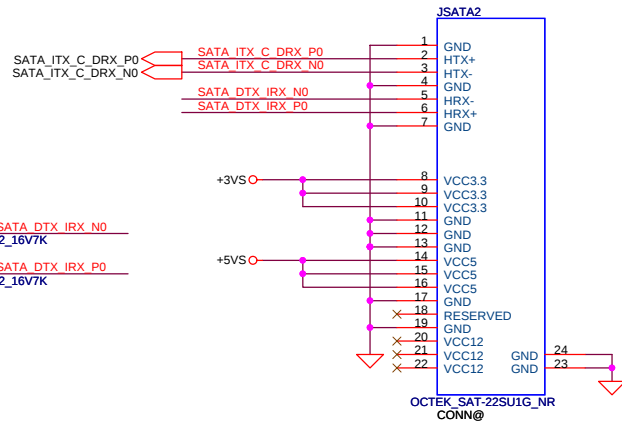
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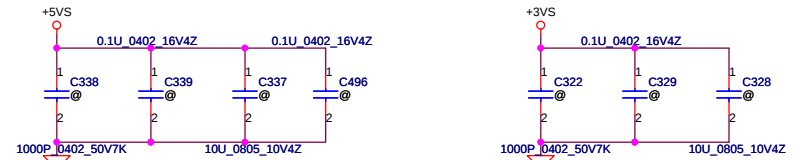
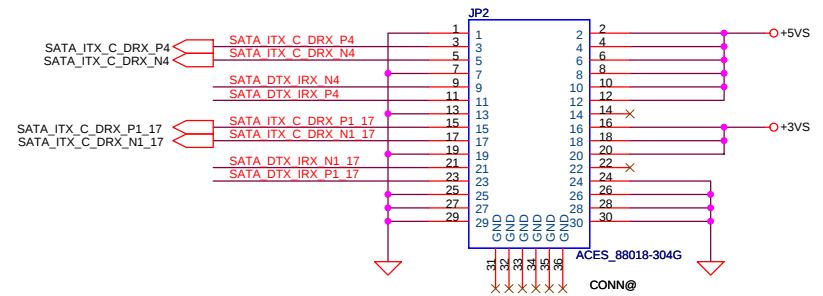
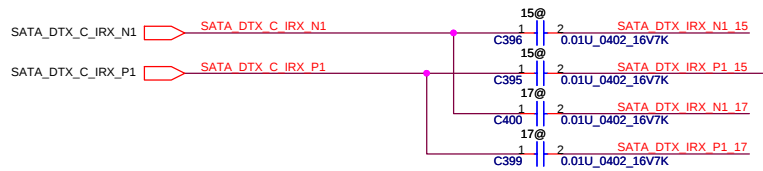
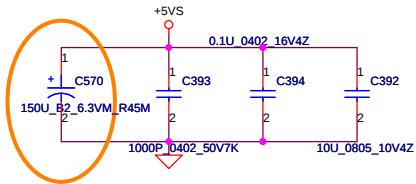
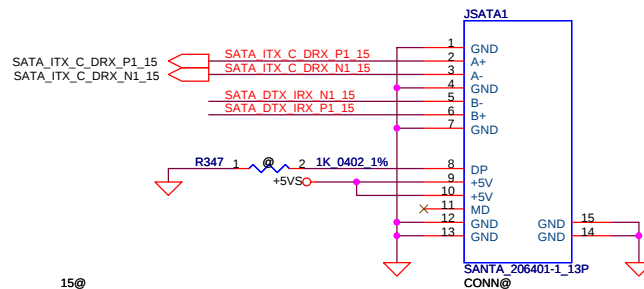




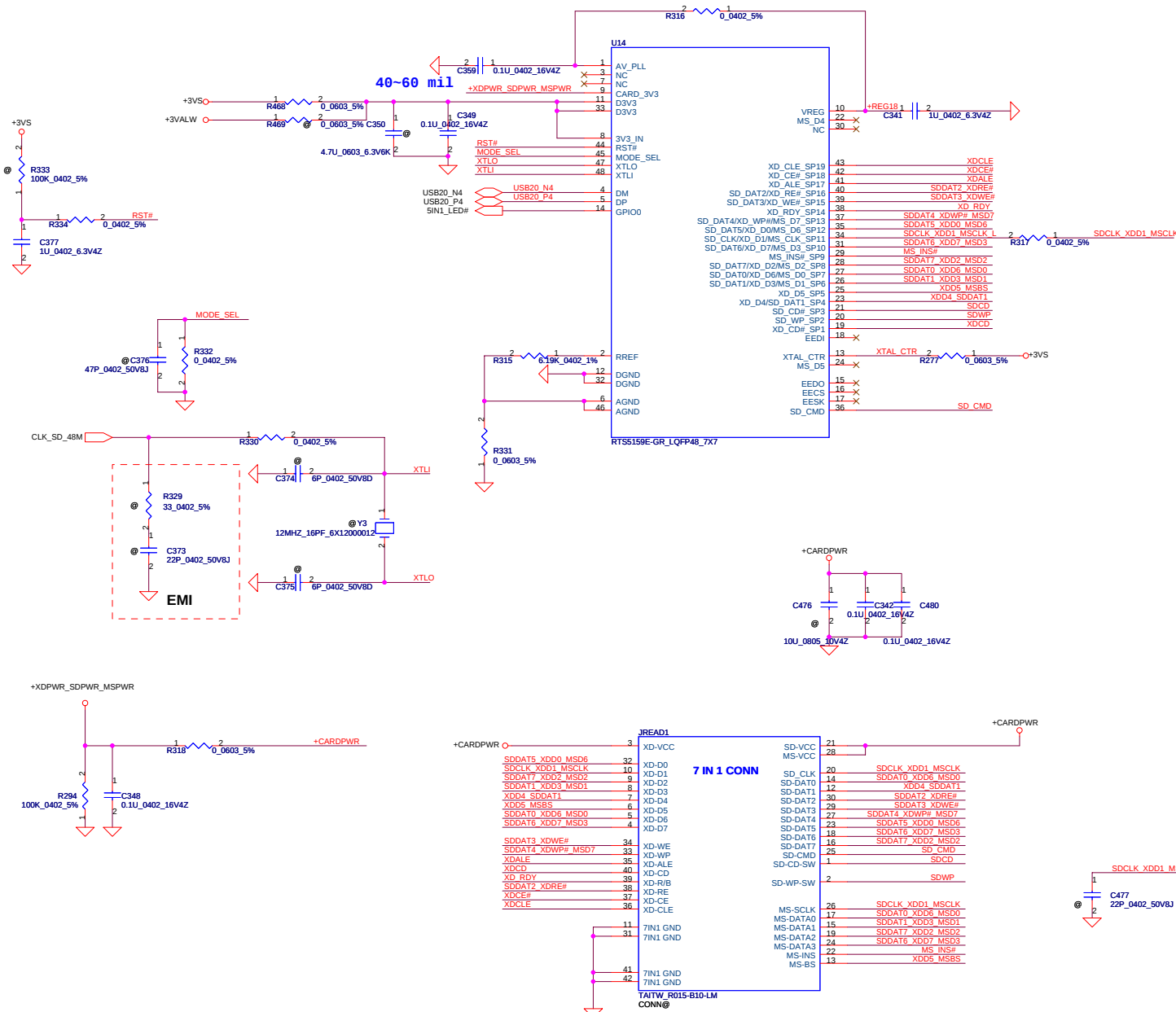
SATA HDD Conn.



SATA ODD Conn.

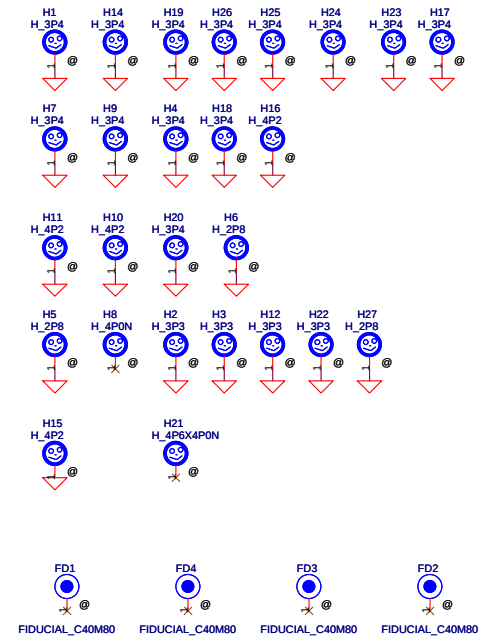
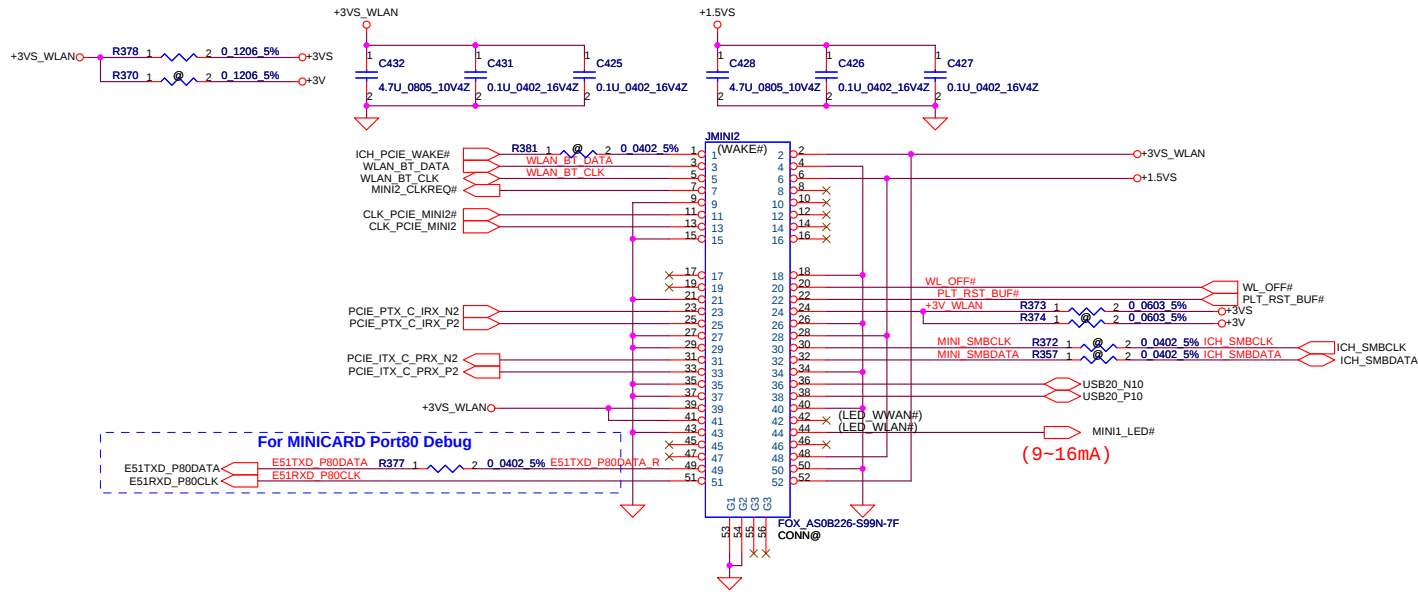


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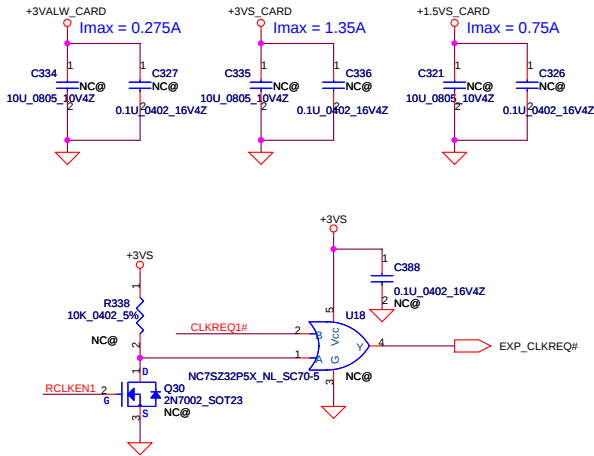
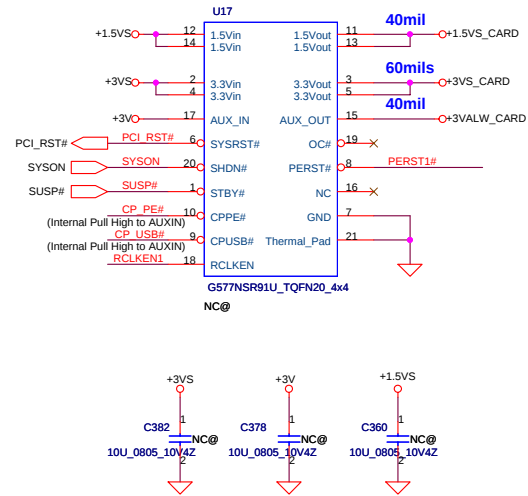
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For Wireless LAN

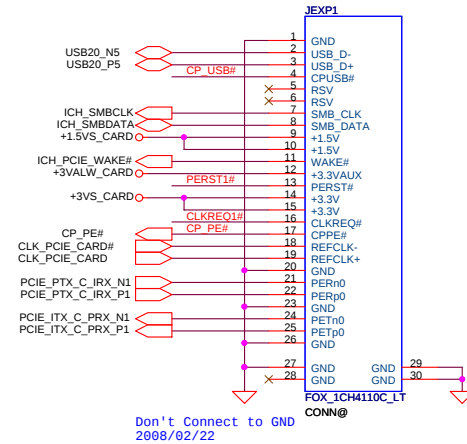


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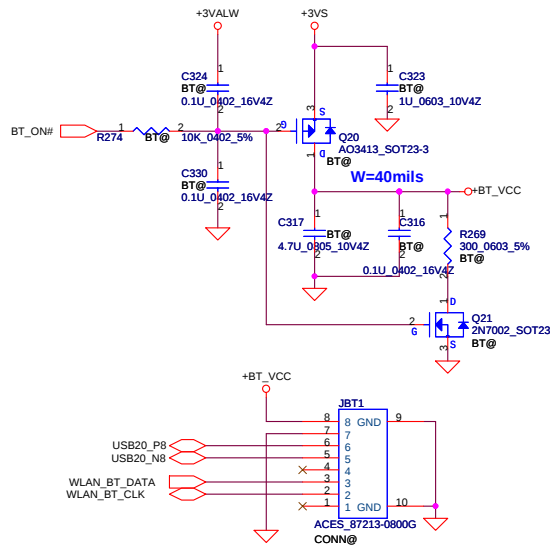
New Card Power Switch



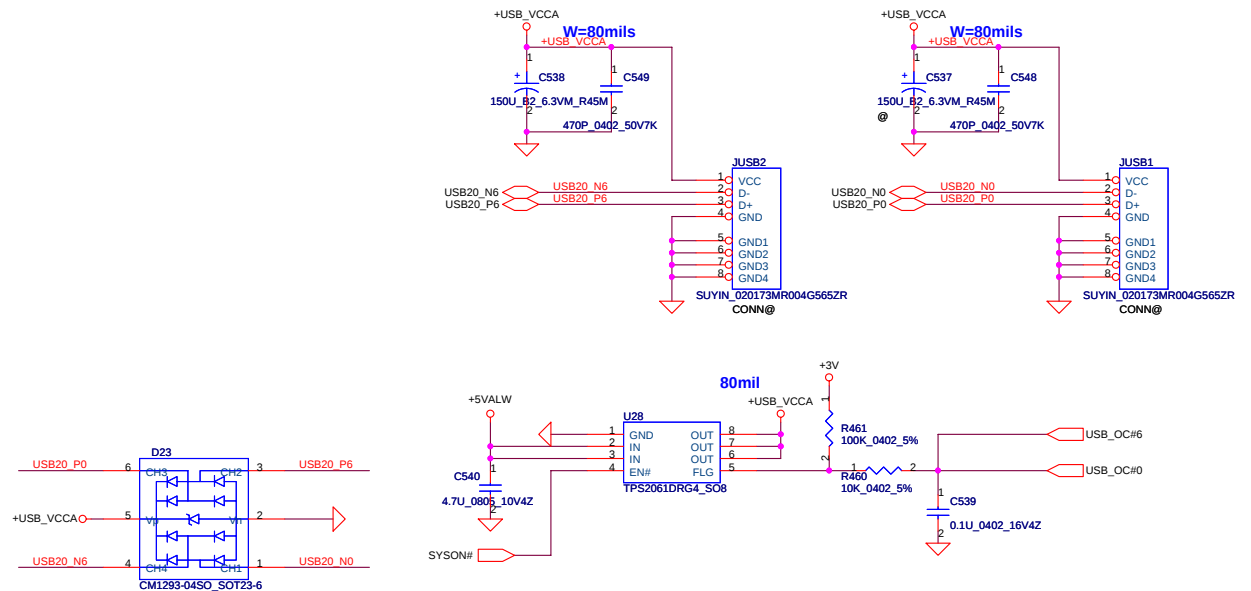
New Card Socket (Left/TOP)



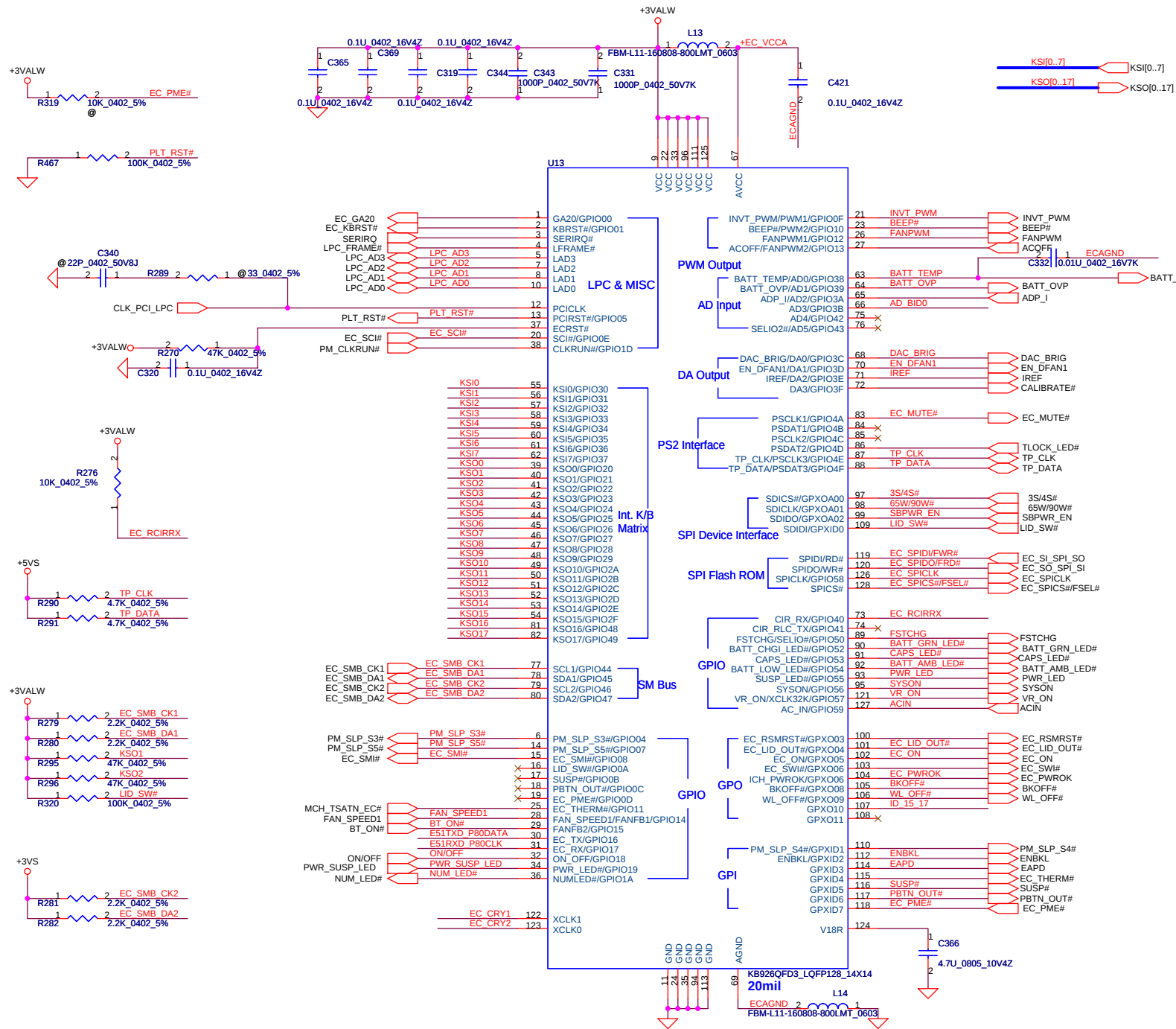
Bluetooth Conn.



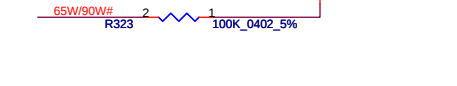
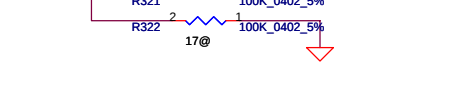
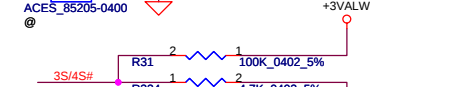
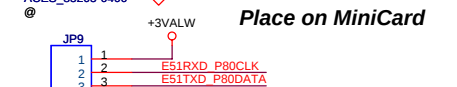
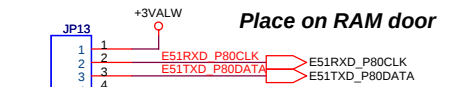
USB CONN.



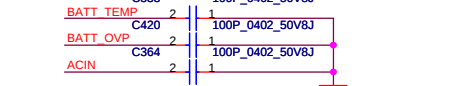
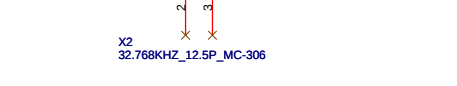
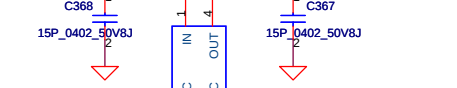
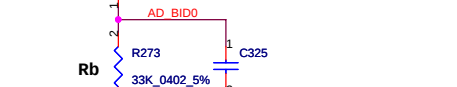
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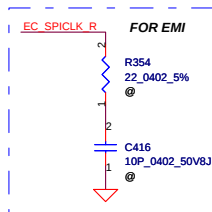
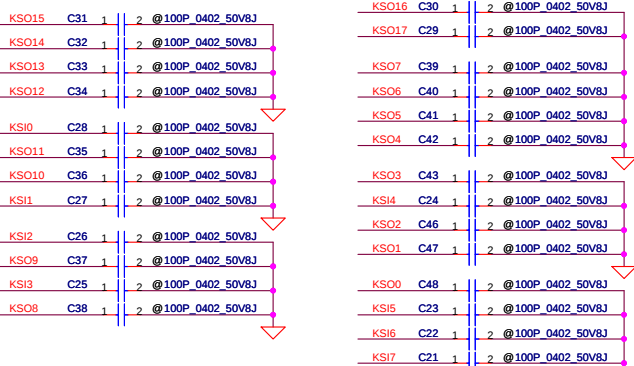
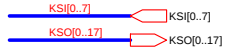
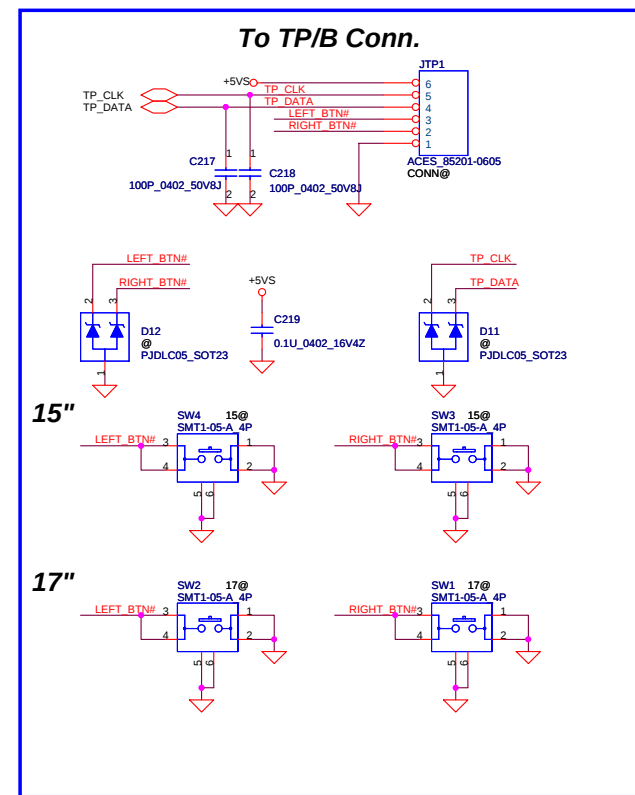
For EC Tools



Analog Board ID definition,
Please see page 3.



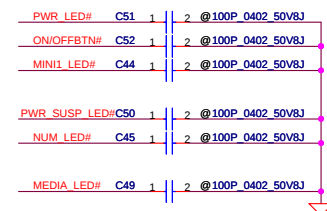
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The diagram illustrates the pin connections for the ACES_85201-20051 module. Power pins are connected to +3VS, +3VALW, and +5VS. Signal pins are connected to various LEDs and buttons. Pins 18, 19, and 20 are connected to ground. Pin 14 is labeled JP14 and ACES_85201-20051.

Pin	Signal
1	+3VS
2	+3VALW
3	+5VS
4	LID_SW#
5	TLOCK_LED#
6	KS00
7	KS12
8	PWR_SUSP_LED#
9	PWR_LED#
10	ON/OFFBTN#
11	KS11
12	MINIL_LED#
13	MEDIA_LED#
14	NUM_LED#
15	CAPS_LED#
16	
17	
18	GND
19	GND
20	GND

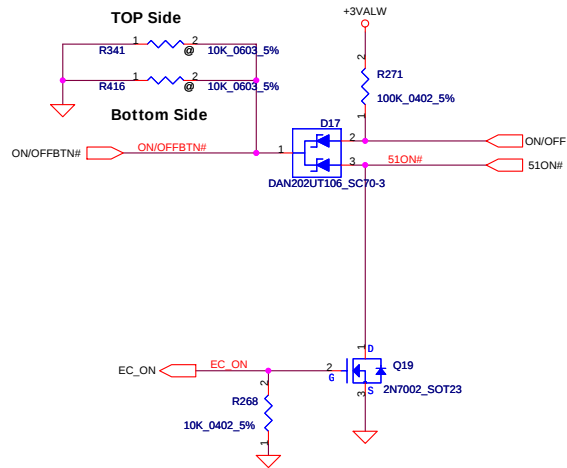
	KSO0
KSI1	WL_BTN#
KSI2	TLOCK_BTN#
KSI3	
KSI4	
KSI5	



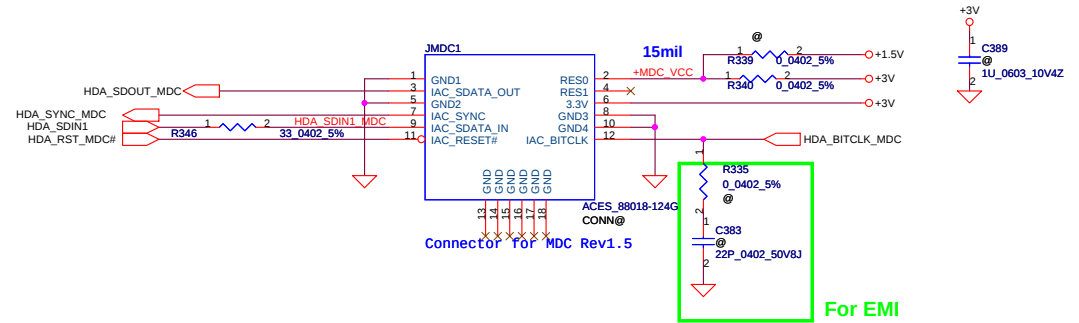
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Power Button

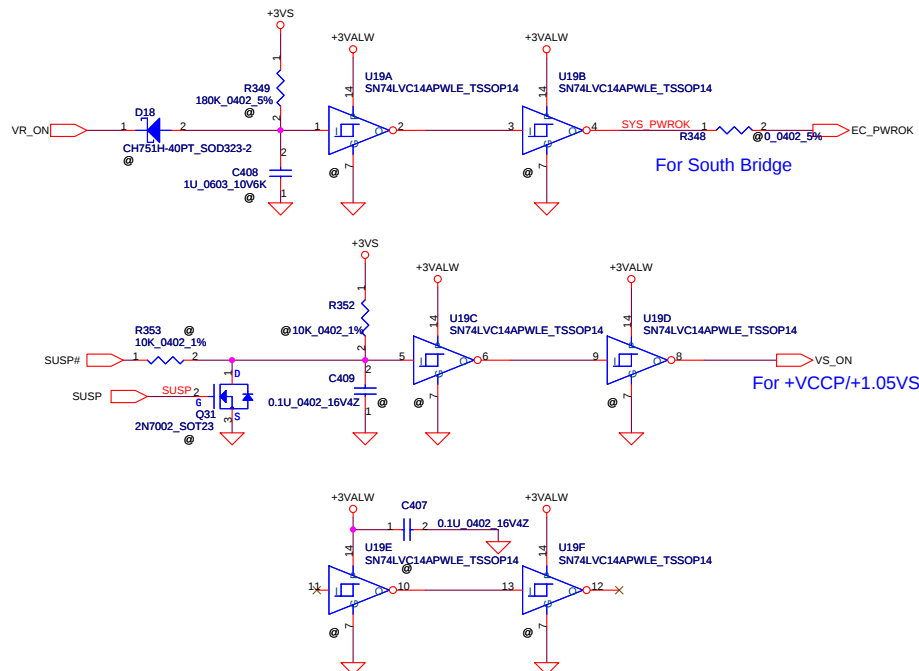
ON/OFF switch



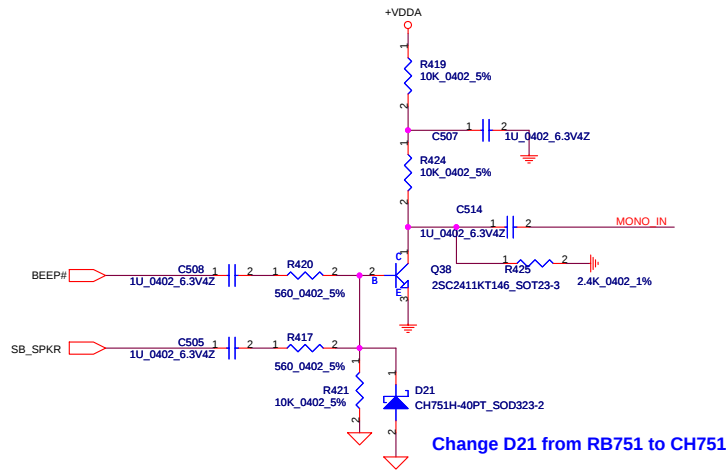
HDA MDC Conn.



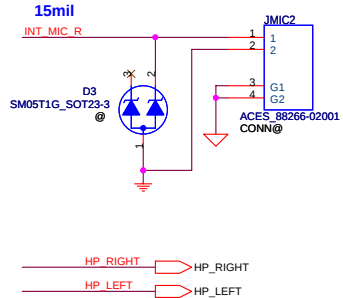
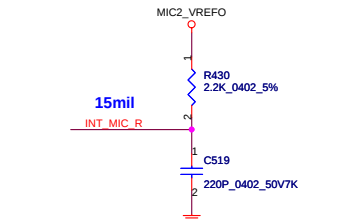
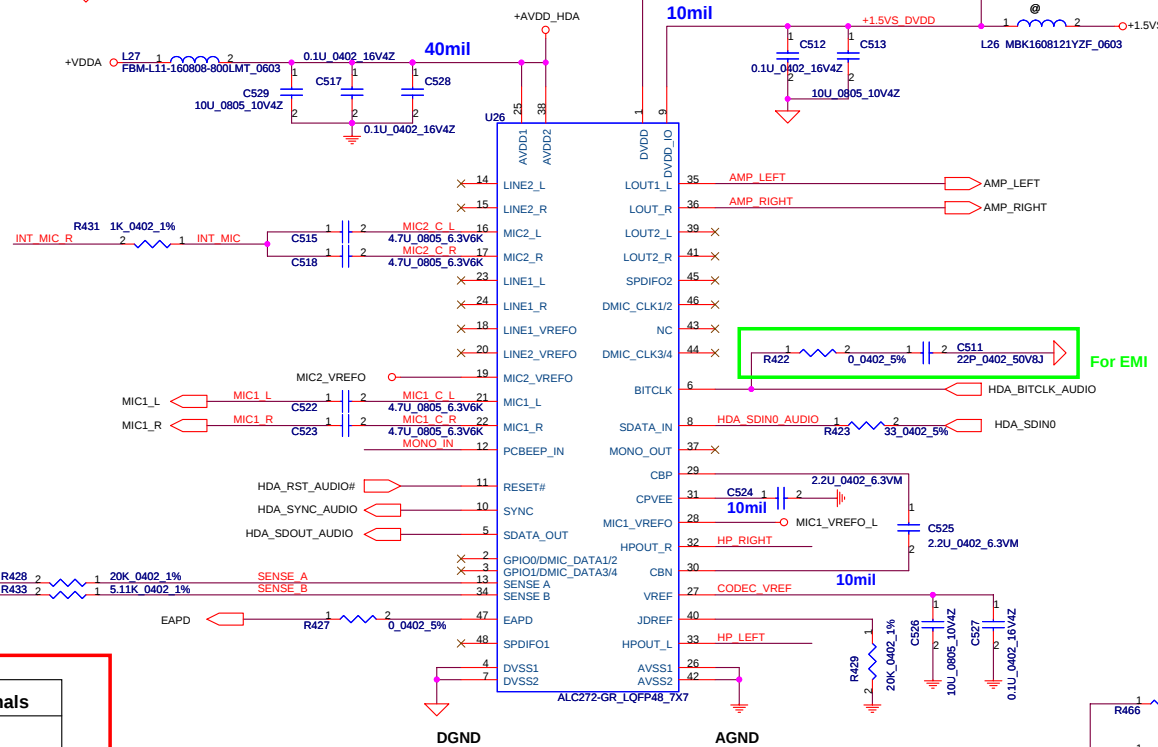
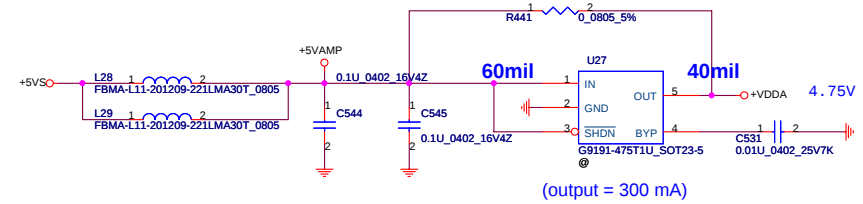
Power ON Circuit



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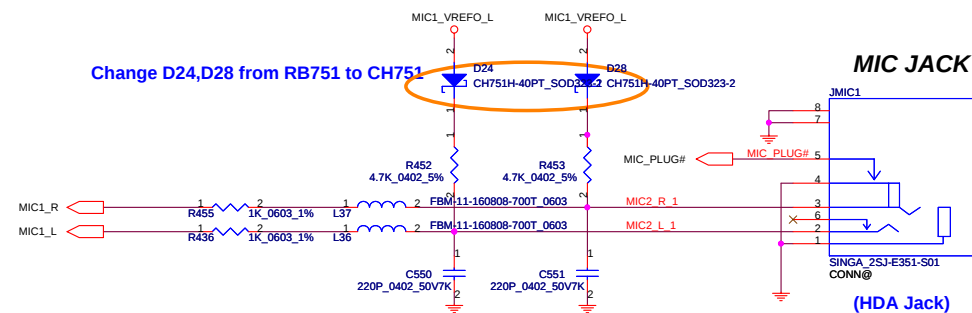
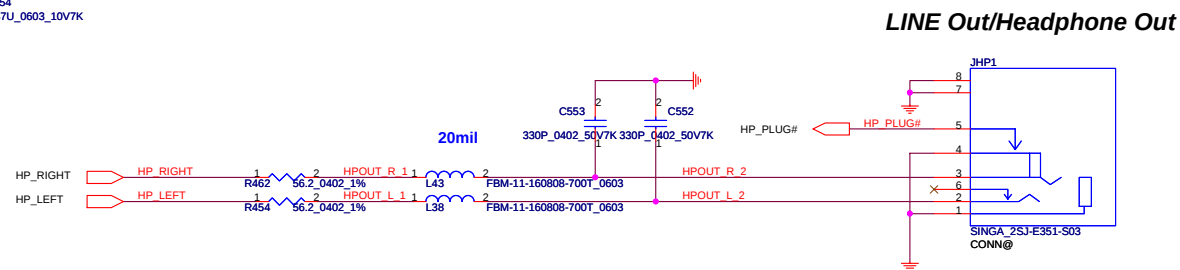
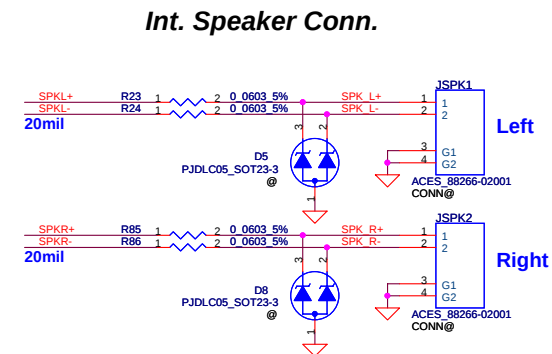
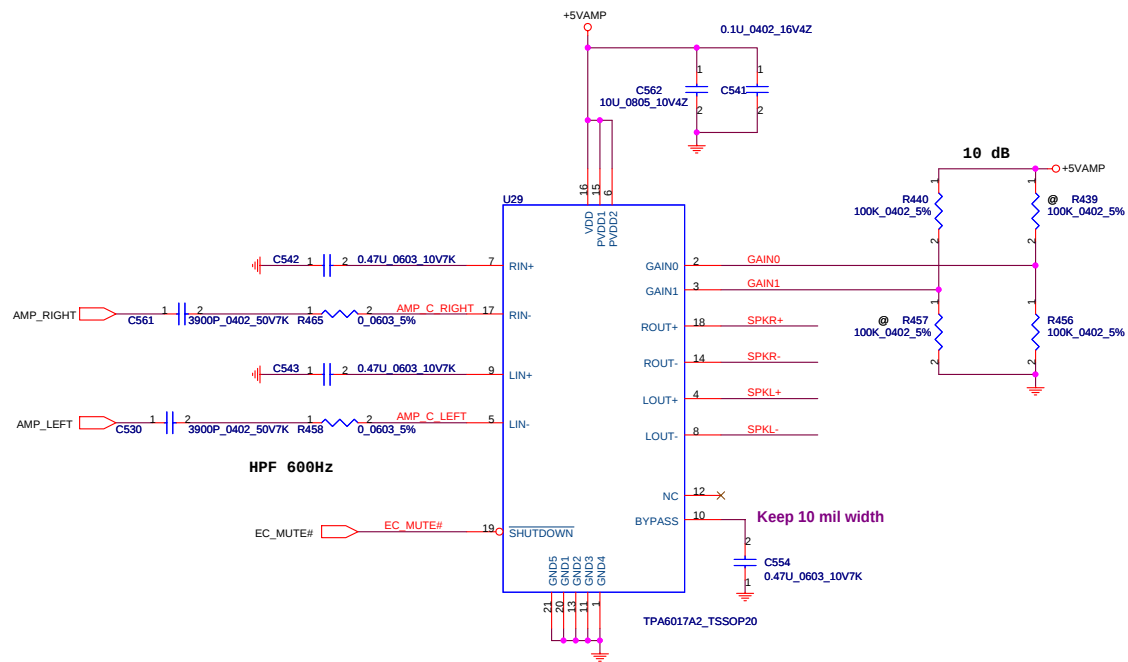


HD Audio Codec



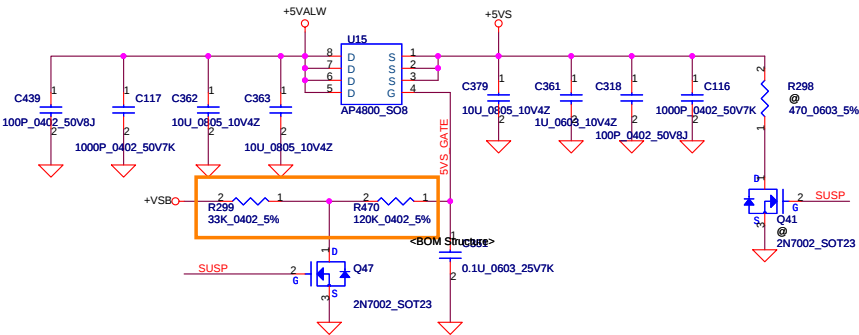
Sense Pin	Impedance	Codec Signals
SENSE A	39.2K	PORT-B (PIN 21, 22)
	20K	
	10K	
	5.1K	
SENSE B	39.2K	PORT-H (PIN 32,33)
	20K	
	10K	
	5.1K	

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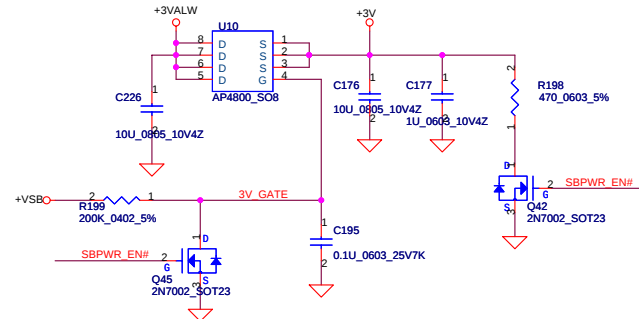


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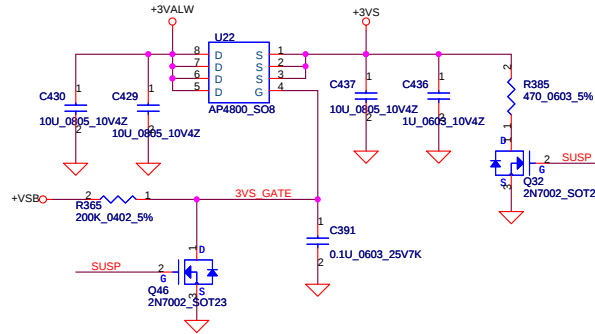
+5VALW TO +5VS



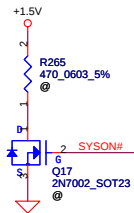
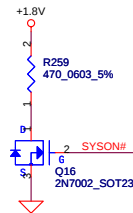
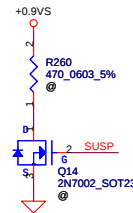
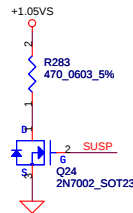
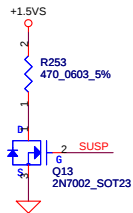
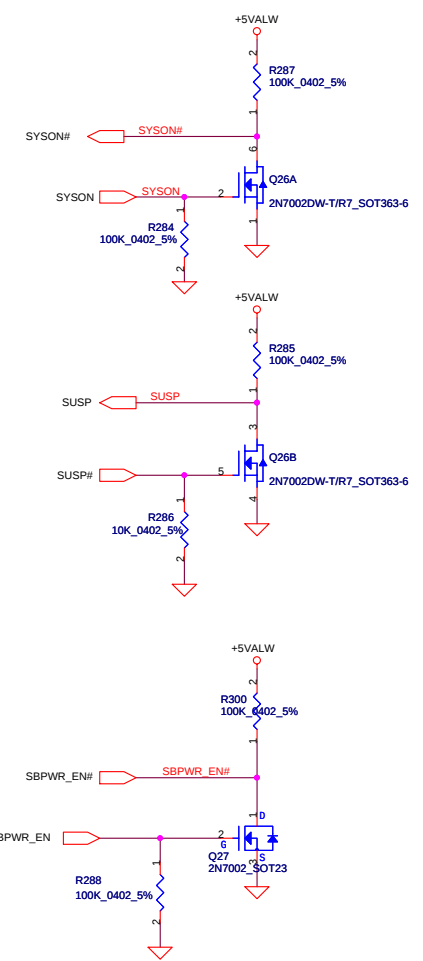
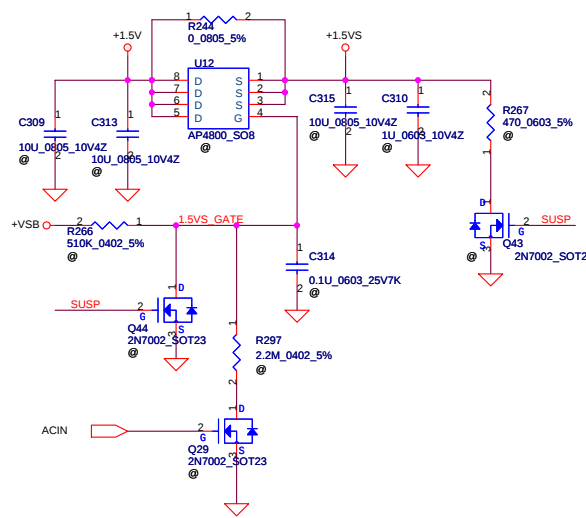
+3VALW TO +3V_SB(ICH8M AUX Power)



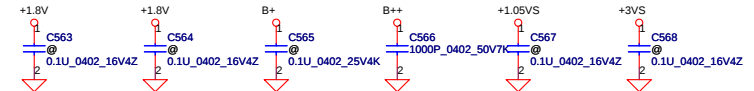
+3VALW TO +3VS



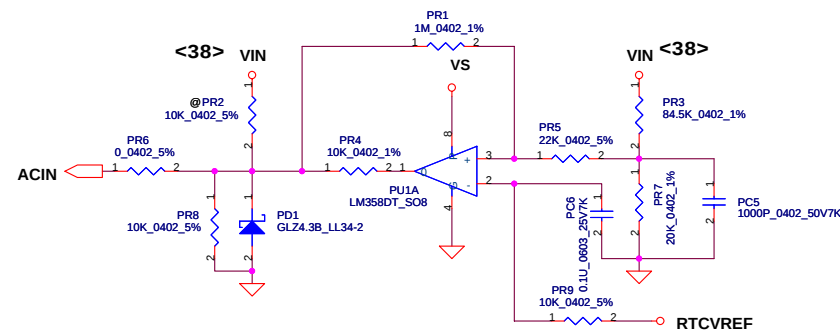
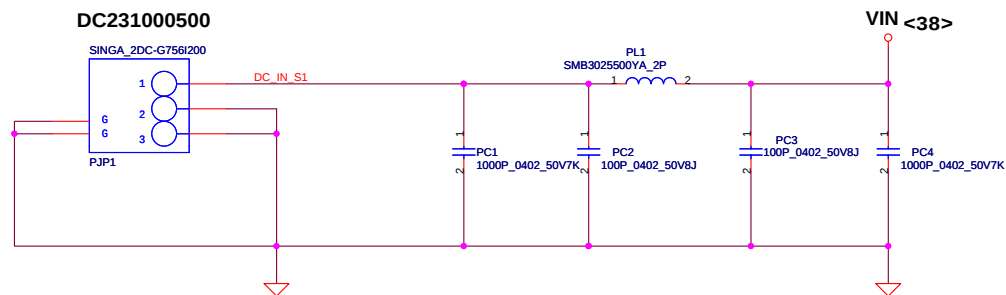
+1.5V to +1.5VS



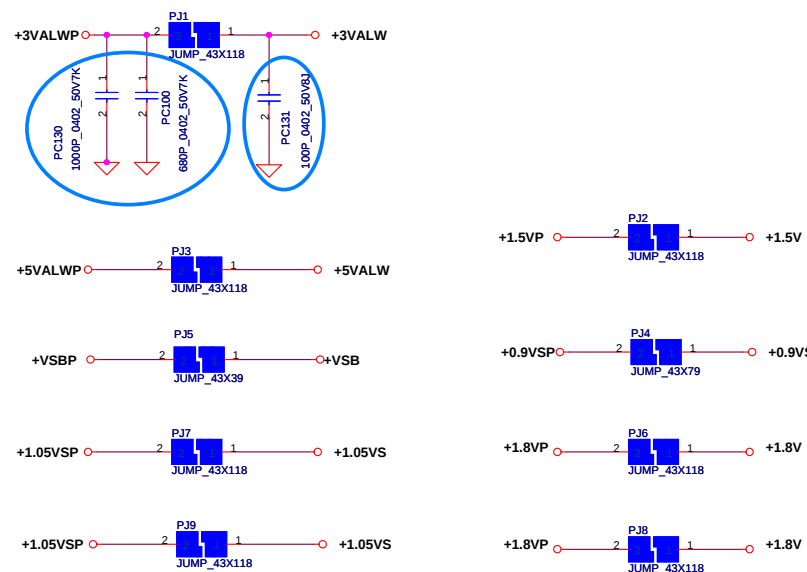
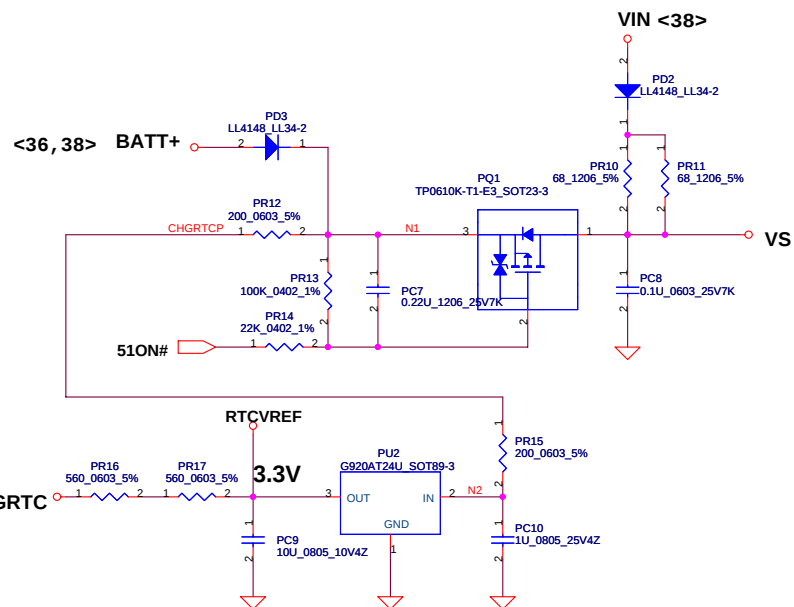
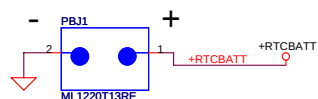
Reserve for EMI request



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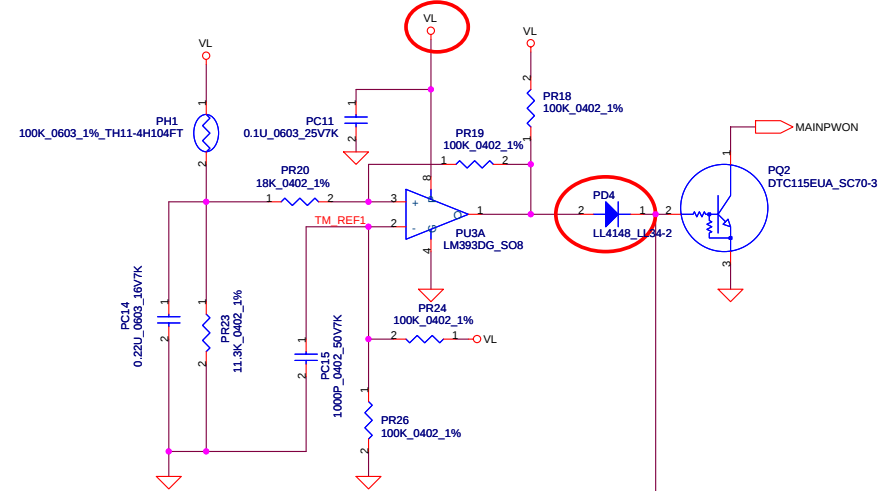


Vin Detector			
	Min.	Typ	Max.
H-->L	16.976V	17.525V	17.728V
L-->H	17.430V	17.901V	18.384V

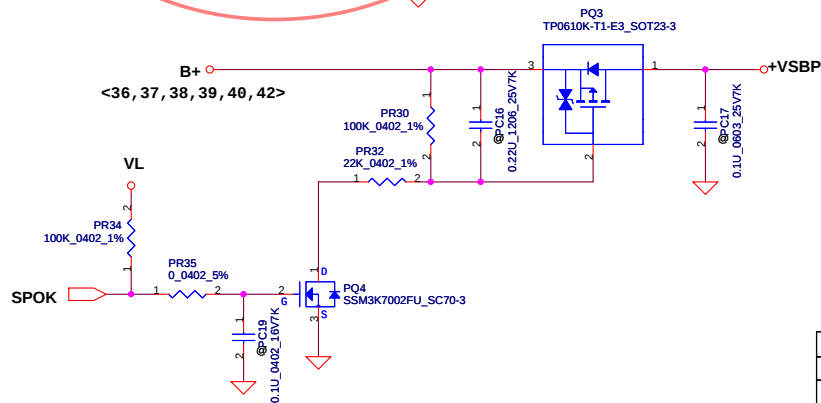
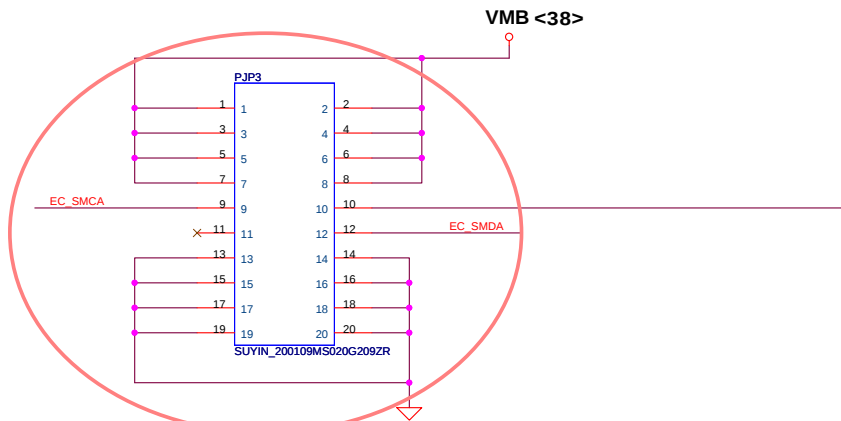
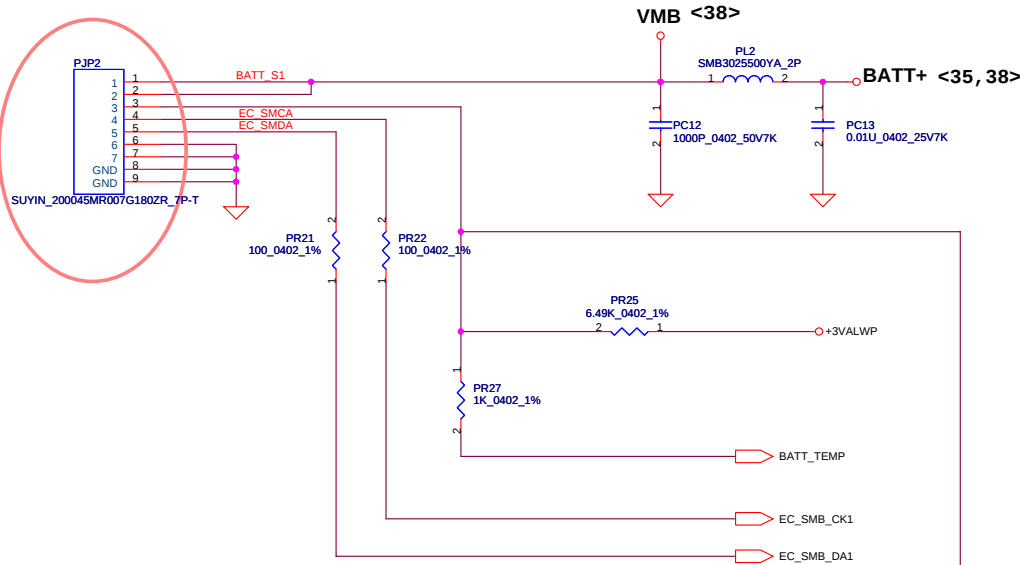
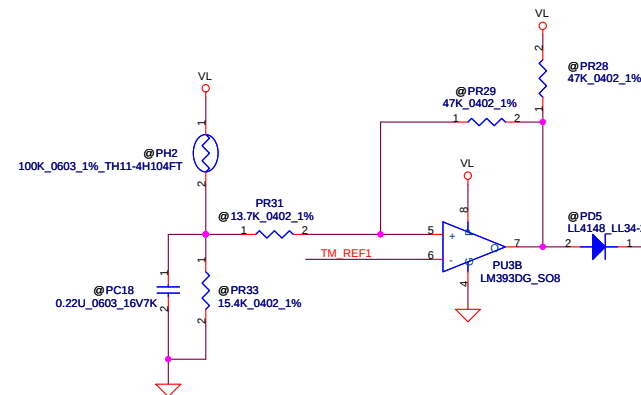


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PH1 under CPU botten side :
CPU thermal protection at 90 degree C
Recovery at 70 degree C

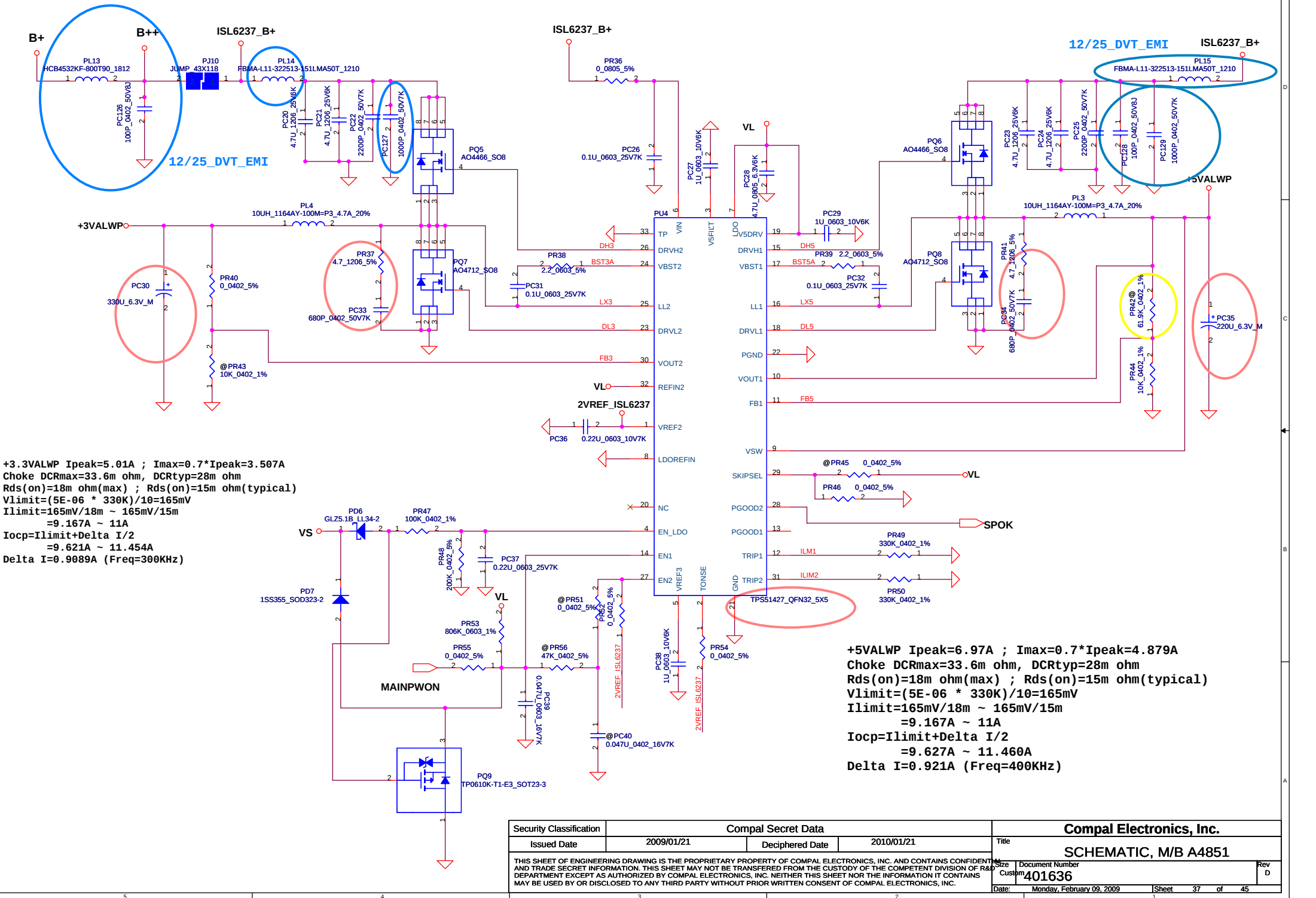


PH2 near main Battery CONN :
BAT. thermal protection at 90 degree C
Recovery at 70 degree C



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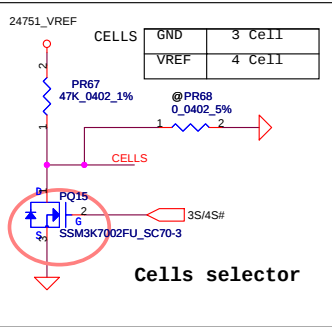
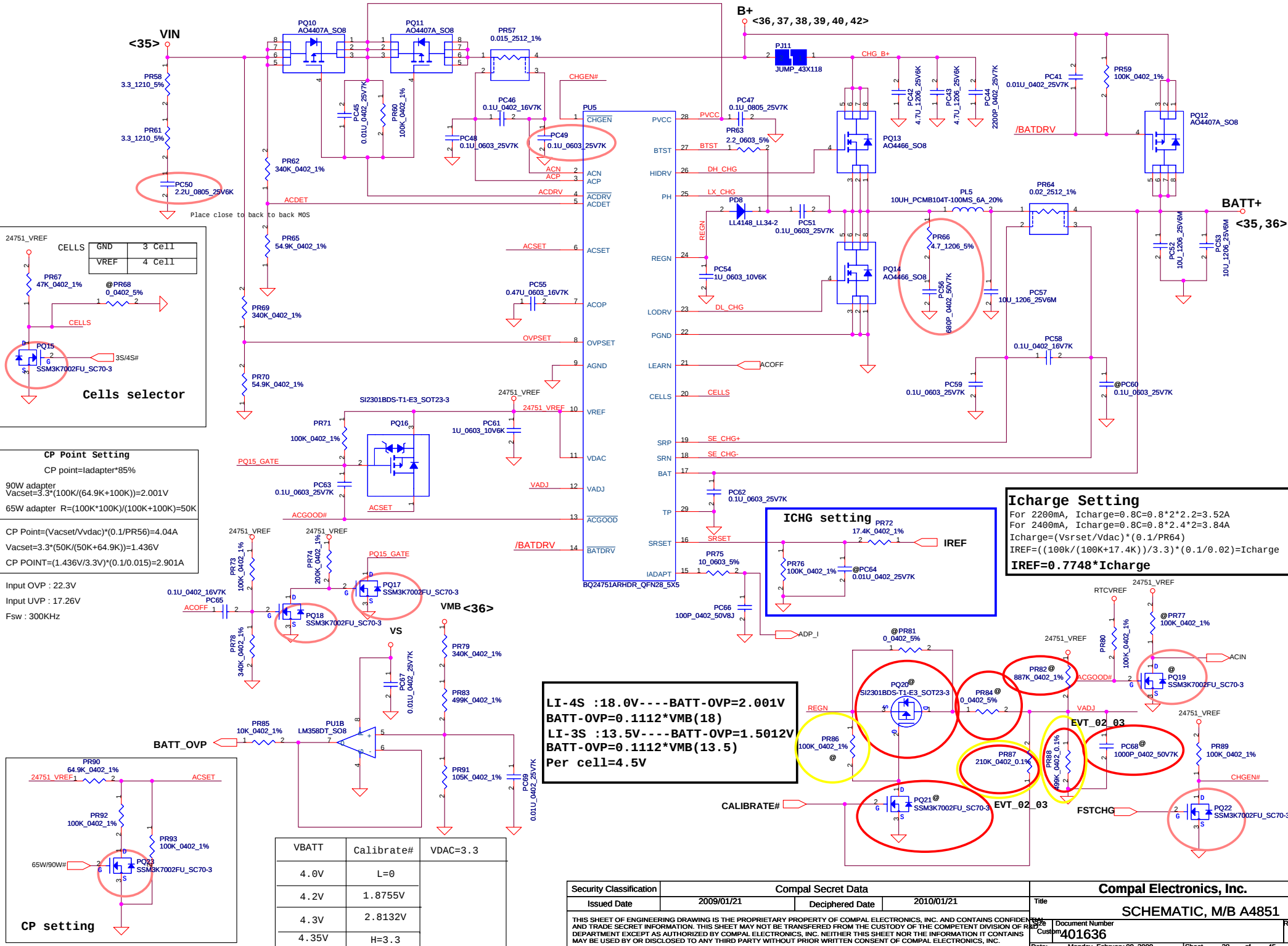
<36, 37, 38, 39, 40, 42>



+3.3VALWP Ipeak=5.01A ; Imax=0.7*Ipeak=3.507A
Choke DCRmax=33.6m ohm, DCRtyp=28m ohm
Rds(on)=18m ohm(max) ; Rds(on)=15m ohm(typical)
Vlimit=(5E-06 * 330K)/10=165mV
Ilimit=165mV/18m ~ 165mV/15m
=9.167A ~ 11A
Iocp=Ilimit+Delta I/2
=9.621A ~ 11.454A
Delta I=0.9089A (Freq=300KHz)

+5VALWP Ipeak=6.97A ; Imax=0.7*Ipeak=4.879A
Choke DCRmax=33.6m ohm, DCRtyp=28m ohm
Rds(on)=18m ohm(max) ; Rds(on)=15m ohm(typical)
Vlimit=(5E-06 * 330K)/10=165mV
Ilimit=165mV/18m ~ 165mV/15m
=9.167A ~ 11A
Iocp=Ilimit+Delta I/2
=9.627A ~ 11.460A
Delta I=0.921A (Freq=400KHz)

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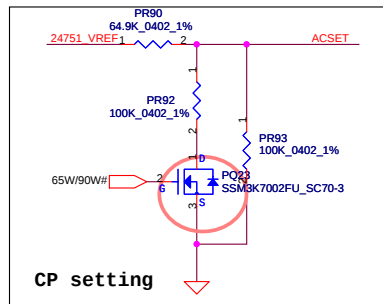


CP Point Setting
CP point=ladapter*85%

90W adapter
 $V_{acset}=3.3 \cdot (100K / (64.9K + 100K)) = 2.001V$
65W adapter $R = (100K \cdot 100K) / (100K + 100K) = 50K$

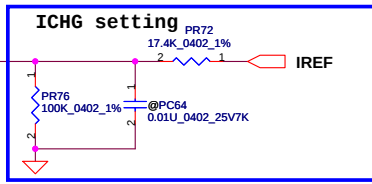
CP Point=(V_{acset} / V_{dacc}) * (0.1 / PR56) = 4.04A
 $V_{acset} = 3.3 \cdot (50K / (50K + 64.9K)) = 1.436V$
CP POINT=($1.436V / 3.3V$) * (0.1 / 0.015) = 2.901A

Input OVP : 22.3V
Input UVP : 17.26V
Fsw : 300KHz

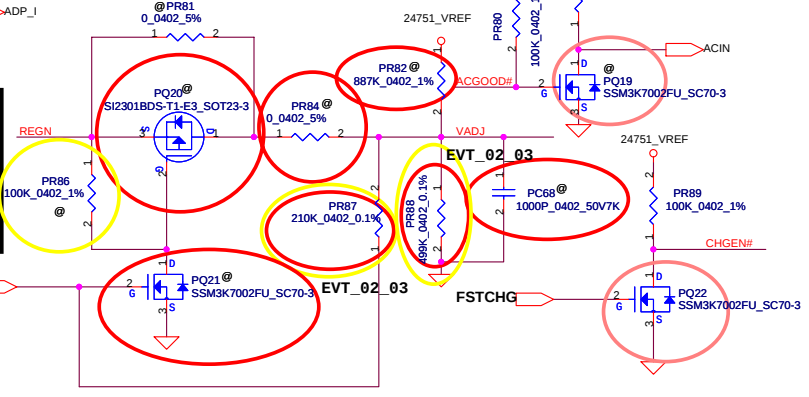


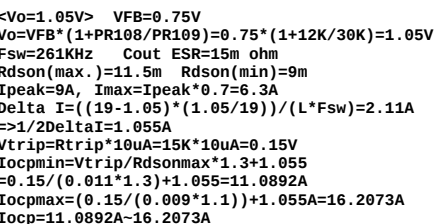
VBATT	Calibrate#	VDAC=3.3
4.0V	L=0	
4.2V	1.8755V	
4.3V	2.8132V	
4.35V	H=3.3	

LI-4S : 18.0V----BATT-OVP=2.001V
BATT-OVP=0.1112*VMB(18)
LI-3S : 13.5V----BATT-OVP=1.5012V
BATT-OVP=0.1112*VMB(13.5)
Per cell=4.5V

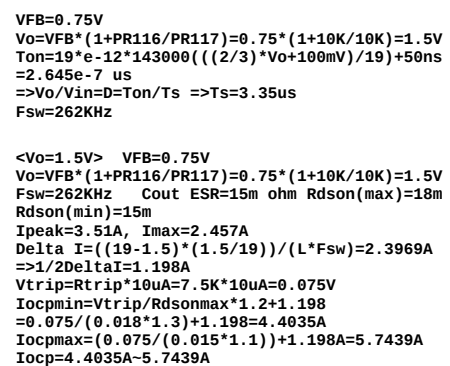


Icharge Setting
For 2200mA, $I_{charge} = 0.8C = 0.8 \cdot 2 \cdot 2 = 3.52A$
For 2400mA, $I_{charge} = 0.8C = 0.8 \cdot 2.4 \cdot 2 = 3.84A$
 $I_{charge} = (V_{srset} / V_{dacc}) \cdot (0.1 / PR64)$
 $IREF = ((100k / (100k + 17.4k)) / 3.3) \cdot (0.1 / 0.02) = I_{charge}$
IREF=0.7748*Icharge





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Version change list (P.I.R. List)

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Item	Fixed Issue	Reason for change	Rev.	PG #	Modify List	Date	Phase
1		Add PC57 :10U_1206_25V_6M	0.1	38	Add PC57 :10U_1206_25V_6M	20080902	EVT
2		Add snubber for EMI	0.1	42	Add snubber for EMI	20080915	EVT
3		Shift PC99 from +cpu_B+ to B+	0.1	42	Shift PC99 from +cpu_B+ to B+	20080915	EVT
4		Add PJ15 to B+	0.1	39	Add PJ15 to B+	20080915	EVT
5		PR135 and PR140 change to 0_0603_5%	0.1	42	PR135 and PR140 change to 0_0603_5%	20080915	EVT
6	Charger feedback trace too long	ADD PC49	0.2	38	ADD PC49	20081124	DVT
7	Power sequence error	+1.5VP: enable pin change from SUSP# to SYSON +0.9VSP: enable pin change from SUSP# to SUSP	0.2	40	+1.5VP: enable pin change from SUSP# to SYSON +0.9VSP: enable pin change from SUSP# to SUSP	20081124	DVT
8	Load line over spec	PR131: change to 5.76K_0402_1%	0.2	42	PR131: change to 5.76K_0402_1%	20081124	DVT
9	3D hang	Charger PR63:change to 2.2_0603_5% PR66:Add 4.7_1206_5% PC56:Add 680P_0402_50V7K	0.2	38	Charger PR63:change to 2.2_0603_5% PR66:Add 4.7_1206_5% PC56:Add 680P_0402_50V7K	20081124	DVT
10	3D hang	+1.8VP PR97:change to 2.2_0603_5% PR160:Add 4.7_1206_5% PC119:Add 680P_0402_50V7K	0.2	39	+1.8VP PR97:change to 2.2_0603_5% PR160:Add 4.7_1206_5% PC119:Add 680P_0402_50V7K	20081124	DVT
11	3D hang	+1.05VSP PR105:change to 2.2_0603_5% PR161:Add 4.7_1206_5% PC120:Add 680P_0402_50V7K Add bead between B+ and 1.05VSP_B+	0.2	39	+1.05VSP PR105:change to 2.2_0603_5% PR161:Add 4.7_1206_5% PC120:Add 680P_0402_50V7K Add bead between B+ and 1.05VSP_B+	20081124	DVT
12	EMI solution	+5VALW/+3VALW PR37: Add 4.7_1206_5% PR41: Add 4.7_1206_5% PC33: Add 680P_0402_50V7K PC34: Add 680P_0402_50V7K PR38: change to 2.2_0603_5% PR39: change to 2.2_0603_5%	0.2	37	+5VALW/+3VALW PR37: Add 4.7_1206_5% PR41: Add 4.7_1206_5% PC33: Add 680P_0402_50V7K PC34: Add 680P_0402_50V7K PR38: change to 2.2_0603_5% PR39: change to 2.2_0603_5%	20081124	DVT
13	EMI solution	+CPU CORE PR158: Add 4.7_1206_5% PR159: Add 4.7_1206_5% PC117: Add 680P_0402_50V7K PC118: Add 680P_0402_50V7K PR135: change to 2.2_0603_5% PR140: change to 2.2_0603_5%	0.2	42	+CPU CORE PR158: Add 4.7_1206_5% PR159: Add 4.7_1206_5% PC117: Add 680P_0402_50V7K PC118: Add 680P_0402_50V7K PR135: change to 2.2_0603_5% PR140: change to 2.2_0603_5%	20081124	DVT
16	EMI solution	+CPU CORE PC122: Reserve 2200P_0402_50V7K on B+	0.2	42	+CPU CORE PC122: Reserve 2200P_0402_50V7K on B+	20081124	DVT
17	EMI solution	+1.05VSP PR105 : change to 2.2_0603_5% PL12 : Add HCB4532KF-800T90_1812 PC124: Reserve 2200P_0402_50V7K on B+ PC125: Reserve 2200P_0402_50V7K on B+	0.2	39	+1.05VSP PR105 : change to 2.2_0603_5% PL12 : Add HCB4532KF-800T90_1812 PC124: Reserve 2200P_0402_50V7K on B+ PC125: Reserve 2200P_0402_50V7K on B+	20081124	DVT

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Item	Fixed Issue	Reason for change	Rev.	PG #	Modify List	Date	Phase
18	Battery & HW solution	Charger PQ20:Reserve(@)SI2301BDS-T1-E3_S0T23-3 PQ21:Reserve(@)SSM3K7002FU_SC70-3 PR82:Reserve(@)887K_0402_1% PR84:Reserve(@)0_0402_5% PC68:Reserve(@)1000P_0402_50V7K PR87:change to 210K_0402_1% PR88:change to 499K_0402_1% +1.05VSP PR104: Reserve(@)0_0402_5% PR110: change to 10K_0402_5% PR79 : Add 0.1U_0402_16V7K +1.5VP PR112: Reserve(@) 0_0402_5%	0.2	38 39 40	Charger PQ20:Reserve(@)SI2301BDS-T1-E3_S0T23-3 PQ21:Reserve(@)SSM3K7002FU_SC70-3 PR82:Reserve(@)887K_0402_1% PR84:Reserve(@)0_0402_5% PC68:Reserve(@)1000P_0402_50V7K PR87:change to 210K_0402_1% PR88:change to 499K_0402_1% +1.05VSP PR104: Reserve(@)0_0402_5% PR110: change to 10K_0402_5% PR79 : Add 0.1U_0402_16V7K +1.5VP PR112: Reserve(@) 0_0402_5%	20081124	DVT
19	EMI soultion	+3VALWP/+3VALW PC100: 680P_0402_50V7K PC130: 1000P_0402_50V_7K PC131: 1000P_0402_50V_8J +1.5VP ADD PR113: 2.2_0603_5% ADD PR163: 4.7_1206_5% ADD PC121: 680P_0402_50V7K ADD PL16 :FBMA-L11-322513-151LMA50T_1210	0.3	35 40	+3VALWP/+3VALW PC100: 680P_0402_50V7K PC130: 1000P_0402_50V_7K PC131: 1000P_0402_50V_8J +1.5VP ADD PR113: 2.2_0603_5% ADD PR163: 4.7_1206_5% ADD PC121: 680P_0402_50V7K ADD PL16 :FBMA-L11-322513-151LMA50T_1210	20081224	PVT
20	POWER Solution	+3VALWP/+5VALWP RT8206- Fix output 5V for HW no HDMI	0.3	37	+3VALWP/+5VALWP PR42: Reserve 61.9K_0402_1%	20090111	PVT

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Item	Fixed Issue	Reason for change	Rev	PG #	Modify List	Date	Phase
21	EMI solution	Reduce the Noise	0.3	37	Add PL 13 (HCB4532KF-800T90_1812) Add PL 14 (FBMA-L11-322513-151LMA50T_1210) Add PL 15 (FBMA-L11-322513-151LMA50T_1210) Add PC126 (100P_0402_50V8J) Add PC128 (100P_0402_50V8J) Add PC129 (1000P_0402_50V7K)	20090112	PVT
22	Battery solution	Adjust battery voltage	0.3	38	Reserve PR86 (100K_0402_1%)	20090112	PVT
23	Saturation current	1.8u choke saturation current too small	0.3	39	change PL7 to 1UH_PCMB103E-1R0MS_20A_20%	20090113	PVT
24	GP BOM	Tolerance: K:+-10% ; J:+-5%	0.4	42	Change PC106 to 33P_0402_50V8J Change PC108 to 33P_0402_50V8J Change PC110 to 33P_0402_50V8J Change PC114 to 33P_0402_50V8J	20090123	PVT

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- 11/11**
- 1. Page 17;Un-POP R412,Q35
 - 2. Page 32;Un-POP R340,POP R339
 - 3. Page 32;Un-POP D3
 - 4. Change C13,C269,C282,C482 P/N to SGA1933D10 (ESR From 15 to 9 ohm)
 - 5. DEL HDMI Schematic (del HDMI@/NHDMI@)

- 11/19**
- 1. Change C538,C539 to B size 150U
 - 2. POP D11,D12,D29 and change P/N to SCA00000A00

- 11/24**
- 1.Add LAN_CLKREQ# on CLK Gen and AR8132

- 11/25**
- 1.Add C563-C568 for EMI request
 - 2.Add L44 for EMI request
 - 3.Add +3VS and +3V for SB HDA bus
 - 4.Add 0 ohm resistor for Audio DVDD_I0 bus
 - 5.Add 0 ohm between +1.5V and +1.5VS
 - 6.Add 3VS_GATE schematic on +3VALW to +3VS
 - 7.remove c318 and D16
 - 8.add R400 and C439 for soft-off
 - 9.add R244 to connect +1.5v to +1.5vs

- 11/25**
- 1. Change R325,R311 Form 11ohm to 22 ohm
 - 2. Change D21,D24,D28 from RB751 to CH751
 - 3. Reserve C485,C282

- 12/18**
- 1. Change R299 to 47K,ADD R470 (100K)

- 1/20**
- 1. Change R299 to 22K and R470 to 120K
 - 2. Add R570 (150U) in pgae 23
 - 3.change board ID R273 to 33K

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