

Compal Confidential

PEW52 M/B Schematics Document

Intel Penryn Processor with Cantiga + DDRII + ICH9M

2010-08-06

REV : 0 . 1

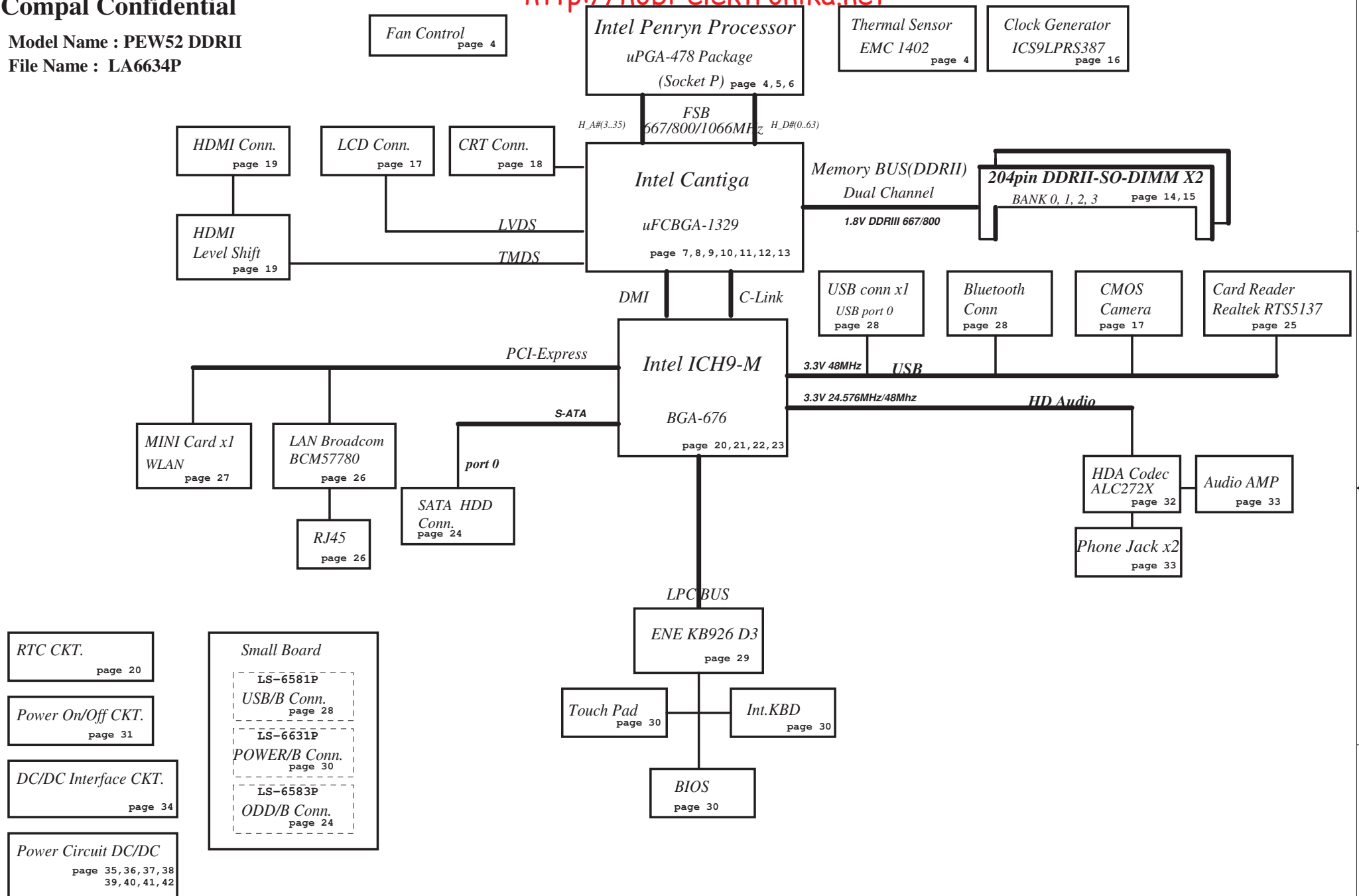
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Model Name : PEW52 DDRII

File Name : LA6634P

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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
+0.75VS	0.75V power rail for DDR	ON	OFF	OFF
+1.05VS	1.05V switched power rail	ON	OFF	OFF
+1.5V	1.5V power rail for DDR	ON	ON	OFF
+1.5VS	1.5V switched power rail	ON	OFF	OFF
+1.8V	1.8V power rail for LVDS	ON	ON	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	SMSC EMC1402	100 1100 b

EC SM Bus2 address

ICH9M SM Bus address

Device	Address
Clock Generator (ICS9LVRS367, RTM890N)	1101 001Xb
DDR DIMM1	1001 000Xb
DDR DIMM2	1001 010Xb

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STATE	SLP_S1#	SLP_S2#	SLP_S3#	SLP_S4#	SLP_S5#	+VALW	+V	+VS	Clock
Full ON	HIGH	HIGH	HIGH	HIGH	HIGH	ON	ON	ON	ON
S1 (Power On Suspend)	LOW	HIGH	HIGH	HIGH	HIGH	ON	ON	ON	LOW
S3 (Suspend to RAM)	LOW	LOW	HIGH	HIGH	HIGH	ON	ON	OFF	OFF
S4 (Suspend to Disk)	LOW	LOW	LOW	HIGH	HIGH	ON	OFF	OFF	OFF
S5 (Soft OFF)	LOW	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	V _{AD_BID} min	V _{AD_BID} typ	V _{AD_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	
5	
6	
7	

BTO Option Table

BTO Item	BOM Structure
GM45 B3	GM@
GM40 A1	GLA1@
Bluetooth	BT@

PCIe table

PCIe port1	
PCIe port2	Wireless Card
PCIe port3	PCIe LAN
PCIe port4	
PCIe port5	
PCIe port6	

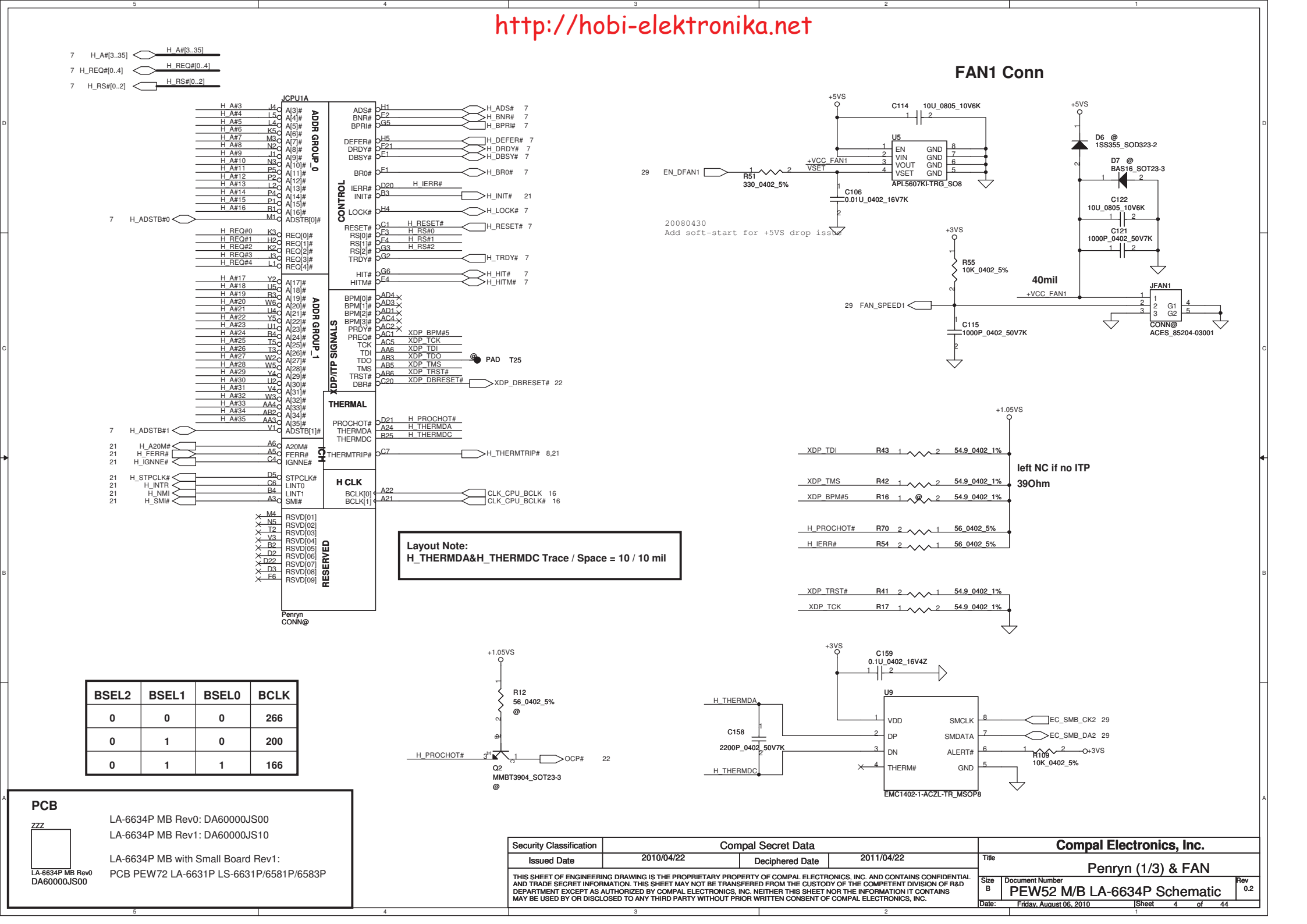
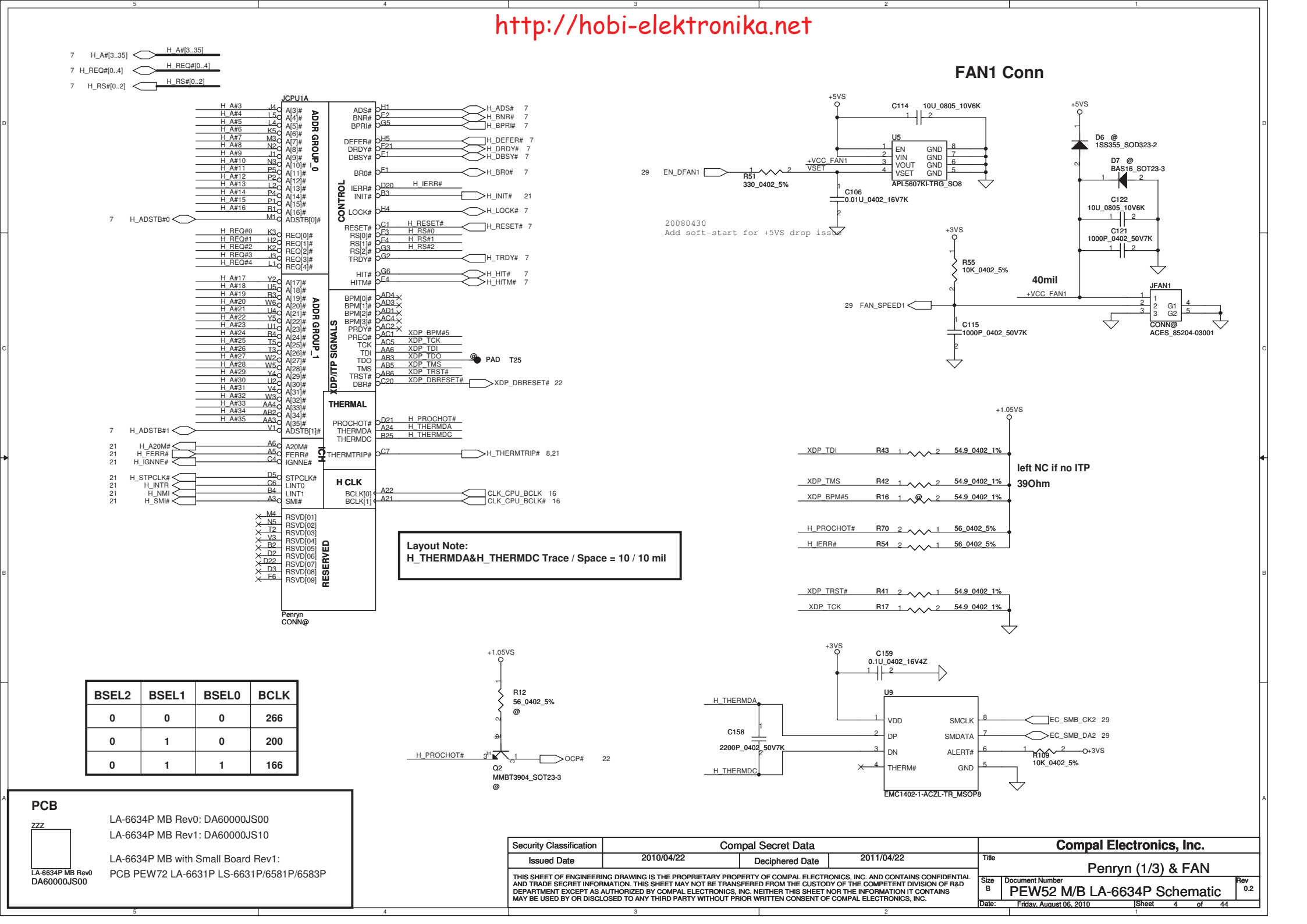
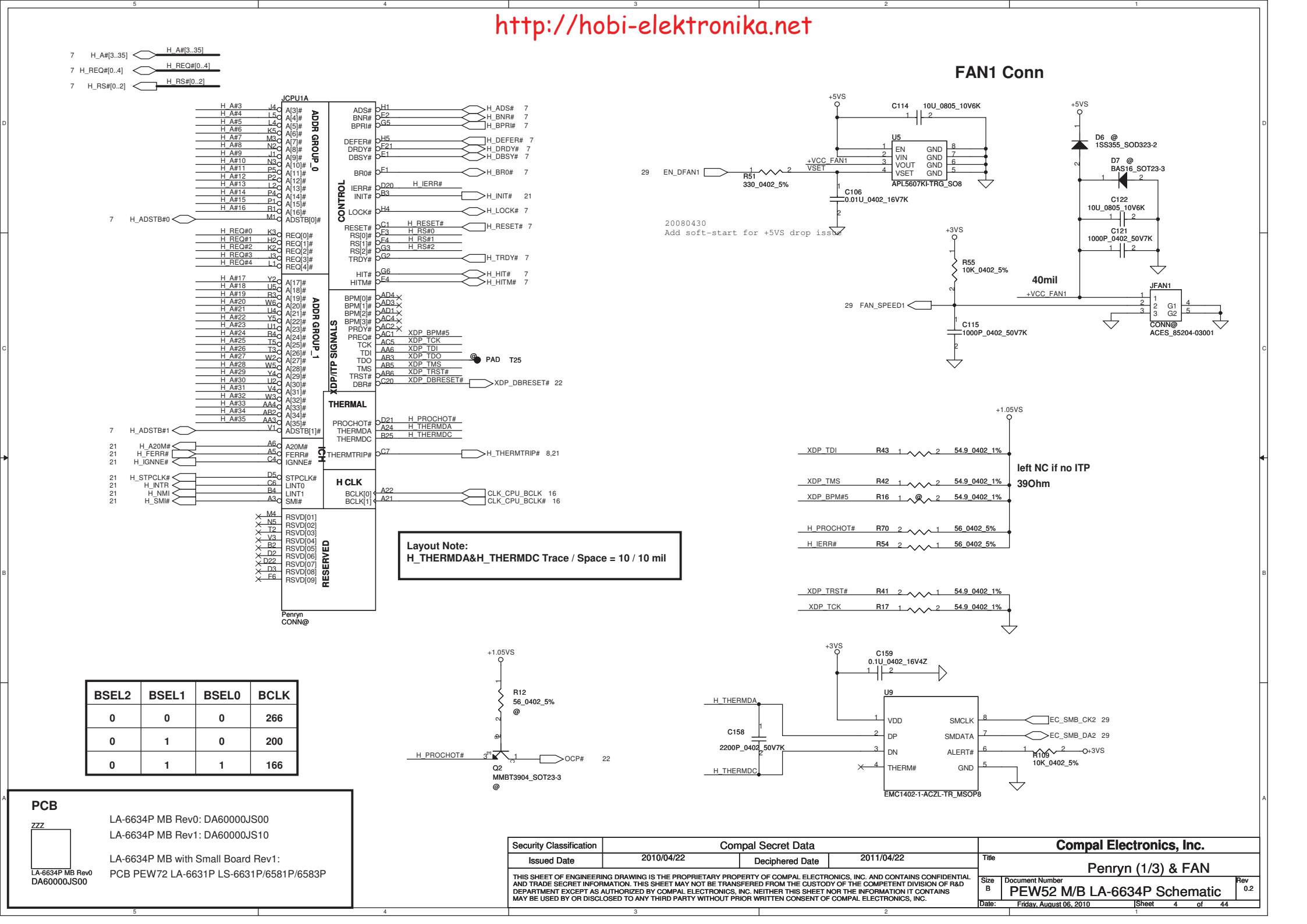
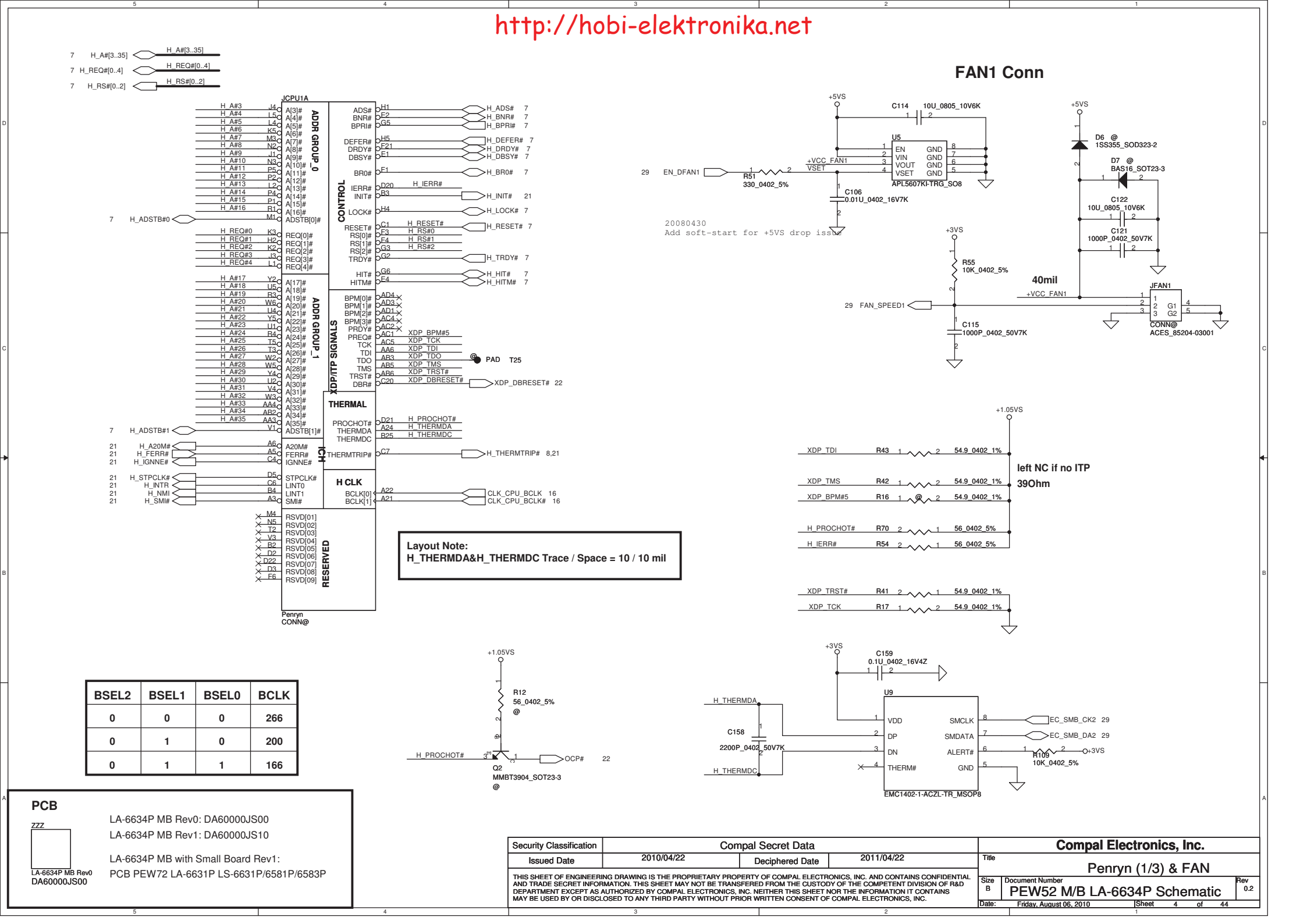
SATA table

SATA port0	HDD
SATA port1	ODD
SATA port2	
SATA port3	
SATA port4	
SATA port5	

USB table

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

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FAN1 Conn

29 EN_DFAN1

29 FAN_SPEED1

20080430
Add soft-start for +5VS drop issue

left NC if no ITP
39Ohm

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

BSEL2 BSEL1 BSEL0 BCLK

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

PCB

LA-6634P MB Rev0: DA60000JS00
LA-6634P MB Rev1: DA60000JS10
LA-6634P MB with Small Board Rev1:
PCB PEW72 LA-6631P LS-6631P/6581P/6583P

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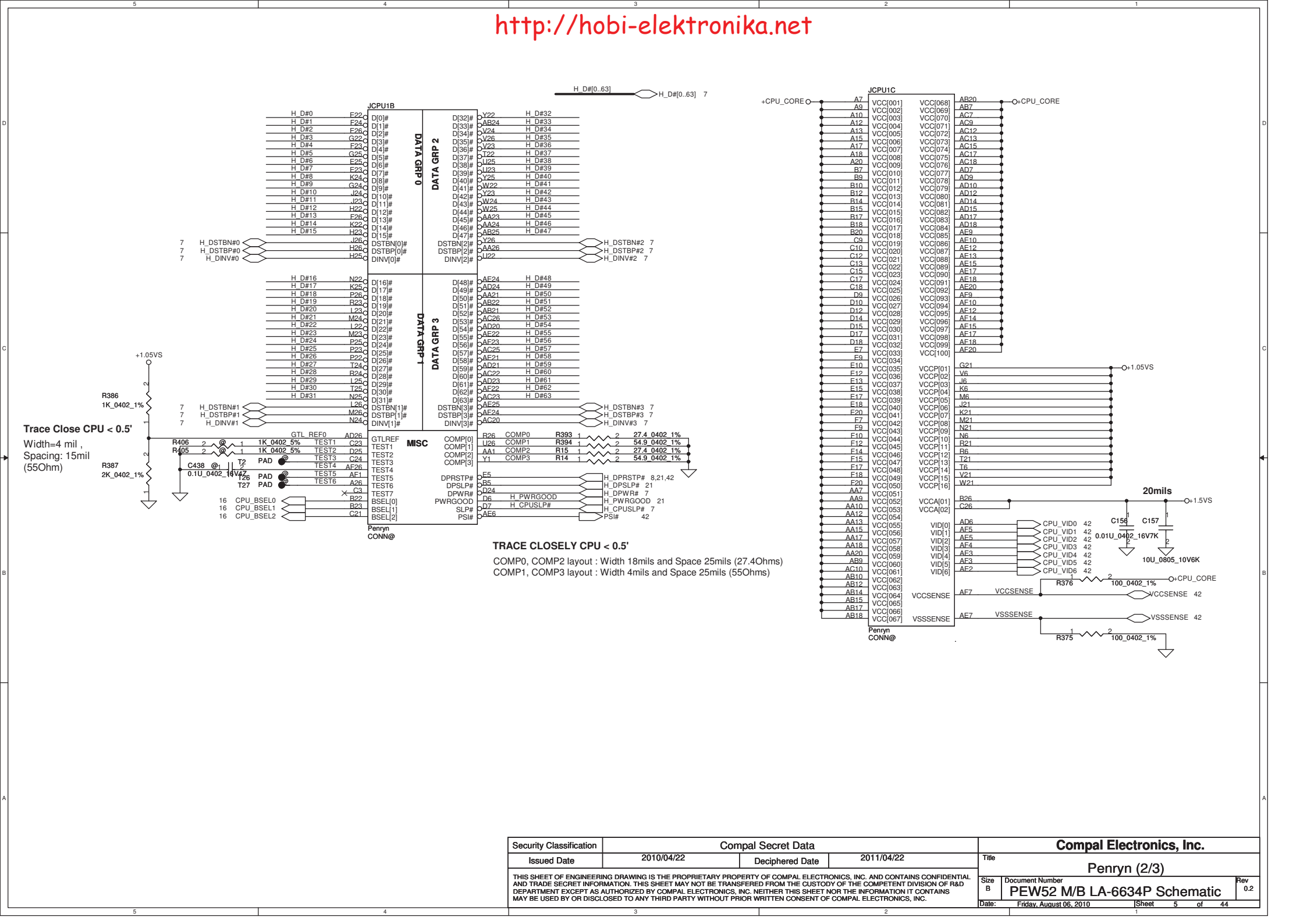
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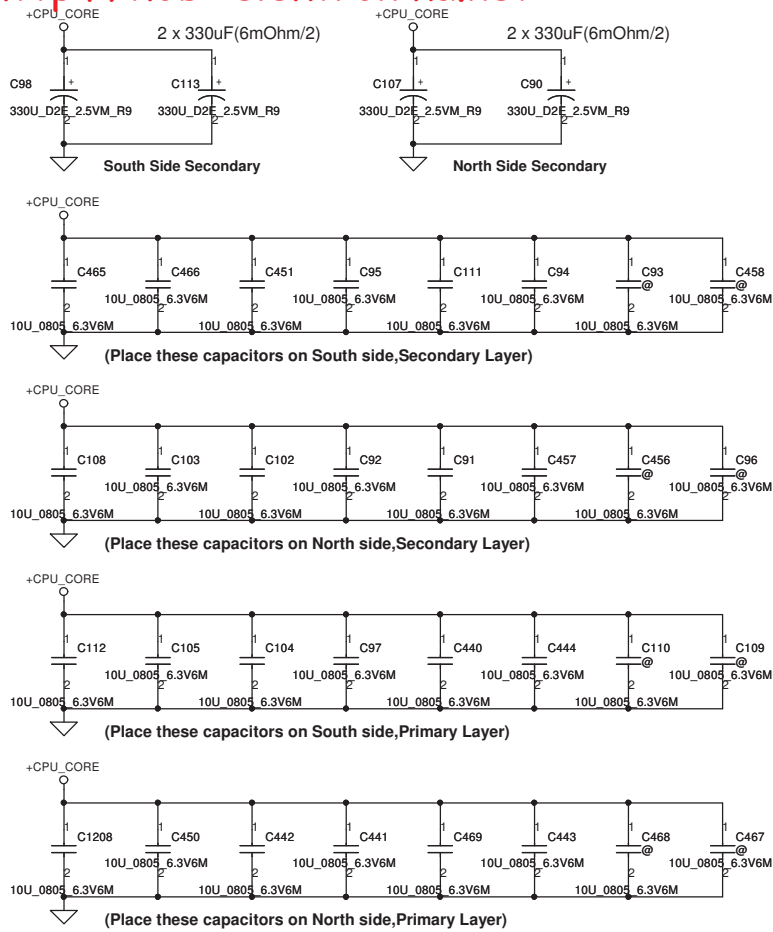
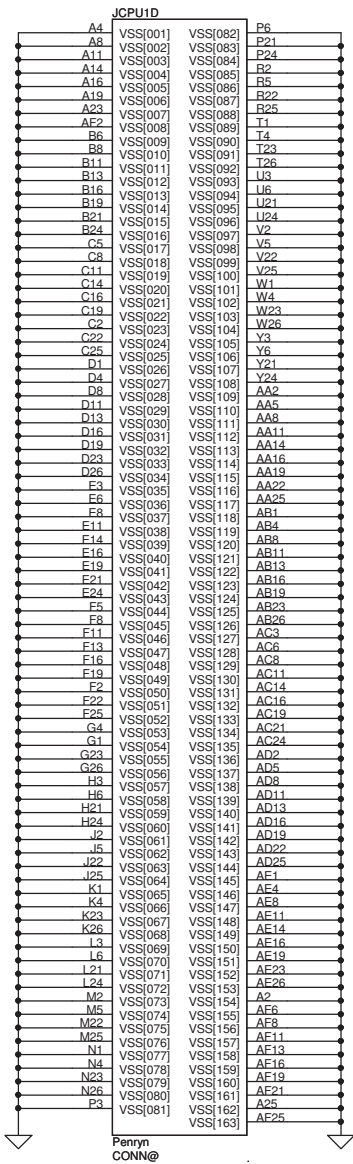
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Penryn (1/3) & FAN	
Size B	Document Number
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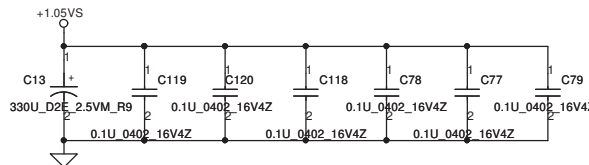
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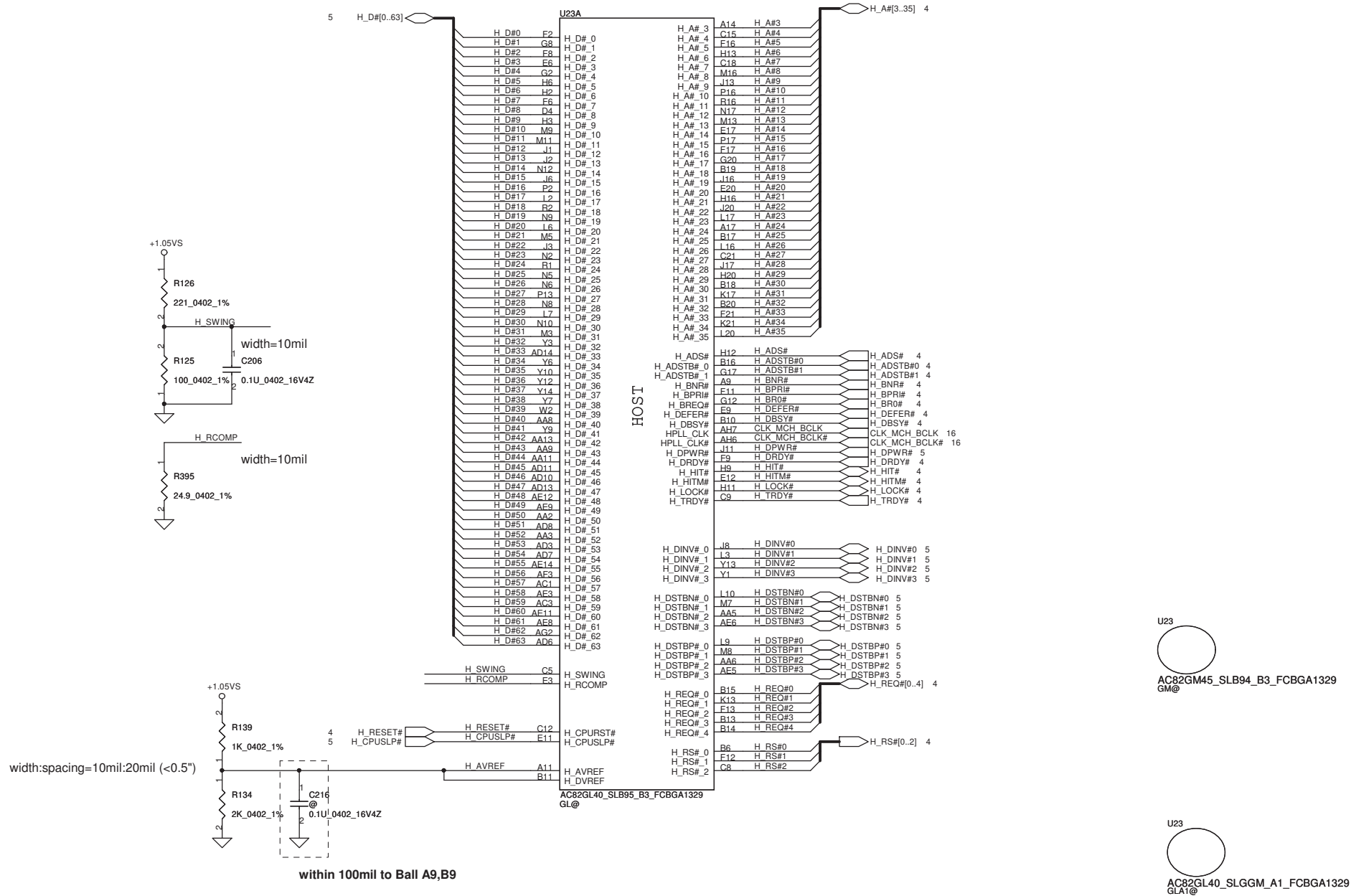
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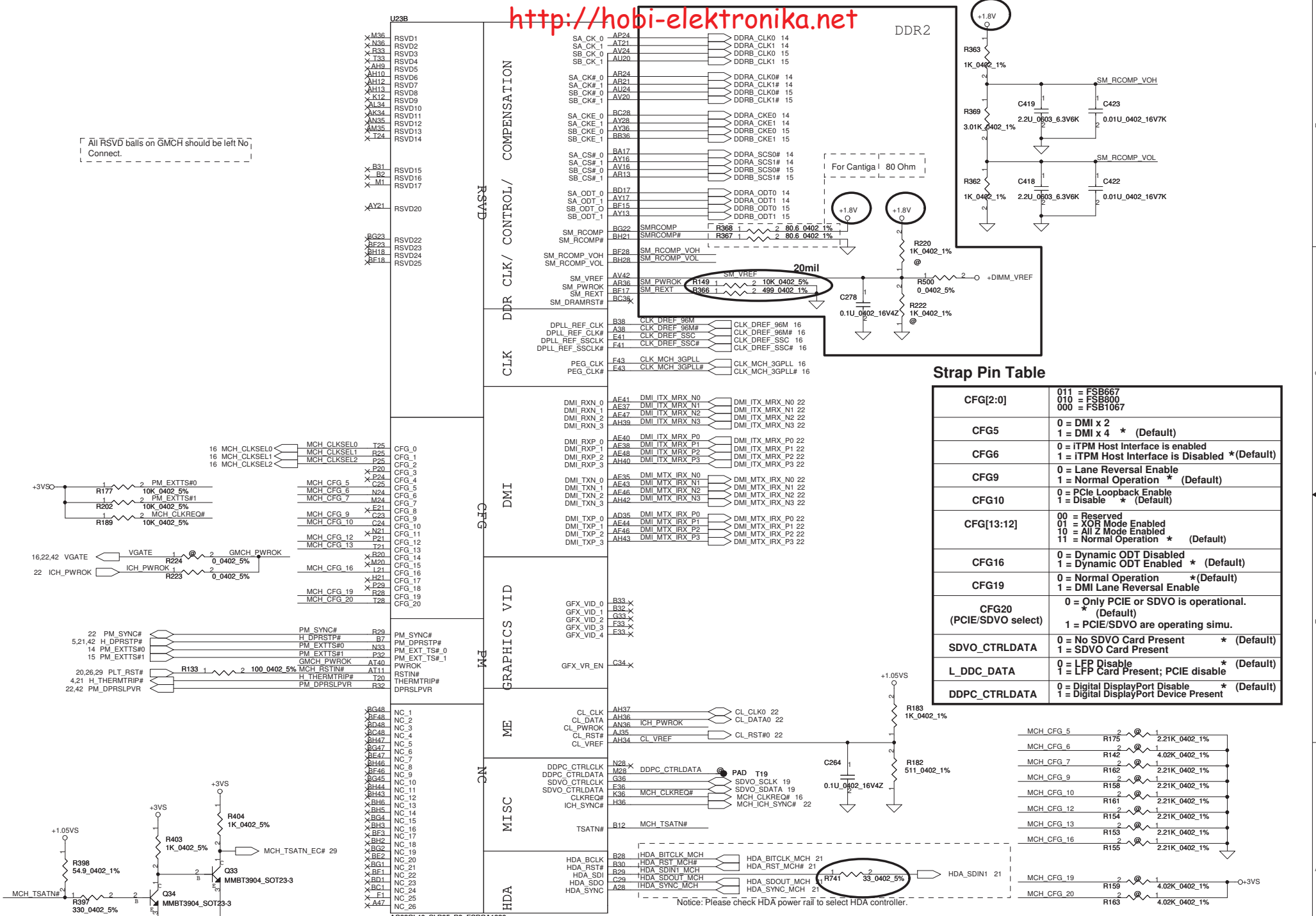
+CPU-CORE Decoupling	C,uF	ESR, mohm	ESL,nH
SPCAP,Polymer	4X330uF	6m ohm/4	1.8nH/6
MLCC 0805 X5R	32X22uF	3m ohm/32	0.6nH/32
	32X10uF	3m ohm/32	0.6nH/32

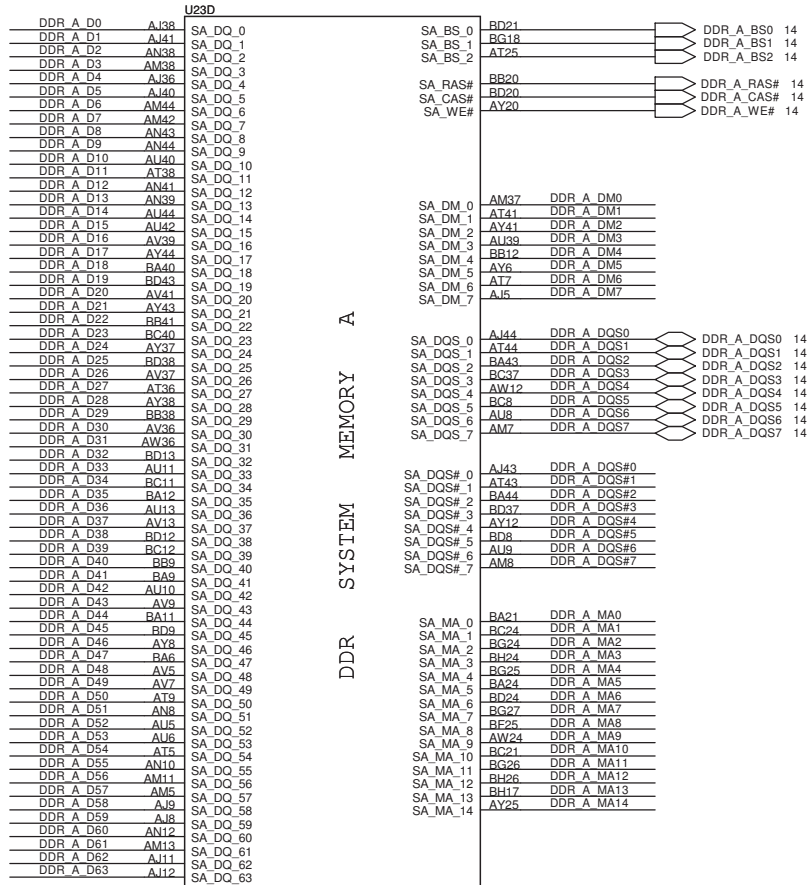


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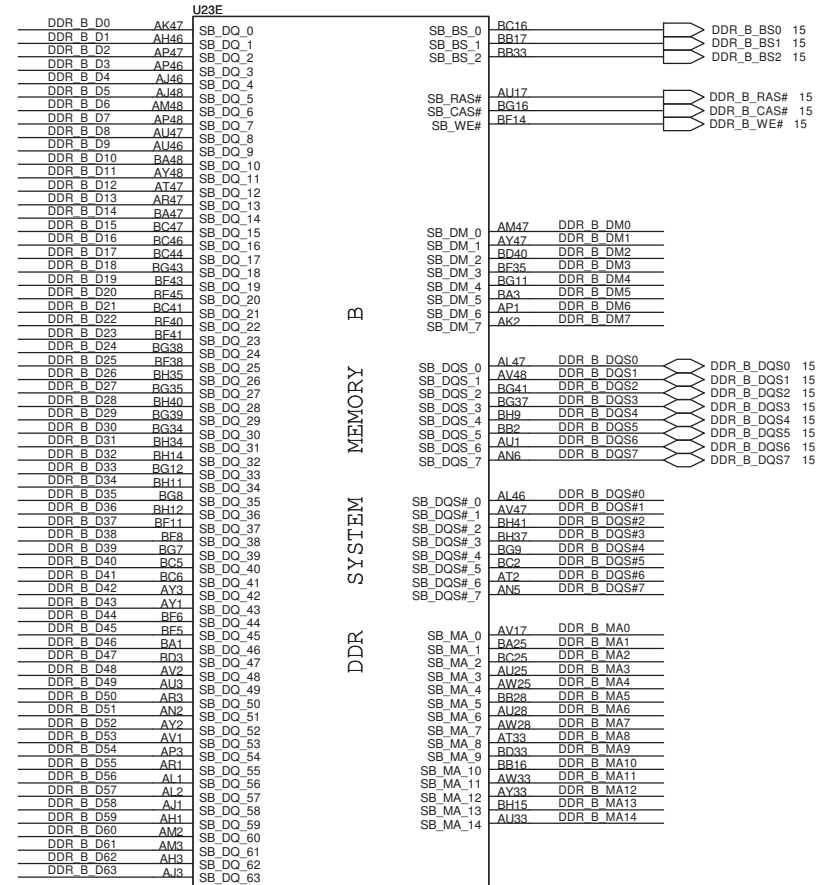


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AC82GL40_SLB95_B3_FCBGA1329
GL@



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Intel Cantiga TMD5 Pin Definition

TMD5_B_CLK TMD5_B_CLK#	PEG_TXP_3 PEG_TXN_3
TMD5_B_DATA0 TMD5_B_DATA0#	PEG_TXP_2 PEG_TXN_2
TMD5_B_DATA1 TMD5_B_DATA1#	PEG_TXP_1 PEG_TXN_1
TMD5_B_DATA2 TMD5_B_DATA2#	PEG_TXP_0 PEG_TXN_0
TMD5_B_HPD#	PEG_RXP_3

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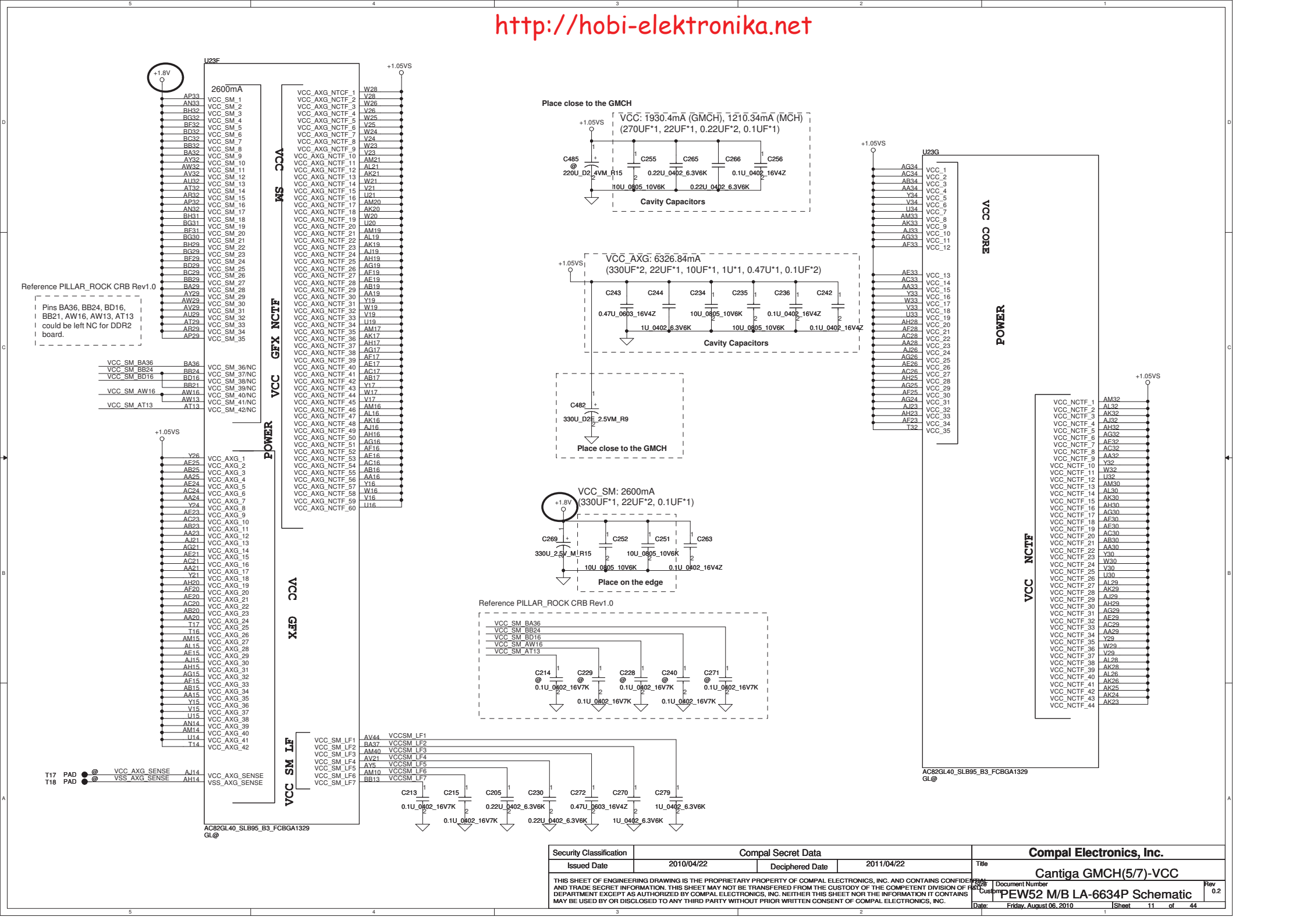
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Cantiga GMCH(4/7)-VGA/LVDS/TV			
Size	Document Number	Rev	
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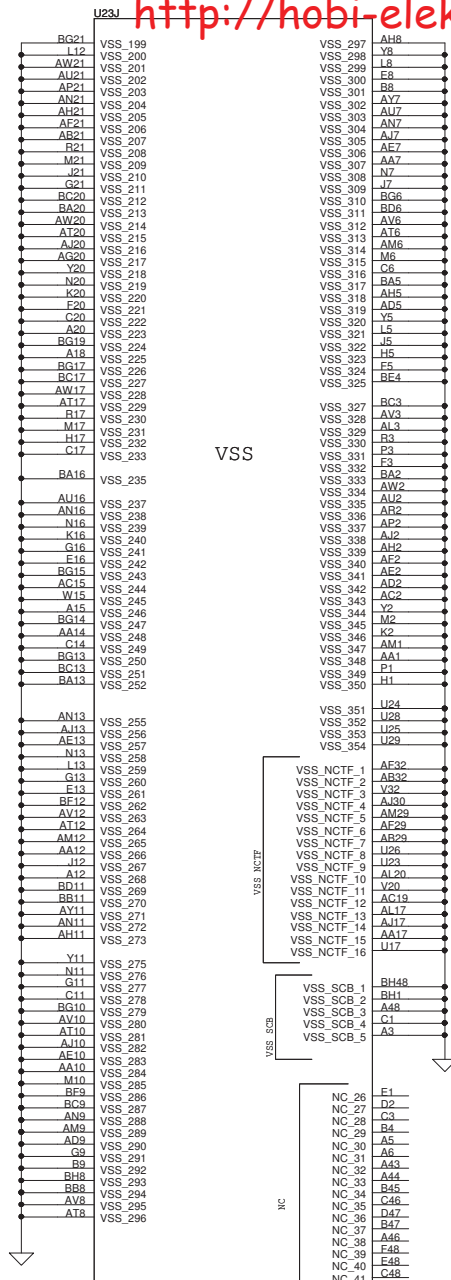
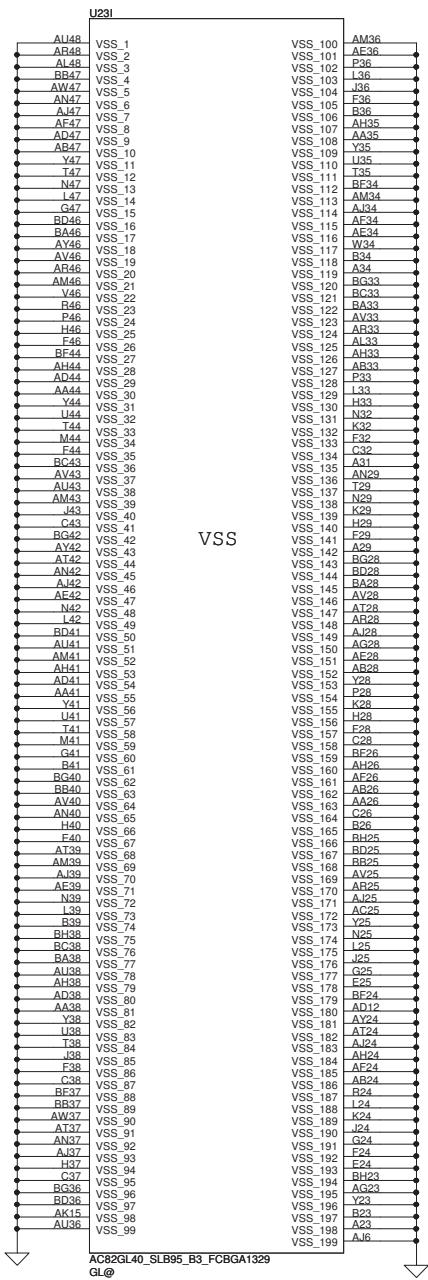
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Intel Cantiga TMDs Pin Definition

TMDs_B_CLK	PEG_TXP_3
TMDs_B_CLK#	PEG_TXN_3
TMDs_B_DATA0	PEG_TXP_2
TMDs_B_DATA0#	PEG_TXN_2
TMDs_B_DATA1	PEG_TXP_1
TMDs_B_DATA1#	PEG_TXN_1
TMDs_B_DATA2	PEG_TXP_0
TMDs_B_DATA2#	PEG_TXN_0
TMDs_B_HPDP#	PEG_RXP_3

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				Customer	
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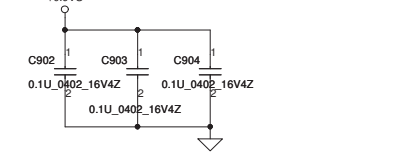
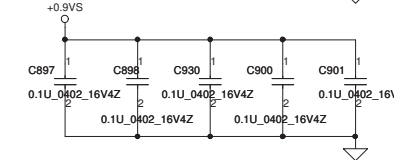
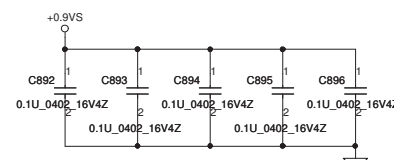
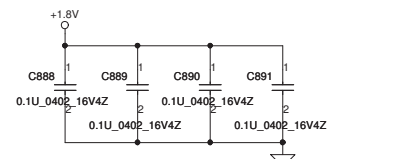
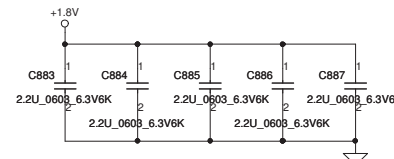
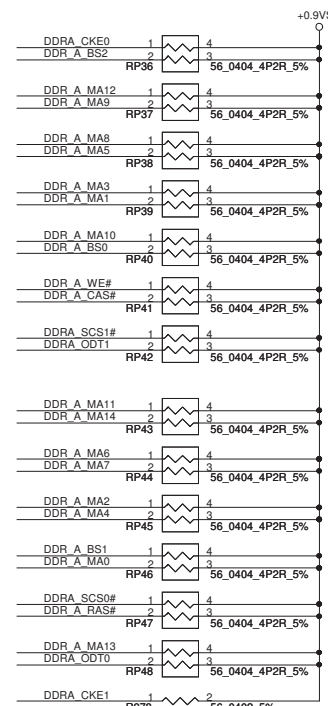
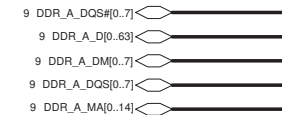
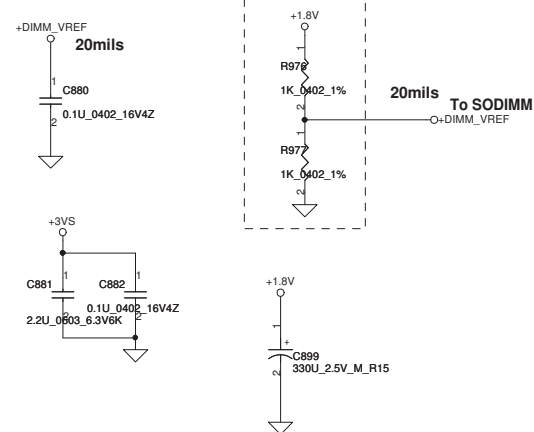
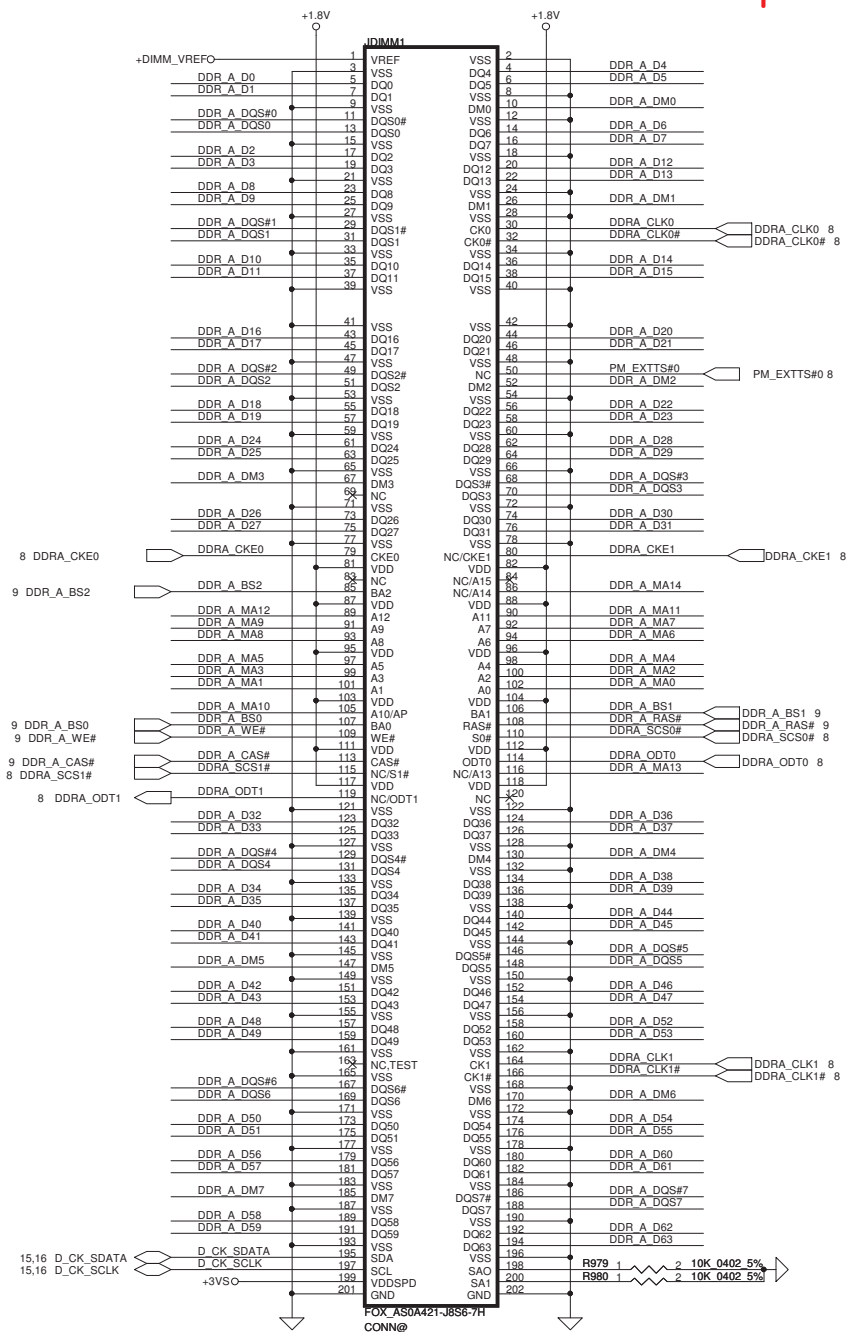
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VSS NCTF

VSS SCB

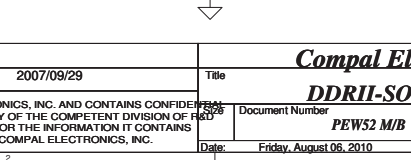
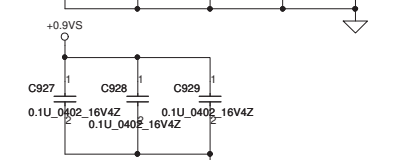
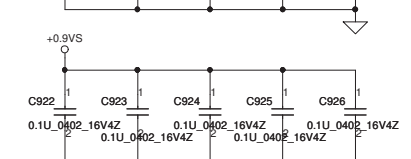
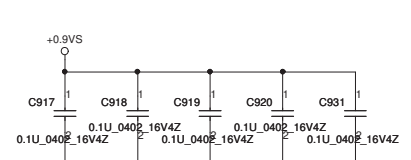
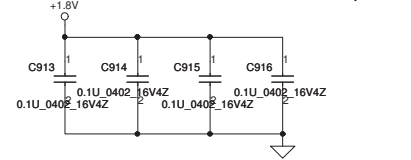
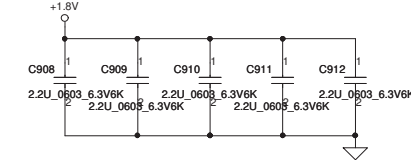
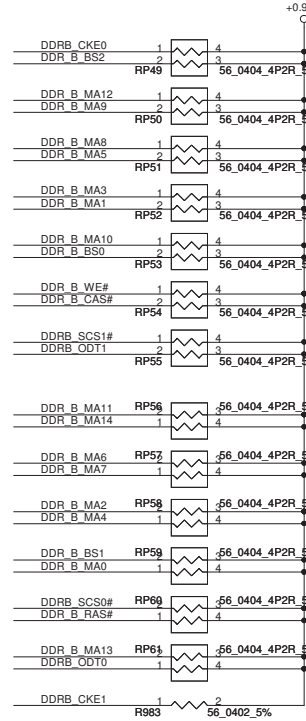
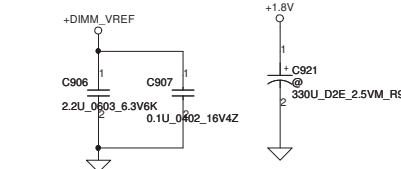
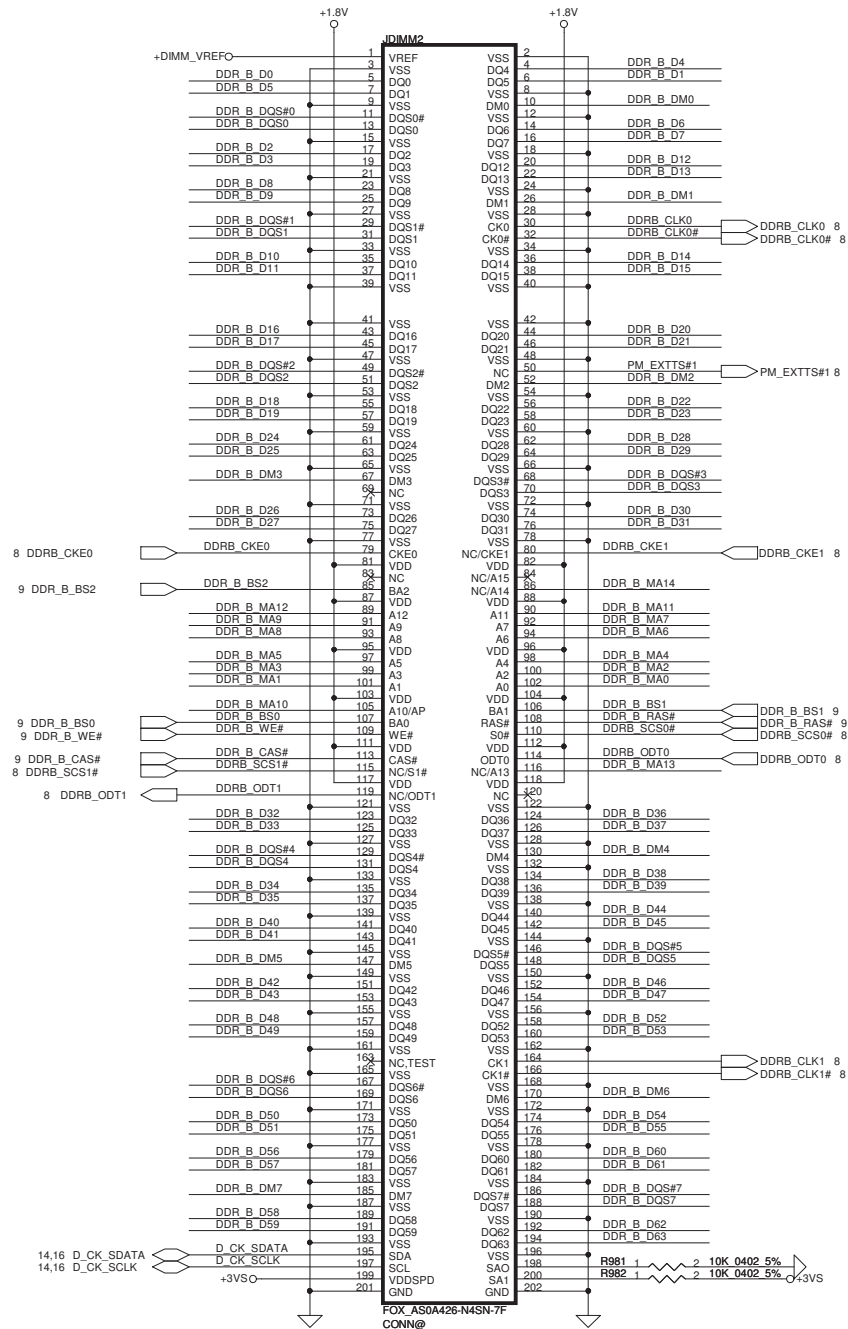
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GL@



DIMM1 STD H:8mm (BOT)

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DIMM2 STD H:4mm (BOT)

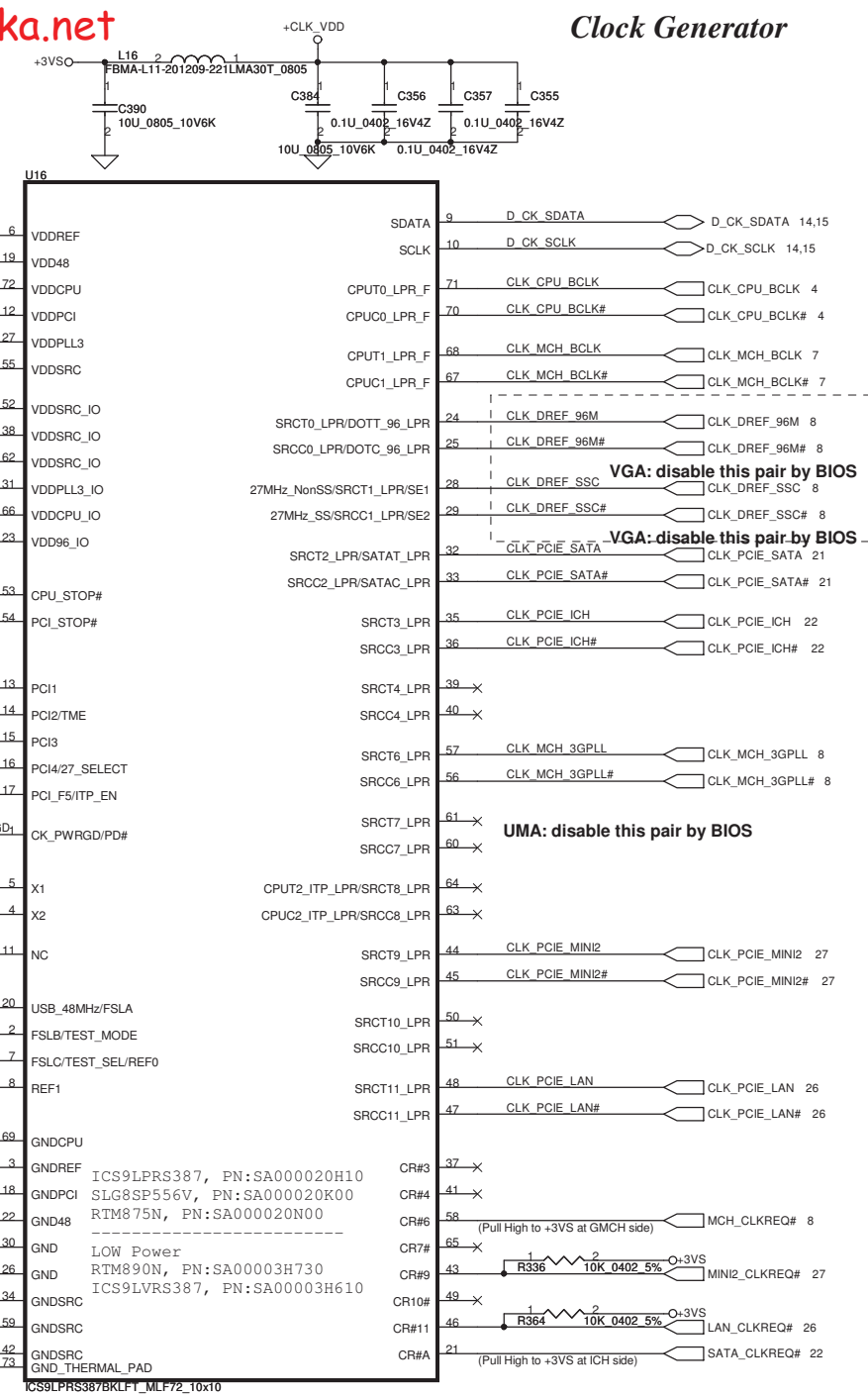
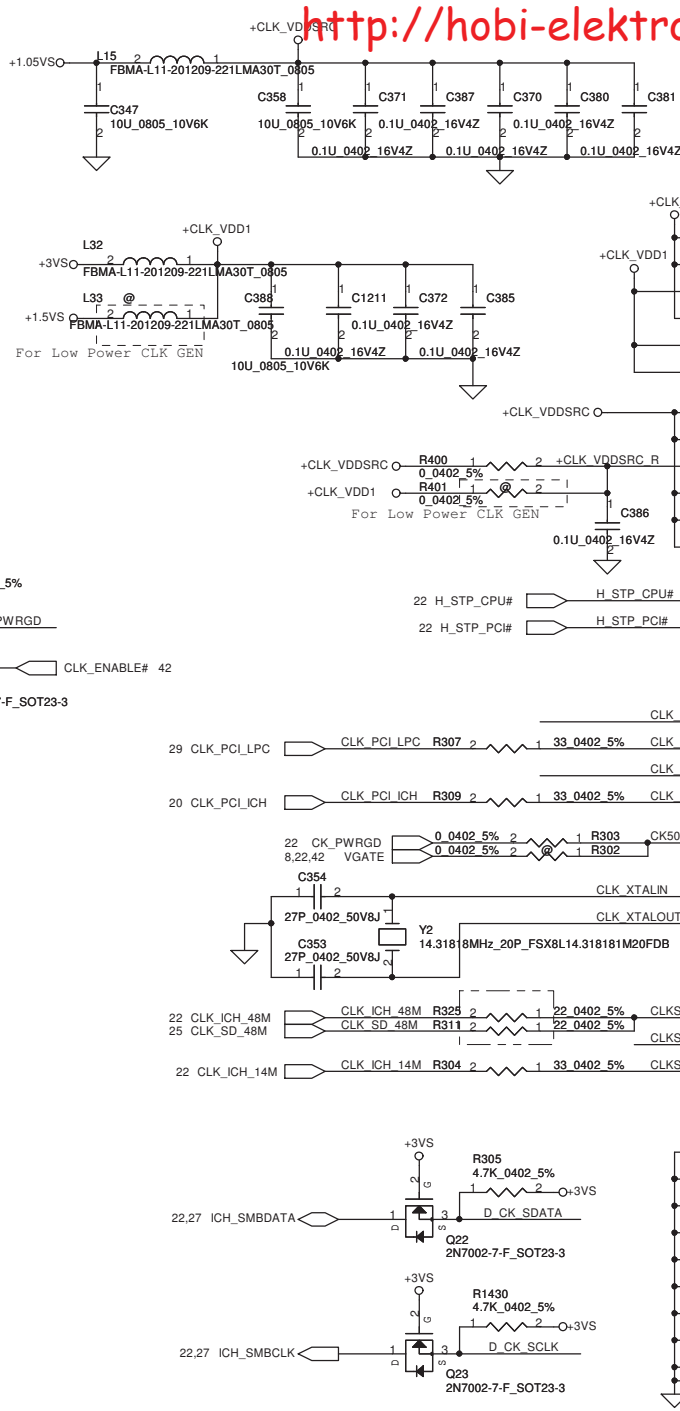
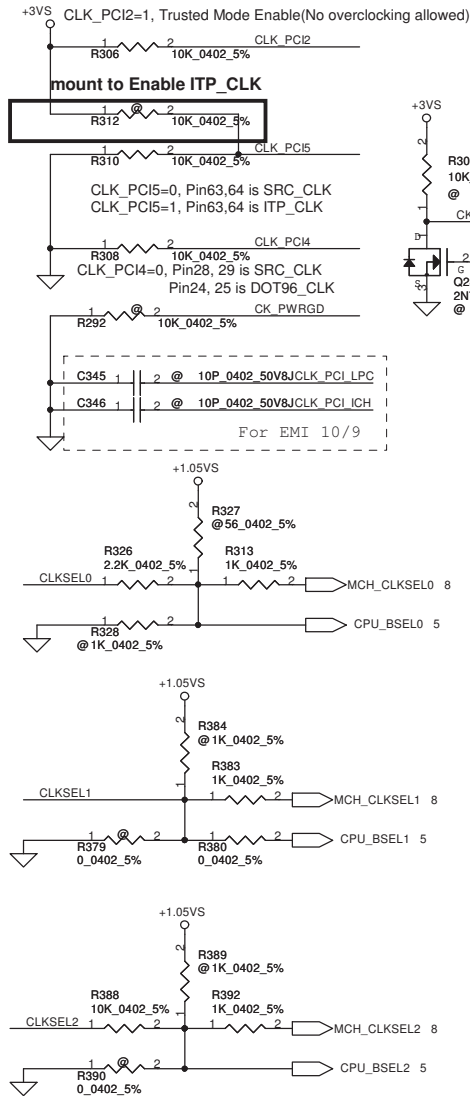
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FSLC CLKSEL2	FSLB CLKSEL1	FSLA CLKSEL0	CPU MHz	SRC MHz	PCI MHz
0	0	0	266	100	33.3
0	1	0	200	100	33.3
0	1	1	166	100	33.3

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	

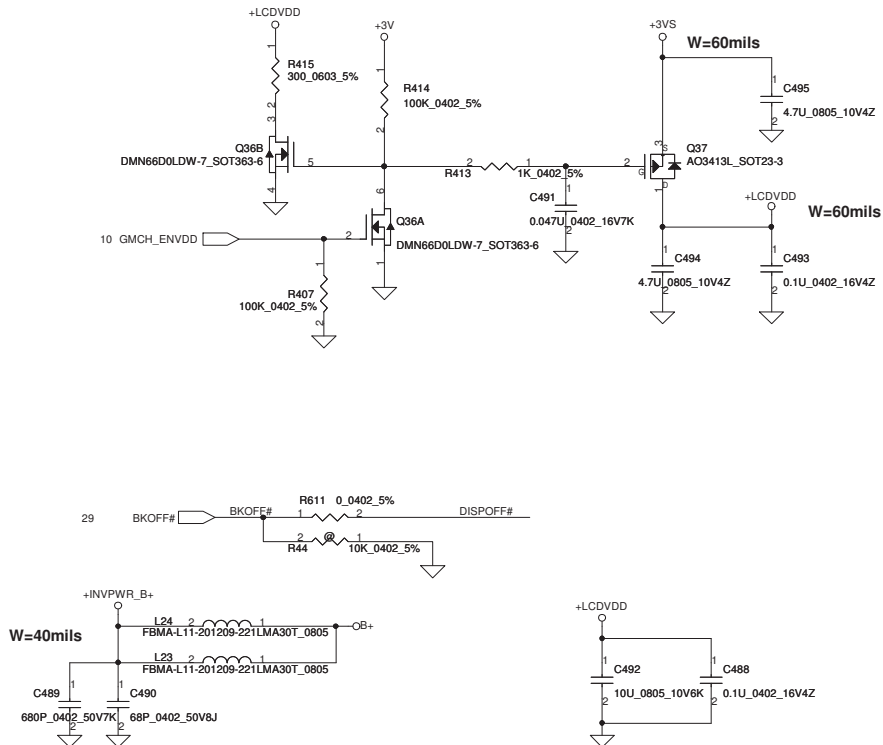
SRC7(VGA_CLK): Discrete VGA[Enable] UMA[Disable]



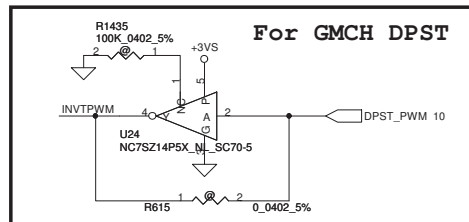
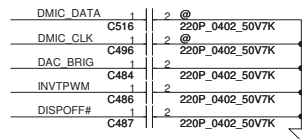
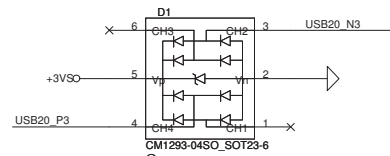
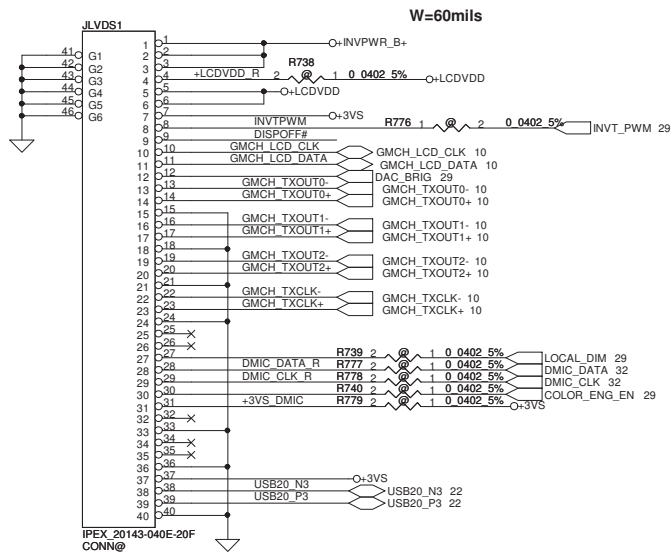
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Size	Document Number	Customer	PEW52 M/B LA-6634P Schematic	Rev	0.2
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LCD POWER CIRCUIT

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LCD/PANEL BD. Conn.



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Date				Friday, August 06, 2010				Sheet			
17				of				44			

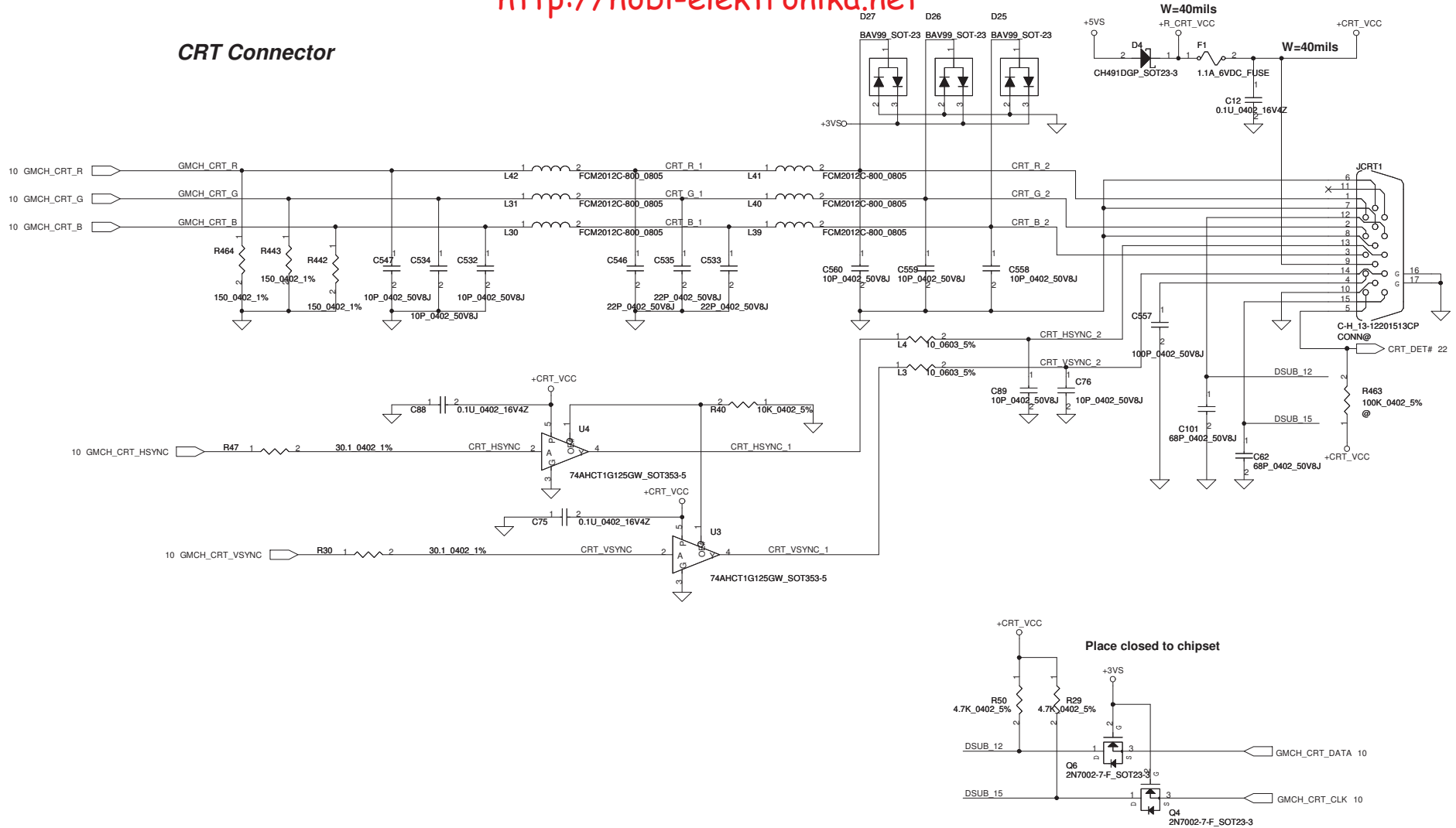
Compal Electronics, Inc.

LVDS Connector

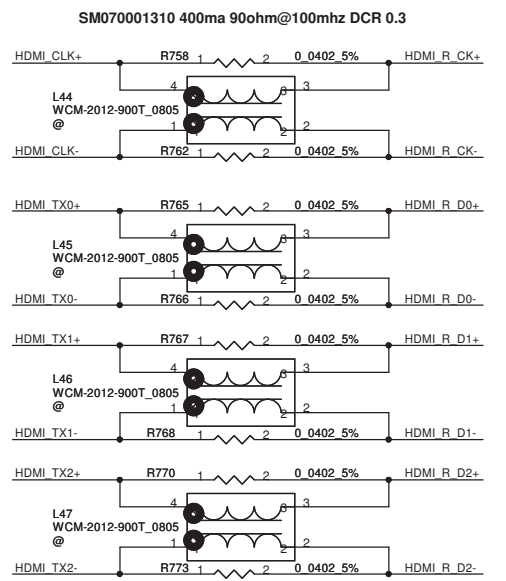
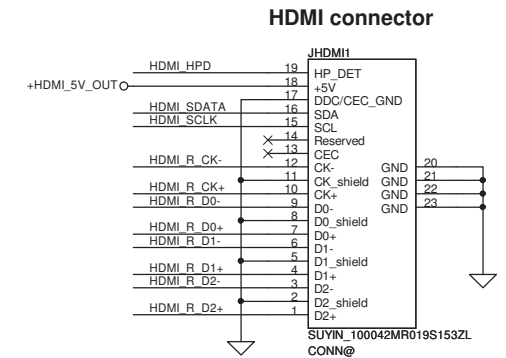
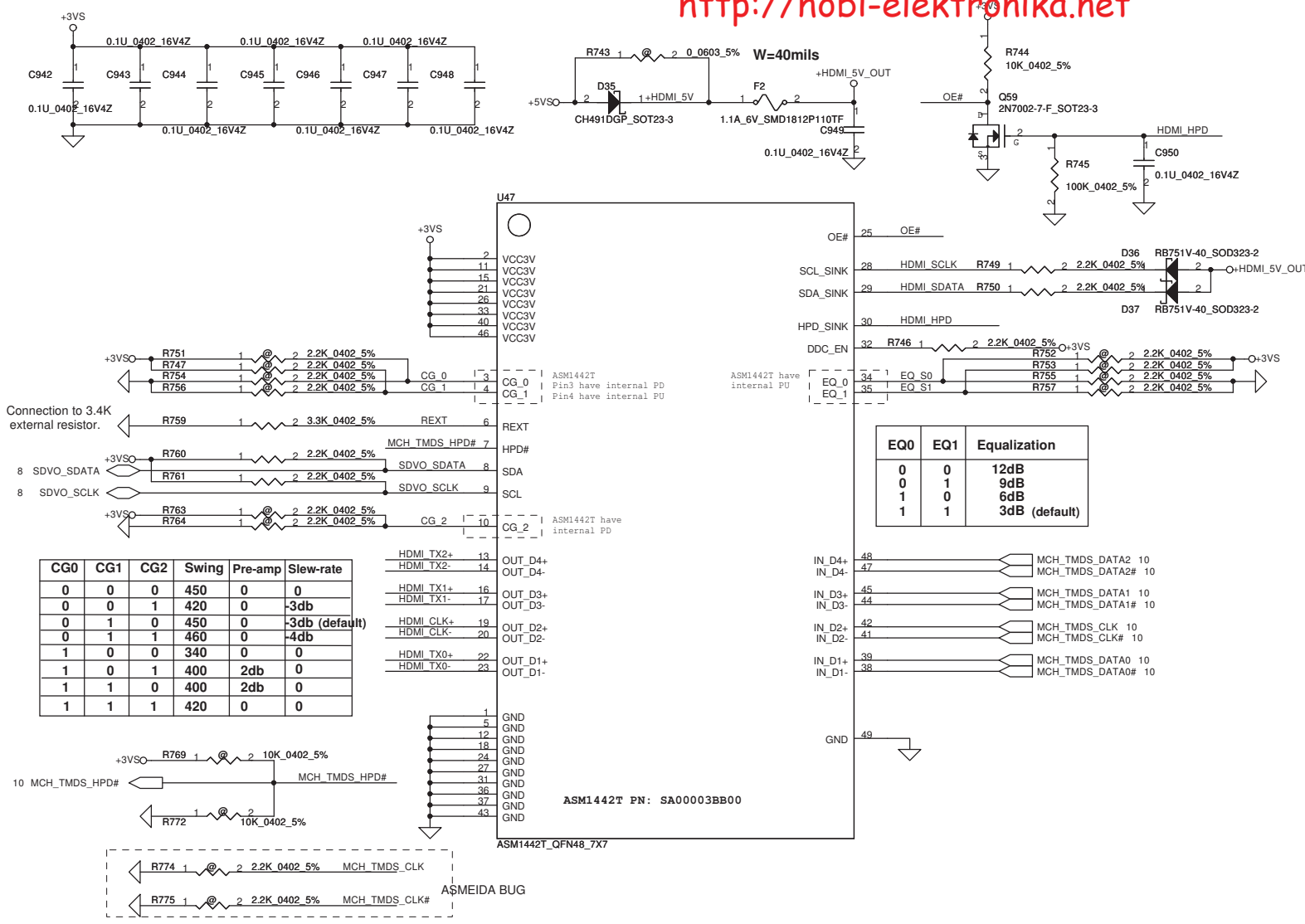
PEW52 M/B LA-6634P Schematic

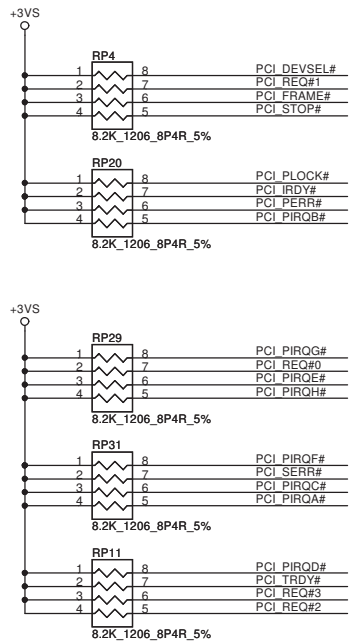
Rev 0.2

CRT Connector

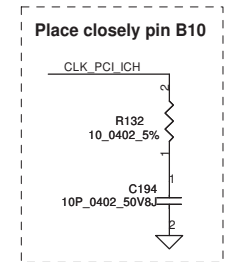
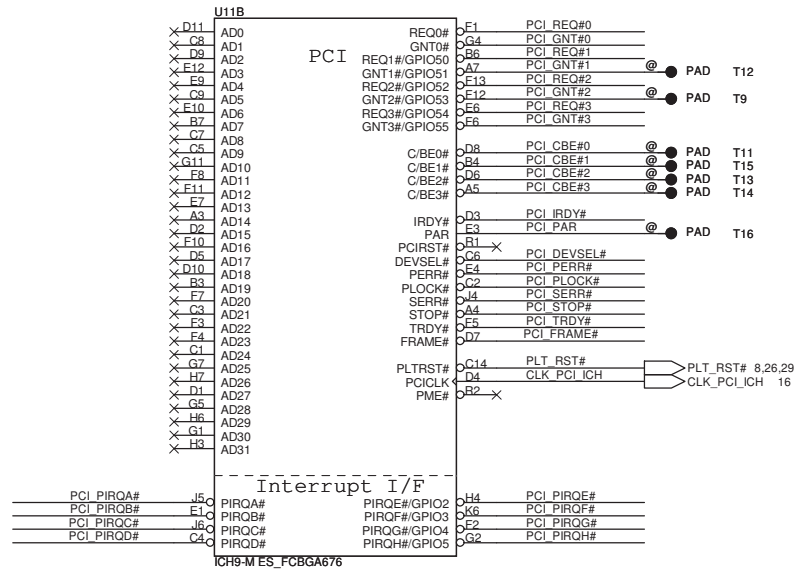


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						Document Number		PEW52 M/B LA-6634P Schematic		Rev	
						Date		Friday, August 06, 2010		Sheet 18 of 44	

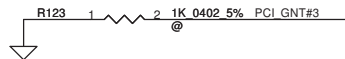




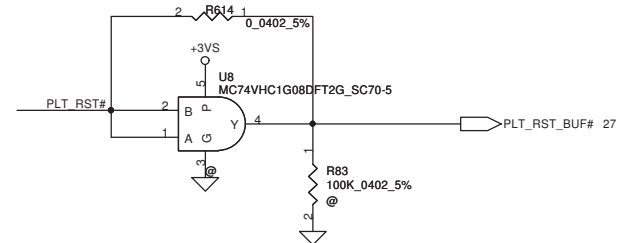
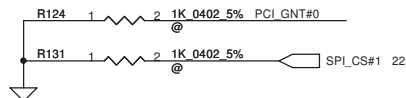
DMI for ESI-compatible operation	
PCI_GNT#1	Low= DMI for ESI-compatible operation High= Default* (Internal pull-up)



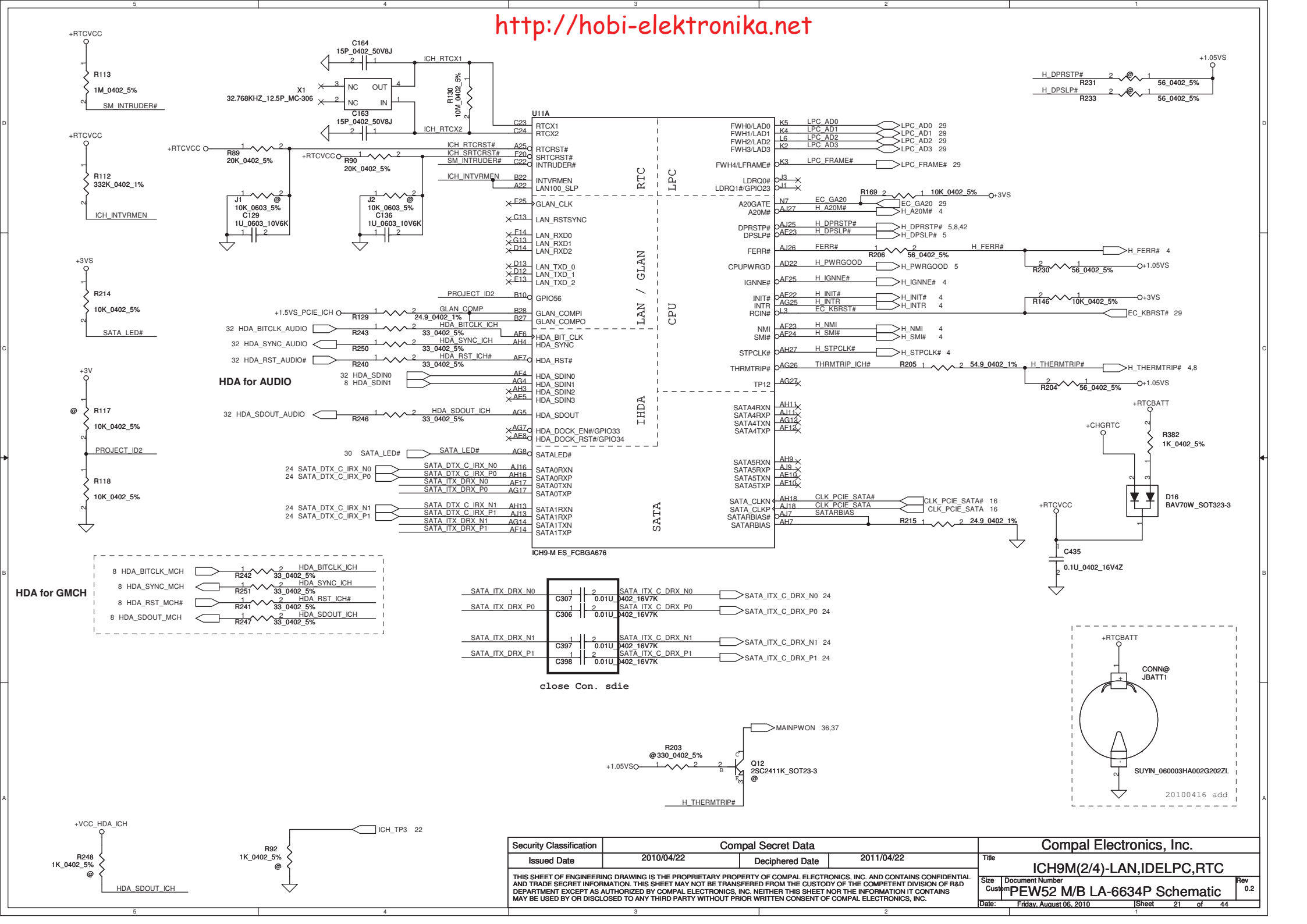
A16 Swap Override Strap	
PCI_GNT#3	Low= A16 swap override Enable High= Default*



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

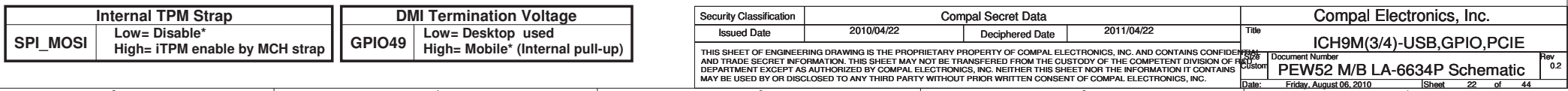


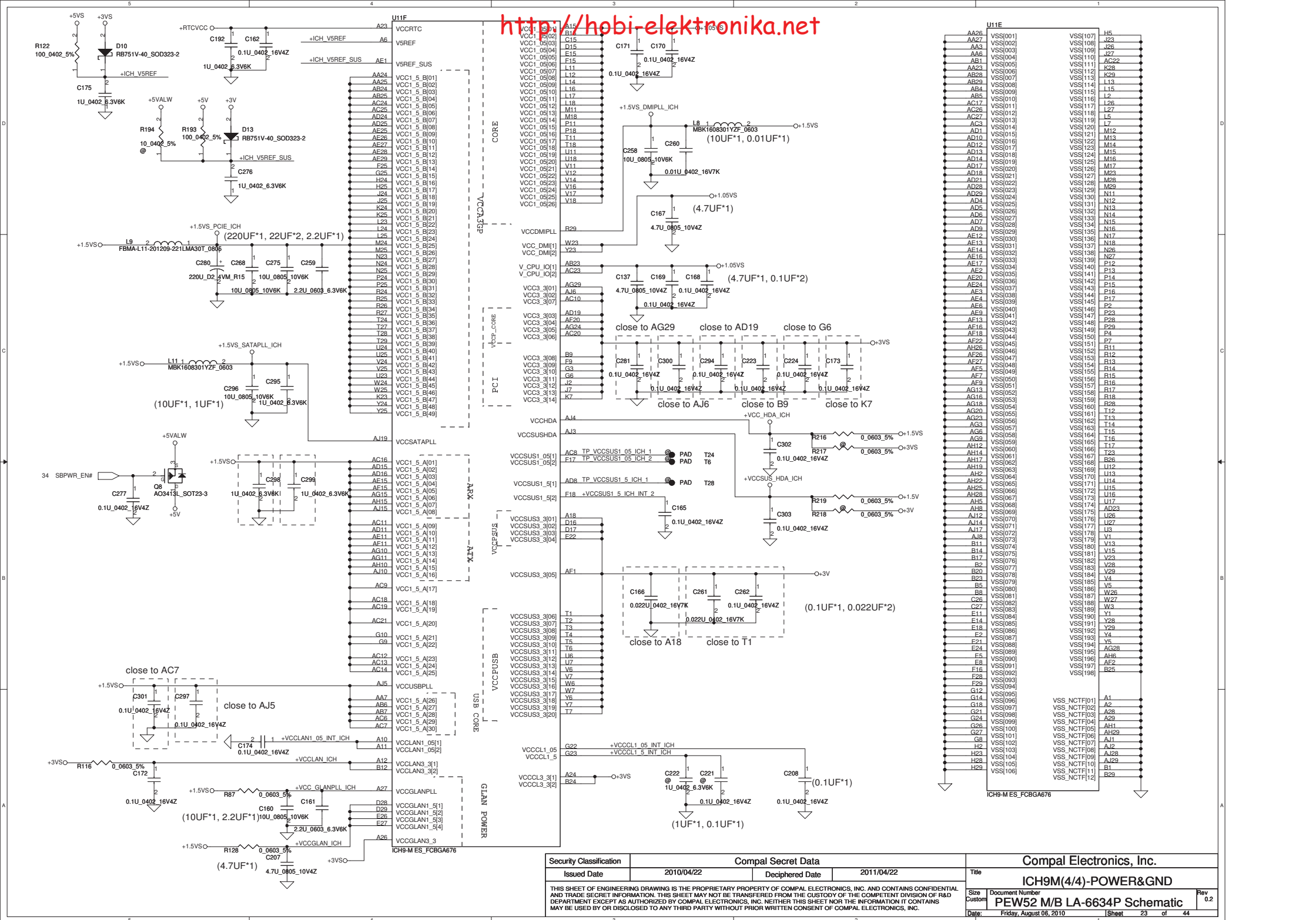
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Size	Document Number	PEW52 M/B LA-6634P Schematic			Rev 0.2
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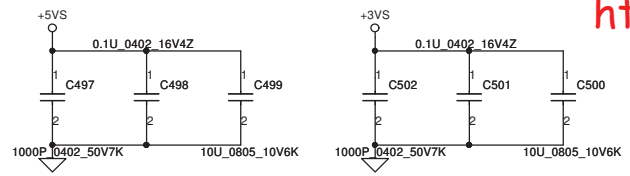


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Size	Document Number	Customer		Rev	0.2
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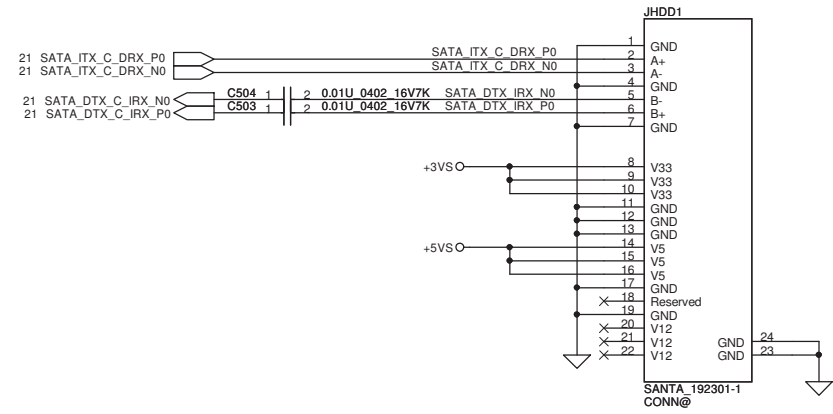
PEW52 M/B LA-6634P Schematic



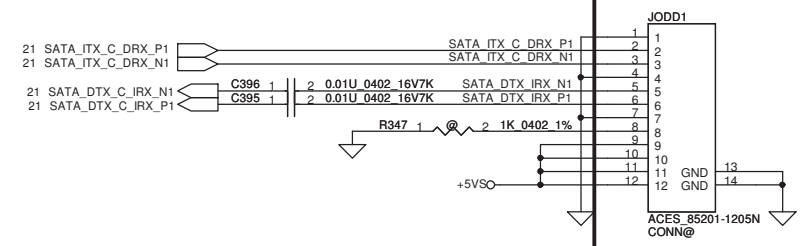




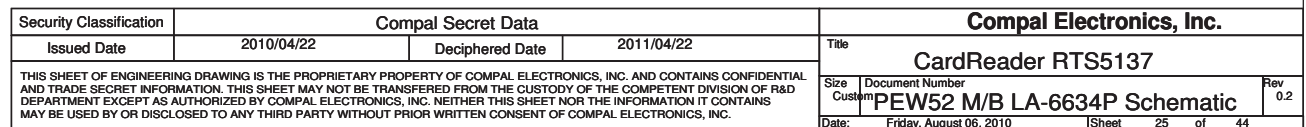
SATA HDD Conn.

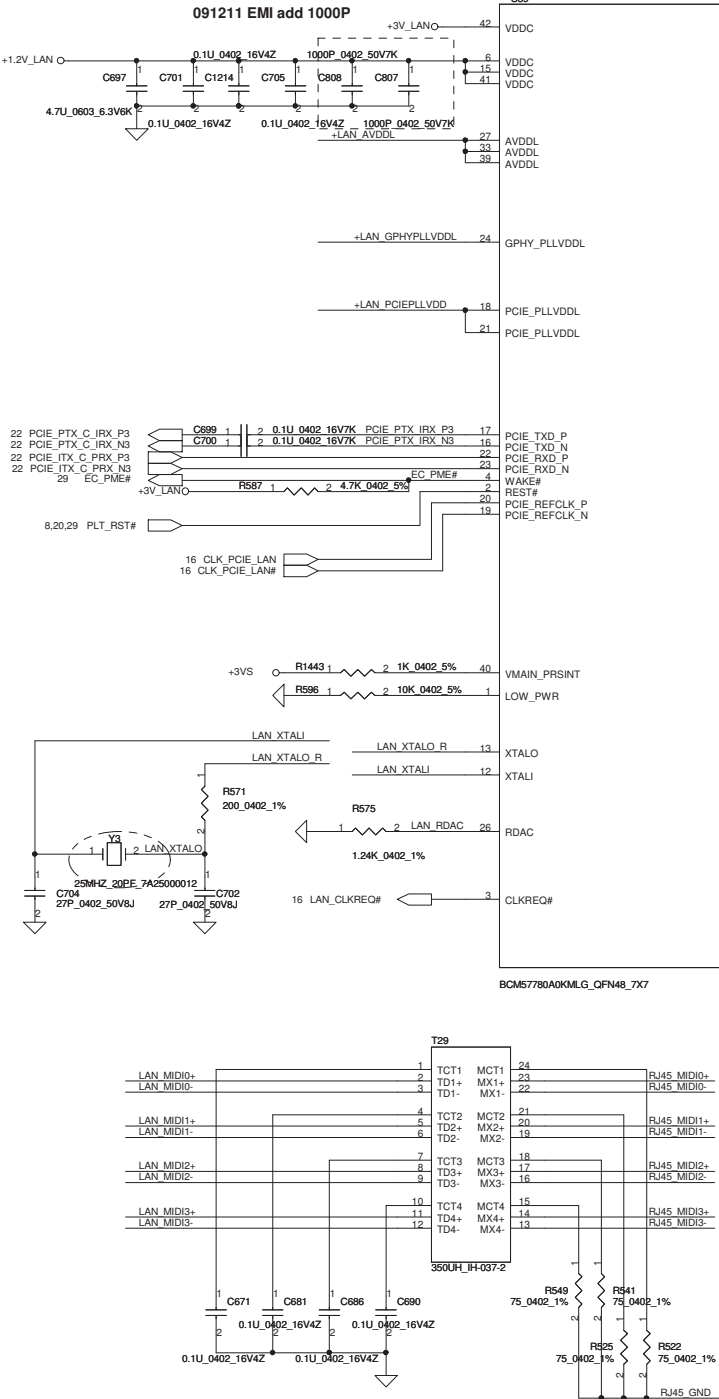


SATA ODD Conn. LS-6583

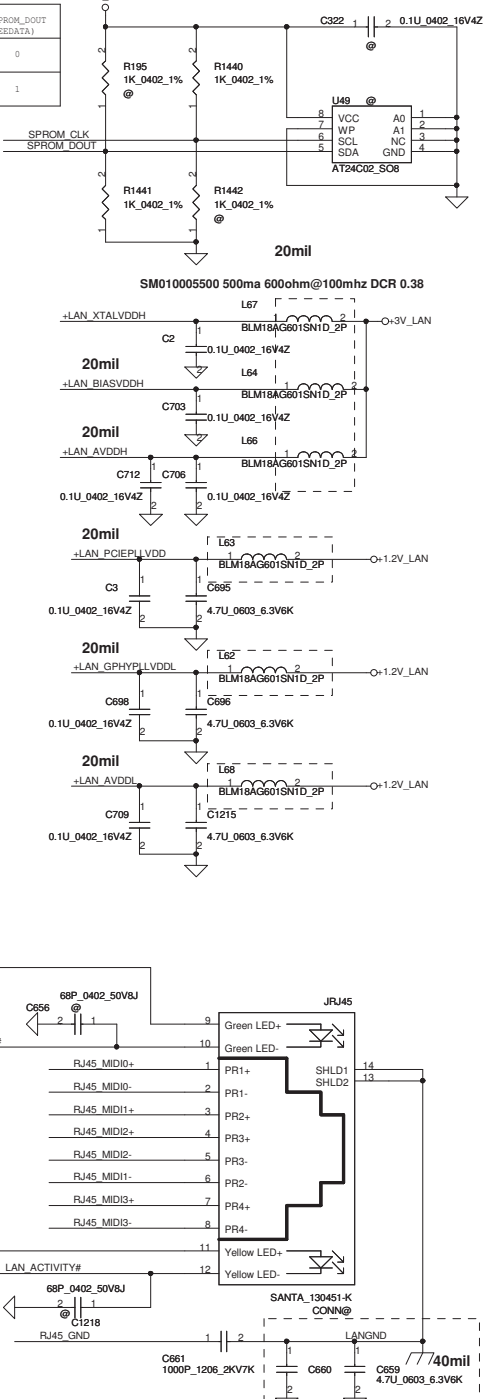


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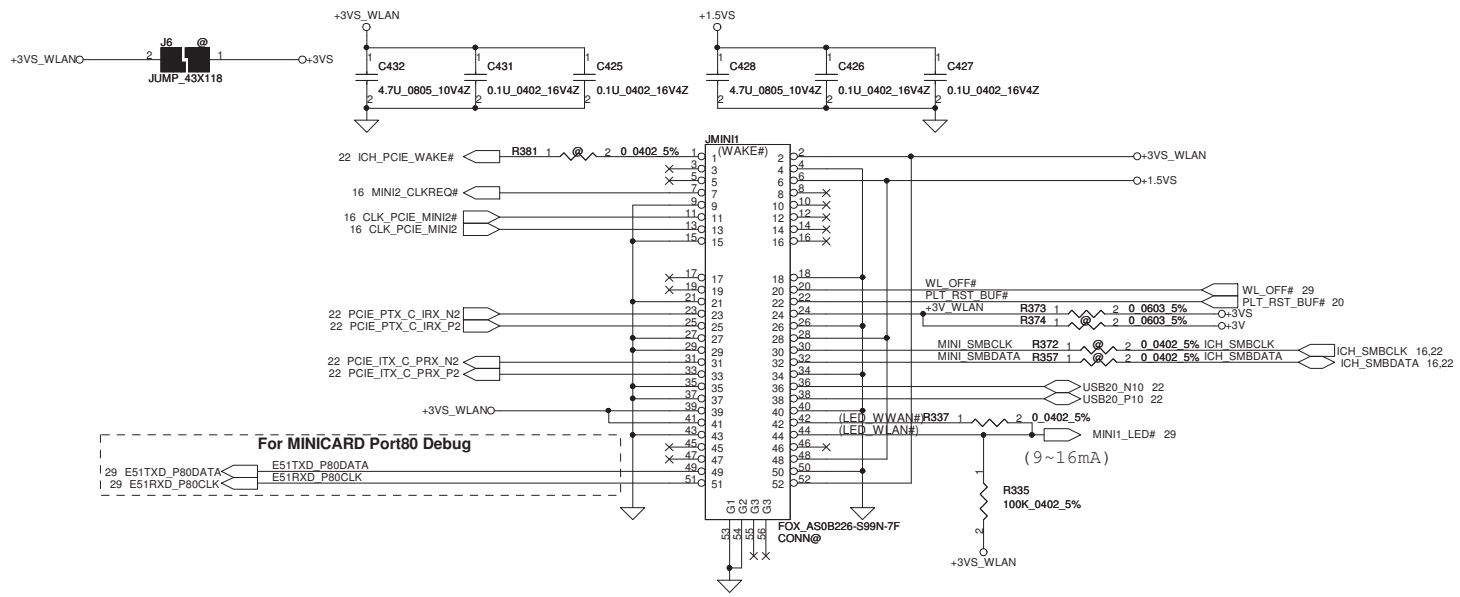


	SPROM_CLK (ECLK)	SPROM_DOUT (EEDATA)
On chip	1	0
AT24C02	1	1

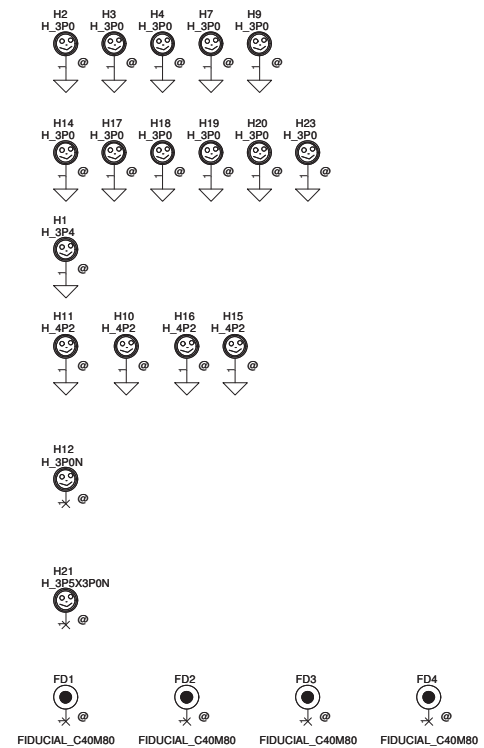


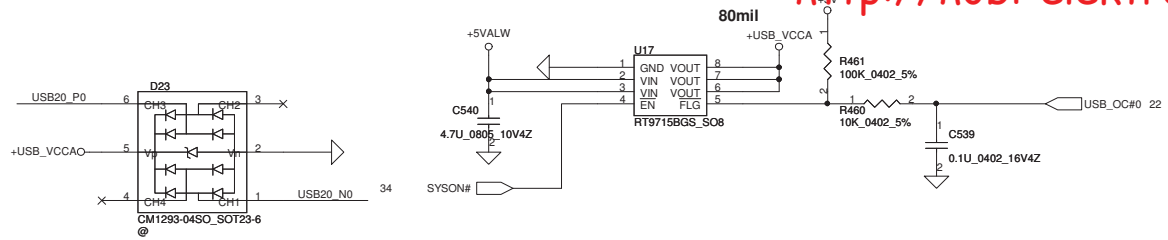
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Customer	Document Number	Revision		Rev		
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Date:	Issued:	By:	Sheet	26 of 44		

For Wireless LAN

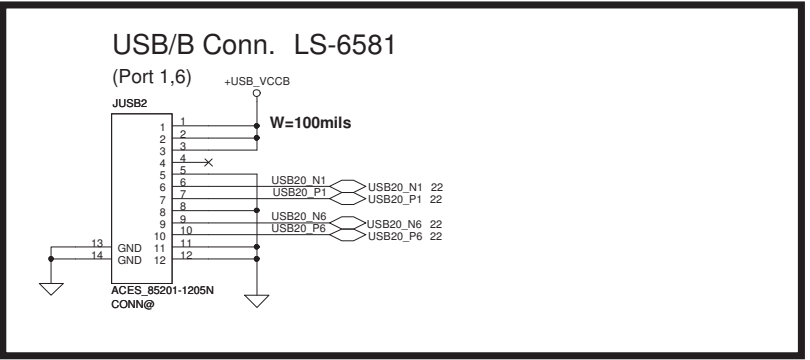
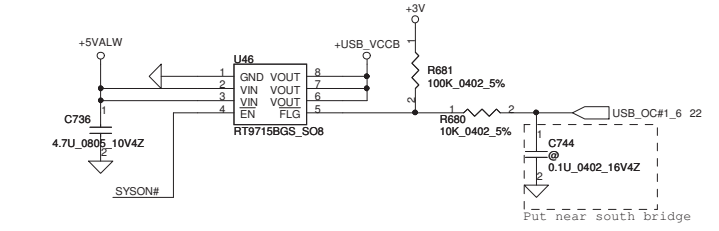
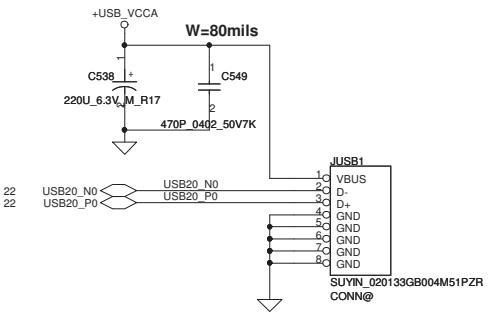


Mini Card Power Rating			
Power	Primary Power (mA)		Auxiliary Power (mA)
	Peak	Normal	Normal
+3VS	1000	750	
+3V	330	250	250 (wake enable)
+1.5VS	500	375	5 (Not wake enable)

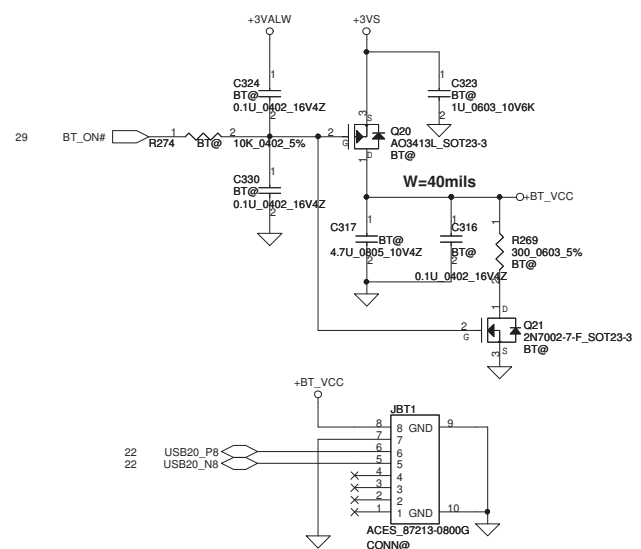




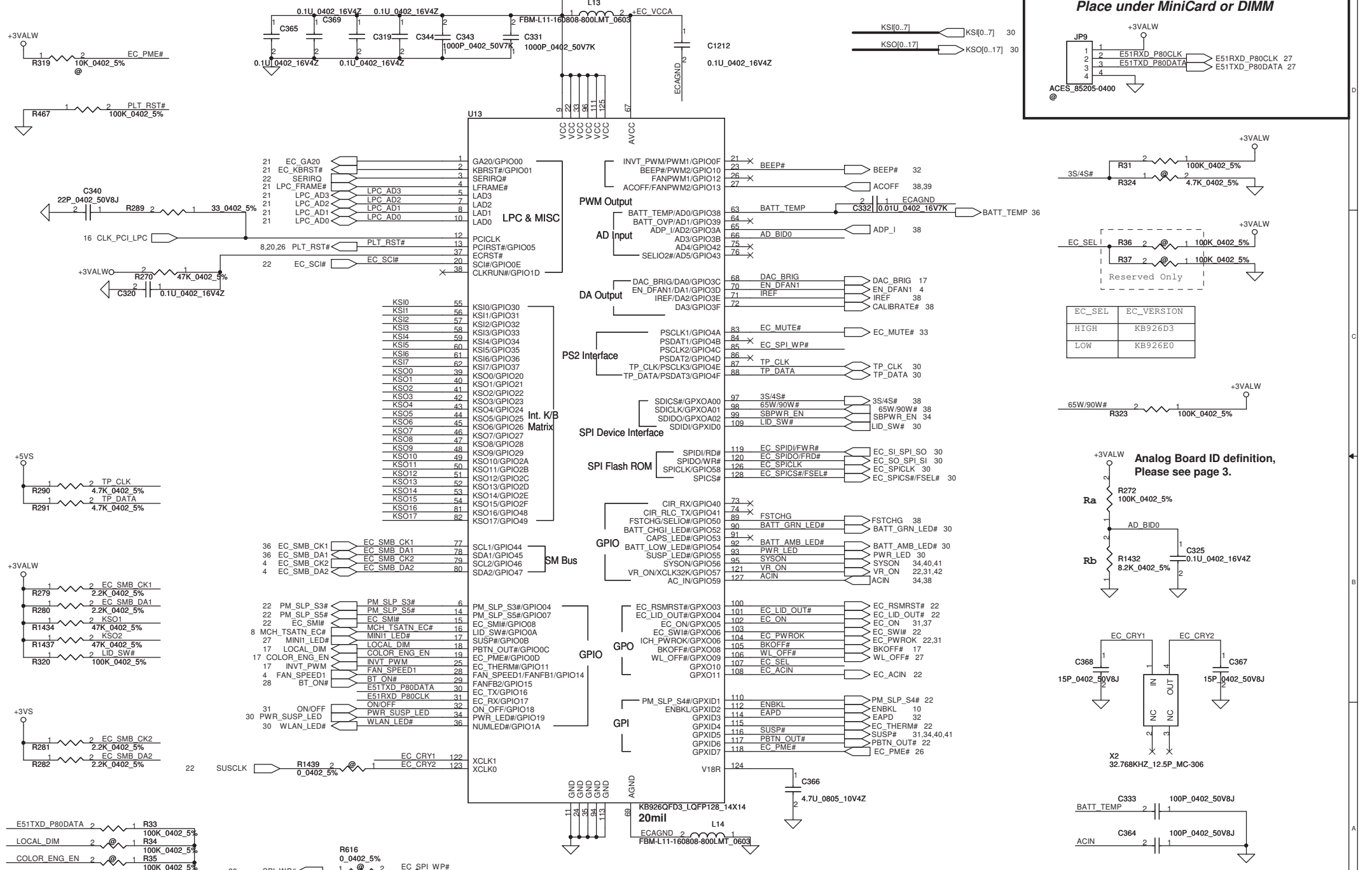
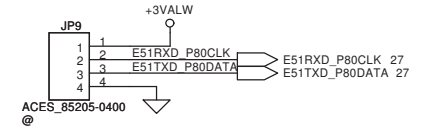
USB Conn.
(Port 0)



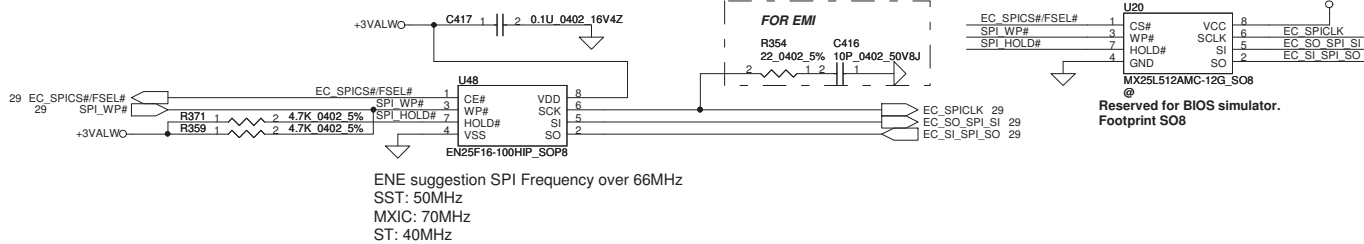
Bluetooth Conn.



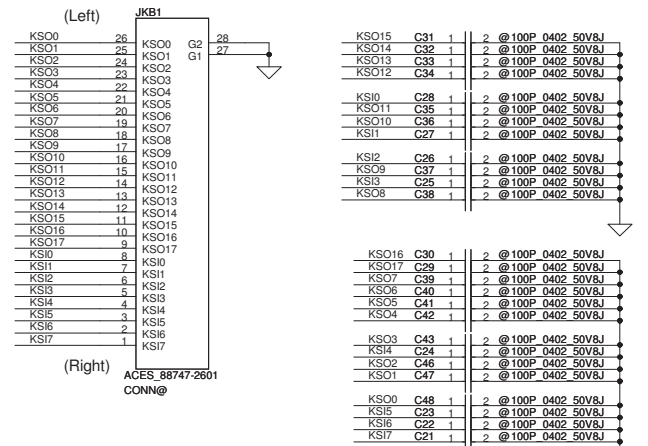
For EC Tools
Place under MiniCard or DIMM



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Size	Document Number	Rev		Date	
B	PEW52 M/B LA-6634P Schematic	0.2		Friday, August 06, 2010	
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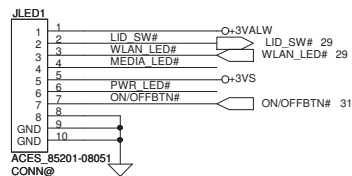


INT_KBD Conn.

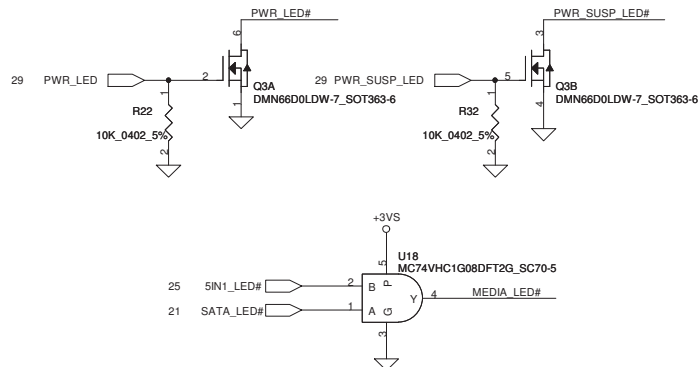
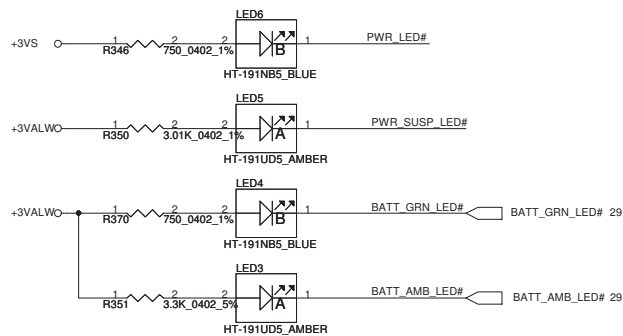
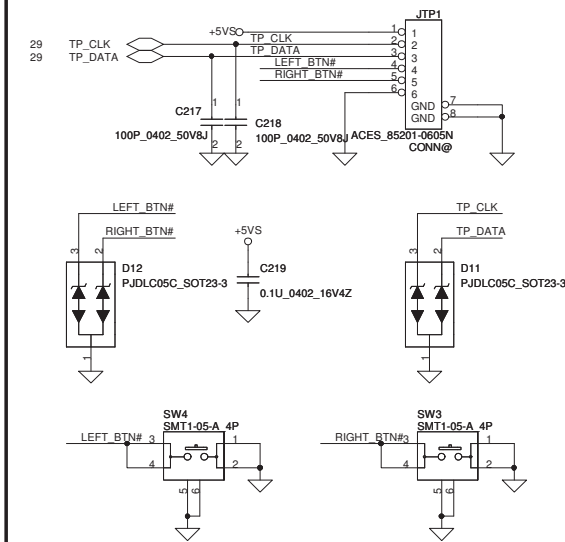


LS-6582

Power/B



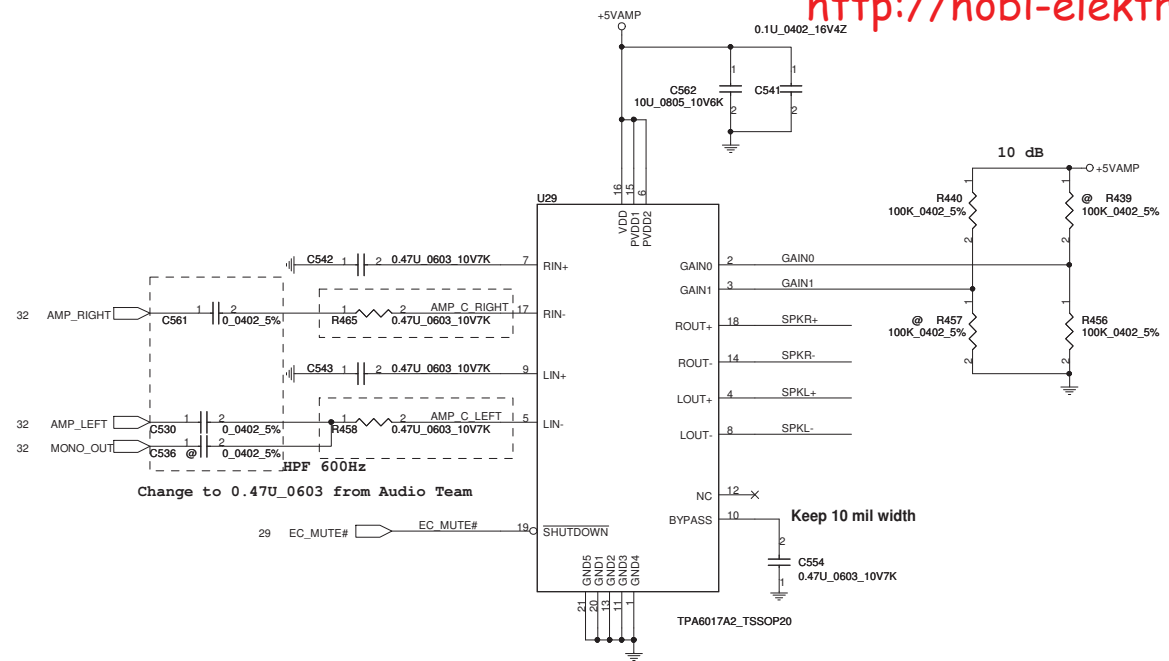
To TP/B Conn.



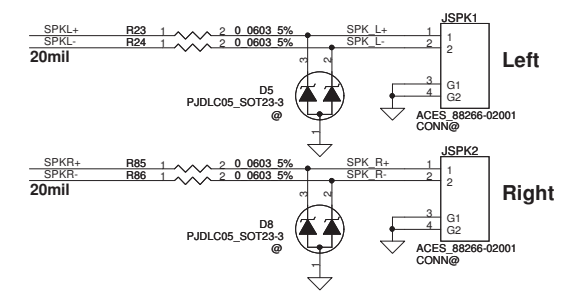
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2011/04/22				2011/04/22				Title			
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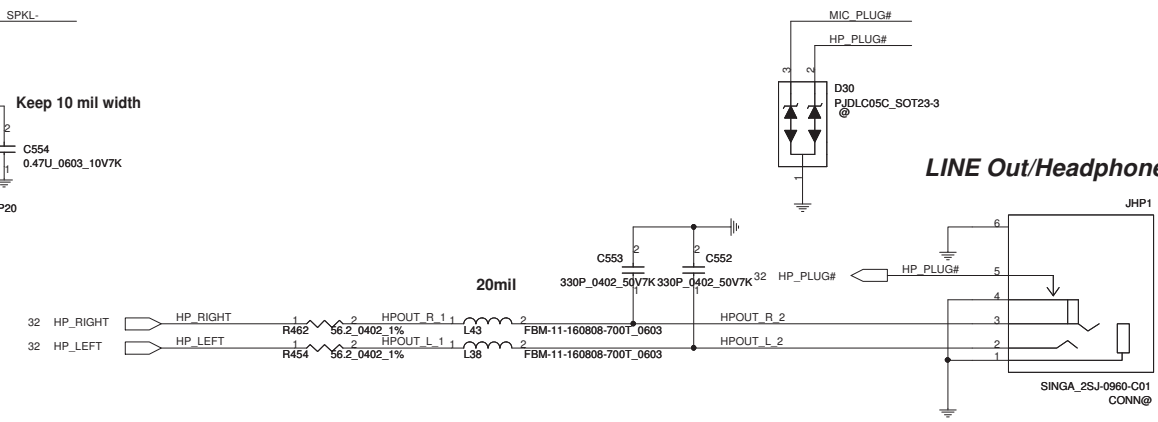
A	B	C	D	E	F	G	H
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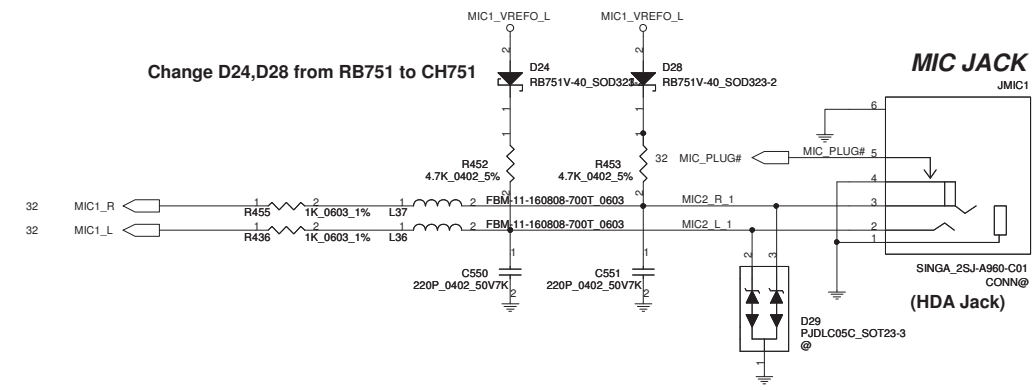
Int. Speaker Conn.



LINE Out/Headphone Out

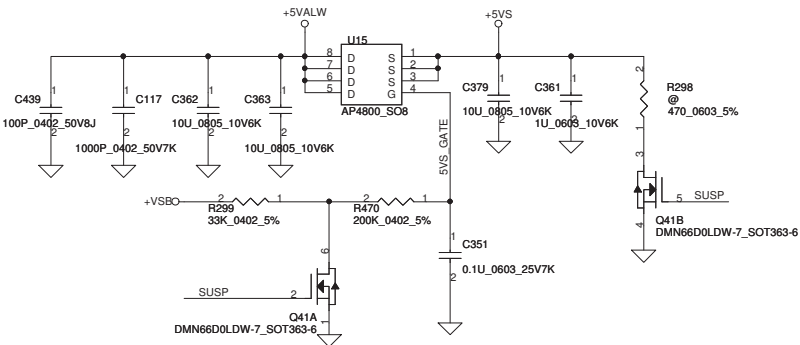


Change D24,D28 from RB751 to CH751

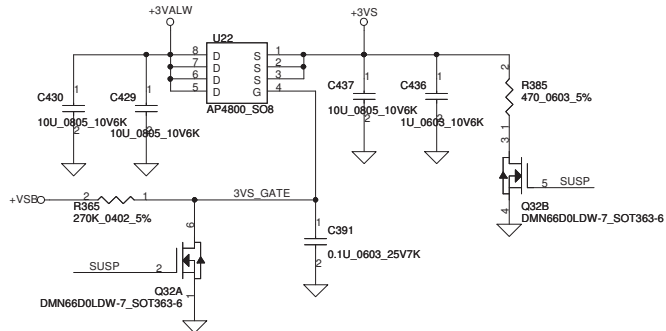


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								PEW52 M/B LA-6634P Schematic								Date: Friday, August 06, 2010		Sheet 33 of 44	

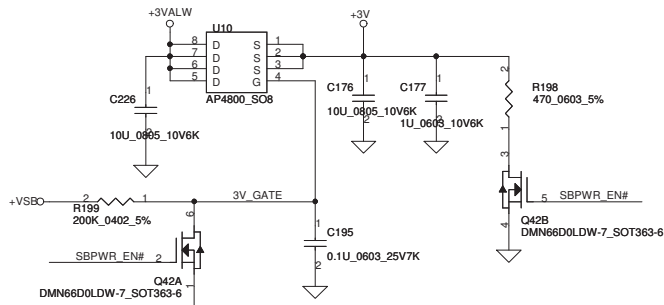
+5VALW TO +5VS



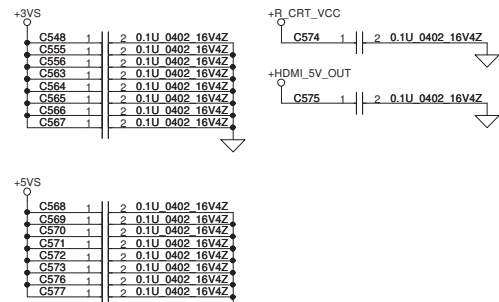
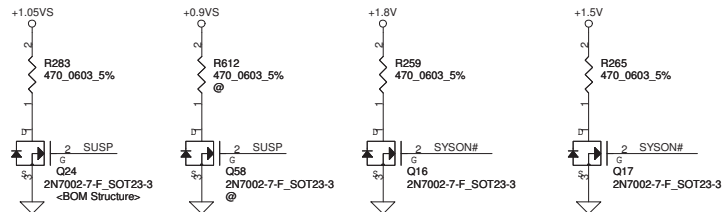
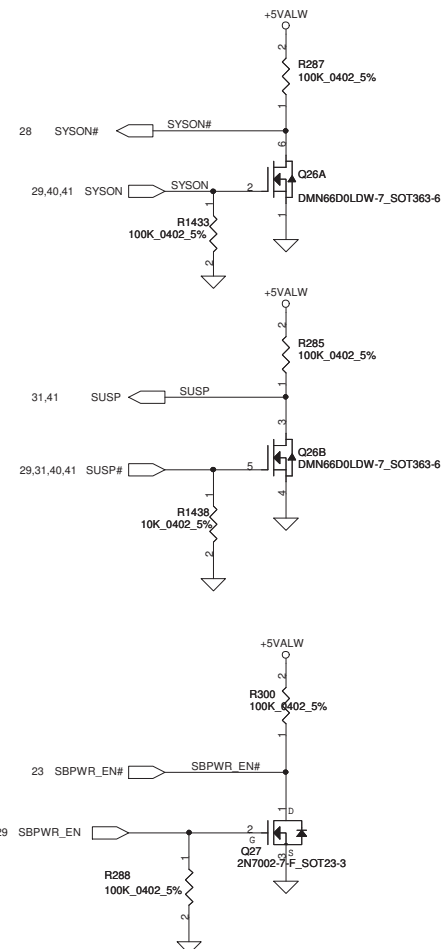
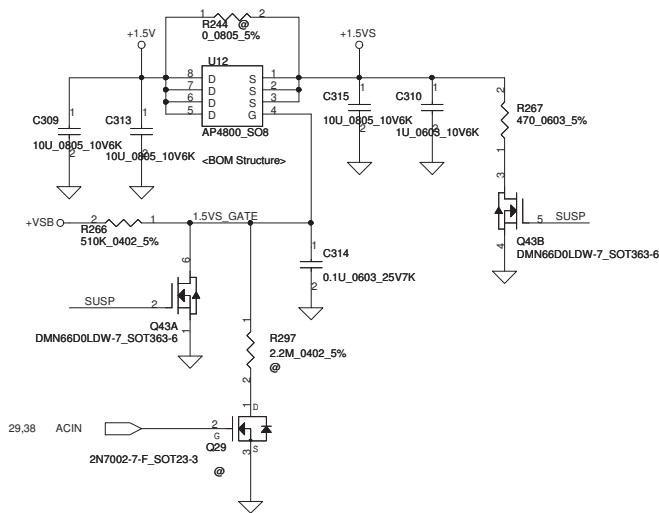
+3VALW TO +3VS



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

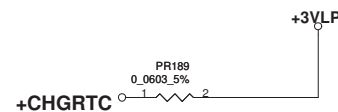
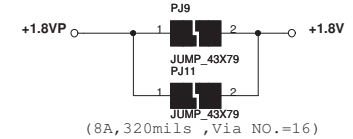
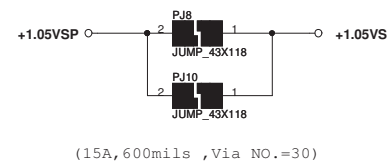
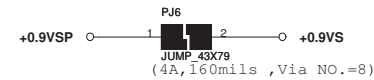
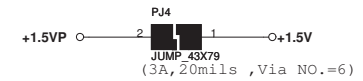
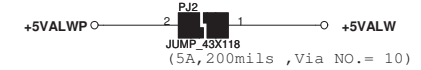
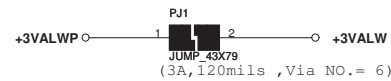
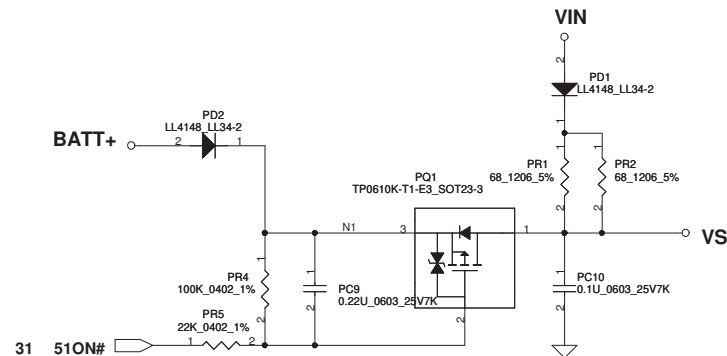
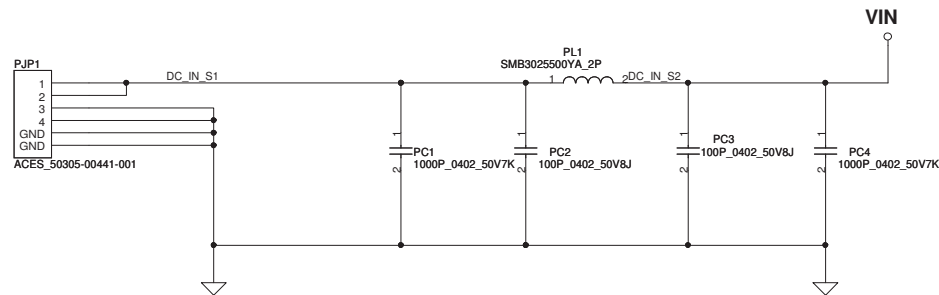


+1.5V to +1.5VS

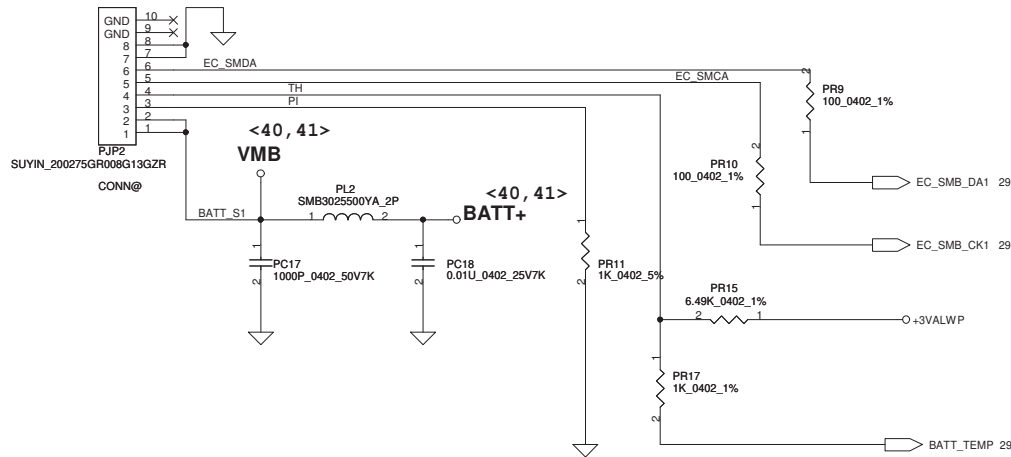


2010/06/17 From ESD Require

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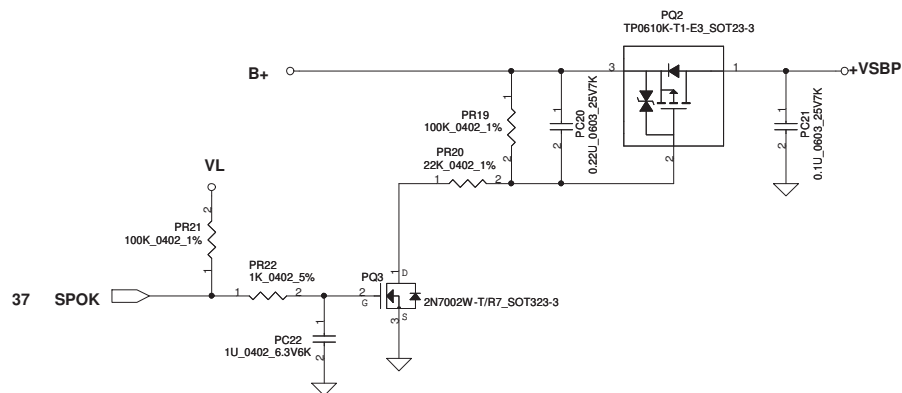
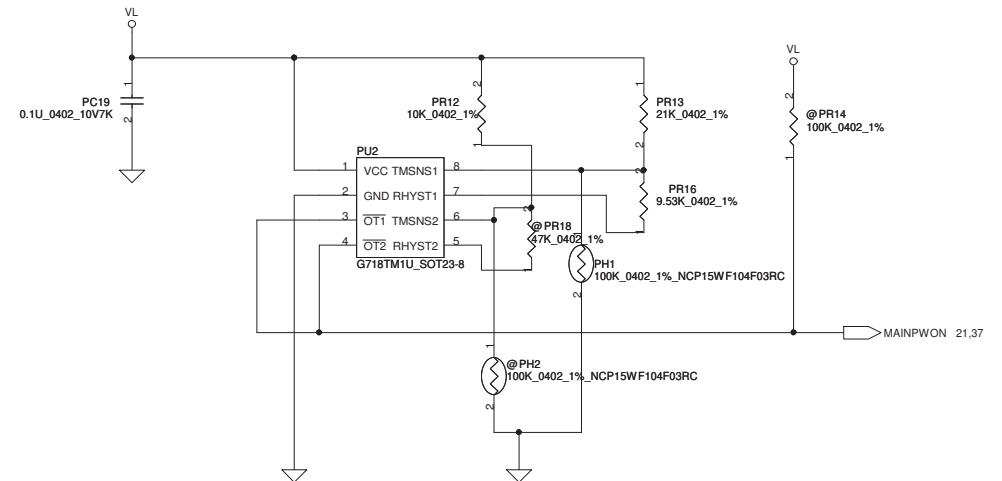
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PH1 under CPU botten side :

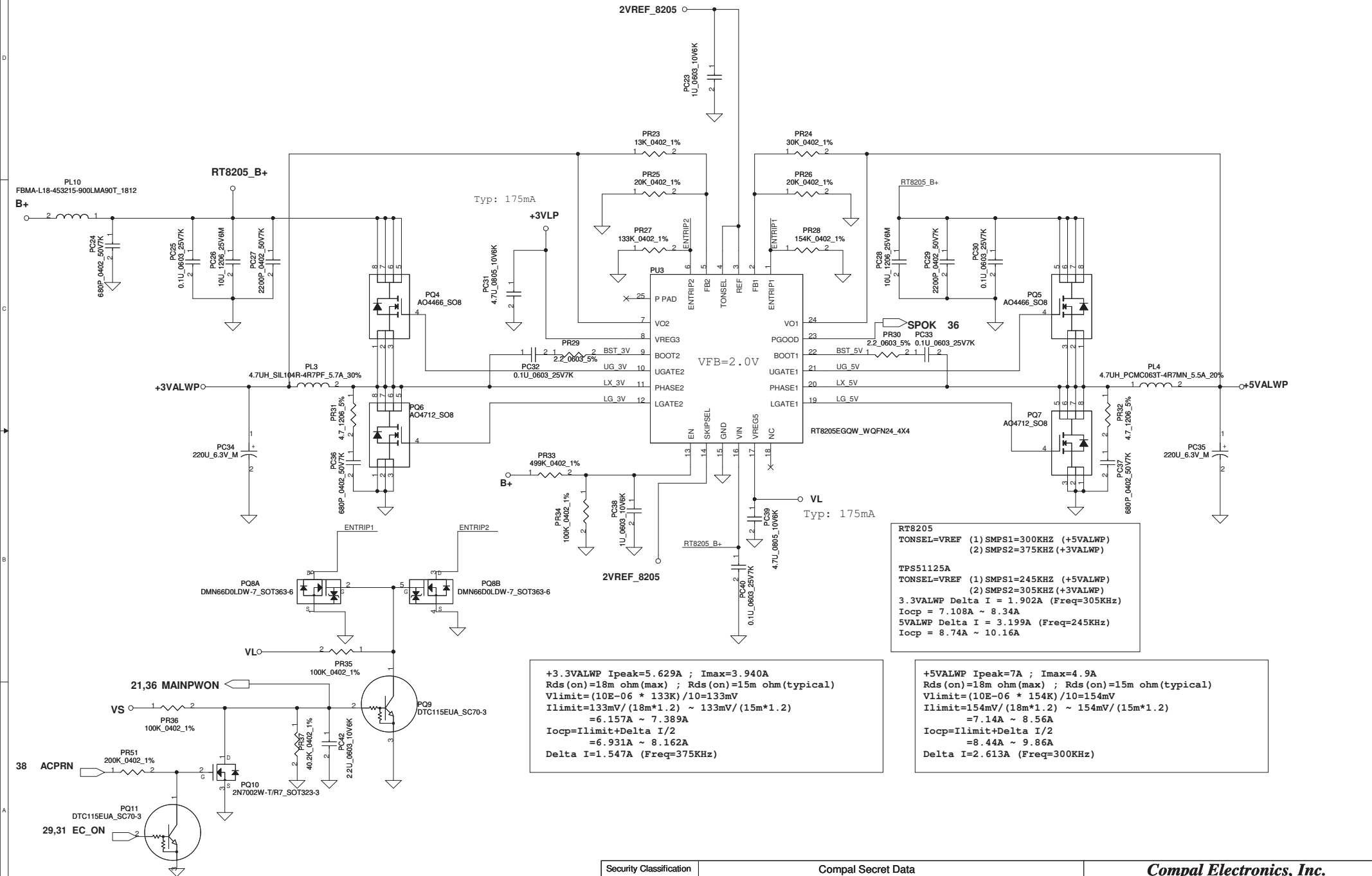
CPU thermal protection at 92 degree C

Recovery at 56 degree C



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Note:
Use TPS51125 IC can remove RTC refernece LDO
Use TPS51427 IC must keep RTC refernece LDO



+3.3VALWP Ipeak=5.629A ; Imax=3.940A
Rds(on)=18m ohm(max) ; Rds(on)=15m ohm(typical)
Vlimit=(10E-06 * 133K)/10=133mV
Ilimit=133mV/(18m*1.2) ~ 133mV/(15m*1.2)
=6.157A ~ 7.389A
Iocp=Ilimit+Delta I/2
=6.931A ~ 8.162A
Delta I=1.547A (Freq=375KHz)

RT8205
TONSEL=VREF (1) SMPS1=300KHZ (+5VALWP)
(2) SMPS2=375KHZ (+3VALWP)

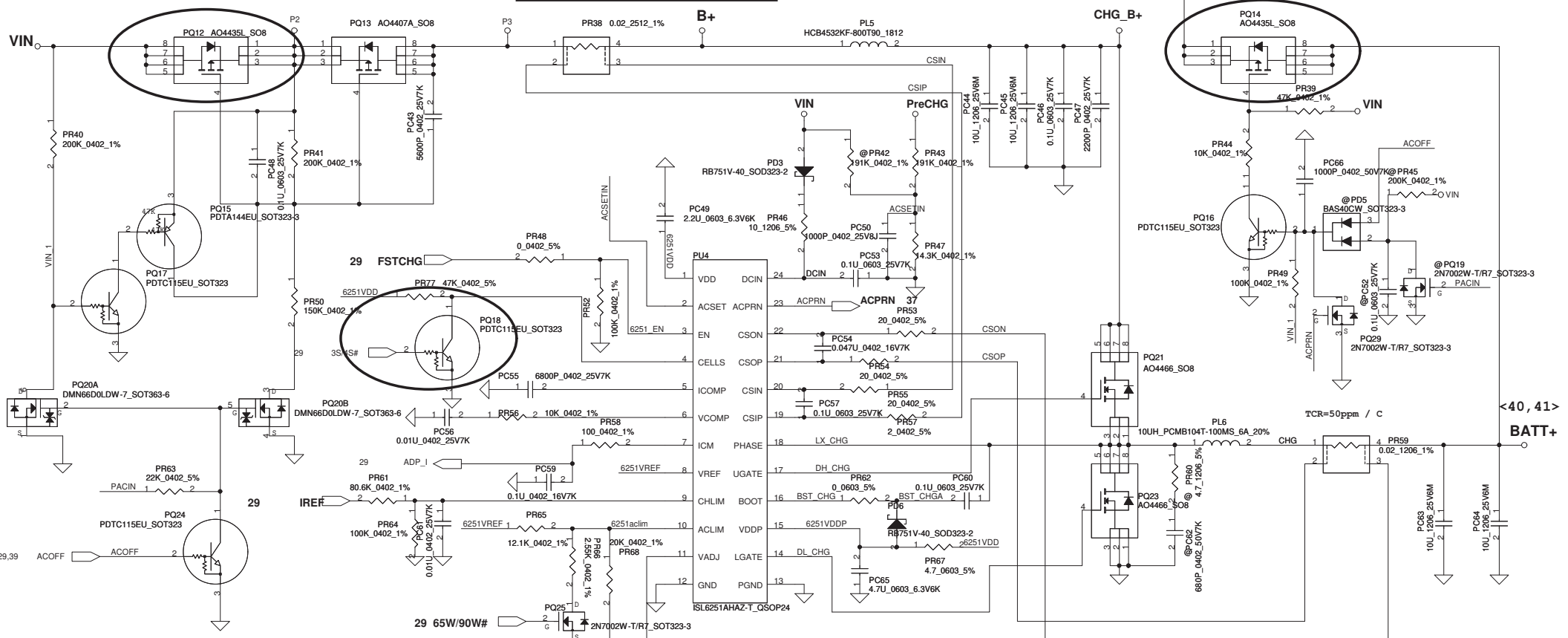
TPS51125A
TONSEL=VREF (1) SMPS1=245KHZ (+5VALWP)
(2) SMPS2=305KHZ (+3VALWP)
3.3VALWP Delta I = 1.902A (Freq=305KHz)
Iocp = 7.108A ~ 8.34A
5VALWP Delta I = 3.199A (Freq=245KHz)
Iocp = 8.74A ~ 10.16A

+5VALWP Ipeak=7A ; Imax=4.9A
Rds(on)=18m ohm(max) ; Rds(on)=15m ohm(typical)
Vlimit=(10E-06 * 154K)/10=154mV
Ilimit=154mV/(18m*1.2) ~ 154mV/(15m*1.2)
=7.14A ~ 8.56A
Iocp=Ilimit+Delta I/2
=8.44A ~ 9.86A
Delta I=2.613A (Freq=300KHz)

Iada=0~4.74A (90W/19V=4.736A)
Iada=0~3.42A (90W/19V=3.421A)

$$ADP_I = 19.9 * I_{adapter} * R_{sense}$$

$$CP = 85\% * I_{ada} ; CP = 4.10A$$
$$CP = 85\% * I_{ada} ; CP = 2.91A$$



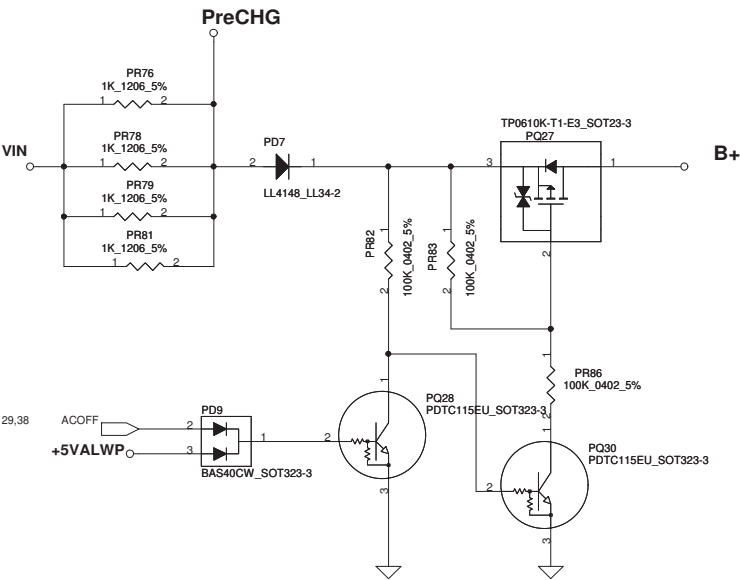
CP mode
 $I_{input} = (1/0.02) (0.05 * V_{ac1m} / 2.39 + 0.05)$
where $V_{ac1m} = 1.502V$, $I_{input} = 4.07A$

CC=0.6~4.48A
 $I_{REF} = 0.7224 * I_{charge}$
 $K_i = 0.7224$
 $I_{REF} = 0.43V \sim 3.24V$

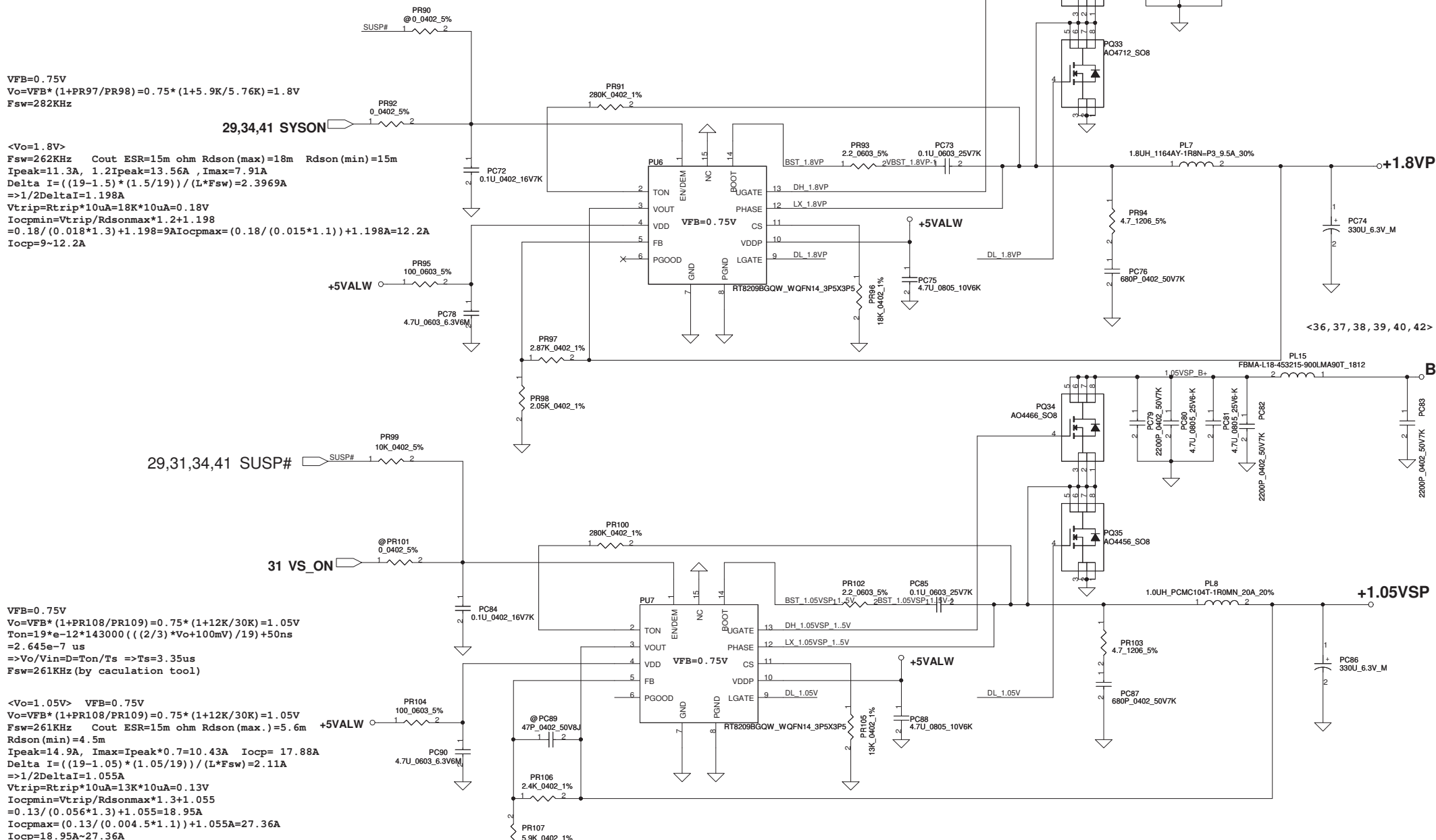
K_i
 $V_{ch1m} = I_{ref} * (PR374 / (PR372 + PR374))$
 $= I_{ref} * (100K / (80.6K + 100K))$
 $= I_{ref} * 0.5537$
 $I_{charge} = (165mV / PR369) * (V_{ch1m} / 3.3V)$
 $= (165m / 20m) * ((1/3.3V) * I_{ref} * 0.5537)$
 $= 1.3842 * I_{ref}$
 $I_{ref} = 0.7224 * I_{charge} \Rightarrow K_i = 0.7224$

K_v
Rinternal ic=514K Rec=3K R1=PR379=15.4K R2=PR381=31.6K
R=514K//31.6K/(15.4K+3K)=11.372K
r=514K//514K//31.6K=28.14K
 $V_{ce11} = 0.175 * V_{adj} + 3.99V$
 $4.2V = 0.175 * V_{adj} + 3.99V \Rightarrow V_{adj} = 1.2V$
 $V_{adj} = V_{ref} * (R / (R + 514K)) + CALIBRATE * (r / (r + 514K))$
 $1.1483 = CALIBRATE * 0.6046 \Rightarrow CALIBRATE = 1.899$
 $1.899 = (4.2 - (V_{ce11} + 0.175)) * K_v = (4.2 - (4.2 + 0.175)) * K_v$
 $A = V_{ref} * (R / (R + 514K)) = 0.052$
 $K_v = 9.451$

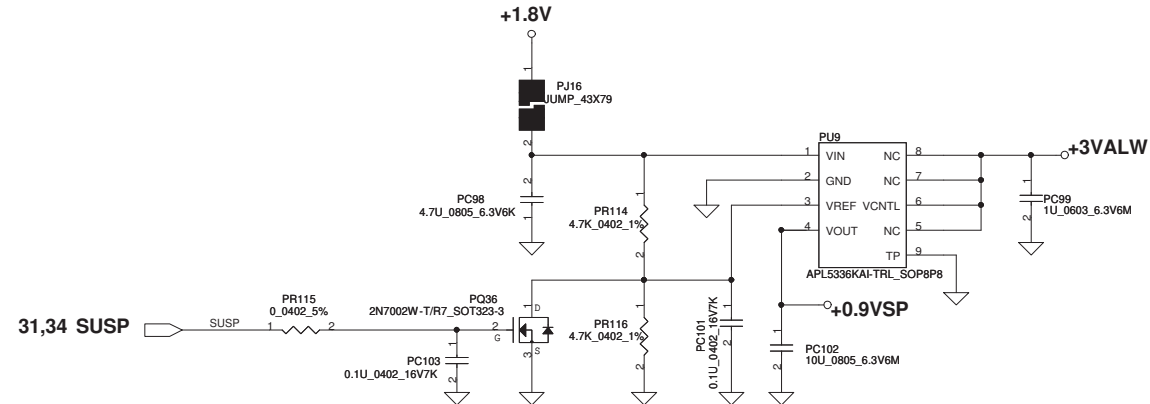
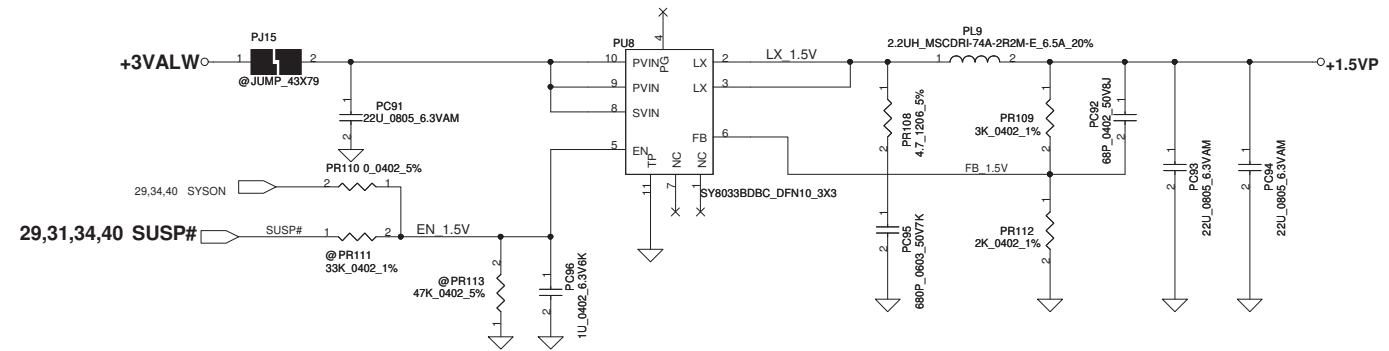
BATT Type	Charging Voltage (0x15)	CV mode
Normal 3S LI-ON Cells	12600mV	12.60V



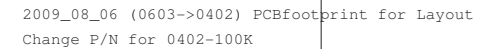
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Item	Fixed Issue	Reason for change	Rev.	PG#	Modify List	Date	Phase
1	add 3S/4S pin function	add 4 cell battery	0.2	45	add PQ18 PDC115EU_SOT323 (SB301150200) and PR77 47K +-5% 0402 (SD028470280)	2010/06/11	EVT
2	ACSETIN net	ACSETIN net no connect	0.2	45		2010/06/11	EVT
3	1.5V enable	1.5V enable BOM error	0.2	45	add PR92 and delete PR90 0_0402_5% (SD028000080)	2010/06/11	EVT
4	EMI issue	add boost R and snubber	0.2	45	add 3/5V 1..05V/1.5V CPU sunbber		
5							
6							
7							
8							
9							
10							
11							
12							
13							
16							
17							

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