

# Compal Confidential

## ZKU10 UMA M/B LA-B241P Schematics Document

Intel Shark Bay Haswell U

2014-01-10

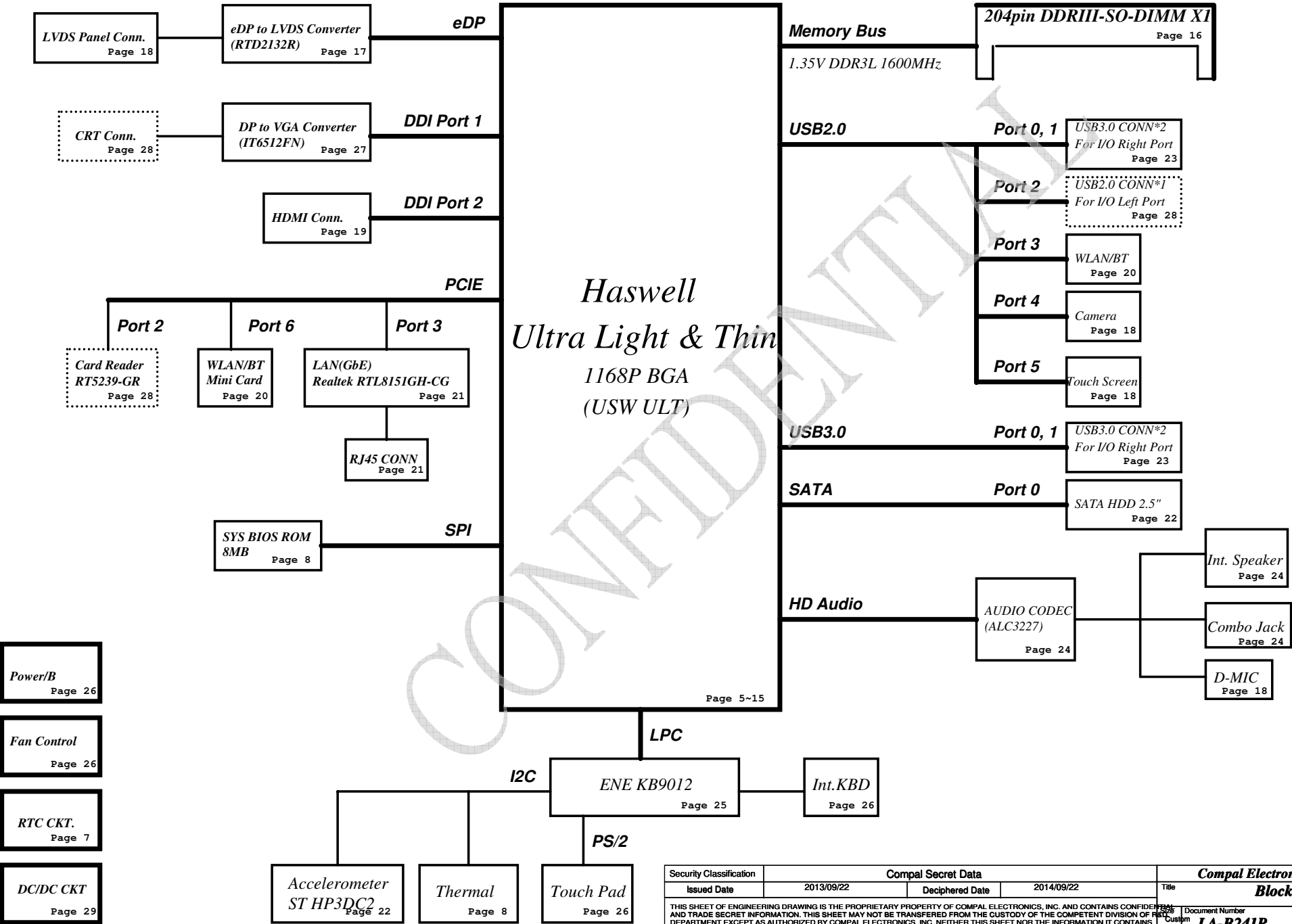
REV: 1.0

CONFIDENTIAL

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Issued Date	2013/09/22	Deciphered Date	2014/09/22	Title <b>Cover Page</b>
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Model Name :

Project Name :



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### Power Rails

Power Plane	Description	S0	S3	S4/S5
VIN	19V Adapter power supply	ON	ON	ON
BATT+	12V Battery power supply	ON	ON	ON
B+	AC or battery power rail for power circuit. (19V/12V)	ON	ON	ON
+RTCVCC	RTC Battery Power	ON	ON	ON
+3VL		ON	ON	ON
+VL		ON	ON	ON
+3VALW	+3.3v Always power rail	ON	ON	ON
+5VALW	+5.0v Always power rail	ON	ON	ON
+3V_PCH	+3.3v Always power rail for CPU	ON	ON	ON
+1.35V_VDDQ	+1.35V power rail for DDR3L	ON	ON	OFF
+0.6V_0.675VS	+0.675V power rail for DDR3L Terminator	ON	OFF	OFF
+3VS	+3.3v system power rail	ON	OFF	OFF
+5VS	+5.0v system power rail	ON	OFF	OFF
+1.05V/+1.05VS	+1.05v system power rail	ON	OFF	OFF
+1.5VS	+1.5v system power rail	ON	OFF	OFF
+VCC_CORE	Core voltage for CPU	ON	OFF	OFF

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

### EC SM Bus1 address

Device	Address	
Accelerometer	25 00101001	U25
Battery		
Charger		

### EC SM Bus2 address

Device	Address	
Thermal Sensor	4C 01001100 EMC1402-1	UC3
	4D 01001101 EMC1402-2	

### PCH SM Bus address

Device	Address
DDR3L	
EC	
eDP to LVDS IC	

### BOM config

PCB P/N	
Pre SI BOM config	

### 43 level BOM table

43 Level	Description	BOM Structure

### Board ID / SKU ID Table for AD channel

Vcc	3.3V +/- 5%			
Ra	100K +/- 1%			
Board ID	Rb	V <sub>AD_BID</sub> min	V <sub>AD_BID</sub> typ	V <sub>AD_BID</sub> max
0	0	0 V	0 V	0 .300V
1	12K +/- 1%	0.347 V	0.354 V	0.360 V
2	15K +/- 1%	0.423 V	0.430 V	0.438 V
3	20K +/- 1%	0.541 V	0.550 V	0.559 V
4	27K +/- 1%	0.691 V	0.702 V	0.713 V
5	33K +/- 1%	0.807 V	0.819 V	0.831 V
6	43K +/- 1%	0.978 V	0.992 V	1.006 V
7	56K +/- 1%	1.169 V	1.185 V	1.200 V

### BOARD ID Table

Board ID	PCB Revision
0	0.1
1	
2	
3	
4	
5	
6	

### BOM Option Table

BTO Item	BOM Structure
Unpop	@
Connector	CONN@
EMI requirement	EMI@
ESD requirement	ESD@
EMI requirement unpop	@EMI@
ESD requirement unpop	@ESD@
For Debug	DB@
ESD requirement	RF@
For SLB9635	9635@
For SLB9656	9656@
For short-pad	Short@

DAX



PCB  
Part Number = DAZ16B00201  
PCB ZKU10 LA-B241P LS-A521P-24P/B24P

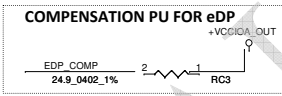
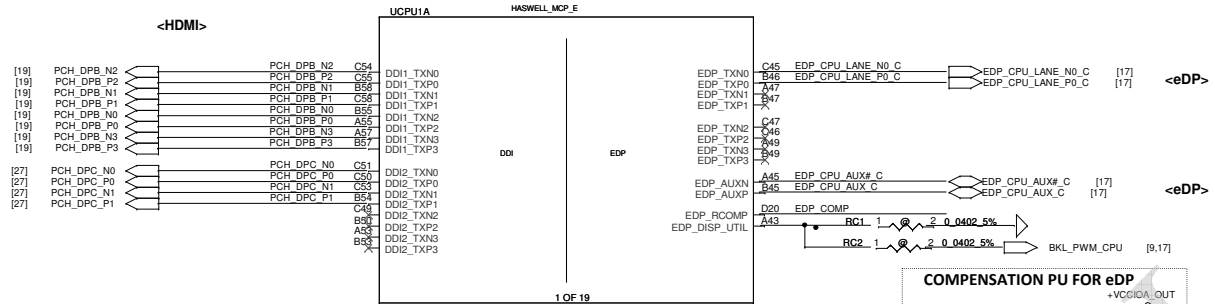
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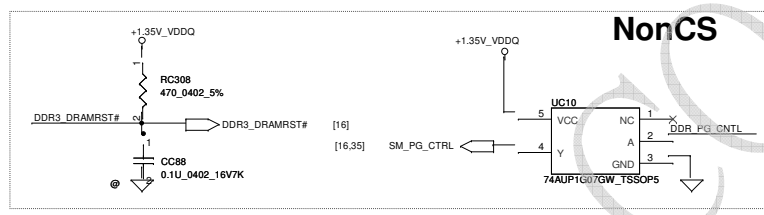
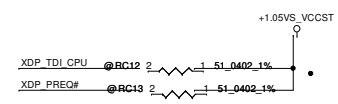
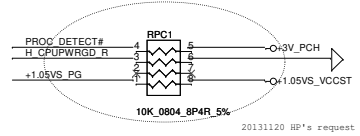
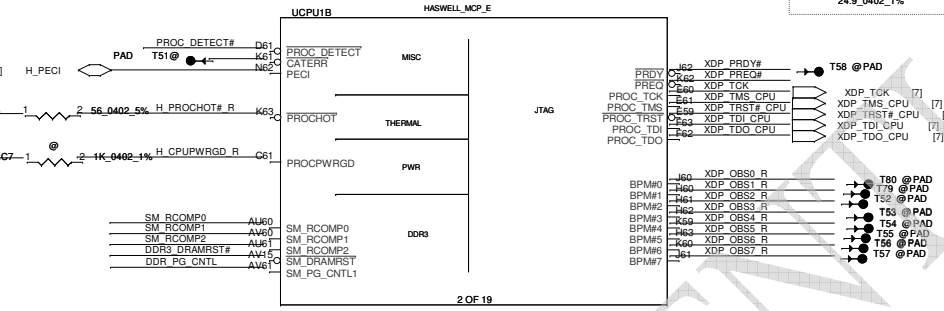
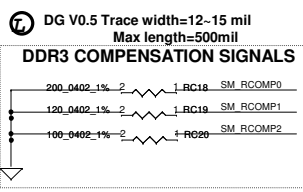
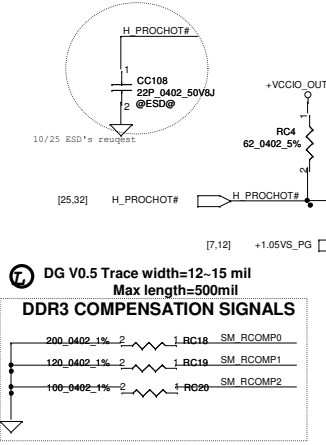
HDMI  
Part Number = RO000003HM  
HDMI 102 LA-B151P REV0 M/B 3  
45@

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**DG V0.9 PEG\_COMP**  
Trace width=20mil and spacing=25mil  
Max length=100mil



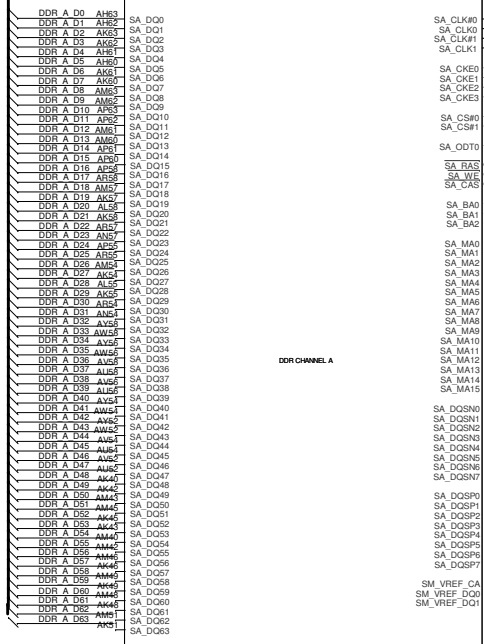
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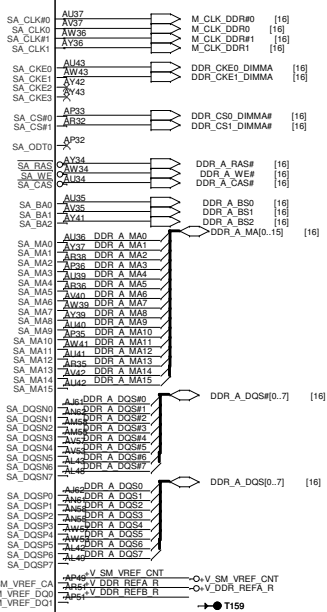
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UCP11C

HASWELL\_MCP\_E



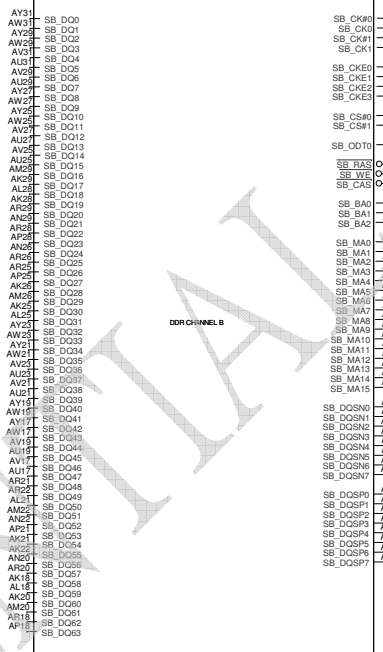
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T159

UCP11D

HASWELL\_MCP\_E

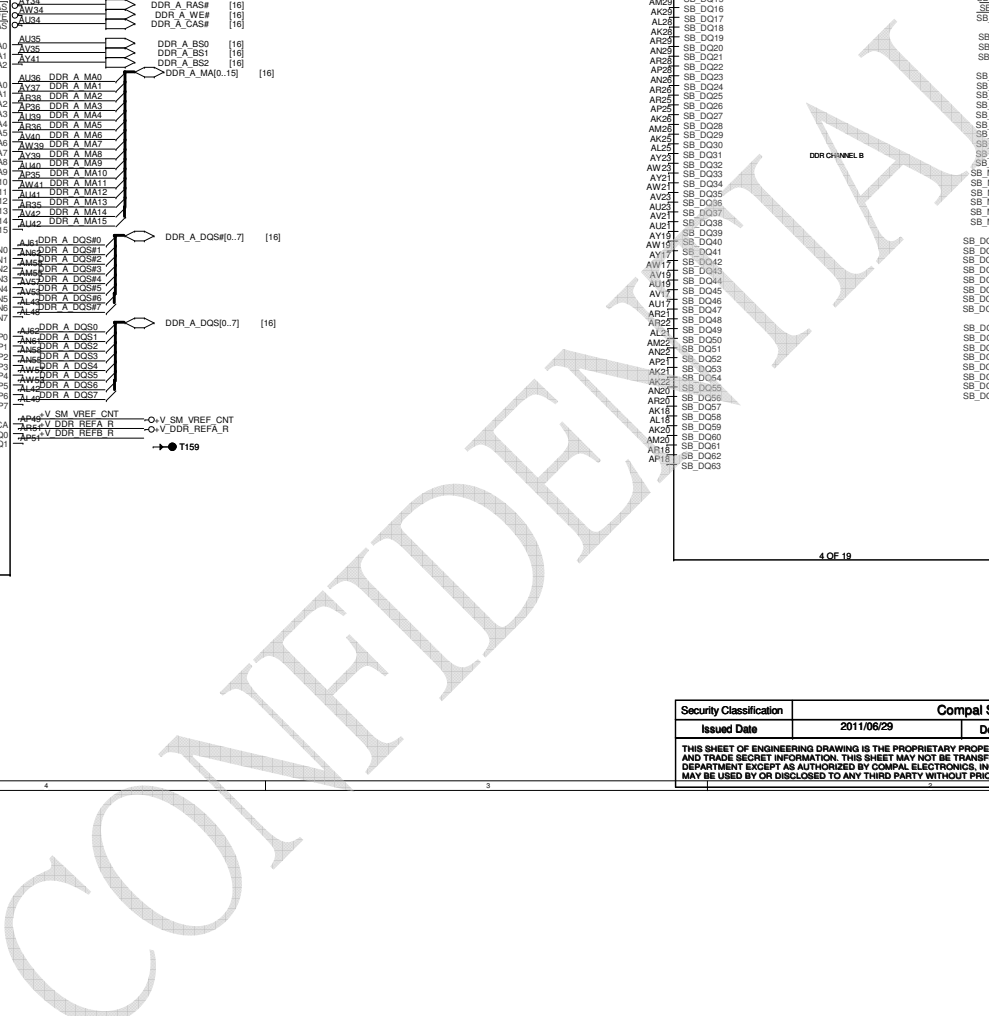


DDR CHANNEL B

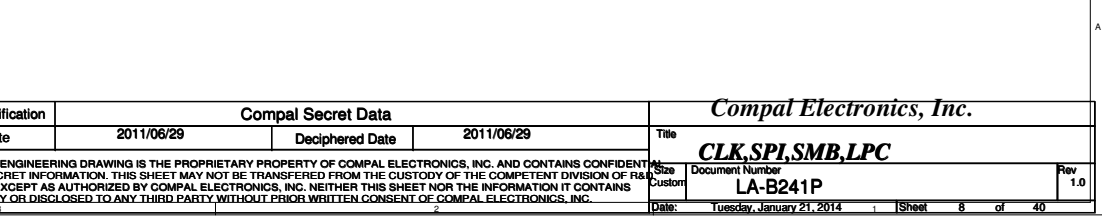
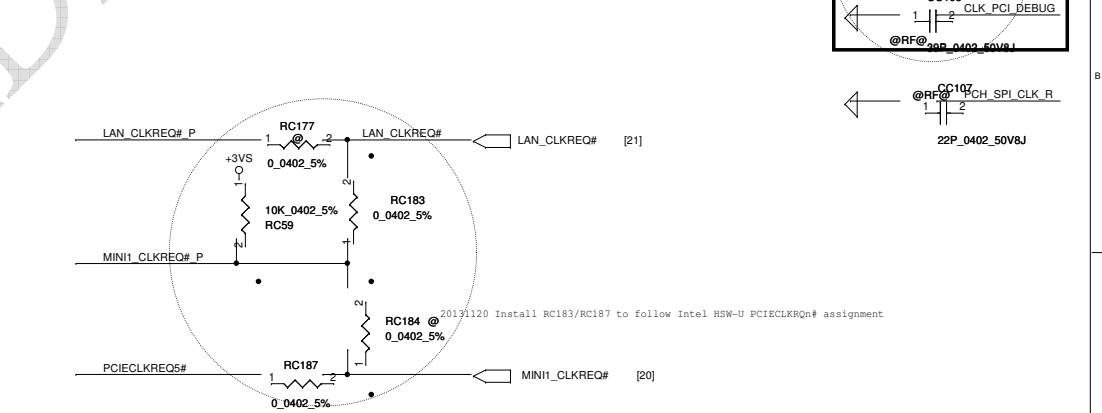
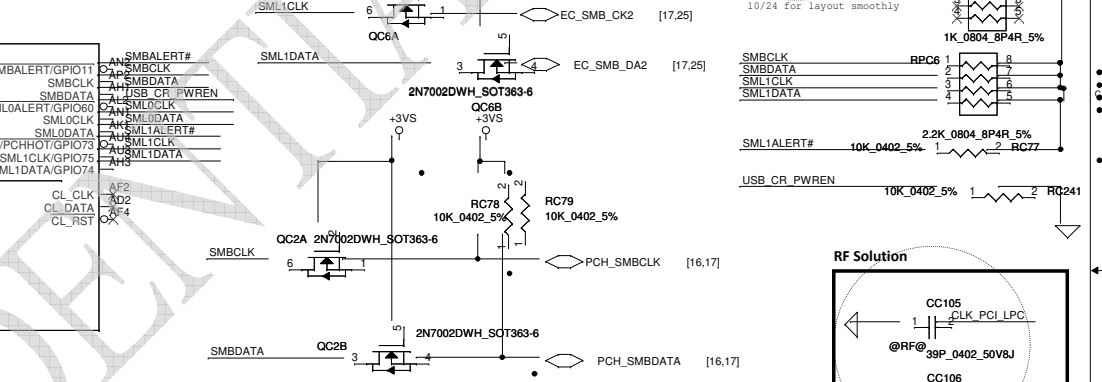
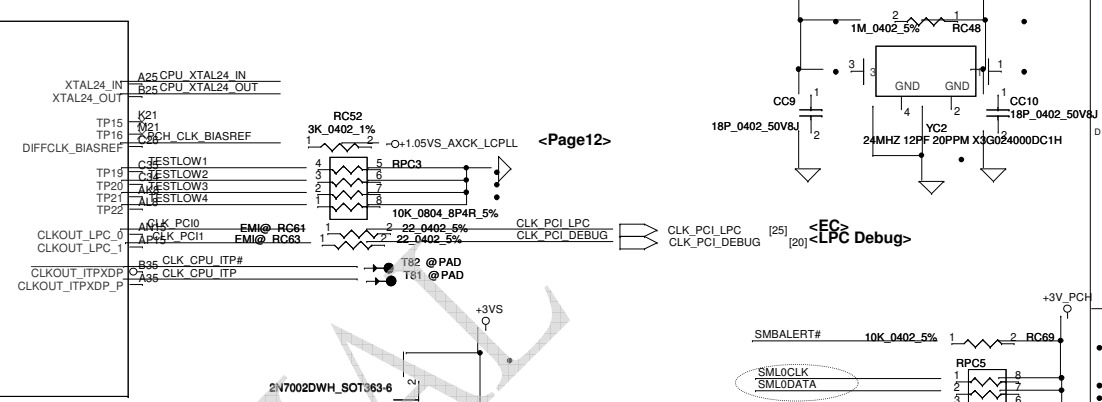
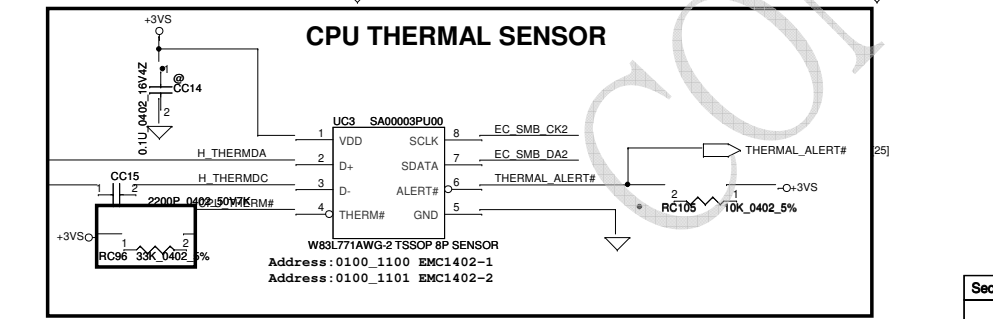
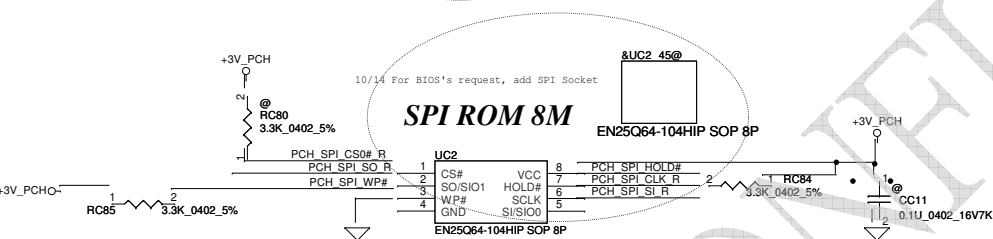
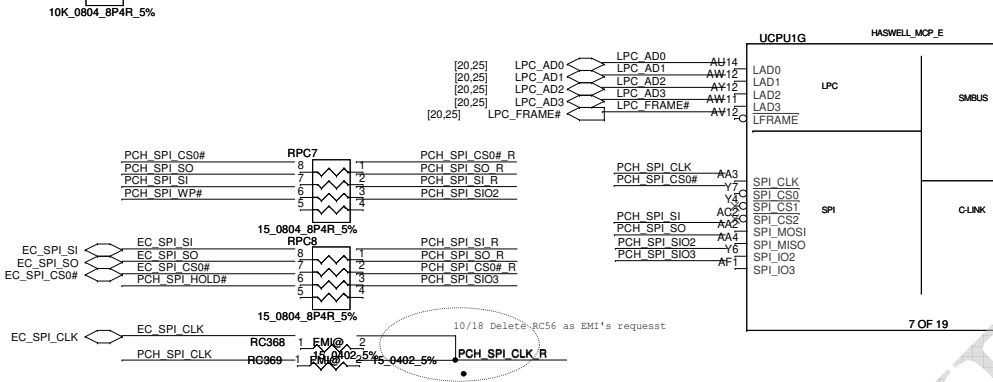
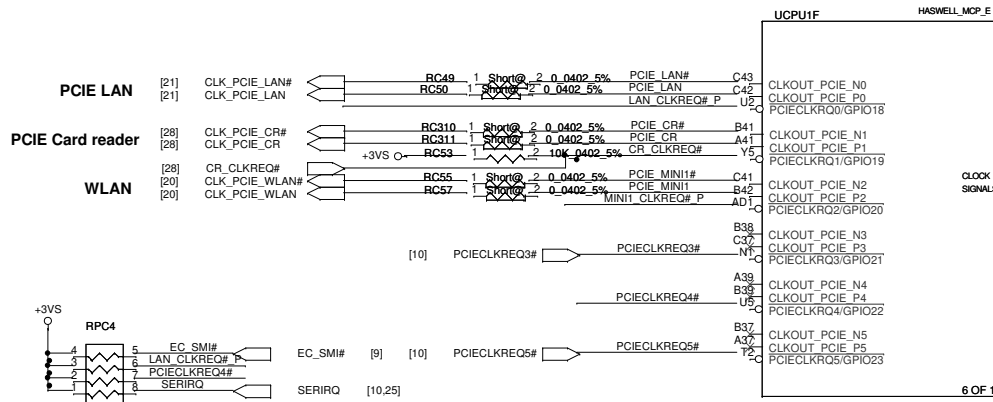
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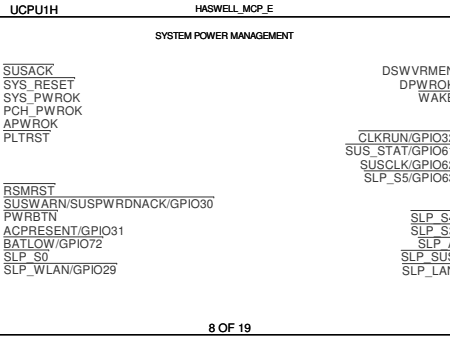


Non Deep S3 RC91-->SMT  
Deep S3 RC93-->SMT

DSWODVREN - On Die DSW VR Enable

\* H : Enable DSWODVREN RC254 2 0 0402 5%  
L : Disable DSWODVREN RC255 2 0 0402 5%

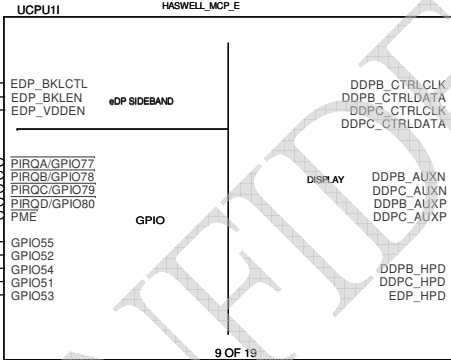
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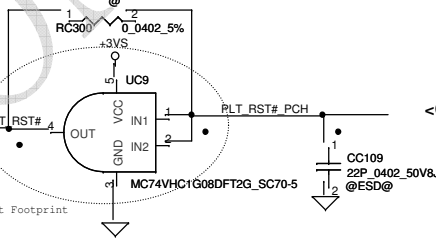
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Deep S3 RC286-->SMT

Deep S3 RC260-->SMT

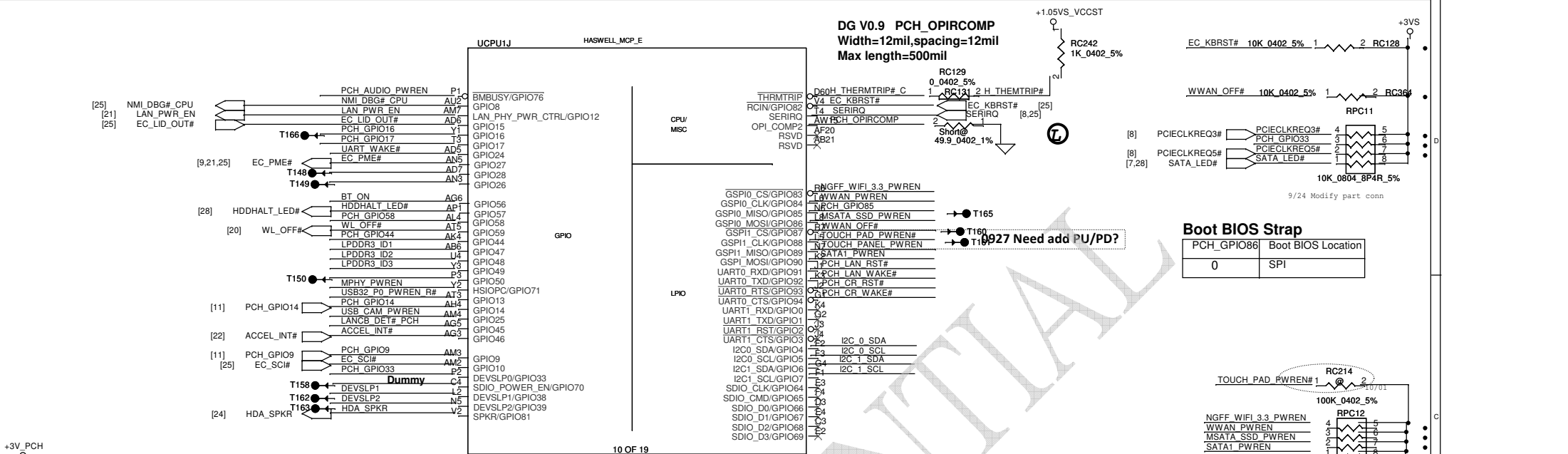
PANEL\_BKEN\_CPU PD 100K on Page20



<CPU>



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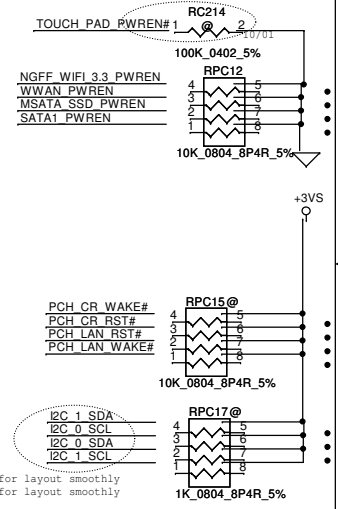
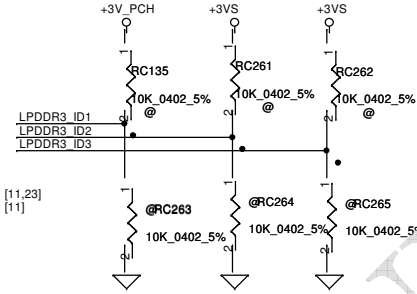
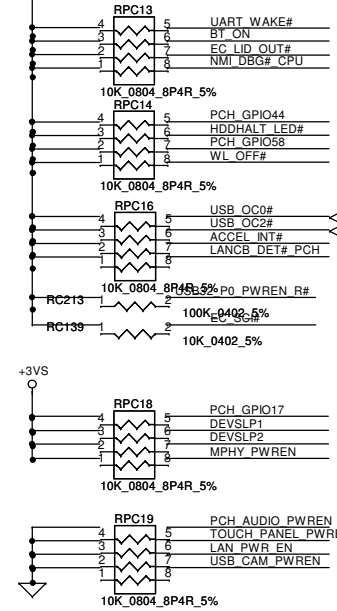


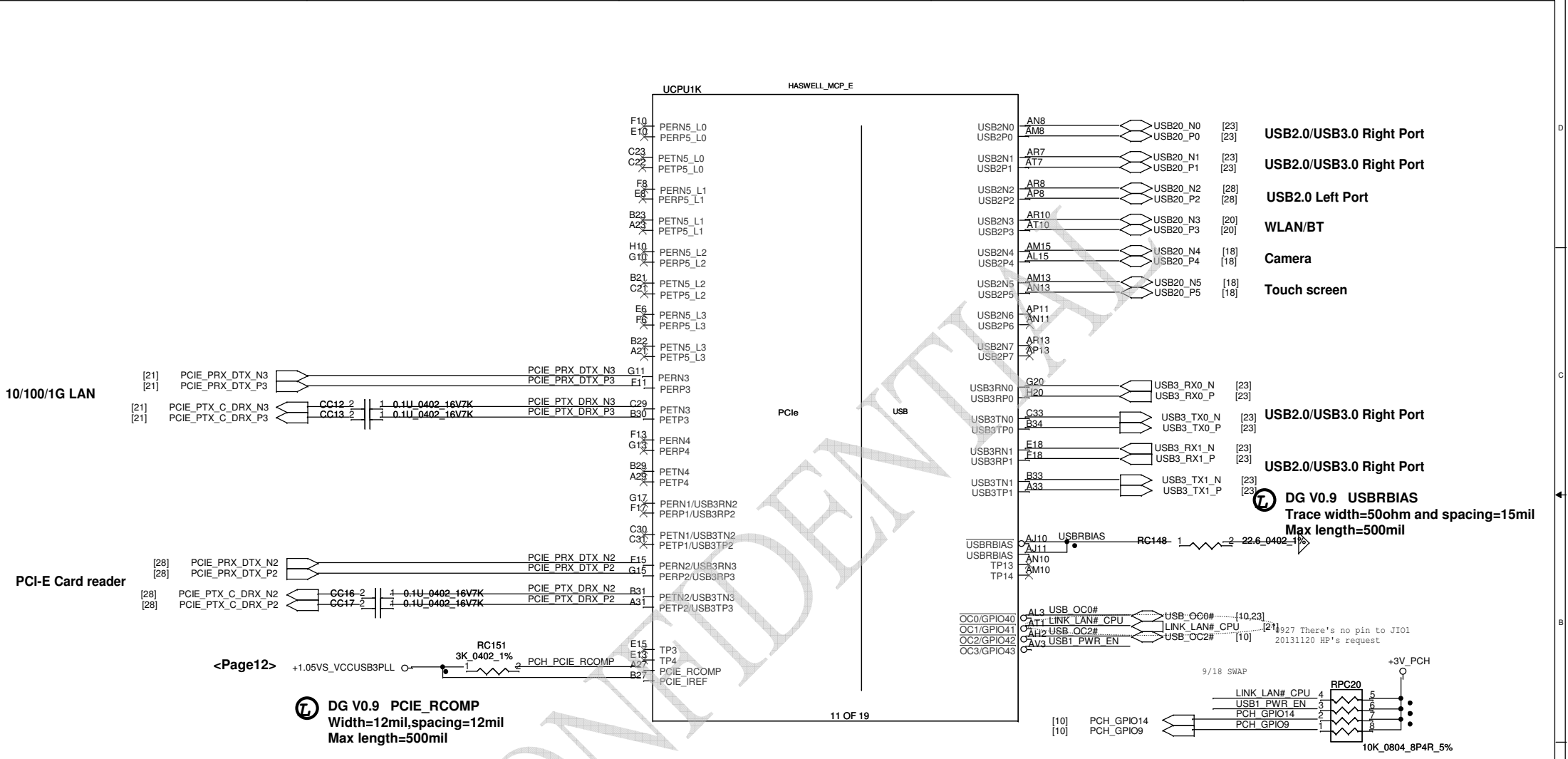
DG V0.9 PCH\_OPIRCOMP  
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Max length=500mil

**Boot BIOS Strap**

PCH_GPIO86	Boot BIOS Location
0	SPI

	GPIO47 LPDDR3_ID1	GPIO48 LPDDR3_ID2	GPIO49 LPDDR3_ID3
<b>Hynix</b> 8G/1600 H9CCNNN8JTMLAR	0	0	0
<b>Samsung</b> 8G/1600 K4E8E304EB-EGCE	0	0	1
<b>Elpida</b> 8G/1600 EDF8132A1MC-GD-F	0	1	0

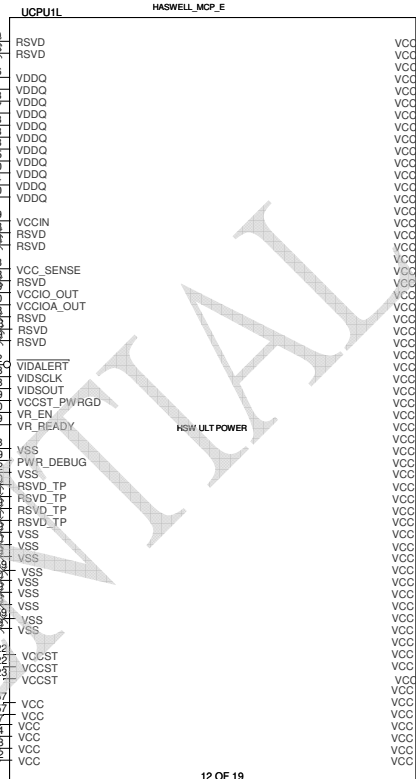




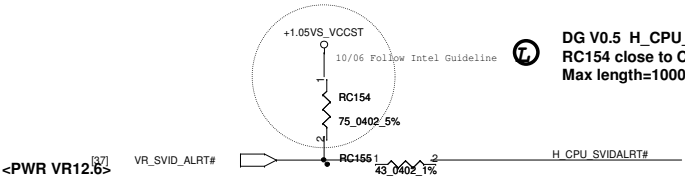
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+VCC\_CORE@1000mA



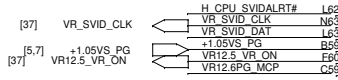
### SVID ALERT



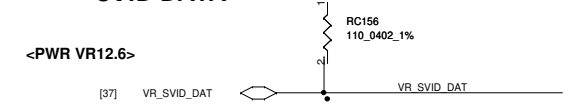
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 RC154 close to CPU<300mil  
 Max length=1000~2000mil

### VCC\_SENSE

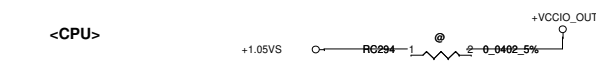
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 <VR IV and CPU>  
 <EDP\_COMP power rail>



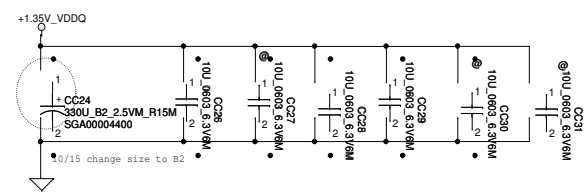
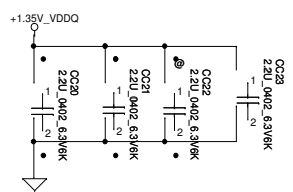
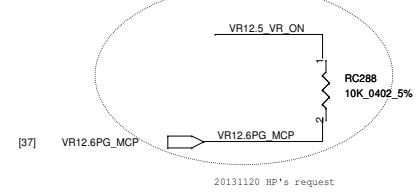
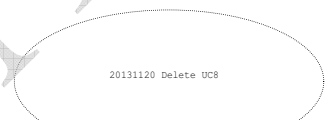
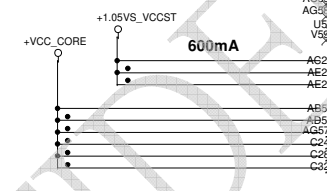
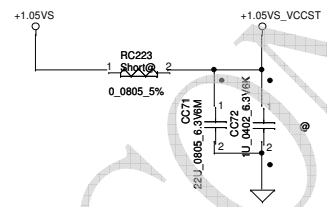
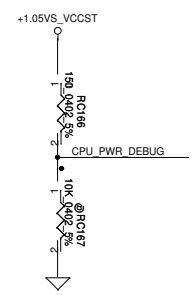
### SVID DATA



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**DG V0.5 VIDSOUT**  
 RC156 close to CPU<500mil  
 Max length=1000~2000mil

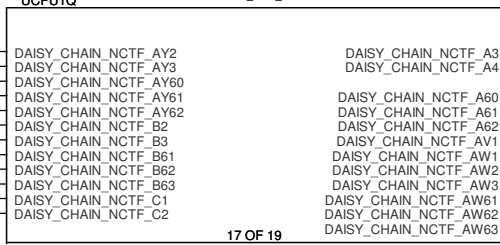


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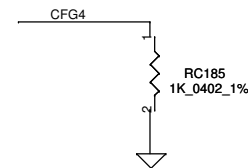




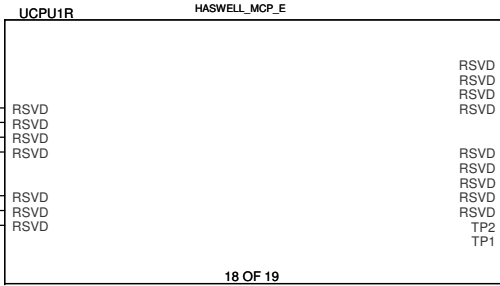
DC TEST AY2 AW2	AY2
DC TEST AY3 AW3	AY3
DC TEST AY61 AW61	AY61
DC TEST AY61 AW62	AY62
TP DC TEST A3 B3	B3
DC TEST A61 B61	B61
DC TEST B62 B63	B62
DC TEST C1 C2	C1
	C2



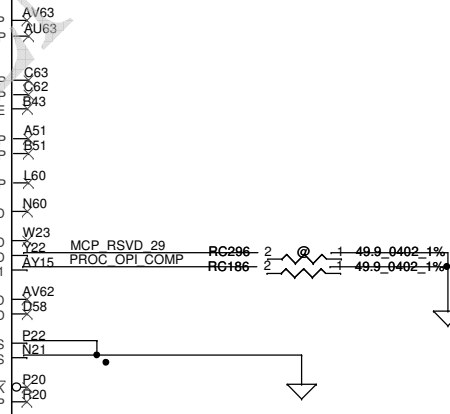
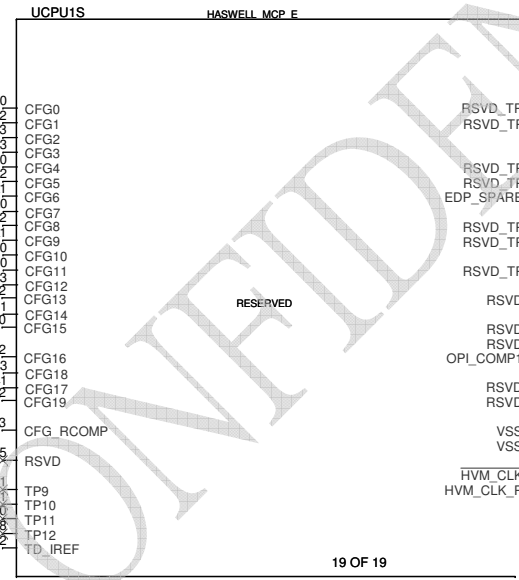
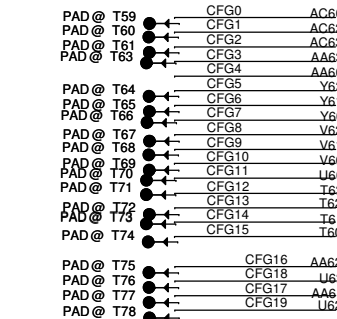
A3 TP DC TEST A3 B3	A3
	A4
	A60
A61 DC TEST A61 B61	A61
	A62
	AV1
	AW1
AW2 DC TEST AY2 AW2	AW2
AW3 DC TEST AY3 AW3	AW3
AW6 DC TEST AY61 AW61	AW6
AW6 DC TEST AY61 AW62	AW6
	AW63



Display Port Presence Strap	
CFG4	1 : Disabled; No Physical Display Port attached to Embedded Display Port * 0 : Enabled; An external Display Port device is connected to the Embedded Display Port

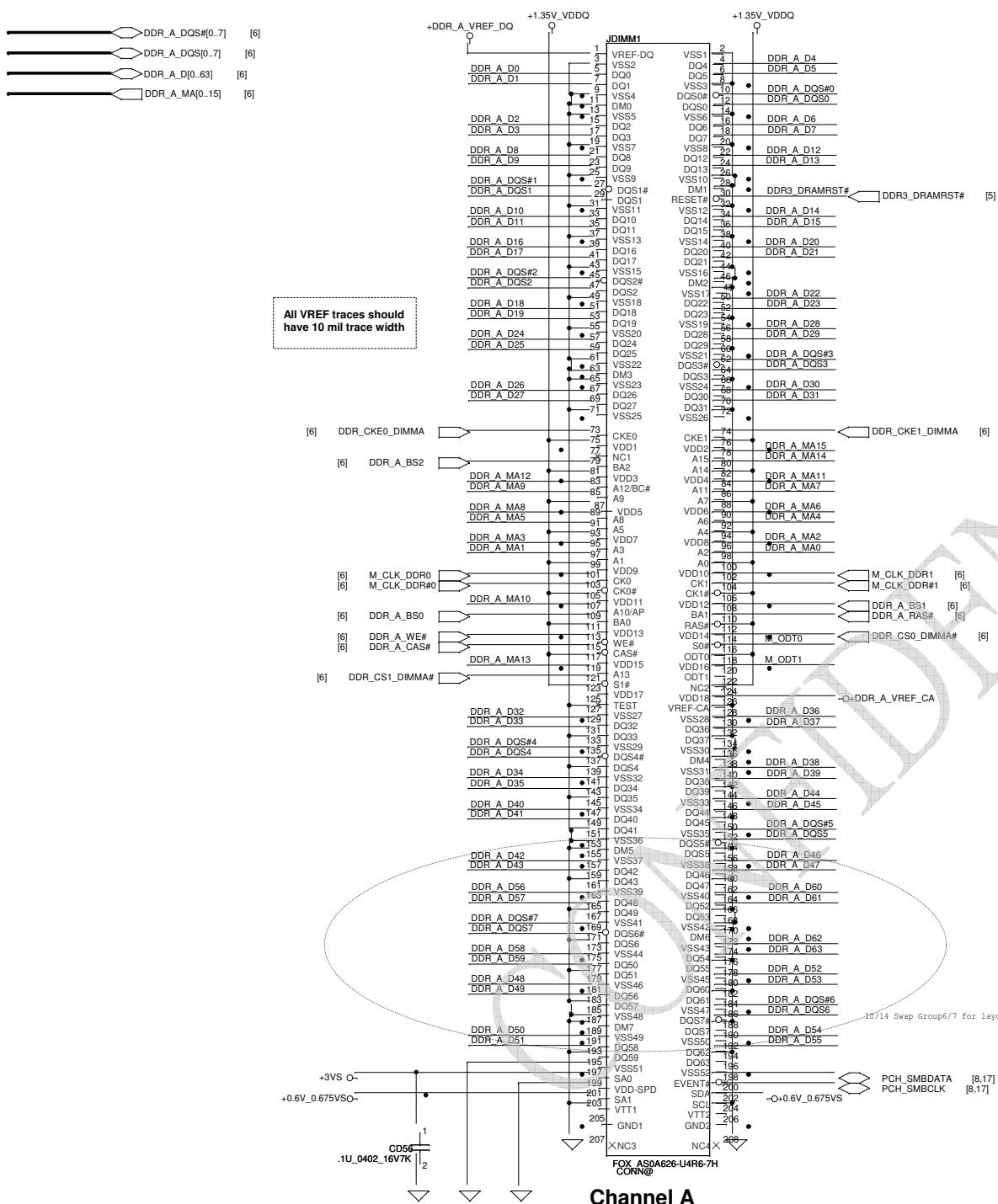


N23
P23
T23
D10
AL1
AM11
AP7
AU10
AU15
AW14
AY14
TP2
TP1

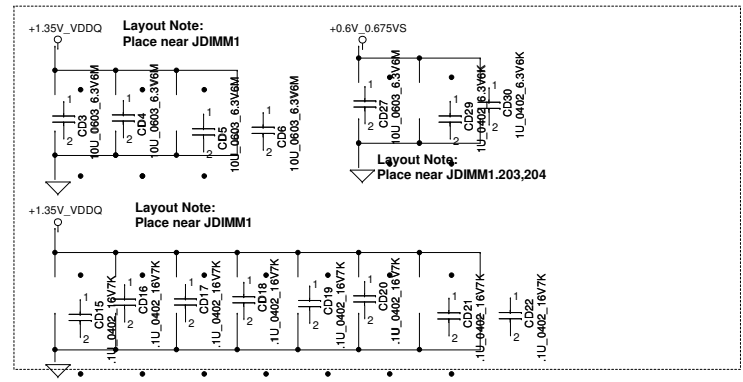
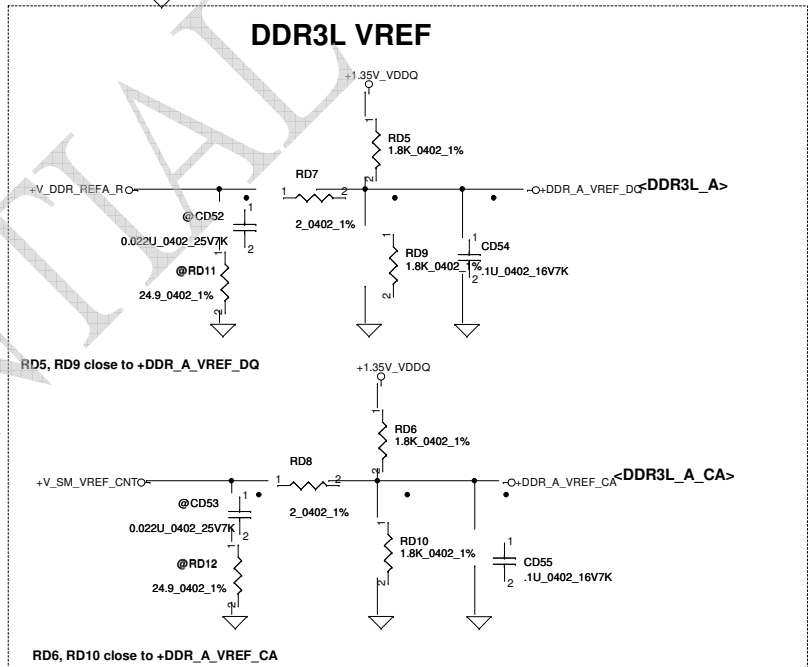
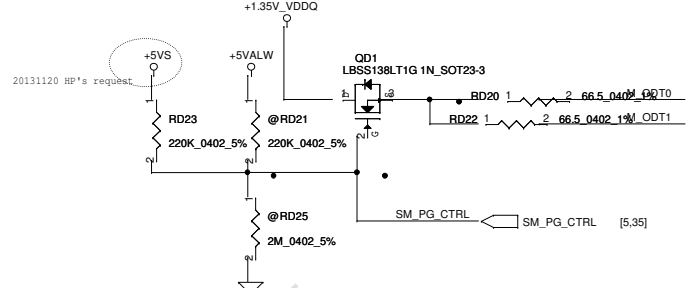


Ⓛ DG V0.9 PROC\_OPL\_COMP  
Width=12mil,spacing=12mil  
Max length=500mil

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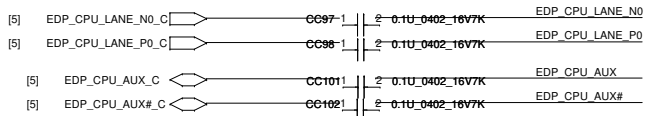
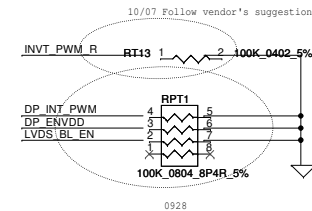
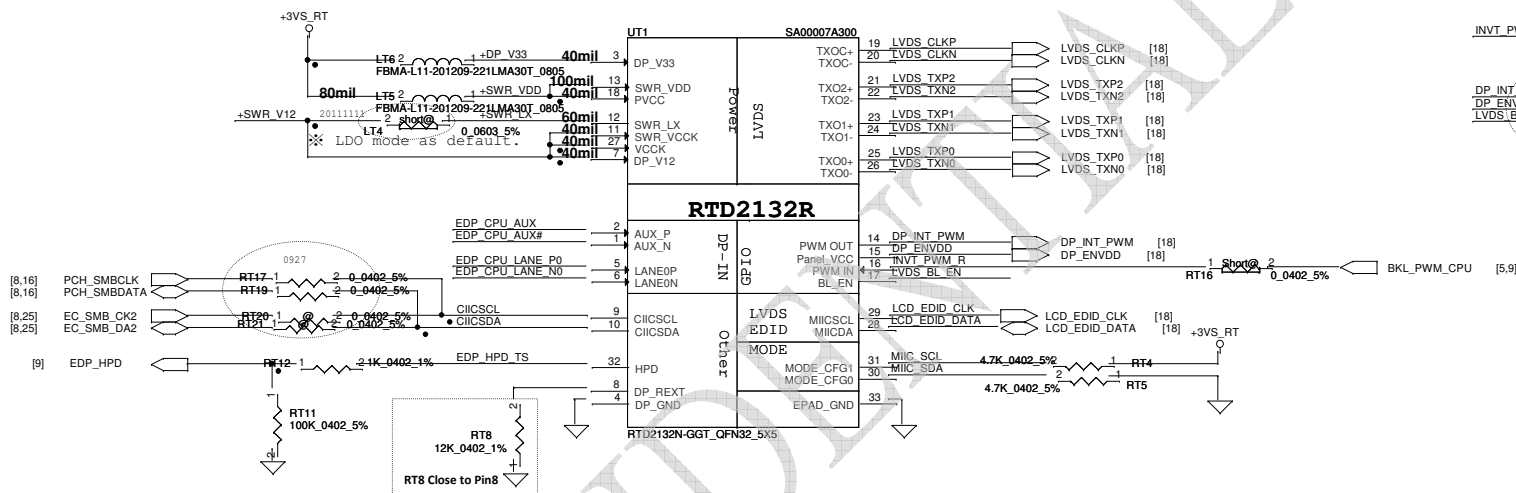
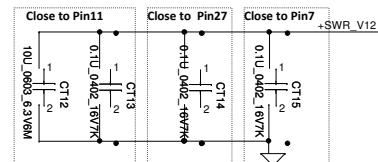
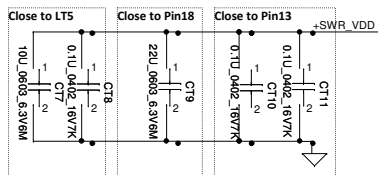
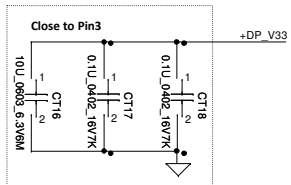
All VREF traces should have 10 mil trace width



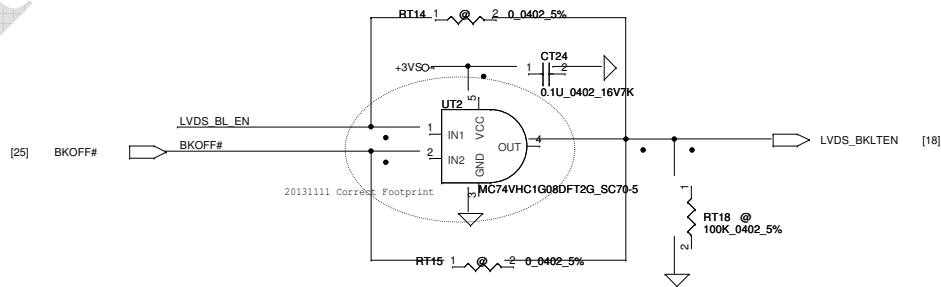
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Issued Date	2013/09/22	Deciphered Date	2014/09/22	DDR3L DIMMA	
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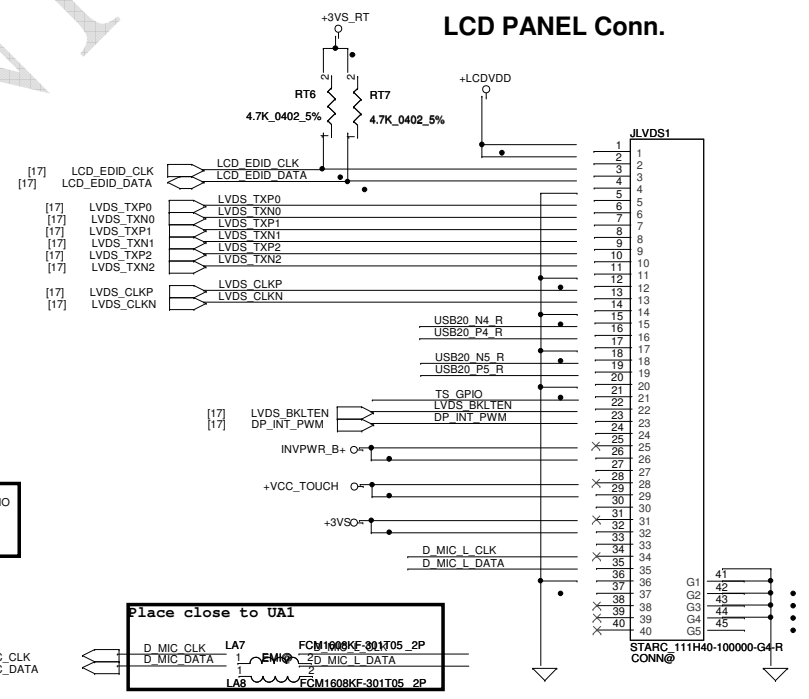
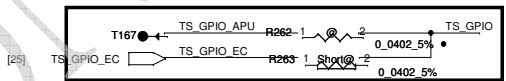
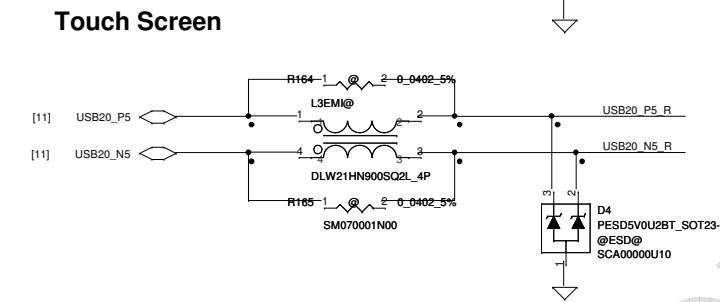
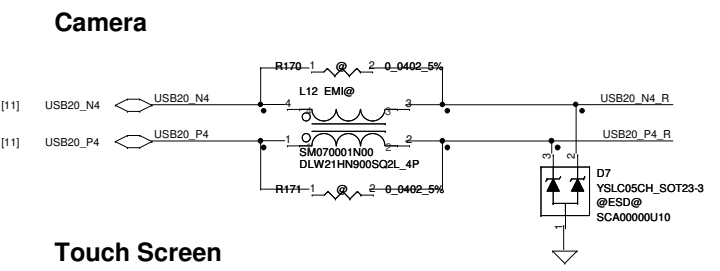
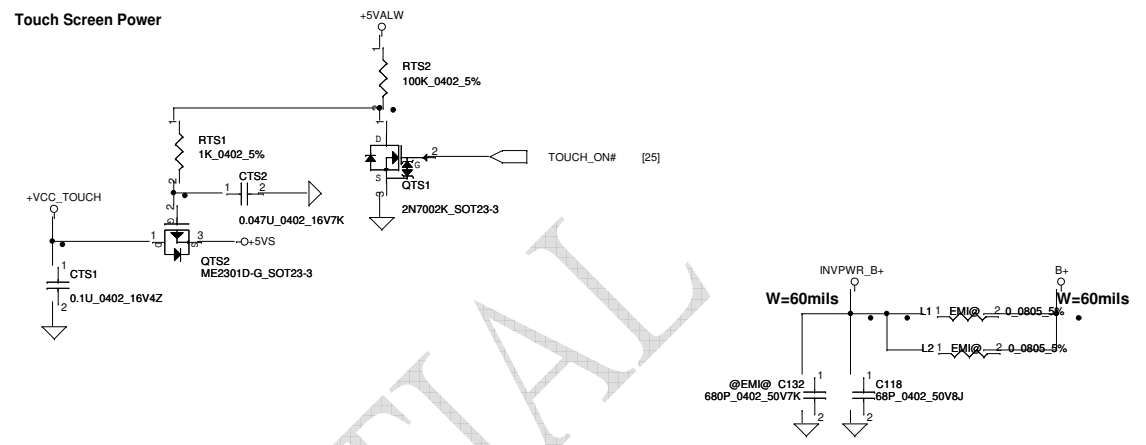
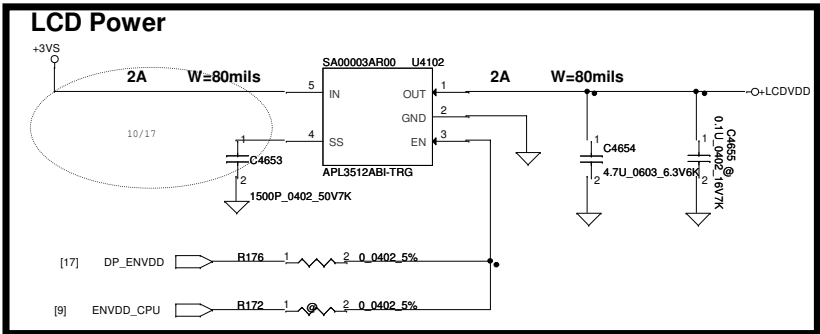
JPHW7 need to short



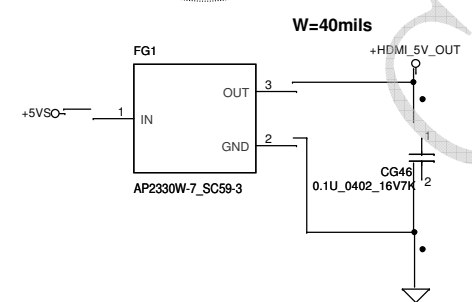
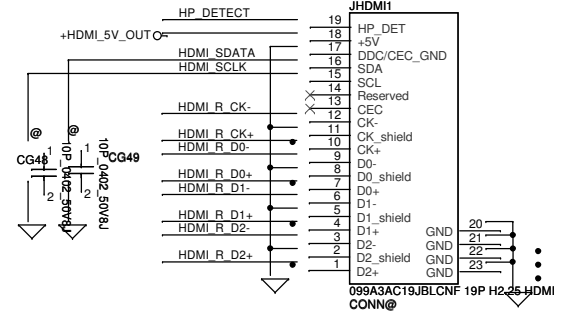
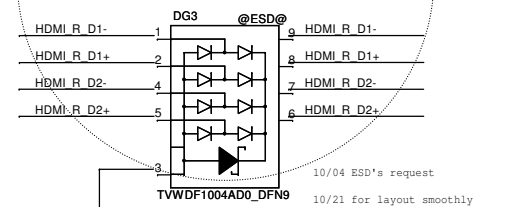
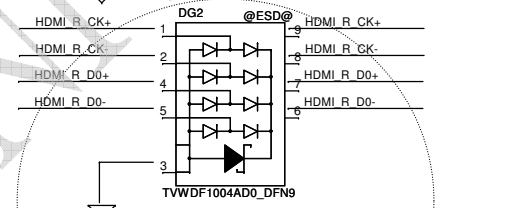
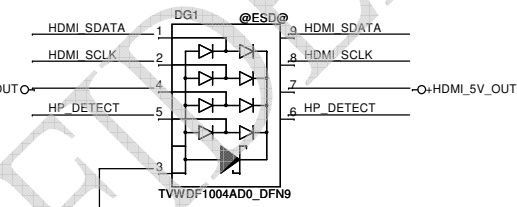
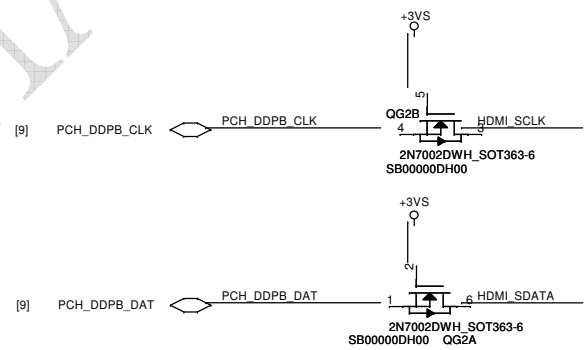
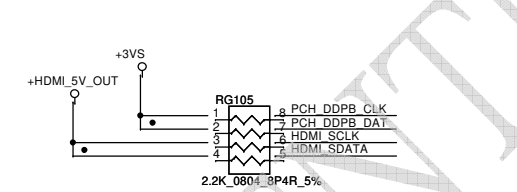
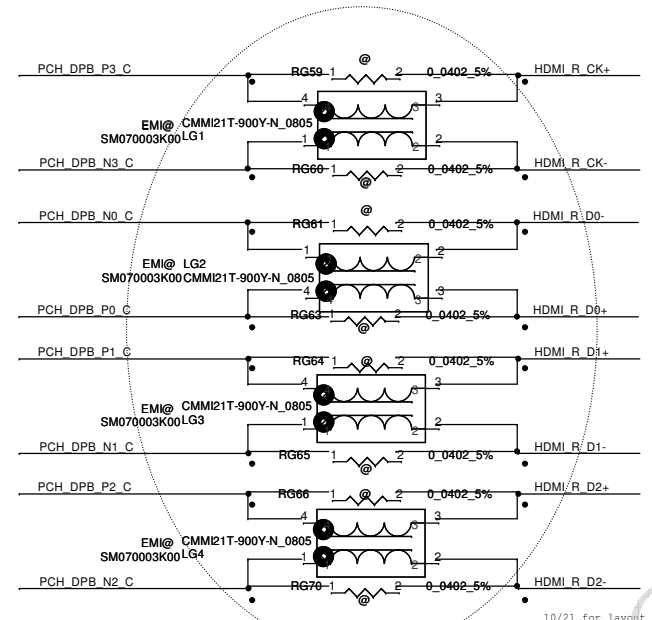
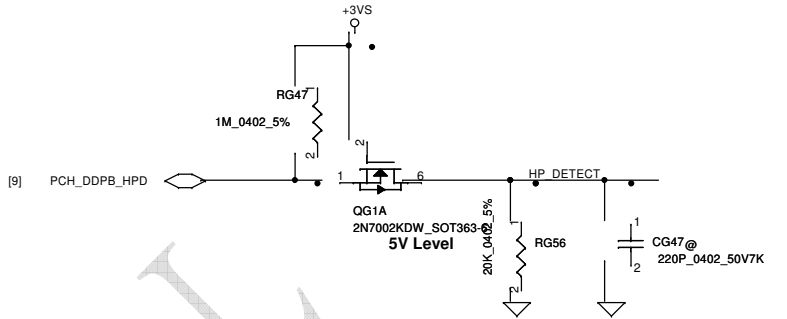
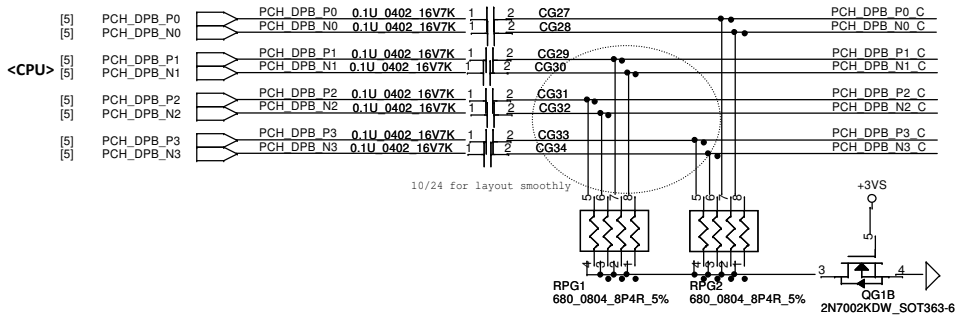
0923 No support eDP/LVDS co-layout



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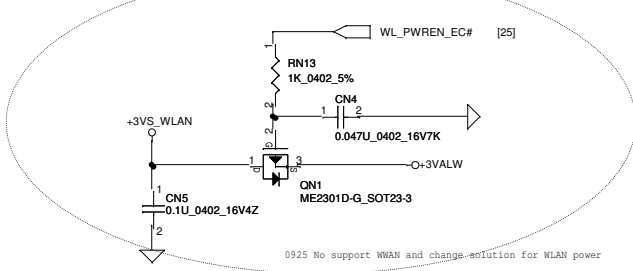


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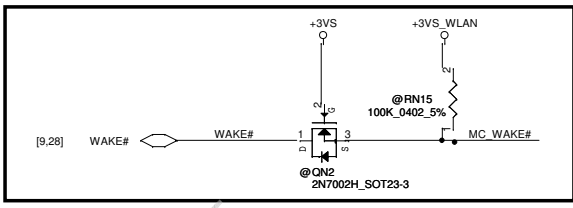
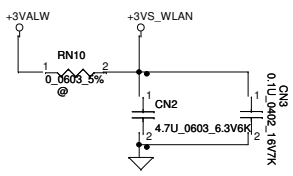


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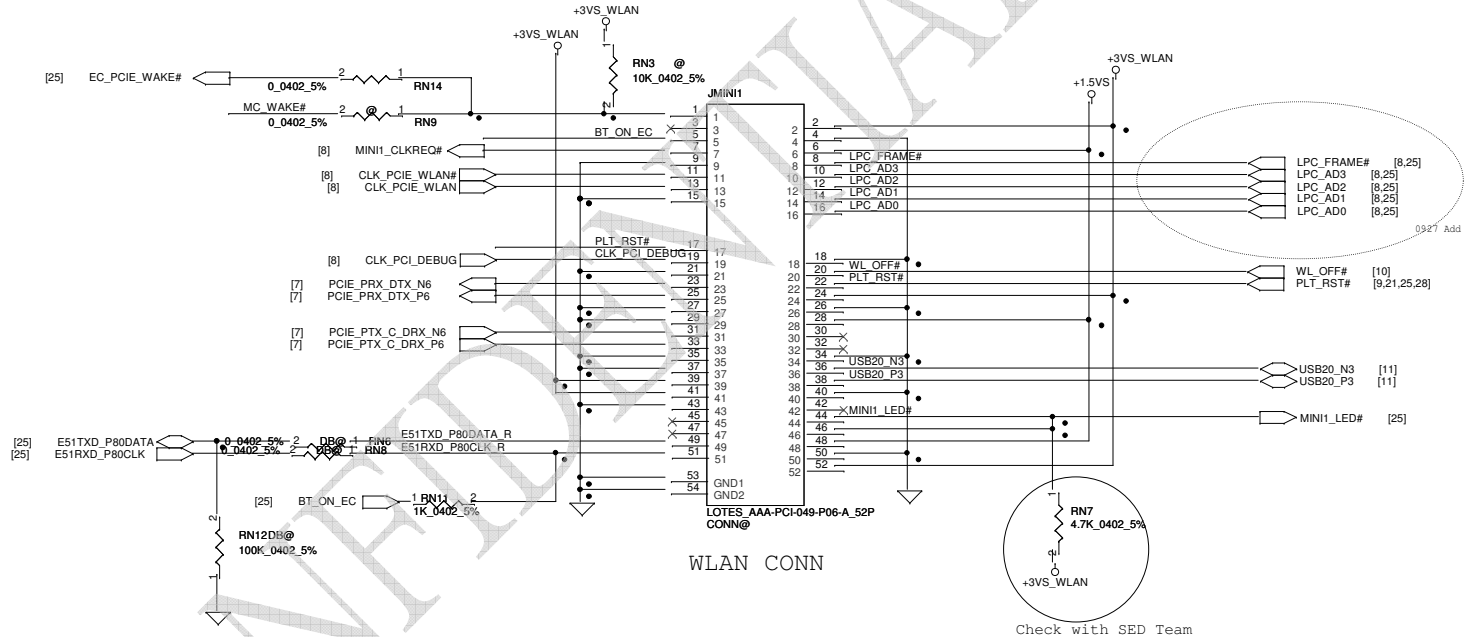
**+3VALW TO +3VS\_WLAN**



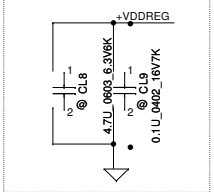
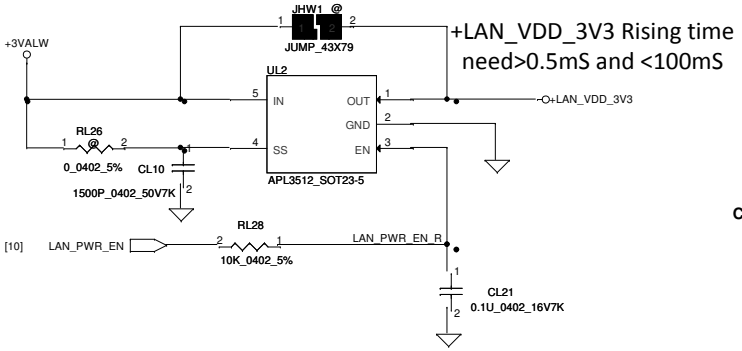
0925 No support WLAN and change solution for WLAN power



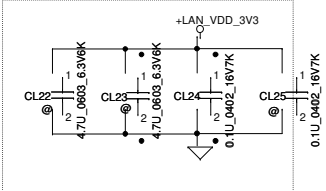
PV# 2013.01.23 Add QB8 abd RL25 to support OBFF



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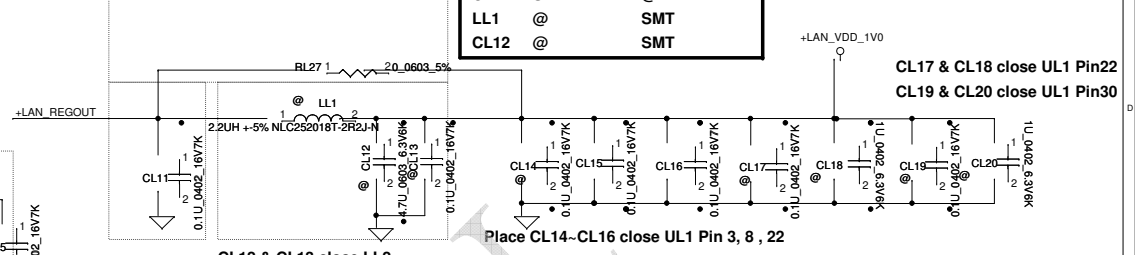
CL8 & CL9 close to UL1: Pin 23



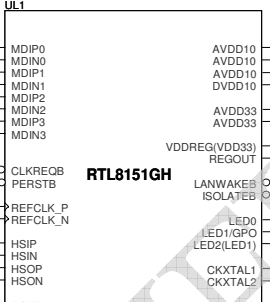
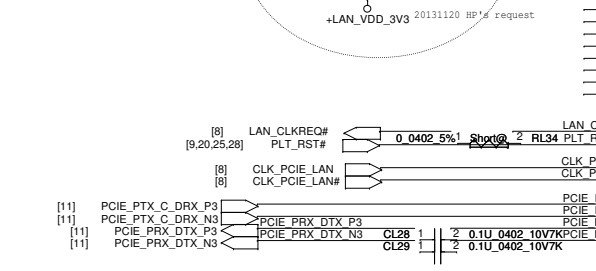
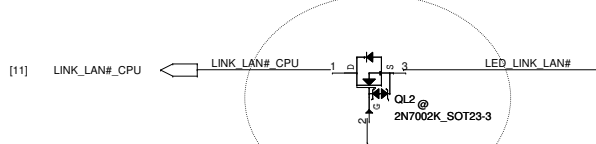
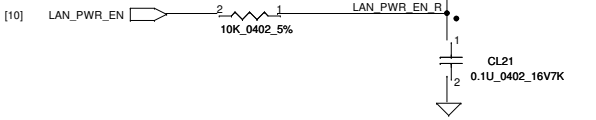
CL22 & CL23 close to UL1: Pin 11,32  
CL24 close to UL1: Pin 32  
CL25 close to UL1: Pin 11

LDO mode	Switching mode
RL27 SMT	@
CL11 SMT	@
LL1 @	SMT
CL12 @	SMT

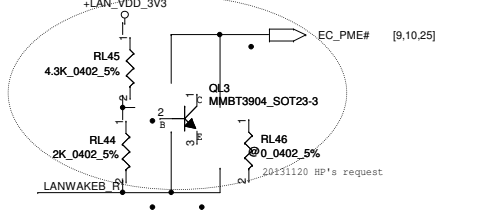
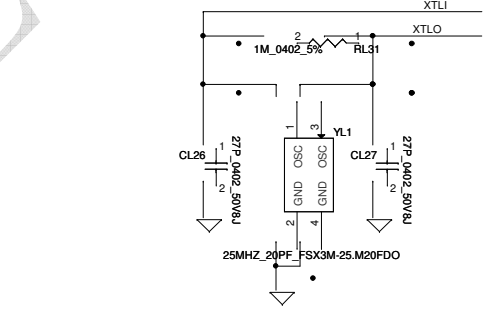
RTL8151GH (LDO mode)



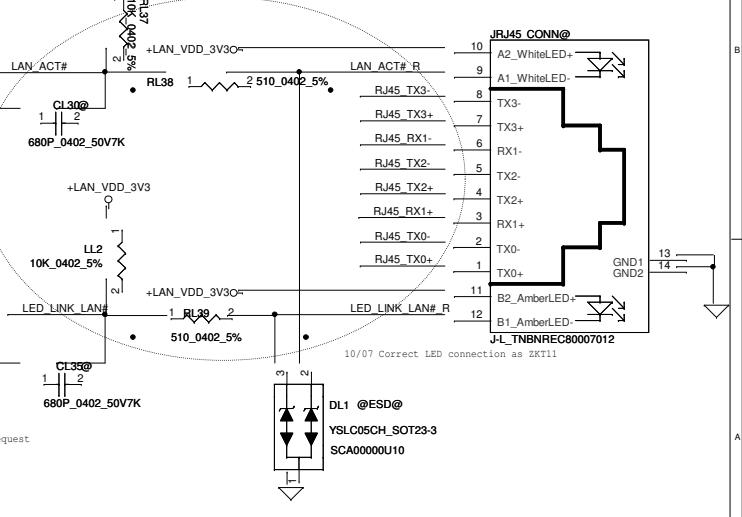
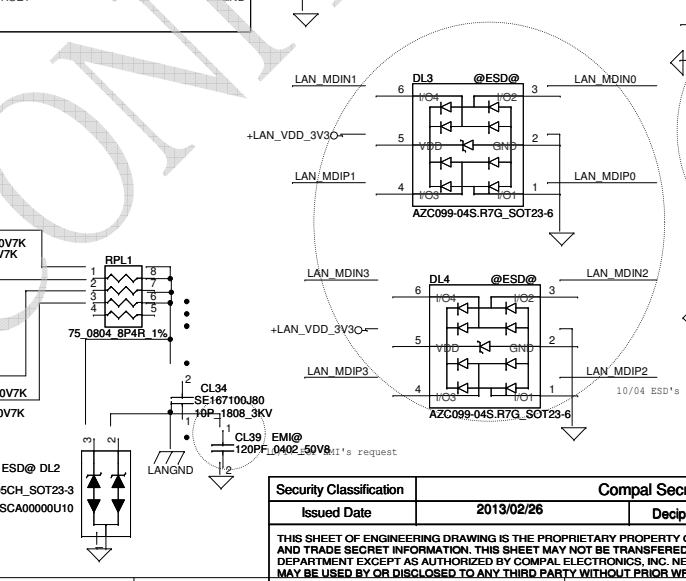
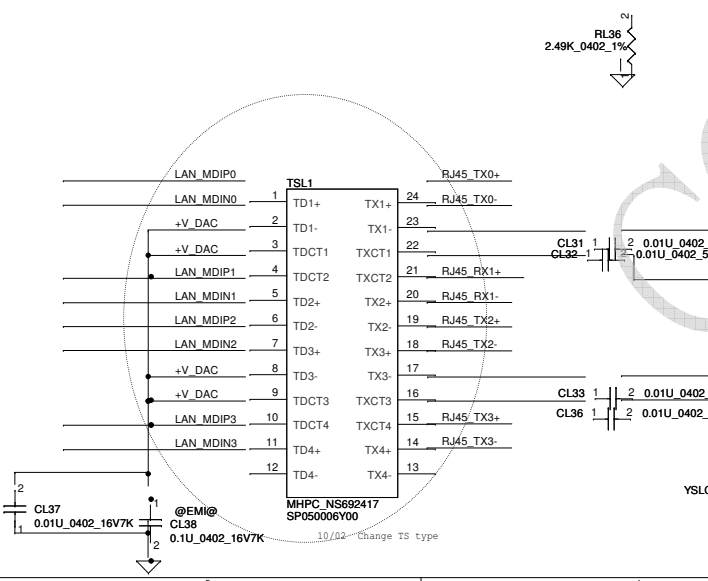
CL12 & CL13 close LL2



RTL8151GH

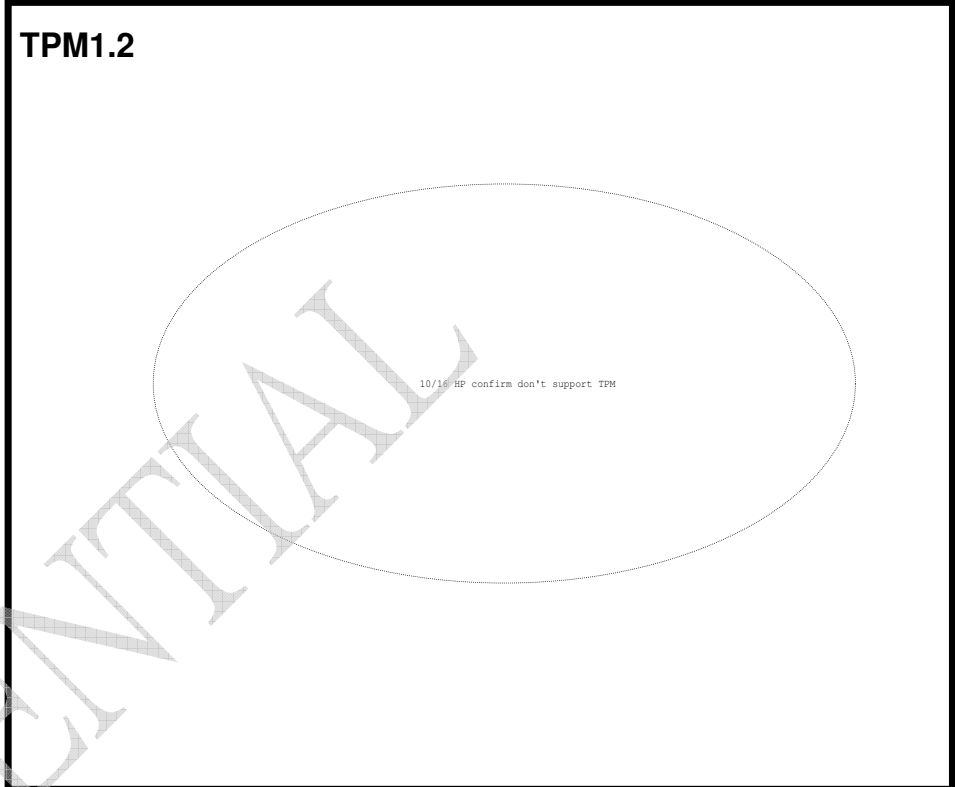
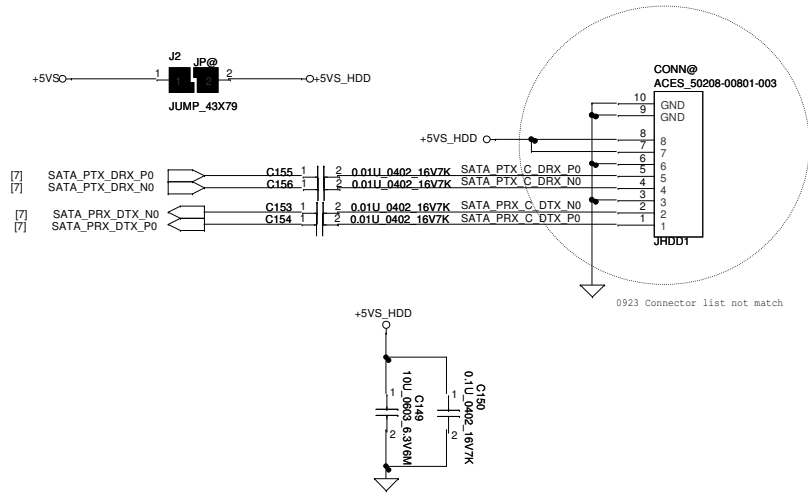


RJ45 CONN.

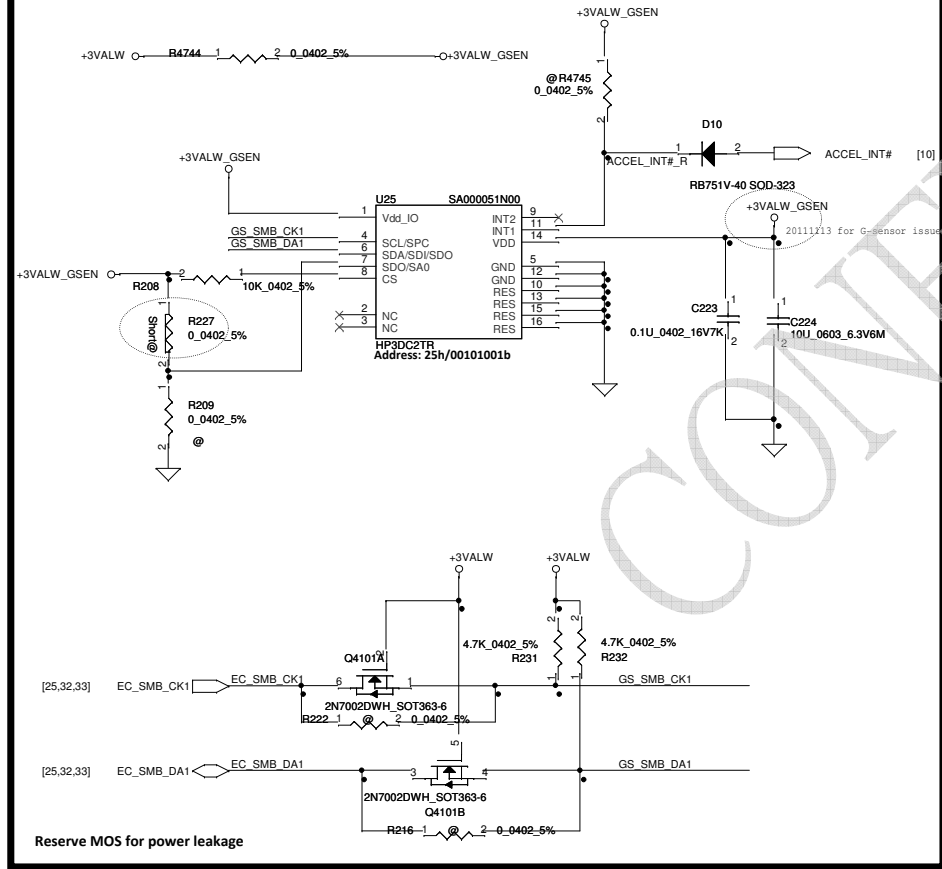


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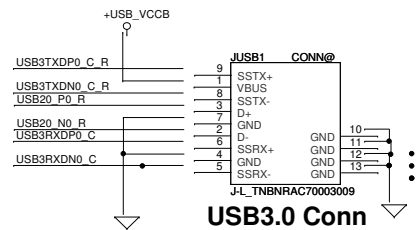
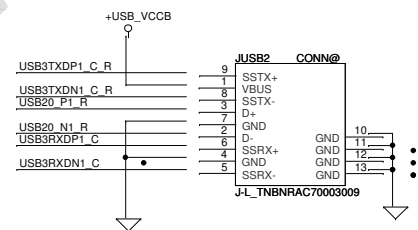
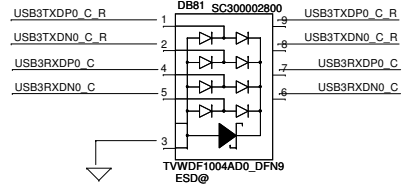
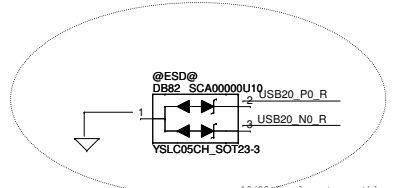
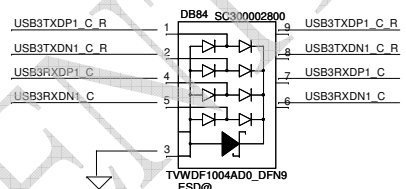
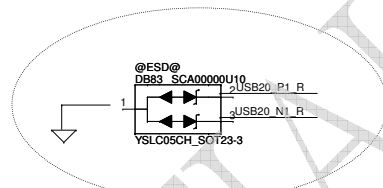
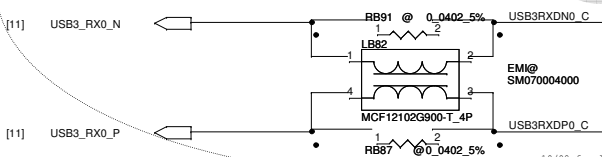
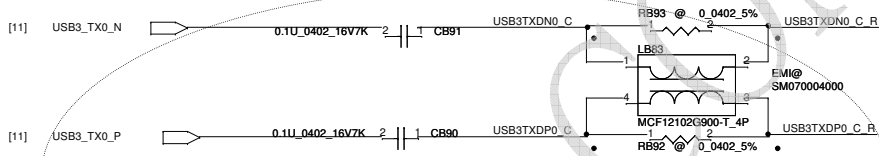
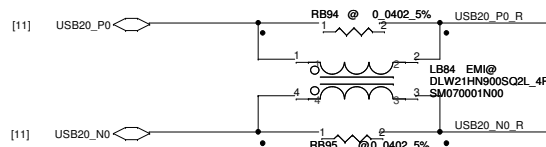
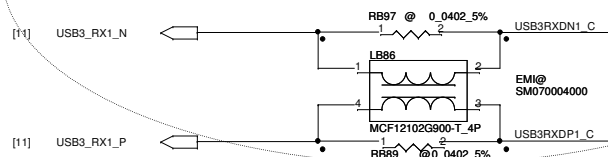
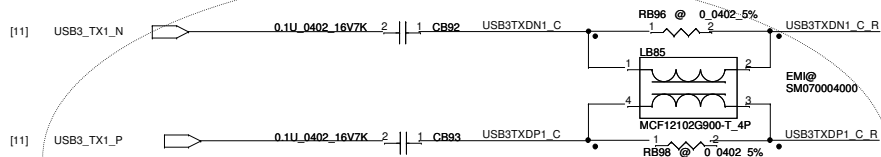
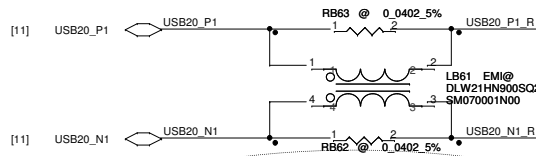
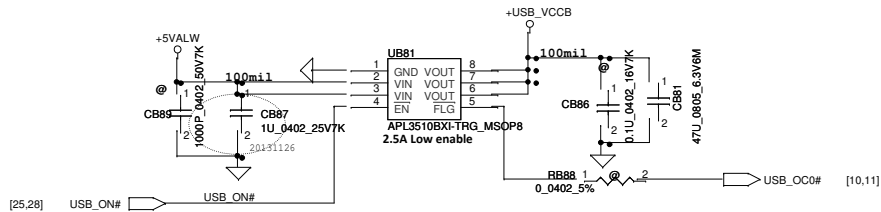
### 2.5" SATA HDD connector



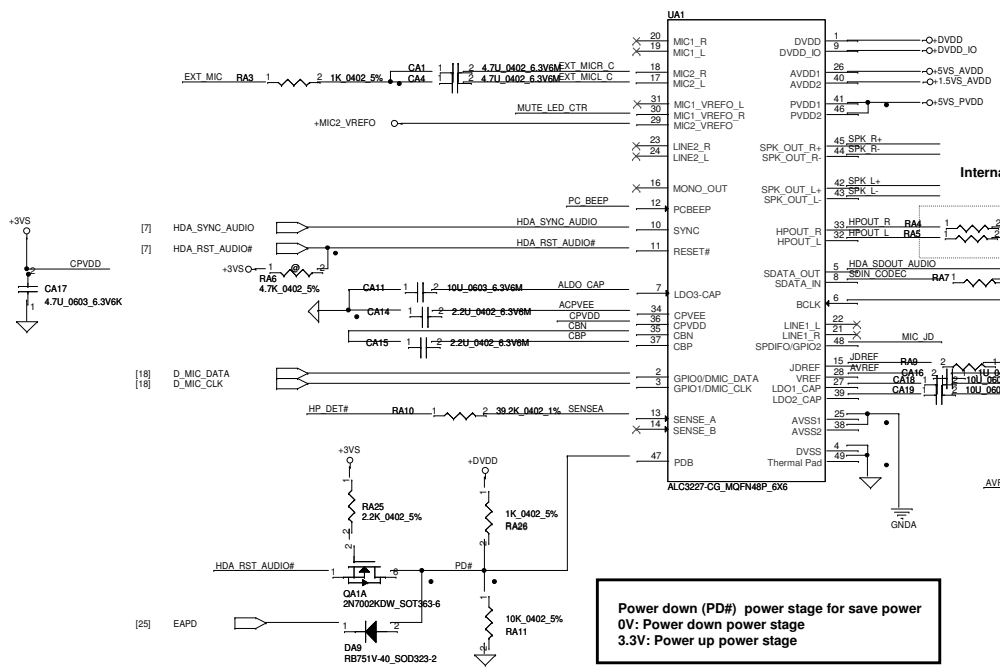
### ACCELEROMETER for HDD Protect



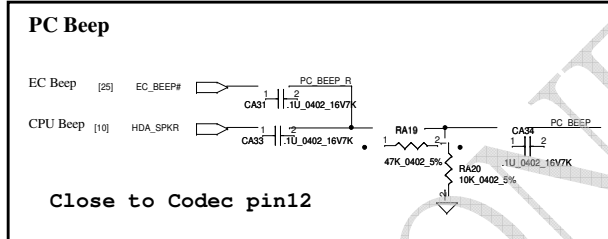
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Power down (PD#) power stage for save power  
 0V: Power down power stage  
 3.3V: Power up power stage



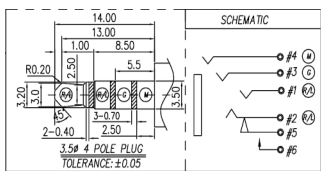
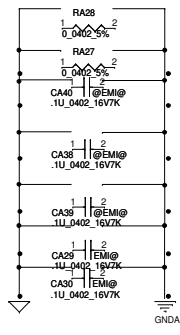
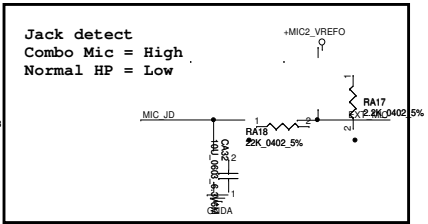
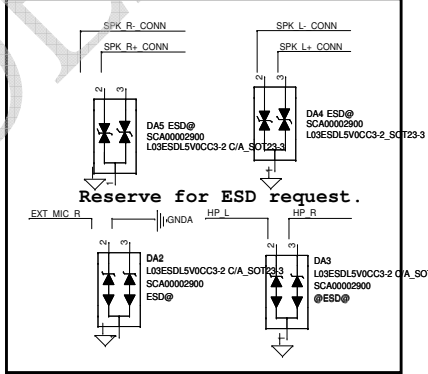
**Internal Speaker**

**Headphone**

**Internal SPK**

<DB>Relace RA13/RA14/RA15/RA16 close to UA1

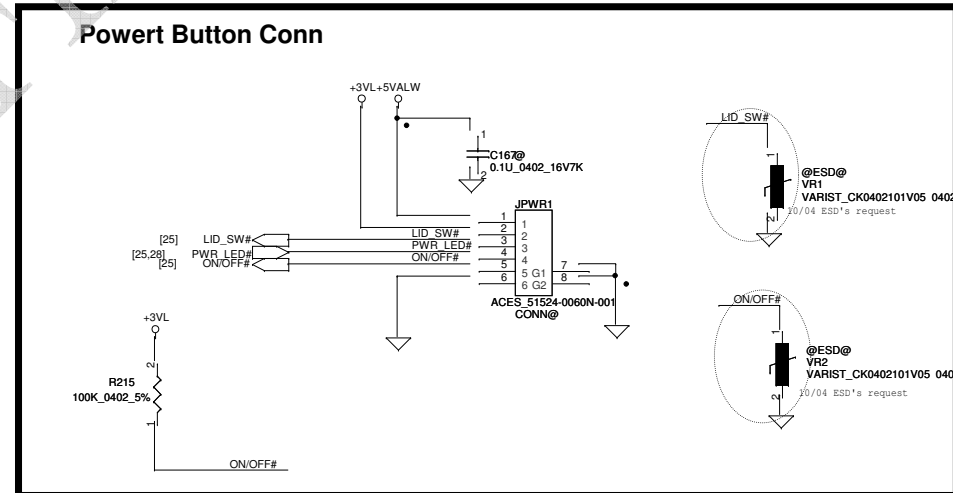
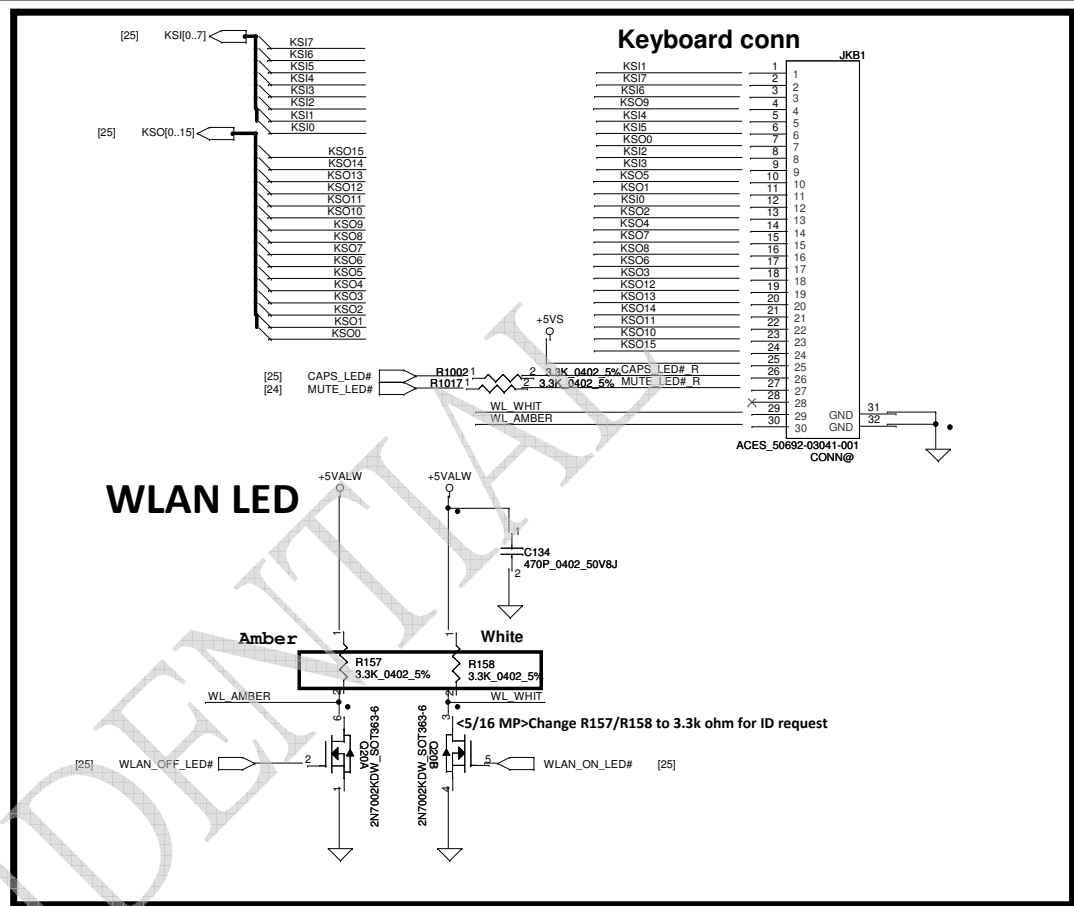
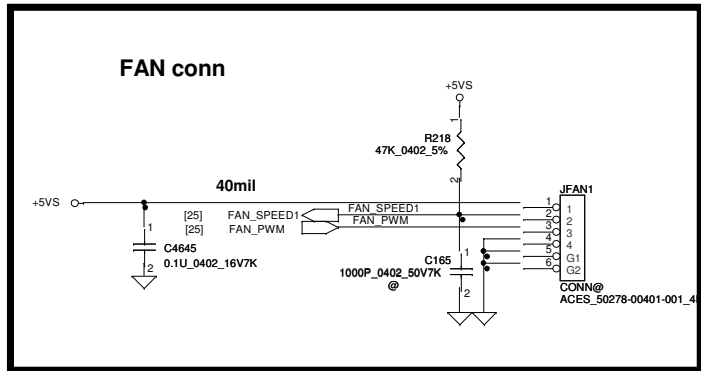
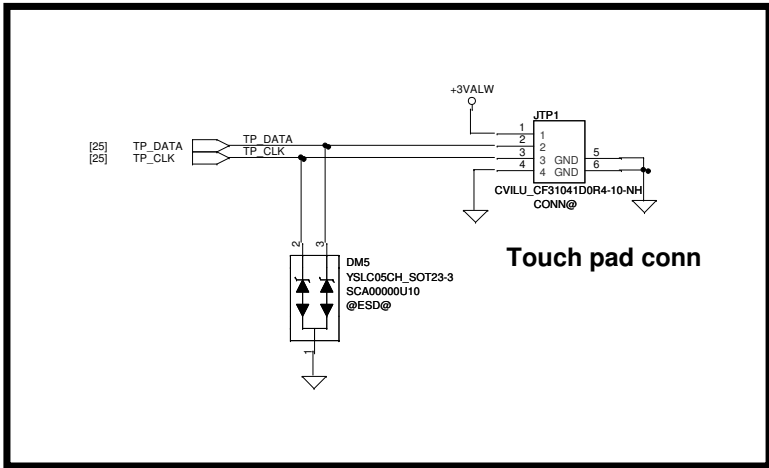
wide 40 MIL



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Date: Tuesday, January 11, 2016				Sheet	24 of 40





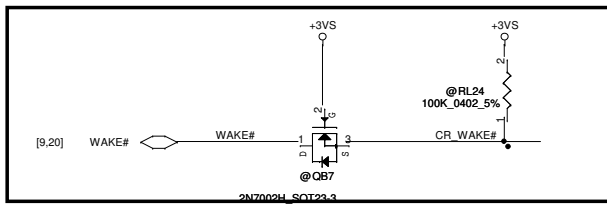
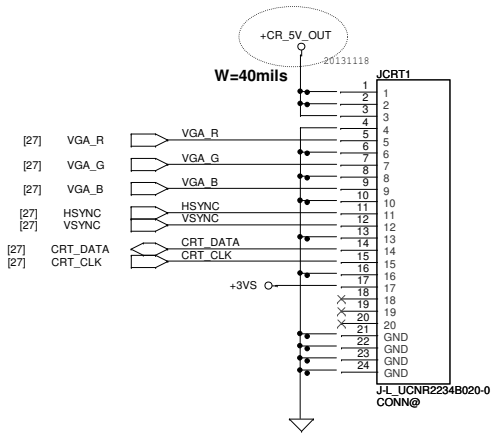
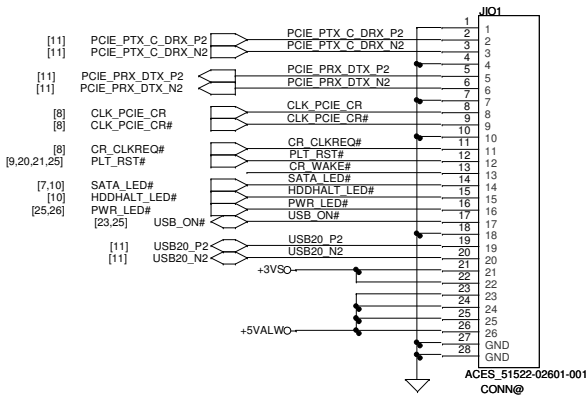


0926 Confirm with HW9, Koopas didn't need Reset IC

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				P30-KB/TP/Sensor-B/Camera/D-MIC
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Date: Tuesday, January 21, 2014				Sheet 26 of 46

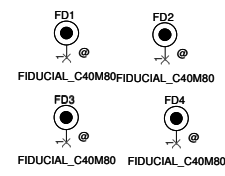
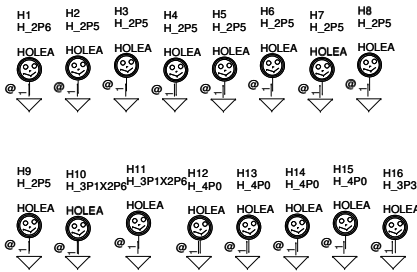


# Card reader/USB IO Connector



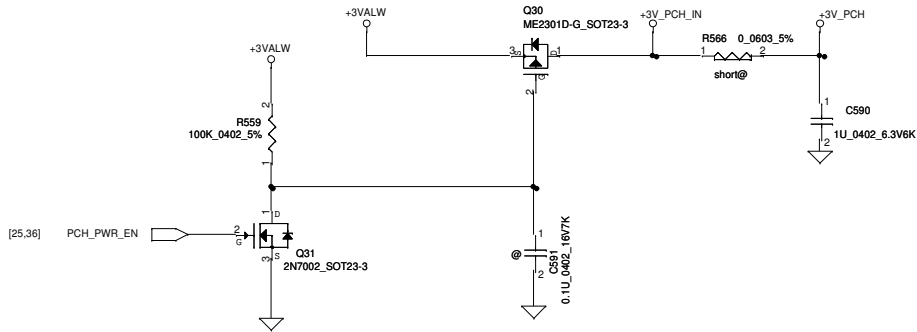
0927 for support OBFF

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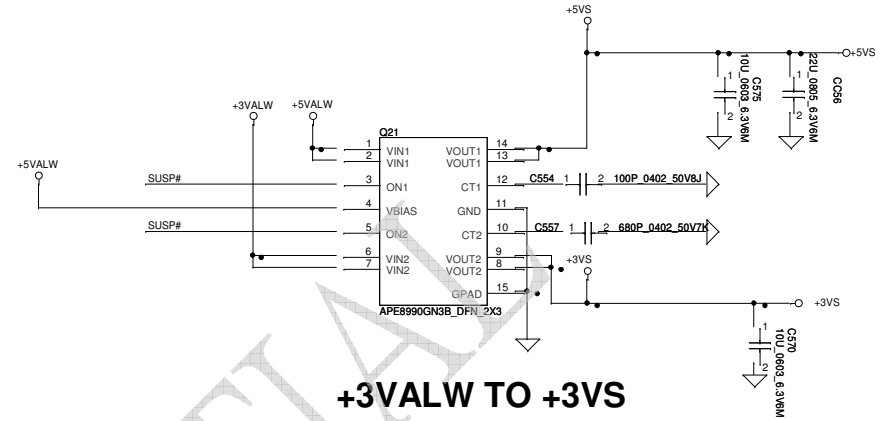


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### +3VALW TO +3V\_PCH

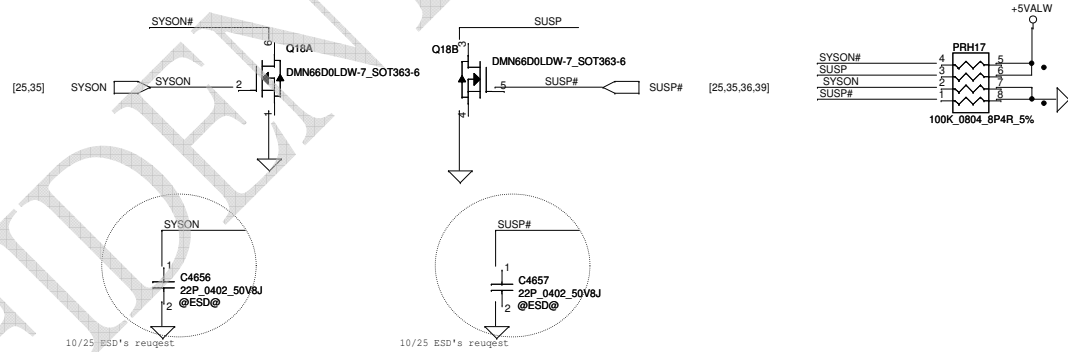


### +5VALW TO +5VS

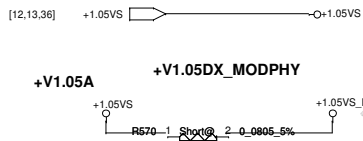


### +3VALW TO +3VS

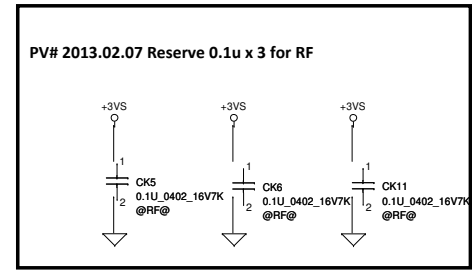
AO4430L  
VGS Max=+- 20V  
VGS(Th) max=2.5V  
Rds Max=5.5m @VGS=10V  
Rds Max=7.5m @VGS=4.5V



CPU +V1.05DX\_MODPHY  
Max Rdsn <6m ohm  
1840mA



AO4430L  
VGS Max=+- 20V  
VGS(Th) max=2.5V  
Rds Max=5.5m @VGS=10V  
Rds Max=7.5m @VGS=4.5V



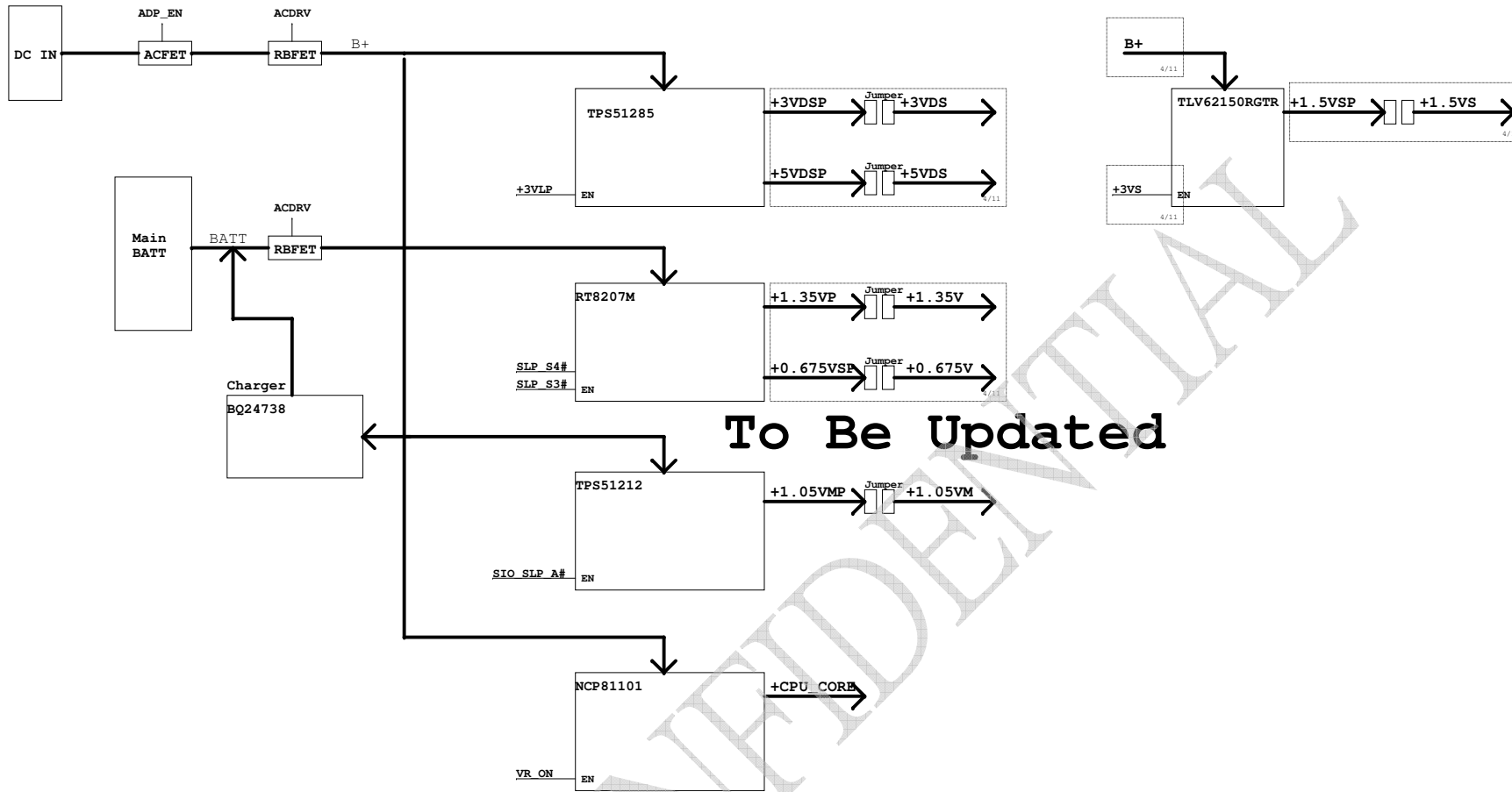
Security Classification		Compal Secret Data		Title	
Issued Date	2011/06/29	Deciphered Date	2011/06/29	DC Interface	
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# Version Change List (P. I. R. List) for HW Circuit

Item	Page#	Title	Date	Request Owner	Issue Description	Solution Description	Rev.
1	9	CRT	11/11	Compal	CRT can't output	Add PU (RC370/RC371) to enable DP port C	0.2
2	9,17	CPU/LVDS	11/11	Compal	DFX issue	Correct footprint for UC9/UT2	0.2
3	22	G-Sensor	11/13	Compal	G-sensor can't work issue	Change power rail from +3V_GSEN to +3V_ALW_GSEN	0.2
4	8	CPU	11/20	HP	To follow Intel HSW-U PCIeCLKRQn# assignment	Install RC183/RC187 and uninstall RC184/RC177	0.3
5	21	LAN	11/20	HP	To prevent from unexpected wake-up when adapter inserting	Add QL3, RL44, RL45, RL46	0.3
6	21	LAN	11/20	HP	Let CPU can detect LAN activity	Connect LINK_LAN#_CPU to GPIO41	0.3
7	5, 12	CPU	11/20	HP	To follow Intel's VR design	Delete UC8 and add RC288	0.3
8	16	DDR	11/20	HP	To avoid glitch	Reserve RD23 and connect to +5VS	0.3
9	29	DC-DC	11/22	Compal	To simplify circuit	Delete J1 and change name from +1.05V to +1.05VS	0.3
10	25	KBC	11/26	Compal	ESD's request	Add CK12, CK13 and CK14	0.3
11	7	CPU	12/24	Compal	For solve OBS#1007037 (RTC accuracy)	Change CC3/CC4 to 18pF	1.0

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To Be Updated

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Issued Date	2012/04/03	Deciphered Date	2014/12/31	Title	Power Block Diagram
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				Date:	Tuesday, January 21, 2014
				Sheet	31 of 40
				Rev	1.0

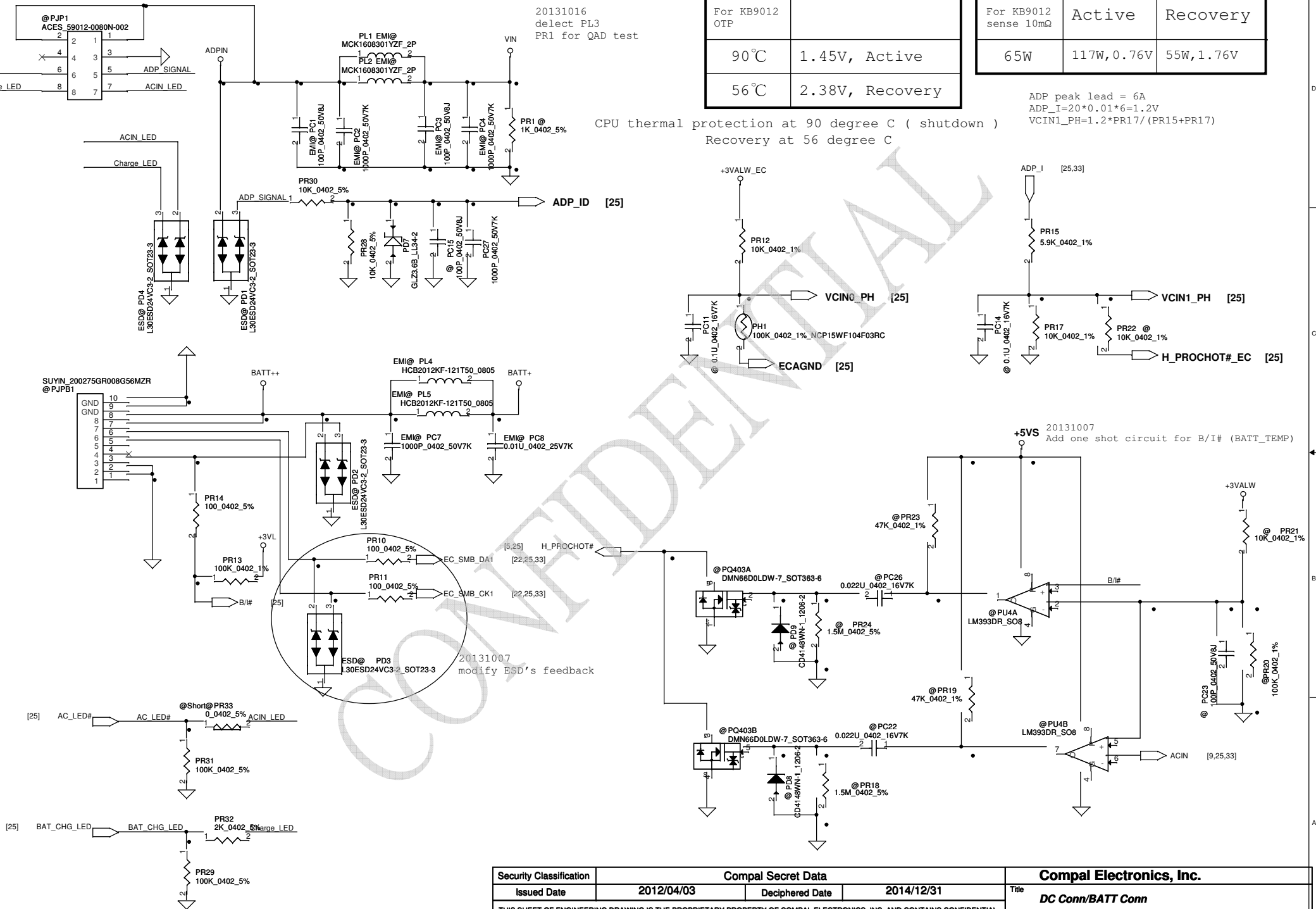
20131016  
 delete PL3  
 PR1 for QAD test

For KB9012 OTP	
90°C	1.45V, Active
56°C	2.38V, Recovery

For KB9012 sense 10mΩ	Active	Recovery
65W	117W, 0.76V	55W, 1.76V

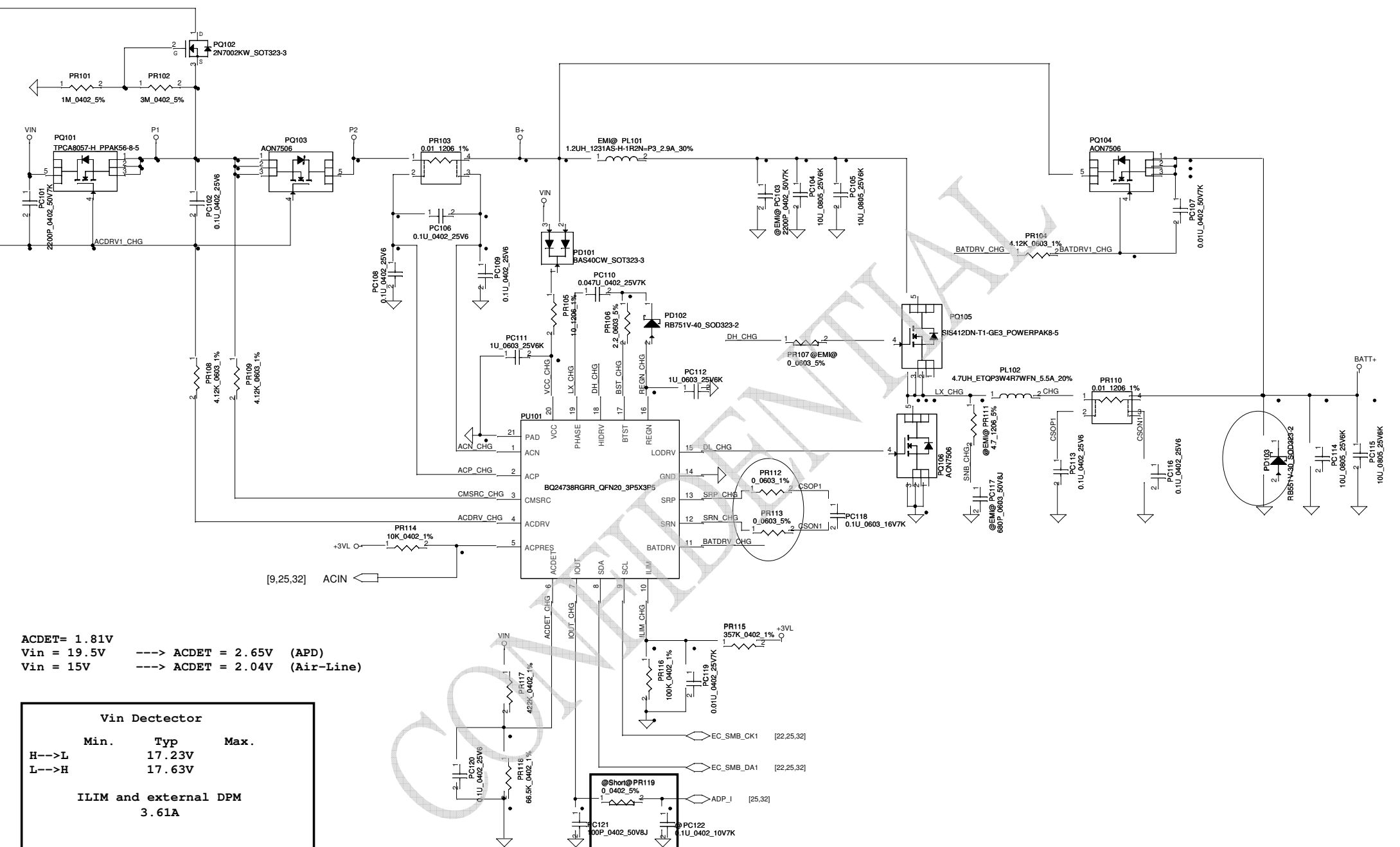
ADP peak lead = 6A  
 ADP\_I=20\*0.01\*6=1.2V  
 VCIN1\_PH=1.2\*PR17/(PR15+PR17)

CPU thermal protection at 90 degree C ( shutdown )  
 Recovery at 56 degree C



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ACDET= 1.81V  
 Vin = 19.5V ----> ACDET = 2.65V (APD)  
 Vin = 15V ----> ACDET = 2.04V (Air-Line)

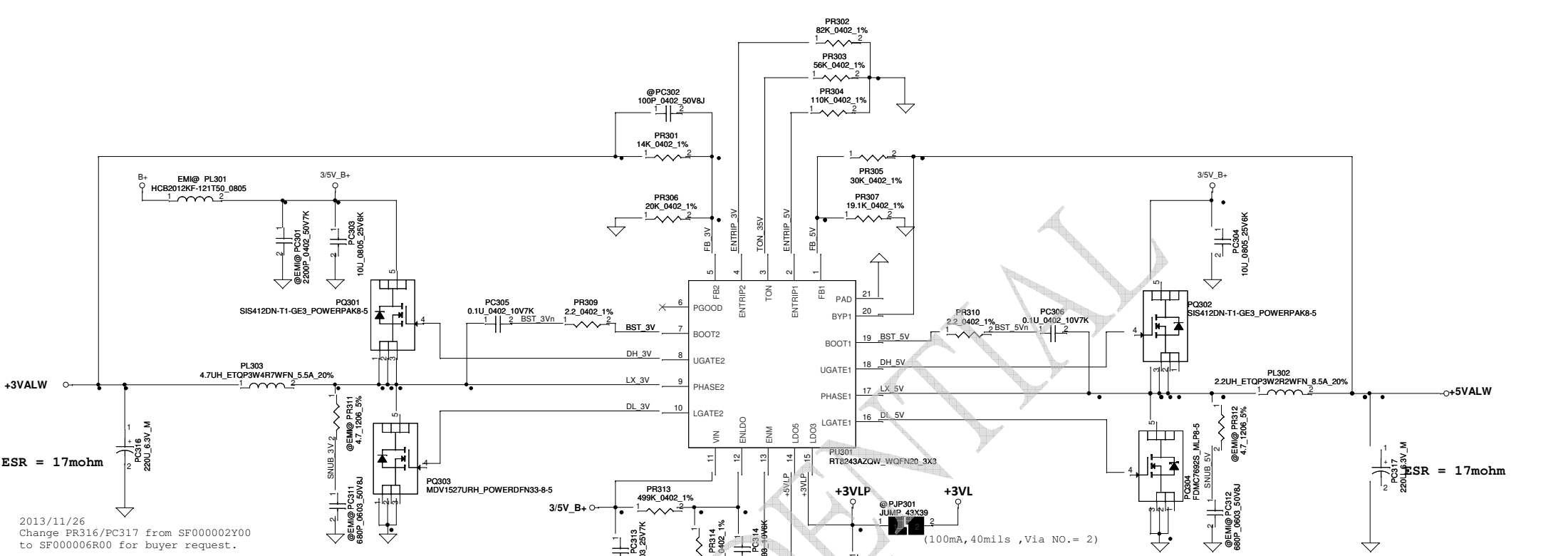
Vin Detector			
	Min.	Typ	Max.
H-->L		17.23V	
L-->H		17.63V	

ILIM and external DPM  
 3.61A

@Short@PR119  
 0.0402\_5%

Please locate the RC  
 Near EC chip  
 2011-02-22

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				<b>CHARGER</b>
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				Rev 1.0
				Date: _____ Sheet 33 of 40



2013/11/26  
 Change PR316/PC317 from SF000002Y00  
 to SF000006R00 for buyer request.

For 12V < Vin < 25V  
 $f1 = 1/ts1 = 1/(45.75p * Rton)$   
 $f2 = 1/ts2 = 1/(39.2p * Rton)$

3.4V  
 Peak Current 4.85A  
 I<sub>max</sub>=3.4A  
 OCP current 5.82A  
 OCP range 5.84A~6.96A  
 FSW=456kHz  
 Tripple=1.3A  
 V<sub>ripple</sub>=1.3\*1.7m=2.21mV

CHOKE: 4.7uH, DCR 35mOhm, L/2 over 10A

5.14V  
 Peak Current 7.6A  
 I<sub>max</sub>=5.3A  
 OCP current 9.12A  
 OCP range 9.16A ~ 10.67A  
 FSW=390kHz  
 Tripple=4.4A  
 V<sub>ripple</sub>=4.4\*1.7m=7.48mV

CHOKE: 2.2uH, DCR 15.5mOhm, L/2 over 18A

L side R<sub>ds(on)</sub>=13mohm ~ 15.8mohm

OVP=108% 112% 116%

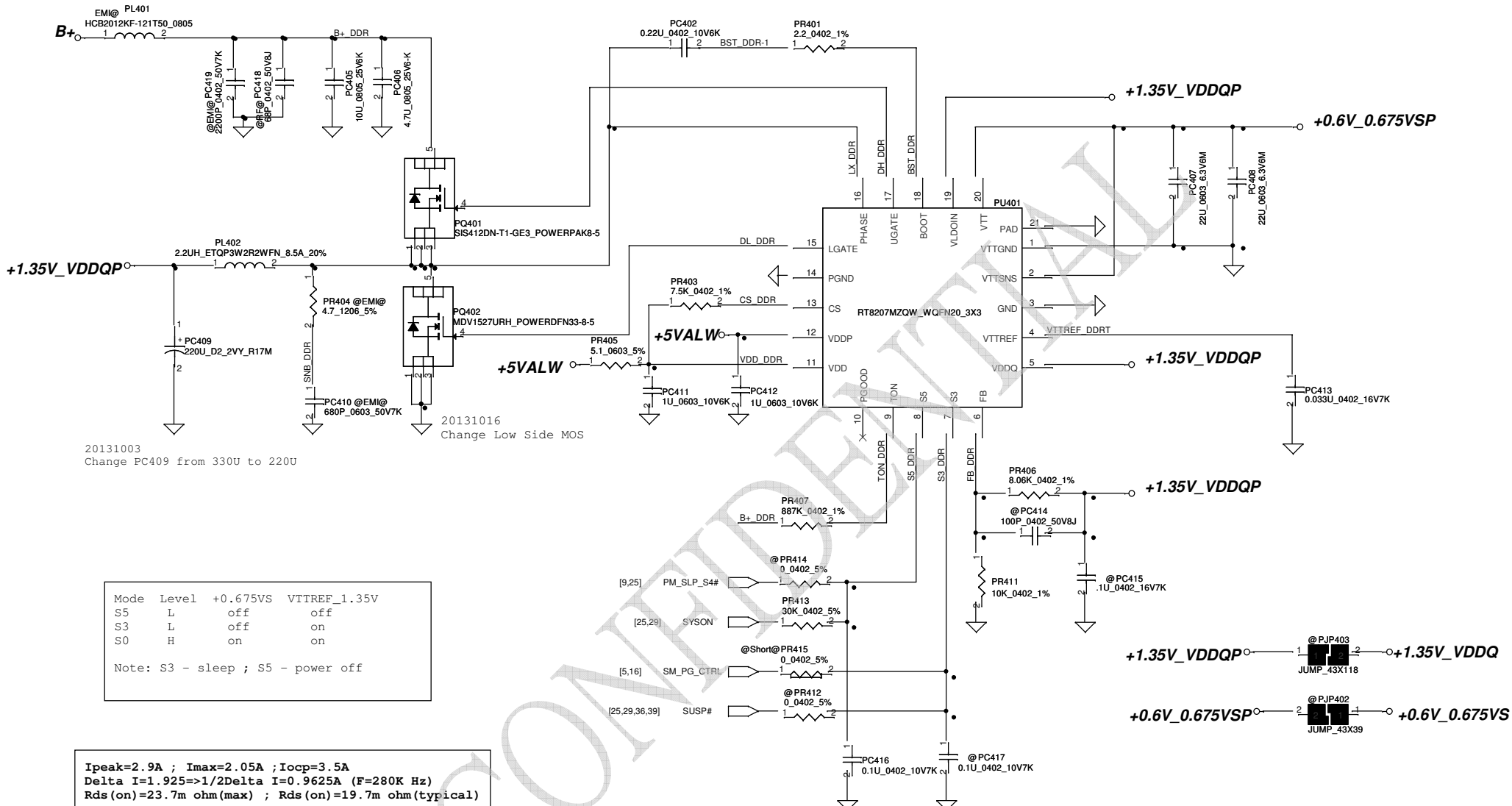
OCP=I<sub>limit</sub>+I<sub>ripple</sub>/2  
 $Rlimit = \{ [Ilimit * Rds(on)] * 10 \} / 10uA$

ENTRIPx=R<sub>limit</sub>\*10uA should be in the range of 0.5~3V

V<sub>out</sub>=VFB\*(1+R<sub>top</sub>/R<sub>bot</sub>)  
 VFB=2V

[25] EC\_ON  
 [25] MAINPWON

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20131003  
Change PC409 from 330U to 220U

20131016  
Change Low Side MOS

Mode	Level	+0.675VS	VTTREF_1.35V
S5	L	off	off
S3	L	off	on
S0	H	on	on

Note: S3 - sleep ; S5 - power off

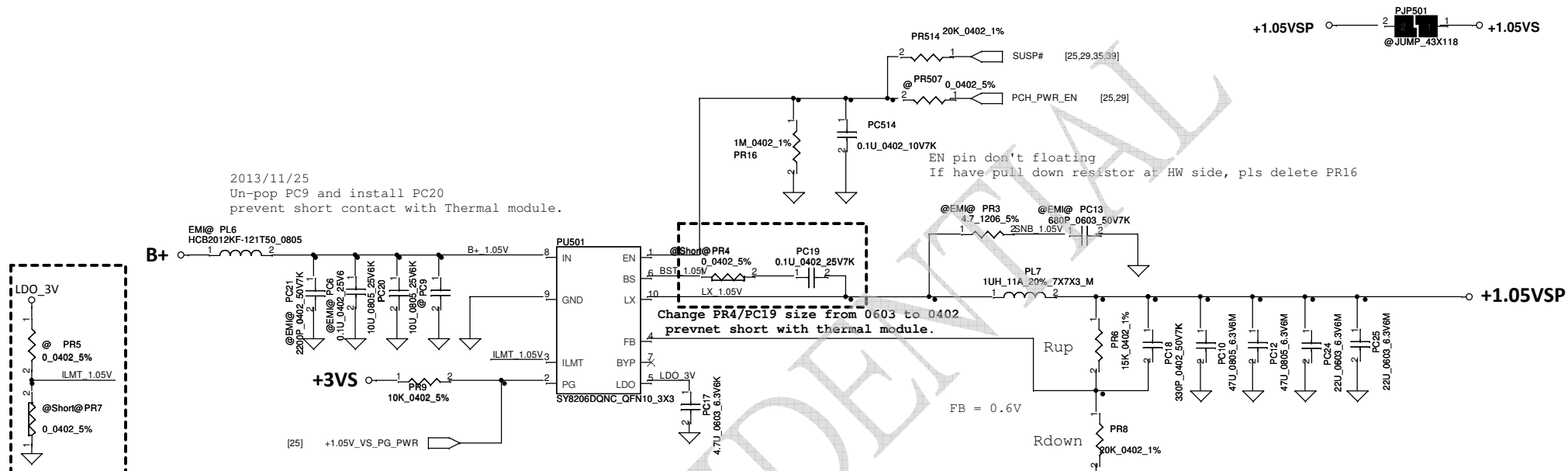
Ipeak=2.9A ; I<sub>max</sub>=2.05A ; I<sub>ocp</sub>=3.5A  
 Delta I=1.925=>1/2Delta I=0.9625A (F=280K Hz)  
 R<sub>ds(on)</sub>=23.7m ohm(max) ; R<sub>ds(on)</sub>=19.7m ohm(typical)

I<sub>limit\_min</sub>=(7.5K\*10uA)/(23.7m)=3.16A  
 I<sub>limit\_max</sub>=(7.5K\*10uA)/(19.7m)=3.81A  
 I<sub>ocp</sub>=1/2Delta I + I<sub>limit</sub> = 4.12A~3.67A

ovp=110%~120%

Choke: 2.2uH, DCR=15.5mohm, L/2 over 18A

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2013/11/25  
 Un-pop PC9 and install PC20  
 prevent short contact with Thermal module.

Change PR4/PC19 size from 0603 to 0402  
 prevent short with thermal module.

EN pin don't floating  
 If have pull down resistor at HW side, pls delete PR16

Pin 7 BYP is for CS.  
 Common NB can delete +3VALW and PC15

The current limit is set to 6A, 8A or 12A when this pin is pull low, floating or pull high

Ipeak = 4.85A, Imax = 3.6A

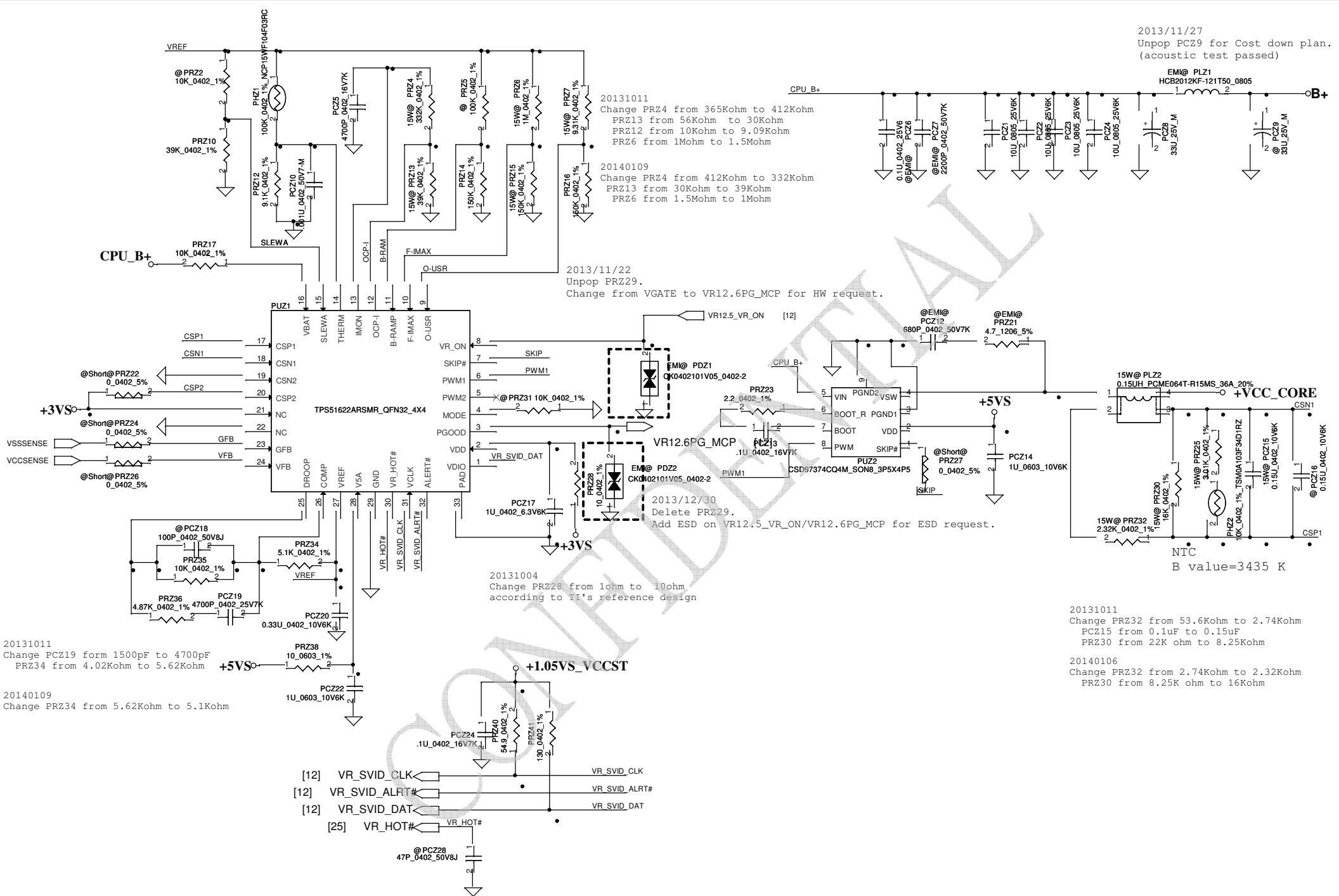
$$VFB = 0.6V$$

$$Vout = 0.6V * (1 + Rup/Rdown)$$

$$Vout = 1.05V$$

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2013/11/27  
 Unpop PCZ9 for Cost down plan.  
 (acoustic test passed)



20131011  
 Change PRZ4 from 365Kohm to 412Kohm  
 PRZ13 from 56Kohm to 30Kohm  
 PRZ12 from 10Kohm to 9.09Kohm  
 PRZ6 from 1Mohm to 1.5Mohm

20140109  
 Change PRZ4 from 412Kohm to 332Kohm  
 PRZ13 from 30Kohm to 39Kohm  
 PRZ6 from 1.5Mohm to 1Mohm

2013/11/22  
 Unpop PRZ29.  
 Change from VGATE to VR12.6PG\_MCP for HW request.

2013/12/30  
 Delete PRZ29.  
 Add ESD on VR12.5\_VR\_ON/VR12.6PG\_MCP for ESD request.

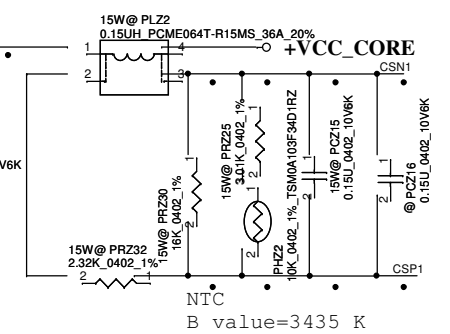
20131004  
 Change PRZ28 from 1ohm to 10ohm  
 according to TI's reference design

20131011  
 Change PCZ19 from 1500pF to 4700pF  
 PRZ34 from 4.02Kohm to 5.62Kohm

20140109  
 Change PRZ34 from 5.62Kohm to 5.1Kohm

20131011  
 Change PRZ32 from 53.6Kohm to 2.74Kohm  
 PCZ15 from 0.1uF to 0.15uF  
 PRZ30 from 22K ohm to 8.25Kohm

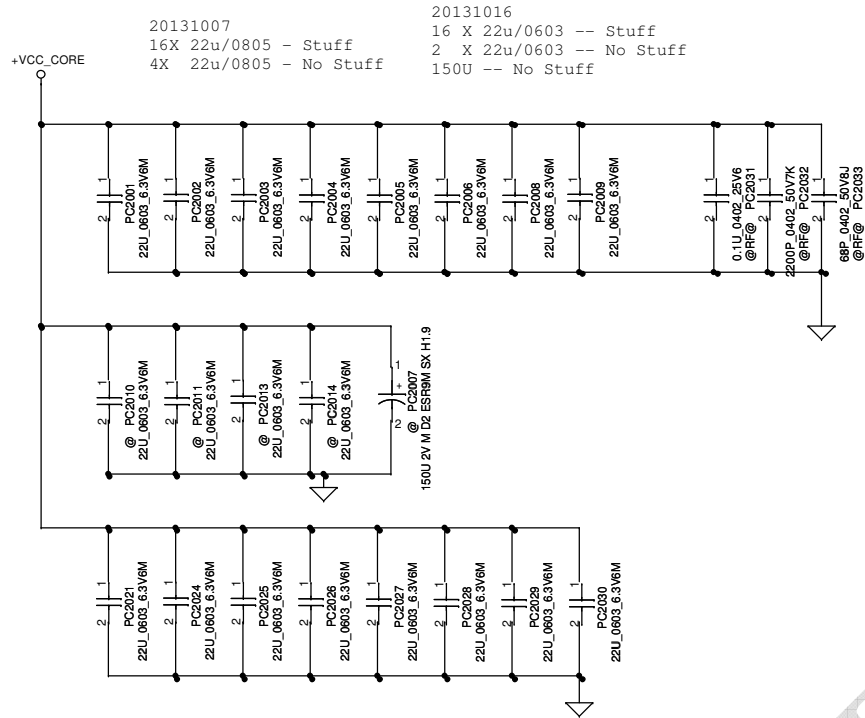
20140106  
 Change PRZ32 from 2.74Kohm to 2.32Kohm  
 PRZ30 from 8.25K ohm to 16Kohm



NTC  
 B value=3435 K

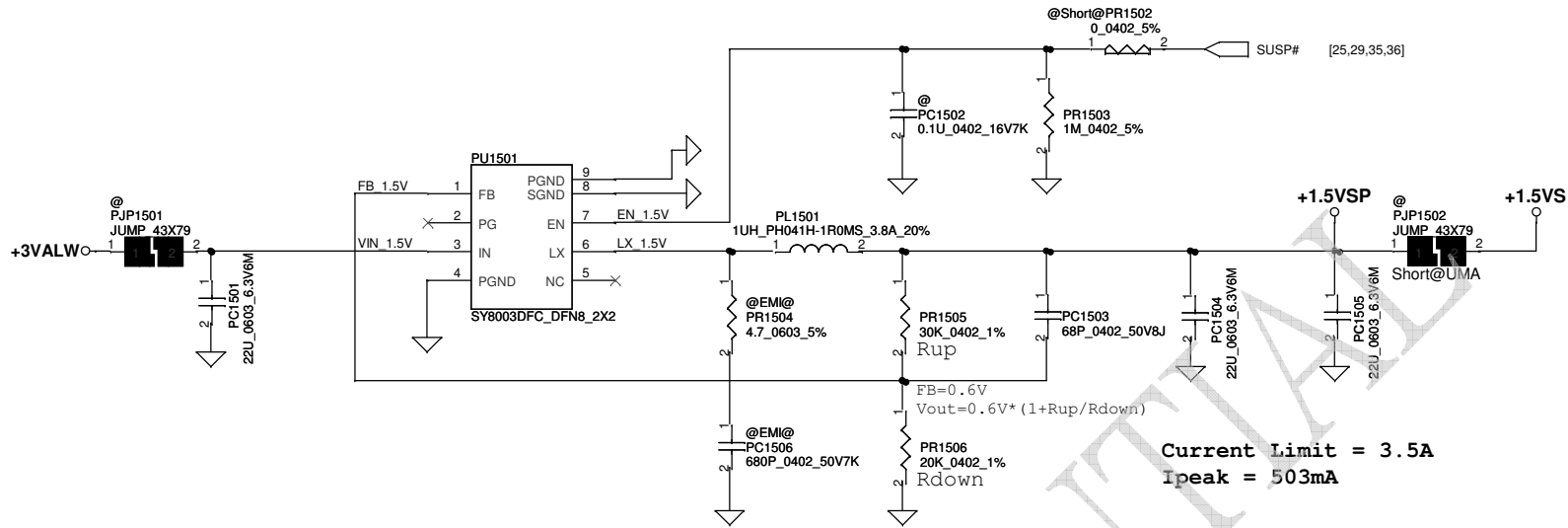
- [12] VR\_SVID\_CLK
- [12] VR\_SVID\_ALRT#
- [12] VR\_SVID\_DAT
- [25] VR\_HOT#

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Date: Tuesday, January 21, 2014			Sheet 39	of 40

Item	Fixed Issue	Reason for change	Rev.	PG#	Modify List	Date	Phase
1	Add PC315 4.7U_0603_6.3V6K	Prevent ENE9012 EC_ON Issue.	1.0	34	Add PC315 4.7U_0603_6.3V6K	2013/11/20	PV
2		Unpop PRZ29 and change Netname from VGATE to VR12.6PG_MCP for HP request.	1.0	37	Unpop PRZ29 and change Netname from VGATE to VR12.6PG_MCP for HP request.	2013/11/22	PV
3		Change Power rail from +1.05VP to +1.05VSP for HW request.	1.0	36	Change Power rail from +1.05VP to +1.05VSP for HW request.	2013/11/22	PV
4		Un-pop PC9 and install PC20 prevent short contact with Thermal module.	1.0	36	Un-pop PC9 and install PC20 prevent short contact with Thermal module.	2013/11/25	PV
5		Unpop PCZ9 for Cost down plan. (acoustic test passed)	1.0	37	Unpop PCZ9 for Cost down plan. (acoustic test passed)	2013/11/25	PV
6		Change PR4/PC19 size from 0603 to 0402 prevent short with thermal module.	1.0	36	Change PR4/PC19 size from 0603 to 0402 prevent short with thermal module.	2013/12/20	MV
7		Change PRZ4 from 412Kohm to 475Kohm.	1.0	37	Change PRZ4 from 412Kohm to 475Kohm.	2013/12/20	MV
8		Delete reserve symbol PRZ29. Add ESD on VR12.5_VR_ON/VR12.6PG_MCP for ESD request.	1.0	37	Delete reserve symbol PRZ29. Add ESD on VR12.5_VR_ON/VR12.6PG_MCP for ESD request.	2013/12/30	MV
9		Change PR33 from 0 ohm to Short PAD.	1.0	32	Change PR33 from 0 ohm to Short PAD.	2013/12/31	MV
10		Change PR4/PR7 from 0 ohm to Short PAD.	1.0	36	Change PR4/PR7 from 0 ohm to Short PAD.	2013/12/31	MV
11		Change PRZ22 from 0 ohm to Short PAD.	1.0	37	Change PRZ22 from 0 ohm to Short PAD.	2013/12/31	MV
12		Change PR1502 from 0 ohm to Short PAD.	1.0	39	Change PR1502 from 0 ohm to Short PAD.	2013/12/31	MV
13		Change PRZ32 from 2.74Kohm to 2.32Kohm. Change PRZ30 from 8.25K ohm to 16Kohm.	1.0	37	Change PRZ32 from 2.74Kohm to 2.32Kohm. Change PRZ30 from 8.25K ohm to 16Kohm.	2014/01/06	MV
14							
15							
16							

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Issued Date	2011/07/08	Deciphered Date	2015/07/08	Title	
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Size	Document Number	Rev		Date	
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