

MODEL NAME : **BBV00/BBV10**

PCB NO : **LA-D993P**

BOM P/N :

Dell/Compal Confidential

Schematic Document

KABYLAKE-H

2016-11-01

Rev: 1.0 (A00)

@ : Nopop Component

CONN@ : Connector Component

R1@ / R3@ : R1/R3 CPN for CPU, GPU, PCB

EMC@ : Pop of EMI parts

S4G@ : Samsung GDDR5 4G for GPU

M4G@ : Micron GDDR5 4G for GPU

H4G@ : Hynix GDDR5 4G for GPU

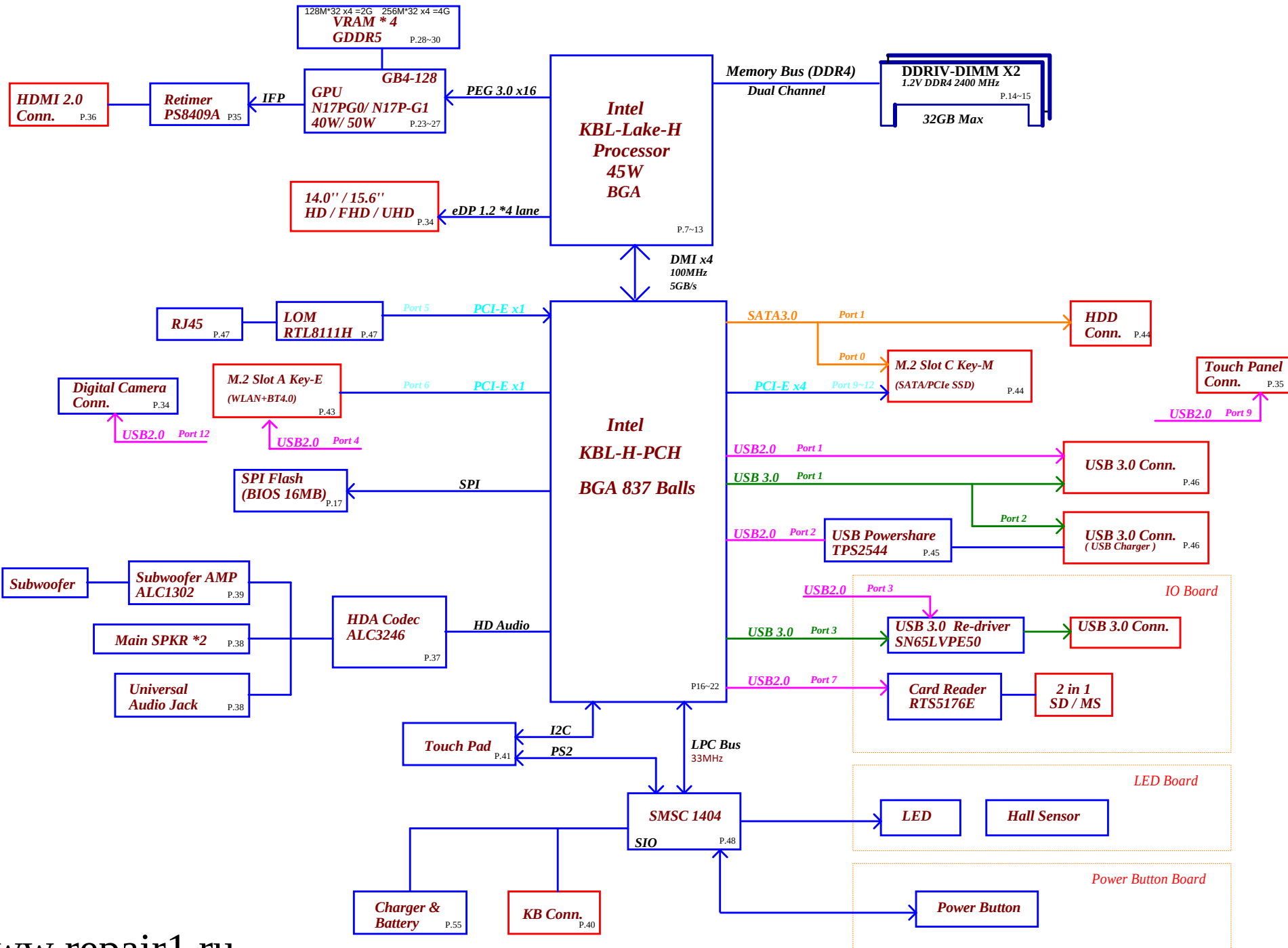
BreakDown@ : For measure power consumption

14G0@ : 14" N17P-G0

15G1@ : 15" N17P-G1

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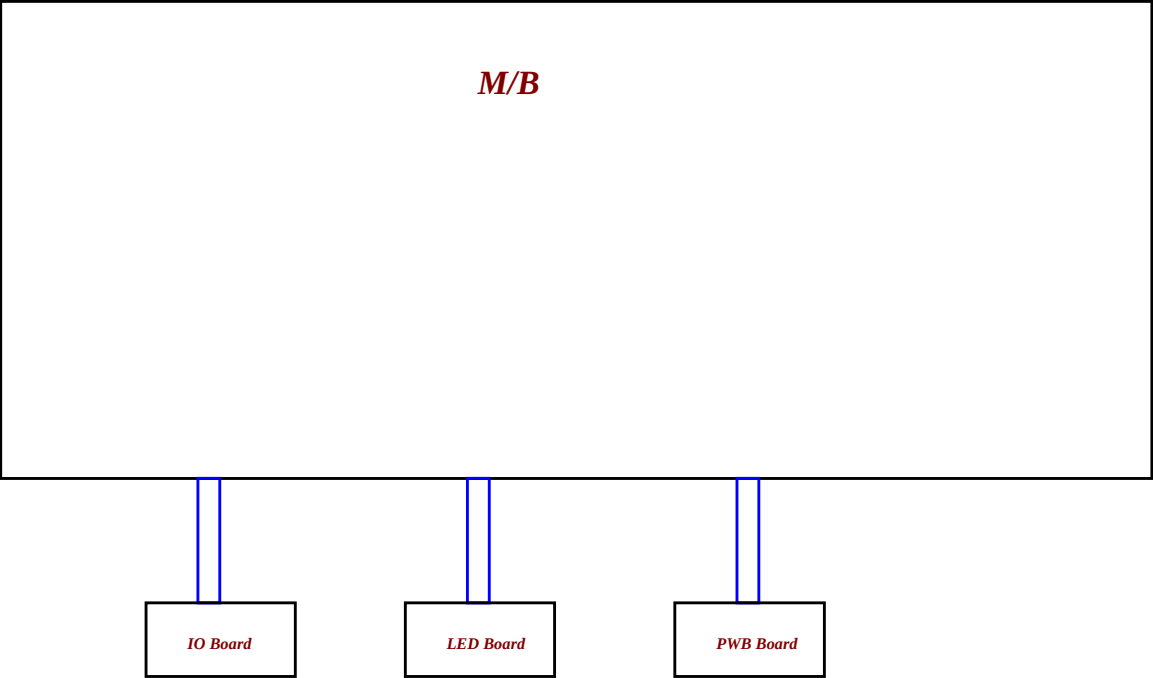


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Project Code :
File Name :



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Board ID	Resistor
X00	N/A
X01	
X02	
X03	
X04	22.1K
A00	

USB3	DESTINATION
1	USB Conn 1 (Right Side)
2	USB Conn 2 (Left Side)
3	None
4	None
5	None
6	None

USB 2.0	DESTINATION
1	USB Conn 1 (Right Side)
2	USB Conn 2 (Left Side)
3	None
4	NGFF-1 WLAN + BT
5	None
6	None
7	None
8	None
9	Touch screen
10	None
11	None
12	CAMERA



DDI	DESTINATION
1	Alpine Ridge
2	Alpine Ridge
3	None

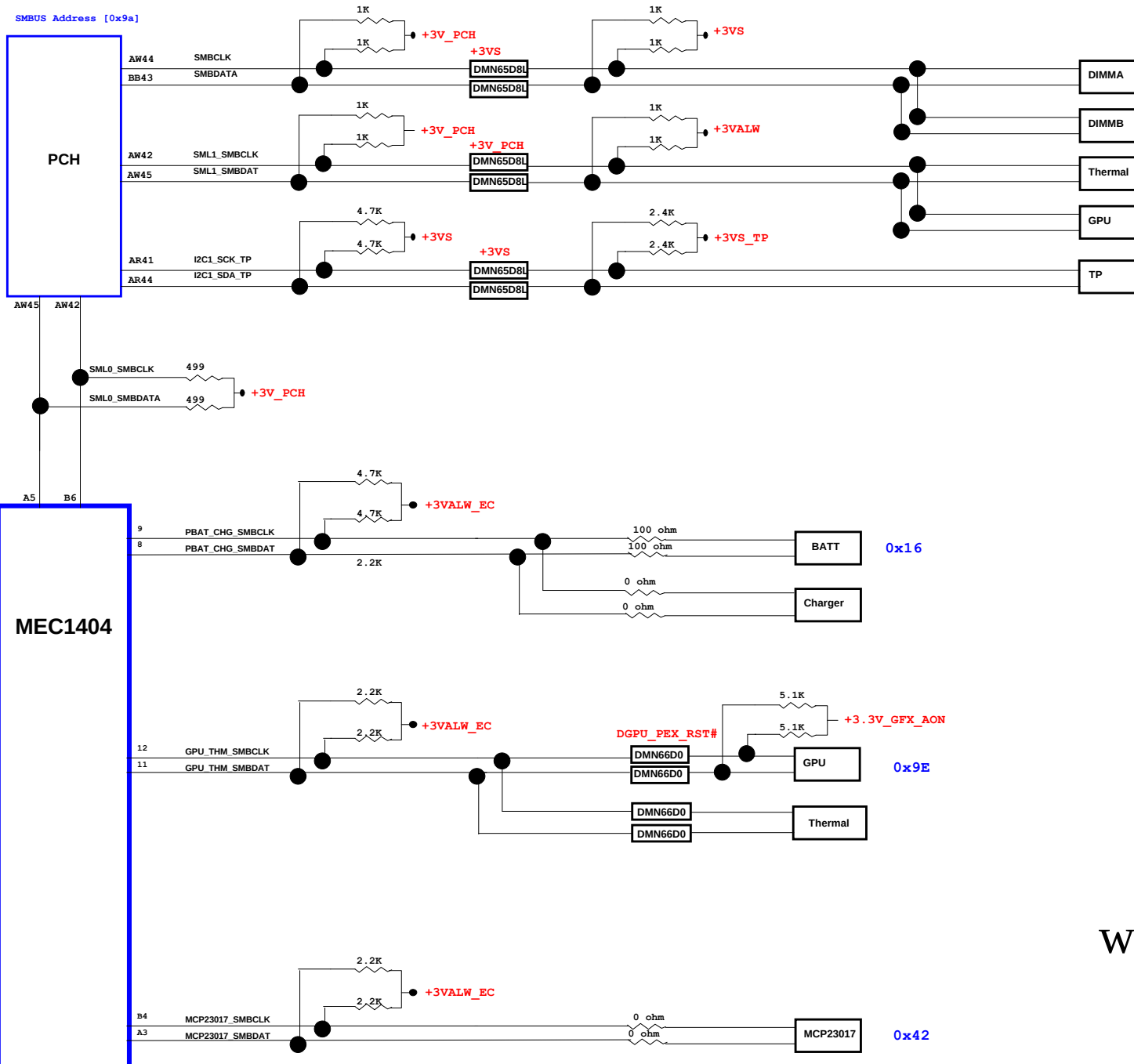
LPC	DESTINATION
LPC0	MEC5085
LPC1	DEBUG PORT

PCI EXPRESS	DESTINATION	USB3	DESTINATION
Lane 1	NGFF-1 WLAN + BT	7	None
Lane 2	CARD READER	8	None
Lane 3	None	9	None
Lane 4	None	10	None
Lane 5	None		
Lane 6	None		
Lane 7	None		
Lane 8	None		
Lane 9	SSD	SATA	DESTINATION
Lane 10	SSD	0A	SSD
Lane 11	SSD	1A	N/A
Lane 12	SSD	N/A	N/A
Lane 13	SSD	N/A	N/A
Lane 14	SSD	0B	None
Lane 15	SSD	1B	HDD
Lane 16	Alpine Ridge	2	None
		3	None

CLKOUT_PCIE	DESTINATION	CLKOUT_PCIE	DESTINATION
0	None	10	None
1	None	11	None
2	None	12	None
3	NGFF-1 WLAN	13	None
4	CARD READER	14	None
5	Thunderbolt	15	None
6	NGFF-2 SSD		
7	GPU		
8	None		
9	None		

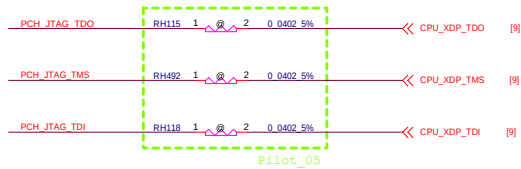
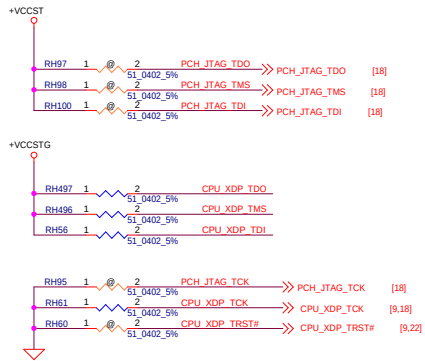
Symbol Note :

 : means Digital Ground
  : means Analog Ground



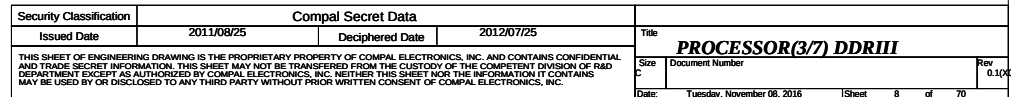
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Issued Date		2011/08/25		Deciphered Date		2012/07/15		Title			
								SMBus Block Diagram			
								Document Number			Rev
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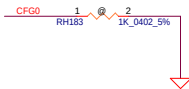
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Issued Date	2011/08/25	Deciphered Date	2012/07/25	Title	XDP CONN	
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```
[14] DDR_A_D[0..63]
[14] DDR_A_MA[0..13]
[14] DDR_A_DQS#[0..7]
[14] DDR_A_DQS[0..7]
```

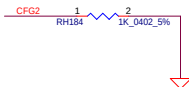


CFG Straps for Processor

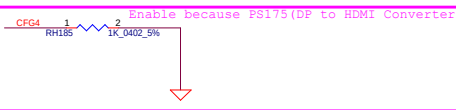
Stall reset sequence after CPU PLL lock until de-asserted	
CFG0	* 1 = (Default) Normal Operation; No stall. 0 = Stall.



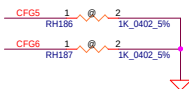
PCI EXPRESS STATIC LANE REVERSAL FOR ALL PEG PORTS	
CFG2	1: Normal Operation; Lane # definition matches socket pin map definition * 0: Lane Reversed



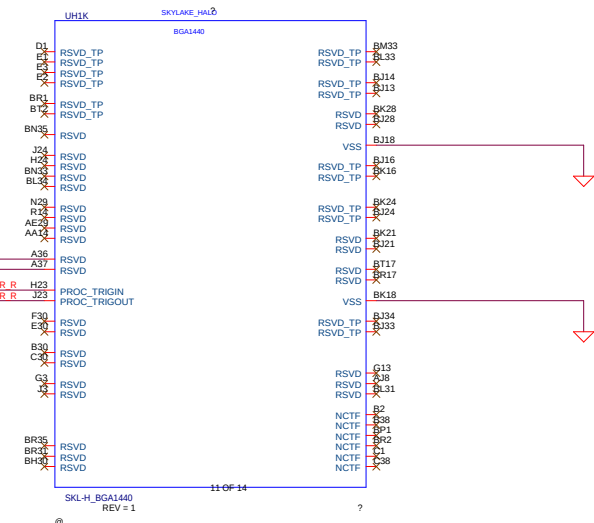
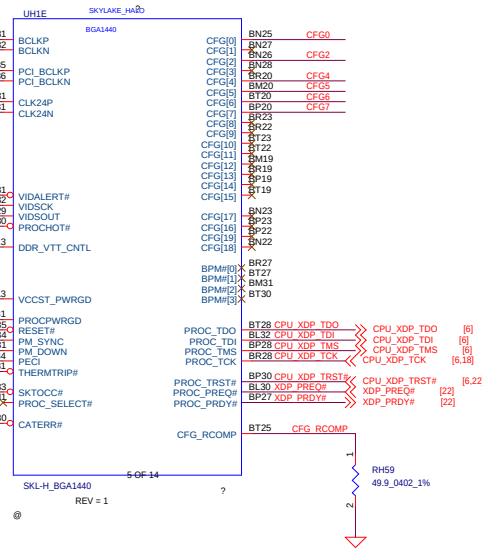
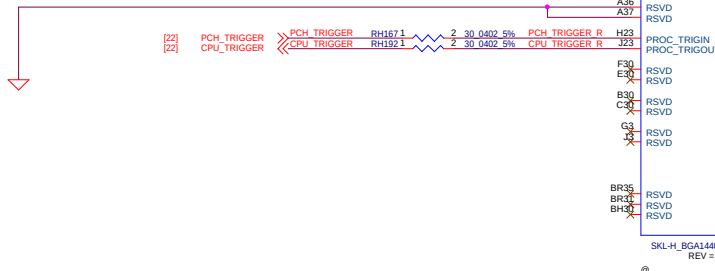
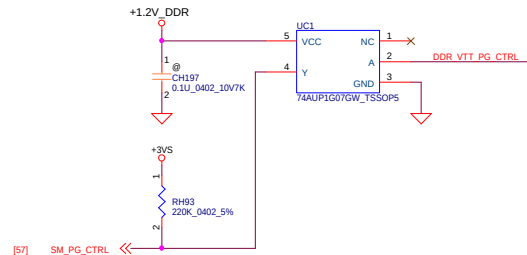
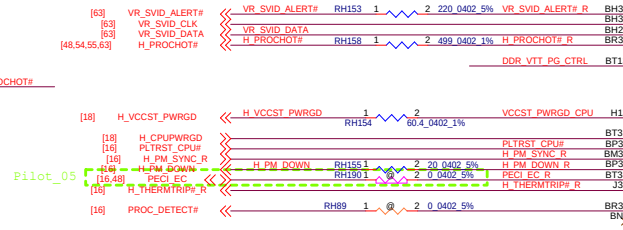
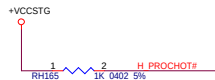
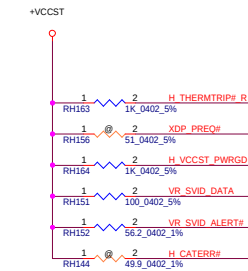
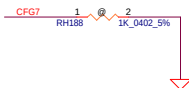
Display Port Presence Strap	
CFG4	1 : Disabled; No Physical Display Port attached to Embedded Display Port * 0 : Enabled; An external Display Port device is connected to the Embedded Display Port

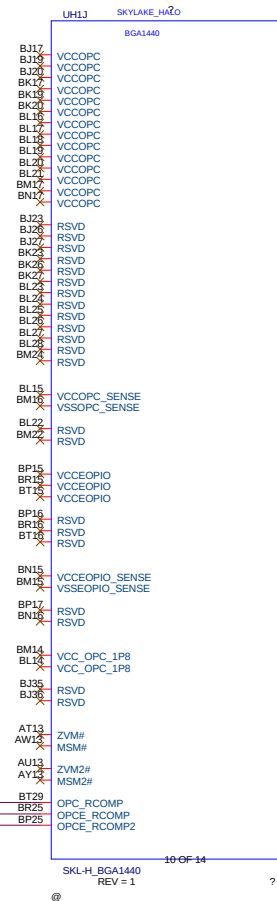
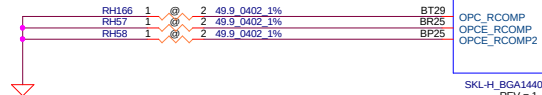
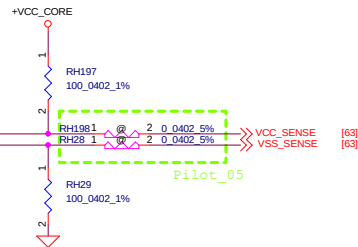
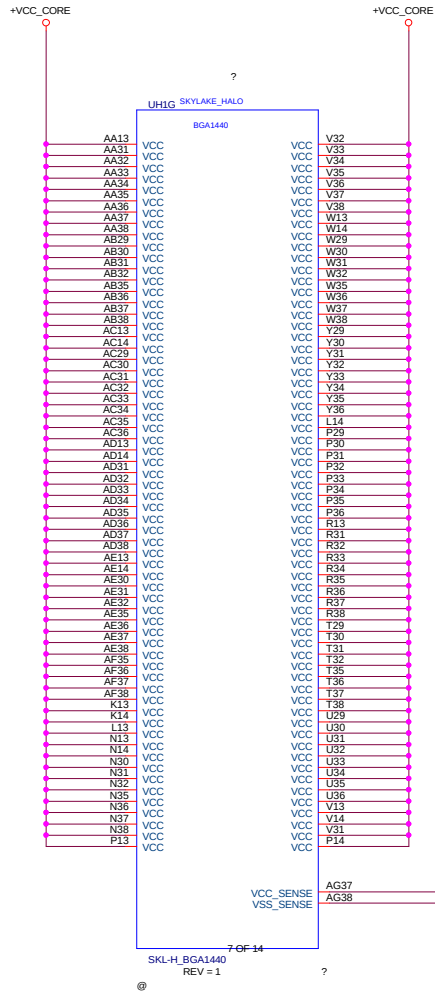


PCIe Port Bifurcation Straps	
CFG[6:5]	* 11: (Default) x16 - Device 1 functions 1 and 2 disabled 10: x8, x8 - Device 1 function 1 enabled ; function 2 disabled 01: Reserved - (Device 1 function 1 disabled ; function 2 enabled) 00: x8,x4,x4 - Device 1 functions 1 and 2 enabled

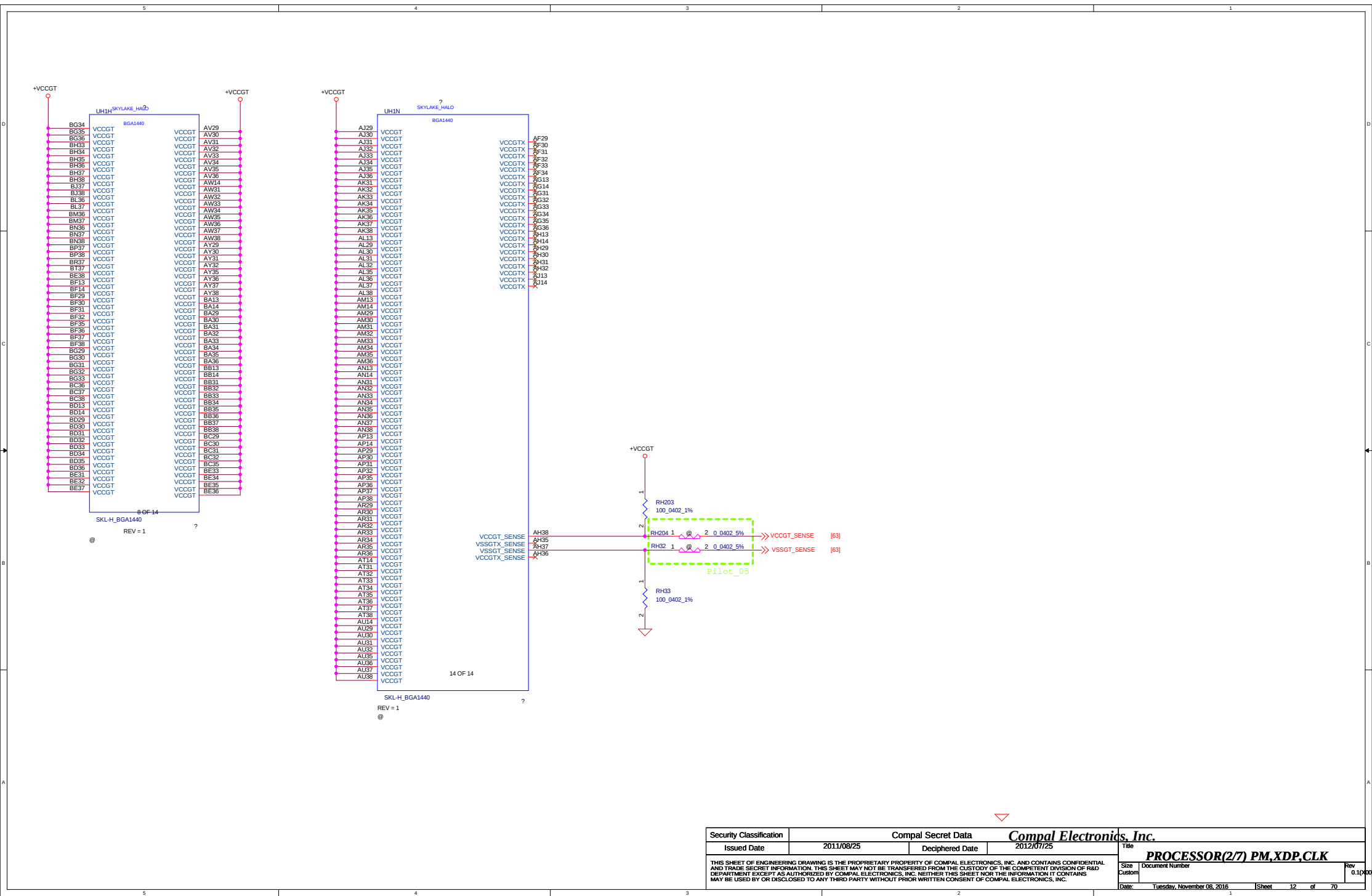


PEG DEFER TRAINING	
CFG7	* 1: (Default) PEG Train immediately following xxRESETB de assertion 0: PEG Wait for BIOS for training

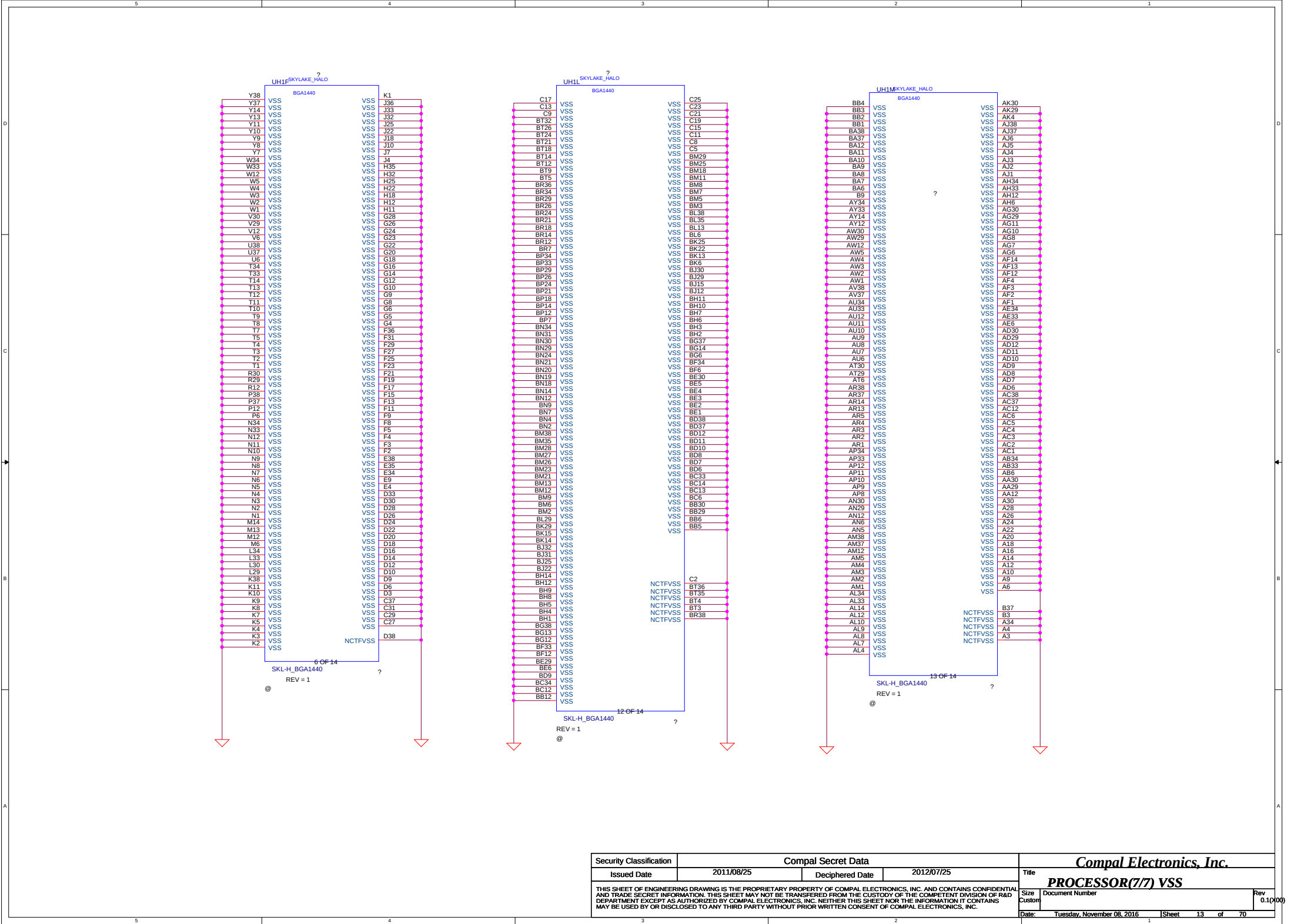




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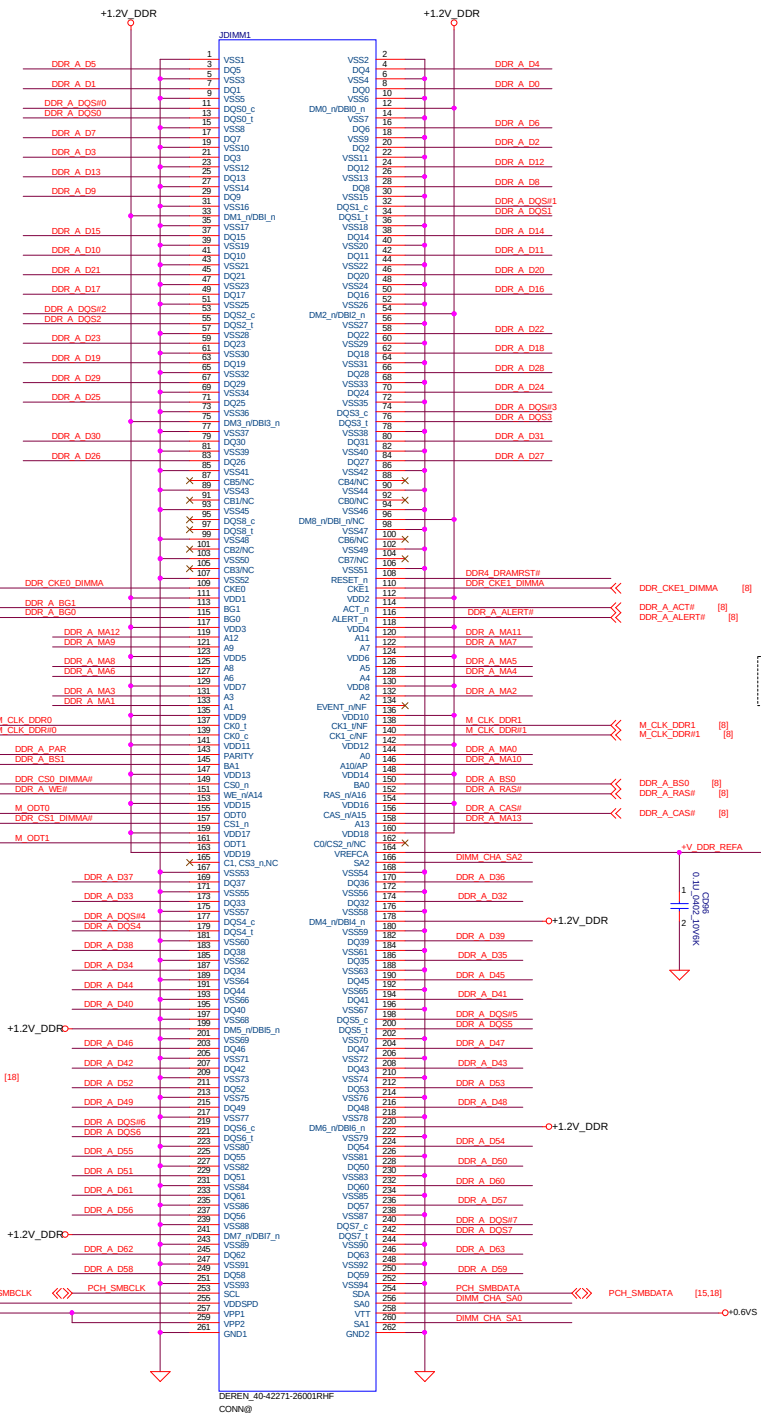
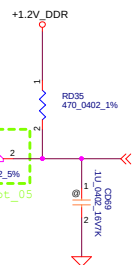
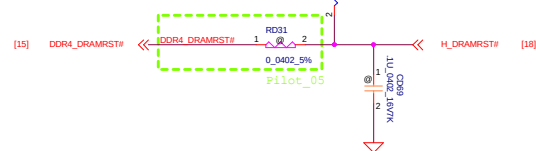
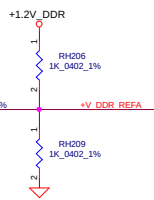
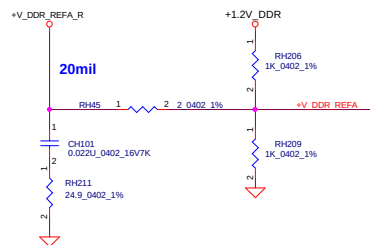
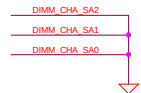


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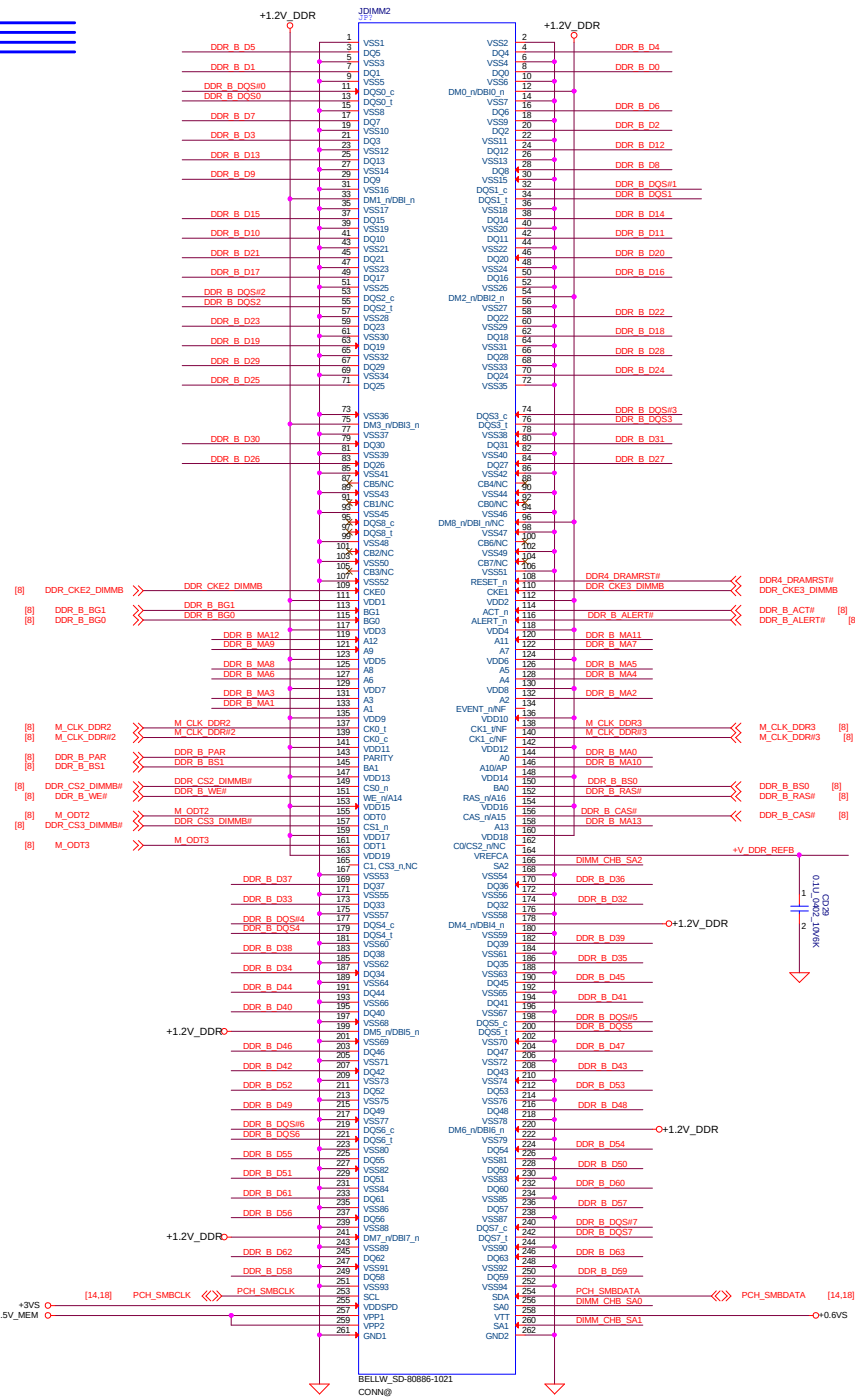
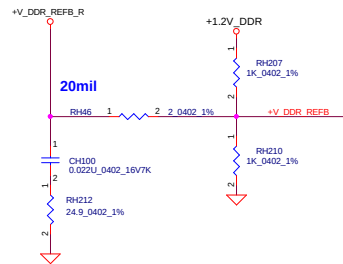
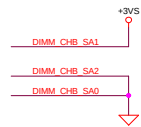
The diagram illustrates the power distribution for a 12V DDR memory module. It features two main power planes, both labeled +12V DDR. The top plane includes a 3.3V regulator (U1.0402, 3.3V) and decoupling capacitors C276 through C281. The bottom plane includes a 3.3V regulator (U0.0402, 3.3V) and decoupling capacitors C272 through C277. A CD11 330uF capacitor is connected to the 3.3V plane. The module is connected to a 12V supply and ground.



All VREF traces should have 10 mil trace width

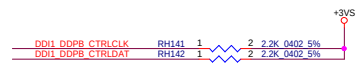
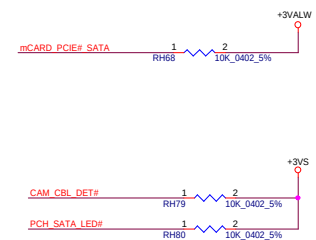
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The diagram illustrates a 16-bit parallel bus system. It consists of two main sections, each connected to a +1.2V_DDR supply. The top section contains 16 capacitors, labeled C200 through C215, each with a value of 100_0603_3.30K. The bottom section contains 16 capacitors, labeled C216 through C231, each with a value of 100_0603_5.50K. A +3.30V_2.5V_M supply is connected to a capacitor labeled C232.



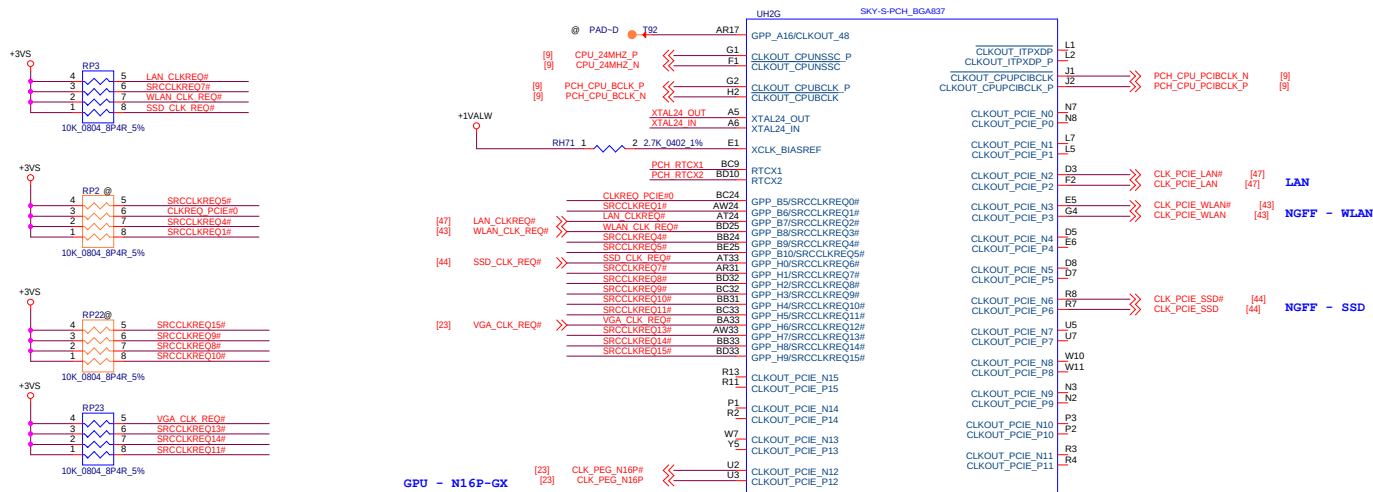
All VREF traces should have 10 mil trace width

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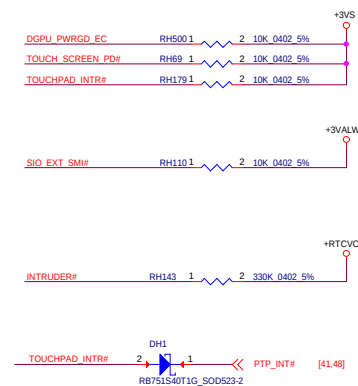
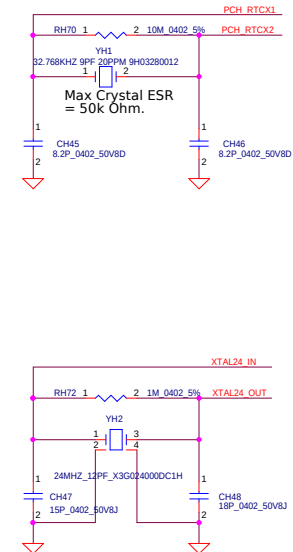


Port	Strap	How to Enable Port?	How to Disable Port?
Port B	DDPB_CTRLDATA	Pull up to 3.3 V with 2.2-k Ω \pm 5% resistor	No Connect
Port C	DDPC_CTRLDATA	Pull up to 3.3 V with 2.2-k Ω \pm 5% resistor	No Connect
Port D	DDPD_CTRLDATA	Pull up to 3.3 V with 2.2-k Ω \pm 5% resistor	No Connect

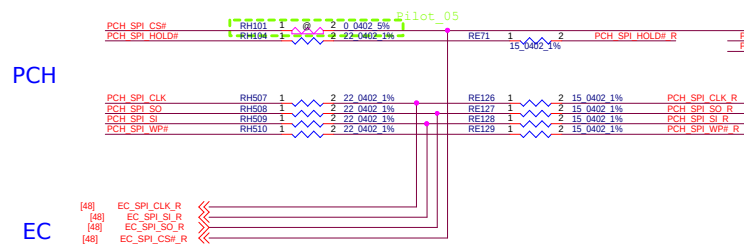
Security Classification		Compal Secret Data		Compal Electronics, Inc. PCH (1/8) SATA,HDA	
Issued Date		Deciphered Date		Title LA-D991P	
2011/08/25		2012/07/25		Size Document Number Rev 01/2009	
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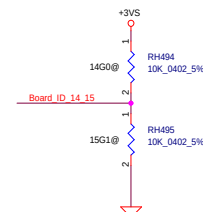
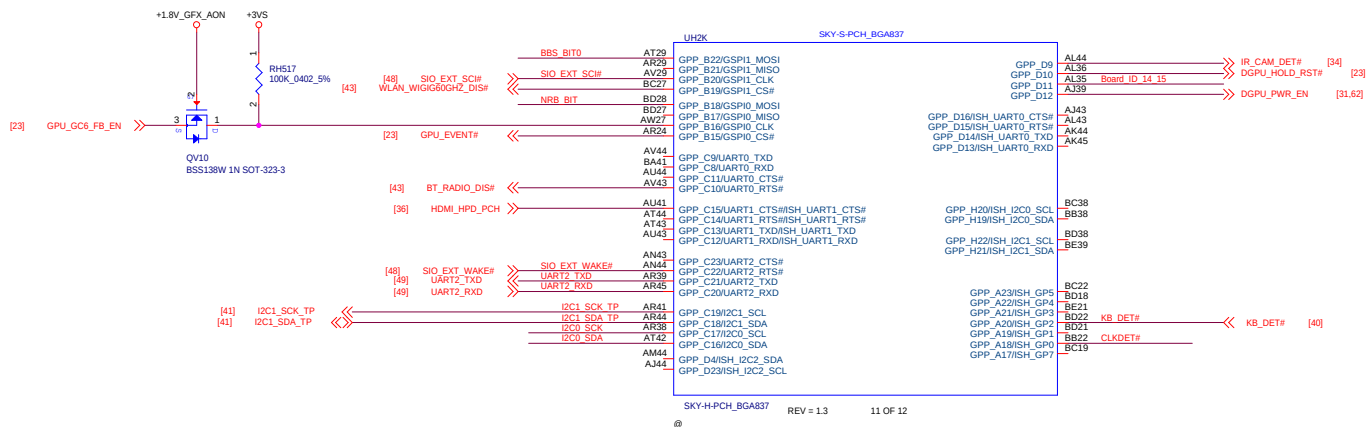
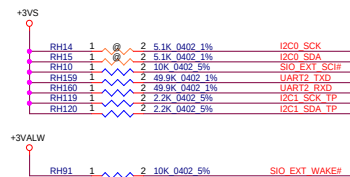
RTC CRYSTAL



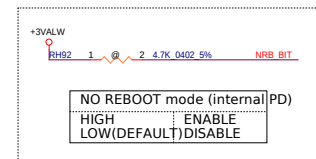
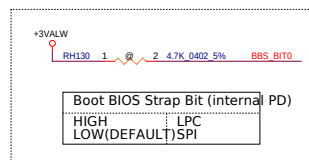
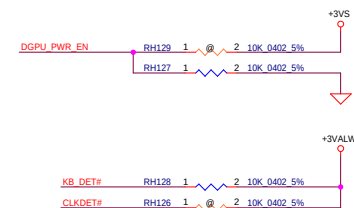
SPI ROM FOR ME (16MByte)



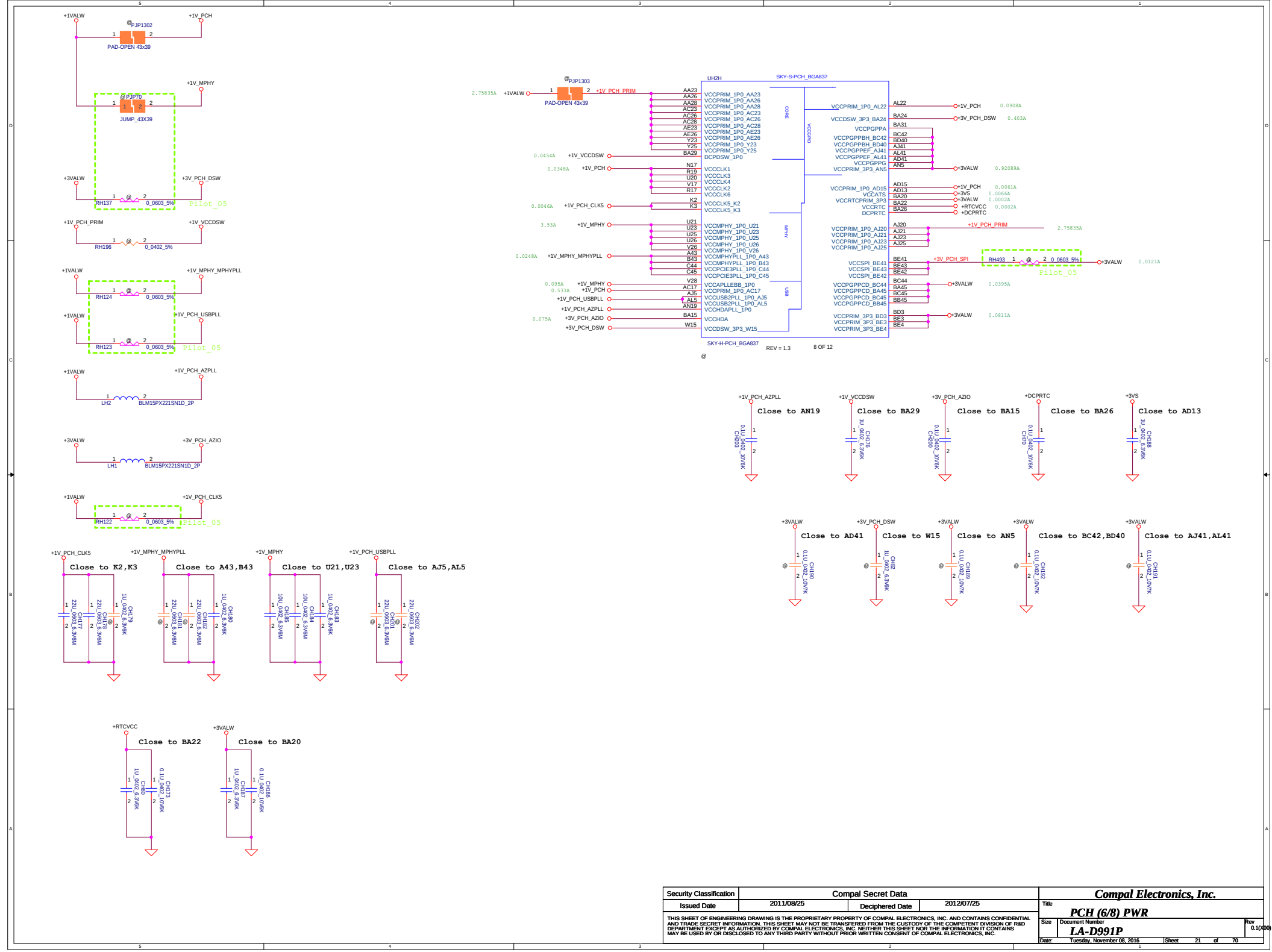
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Size		Document Number		Rev	
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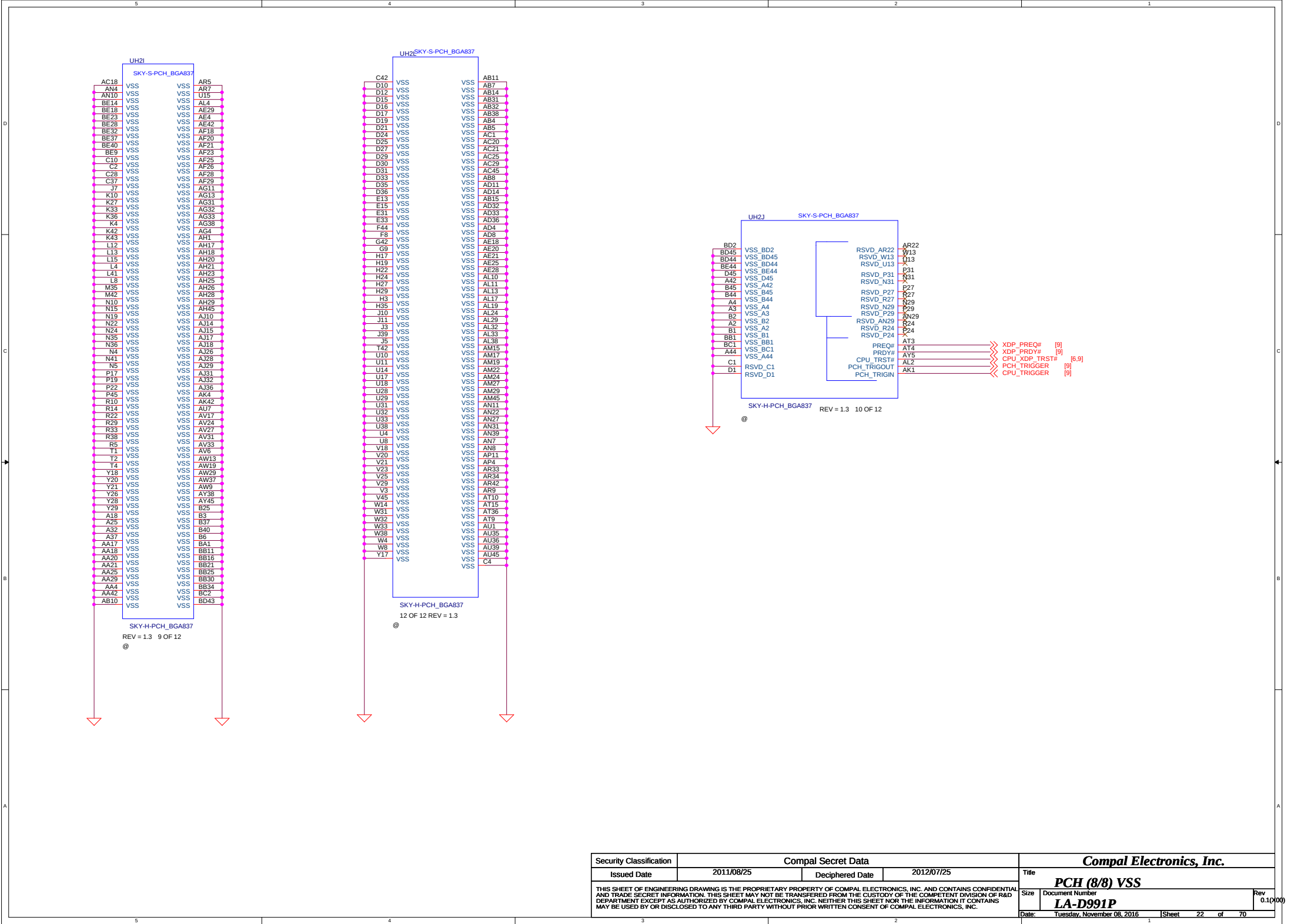


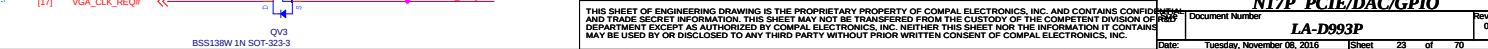
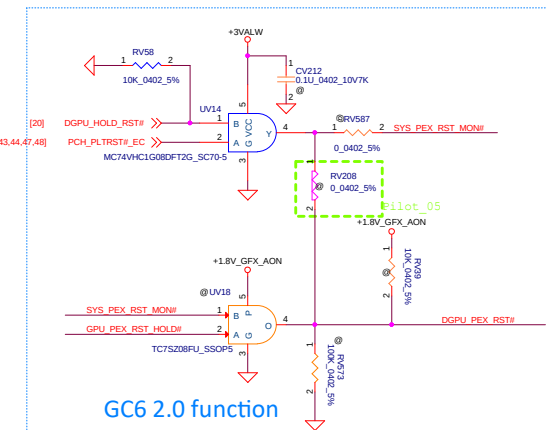
SYSTEM ID	
HIGH	14" & N16P GT
LOW	15" & N16P GX



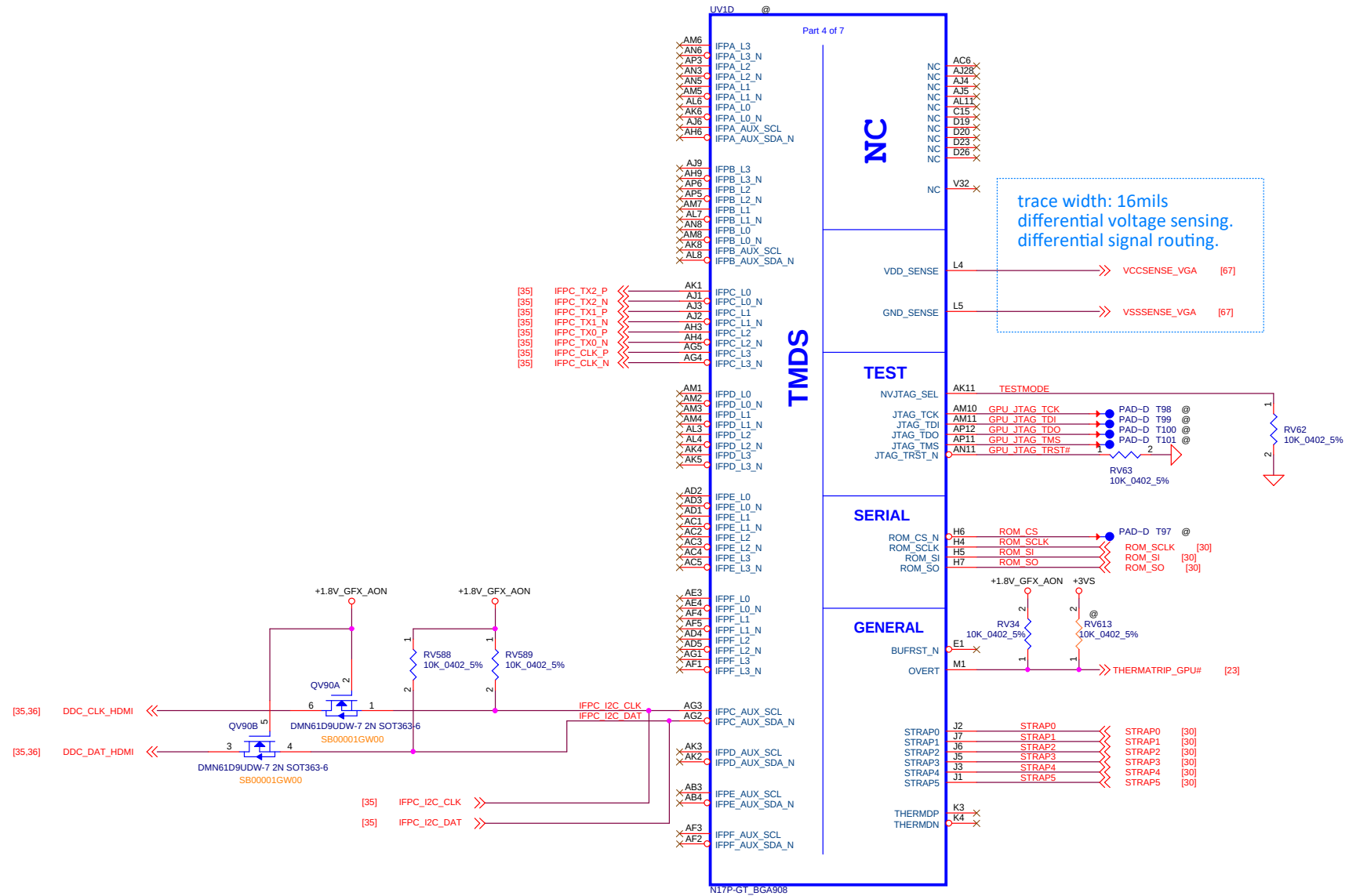
Security Classification	Compal Secret Data			Compal Electronics, Inc.	
Issued Date	2011/08/25	Deciphered Date	2012/07/25	Title	PCH (5/8) GPIO, CPU, MISC
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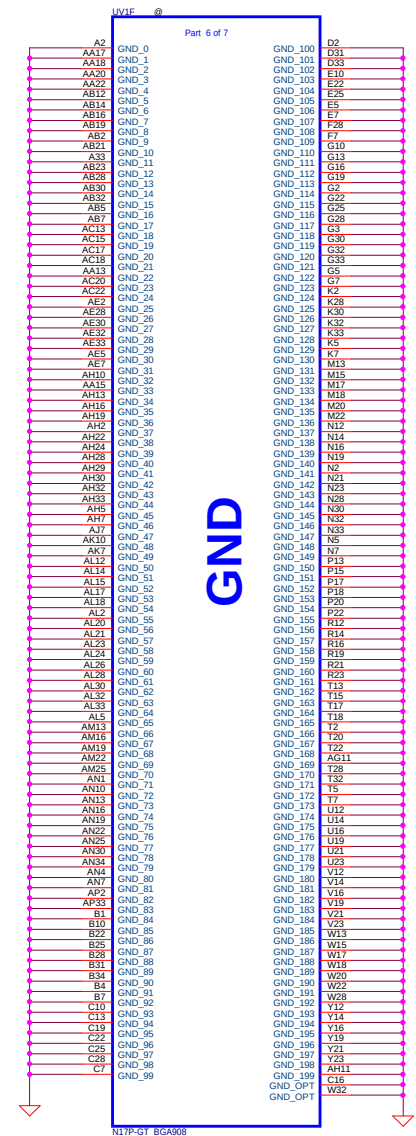
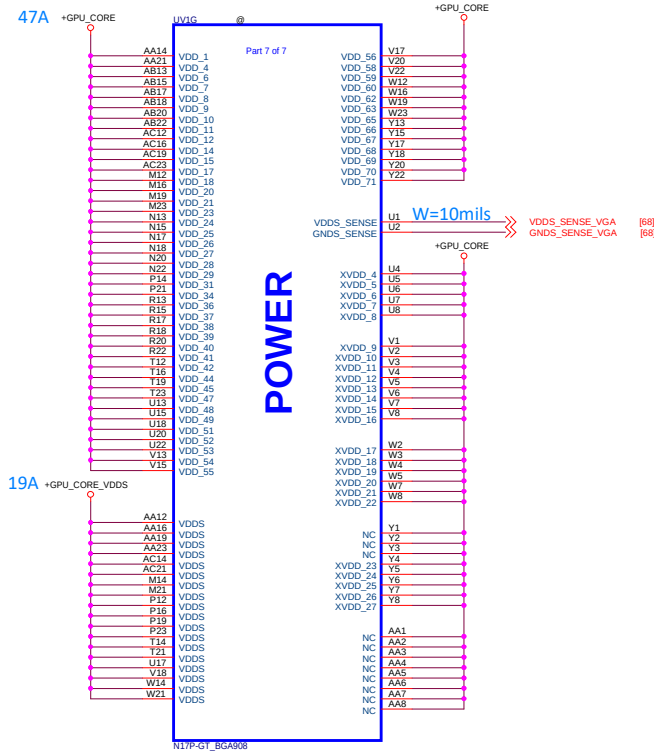




Security Classification	Compal Secret Data		Title	
Issued Date	2013/09/09	Deciphered Date	2014/09/09	Compal Electronics, Inc. N17P PCIE/DAC/GPIO LA-D993P
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			Date: Tuesday, November 08, 2016	Sheet 23 of 70



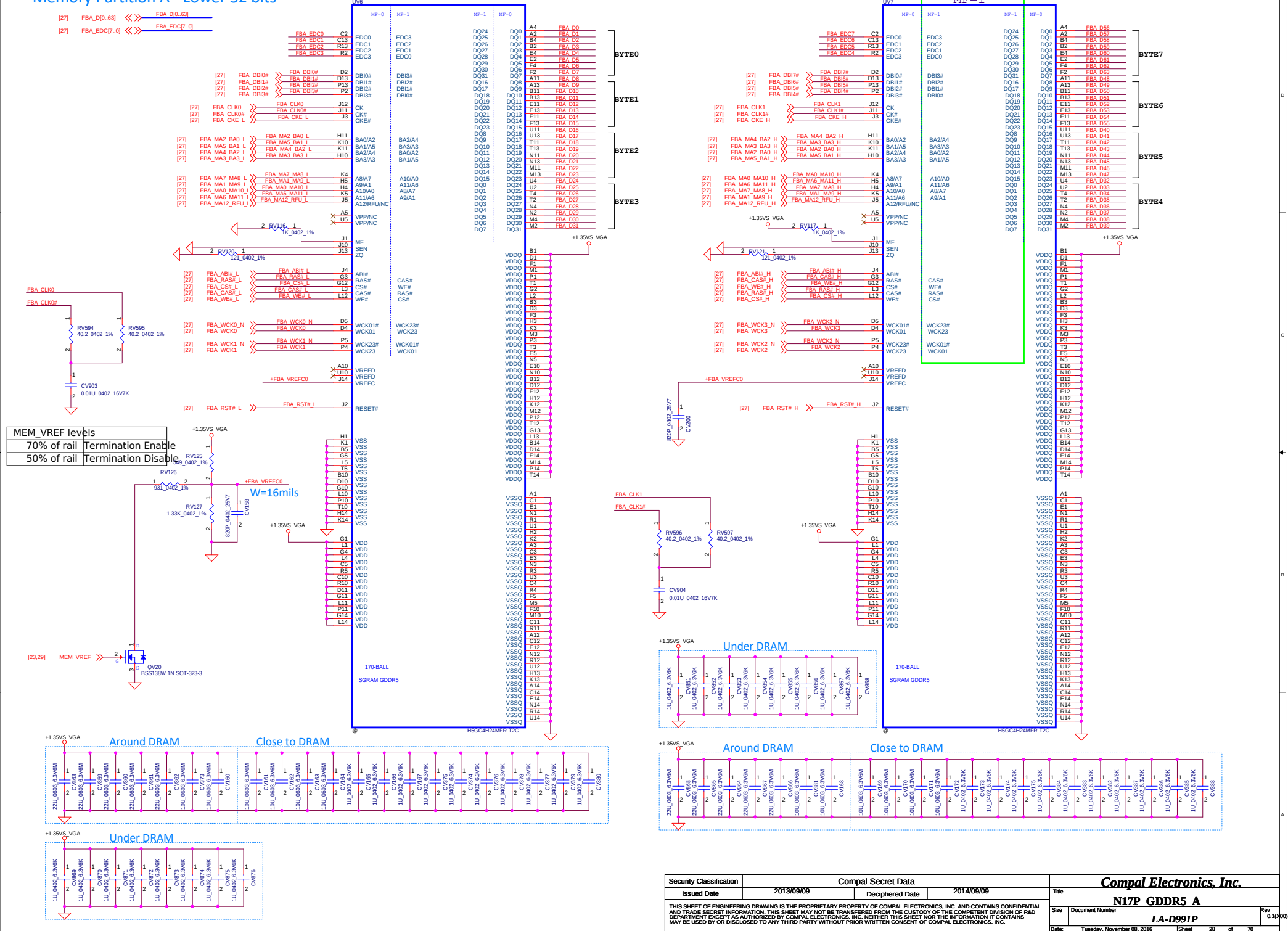
Security Classification		Compal Secret Data				Compal Electronics, Inc.			
Issued Date		2013/09/09		Deciphered Date		2014/09/09		Title	
								N17P_eDP/HDMI/mDP	
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							LA-D991P		0.1(000)
Date:		Tuesday, November 08, 2016			Sheet		24 of 70		



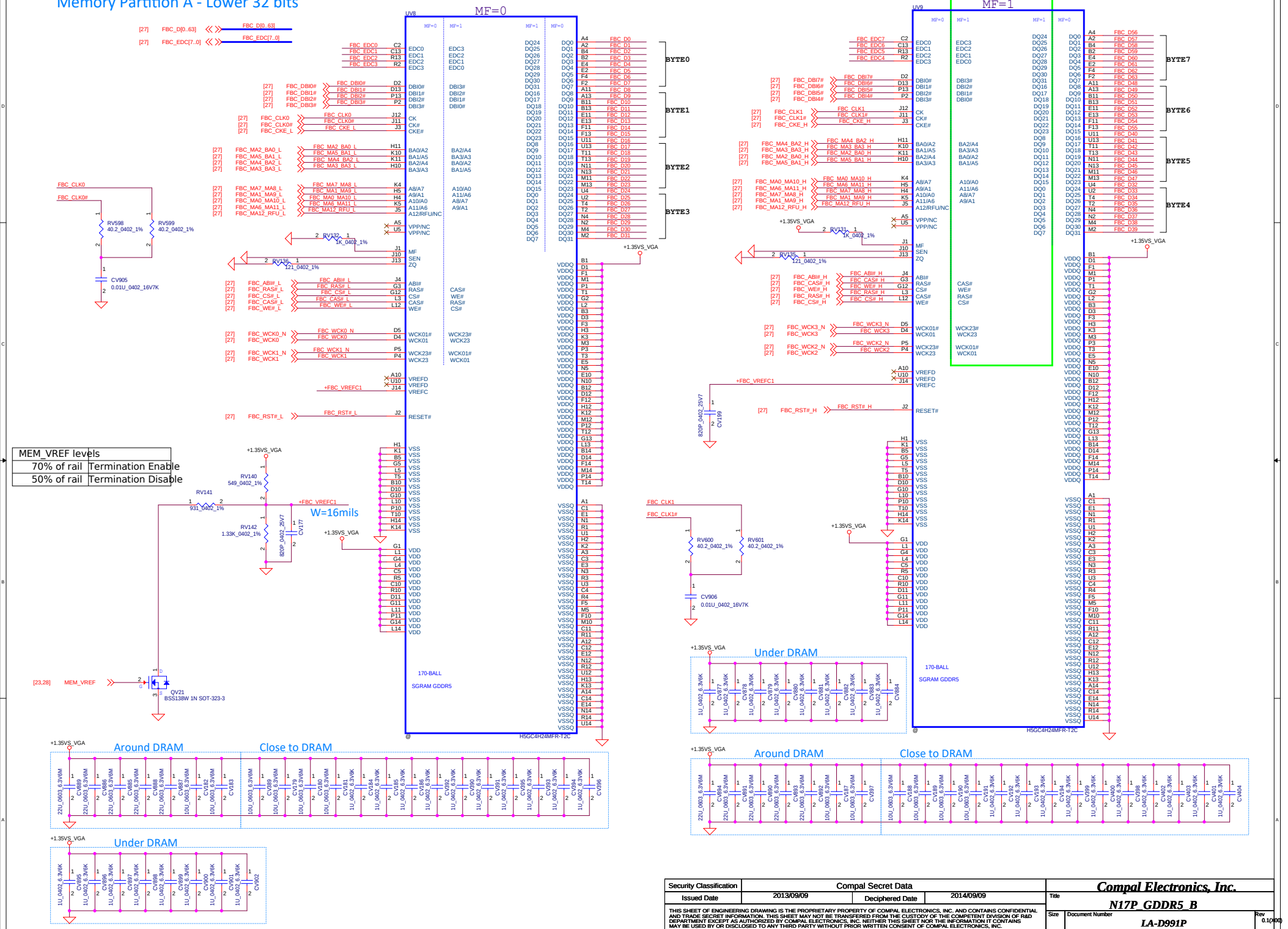
Memory Partition A - Lower 32 bits

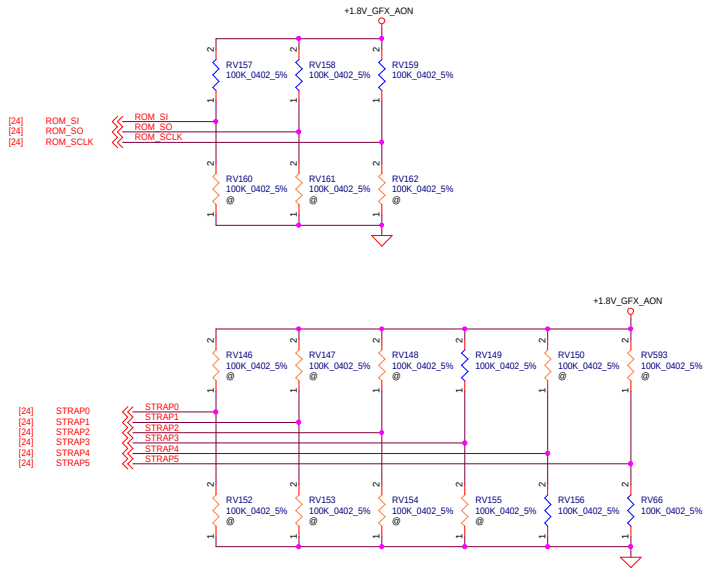
MF=0

MF=1



Memory Partition A - Lower 32 bits





SMB_ALT_ADDR	
Low	Single GPU
High	Dual GPU
DEVID_SEL	
Low	Original Device ID
High	Re-brand Device ID
VGA_DEVICE	
Low	3D Device
High	VGA Device
PCIE_CFG	
Low	Normal signal swing
High	Reduce the signal amplitude

Table 5.2 RAMCFG

Strap Pins see Note			RAMCFG Setting Number
STRAP2	STRAP1	STRAP0	(see Memory RVL for memory configs corresponding to these numbers)
L	L	L	0 (0x0000)
L	L	H	1 (0x0001)
L	H	L	2 (0x0002)
L	H	H	3 (0x0003)
H	L	L	4 (0x0004)
H	L	H	5 (0x0005)
H	H	L	6 (0x0006)
H	H	H	7 (0x0007)
L	L	M	8 (0x0008)
L	M	L	9 (0x0009)
L	M	H	10 (0x000A)
L	H	M	11 (0x000B)
M	L	L	12 (0x000C)
M	L	H	13 (0x000D)

Table 1. N17P-G0/-G1 GDDR5 Recommended Memories

Memory Type	FBVDD/ FBVDDQ	Memory Density	Allowed Memory Configuration	Vendor	Manufacturer Part Number	Die Revision	Strap	Memory Speed CK Grade(MHz)	Memory Date Code Minimum	Status
GDDR5	1.35V/ 1.35V and 1.5V/ 1.5V See Note 2	8 Gb	256Mx32	Samsung	K4G80325FB-HC28	B-die	0x0	3500	N/A	Production candidate
				Micron	MT51J256M32HF-70-A	A-die	0x1	3500	N/A	Production candidate
				Hynix	H5GQ8H24MJR-R0C	M-die	0x2	3500	N/A	Post-production candidate

Note:

- For N17P-Gx, the maximum allowable memory case temperature is 85 °C.
- N17P-Gx runs WCLK up to 3000 MHz with FBVDD=1.35V. DVS is required to run WCLK > 3000 MHz.

Table 5.5 SMB ALT_ADDR, DEVID_SEL, PCIE_CFG, VGA_DEVICE

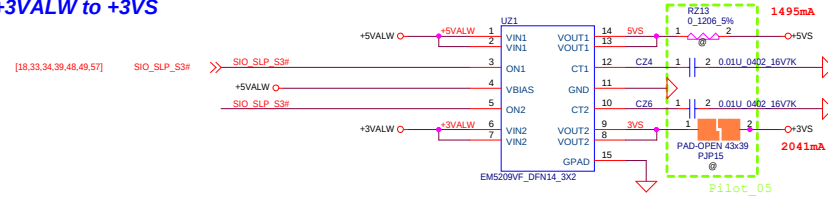
Strap Pins Note 1			Functions Selected by This Strapping			
STRAP5	STRAP4	STRAP3	SMB_ALT_ADDR	DEVID_SEL	PCIE_CFG	VGA_DEVICE
L	L	L	0	0	0	0
L	L	H	0	0	0	1
L	H	L	0	0	1	0
L	H	H	0	0	1	1
H	L	L	0	1	0	0
H	L	H	0	1	0	1
H	H	L	0	1	1	0
H	H	H	0	1	1	1
L	L	M	1	0	0	0
L	M	L	1	0	0	1
L	M	H	1	0	1	0
L	H	M	1	0	1	1
M	L	L	1	1	0	0
M	L	H	1	1	0	1
M	H	L	1	1	1	0
M	H	H	1	1	1	1

Row Index	Strap Pins see Note			Resulting SORx_EXPOSED Enablements			
	ROM_SO	ROM_SI	ROM_SCLK	SOR3_EXPOSED	SOR2_EXPOSED	SOR1_EXPOSED	SOR0_EXPOSED
8	H	H	H	ENABLED	disabled	disabled	disabled

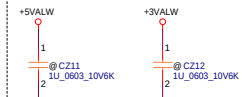
Total Display Links (HDMI, DP or DVI)			See This Row of Table 5.5			
Total Enabled for Audio (HDMI, DP or DVI)			Is eDP Supported on:			
			IFPA or IFPB?	IFPC or IFPD?	IFPE or IFPF?	
1	1	--	--	--	--	8

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				Tuesday, November 08, 2016
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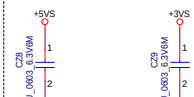
+5VALW to +5VS
+3VALW to +3VS



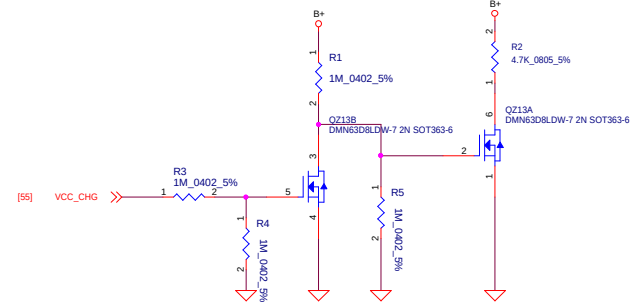
Close UZ1



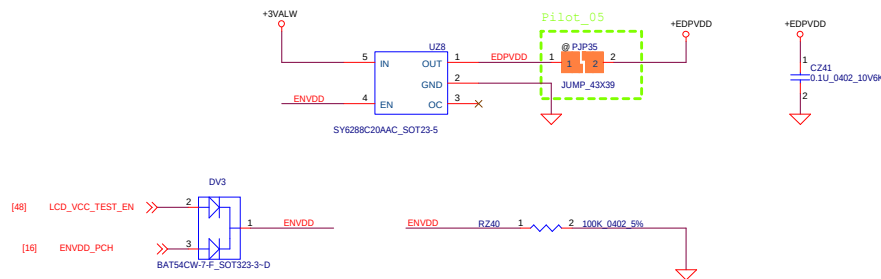
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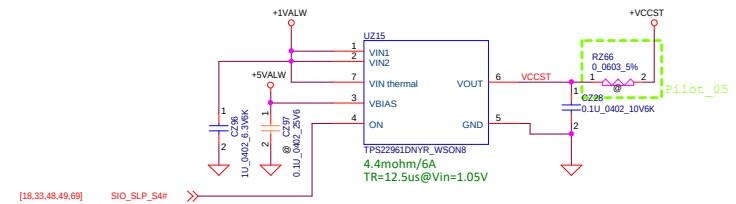
B+ Discharge



eDP & Camera Load Switch

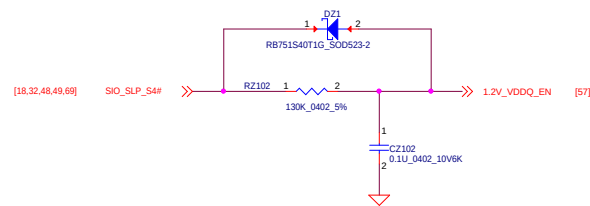


+VCCST Load Switch

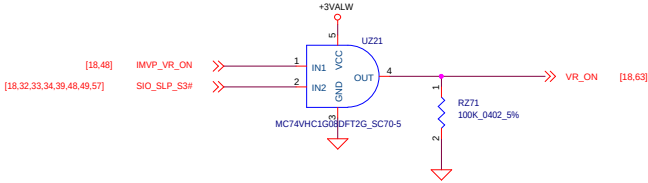
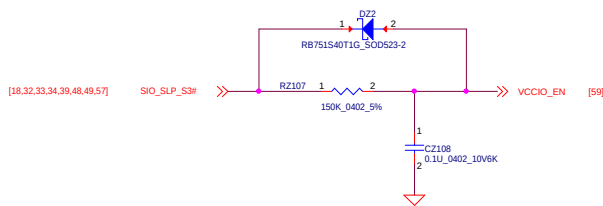


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				LA-D991P
				Date: Tuesday, November 06, 2016
				Sheet 32 of 70

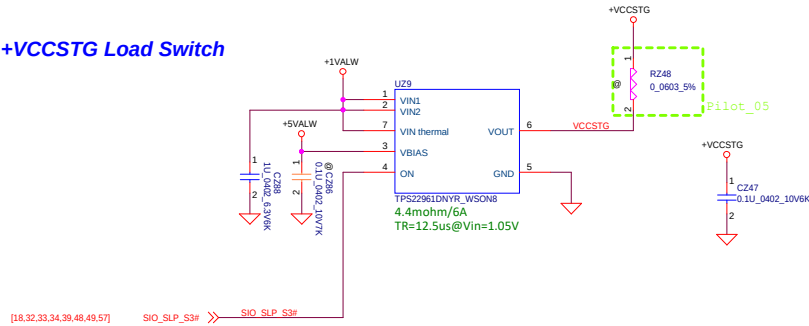
+1.2V_DDR Enable



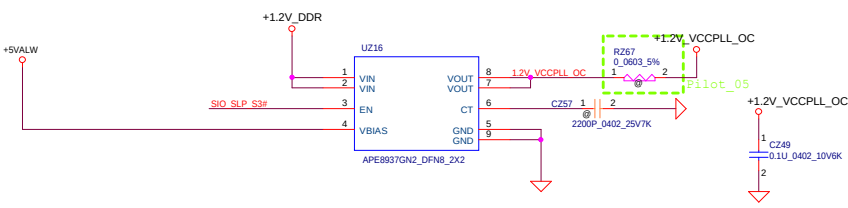
+VCCIO Enable



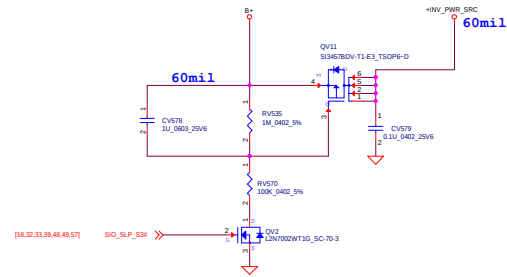
+VCCSTG Load Switch



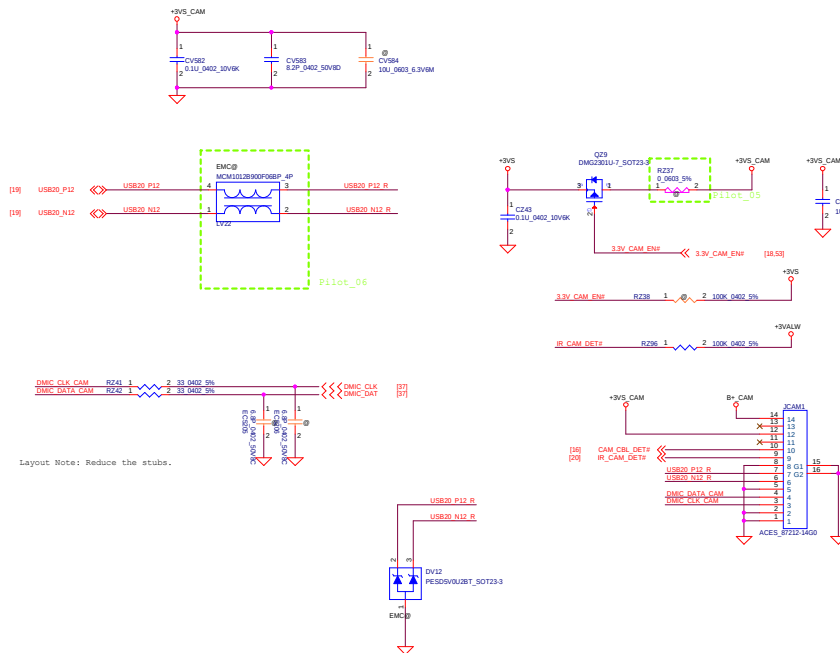
+VCCPLL_OC Load Switch



LCD backlight PWR CTRL

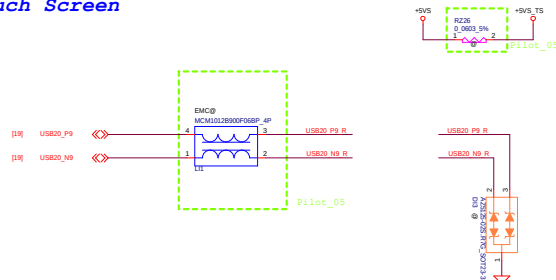


CCD +DMIC Conn.



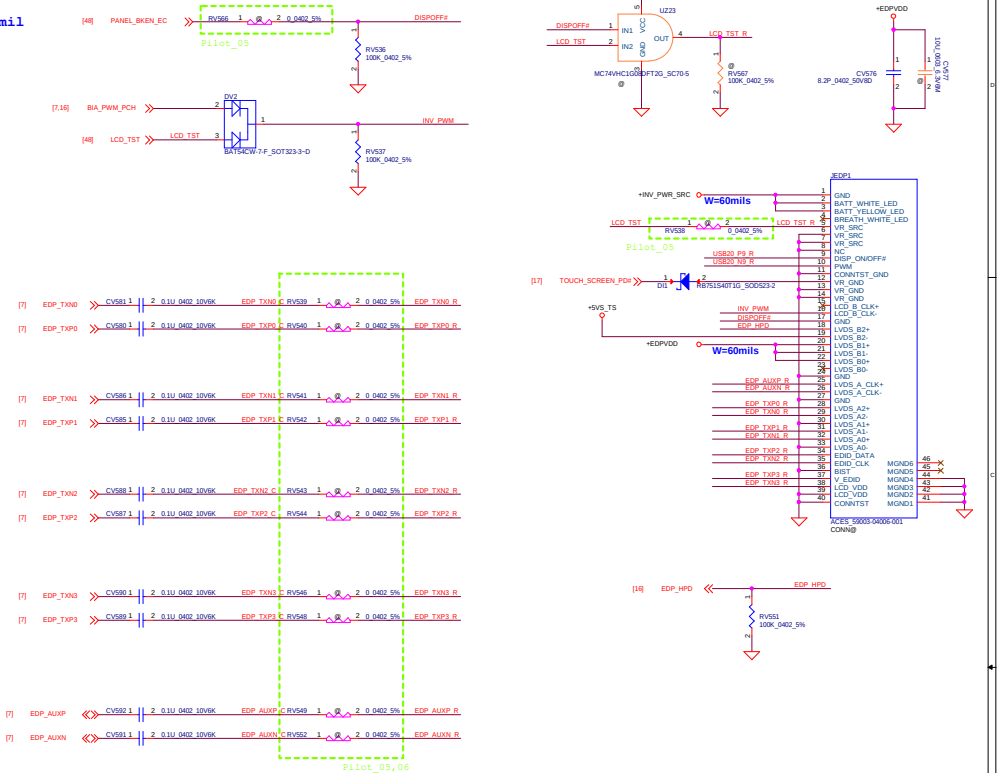
Layout Note: Reduce the stubs.

Touch Screen

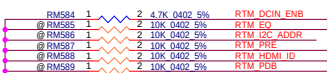
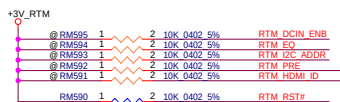
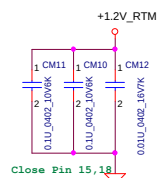
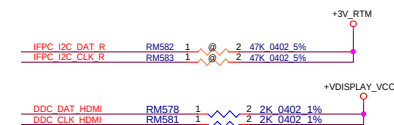
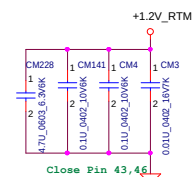
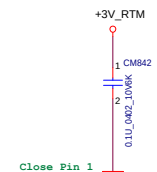
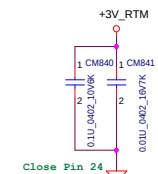
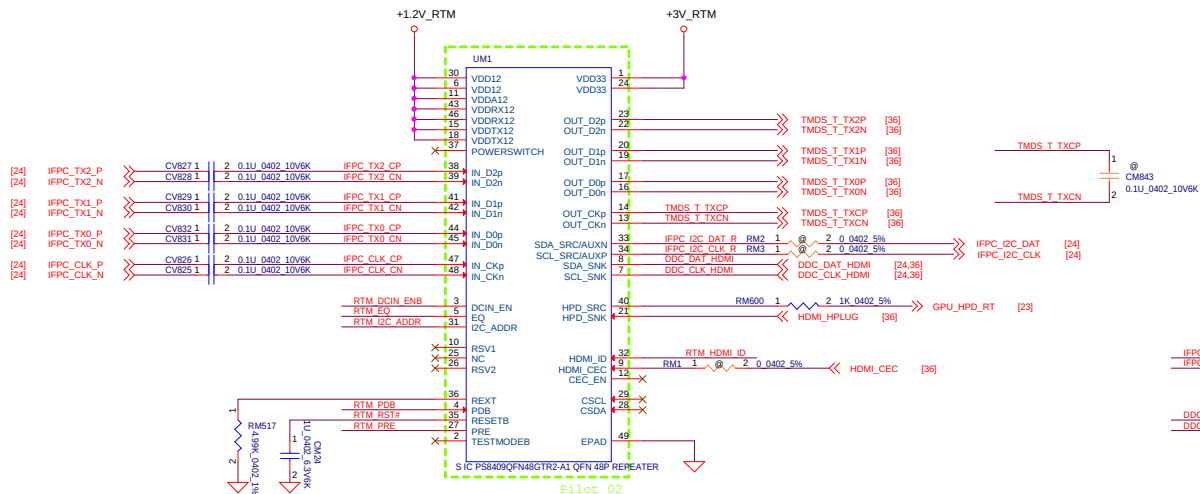


eDP & TS Conn.

60mil

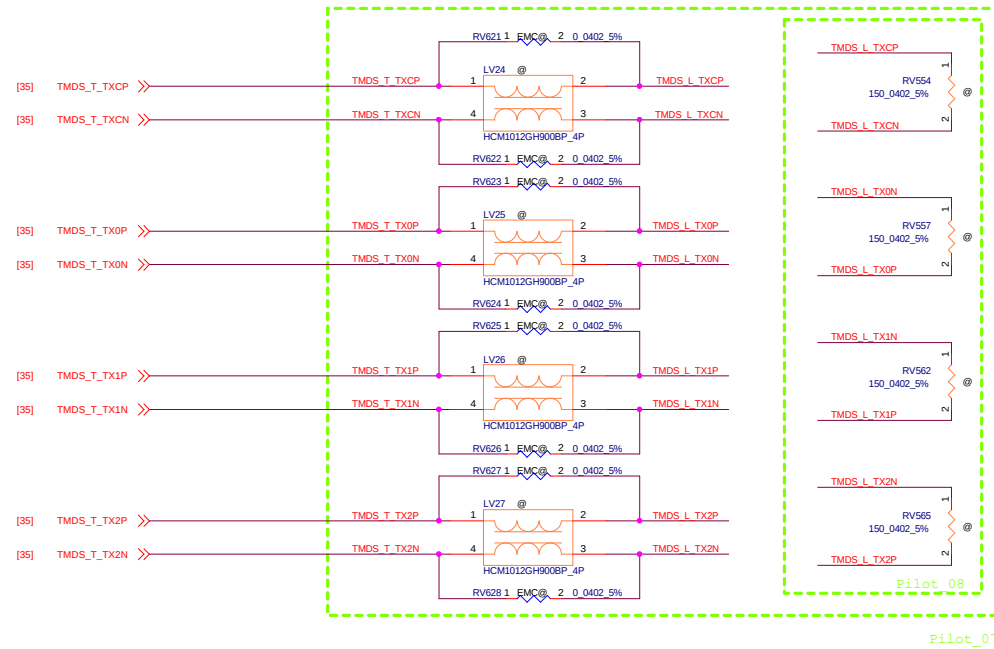


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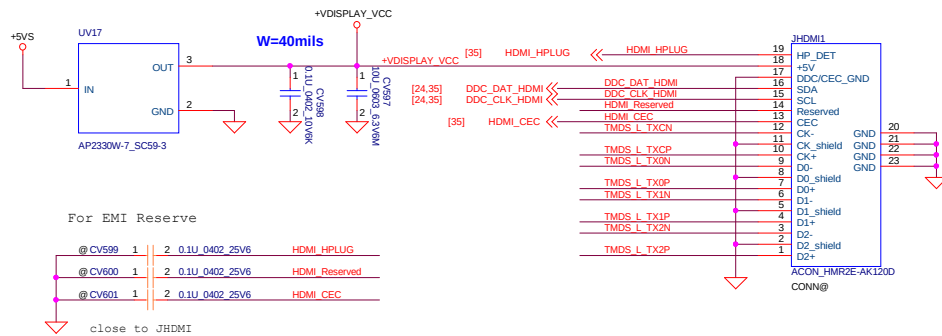


Place close to JHDMI1

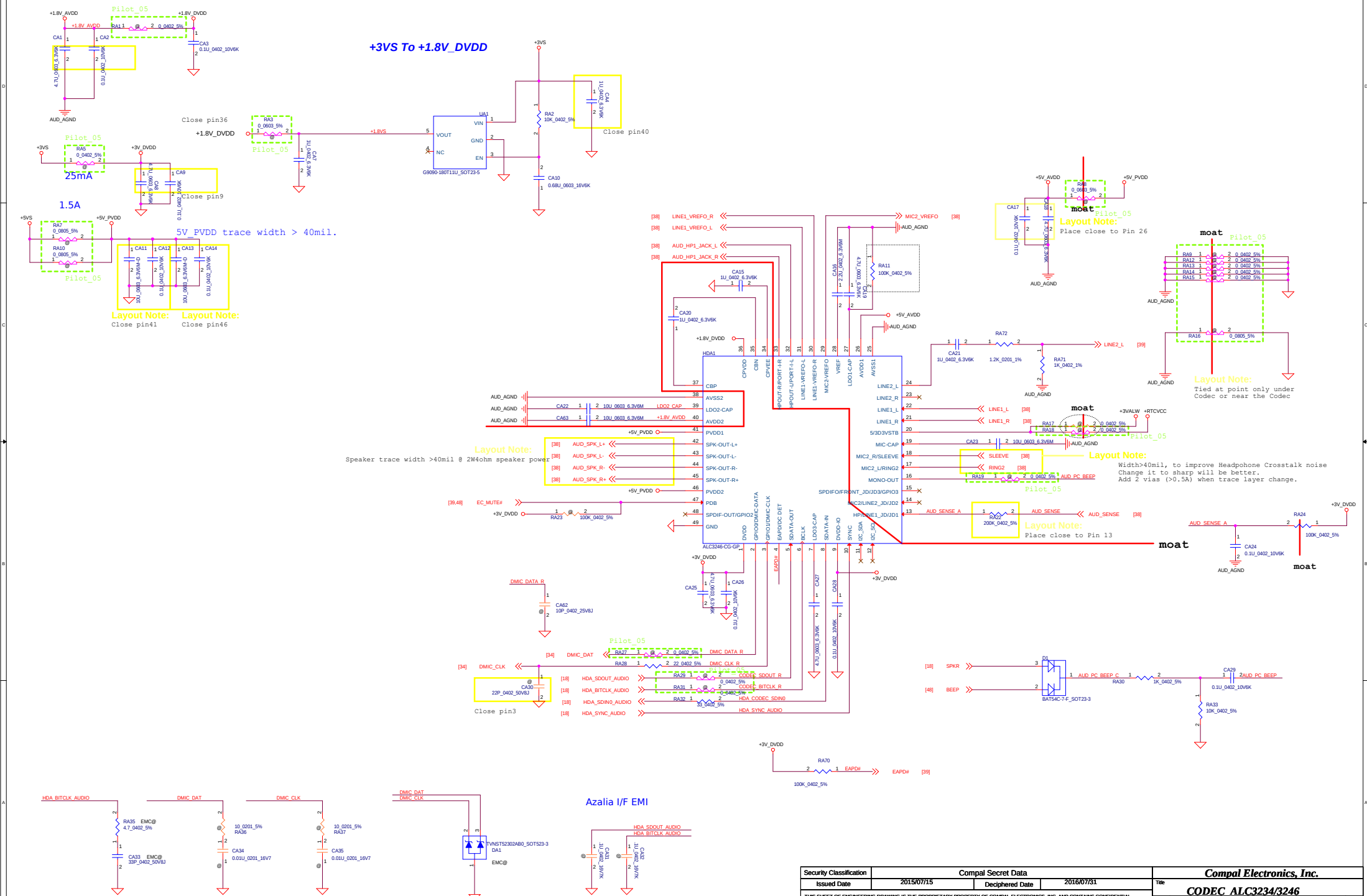
Place between ESD and CM-Choke



HDMI conn



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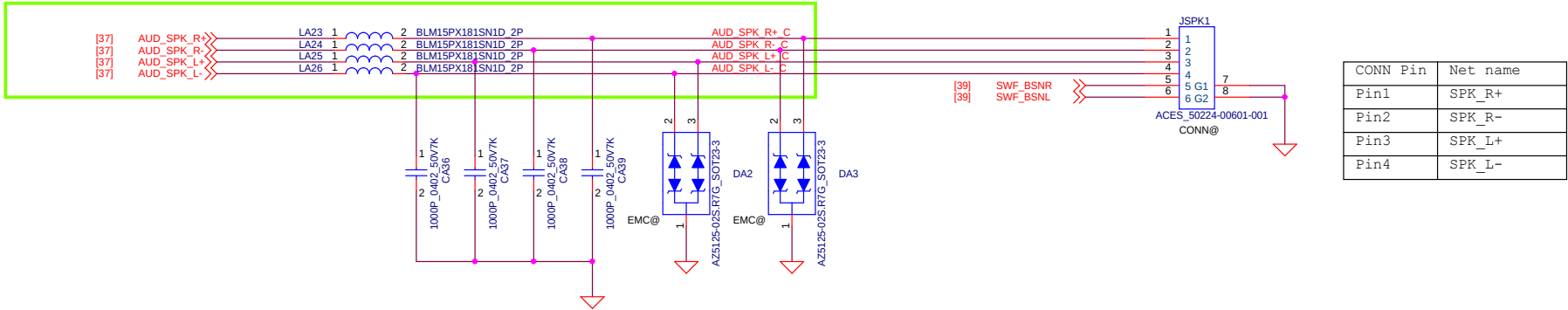


Main Func = Audio

Layout Note:

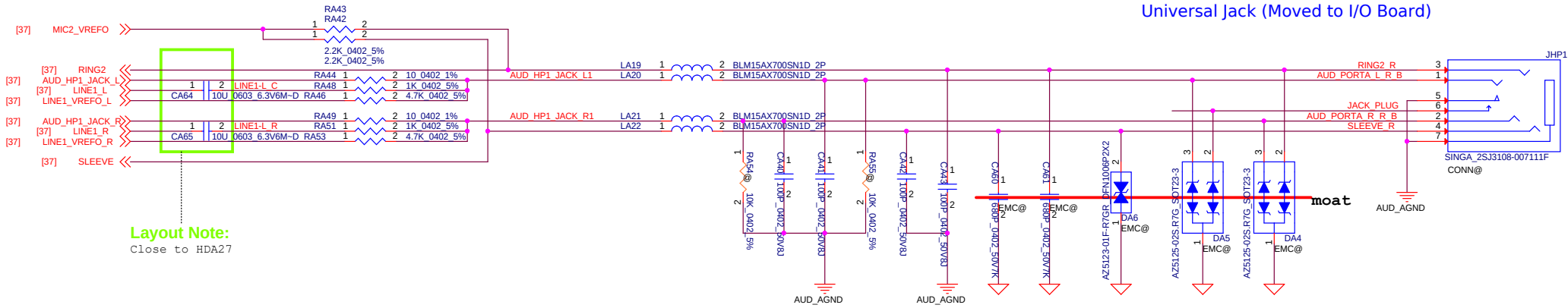
Speaker trace width >40mil @ 2W4ohm speaker power

Speaker



CONN Pin	Net name
Pin1	SPK_R+
Pin2	SPK_R-
Pin3	SPK_L+
Pin4	SPK_L-

Universal Jack (Moved to I/O Board)

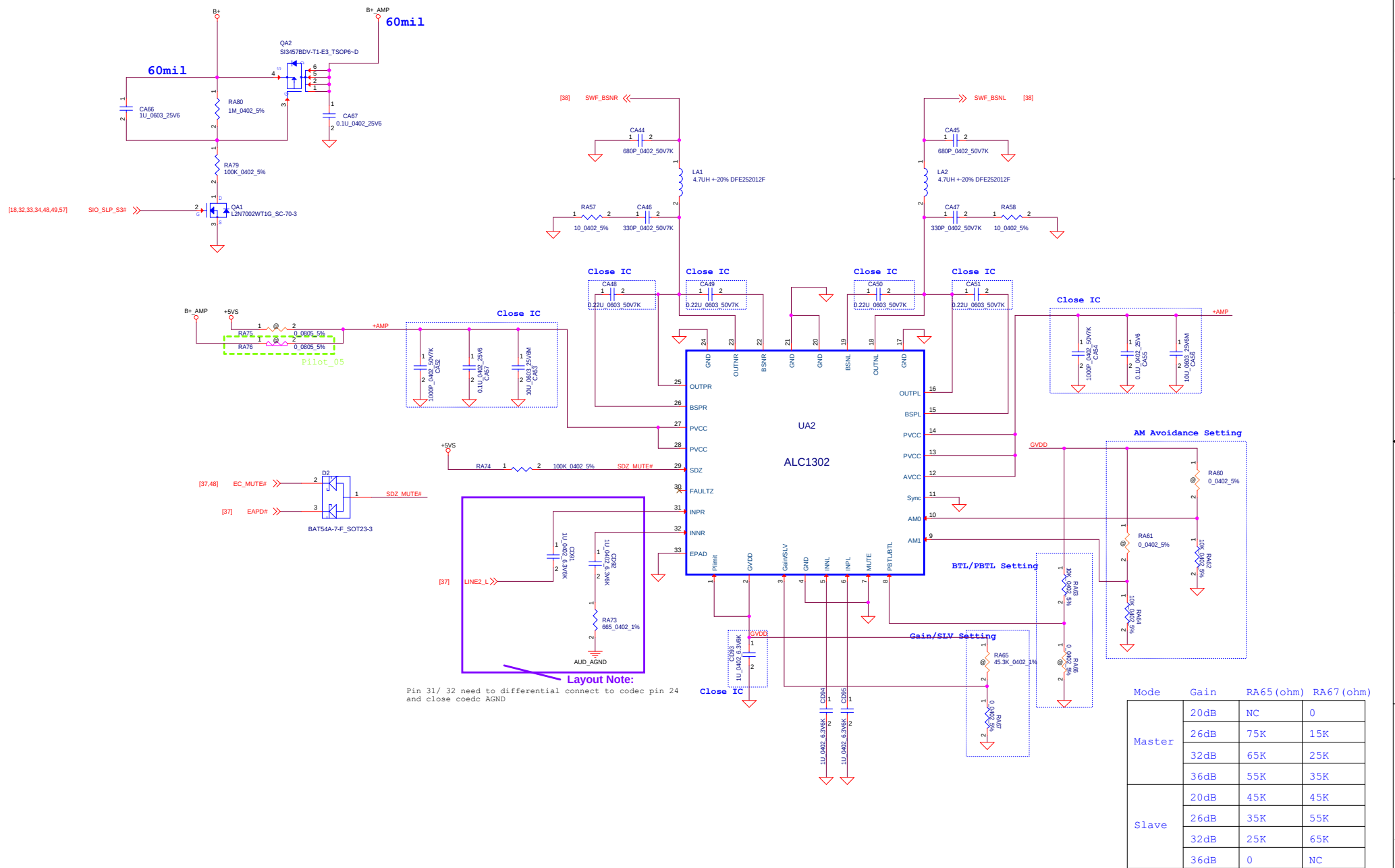


Layout Note:
Close to HDA27

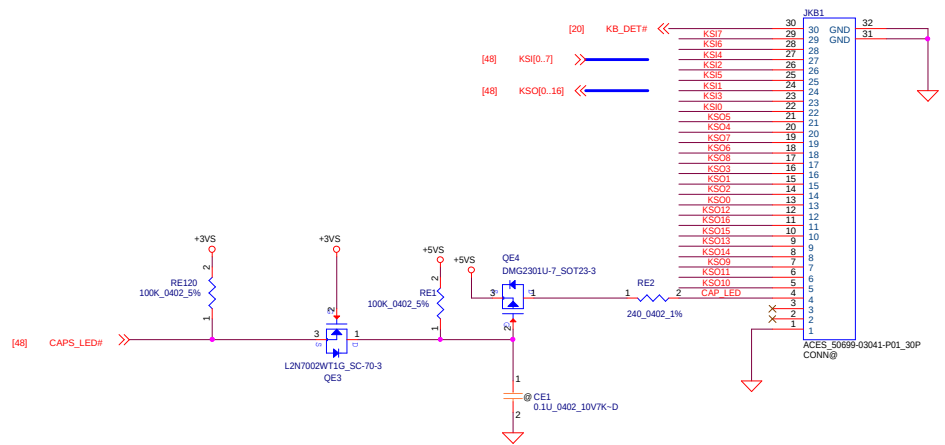
JACK PLUG 10 mils RA56 1 @ 2 0 0402 5% 10 mils >>> AUD_SENSE [37]
Pilot_05

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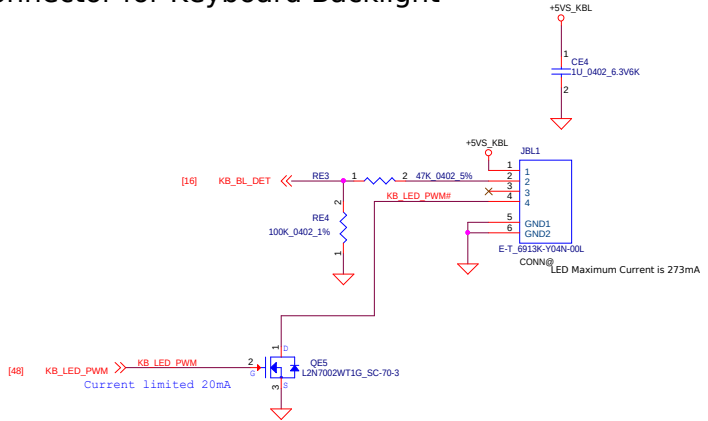
Subwoofer AMP



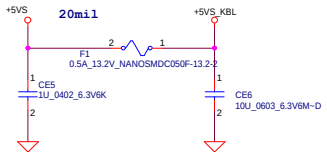
Connector for Keyboard



Connector for Keyboard Backlight



Fuse for Backlight



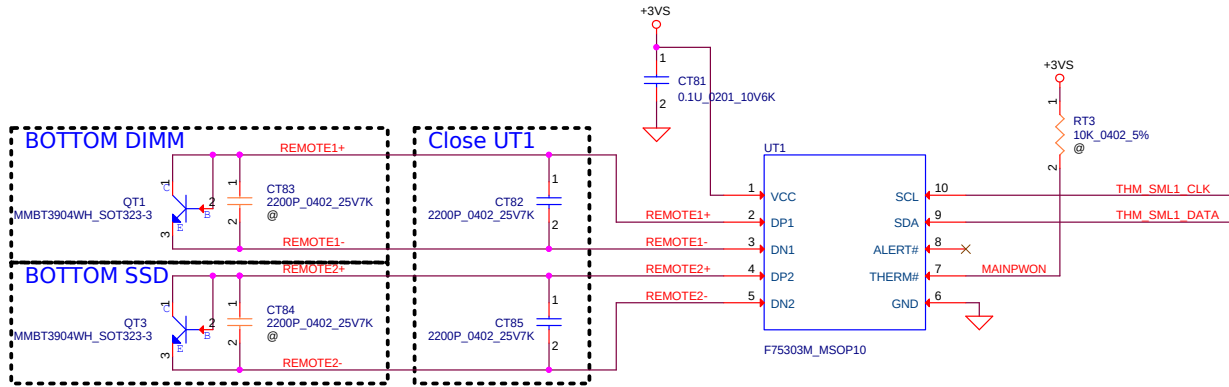
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				Date:	Tuesday, November 06, 2016	Sheet 41 of 70

Main Func : Fan/Thermal

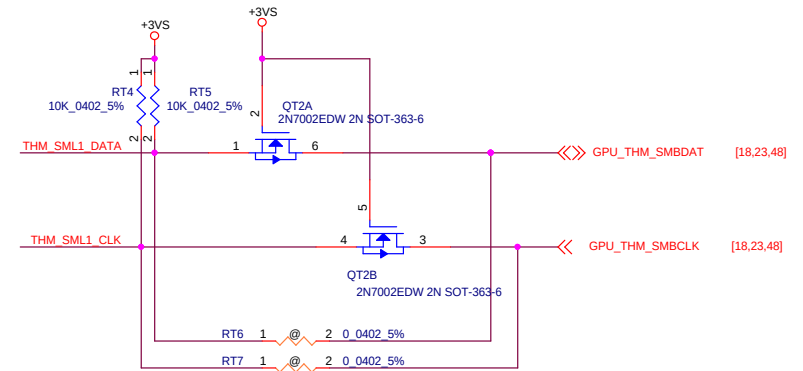
CPU TOP side

Fintek thermal sensor
placed TOP near between GPU & CPU



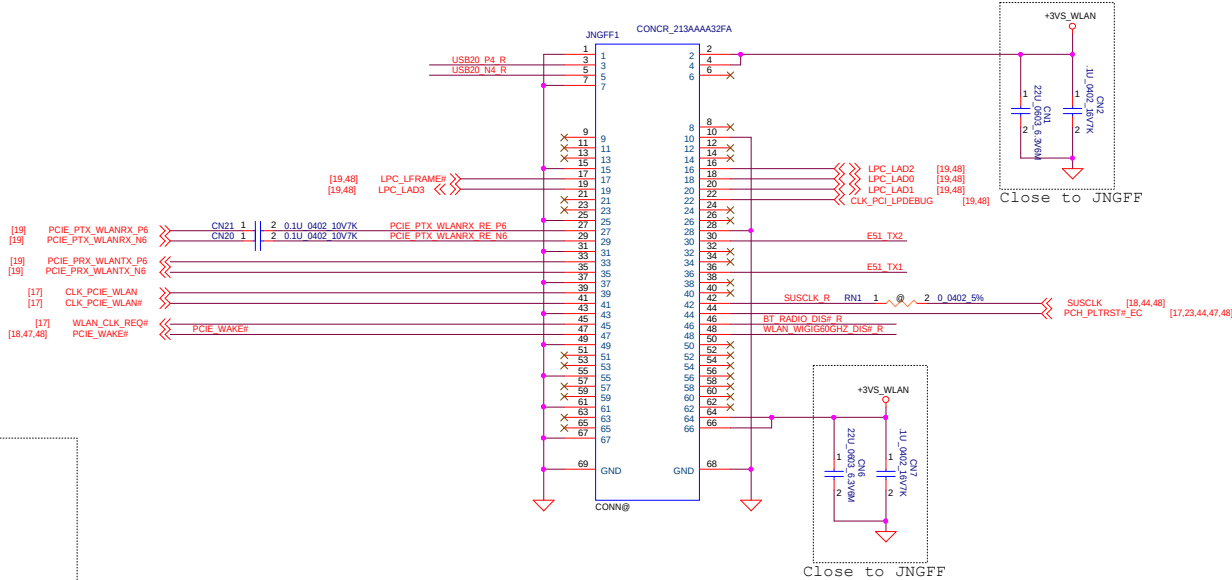
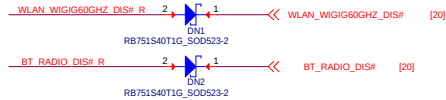
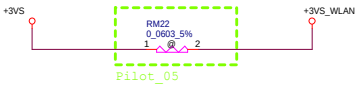
REMOTE1,2 (+/-) :
Trace width/space:10/10 mil
Trace length:<8"

Address 1001_101xb
2nd source
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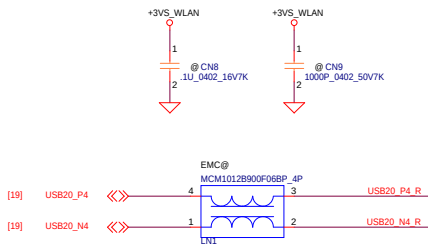


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						Size		Document Number		Rev	
						LA-D991P		0.1(00)			
						Date:		Tuesday, November 08, 2016		Sheet	
								42 of 70			

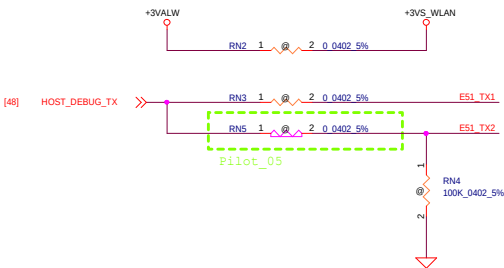
M.2 Slot-A Key-A (WLAN + BT)



Reserve for EMI

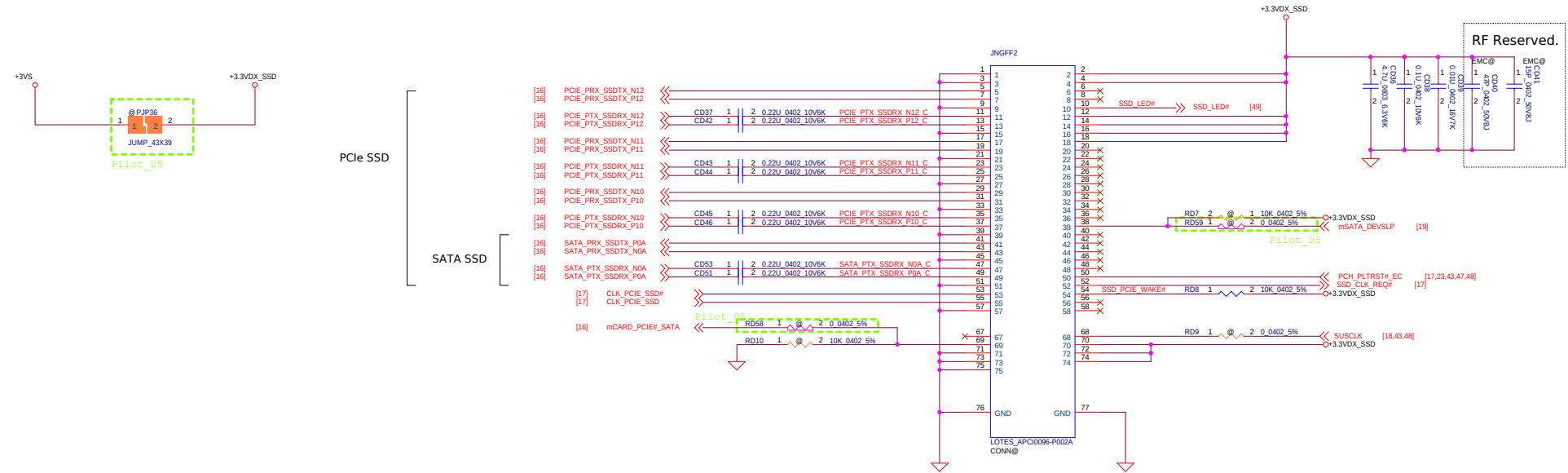


Reserve for NGFF Debug Card

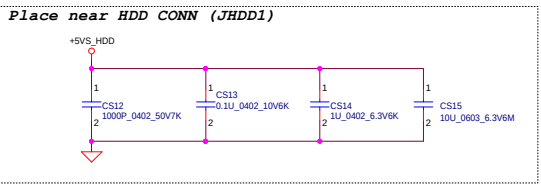
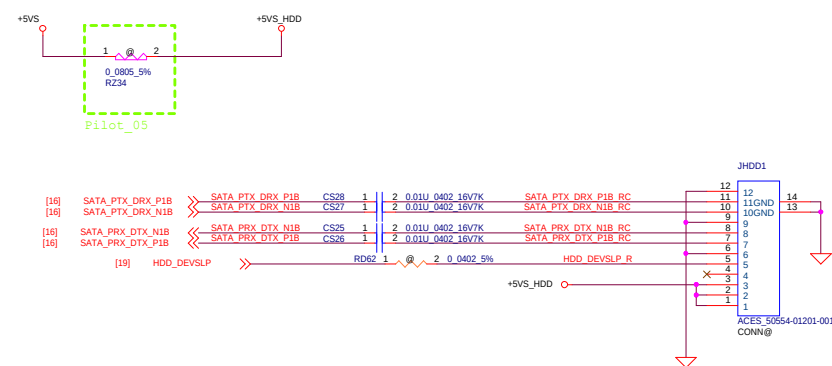


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Date:	Tuesday, November 08, 2016			Sheet	43 of 70

M.2 Slot-C Key-M (SSD)



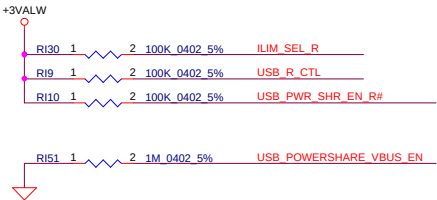
HDD CONN



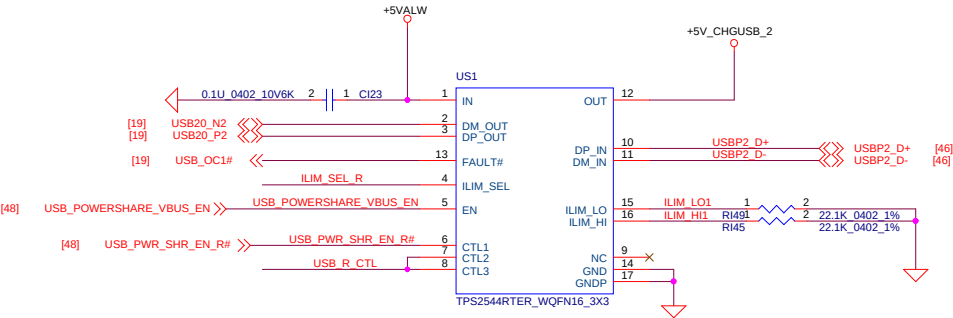
USB Powershare

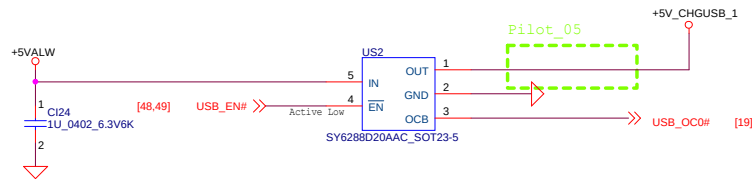
Device Control Pins				Flow Line Condition
CTL1	CTL2	CTL3	ILIM_SEL	
0	1	1	X	DCP AUTO
1	1	1	0	SDP
1	1	1	1	CDP

Suspend mode	CTL1 = 0 : Enable Power Share DCP mode in Suspend mode
	CTL1 = 1 : Disable Power Share in Suspend mode (For Support USB wake)
S0 mode	ILIM_SEL = 0 : SDP mode (0.9A by ILIM_LO setting)
	ILIM_SEL = 1 : CDP mode (STATUS# trigger by ILIM_HI =2.2A)

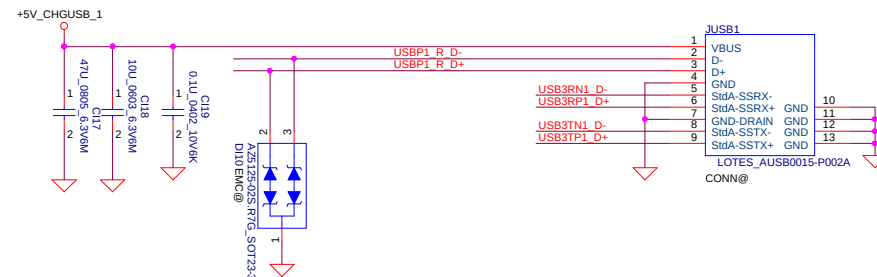
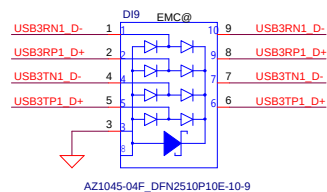
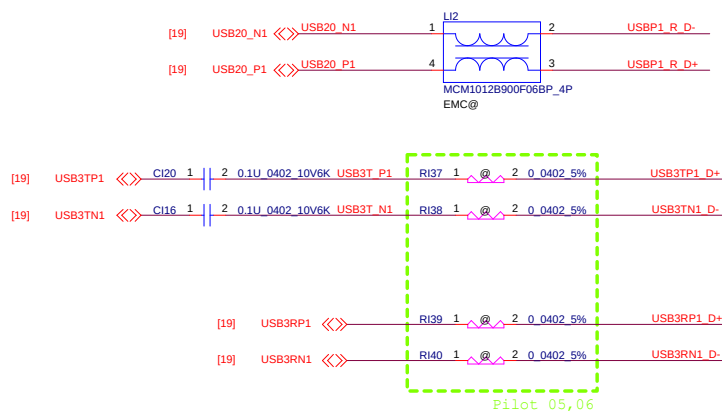


USB3.0 / USB2.0 Port1



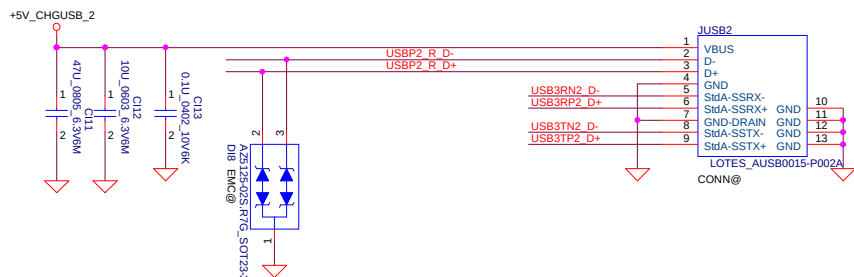
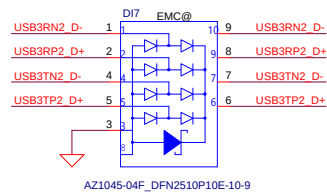
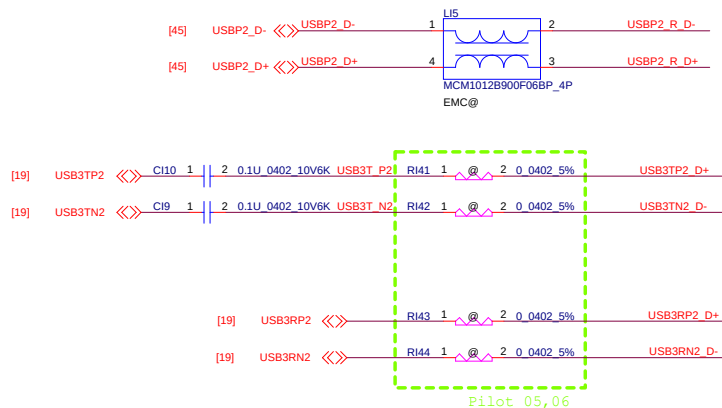


USB3.0 / USB2.0 Port1



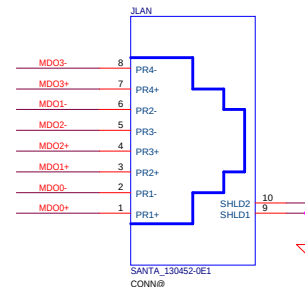
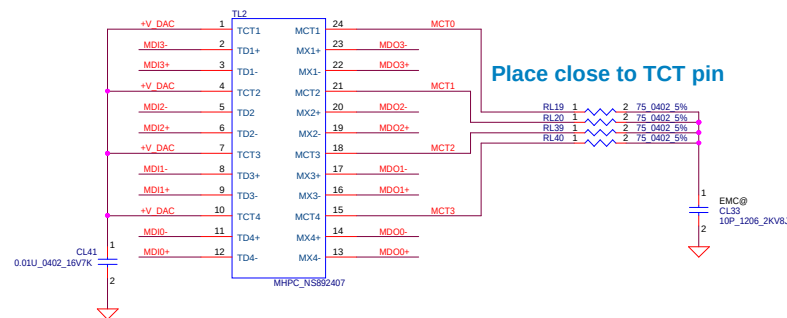
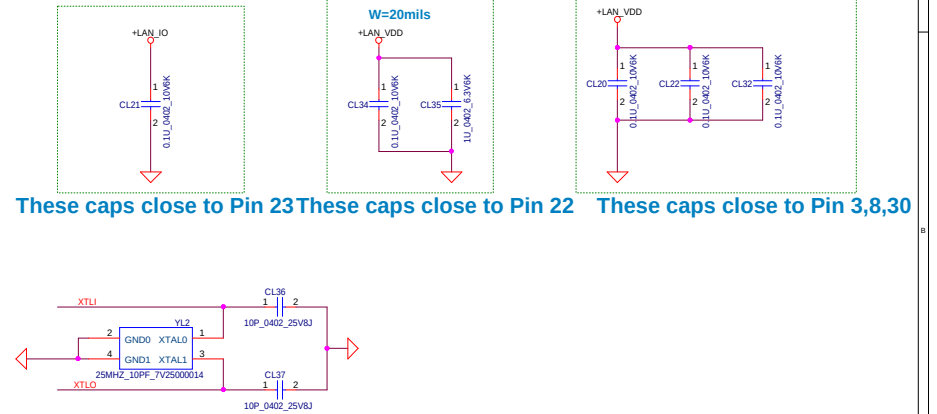
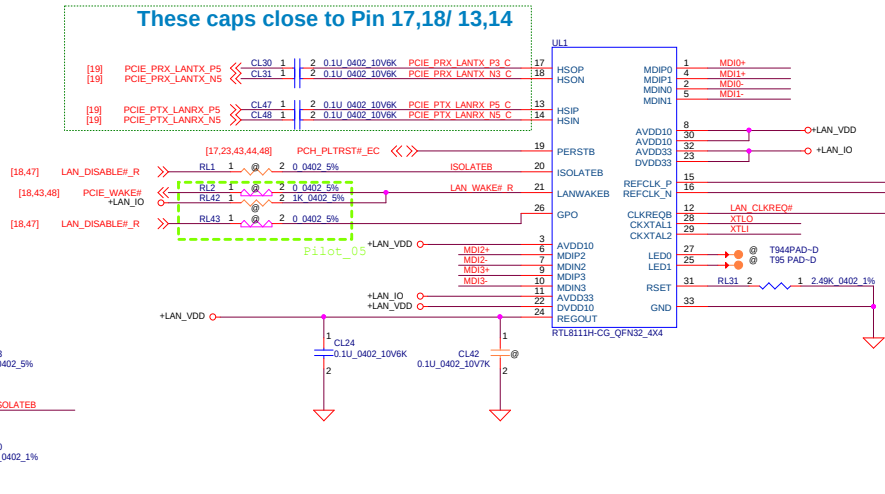
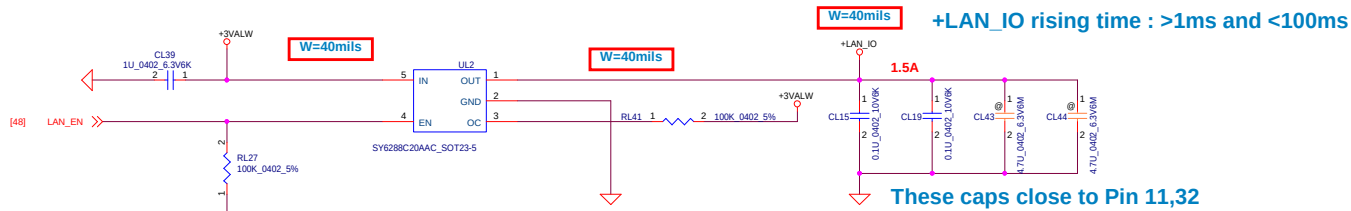
Place close to JUSB1

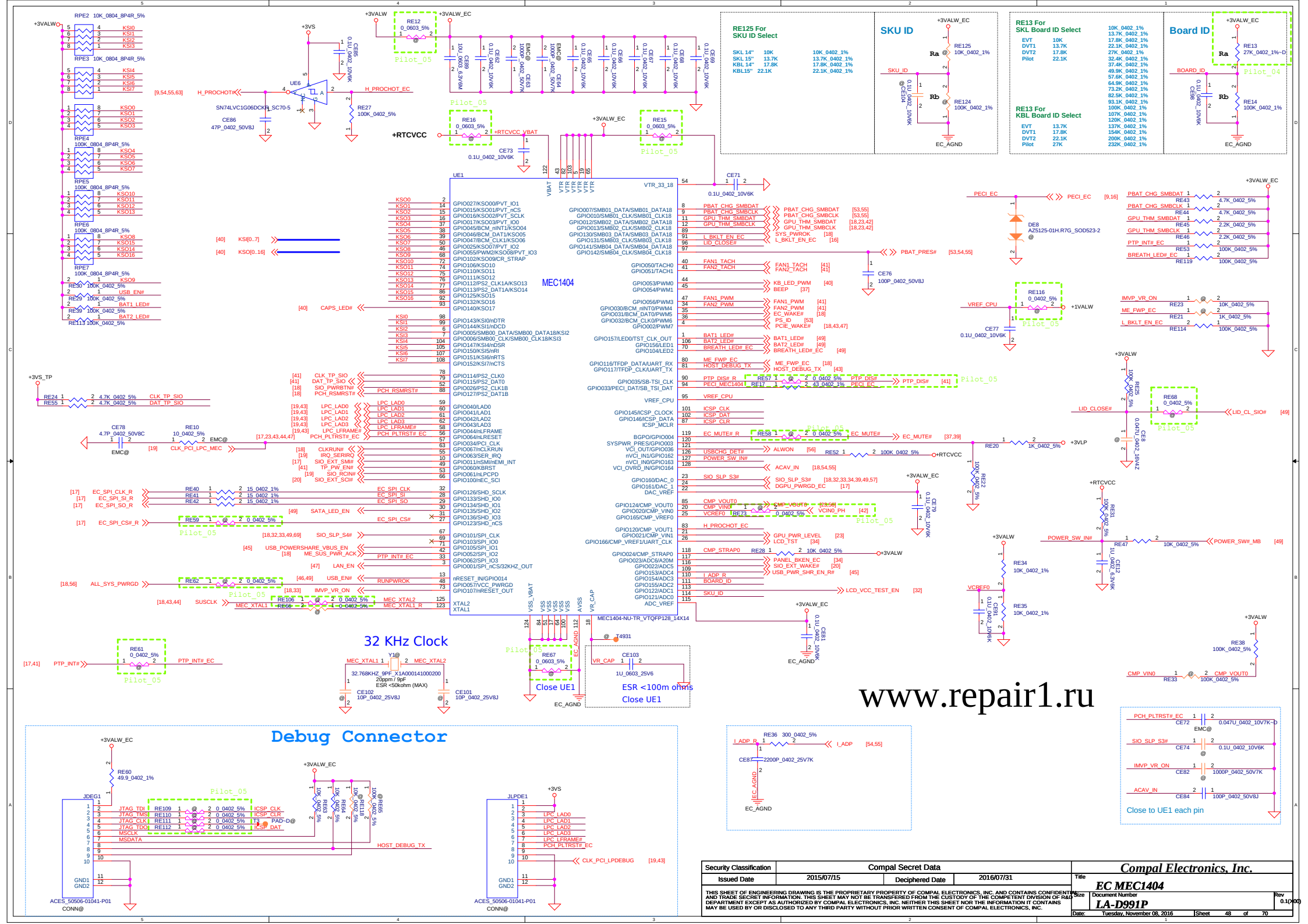
USB3.0 / USB2.0 Port2 (Power share)



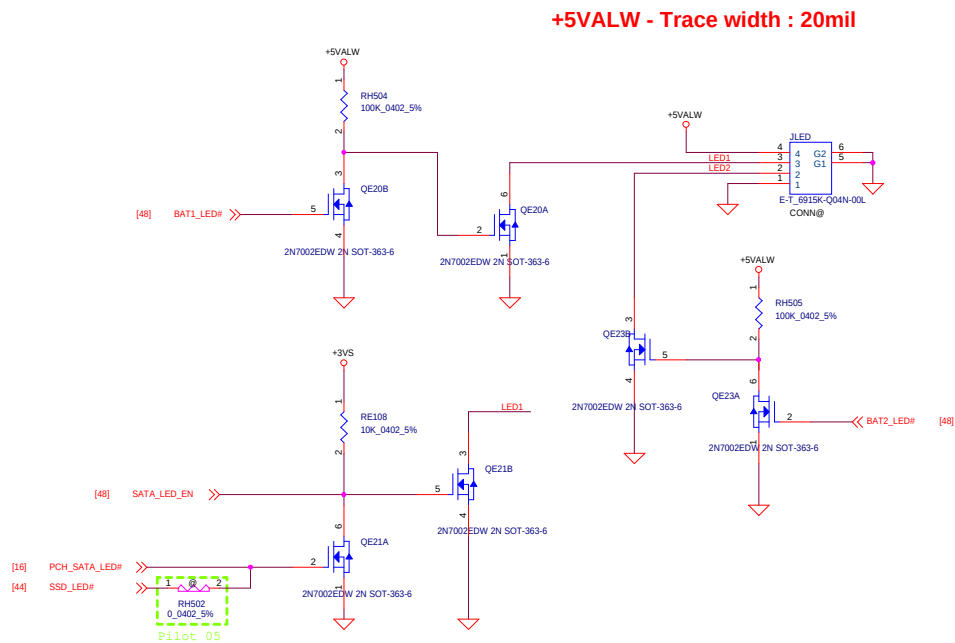
Place close to JUSB2

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								Size	Document Number						Rev
									LA-D991P						0.1000
								Date:	Tuesday, November 08, 2016			Sheet	46	of	70

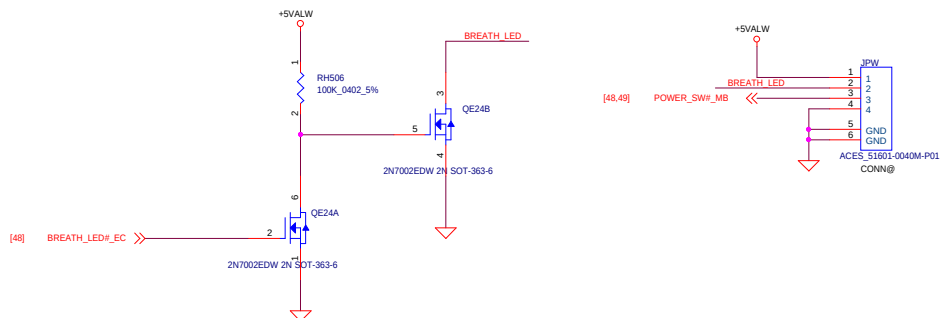




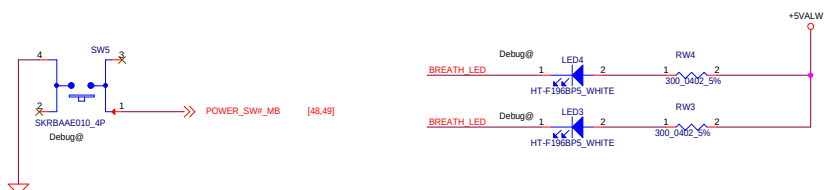
LED Board Connector



TO PWR BOARD

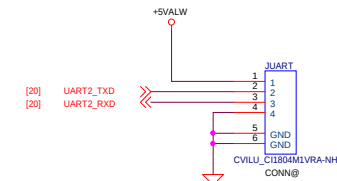


Power Button & LED (Reserve)

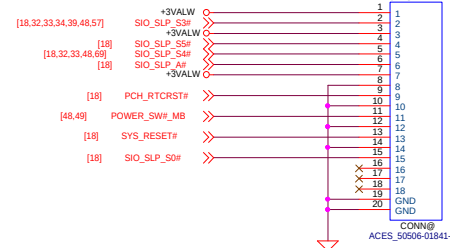


I/O & APS & UART CONN

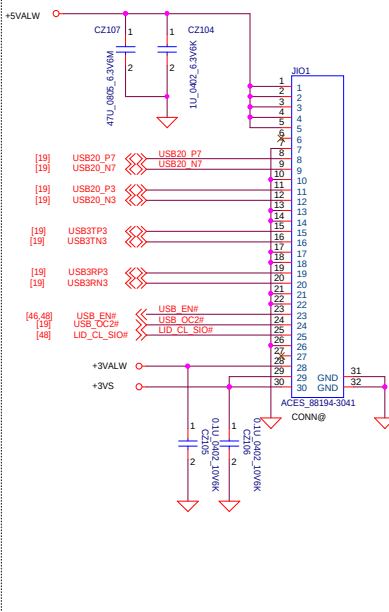
UART CONN



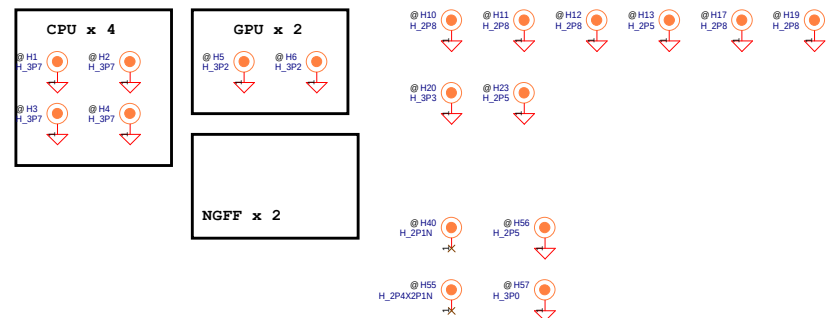
APS CONN



I/O CONN



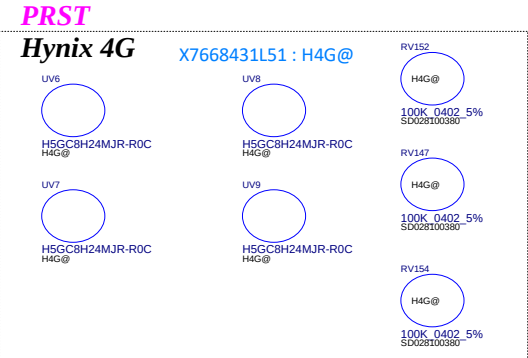
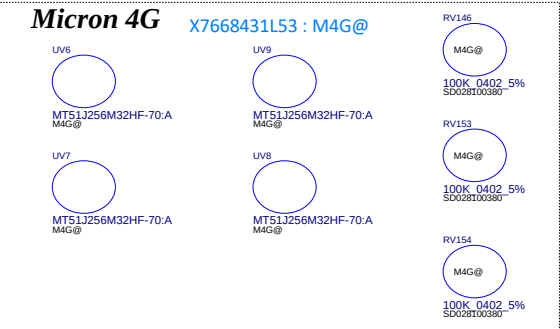
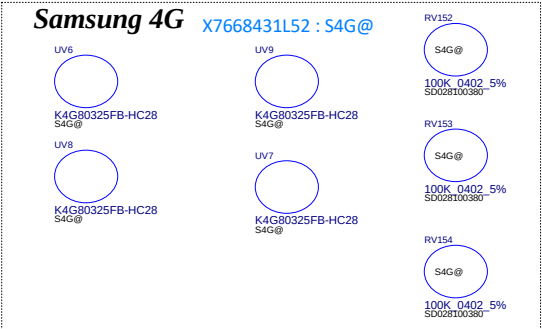
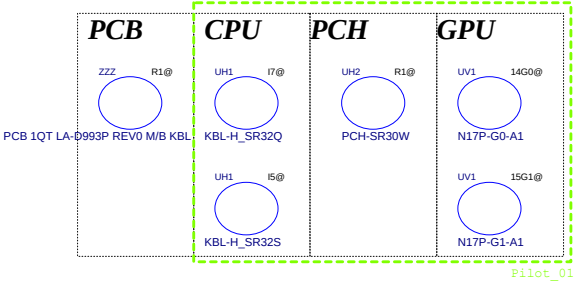
Screw Hole

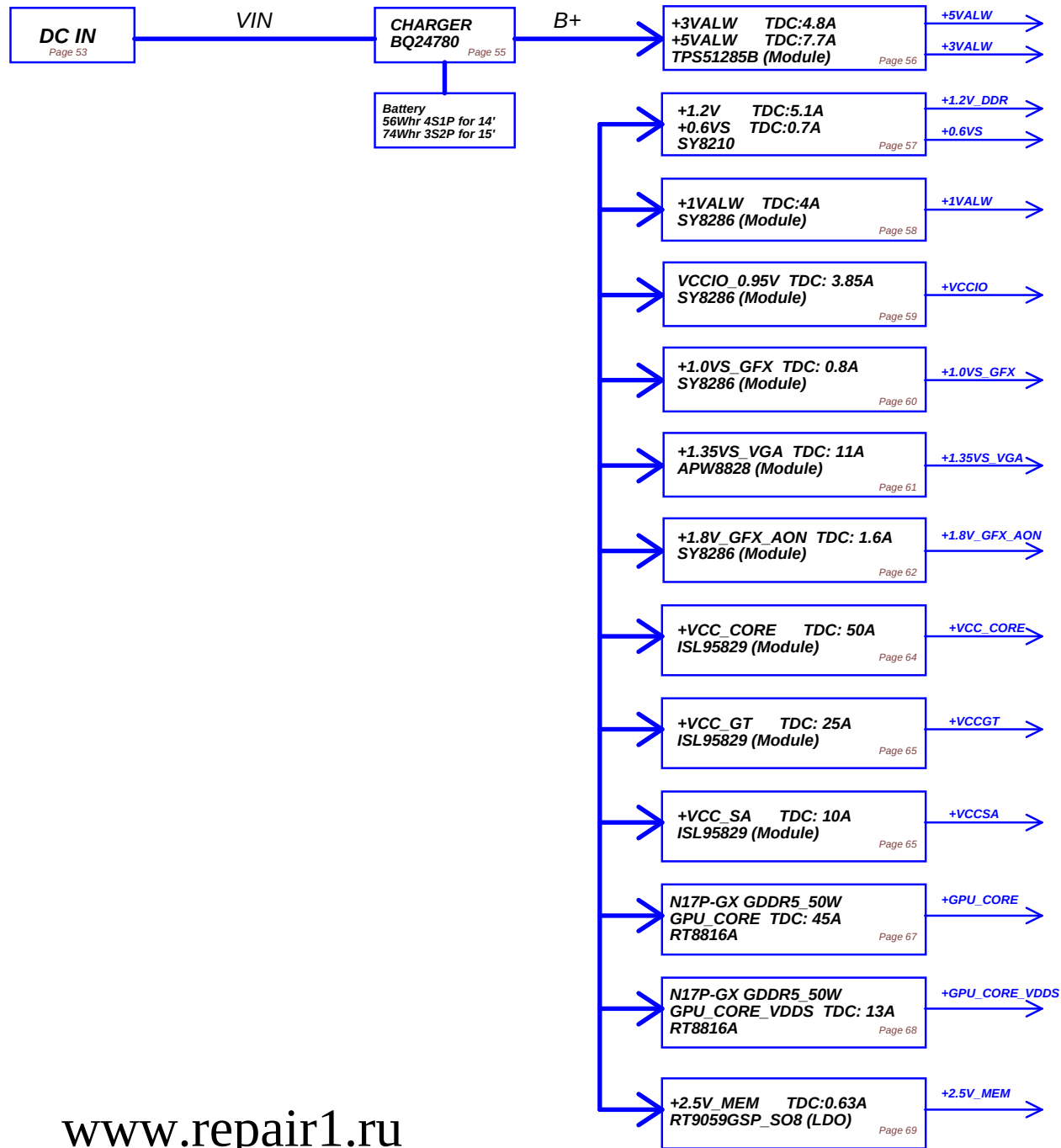


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				Date: Tuesday, November 06, 2016	Sheet 49 of 70 Rev 0.1/000

MODEL NAME : **BBV00/ BBV10**
PCB NO : **LA-D993P**

Bom Structure

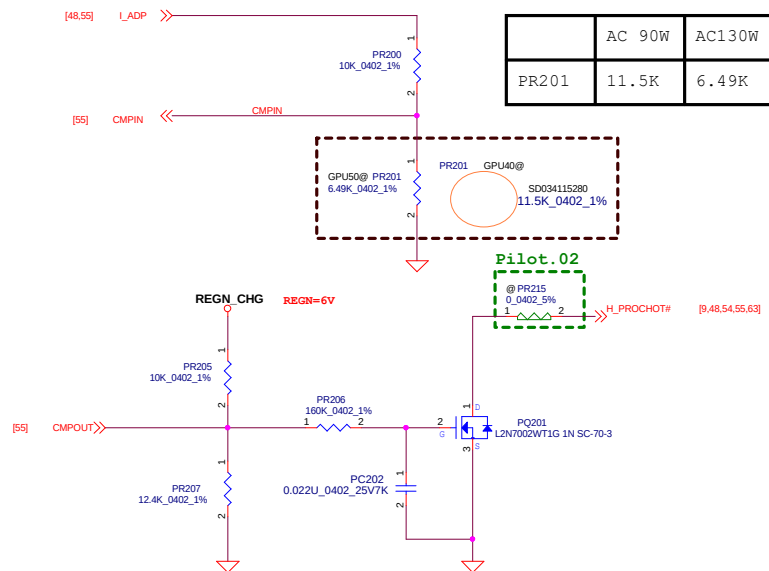




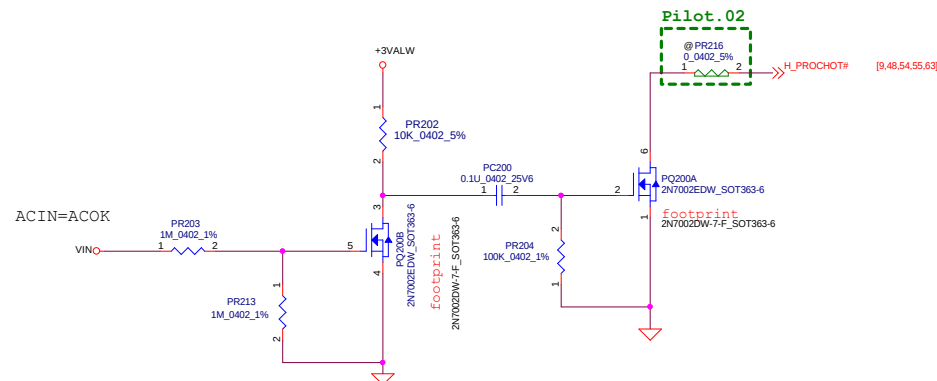
www.repair1.ru

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Issued Date	2011/08/25	Deciphered Date	2012/07/25	Title	Power Block Diagram
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				LA-D993P	Rev 0.10/000
				Date	Tuesday, November 08, 2016
				ISect	52 of 70

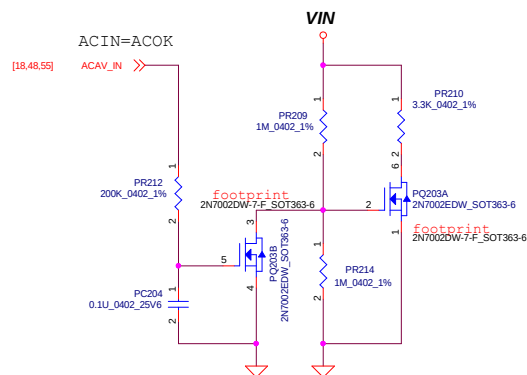
When CMPIN> Vref(2.3V/1.3V)
CMPOUT=floating



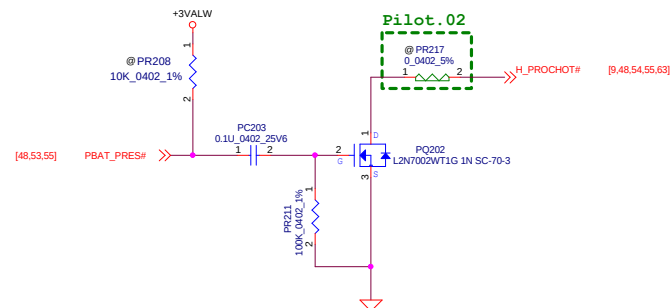
ENG0012879 Circuit-1
Delay Adapter OC H_PROCHOT# 2ms while
Hybrid power transition



Ref ENG0012879 Circuit-2
HW Asserts H_PROCHOT# when ac adapter
is being unplugged and keep low for 10ms
until SW prochot# is issued by EC

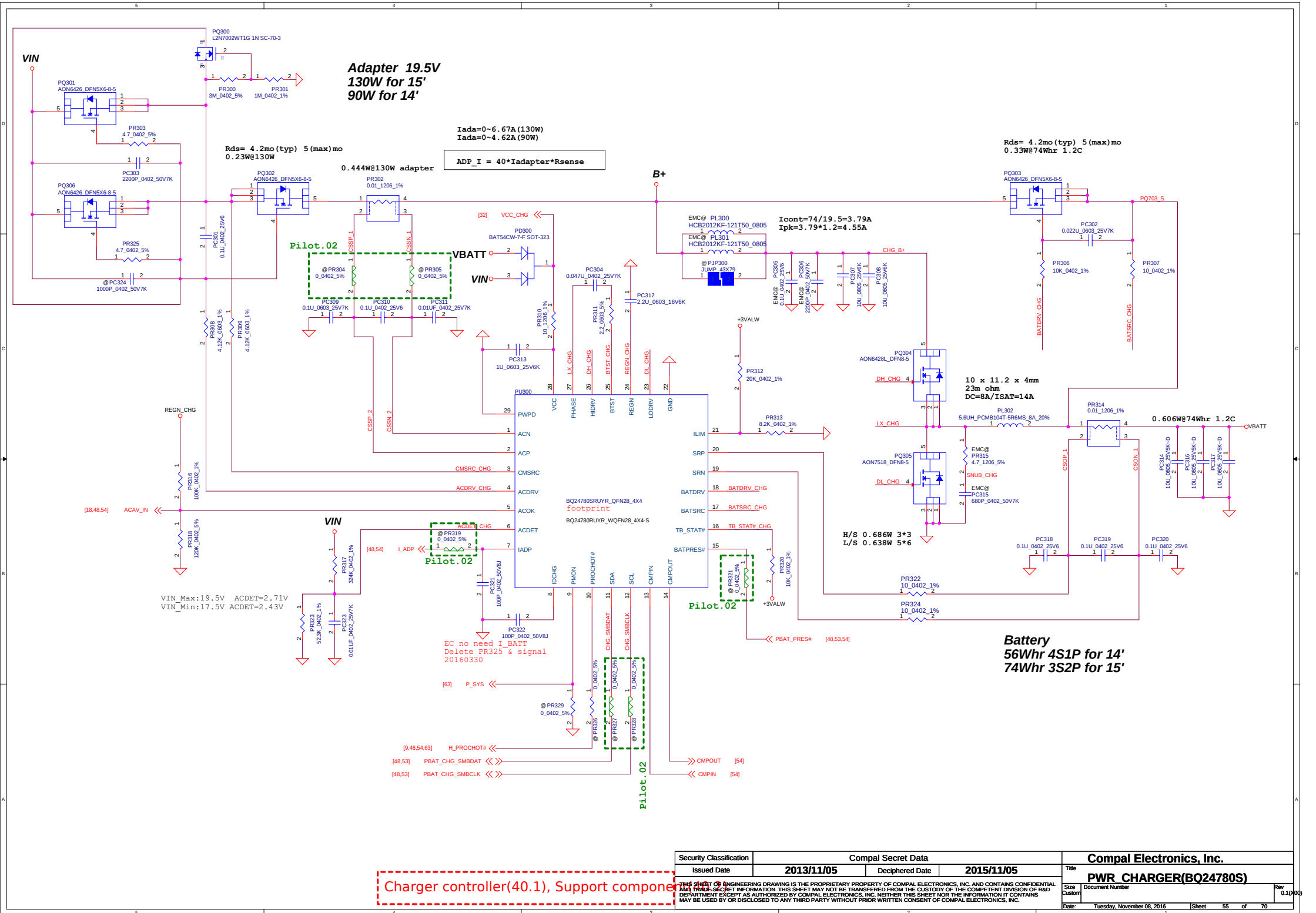


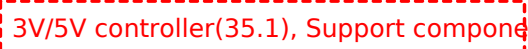
Erp lot 6 circuit



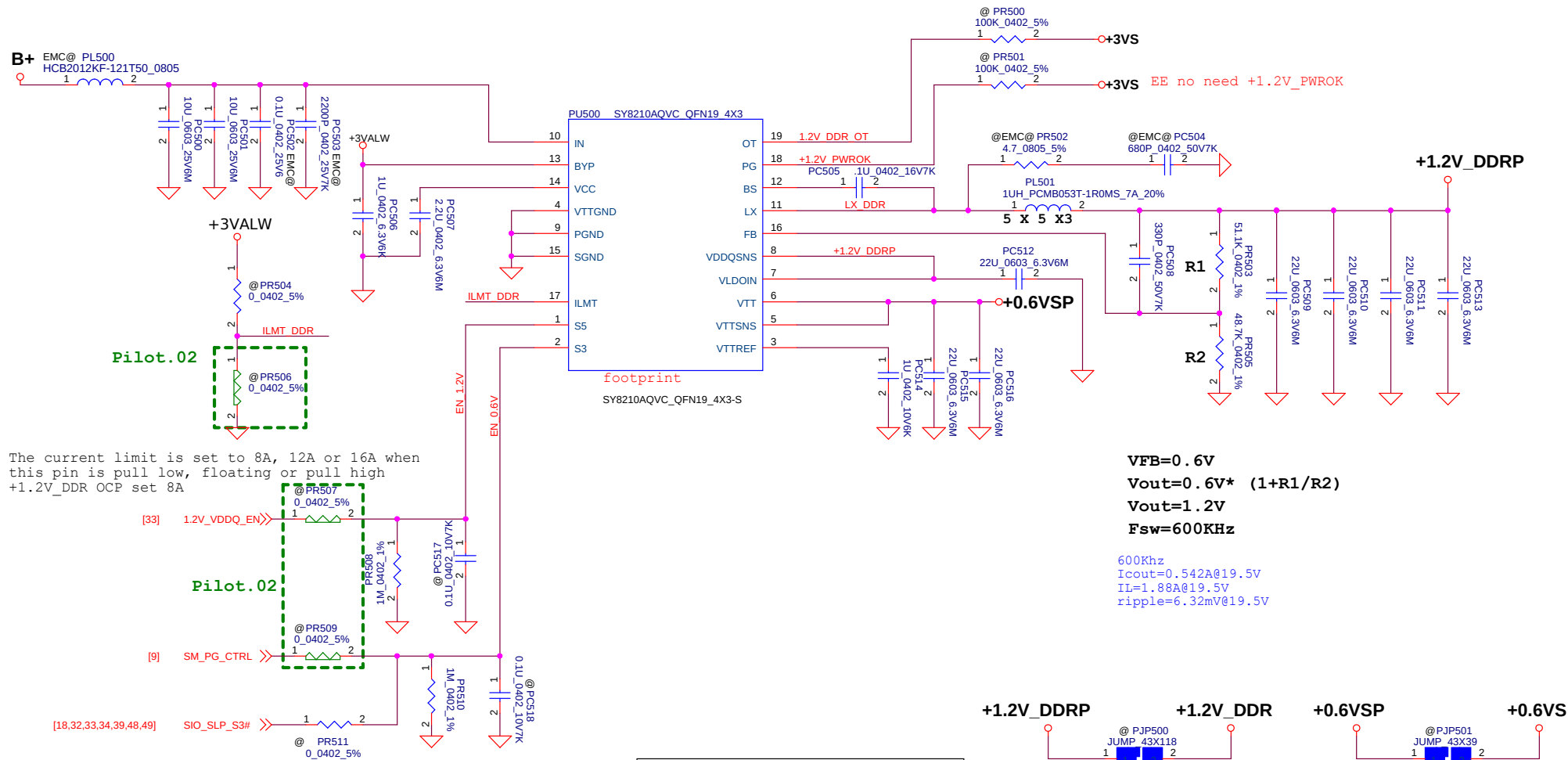
Ref ENG0012879 Circuit-4
HW Asserts H_PROCHOT# when battery
is being unplugged and keep low for 10ms
until SW prochot# is issued by EC

Rest of support elements





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The current limit is set to 8A, 12A or 16A when this pin is pull low, floating or pull high +1.2V_DDR OCP set 8A

VFB=0.6V
Vout=0.6V* (1+R1/R2)
Vout=1.2V
Fsw=600KHz

600KHz
Icout=0.542A@19.5V
IL=1.88A@19.5V
ripple=6.32mV@19.5V

Mode	S3	S5	VOUT	VTT
Normal	H	H	on	on
Stadby	L	H	on	off
Shutdown	L	L	off	off

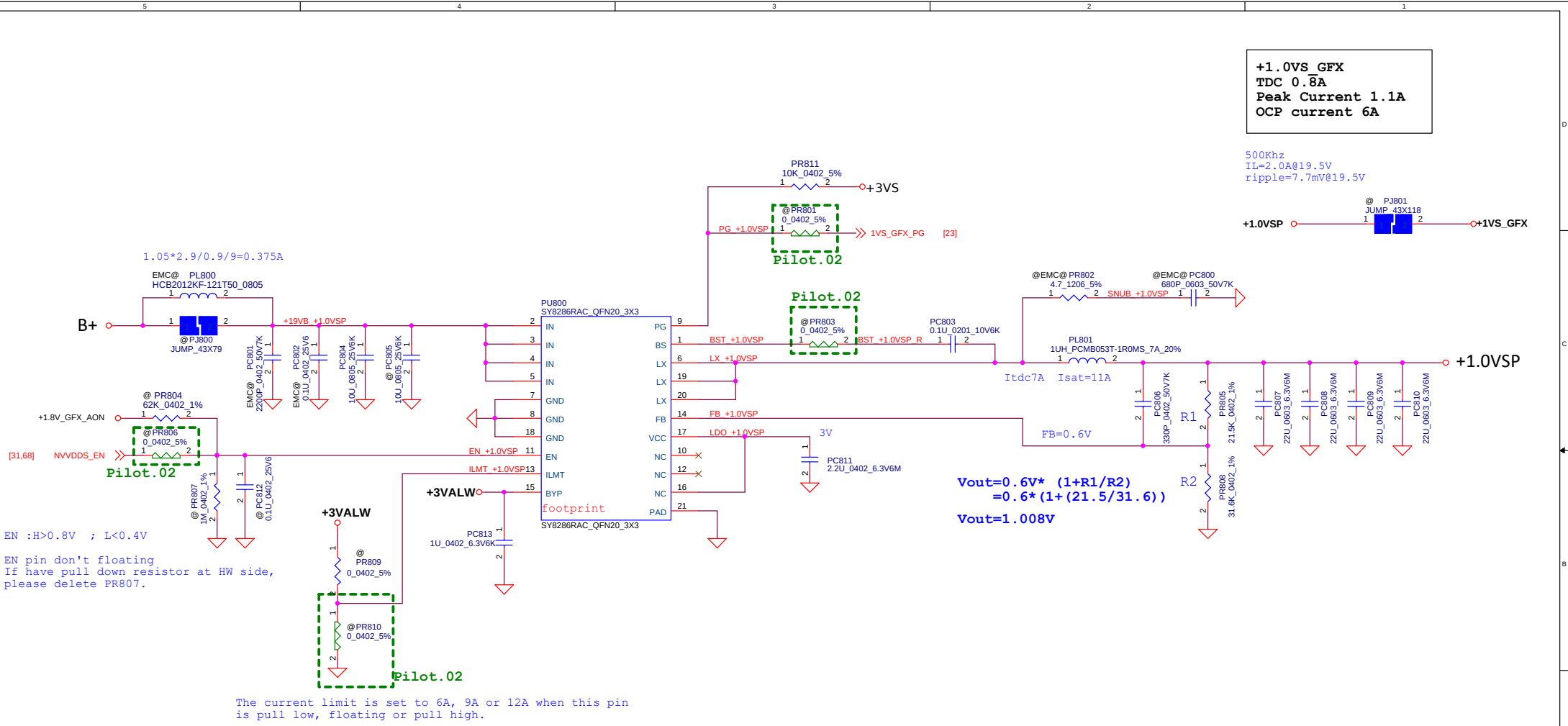
Note: S3 - sleep ; S5 - power off

+1.2V_DDRP
+1.2V_DDR
TDC 5_1A
Peak Current 7.3A
OCP current 8A

+0.6VSP
+0.6VS
TDC 0.7A
Peak Current 1A
OCP Current 2A

DDR controller(35.3), Support component

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Issued Date	2014/10/17	Deciphered Date	2014/12/05	Title	PWR +1.2V_DDR/0.6VS(SY8210)
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+1.0VS_GFX
TDC 0.8A
Peak Current 1.1A
OCP current 6A

500Khz
IL=2.0A@19.5V
ripple=7.7mV@19.5V

+1.0VSP
+1VS_GFX

$1.05 \times 2.9 / 0.9 / 9 = 0.375A$

[31,68] NVVDDS_EN

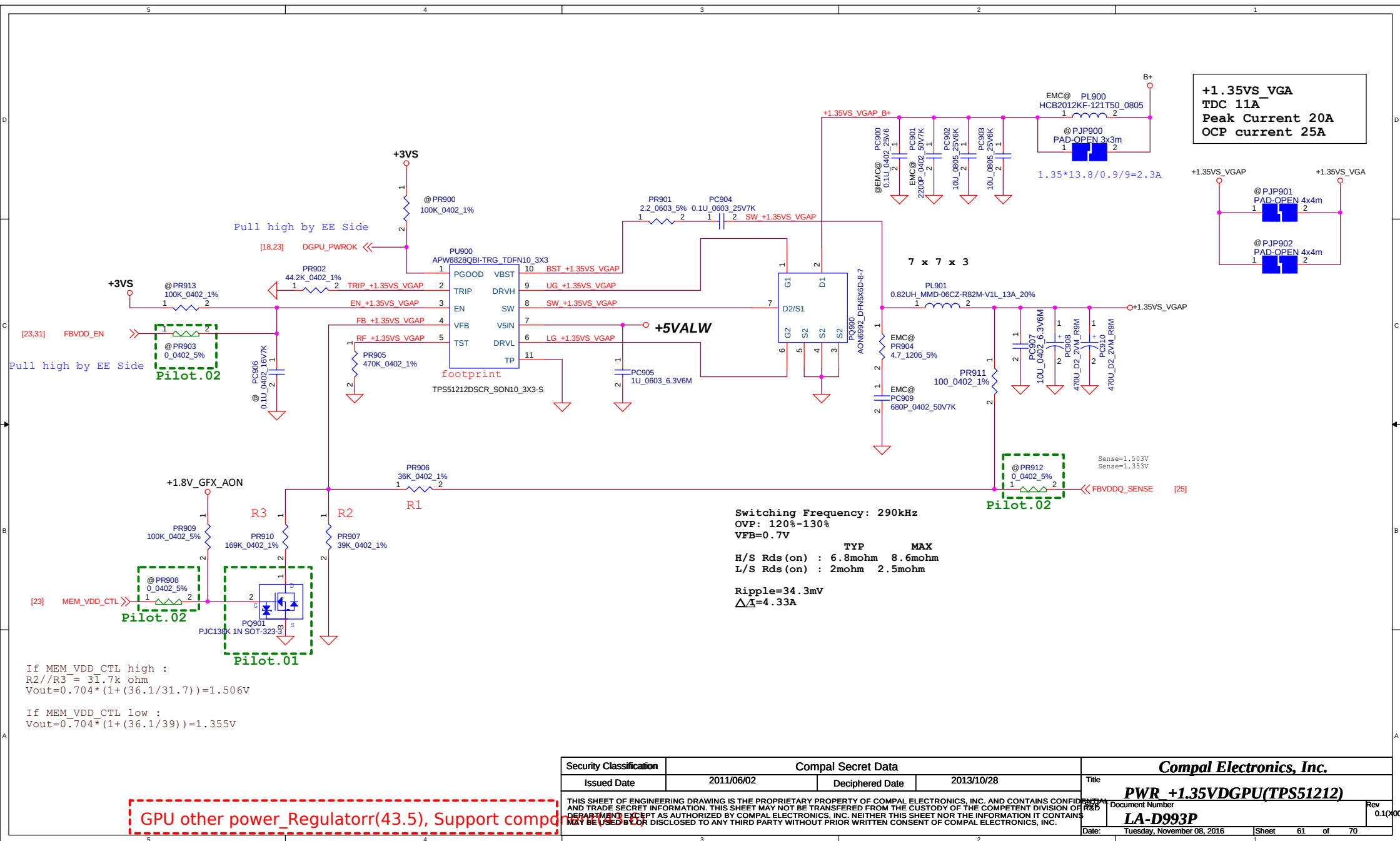
EN :H>0.8V ; L<0.4V
EN pin don't floating
If have pull down resistor at HW side,
please delete PR807.

The current limit is set to 6A, 9A or 12A when this pin is pull low, floating or pull high.

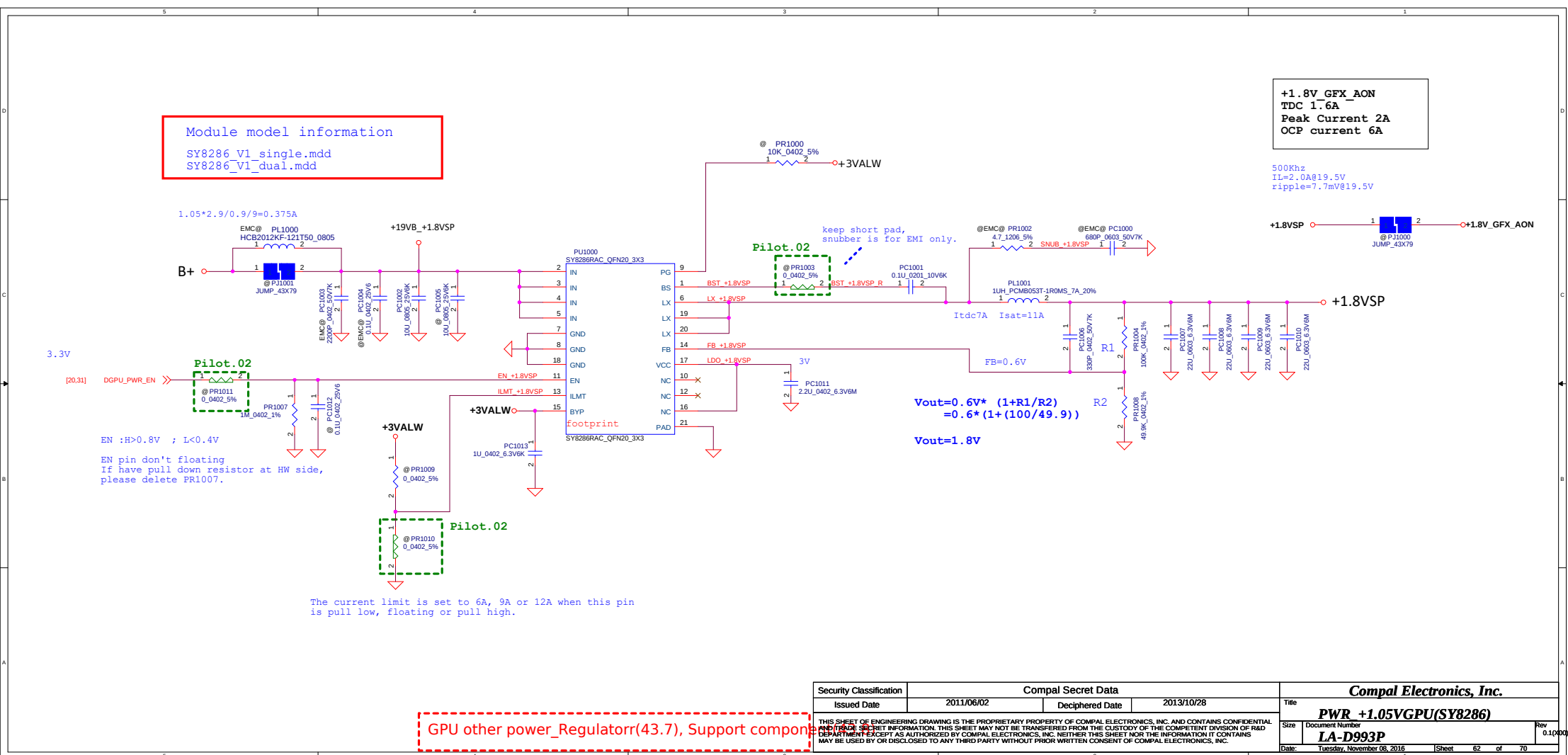
$V_{out} = 0.6V \times (1 + R1/R2)$
 $= 0.6 \times (1 + (21.5/31.6))$
 $V_{out} = 1.008V$

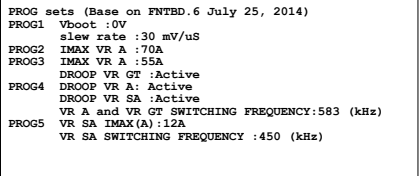
GPU other power_Regulatorr(43.7), Support compo

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Issued Date	2011/06/02	Deciphered Date	2013/10/28	Title	PWR +1.05VGPU(SY8286)
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				Date	Tuesday, November 08, 2016
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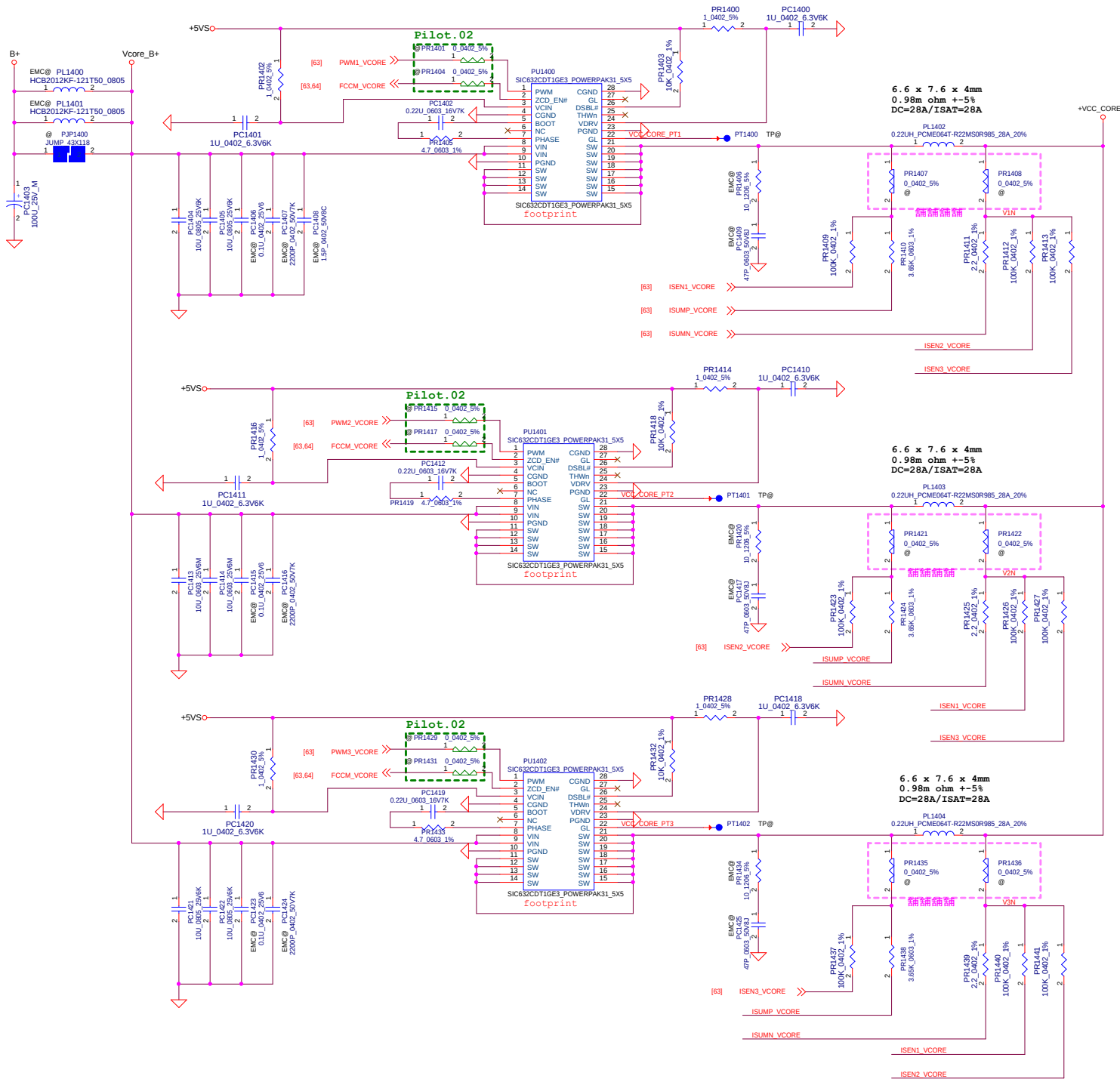


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GPU other power_Regulatorr(43.5), Support compd				Document Number
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				Date: Tuesday, November 08, 2016
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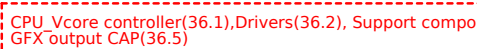
Security Classification		Compal Secret Data		Compal Electronics, Inc.	
Issued Date	2013/06/02	Deciphered Date	2013/10/28	Title	
<p>THIS SECRET OF ENGINEERING DRAWING IS THE PROPRIETARY PROPERTY OF COMPAL ELECTRONICS, INC. AND CONTAINS CONFIDENTIAL INFORMATION. THIS SECRET MAY NOT BE TRANSFERRED OR REPRODUCED WITHOUT THE WRITTEN PERMISSION OF THE COMPETENT DIVISION OF R&D DEPARTMENT EXCEPT AS AUTHORIZED BY COMPAL ELECTRONICS, INC. NEITHER THIS SECRET NOR THE INFORMATION IT CONTAINS MAY BE USED BY OR DISCLOSED TO ANY THIRD PARTY WITHOUT THE PRIOR WRITTEN CONSENT OF COMPAL ELECTRONICS, INC.</p>				Doc Number	PWR-VCORE IS159529
				Size	0.009
				LA-D993P	
				Date	Tue, November 08, 2016
				Sheet	63 of 70



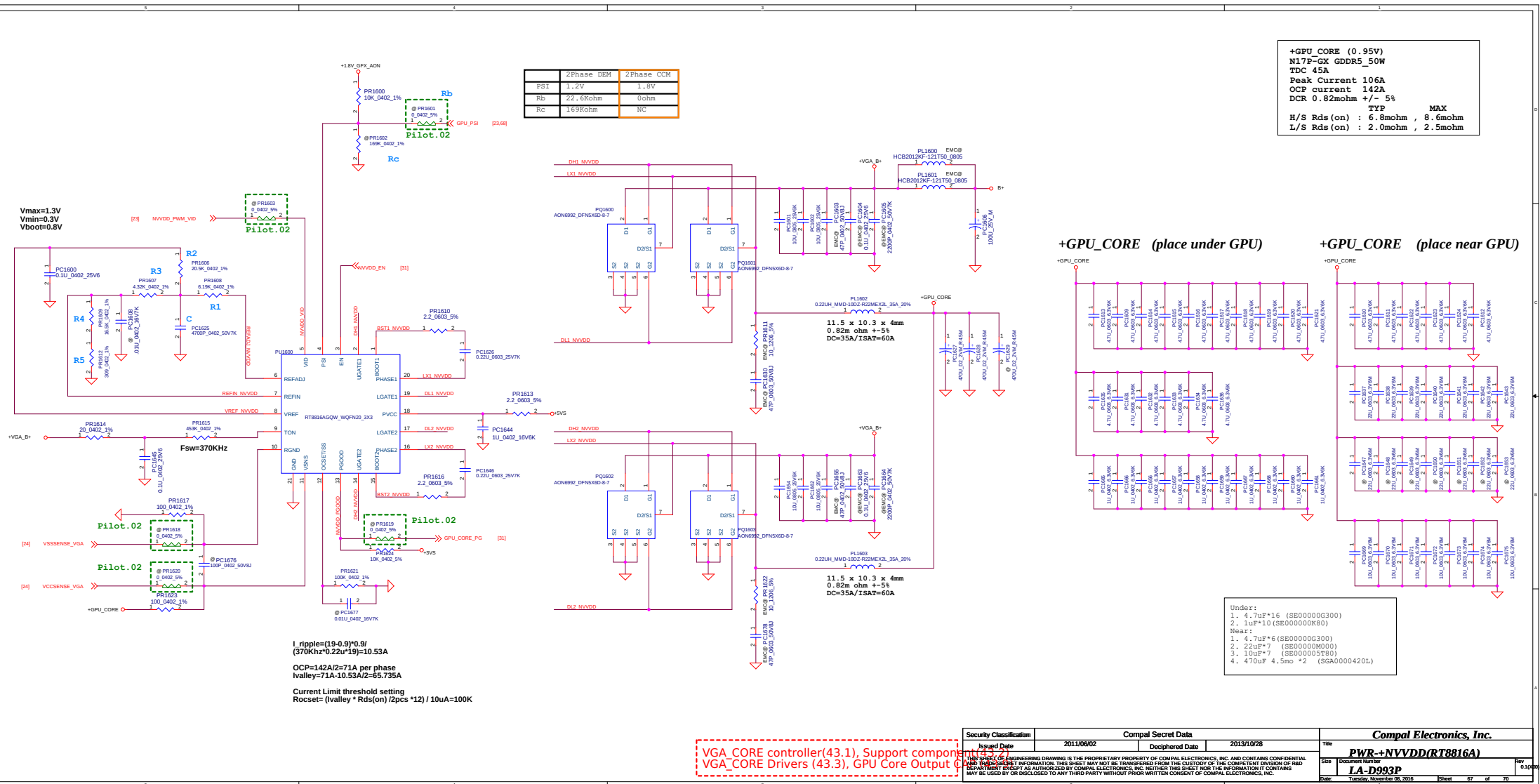
VCC_core (Base on PDDG rev 0.7)
 PL2_TDC_default):TB
 PL2_TDC_max (40Sec):50A
 Peak Current 68A
 DC Load line -1.8mV/A
 AC Load line -1.8mV/A
 OCP Current 83.2A
 DCR 0.97mohm +/-5%

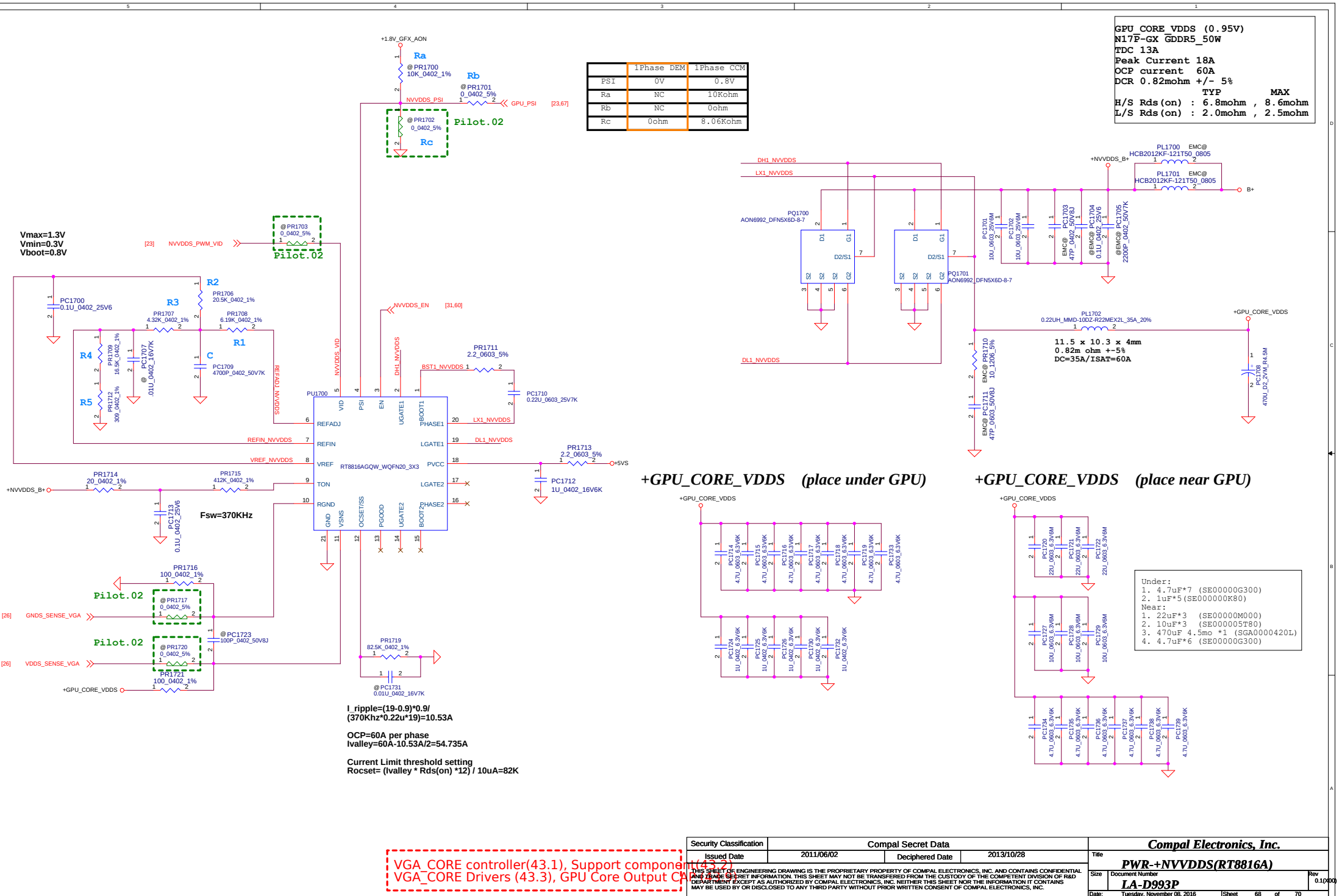
CPU_Vcore controller(36.1), Drivers(36.2), Support compo
 CPU_Core output CAP(36.4),Acoustic Noise B+ Bulk CAP(

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	1Phase DEM	1Phase CCM
PSI	0V	0.8V
Ra	NC	10Kohm
Rb	NC	0ohm
Rc	0ohm	8.06Kohm

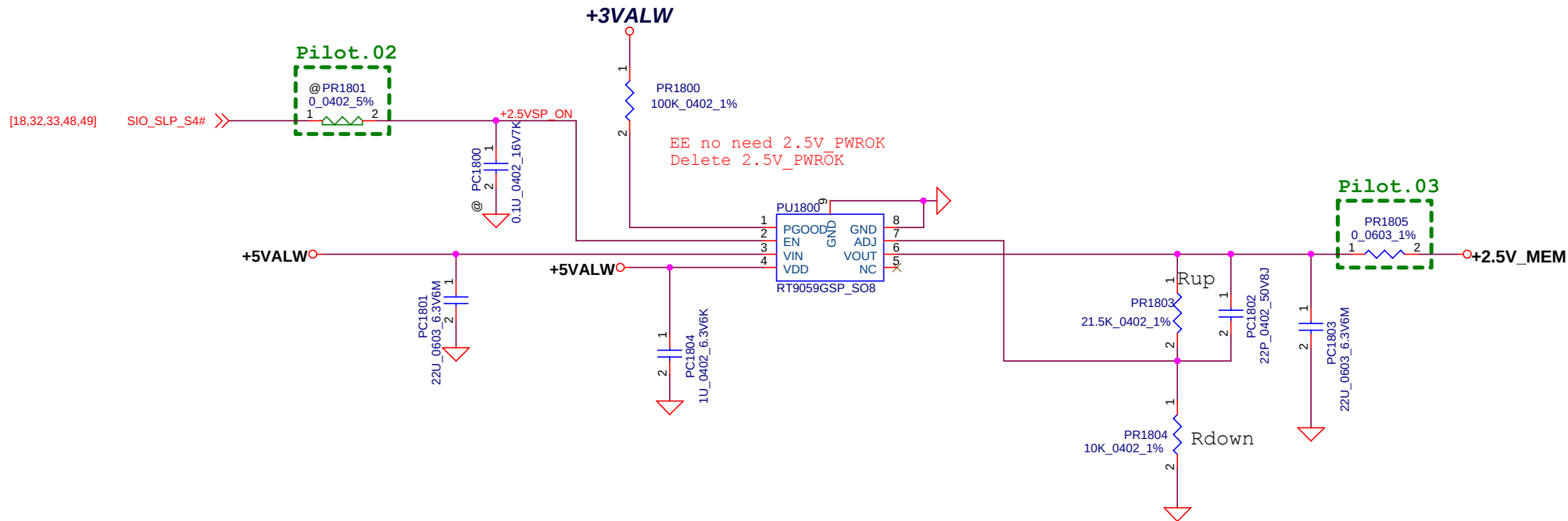
GPU CORE VDD5 (0.95V)
N17P-GX GDDR5_50W
TDC 13A
Peak Current 18A
OCP current 60A
DCR 0.82mohm +/- 5%
H/S Rds(on) : 6.8mohm , 8.6mohm
L/S Rds(on) : 2.0mohm , 2.5mohm

$I_{ripple} = (19 \cdot 0.9) \cdot 0.9 / (370KHz \cdot 0.22u \cdot 19) = 10.53A$
OCP=60A per phase
Ivalley=60A-10.53A/2=54.735A
Current Limit threshold setting
Rocset= (Ivalley * Rds(on) * 12) / 10uA=82K

VGA_CORE controller(43.1), Support component (43.2)
VGA_CORE Drivers (43.3), GPU Core Output C

2.5V_MEM controller(35.13), Support component(35.14)

+2.5V_MEM
TDC 0.63A
Peak Current 0.9A
OCP Current 3.5A



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				Size	Document Number	Rev
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Date:				Tuesday, November 08, 2016	Sheet	69 of 70

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