Compal Confidential

Model Name : ZIUS1(Lenovo)
ZIUS2(NEC)

File Name : LA-B591P

Compal Confidential

Asahi M/B Schematics Document

Intel Crescent Bay Broadwell U Processor with DDR3L
+ NVIDA N15S-GT GPU

Security Classification	Compal Secret Data		
Issued Date	2014/01/09	Deciphered Date	2014/01/09

Compal Electronics, Inc.			
Title: Cover Sheet			
Size: Custom	Document Number: LA-B591P_SDV		Rev: 0.1
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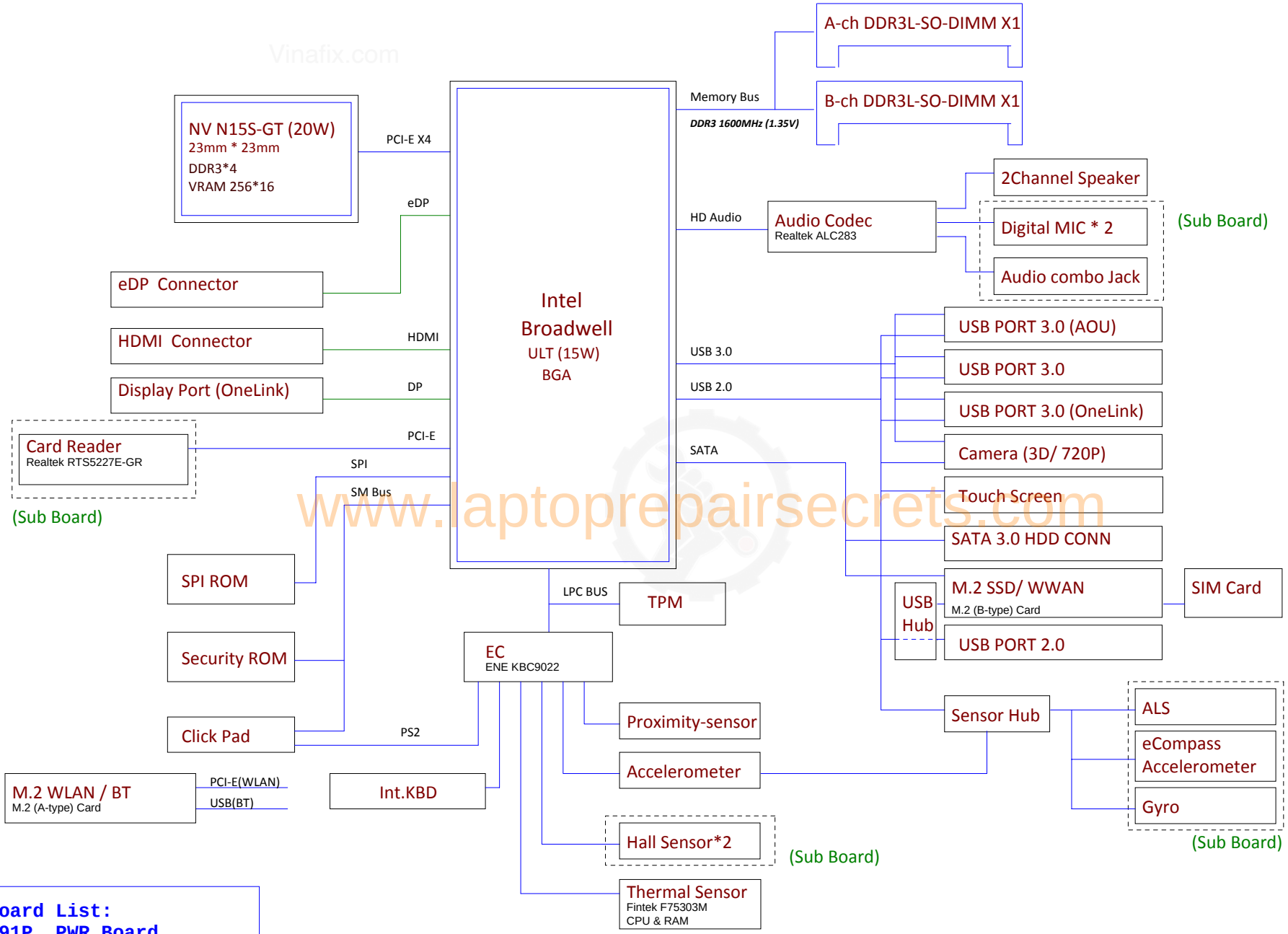

Sub-Board List:
LS-B591P PWR Board
LS-B592P Card Reader Board
LS-B593P 3D Sensor Board
LS-B594P 2D Sensor Board
LS-B595P OneLink Board

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Title: Block Diagram			
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Voltage Rails

power plane / State	+B	+5VALW +3VALW	+1.35V	+5VS +3VS +1.5VS +VCCP +CPU_CORE +VGA_CORE +VCC_GFXCORE_AXG +1.8VS +0.675VS +1.05VS	+3VM +1.05VM (SBA Only)
S0	0	0	0	0	0 M3 Supported
S3	0	0	0	X	0 M3 Supported
S5 S4/AC	0	0	X	X	0 M3 Supported
S5 S4/ Battery only	X	X	X	X	
S5 S4/AC & Battery don't exist	X	X	X	X	

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

BOARD ID Table

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

BOM Structure Table

BTO Item	BOM Structure
Connector	ME@
Unpop	@
Nviida GPU	DIS@
Intel UMA	UMA@
VRAM: Micron 2G VRAM	X76M2G@
VRAM: Hynix 2G VRAM	X76H2G@
VRAM: Samsung 2G VRAM	X76S2G@
AOAC Mount	AOAC@
w/ 3G	3G@
w/o 3G	NO3G@
Trick Point	TP@
SBA	SBA@
no SBA	NOSBA@
GPU GC6	GC6@
GPU NO GC6	NOGC6@
TPM	TPM@
EMI Un-Mount	@EMI@
EMI Mount	EMI@

USB 2.0 Port Table

Port	3 External USB Port
0	USB 3.0 AOU Port (MB-Left)
1	USB 3.0 Port (MB-Right)
2	USB 3.0 Port (OneLink)
3	Camera (2D)
4	M.2 BT (w/o 3G) USB2 Hub (w/ 3G)
5	Touch Screen
6	Sensor Hub
7	USB2 Port (MB-Right)

USB 3.0 Port Table

Port	
1	USB 3.0 Port (MB-Left)
2	USB 3.0 Port (MB-Right)
3	USB 3.0 Port (OneLink)
4	Camera (3D)

SATA Port Table

Port	
3	
2	
1	M.2 WWAN/SSD
0	HDD

PCIE Port Table

Port	Lane	
1		
2		
3		M.2 WLAN
4		Card Reader
5	0	GPU
	1	
	2	
	3	
6	0	
	1	
	2	
	3	

EC SM Bus1 address

Device	Address	HEX
Smart Battery	0001 011X b	16H
Charger	0001 011X b	12H
Touch HOME botton		

EC SM Bus2 address

Device	Address	HEX
Thermal Sensor Fintek F75303M	1001_101xb	9AH
Thermal Sensor ON-semi ADM1032	0100_110xb	4CH
P - Sensor	0010_1000b	28H
Intel BDW-U		
Nvidia N15S-GT		

PCH SM Bus address

Device	Address	HEX
DDR DIMM1	1001 000Xb	A0H
DDR DIMM2		
Security Rom	1010 100xb	A8H
Synaptics Inter Touch Click Pad	0010_110xb	2CH
M.2 mSATA		
M.2 WLAN		

CPU

U1 HSW QFSY CPU1@ SA00007AM20

U1 BDW QG21 CPU2@ SA00007OS00

U1 BDW QG22 CPU3@ SA00007OT00

PCB

ZZZ LA-B591P DA_PCB DA80010I000

VRAM

ZZZ Hynix_512MB X76H2G@ X7656639L01

ZZZ MICRON_512MB X76M2G@ X7656639L02

ZZZ Samsung_512MB X76S2G@ X7656639L03

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Title: Notes List

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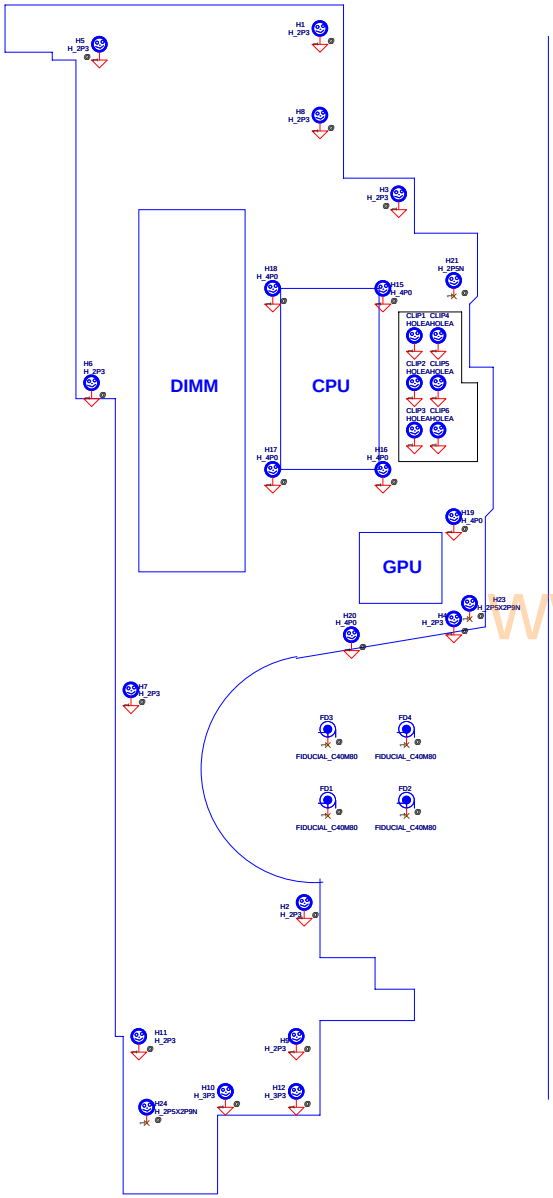
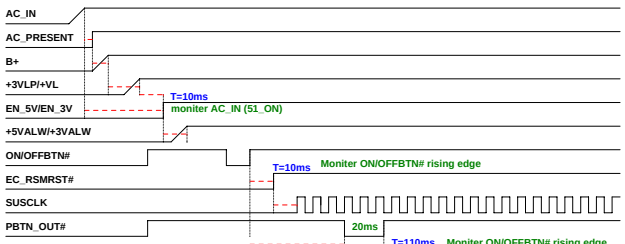


[AC Mode]



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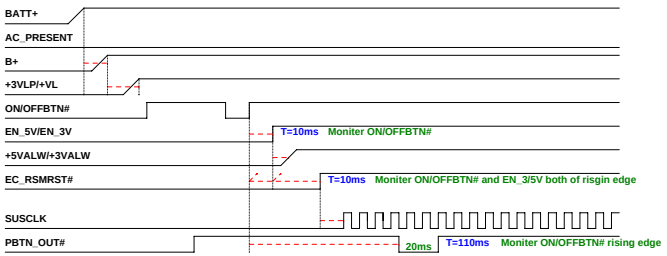

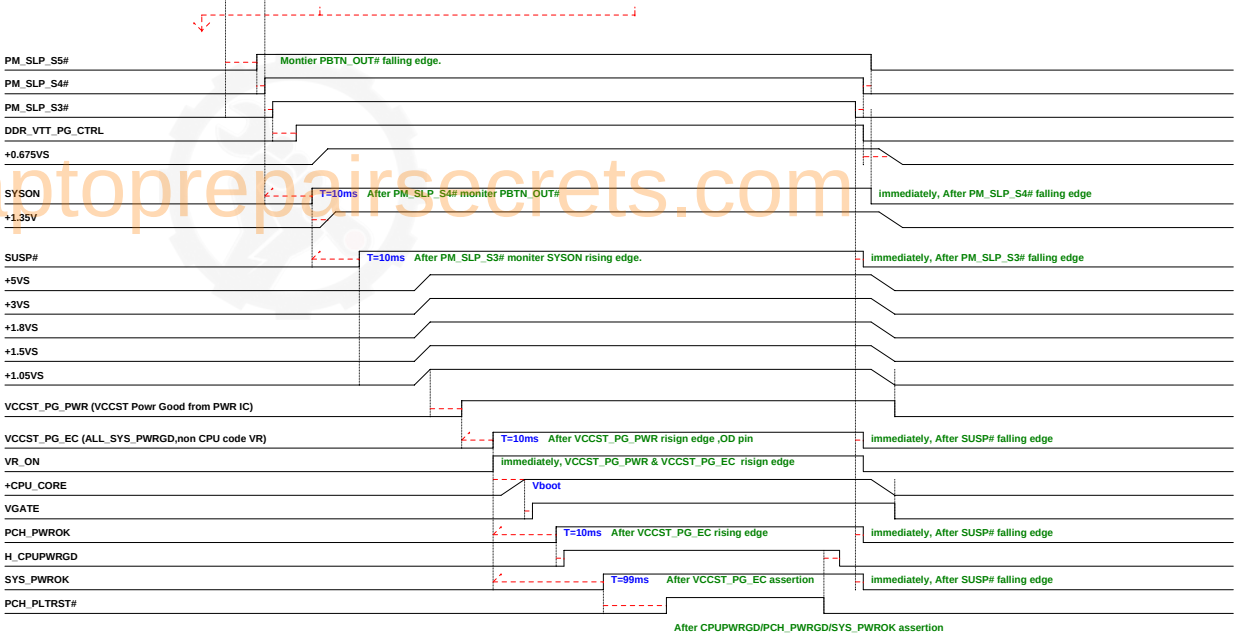

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Compal Electronics, Inc.			
Title	Screw Hole		
Size	Document Number		Rev
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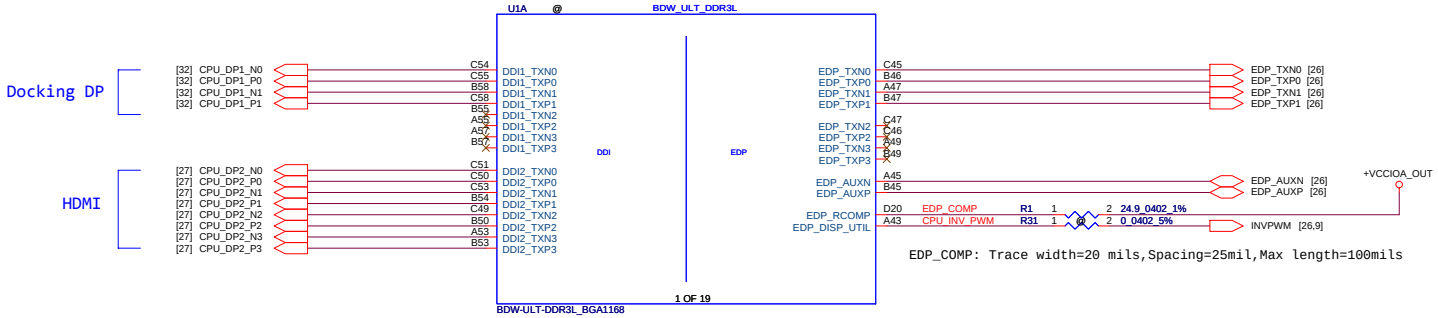
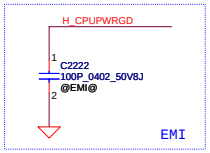
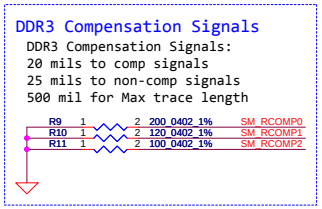
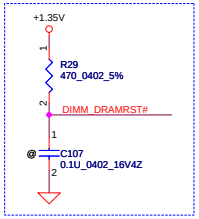
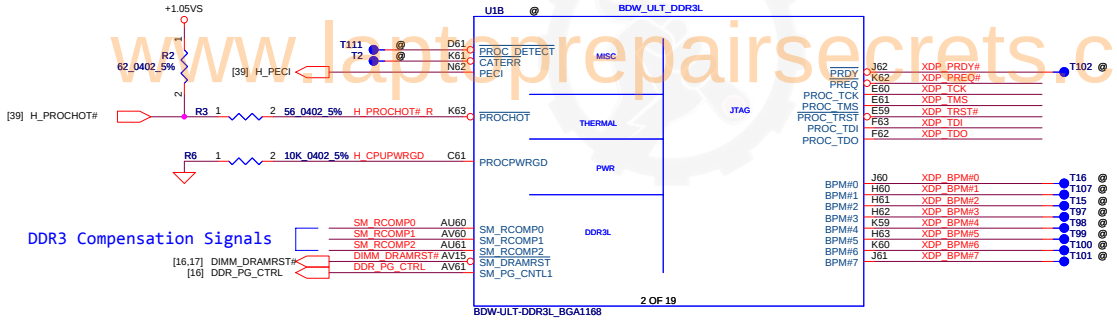
DDI/ MSIC/ XDP

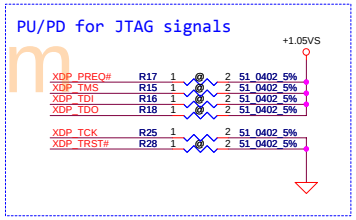












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Issued Date	2014/01/09	Deciphered Date	2014/01/09

Compal Electronics, Inc.			
Title: HSW MCP(1/11) DDI,MSIC,XDP			
Size: Custom	Document Number: LA-B591P_SDV		Rev: 0.1
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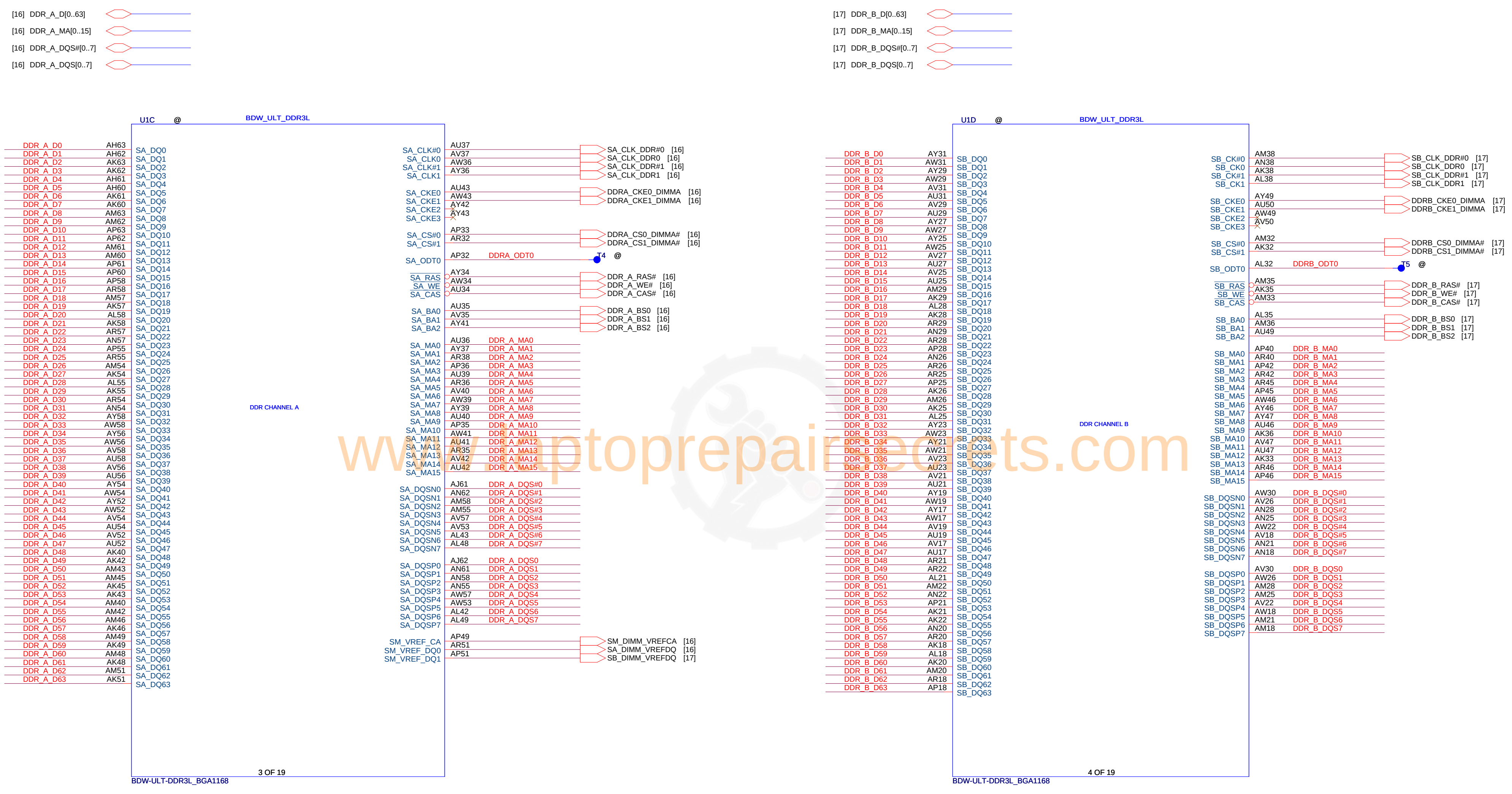
Memory I/F



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Issued Date	2014/01/09	Deciphered Date	2014/01/09

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Title: **HSW MCP(2/11) DDRIII**

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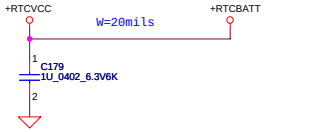
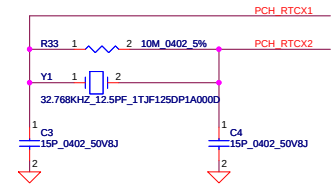
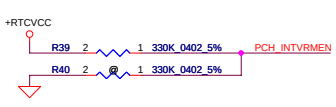
RTC/ SATA/ XDP

RTC Battery



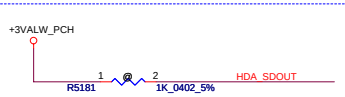
Safty suggestion remove EE side ,Keep PWR side





INTVRMEN (+1.05VA)

* H禁Integrated VRM enable
  L禁Integrated VRM disable

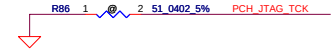


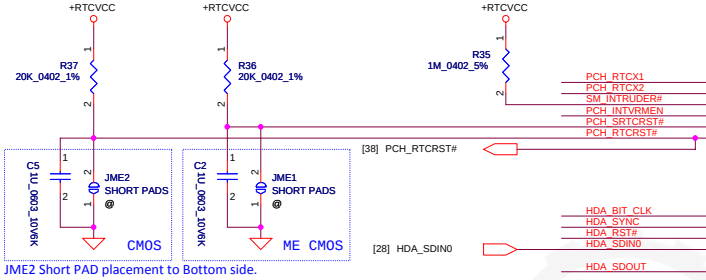
HDA_SDOUT

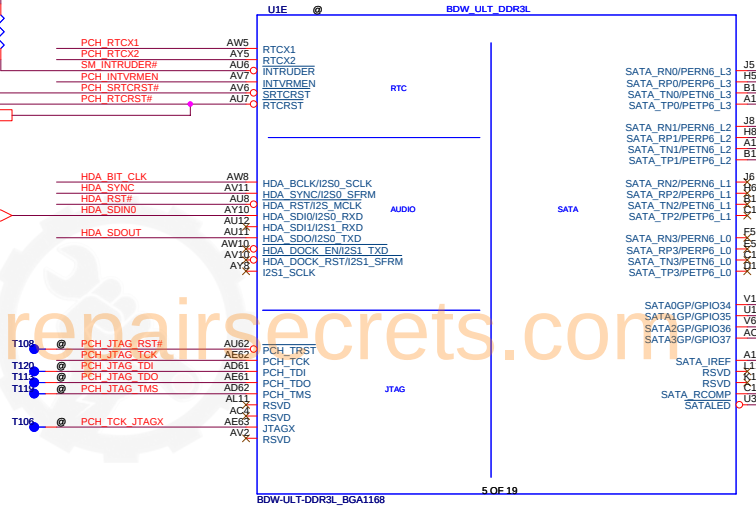
ME debug mode,this signal has a weak internal PD

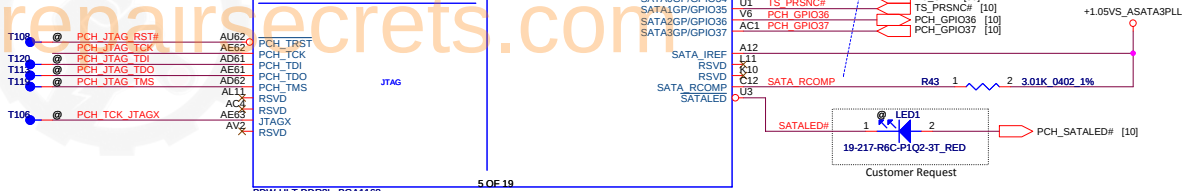
* Low = Disabled (Default)
  High = Enabled [Flash Descriptor Security Overide]

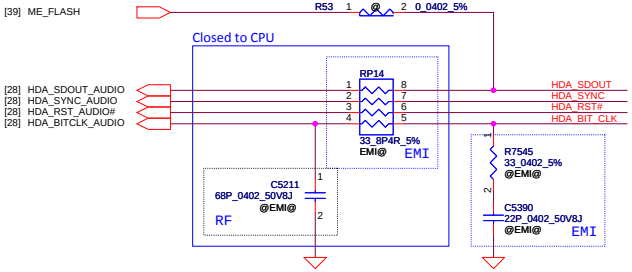
PH/ PD for PCH JTAG











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Issued Date	2014/01/09	Deciphered Date	2014/01/09

Compal Electronics, Inc.			
Title	HSW MCP(3/11) RTC,SATA,XDP		
Size: Custom	Document Number: LA-B591P_SDV		Rev: 0.1
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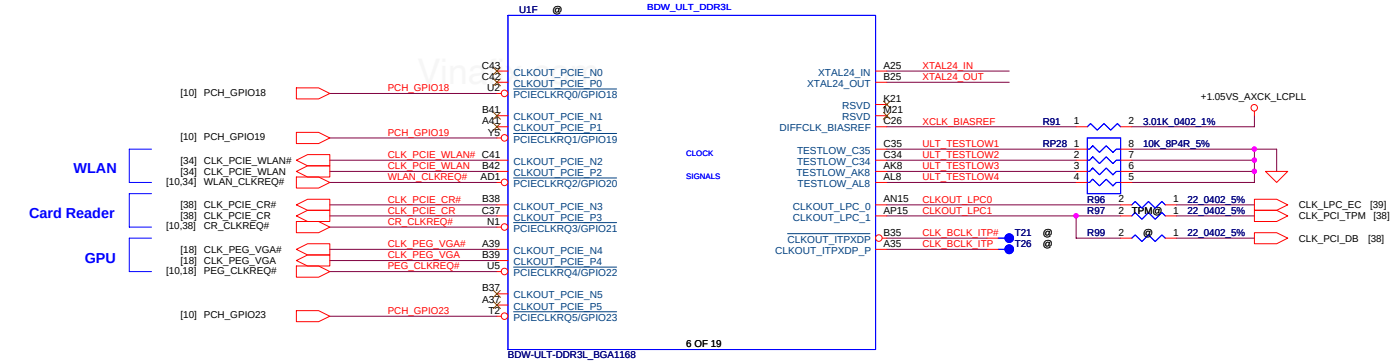
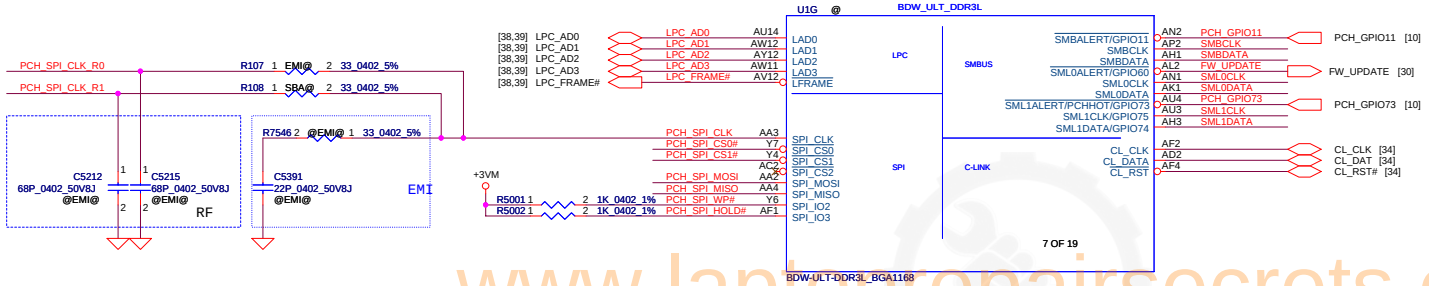
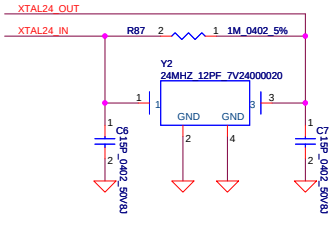
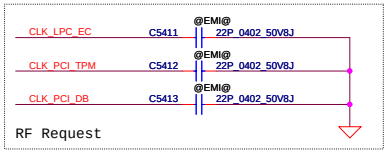
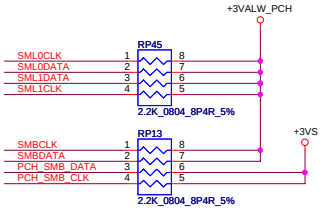
CLK/ SPI/ SMBUS



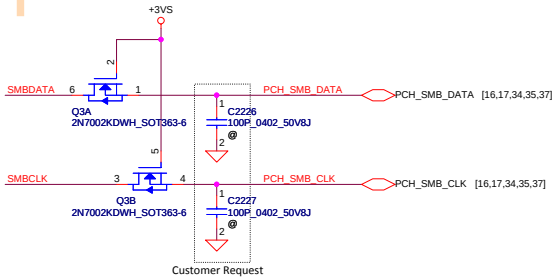




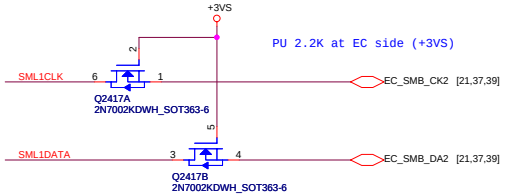




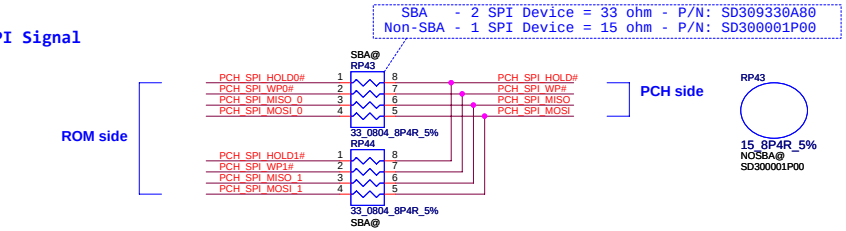
SMBus:RAM SPD/Security ROM/Click Pad/NFC/M.2 SSD/M.2 WLAN



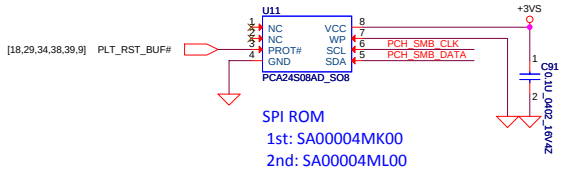
SML1 Bus:EC/GPU/Thermal Sensor/P-sensor



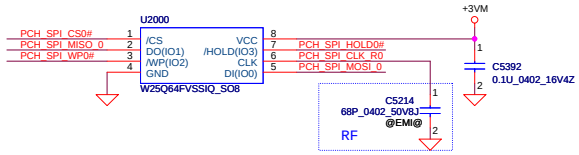
SPI Signal



Security ROM

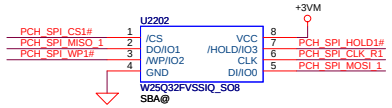


SPI ROM (8MByte)



SPI ROM 8MB
1st: SA000039A20 - Winbond
2nd: SA000046400 - E-ON

SPI ROM (4MByte)



SPI ROM 4MB
1st: SA00003K800 - Winbond
2nd: SA00004LI00 - E-ON

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Compal Electronics, Inc.			
Title	HSW MCP(4/11) CLK,SPI,SMBUS		
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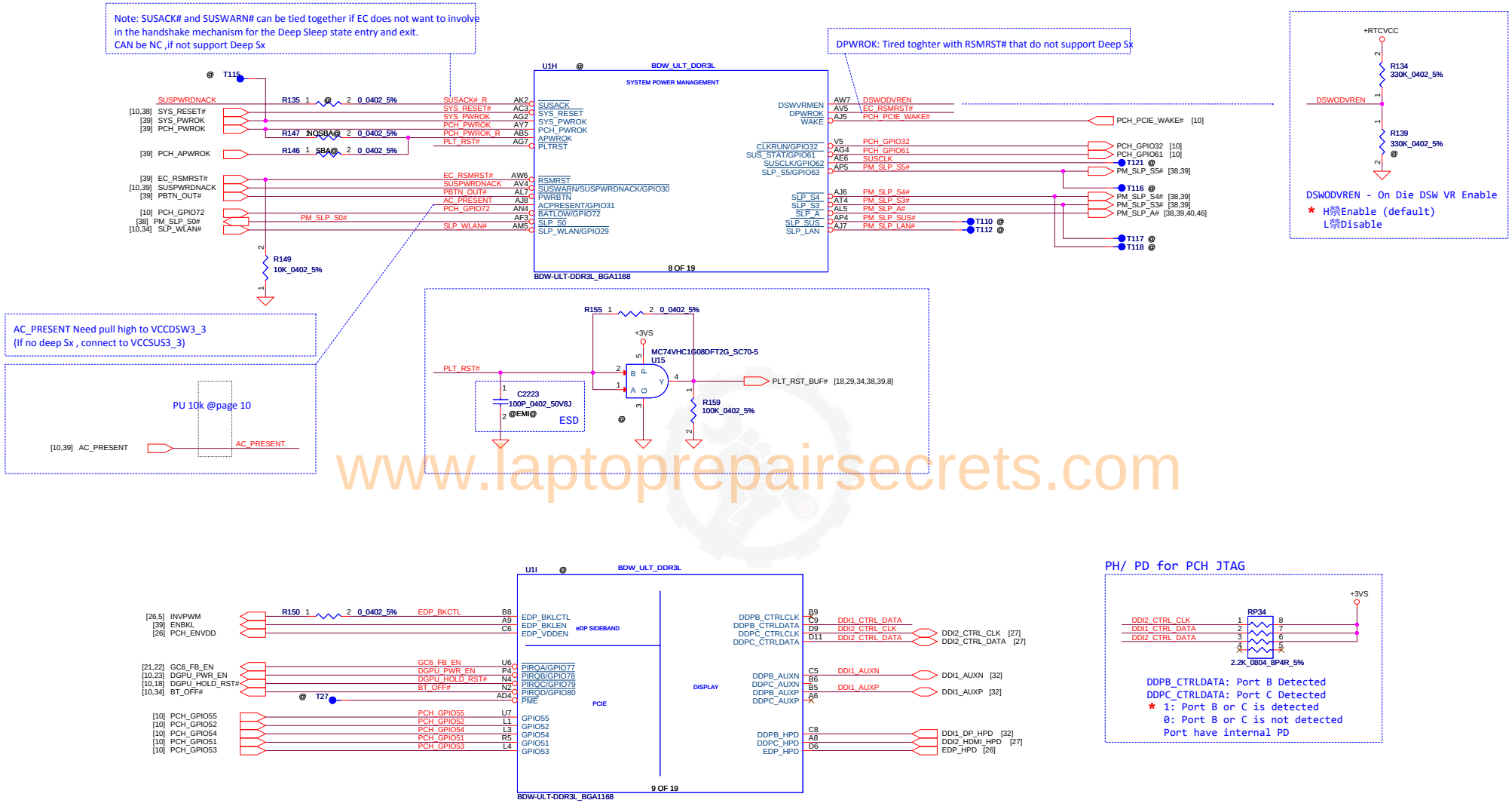
PM/ GPIO/ DDI



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Issued Date	2014/01/09	Deciphered Date	2014/01/09

Compal Electronics, Inc.	
Title	HSW MCP(5/11) PM,GPIO,DDI
Size: Custom	Document Number: LA-B591P_SDV
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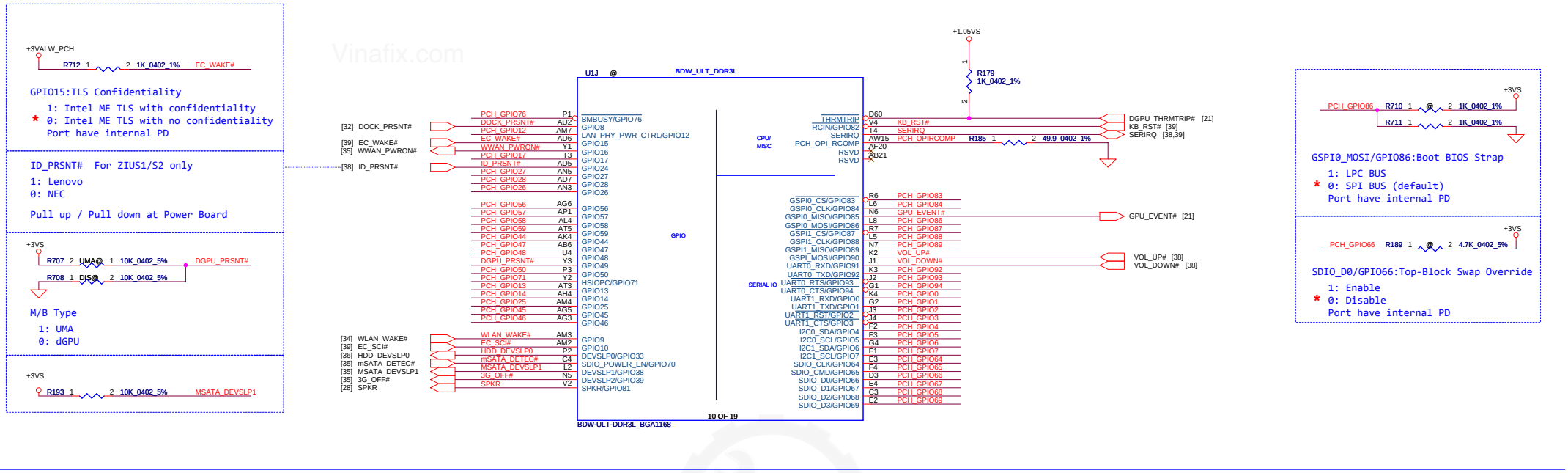
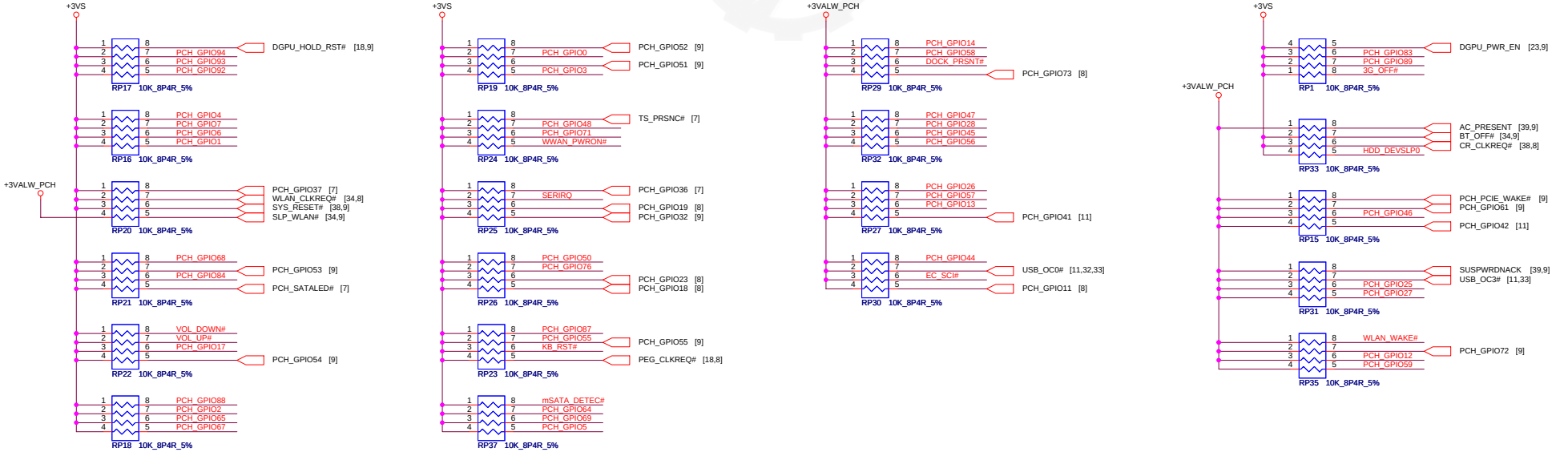
GPIO/ LPIO





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Compal Electronics, Inc.			
Title: HSW MCP(6/11) GPIO,LPIO			
Size: Custom	Document Number: LA-B591P_SDV		Rev: 0.1
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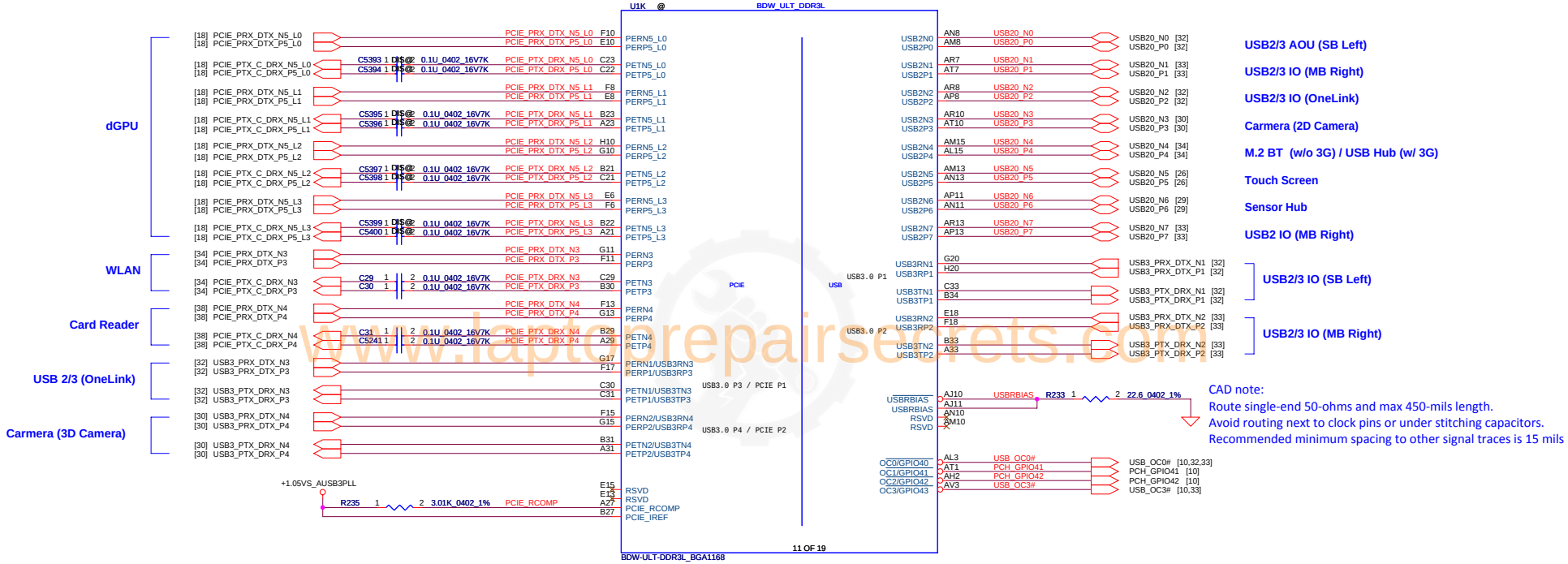
PCIE/ USB



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Issued Date	2014/01/09	Deciphered Date	2014/01/09

Compal Electronics, Inc.			
Title: HSW MCP(7/11) PCIE,USB			
Size: Custom	Document Number: LA-B591P_SDV		Rev: 0.1
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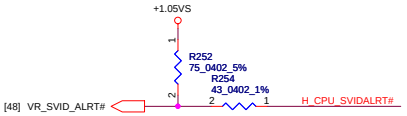
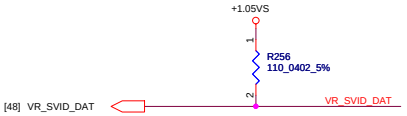
Power

SVID ALERT

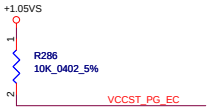


Place the PU resistors close to CPU

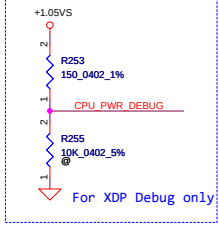
SVID DATA



Place the PU resistors close to CPU

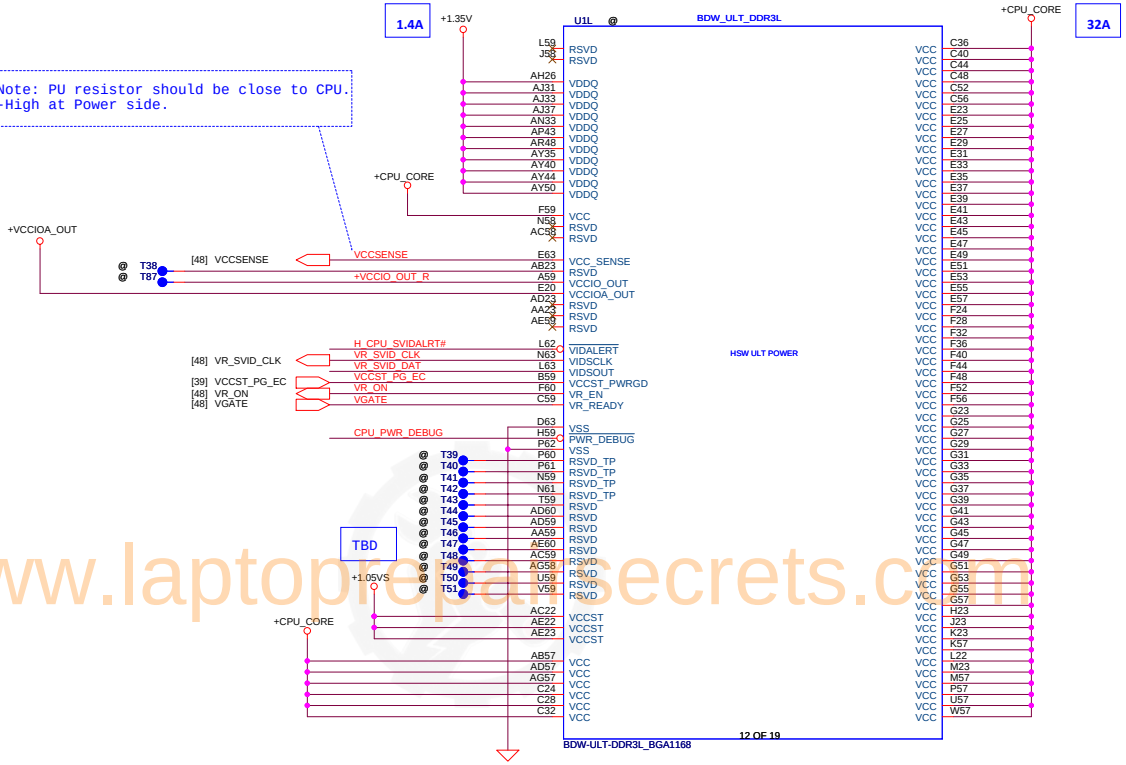


Define EC OD pin, need double confirm.

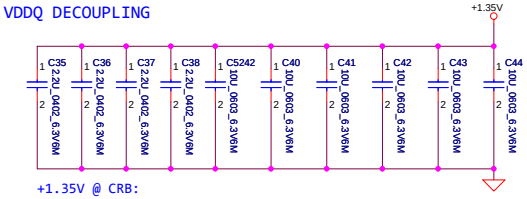


For XDP Debug only

CAD Note: PU resistor should be close to CPU.
Pull-High at Power side.



VDDQ DECOUPLING



+1.35V @ CRB:
470UF/2V/7343 *2 (Un-mount)
10UF/6.3V/0603 * 6
2.2UF/6.3V/0402 * 4

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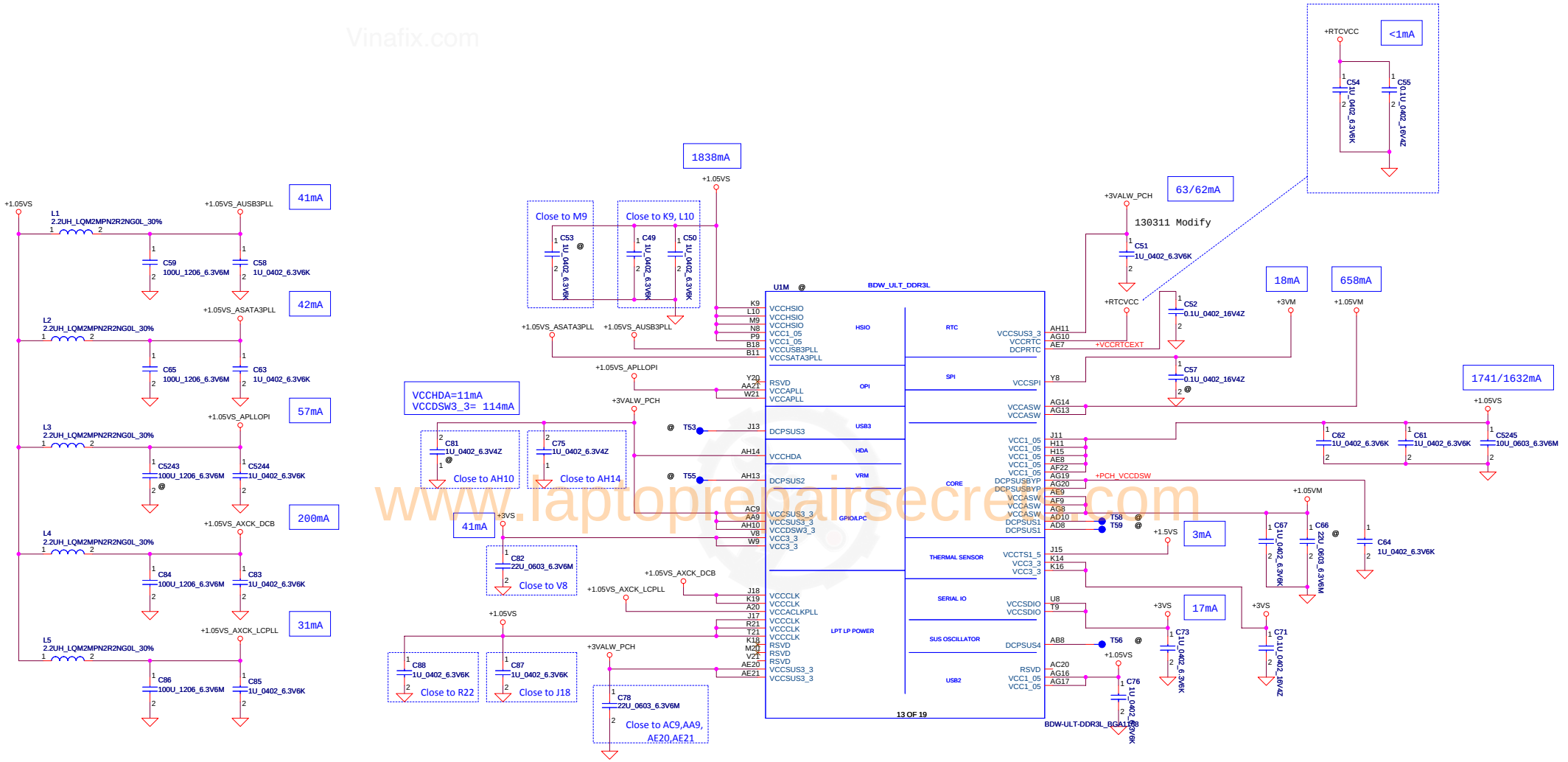
Power



Only availible on External Suspend VR powered.
DcpSus1= 109mA
DcpSus2= 25mA
DcpSus3= 10mA
DcpSus4= 1mA

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Title: HSW MCP(9/11) Power			
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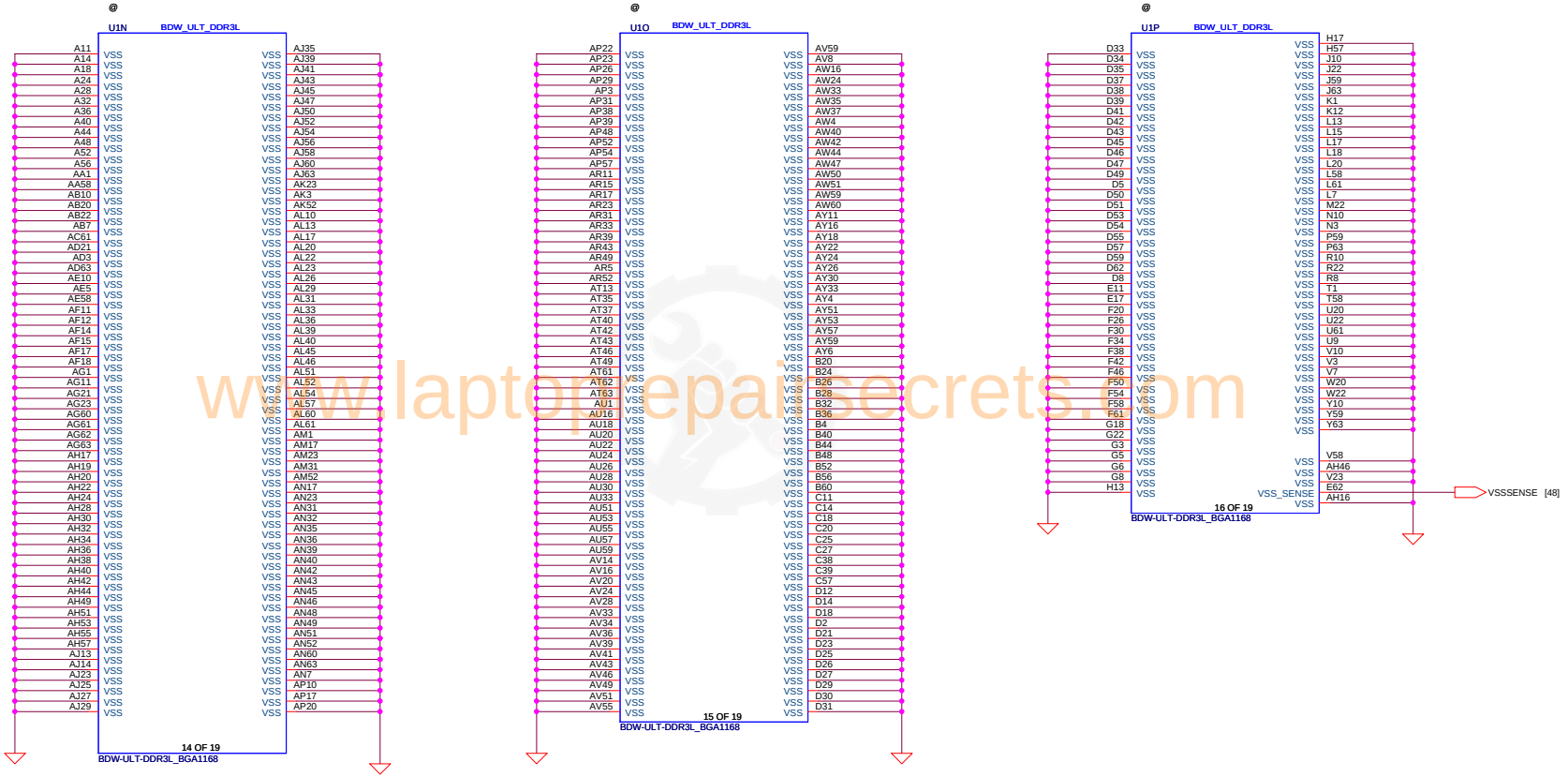
GND



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TOP_KSP4

Compal Electronics, Inc.

Title: **HSW MCP(10/11) GND**

Size	Document Number	Rev
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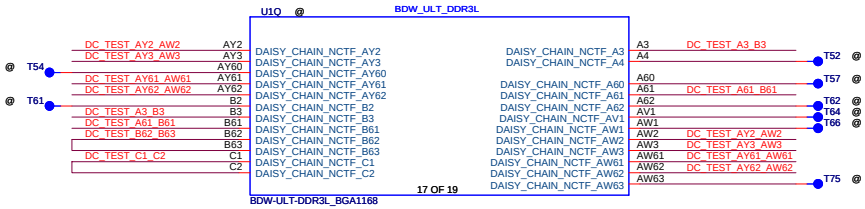
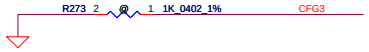
RSVD



CFG Straps for Processor

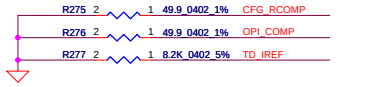


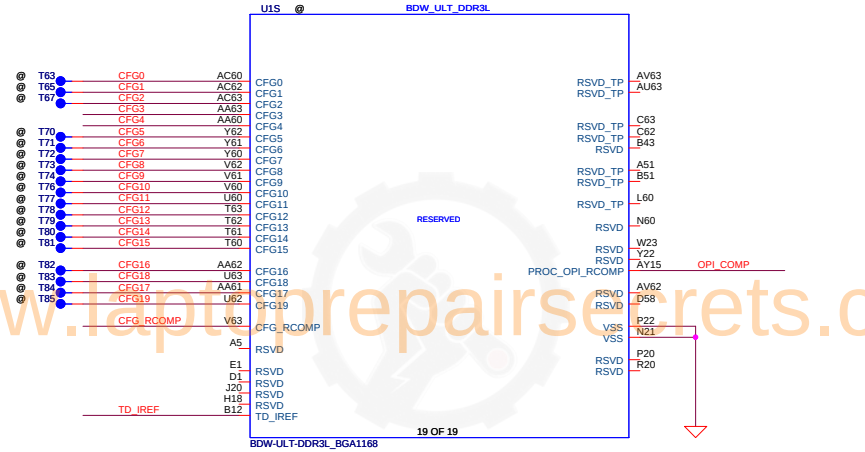
CFG3 - Physical Debug Enable (DFX Privacy)

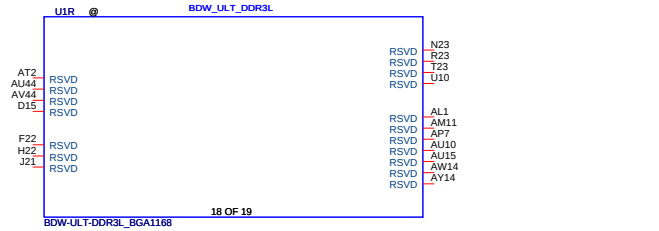
* 1: DISABLED
  0: ENABLED; SET DFX ENABLED BIT IN DEBUG INTERFACE MSR.
  CFG3 have internal PU.

CFG4 - Display Port Presence Strap

  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
  CFG4 have internal PH.







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Compal Electronics, Inc.			
Title: HSW MCP(11/11) RSVD			
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DIMM A

All VREF traces should have 10 mil trace width

JDIMM1

FOX_AS0A621-U4RG-7H ME@

CRB1.0 0.1uF *1 /2.2uF *1
2.2uF (reserved)

CRB1.0 0.1uF *1 /2.2uF *1
2.2uF (reserved)

CRB1.0 0.1uF *1 /2.2uF *1

Layout Note:
Place near JDIMM1
Everage by each side

CRB1.0 10uF *8 /1uF *8

Layout Note:
Place near JDIMM1.203,204

CRB1.0 10uF *1 /1uF *4

CHANNEL A /TYPE :Reverse / H:4mm

CHA SPD ADDRESS IS OxA0
CHA TS ADDRESS IS Ox30

P/N:SP07000NZ00

DDR3L SODIMM ODT GENERATION

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Compal Electronics, Inc.			
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DIMM B

All VREF traces should have 10 mil trace width

CRB1.0 0.1uF *1 /2.2uF *1 2.2uF (reserved)

CRB1.0 0.1uF *1 /2.2uF *1 2.2uF (reserved)

CRB1.0 0.1uF *1 /2.2uF *1

Layout Note: Place near JDIMM1 Everage by each side

CRB1.0 10uF *8 /1uF *8

Layout Note: Place near JDIMM1.203,204

CRB1.0 10uF *1 /1uF *4

CHANNEL B /TYPE :Reverse / H:4mm

CHB SPD ADDRESS IS 0xA4

CHB TS ADDRESS IS 0x34

P/N:SP07000LT00

Security Classification	Compal Secret Data		
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Compal Electronics, Inc.

Title: DDRIII DIMMB

Size: Custom | Document Number: LA-B591P_SDV | Rev: 0.1

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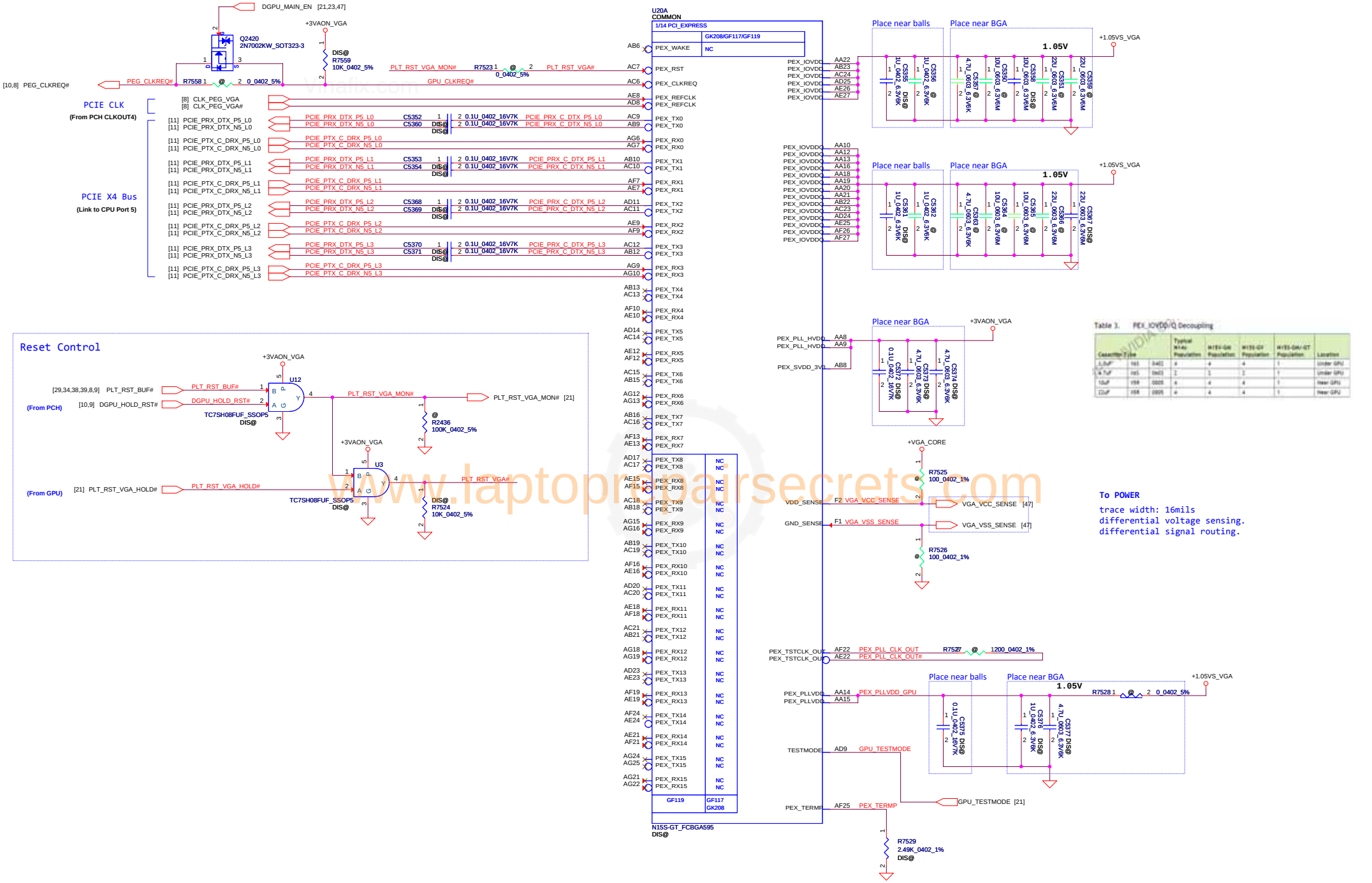

Table 3. PEX_IOVDD/Q Decoupling

Capacitor Type			Typical N14x Population	N15S-GM Population	N15S-GT Population	N15S-GM/-GT Population	Location
1.0uF	1x1	0402	x	x	x	1	Under GPU
4.7uF	1x1	0603	1	1	1	1	Under GPU
10uF	1X8	0805	x	x	x	1	Near GPU
22uF	1X8	0805	x	x	x	1	Near GPU

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Title: NV(1/5)-PCIE EXPRESS			
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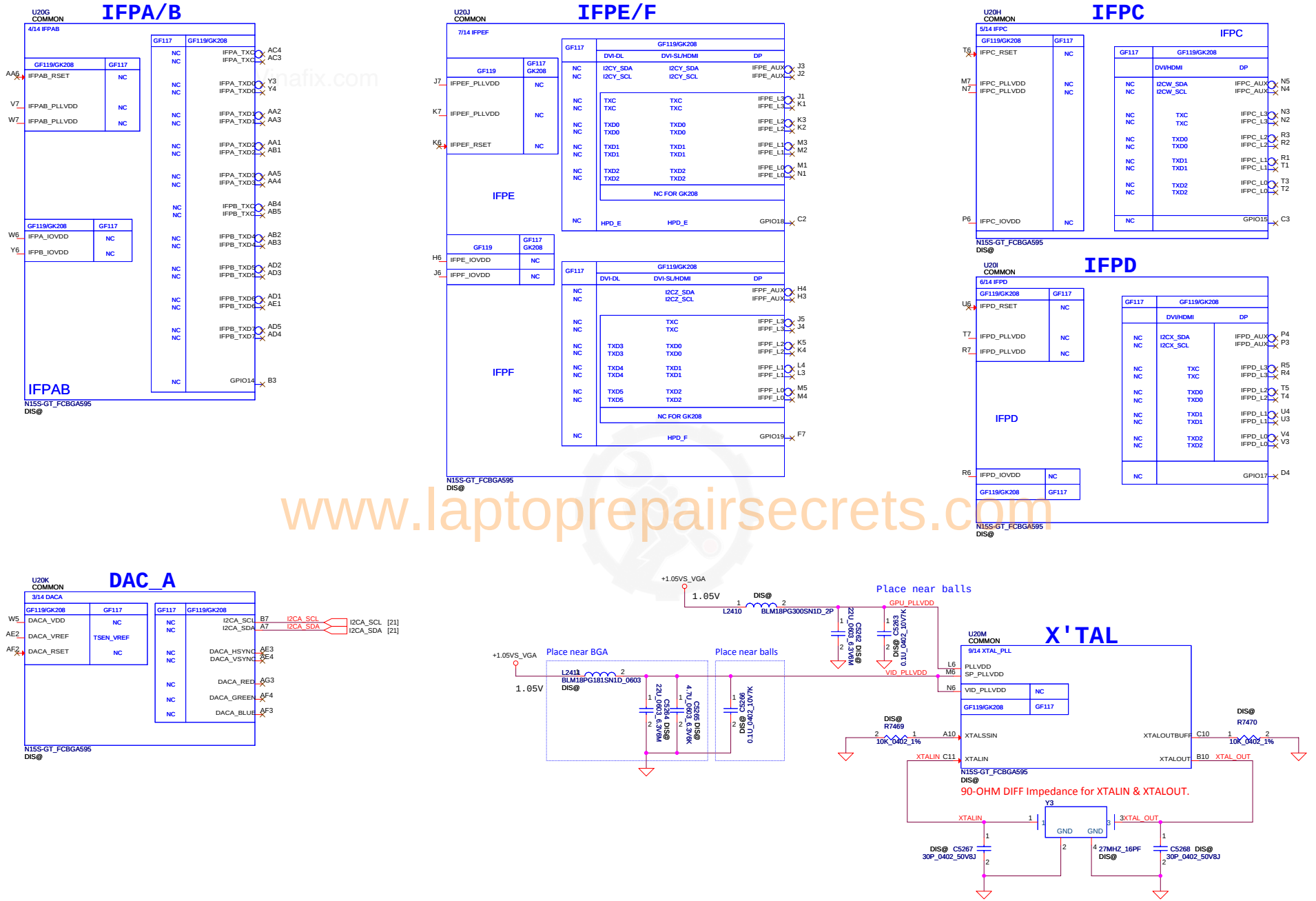
Date: Tuesday, March 25, 2014	Sheet 18 of 50		



Security Classification	Compal Secret Data		
Issued Date	2014/01/09	Deciphered Date	2014/01/09

Compal Electronics, Inc.			
Title	NV(2/5)-IFP_ABCDEF_DAC_XTAL		
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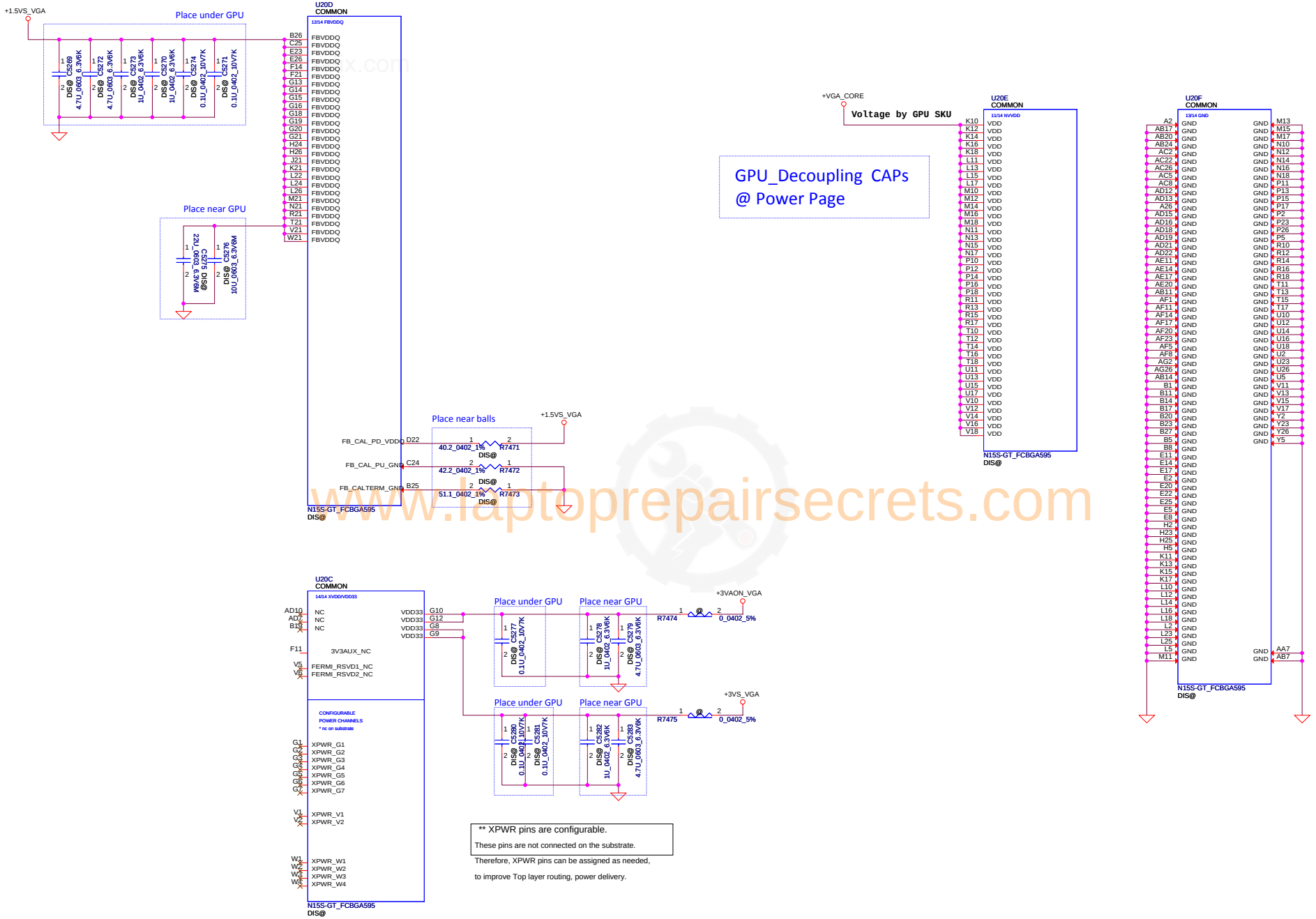

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Title	NV(3/5)-POWER_GND		
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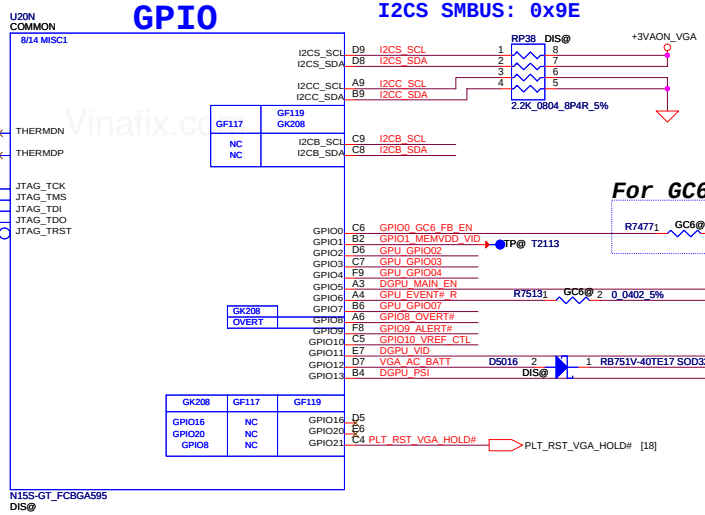
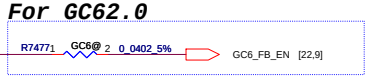
VGA_THERMDN and VGA_THERMDP:
1. 5mil track width and spacing
2. 5mil grounded gurad tracks width and spacing
3. ground referenced
4. Connect guard tracks to pin5

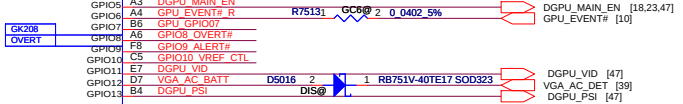
GPIO

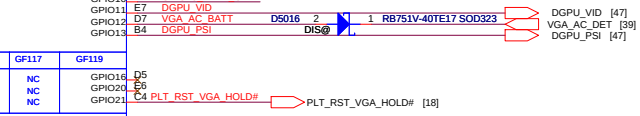
I2CS SMBUS: 0x9E



For GC62.0

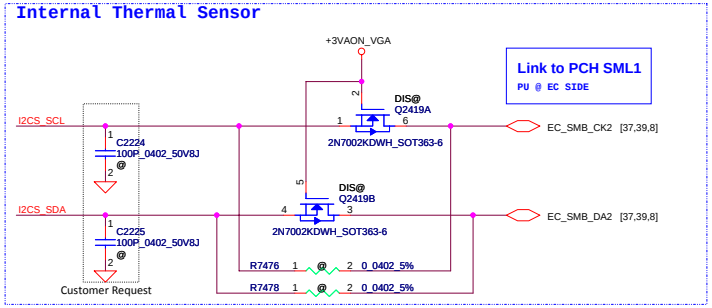


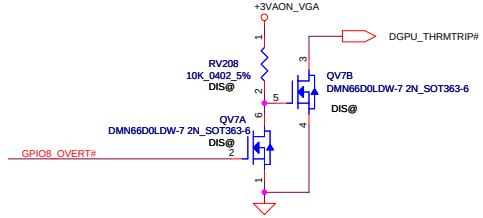


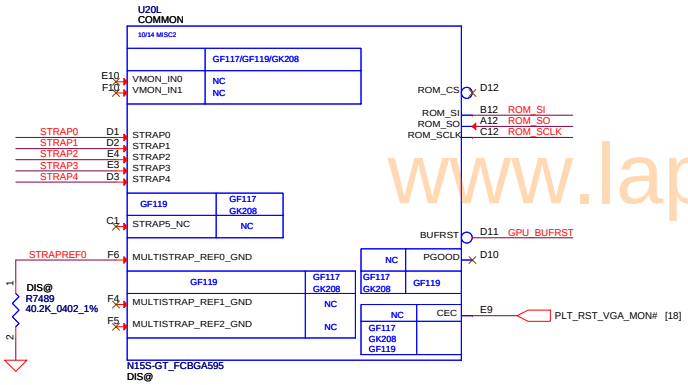


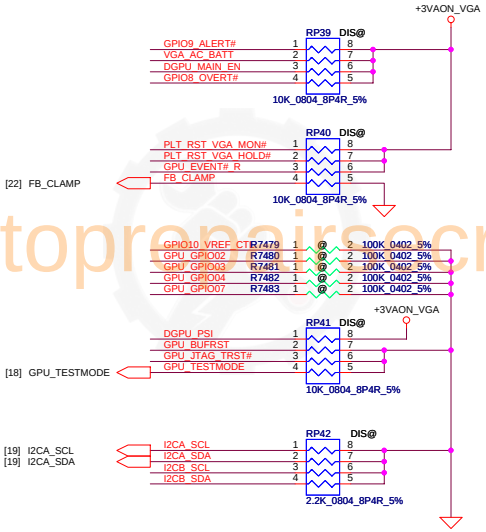
To DGPU VR
From PCH
To DGPU VR

Internal Thermal Sensor

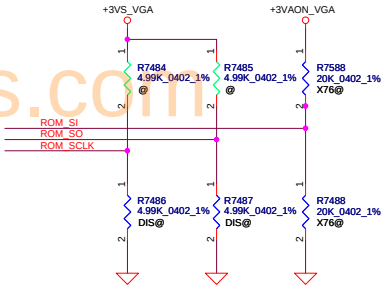








STRAP



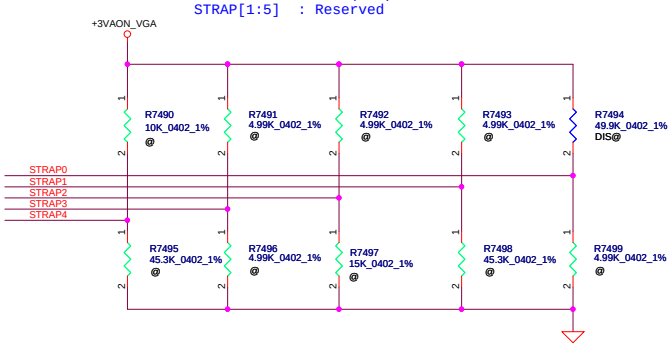
[ROM_SI] :

[ROM_SO] : 0x01(PD 10K)
Bit3(DEVID_SEL)=0,default.
Bit2(PCIE_CFG)=0, default.
Bit1(SMB_ALT_ADDR)=0,I2CS ADR 0x9E.
Bit0(VGA_DEVICE)=1,Primary Display.

[ROM_SCLK] : 0x00(PD 4.99K)
No display output

STRAP

STRAP0 : PU 49.9K (50K)
STRAP[1:5] : Reserved



GPU	FB Memory DDR3(1.5V) / DDR3L(1.35V)					ROM_SI	
						R7488 PD	R7588 PU
N15S-GT/GM	128M x16	Hynix	1.5V	1GHz	H5TC2G63FFR-11C	4.99K	NA
		Micron	1.5V	1GHz	MT41J128M16JT-093G:K DateCode_Min:1332	10K	NA
		Samsung	1.5V	1GHz	K4W2G1646Q-BC1A	15K	NA
	256M x16	Hynix	1.5V	1GHz	H5TC4G63AFR-11C	35K	NA
		Micron	1.5V	1GHz	MT41J256M16HA-093G:K DateCode_Min:1332	45K	NA
		Samsung	1.5V	1GHz	K4W4G1646D-HC1A	NA	4.99K

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Title	NV(4/5)-GPIO/Strap
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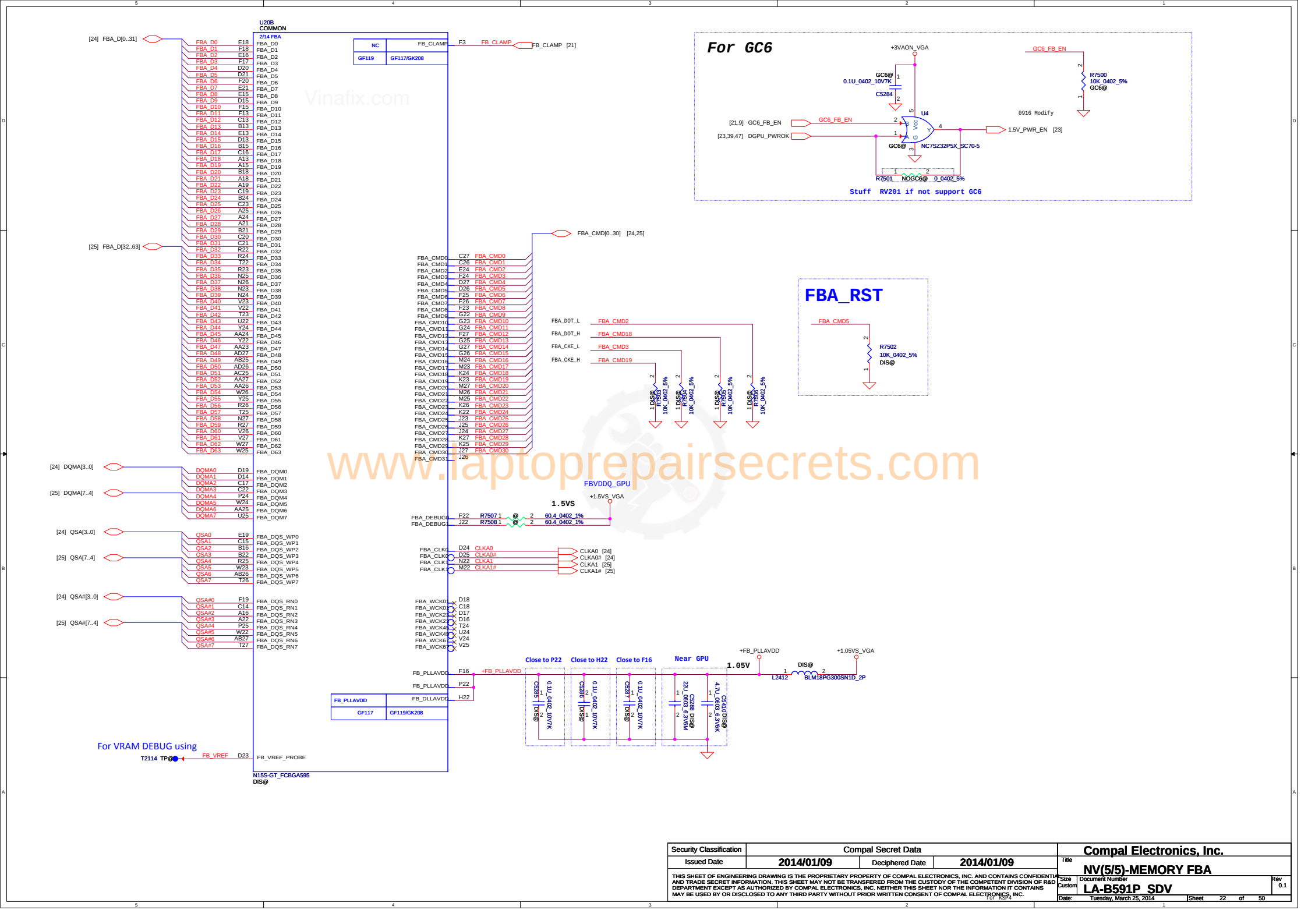

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Compal Electronics, Inc.	
Title	NV(5/5)-MEMORY FBA
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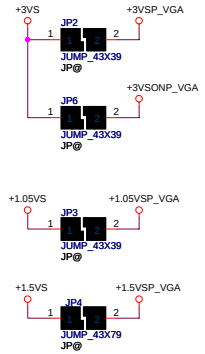
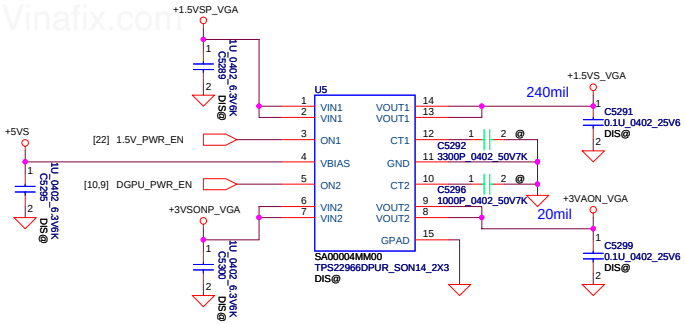
For Power consumption Measurement

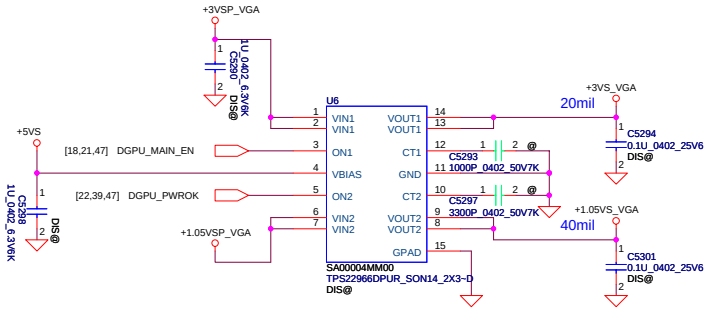


+1.5VSP_VGA to +1.5VS_VGA



+3VSONP_VGA to +3VAON_VGA

+3VSP_VGA to +3VS_VGA



+1.05VSP_VGA to +1.05VS_VGA

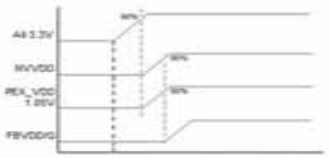


Figure 3-6. Example of Power-up Sequencing Order

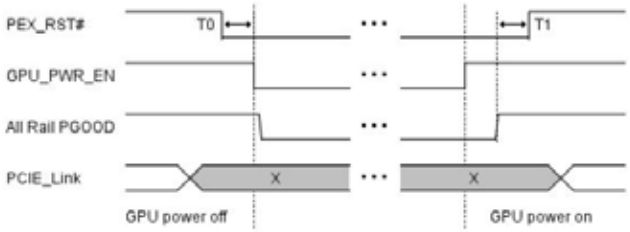


Figure 18-7. Optimus Entry/Exit Timing Diagram

Table 18-1. Optimus Timing Parameters

Symbol	Description	Min	Max	Units
T0	PEX_RST# assertion to GPU_PWR_EN=0	>0	5	ms
T1	All GPU power rail up and stable to PEX_RST# de-assertion	0.1	5	ms

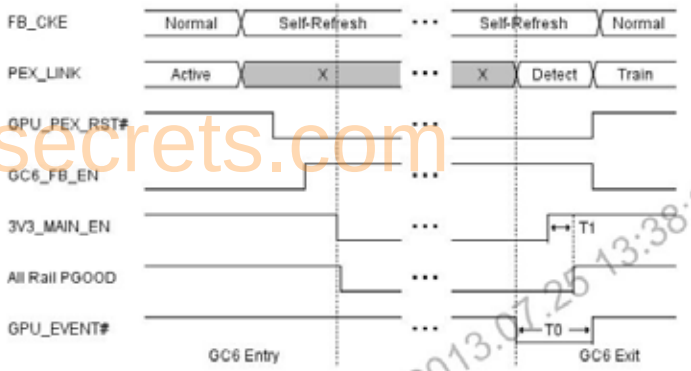


Figure 18-15. GC6 2.0 Entry/Exit Sequence Timing Diagram

Table 18-3. GC6 2.0 Entry/Exit Sequence Timing Parameters

Symbol	Description	Min	Max	Unit
T0	GPU_EVENT# assertion period	0.001	N/A	ms
T1	3V3_MAIN_EN assertion to all power rails up and stable	0.04	4	ms

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Compal Electronics, Inc.			
Title: DGPU_DC/DC Interface			
Size: Custom	Document Number: LA-B591P_SDV		Rev: 0.1
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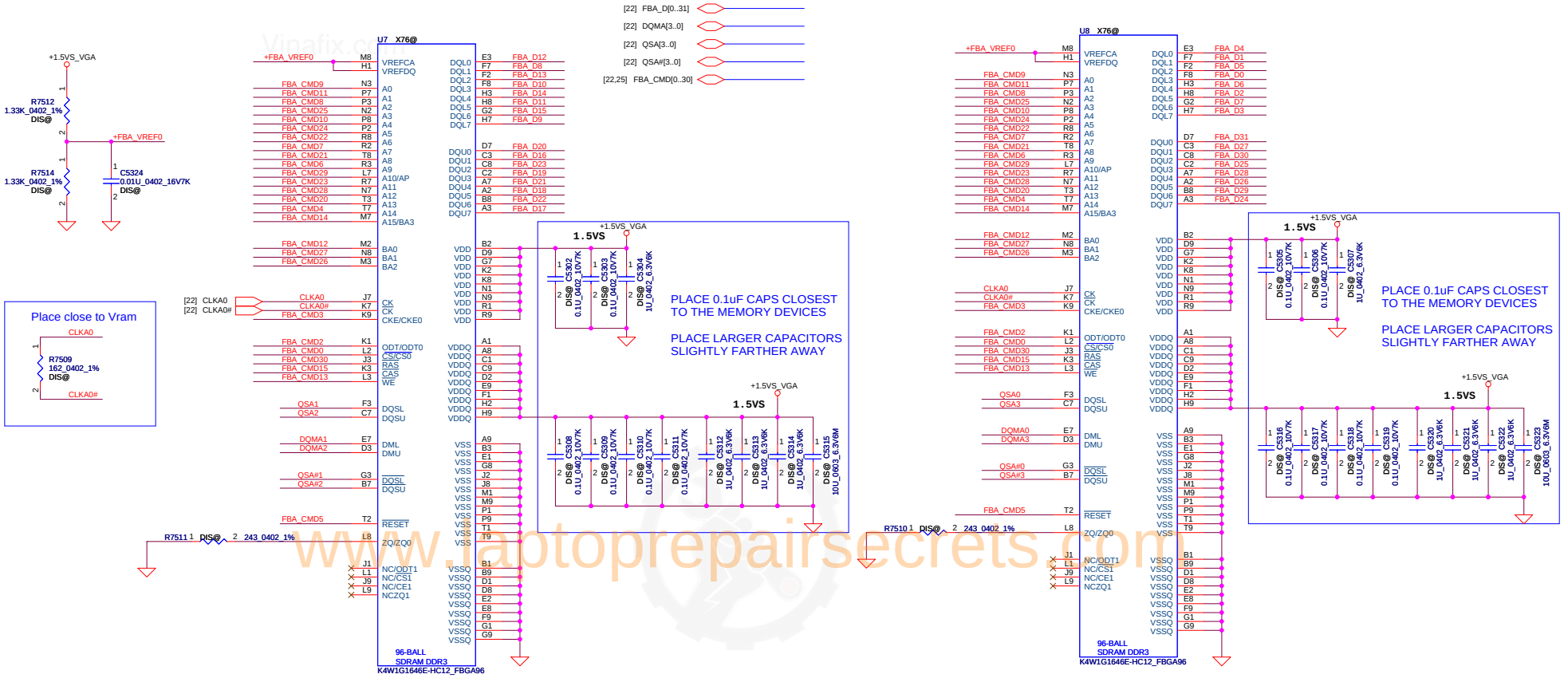
Memory Partition A - Lower 32 bits [31..0]



A15 is not required for any x16 device, even up to 4Gb density.

A15 is only needed if we support x8 configurations, and only at 4Gb.

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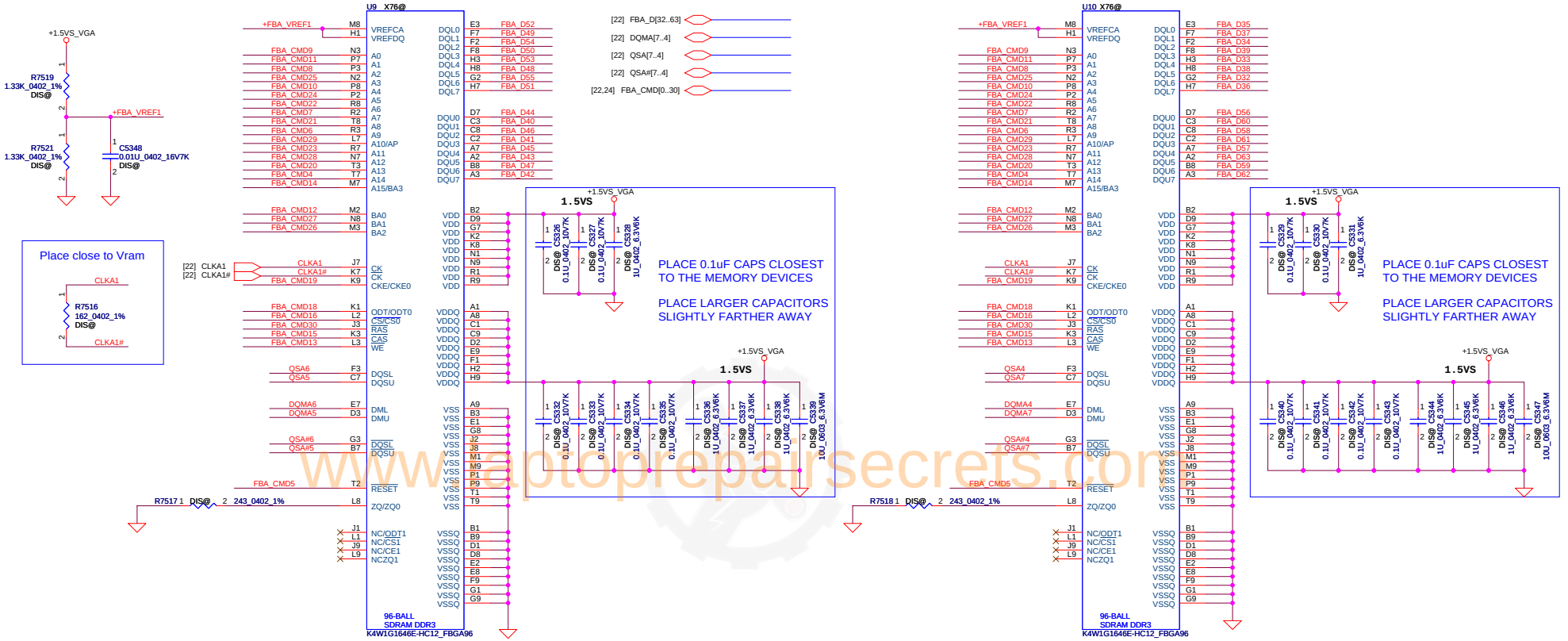
Compal Electronics, Inc.			
Title	VRAM_DDR3_A Lower		
Size: Custom	Document Number: LA-B591P_SDV		Rev: 0.1
Date: Tuesday, March 25, 2014	Sheet 24 of 50		

Memory Partition A - Upper 32 bits [64..32]



A15 is not required for any x16 device, even up to 4Gb density.

A15 is only needed if we support x8 configurations, and only at 4Gb.

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For KSP4

Compal Electronics, Inc.			
Title	VRAM_DDR3_A Upper		
Size: Custom	Document Number: LA-B591P_SDV		Rev: 0.1
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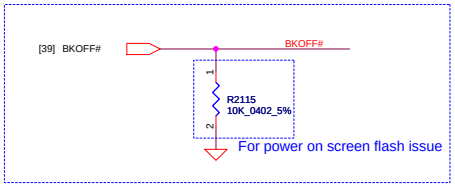
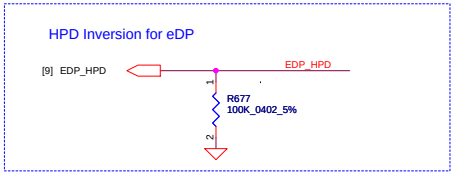
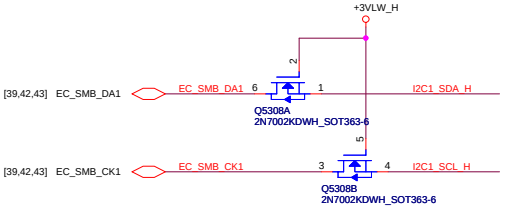
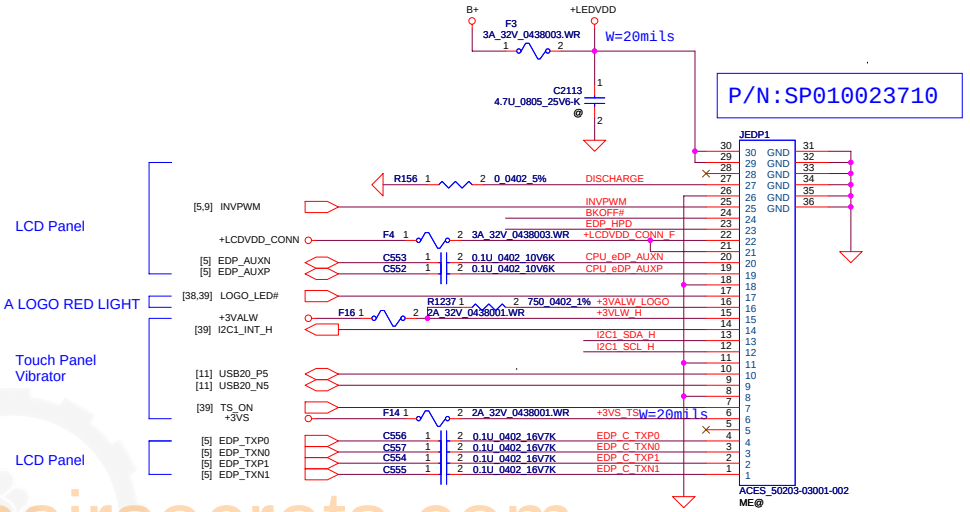
eDP Panel Conn





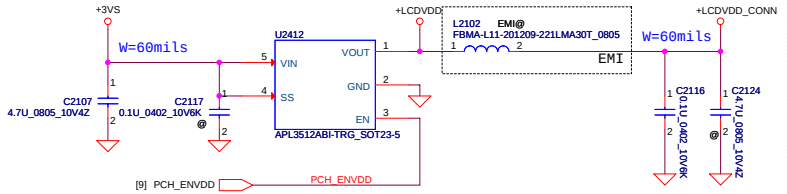




LCD POWER CIRCUIT

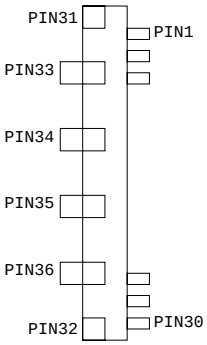
SS table

Css	Tss
0.1uF	100mS
10nF	10mS
1nF	1mS
Open or tied to VIN	1mS



Touch Panel & Vibrator module pin define

No	Pin define
1	VCC (5V)
2	D+
3	D-
4	+3VS
5	GND
6	+3VALW
7	I2C1_SCL_H
8	I2C1_SDA_H
9	I2C1_INT_H
10	GND



Security Classification	Compal Secret Data		
Issued Date	2014/01/09	Deciphered Date	2014/01/09

Compal Electronics, Inc.

Title: eDP Connector

Size: Custom | Document Number: LA-B591P_SDV | Rev: 0.1

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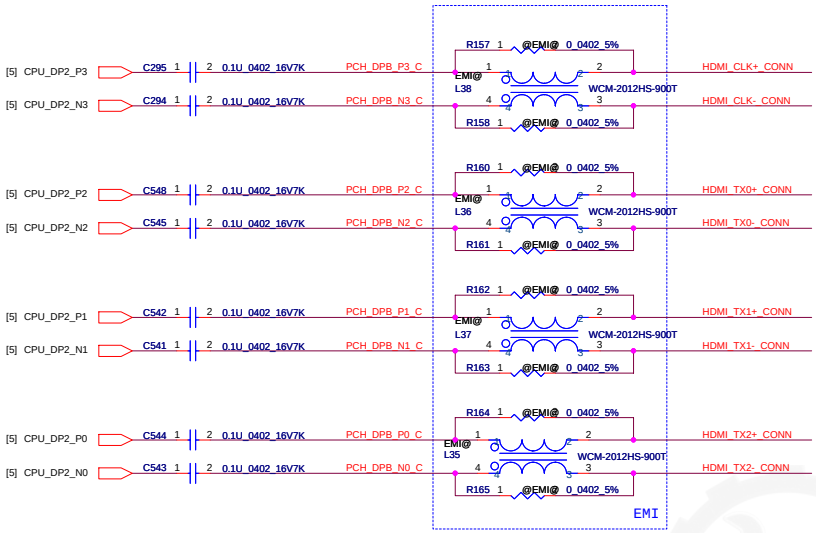
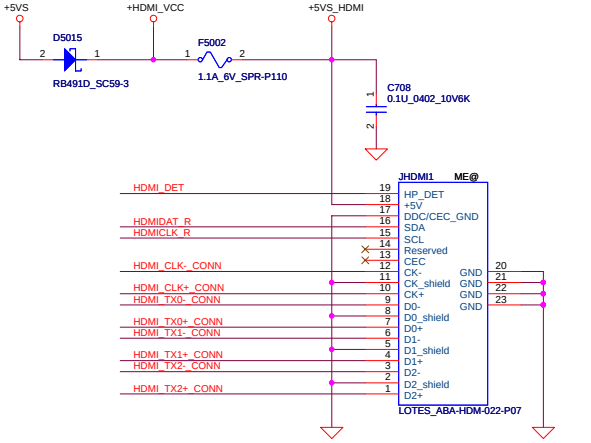
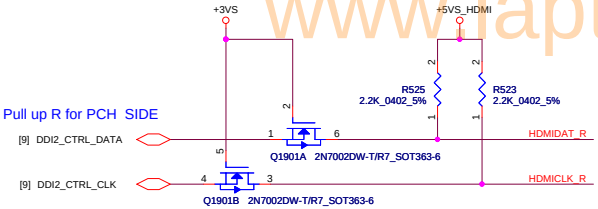
HDMI

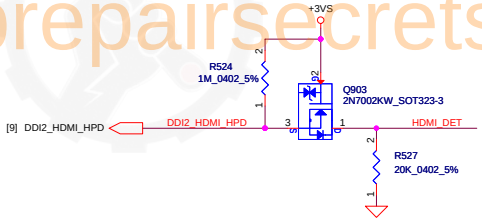
P/N:SM070003Y00

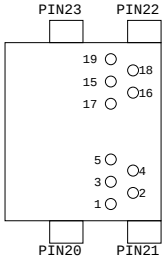


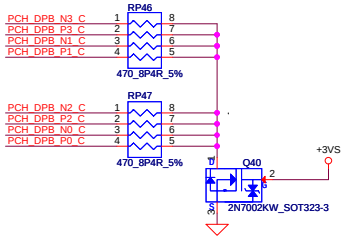


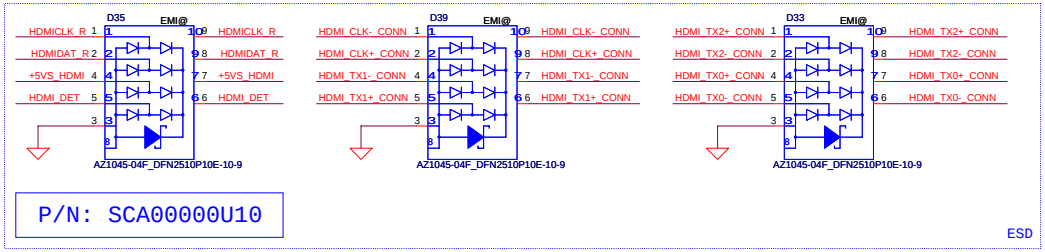
P/N:DC232000B10
TYPE A Connector











P/N: SCA00000U10

ESD

Security Classification	Compal Secret Data		
Issued Date	2014/01/09	Deciphered Date	2014/01/09

For KSP4

Compal Electronics, Inc.

Title: **HDMI CONN**

Size	Document Number	Rev
Custom	LA-B591P_SDV	0.1

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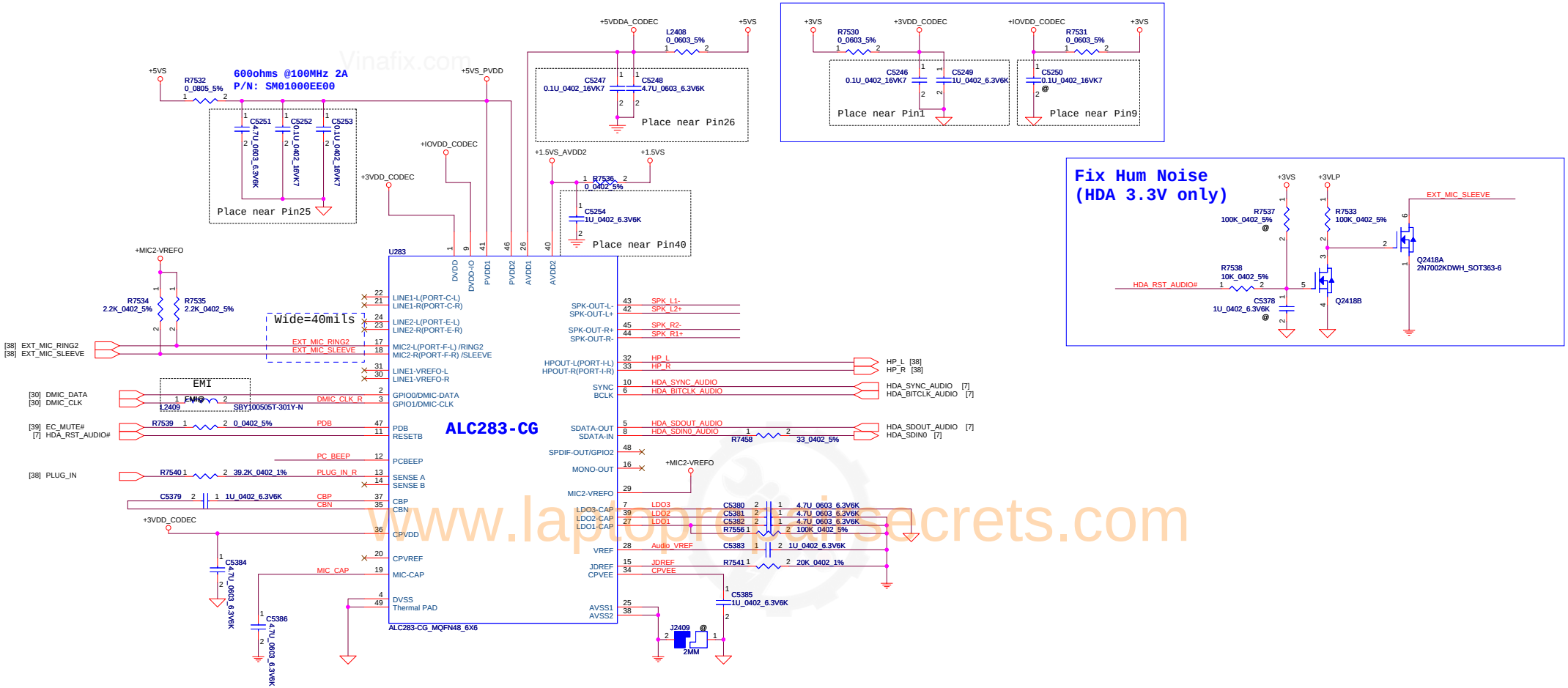
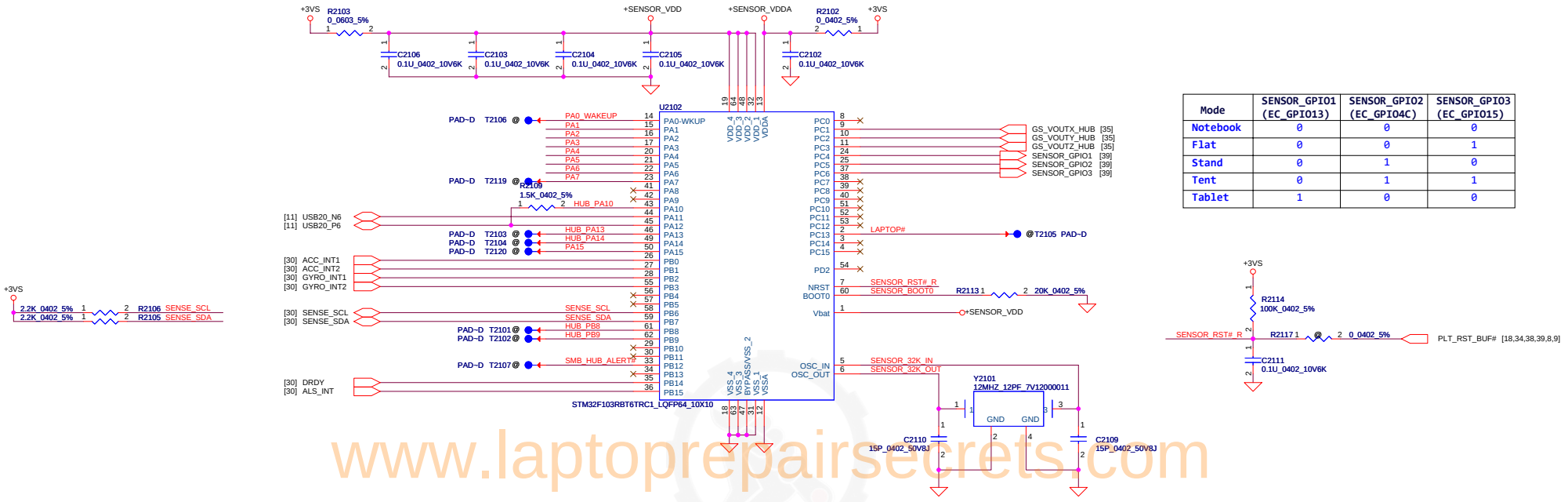
Audio ALC283



Security Classification	Compal Secret Data		
Issued Date	2014/01/09	Deciphered Date	2014/01/09

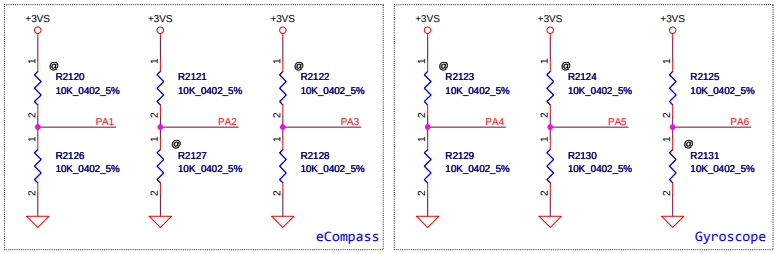
Compal Electronics, Inc.			
Title: Audio Codec ALC283			
Size: Custom	Document Number: LA-B591P_SDV		Rev: 0.1
Date: Tuesday, March 25, 2014	Sheet 28 of 50		

Sensor Hub



Mode	SENSOR_GPIO1 (EC_GPIO13)	SENSOR_GPIO2 (EC_GPIO4C)	SENSOR_GPIO3 (EC_GPIO15)
Notebook	0	0	0
Flat	0	0	1
Stand	0	1	0
Tent	0	1	1
Tablet	1	0	0

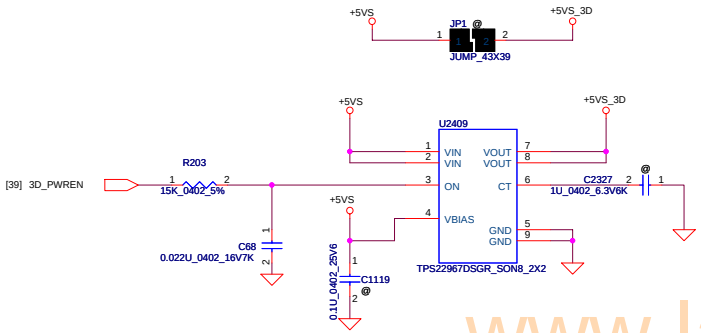
GPIO	Orientation Definition
PA1	303_l (eCompass)
PA2	303_m
PA3	303_n
PA4	4200_l (gyroscope)
PA5	4200_m
PA6	4200_n

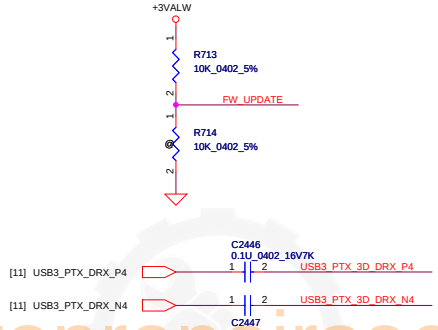


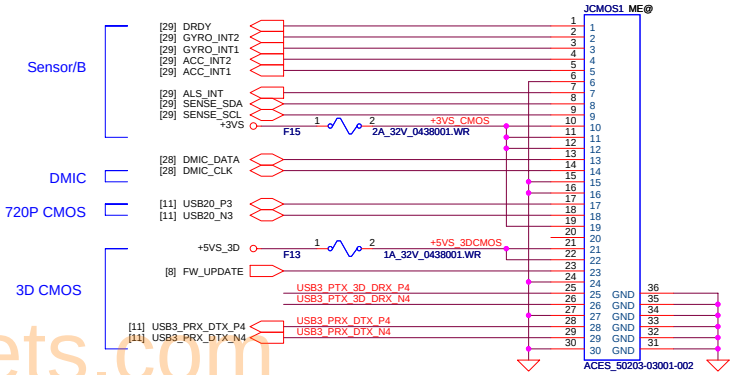
Security Classification	Compal Secret Data		
Issued Date	2014/01/09	Deciphered Date	2014/01/09

Compal Electronics, Inc.			
Title: Sensor Fusion			
Size: Custom	Document Number: LA-B591P_SDV		Rev: 0.1
Date: Tuesday, March 25, 2014	Sheet 29 of 50		

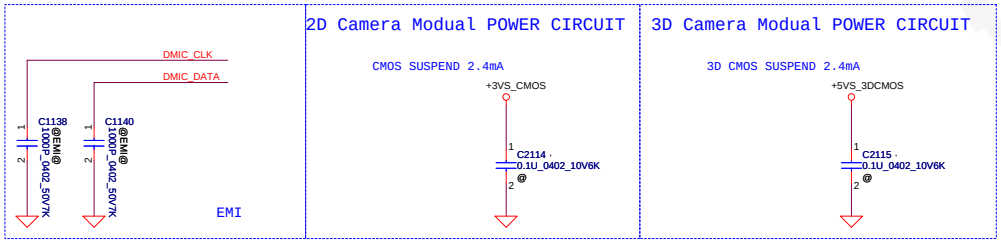
CMOS + Sensor Board Conn







P/N:SP010023710



Security Classification	Compal Secret Data		
Issued Date	2014/01/09	Deciphered Date	2014/01/09

Compal Electronics, Inc.			
Title: Camera Conn			
Size: Custom	Document Number: LA-B591P_SDV		Rev: 0.1
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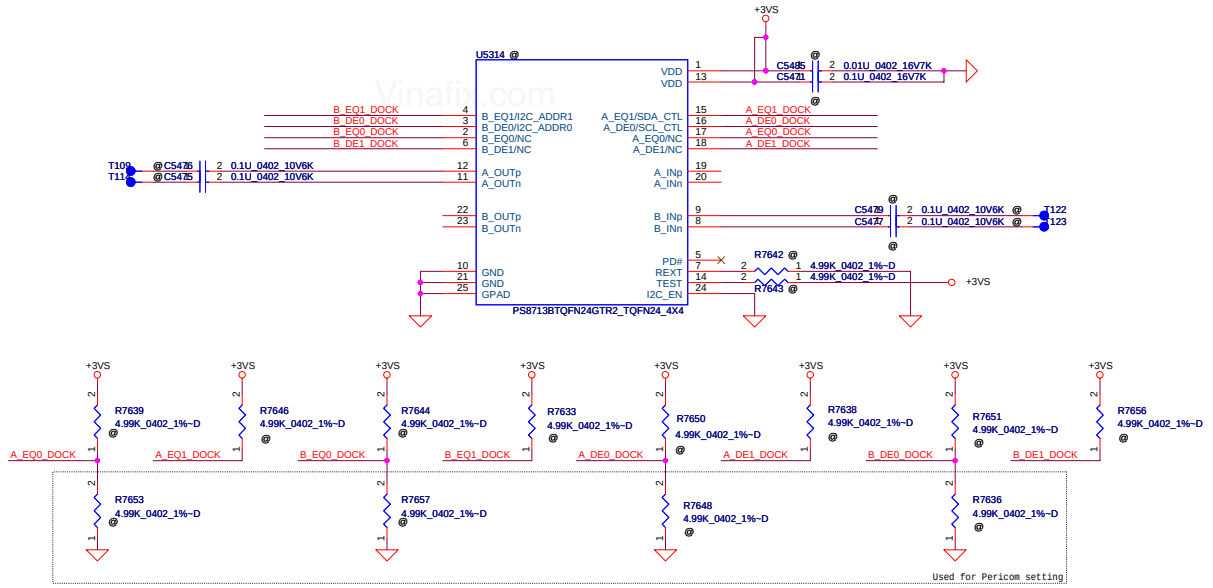
Docking USB 3.0 Re-driver



PERICOM PI3EQX7502AIZDEX
SA00006WV00

EQualization	EQ_A / EQ_B
3 dB	Low
6dB (Default)	Open
9dB	High

De-Emphasis	DE_A / DE_B
0 dB	Low
-3.5 dB	Open
-6 dB	High

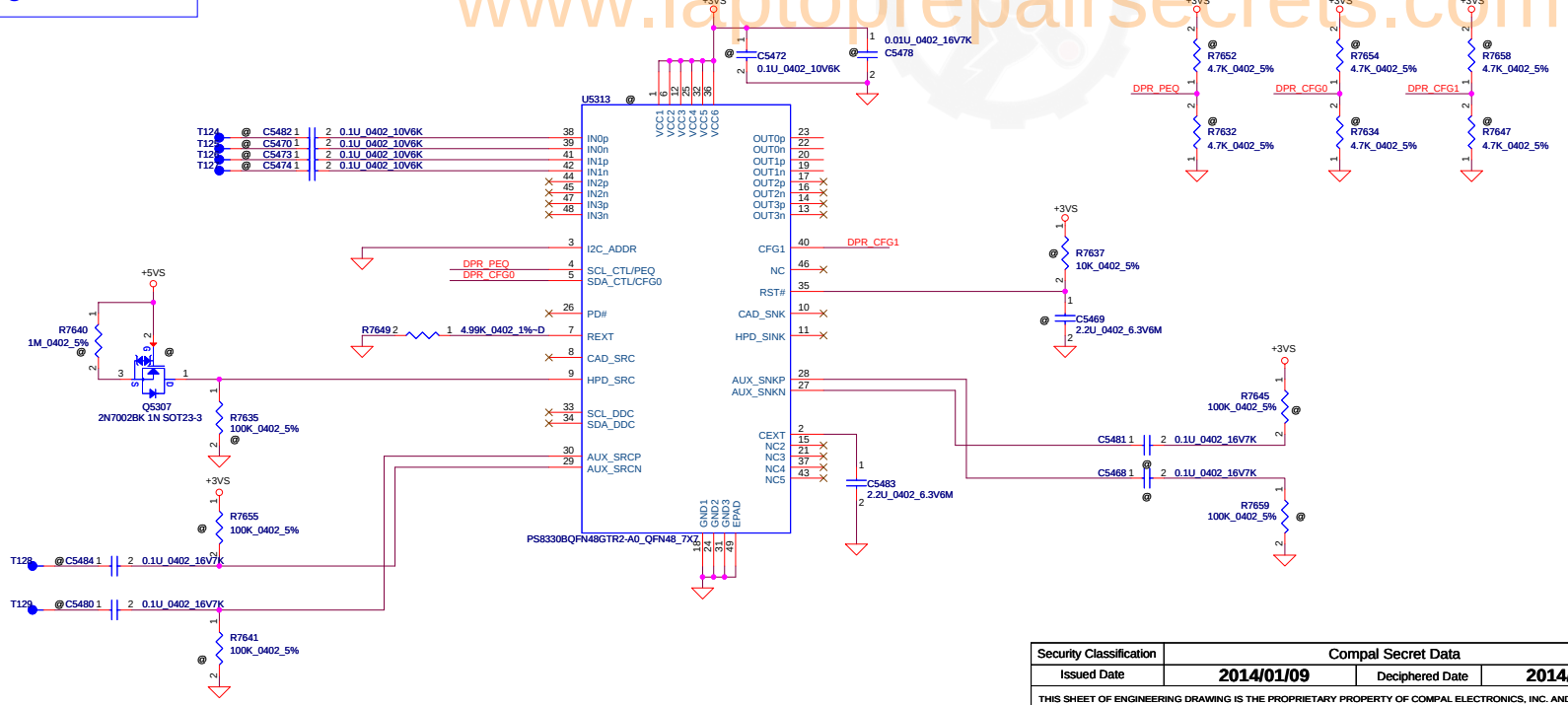
Parade PS8713BTQFN24GTR2-A1
SA00005OR20

EQualizer	A_EQ1 / B_EQ1 (Internal pull Low)	A_EQ0 / B_EQ0 (Internal pull Low)
9.5 dB	Low	Low
13 dB	Low	High
4.5 dB	High	Low
7.5 dB	High	High

De-Emphasis	A_DE1 / B_DE1 (Internal pull Low)	A_DE0 / B_DE0 (Internal pull Low)
3.5dB	Low	Low
No	Low	High
2.7dB	High	Low
5dB	High	High

	TEST (Internal pull Low)
Normal operation (default)	Low
Test mode enable	High

Docking DP Re-driver



Parade PS8330BQFN48GTR2-A0
SA00004ZM10

EQualization @HBR2	PEQ (Internal pull Low)
15dB (HEQ)	H
5dB (LLEQ)	M
12dB (LEQ)	L

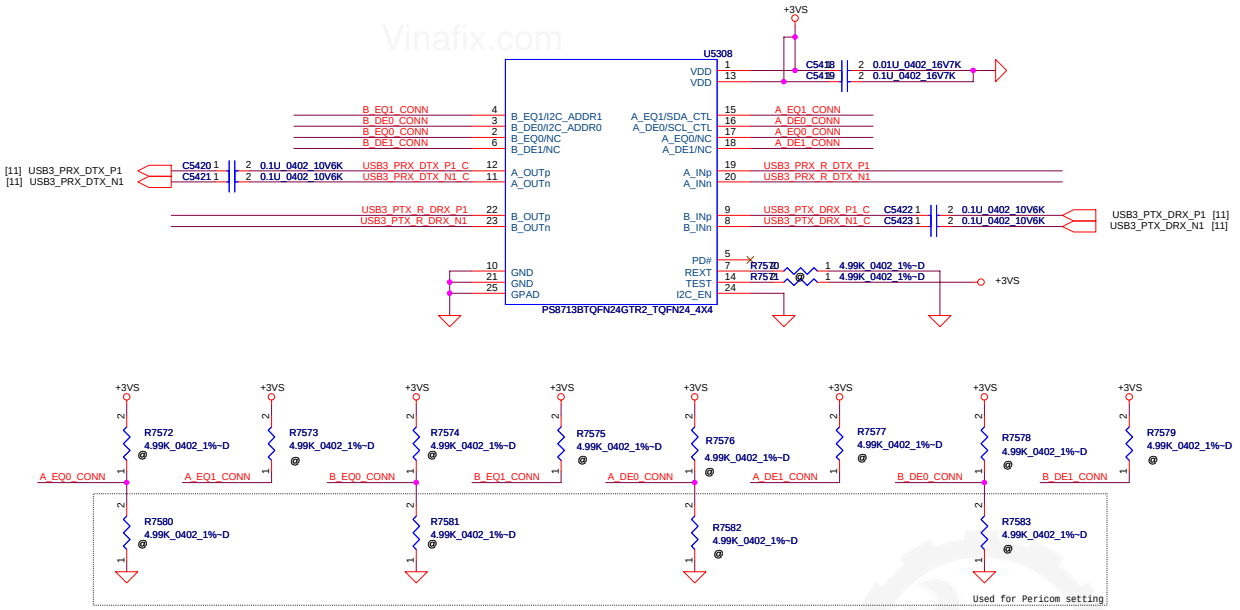
CFG0 (Internal pull Low)	automatic EQ	AUX interception
H	Disable	Enable
M	Disable	Disable
L	Enable	Enable

CFG1 (Internal pull Low)	auto CTS test	input offset cancellation
H	Disable	Enable
M	Disable	Disable
L	Enable	Enable

Security Classification	Compal Secret Data		
Issued Date	2014/01/09	Deciphered Date	2014/01/09

Compal Electronics, Inc.	
Title	Docking USB/DP Redriver
Size: Custom	Document Number: LA-B591P_SDV
Rev	0.1
Date: Tuesday, March 25, 2014	Sheet 31 of 50

USB3.0 Redriver (Left)



PERICOM PI3EQX7502AIZDEX
SA00006WV00

EQualization	EQ_A / EQ_B
3 dB	Low
6dB (Default)	Open
9dB	High

De-Emphasis	DE_A / DE_B
0 dB	Low
-3.5 dB	Open
-6 dB	High

Parade PS8713BTQFN24GTR2-A1
SA00005OR20

EQualizer	A_EQ1 / B_EQ1 (Internal pull Low)	A_EQ0 / B_EQ0 (Internal pull Low)
9.5 dB	Low	Low
13 dB	Low	High
4.5 dB	High	Low
7.5 dB	High	High

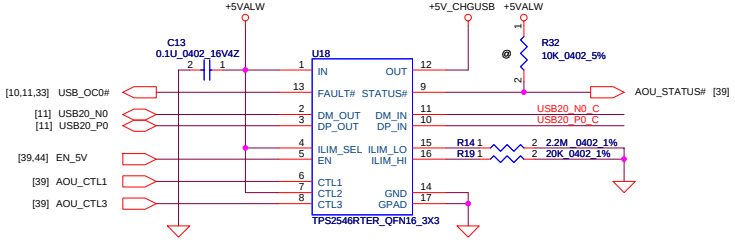
De-Emphasis	A_DE1 / B_DE1 (Internal pull Low)	A_DE0 / B_DE0 (Internal pull Low)
3.5dB	Low	Low
No	Low	High
2.7dB	High	Low
5dB	High	High

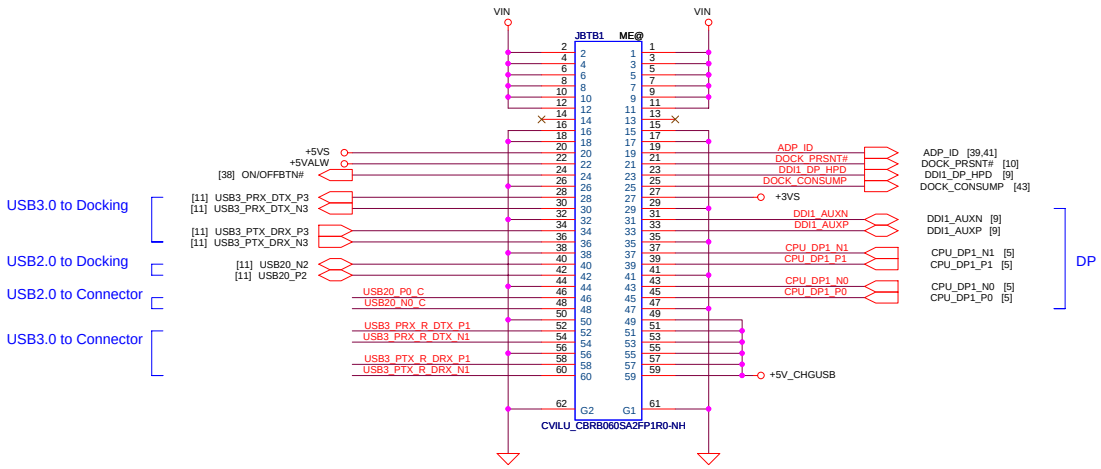
	TEST (Internal pull Low)
Normal operation (default)	Low
Test mode enable	High

Docking Board BtB Conn

P/N:SP011401201

Connector: 0.5A / pin

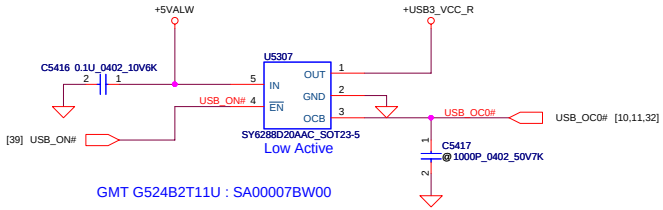




Security Classification	Compal Secret Data		
Issued Date	2014/01/09	Deciphered Date	2014/01/09

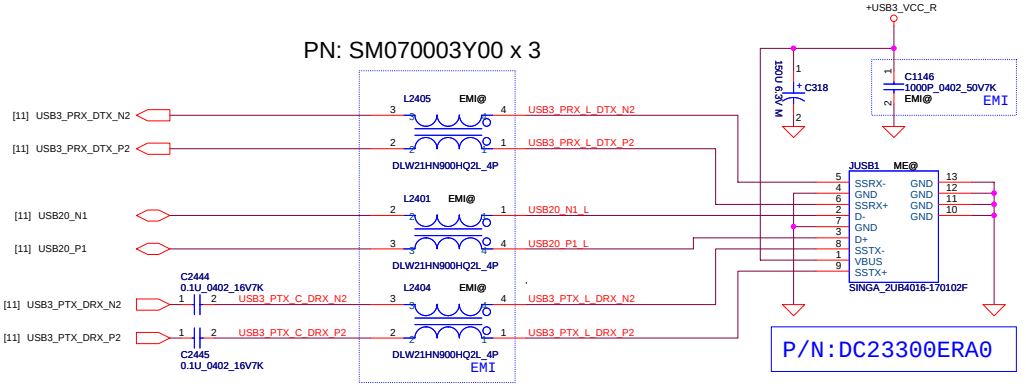
Compal Electronics, Inc.			
Title: Docking BtB (AOU)			
Size: Custom	Document Number: LA-B591P_SDV		Rev: 0.1
Date: Tuesday, March 25, 2014	Sheet 32 of 50		

USB30 Right Conn

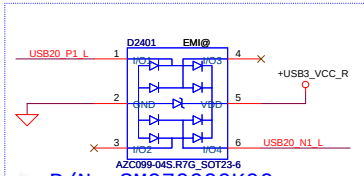


GMT G524B2T11U : SA00007BW00

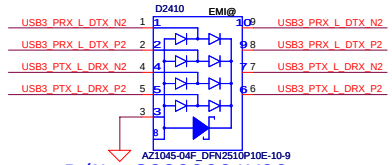
PN: SM070003Y00 x 3



P/N:DC23300ERA0

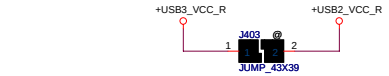


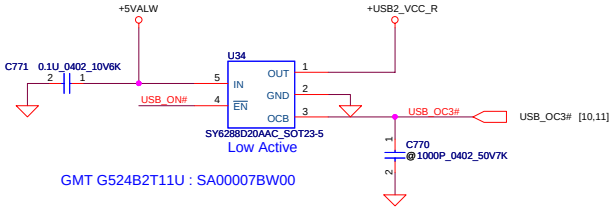
P/N: SM070000K00



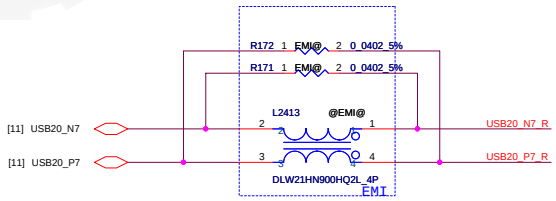
P/N: SC300001Y00 ESD

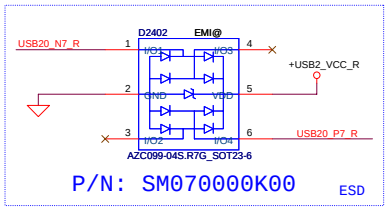
USB20 Right Conn



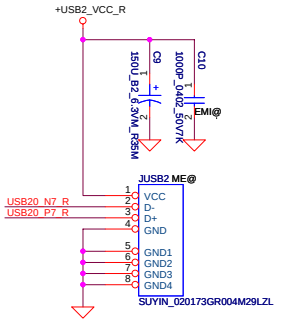


GMT G524B2T11U : SA00007BW00





P/N: SM070000K00 ESD

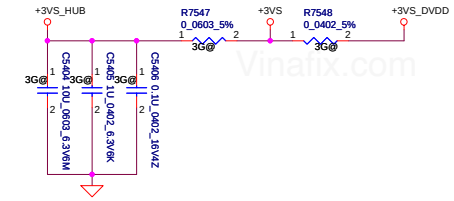


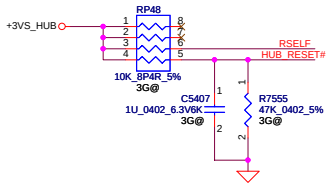
P/N:DC233000U10

Security Classification	Compal Secret Data		
Issued Date	2014/01/09	Deciphered Date	2014/01/09

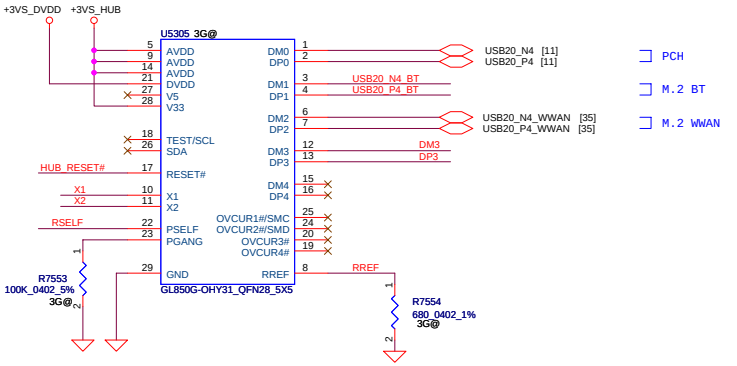
Compal Electronics, Inc.			
Title: USB-3.0/USB2.0 Right			
Size: Custom	Document Number: LA-B591P_SDV		Rev: 0.1
Date: Tuesday, March 25, 2014		Sheet 33 of 50	

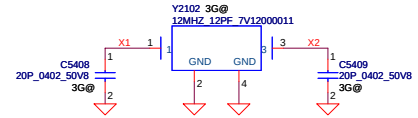
USB20 HUB



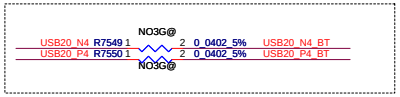


Pin 18 TEST:
0 : Switch mode.
1 : Chip will be put in test mode.
NC : Normal hub operation.

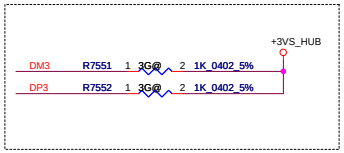




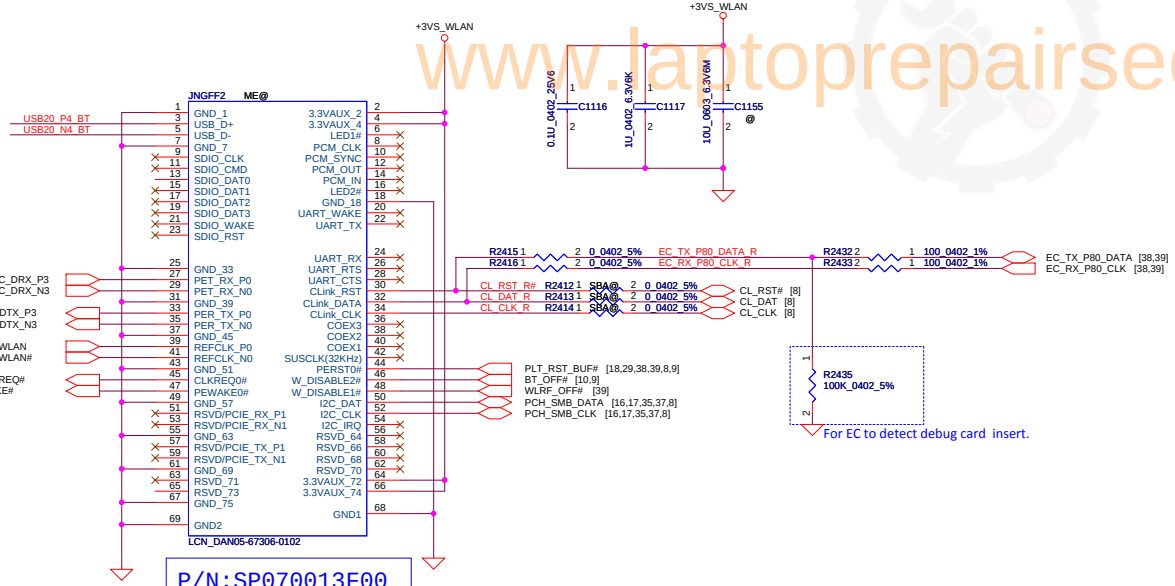
Bypass Resistance



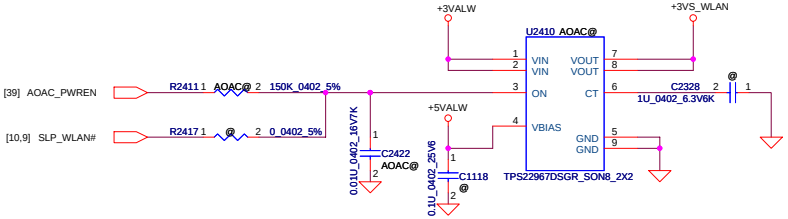
Disable Port 3 & Port 4



M.2 WLAN



P/N:SP070013F00



Security Classification	Compal Secret Data		
Issued Date	2014/01/09	Deciphered Date	2014/01/09

TDT KSP4

Compal Electronics, Inc.

Title: USB 2.0 HUB /M.2 WLA/BT

Size	Document Number	Rev
Custom	LA-B591P_SDV	0.1

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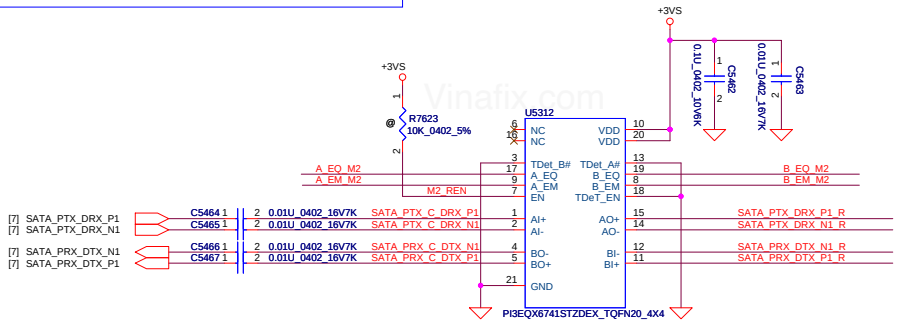
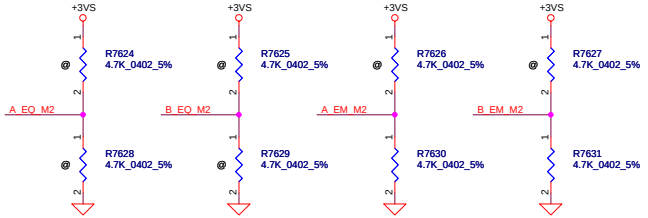
M.2 mSATA Redriver





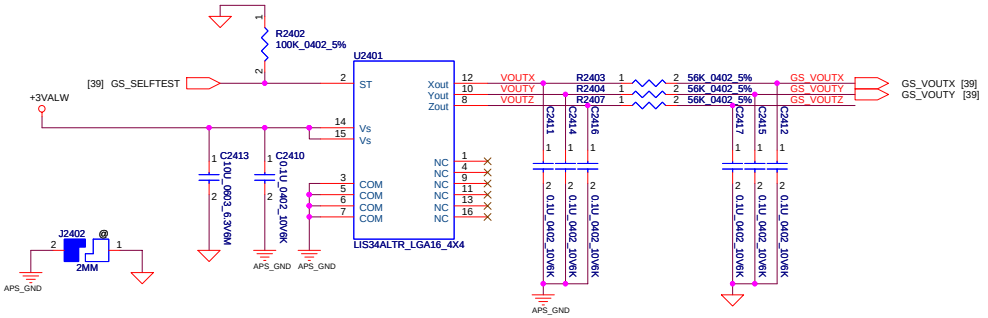
PERICOM PI3EQX6741STZDEX

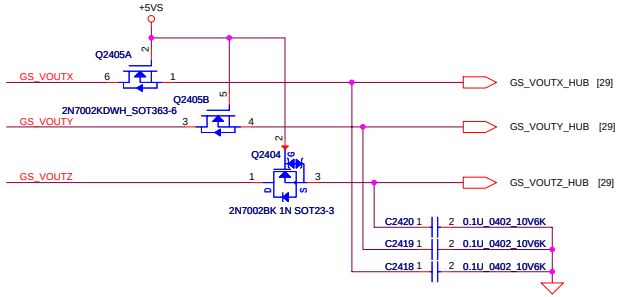
SA00004H100

Input equalization	A_EQ / B_EQ
3 dB	Low
6dB (Default)	Open
9dB	High

Outtput Pre-Emphasis	A_EM / B_EM
0 dB	Low
1.5 dB	High

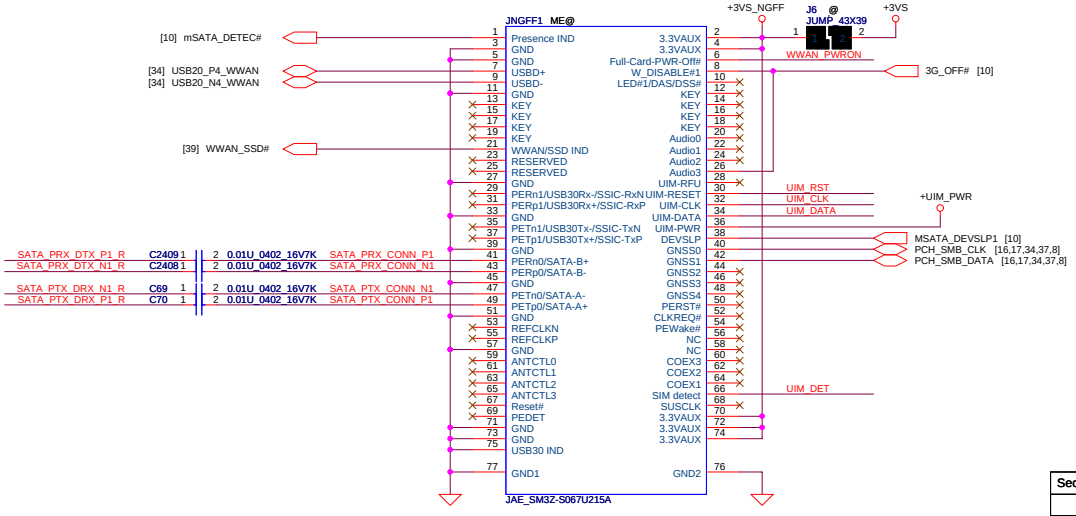
APS G-Sensor

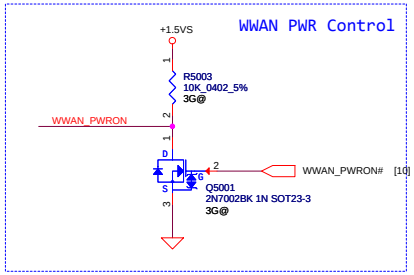


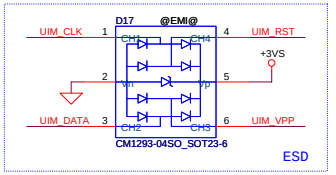


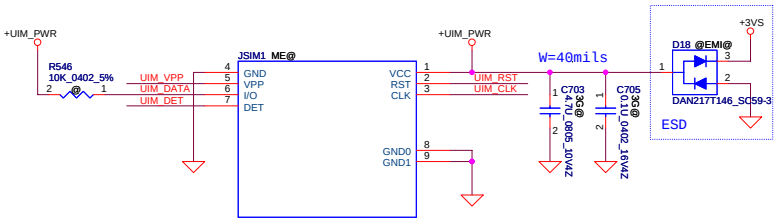
M.2 mSATA/WWAN Conn

P/N:DC021209061









P/N:SP07000LS00

Security Classification	Compal Secret Data		
Issued Date	2014/01/09	Deciphered Date	2014/01/09

For KSP4

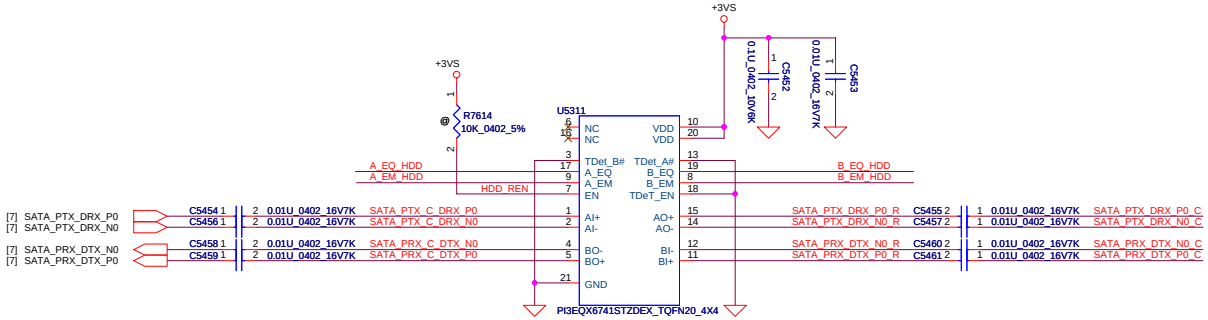
Compal Electronics, Inc.

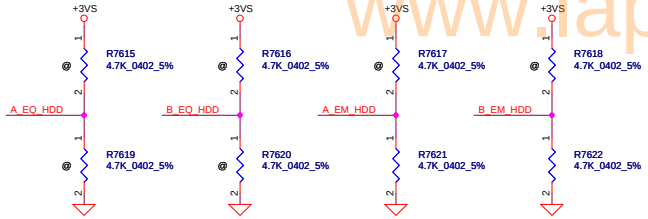
Title: mSATA/WWAN/G-Sensor

Size: Custom | Document Number: LA-B591P_SDV | Rev: 0.1

Date: Tuesday, March 25, 2014 | Sheet 35 of 50

SATA HDD WTB Conn



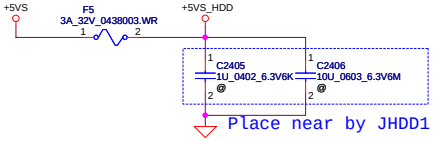


PERICOM PI3EQX6741STZDEX

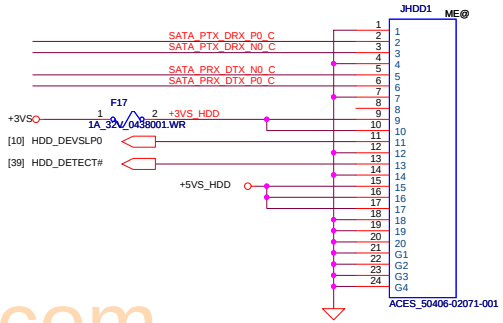
SA00004H100

Input equalization	A_EQ / B_EQ
3 dB	Low
6dB (Default)	Open
9dB	High

Outtput Pre-Emphasis	A_EM / B_EM
0 dB	Low
1.5 dB	High



P/N:SP010016L00



Security Classification	Compal Secret Data		
Issued Date	2014/01/09	Deciphered Date	2014/01/09

For KSP4

Compal Electronics, Inc.

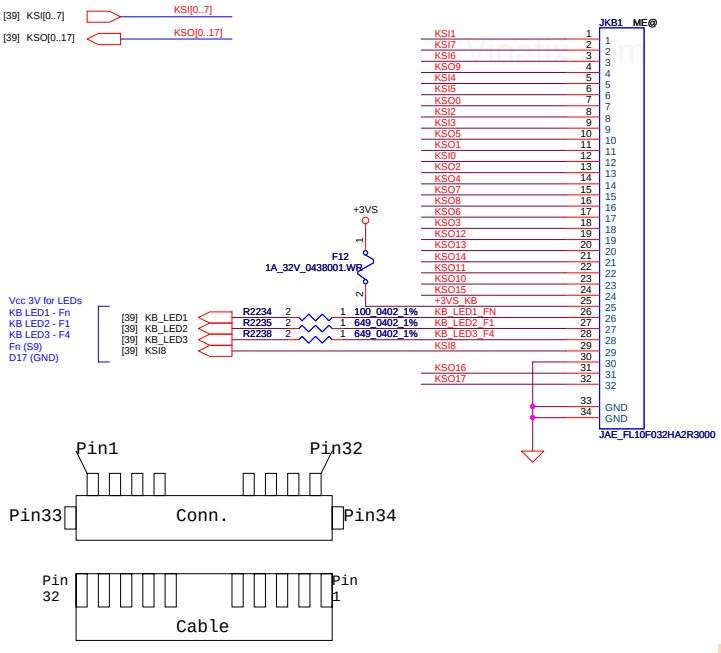
Title: **HDD**

Size	Document Number	Rev
Custom	LA-B591P_SDV	0.1

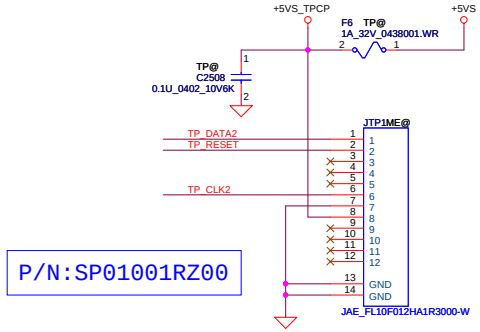
Date: Tuesday, March 25, 2014 Sheet 36 of 50

Int KB Conn

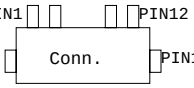
P/N:SP01001PU00

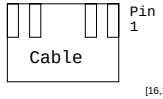


Track Point

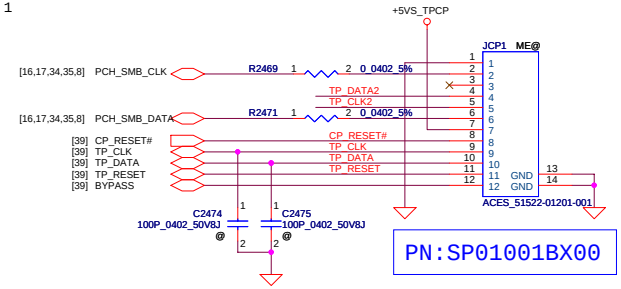


P/N:SP01001RZ00



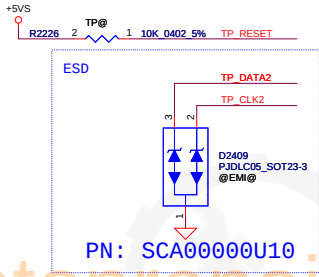


Click PAD



PN:SP01001BX00

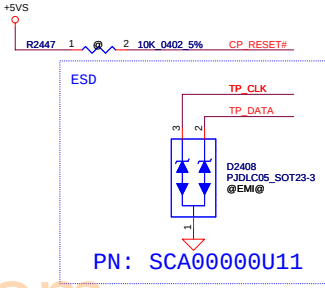
Track Point pin define



PN: SCA00000U10

NO	Signal
1	IPD DATA
2	IPD RST
3	NC
4	NC
5	NC
6	IPD CLK
7	GND
8	VCC5
9	BKLITE DEC
10	LED VCC5
11	LED PWM
12	LED GND

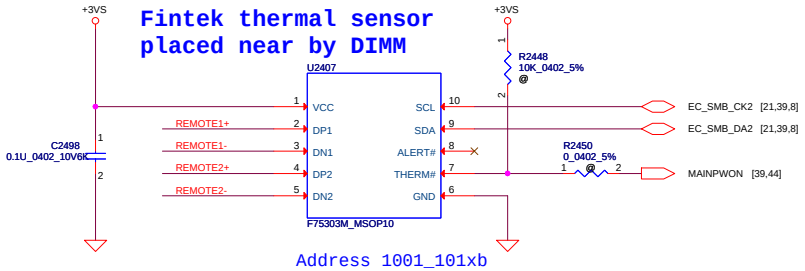
Click PAD pin define



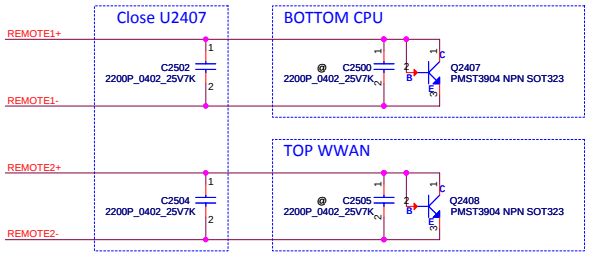
PN: SCA00000U11

NO	Signal
1	GND
2	SMB CLK
3	NC
4	DATA-TP
5	CLK-TP
6	SMB-DATA
7	VDD
8	RESET
9	CLK
10	DATA
11	TP4RST
12	BYPASS

THRM Sensor

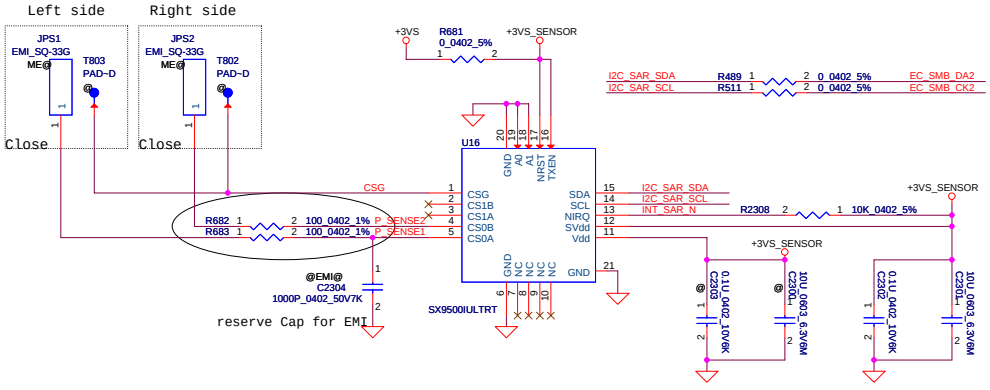


Address 1001_101xb
2nd source
SA000029210-->EMC1403-2-AIZL-TR



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

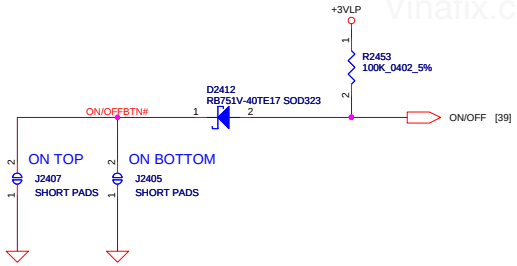
PROXIMITY SENSOR



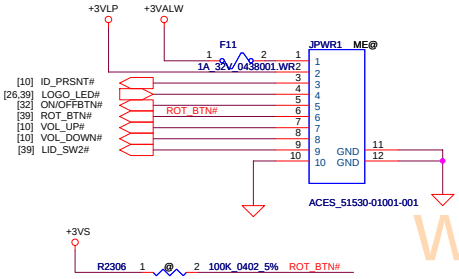
Security Classification	Compal Secret Data		
Issued Date	2014/01/09	Deciphered Date	2014/01/09

Compal Electronics, Inc.			
Title	KB/CP/TP/Thermal Sensor/P Sensor		
Size: Custom	Document Number: LA-B591P_SDV		Rev: 0.1
Date: Tuesday, March 25, 2014	Sheet 37 of 50		

PWRBTN Conn

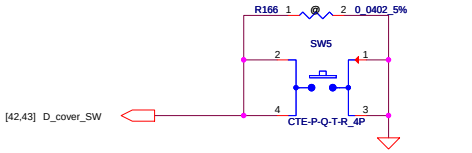


P/N:SP011312113

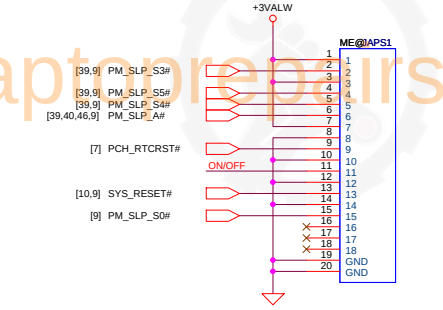


D_Cover cut Power

P/N:SN400001D00

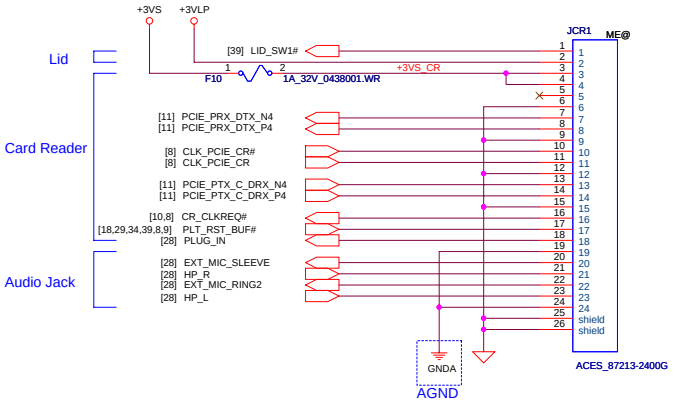


Debug Conn

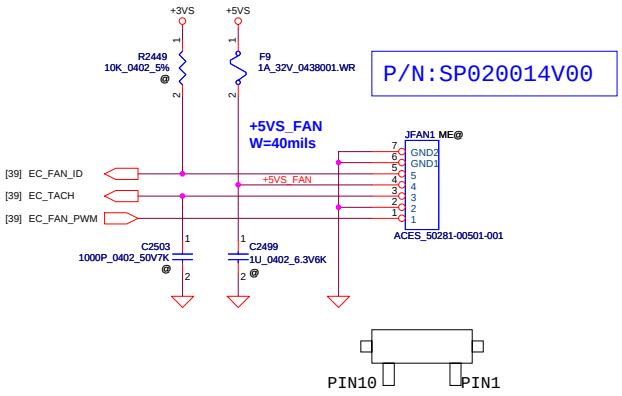


ard Reader Conn

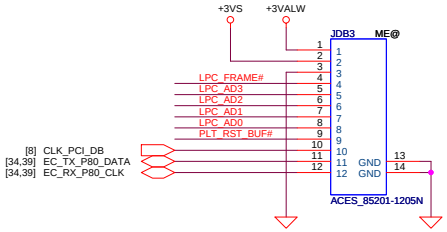
P/N:SP02000AH00



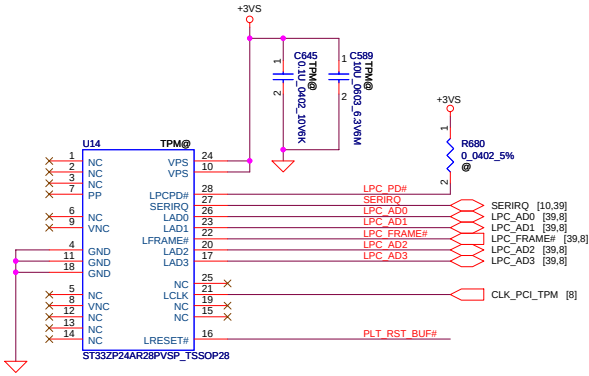
FAN Conn



P/N:SP020014V00



TPM



Security Classification	Compal Secret Data		
Issued Date	2014/01/09	Deciphered Date	2014/01/09

Compal Electronics, Inc.			
Title	PBTN/FAN/TPM/RTC/IO Board		
Size: Custom	Document Number: LA-B591P_SDV		Rev: 0.1
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EC KB9022

KB9022 A v.02	
GPIO W/O internal-PH:	
1. GPIO44	6. GPIO4B
2. GPIO45	7. GPIO4E
3. GPIO46	8. GPIO4F
4. GPIO47	9. GPIO50
5. GPIO4A	10.GPIO51

Vcc	3.3V +/- 5%				
R2210	100K +/- 1%				
Board ID	R2213	V_{AD_BID} min	V_{AD_BID} typ	V_{AD_BID} max	EC AD
SDV	0K +/- 5%		0.000V	0.300V	0x00 - 0x0B
FVT	12K +/- 1%	0.347V	0.354V	0.360V	0x0C - 0x1C
SIT	15K +/- 1%	0.423V	0.430V	0.438V	0x1D - 0x26
SVT	20K +/- 1%	0.541V	0.550V	0.559V	0x27 - 0x30

+3VALW_EC R2210 100K_0402_1% BRDID R2213 0_0402_5%

SD028000080 - S RES 1/16W 0 +-5% 0402
SD028120280 - S RES 1/16W 12K +-5% 0402
SD028150280 - S RES 1/16W 15K +-5% 0402
SD028200280 - S RES 1/16W 20K +-5% 0402

+3VLP R313 0_0603_5%
+3VALW_EC R2201 0_0603_5%
+EC_AVCC
C2203 C2204 C2205 C2206 C2207 0.1U_0402_16V4Z
C2208 1000P_0402_50V7K
C2202 1000P_0402_50V7K
C2201 0.1U_0402_16V4Z
ECAGND

U2201 KB9022QA_LQFP128_14X14

GATEA20/GPIO00 KBRST#/GPIO01 SERIRQ LPC_FRAME# LPC_AD3 LPC_AD2 LPC_AD1 LPC_AD0 CLK_PCI_EC PCIRST#/GPIO05 EC_RST# EC_SCI#/GPIO0E GPIO1D
HDD_DETECT# KB_RST# SERIRQ LPC_FRAME# LPC_AD3 LPC_AD2 LPC_AD1 LPC_AD0 CLK_LPC_EC PLT_RST_BUF# EC_RST# EC_SCI# ROT_BTN#
LPC & MISC

GPIO0F BEEP#/GPIO10 GPIO12 ACOFF/GPIO13
LOGO_LED# BEEP# I2C1_INT_H SENSOR_GPIO1
PWM Output

BATT_TEMP/AD0/GPIO38 AD1/GPIO39 ADP_I/AD2/GPIO3A AD3/GPIO3B AD4/GPIO42 IMON/AD5/GPIO43
BATT_TEMP GS_VOUTX ADP_I GS_VOUTY BRDID DCHG_I
AD Input

DAC_BRIG/GPIO3C EN_DFAN1/GPIO3D IREF/GPIO3E CHGVADJ/GPIO3F
AOU_CTL1 EC_FAN_ID AOU_CTL3 AOAC_PWREN
DA Output

EC_MUTE#/GPIO4A USB_EN#/GPIO4B CAP_INT#/GPIO4C EAPD/GPIO4D TP_CLK/GPIO4E TP_DATA/GPIO4F
EC_MUTE# USB_ON# SENSOR_GPIO2 DGPU_PWROK TP_CLK TP_DATA
PS2 Interface

KSI0/GPIO30 KSI1/GPIO31 KSI2/GPIO32 KSI3/GPIO33 KSI4/GPIO34 KSI5/GPIO35 KSI6/GPIO36 KSI7/GPIO37 KSO0/GPIO20 KSO1/GPIO21 KSO2/GPIO22 KSO3/GPIO23 KSO4/GPIO24 KSO5/GPIO25 KSO6/GPIO26 KSO7/GPIO27 KSO8/GPIO28 KSO9/GPIO29 KSO10/GPIO2A KSO11/GPIO2B KSO12/GPIO2C KSO13/GPIO2D KSO14/GPIO2E KSO15/GPIO2F KSO16/GPIO48 KSO17/GPIO49
KSO[0..17] KSI[0..8]
Int. K/B Matrix

CPU1.5V_S3_GATE/GPXIOA00 WOL_EN/GPXIOA01 ME_EN/GPXIOA02 VSMD_PH/GPXIOD00
ENBKL VGA_AC_DET ME_FLASH NTC_V
SPI Device Interface

SPIDI/GPIO5B SPIDO/GPIO5C SPICLK/GPIO5B SPICS#/GPIO5A
WWAN_SSD# PM_SLP_A# BYPASS KB_LED2
SPI Flash ROM

ENBKL/AD6/GPIO40 PECI_KB930/AD7/GPIO41 FSTCHG/GPIO50 BATT_CHG_LED#/GPIO52 CAPS_LED#/GPIO53 PWR_LED#/GPIO54 BATT_LOW_LED#/GPIO55 SYSON/GPIO56 VR_ON/GPIO57 PM_SLP_S4#/GPIO59
MOS_OTP ADP_ID_R KSI8 LID_SW2# AOU_STATUS# PCH_APWROK VCCST_PG_PWR SYSON SYS_PWROK PM_SLP_S4#
GPIO

EC_SMB_CK1/GPIO44 EC_SMB_DA1/GPIO45 EC_SMB_CK2/GPIO46 EC_SMB_DA2/GPIO47
EC_SMB_CK1 EC_SMB_DA1 EC_SMB_CK2 EC_SMB_DA2
SM Bus

PM_SLP_S3#/GPIO04 PM_SLP_S5#/GPIO07 EC_SMI#/GPIO08 GPIO0A GPIO0B GPIO0C GPIO0D EC_INVT_PWM/GPIO11 FAN_SPEED1/GPIO14 EC_PME#/GPIO15 EC_TX/GPIO16 EC_RX/GPIO17 PCH_PWROK/GPIO18 SUSP_LED#/GPIO19 NUM_LED#/GPIO1A
PM_SLP_S3# PM_SLP_S5# EC_SMI# KB_LED3 TP_RESET VCCST_PG_EC WLRF_OFF# TS_ON EC_TACH SENSOR_GPIO3 EC_TX_P80_DATA EC_RX_P80_CLK PCH_PWROK EC_FAN_PWM GS_SELFTEST
GPIO

EC_RSMRST#/GPIOA03 EC_LID_OUT#/GPXIOA04 PROCHOT_IN/GPXIOA05 H_PROCHOT#_EC/GPXIOA06 VCOUT0_PH/GPXIOA07 BKOFF#/GPIOA08 PBTN_OUT#/GPXIOA09 PCH_APWROK/GPXIOA10 SA_PGOOD/GPXIOA11
EC_RSMRST# EC_WAKE# 3D_PWREN H_PROCHOT#_EC MAINPWON BKOFF# PBTN_OUT# EN_5V CP_RESET#
GPO

AC_IN/GPXIOD01 EC_ON/GPXIOD02 ON/OFF/GPXIOD03 LID_SW#/GPXIOD04 SUSP#/GPXIOD05 GPXIOD06 ECI_KB9012/GPXIOD07
ACIN EN_3V ON/OFF LID_SW1# SUSP# KB_LED1 EC_PECI
GPI

V18R +V18R R4991 1 2 0_0402_5% +3VALW_EC
R2245 43_0402_1% H_PECI [5]
For 9022 +V18R, +EC_VCCLPC can be changed to 1.8V if supports 1.8V I/F.

SUSPWRDNACK AC_PRESENT
XCLKI/GPIO5D XCLKO/GPIO5E
[10,9] SUSPWRDNACK [10,9] AC_PRESENT

VDDVCC EC_VDDVCC EC_VDDVCC EC_VDDVCC EC_VDD0 EC_VDDVCC EC_VDD/AVCC
GND/GND GND/GND GND/GND GND/GND GND/GND AGND/AGND

L2202 0_0603_5% ECAGND [42]

Reserved for KBC9012
+3VALW_EC R2205 330K_0402_5% C2210 0.1U_0402_10V6K

If +3VS leakage on S3 mode Please check EC_MUTE#
+3VALW_EC
R2202 10K_0402_5% EC_MUTE#
R2218 10K_0402_5% I2C1_INT_H
R2219 10K_0402_5% NTC_V
R2204 100K_0402_5% HDD_DETECT#
R2203 100K_0402_5% LID_SW1#
R2206 100K_0402_5% LID_SW2#
R2457 10K_0402_5% KSI8

+3VS +3VALW_EC
RP36 2.2K_0804_8P4R_5%
EC_SMB_CK1 EC_SMB_DA1 EC_SMB_CK2 EC_SMB_DA2
R2456 10K_0402_5% EC_SMI#
R2452 10K_0402_5% EC_FAN_PWM
R2451 10K_0402_5% EC_TACH

C2228 C2229 C2220 C2221 100P_0402_50V8J EC_SMB_CK1 EC_SMB_DA1 EC_SMB_CK2 EC_SMB_DA2
Customer Request
R2239 10K_0402_5% PCH_PWROK
R2217 100K_0402_5% ENBKL

SN111005800
by ME drawing
SW4 SKRBAAE010_4P
[44] PWR_RESET PWR_RESET GND

Power Requset
+3VALW
RB751V40_SC76-2 D406
ADP_ID_R R7560 10K_0402_5% ADP_ID [32,41]
D404 ESD5Z3.3T1G_SOD523-2

+5VALW
USB_ON# R2209 10K_0402_5%
+5VS
TP_CLK R2211 4.7K_0402_5%
TP_DATA R2212 4.7K_0402_5%
BATT_TEMP C2211 100P_0402_50V8J
ACIN C2212 100P_0402_50V8J

PROCHOT
[48] VR_HOT# R2233 0_0402_5% H_PROCHOT# [5]
H_PROCHOT#_EC R2236 0_0402_5%

Security Classification	Compal Secret Data		
Issued Date	2014/01/09	Deciphered Date	2014/01/09

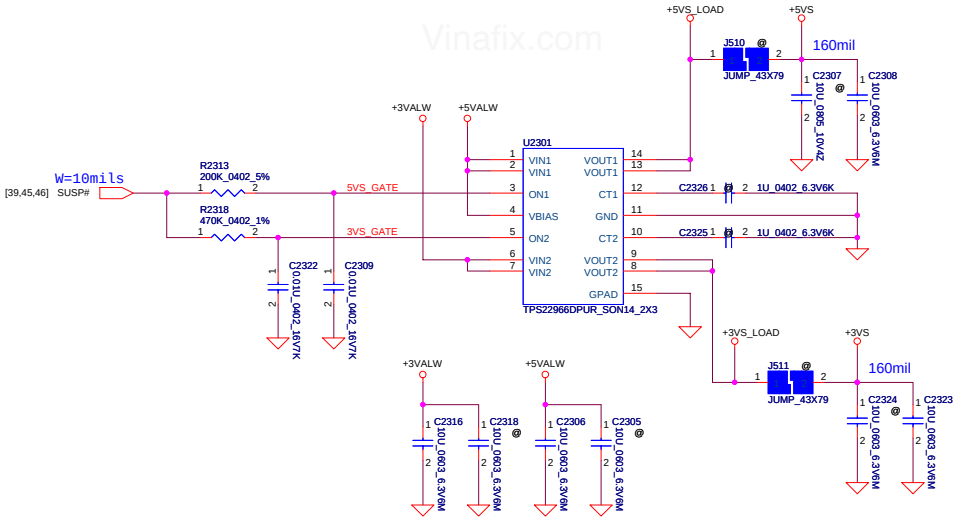
TOP KSP4

Compal Electronics, Inc.

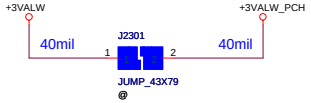
Title	EC ENE-KB9022		
Size: Custom	Document Number: LA-B591P_SDV		Rev: 0.1
Date: Tuesday, March 25, 2014	Sheet 39 of 50		

DC/DC I/F

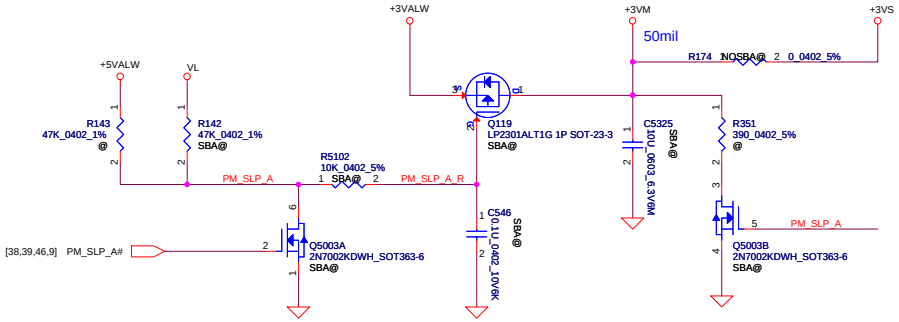
+5VALW TO +5VS
+3VALW TO +3VS



+3VALW TO +3VALW(PCH AUX Power)

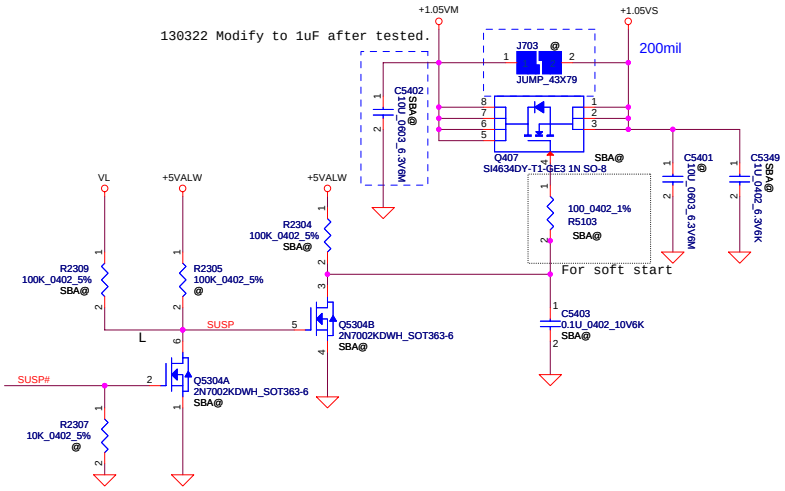


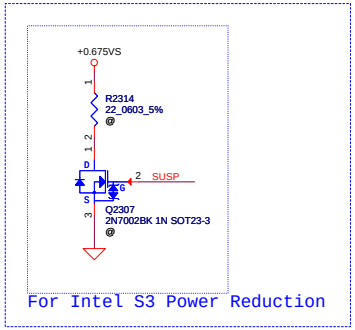
+3VALW TO +3VM (SBA)



PJ703 Short => NOSBA
PJ703 Open => SBA

Rds(on) VGS=4.5V,ID=8.5A,7mOhm(Max)



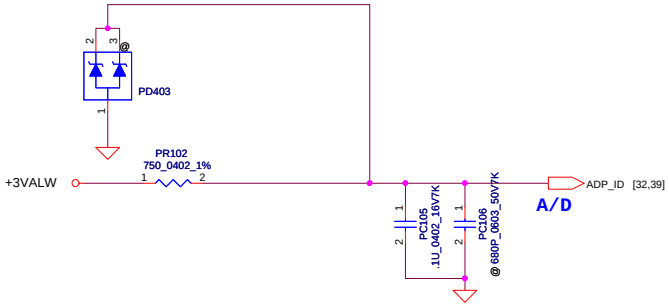


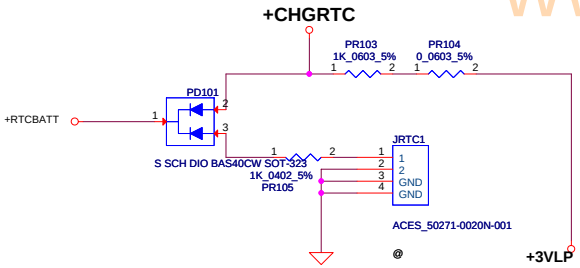
Security Classification	Compal Secret Data		
Issued Date	2014/01/09	Deciphered Date	2014/01/09

Compal Electronics, Inc.			
Title: DC Interface			
Size: Custom	Document Number: LA-B591P_SDV		Rev: 0.1
Date: Tuesday, March 25, 2014		Sheet 40 of 50	

ADP_ID

AC Adapter	45W	65W	90W
R(ohm)	118	287	549
ADP_ID(V)	0.449	0.913	1.395
Detection -Voltage(V)	<=0.663, >0.234	<=1.134, >0.693	<=1.618 >1.172





Security Classification	Compal Secret Data		
Issued Date	2013/11/05	Deciphered Date	2015/11/05

for KSP4

Compal Electronics, Inc.

Title: **PWR-DCIN**

Size	Document Number	Rev
Custom		0.1

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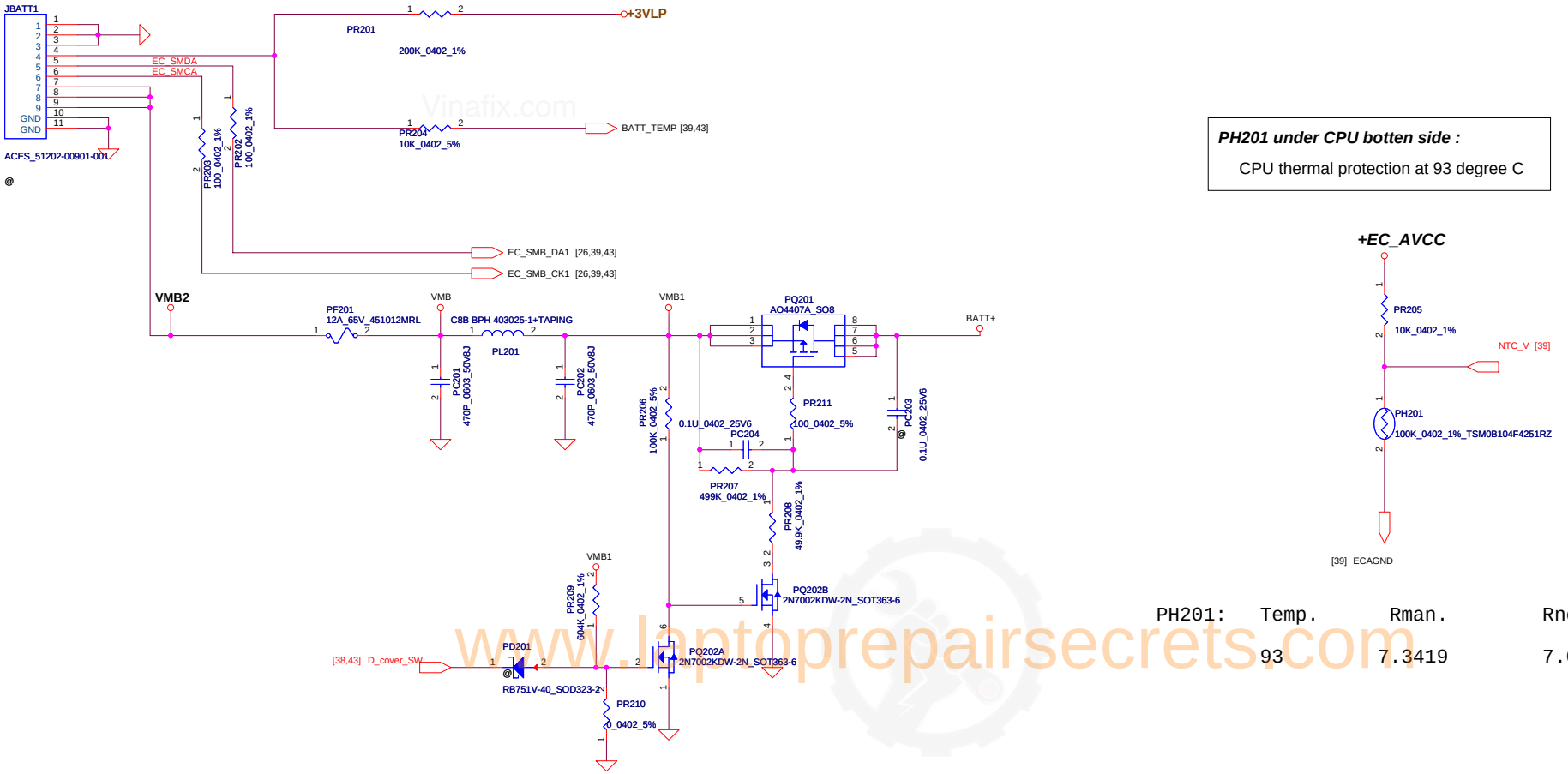


PH201 under CPU botten side :

CPU thermal protection at 93 degree C

PH201:	Temp.	Rman.	Rnor.	Rmin. (Kohm)
	93	7.3419	7.0792	6.8253

Security Classification	Compal Secret Data		
Issued Date	2013/11/05	Deciphered Date	2015/11/05

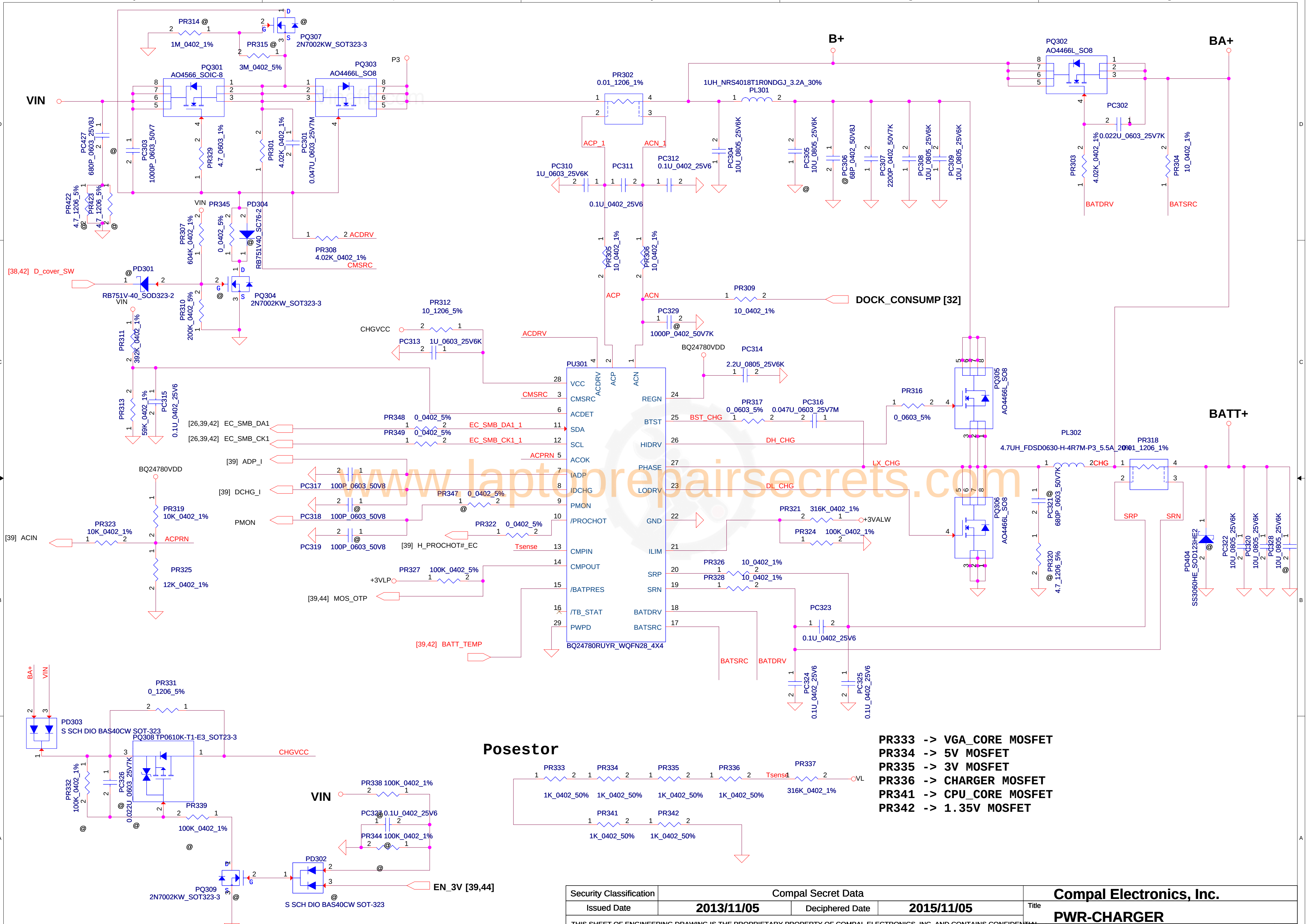
for KSP4

Compal Electronics, Inc.

Title: **PWR-BATTERY CONN/OTP**

Size: Custom | Document Number | Rev: 0.1

Date: Tuesday, March 25, 2014 | Sheet 42 of 50


VIN
B+
BA+
BATT+
PQ301 AO4566_SOIC-8
PQ303 AO4466L_SO8
PQ302 AO4466L_SO8
PQ307 2N7002KW_SOT323-3
PR302 0.01_1206_1%
PL301 1UH_NRS4018T1R0NDGJ_3.2A_30%
PU301
BQ24780RUYR_WQFN28_4X4
PR318 0.01_1206_1%
PL302 4.7UH_FDSD0630-H-4R7M-P3_5.5A_20%
PQ305 AO4466L_SO8
PQ306 AO4466L_SO8
DOCK_CONSUMP [32]
[38,42] D_cover_SW
PD301 RB751V-40_SOD323-2
PQ304 2N7002KW_SOT323-3
PD304 RB751V40_SC76-2
[26,39,42] EC_SMB_DA1
[26,39,42] EC_SMB_CK1
[39] ADP_I
[39] DCHG_I
PMON
[39] ACIN
[39] H_PROCHOT#_EC
[39,44] MOS_OTP
[39,42] BATT_TEMP
BQ24780VDD
CHGVCC
PD303 S SCH DIO BAS40CW SOT-323
PQ308 TP0610K-T1-E3_SOT23-3
PQ309 2N7002KW_SOT323-3
PD302 S SCH DIO BAS40CW SOT-323
EN_3V [39,44]
Posestor
PR333 PR334 PR335 PR336 PR337
PR341 PR342
Tsense
VL
+3VALW
+3VLP

PR333 -> VGA_CORE MOSFET
PR334 -> 5V MOSFET
PR335 -> 3V MOSFET
PR336 -> CHARGER MOSFET
PR341 -> CPU_CORE MOSFET
PR342 -> 1.35V MOSFET

Security Classification	Compal Secret Data			Compal Electronics, Inc.
Issued Date	2013/11/05	Deciphered Date	2015/11/05	Title: PWR-CHARGER

for KSP4

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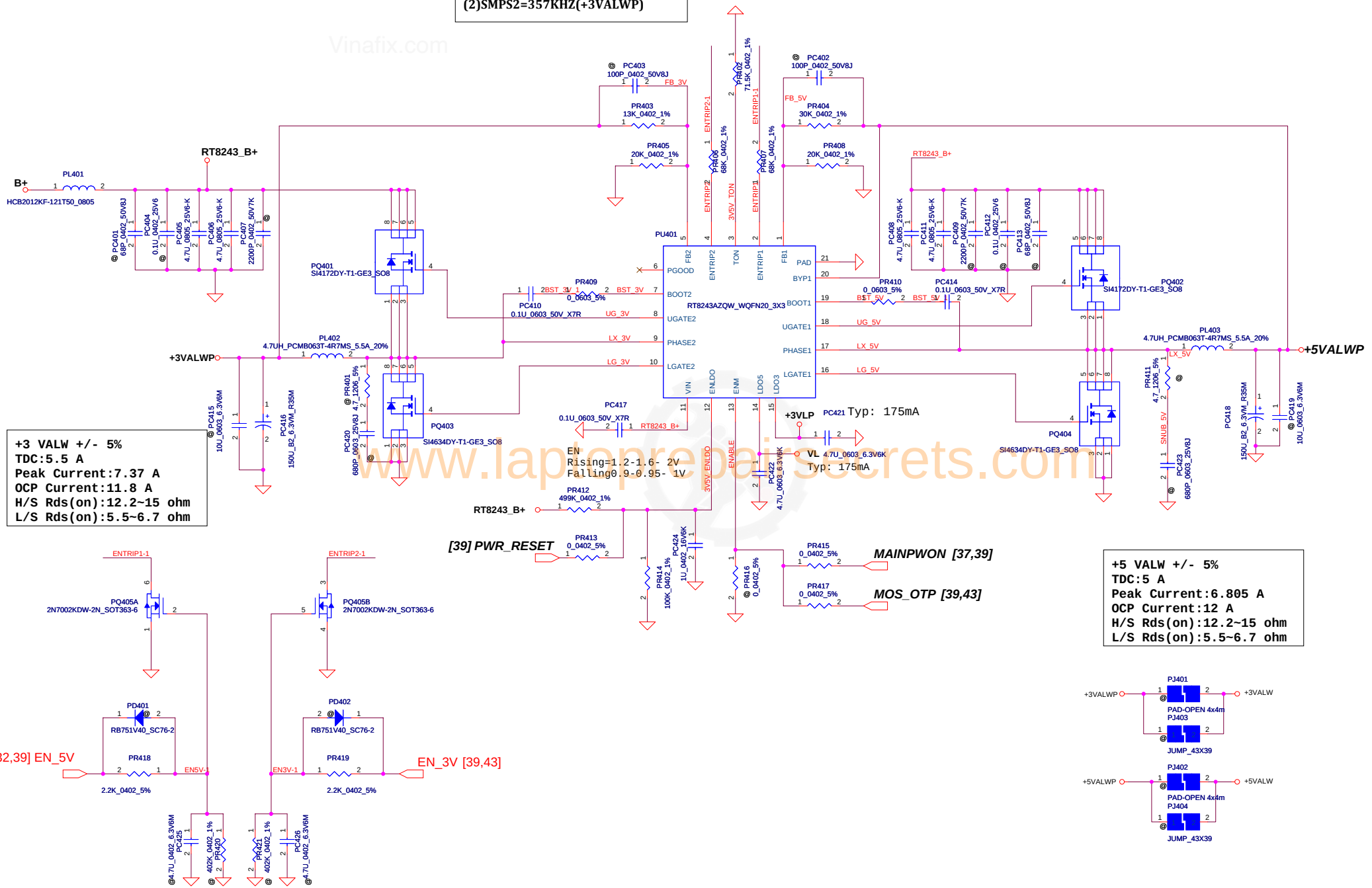
TON (1)SMPS1=305KHZ (+5VALWP)
(2)SMPS2=357KHZ(+3VALWP)



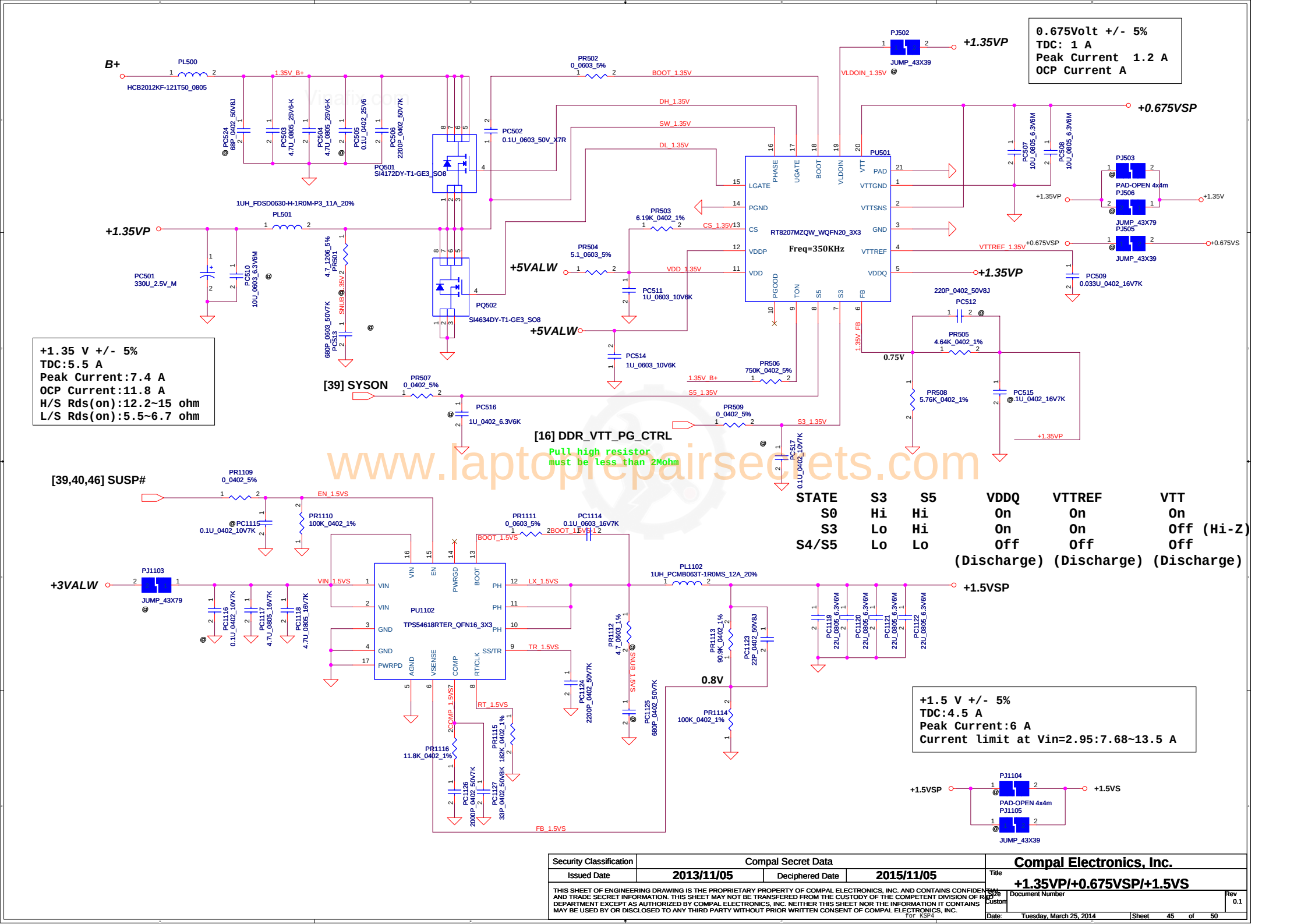
Security Classification	Compal Secret Data		
Issued Date	2013/11/05	Deciphered Date	2015/11/05

For KSP4

Compal Electronics, Inc.

Title: **PWR-3VALWP/5VALWP**

Size: Custom	Document Number	Rev: 0.1
Date: Tuesday, March 25, 2014	Sheet 44 of 50	



Security Classification	Compal Secret Data		
Issued Date	2013/11/05	Deciphered Date	2015/11/05

for KSP4

Compal Electronics, Inc.

Title: **+1.35VP/+0.675VSP/+1.5VS**

Size: Custom	Document Number	Rev: 0.1
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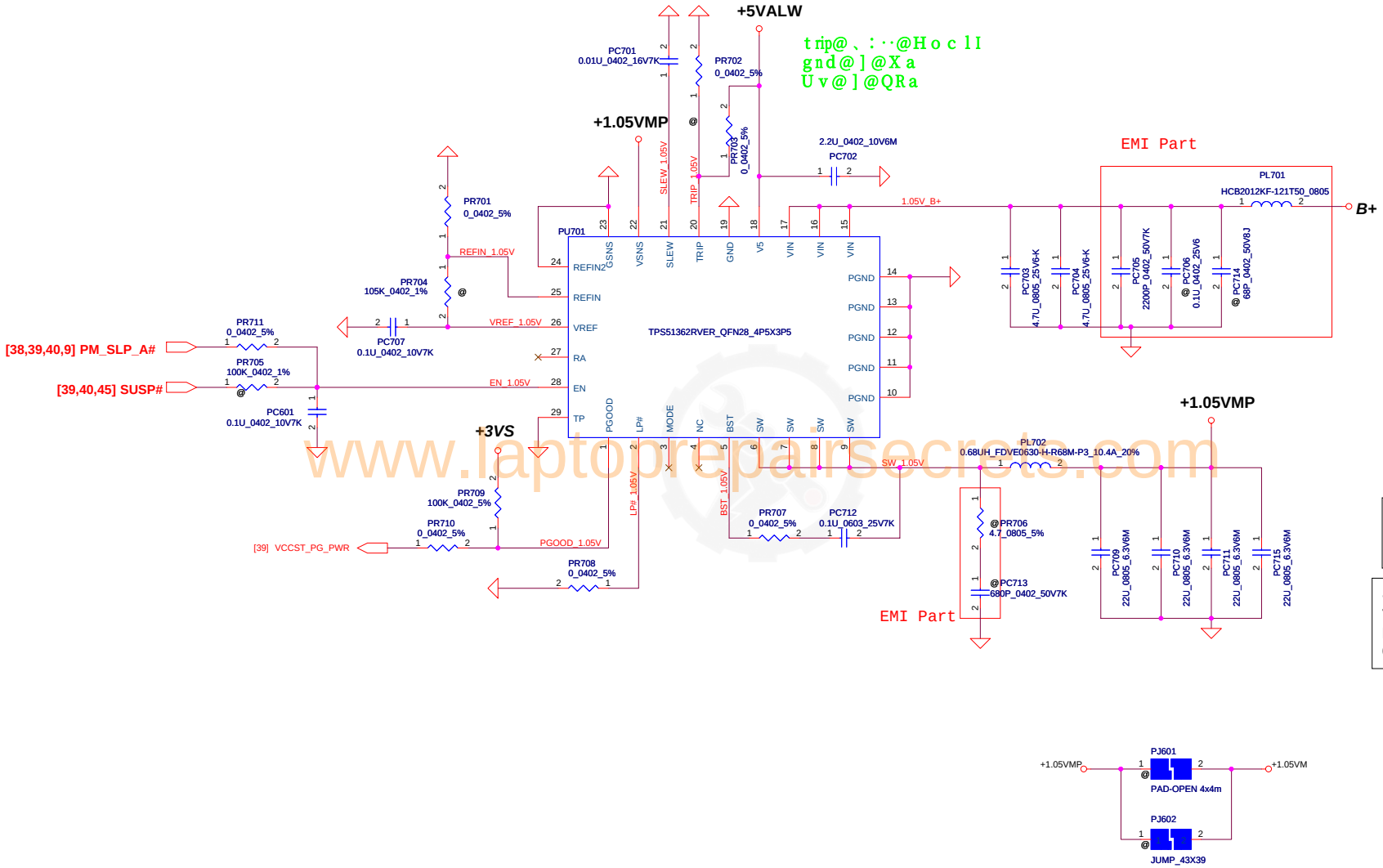

Security Classification	Compal Secret Data		
Issued Date	2013/11/05	Deciphered Date	2015/11/05

for KSP4

Compal Electronics, Inc.

Title: **PWR-+1.05VM**

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Module model information:
RT8812-2Phase

Remark:
1. Switching frequency setting:(Ton pin)
Fsw=(Vin-0.5)/(2*Vin*Rton*3.2p)
=448Khz
2. Soft-Start:(SS pin)
SS time (Internal) is 0.7ms (PC18 un-pop)
SS time(External): (PC18 pop)
Tss=(Css*Vrefin)/Iss+2.3ms
=0.01U*0.9V/5uA+2.3ms=4.1ms

4.Current Limit threshold setting
Rocset= (Ivalley * Rds(on) + 40 mV) / 10uA

I_ripple=(20-1.028)*1.028/(448Khz*0.22u*20)=9.89A

OCP=72A/2=36A per phase
Ivalley=36A-9.89A/2=31.055A

H-side MOS:TPCA8065 L-side MOS:TPCA8057
Rds(on): Rds(on):
11.7mohm@Vgs=10V 2.0mohm@Vgs=10V
9.4mohm@Vgs=4.5V 2.6~3.2mohm@Vgs=4.5V
Id :16A@Ta=25 degC Id :42A@Ta=25 degC

5.OpenVReg Configurations:(PSI pin)

Operation phase Number	PSI Voltage setting
1 phase with DEM	0V to 0.8V
1 phase with CCM	1.2V to 1.8V
Active phase with CCM	2.4V to 5.5V

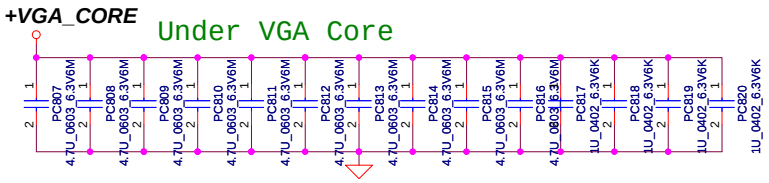
3.PWM-VID Spec and component Values

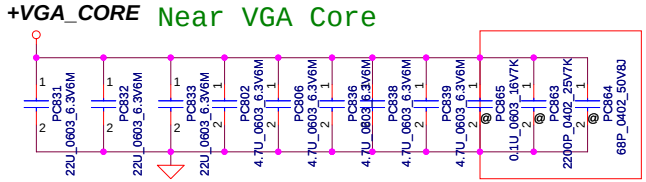
PWM-VID Spec		Config A	Config B	Config C	Config D
Vmin		0.6V	0.6V	0.65V	0.9V
Vmax		1.2V	1.2V	1.15V	1.15V
Vboot		0.875V	0.9V	0.9V	1.028V
Voltage step		6.25mV	6.25mV	25mV	12.5mV
N of Voltage level		96	96	20	20
Rrefadj	PR811	39K	20K	39K	27K
Rref1	PR807	39K	20K	30K	7.5K
Rboot	PR810	1.5K	2K	3K	0
Rref2=PR20+PR21	PR801	30K	18K	24K	6.2K
	PR816	1.5K	0	3K	1.74K
C	PC852	1.5nf	2.7nf	1.8nf	5.6nf

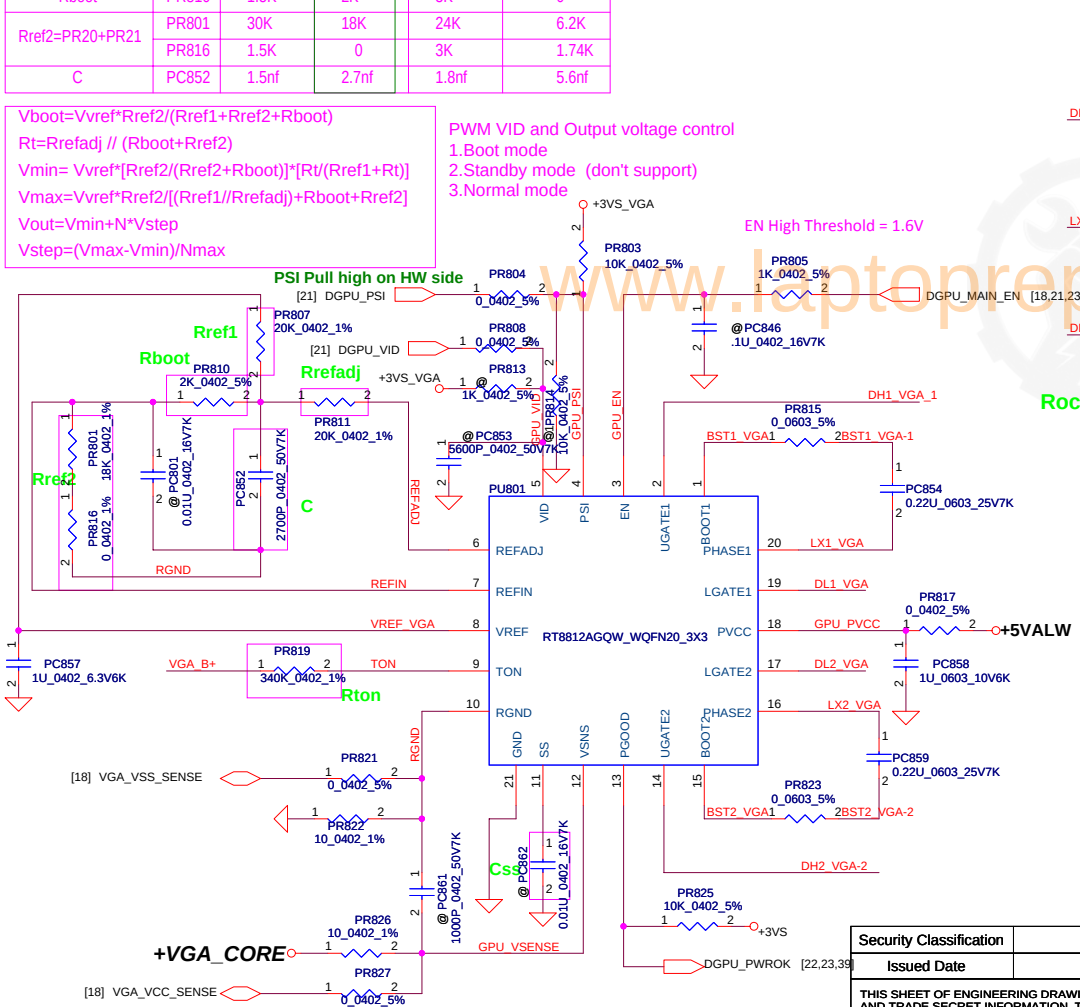
Vboot=Vvref*Rref2/(Rref1+Rref2+Rboot)
Rt=Rrefadj // (Rboot+Rref2)
Vmin= Vvref*[Rref2/(Rref2+Rboot)]*[Rt/(Rref1+Rt)]
Vmax=Vvref*Rref2/[(Rref1//Rrefadj)+Rboot+Rref2]
Vout=Vmin+N*Vstep
Vstep=(Vmax-Vmin)/Nmax

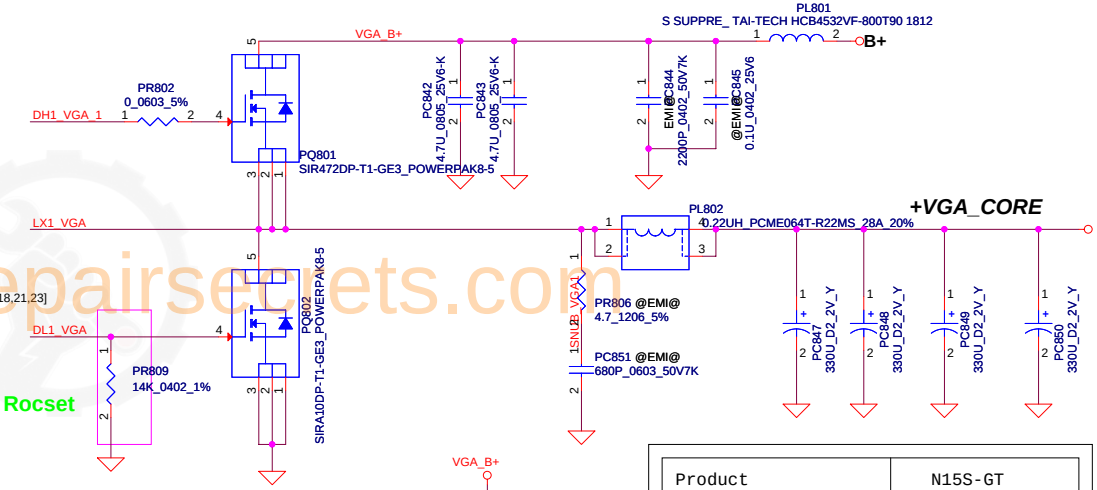
PWM VID and Output voltage control
1.Boot mode
2.Standby mode (don't support)
3.Normal mode

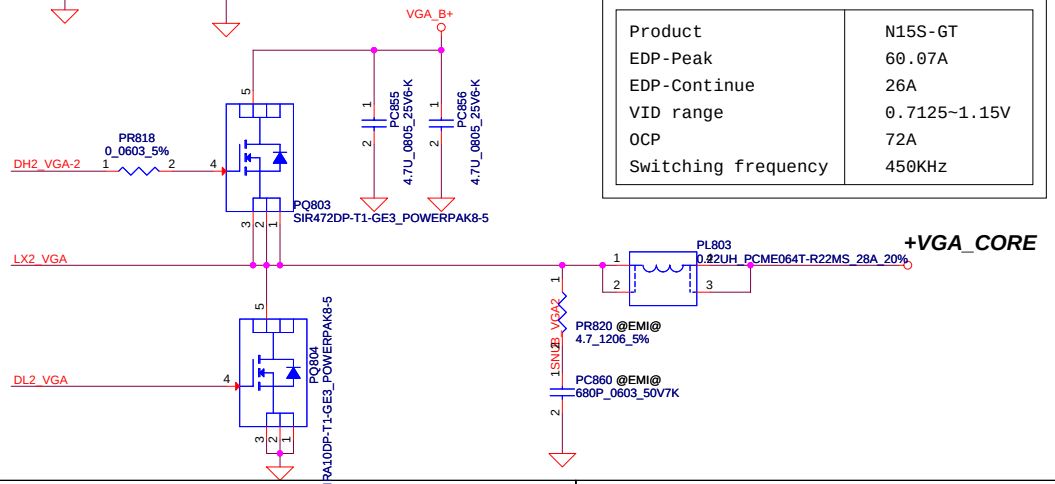
EN High Threshold = 1.6V











Product	N15S-GT
EDP-Peak	60.07A
EDP-Continue	26A
VID range	0.7125~1.15V
OCP	72A
Switching frequency	450KHz

Security Classification	Compal Secret Data		
Issued Date	2013/11/05	Deciphered Date	2015/11/05

Compal Electronics, Inc.			
Title	PWR-VGA CORE		
Size	Document Number		Rev
Custom			0.1
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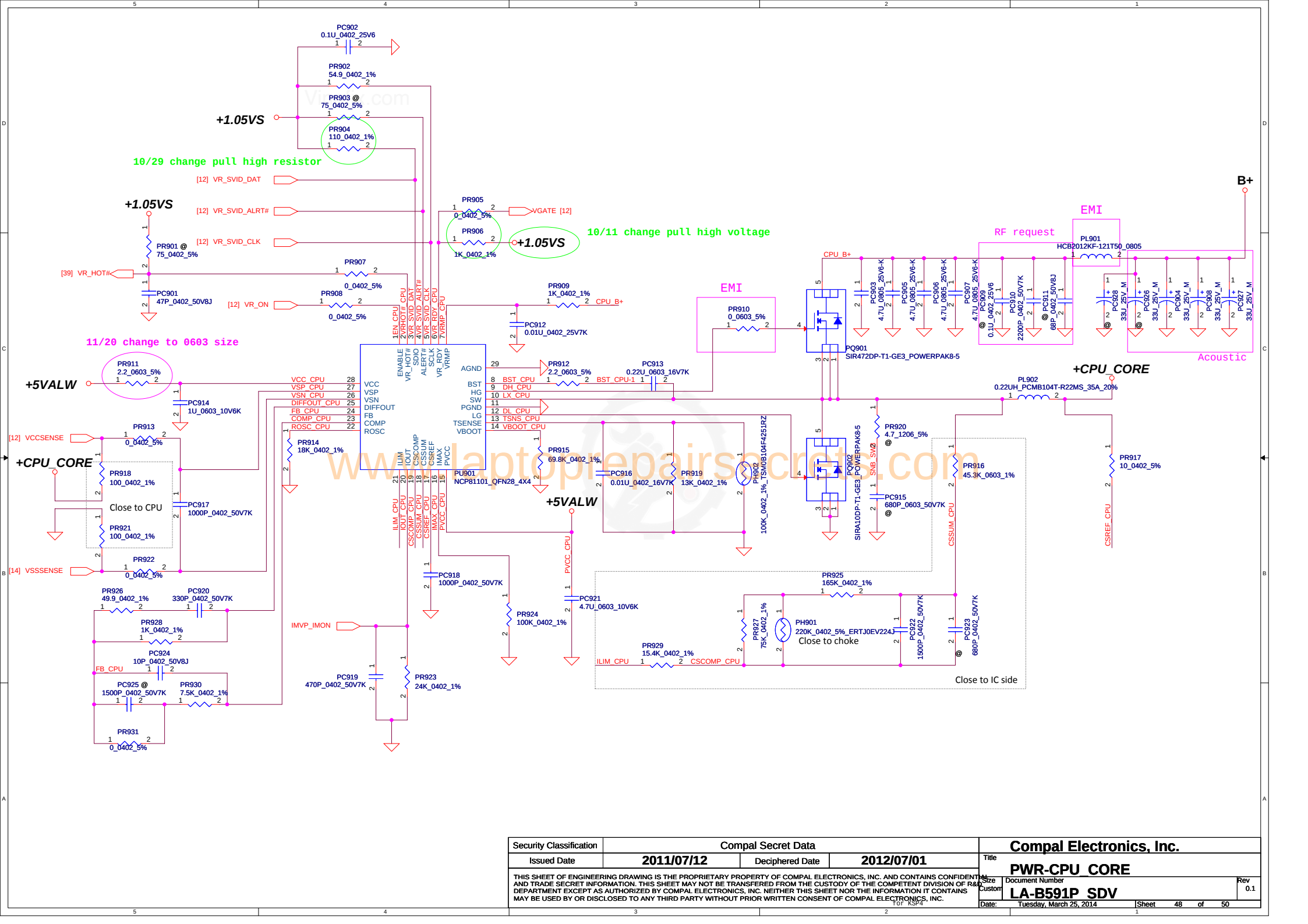

Security Classification	Compal Secret Data		
Issued Date	2011/07/12	Deciphered Date	2012/07/01

Compal Electronics, Inc.			
Title	PWR-CPU_CORE		
Size: Custom	Document Number: LA-B591P_SDV		Rev: 0.1
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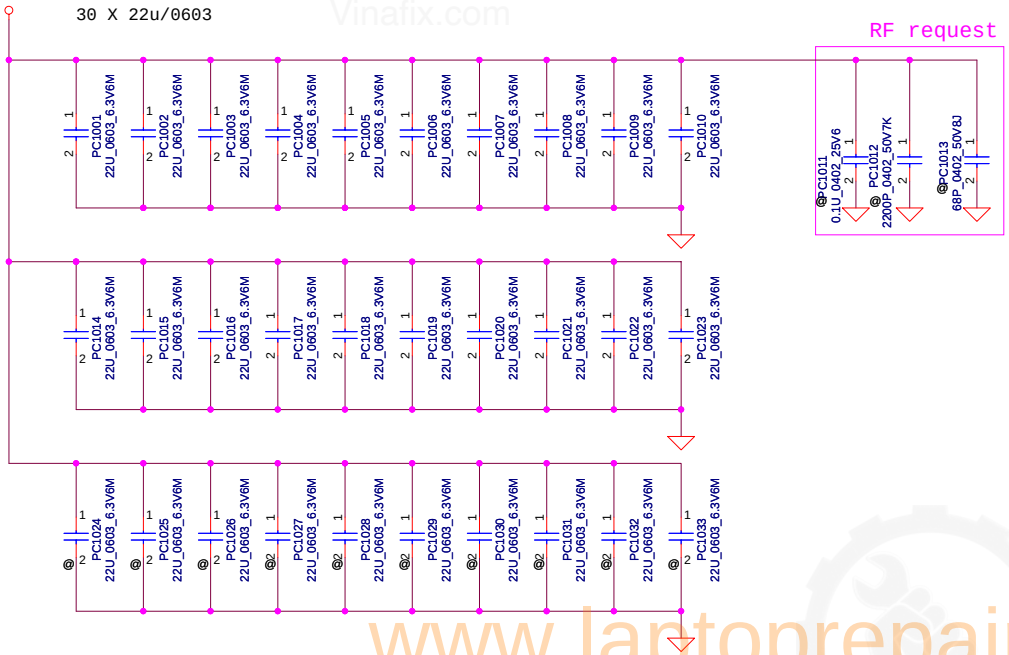
+CPU_CORE

30 X 22u/0603

RF request



Security Classification	Compal Secret Data		
Issued Date	2011/07/12	Deciphered Date	2012/07/01

for KSP4

Compal Electronics, Inc.

Title: **PWR-PROCESSOR_DECOUPLING**

Size: Custom | Document Number: **LA-B591P_SDV** | Rev: 0.1

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

for PWR

Item	Reason for change	PG#	Modify List	Date	Phase
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					

Compal Electronics, Inc.

Title: PIR (PWR)

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