Compal Confidential

Model Name : A5WAH/A5WAB
File Name : LA-B991P

Compal Confidential

EA50_HB M/B Schematics Document

Intel Broadwell ULT (Broadwell + Wildcat point)

Nvidia N15S-GT / N15V-GM / N15V-GL

2014-08-27

REV:1.0

Security Classification	Compal Secret Data		
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Compal Electronics, Inc.		
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eDP

DDI

HDMI Conn.

HDMI

page 26

HDMI x 4 lanes

Intel Broadwell ULT

Broadwell ULT
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OPI

Wildcat point
PCH

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PCIe 2.0
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6.0 Gb/s
port 1

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LS-B163P
BATT/B (UMA)

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Title: Block Diagrams

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Voltage Rails

Power Plane	Description	S1	S3	S5
VIN	Adapter power supply (19V)	N/A	N/A	N/A
BATT+	Battery power supply (12.6V)	N/A	N/A	N/A
B+	AC or battery power rail for power circuit.	N/A	N/A	N/A
+CPU_CORE	Core voltage for CPU	ON	OFF	OFF
+VGA_CORE	Core voltage for GPU	ON	OFF	OFF
+0.675VS	+0.675VS power rail for DDR3 terminator	ON	OFF	OFF
+1.05VS_VTT	+1.05V power rail for CPU	ON	OFF	OFF
+1.05VSDGPU	+1.05VSDGPU switched power rail for GPU	ON	OFF	OFF
+1.35V	+1.35V power rail for DDR3	ON	ON	OFF
+1.5VSDGPU	+1.5VSDGPU power rail for GPU	ON	OFF	OFF
+1.5VS	+1.5V power rail for CPU	ON	OFF	OFF
+3VALW	+3VALW always on power rail	ON	ON	ON*
+3VLP	B+ to +3VLP power rail for suspend power	ON	ON	ON
+3VS	+3VALW to +3VS power rail	ON	OFF	OFF
+3VSDGPU	+3VS to +3VSDGPU power rail for GPU	ON	OFF	OFF
+5VALW	+5VALWP to +5VALW power rail	ON	ON	ON*
+5VS	+5VALW to +5VS power rail	ON	OFF	OFF
+RTCVCC	RTC power	ON	ON	ON

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

	SYSON	SUSP	SUSP	SLP_S4#	SLP_S5#	+5VALW	+V	+VS	Clock
Full ON	HIGH	HIGH	HIGH	HIGH	HIGH	ON	ON	ON	ON
S1(Power On Suspend)	LOW	HIGH	HIGH	HIGH	HIGH	ON	ON	ON	LOW
S3 (Suspend to RAM)	LOW	LOW	HIGH	HIGH	HIGH	ON	ON	OFF	OFF
S4 (Suspend to Disk)	LOW	LOW	LOW	HIGH	HIGH	ON	OFF	OFF	OFF
S5 (Soft OFF)	LOW	LOW	LOW	LOW	LOW	ON	OFF	OFF	OFF

Board ID / SKU ID Table for AD channel

Vcc	3.3V +/- 5%
Ra/Rc/Re	100K +/- 5%

Board ID	Rb / Rd / Rf	V_{AD_BID} min	V_{AD_BID} typ	V_{AD_BID} max
0	0	0 V	0 V	0 V
1	12K +/- 5%	0.347 V	0.354 V	0.360 V
2	15K +/- 5%	0.423 V	0.430 V	0.438 V
3	20K +/- 5%	0.541 V	0.550 V	0.559 V
4	27K +/- 5%	0.691 V	0.702 V	0.713 V
5	33K +/- 5%	0.807 V	0.819 V	0.831 V
6	43K +/- 5%	0.978 V	0.992 V	1.006 V
7	56K +/- 5%	1.169 V	1.185 V	1.200 V
8	75K +/- 5%	1.398 V	1.414 V	1.430 V
9	100K +/- 5%	1.634 V	1.650 V	1.667 V
10	130K +/- 5%	1.849 V	1.865 V	1.881 V
11	160K +/- 5%	2.015 V	2.031 V	2.046 V
12	200K +/- 5%	2.185 V	2.200 V	2.215 V
13	240K +/- 5%	2.316 V	2.329 V	2.343 V

EC SM Bus1 address

Device	Address
Smart Battery	0x16

EC SM Bus2 address

Device	Address
On Board Thermal Senser	0x96
VGA Internal Thermal Senser	0x9E

PCH SM Bus address

Device		Address	
ChannelA	DIMM0	1010 0000	JDIMM1
ChannelB	DIMM1	1010 0010	JDIMM2

USB Port Table

USB 2.0	Port	3 External USB Port
EHCI1	0	USB Port(Left 3.0)
	1	USB Port(Right 2.0)
	2	USB Port(Right 2.0)
	3	
	4	Mini Card (WLAN+BT)
	5	Touch Screen
	6	Camera
	7	Finger Print
USB 3.0	**Port**	
XHCI	0	USB Port(Left 3.0)
	1	
	2	
	3	

BOARD ID Table

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

BTO Option Table

BTO Item	BOM Structure
Unpop	@
Connector	CONN@
EC 9022	9022@
EC 9012	9012@
UMA Component	UMA@
GPU	VGA@
On Board HDD	HDD@
EDP panel	EDP@
eDP to LVDS	LVDS@
EMC Component	EMC@
EMC Reserve	XEMC@
TPM Module	TPM@
G-Sensor	BA@
Redriver HDD	BA@
Touch Screen	TS@
VRAM Selection	X76@
DGPU IDEN	VGL@, VGM@, SGT@
CPU IDEN	HW@, BW@
GC6 2.0	GC6@
Non GC6	NGC6@
One DMIC	EA50@
Two DMIC	2MIC@

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Title: Notes List

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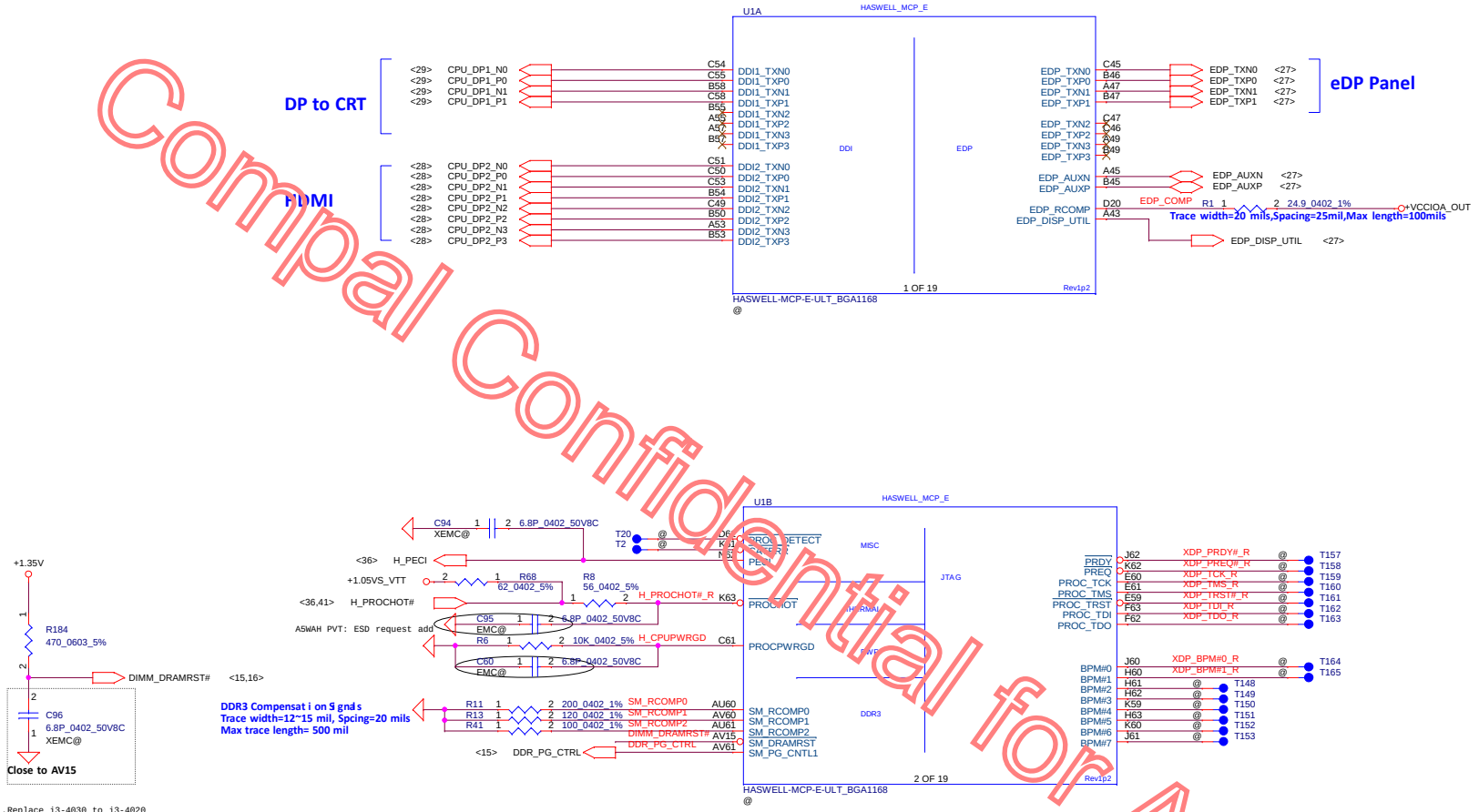

U1 CPU_Haswell intel PMD3558U 1.7G 3558@ SA00007G260	U1 CPU_Haswell intel I3-4030 1.9G 4030@ SA00007TA60	U1 CPU Haswell Intel I5-4200U 1.6G 4200@ SA00006SMB0	U1 CPU Haswell Intel I3-4010U 1.7G 4010@ SA00006SX70
U1 CPU_Haswell intel I5-4210 1.7G 4210@ SA00007LO70	U1 CPU_Haswell intel I7-4510 2G 4510@ SA00007M760	U1 CPU Haswell Intel I7-4500U 1.8G 4500@ SA00006SLB0	U1 CPU_Haswell intel I3-4158U 2G 4158@ SA00006VW40	U1 CPU Haswell Intel I3-4005 1.7G 4005@ SA000072QD0
U1 CPU_Haswell intel I3-4020 1.9G 4020@ SA00007MG50	U1 CPU_Haswell intel PMD3556U 1.7G 3556@ SA000072Y70	U1 CPU_Haswell intel I7-4550U 1.5G 4550@ SA00006SJA0	U1 CPU_Haswell intel PDC2957 1.4G 2957@ SA00007G060	U1 CPU_Boardwell intel QGHB 1.6G QGHB@ SA00007UH20
ZZZ PCB A5WAH LA-B991P LS-B161P/B162P DAZ1A400100	U1 CPU_Boardwell intel QG21 1.2G QG21@ SA00007OS10	U1 CPU_Boardwell intel QG22 1.2G QG22@ SA00007OT10	U1 CPU_Boardwell intel QGH9 1.8G QGH9@ SA00007U920	U1 CPU_Boardwell intel QGHA 1.6G QGHA@ SA00007UG20

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Compal Electronics, Inc.			
Title	BDW MCP(1/11) DDI,MSIC,XDP		
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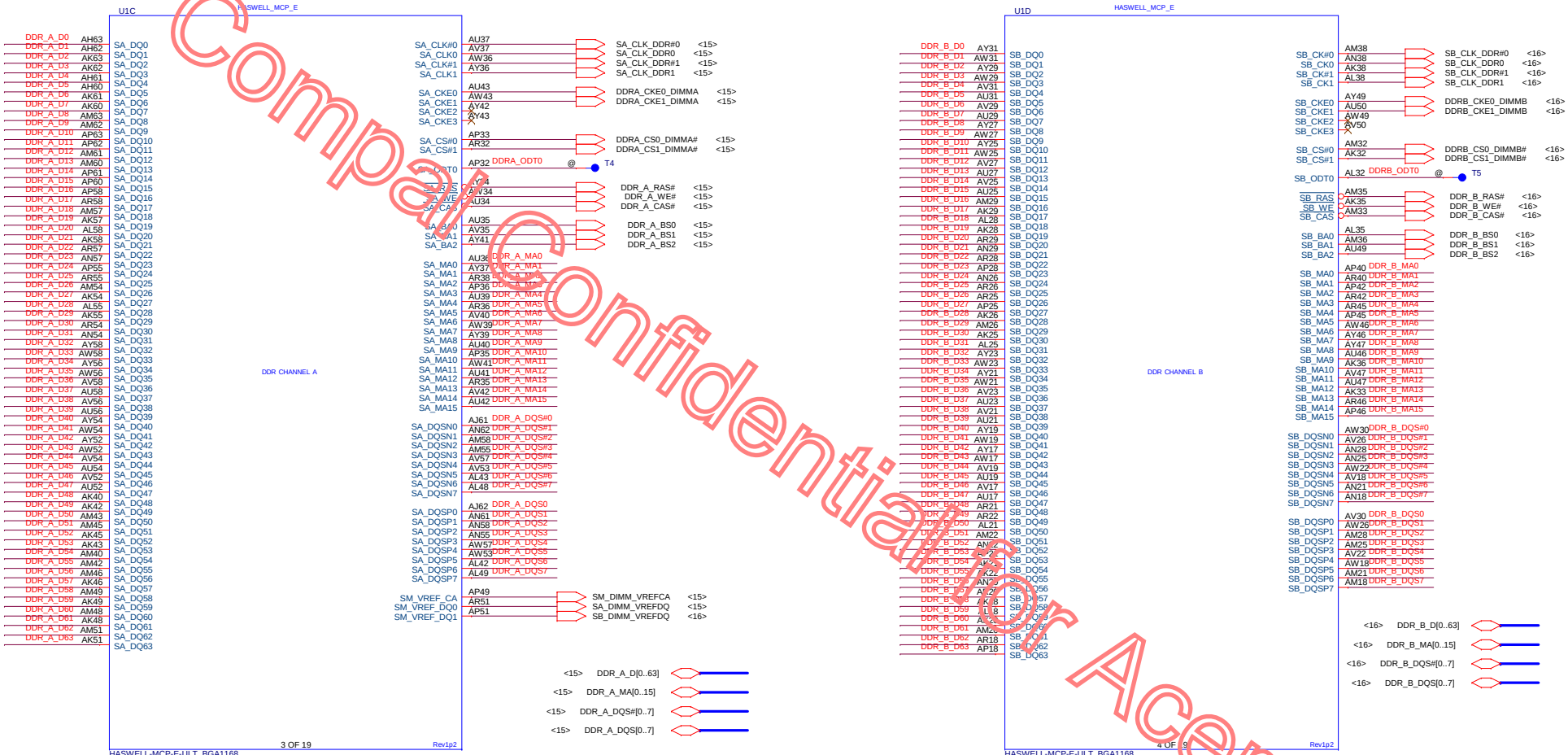

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Compal Electronics, Inc.			
Title	BDW MCP(2/11) DDRIII		
Size: Custom	Document Number: A5WAH M/B LA-B991P		Rev: 1.0
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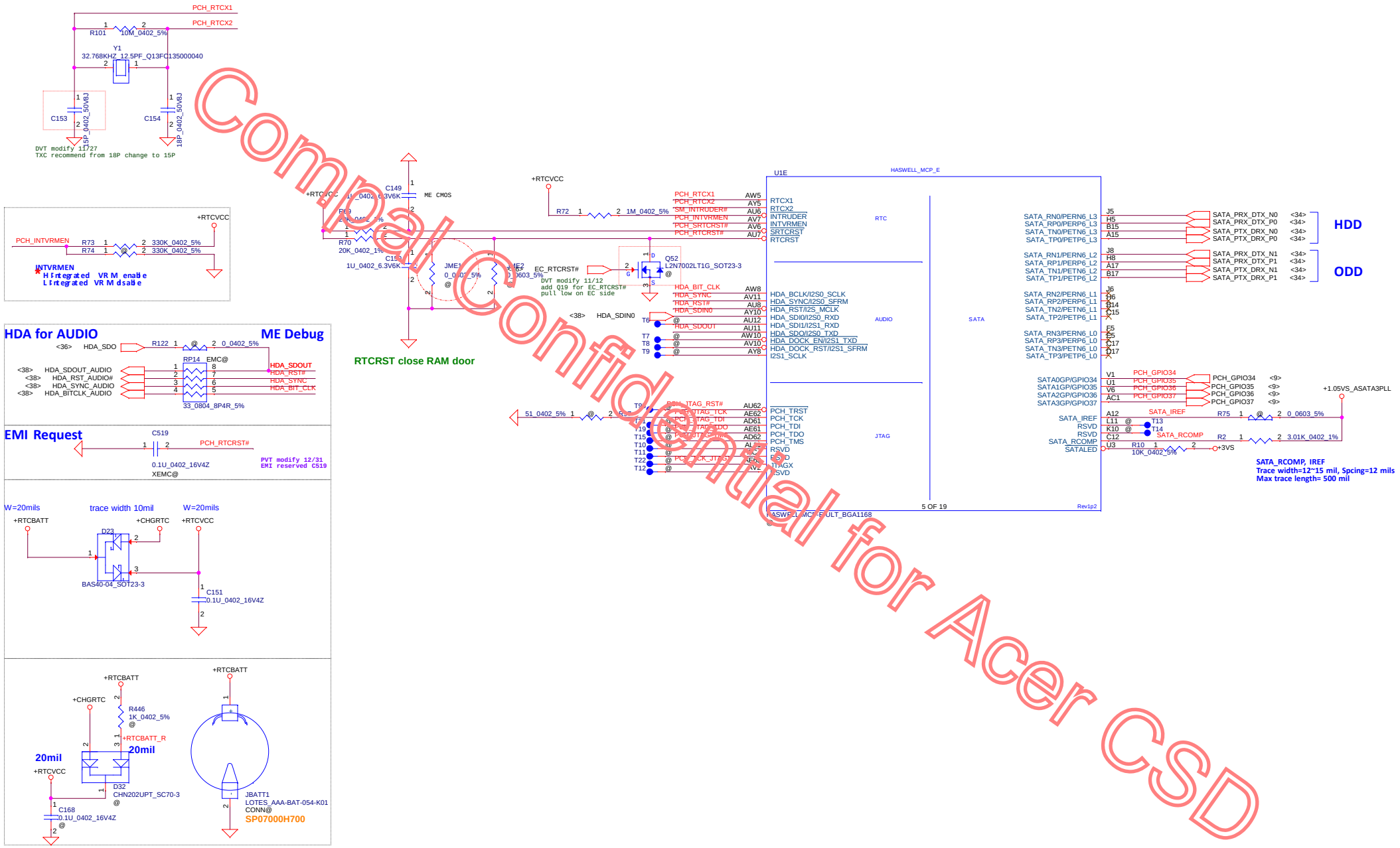

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Issued Date	2013/10/01	Deciphered Date	2014/05/24

Compal Electronics, Inc.			
Title	BDW MCP(3/11) RTC,SATA,XDP		
Size: Custom	Document Number: A5WAH M/B LA-B991P		Rev: 1.0
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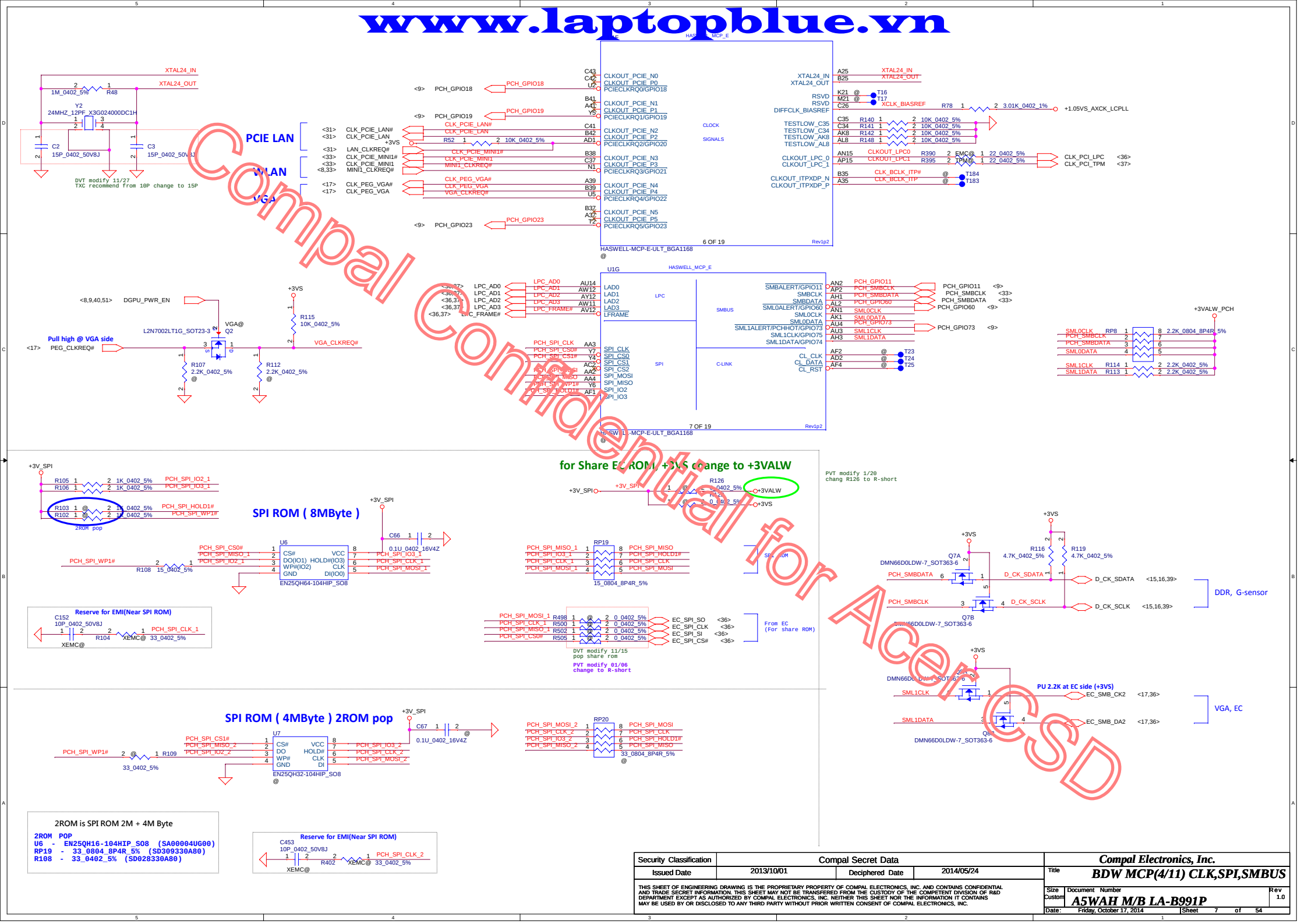

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Issued Date	2013/10/01	Deciphered Date	2014/05/24

Compal Electronics, Inc.			
Title	BDW MCP(4/11) CLK,SPI,SMBUS		
Size	Document Number		Rev
Custom	A5WAH M/B LA-B991P		1.0
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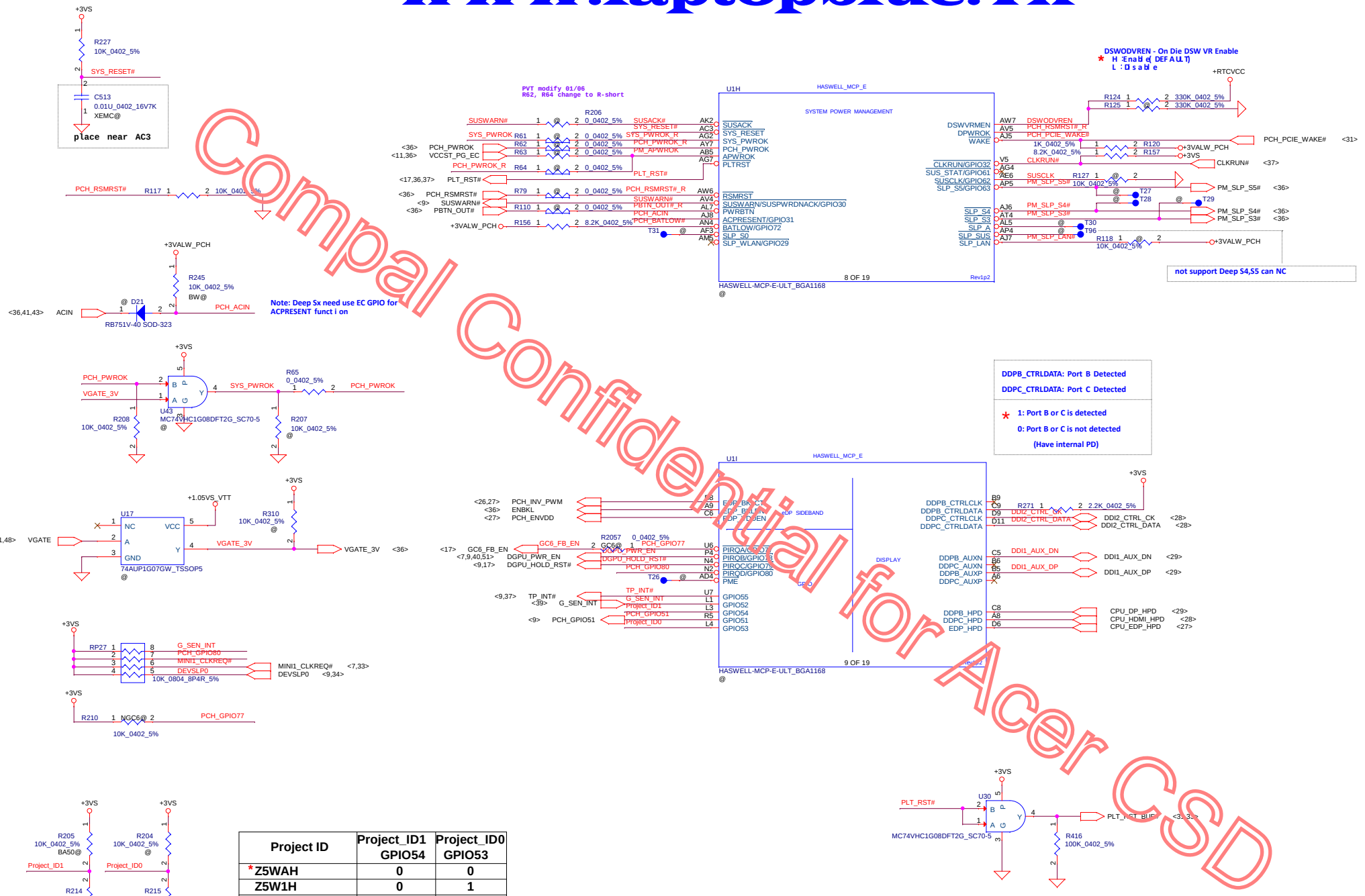

Project ID	Project_ID1 GPIO54	Project_ID0 GPIO53
*Z5WAH	0	0
Z5W1H	0	1
Z5WBH	1	0
Reserved	1	1

Security Classification	Compal Secret Data		
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Compal Electronics, Inc.

Title: BDW MCP(5/11) PM,GPIO,DDI

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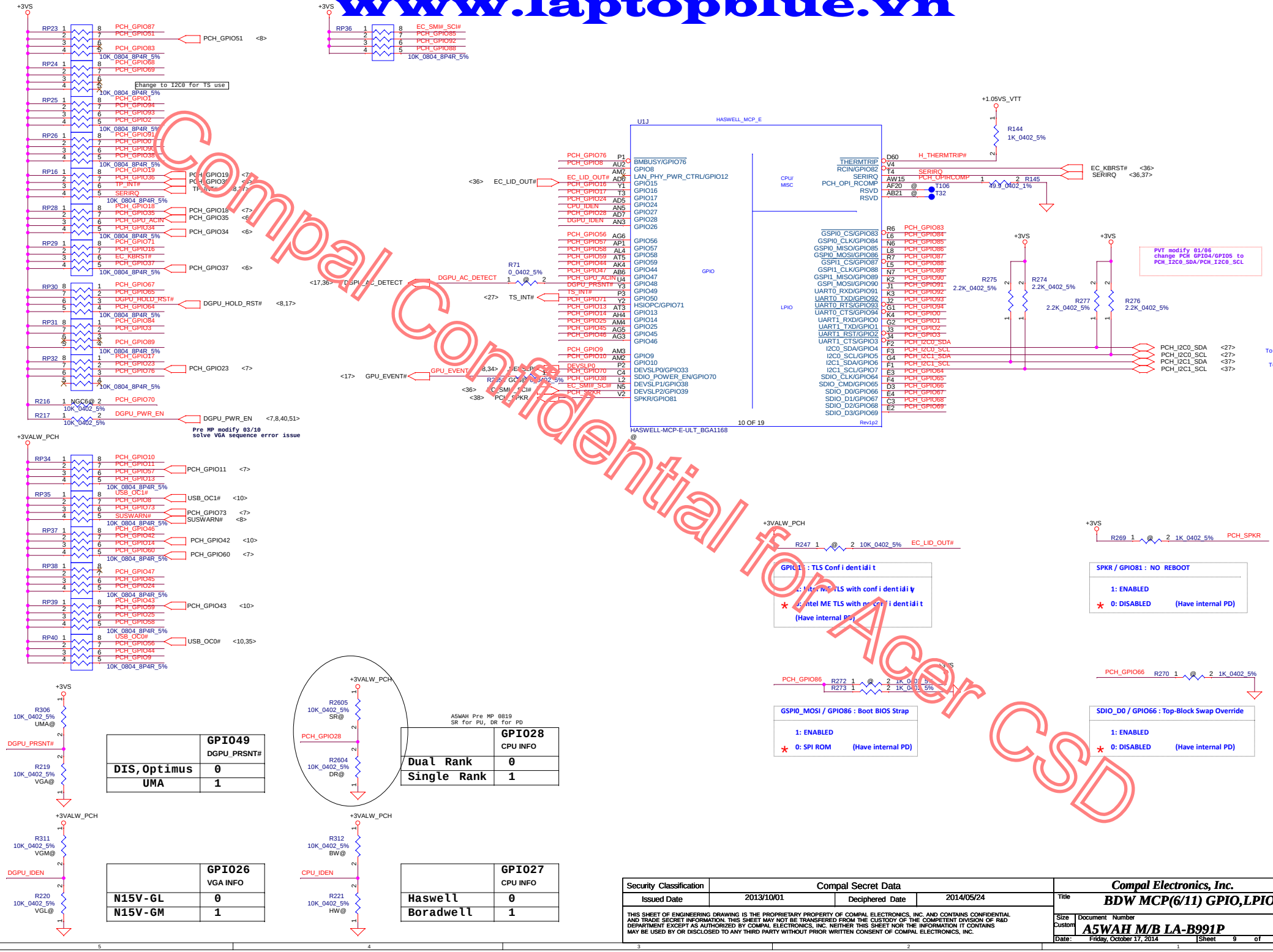

	GPIO49 DGPU_PRSNT#
DIS,Optimus	0
UMA	1

	GPIO28 CPU INFO
Dual Rank	0
Single Rank	1

	GPIO26 VGA INFO
N15V-GL	0
N15V-GM	1

	GPIO27 CPU INFO
Haswell	0
Boradwell	1

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Compal Electronics, Inc.	
Title	BDW MCP(6/11) GPIO,LPIO
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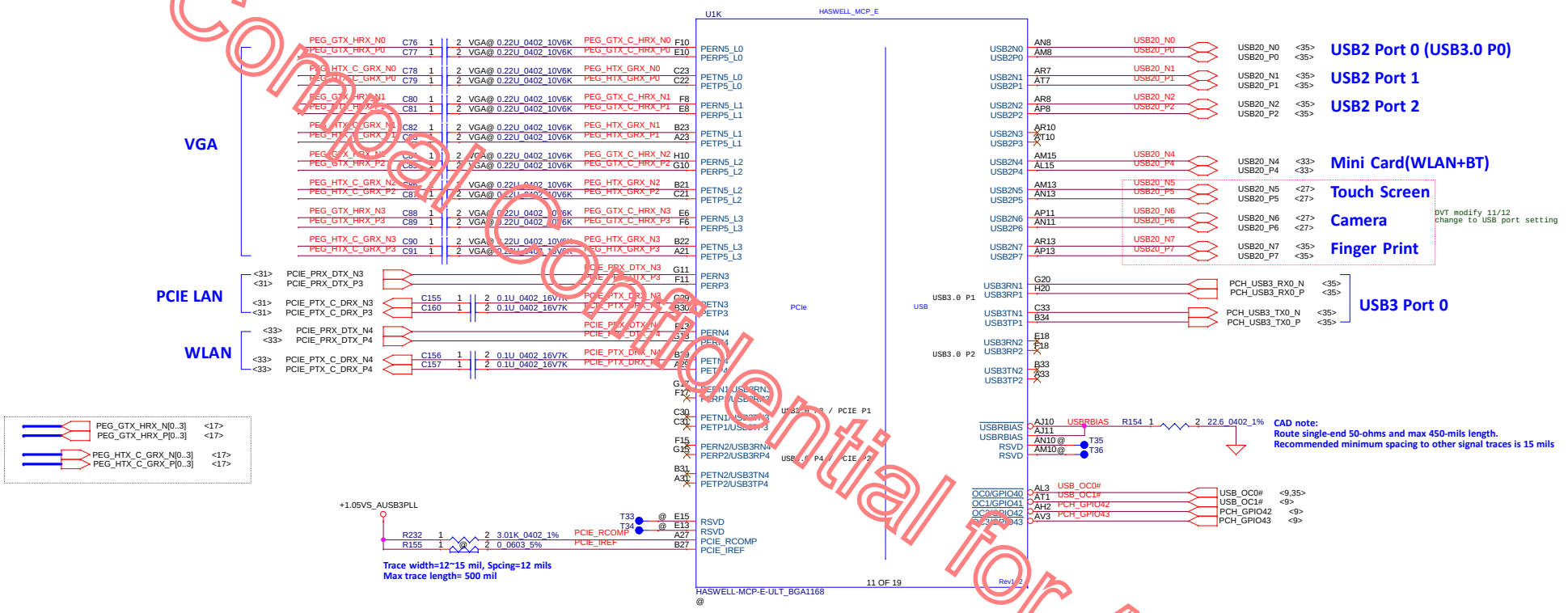

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Compal Electronics, Inc.			
Title	BDW MCP(7/11) PCIE,USB		
Size: Custom	Document Number: A5WAH M/B LA-B991P		Rev: 1.0
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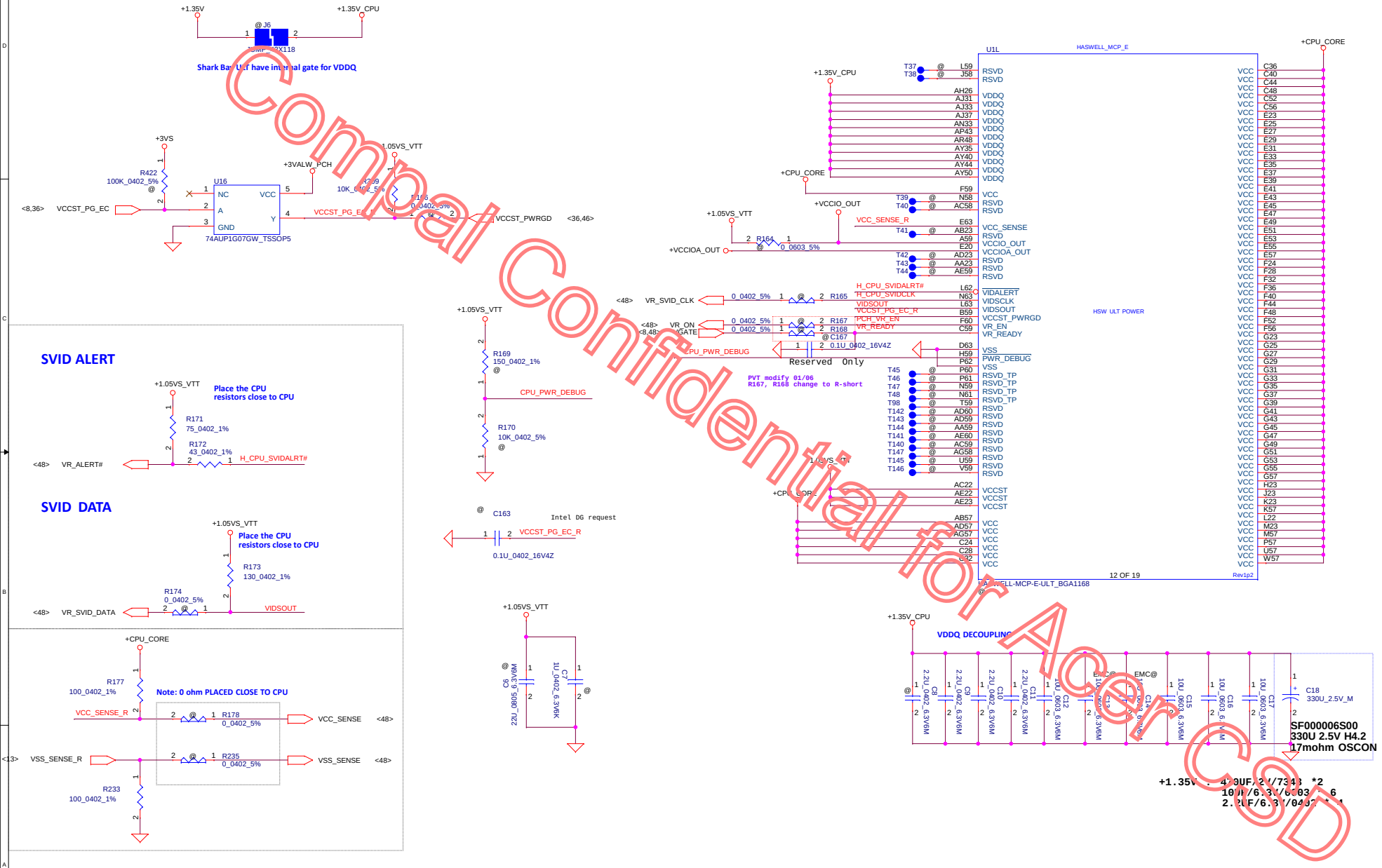

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Issued Date	2013/10/01	Deciphered Date	2014/05/24

Compal Electronics, Inc.			
Title	BDW MCP(8/11) Power		
Size	Document Number		Rev
Custom	A5WAH M/B LA-B991P		1.0
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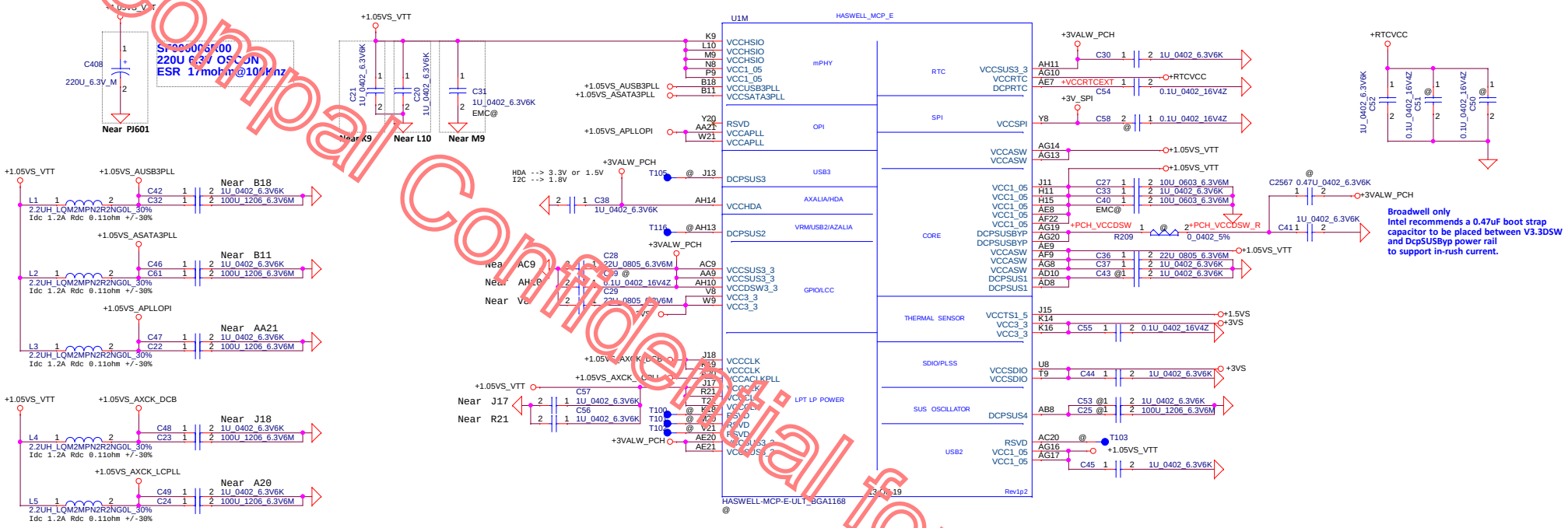

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Compal Electronics, Inc.			
Title	BDW MCP(9/11) Power		
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Custom	A5WAH M/B LA-B991P		1.0
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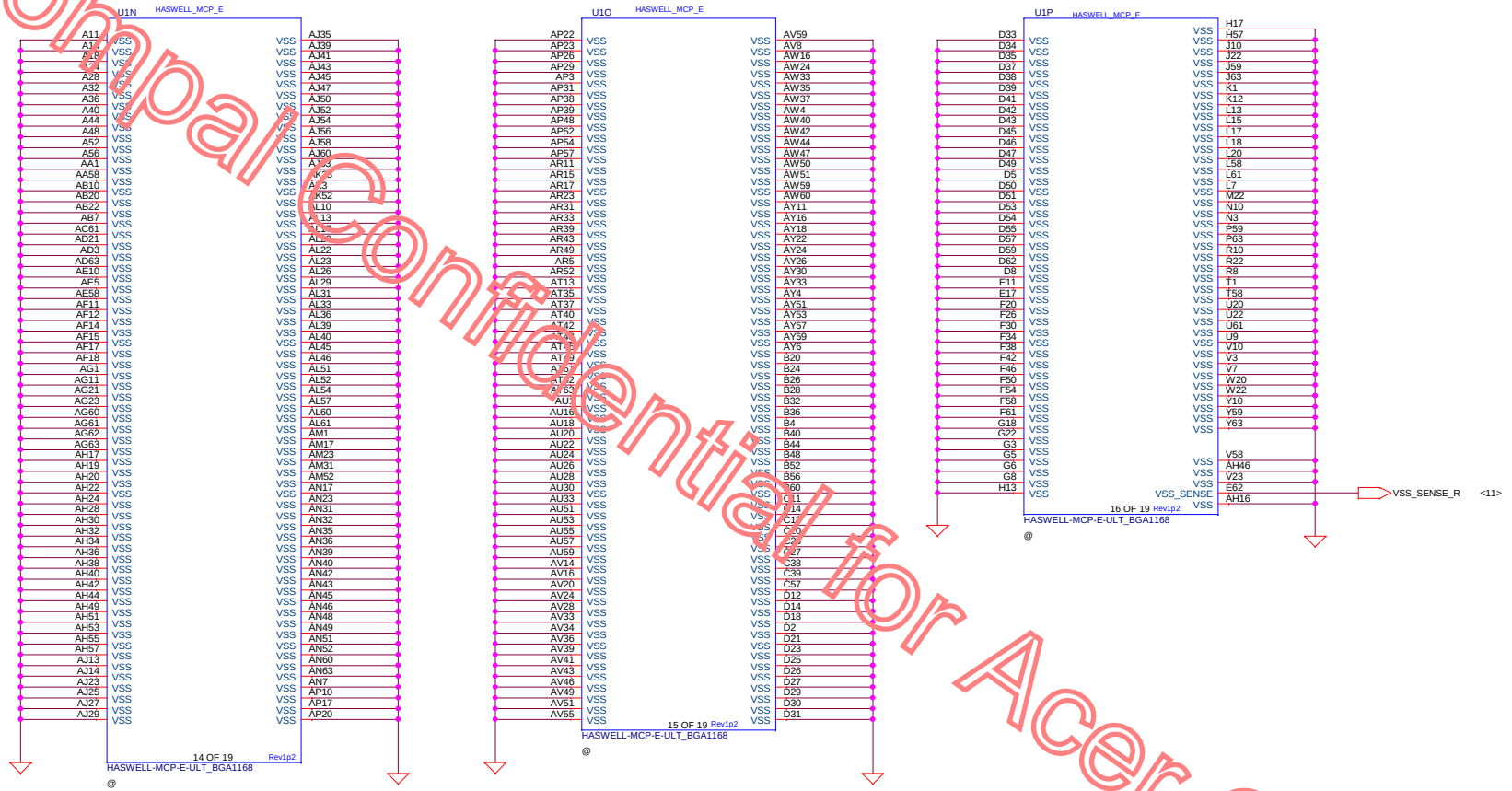

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Compal Electronics, Inc.			
Title	HSW MCP(10/11) GND		
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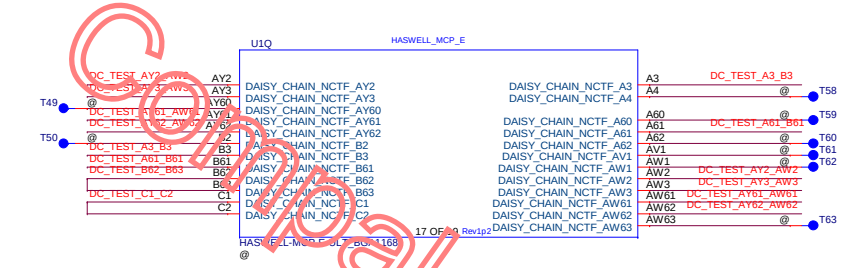
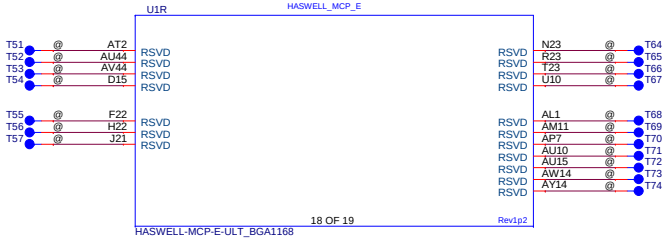
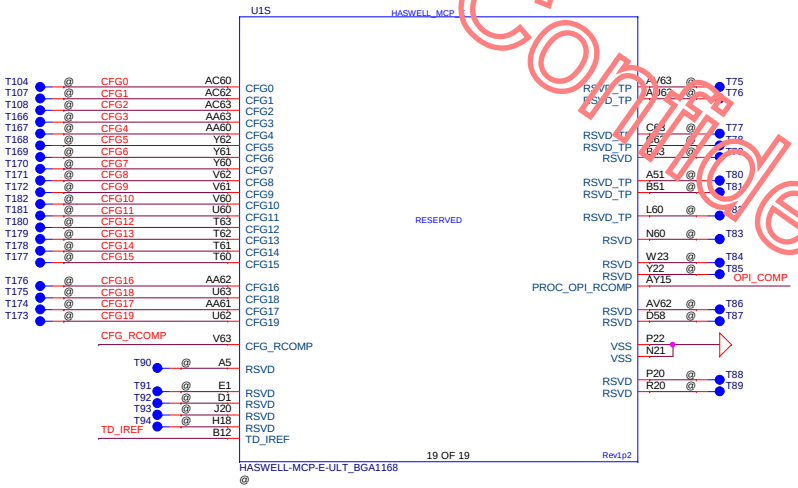
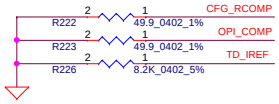
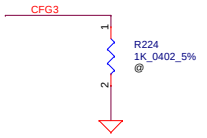




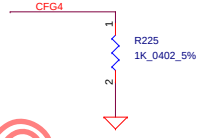




CFG Straps for Processor



Physical Debug Enable (DFX Privacy)	
CFG3	1: DISABLED 0: ENABLED; SET DFX ENABLED BIT IN DEBUG INTERFACE MSR



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

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Title	BDW MCP(11/11) RSVD		
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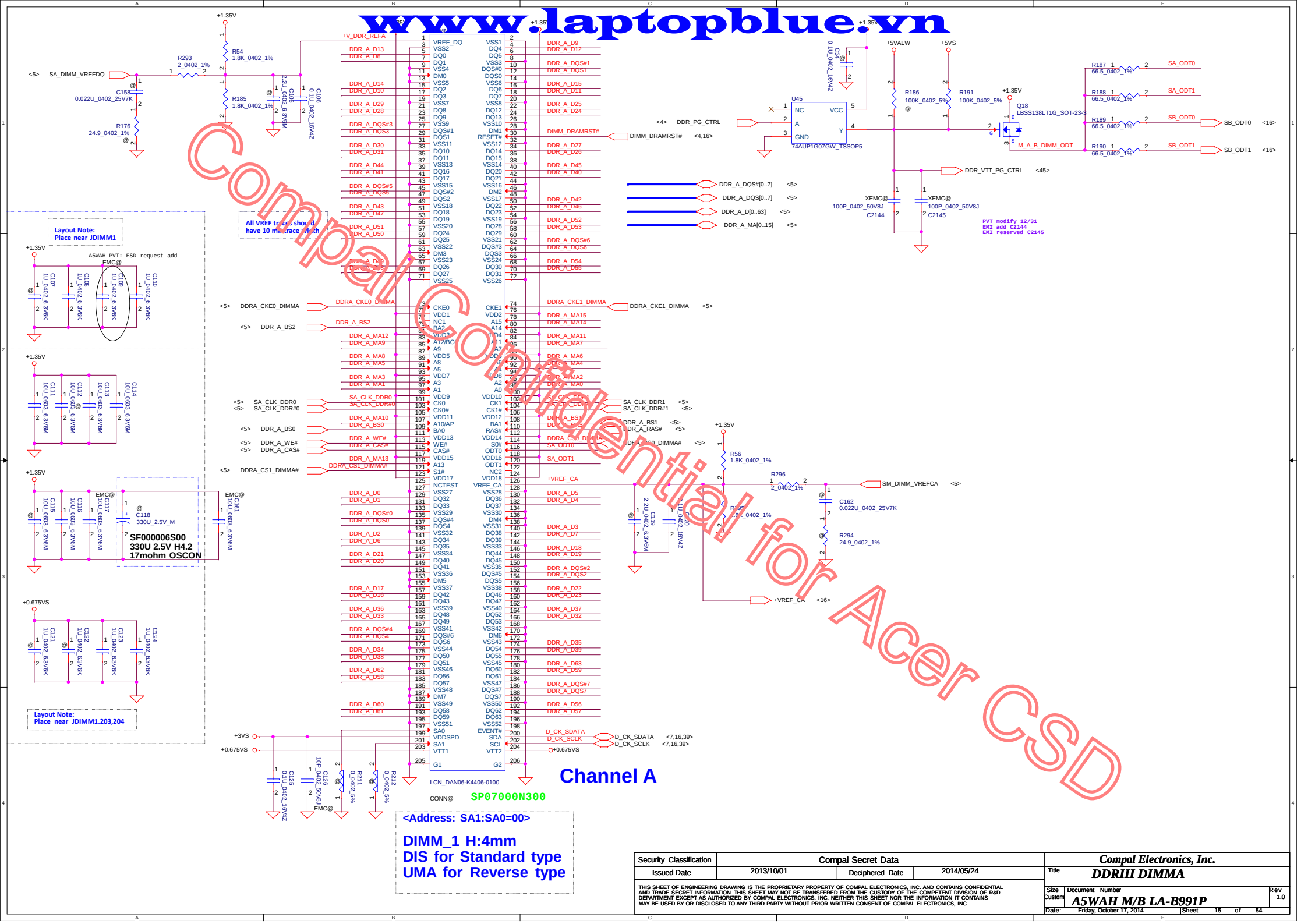

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Compal Electronics, Inc.			
Title	DDRIII DIMMA		
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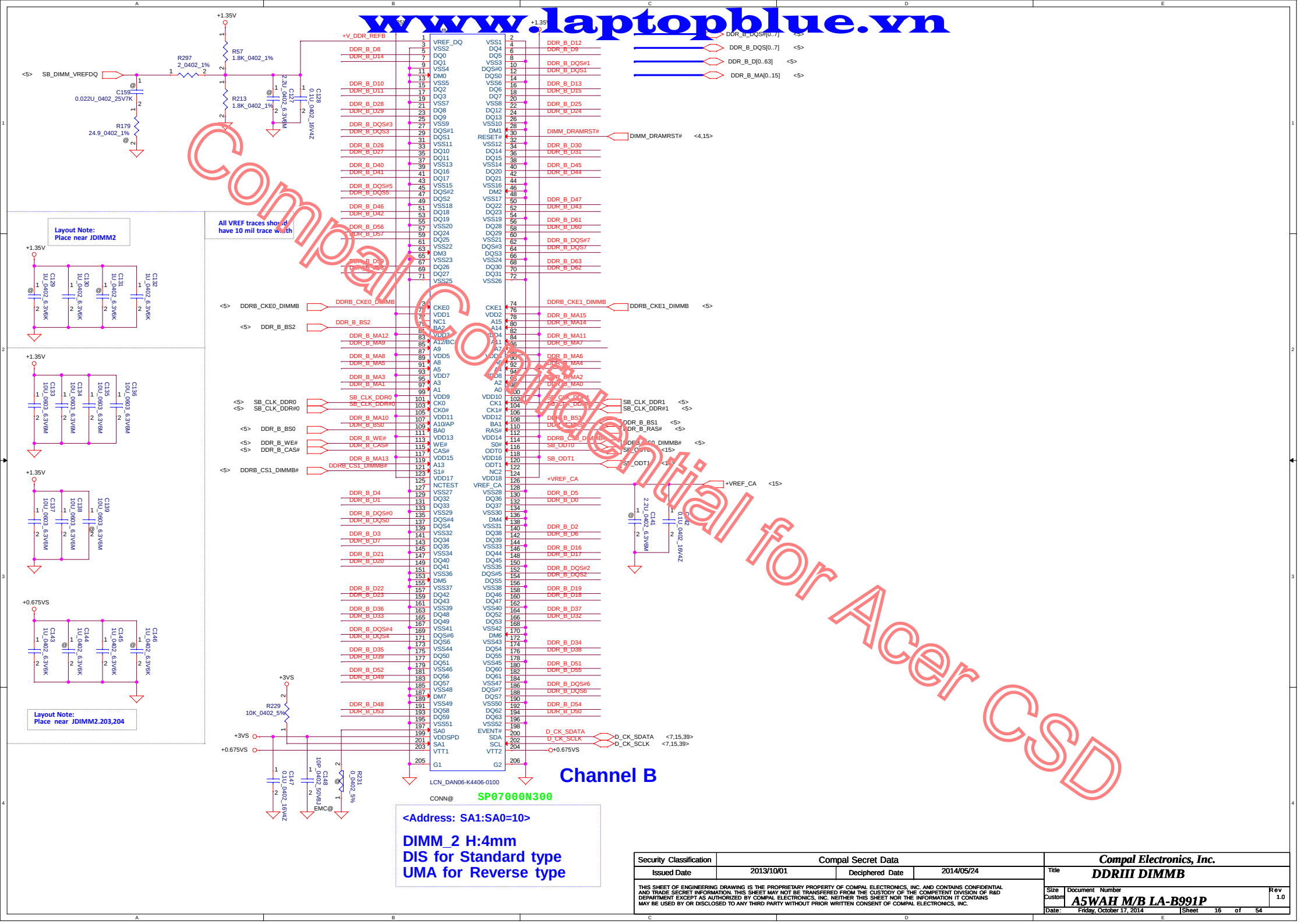

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Title	DDRIII DIMMB		
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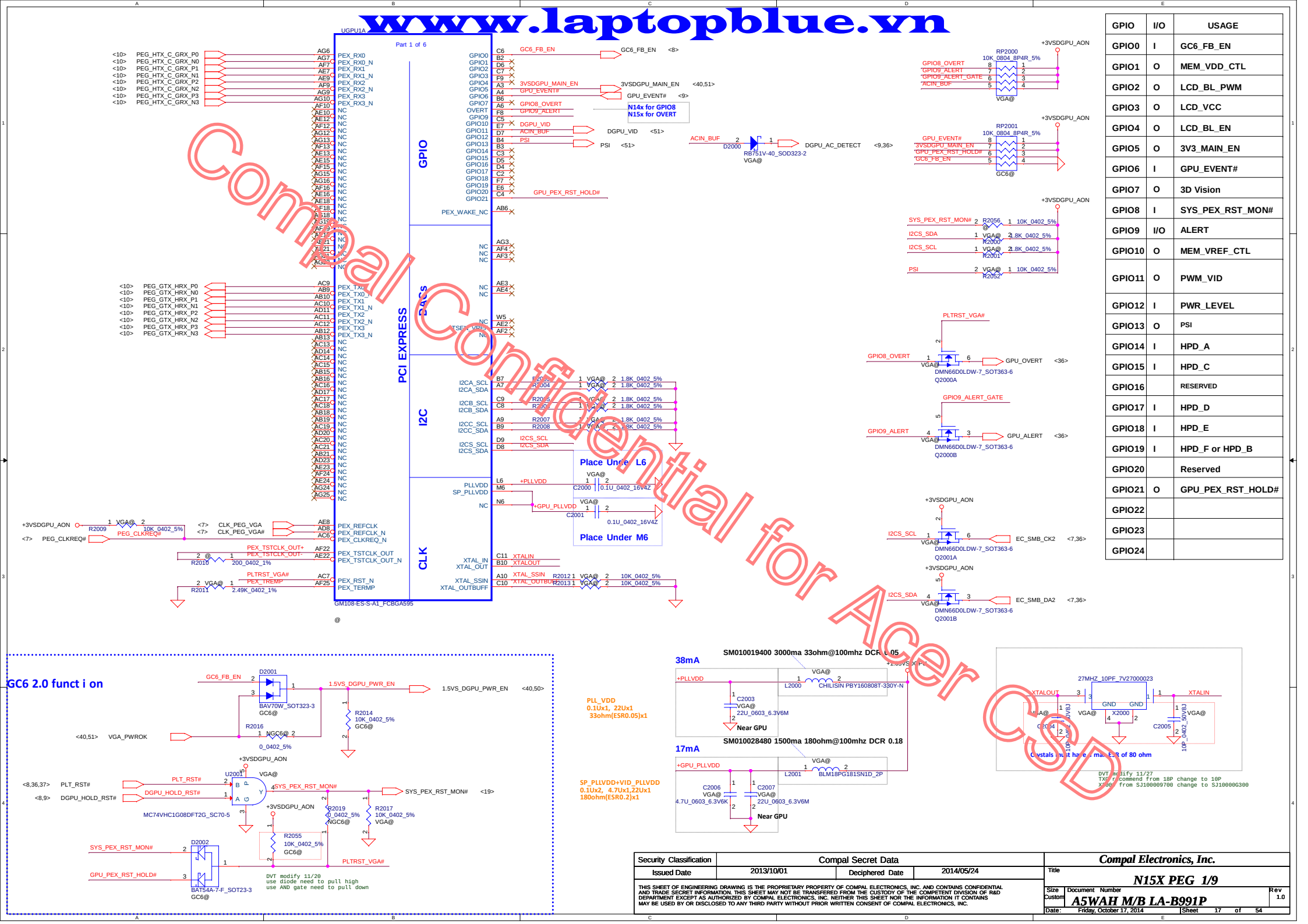

GPIO	I/O	USAGE
GPIO0	I	GC6_FB_EN
GPIO1	O	MEM_VDD_CTL
GPIO2	O	LCD_BL_PWM
GPIO3	O	LCD_VCC
GPIO4	O	LCD_BL_EN
GPIO5	O	3V3_MAIN_EN
GPIO6	I	GPU_EVENT#
GPIO7	O	3D Vision
GPIO8	I	SYS_PEX_RST_MON#
GPIO9	I/O	ALERT
GPIO10	O	MEM_VREF_CTL
GPIO11	O	PWM_VID
GPIO12	I	PWR_LEVEL
GPIO13	O	PSI
GPIO14	I	HPD_A
GPIO15	I	HPD_C
GPIO16		RESERVED
GPIO17	I	HPD_D
GPIO18	I	HPD_E
GPIO19	I	HPD_F or HPD_B
GPIO20		Reserved
GPIO21	O	GPU_PEX_RST_HOLD#
GPIO22		
GPIO23		
GPIO24		

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Compal Electronics, Inc.			
Title	N15X PEG 1/9		
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VRAM Interface

UGPU1
N15V-GM
VGM@
SA00007BR20

UGPU1
N15V-GT
SGT@
SA00007GJ10

UGPU1
N15V-GL
VGL@
SA00007OO10

<22,23> MDA[15..0] MDA[15..0]
<22,23> MDA[31..16] MDA[31..16]
<24,25> MDA[47..32] MDA[47..32]
<24,25> MDA[63..48] MDA[63..48]

UGPU1B
Part 2 of 6
MEMORY INTERFACE A
GM108-ES-S-A1_FCBGA595

MDA	FBA_D	FBA_CMD	CMDA
MDA0	E18	C27	CMDA0
MDA1	F18	C26	CMDA1
MDA2	E16	E24	CMDA2
MDA3	F17	F24	CMDA3
MDA4	D20	D27	CMDA4
MDA5	D21	D26	CMDA5
MDA6	F20	F25	CMDA6
MDA7	E21	F26	CMDA7
MDA8	E15	F23	CMDA8
MDA9	D15	G22	CMDA9
MDA10	F15	G23	CMDA10
MDA11	F13	G24	CMDA11
MDA12	C13	F27	CMDA12
MDA13	B13	G25	CMDA13
MDA14	E13	G27	CMDA14
MDA15	D13	G26	CMDA15
MDA16	B15	M24	CMDA16
MDA17	C16	M23	CMDA17
MDA18	A13	K24	CMDA18
MDA19	A15	K23	CMDA19
MDA20	B18	M27	CMDA20
MDA21	A18	M26	CMDA21
MDA22	A19	M25	CMDA22
MDA23	C19	K26	CMDA23
MDA24	B24	K22	CMDA24
MDA25	C23	J23	CMDA25
MDA26	A25	J25	CMDA26
MDA27	A24	J24	CMDA27
MDA28	A21	K27	CMDA28
MDA29	B21	K25	CMDA29
MDA30	C20	J27	CMDA30
MDA31	C21	J26	CMDA31
MDA32	R2		
MDA33	R4		
MDA34	T2		
MDA35	F23		
MDA36	N25		
MDA37	N23		
MDA38	N22		
MDA39	N24		
MDA40	V23		
MDA41	V22		
MDA42	T23		
MDA43	U22		
MDA44	Y24		
MDA45	AA24		
MDA46	Y22		
MDA47	AA23		
MDA48	AD27		
MDA49	AB25		
MDA50	AD26		
MDA51	AC25		
MDA52	AA27		
MDA53	AA26		
MDA54	W26		
MDA55	Y25		
MDA56	R26		
MDA57	T25		
MDA58	N27		
MDA59	R27		
MDA60	V26		
MDA61	V27		
MDA62	W27		
MDA63	W25		

DQM	DQSA	DQSA#
FBA_DQM0 D19	DQMA0	DQSA#0 F19
FBA_DQM1 D14	DQMA1	DQSA#1 C14
FBA_DQM2 C17	DQMA2	DQSA#2 A16
FBA_DQM3 C22	DQMA3	DQSA#3 A22
FBA_DQM4 P24	DQMA4	DQSA#4 P23
FBA_DQM5 W24	DQMA5	DQSA#5 A27
FBA_DQM6 AA25	DQMA6	DQSA#6 A27
FBA_DQM7 U25	DQMA7	DQSA#7
FBA_DQS_RN0		
FBA_DQS_RN1		
FBA_DQS_RN2		
FBA_DQS_RN3		
FBA_DQS_RN4		
FBA_DQS_RN5		
FBA_DQS_RN6		
FBA_DQS_RN7		
FBA_DQS_WP0 J19	DQSA0	
FBA_DQS_WP1 G15	DQSA1	
FBA_DQS_WP2 B16	DQSA2	
FBA_DQS_WP3 B22	DQSA3	
FBA_DQS_WP4 R25	DQSA4	
FBA_DQS_WP5 W23	DQSA5	
FBA_DQS_WP6 AB26	DQSA6	
FBA_DQS_WP7 T26	DQSA7	

CLK	CLKA	CLKA#
FBA_CLK0 D24	CLKA0 <22,23>	
FBA_CLK0_N D25		CLKA0# <22,23>
FBA_CLK1 N22	CLKA1 <24,25>	
FBA_CLK1_N M22		CLKA1# <24,25>

WCK	
FBA_WCK01 D18	
FBA_WCK01_N C18	
FBA_WCK23 D17	
FBA_WCK23_N D16	
FBA_WCK45 T24	
FBA_WCK45_N U24	
FBA_WCK67 V24	
FBA_WCK67_N V25	

CMDA[31..0] <22,23,24,25>

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DQSA#[3..0] <22,23>
DQSA#[7..4] <24,25>
DQSA[3..0] <22,23>
DQSA[7..4] <24,25>

PVT modify 01/13
DQSA, DQSA# reverse

FB_PLLAVDD_1
FB_PLLAVDD_2
FB_VREF_PROBE
FB_DLLAVDD
FB_CLAMP
FBA_CMD34
FBA_CMD35

T97 @ D23
1 VGA@ 2 FB_CLAMP F3
10K_0402_5% R2028
60.4_0402_1% 1 @ 2 R2020 FBA_CMD34 F22
60.4_0402_1% 1 @ 2 R2022 FBA_CMD35 J22
+1.5VSDGPU

NV 15x DG-06803-V03

GPU Package	Rail	Capacitor Type		Footprint	Population	Location
GB2B-64	FBx_PLL_AVDD and FB_DLL_AVDD Combined	0.1 µF	X7R	0402	2	Under GPU
		22 µF	X5R	0805	1	Near GPU
		Bead Type				
		30 Ω (ESR=0.010 Ω)		0603	1	Near GPU

SM010019400 3000ma 33ohm@100mhz DCR 0.05

+1.05VSDGPU
VGA@ 2 1 L2002
CHILISIN PBY160808T-330Y-N
15+55mA
+FB_PLLAVDD
C2008 VGA@ 22U_0603_6.3V6M
C2011 VGA@ 0.1U_0402_16V4Z
C2010 VGA@ 0.1U_0402_16V4Z
C2009 VGA@ 0.1U_0402_16V4Z
Place Near GPU Place Under F16 P22 H22

change to 1.35VSDGPU

+1.5VSDGPU

RP33 CMDA12 CMDA14 100_0804_8P4R_5%
RP42 CMDA22 CMDA21 100_0804_8P4R_5%
RP43 CMDA5 CMDA8 100_0804_8P4R_5%
RP44 CMDA26 CMDA23 100_0804_8P4R_5%
RP45 CMDA4 CMDA10 100_0804_8P4R_5%
RP46 CMDA24 CMDA13 100_0804_8P4R_5%
RP47 CMDA9 CMDA6 100_0804_8P4R_5%
RP48 CMDA29 CMDA7 100_0804_8P4R_5%
RP49 CMDA27 CMDA30 100_0804_8P4R_5%
RP50 CMDA25 CMDA28 100_0804_8P4R_5%
RP51 CMDA11 CMDA15 100_0804_8P4R_5%
VGA@

C2084 @ 0.1U_0402_16V4Z
C2083 @ 0.1U_0402_16V4Z
C2086 @ 0.1U_0402_16V4Z
C2085 @ 0.1U_0402_16V4Z
C2088 @ 0.1U_0402_16V4Z
C2087 @ 0.1U_0402_16V4Z
C2089 @ 0.1U_0402_16V4Z
C2090 @ 0.1U_0402_16V4Z
C2092 @ 0.1U_0402_16V4Z
C2091 @ 0.1U_0402_16V4Z
C2093 @ 0.1U_0402_16V4Z

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Title: N15X VRAM 2/9

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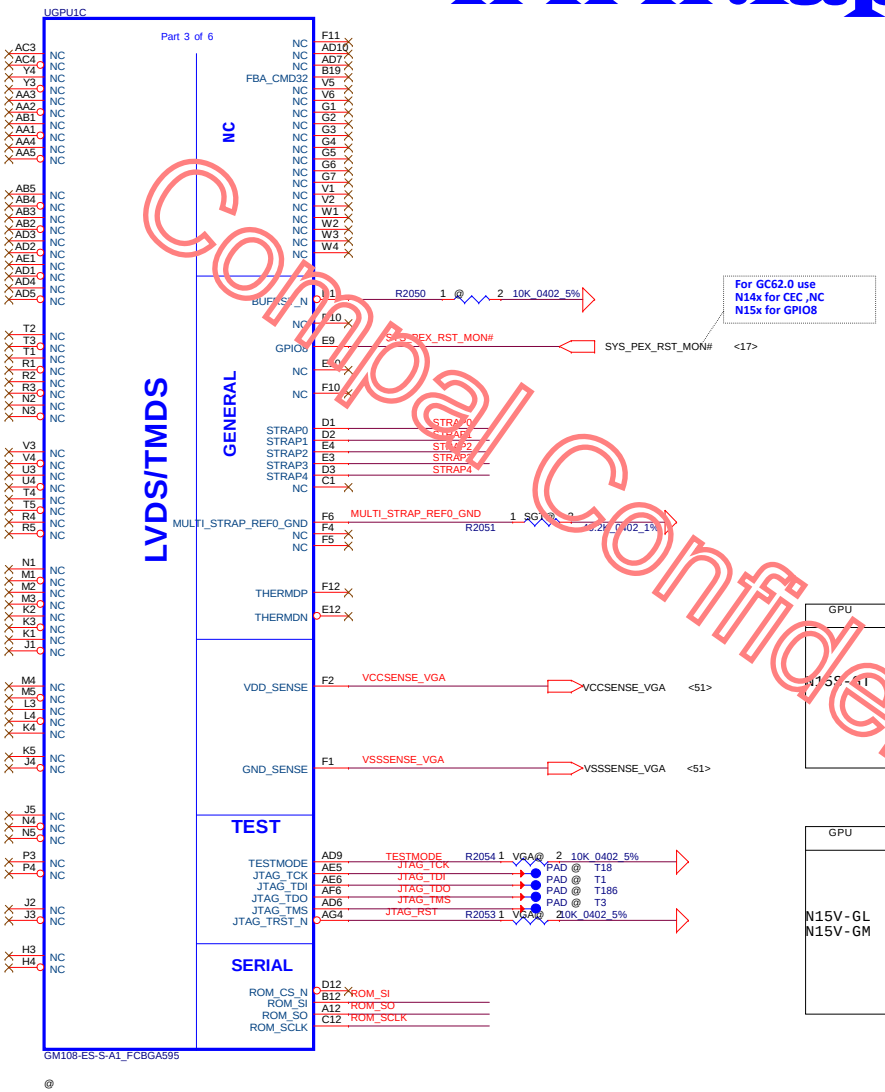
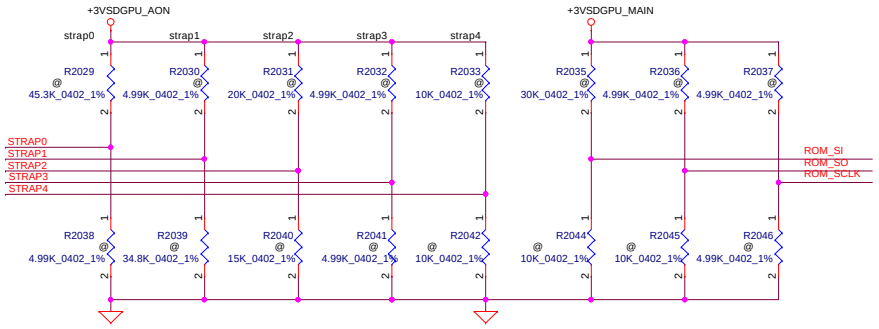


MULTI LEVEL STRAPS



02/19 PreMP modify strap resistor for 1.35V VRAM

For N15S-GT Binary strap table — Decive ID : 0x1341

GPU	X76	Freq	Memory Size	Memory Config	strap0	strap1	strap2	strap3	strap4	ROM_SI	ROM_SO	ROM_SCLK
N15S-GT		1GHz	128Mx16x4	0xA (SA000067550) Micron MT41J128M16JT-093G:K	PU 50K	NC	NC	NC	NC	PU 15K	PD 4.99K	PD 4.99K
				0xB (SA000068U90) Samsung K4W2G1646Q-BC1A						PU 20K		
				0x9 (SA00006H430) Hynix H5TC2G63FFR-11C						PU 10K		
	X76550B0L05			0x4 (SA000077K20) Micron MT41J256M16HA-093G:E						PD 24.9K		
	X76550B0L[illegible]	2GHz	256Mx16x4	0x5 (SA000076P20) Samsung K4W4G1646D-BC1A						PD 30.1K		
	X76550B0L[illegible]			0x3 (SA00006E840) Hynix H5TC4G63AFR-11C						PD 20K		

For N15V-GL/GM Binary strap table — Decive ID : 0x1140

GPU	X76	Freq	Memory Size	Memory Config	strap0	strap1	strap2	strap3	strap4	ROM_SI	ROM_SO	ROM_SCLK
N15V-GL N15V-GM	X76550B0L03	1GHz	128Mx16x4	0x1 (SA000067550) Micron MT41J128M16JT-093G:K	PU 10K	PD10K	PD 10K	PD 10K	PD 10K	PD 10K	PD 10K	PD 10K
				0x5 (SA000068U00) Samsung K4W2G1646E-BC1A	PU 10K	PD10K	PU 10K	PD 10K				
	X76550B0L08			0x9 (SA00006H430) Hynix H5TC2G63FFR-11C	PD 10K	PD10K	PU 10K	PU 10K				
	X76550B0L10			0x[illegible] (SA000068U90) Samsung K4W2G1646Q-BC1A	PD 10K	PU 10K	PU 10K	PU 10K				
	X76550B0L12	2GHz	256Mx16x4	0x[illegible] (SA000076P20) Samsung K4W4G1646D-BC1A	PU 10K	PD10K	PD 10K	PU 10K				
	X76550B0L14			0x[illegible] (SA000077K20) Micron MT41J256M16HA-093G:E	PU 10K	PD10K	PU 10K	PU 10K				
	X76550B0L13			0x4 (SA00006E840) Hynix H5TC4G63AFR-11C	PD 10K	PD10K	PU 10K	PD 10K				

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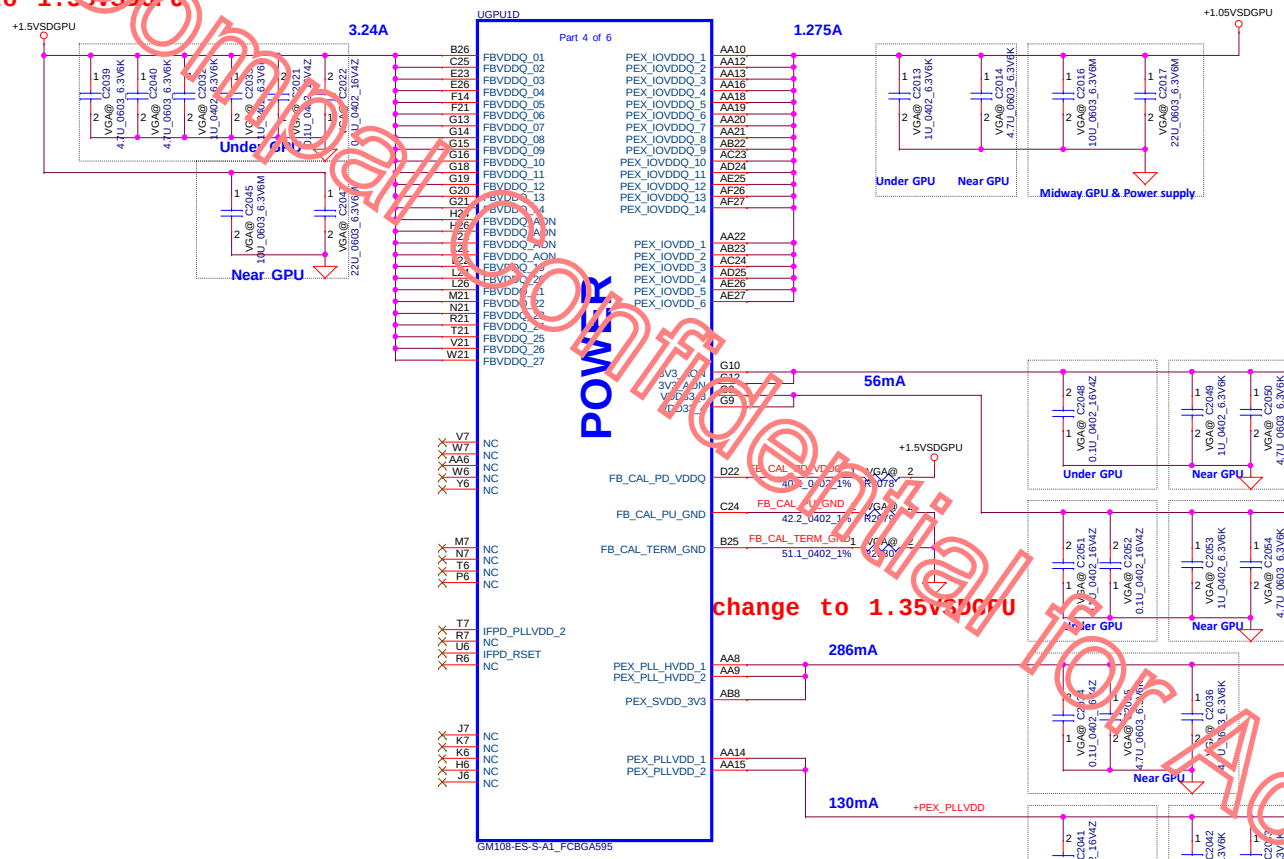
NV 15x DG-06803-V03

GPU Package Type	Capacitor Type		Footprint		Population	Location
GB2B-64 DDR3	0.1μF	X7R	0402	2	2	Under GPU
	1 μF	X7R	0603	2	2	Under GPU
	4.7 μF	X6S	0603	2	2	Under GPU
	10 μF	X5R	0805	1	1	Near GPU
	22 μF	X5R	0805	1	1	Near GPU

GPU Package Type	Capacitor Type		Footprint	Population	Location
GB2B-64	1.0 μF	X6S	0402	1	Under GPU
	4.7 μF	X6S	0603	1	Near GPU
	10 μF	X5R	0805	1	Midway between GPU and Power Supply
	22 μF	X5R	0805	1	Midway between GPU and Power Supply

change to 1.35VSDGPU



GPU Package	Rail	Capacitor Type		Footprint		Population	Location
GB2B-64 GB4B-128 GB3-256	3V3_MAIN	0.1μF	X6S	0402	1	1	Under GPU
		1 μF	X5R	0603	1	1	Near GPU
		4.7 μF	X5R	0603	1	1	Near GPU
GB2B-64 GB4B-128 GB3-256	3V3_AON	0.1μF	X6S	0402	1	1	Under GPU
		1 μF	X5R	0603	1	1	Near GPU
		4.7 μF	X5R	0603	1	1	Near GPU

Capacitor Type		Footprint	Population	Location
0.1 μF	X5R	0402	1	Near GPU
4.7 μF	X5R	0603	2	Near GPU

Capacitor Type		Footprint	Population	Location
0.1 μF	X6S	0402	1	Under GPU
1.0 μF	X5R	0603	1	Near GPU
4.7 μF	X5R	0805	1	Near GPU

R2075 BLM18PG121SN1D_0603 VGL@ SM01000BW00
R2075 BLM18PG121SN1D_0603 VGM@ SM01000BW00

SM010028800 2000ma 120ohm@100mhz DCR 0.1

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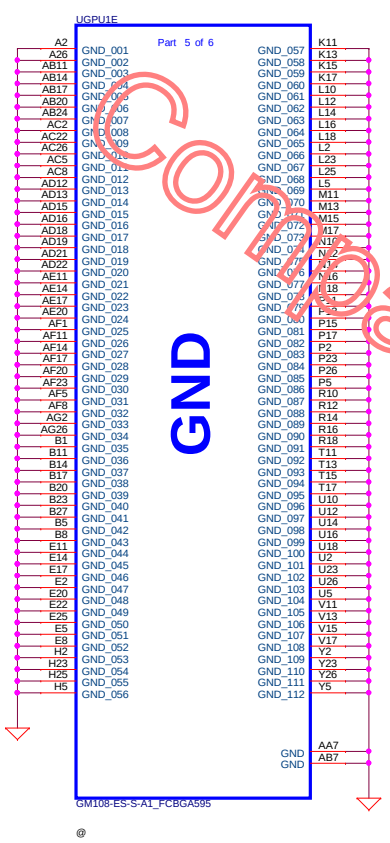

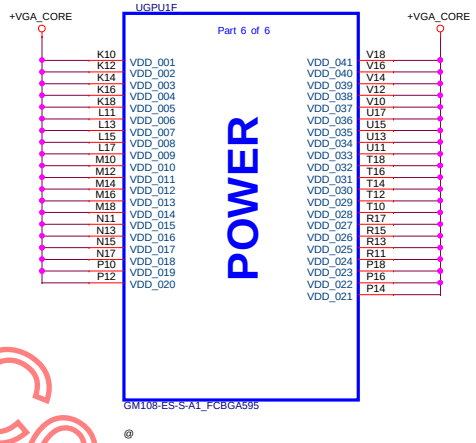

NV 15x DG-06803-V03

GPU Package Type	Capacitor Type		Footprint		Population	Location	Comments
GB2B-64	4.7 µF	X6S	0603	10	10	Under GPU	
	1 µF	X6S	0402	4	4	Under GPU	
	47 µF	X5R	0805	1	1	Near GPU	
	22 µF	X5R	0805	1	1	Near GPU	
	4.7 µF	X5R	0805	5	5	Near GPU	
	330 µF	POS	7343	1	1	Near GPU	ESR ≤ 6 mΩ

DA-06840-V03

Table 6. EDP-Peak

Products	VRM Type	GPU Core — (A)	FB Total 1.5/1.35V (A)	1.05V Total 1.05V (A)
~~N15S-GM~~	~~DDR3/L~~	~~48.11~~	~~4.23~~	~~0.91~~
N15S-GT	DDR3/L	60.07	4.26	0.91

DA-06925-V05

Table 6. EDP-Peak at T_J = 102°C

Power Supply Rail	N15V-GM-S DDR3/L
(V)	(A)
GPU Core Max	51.50
FB Total	4.25
PEXVDD	2.29

DA07075-V01

Table 7. EDP-Peak at T_J = 102°C

Power Supply Rail	N15V-GL DDR3
(V)	(A)
GPU Core Max	28.26
FB Total	4.07
PEXVDD	1.82

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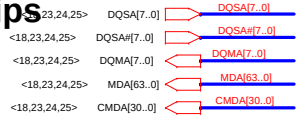
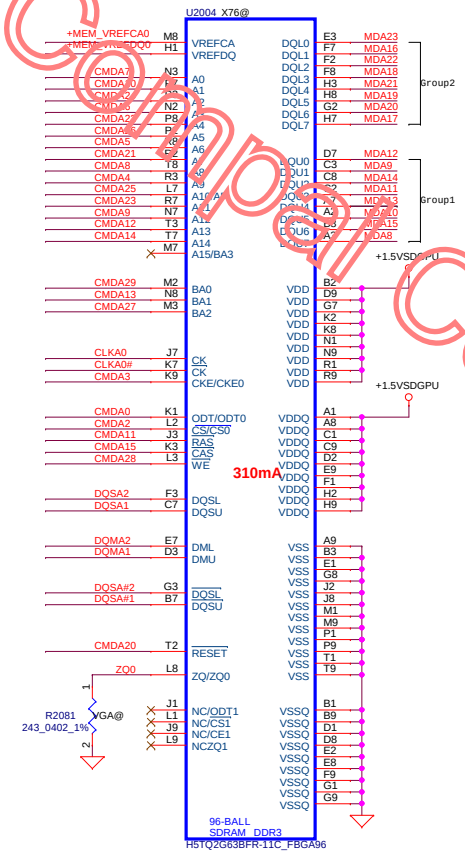
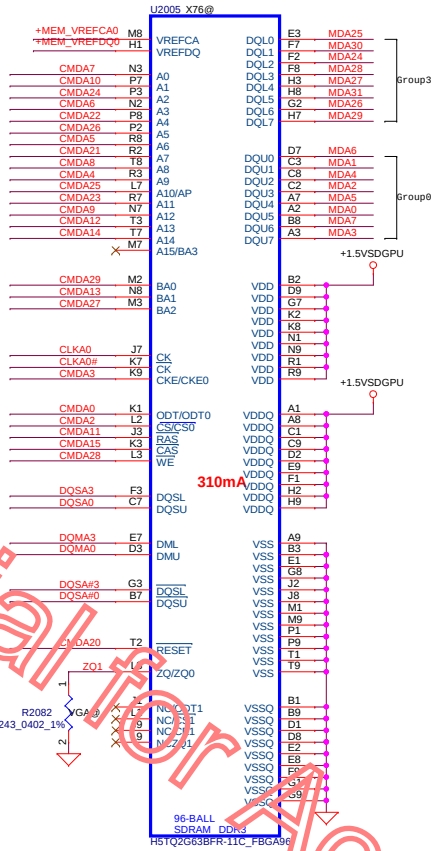
VRAM DDR3 chips

Upper Rank 0 BOT SIDE





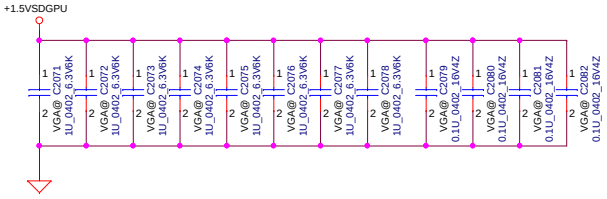


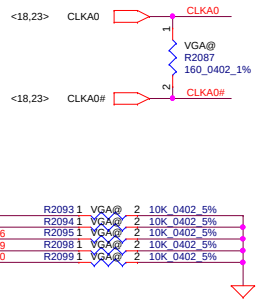
Mode E Address	Rank0		Rank1	
	0..31	32..63	0..31	32..63
CMD0	ODT		ODT	
CMD1			CS1*	
CMD2	CS0*			
CMD3	CKE		CKE	
CMD4	A9	A9	A11	A11
CMD5	A6	A6	A7	A7
CMD6	A3	A3	BA1	BA1
CMD7	A0	A0	A12	A12
CMD8	A8	A8	A8	A8
CMD9	A12	A12	A0	A0
CMD10	A1	A1	A2	A2
CMD11	RAS*	RAS*	RAS*	RAS*
CMD12	A13	A13	A14	A14
CMD13	BA1	BA1	A3	A3
CMD14	A14	A14	A13	A13
CMD15	CAS*	CAS*	CAS*	CAS*
CMD16		ODT		ODT
CMD17				CS1*
CMD18		CS0*		
CMD19		CKE		CKE
CMD20	RST	RST	RST	RST
CMD21	A7	A7	A6	A6
CMD22	A4	A4	A5	A5
CMD23	A11	A11	A9	A9
CMD24	A2	A2	A1	A1
CMD25	A10	A10	WE*	WE*
CMD26	A5	A5	A4	A4
CMD27	BA2	BA2		
CMD28	WE*	WE*	A10	A10
CMD29	BA0	BA0	BA0	BA0
CMD30			BA2	BA2
Not Available				

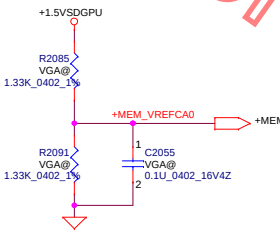
	Command Bit	Default Pull-down
DDR3	ODTx	10k
	CKEx	10k
	RST	10k
	CS*	No Termination

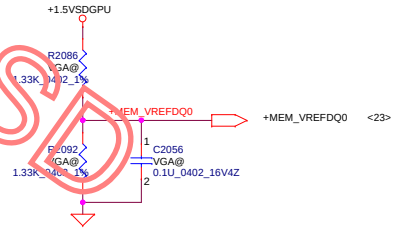
Table 3-11. DDR3 per Memory FBVDD/Q Decoupling

Capacitor Type			Population FBVDDQ	Population FBVDD	Location
FBVDD/Q Combined					
0.1 µF	X7R	0402	2		Under DRAM
1.0 µF	X7R	0603	4		Under DRAM
10 µF	X5R	0805	0		Close to DRAM









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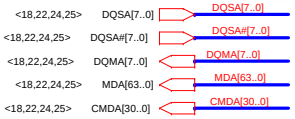
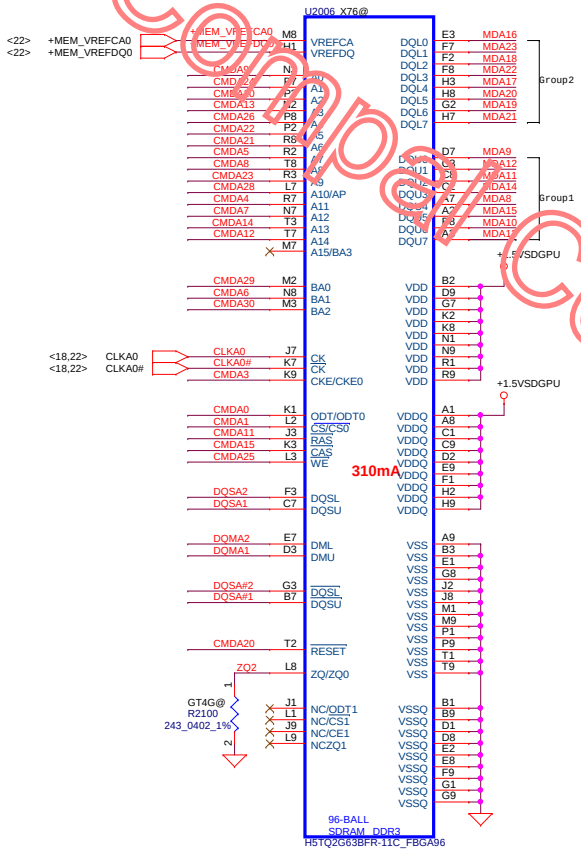
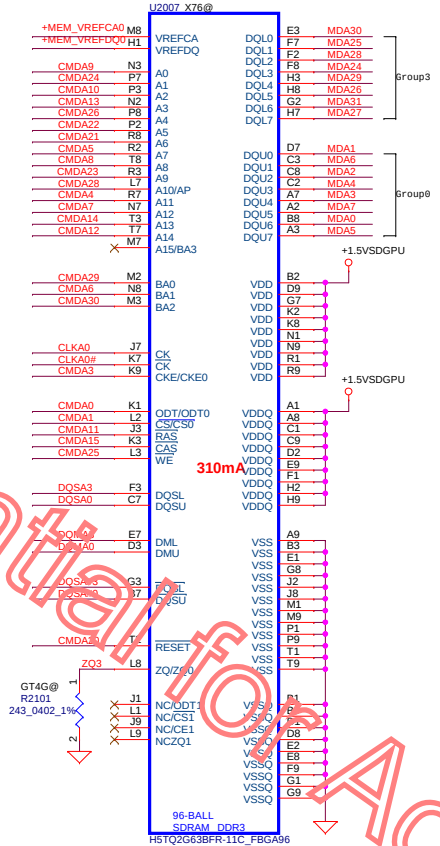


Upper Rank 1 TOP SIDE



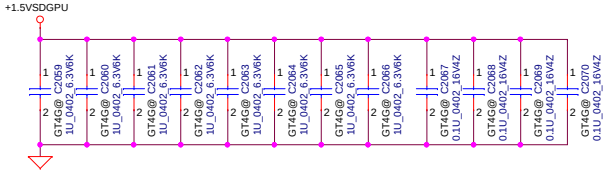
Only for N15S-GT 4G



Only for N15S-GT 4G

Mode E Address	Rank0		Rank1	
	0..31	32..63	0..31	32..63
CMD0	ODT		ODT	
CMD1			CS1*	
CMD2	CS0*			
CMD3	CKE		CKE	
CMD4	A9	A9	A11	A11
CMD5	A6	A6	A7	A7
CMD6	A3	A3	BA1	BA1
CMD7	A0	A0	A12	A12
CMD8	A8	A8	A8	A8
CMD9	A12	A12	A0	A0
CMD10	A1	A1	A2	A2
CMD11	RAS*	RAS*	RAS*	RAS*
CMD12	A13	A13	A14	A14
CMD13	BA1	BA1	A3	A3
CMD14	A14	A14	A13	A13
CMD15	CAS*	CAS*	CAS*	CAS*
CMD16		ODT		ODT
CMD17				CS1*
CMD18		CS0*		
CMD19		CKE		CKE
CMD20	RST	RST	RST	RST
CMD21	A7	A7	A6	A6
CMD22	A4	A4	A5	A5
CMD23	A11	A11	A9	A9
CMD24	A2	A2	A1	A1
CMD25	A10	A10	WE*	WE*
CMD26	A5	A5	A4	A4
CMD27	BA2	BA2		
CMD28	WE*	WE*	A10	A10
CMD29	BA0	BA0	BA0	BA0
CMD30			BA2	BA2
Not Available				

	Command Bit	Default Pull-down
DDR3	ODTx	10k
	CKEx	10k
	RST	10k
	CS*	No Termination



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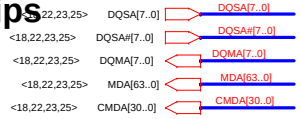
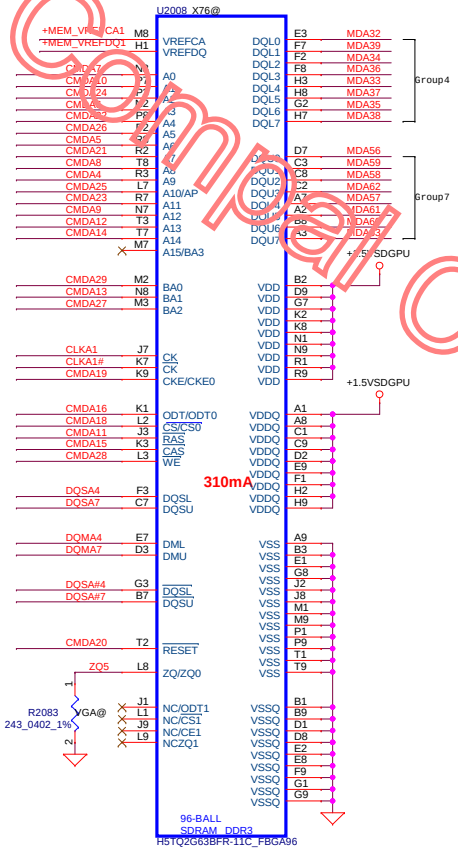
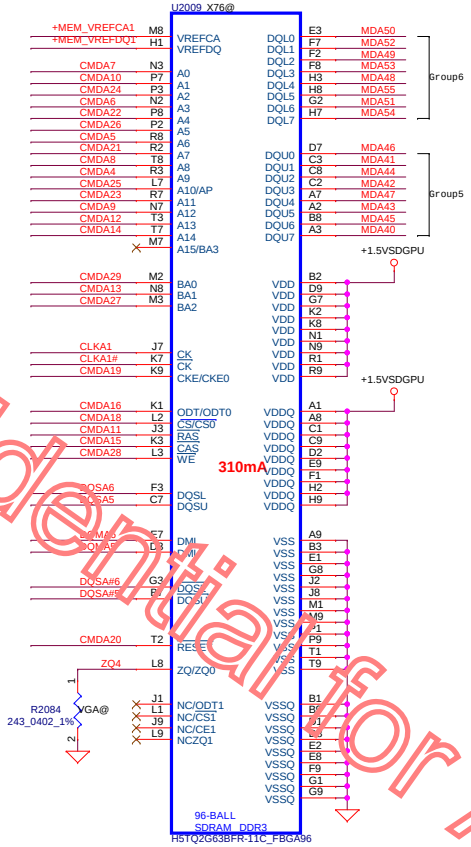
VRAM DDR3 chips

Lower Rank 0 BOT SIDE

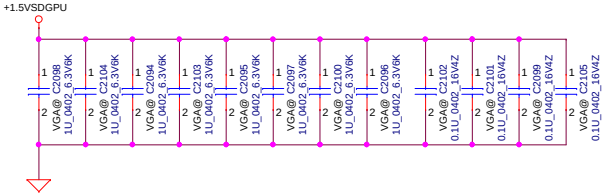


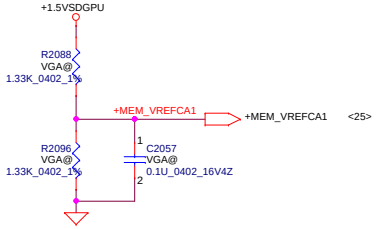


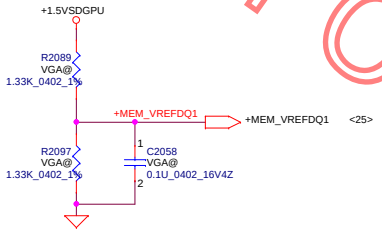


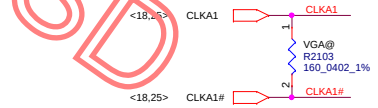
Mode E Address	Rank0		Rank1	
	0..31	32..63	0..31	32..63
CMD0	ODT		ODT	
CMD1			CS1*	
CMD2	CS0*			
CMD3	CKE		CKE	
CMD4	A9	A9	A11	A11
CMD5	A6	A6	A7	A7
CMD6	A3	A3	BA1	BA1
CMD7	A0	A0	A12	A12
CMD8	A8	A8	A8	A8
CMD9	A12	A12	A0	A0
CMD10	A1	A1	A2	A2
CMD11	RAS*	RAS*	RAS*	RAS*
CMD12	A13	A13	A14	A14
CMD13	BA1	BA1	A3	A3
CMD14	A14	A14	A13	A13
CMD15	CAS*	CAS*	CAS*	CAS*
CMD16		ODT		ODT
CMD17				CS1*
CMD18		CS0*		
CMD19		CKE		CKE
CMD20	RST	RST	RST	RST
CMD21	A7	A7	A6	A6
CMD22	A4	A4	A5	A5
CMD23	A11	A11	A9	A9
CMD24	A2	A2	A1	A1
CMD25	A10	A10	WE*	WE*
CMD26	A5	A5	A4	A4
CMD27	BA2	BA2		
CMD28	WE*	WE*	A10	A10
CMD29	BA0	BA0	BA0	BA0
CMD30			BA2	BA2
Not Available				

	Command Bit	Default Pull-down
DDR3	ODTx	10k
	CKEx	10k
	RST	10k
	CS*	No Termination









Security Classification	Compal Secret Data		
Issued Date	2013/10/01	Deciphered Date	2014/05/24

Compal Electronics, Inc.

Title: N15X Lower Rank0 8/9

Size: Custom | Document Number: A5WAH M/B LA-B991P | Rev: 1.0

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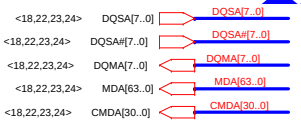
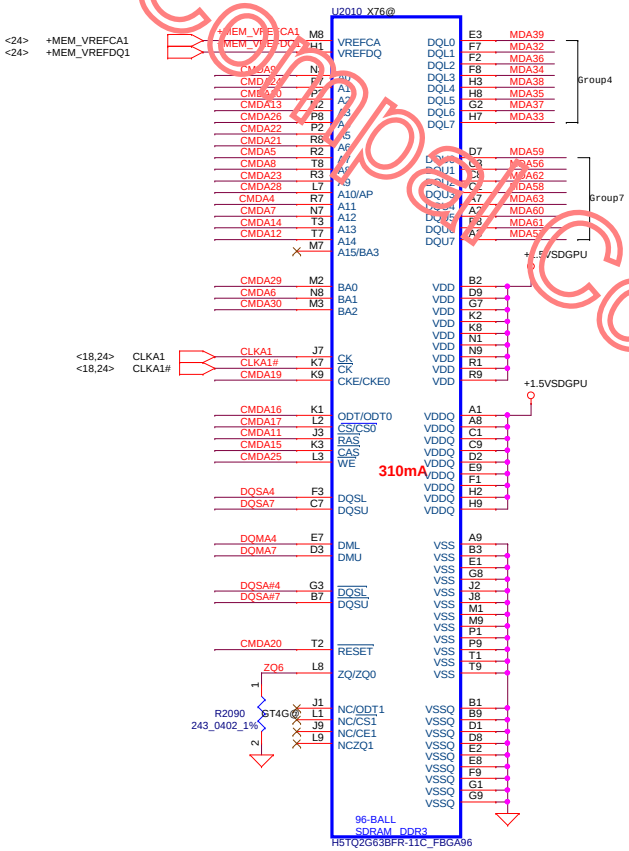
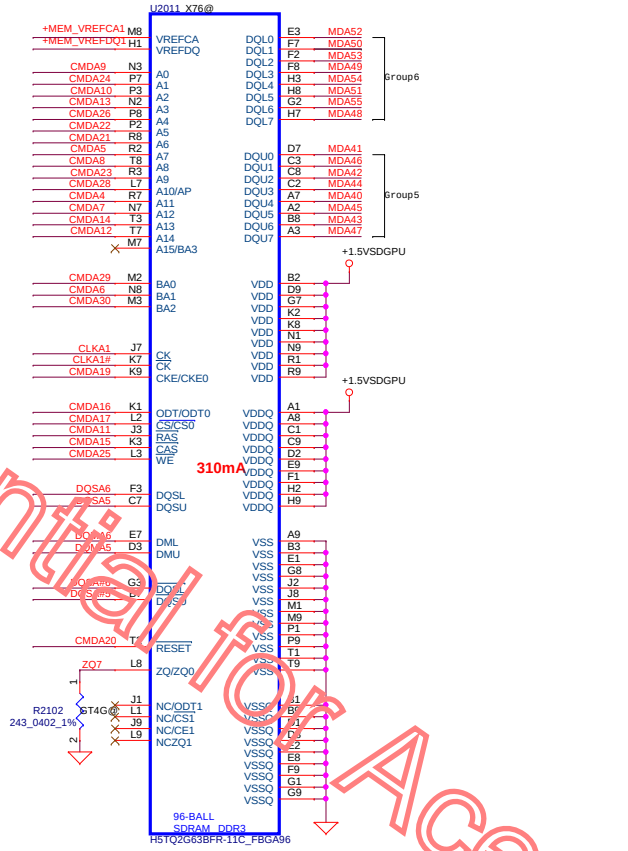
VRAM DDR3 chips



Lower Rank 1 TOP SIDE



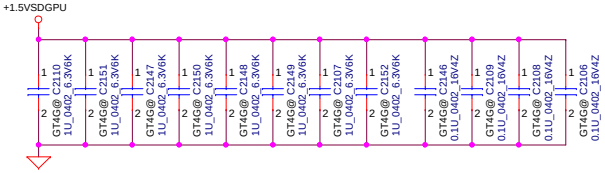
Only for N15S-GT 4G



Only for N15S-GT 4G

Mode E Address	Rank0		Rank1	
	0..31	32..63	0..31	32..63
CMD0	ODT		ODT	
CMD1			CS1*	
CMD2	CS0*			
CMD3	CKE		CKE	
CMD4	A9	A9	A11	A11
CMD5	A6	A6	A7	A7
CMD6	A3	A3	BA1	BA1
CMD7	A0	A0	A12	A12
CMD8	A8	A8	A8	A8
CMD9	A12	A12	A0	A0
CMD10	A1	A1	A2	A2
CMD11	RAS*	RAS*	RAS*	RAS*
CMD12	A13	A13	A14	A14
CMD13	BA1	BA1	A3	A3
CMD14	A14	A14	A13	A13
CMD15	CAS*	CAS*	CAS*	CAS*
CMD16		ODT		ODT
CMD17				CS1*
CMD18		CS0*		
CMD19		CKE		CKE
CMD20	RST	RST	RST	RST
CMD21	A7	A7	A6	A6
CMD22	A4	A4	A5	A5
CMD23	A11	A11	A9	A9
CMD24	A2	A2	A1	A1
CMD25	A10	A10	WE*	WE*
CMD26	A5	A5	A4	A4
CMD27	BA2	BA2		
CMD28	WE*	WE*	A10	A10
CMD29	BA0	BA0	BA0	BA0
CMD30			BA2	BA2
Not Available				

	Command Bit	Default Pull-down
DDR3	ODTx	10k
	CKEx	10k
	RST	10k
	CS*	No Termination



Security Classification	Compal Secret Data		
Issued Date	2013/10/01	Deciphered Date	2014/05/24

Compal Electronics, Inc.	
Title	N15X Lower Rank1 9/9
Size: Custom	Document Number: A5WAH M/B LA-B991P
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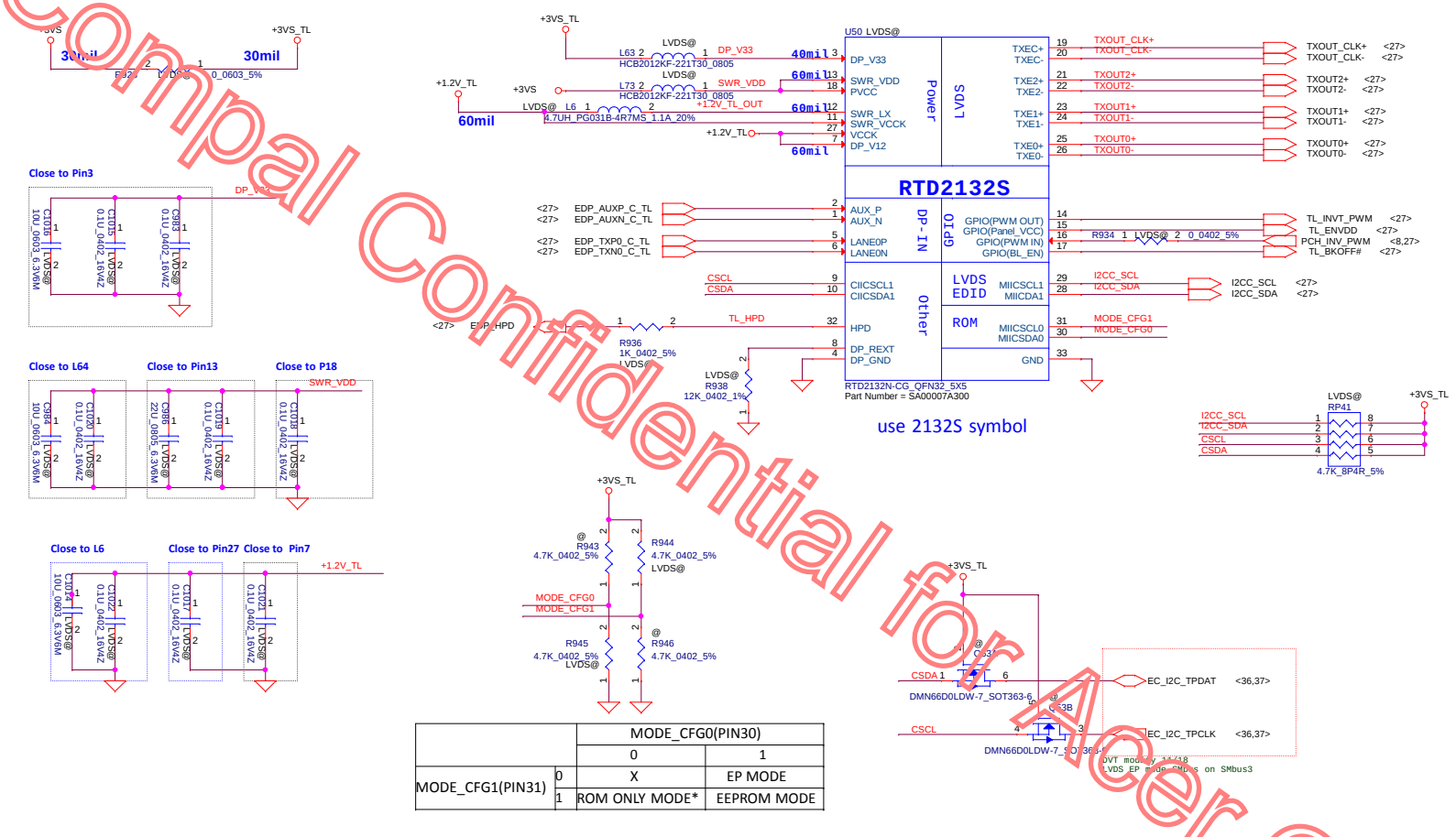
Date: Friday, October 17, 2014	Sheet 25 of 54

LVDS Translator - RTD2132R



Security Classification	Compal Secret Data		
Issued Date	2013/10/01	Deciphered Date	2014/05/24

Title	LVDS Translator - RTD2132R		
Size: Custom	Document Number: A5WAH M/B LA-B991P		Rev: 1.0
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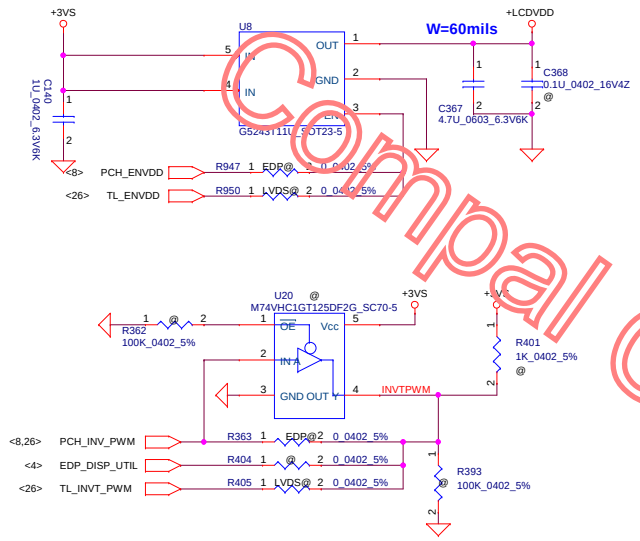
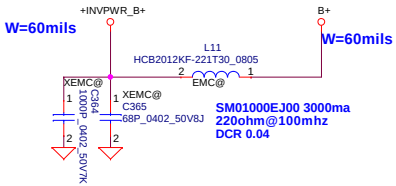
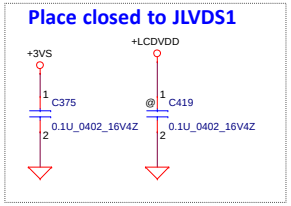
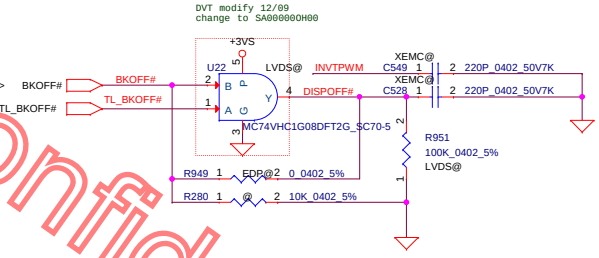
EDP / LVDS conn.

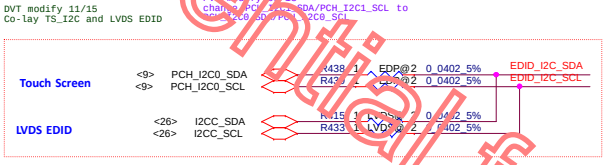
LCD POWER CIRCUIT



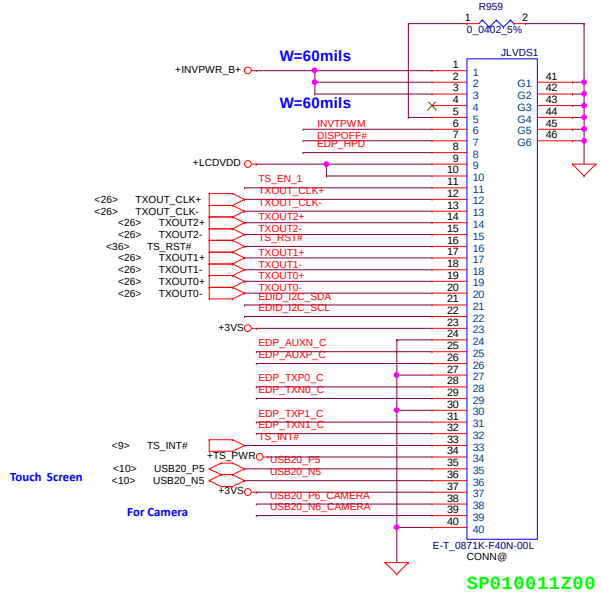




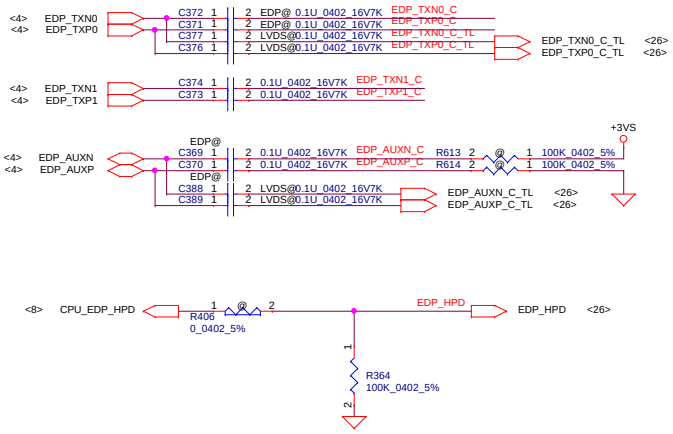




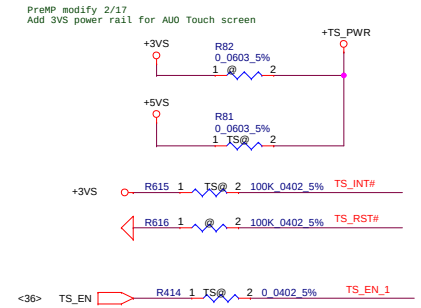
LCD/ LED PANEL Conn.



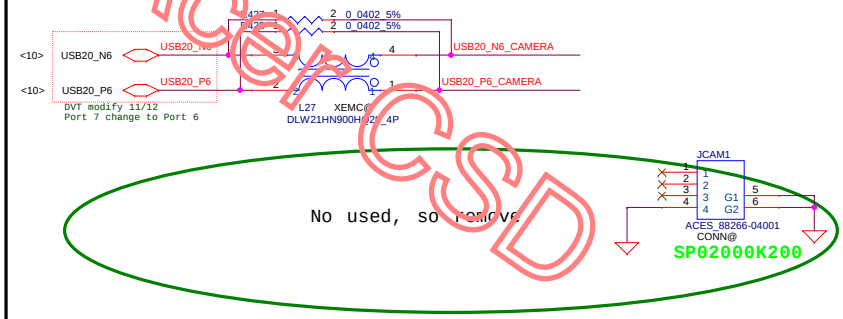
eDP



Touch Screen



Camera



Security Classification	Compal Secret Data		
Issued Date	2013/10/01	Deciphered Date	2014/05/24

Compal Electronics, Inc.

Title: eDP Connector

Size	Document Number	Rev
Custom	A5WAH M/B LA-B991P	1.0

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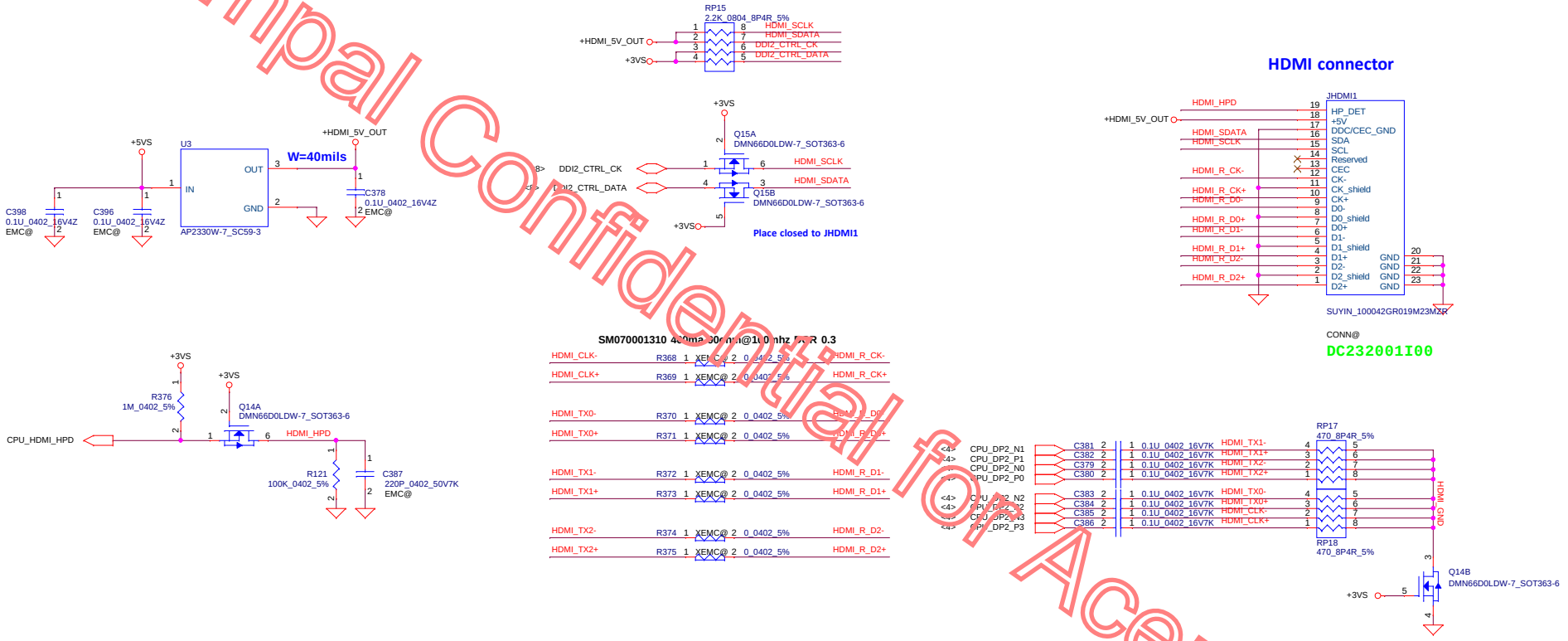
HDMI conn.



Security Classification	Compal Secret Data		
Issued Date	2013/10/01	Deciphered Date	2014/05/24

Compal Electronics, Inc.

Title: HDMI Conn

Size	Document Number	Rev
Custom	A5WAH M/B LA-B991P	1.0

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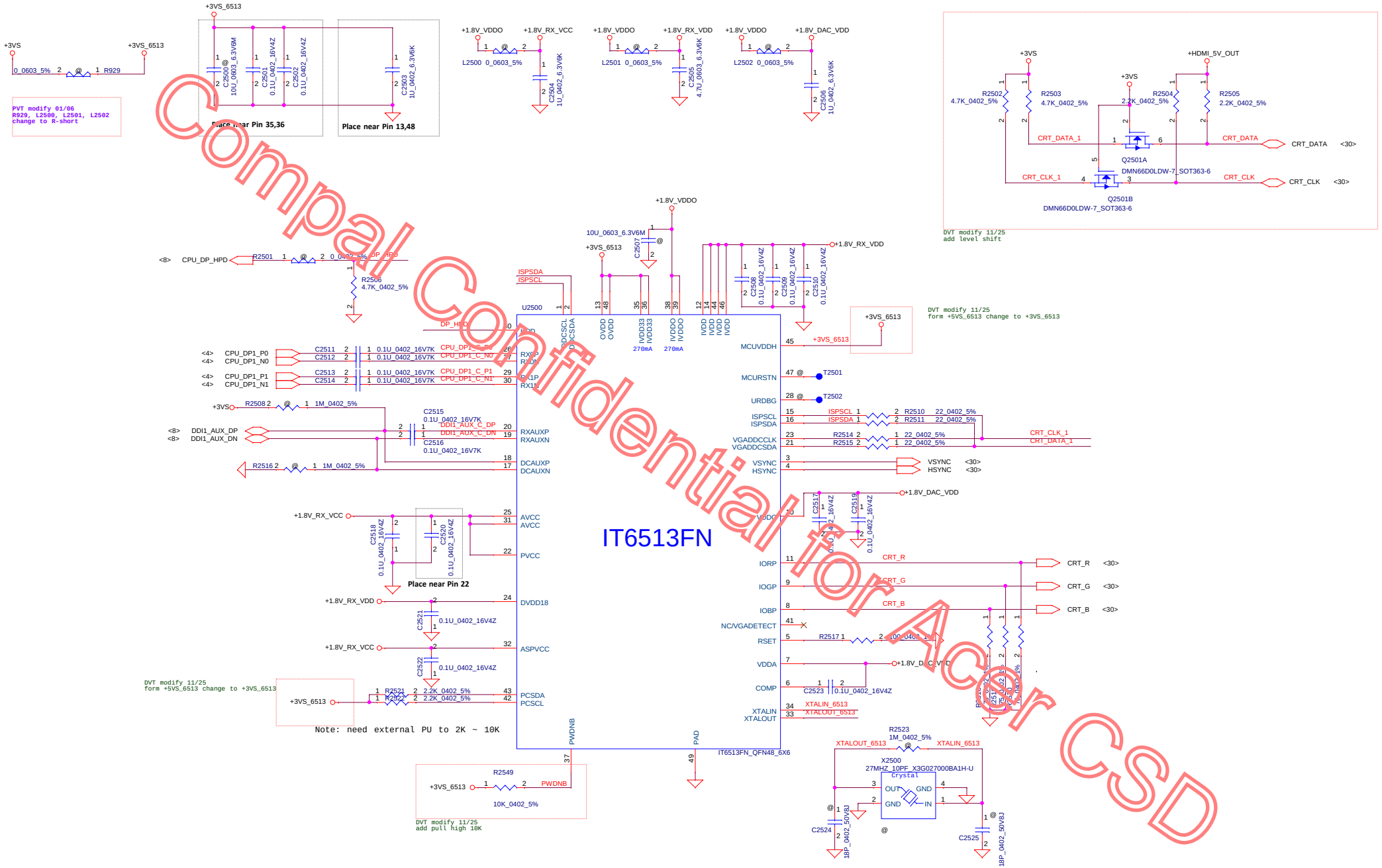
DP to VGA-IT6513



Security Classification	Compal Secret Data		
Issued Date	2013/10/01	Deciphered Date	2014/05/24

Compal Electronics, Inc.

Title: ITE IT6513FN

Size	Document Number	Rev
Custom	A5WAH M/B LA-B991P	1.0

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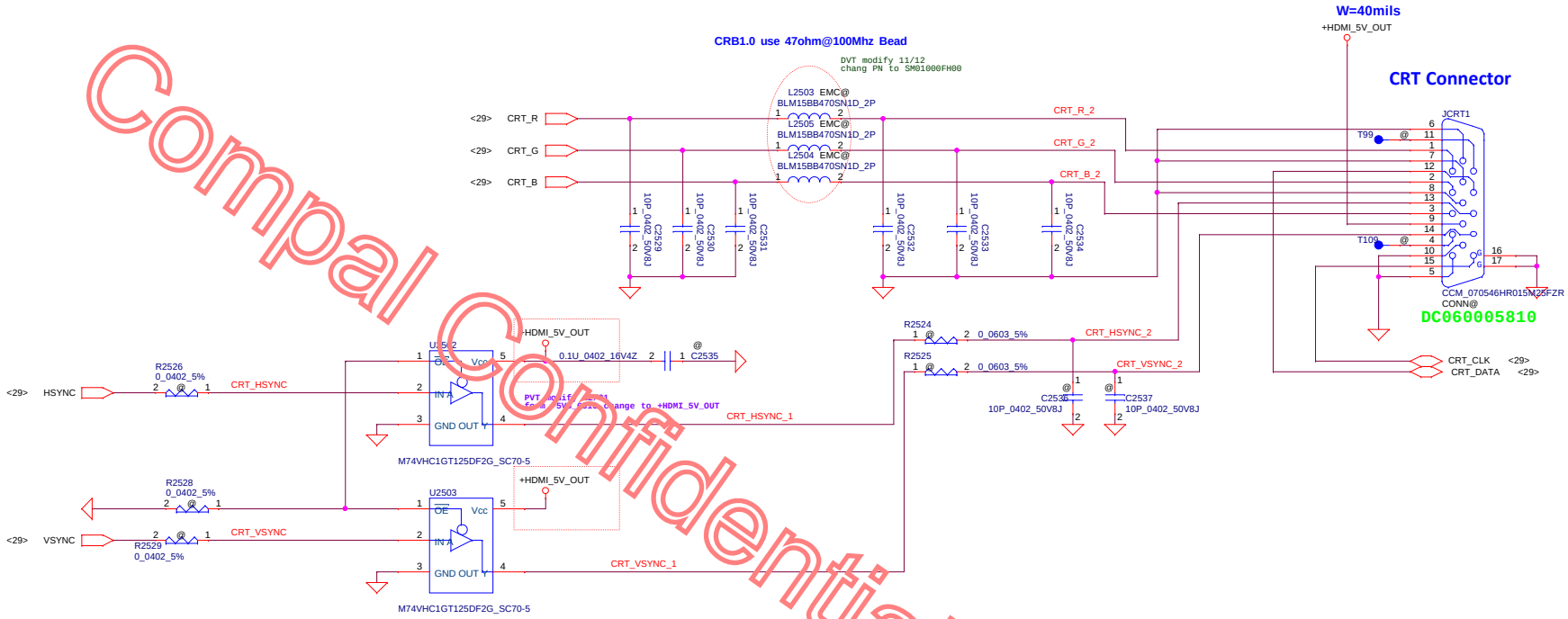
CRT conn.



Security Classification	Compal Secret Data		
Issued Date	2013/10/01	Deciphered Date	2014/05/24

Compal Electronics, Inc.

Title: CRT Connector

Size	Document Number	Rev
Custom	A5WAH M/B LA-B991P	1.0

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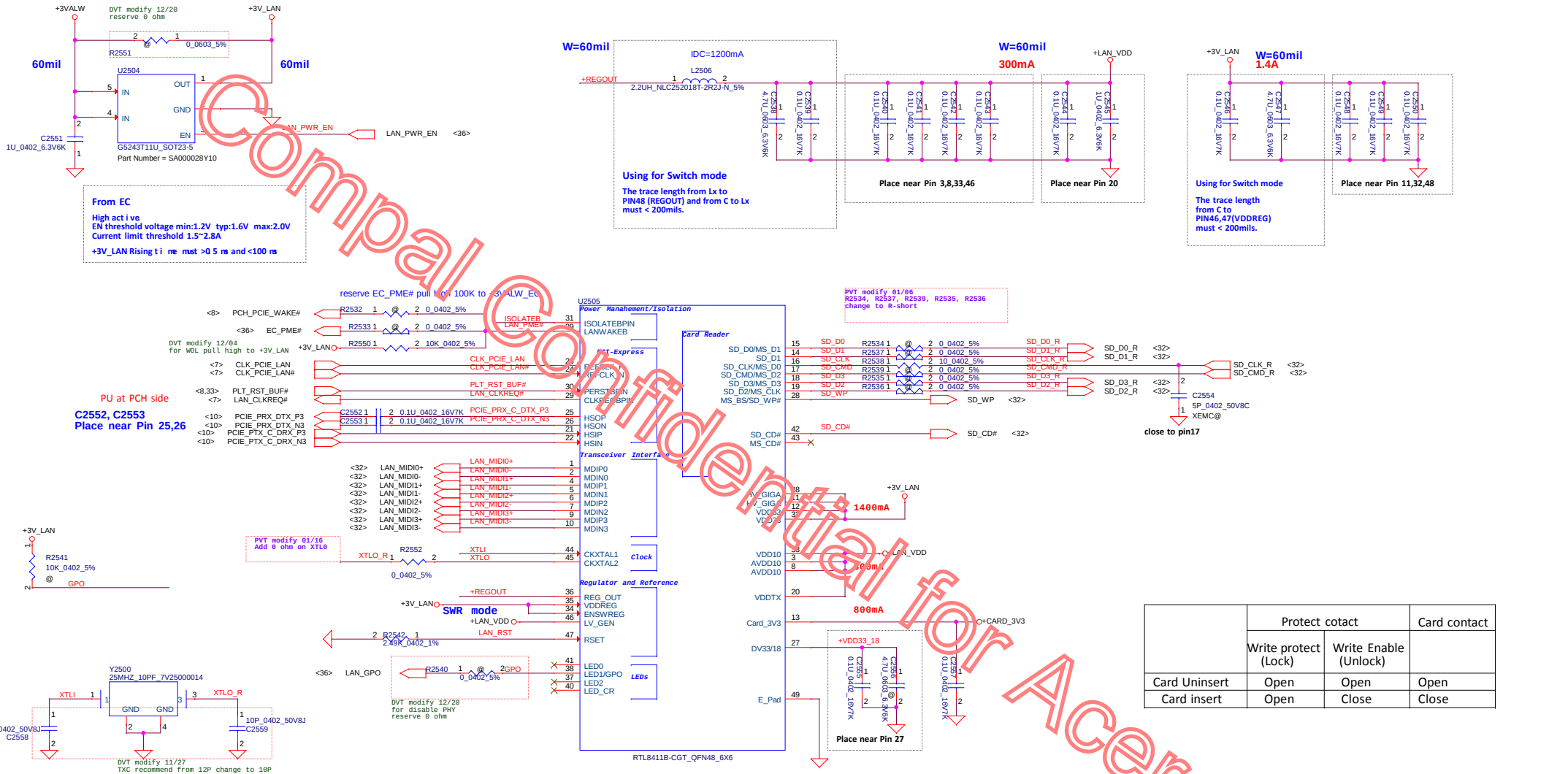
LAN-RTL8411B



	Protect cotact		Card contact
	Write protect (Lock)	Write Enable (Unlock)	
Card Uninsert	Open	Open	Open
Card insert	Open	Close	Close

Security Classification	Compal Secret Data		
Issued Date	2013/10/01	Deciphered Date	2014/05/24

Compal Electronics, Inc.

Title: LAN RTL8411-CG

Size: Custom | Document Number: A5WAH M/B LA-B991P | Rev: 1.0

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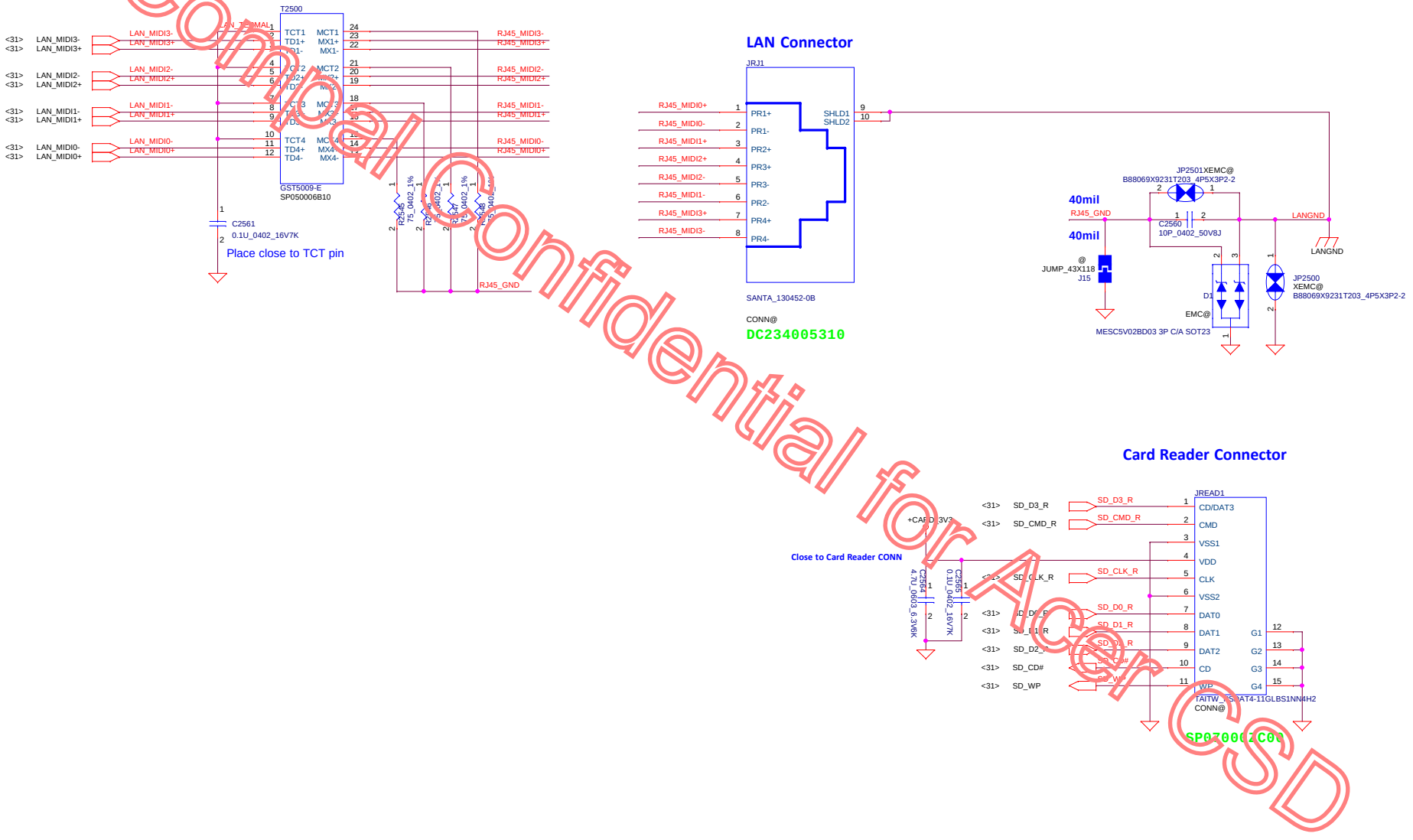
RJ45 / Card Reader conn.



Security Classification	Compal Secret Data		
Issued Date	2013/10/01	Deciphered Date	2014/05/24

Compal Electronics, Inc.

Title: LAN RJ45/CR SD Connector

Size	Document Number	Rev
Custom	A5WAH M/B LA-B991P	1.0

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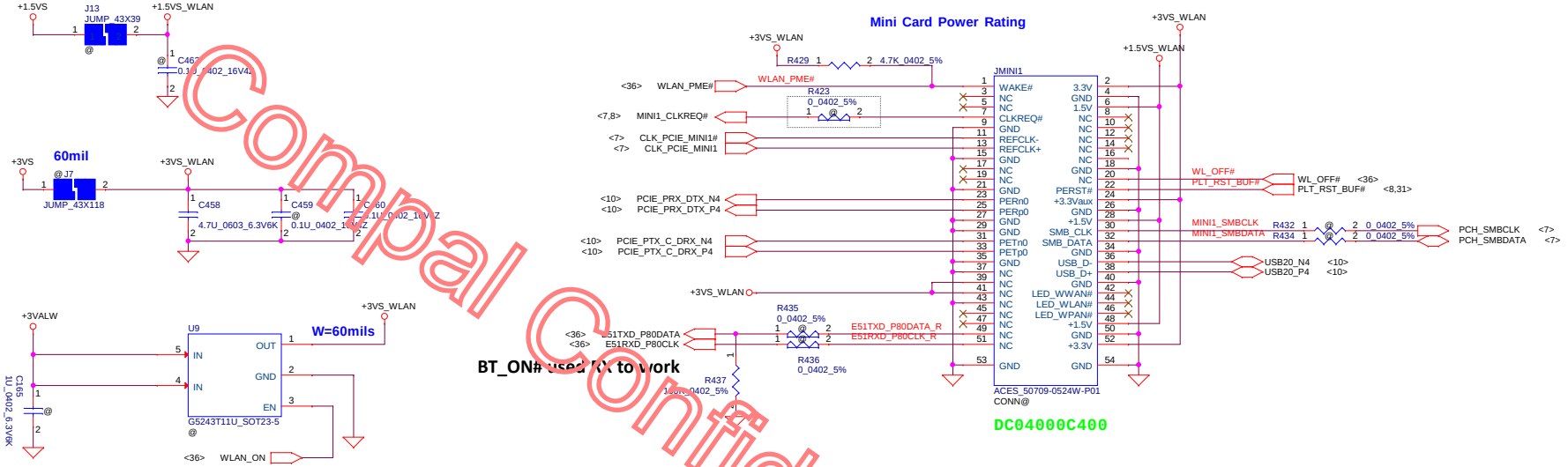
Wireless LAN



Security Classification	Compal Secret Data		
Issued Date	2013/10/01	Deciphered Date	2014/05/24

Compal Electronics, Inc.

Title: MINI CARD (WLAN)

Size	Document Number	Rev
Custom	A5WAH M/B LA-B991P	1.0

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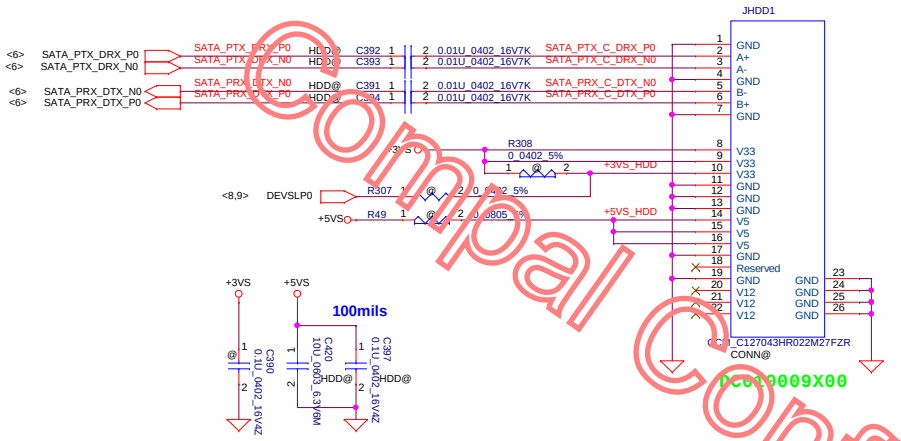
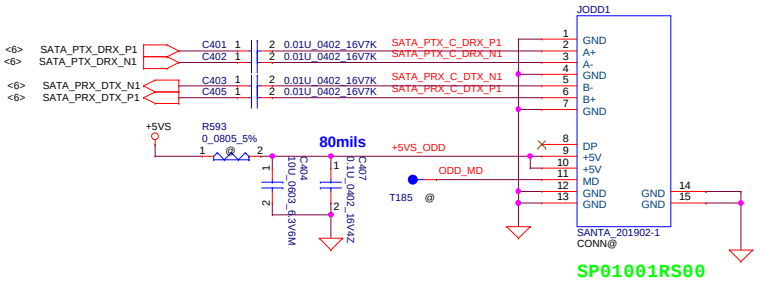
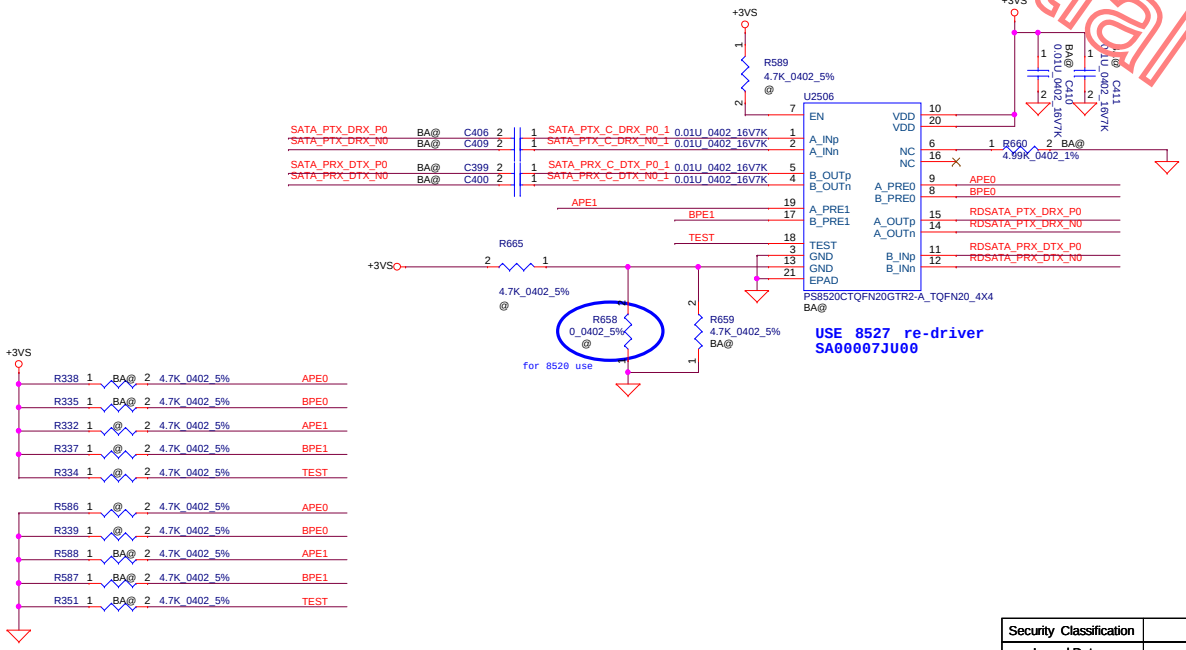
SATA HDD1 Conn.

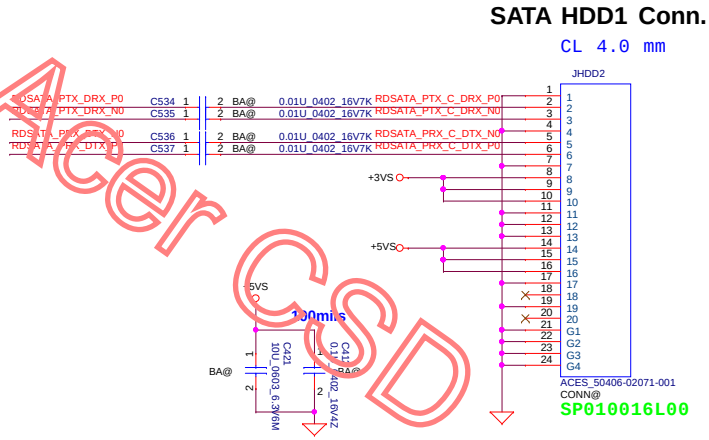


SATA ODD Conn.



SATA Re-Driver HDD Conn. for BA50





Security Classification	Compal Secret Data		
Issued Date	2013/10/01	Deciphered Date	2014/05/24

Compal Electronics, Inc.

Title: HDD/ODD/ HDD Re-Driver

Size	Document Number	Rev
Custom	A5WAH M/B LA-B991P	1.0

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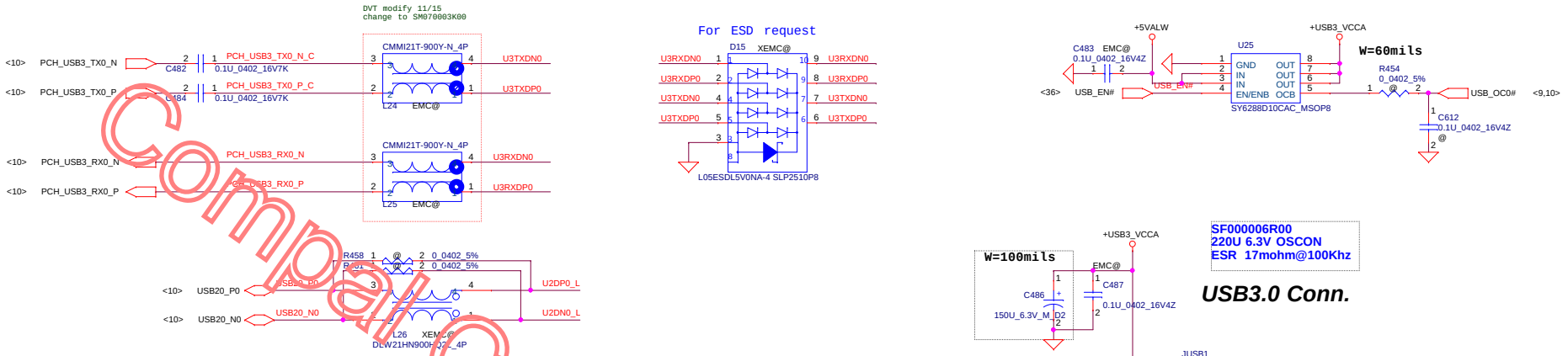
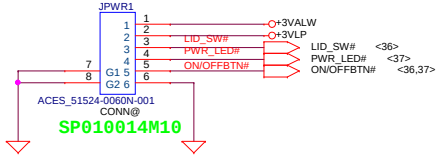
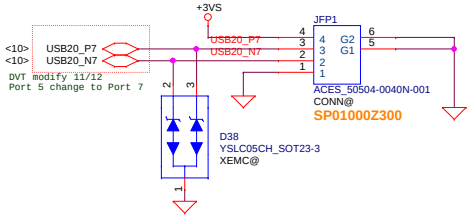
USB3.0 (Port 0)



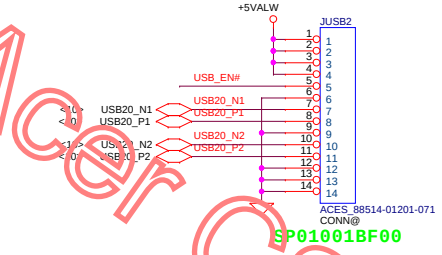
PWR/B



Finger Print /B for BA50



USB/B (USB Port 1, Port2)



Security Classification	Compal Secret Data		
Issued Date	2013/10/01	Deciphered Date	2014/05/24

Compal Electronics, Inc.

Title: USB3.0 Conn/USB_B/PWR_B

Size	Document Number	Rev
Custom	A5WAH M/B LA-B991P	1.0

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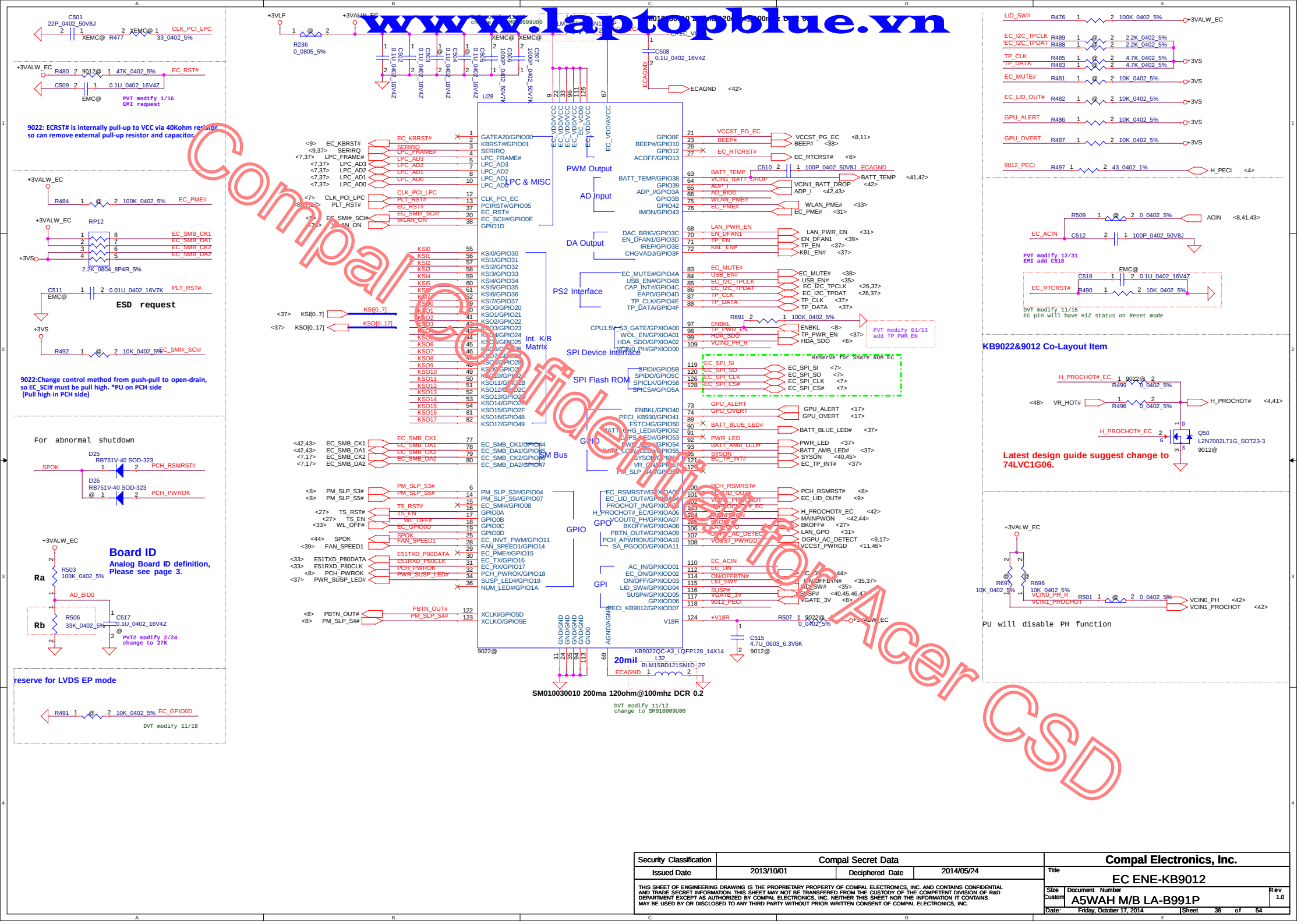

Security Classification	Compal Secret Data		
Issued Date	2013/10/01	Deciphered Date	2014/05/24

Compal Electronics, Inc.

Title: EC ENE-KB9012

Size	Document Number	Rev
Custom	A5WAH M/B LA-B991P	1.0
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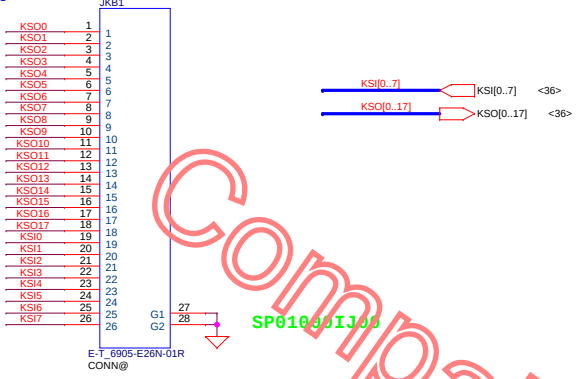
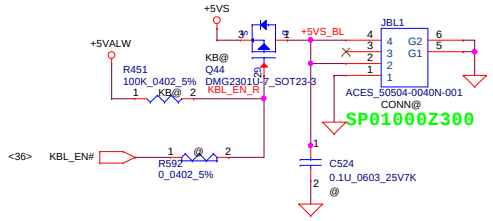
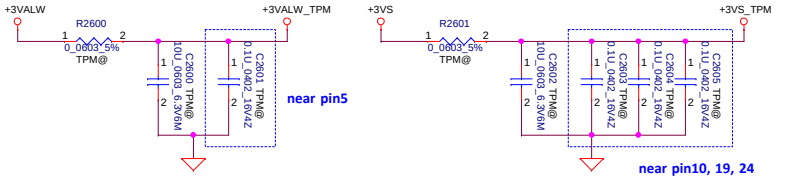
KB Conn.



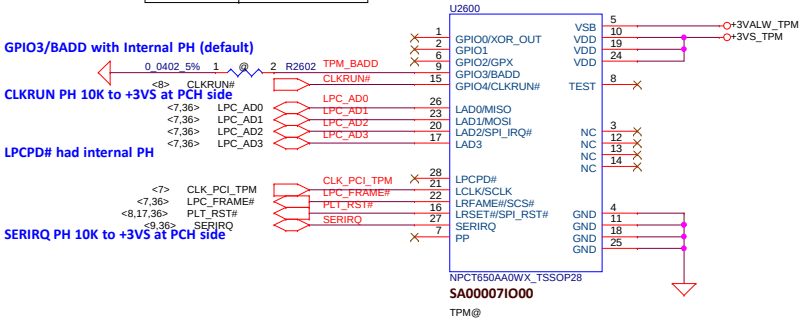
KB BackLight Conn. Reserve



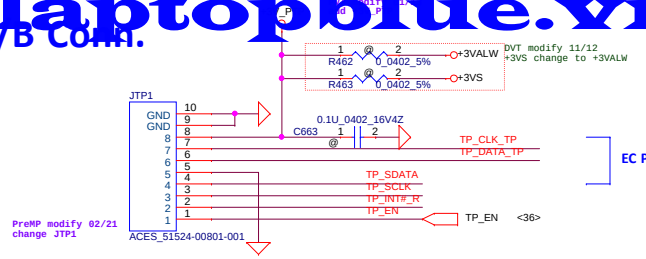
TPM Board for 2015



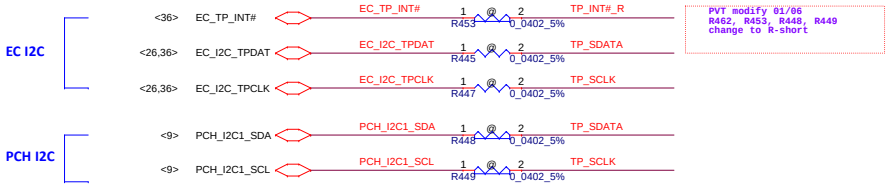
BADD	SELECTION
0	EEh - EFh
* 1	7Eh - 7Fh

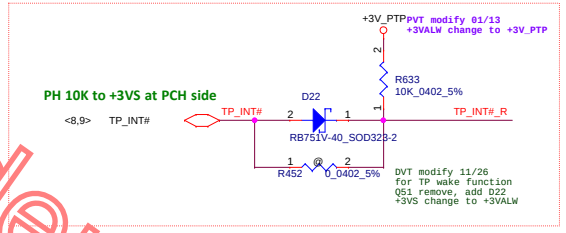


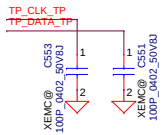
TP/B Conn.

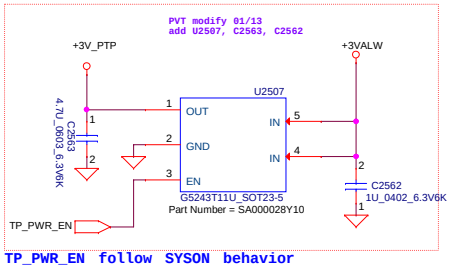


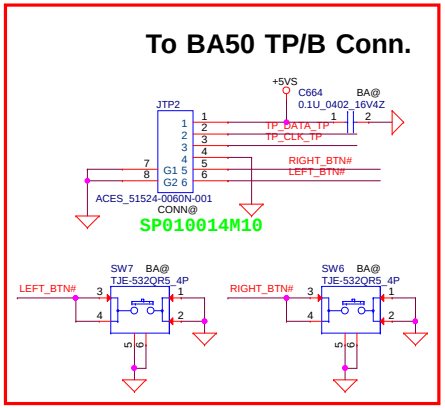
SP01001A910



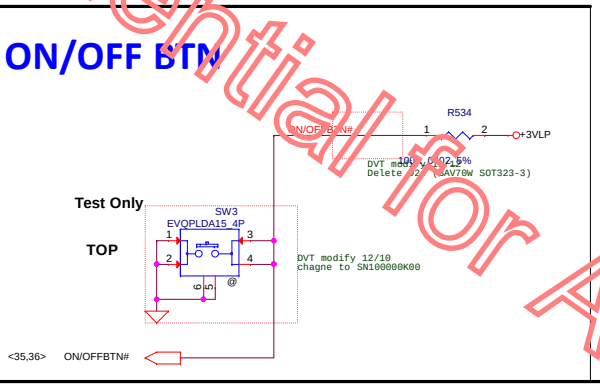


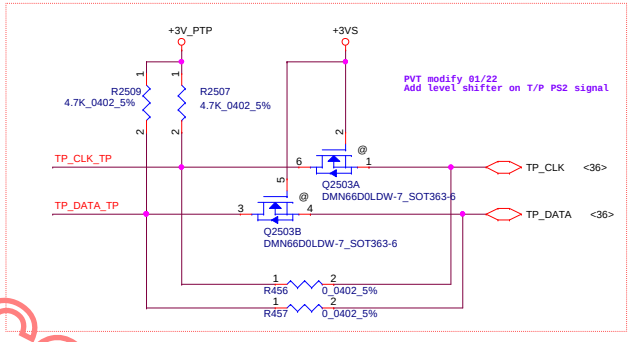




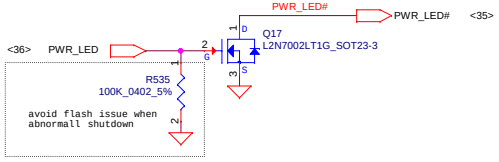


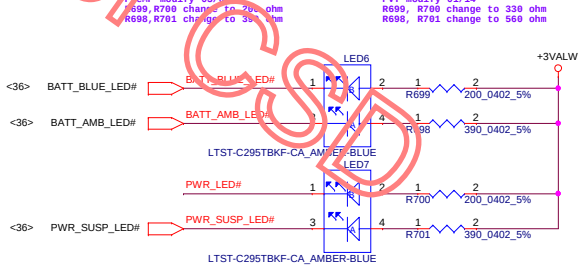
ON/OFF BTN





LED





Security Classification	Compal Secret Data		
Issued Date	2013/10/01	Deciphered Date	2014/05/24

Compal Electronics, Inc.	
Title	KB & TP & TPM Connector & LED
Size / Document Number	A5WAH M/B LA-B991P
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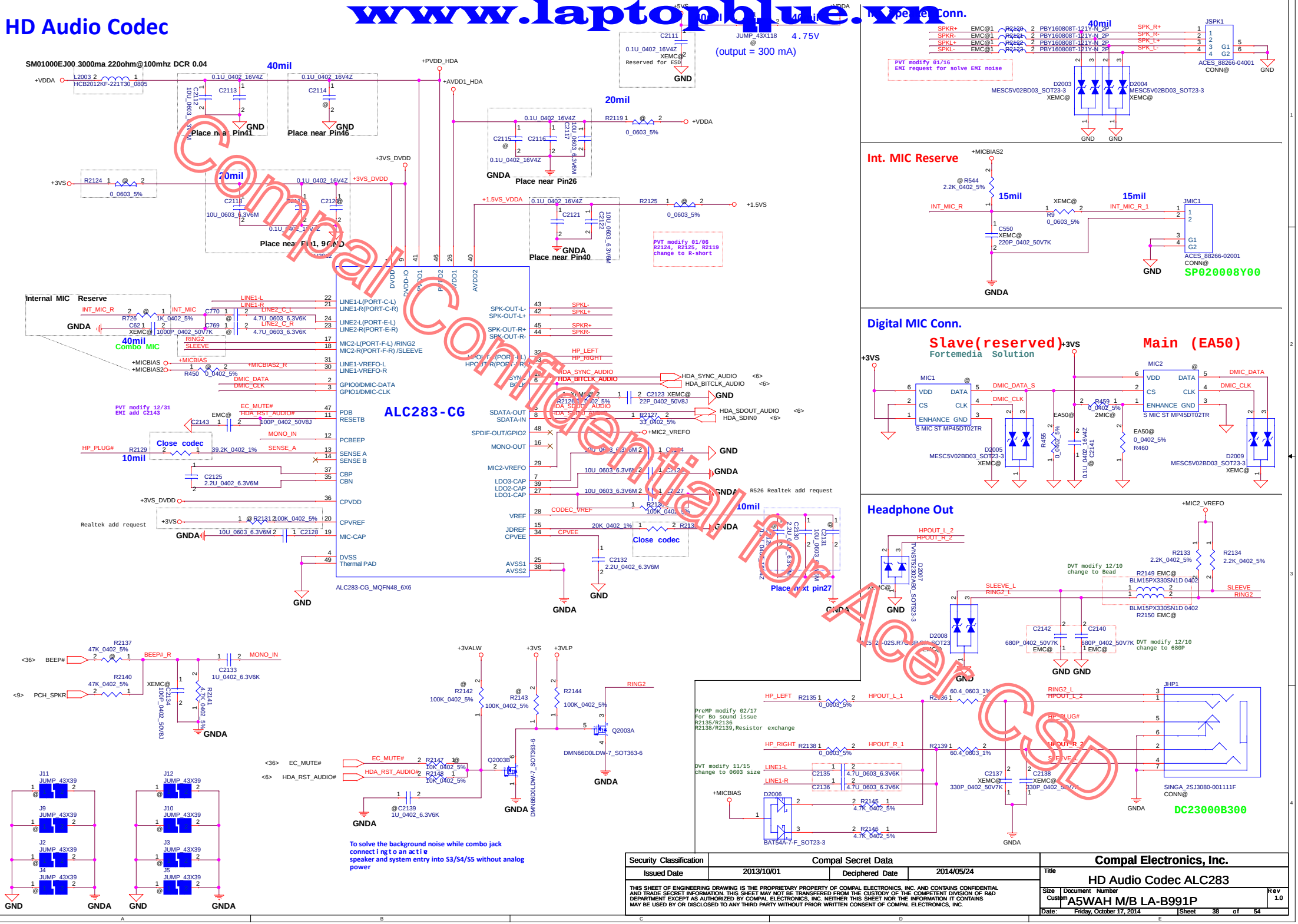
Date: Friday, October 17, 2014	Sheet 37 of 54

HD Audio Codec



Security Classification	Compal Secret Data		
Issued Date	2013/10/01	Deciphered Date	2014/05/24

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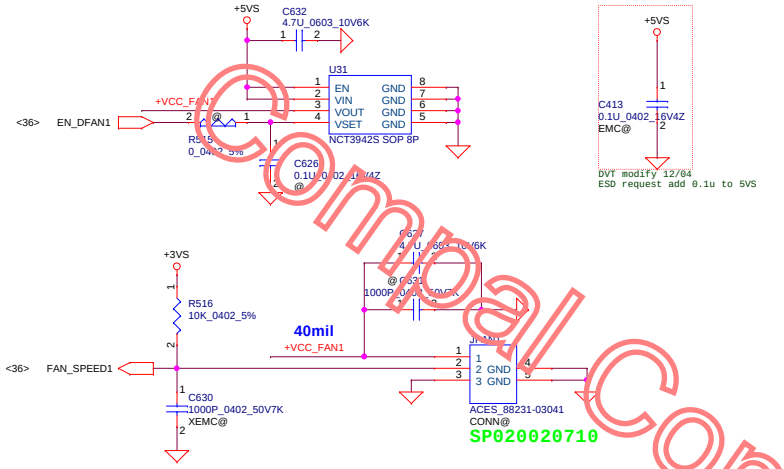
Compal Electronics, Inc.

Title: HD Audio Codec ALC283

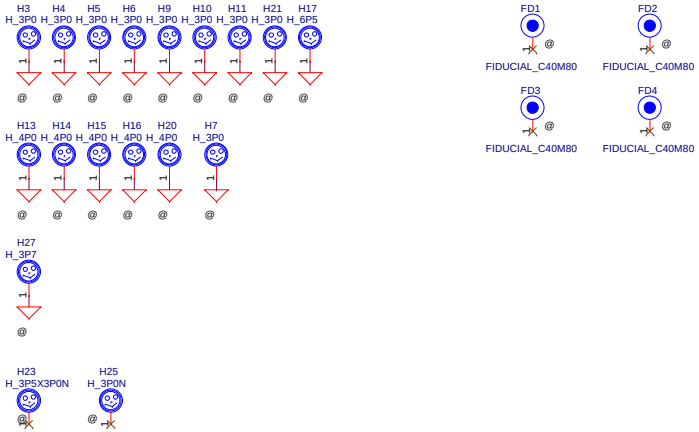
Size	Document Number	Rev
Custom	A5WAH M/B LA-B991P	1.0

Date: Friday, October 17, 2014 Sheet 38 of 54

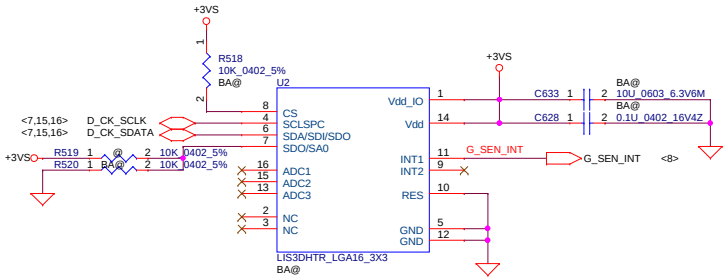
FAN1 Conn



Screw Hole



G-Sensor for BA50



LIS3DH
SA0 ->0, Address is 0011 000 (0x30h)
SA0 ->1, Address is 0011 001 (0x32h)

Security Classification	Compal Secret Data		
Issued Date	2013/10/01	Deciphered Date	2014/05/24

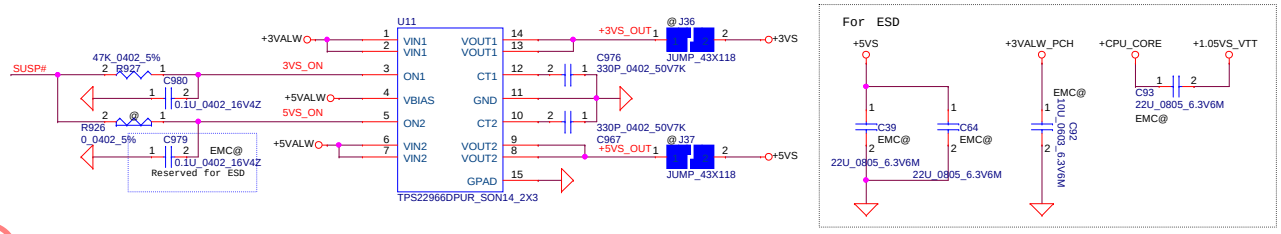
Compal Electronics, Inc.

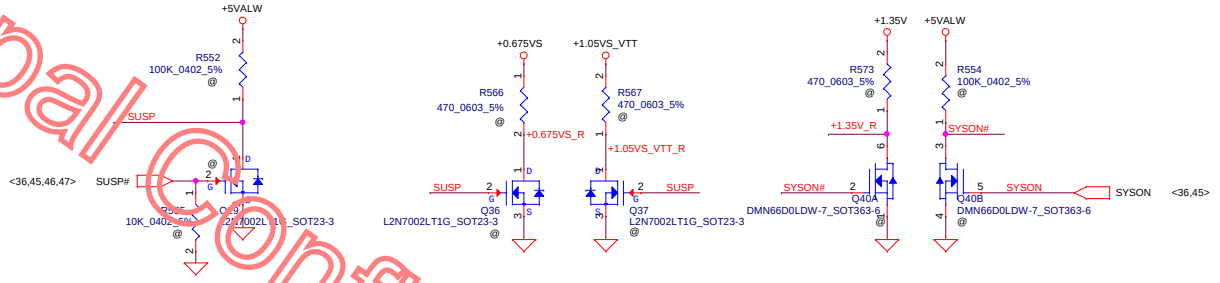
Title: FAN & Screw Hole & G-Sensor

Size: Custom | Document Number: A5WAH M/B LA-B991P | Rev: 1.0

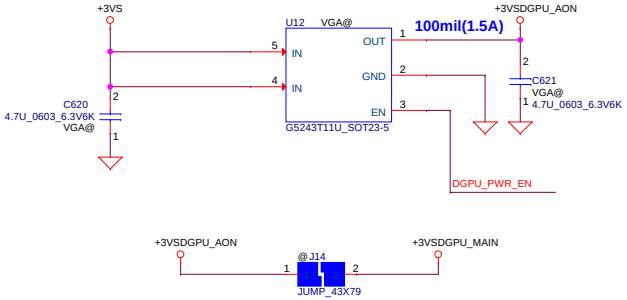
Date: Friday, October 17, 2014 | Sheet 39 of 54

DC & VGA Interface

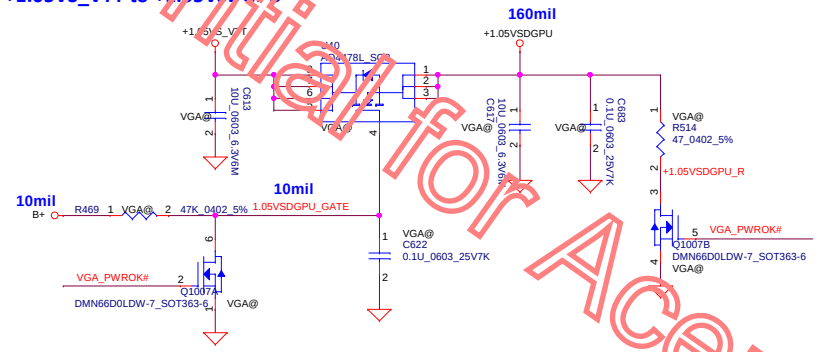


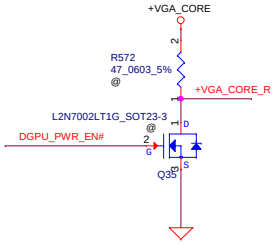


+3VS to +3VSDGPU_AON for GPU

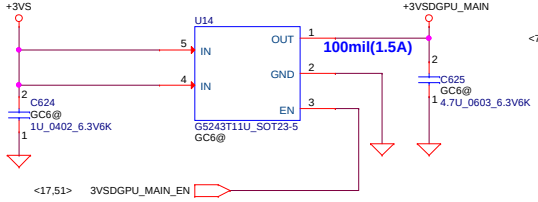


+1.05VS_VTT to +1.05VSDGPU

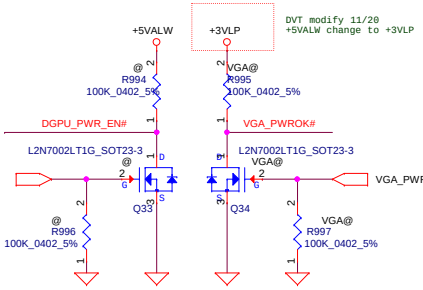


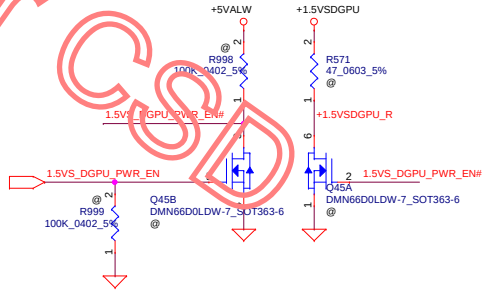


+3VS to +3VSDGPU_MAIN for GC6-2.0



3VSDGPU_MAIN_EN From GPU





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Issued Date	2013/10/01	Deciphered Date	2014/05/24

Compal Electronics, Inc.			
Title: DC Interface			
Size: Custom	Document Number: A5WAH M/B LA-B991P		Rev: 1.0
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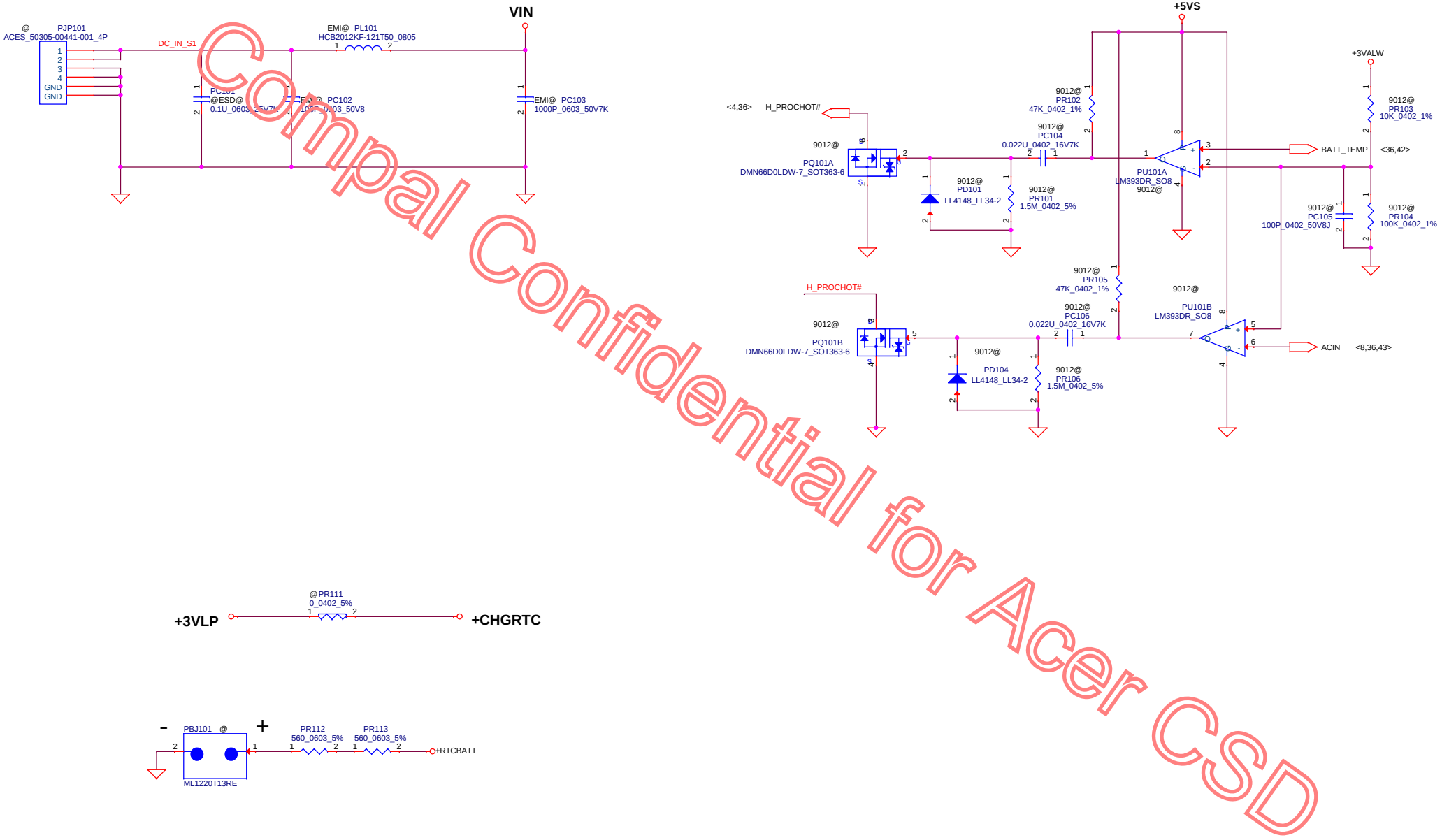

Security Classification	Compal Secret Data		
Issued Date	2013/10/01	Deciphered Date	2014/05/24

Compal Electronics, Inc.

Title: *DCIN*

Size	Document Number	Rev
Custom		1.0

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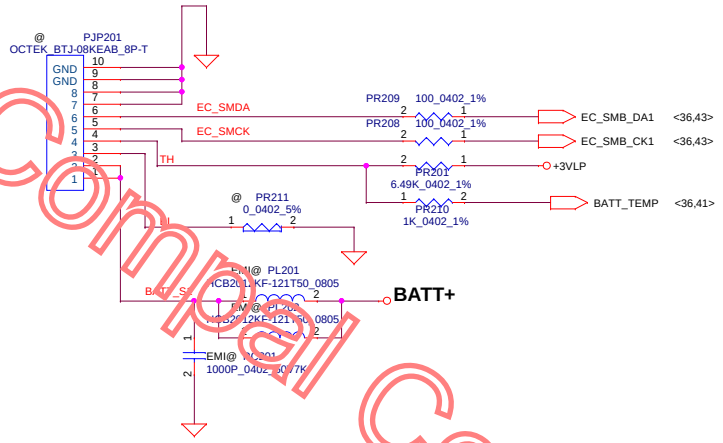
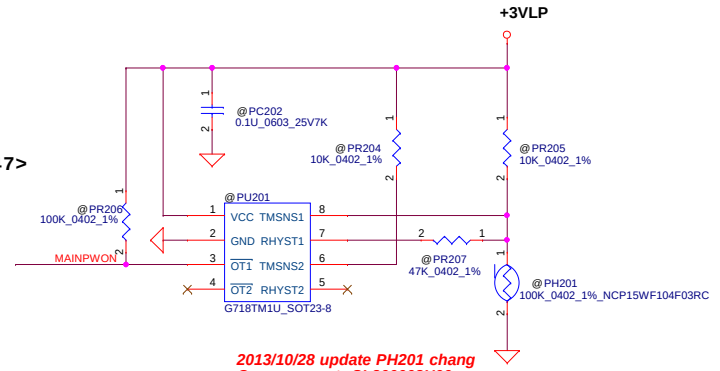




2013/10/28 update PH201 chang
Common part SL200002H00

---Battery_pin define---

PIN1 GND	PIN8 GND
PIN2 GND	PIN7 GND
PIN3 SMD	PIN6 SMD
PIN4 SMC	PIN5 SMC
PIN5 TS	PIN4 TS
PIN6 B/I	PIN3 B/I
PIN7 Batt+	PIN2 Batt+
PIN8 Batt+	PIN1 Batt+

---Battery Con_pin define---

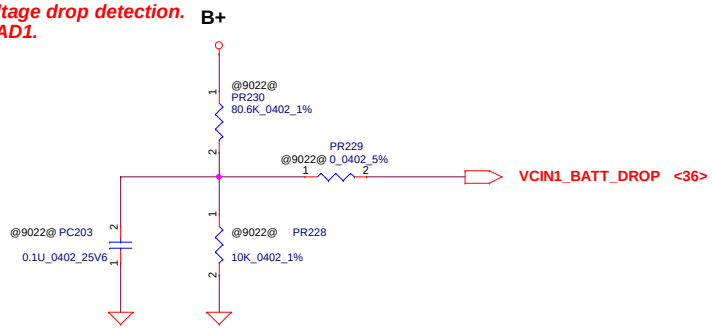
2013/10/14 update

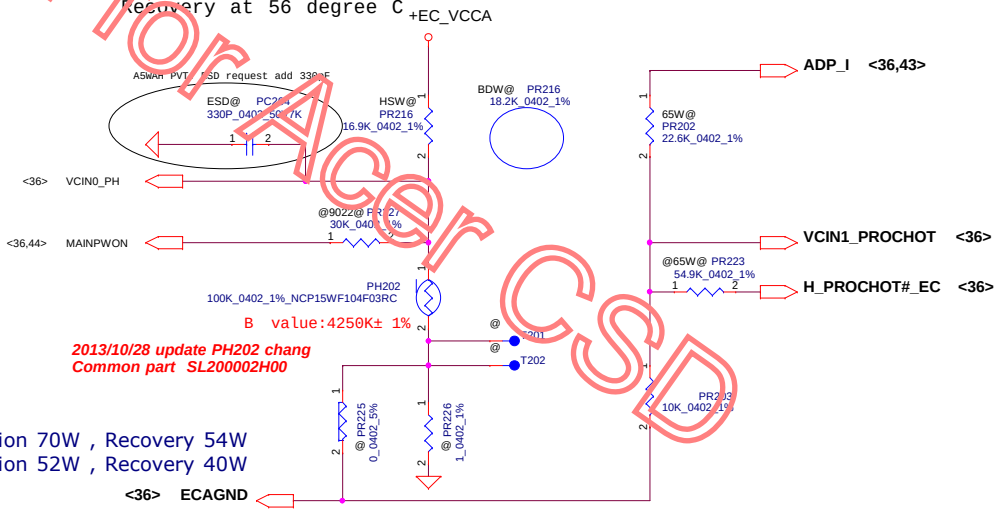
For KB9022 sense 20mΩ	Active	Recovery
40W PR202 10K ohm	52W,0.54V	40W,0.42V
65W PR202 22.6K ohm	84.5W,0.54V	65W,0.42V

PH201 under CPU botten side :
CPU thermal protection at 92 degree C (shutdown)
Recovery at 56 degree C

2013/10/02
Add for ENE9022 Battery Voltage drop detection.
Connect to ENE9022 pin64 AD1.

Battery is 3-cell design.
B+=9V





2013/10/28 update PH202 chang
Common part SL200002H00

For 65W adapter==>action 70W , Recovery 54W
For 40W adapter==>action 52W , Recovery 40W

Security Classification	Compal Secret Data		
Issued Date	2013/10/01	Deciphered Date	2014/05/24

Compal Electronics, Inc.

Title: BATTERY CONN / OTP

Size	Document Number	Rev
Custom		1.0

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Protection for reverse input

Vgs = 20V
Vds = 60V
Id = 250mA

PQ301 2N7002KW_SOT323-3

PR301 1M_0402_5%

PR302 3M_0402_5%

Need check the SOA for inrush

2013/10/14
PR303 10m ohm chang -->20m ohm
SD00000S120

2014/01/21 update PL301 change
Common part SH00000YG00

VIN

PQ302 AON5414AL_DFN8-5

PR303 0.02_1206_1%

EMI@ PL301 1UH +-30% 2.8A
Isat: 4A
DCR: 27mohm

CHG_B+

PC303 10U_0805_25V6K

PC304 10U_0805_25V6K

PC305 EMI@ 2200P_0402_25V7K

PC306 @EMI@ 0.1U_0402_25V6

PQ304 AO4406AL_SO8

PC307 0.01U_0402_50V7K

BQ24725A_BATDRV

PR305 4.12K_0603_1%

VF = 0.5V

PD301 BAS40CW_SOT323-3

Rds(on) = 30mohm max
Vgs = 20V
Vds = 30V
ID = 7A (Ta=70C)

VF = 0.37V

PD302 RB751V-40_SOD323-2

2013/11/29 update PL302 change
Common part SH00000YB00

7*7*3

Support max charge 3.5A
Power loss: 0.245W
CSR rating: 1W
VSRP-VSRN spec < 81.28mV

PL302 10UH_PCMB063T-100MS_4A_20%

PR311 0.01_1206_1%

BATT+

PC311 0.047U_0402_25V7K

PR306 10_1206_1%

PR307 2.2_0603_5%

PR308 0_0402_5%

PC313 1U_0603_25V6K

PC310 0.1U_0402_25V6

PR309 4.12K_0603_1%

PR310 4.12K_0603_1%

PU301 BQ24735RGRR_QFN20_3P5X3P5

PAD ACN ACP CMSRC ACDRV ACOK VCC BTST HIDRV PHASE LODRV REGN GND PGND SRP SRN BATDRV ACDET IOUT SDA SCL ILIM

PR312 4.7_1206_5%

PR313 10_0603_1%

PR314 6.8_0603_1%

PC319 0.1U_0603_16V7K

PC316 0.1U_0402_25V6

PC317 0.1U_0402_25V6

PC314 10U_0805_25V6K

PC315 10U_0805_25V6K

PC318 680P_0402_50V7K

PR315 100K_0402_1%

<8,36,41> ACIN

PR316 316K_0402_1%

PR317 100K_0402_1%

PC320 0.01U_0402_25V7K

PR318 422K_0402_1%

PC321 2200P_0402_50V7K

PR319 66.5K_0402_1%

PC322 100P_0402_50V8J

@PR320 0_0402_5%

PC323 @ 100P_0402_50V8J

Close EC chip

EC_SMB_CK1 <36,42>

EC_SMB_DA1 <36,42>

ADP_I <36,42>

A5WAH PVT: ESD request add 0.1u

PC324 0.1U_0402_16V4Z ESD@

Module model information

BQ24735A_V1.mdd

BQ24735A_V2.mdd

Design Notes
1.For 65 /90W system, 3S1P/3S2P battery
Maximum Charging current 3.5A
Battery discharge power 55W.
#Register Setting
1. 0x12 bit8 set 0 (default 1) to disable IFAULT HI if add ISN choke
2. 0x12 bit3 set 1 (default 0) to enable turbo boost function
3. Disable turbo when AC only
#Circuit Design
1. ACOK,ILIM pull high voltage need base on 3/5V enable control
2. Use 10X10 choke and 3X3 H/L side MOSFET
Charge current : 3.5A
Power loss : 0.82W
Power density : 0.82/(15X15)
3. If use 4S per cell battery, need additional circuit for ACDET(PR218/PR220/PR222 change to 0.1%, parallel resistors with PR222 for ACDET setting.
4. PC223 2200p is for quick response when AC plug out.
5. For hybrid design, need double check PQ202,PQ203,PQ204,PQ205 component rating
#Protect function
1. ACOVP : ACDET voltage > 3.14V
2. Charger timeout : No communication within 175s(default)
3. ACOC : 3.33 X Input current DAC setting(default)
4. CHGOCP : 3/4.5/6A based on current current setting
5. BATOVP : 103-106%
6. BATLOWV : 2.5V
7. TSHUT : 155C
8. IFAULT HI : 750mV (default)
9. IFAULT LOW : 110mV (default)

Vin Dectector

	Min.	Typ	Max.
L-->H	17.16V	17.63V	18.12V
H-->L	16.76V	17.22V	17.70V

VILIM = 20*ILIM*Rsr
ILIM = 3.3*100/(100+107)/20/0.02
= 3.986 A

Security Classification	Compal Secret Data		
Issued Date	2013/10/01	Deciphered Date	2014/05/24

Compal Electronics, Inc.

Title: CHARGER

Size | Document Number: Common Circuit | Rev: 1.0

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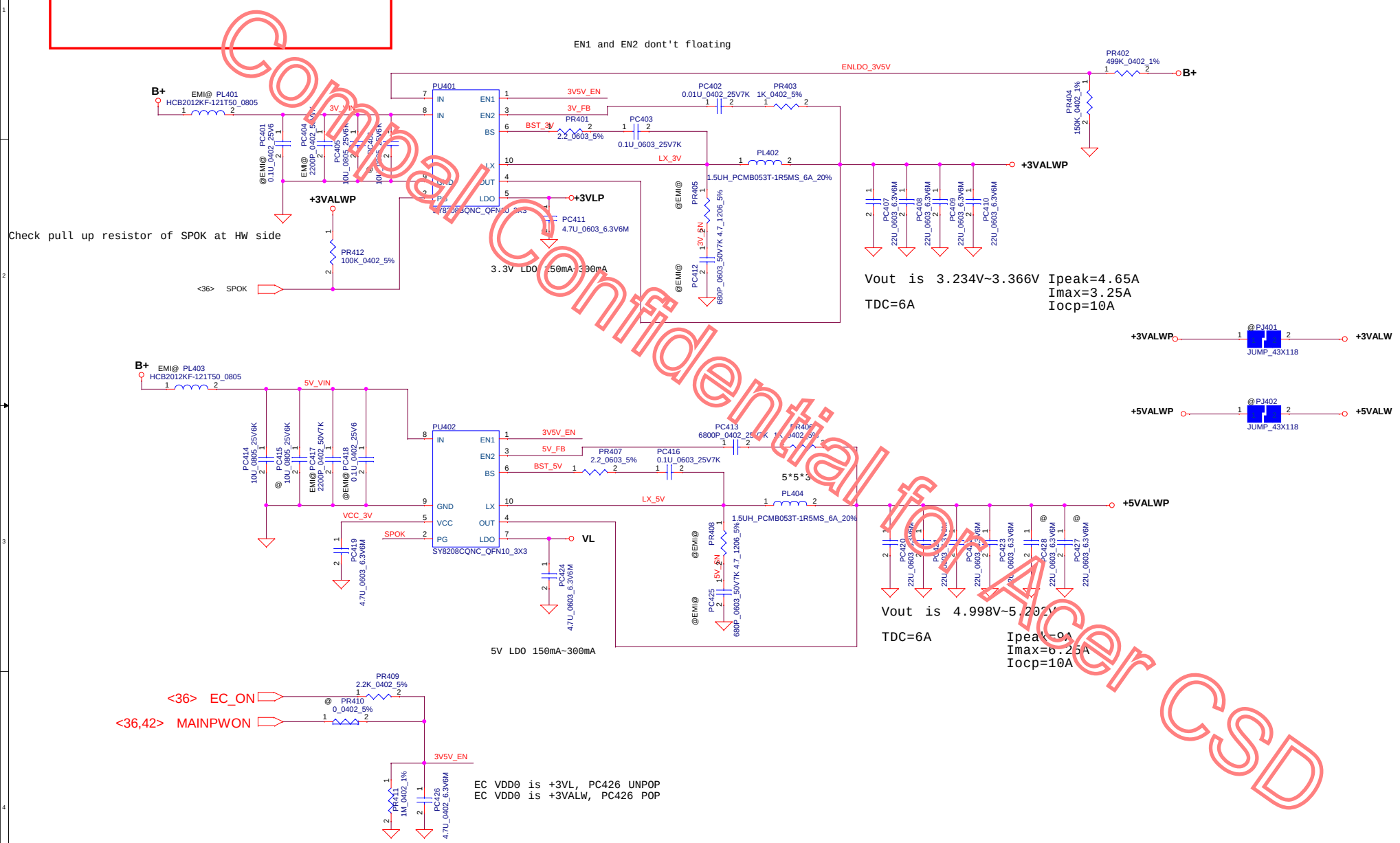
Module model information

SY8208B_V2.mdd
SY8208C_V2.mdd



Security Classification	Compal Secret Data		
Issued Date	2013/10/01	Deciphered Date	2014/05/24

Compal Electronics, Inc.

Title: +3VALW/+5VALW

Size	Document Number	Rev
Custom		1.0

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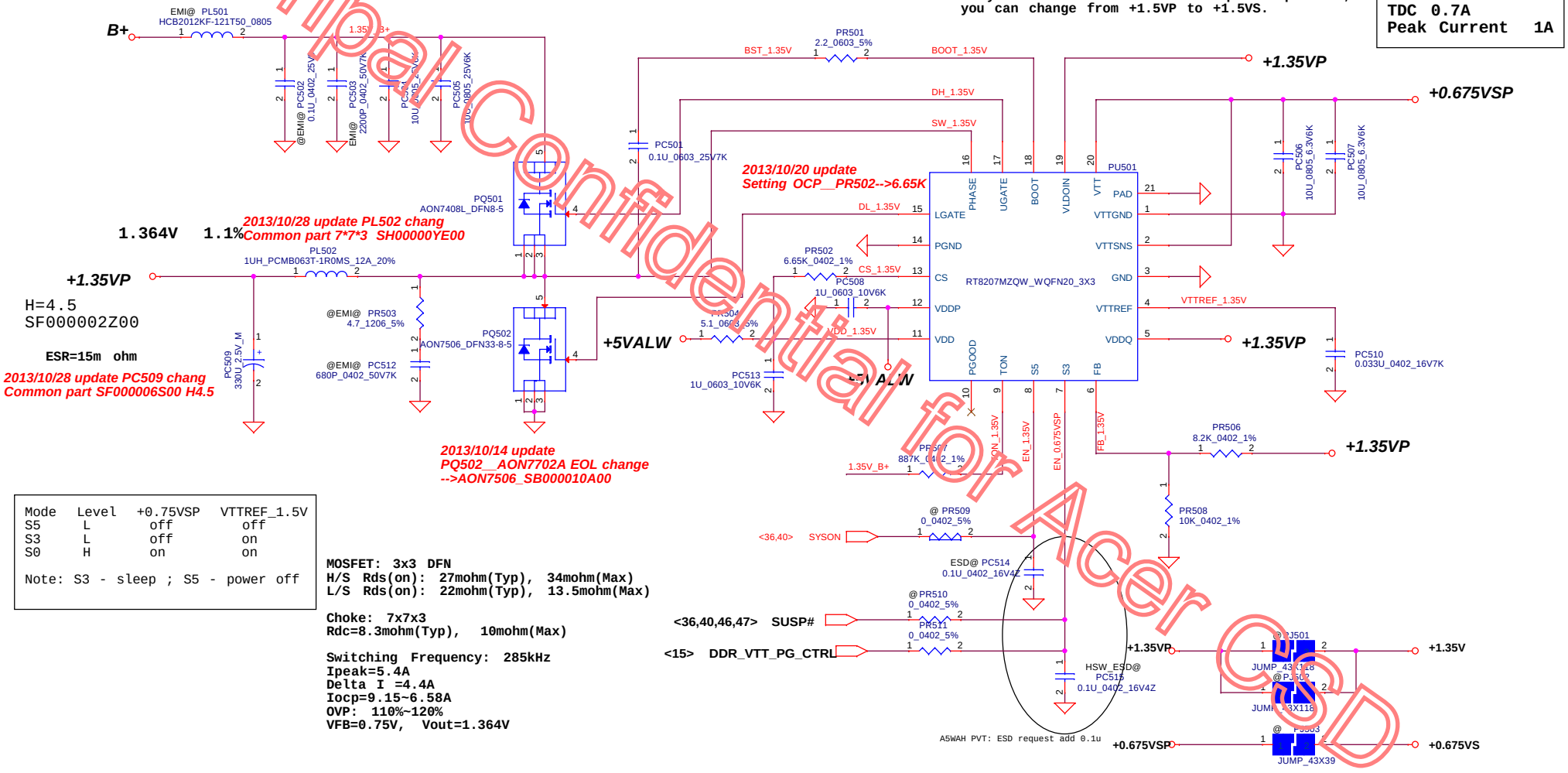
Module model information

RT8207M_V1.mdd For Single layer
RT8207M_V2.mdd For Dual layer

Pin19 need pull separate from +1.5VP.
If you have +1.5V and +0.75V sequence question, you can change from +1.5VP to +1.5VS.

0.75Volt +/- 5%
TDC 0.7A
Peak Current 1A



Mode	Level	+0.75VSP	VTTREF_1.5V
S5	L	off	off
S3	L	off	on
S0	H	on	on

Note: S3 - sleep ; S5 - power off

MOSFET: 3x3 DFN
H/S Rds(on): 27mohm(Typ), 34mohm(Max)
L/S Rds(on): 22mohm(Typ), 13.5mohm(Max)

Choke: 7x7x3
Rdc=8.3mohm(Typ), 10mohm(Max)

Switching Frequency: 285kHz
Ipeak=5.4A
Delta I =4.4A
Iocp=9.15~6.58A
OVP: 110%~120%
VFB=0.75V, Vout=1.364V

Security Classification	Compal Secret Data		
Issued Date	2013/10/01	Deciphered Date	2014/05/24

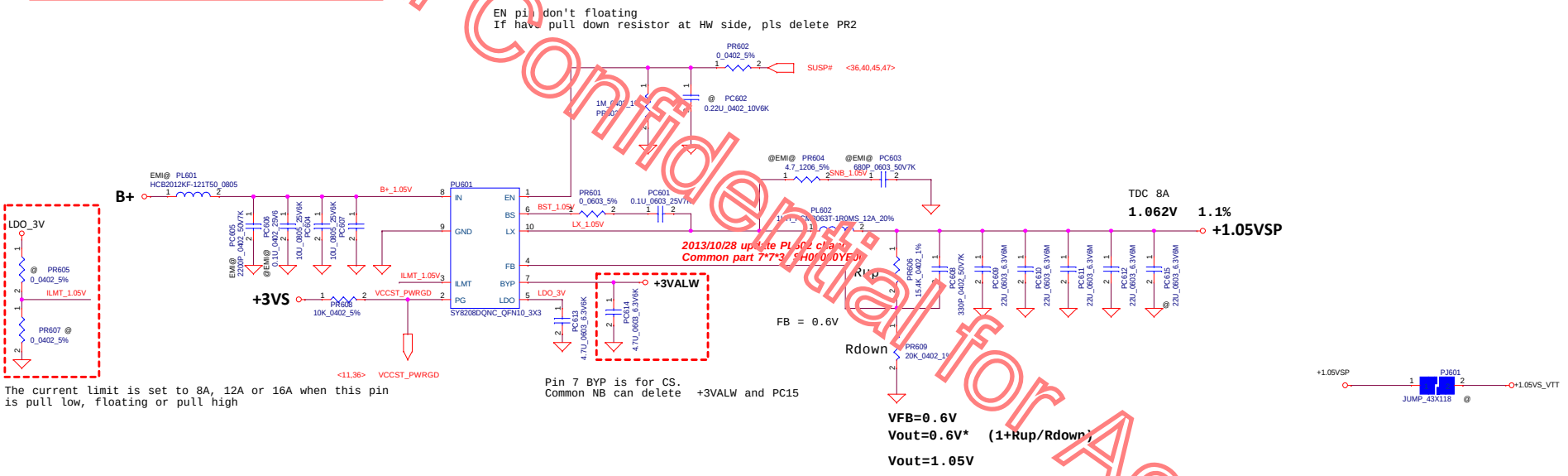
Compal Electronics, Inc.

Title: +1.35VP/+0.675VSP

Size: Custom | Document Number | Rev: 1.0

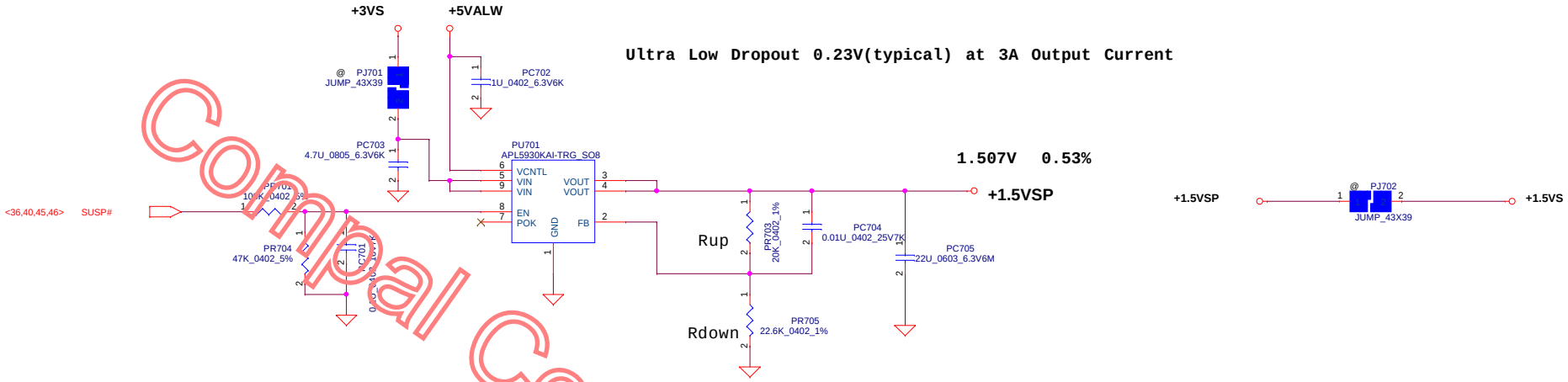
Date: Friday, October 17, 2014 | Sheet 45 of 54

Module model information
SY8208D_V1.mdd



Security Classification	Compal Secret Data		Compal Electronics, Inc.
Issued Date	2013/10/01	Deciphered Date	2014/05/24

Title	+1.05VSP		
Size C	Document Number		Rev 1.0
Date: Friday, October 17, 2014	Sheet 46 of 54		



Security Classification	Compal Secret Data		
Issued Date	2013/10/01	Deciphered Date	2014/05/24

Compal Electronics, Inc.

Title: +1.5VSP

Size	Document Number	Rev
Custom		1.0

Date: Friday, October 17, 2014 Sheet 47 of 54

Module model information:
ISL95813 (for 15W & 28W CPU)

Base on BDW PDDG Rev_0_73			
Location	15W TDC 14A MAX 32A OCP 38.4A Loadline=-2.0mv/A	28W TDC 19A MAX 40A OCP 48A Loadline=-2.0mv/A	Note
PR820	392 Ohm	499Ohm	OCP
PR816	1.27kOhm	1.58kOhm	Droop
PC816	0.033uF	0.022uF	RC Match
PR804	90.9kOhm	113kOhm	PROG1
PR807	93.1kOhm	95.3kOhm	IMON
PC811	0.1uF (0402)	0.1uF (0402)	RC Filter

H-side MOS: MDV1525URH
Rds(on):
<10.1mohm@Vgs=10V
<14.0mohm@Vgs=4.5V
Id :24A@Vgs=10V

L-side MOS: MDU1511RH
Rds(on):
<2.4mohm@Vgs=10V
<3.3mohm@Vgs=4.5V
Id :100A@Vgs=10V

-->20130828
Choke: 0.15UH (Size:7*7*4)
SH00000U300
Rdc=0.66mohm +-7%
Heat Rating Current=36A
Saturation Current=45A

+1.05VS_VCC Follow intel guideline

PR802 130_0402_1%
PR803 54.9_0402_1%
PC802 1U_0402_6.3V6K

Note:
VR_SVID_ALRT# Pull high on HW side

<11> VR_SVID_DATA
<11> VR_ALERT#
<11> VR_SVID_CLK
<11> VR_ON
<8,11> VGATE
<36> VR_HOT#

PR805 1.91K_0402_1%
PC808 1000P_0402_50V7K
PR807 121K_0402_1%
PH802 470K_0402_5%_TSM0B474J4702RE
PR810 5.62K_0402_1%
PR811 27.4K_0402_1%
PC809 47P_0402_50V8J

Over temperature protection:
OTP Setting: 100C active
Pin5 (NTC) voltage <0.88V, Protect
Pin5 (NTC) voltage >0.92v, recovery

2013/10/28 update PH802 chang
Common part SL200002E00

PU801 ISL95813HRZ-T_QFN20_3X4
PAD SCLK ALERT# SDA PRGM1
VR_ON PGOOD IMON VR_HOT# NTC COMP FB RTN ISUMN ISUMP
LGATE PHASE UGATE BOOT VCC PRGM2

15W@ PR804 90.9K_0402_1%
28W@ PR804 113K_0402_1%

Note:
PR804=113K
=>Icc(max)=40A
fsw=700KHz

PR806 0_0603_5%
PR801 2.2_0603_5%
PC801 0.22U_0603_16V7K
PC811 0.1U_0402_25V6
PR812 124K_0402_1%

Note:
PR812=124K
=>Slew rate=53mV/us
Vboot = 1.7V

PQ801 AON7518_DFN8-5
PQ803 ADN6554_DFN5X6-8-5
28W@ PQ802 ADN6554_DFN5X6-8-5

CPU_B+
PC803 10U_0805_25V6K
PC804 10U_0805_25V6K
EMI@ PC805 0.01U_0402_50V7K
EMI@ PC806 220P_0402_50V7K
PC807 68U_25V_M_R0.36
EMI@ PL801 HCB2012KF-121T50_0805
B+

Height 8 mm
100u_SF000000I80
Height 6 mm
68u_SF000000W00

2014/01/21 update PL802 change
Common part SH000011H00

PL802 0.22UH 20% FDUE0640J -H 25A
+CPU_CORE

PR808 4.7_1206_5%
EMI@ PC810 680P_0603_50V7K
PR809 3.65K_0603_1%

TDC 19A
MAX 40A
OCP 48A
Loadline=-2.0mv/A

PC813 6800P_0402_25V7K
PR813 1.91K_0402_1%
33P_0402_50V8J PC812
PR814 2K_0402_1%
@ PC814 330P_0402_50V7K
@ PR815 10_0402_1%
@ PC815 390P_0402_50V7K
15W@ PR816 1.27K_0402_1%

Droop
28W@ PR816 1.58K_0402_1%

PR817 4.99M_0402_1%

RC Match
15W@ PC816 0.033U_0402_16V7K
28W@ PC816 0.022U_0402_16V7K

PC817 0.1U_0402_16V4Z
PR818 2.61K_0402_1%
PR819 11K_0402_1%
PH801 10KB_0402_5%_ERTJ0ER103J

2013/10/28 update PH801 chang
Common part SL200002G00

<11> VCC_SENSE
<11> VSS_SENSE

@ PC818 330P_0402_50V7K
@ PC819 0.082U_0402_16V7K
PC820 0.01U_0402_50V7K

28W@ PR820 499_0402_1%
OCP Setting
15W: 38A
28W: 48A
PR820 15W@ 392_0402_1%

@ PC821 4700P_0402_25V7K
@ PR821 1.5K_0402_1%

Local sense put on HW site

Title	123	
	CPU_CORE/GFX_CORE	
Size	Document Number	Rev 1.0
	A5WAH M/B LA-B991P	
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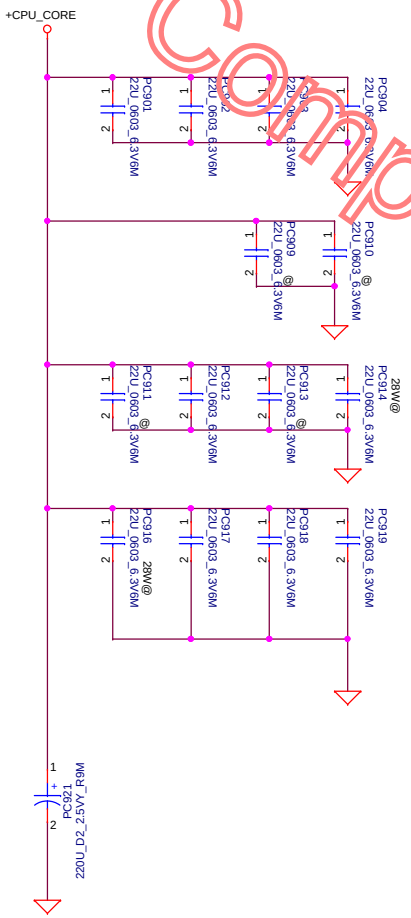
PWR Rule
需確認 最 新 SPEC
Modify 8/6.



30 X 22uF 0805
2012/10/23
check the output cap Qty!!!
2012/10/24
23 pcs 22uF and reserve 7 pcs
2013/01/14
22uF*17 unpop:22uF*3

20130828
15W: 22uF*14
28W: 22uF*16

Security Classification	Compal Secret Data		
Issued Date	2013/10/01	Deciphered Date	2014/05/24

Compal Electronics, Inc.

Title: CPU_CORE_CAP

Size	Document Number	Rev
Custom		1.0

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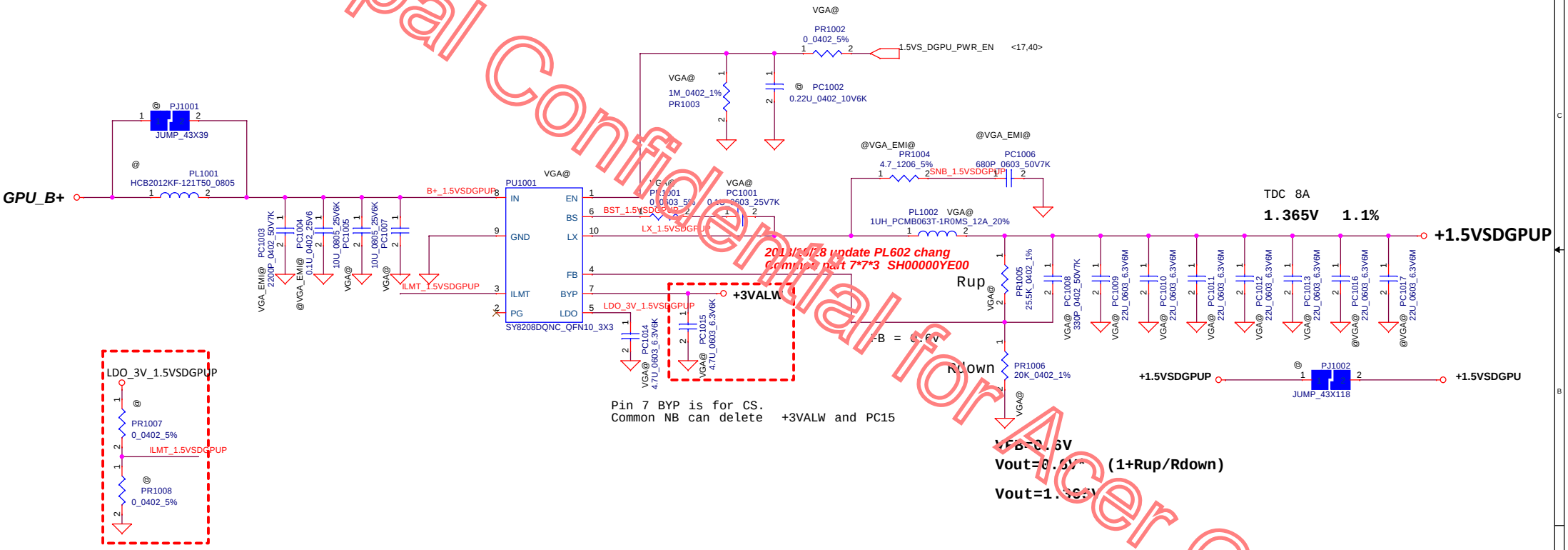

Security Classification	Compal Secret Data		
Issued Date	2013/10/01	Deciphered Date	

Compal Electronics, Inc.			
Title	1.5VSDGPUP		
Size	Document Number		Rev 1.0
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Module model information:
RT8813A_V1A for IC module
RT8813A_V1B for SW module

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 Spec and component Values

PWM-VID Spec		Config B	Config C	Config D
Vmin		0.6V	0.65V	0.9V
Vmax		1.2V	1.15V	1.15V
Vboot		0.9V	0.9V	1.028V
Voltage step		6.25mV	25mV	12.5mV
N of Voltage level		96	20	20
Rrefadj	PR1206	20K	39K	27K
Rref1	PR1204	20K	30K	7.5K
Rboot	PR1205	2K	3K	0
Rref2=PR1209 +PR1212	PR1209	18K	24K	6.2K
	PR1212	0	3K	1.74K
C	PC1209	2.7nf	1.8nf	5.6nf
		N15S-GT	N15V-GL	N15V-GM

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

I_ripple=(19-0.9)*0.9/(304.89Khz*0.36u*19)=7.811A

OCP=54A/2=27A per phase
Ivalley=27A-7.811A/2=23.1A

H-side MOS:AON6552
Rds(on):
5.6mohm@Vgs=10V
6.7mohm@Vgs=4.5V
Id :20A@Ta=25 degC

L-side MOS:AON6554
Rds(on):
3.2mohm@Vgs=10V
3~3.8mohm@Vgs=4.5V
Id :85A@Ta=25 degC

Choke: 0.22uH (Size:7*7*4)
Rdc=0.97mohm +-5%
Heat Rating Current=34A
Saturation Current=25A

C=3*330uF (9mohm)=990uF
Vripple=Iripple*ESR(min)=7.811A*3mohm=23.4mV

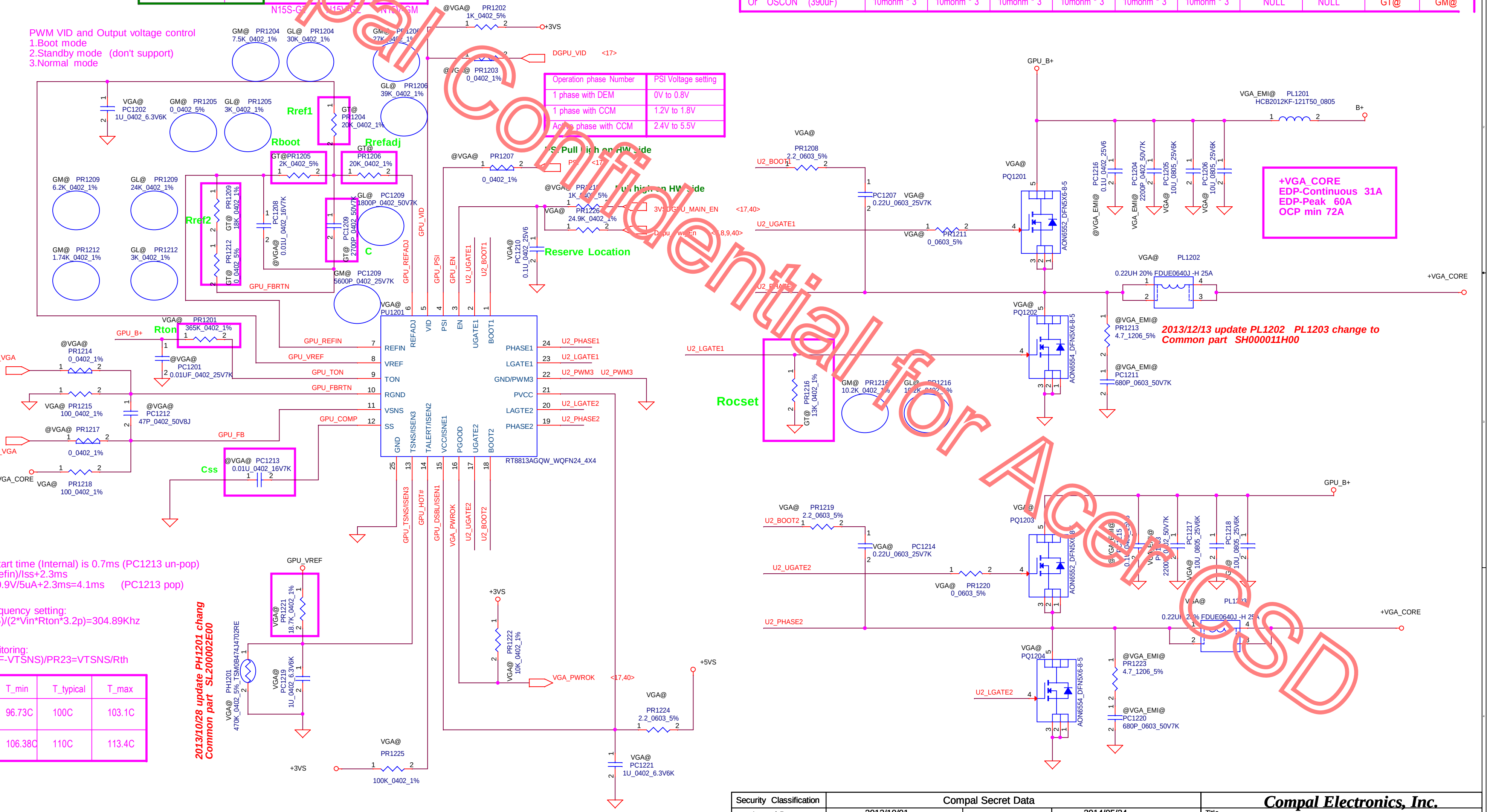
Different VGA Chip (different EDP peak Current) need select different solution

VGA Chip	N14P-GV	N14P-GV2	N14M-GS	N14M-LP	N14P-LP	N14P-GE	N14P-GS	N14P-GT	N15S-GT	N15V-GM
OpenVReg Configurations	Config B	Config B	Config B	Config B	Config B	Config B	Config B	Config B	Config B	Config C
Rated TDP Power at Tj=102C	18W	25W	18W	13W	18.9W	25W	25.6W	35.5W	18W	18.16W
Boosted GPU Total at Tj=102C	25W	32W	25W	20W	23W	N/A	30W	40W	25W	24.72W
EDP-Continuous at Tj=102C	24A	32A	26A	22A	25A	27A	38A	45A	31A	29.2A
EDP-Peak at Tj=102C	35A	55A	45A	35A	35A	40A	60A	75A	60A	44.3A
Istep max (Evaluation)	15A	27A	25A	20A	14A	12A	31.5A	35A		
OCP Setting Current	42A	66A	54A	42A	42A	48A	72A	90A	72A	54A
Rocset	8.96K	12.45K	10.7K	8.96K	8.96K	9.83K	8.3K	9.39K	13K	10.2K
Recommendation	2phase 1H1L	2phase 1H1L	2phase 1H1L	2phase 1H1L	2phase 1H1L	2phase 1H1L	2phase 1H2L	2phase 1H2L	2phase 1H1L	2phase 1H1L
Polymer Cap (330uF)	6mohm * 2	9mohm * 3	9mohm * 3	6mohm * 2	6mohm * 2	6mohm * 2	6mohm * 3 (L=0.22uH)	4.5mohm * 3 (L=0.15uH)		
Or OSCON (390uF)	10mohm * 3	10mohm * 3	10mohm * 3	10mohm * 3	10mohm * 3	10mohm * 3	NULL	NULL	GT@	GM@

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

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

+VGA_CORE
EDP-Continuous 31A
EDP-Peak 60A
OCP min 72A



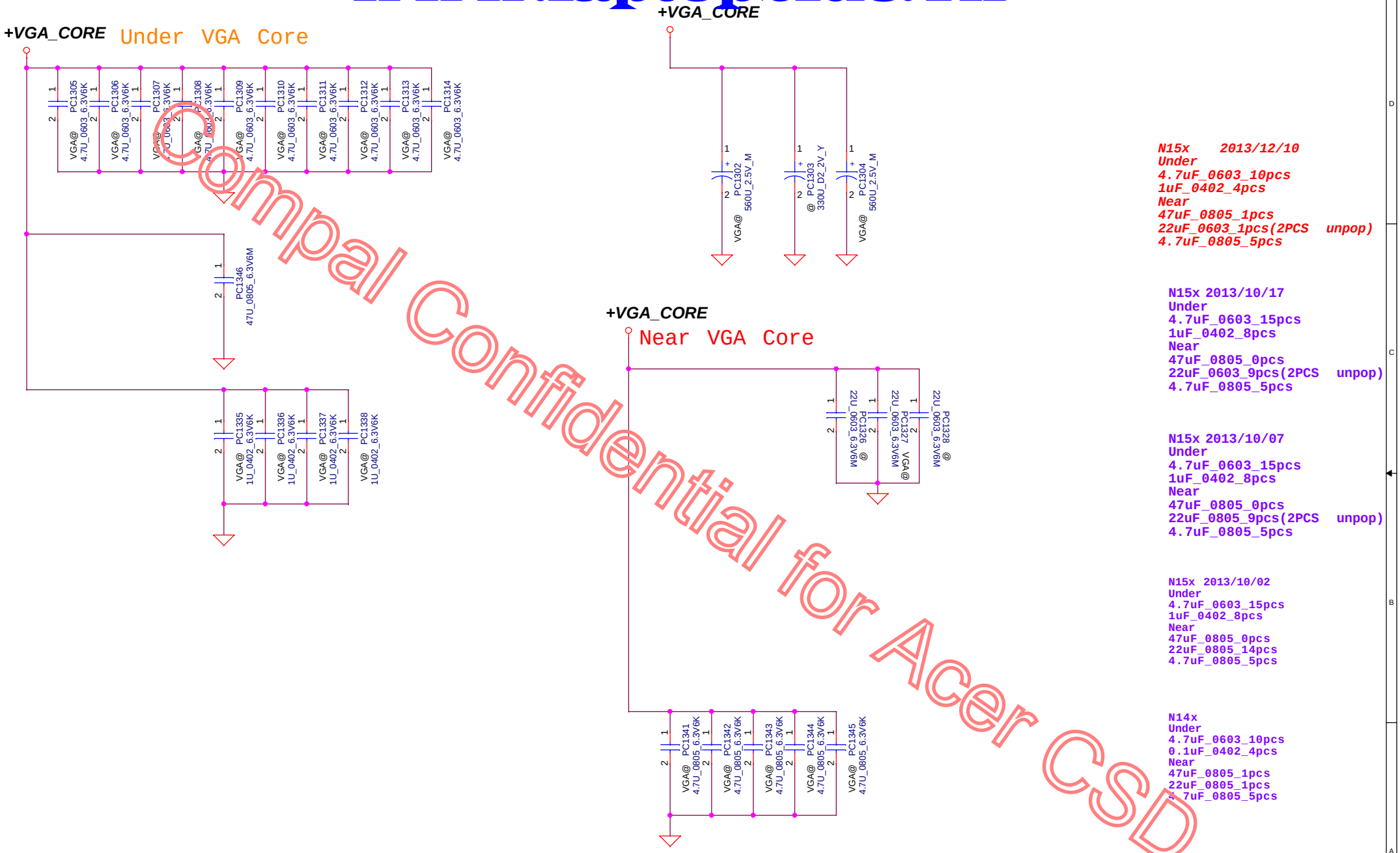
1. VSNS Soft-Start time (Internal) is 0.7ms (PC1213 un-pop)
Tss=(Css*Vrefin)/Iss+2.3ms
=0.01U*0.9V/5uA+2.3ms=4.1ms (PC1213 pop)

2. Switching frequency setting:
Fsw=(Vin-0.5)/(2*Vin*Rton*3.2p)=304.89Khz

3. Thermal monitoring:
(VGPU_VREF-VTSNS)/PR23=VTSNS/Rth

	T_min	T_typical	T_max
PR1221=18.7K	96.73C	100C	103.1C
PR1221=13K	106.38C	110C	113.4C

Security Classification	Compal Secret Data		Compal Electronics, Inc.
Issued Date	2013/10/01	Deciphered Date 2014/05/24	Title: RT8813
			Size / Document Number / Rev 1.0
			Date: Friday, October 17, 2014 / Sheet 51 of 54



N15x 2013/12/10
Under
4.7uF_0603_10pcs
1uF_0402_4pcs
Near
47uF_0805_1pcs
22uF_0603_1pcs(2PCS unpop)
4.7uF_0805_5pcs

N15x 2013/10/17
Under
4.7uF_0603_15pcs
1uF_0402_8pcs
Near
47uF_0805_0pcs
22uF_0603_9pcs(2PCS unpop)
4.7uF_0805_5pcs

N15x 2013/10/07
Under
4.7uF_0603_15pcs
1uF_0402_8pcs
Near
47uF_0805_0pcs
22uF_0805_9pcs(2PCS unpop)
4.7uF_0805_5pcs

N15x 2013/10/02
Under
4.7uF_0603_15pcs
1uF_0402_8pcs
Near
47uF_0805_0pcs
22uF_0805_14pcs
4.7uF_0805_5pcs

N14x
Under
4.7uF_0603_10pcs
0.1uF_0402_4pcs
Near
47uF_0805_1pcs
22uF_0805_1pcs
4.7uF_0805_5pcs

Security Classification	Compal Secret Data		
Issued Date	2013/10/01	Deciphered Date	2014/05/24

Compal Electronics, Inc.

Title: *VGA_CORE CAP*

Size	Document Number	Rev
Custom		1.0

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

Item	Fixed Issue	Reason for change	PG#	Modify List	Date	Phase
1	Design Update	ESD request	P.42 P.43 P.45	Add PC204 330P_0402_50V7K SE074331K80 Add PC324 0.1U_0402_16V4Z SE070104Z80 Add PC514 PC515 0.1U_0402_16V4Z SE070104Z80	20140812	EVT
2						
3						
4						
5						
15						
16						
17						

Security Classification	Compal Secret Data		
Issued Date	2013/10/30	Deciphered Date	2014/05/24

Compal Electronics, Inc.

Title: PIR (PWR)

Size	Document Number	Rev
Custom		1.0

Date: Friday, October 17, 2014 Sheet 53 of 54

Item	Fixed Issue	Reason for change	PG#	Modify List	Date	Phase
1						
2	Desidn change					
3	Desidn change					
4	Desidn change					
5	Desidn change					
6	Desidn change					
7	Desidn change					
8	Desidn change					
9	Desidn change					
10	Desidn change					
11	Desidn change					
12	Desidn change					
13	Desidn change					
15	Desidn change					
16	Desidn change					
17	Desidn change					
18	CRT leakage					
19	CRT leakage					
20	CRT leakage					
21	CRT leakage					
22	Desidn change					
23	Desidn change					
24	Desidn change					
25	Desidn change					
26	Desidn change					
27	Desidn change					
28	Desidn change					
29	Desidn change					
30	Desidn change					
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32	Desidn change					
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34	Desidn change					
35	Desidn change					
36	Desidn change					
37	Desidn change					
38	Desidn change					
39	Desidn change					
40	Desidn change					
41	Desidn change					
42	Desidn change					
43	Desidn change					

Security Classification	Compal Secret Data		
Issued Date	2013/10/30	Deciphered Date	2014/05/24

Compal Electronics, Inc.			
Title	PIR-HW		
Size: Custom	Document Number: Z5WAH M/B LA-B161P		Rev: 1.0
Date: Friday, October 17, 2014	Sheet 54 of 54		