1. ALL RESISTANCE VALUES ARE IN OHMS, 0.1 WATT +/- 5%.
2. ALL CAPACITANCE VALUES ARE IN MICROFARADS.
3. ALL CRYSTALS & OSCILLATOR VALUES ARE IN HERTZ.

REV	ECN	DESCRIPTION OF REVISION	CK APPD / DATE
6	0001395489	ENGINEERING RELEASED	2012-03-13

SCHEM,MLB,J30

03/12/12

Schematic / PCB #'s

PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
051-9058	1	SCHEM,MLB,J30	SCH	CRITICAL	
820-3115	1	PCBF,MLB,J30	PCB	CRITICAL	

DRAWING
TITLE=MLB
ABBREV=DRAWING
LAST_MODIFIED=Tue Mar 13 14:00:17 2012

DRAWING TITLE: SCHEM,MLB,J30

Apple Inc.

DRAWING NUMBER: 051-9058 SIZE: D
REVISION: 6.0.0
BRANCH:
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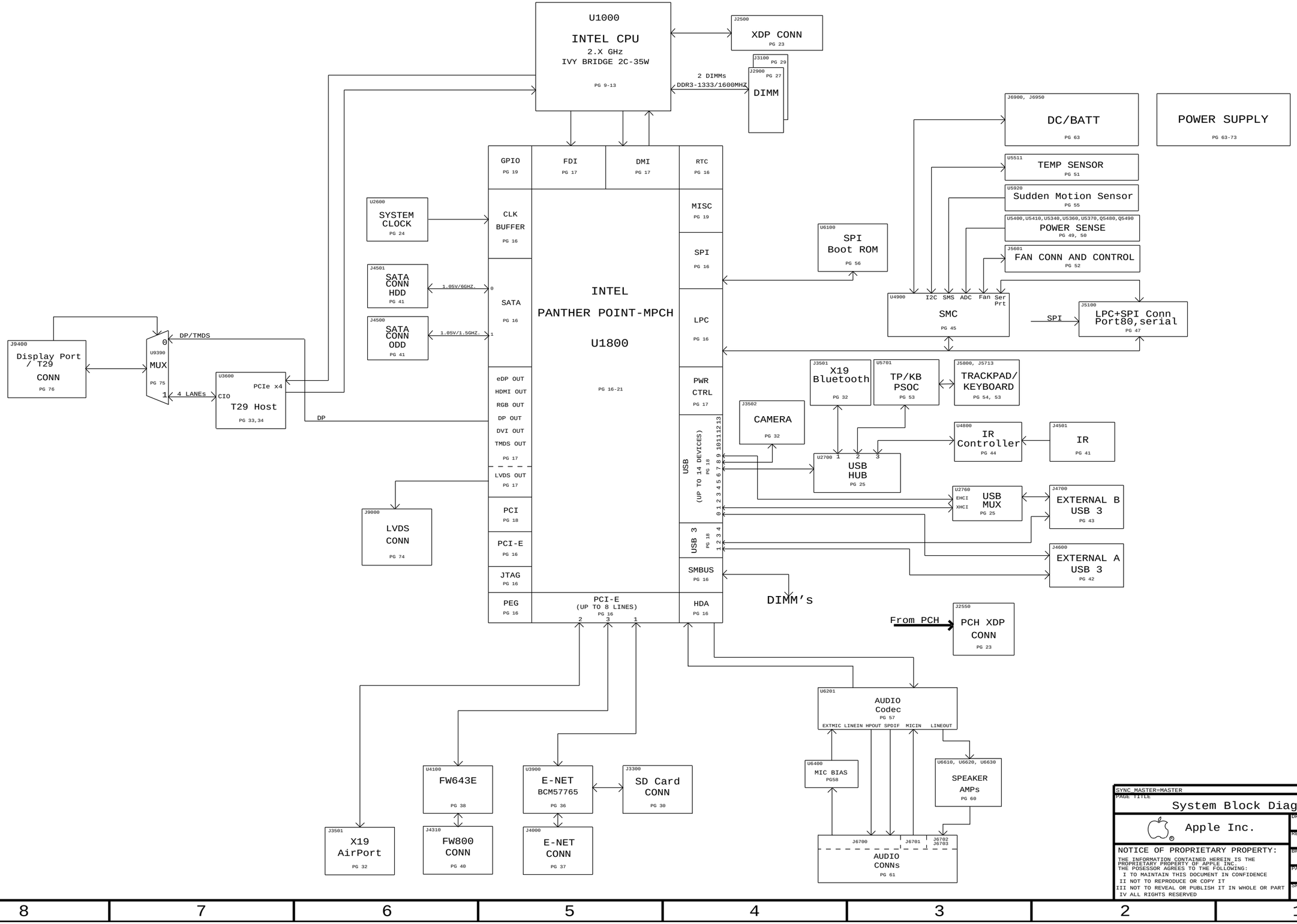

SYNC_MASTER=MASTER SYNC_DATE=02/15/2013

PAGE TITLE

System Block Diagram

Apple Inc.

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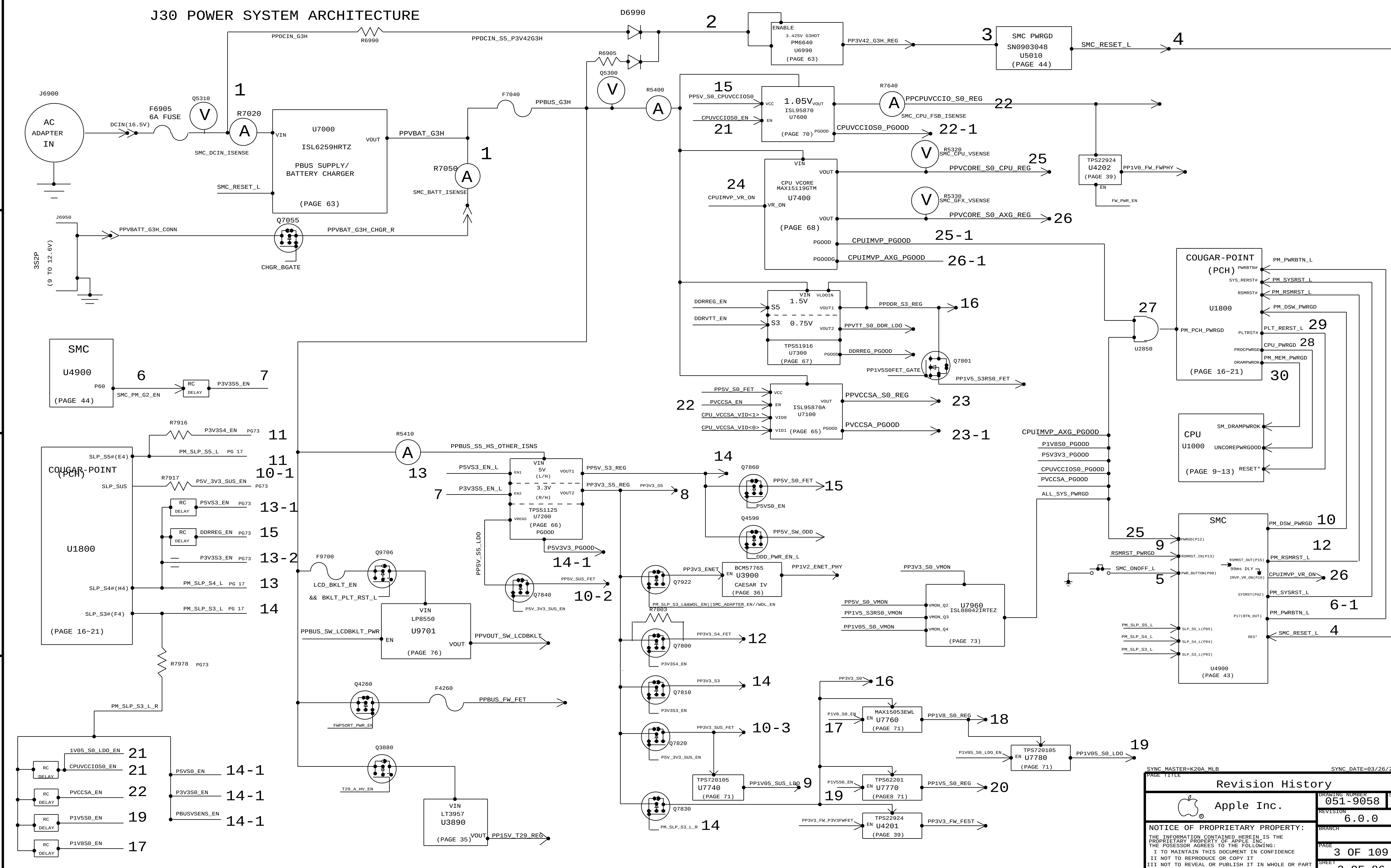
J30 POWER SYSTEM ARCHITECTURE



AC ADAPTER IN
J6900
DCIN(16.5V)
F6905 6A FUSE
Q5310
R7020
SMC_DCIN_ISENSE
U7000
ISL6259HRTZ
PBUS SUPPLY/ BATTERY CHARGER
(PAGE 63)
SMC_RESET_L
PPVBAT_G3H
R7050
SMC_BATT_ISENSE
J6950
3S2P (9 TO 12.6V)
PPVBATT_G3H_CONN
Q7055
CHGR_BGATE
PPVBAT_G3H_CHGR_R
PPDCIN_G3H
R6990
PPDCIN_S5_P3V42G3H
D6990
R6905
Q5300
F7040
PPBUS_G3H
R5400
ENABLE
3.425V G3HOT
PM6640
U6990
(PAGE 63)
PP3V42_G3H_REG
SMC PWRGD
SN0903048
U5010
(PAGE 44)
SMC_RESET_L
PP5V_S0_CPUVCCIOS0
CPUVCCIOS0_EN
1.05V
ISL95870
U7600
(PAGE 70)
CPUVCCIOS0_PGOOD
R7640
PPCPUVCCIO_S0_REG
SMC_CPU_FSB_ISENSE
TPS22924
U4202
(PAGE 39)
PP1V0_FW_FWPHY
FW_PWR_EN
CPU VCORE
MAX15119GTM
U7400
(PAGE 68)
CPUIMVP_VR_ON
R5320
SMC_CPU_VSENSE
PPVCORE_S0_CPU_REG
R5330
SMC_GFX_VSENSE
PPVCORE_S0_AXG_REG
CPUIMVP_PGOOD
CPUIMVP_AXG_PGOOD
DDRREG_EN
DDRVTT_EN
1.5V
0.75V
TPS51916
U7300
(PAGE 67)
PPDDR_S3_REG
PPVTT_S0_DDR_LDO
DDRREG_PGOOD
Q7801
PP1V5S0FET_GATE
PP1V5_S3RS0_FET
PP5V_S0_FET
PVCCSA_EN
CPU_VCCSA_VID<1>
CPU_VCCSA_VID<0>
ISL95870A
U7100
(PAGE 65)
PPVCCSA_S0_REG
PVCCSA_PGOOD
COUGAR-POINT (PCH)
U1800
(PAGE 16~21)
PM_PWRBTN_L
PM_SYSRST_L
PM_RSMRST_L
PM_DSW_PWRGD
PLT_RERST_L
CPU_PWRGD
PM_MEM_PWRGD
PM_PCH_PWRGD
U2850
CPU
U1000
(PAGE 9~13)
SM_DRAMPWROK
UNCOREPWRGOOD
RESET*
CPUIMVP_AXG_PGOOD
P1V8S0_PGOOD
P5V3V3_PGOOD
CPUVCCIOS0_PGOOD
PVCCSA_PGOOD
ALL_SYS_PWRGD
SMC
U4900
(PAGE 44)
P60
SMC_PM_G2_EN
RC DELAY
P3V3S5_EN
R7916
P3V3S4_EN
PM_SLP_S5_L
SLP_S5#(E4)
R7917
P5V_3V3_SUS_EN
SLP_SUS
P5VS3_EN
DDRREG_EN
P3V3S3_EN
SLP_S4#(H4)
PM_SLP_S4_L
SLP_S3#(F4)
PM_SLP_S3_L
R7978
PM_SLP_S3_L_R
R5410
PPBUS_S5_HS_OTHER_ISNS
P5VS3_EN_L
P3V3S5_EN_L
TPS51125
U7200
(PAGE 66)
PP5V_S3_REG
PP3V3_S5_REG
P5V3V3_PGOOD
PP5V_S5_LDO
Q7840
PP5V_SUS_FET
P5V_3V3_SUS_EN
Q7860
PP5V_S0_FET
P5VS0_EN
Q4590
PP5V_SW_ODD
ODD_PWR_EN_L
Q7922
PP3V3_ENET
BCM57765
U3900
CAESAR IV
(PAGE 36)
PP1V2_ENET_PHY
PM_SLP_S3_L&WOL_EN||SMC_ADAPTER_EN//WOL_EN
R7803
Q7800
PP3V3_S4_FET
P3V3S4_EN
Q7810
PP3V3_S3
P3V3S3_EN
Q7820
PP3V3_SUS_FET
P5V_3V3_SUS_EN
TPS720105
U7740
(PAGE 71)
PP1V05_SUS_LDO
Q7830
PM_SLP_S3_L_R
F9700
Q9706
LCD_BKLT_EN
&& BKLT_PLT_RST_L
LP8550
U9701
(PAGE 76)
PPBUS_SW_LCDBKLT_PWR
PPVOUT_SW_LCDBKLT
Q4260
F4260
PPBUS_FW_FET
FWPSORT_PWR_EN
Q3880
T29_A_HV_EN
LT3957
U3890
(PAGE 35)
PP15V_T29_REG
PP3V3_S0_VMON
PP5V_S0_VMON
PP1V5_S3RS0_VMON
PP1V05_S0_VMON
U7960
ISL88042IRTEZ
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RSMRST_PWRGD
SMC_ONOFF_L
PM_SLP_S5_L
PM_SLP_S4_L
PM_SLP_S3_L
U4900
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PM_DSW_PWRGD
PM_RSMRST_L
CPUIMVP_VR_ON
PM_SYSRST_L
PM_PWRBTN_L
SMC_RESET_L
PP3V3_S0
P1V8_S0_EN
MAX15053EWL
U7760
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PP1V8_S0_REG
P1V05_S0_LDO_EN
TPS720105
U7780
(PAGE 71)
PP1V05_S0_LDO
P1V5S0_EN
TPS62201
U7770
(PAGE8 71)
PP1V5_S0_REG
PP3V3_FW_P3V3FWFET
TPS22924
U4201
(PAGE 39)
PP3V3_FW_FEST
1V05_S0_LDO_EN
CPUVCCIOS0_EN
PVCCSA_EN
P1V5S0_EN
P1V8S0_EN
P5VS0_EN
P3V3S0_EN
PBUSVSENS_EN

SYNC_MASTER=K20A_MLB
SYNC_DATE=03/26/2009

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NOTICE OF PROPRIETARY PROPERTY:

PROTO:

SYNC_MASTER=K90I_MLB SYNC_DATE=02/15/2011

PAGE TITLE

Revision History

Apple Inc.

DRAWING NUMBER 051-9058 SIZE D

REVISION 6.0.0

BRANCH

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BOM Variants

BOM NUMBER	BOM NAME	BOM OPTIONS
607-8895	CMN PTS,PCBA,MLB,J30	J30_COMMON,FET_PAIR
085-3092	J30 MLB DEVELOPMENT BOM	J30_DEVEL:ENG
607-8721	POWER FETS PAIR,FAIRCHILD,DDR,J30	DDR_POWER_FET:FAIR
607-8722	POWER FETS PAIR,FAIRCHILD,5V_S3,J30	5V_S3_POWER_FET:FAIR
607-8723	POWER FETS PAIR,FAIRCHILD,PBUS_CHARGER,J30	CHARGER_POWER_FET:FAIR
607-9309	POWER FETS PAIR,RENESAS,DDR,J30	DDR_POWER_FET:REN
607-9310	POWER FETS PAIR,RENESAS,5V_S3,J30	5V_S3_POWER_FET:REN
607-9311	POWER FETS PAIR,RENESAS,PBUS_CHARGER,J30	CHARGER_POWER_FET:REN
639-3752	PCBA,MLB,MOL,2.9G,J30	J30_CMNPTS,CPU_2_9GHZ,SODIMM:MOLEX,EEEE_F1YK
639-3756	PCBA,MLB,HYB,2.9G,J30	J30_CMNPTS,CPU_2_9GHZ,SODIMM:HYBRID,EEEE_F1YH
639-3753	PCBA,MLB,FOX,2.5G,J30	J30_CMNPTS,CPU_2_5GHZ,SODIMM:FOXCONN,EEEE_F1YL
639-3755	PCBA,MLB,HYB,2.5G,J30	J30_CMNPTS,CPU_2_5GHZ,SODIMM:HYBRID,EEEE_F1YJ
639-3751	PCBA,MLB,MOL,2.5G,J30	J30_CMNPTS,CPU_2_5GHZ,SODIMM:MOLEX,EEEE_F1YM
639-3754	PCBA,MLB,FOX,2.9G,J30	J30_CMNPTS,CPU_2_9GHZ,SODIMM:FOXCONN,EEEE_F1YG

J30 BOM GROUPS

BOM GROUP	BOM OPTIONS
J30_COMMON	ALTERNATE,COMMON,J30_COMMON1,J30_COMMON2,J30_DEBUG:ENG,J30_PROGPARTS,T29BST:Y,TBTHV:P15V
J30_COMMON1	BATT_3S,CPUMEM_S0,USBHUB2513B,HUB_3NONREM,T29:YES,SDRV_PD,SDRVI2C:MCU,AXG_PHASE1,BTPWR:S4,UV_GLUE_J30
J30_COMMON2	MIKEY,TPAD:Z2,RAMCFG_SLOT
J30_PROGPARTS	BOOTROM_PROG,SMC_PROG,TPAD_PROG,ENET_PROG,T29ROM:PROG,T29MCU:PROG
J30_DEVEL:ENG	BKLT:ENG,XDP_CONN,XDP_CPU:BPM,XDP_PCH,LPCPLUS_CONN:YES,LOADISNS:YES,DDRVREF_DAC,S0PGOOD_ISL
J30_DEVEL:PVT	LPCPLUS_CONN:YES,XDP_CONN
J30_DEBUG:ENG	DEVEL_BOM,MOJO:YES,XDP,LPCPLUS_R:YES,VREFDQ:M1_M3,VREFCA:LDO_DAC
J30_DEBUG:PVT	DEVEL_BOM,BKLT:PROD,MOJO:YES,XDP,LPCPLUS_R:YES,VREFDQ:M1_M3,VREFCA:LDO,USBHUB2514B
J30_DEBUG:PROD	BKLT:PROD,MOJO:YES,XDP,LPCPLUS_R:YES,LOADISNS:NO,VREFDQ:M1_M3,VREFCA:LDO,USBHUB2513B

Module Parts

PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
337S4113	1	IC,IVB,2C,35W,1023BGA	U1000	CRITICAL	CPU_IVB_2C
337S4264	1	IVB,S R0N0,PRQ,L1,2.5,35W,2+2,1.1,3M,BGA	U1000	CRITICAL	CPU_2_5GHZ
337S4265	1	IVB,S R0MU,PRQ,L1,2.9,35W,2+2,1.25,4M,BGA	U1000	CRITICAL	CPU_2_9GHZ
337S4269	1	PANTHERPOINT,C1,SLJ8C,PRQ,BD82HM77	U1800	CRITICAL	
343S0534	1	IC,BCM57765B0,ENET&SD,8X8	U3900	CRITICAL	
338S0753	1	IC,FW643E,1394B PHY/DHCI LINK/PCI-E,12	U4100	CRITICAL	
338S1072	1	IC,T29,PRQ,S LJJY,FCBGA,15x15MM,C1	U3600	CRITICAL	T29:YES
353S3055	1	IC,PI3VEDP212,X2 DISPLAYPORT 2:1 MUX,QFN	U9390	CRITICAL	
946-3827	1	J30 MLB DYMAX ADHESIVE 29993-SC 0.48G	UV_GLUE_J30	CRITICAL	UV_GLUE_J30
516S0806	1	CONN,204P,SODIMM,SOCKET,DDR3,RAM,BGA,FOXCONN	J3100	CRITICAL	SODIMM:FOXCONN
516-0246	1	CONN,204P,SODIMM,DDR3,P=0.6MM,FOXCONN	J2900	CRITICAL	SODIMM:FOXCONN
516S0805	1	CONN,204P,SODIMM,SOCKET,DDR3,RAM,BGA,MOLEX	J3100	CRITICAL	SODIMM:MOLEX
516-0245	1	CONN,204P,SODIMM,DDR3,P=0.6MM,MOLEX	J2900	CRITICAL	SODIMM:MOLEX
516S0805	1	CONN,204P,SODIMM,SOCKET,DDR3,RAM,BGA,MOLEX	J3100	CRITICAL	SODIMM:HYBRID
516-0246	1	CONN,204P,SODIMM,DDR3,P=0.6MM,FOXCONN	J2900	CRITICAL	SODIMM:HYBRID

Bar Code Labels / EEEE #'s

PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE:F1YG]	CRITICAL	EEEE_F1YG
826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE:F1YH]	CRITICAL	EEEE_F1YH
826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE:F1YJ]	CRITICAL	EEEE_F1YJ
826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE:F1YK]	CRITICAL	EEEE_F1YK
826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE:F1YL]	CRITICAL	EEEE_F1YL
826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE:F1YM]	CRITICAL	EEEE_F1YM

Programmable Parts

PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
335S0862	1	IC,FLASH,SERIAL,SPI,!MBIT,2V7,REV F	U3990	CRITICAL	ENET_BLANK
341S3096	1	IC ENET,1!MBITFLAH,CIV REV01,K9x	U3990	CRITICAL	ENET_PROG
335S0550	1	IC,EEPROM,SERIAL,SPI,4Kx8,1.8V,MLP8,LF	U3690	CRITICAL	T29ROM:BLANK
341S3430	1	IC,T29 EEPROM,LR,J30/J31	U3690	CRITICAL	T29ROM:PROG
337S3997	1	IC,MCU,32B,LPC1112A,16KB/2KB,HVQFN25	U9330	CRITICAL	T29MCU:BLANK
341S3365	1	IC,PROGRMD,T29,PORT MCU,K90IA,K91A,K92A	U9330	CRITICAL	T29MCU:PROG
338S1098	1	IC,SMC12-A3,40MHZ/50DMIPS MCU,9x9,157BGA	U4900	CRITICAL	SMC_BLANK
341S3300	1	IC,SMC,EXTERNAL,FSB,A3,J30	U4900	CRITICAL	SMC_PROG
335S0807	1	IC,SPI SRL 50MHZ FLASH,64MBT,8SOP,FUSE=1	U6100	CRITICAL	BOOTROM_BLANK
335S0812	1	64 MBIT SPI SRL DUAL I/O FLSH,SOIC8	U6100	CRITICAL	BOOTROM_BLANK
341S3558	1	IC,EFI,V00C7,J30/J31	U6100	CRITICAL	BOOTROM_PROG
341S2384	1	IR,ENCORE II, CY7C63803-LQXC	U4800	CRITICAL	
341S3522	1	IC,PSOC,TP/KB,J30/J31	U5701	CRITICAL	TPAD_PROG

Alternate Parts

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
138S0603	138S0602		ALL	Murata alt to Samsung
157S0058	157S0084		ALL	Delta alt to TDK Magnetics
128S0303	128S0353		ALL	Panasonic alt to Sanyo
138S0676	138S0691		ALL	Murata alt to Samsung
152S0778	152S0693		ALL	Cyntec alt to Vishay
376S0855	376S1032		ALL	Diodes alt to Toshiba
376S0977	376S0859		ALL	Diodes alt to Toshiba
376S0972	376S1017		ALL	Rohm alt to Toshiba
376S0937	376S0845		ALL	Fairchild alt to Renesas
376S0777	376S0761		ALL	AON alt to Siliconix
376S0957	376S0958		ALL	Fairchild alt to Fairchild
376S0953	376S0958		ALL	Fairchild alt to Renesas
377S0107	377S0126		ALL	Onsemi alt to Semtech
371S0709	371S0652		ALL	NXP alt to Infineon
514-0788	514-0671		ALL	Acon(w liteon) alt to Acon
607-9310	607-8722		ALL	Renesas alternate to Fairchild
607-9311	607-8723		ALL	Renesas alternate to Fairchild

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
152S1499	152S0864		ALL	Coilcraft alt to Murata
152S1493	152S1300		ALL	Coilcraft alt to Murata
138S0652	138S0648		ALL	Samsung/Murata alt to Taiyo
138S0684	138S0660		ALL	Murata alt to Taiyo
152S1512	152S1295		ALL	Cyntec alt to NEC
152S1019	152S1271		ALL	Cyntec alt to TOKO
376S1023	376S0960		ALL	Siliconix alt to Renesas
353S3312	353S3055		ALL	NXP alt to Pericom
353S3238	353S1428		ALL	Intersil alt to TI
353S3519	353S2179		ALL	Intersil alt to TI
155S0578	155S0367		ALL	Taiyo alt to Murata
138S0681	138S0638		ALL	Taiyo alt to Samsung
138S0671	138S0673		ALL	Taiyo alt to Murata
376S0903	376S0796		ALL	Fairchsil alt to Vishay
377S0124	377S0057		ALL	Amotech alt to Tdk
341S3492	341S3096		ALL	Numonix alt to Atmel (ENET ROM)
376S1053	376S0604		ALL	Diodes alt to Fairchild
376S1076	376S0634		ALL	Diodes alt to onsemi

Sub BOM

PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
085-3092	1	J30 MLB DEVELOPMENT	DEVEL	CRITICAL	DEVEL_BOM
607-8895	1	CMN PTS,PCBA,MLB,J30	CMNPTS	CRITICAL	J30_CMNPTS
607-8721	1	POWER_FETS PAIR,FAIRCHILD,DDR,J30	CSET1	CRITICAL	FET_PAIR
607-8722	1	POWER_FETS PAIR,FAIRCHILD,5V_S3,J30	CSET2	CRITICAL	FET_PAIR
607-8723	1	POWER_FETS PAIR,FAIRCHILD,PBUS_CHARGER,J30	CSET3	CRITICAL	FET_PAIR

SYNC_MASTER=K90I_MLB SYNC_DATE=02/15/2013

PAGE TITLE

BOM Configuration

Apple Inc.

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Functional Test Points

Fan Connectors

J4100	TRUE	PP5V_S0	6 7
J4101	TRUE	FAN_RT_PWM	52
J4102	TRUE	FAN_RT_TACH	52

(NEED TO ADD 1 GND TP)

MIC FUNC_TEST

J4050	TRUE	BI_MIC_LO	61 62
J4051	TRUE	BI_MIC_HI	61 62
J4052	TRUE	BI_MIC_SHIELD	61 62

(NEED TO ADD 1 GND TP)

SPEAKER FUNC_TEST

J4227	TRUE	SPKRAMP_L_N_OUT	60 61 85
J4228	TRUE	SPKRAMP_L_P_OUT	60 61 85
J4229	TRUE	SPKRAMP_R_N_OUT	60 61 85
J4230	TRUE	SPKRAMP_R_P_OUT	60 61 85
J4229	TRUE	SPKRAMP_SUB_N_OUT	60 61 85
J4231	TRUE	SPKRAMP_SUB_P_OUT	60 61 85

LVDS FUNC_TEST

J700	TRUE	PP3V3_LCDVDD_SW_F (NEED 2 TP)	6 74
J701	TRUE	PP3V3_S0_LCD_F	6 74
J702	TRUE	PPVOUT_SW_LCDBKLT (NEED 2 TP)	74 77
J703	TRUE	LVDS_DDC_CLK	8 74
J704	TRUE	LVDS_DDC_DATA	8 74
J705	TRUE	LVDS_IG_A_DATA_N<0>	17 74 80
J706	TRUE	LVDS_IG_A_DATA_P<0>	17 74 80
J707	TRUE	LVDS_IG_A_DATA_N<1>	17 74 80
J708	TRUE	LVDS_IG_A_DATA_P<1>	17 74 80
J709	TRUE	LVDS_IG_A_DATA_N<2>	17 74 80
J710	TRUE	LVDS_IG_A_DATA_P<2>	17 74 80
J711	TRUE	LVDS_CONN_A_CLK_F_N	74 85
J712	TRUE	LVDS_CONN_A_CLK_F_P	74 85
J713	TRUE	LED_RETURN_1	74 77
J714	TRUE	LED_RETURN_2	74 77
J715	TRUE	LED_RETURN_3	74 77
J716	TRUE	LED_RETURN_4	74 77
J717	TRUE	LED_RETURN_5	74 77
J718	TRUE	LED_RETURN_6	74 77

(NEED TO ADD 5 GND TP)

SATA ODD CONN

J264	TRUE	PP5V_SW_ODD (NEED 2 TP)	6 41
J265	TRUE	SMC_ODD_DETECT	41 45
J266	TRUE	SATA_ODD_D2R_C_P	41 85
J267	TRUE	SATA_ODD_D2R_C_N	41 85
J268	TRUE	SATA_ODD_R2D_P	41 80
J269	TRUE	SATA_ODD_R2D_N	41 80
J620	TRUE	SMC_SSD_TEMP_CTL_R	
J621	TRUE	HDD_OOB_TEMP	

(NEED TO ADD 3 GND TP)

SATA HDD/IR/SIL

J330	TRUE	PP5V_S0_HDD_FLT (NEED 2 TP)	6 41
J314	TRUE	SATA_HDD_R2D_P	41 80
J315	TRUE	SATA_HDD_R2D_N	41 80
J316	TRUE	SATA_HDD_D2R_C_P	41 80
J317	TRUE	SATA_HDD_D2R_C_N	41 80
J307	TRUE	SYS_LED_ANODE_R	41
J309	TRUE	IR_RX_OUT	41 44
J620	TRUE	SMC_SSD_THROTTLE_R	
J311	TRUE	PP5V_S3_IR_R	41

(NEED TO ADD 3 GND TP)

BATT POWER CONN

J322	TRUE	SMBUS_SMC_5_G3_SCL	6 45 48 84
J321	TRUE	SMBUS_SMC_5_G3_SDA	6 45 48 84
J320	TRUE	SYS_DETECT_L	63
J305	TRUE	PPVBAT_G3H_CONN (NEED 5 TP)	63 64

(NEED TO ADD 5 GND TP)

BIL CONN

J320	TRUE	PP3V42_G3H	6 7
J321	TRUE	SMBUS_SMC_5_G3_SCL	6 45 48 84
J322	TRUE	SMBUS_SMC_5_G3_SDA	6 45 48 84
J323	TRUE	SMC_BIL_BUTTON_L	45 46 63
J308	TRUE	SMC_LID_R	63

(NEED TO ADD 2 GND TP)

X19 CONN

J800	TRUE	PP3V3_WLAN (NEED 3 TP)	6 32 46
J801	TRUE	PCIE_AP_D2R_PI_P	32 81
J802	TRUE	PCIE_AP_D2R_PI_N	32 81
J803	TRUE	PCIE_AP_R2D_P	32 81
J804	TRUE	PCIE_AP_R2D_N	32 81
J805	TRUE	PCIE_CLK100M_AP_CONN_P	32 85
J806	TRUE	PCIE_CLK100M_AP_CONN_N	32 85
J807	TRUE	PP3V3_S3RS4_BT_F	32
J808	TRUE	PCIE_WAKE_L	17 24 32
J809	TRUE	USB_BT_CONN_P	32 80
J810	TRUE	USB_BT_CONN_N	32 80
J811	TRUE	AP_CLKREQ_Q_L	32
J812	TRUE	AP_RESET_CONN_L	32
J1600	TRUE	AP_TEMP_SMB_SDA_R	32
J1601	TRUE	AP_TEMP_SMB_SCL_R	32
J1602	TRUE	WIFI_EVENT_L_R	32

(NEED TO ADD 5 GND TP)

IPD_FLEX_CONN

J370	TRUE	PP3V3_S4	6 7
J374	TRUE	PP18V5_Z2	6 54
J372	TRUE	Z2_CS_L	53 54
J373	TRUE	Z2_DEBUG3	53 54
J374	TRUE	Z2_MOSI	53 54
J375	TRUE	Z2_MISO	53 54
J376	TRUE	Z2_SCLK	53 54
J377	TRUE	Z2_BOOST_EN	54
J378	TRUE	Z2_HOST_INTN	53 54
J379	TRUE	Z2_CLKIN	53 54
J380	TRUE	Z2_KEY_ACT_L	53 54
J381	TRUE	Z2_RESET	53 54
J382	TRUE	PSOC_MISO	53 54
J383	TRUE	PSOC_MOSI	53 54
J384	TRUE	PSOC_SCLK	53 54
J385	TRUE	SMBUS_SMC_2_S3_SCL	6 45 48 84
J386	TRUE	SMBUS_SMC_2_S3_SDA	6 45 48 84
J387	TRUE	PSOC_F_CS_L	53 54
J1540	TRUE	PICKB_L	53 54
J1620	TRUE	PP5V_S5_CUMULUS	54

(NEED TO ADD 2 GND TP)

KEYBOARD CONN

J340	TRUE	PP3V3_S4	6 7
J341	TRUE	PP3V42_G3H	6 7
J342	TRUE	WS_KBD1	53
J343	TRUE	WS_KBD2	53
J344	TRUE	WS_KBD3	53
J345	TRUE	WS_KBD4	53
J346	TRUE	WS_KBD5	53
J347	TRUE	WS_KBD6	53
J348	TRUE	WS_KBD7	53
J349	TRUE	WS_KBD8	53
J350	TRUE	WS_KBD9	53
J351	TRUE	WS_KBD10	53
J352	TRUE	WS_KBD11	53
J353	TRUE	WS_KBD12	53
J354	TRUE	WS_KBD13	53
J355	TRUE	WS_KBD14	53
J356	TRUE	WS_KBD15_CAP	53
J357	TRUE	WS_KBD16_NUM	53
J358	TRUE	WS_KBD17	53
J359	TRUE	WS_KBD18	53
J360	TRUE	WS_KBD19	53
J361	TRUE	WS_KBD20	53
J362	TRUE	WS_KBD21	53
J363	TRUE	WS_KBD22	53
J364	TRUE	WS_KBD23	53
J365	TRUE	WS_KBD_ONOFF_L	53
J366	TRUE	WS_LEFT_SHIFT_KBD	53
J367	TRUE	WS_LEFT_OPTION_KBD	53
J368	TRUE	WS_CONTROL_KBD	53

(NEED TO ADD 2 GND TP)

KBD BACKLIGHT CONN

J350	TRUE	KBDLED_ANODE	54
J320	TRUE	SMC_KDBLED_PRESENT_L	54

(NEED TO ADD 1 GND TP)

CAMERA/ALS CONN

J400	TRUE	PP5V_S3_ALSCAMERA_F	32
J401	TRUE	SMBUS_SMC_2_S3_SCL	6 45 48 84
J410	TRUE	SMBUS_SMC_2_S3_SDA	6 45 48 84
J297	TRUE	USB_CAMERA_CONN_P	32 80
J294	TRUE	USB_CAMERA_CONN_N	32 80

(NEED TO ADD 2 GND TP)

DEBUG VOLTAGE

J287	TRUE	PPVCORE_S0_CPU	7
J288	TRUE	PPVCORE_S0_AXG	7
J1430	TRUE	PP1V2_S3_ENET_INTREG	71
J289	TRUE	PP1V05_S0	7
J290	TRUE	PP1V5_S3RS0	7 85
J291	TRUE	PP1V8_S0	7
J292	TRUE	PP3V3_S0	7 85
J293	TRUE	PP5V_S0	6 7
J294	TRUE	PP3V3_S3	7
J295	TRUE	PP5V_S3	7
J296	TRUE	PPVCCSA_S0_CPU	7
J1410	TRUE	PP3V3_S5	7 85
J297	TRUE	PP3V42_G3H	6 7
J298	TRUE	PPBUS_G3H	7
J299	TRUE	PP3V3_ENET	7
J1417	TRUE	PP3V3_WLAN	6 32 46
J892	TRUE	PP5V_SW_ODD	6 41
J893	TRUE	PP5V_S0_HDD_FLT	6 41
J894	TRUE	PP18V5_Z2	6 54
J1416	TRUE	PP3V3_S0_LCD_F	6 74
J1418	TRUE	PP3V3_LCDVDD_SW_F	6 74
J895	TRUE	PP4V5_AUDIO_ANALOG	57 62
J1419	TRUE	PP1V5_S3	7
J1415	TRUE	SMC_PM_G2_EN	45 73
J1545	TRUE	PM_SLP_S4_L	17 26 32 45 73
J1546	TRUE	PM_SLP_S3_L	8 17 26 45 73

(NEED TO ADD 6 GND TP)

DC POWER CONN

(NEED 3 TP)

J302	TRUE	PP18V5_DCIN_FUSE	63
J304	TRUE	ADAPTER_SENSE	63

(NEED TO ADD 4 GND TP)

LPC+SPI DEBUG_CONN

J650	TRUE	LPC_AD<0>	16 45 47 81
J651	TRUE	LPC_AD<1>	16 45 47 81
J652	TRUE	LPC_AD<2>	16 45 47 81
J653	TRUE	LPC_AD<3>	16 45 47 81
J654	TRUE	LPC_CLK33M_LPCPLUS	24 47 81
J655	TRUE	LPC_FRAME_L	16 45 47 81
J656	TRUE	LPC_PWRDWN_L	17 45 47
J657	TRUE	LPC_SERIRQ	16 45 47
J658	TRUE	LPCPLUS_GPIO	19 47
J659	TRUE	LPCPLUS_RESET_L	24 47
J660	TRUE	PM_CLKRUN_L	17 45 47
J661	TRUE	PP3V42_G3H	6 7
J662	TRUE	PP5V_S0	6 7
J663	TRUE	SMC_RX_L	45 46 47
J664	TRUE	SMC_TCK	45 46 47
J665	TRUE	SMC_TDI	45 46 47
J666	TRUE	SMC_TDO	45 46 47
J667	TRUE	SMC_TMS	45 46 47
J668	TRUE	SMC_TX_L	45 46 47
J669	TRUE	SPI_ALT_CLK	47
J670	TRUE	SPI_ALT_CS_L	47
J671	TRUE	SPI_ALT_MISO	47
J672	TRUE	SPI_ALT_MOSI	47
J673	TRUE	SPIROM_USE_MLB	19 47 56

(NEED TO ADD 2 GND TP)

NC NO_TESTs

NO_TEST

17	TP_CRT_IG_BLUE	MAKE_BASE=TRUE	NC_CRT_IG_BLUE
17	TP_CRT_IG_GREEN	MAKE_BASE=TRUE	NC_CRT_IG_GREEN
17	TP_CRT_IG_RED	MAKE_BASE=TRUE	NC_CRT_IG_RED
17	TP_CRT_IG_DDC_CLK	MAKE_BASE=TRUE	NC_CRT_IG_DDC_CLK
17	TP_CRT_IG_DDC_DATA	MAKE_BASE=TRUE	NC_CRT_IG_DDC_DATA
17	TP_CRT_IG_HSYNC	MAKE_BASE=TRUE	NC_CRT_IG_HSYNC
17	TP_CRT_IG_VSYNC	MAKE_BASE=TRUE	NC_CRT_IG_VSYNC
17	TP_LVDS_IG_CTRL_CLK	MAKE_BASE=TRUE	NC_LVDS_IG_CTRL_CLK
17	TP_LVDS_IG_CTRL_DATA	MAKE_BASE=TRUE	NC_LVDS_IG_CTRL_DATA
17	TP_PCH_LVDS_VBG	MAKE_BASE=TRUE	NC_PCH_LVDS_VBG
16	TP_HDA_SDIN1	MAKE_BASE=TRUE	NC_HDA_SDIN1
16	TP_HDA_SDIN2	MAKE_BASE=TRUE	NC_HDA_SDIN2
16	TP_HDA_SDIN3	MAKE_BASE=TRUE	NC_HDA_SDIN3
18	TP_PCI_PME_L	MAKE_BASE=TRUE	NC_PCI_PME_L
18	TP_PCI_CLK33M_OUT3	MAKE_BASE=TRUE	NC_PCI_CLK33M_OUT3
16	TP_CLINK_CLK	MAKE_BASE=TRUE	NC_CLINK_CLK
16	TP_CLINK_DATA	MAKE_BASE=TRUE	NC_CLINK_DATA
16	TP_CLINK_RESET_L	MAKE_BASE=TRUE	NC_CLINK_RESET_L
16	TP_PCIE_CLK100M_PEBN	MAKE_BASE=TRUE	NC_PCIE_CLK100M_PEBN
16	TP_PCIE_CLK100M_PEBP	MAKE_BASE=TRUE	NC_PCIE_CLK100M_PEBP
38	TP_FW643_SDA	MAKE_BASE=TRUE	NC_FW643_SDA
38	TP_FW643_SM	MAKE_BASE=TRUE	NC_FW643_SM
38	TP_FW643_TCK	MAKE_BASE=TRUE	NC_FW643_TCK
38	TP_FW643_TMS	MAKE_BASE=TRUE	NC_FW643_TMS
38	TP_FW643_FW620_L	MAKE_BASE=TRUE	NC_FW643_FW620_L
38	TP_FW643_VBUF	MAKE_BASE=TRUE	NC_FW643_VBUF
38	TP_FW643_OCR10_CTL	MAKE_BASE=TRUE	NC_FW643_OCR10_CTL
38	TP_FW643_AVREG	MAKE_BASE=TRUE	NC_FW643_AVREG
38	TP_FW643_TDI	MAKE_BASE=TRUE	NC_FW643_TDI
23	TP_XDP_PCH_OBSFN_A<0..1>	MAKE_BASE=TRUE	NC_TP_XDP_PCH_OBSFN_A<0..1>
23	TP_XDP_PCH_OBSFN_B<0..1>	MAKE_BASE=TRUE	NC_TP_XDP_PCH_OBSFN_B<0..1>
23	TP_XDPPCH_HOOK2	MAKE_BASE=TRUE	NC_TP_XDPPCH_HOOK2
23	TP_XDPPCH_HOOK3	MAKE_BASE=TRUE	NC_TP_XDPPCH_HOOK3
23	TP_XDP_PCH_OBSFN_D<0..1>	MAKE_BASE=TRUE	NC_TP_XDP_PCH_OBSFN_D<0..1>
23	TP_XDP_PCH_HOOK4	MAKE_BASE=TRUE	NC_TP_XDP_PCH_HOOK4
23	TP_XDP_PCH_HOOK5	MAKE_BASE=TRUE	NC_TP_XDP_PCH_HOOK5
16	TP_PCH_GPIO64_CLKOUTFLEX0	MAKE_BASE=TRUE	NC_PCH_GPIO64_CLKOUTFLEX0
16	TP_PCH_GPIO65_CLKOUTFLEX1	MAKE_BASE=TRUE	NC_PCH_GPIO65_CLKOUTFLEX1
16	TP_PCH_GPIO66_CLKOUTFLEX2	MAKE_BASE=TRUE	NC_PCH_GPIO66_CLKOUTFLEX2
16	TP_PCH_GPIO67_CLKOUTFLEX3	MAKE_BASE=TRUE	NC_PCH_GPIO67_CLKOUTFLEX3

NC NO_TESTs

NO_TEST

J660	TRUE	NC_FW2_TPBP	40
J1498	TRUE	NC_FW2_TPBN	40
J1499	TRUE	NC_FW2_TPBIAS	40
J1497	TRUE	NC_FW2_TPAP	40
J1496	TRUE	NC_FW2_TPAN	40
J1495	TRUE	NC_FW0_TPBP	40
J1494	TRUE	NC_FW0_TPBN	40
J1493	TRUE	NC_FW0_TPAP	40
J1502	TRUE	XDP_PCH_AP_PWR_EN	
J1503	TRUE	XDP_PCH_USB_HUB_SOFT_RST_L	
J1504	TRUE	XDP_PCH_SDCONN_STATE_RST_L	
J1505	TRUE	XDP_PCH_ENET_PWR_EN	
J1552	TRUE	XDP_PCH_SDCONN_DET_L	
J1683	TRUE	XDP_PCH_S5_PWRGD	23
J1684	TRUE	XDP_PCH_PWRBTN_L	23
J1685	TRUE	XDP_PCH_ISOLATE_CPU_MEM_L	
J1686	TRUE	XDP_FW_CLKREQ_L	
J1688	TRUE	XDP_AP_CLKREQ_L	
J1687	TRUE	XDP_PCH_AUD_IPHS_SWITCH_EN	
17	TP_SDVO_TVCLKINN	MAKE_BASE=TRUE	NC_SDVO_TVCLKINN
17	TP_SDVO_TVCLKINP	MAKE_BASE=TRUE	NC_SDVO_TVCLKINP
17	TP_SDVO_STALLN	MAKE_BASE=TRUE	NC_SDVO_STALLN
17	TP_SDVO_STALLP	MAKE_BASE=TRUE	NC_SDVO_STALLP
17	TP_SDVO_INTN	MAKE_BASE=TRUE	NC_SDVO_INTN
17	TP_SDVO_INTP	MAKE_BASE=TRUE	NC_SDVO_INTP

	NC_EDP_TXP<0..3>	TRUE	TP_EDP_TX_P<0..3> 9
	NC_EDP_TXN<0..3>	TRUE	TP_EDP_TX_N<0..3> 9
	NC_EDP_AUXP	TRUE	TP_EDP_AUX_P 9
	NC_EDP_AUXN	TRUE	TP_EDP_AUX_N 9
	NC_CPU_THERMDA	TRUE	TP_CPU_THERMDA
	NC_CPU_THERMDC	TRUE	TP_CPU_THERMDC
	NC_CPU_RSVD<30..45>	TRUE	TP_CPU_RSVD<30..45>
	NC_CPU_RSVD<8..27>	TRUE	TP_CPU_RSVD<8..27>
	NC_PEG_R2D_CP<0..7>	TRUE	=PEG_R2D_C_P<0..7> 9
	NC_PEG_R2D_CN<0..7>	TRUE	=PEG_R2D_C_N<0..7> 9
	NC_PEG_D2RP<0..7>	TRUE	=PEG_D2R_P<0..7> 9
	NC_PEG_D2RN<0..7>	TRUE	=PEG_D2R_N<0..7> 9
	NC_PEG_R2D_CP<8..11>	TRUE	=PEG_R2D_C_P<8..11> 9
	NC_PEG_R2D_CN<8..11>	TRUE	=PEG_R2D_C_N<8..11> 9
	NC_PEG_D2RP<8..11>	TRUE	=PEG_D2R_P<8..11> 9
	NC_PEG_D2RN<8..11>	TRUE	=PEG_D2R_N<8..11> 9
16	TP_PCIE_CLK100M_PE4N	TRUE	NC_PCIE_CLK100M_PE4N
16	TP_PCIE_CLK100M_PE4P	TRUE	NC_PCIE_CLK100M_PE4P
16	TP_PCIE_CLK100M_PE5N	TRUE	NC_PCIE_CLK100M_PE5N
16	TP_PCIE_CLK100M_PE5P	TRUE	NC_PCIE_CLK100M_PE5P
16	TP_PCIE_CLK100M_PE6N	TRUE	NC_PCIE_CLK100M_PE6N
16	TP_PCIE_CLK100M_PE6P	TRUE	NC_PCIE_CLK100M_PE6P
16	TP_PCIE_CLK100M_PE7N	TRUE	NC_PCIE_CLK100M_PE7N
16	TP_PCIE_CLK100M_PE7P	TRUE	NC_PCIE_CLK100M_PE7P
53	TP_PSOC_P1_3	TRUE	NC_PSOC_P1_3
16	TP_SATA_C_D2RN	TRUE	NC_SATA_C_D2RN
16	TP_SATA_C_D2RP	TRUE	NC_SATA_C_D2RP
16	TP_SATA_C_R2D_CN	TRUE	NC_SATA_C_R2D_CN
16	TP_SATA_C_R2D_CP	TRUE	NC_SATA_C_R2D_CP
16	TP_SATA_D_D2RN	TRUE	NC_SATA_D_D2RN
16	TP_SATA_D_D2RP	TRUE	NC_SATA_D_D2RP
16	TP_SATA_D_R2D_CN	TRUE	NC_SATA_D_R2D_CN
16	TP_SATA_D_R2D_CP	TRUE	NC_SATA_D_R2D_CP
16	TP_SATA_E_D2RN	TRUE	NC_SATA_E_D2RN
16	TP_SATA_E_D2RP	TRUE	NC_SATA_E_D2RP
16	TP_SATA_E_R2D_CN	TRUE	NC_SATA_E_R2D_CN
16	TP_SATA_E_R2D_CP	TRUE	NC_SATA_E_R2D_CP
16	TP_SATA_F_D2RN	TRUE	NC_SATA_F_D2RN
16	TP_SATA_F_D2RP	TRUE	NC_SATA_F_D2RP
16	TP_SATA_F_R2D_CN	TRUE	NC_SATA_F_R2D_CN
16	TP_SATA_F_R2D_CP	TRUE	NC_SATA_F_R2D_CP
33	TP_TBT_MONDC0	TRUE	NC_TBT_MONDC0
33	TP_TBT_MONDC1	TRUE	NC_TBT_MONDC1
33	TP_TBT_MONOBSP	TRUE	NC_TBT_MONOBSP
33	TP_TBT_MONOBSN	TRUE	NC_TBT_MONOBSN
33	TP_DP_T29SRC_ML_CP<0..3>	TRUE	NC_DP_T29SRC_ML_CP<0..3>
33	TP_DP_T29SRC_ML_CN<0..3>	TRUE	NC_DP_T29SRC_ML_CN<0..3>
33	TP_DP_T29SRC_AUXCH_CP	TRUE	NC_DP_T29SRC_AUXCH_CP
33	TP_DP_T29SRC_AUXCH_CN	TRUE	NC_DP_T29SRC_AUXCH_CN
33 6	TP_T29_PCIE_RESET0_L	TRUE	TP_T29_PCIE_RESET0_L 6 33
33 6	TP_T29_PCIE_RESET1_L	TRUE	TP_T29_PCIE_RESET1_L 6 33
33 6	TP_T29_PCIE_RESET2_L	TRUE	TP_T29_PCIE_RESET2_L 6 33
33 6	TP_T29_PCIE_RESET3_L	TRUE	TP_T29_PCIE_RESET3_L 6 33
J1522	TRUE	PCH_VSS_NCTF<1>	81
J1523	TRUE	PCH_VSS_NCTF<2>	81
J1526	TRUE	PCH_VSS_NCTF<5>	81
J1516	TRUE	PCH_VSS_NCTF<9>	81
J1518	TRUE	PCH_VSS_NCTF<11>	81
J1517	TRUE	PCH_VSS_NCTF<12>	81
J1547	TRUE	PCH_VSS_NCTF<15>	81
J1548	TRUE	PCH_VSS_NCTF<17>	81
J1549	TRUE	PCH_VSS_NCTF<19>	6 81
J1524	TRUE	PCH_VSS_NCTF<19>	6 81
J1683	TRUE	PCH_VSS_NCTF<21>	81
J1682	TRUE	PCH_VSS_NCTF<25>	81
J1681	TRUE	PCH_VSS_NCTF<27>	81
J1546	TRUE	PCH_VSS_NCTF<29>	81
8	TP_LVDS_IG_B_CLKN	TRUE	NC_LVDS_IG_B_CLKN
8	TP_LVDS_IG_B_CLKP	MAKE_BASE=TRUE	NC_LVDS_IG_B_CLKP
	TP_LVDS_IG_BKL_PWM	TRUE MAKE_BASE=TRUE	NC_LVDS_IG_BKL_PWM
	SMC_BS_ALRT_L	TRUE MAKE_BASE=TRUE	NC_SMC_BS_ALRT_L

SYNC_MASTER=K90I_MLB
PAGE TITLE

FUNC TEST

Apple Inc.

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"G3Hot" (Always-Present) Rails

64 63 =PPBUS_G3H — PPBUS_G3H
MIN_LINE_WIDTH=0.6 mm
MIN_NECK_WIDTH=0.25 mm
VOLTAGE=12.6V
MAKE_BASE=TRUE
=PPBUS_S0_LCDBKLT 77
=PPBUS_S5_FWPWRSW 39
=PPBUS_S0_VSENSE 50
35 PPVIN_SW_T29BST (VOLTAGE=12.8V) — =PPVIN_SW_T29BST 8 35
=PPVIN_S5_HS_COMPUTING_ISNS_R 50
=PPVIN_S5_HS_OTHER_ISNS_R 50

50 =PPVIN_S5_HS_COMPUTING_ISNS — PPBUS_S5_HS_COMPUTING_ISNS
MIN_LINE_WIDTH=0.6 mm
MIN_NECK_WIDTH=0.25 mm
VOLTAGE=12.8V
MAKE_BASE=TRUE
=PPVIN_S0_CPUIMVP 68 69
=PPVIN_S3_DDRREG 67
=PPVIN_S0_CPUVCCIOS0 70
=PPVIN_S0_VCCSAS0 65
=PPVIN_S0_CPUAXG 69

50 =PPVIN_S5_HS_OTHER_ISNS — PPBUS_S5_HS_OTHER_ISNS
MIN_LINE_WIDTH=0.6 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=12.8V
MAKE_BASE=TRUE
=PPVIN_S5_5VS3 66
=PPVIN_S5_3V3S5 66

63 =PP18V5_DCIN_CONN — PPDCIN_G3H
MIN_LINE_WIDTH=0.6 MM
MIN_NECK_WIDTH=0.25 MM
VOLTAGE=18.5V
MAKE_BASE=TRUE
=PPDCIN_S5_CHGR 64
=PPDCIN_S5_VSENSE 50

63 =PP3V42_G3H_REG — PP3V42_G3H
MIN_LINE_WIDTH=0.3 MM
MIN_NECK_WIDTH=0.2 MM
VOLTAGE=3.42V
MAKE_BASE=TRUE
=PP3V3_S5_LPCPLUS 47
=PP3V3_S5_SMC 45 46
=PP3V42_G3H_BATT 63
=PP3V42_G3H_CHGR 64
=PP3V42_G3H_ONEWIREPROT 63
=PP3V42_G3H_PWRCTL 73
=PP3V42_G3H_SMBUS_SMC_BSA 48
=PP3V42_G3H_SMCUSBMUX 42
=PP3V42_G3H_TPAD 53
=PPVIN_S5_SMCVREF 46
=PPVBAT_G3_SYSCLK 24
=PP3V42_G3H_AUDIO 58

24 =PPVRTC_G3_OUT — PPVRTC_G3H
MIN_LINE_WIDTH=0.2 MM
MIN_NECK_WIDTH=0.2 MM
VOLTAGE=3V
MAKE_BASE=TRUE
=PPVRTC_G3_PCH 16 17 20

5V Rails

66 =PP5V_S5_LDO — PP5V_S5
MIN_LINE_WIDTH=0.5 MM
MIN_NECK_WIDTH=0.2 MM
VOLTAGE=5V
MAKE_BASE=TRUE
=PP5V_S5_P1V5DDRFET 72
=PP5V_S5_TPAD 54
=PP5V_S5_P5VSUSFET 72

72 =PP5V_SUS_FET — PP5V_SUS
MIN_LINE_WIDTH=0.50MM
MIN_NECK_WIDTH=0.20MM
VOLTAGE=5V
MAKE_BASE=TRUE
=PP5V_SUS_PCH 22

66 =PP5V_S3_REG — PP5V_S3
MIN_LINE_WIDTH=0.5 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=5V
MAKE_BASE=TRUE
=PP5V_S3_ALSCAMERA 32
=PP5V_S3_AUDIO 57
=PP5V_S3_AUDIO_AMP 60
=PP5V_S3_DDRREG 67
=PP5V_S3_IR 41 44
=PP5V_S3_MEMRESET 26
=PP5V_S3_ODD 41
=PP5V_S3_P5VS0FET 72
=PP5V_S3_USB 42
=PP5V_S3_SYSLED 46

72 =PP5V_S0_FET — PP5V_S0
MIN_LINE_WIDTH=0.4 MM
MIN_NECK_WIDTH=0.2 MM
VOLTAGE=5V
MAKE_BASE=TRUE
=PP5V_S0_BKL 77
=PP5V_S0_CPUIMVP 68 69
=PP5V_S0_CPUVCCIOS0 70
=PP5V_S0_FAN_RT 52
=PP5V_S0_HDD_ISNS_R 49
=PP5V_S0_KBDLED 54
=PP5V_S0_LPCPLUS 47
=PP5V_S0_VCCSAS0 65
=PP5V_S0_PCH 22 24
=PP5V_S0_VMON 73
=PP5V_S0_ISNS 49
=PP5V_S0_AUDIO

49 =PP5V_S0_HDD_ISNS — PP5V_S0_HDD
MIN_LINE_WIDTH=0.6MM
MIN_NECK_WIDTH=0.4MM
VOLTAGE=5V
MAKE_BASE=TRUE
=PP5V_S0_HDD 41

3.3V Rails

66 =PP3V3_S5_REG — PP3V3_S5
MIN_LINE_WIDTH=0.6 MM VOLTAGE=3.3V
MIN_NECK_WIDTH=0.2 MM MAKE_BASE=TRUE
=PP3V3_S5_XDP 23
=PP3V3_S0_P3V3S0FET 72
=PP3V3_S3_P3V3S3FET 72
=PP3V3_S5_CPU_VCCDDR 26
=PP3V3_S4_P3V3S4FET 72
=PP3V3_S5_LCD 74
=PP3V3_S5_PCH 17
=PP3V3_S5_PCHPWRGD 24
=PP3V3_S5_SMCBATLOW 46
=PP3V3_S5_PCH_VCCDSW 20 22
=PP3V3_S5_SYSCLK 24
=PP3V3_S5_VMON 73
=PP3V3_S5_PWRCTL 73
=PP3V3_S5_P3V3SUSFET 72
=PP3V3_S4_TBTAPWRSW 76
=PP3V3_S5_PCH_GPIO 19

72 =PP3V3_SUS_FET — PP3V3_SUS
MIN_LINE_WIDTH=0.50MM VOLTAGE=3.3V
MIN_NECK_WIDTH=0.20MM MAKE_BASE=TRUE
=PP3V3_SUS_PCH_VCCSUS_USB 20 22
=PP3V3_SUS_PCH_VCCSUS_GPIO 20 22
=PP3V3_SUS_PCH_VCCSUS 20
=PP3V3_SUS_PCH_GPIO 16 17 18 19
=PP3V3_SUS_PCH 22
=PP3V3_SUS_PWRCTL 73
=PP3V3_SUS_P1V05SUSLDO 71
=PP3V3_SUS_SMC 46
=PP3V3_SUS_ROM 56
=PP3V3_SUS_PCH_VCC_SPI 20 22

72 =PP3V3_S4_FET — PP3V3_S4
MIN_LINE_WIDTH=0.50MM VOLTAGE=3.3V
MIN_NECK_WIDTH=0.20MM MAKE_BASE=TRUE
=PP3V3_S4_TPAD 53 54
=PP3V3_S4_SMC 46
=PP3V3_S4_SD_HPD 30
=PP3V3_S4_BT 32

72 =PP3V3_S3_FET — PP3V3_S3
MIN_LINE_WIDTH=0.50MM VOLTAGE=3.3V
MIN_NECK_WIDTH=0.20MM MAKE_BASE=TRUE
=PP3V3_S3_BT 32
=PP3V3_S3_MEMRESET 26
=PP3V3_S3_SMBUS_SMC_A_S3 48
=PP3V3_S3_SMBUS_SMC_MGMT 48
=PP3V3_S3_SMS 55
=PP3V3_S3_USB_HUB 25
=PP3V3_S3_USB_RESET 25
=PP3V3_S3_VREFMRGN 31
=PP3V3_S3_WLAN 32
=PP3V3_S3_SDBUF 24
=PP3V3_S3_P3V3ENETFET 73
=PP3V3_S3_PCH_GPIO 18 24
=PP3V3_S3_ISNS 49
=PP3V3_S3_USBMUX 25

72 =PP3V3_S0_FET — PP3V3_S0
MIN_LINE_WIDTH=0.5 MM VOLTAGE=3.3V
MIN_NECK_WIDTH=0.20MM MAKE_BASE=TRUE
=PP3V3_S0_HDD 41
=PP3V3_S0_AUDIO 57 61 62
=PP3V3_S0_BKL_VDDIO 77
=PP3V3_S0_ISNS 49
=PP3V3_S0_HS_COMPUTING_ISNS 50
=PP3V3_S0_CPUTHMSNS 51
=PP3V3_S0_LCD 74
=PP3V3_S0_DP_DDC 8
=PP3V3_S0_ENETPHY 36
=PP3V3_S0_FAN_RT 52
=PP3V3_S0_FWPWRCTL 39
=PP3V3_S0_FWLATEVG 39 40
=PP3V3_S0_P3V3T29FET 35
=PP3V3_S0_SDCARD 30
=PP3V3_S0_P1V8S0 71
=PP3V3_S0_ODD 41
=PP3V3_FW_P3V3FWFET 39
=PP3V3_S0_PCH 16 22
=PP3V3_S0_PCH_GPIO 16 17 18 19 30
=PP3V3_S0_PCH_VCC3_3_CLK 22
=PP3V3_S0_PCH_VCC3_3_GPIO 20 22
=PP3V3_S0_PCH_VCC3_3_HVCMOS 20 22
=PP3V3_S0_PCH_VCC3_3_PCI 20 22
=PP3V3_S0_PCH_VCC3_3_SATA 20 22
=PP3V3_S0_PCH_VCCADAC 22
=PP3V3_S0_PCH_VCCA_LVDS 20
=PP3V3_S0_PWRCTL 73
=PP3V3_S0_RSTBUF 24
=PP3V3_S0_SB_PM 24
=PP3V3_S0_SMBUS_PCH 48
=PP3V3_S0_SMBUS_SMC_0_S0 48
=PP3V3_S0_SMBUS_SMC_B_S0 48
=PP3V3_S0_SMC 41
=PP3V3_S0_KBDLED 54
=PP3V3_S0_VMON 73
=PPSPD_S0_MEM_A 27
=PPSPD_S0_MEM_B 29
=PP3V3_S0_P1V5S0 71
=PP3V3_S0_T29PWRCTL 35
=PP3V3_S0_HS_OTHER_ISNS 50
=PP3V3_S0_DPSDRVA 75
=PP3V3_S0_P1V05S0LDO 71
=PP3V3_S0_IMVPISNS 49
=PP3V3_S0_XDP 23
=PP3V3_S0_T29I2C 48

1.8V/1.5V/1.2V/1.05V Rails

71 =PP1V8_S0_REG — PP1V8_S0
2A max supply
MIN_LINE_WIDTH=0.5 MM
MIN_NECK_WIDTH=0.2 MM
VOLTAGE=1.8V
MAKE_BASE=TRUE
=PP1V8_S0_CPU_VCCPLL 14
=PP1V8_S0_PCH_VCCTX_LVDS 22
=PP1V8_S0_PCH_VCC_DFTERM 19 20 22
=PP1V8_S0_P1V05S0LDO 71
=PP1V8R1V5_S0_PCH_VCCVRM 20
=PPVDDIO_S0_SBCLK 24

49 =PP1V5_S3_DDR_ISNS — PP1V5_S3_DDR
MIN_LINE_WIDTH=0.8 MM
MIN_NECK_WIDTH=0.1 MM
VOLTAGE=1.5V
MAKE_BASE=TRUE
=PP1V5_S3_MEMRESET 26
=PP1V5_S3_MEM_A 27
=PP1V5_S3_MEM_B 29
=PPVIN_S0_DDRREG_LDO 67
=PPDDR_S3_MEMVREF 31

67 =PPDDR_S3_REG — PP1V5_S3
MIN_LINE_WIDTH=0.8 MM
MIN_NECK_WIDTH=0.1 MM
VOLTAGE=1.5V
MAKE_BASE=TRUE
=PP1V5_S3_P1V5S3RS0_FET 72
=PP1V5_S3_DDR_ISNS_R 49

72 =PP1V5_S3RS0_FET — PP1V5_S3RS0
MIN_LINE_WIDTH=0.6 MM
MIN_NECK_WIDTH=0.2 MM
VOLTAGE=1.5V
MAKE_BASE=TRUE
=PP1V5_S3_CPU_VCCDDR 10 12 15 26

71 =PP1V5_S0_REG — PP1V5_S0
MIN_LINE_WIDTH=2 mm
MIN_NECK_WIDTH=0.17 mm
VOLTAGE=1.5V
MAKE_BASE=TRUE
=PP1V5_S0_RDRVR 41
=PP1V8R1V5_S0_AUDIO 57
=PP3V3R1V5_S0_AUDIO 57
=PP3V3R1V5_S0_PCH_VCCSUSHDA 20 22 24
=PP1V5_S0_VMON 73

67 31 =PPVTT_S3_DDR_BUF — PPVTTDDR_S3
MIN_LINE_WIDTH=0.3 MM
MIN_NECK_WIDTH=0.2 MM
VOLTAGE=0.75V
MAKE_BASE=TRUE

67 =PPVTT_S0_DDR_LDO — PP0V75_S0_DDRVTT
MIN_LINE_WIDTH=2 mm
MIN_NECK_WIDTH=0.17 mm
VOLTAGE=0.75V
MAKE_BASE=TRUE
=PP0V75_S0_MEM_VTT_A 27
=PP0V75_S0_MEM_VTT_B 29
=PPVTT_S0_VTTCLAMP 26

65 =PPVCCSA_S0_REG — PPVCCSA_S0_CPU
MIN_LINE_WIDTH=0.6 MM
MIN_NECK_WIDTH=0.2 MM
VOLTAGE=0.9V
MAKE_BASE=TRUE
=PPVCCSA_S0_CPU 12 15

71 =PP1V05_SUS_LDO — PP1V05_SUS
MIN_LINE_WIDTH=0.4 MM
MIN_NECK_WIDTH=0.2 MM
VOLTAGE=1.05V
MAKE_BASE=TRUE
=PP1V05_SUS_PCH_JTAG 23

70 =PPCPUVCCIO_S0_REG — PP1V05_S0
? mA
MIN_LINE_WIDTH=0.6 MM
MIN_NECK_WIDTH=0.2 MM
VOLTAGE=1V
MAKE_BASE=TRUE
=PP1V05_S0_CPU_VCCIO 9 10 12 14
=PPVCCIO_S0_CPUIMVP 68
=PPVCCIO_S0_XDP 23
=PPVCCIO_S0_SMC 46
=PP1V05_S0_FWPWRCTL 39
=PP1V05_FW_P1V0FWFET 39
=PP1V05_S0_VMON 73
=PP1V05_S0_P1V05T29FET 35

XW0800 SM 1 2
XW0801 SM 1 2

PP1V05_S0_PCH
MIN_LINE_WIDTH=0.6 MM
MIN_NECK_WIDTH=0.2 MM
VOLTAGE=1V
MAKE_BASE=TRUE
=PP1V05_S0_PCH_VCCIO_PLLPCIE 20
=PP1V05_S0_PCH 16 22
=PP1V05_S0_PCH_VCCIO 20 22
=PP1V05_S0_PCH_VCCIO_PCIE 17
=PP1V05_S0_PCH_VCCIO_SATA 16 20 22
=PP1V05_S0_PCH_VCCASW 20 22
=PP1V05_S0_PCH_VCCIO_USB 20 22
=PP1V05_S0_PCH_VCC_CORE 20 22
=PP1V05_S0_PCH_VCCIO_CLK 20 22
=PP1V05_S0_PCH_VCCDIFFCLK 16 20 22
=PP1V05_S0_PCH_VCCSSC 20 22
=PP1V05_S0_PCH_V_PROC_IO 20 22
=PP1V05_S0_PCH_VCCIO_PLLUSB 20
=PP1V05_S0_PCH_VCC_DMI 20 22
=PP1V05_S0_PCH_VCCIO_PLLFDI 20
=PP1V05_S0_PCH_VCCDMI_FDI 20

ENET Rails

73 =PP3V3_ENET_FET — PP3V3_ENET
MIN_LINE_WIDTH=0.6 MM
MIN_NECK_WIDTH=0.2 MM
VOLTAGE=3.3V
MAKE_BASE=TRUE
=PP3V3_ENET_PHY 24 36 71
=PP3V3_ENET_SYSCLK 24
=PPVDDIO_ENET_CLK 24

"FW" (FireWire) Rails

39 =PPBUS_FW_FET — PPVP_FW
MIN_LINE_WIDTH=0.4 MM
MIN_NECK_WIDTH=0.2 MM
VOLTAGE=12.8V
MAKE_BASE=TRUE
=PPVP_FW_PORT1 40
=PPVP_FW_PHY_CPS_FET 40

39 =PP3V3_FW_FET — PP3V3_FW_FWPHY
MIN_LINE_WIDTH=0.4 MM
MIN_NECK_WIDTH=0.2 MM
VOLTAGE=3.3V
MAKE_BASE=TRUE
=PP3V3_FW_FWPHY 38 39 40
=PP3V3_S0_P1V05FWFET

39 =PP1V0_FW_FET_R — PP1V0_FW_FWPHY
MIN_LINE_WIDTH=0.4 MM
MIN_NECK_WIDTH=0.2 MM
VOLTAGE=1.0V
MAKE_BASE=TRUE
=PP1V0_FW_FWPHY 38 39

T29 Rails (off when no cable)

35 8 =PP15V_T29_REG — PP15V_T29
MIN_LINE_WIDTH=0.4 MM
MIN_NECK_WIDTH=0.2 MM
VOLTAGE=17.8V
MAKE_BASE=TRUE
=PPHV_SW_TBTAPWRSW 76

35 =PP3V3_T29_FET — PP3V3_T29
MIN_LINE_WIDTH=0.4 MM
MIN_NECK_WIDTH=0.2 MM
VOLTAGE=3.3V
MAKE_BASE=TRUE
=PPVDDIO_T29_CLK 24
=PP3V3_T29_RTR 33 34 35
=PP3V3_T29_PCH_GPIO 16 19

35 =PP1V05_T29_FET — PP1V05_T29
MIN_LINE_WIDTH=0.4 MM
MIN_NECK_WIDTH=0.2 MM
VOLTAGE=1.05V
MAKE_BASE=TRUE
=PP1V05_T29_RTR 34

1V05 S0 LDO

71 =PP1V05_S0_LDO — PP1V05_S0_PCH_VCCADPLL
MIN_LINE_WIDTH=0.4 MM
MIN_NECK_WIDTH=0.2 MM
VOLTAGE=1.05V
MAKE_BASE=TRUE
=PP1V05_S0_PCH_VCCADPLL 22

Chipset "VCore" Rails

69 =PPVCORE_S0_CPU_REG — PPVCORE_S0_CPU
MIN_LINE_WIDTH=0.6 MM
MIN_NECK_WIDTH=0.25 MM
VOLTAGE=1.25V
MAKE_BASE=TRUE
=PPVCORE_S0_CPU 9 12 14
=PPCPUVCORE_S0_VSENSE 49

69 =PPVCORE_S0_AXG_REG — PPVCORE_S0_AXG
MIN_LINE_WIDTH=0.6 MM
MIN_NECK_WIDTH=0.2 MM
VOLTAGE=1.05V
MAKE_BASE=TRUE
=PPVCORE_S0_CPU_VCCAXG 9 12 15
=PPAXGVCORE_S0_VSENSE 49

15 12 =PP1V5_S3_CPU_VCCDQ — PP1V5_S3_CPU_VCCDQ
MIN_LINE_WIDTH=0.6 MM
MIN_NECK_WIDTH=0.2 MM
VOLTAGE=1.5V
MAKE_BASE=TRUE

14 12 8 =PP1V05_S0_CPU_VCCPQE — PP1V05_S0_CPU_VCCPQE
MIN_LINE_WIDTH=0.6 MM
MIN_NECK_WIDTH=0.2 MM
VOLTAGE=1.05V
MAKE_BASE=TRUE

14 12 =PP1V8_S0_CPU_VCCPLL_R — PP1V8_S0_CPU_VCCPLL_R
MIN_LINE_WIDTH=0.6 MM
MIN_NECK_WIDTH=0.2 MM
VOLTAGE=1.8V
MAKE_BASE=TRUE

SYNC_MASTER=K90I_MLB SYNC_DATE=02/15/2011
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HEATSINK STANDOFFS

Z0902
STDOFF-4.50D.98H-1.1-3.48-TH

Z0904
STDOFF-4.50D.98H-1.1-3.48-TH
BELOW CPU

FAN STANDOFF
Z0905
STDOFF-4.50D.98H-1.1-3.48-TH

Z0920
STDOFF-4.50D.98H-1.1-3.48-TH
LEFT OF CPU

MLB MOUNTING (TO C. BRACKET) SCREW HOLES

OMIT
Z0906
3R2P5

MLB MOUNTING (TO TOPCASE) SCREW HOLES

OMIT Z0908 3R2P5
OMIT Z0909 3R2P5
OMIT Z0910 3R2P5
OMIT Z0911 3R2P5
OMIT Z0912 3R2P5

EMI IO (SHORT) POGO PINS

ZS0900 1.4DIA-SHORT-SILVER-K99
ZS0901 1.4DIA-SHORT-SILVER-K99
ZS0910 1.4DIA-SHORT-SILVER-K99
ZS0903 1.4DIA-SHORT-SILVER-K99

EMI TALL POGO PINS

ZS0904 POGO-2.00D-3.5H-K86-K87
ZS0905 POGO-2.00D-3.5H-K86-K87
ZS0907 POGO-2.00D-3.5H-K86-K87

TALL POGO PINS close to DIMM conn.

ZS0920 POGO-2.00D-3.5H-K86-K87 NO STUFF
ZS0921 POGO-2.00D-3.5H-K86-K87 NO STUFF
ZS0922 POGO-2.00D-3.5H-K86-K87 NO STUFF
ZS0923 POGO-2.00D-3.5H-K86-K87 NO STUFF
ZS0924 POGO-2.00D-3.5H-K86-K87 NO STUFF

CPU signals

MEMVTT_EN = DDRVTT_EN
DP_EXTA_ML_C_P<3..0> = TP_DP_IG_B_MLP<3..0>
DP_EXTA_ML_C_N<3..0> = TP_DP_IG_B_MLN<3..0>
DP_EXTA_AUXCH_C_P = DPA_IG_AUX_CH_P
DP_EXTA_AUXCH_C_N = DPA_IG_AUX_CH_N

FW_PLUG_DET_L = FW_PME_L
FW643_WAKE_L = =FW_PME_L
TP_SMC_EXCARD_PWR_EN = SMC_EXCARD_PWR_EN

PCIE_EXCARD_D2R_N = NC_PCIE_EXCARD_D2RN
PCIE_EXCARD_D2R_P = NC_PCIE_EXCARD_D2RP
PCIE_EXCARD_R2D_C_N = NC_PCIE_EXCARD_R2D_CN
PCIE_EXCARD_R2D_C_P = NC_PCIE_EXCARD_R2D_CP
PCIE_CLK100M_EXCARD_N = NC_PCIE_CLK100M_EXCARDN
PCIE_CLK100M_EXCARD_P = NC_PCIE_CLK100M_EXCARDP

PCIE_PCH_D2R_N<5..8> = NC_PCIE_PCH_D2RN<5..8>
PCIE_PCH_D2R_P<5..8> = NC_PCIE_PCH_D2RP<5..8>
PCIE_PCH_R2D_C_N<5..8> = NC_PCIE_PCH_R2D_CN<5..8>
PCIE_PCH_R2D_C_P<5..8> = NC_PCIE_PCH_R2D_CP<5..8>
PEG_CLK100M_P = NC_PEG_CLK100MP
PEG_CLK100M_N = NC_PEG_CLK100MN

TP_PCH_CLKOUT_DPN = NC_PCH_CLKOUT_DPN
TP_PCH_CLKOUT_DPP = NC_PCH_CLKOUT_DPP

T29BST:N

=PPVIN_SW_T29BST — R0960 0 5% 1/8W MF-LF 805 — =PP15V_T29_REG

T29 A BIAS

T29 A BIAS — C0960 0.01UF 10% 10V X5R-CERM 0201

DP A BIAS0

DP A BIAS0 — C0962 0.01UF 10% 10V X5R-CERM 0201

DP A BIAS2

DP A BIAS2 — C0964 0.01UF 10% 10V X5R-CERM 0201

T29 A BIAS R2DP1
T29 A BIAS R2DN0

T29 A BIAS — R0970 51 1/20W MF — T29 A BIAS R2DP0 VOLTAGE=3.3V
T29 A BIAS R2DP0 — C0970 0.01UF 10% 10V X5R-CERM 0201
T29 A BIAS R2DP0 — R0971 51 1/20W MF — T29 A BIAS R2DN1 VOLTAGE=3.3V
T29 A BIAS R2DN1 — C0971 0.01UF 10% 10V X5R-CERM 0201

T29 A BIAS D2RN1 — R0973 51 1/20W MF — VOLTAGE=3.3V
T29 A BIAS D2RP1 — R0972 51 1/20W MF — VOLTAGE=3.3V
T29 A BIAS D2RP1 — C0972 0.01UF 10% 10V X5R-CERM 0201
T29 A BIAS D2RN1 — C0973 0.01UF 10% 10V X5R-CERM 0201

TBT JTAG

JTAG_ISP_TCK = JTAG_TBT_TCK
JTAG_ISP_TDI = JTAG_TBT_TDI
JTAG_ISP_TDO = JTAG_TBT_TDO

=PCIE_T29_R2D_C_P<3..0>
=PCIE_T29_R2D_C_N<3..0>
=PCIE_T29_D2R_P<3..0>
=PCIE_T29_D2R_N<3..0>

=PP3V3_S0_DP_DDC
R0920 2.2K 5% 1/16W MF-LF 402
R0921 2.2K 5% 1/16W MF-LF 402
R0922 2.2K 5% 1/16W MF-LF 402
R0923 2.2K 5% 1/16W MF-LF 402

TP_DP_IG_C_CTRL_CLK = DPB_IG_DDC_CLK
TP_DP_IG_C_CTRL_DATA = DPB_IG_DDC_DATA
TP_DP_IG_D_CTRL_CLK = DP_IG_D_CTRL_CLK
TP_DP_IG_D_CTRL_DATA = DP_IG_D_CTRL_DATA

=PP3V3_S0_DP_DDC
R0924 2.2K 5% 1/16W MF-LF 402
R0925 2.2K 5% 1/16W MF-LF 402

DP_EXTA_DDC_CLK = DPA_IG_DDC_CLK
DP_EXTA_DDC_DATA = DPA_IG_DDC_DATA
DP_EXTA_HPD = DPA_IG_HPD

R0908 100K 5% 1/16W MF-LF 402

R0910 0 5% 1/16W MF-LF 402
PPBUS_SW_LCDBKLT_PWR — PPBUS_SW_BKL
MIN_LINE_WIDTH=0.5 MM
MIN_NECK_WIDTH=0.375 MM
VOLTAGE=12.6V
=PPBUS_SW_BKL

NC_CPU_VCCIO_SEL = CPU_VCCIO_SEL

NC_USB3_EXTD_TXN = USB3_EXTD_TX_N
NC_USB3_EXTD_TXP = USB3_EXTD_TX_P
NC_USB3_EXTD_RXN = USB3_EXTD_RX_N
NC_USB3_EXTD_RXP = USB3_EXTD_RX_P

=PP1V05_S0_CPU_VCCPQE
R0940 1K 5% 1/16W MF-LF 402

Unused eDP CLK

DPLL_REF_CLK_P = DPLL_REF_CLKP
DPLL_REF_CLK_N = DPLL_REF_CLKN

R0941 1K 5% 1/16W MF-LF 402

PM_SLP_S3_L = =TBT_S0_EN

Unused T29 Ports

T29_D2R_P<2..3> = NC_T29_D2RP<2..3>
T29_D2R_N<2..3> = NC_T29_D2RN<2..3>
T29_R2D_C_P<2..3> = NC_T29_R2D_CP<2..3>
T29_R2D_C_N<2..3> = NC_T29_R2D_CN<2..3>
T29_LSOE<2> = T29_LSOE<2>
T29_LSOE<3> = T29_LSOE<3>

Unused PGOOD signal

TP_P1V5S3RS0_RAMP_DONE = P1V5S3RS0_RAMP_DONE
TP_DDRREG_PGOOD = DDRREG_PGOOD

T29 DP Ports

DPB_IG_HPD = DP_T29SNK0_HPD
DP_IG_C_MLP<3..0> = DP_T29SNK0_ML_C_P<3..0>
DP_IG_C_MLN<3..0> = DP_T29SNK0_ML_C_N<3..0>
DPB_IG_AUX_CH_P = DP_T29SNK0_AUXCH_C_P
DPB_IG_AUX_CH_N = DP_T29SNK0_AUXCH_C_N
TP_DP_IG_D_HPD = DP_T29SNK1_HPD
DP_IG_D_MLP<3..0> = DP_T29SNK1_ML_C_P<3..0>
DP_IG_D_MLN<3..0> = DP_T29SNK1_ML_C_N<3..0>
TP_DP_IG_D_AUXP = DP_T29SNK1_AUXCH_C_P
TP_DP_IG_D_AUXN = DP_T29SNK1_AUXCH_C_N

NC_BCM57765_CE_L_MS_INS_L = BCM57765_CE_L_MS_INS_L

TP_LVDS_IG_B_CLKP = LVDS_IG_B_CLK_P
TP_LVDS_IG_B_CLKN = LVDS_IG_B_CLK_N
NC_LVDS_IG_B_DATAP<0..3> = LVDS_IG_B_DATA_P<0..3>
NC_LVDS_IG_B_DATAN<0..3> = LVDS_IG_B_DATA_N<0..3>
NC_LVDS_IG_A_DATAP<3> = LVDS_IG_A_DATA_P<3>
NC_LVDS_IG_A_DATAN<3> = LVDS_IG_A_DATA_N<3>
LVDS_DDC_CLK = LVDS_IG_DDC_CLK
LVDS_DDC_DATA = LVDS_IG_DDC_DATA
LCD_BKLT_PWM = LVDS_IG_BKL_PWM
LCD_IG_PWR_EN = LVDS_IG_PANEL_PWR
LCD_BKLT_EN = LVDS_IG_BKL_ON

USB Signals

USB_BT_N = USBHUB_DN1_N
USB_BT_P = USBHUB_DN1_P
USB_TPAD_N = USBHUB_DN3_N
USB_TPAD_P = USBHUB_DN3_P
USB_IR_N = USBHUB_DN2_N
USB_IR_P = USBHUB_DN2_P
USB_SMC_N = NC_USB_SMCN
USB_SMC_P = NC_USB_SMCP

NC_USB_EXTD_EHCIN = USB_EXTD_EHCI_N
NC_USB_EXTD_EHCIP = USB_EXTD_EHCI_P
NC_USB_EXTCN = USB_EXTC_N
NC_USB_EXTCP = USB_EXTC_P
NC_USB3_EXTC_TXN = USB3_EXTC_TX_N
NC_USB3_EXTC_TXP = USB3_EXTC_TX_P
NC_USB3_EXTC_RXN = USB3_EXTC_RX_N
NC_USB3_EXTC_RXP = USB3_EXTC_RX_P
NC_USB_EXTD_XHCIN = USB_EXTD_XHCI_N
NC_USB_EXTD_XHCIP = USB_EXTD_XHCI_P

TP_CPU_THERMDP = CPU_THERMD_P
TP_CPU_THERMDN = CPU_THERMD_N

TP_CPU_VTT_SELECT = CPU_VTTSELECT

Digital Ground

GND
MIN_LINE_WIDTH=0.6MM
MIN_NECK_WIDTH=0.2MM
VOLTAGE=0V

SYNC_MASTER=K90I_MLB	SYNC_DATE=02/15/2011
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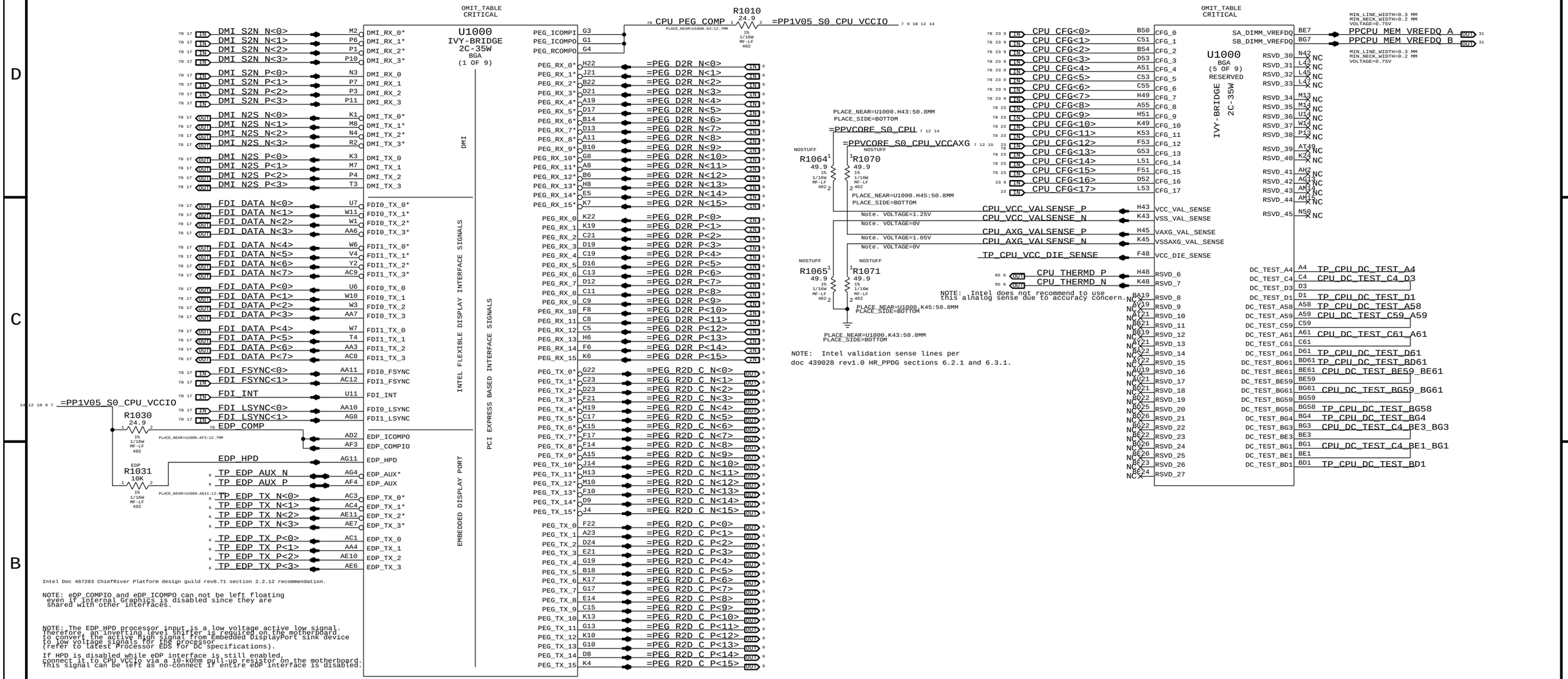
NOTE: Intel provides an internal pull-up OF 5-15k to VCCIO on all CFG signals.



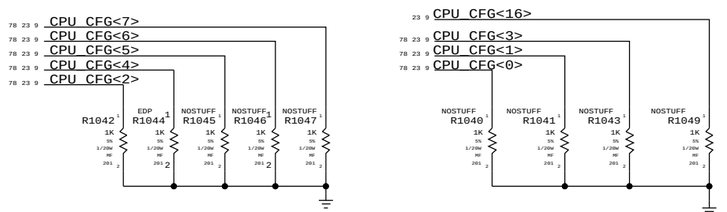
Intel Doc 467283 ChiefRiver Platform design guild rev0.71 section 2.2.12 recommendation.

NOTE: eDP_COMPIO and eDP_ICOMPO can not be left floating even if Internal Graphics is disabled since they are shared with other interfaces.

NOTE: The EDP_HPD processor input is a low voltage active low signal. Therefore, an inverting level shifter is required on the motherboard to convert the active High signal from Embedded DisplayPort sink device to low voltage signals for the processor (refer to latest Processor EDS for DC specifications).

If HPD is disabled while eDP interface is still enabled, connect it to CPU_VCCIO via a 10-kOhm pull-up resistor on the motherboard. This signal can be left as no-connect if entire eDP interface is disabled.

NOTE: Intel validation sense lines per doc 439028 rev1.0 HR_PPDG sections 6.2.1 and 6.3.1.



These can be Placed close to J2500 and Only for debug access

FOR IVYBRIDGE PROCESSOR

CFG [7] :PEG DEFER TRAINING	1 = (DEFAULT) IMMEDIATELY AFTER xxRESETB	0 = WAIT FOR BIOS
CFG [6:5] :PCIE BIFURCATION	11 = 1 X16 (DEFAULT)	10 = 2 X8 01 = RSVD 00 = X8, X4, X4
CFG [4] :eDP ENABLE/DISABLE	1 = DISABLED	0 = ENABLED
CFG [3] :PCIE x4 LANE REVERSAL	1 = NORMAL OPERATION	0 = LANES REVERSED
CFG [2] :PCIE x16 LANE REVERSAL	1 = NORMAL OPERATION	0 = LANES REVERSED

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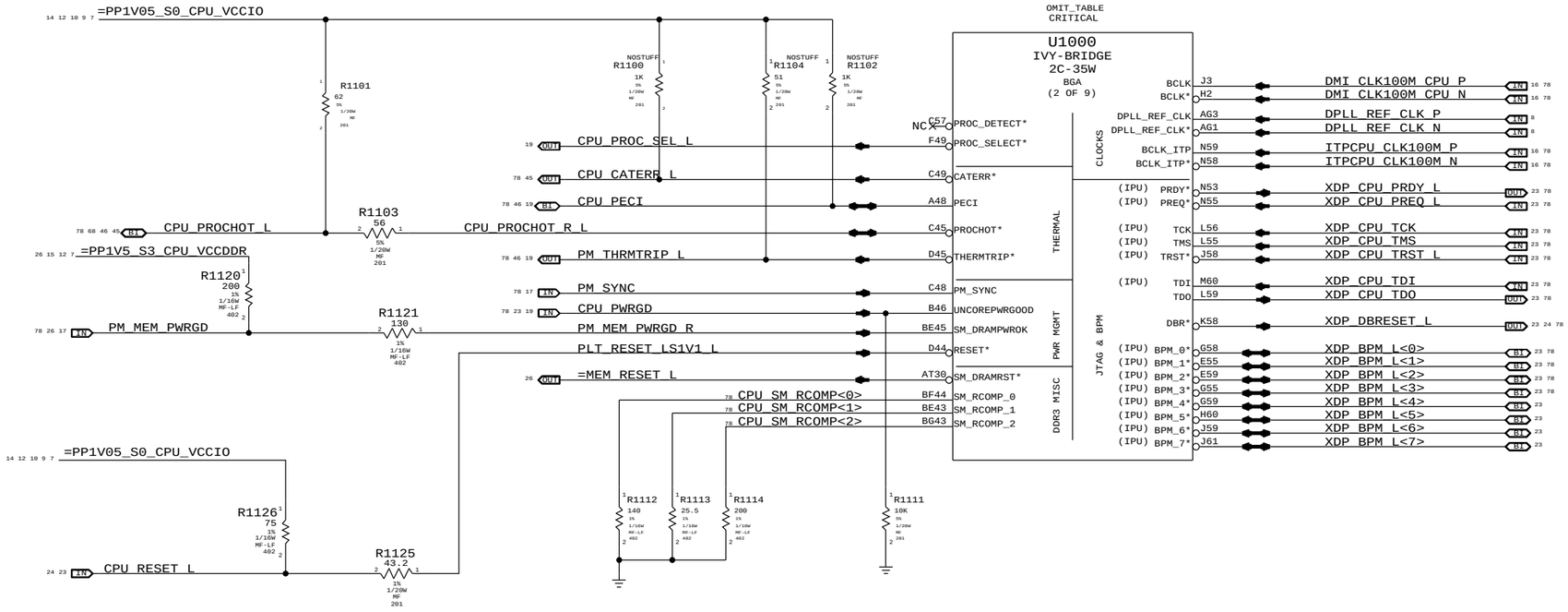

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OMIT_TABLE
CRITICAL

U1000
BGA
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IVY-BRIDGE
2C-35W
MEMORY CHANNEL A

MEM_A_DQ<0>	AG6	SA_DQ_0	SA_CK_0	AU36	MEM_A_CLK_P<0>	OUT	27 79
MEM_A_DQ<1>	AJ6	SA_DQ_1	SA_CK_0*	AV36	MEM_A_CLK_N<0>	OUT	27 79
MEM_A_DQ<2>	AP11	SA_DQ_2	SA_CKE_0	AY26	MEM_A_CKE<0>	OUT	27 79
MEM_A_DQ<3>	AL6	SA_DQ_3	SA_CK_1	AT40	MEM_A_CLK_P<1>	OUT	27 79
MEM_A_DQ<4>	AJ10	SA_DQ_4	SA_CK_1*	AU40	MEM_A_CLK_N<1>	OUT	27 79
MEM_A_DQ<5>	AJ8	SA_DQ_5	SA_CKE_1	BB26	MEM_A_CKE<1>	OUT	27 79
MEM_A_DQ<6>	AL8	SA_DQ_6	SA_CS_0*	BB40	MEM_A_CS_L<0>	OUT	27 79
MEM_A_DQ<7>	AL7	SA_DQ_7	SA_CS_1*	BC41	MEM_A_CS_L<1>	OUT	27 79
MEM_A_DQ<8>	AR11	SA_DQ_8	SA_ODT_0	AY40	MEM_A_ODT<0>	OUT	27 79
MEM_A_DQ<9>	AP6	SA_DQ_9	SA_ODT_1	BA41	MEM_A_ODT<1>	OUT	27 79
MEM_A_DQ<10>	AU6	SA_DQ_10	SA_DQS_0*	AL11	MEM_A_DQS_N<0>	BI	28 79
MEM_A_DQ<11>	AV9	SA_DQ_11	SA_DQS_1*	AR8	MEM_A_DQS_N<1>	BI	28 79
MEM_A_DQ<12>	AR6	SA_DQ_12	SA_DQS_2*	AV11	MEM_A_DQS_N<2>	BI	28 79
MEM_A_DQ<13>	AP8	SA_DQ_13	SA_DQS_3*	AT17	MEM_A_DQS_N<3>	BI	28 79
MEM_A_DQ<14>	AT13	SA_DQ_14	SA_DQS_4*	AV45	MEM_A_DQS_N<4>	BI	28 79
MEM_A_DQ<15>	AU13	SA_DQ_15	SA_DQS_5*	AY51	MEM_A_DQS_N<5>	BI	28 79
MEM_A_DQ<16>	BC7	SA_DQ_16	SA_DQS_6*	AT55	MEM_A_DQS_N<6>	BI	28 79
MEM_A_DQ<17>	BB7	SA_DQ_17	SA_DQS_7*	AK55	MEM_A_DQS_N<7>	BI	28 79
MEM_A_DQ<18>	BA13	SA_DQ_18	SA_DQS_0	AJ11	MEM_A_DQS_P<0>	BI	28 79
MEM_A_DQ<19>	BB11	SA_DQ_19	SA_DQS_1	AR10	MEM_A_DQS_P<1>	BI	28 79
MEM_A_DQ<20>	BA7	SA_DQ_20	SA_DQS_2	AY11	MEM_A_DQS_P<2>	BI	28 79
MEM_A_DQ<21>	BA9	SA_DQ_21	SA_DQS_3	AU17	MEM_A_DQS_P<3>	BI	28 79
MEM_A_DQ<22>	BB9	SA_DQ_22	SA_DQS_4	AW45	MEM_A_DQS_P<4>	BI	28 79
MEM_A_DQ<23>	AY13	SA_DQ_23	SA_DQS_5	AV51	MEM_A_DQS_P<5>	BI	28 79
MEM_A_DQ<24>	AV14	SA_DQ_24	SA_DQS_6	AT56	MEM_A_DQS_P<6>	BI	28 79
MEM_A_DQ<25>	AR14	SA_DQ_25	SA_DQS_7	AK54	MEM_A_DQS_P<7>	BI	28 79
MEM_A_DQ<26>	AY17	SA_DQ_26	SA_MA_0	BG35	MEM_A_A<0>	OUT	27 79
MEM_A_DQ<27>	AR19	SA_DQ_27	SA_MA_1	BB34	MEM_A_A<1>	OUT	27 79
MEM_A_DQ<28>	BA14	SA_DQ_28	SA_MA_2	BE35	MEM_A_A<2>	OUT	27 79
MEM_A_DQ<29>	AU14	SA_DQ_29	SA_MA_3	BD35	MEM_A_A<3>	OUT	27 79
MEM_A_DQ<30>	BB14	SA_DQ_30	SA_MA_4	AT34	MEM_A_A<4>	OUT	27 79
MEM_A_DQ<31>	BB17	SA_DQ_31	SA_MA_5	AU34	MEM_A_A<5>	OUT	27 79
MEM_A_DQ<32>	BA45	SA_DQ_32	SA_MA_6	BB32	MEM_A_A<6>	OUT	27 79
MEM_A_DQ<33>	AR43	SA_DQ_33	SA_MA_7	AT32	MEM_A_A<7>	OUT	27 79
MEM_A_DQ<34>	AW48	SA_DQ_34	SA_MA_8	AY32	MEM_A_A<8>	OUT	27 79
MEM_A_DQ<35>	BC48	SA_DQ_35	SA_MA_9	AV32	MEM_A_A<9>	OUT	27 79
MEM_A_DQ<36>	BC45	SA_DQ_36	SA_MA_10	BE37	MEM_A_A<10>	OUT	27 79
MEM_A_DQ<37>	AR45	SA_DQ_37	SA_MA_11	BA30	MEM_A_A<11>	OUT	27 79
MEM_A_DQ<38>	AT48	SA_DQ_38	SA_MA_12	BC30	MEM_A_A<12>	OUT	27 79
MEM_A_DQ<39>	AY48	SA_DQ_39	SA_MA_13	AW41	MEM_A_A<13>	OUT	27 79
MEM_A_DQ<40>	BA49	SA_DQ_40	SA_MA_14	AY28	MEM_A_A<14>	OUT	27 79
MEM_A_DQ<41>	AV49	SA_DQ_41	SA_MA_15	AU26	MEM_A_A<15>	OUT	27 79
MEM_A_DQ<42>	BB51	SA_DQ_42					
MEM_A_DQ<43>	AY53	SA_DQ_43					
MEM_A_DQ<44>	BB49	SA_DQ_44					
MEM_A_DQ<45>	AU49	SA_DQ_45					
MEM_A_DQ<46>	BA53	SA_DQ_46					
MEM_A_DQ<47>	BB55	SA_DQ_47					
MEM_A_DQ<48>	BA55	SA_DQ_48					
MEM_A_DQ<49>	AV56	SA_DQ_49					
MEM_A_DQ<50>	AP50	SA_DQ_50					
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MEM_A_DQ<52>	AV54	SA_DQ_52					
MEM_A_DQ<53>	AT54	SA_DQ_53					
MEM_A_DQ<54>	AP56	SA_DQ_54					
MEM_A_DQ<55>	AP52	SA_DQ_55					
MEM_A_DQ<56>	AN57	SA_DQ_56					
MEM_A_DQ<57>	AN53	SA_DQ_57					
MEM_A_DQ<58>	AG56	SA_DQ_58					
MEM_A_DQ<59>	AG53	SA_DQ_59					
MEM_A_DQ<60>	AN55	SA_DQ_60					
MEM_A_DQ<61>	AN52	SA_DQ_61					
MEM_A_DQ<62>	AG55	SA_DQ_62					
MEM_A_DQ<63>	AK56	SA_DQ_63					
MEM_A_BA<0>	BD37	SA_BS_0					
MEM_A_BA<1>	BF36	SA_BS_1					
MEM_A_BA<2>	BA28	SA_BS_2					
MEM_A_CAS_L	BE39	SA_CAS*					
MEM_A_RAS_L	BD39	SA_RAS*					
MEM_A_WE_L	AT41	SA_WE*					

OMIT_TABLE
CRITICAL

U1000
BGA
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IVY-BRIDGE
2C-35W
MEMORY CHANNEL B

MEM_B_DQ<0>	AL4	SB_DQ_0	SB_CK_0	BA34	MEM_B_CLK_P<0>	OUT	29 79
MEM_B_DQ<1>	AL1	SB_DQ_1	SB_CK_0*	AY34	MEM_B_CLK_N<0>	OUT	29 79
MEM_B_DQ<2>	AN3	SB_DQ_2	SB_CKE_0	AR22	MEM_B_CKE<0>	OUT	29 79
MEM_B_DQ<3>	AR4	SB_DQ_3	SB_CK_1	BA36	MEM_B_CLK_P<1>	OUT	29 79
MEM_B_DQ<4>	AK4	SB_DQ_4	SB_CK_1*	BB36	MEM_B_CLK_N<1>	OUT	29 79
MEM_B_DQ<5>	AK3	SB_DQ_5	SB_CKE_1	BF27	MEM_B_CKE<1>	OUT	29 79
MEM_B_DQ<6>	AN4	SB_DQ_6	SB_CS_0*	BE41	MEM_B_CS_L<0>	OUT	29 79
MEM_B_DQ<7>	AR1	SB_DQ_7	SB_CS_1*	BE47	MEM_B_CS_L<1>	OUT	29 79
MEM_B_DQ<8>	AU4	SB_DQ_8	SB_ODT_0	AT43	MEM_B_ODT<0>	OUT	29 79
MEM_B_DQ<9>	AT2	SB_DQ_9	SB_ODT_1	BG47	MEM_B_ODT<1>	OUT	29 79
MEM_B_DQ<10>	AV4	SB_DQ_10	SB_DQS_0*	AL3	MEM_B_DQS_N<0>	BI	28 79
MEM_B_DQ<11>	BA4	SB_DQ_11	SB_DQS_1*	AV3	MEM_B_DQS_N<1>	BI	28 79
MEM_B_DQ<12>	AU3	SB_DQ_12	SB_DQS_2*	BG11	MEM_B_DQS_N<2>	BI	28 79
MEM_B_DQ<13>	AR3	SB_DQ_13	SB_DQS_3*	BD17	MEM_B_DQS_N<3>	BI	28 79
MEM_B_DQ<14>	AY2	SB_DQ_14	SB_DQS_4*	BG51	MEM_B_DQS_N<4>	BI	28 79
MEM_B_DQ<15>	BA3	SB_DQ_15	SB_DQS_5*	BA59	MEM_B_DQS_N<5>	BI	28 79
MEM_B_DQ<16>	BE9	SB_DQ_16	SB_DQS_6*	AT60	MEM_B_DQS_N<6>	BI	28 79
MEM_B_DQ<17>	BD9	SB_DQ_17	SB_DQS_7*	AK59	MEM_B_DQS_N<7>	BI	28 79
MEM_B_DQ<18>	BD13	SB_DQ_18	SB_DQS_0	AM2	MEM_B_DQS_P<0>	BI	28 79
MEM_B_DQ<19>	BF12	SB_DQ_19	SB_DQS_1	AV1	MEM_B_DQS_P<1>	BI	28 79
MEM_B_DQ<20>	BF8	SB_DQ_20	SB_DQS_2	BE11	MEM_B_DQS_P<2>	BI	28 79
MEM_B_DQ<21>	BD10	SB_DQ_21	SB_DQS_3	BD18	MEM_B_DQS_P<3>	BI	28 79
MEM_B_DQ<22>	BD14	SB_DQ_22	SB_DQS_4	BE51	MEM_B_DQS_P<4>	BI	28 79
MEM_B_DQ<23>	BE13	SB_DQ_23	SB_DQS_5	BA61	MEM_B_DQS_P<5>	BI	28 79
MEM_B_DQ<24>	BF16	SB_DQ_24	SB_DQS_6	AR59	MEM_B_DQS_P<6>	BI	28 79
MEM_B_DQ<25>	BE17	SB_DQ_25	SB_DQS_7	AK61	MEM_B_DQS_P<7>	BI	28 79
MEM_B_DQ<26>	BE18	SB_DQ_26	SB_MA_0	BF32	MEM_B_A<0>	OUT	29 79
MEM_B_DQ<27>	BE21	SB_DQ_27	SB_MA_1	BE33	MEM_B_A<1>	OUT	29 79
MEM_B_DQ<28>	BE14	SB_DQ_28	SB_MA_2	BD33	MEM_B_A<2>	OUT	29 79
MEM_B_DQ<29>	BG14	SB_DQ_29	SB_MA_3	AU30	MEM_B_A<3>	OUT	29 79
MEM_B_DQ<30>	BG18	SB_DQ_30	SB_MA_4	BD30	MEM_B_A<4>	OUT	29 79
MEM_B_DQ<31>	BF19	SB_DQ_31	SB_MA_5	AV30	MEM_B_A<5>	OUT	29 79
MEM_B_DQ<32>	BD50	SB_DQ_32	SB_MA_6	BG30	MEM_B_A<6>	OUT	29 79
MEM_B_DQ<33>	BF48	SB_DQ_33	SB_MA_7	BD29	MEM_B_A<7>	OUT	29 79
MEM_B_DQ<34>	BD53	SB_DQ_34	SB_MA_8	BE30	MEM_B_A<8>	OUT	29 79
MEM_B_DQ<35>	BF52	SB_DQ_35	SB_MA_9	BE28	MEM_B_A<9>	OUT	29 79
MEM_B_DQ<36>	BD49	SB_DQ_36	SB_MA_10	BD43	MEM_B_A<10>	OUT	29 79
MEM_B_DQ<37>	BE49	SB_DQ_37	SB_MA_11	AT28	MEM_B_A<11>	OUT	29 79
MEM_B_DQ<38>	BD54	SB_DQ_38	SB_MA_12	AV28	MEM_B_A<12>	OUT	29 79
MEM_B_DQ<39>	BE53	SB_DQ_39	SB_MA_13	BD46	MEM_B_A<13>	OUT	29 79
MEM_B_DQ<40>	BF56	SB_DQ_40	SB_MA_14	AT26	MEM_B_A<14>	OUT	29 79
MEM_B_DQ<41>	BE57	SB_DQ_41	SB_MA_15	AU22	MEM_B_A<15>	OUT	29 79
MEM_B_DQ<42>	BC59	SB_DQ_42					
MEM_B_DQ<43>	AY60	SB_DQ_43					
MEM_B_DQ<44>	BE54	SB_DQ_44					
MEM_B_DQ<45>	BG54	SB_DQ_45					
MEM_B_DQ<46>	BA58	SB_DQ_46					
MEM_B_DQ<47>	AW59	SB_DQ_47					
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MEM_B_DQ<49>	AU58	SB_DQ_49					
MEM_B_DQ<50>	AN61	SB_DQ_50					
MEM_B_DQ<51>	AN59	SB_DQ_51					
MEM_B_DQ<52>	AU59	SB_DQ_52					
MEM_B_DQ<53>	AU61	SB_DQ_53					
MEM_B_DQ<54>	AN58	SB_DQ_54					
MEM_B_DQ<55>	AR58	SB_DQ_55					
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MEM_B_DQ<57>	AL58	SB_DQ_57					
MEM_B_DQ<58>	AG58	SB_DQ_58					
MEM_B_DQ<59>	AG59	SB_DQ_59					
MEM_B_DQ<60>	AM60	SB_DQ_60					
MEM_B_DQ<61>	AL59	SB_DQ_61					
MEM_B_DQ<62>	AF61	SB_DQ_62					
MEM_B_DQ<63>	AH60	SB_DQ_63					
MEM_B_BA<0>	BG39	SB_BS_0					
MEM_B_BA<1>	BD42	SB_BS_1					
MEM_B_BA<2>	AT22	SB_BS_2					
MEM_B_CAS_L	AV43	SB_CAS*					
MEM_B_RAS_L	BF40	SB_RAS*					
MEM_B_WE_L	BD45	SB_WE*					

SYNC_MASTER=MASTER SYNC_DATE=02/15/2011

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CPU DDR3 INTERFACES

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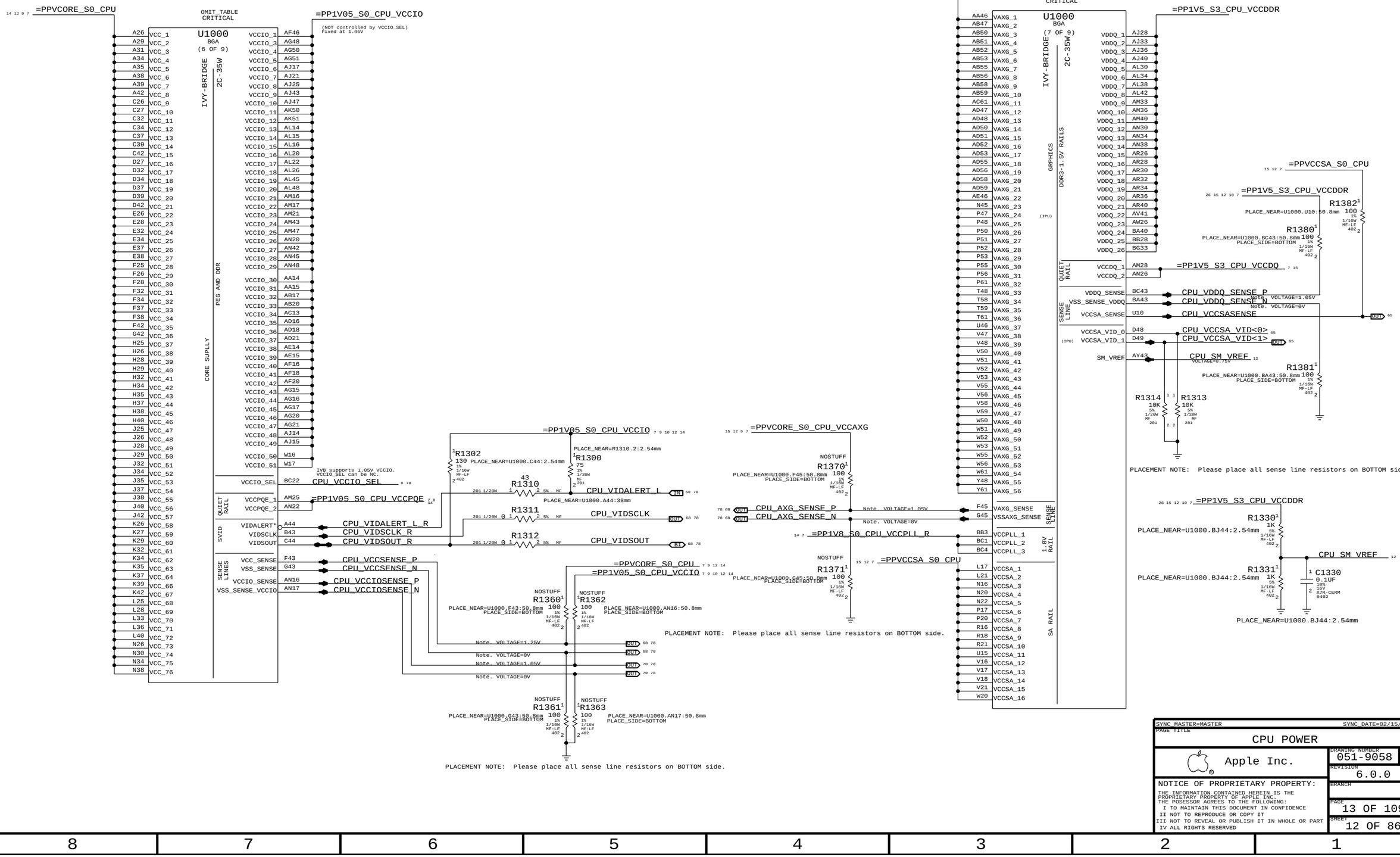

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PAGE TITLE	CPU POWER
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OMIT_TABLE
CRITICAL

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IVY-BRIDGE
2C-35W

BG13	VSS	VSS	M11
BG17	VSS	VSS	M15
BG21	VSS	VSS	M58
BG24	VSS	VSS	N1
BG28	VSS	VSS	N17
BG37	VSS	VSS	N21
BG41	VSS	VSS	N25
BG45	VSS	VSS	N28
BG49	VSS	VSS	N33
BG53	VSS	VSS	N36
C29	VSS	VSS	N40
C35	VSS	VSS	N43
C40	VSS	VSS	N47
D4	VSS	VSS	N48
D6	VSS	VSS	N51
D10	VSS	VSS	N52
D14	VSS	VSS	N56
D18	VSS	VSS	N61
D22	VSS	VSS	P9
D26	VSS	VSS	P14
D29	VSS	VSS	P16
D35	VSS	VSS	P18
D40	VSS	VSS	P21
D43	VSS	VSS	P58
D46	VSS	VSS	P59
D50	VSS	VSS	R4
D54	VSS	VSS	R17
D58	VSS	VSS	R20
E3	VSS	VSS	R46
E25	VSS	VSS	T1
E29	VSS	VSS	T47
E35	VSS	VSS	T50
E40	VSS	VSS	T51
F13	VSS	VSS	T52
F15	VSS	VSS	T53
F19	VSS	VSS	T55
F29	VSS	VSS	T56
F35	VSS	VSS	U8
F40	VSS	VSS	U13
F55	VSS	VSS	V20
G6	VSS	VSS	V61
G48	VSS	VSS	W8
G51	VSS	VSS	W13
G61	VSS	VSS	W15
H4	VSS	VSS	W18
H10	VSS	VSS	W21
H14	VSS	VSS	W46
H17	VSS	VSS	Y4
H21	VSS	VSS	Y47
H53	VSS	VSS	Y58
H58	VSS	VSS	Y59
J1	VSS		
J49	VSS		
J55	VSS		
K8	VSS		
K11	VSS		
K21	VSS	VSS_NCTF	A5
K51	VSS	VSS_NCTF	A57
L16	VSS	VSS_NCTF	BC61
L20	VSS	VSS_NCTF	BD3
L22	VSS	VSS_NCTF	BD59
L26	VSS	VSS_NCTF	BE4
L30	VSS	VSS_NCTF	BE58
L34	VSS	VSS_NCTF	BG5
L38	VSS	VSS_NCTF	BG57
L43	VSS	VSS_NCTF	C3
L48	VSS	VSS_NCTF	C58
L61	VSS	VSS_NCTF	D59
M4	VSS	VSS_NCTF	E1
M6	VSS	VSS_NCTF	E61

OMIT_TABLE
CRITICAL

U1000
BGA
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IVY-BRIDGE
2C-35W

A9	VSS	VSS	AM34
A13	VSS	VSS	AM38
A17	VSS	VSS	AM42
A21	VSS	VSS	AM45
A25	VSS	VSS	AM48
A28	VSS	VSS	AM58
A33	VSS	VSS	AN1
A37	VSS	VSS	AN21
A40	VSS	VSS	AN25
A45	VSS	VSS	AN28
A49	VSS	VSS	AN33
A53	VSS	VSS	AN36
AA1	VSS	VSS	AN40
AA8	VSS	VSS	AN43
AA13	VSS	VSS	AN47
AA50	VSS	VSS	AN50
AA51	VSS	VSS	AN54
AA52	VSS	VSS	AP7
AA53	VSS	VSS	AP10
AA55	VSS	VSS	AP51
AA56	VSS	VSS	AP55
AB16	VSS	VSS	AR7
AB18	VSS	VSS	AR13
AB21	VSS	VSS	AR17
AB48	VSS	VSS	AR21
AB61	VSS	VSS	AR41
AC6	VSS	VSS	AR48
AC10	VSS	VSS	AR61
AC14	VSS	VSS	AT4
AC46	VSS	VSS	AT14
AD4	VSS	VSS	AT19
AD17	VSS	VSS	AT36
AD20	VSS	VSS	AT45
AD61	VSS	VSS	AT52
AE8	VSS	VSS	AT58
AE13	VSS	VSS	AU1
AF1	VSS	VSS	AU7
AF17	VSS	VSS	AU11
AF21	VSS	VSS	AU28
AF47	VSS	VSS	AU32
AF48	VSS	VSS	AU51
AF50	VSS	VSS	AV17
AF51	VSS	VSS	AV21
AF52	VSS	VSS	AV22
AF53	VSS	VSS	AV34
AF55	VSS	VSS	AV40
AF56	VSS	VSS	AV48
AF58	VSS	VSS	AV55
AF59	VSS	VSS	AW7
AG7	VSS	VSS	AW13
AG10	VSS	VSS	AW43
AG14	VSS	VSS	AW61
AG18	VSS	VSS	AY4
AG47	VSS	VSS	AY9
AG52	VSS	VSS	AY14
AG61	VSS	VSS	AY19
AH4	VSS	VSS	AY30
AH58	VSS	VSS	AY36
AJ7	VSS	VSS	AY41
AJ13	VSS	VSS	AY45
AJ16	VSS	VSS	AY49
AJ20	VSS	VSS	AY55
AJ22	VSS	VSS	AY58
AJ26	VSS	VSS	BA1
AJ30	VSS	VSS	BA11
AJ34	VSS	VSS	BA17
AJ38	VSS	VSS	BA21
AJ42	VSS	VSS	BA26
AJ45	VSS	VSS	BA32
AJ48	VSS	VSS	BA48
AK1	VSS	VSS	BA51
AK52	VSS	VSS	BB53
AL10	VSS	VSS	BC5
AL13	VSS	VSS	BC13
AL17	VSS	VSS	BC57
AL21	VSS	VSS	BD8
AL25	VSS	VSS	BD12
AL28	VSS	VSS	BD16
AL33	VSS	VSS	BD19
AL36	VSS	VSS	BD23
AL40	VSS	VSS	BD27
AL43	VSS	VSS	BD32
AL47	VSS	VSS	BD36
AL61	VSS	VSS	BD40
AM4	VSS	VSS	BD44
AM13	VSS	VSS	BD48
AM20	VSS	VSS	BD52
AM22	VSS	VSS	BD56
AM26	VSS	VSS	BE5
AM30	VSS	VSS	BG9

SYNC MASTER=MASTER
SYNC DATE=02/15/2013

PAGE TITLE

CPU GROUNDS

Apple Inc.

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All INTEL recommendations from Intel doc #4439028 Huron River Platform Power Design Guide

CPU VCORE DECOUPLING

Intel recommendation (Section 6.2): 35x 2.2uF, 25x 22uF, 4x 470uF

12 9 7 =PPVCORE_S0_CPU

CRITICAL C1600 2.2UF 20% 4V X5R 402
CRITICAL C1604 2.2UF 20% 4V X5R 402
CRITICAL C1606 2.2UF 20% 4V X5R 402
CRITICAL C1607 2.2UF 20% 4V X5R 402
CRITICAL C1608 2.2UF 20% 4V X5R 402
CRITICAL C1609 2.2UF 20% 4V X5R 402
CRITICAL C1610 2.2UF 20% 4V X5R 402
CRITICAL C1612 2.2UF 20% 4V X5R 402
CRITICAL C1613 2.2UF 20% 4V X5R 402
CRITICAL C1615 2.2UF 20% 4V X5R 402
CRITICAL C1617 2.2UF 20% 4V X5R 402
CRITICAL C1623 2.2UF 20% 4V X5R 402
CRITICAL C1624 2.2UF 20% 4V X5R 402

CRITICAL C1625 2.2UF 20% 4V X5R 402
CRITICAL C1627 2.2UF 20% 4V X5R 402
CRITICAL C1628 2.2UF 20% 4V X5R 402
CRITICAL C1631 2.2UF 20% 4V X5R 402
CRITICAL C1632 2.2UF 20% 4V X5R 402
CRITICAL C1635 2.2UF 20% 4V X5R 402
CRITICAL C1637 2.2UF 20% 4V X5R 402
CRITICAL C1638 2.2UF 20% 4V X5R 402
CRITICAL C1639 2.2UF 20% 4V X5R 402
CRITICAL C1640 2.2UF 20% 4V X5R 402
CRITICAL C1641 2.2UF 20% 4V X5R 402
CRITICAL C1642 2.2UF 20% 4V X5R 402
CRITICAL C1643 2.2UF 20% 4V X5R 402
CRITICAL C1644 2.2UF 20% 4V X5R 402
CRITICAL C1645 2.2UF 20% 4V X5R 402
CRITICAL C1647 2.2UF 20% 4V X5R 402
CRITICAL C1648 2.2UF 20% 4V X5R 402

CRITICAL C1650 2.2UF 20% 4V X5R 402
CRITICAL C1651 2.2UF 20% 4V X5R 402
CRITICAL C1652 2.2UF 20% 4V X5R 402
CRITICAL C1653 2.2UF 20% 4V X5R 402
CRITICAL C1654 2.2UF 20% 4V X5R 402

PLACEMENT_NOTE (C1655-C1666):
Place close to U1000 on top side.

CRITICAL OMIT C1655 22UF 20% 6.3V X5R-CERM-1 603
CRITICAL OMIT C1656 22UF 20% 6.3V X5R-CERM-1 603
CRITICAL OMIT C1657 22UF 20% 6.3V X5R-CERM-1 603
CRITICAL OMIT C1658 22UF 20% 6.3V X5R-CERM-1 603
CRITICAL NOSTUFF C1659 22UF 20% 6.3V X5R-CERM-1 603
CRITICAL OMIT C1660 22UF 20% 6.3V X5R-CERM-1 603
CRITICAL OMIT C1661 22UF 20% 6.3V X5R-CERM-1 603
CRITICAL NOSTUFF C1662 22UF 20% 6.3V X5R-CERM-1 603
CRITICAL NOSTUFF C1663 22UF 20% 6.3V X5R-CERM-1 603
CRITICAL OMIT C1664 22UF 20% 6.3V X5R-CERM-1 603
CRITICAL NOSTUFF C1665 22UF 20% 6.3V X5R-CERM-1 603
CRITICAL OMIT C1666 22UF 20% 6.3V X5R-CERM-1 603

PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
138S0691	16	CAP,CER,X5R,22uF,20%,6.3V,0603,SAMSUNG	C1655,C1660,C1661,C1664,C1666,C1667,C1670,C1677,C1678,C1679,C1657,C1672,C1658,C1669,C1668,C1656	CRITICAL	

PLACEMENT_NOTE (C1667-C1679):
Place close to U1000 on bottom side.

CRITICAL OMIT C1667 22UF 20% 6.3V X5R-CERM-1 603
CRITICAL OMIT C1668 22UF 20% 6.3V X5R-CERM-1 603
CRITICAL OMIT C1669 22UF 20% 6.3V X5R-CERM-1 603
CRITICAL OMIT C1670 22UF 20% 6.3V X5R-CERM-1 603
CRITICAL NOSTUFF C1671 22UF 20% 6.3V X5R-CERM-1 603
CRITICAL OMIT C1672 22UF 20% 6.3V X5R-CERM-1 603
CRITICAL NOSTUFF C1673 22UF 20% 6.3V X5R-CERM-1 603
CRITICAL NOSTUFF C1674 22UF 20% 6.3V X5R-CERM-1 603
CRITICAL NOSTUFF C1675 22UF 20% 6.3V X5R-CERM-1 603
CRITICAL NOSTUFF C1676 22UF 20% 6.3V X5R-CERM-1 603
CRITICAL OMIT C1677 22UF 20% 6.3V X5R-CERM-1 603
CRITICAL OMIT C1678 22UF 20% 6.3V X5R-CERM-1 603
CRITICAL OMIT C1679 22UF 20% 6.3V X5R-CERM-1 603

PLACEMENT_NOTE (C1640-C1645):
Place near inductors on bottom side.

C1680 470UF-4MOHM 20% 2.0V POLY-TANT D2T-SM1
C1681 470UF-4MOHM 20% 2.0V POLY-TANT D2T-SM1
C1682 470UF-4MOHM 20% 2.0V POLY-TANT D2T-SM1
C1683 470UF-4MOHM 20% 2.0V POLY-TANT D2T-SM1

CPU VCCIO/VCCPQ DECOUPLING

Intel recommendation (Section 6.5): 26x 1uF, 10x 10uF, 2x 330uF

PLACEMENT_NOTE (C1684-C167F):
Place on bottom side of U1000

12 10 9 7 =PP1V05_S0_CPU_VCCIO

C1684 1UF 10% 10V X5R 402
C1685 1UF 10% 10V X5R 402
C1686 1UF 10% 10V X5R 402
C1687 1UF 10% 10V X5R 402
C1688 1UF 10% 10V X5R 402
C1689 1UF 10% 10V X5R 402
C1690 1UF 10% 10V X5R 402
C1691 1UF 10% 10V X5R 402
C1692 1UF 10% 10V X5R 402
C1693 1UF 10% 10V X5R 402
C1694 1UF 10% 10V X5R 402
C1695 1UF 10% 10V X5R 402
C1696 1UF 10% 10V X5R 402

C1697 1UF 10% 10V X5R 402
C1698 1UF 10% 10V X5R 402
C1699 1UF 10% 10V X5R 402
C169A 1UF 10% 10V X5R 402
C169B 1UF 10% 10V X5R 402
C169C 1UF 10% 10V X5R 402
C169D 1UF 10% 10V X5R 402
C169E 1UF 10% 10V X5R 402
C169F 1UF 10% 10V X5R 402
C161A 1UF 10% 10V X5R 402
C161B 1UF 10% 10V X5R 402
C161C 1UF 10% 10V X5R 402
C161D 1UF 10% 10V X5R 402

PLACEMENT_NOTE (C1672-C1681):
Place near ~~U1000~~ on bottom side

C161E 10UF 20% 6.3V X5R 603
C161F 10UF 20% 6.3V CERM-X5R 0402-1
C162A 10UF 20% 6.3V CERM-X5R 0402-1
C162B 10UF 20% 6.3V CERM-X5R 0402-1
C162C 10UF 20% 6.3V CERM-X5R 0402-1
C162D 10UF 20% 6.3V CERM-X5R 0402-1
C162E 10UF 20% 6.3V CERM-X5R 0402-1
C167A 10UF 20% 6.3V CERM-X5R 0402-1
C167B 10UF 20% 6.3V CERM-X5R 0402-1
C167C 10UF 20% 6.3V CERM-X5R 0402-1

C167D 330UF 20% 2.5V TANT CASE-B2-SM1
C167E 330UF 20% 2.5V TANT CASE-B2-SM1
C167G 330UF 20% 2.5V TANT CASE-B2-SM1
C167H 330UF 20% 2.5V TANT CASE-B2-SM1
C167J 330UF 20% 2.5V TANT CASE-B2-SM1

Intel recommendation: 1x 10mOhn resistor, 1x 1uF 0402

R1601 0.010 1% 1/4W MF 0603
=PP1V05_S0_CPU_VCCPQE 7 8 12
C167F 1UF 10% 10V X5R 402

Note:The smallest 10mOhm available in the library are 0805s

CPU VCCPLL DECOUPLING

Intel recommendation (section 6.4): 2x 1uF, 1x 330uF

PLACEMENT_NOTE (C1646-C1671):
Place near U1000 on top side

7 =PP1V8_S0_CPU_VCCPLL
R1600 0 5% 1/10W MF-LF 402
=PP1V8_S0_CPU_VCCPLL_R 7 12
PLACE_NEAR=U1000.BC1:5mm
PLACE_NEAR=U1000.AK63:2.54 mm:NO_VIA
C160X 1UF 10% 10V X5R 402
C160Y 1UF 10% 10V X5R 402
C160Z 330UF-0.0060HM 20% 2V POLY CASE-D2-SM
PLACE_NEAR=U1000.AK65:2.54 mm:NO_VIA

CPU VCCPLL Low pass filter

SYNC_MASTER=JACK_J30 SYNC_DATE=09/27/2013

PAGE TITLE: CPU DECOUPLING-I

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VAXG DECOUPLING

Intel recommendation (section 6.3): 21x 1uF, 6x 10uF, 6x 22uF, 2x 470uF

12 9 7 =PPVCORE_S0_CPU_VCCAXG

PLACEMENT_NOTE (C1700-C1710):

Place on bottom side of U1000

CRITICAL C1700 1UF 10% 10V X5R 402
CRITICAL C1701 1UF 10% 10V X5R 402
CRITICAL C1702 1UF 10% 10V X5R 402
CRITICAL C1703 1UF 10% 10V X5R 402
CRITICAL C1704 1UF 10% 10V X5R 402
CRITICAL C1705 1UF 10% 10V X5R 402
CRITICAL C1706 1UF 10% 10V X5R 402
CRITICAL C1707 1UF 10% 10V X5R 402
CRITICAL C1708 1UF 10% 10V X5R 402
CRITICAL C1709 1UF 10% 10V X5R 402
CRITICAL C1710 1UF 10% 10V X5R 402

PLACEMENT_NOTE (C1711-C1716):

CRITICAL C1711 10UF 20% 6.3V CERM-X5R 0402-1
CRITICAL C1712 10UF 20% 6.3V CERM-X5R 0402-1
CRITICAL C1713 10UF 20% 6.3V CERM-X5R 0402-1
CRITICAL C1714 10UF 20% 6.3V CERM-X5R 0402-1
CRITICAL C1715 10UF 20% 6.3V CERM-X5R 0402-1
CRITICAL C1716 10UF 20% 6.3V CERM-X5R 0402-1

PLACEMENT_NOTE (C1717-C1722):

CRITICAL OMIT C1717 22UF 20% 6.3V X5R-CERM-1 603
CRITICAL OMIT C1718 22UF 20% 6.3V X5R-CERM-1 603
CRITICAL OMIT C1719 22UF 20% 6.3V X5R-CERM-1 603
CRITICAL OMIT C1720 22UF 20% 6.3V X5R-CERM-1 603
CRITICAL OMIT C1721 22UF 20% 6.3V X5R-CERM-1 603
CRITICAL OMIT C1722 22UF 20% 6.3V X5R-CERM-1 603

PLACEMENT_NOTE (C1723-C1724):

Place near inductors on bottom side.

C1723 470UF-4MOHM 20% 2.0V POLY D2T-SM1
C1724 470UF-4MOHM 20% 2.0V POLY D2T-SM1

PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
138S0691	6	CAP,CER,X5R,22uF,20%,6.3V,0603,SAMSUNG	C1717,C1718,C1719,C1720,C1721,C1722	CRITICAL	

CPU VDDQ/VCCDQ DECOUPLING

Intel recommendation (Section 6.5): 10x 1uF, 8x 10uF, 1x 330uF

PLACEMENT_NOTE (C1738-C1747):

26 12 10 7 =PP1V5_S3_CPU_VCCDDR

Place on bottom side of U1000

C1738 1UF 10% 10V X5R 402
C1739 1UF 10% 10V X5R 402
C1740 1UF 10% 10V X5R 402
C1741 1UF 10% 10V X5R 402
C1742 1UF 10% 10V X5R 402
C1743 1UF 10% 10V X5R 402
C1744 1UF 10% 10V X5R 402
C1745 1UF 10% 10V X5R 402
C1746 1UF 10% 10V X5R 402
C1747 1UF 10% 10V X5R 402

Place close to U1000 on bottom side

C1748 10UF 20% 6.3V CERM-X5R 0402-1
C1749 10UF 20% 6.3V CERM-X5R 0402-1
C1750 10UF 20% 6.3V X5R 603
C1751 10UF 20% 6.3V CERM-X5R 0402-1
C1752 10UF 20% 6.3V CERM-X5R 0402-1
C1753 10UF 20% 6.3V CERM-X5R 0402-1
C1754 10UF 20% 6.3V X5R 603
C1755 10UF 20% 6.3V CERM-X5R 0402-1

C1756 330UF-0.006OHM 20% 2V POLY CASE-D2-SM

Intel recommendation: 1x 10mOhn resistor, 1x 1uF 0402

R1702 0.010 1% 1/4W MF 0603

=PP1V5_S3_CPU_VCCDQ 7 12

C1757 1UF 10% 10V X5R 402

CPU VCCSA DECOUPLING

Intel recommendation (Section 6.6): 6x 1uf, 5x 10uf, 1x 330uf

PLACEMENT_NOTE (C1758-C1762):

12 7 =PPVCCSA_S0_CPU

Place on bottom side of U1000

C1758 1UF 10% 10V X5R 402
C1759 1UF 10% 10V X5R 402
C1760 1UF 10% 10V X5R 402
C1761 1UF 10% 10V X5R 402
C1762 1UF 10% 10V X5R 402

C1763 10UF 20% 6.3V CERM-X5R 0402-1
C1764 10UF 20% 6.3V CERM-X5R 0402-1
C1765 10UF 20% 6.3V CERM-X5R 0402-1
C1766 10UF 20% 6.3V CERM-X5R 0402-1
C1767 10UF 20% 6.3V CERM-X5R 0402-1

C1768 330UF-0.006OHM 20% 2V POLY CASE-D2-SM

SYNC_MASTER=MASTER SYNC_DATE=02/15/2011

PAGE TITLE: CPU DECOUPLING-II

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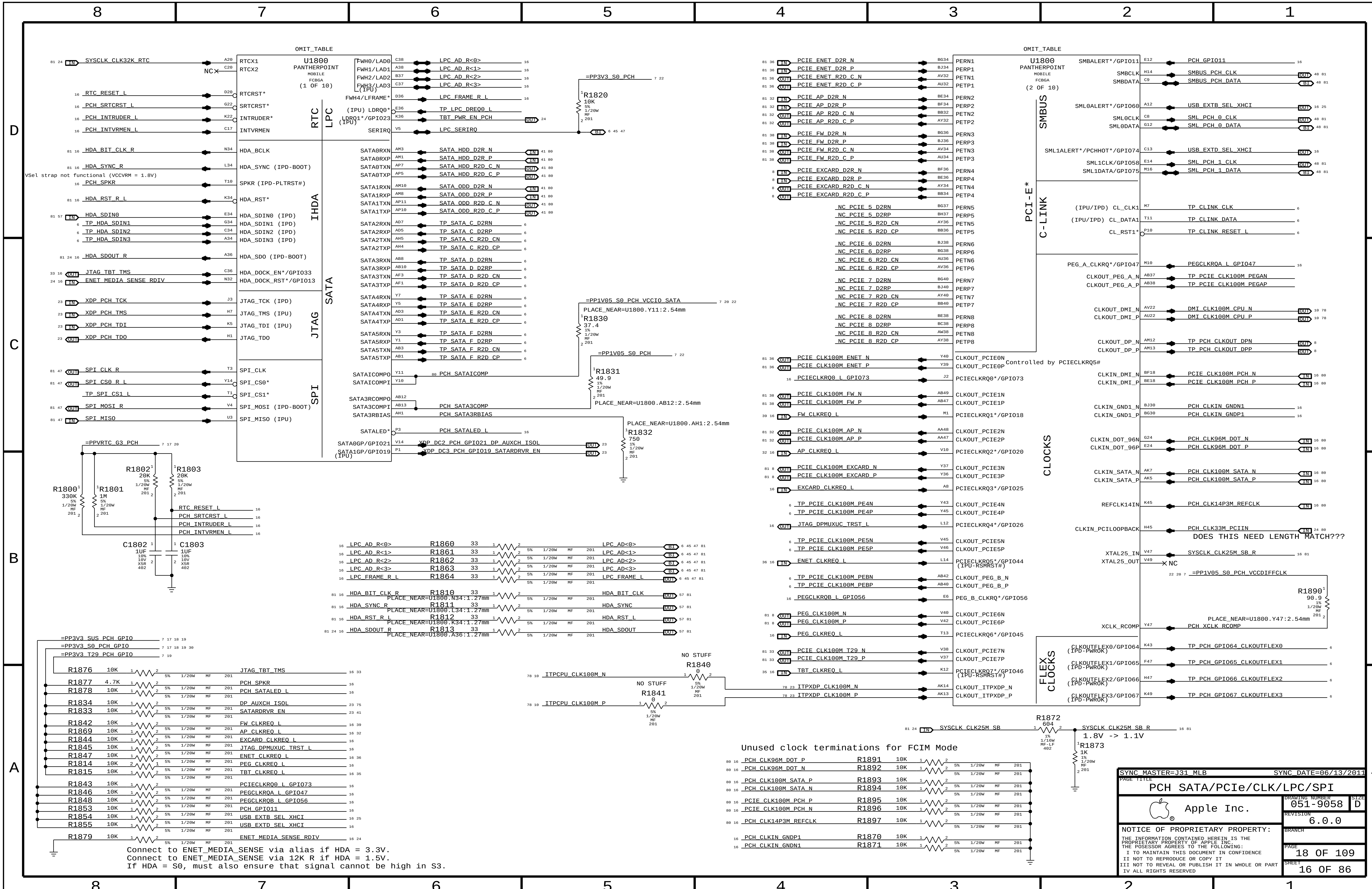
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U1800
PANTHERPOINT
MOBILE
FCBGA
(1 OF 10)
RTC
LPC
IHDA
SATA
JTAG
SPI
U1800
PANTHERPOINT
MOBILE
FCBGA
(2 OF 10)
SMBUS
PCI-E*
C-LINK
CLOCKS
FLEX CLOCKS
=PP3V3_S0_PCH
=PP1V05_S0_PCH_VCCIO_SATA
=PP1V05_S0_PCH
=PPVRTC_G3_PCH
=PP1V05_S0_PCH_VCCDIFFCLK
=PP3V3_SUS_PCH_GPIO
=PP3V3_S0_PCH_GPIO
=PP3V3_T29_PCH_GPIO
VSel strap not functional (VCCVRM = 1.8V)
Controlled by PCIECLKRQ5#
DOES THIS NEED LENGTH MATCH???
PLACE_NEAR=U1800.Y11:2.54mm
PLACE_NEAR=U1800.AB12:2.54mm
PLACE_NEAR=U1800.AH1:2.54mm
PLACE_NEAR=U1800.Y47:2.54mm
NO STUFF
1.8V -> 1.1V
Unused clock terminations for FCIM Mode
Connect to ENET_MEDIA_SENSE via alias if HDA = 3.3V.
Connect to ENET_MEDIA_SENSE via 12K R if HDA = 1.5V.
If HDA = S0, must also ensure that signal cannot be high in S3.
SYNC_MASTER=J31_MLB
SYNC_DATE=06/13/2011
PAGE TITLE
PCH SATA/PCIe/CLK/LPC/SPI
Apple Inc.
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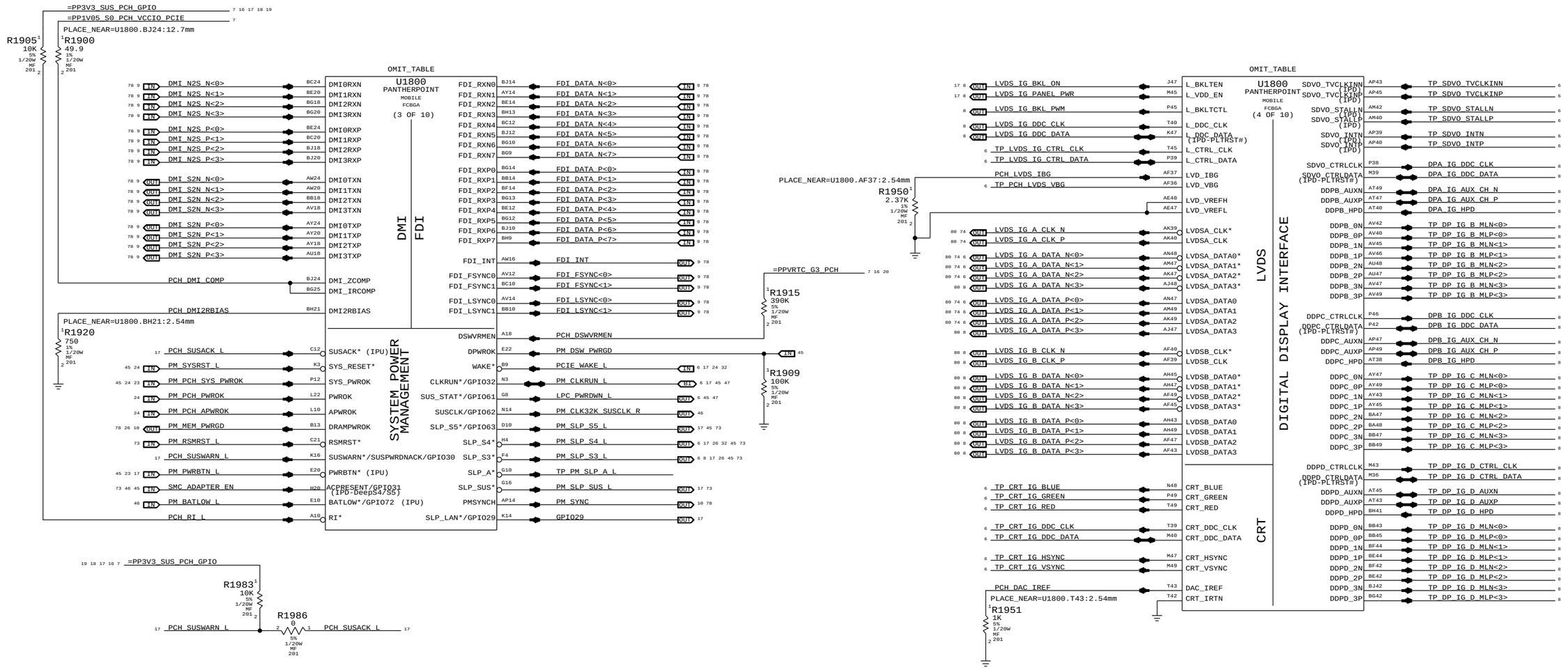

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PAGE TITLE: PCH DMI/FDI/PM/Graphics

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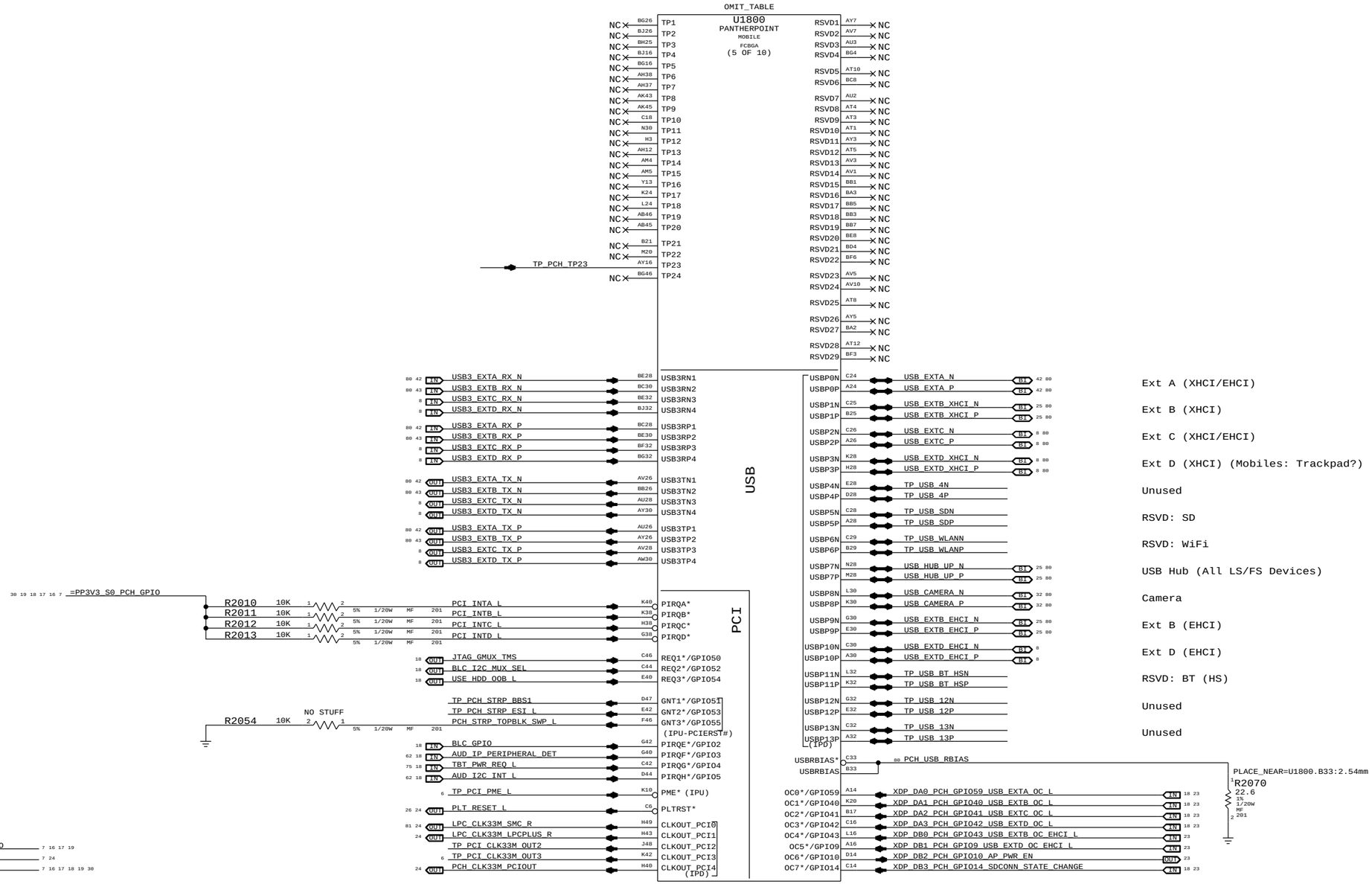

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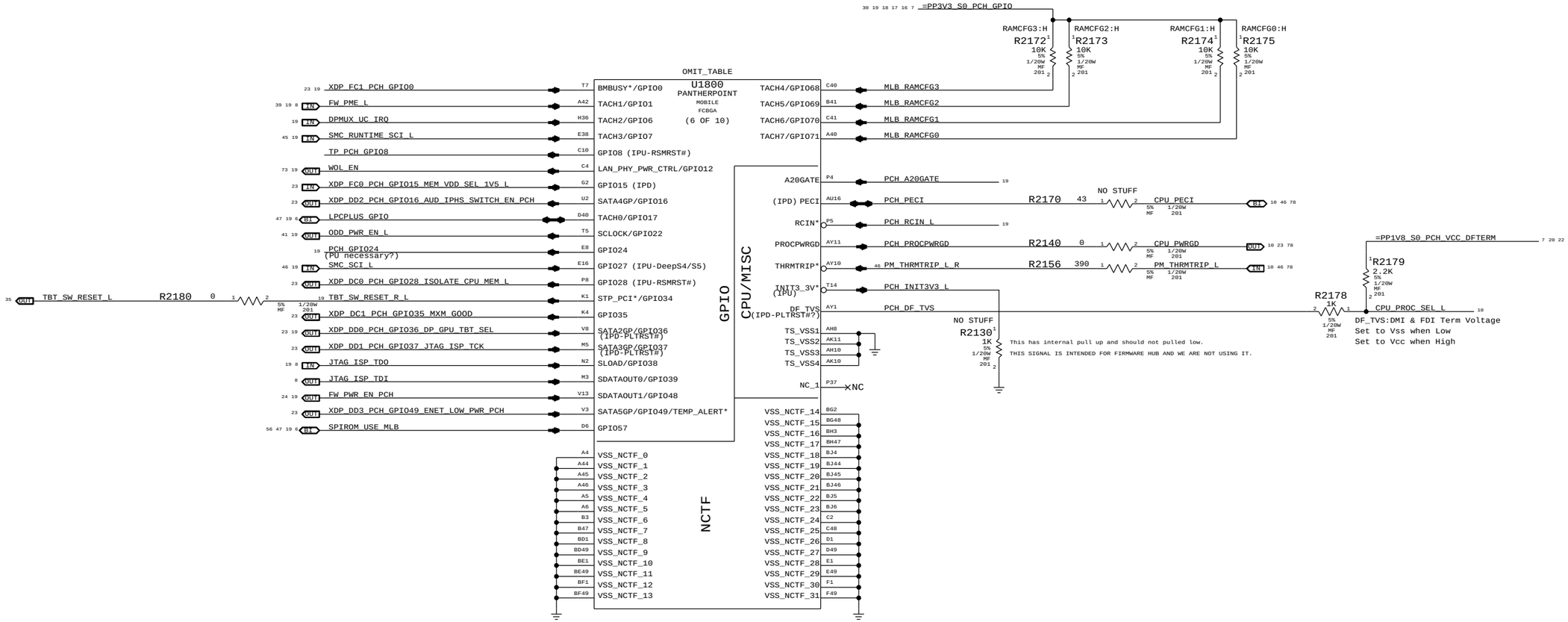
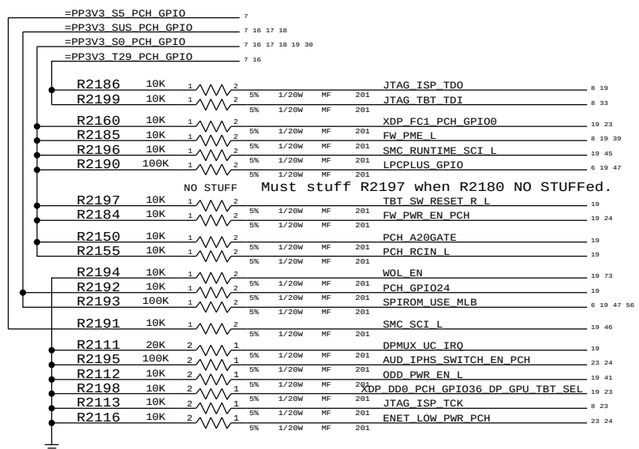
BOM GROUP	BOM OPTIONS
RAMCFG_SLOT	RAMCFG3:H,RAMCFG2:H,RAMCFG1:H,RAMCFG0:H

Systems with no chip-down memory should pull all 4 RAMCFG GPIOs high.

Systems with chip-down memory should add pull-downs on another page and set straps per software.





SYNC_MASTER=J31_MLB SYNC_DATE=06/13/2011

PAGE TITLE: PCH GPIO/MISC/NCTF

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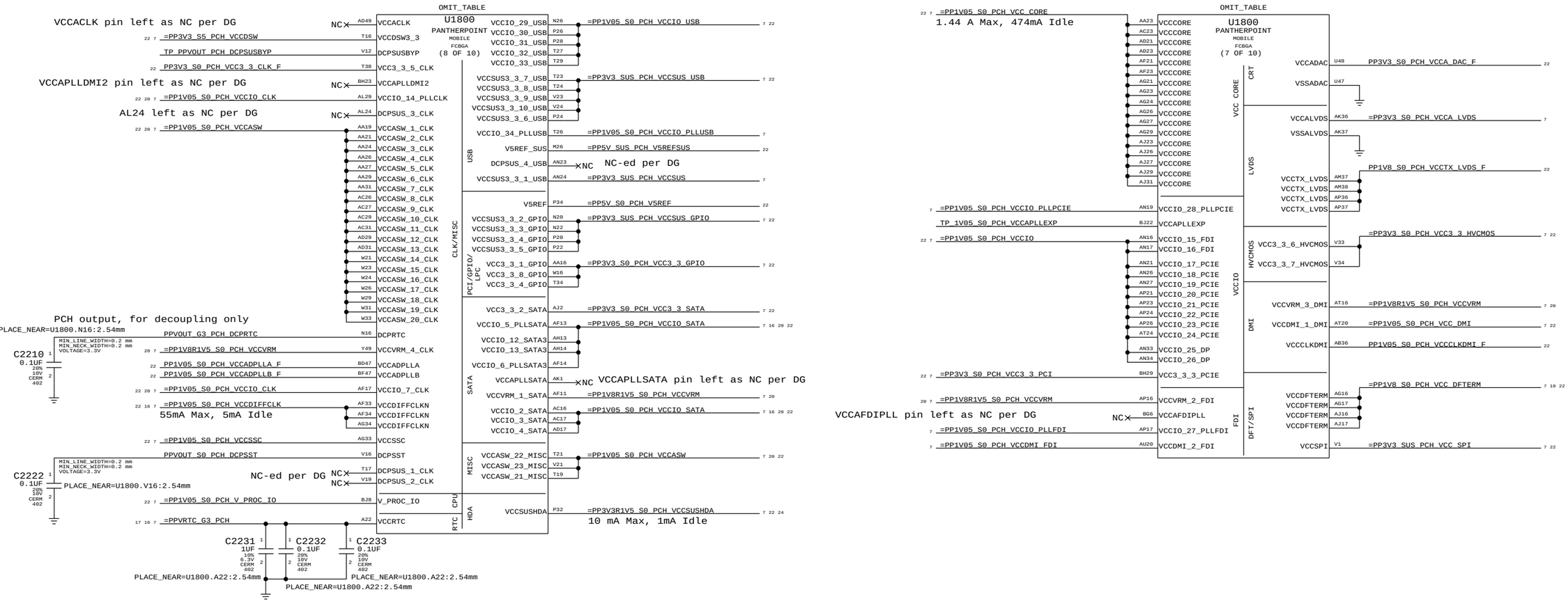

SYNC_MASTER=J31_MLB	SYNC_DATE=06/13/2011
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Apple Inc.	DRAWING NUMBER 051-9058 · SIZE D
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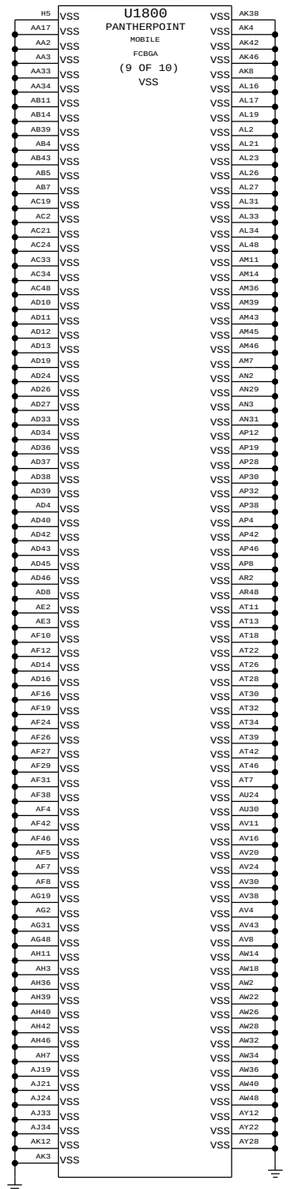

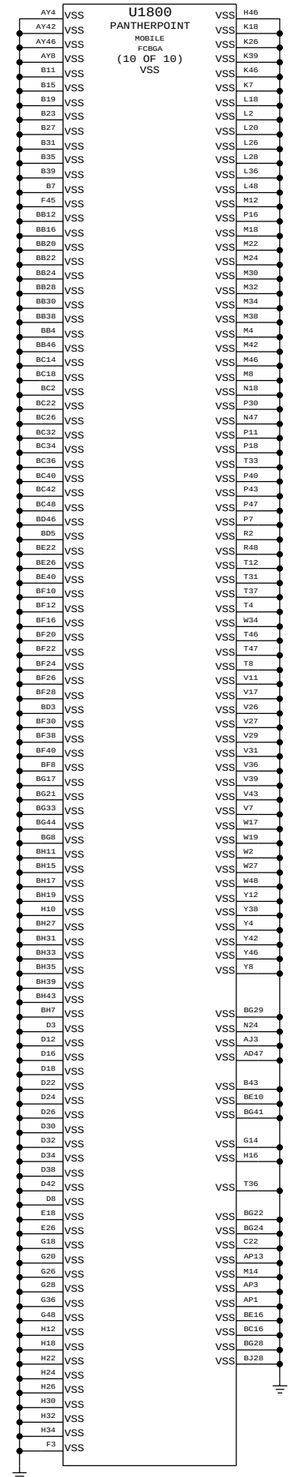

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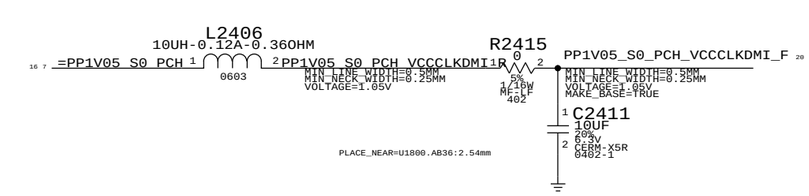

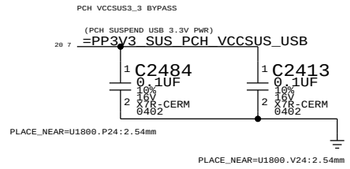

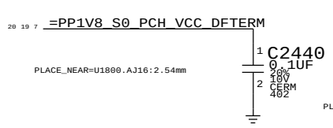

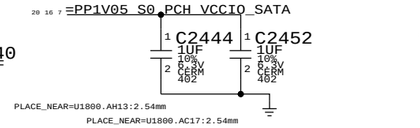

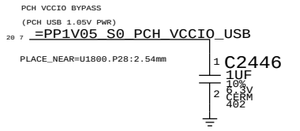

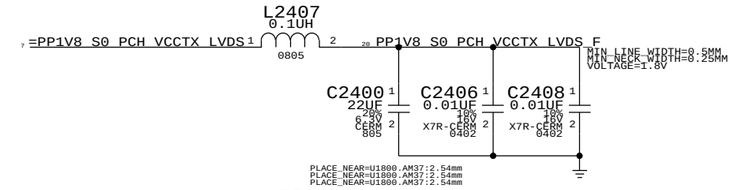

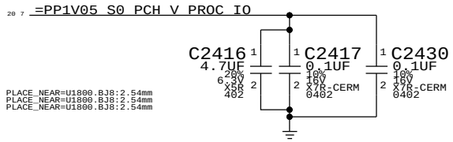

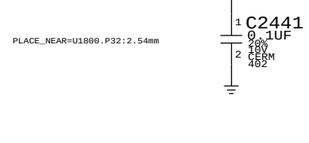

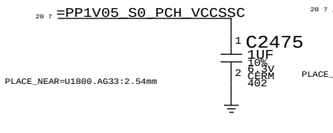

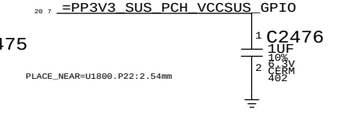

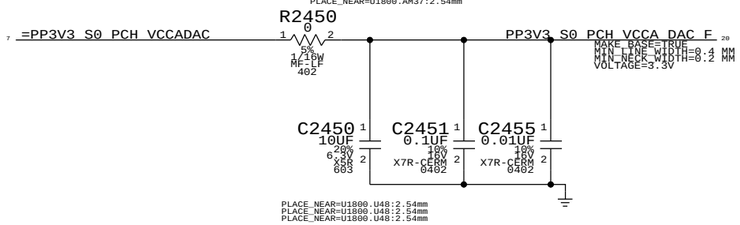

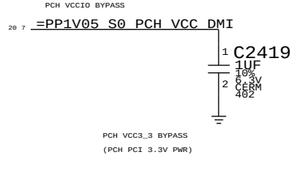

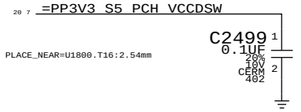

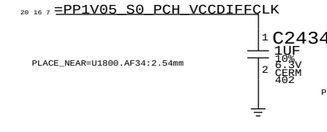

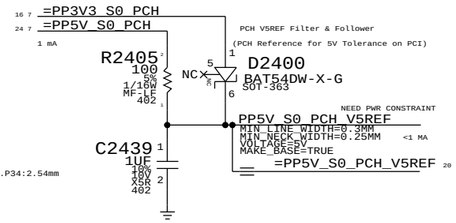

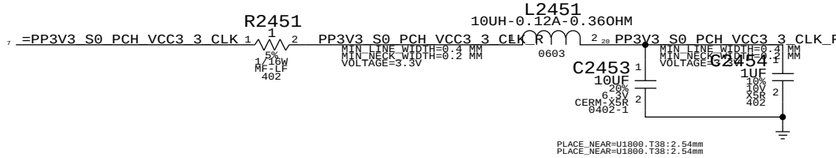

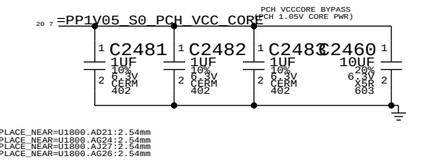

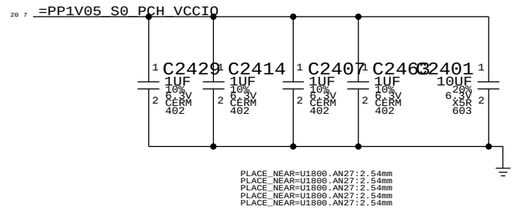

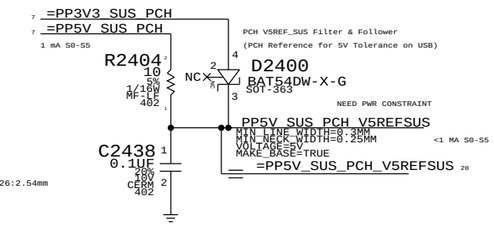

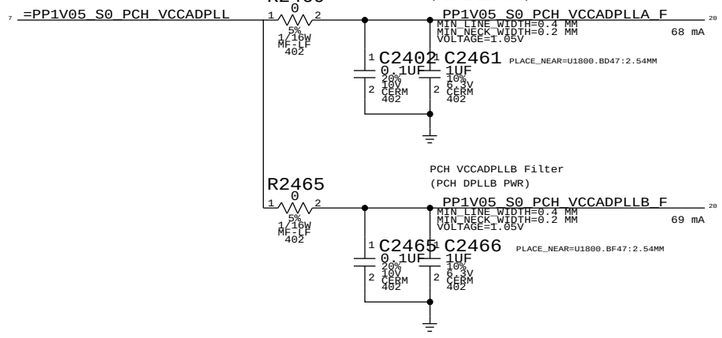

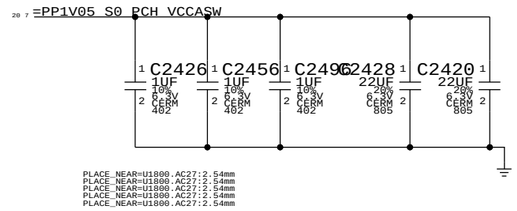

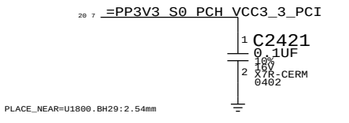

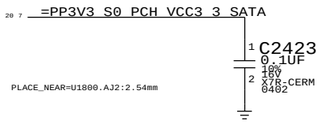

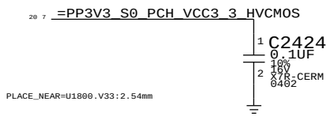

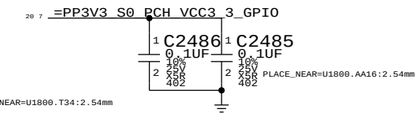

SYNC_MASTER=K90I_MLB SYNC_DATE=02/15/2013

PAGE TITLE: PCH DECOUPLING

Apple Inc.

DRAWING NUMBER: 051-9058 SIZE: D
REVISION: 6.0.0
BRANCH:
PAGE: 24 OF 109
SHEET: 22 OF 86

CPU Micro2-XDP

CRITICAL
XDP_CONN
J2500
DF40RC-60DP-0.4V
M-ST-SM

NOTE: This is not the standard XDP pinout.
Use with 921-0133 Adapter Flex to
support chipset debug.

=PPVCCIO_S0_XDP

=PP3V3_S0_XDP
NO STUFF
R2540 1K 5% 1/16W MF-LF 402

(R2560-R2563)
XDP_CPU:BPM

XDP_BPM_L<4>	R2560	0	5% 1/20W MF 201
XDP_BPM_L<5>	R2561	0	5% 1/20W MF 201
XDP_BPM_L<6>	R2562	0	5% 1/20W MF 201
XDP_BPM_L<7>	R2563	0	5% 1/20W MF 201

(R2564-R2567)
XDP_CPU:CFG

CPU_CFG<12>	R2564	0	5% 1/20W MF 201
CPU_CFG<13>	R2565	0	5% 1/20W MF 201
CPU_CFG<14>	R2566	0	5% 1/20W MF 201
CPU_CFG<15>	R2567	0	5% 1/20W MF 201

CPU_PWRGD	R2500	1K	5% 1/20W MF 201
PM_PWRBTN_L	R2502	0	5% 1/20W MF 201
CPU_CFG<0>	R2501	1K	5% 1/20W MF 201
PM_PCH_SYS_PWROK	R2504	330	5% 1/20W MF 201

PLACE_NEAR=U1000.C60:2.54mm
PLACE_NEAR=U4900.P17:2.54mm
PLACE_NEAR=U1000.B57:2.54mm

XDP_CPU_PREQ_L	OBSEN_A0	OBSEN_C0
XDP_CPU_PRDY_L	OBSEN_A1	OBSEN_C1
XDP_BPM_L<0>	OBSDATA_A0	OBSDATA_C0
XDP_BPM_L<1>	OBSDATA_A1	OBSDATA_C1
XDP_BPM_L<2>	OBSDATA_A2	OBSDATA_C2
XDP_BPM_L<3>	OBSDATA_A3	OBSDATA_C3
CPU_CFG<10>	OBSEN_B0	OBSEN_D0
CPU_CFG<11>	OBSEN_B1	OBSEN_D1
XDP_OBSDATA_B<0>	OBSDATA_B0	OBSDATA_D0
XDP_OBSDATA_B<1>	OBSDATA_B1	OBSDATA_D1
XDP_OBSDATA_B<2>	OBSDATA_B2	OBSDATA_D2
XDP_OBSDATA_B<3>	OBSDATA_B3	OBSDATA_D3
XDP_CPU_PWRGD	PWRGD/HOOK0	ITPCLK/HOOK4
XDP_CPU_PWRBTN_L	HOOK1	ITPCLK#/HOOK5
	VCC_OBS_AB	VCC_OBS_CD
XDP_CPU_CFG<0>	HOOK2	RESET#/HOOK6
XDP_VR_READY	HOOK3	DBR#/HOOK7
=SMBUS_XDP_SDA	SDA	TDO
=SMBUS_XDP_SCL	SCL	TRSTn
	TCK1	TDI
XDP_CPU_TCK	TCK0	TMS
	NCX	XDP_PRESENT#

OBSEN_C0	CPU_CFG<16>
OBSEN_C1	CPU_CFG<17>
OBSDATA_C0	CPU_CFG<0>
OBSDATA_C1	CPU_CFG<1>
OBSDATA_C2	CPU_CFG<2>
OBSDATA_C3	CPU_CFG<3>
OBSEN_D0	CPU_CFG<8>
OBSEN_D1	CPU_CFG<9>
OBSDATA_D0	CPU_CFG<4>
OBSDATA_D1	CPU_CFG<5>
OBSDATA_D2	CPU_CFG<6>
OBSDATA_D3	CPU_CFG<7>
ITPCLK/HOOK4	XDP_CPU_CLK100M_P
ITPCLK#/HOOK5	XDP_CPU_CLK100M_N
RESET#/HOOK6	XDP_CPURST_L
DBR#/HOOK7	XDP_DBRESET_L
TDO	XDP_CPU_TDO
TRSTn	XDP_CPU_TRST_L
TDI	XDP_CPU_TDI
TMS	XDP_CPU_TMS

NOTE: XDP_DBRESET_L pulled-up to 3.3V on PCH Support Page

R2581 1K 1/20W 5% MF 201
R2580 1K 1/20W 5% MF 201

C2500 0.1UF 10V X7R-CERM 0402
C2501 0.1UF 10V X7R-CERM 0402

998-2516

XDP_CPU_TDO R2510 51 5% 1/20W MF 201 — XDP PLACE_NEAR=J2500.52:2.54mm
XDP_CPU_TDI R2511 51 5% 1/20W MF 201 — XDP PLACE_NEAR=U1000.K61:2.54mm
XDP_CPU_TMS R2512 51 5% 1/20W MF 201 — XDP PLACE_NEAR=U1000.H59:2.54mm
XDP_CPU_TCK R2513 51 5% 1/20W MF 201 — XDP PLACE_NEAR=U1000.J58:2.54mm
XDP_CPU_TRST_L R2514 51 5% 1/20W MF 201 — XDP PLACE_NEAR=U1000.H63:2.54mm

XDP_CPU_CLK100M_P	R2515	0	PLACE_NEAR=R1841.1:2.54mm
XDP_CPU_CLK100M_N	R2516	0	PLACE_NEAR=R1840.1:2.54mm
XDP_CPU_RESET_L	R2505	1K	PLACE_NEAR=U1000.G3:2.54mm

5% 1/20W MF 201

XDP SIGNALS

(R2520-R2537)
XDP

XDP_DA0_USB_EXTA_OC_L	R2520	33	XDP_DA0_PCH_GPIO59_USB_EXTA_OC_L
XDP_DA1_USB_EXTB_OC_L	R2521	33	XDP_DA1_PCH_GPIO40_USB_EXTB_OC_L
XDP_DA2_USB_EXTC_OC_L	R2522	33	XDP_DA2_PCH_GPIO41_USB_EXTC_OC_L
XDP_DA3_USB_EXTD_OC_L	R2523	33	XDP_DA3_PCH_GPIO42_USB_EXTD_OC_L
XDP_DB0_USB_EXTB_OC_EHCI_L	R2524	33	XDP_DB0_PCH_GPIO43_USB_EXTB_OC_EHCI_L
XDP_DB1_USB_EXTD_OC_EHCI_L	R2525	33	XDP_DB1_PCH_GPIO9_USB_EXTD_OC_EHCI_L
XDP_DB2_AP_PWR_EN	R2526	33	XDP_DB2_PCH_GPIO10_AP_PWR_EN
XDP_DB3_SDCONN_STATE_CHANGE	R2527	33	XDP_DB3_PCH_GPIO14_SDCONN_STATE_CHANGE
XDP_FC0	R2528	33	XDP_FC0_PCH_GPIO15_MEM_VDD_SEL_1V5_L
XDP_FC1	R2529	33	XDP_FC1_PCH_GPIO0
XDP_DC0_ISOLATE_CPU_MEM_L	R2530	33	XDP_DC0_PCH_GPIO28_ISOLATE_CPU_MEM_L
XDP_DC1_MXM_GOOD	R2531	33	XDP_DC1_PCH_GPIO35_MXM_GOOD
XDP_DC2_DP_AUXCH_ISOL	R2532	33	XDP_DC2_PCH_GPIO21_DP_AUXCH_ISOL
XDP_DC3_SATARDRVR_EN	R2533	33	XDP_DC3_PCH_GPIO19_SATARDRVR_EN
XDP_DD0_DP_GPU_TBT_SEL	R2534	33	XDP_DD0_PCH_GPIO36_DP_GPU_TBT_SEL
XDP_DD1_JTAG_ISP_TCK	R2535	33	XDP_DD1_PCH_GPIO37_JTAG_ISP_TCK
XDP_DD2_AUD_IPHS_SWITCH_EN	R2536	33	XDP_DD2_PCH_GPIO16_AUD_IPHS_SWITCH_EN_PCH
XDP_DD3_ENET_LOW_PWR	R2537	33	XDP_DD3_PCH_GPIO49_ENET_LOW_PWR_PCH

5% 1/20W MF 201

PCH SIGNALS

XDP_DA0_PCH_GPIO59_USB_EXTA_OC_L	R2590	0	USB_EXTA_OC_L
XDP_DA1_PCH_GPIO40_USB_EXTB_OC_L	R2591	0	USB_EXTB_OC_L
XDP_DB2_PCH_GPIO10_AP_PWR_EN	R2596	0	AP_PWR_EN
XDP_DB3_PCH_GPIO14_SDCONN_STATE_CHANGE	R2597	0	SDCONN_STATE_CHANGE
XDP_DC3_PCH_GPIO19_SATARDRVR_EN	R2573	0	SATARDRVR_EN
XDP_DC0_PCH_GPIO28_ISOLATE_CPU_MEM_L	R2570	0	ISOLATE_CPU_MEM_L
XDP_DC2_PCH_GPIO21_DP_AUXCH_ISOL	R2572	0	DP_AUXCH_ISOL
XDP_FC0_PCH_GPIO15_MEM_VDD_SEL_1V5_L	R2574	0	MEM_VDD_SEL_1V5_L

5% 1/20W MF 201

Non-XDP Signals

XDP_DD1_PCH_GPIO37_JTAG_ISP_TCK	R2575	0	JTAG_ISP_TCK
XDP_DD2_PCH_GPIO16_AUD_IPHS_SWITCH_EN_PCH	R2576	0	AUD_IPHS_SWITCH_EN_PCH
XDP_DD3_PCH_GPIO49_ENET_LOW_PWR_PCH	R2577	0	ENET_LOW_PWR_PCH

5% 1/20W MF 201

NOTE: This is not the standard XDP pinout.
Use with 921-0133 Adapter Flex to
support chipset debug.

PCH Micro2-XDP

=PP3V3_S5_XDP

CRITICAL
XDP_CONN
J2550
DF40RC-60DP-0.4V
M-ST-SM

TP_XDP_PCH_OBSFN_A<0>	OBSEN_A0	OBSEN_C0
TP_XDP_PCH_OBSFN_A<1>	OBSEN_A1	OBSEN_C1
XDP_DA0_USB_EXTA_OC_L	OBSDATA_A0	OBSDATA_C0
XDP_DA1_USB_EXTB_OC_L	OBSDATA_A1	OBSDATA_C1
XDP_DA2_USB_EXTC_OC_L	OBSDATA_A2	OBSDATA_C2
XDP_DA3_USB_EXTD_OC_L	OBSDATA_A3	OBSDATA_C3
TP_XDP_PCH_OBSFN_B<0>	OBSEN_B0	OBSEN_D0
TP_XDP_PCH_OBSFN_B<1>	OBSEN_B1	OBSEN_D1
XDP_DB0_USB_EXTB_OC_EHCI_L	OBSDATA_B0	OBSDATA_D0
XDP_DB1_USB_EXTD_OC_EHCI_L	OBSDATA_B1	OBSDATA_D1
XDP_DB2_AP_PWR_EN	OBSDATA_B2	OBSDATA_D2
XDP_DB3_SDCONN_STATE_CHANGE	OBSDATA_B3	OBSDATA_D3
XDP_PCH_S5_PWRGD	PWRGD/HOOK0	ITPCLK/HOOK4
XDP_PCH_PWRBTN_L	HOOK1	ITPCLK#/HOOK5
	VCC_OBS_AB	VCC_OBS_CD
TP_XDPPCH_HOOK2	HOOK2	RESET#/HOOK6
TP_XDPPCH_HOOK3	HOOK3	DBR#/HOOK7
=SMBUS_XDP_SDA	SDA	TDO
=SMBUS_XDP_SCL	SCL	TRSTn
	TCK1	TDI
XDP_PCH_TCK	TCK0	TMS
	NCX	XDP_PRESENT#

OBSEN_C0	XDP_FC0
OBSEN_C1	XDP_FC1
OBSDATA_C0	XDP_DC0_ISOLATE_CPU_MEM_L
OBSDATA_C1	XDP_DC1_MXM_GOOD
OBSDATA_C2	XDP_DC2_DP_AUXCH_ISOL
OBSDATA_C3	XDP_DC3_SATARDRVR_EN
OBSEN_D0	TP_XDP_PCH_OBSFN_D<0>
OBSEN_D1	TP_XDP_PCH_OBSFN_D<1>
OBSDATA_D0	XDP_DD0_DP_GPU_TBT_SEL
OBSDATA_D1	XDP_DD1_JTAG_ISP_TCK
OBSDATA_D2	XDP_DD2_AUD_IPHS_SWITCH_EN
OBSDATA_D3	XDP_DD3_ENET_LOW_PWR
ITPCLK/HOOK4	TP_XDP_PCH_HOOK4
ITPCLK#/HOOK5	TP_XDP_PCH_HOOK5
RESET#/HOOK6	XDPPCH_PLTRST_L
DBR#/HOOK7	XDP_DBRESET_L
TDO	XDP_PCH_TDO
TRSTn	TP_XDP_PCH_TRST_L
TDI	XDP_PCH_TDI
TMS	XDP_PCH_TMS

NOTE: XDP_DBRESET_L pulled-up to 3.3V on PCH Support Page

C2580 0.1UF 10V X7R-CERM 0402
C2581 0.1UF 10V X7R-CERM 0402

998-2516

PCH/XDP Signal Isolation Notes:

- Following Intel's Debug Prot Design Guid for HR and CR v1.3 doc id 404081.
Initially, stuffing both 33 and 0 ohms and validate whether it is functional in that state, else add BOM options.
- For isolated GPIOs:
  - 'Output' non-XDP signals require pulls.
  - 'Output' PCH/XDP signals require pulls.

R252x, R253x, R257x and R259x should be placed where signal path needs to split between route from PCH to J2550 and path to non-XDP signal destination.

ALL_SYS_PWRGD R2584 1K 5% 1/20W MF 201 — PLACE_NEAR=J2550.39:2.54mm
PM_PWRBTN_L R2585 0 5% 1/20W MF 201 — PLACE_NEAR=U4900.P17:2.54mm

=PP1V05_SUS_PCH_JTAG

XDP_PCH_TDO	R2550	51
XDP_PCH_TDI	R2551	51
XDP_PCH_TMS	R2552	51
XDP_PCH_TCK	R2556	51

5% 1/20W MF 201
PLACE_NEAR=J2550.52:2.54mm
PLACE_NEAR=U1800.K5:2.54mm
PLACE_NEAR=U1800.H7:2.54mm
PLACE_NEAR=U1800.J3:2.54mm

1K series R on PCH Support Page

SYNC_MASTER=J31_MLB SYNC_DATE=06/13/2011

PAGE TITLE
CPU & PCH XDP

Apple Inc.

DRAWING NUMBER 051-9058 SIZE D
REVISION 6.0.0
BRANCH
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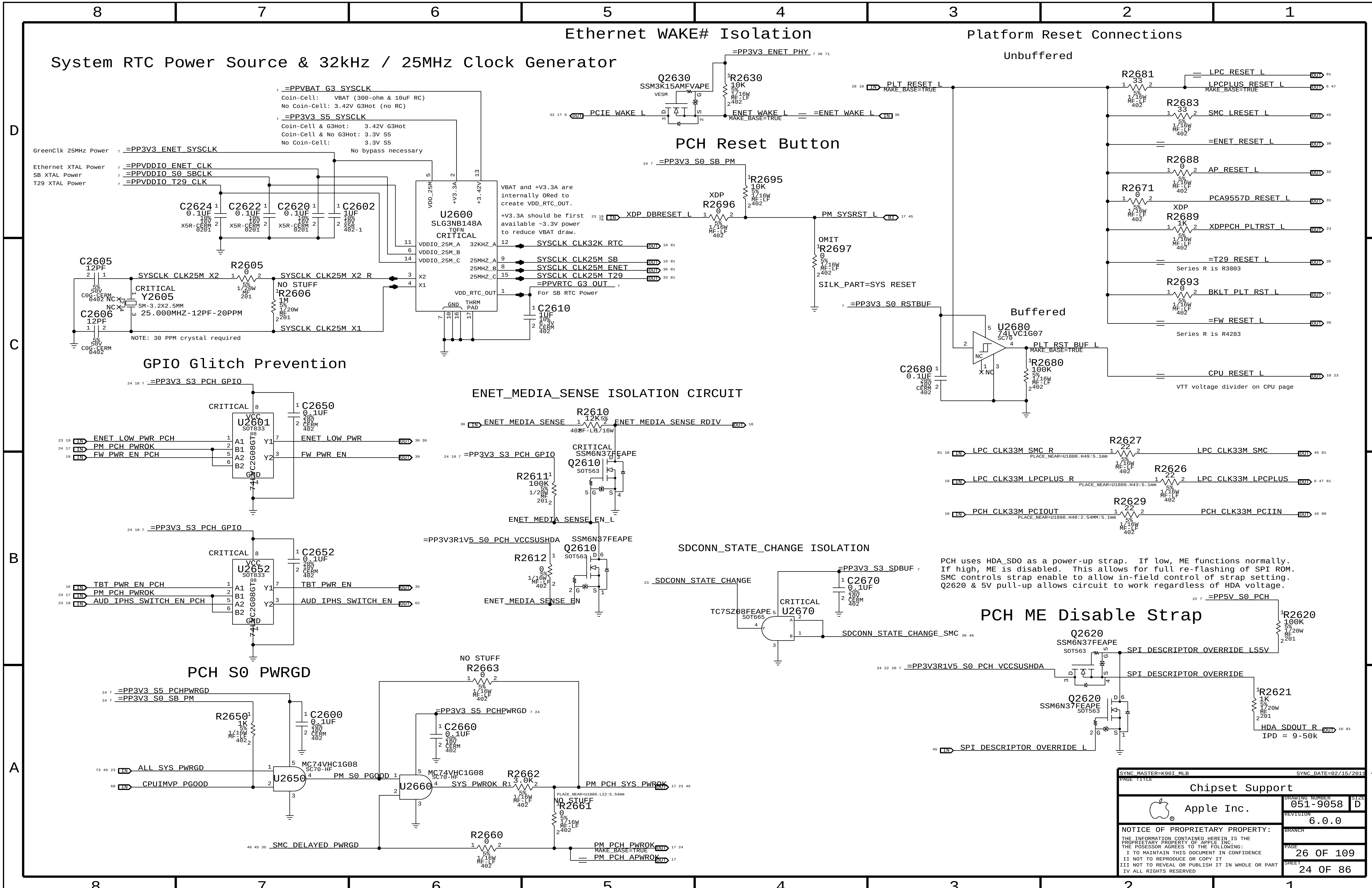
System RTC Power Source & 32kHz / 25MHz Clock Generator
Ethernet WAKE# Isolation
Platform Reset Connections
Unbuffered
Buffered
PCH Reset Button
GPIO Glitch Prevention
ENET_MEDIA_SENSE ISOLATION CIRCUIT
SDCONN_STATE_CHANGE ISOLATION
PCH ME Disable Strap
PCH S0 PWRGD
=PPVBAT_G3_SYSCLK
Coin-Cell: VBAT (300-ohm & 10uF RC)
No Coin-Cell: 3.42V G3Hot (no RC)
=PP3V3_S5_SYSCLK
Coin-Cell & G3Hot: 3.42V G3Hot
Coin-Cell & No G3Hot: 3.3V S5
No Coin-Cell: 3.3V S5
No bypass necessary
GreenClk 25MHz Power
=PP3V3_ENET_SYSCLK
Ethernet XTAL Power
=PPVDDIO_ENET_CLK
SB XTAL Power
=PPVDDIO_S0_SBCLK
T29 XTAL Power
=PPVDDIO_T29_CLK
U2600
SLG3NB148A
TQFN
CRITICAL
VBAT and +V3.3A are internally ORed to create VDD_RTC_OUT.
+V3.3A should be first available ~3.3V power to reduce VBAT draw.
SYSCLK_CLK32K_RTC
SYSCLK_CLK25M_SB
SYSCLK_CLK25M_ENET
SYSCLK_CLK25M_T29
=PPVRTC_G3_OUT
For SB RTC Power
SYSCLK_CLK25M_X2
SYSCLK_CLK25M_X2_R
SYSCLK_CLK25M_X1
Y2605
25.000MHZ-12PF-20PPM
NOTE: 30 PPM crystal required
NO STUFF
Q2630
SSM3K15AMFVAPE
=PP3V3_ENET_PHY
PCIE_WAKE_L
ENET_WAKE_L
=ENET_WAKE_L
=PP3V3_S0_SB_PM
XDP_DBRESET_L
PM_SYSRST_L
OMIT
SILK_PART=SYS RESET
PLT_RESET_L
MAKE_BASE=TRUE
LPC_RESET_L
LPCPLUS_RESET_L
SMC_LRESET_L
=ENET_RESET_L
AP_RESET_L
PCA9557D_RESET_L
XDPPCH_PLTRST_L
=T29_RESET_L
Series R is R3803
BKLT_PLT_RST_L
=FW_RESET_L
Series R is R4283
U2680
74LVC1G07
SC70
=PP3V3_S0_RSTBUF
PLT_RST_BUF_L
CPU_RESET_L
VTT voltage divider on CPU page
=PP3V3_S3_PCH_GPIO
U2601
74LVC2G08GT
ENET_LOW_PWR_PCH
PM_PCH_PWROK
FW_PWR_EN_PCH
ENET_LOW_PWR
FW_PWR_EN
U2652
TBT_PWR_EN_PCH
AUD_IPHS_SWITCH_EN_PCH
TBT_PWR_EN
AUD_IPHS_SWITCH_EN
ENET_MEDIA_SENSE
ENET_MEDIA_SENSE_RDIV
ENET_MEDIA_SENSE_EN_L
ENET_MEDIA_SENSE_EN
Q2610
SSM6N37FEAPE
=PP3V3R1V5_S0_PCH_VCCSUSHDA
LPC_CLK33M_SMC_R
LPC_CLK33M_SMC
LPC_CLK33M_LPCPLUS_R
LPC_CLK33M_LPCPLUS
PCH_CLK33M_PCIOUT
PCH_CLK33M_PCIIN
=PP3V3_S3_SDBUF
SDCONN_STATE_CHANGE
SDCONN_STATE_CHANGE_SMC
U2670
TC7SZ08FEAPE
SOT665
PCH uses HDA_SDO as a power-up strap. If low, ME functions normally. If high, ME is disabled. This allows for full re-flashing of SPI ROM. SMC controls strap enable to allow in-field control of strap setting. Q2620 & 5V pull-up allows circuit to work regardless of HDA voltage.
=PP5V_S0_PCH
Q2620
SPI_DESCRIPTOR_OVERRIDE_LS5V
SPI_DESCRIPTOR_OVERRIDE
SPI_DESCRIPTOR_OVERRIDE_L
HDA_SDOUT_R
IPD = 9-50k
=PP3V3_S5_PCHPWRGD
=PP3V3_S0_SB_PM
U2650
MC74VHC1G08
SC70-HF
ALL_SYS_PWRGD
CPUIMVP_PGOOD
PM_S0_PGOOD
U2660
SYS_PWROK_R
PM_PCH_SYS_PWROK
SMC_DELAYED_PWRGD
PM_PCH_PWROK
PM_PCH_APWROK
SYNC_MASTER=K90I_MLB
SYNC_DATE=02/15/2011
PAGE TITLE
Chipset Support
Apple Inc.
DRAWING NUMBER
051-9058
SIZE
D
REVISION
6.0.0
BRANCH
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USB MUX FOR LS/FS INTERNAL DEVICES

BOM GROUP	BOM OPTIONS
HUB_ALLREM	HUB_NONREM1_0,HUB_NONREM0_0
HUB_1NONREM	HUB_NONREM1_0,HUB_NONREM0_1
HUB_2NONREM	HUB_NONREM1_1,HUB_NONREM0_0
HUB_3NONREM	HUB_NONREM1_1,HUB_NONREM0_1

NON_REM 1	NON_REM 0	STRAP PIN CFG
0	0	ALL PORTS ARE REMOVABLE
0	1	PORT 1 IS NON REMOVABLE
1	0	PORT 1&2 ARE NON REMOVABLE
1	1	PORT 1&2&3 ARE NON REMOVABLE

CANNOT INDICATE ALL 4 PORTS ARE NON REMOVABLE ON USB2514B VIA STARPPING, PROGRAM NON_REMOVABLE DEVICE REGISTER 09H

BOM TABLE

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
338S0824	1	USB HUB 2514B	U2700	CRITICAL	USBHUB2514B
338S0923	1	USB HUB 2513B	U2700	CRITICAL	USBHUB2513B
338S0983	1	USB HUB 2512B	U2700	CRITICAL	USBHUB2512B

J5 ENGINEERING: USE USB2513B PRODUCTION: USE USB2512B
J3X ENGINEERING: USE USB2514B PRODUCTION: USE USB2513B

=PP3V3_S3_USB_HUB

BYPASS=U27000.5::5MM
BYPASS=U2700.5::2MM
C2700 4.7UF 20% 6.3V X5R 603
C2701 0.1UF 10% 16V X7R-CERM 0402
C2702 0.1UF 10% 16V X7R-CERM 0402
C2703 0.1UF 10% 16V X7R-CERM 0402
BYPASS=U2700.15::2MM
BYPASS=U2700.10::2MM
BYPASS=U2700.23::5MM
BYPASS=U2700.23::2MM
C2704 4.7UF 20% 6.3V X5R 603
C2705 0.1UF 10% 16V X7R-CERM 0402
C2706 0.1UF 10% 16V X7R-CERM 0402
C2708 0.1UF 10% 16V X7R-CERM 0402
BYPASS=U2700.36::2MM
BYPASS=U2650.29::2MM

Y2700
24.000M-60PPM-16PF
USB_HUB_XTAL2
SX3.2X1.4-SM
CRITICAL
C2709 18PF 5% 50V C0G-CERM 0402
R2710 0 5% 1/16W MF-LF 402
CRITICAL
R2700 1M 5% 1/16W MF-LF 402
CRITICAL
C2710 18PF 5% 50V C0G-CERM 0402
R2701 100 5% 1/16W MF-LF 402

HUB_NONREM1_1
R2702 10K 5% 1/16W MF-LF 402
HUB_NONREM0_1
R2703 10K 5% 1/16W MF-LF 402
HUB_NONREM1_0
R2704 10K 5% 1/16W MF-LF 402
HUB_NONREM0_0
R2705 10K 5% 1/16W MF-LF 402
R2706 10K 5% 1/16W MF-LF 402
R2707 10K 5% 1/16W MF-LF 402

J5 USES 197S0181 FOR Y2700 DUE TO HEIGHT LIMITATION
J3X USE 197S0284 FOR Y2700 TO SAVE COST

SYM VER 1
U2700
USB2513B
QFN
OMIT

VDD33
CRFILT
PLLFILT
PPUSB_HUB2_VDD1V8
MIN_LINE_WIDTH=0.4MM
MIN_NECK_WIDTH=0.2MM
VOLTAGE=1.8V
PPUSB_HUB2_VDD1V8PLL
MIN_LINE_WIDTH=0.4MM
MIN_NECK_WIDTH=0.2MM
VOLTAGE=1.8V
C2711 0.1UF 10% 16V X7R-CERM 0402
C2712 1UF 10% 16V X5R 402
C2713 0.1UF 10% 16V X7R-CERM 0402
C2714 1UF 10% 16V X5R 402

TEST	11	USB_HUB_TEST	
RESET*	26	USB_HUB_RESET_L	25
XTALIN/CLKIN	33	USB_HUB_XTAL1	
XTALOUT	32	USB_HUB_XTAL2_R	
SUSP_IND/LOCAL_PWR/NON_REM0	28	USB_HUB_NONREM0	
SDA/SMBDATA/NON_REM1	22	USB_HUB_NONREM1	
SCL/SMBCLK/CFG_SEL0	24	USB_HUB_CFG_SEL0	
HS_IND/CFG_SEL1	25	USB_HUB_CFG_SEL1	

USBDM_DN1/PRT_DIS_M1	1	USBHUB_DN1_N	BI	8
USBDP_DN1/PRT_DIS_P1	2	USBHUB_DN1_P	BI	8
USBDM_DN2/PRT_DIS_M2	3	USBHUB_DN2_N	BI	8
USBDP_DN2/PRT_DIS_P2	4	USBHUB_DN2_P	BI	8
USBDM_DN3/PRT_DIS_M3	6	USBHUB_DN3_N	BI	8 25
USBDP_DN3/PRT_DIS_P3	7	USBHUB_DN3_P	BI	8 25
NC	8	USBHUB_DN4_N	BI	25
NC	9	USBHUB_DN4_P	BI	25

PRTPWR1/BC_EN1*	12	TP_USB_HUB_PRTPWR1		
PRTPWR2/BC_EN2*	16	NC_USB_HUB_PRTPWR2		
PRTPWR3/BC_EN3*	18	NC_USB_HUB_PRTPWR3		
NC	20	NC_USB_HUB_PRTPWR4		
IPU OCS1*	13	TP_USB_HUB_OCS1		
IPU OCS2*	17	NC_USB_HUB_OCS2		
IPU OSC3*	19	NC_USB_HUB_OCS3		
IPU NC	21	NC_USB_HUB_OCS4		
RBIAS	35	USB_HUB_RBIAS		
VBUS_DET	27	USB_HUB_VBUS_DET		
USBDM_UP	30	USB_HUB_UP_N	BI	18 80
USBDP_UP	31	USB_HUB_UP_P	BI	18 80

THERM_PAD 37

PCH PORT 7 (EHCI1)

CRITICAL
R2709 12K 1% 1/16W MF 402

BLUETOOTH FOR J5 & J3X
TP/KB FOR J5, IR FOR J3X
SMC DEBUG PORT FOR J5, TP/KB FOR J3X
NC FOR J5, SMC DEBUG PORT FOR J3X

=PP3V3_S3_USB_HUB
NOSTUFF R2716 10K 5% 1/16W MF-LF 402
NOSTUFF R2717 10K 5% 1/16W MF-LF 402
NOSTUFF R2718 10K 5% 1/16W MF-LF 402
NOSTUFF R2719 10K 5% 1/16W MF-LF 402
USBHUB_DN3_N
USBHUB_DN3_P
USBHUB_DN4_N
USBHUB_DN4_P

=PP3V3_S3_USB_HUB
R2708 10K 5% 1/16W MF-LF 402

=PP3V3_S3_USB_RESET
R2712 10K 5% 1/16W MF-LF 402
USB_HUB_RESET_L
C2715 0.1UF 10% 16V X7R-CERM 0402
PLACE_NEAR=U2700.26:2.5MM

USB XHCI/EHCI2 PORT MUX FOR EXT B

=PP3V3_S3_USBMUX
C2760 0.1UF 20% 10V CERM 402
VCC
U2760
PI3USB102ZLE
TQFN
CRITICAL
GND

PCH PORT 9 (EHCI2)	M+	5	USB_EXTB_EHCI_P	Y+	1	USB_EXTB_MUX_P
	M-	4	USB_EXTB_EHCI_N	Y-	2	USB_EXTB_MUX_N
PCH PORT 1 (XHCI)	D+	7	USB_EXTB_XHCI_P			
	D-	6	USB_EXTB_XHCI_N			
	OE*	8		SEL	10	USB_EXTB_SEL_XHCI

TO CONNECTOR

PULL-UP TO 3.3V SUS ON PCH PAGE, SEL PIN IS LEAKAGE-SAFE
PCH GPIO60
SEL=0 CHOOSE USB EHCI2 PORT
SEL=1 CHOOSE USB XHCI PORT

SYNC_MASTER=LINDA_J30 SYNC_DATE=09/19/2011
PAGE TITLE: USB HUB & MUX
Apple Inc.
DRAWING NUMBER: 051-9058 SIZE: D
REVISION: 6.0.0
BRANCH:
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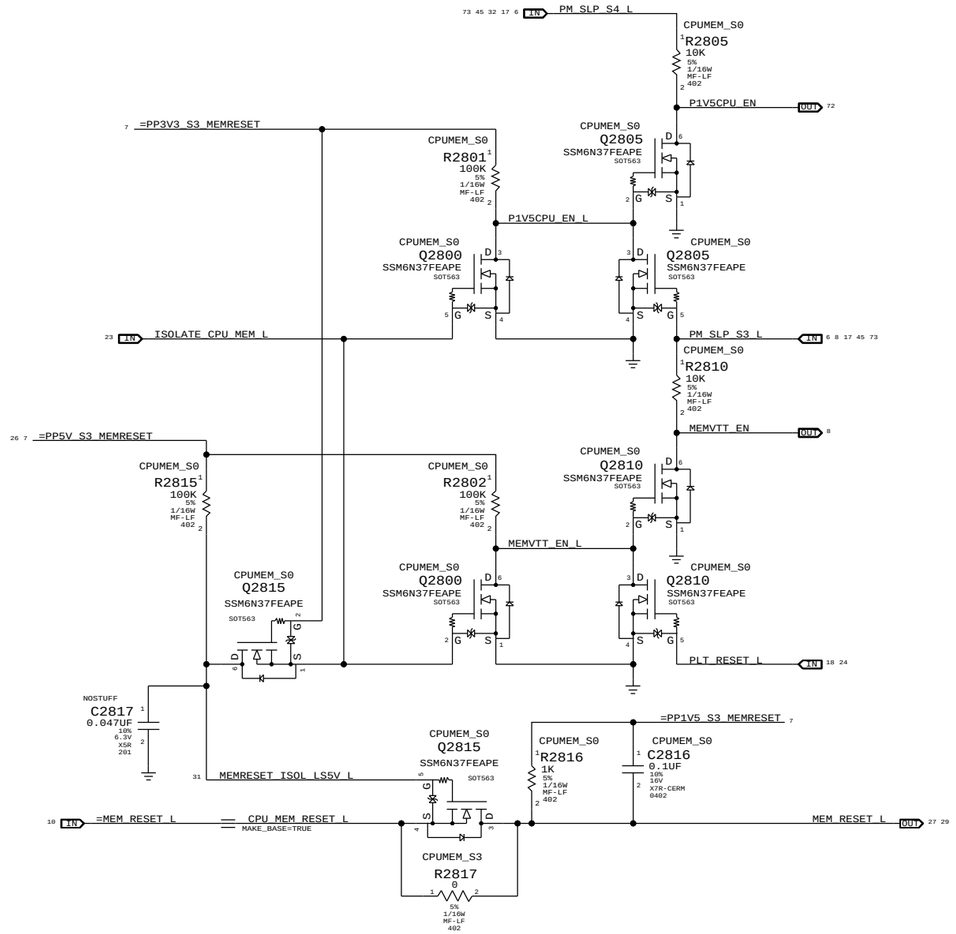
The circuit below handles CPU and VTT power during S0->S3->S0 transitions, as well as isolating the CPU's SM_DRAMRST# output from the SO-DIMMs when necessary.

ISOLATE_CPU_MEM_L GPIO state during S3<->S0 transitions determines behavior of signals.
WHEN HIGH: CPU 1.5V remains powered in S3, VTT follows S0 rails, MEM_RESET_L not isolated.
WHEN LOW: CPU 1.5V follows S0 rails, VTT ensures clean CKE transition, MEM_RESET_L isolated.

P1V5CPU_EN = (ISOLATE_CPU_MEM_L + PM_SLP_S3_L) * PM_SLP_S4_L
MEMVTT_EN = (ISOLATE_CPU_MEM_L + PLT_RST_L) * PM_SLP_S3_L
MEM_RESET_L = !ISOLATE_CPU_MEM_L + CPU_MEM_RESET_L

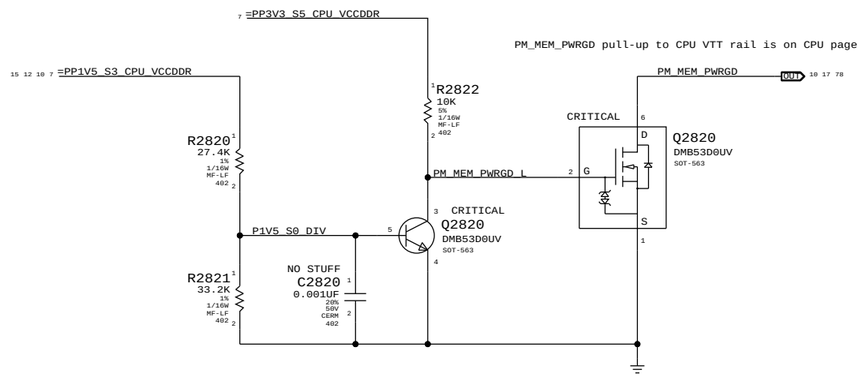


	Step	ISOLATE_CPU_MEM_L	PLT_RESET_L	PM_SLP_S3_L	PM_SLP_S4_L	CPU_MEM_RESET_L	MEM_RESET_L	MEMVTT_EN	P1V5CPU_EN
S0	0	1	1	1	1	1	CPU_MEM_RESET_L	1	1
to	1	0	1	1	1	1	1	1	1
S3	2	0	0	1	1	1	1	0	1
to	3	0	0	0	1	X	1	0	0
S0	4	0	0	1	1	X	1	0	1
	5	0	1	1	1	0 (*)	1	1	1
	6	0	1	1	1	1	1	1	1
	7	1	1	1	1	1	CPU_MEM_RESET_L	1	1

(*) CPU_MEM_RESET_L asserts due to loss of PM_MEM_PWRGD, must wait for software to clear before deasserting ISOLATE_CPU_MEM_L GPIO.

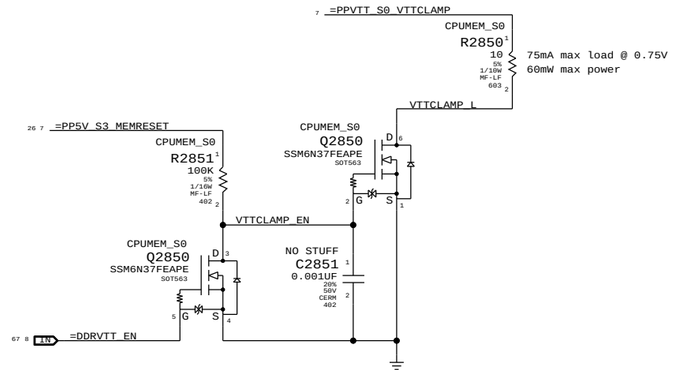
NOTE: In the event of a S3->S5 transition ISOLATE_CPU_MEM_L will still be asserted on next S5->S0 transition. Rails will power-up as if from S3, but MEM_RESET_L will not properly assert. Software must deassert ISOLATE_CPU_MEM_L and then generate a valid reset cycle on CPU_MEM_RESET_L.

1V5 S0 "PGOOD" for CPU



MEMVTT Clamp

Ensures CKE signals are held low in S3



SYNC_MASTER=K90I_MLB SYNC_DATE=02/15/2011

PAGE TITLE: CPU Memory S3 Support

Apple Inc.

DRAWING NUMBER: 051-9058 SIZE: D
REVISION: 6.0.0
BRANCH:
PAGE: 28 OF 109
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DDR3 DECOUPLING AND GND RETURN CAPS (SPACE EVENLY AT CONNECTOR)

Page Notes

Power aliases required by this page:

- =PP1V5_S0_MEM_A
- =PP1V5_S3_MEM_A
- =PP0V75_S0_MEM_VTT_A
- =PPSPD_S0_MEM_A (2.5 - 3.3V)

Signal aliases required by this page:

- =I2C_SODIMMA_SCL
- =I2C_SODIMMA_SDA

BOM options provided by this page:

(NONE)

7 =PP1V5_S3_MEM_A

C2910 0.1UF 20% 10V CERM 402
C2911 0.1UF 20% 10V CERM 402
C2912 0.1UF 20% 10V CERM 402
C2913 0.1UF 20% 10V CERM 402
C2914 0.1UF 20% 10V CERM 402
C2915 0.1UF 20% 10V CERM 402
C2916 0.1UF 20% 10V CERM 402
C2917 0.1UF 20% 10V CERM 402
C2918 0.1UF 20% 10V CERM 402
C2919 0.1UF 20% 10V CERM 402
C2920 0.1UF 20% 10V CERM 402
C2921 0.1UF 20% 10V CERM 402
C2922 0.1UF 20% 10V CERM 402
C2923 0.1UF 20% 10V CERM 402

C2900 10UF 20% 6.3V X5R 603
C2901 10UF 20% 6.3V X5R 603

31 PP0V75_S3_MEM_VREFDQ_A

C2930 2.2UF 20% 6.3V CERM 402-LF
C2931 0.1UF 20% 10V CERM 402

OMIT_TABLE

J2900 DDR3-SODIMM-DUAL-K6 (SYMBOL 2 OF 2) F-RT-THB

		KEY					
79 11	IN	MEM_A_CKE<0>	73	CKE0	CKE1	74	MEM_A_CKE<1>	IN 11 79
NC			75	VDD	VDD	76		
79 11	IN	MEM_A_BA<2>	77	NC	A15	78	MEM_A_A<15>	IN 11 79
			79	BA2	A14	80	MEM_A_A<14>	IN 11 79
			81	VDD	VDD	82		
79 11	IN	MEM_A_A<12>	83	A12/BC*	A11	84	MEM_A_A<11>	IN 11 79
79 11	IN	MEM_A_A<9>	85	A9	A7	86	MEM_A_A<7>	IN 11 79
			87	VDD	VDD	88		
79 11	IN	MEM_A_A<8>	89	A8	A6	90	MEM_A_A<6>	IN 11 79
79 11	IN	MEM_A_A<5>	91	A5	A4	92	MEM_A_A<4>	IN 11 79
			93	VDD	VDD	94		
79 11	IN	MEM_A_A<3>	95	A3	A2	96	MEM_A_A<2>	IN 11 79
79 11	IN	MEM_A_A<1>	97	A1	A0	98	MEM_A_A<0>	IN 11 79
			99	VDD	VDD	100		
79 11	IN	MEM_A_CLK_P<0>	101	CK0	CK1	102	MEM_A_CLK_P<1>	IN 11 79
79 11	IN	MEM_A_CLK_N<0>	103	CK0*	CK1*	104	MEM_A_CLK_N<1>	IN 11 79
			105	VDD	VDD	106		
79 11	IN	MEM_A_A<10>	107	A10/AP	BA1	108	MEM_A_BA<1>	IN 11 79
79 11	IN	MEM_A_BA<0>	109	BA0	RAS*	110	MEM_A_RAS_L	IN 11 79
			111	VDD	VDD	112		
79 11	IN	MEM_A_WE_L	113	WE*	S0*	114	MEM_A_CS_L<0>	IN 11 79
79 11	IN	MEM_A_CAS_L	115	CAS*	ODT0	116	MEM_A_ODT<0>	IN 11 79
			117	VDD	VDD	118		
79 11	IN	MEM_A_A<13>	119	A13	ODT1	120	MEM_A_ODT<1>	IN 11 79
79 11	IN	MEM_A_CS_L<1>	121	S1*	NC	122	NC	
			123	VDD	VDD	124		
NC			125	TEST	VREFCA	126		
			127	VSS	VSS	128		
28	BI	=MEM_A_DQ<32>	129	DQ32	DQ36	130	=MEM_A_DQ<36>	BI 28
28	BI	=MEM_A_DQ<33>	131	DQ33	DQ37	132	=MEM_A_DQ<37>	BI 28
			133	VSS	VSS	134		
28	BI	=MEM_A_DQS_N<4>	135	DQS4*	DM4	136	=MEM_A_DM<4>	IN 28
28	BI	=MEM_A_DQS_P<4>	137	DQS4	VSS	138		
			139	VSS	DQ38	140	=MEM_A_DQ<38>	BI 28
28	BI	=MEM_A_DQ<34>	141	DQ34	DQ39	142	=MEM_A_DQ<39>	BI 28
28	BI	=MEM_A_DQ<35>	143	DQ35	VSS	144		
			145	VSS	DQ44	146	=MEM_A_DQ<44>	BI 28
28	BI	=MEM_A_DQ<40>	147	DQ40	DQ45	148	=MEM_A_DQ<45>	BI 28
28	BI	=MEM_A_DQ<41>	149	DQ41	VSS	150		
			151	VSS	DQS5*	152	=MEM_A_DQS_N<5>	BI 28
28	IN	=MEM_A_DM<5>	153	DM5	DQS5	154	=MEM_A_DQS_P<5>	BI 28
			155	VSS	VSS	156		
28	BI	=MEM_A_DQ<42>	157	DQ42	DQ46	158	=MEM_A_DQ<46>	BI 28
28	BI	=MEM_A_DQ<43>	159	DQ43	DQ47	160	=MEM_A_DQ<47>	BI 28
			161	VSS	VSS	162		
28	BI	=MEM_A_DQ<48>	163	DQ48	DQ52	164	=MEM_A_DQ<52>	BI 28
28	BI	=MEM_A_DQ<49>	165	DQ49	DQ53	166	=MEM_A_DQ<53>	BI 28
			167	VSS	VSS	168		
28	BI	=MEM_A_DQS_N<6>	169	DQS6*	DM6	170	=MEM_A_DM<6>	IN 28
28	BI	=MEM_A_DQS_P<6>	171	DQS6	VSS	172		
			173	VSS	DQ54	174	=MEM_A_DQ<54>	BI 28
28	BI	=MEM_A_DQ<50>	175	DQ50	DQ55	176	=MEM_A_DQ<55>	BI 28
28	BI	=MEM_A_DQ<51>	177	DQ51	VSS	178		
			179	VSS	DQ60	180	=MEM_A_DQ<60>	BI 28
28	BI	=MEM_A_DQ<56>	181	DQ56	DQ61	182	=MEM_A_DQ<61>	BI 28
28	BI	=MEM_A_DQ<57>	183	DQ57	VSS	184		
			185	VSS	DQS7*	186	=MEM_A_DQS_N<7>	BI 28
28	IN	=MEM_A_DM<7>	187	DM7	DQS7	188	=MEM_A_DQS_P<7>	BI 28
			189	VSS	VSS	190		
28	BI	=MEM_A_DQ<58>	191	DQ58	DQ62	192	=MEM_A_DQ<62>	BI 28
28	BI	=MEM_A_DQ<59>	193	DQ59	DQ63	194	=MEM_A_DQ<63>	BI 28
			195	VSS	VSS	196		
		MEM_A_SA<0>	197	SA0	EVENT*	198	MEM_EVENT_L	OUT 29 45 46
			199	VDDSPD	SDA	200	=I2C_SODIMMA_SDA	BI 48
		MEM_A_SA<1>	201	SA1	SCL	202	=I2C_SODIMMA_SCL	IN 48
			203	VTT	VTT	204	=PP0V75_S0_MEM_VTT_A	7

OMIT_TABLE

J2900 DDR3-SODIMM-DUAL-K6 (SYMBOL 1 OF 2) CRITICAL

			1	VREFDQ	VSS	2	
			3	VSS	DQ4	4	=MEM_A_DQ<4>	BI 28
28	BI	=MEM_A_DQ<0>	5	DQ0	DQ5	6	=MEM_A_DQ<5>	BI 28
28	BI	=MEM_A_DQ<1>	7	DQ1	VSS	8		
			9	VSS	DQS0*	10	=MEM_A_DQS_N<0>	BI 28
28	IN	=MEM_A_DM<0>	11	DM0	DQS0	12	=MEM_A_DQS_P<0>	BI 28
			13	VSS	VSS	14		
28	BI	=MEM_A_DQ<2>	15	DQ2	DQ6	16	=MEM_A_DQ<6>	BI 28
28	BI	=MEM_A_DQ<3>	17	DQ3	DQ7	18	=MEM_A_DQ<7>	BI 28
			19	VSS	VSS	20		
28	BI	=MEM_A_DQ<8>	21	DQ8	DQ12	22	=MEM_A_DQ<12>	BI 28
28	BI	=MEM_A_DQ<9>	23	DQ9	DQ13	24	=MEM_A_DQ<13>	BI 28
			25	VSS	VSS	26		
28	BI	=MEM_A_DQS_N<1>	27	DQS1*	DM1	28	=MEM_A_DM<1>	IN 28
28	BI	=MEM_A_DQS_P<1>	29	DQS1	RESET*	30	MEM_RESET_L	IN 26 29
			31	VSS	VSS	32		
28	BI	=MEM_A_DQ<10>	33	DQ10	DQ14	34	=MEM_A_DQ<14>	BI 28
28	BI	=MEM_A_DQ<11>	35	DQ11	DQ15	36	=MEM_A_DQ<15>	BI 28
			37	VSS	VSS	38		
28	BI	=MEM_A_DQ<16>	39	DQ16	DQ20	40	=MEM_A_DQ<20>	BI 28
28	BI	=MEM_A_DQ<17>	41	DQ17	DQ21	42	=MEM_A_DQ<21>	BI 28
			43	VSS	VSS	44		
28	BI	=MEM_A_DQS_N<2>	45	DQS2*	DM2	46	=MEM_A_DM<2>	IN 28
28	BI	=MEM_A_DQS_P<2>	47	DQS2	VSS	48		
			49	VSS	DQ22	50	=MEM_A_DQ<22>	BI 28
28	BI	=MEM_A_DQ<18>	51	DQ18	DQ23	52	=MEM_A_DQ<23>	BI 28
28	BI	=MEM_A_DQ<19>	53	DQ19	VSS	54		
			55	VSS	DQ28	56	=MEM_A_DQ<28>	BI 28
28	BI	=MEM_A_DQ<24>	57	DQ24	DQ29	58	=MEM_A_DQ<29>	BI 28
28	BI	=MEM_A_DQ<25>	59	DQ25	VSS	60		
			61	VSS	DQS3*	62	=MEM_A_DQS_N<3>	BI 28
28	IN	=MEM_A_DM<3>	63	DM3	DQS3	64	=MEM_A_DQS_P<3>	BI 28
			65	VSS	VSS	66		
28	BI	=MEM_A_DQ<26>	67	DQ26	DQ30	68	=MEM_A_DQ<30>	BI 28
28	BI	=MEM_A_DQ<27>	69	DQ27	DQ31	70	=MEM_A_DQ<31>	BI 28
			71	VSS	VSS	72		
				KEY			

PP0V75_S3_MEM_VREFCA_A 31

C2935 2.2UF 20% 6.3V CERM 402-LF
C2936 0.1UF 20% 10V CERM 402

7 =PPSPD_S0_MEM_A

C2940 2.2UF 20% 6.3V CERM 402-LF
R2940 10K 5% 1/16W MF-LF 402
R2941 10K 5% 1/16W MF-LF 402

SPD ADDR=0xA0(WR)/0xA1(RD)

C2950 1UF 10% 10V X5R 402
C2951 1UF 10% 10V X5R 402
C2952 1UF 10% 10V X5R 402
C2953 1UF 10% 10V X5R 402

"Factory" (top) slot

SYNC_MASTER=K90I_MLB SYNC_DATE=02/15/2011

PAGE TITLE: DDR3 SO-DIMM Connector A

Apple Inc.

DRAWING NUMBER: 051-9058 SIZE: D
REVISION: 6.0.0
BRANCH:
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CPU CHANNEL A DQS 0 -> DIMM A DQS 0

79 11	MEM_A_DQS_N<0>	MAKE_BASE=TRUE	=MEM_A_DQS_N<0>	27
79 11	MEM_A_DQS_P<0>	MAKE_BASE=TRUE	=MEM_A_DQS_P<0>	27
		MAKE_BASE=TRUE	=MEM_A_DM<0>	27
79 11	MEM_A_DQ<7>		=MEM_A_DQ<3>	27
79 11	MEM_A_DQ<6>	MAKE_BASE=TRUE	=MEM_A_DQ<6>	27
79 11	MEM_A_DQ<5>	MAKE_BASE=TRUE	=MEM_A_DQ<1>	27
79 11	MEM_A_DQ<4>	MAKE_BASE=TRUE	=MEM_A_DQ<5>	27
79 11	MEM_A_DQ<3>	MAKE_BASE=TRUE	=MEM_A_DQ<2>	27
79 11	MEM_A_DQ<2>	MAKE_BASE=TRUE	=MEM_A_DQ<7>	27
79 11	MEM_A_DQ<1>	MAKE_BASE=TRUE	=MEM_A_DQ<0>	27
79 11	MEM_A_DQ<0>	MAKE_BASE=TRUE	=MEM_A_DQ<4>	27
		MAKE_BASE=TRUE		

CPU CHANNEL A DQS 1 -> DIMM A DQS 1

79 11	MEM_A_DQS_N<1>		=MEM_A_DQS_N<1>	27
79 11	MEM_A_DQS_P<1>	MAKE_BASE=TRUE	=MEM_A_DQS_P<1>	27
		MAKE_BASE=TRUE	=MEM_A_DM<1>	27
79 11	MEM_A_DQ<15>		=MEM_A_DQ<11>	27
79 11	MEM_A_DQ<14>	MAKE_BASE=TRUE	=MEM_A_DQ<10>	27
79 11	MEM_A_DQ<13>	MAKE_BASE=TRUE	=MEM_A_DQ<12>	27
79 11	MEM_A_DQ<12>	MAKE_BASE=TRUE	=MEM_A_DQ<9>	27
79 11	MEM_A_DQ<11>	MAKE_BASE=TRUE	=MEM_A_DQ<15>	27
79 11	MEM_A_DQ<10>	MAKE_BASE=TRUE	=MEM_A_DQ<14>	27
79 11	MEM_A_DQ<9>	MAKE_BASE=TRUE	=MEM_A_DQ<13>	27
79 11	MEM_A_DQ<8>	MAKE_BASE=TRUE	=MEM_A_DQ<8>	27
		MAKE_BASE=TRUE		

CPU CHANNEL A DQS 2 -> DIMM A DQS 2

79 11	MEM_A_DQS_N<2>		=MEM_A_DQS_N<2>	27
79 11	MEM_A_DQS_P<2>	MAKE_BASE=TRUE	=MEM_A_DQS_P<2>	27
		MAKE_BASE=TRUE	=MEM_A_DM<2>	27
79 11	MEM_A_DQ<23>		=MEM_A_DQ<23>	27
79 11	MEM_A_DQ<22>	MAKE_BASE=TRUE	=MEM_A_DQ<22>	27
79 11	MEM_A_DQ<21>	MAKE_BASE=TRUE	=MEM_A_DQ<21>	27
79 11	MEM_A_DQ<20>	MAKE_BASE=TRUE	=MEM_A_DQ<20>	27
79 11	MEM_A_DQ<19>	MAKE_BASE=TRUE	=MEM_A_DQ<18>	27
79 11	MEM_A_DQ<18>	MAKE_BASE=TRUE	=MEM_A_DQ<19>	27
79 11	MEM_A_DQ<17>	MAKE_BASE=TRUE	=MEM_A_DQ<16>	27
79 11	MEM_A_DQ<16>	MAKE_BASE=TRUE	=MEM_A_DQ<17>	27
		MAKE_BASE=TRUE		

CPU CHANNEL A DQS 3 -> DIMM A DQS 3

79 11	MEM_A_DQS_N<3>		=MEM_A_DQS_N<3>	27
79 11	MEM_A_DQS_P<3>	MAKE_BASE=TRUE	=MEM_A_DQS_P<3>	27
		MAKE_BASE=TRUE	=MEM_A_DM<3>	27
79 11	MEM_A_DQ<31>		=MEM_A_DQ<26>	27
79 11	MEM_A_DQ<30>	MAKE_BASE=TRUE	=MEM_A_DQ<24>	27
79 11	MEM_A_DQ<29>	MAKE_BASE=TRUE	=MEM_A_DQ<28>	27
79 11	MEM_A_DQ<28>	MAKE_BASE=TRUE	=MEM_A_DQ<25>	27
79 11	MEM_A_DQ<27>	MAKE_BASE=TRUE	=MEM_A_DQ<31>	27
79 11	MEM_A_DQ<26>	MAKE_BASE=TRUE	=MEM_A_DQ<27>	27
79 11	MEM_A_DQ<25>	MAKE_BASE=TRUE	=MEM_A_DQ<30>	27
79 11	MEM_A_DQ<24>	MAKE_BASE=TRUE	=MEM_A_DQ<29>	27
		MAKE_BASE=TRUE		

CPU CHANNEL A DQS 4 -> DIMM A DQS 4

79 11	MEM_A_DQS_N<4>		=MEM_A_DQS_N<4>	27
79 11	MEM_A_DQS_P<4>	MAKE_BASE=TRUE	=MEM_A_DQS_P<4>	27
		MAKE_BASE=TRUE	=MEM_A_DM<4>	27
79 11	MEM_A_DQ<39>		=MEM_A_DQ<38>	27
79 11	MEM_A_DQ<38>	MAKE_BASE=TRUE	=MEM_A_DQ<39>	27
79 11	MEM_A_DQ<37>	MAKE_BASE=TRUE	=MEM_A_DQ<37>	27
79 11	MEM_A_DQ<36>	MAKE_BASE=TRUE	=MEM_A_DQ<33>	27
79 11	MEM_A_DQ<35>	MAKE_BASE=TRUE	=MEM_A_DQ<34>	27
79 11	MEM_A_DQ<34>	MAKE_BASE=TRUE	=MEM_A_DQ<35>	27
79 11	MEM_A_DQ<33>	MAKE_BASE=TRUE	=MEM_A_DQ<32>	27
79 11	MEM_A_DQ<32>	MAKE_BASE=TRUE	=MEM_A_DQ<36>	27
		MAKE_BASE=TRUE		

CPU CHANNEL A DQS 5 -> DIMM A DQS 5

79 11	MEM_A_DQS_N<5>		=MEM_A_DQS_N<5>	27
79 11	MEM_A_DQS_P<5>	MAKE_BASE=TRUE	=MEM_A_DQS_P<5>	27
		MAKE_BASE=TRUE	=MEM_A_DM<5>	27
79 11	MEM_A_DQ<47>		=MEM_A_DQ<46>	27
79 11	MEM_A_DQ<46>	MAKE_BASE=TRUE	=MEM_A_DQ<43>	27
79 11	MEM_A_DQ<45>	MAKE_BASE=TRUE	=MEM_A_DQ<45>	27
79 11	MEM_A_DQ<44>	MAKE_BASE=TRUE	=MEM_A_DQ<41>	27
79 11	MEM_A_DQ<43>	MAKE_BASE=TRUE	=MEM_A_DQ<47>	27
79 11	MEM_A_DQ<42>	MAKE_BASE=TRUE	=MEM_A_DQ<42>	27
79 11	MEM_A_DQ<41>	MAKE_BASE=TRUE	=MEM_A_DQ<40>	27
79 11	MEM_A_DQ<40>	MAKE_BASE=TRUE	=MEM_A_DQ<44>	27
		MAKE_BASE=TRUE		

CPU CHANNEL A DQS 6 -> DIMM A DQS 6

79 11	MEM_A_DQS_N<6>		=MEM_A_DQS_N<6>	27
79 11	MEM_A_DQS_P<6>	MAKE_BASE=TRUE	=MEM_A_DQS_P<6>	27
		MAKE_BASE=TRUE	=MEM_A_DM<6>	27
79 11	MEM_A_DQ<55>		=MEM_A_DQ<51>	27
79 11	MEM_A_DQ<54>	MAKE_BASE=TRUE	=MEM_A_DQ<54>	27
79 11	MEM_A_DQ<53>	MAKE_BASE=TRUE	=MEM_A_DQ<49>	27
79 11	MEM_A_DQ<52>	MAKE_BASE=TRUE	=MEM_A_DQ<53>	27
79 11	MEM_A_DQ<51>	MAKE_BASE=TRUE	=MEM_A_DQ<50>	27
79 11	MEM_A_DQ<50>	MAKE_BASE=TRUE	=MEM_A_DQ<55>	27
79 11	MEM_A_DQ<49>	MAKE_BASE=TRUE	=MEM_A_DQ<48>	27
79 11	MEM_A_DQ<48>	MAKE_BASE=TRUE	=MEM_A_DQ<52>	27
		MAKE_BASE=TRUE		

CPU CHANNEL A DQS 7 -> DIMM A DQS 7

79 11	MEM_A_DQS_N<7>		=MEM_A_DQS_N<7>	27
79 11	MEM_A_DQS_P<7>	MAKE_BASE=TRUE	=MEM_A_DQS_P<7>	27
		MAKE_BASE=TRUE	=MEM_A_DM<7>	27
79 11	MEM_A_DQ<63>		=MEM_A_DQ<58>	27
79 11	MEM_A_DQ<62>	MAKE_BASE=TRUE	=MEM_A_DQ<59>	27
79 11	MEM_A_DQ<61>	MAKE_BASE=TRUE	=MEM_A_DQ<60>	27
79 11	MEM_A_DQ<60>	MAKE_BASE=TRUE	=MEM_A_DQ<57>	27
79 11	MEM_A_DQ<59>	MAKE_BASE=TRUE	=MEM_A_DQ<63>	27
79 11	MEM_A_DQ<58>	MAKE_BASE=TRUE	=MEM_A_DQ<62>	27
79 11	MEM_A_DQ<57>	MAKE_BASE=TRUE	=MEM_A_DQ<61>	27
79 11	MEM_A_DQ<56>	MAKE_BASE=TRUE	=MEM_A_DQ<56>	27
		MAKE_BASE=TRUE		

CPU CHANNEL B DQS 0 -> DIMM B DQS 0

79 11	MEM_B_DQS_N<0>		=MEM_B_DQS_N<0>	29
79 11	MEM_B_DQS_P<0>	MAKE_BASE=TRUE	=MEM_B_DQS_P<0>	29
		MAKE_BASE=TRUE	=MEM_B_DM<0>	29
79 11	MEM_B_DQ<7>		=MEM_B_DQ<3>	29
79 11	MEM_B_DQ<6>	MAKE_BASE=TRUE	=MEM_B_DQ<2>	29
79 11	MEM_B_DQ<5>	MAKE_BASE=TRUE	=MEM_B_DQ<0>	29
79 11	MEM_B_DQ<4>	MAKE_BASE=TRUE	=MEM_B_DQ<4>	29
79 11	MEM_B_DQ<3>	MAKE_BASE=TRUE	=MEM_B_DQ<7>	29
79 11	MEM_B_DQ<2>	MAKE_BASE=TRUE	=MEM_B_DQ<6>	29
79 11	MEM_B_DQ<1>	MAKE_BASE=TRUE	=MEM_B_DQ<5>	29
79 11	MEM_B_DQ<0>	MAKE_BASE=TRUE	=MEM_B_DQ<1>	29
		MAKE_BASE=TRUE		

CPU CHANNEL B DQS 1 -> DIMM B DQS 1

79 11	MEM_B_DQS_N<1>		=MEM_B_DQS_N<1>	29
79 11	MEM_B_DQS_P<1>	MAKE_BASE=TRUE	=MEM_B_DQS_P<1>	29
		MAKE_BASE=TRUE	=MEM_B_DM<1>	29
79 11	MEM_B_DQ<15>		=MEM_B_DQ<15>	29
79 11	MEM_B_DQ<14>	MAKE_BASE=TRUE	=MEM_B_DQ<14>	29
79 11	MEM_B_DQ<13>	MAKE_BASE=TRUE	=MEM_B_DQ<13>	29
79 11	MEM_B_DQ<12>	MAKE_BASE=TRUE	=MEM_B_DQ<8>	29
79 11	MEM_B_DQ<11>	MAKE_BASE=TRUE	=MEM_B_DQ<11>	29
79 11	MEM_B_DQ<10>	MAKE_BASE=TRUE	=MEM_B_DQ<10>	29
79 11	MEM_B_DQ<9>	MAKE_BASE=TRUE	=MEM_B_DQ<12>	29
79 11	MEM_B_DQ<8>	MAKE_BASE=TRUE	=MEM_B_DQ<9>	29
		MAKE_BASE=TRUE		

CPU CHANNEL B DQS 2 -> DIMM B DQS 2

79 11	MEM_B_DQS_N<2>		=MEM_B_DQS_N<2>	29
79 11	MEM_B_DQS_P<2>	MAKE_BASE=TRUE	=MEM_B_DQS_P<2>	29
		MAKE_BASE=TRUE	=MEM_B_DM<2>	29
79 11	MEM_B_DQ<23>		=MEM_B_DQ<23>	29
79 11	MEM_B_DQ<22>	MAKE_BASE=TRUE	=MEM_B_DQ<18>	29
79 11	MEM_B_DQ<21>	MAKE_BASE=TRUE	=MEM_B_DQ<16>	29
79 11	MEM_B_DQ<20>	MAKE_BASE=TRUE	=MEM_B_DQ<17>	29
79 11	MEM_B_DQ<19>	MAKE_BASE=TRUE	=MEM_B_DQ<22>	29
79 11	MEM_B_DQ<18>	MAKE_BASE=TRUE	=MEM_B_DQ<19>	29
79 11	MEM_B_DQ<17>	MAKE_BASE=TRUE	=MEM_B_DQ<21>	29
79 11	MEM_B_DQ<16>	MAKE_BASE=TRUE	=MEM_B_DQ<20>	29
		MAKE_BASE=TRUE		

CPU CHANNEL B DQS 3 -> DIMM B DQS 3

79 11	MEM_B_DQS_N<3>		=MEM_B_DQS_N<3>	29
79 11	MEM_B_DQS_P<3>	MAKE_BASE=TRUE	=MEM_B_DQS_P<3>	29
		MAKE_BASE=TRUE	=MEM_B_DM<3>	29
79 11	MEM_B_DQ<31>		=MEM_B_DQ<26>	29
79 11	MEM_B_DQ<30>	MAKE_BASE=TRUE	=MEM_B_DQ<30>	29
79 11	MEM_B_DQ<29>	MAKE_BASE=TRUE	=MEM_B_DQ<28>	29
79 11	MEM_B_DQ<28>	MAKE_BASE=TRUE	=MEM_B_DQ<29>	29
79 11	MEM_B_DQ<27>	MAKE_BASE=TRUE	=MEM_B_DQ<27>	29
79 11	MEM_B_DQ<26>	MAKE_BASE=TRUE	=MEM_B_DQ<31>	29
79 11	MEM_B_DQ<25>	MAKE_BASE=TRUE	=MEM_B_DQ<25>	29
79 11	MEM_B_DQ<24>	MAKE_BASE=TRUE	=MEM_B_DQ<24>	29
		MAKE_BASE=TRUE		

CPU CHANNEL B DQS 4 -> DIMM B DQS 4

79 11	MEM_B_DQS_N<4>		=MEM_B_DQS_N<4>	29
79 11	MEM_B_DQS_P<4>	MAKE_BASE=TRUE	=MEM_B_DQS_P<4>	29
		MAKE_BASE=TRUE	=MEM_B_DM<4>	29
79 11	MEM_B_DQ<39>		=MEM_B_DQ<38>	29
79 11	MEM_B_DQ<38>	MAKE_BASE=TRUE	=MEM_B_DQ<39>	29
79 11	MEM_B_DQ<37>	MAKE_BASE=TRUE	=MEM_B_DQ<33>	29
79 11	MEM_B_DQ<36>	MAKE_BASE=TRUE	=MEM_B_DQ<37>	29
79 11	MEM_B_DQ<35>	MAKE_BASE=TRUE	=MEM_B_DQ<34>	29
79 11	MEM_B_DQ<34>	MAKE_BASE=TRUE	=MEM_B_DQ<35>	29
79 11	MEM_B_DQ<33>	MAKE_BASE=TRUE	=MEM_B_DQ<32>	29
79 11	MEM_B_DQ<32>	MAKE_BASE=TRUE	=MEM_B_DQ<36>	29
		MAKE_BASE=TRUE		

CPU CHANNEL B DQS 5 -> DIMM B DQS 5

79 11	MEM_B_DQS_N<5>		=MEM_B_DQS_N<5>	29
79 11	MEM_B_DQS_P<5>	MAKE_BASE=TRUE	=MEM_B_DQS_P<5>	29
		MAKE_BASE=TRUE	=MEM_B_DM<5>	29
79 11	MEM_B_DQ<47>		=MEM_B_DQ<43>	29
79 11	MEM_B_DQ<46>	MAKE_BASE=TRUE	=MEM_B_DQ<46>	29
79 11	MEM_B_DQ<45>	MAKE_BASE=TRUE	=MEM_B_DQ<40>	29
79 11	MEM_B_DQ<44>	MAKE_BASE=TRUE	=MEM_B_DQ<45>	29
79 11	MEM_B_DQ<43>	MAKE_BASE=TRUE	=MEM_B_DQ<47>	29
79 11	MEM_B_DQ<42>	MAKE_BASE=TRUE	=MEM_B_DQ<42>	29
79 11	MEM_B_DQ<41>	MAKE_BASE=TRUE	=MEM_B_DQ<41>	29
79 11	MEM_B_DQ<40>	MAKE_BASE=TRUE	=MEM_B_DQ<44>	29
		MAKE_BASE=TRUE		

CPU CHANNEL B DQS 6 -> DIMM B DQS 6

79 11	MEM_B_DQS_N<6>		=MEM_B_DQS_N<6>	29
79 11	MEM_B_DQS_P<6>	MAKE_BASE=TRUE	=MEM_B_DQS_P<6>	29
		MAKE_BASE=TRUE	=MEM_B_DM<6>	29
79 11	MEM_B_DQ<55>		=MEM_B_DQ<54>	29
79 11	MEM_B_DQ<54>	MAKE_BASE=TRUE	=MEM_B_DQ<55>	29
79 11	MEM_B_DQ<53>	MAKE_BASE=TRUE	=MEM_B_DQ<53>	29
79 11	MEM_B_DQ<52>	MAKE_BASE=TRUE	=MEM_B_DQ<49>	29
79 11	MEM_B_DQ<51>	MAKE_BASE=TRUE	=MEM_B_DQ<51>	29
79 11	MEM_B_DQ<50>	MAKE_BASE=TRUE	=MEM_B_DQ<50>	29
79 11	MEM_B_DQ<49>	MAKE_BASE=TRUE	=MEM_B_DQ<48>	29
79 11	MEM_B_DQ<48>	MAKE_BASE=TRUE	=MEM_B_DQ<52>	29
		MAKE_BASE=TRUE		

CPU CHANNEL B DQS 7 -> DIMM B DQS 7

79 11	MEM_B_DQS_N<7>		=MEM_B_DQS_N<7>	29
79 11	MEM_B_DQS_P<7>	MAKE_BASE=TRUE	=MEM_B_DQS_P<7>	29
		MAKE_BASE=TRUE	=MEM_B_DM<7>	29
79 11	MEM_B_DQ<63>		=MEM_B_DQ<56>	29
79 11	MEM_B_DQ<62>	MAKE_BASE=TRUE	=MEM_B_DQ<59>	29
79 11	MEM_B_DQ<61>	MAKE_BASE=TRUE	=MEM_B_DQ<61>	29
79 11	MEM_B_DQ<60>	MAKE_BASE=TRUE	=MEM_B_DQ<60>	29
79 11	MEM_B_DQ<59>	MAKE_BASE=TRUE	=MEM_B_DQ<63>	29
79 11	MEM_B_DQ<58>	MAKE_BASE=TRUE	=MEM_B_DQ<58>	29
79 11	MEM_B_DQ<57>	MAKE_BASE=TRUE	=MEM_B_DQ<57>	29
79 11	MEM_B_DQ<56>	MAKE_BASE=TRUE	=MEM_B_DQ<62>	29
		MAKE_BASE=TRUE		

NOTE: Ivybridge does not use DM signals per doc 460452 CR SFF DG Section 2.6.14

SYNC_MASTER=K90I_MLB SYNC_DATE=02/15/2011

PAGE TITLE

DDR3 Byte/Bit Swaps

Apple Inc.

DRAWING NUMBER 051-9058 SIZE D

REVISION 6.0.0

BRANCH

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DDR3 DECOUPLING AND GND RETURN CAPS (SPACE EVENLY AT CONNECTOR)

Page Notes

Power aliases required by this page:
- =PP1V5_S0_MEM_B
- =PP1V5_S3_MEM_B
- =PP0V75_S0_MEM_VTT_B
- =PPSPD_S0_MEM_B (2.5 - 3.3V)

Signal aliases required by this page:
- =I2C_SODIMMB_SCL
- =I2C_SODIMMB_SDA

BOM options provided by this page:
(NONE)

7 =PP1V5_S3_MEM_B

C3100 10UF 20% 6.3V X5R 603
C3101 10UF 20% 6.3V X5R 603
C3110 C3111 C3112 C3113 C3114 C3115 C3116 C3117 C3118 C3119 C3120 C3121 C3122 C3123 0.1UF 20% 10V CERM 402

31 PP0V75_S3_MEM_VREFDQ_B

C3130 2.2UF 20% 6.3V CERM 402-LF
C3131 0.1UF 20% 10V CERM 402

OMIT_TABLE

J3100 F-RT-BGA6 DDR3-SODIMM (2 OF 2)

79 11	IN	MEM_B_CKE<0>	73	CKE0	CKE1	74	MEM_B_CKE<1>	IN 11 79
		NC	75	VDD	VDD	76		
			77	NC	A15	78	MEM_B_A<15>	IN 11 79
79 11	IN	MEM_B_BA<2>	79	BA2	A14	80	MEM_B_A<14>	IN 11 79
			81	VDD	VDD	82		
79 11	IN	MEM_B_A<12>	83	A12/BC*	A11	84	MEM_B_A<11>	IN 11 79
79 11	IN	MEM_B_A<9>	85	A9	A7	86	MEM_B_A<7>	IN 11 79
			87	VDD	VDD	88		
79 11	IN	MEM_B_A<8>	89	A8	A6	90	MEM_B_A<6>	IN 11 79
79 11	IN	MEM_B_A<5>	91	A5	A4	92	MEM_B_A<4>	IN 11 79
			93	VDD	VDD	94		
79 11	IN	MEM_B_A<3>	95	A3	A2	96	MEM_B_A<2>	IN 11 79
79 11	IN	MEM_B_A<1>	97	A1	A0	98	MEM_B_A<0>	IN 11 79
			99	VDD	VDD	100		
79 11	IN	MEM_B_CLK_P<0>	101	CK0	CK1	102	MEM_B_CLK_P<1>	IN 11 79
79 11	IN	MEM_B_CLK_N<0>	103	CK0*	CK1*	104	MEM_B_CLK_N<1>	IN 11 79
			105	VDD	VDD	106		
79 11	IN	MEM_B_A<10>	107	A10/AP	BA1	108	MEM_B_BA<1>	IN 11 79
79 11	IN	MEM_B_BA<0>	109	BA0	RAS*	110	MEM_B_RAS_L	IN 11 79
			111	VDD	VDD	112		
79 11	IN	MEM_B_WE_L	113	WE*	S0*	114	MEM_B_CS_L<0>	IN 11 79
79 11	IN	MEM_B_CAS_L	115	CAS*	ODT0	116	MEM_B_ODT<0>	IN 11 79
			117	VDD	VDD	118		
79 11	IN	MEM_B_A<13>	119	A13	ODT1	120	MEM_B_ODT<1>	IN 11 79
79 11	IN	MEM_B_CS_L<1>	121	S1*	NC	122	NC	
			123	VDD	VDD	124		
		NC	125	TEST	VREFCA	126		
			127	VSS	VSS	128		
28	BI	=MEM_B_DQ<32>	129	DQ32	DQ36	130	=MEM_B_DQ<36>	BI 28
28	BI	=MEM_B_DQ<33>	131	DQ33	DQ37	132	=MEM_B_DQ<37>	BI 28
			133	VSS	VSS	134		
28	BI	=MEM_B_DQS_N<4>	135	DQS4*	DM4	136	=MEM_B_DM<4>	IN 28
28	BI	=MEM_B_DQS_P<4>	137	DQS4	VSS	138		
			139	VSS	DQ38	140	=MEM_B_DQ<38>	BI 28
28	BI	=MEM_B_DQ<34>	141	DQ34	DQ39	142	=MEM_B_DQ<39>	BI 28
28	BI	=MEM_B_DQ<35>	143	DQ35	VSS	144		
			145	VSS	DQ44	146	=MEM_B_DQ<44>	BI 28
28	BI	=MEM_B_DQ<40>	147	DQ40	DQ45	148	=MEM_B_DQ<45>	BI 28
28	BI	=MEM_B_DQ<41>	149	DQ41	VSS	150		
			151	VSS	DQS5*	152	=MEM_B_DQS_N<5>	BI 28
28	IN	=MEM_B_DM<5>	153	DM5	DQS5	154	=MEM_B_DQS_P<5>	BI 28
			155	VSS	VSS	156		
28	BI	=MEM_B_DQ<42>	157	DQ42	DQ46	158	=MEM_B_DQ<46>	BI 28
28	BI	=MEM_B_DQ<43>	159	DQ43	DQ47	160	=MEM_B_DQ<47>	BI 28
			161	VSS	VSS	162		
28	BI	=MEM_B_DQ<48>	163	DQ48	DQ52	164	=MEM_B_DQ<52>	BI 28
28	BI	=MEM_B_DQ<49>	165	DQ49	DQ53	166	=MEM_B_DQ<53>	BI 28
			167	VSS	VSS	168		
28	BI	=MEM_B_DQS_N<6>	169	DQS6*	DM6	170	=MEM_B_DM<6>	IN 28
28	BI	=MEM_B_DQS_P<6>	171	DQS6	VSS	172		
			173	VSS	DQ54	174	=MEM_B_DQ<54>	BI 28
28	BI	=MEM_B_DQ<50>	175	DQ50	DQ55	176	=MEM_B_DQ<55>	BI 28
28	BI	=MEM_B_DQ<51>	177	DQ51	VSS	178		
			179	VSS	DQ60	180	=MEM_B_DQ<60>	BI 28
28	BI	=MEM_B_DQ<56>	181	DQ56	DQ61	182	=MEM_B_DQ<61>	BI 28
28	BI	=MEM_B_DQ<57>	183	DQ57	VSS	184		
			185	VSS	DQS7*	186	=MEM_B_DQS_N<7>	BI 28
28	IN	=MEM_B_DM<7>	187	DM7	DQS7	188	=MEM_B_DQS_P<7>	BI 28
			189	VSS	VSS	190		
28	BI	=MEM_B_DQ<58>	191	DQ58	DQ62	192	=MEM_B_DQ<62>	BI 28
28	BI	=MEM_B_DQ<59>	193	DQ59	DQ63	194	=MEM_B_DQ<63>	BI 28
			195	VSS	VSS	196		
		MEM_B_SA<0>	197	SA0	EVENT*	198	MEM_EVENT_L	OUT 27 45 46
			199	VDDSPD	SDA	200	=I2C_SODIMMB_SDA	BI 48
		MEM_B_SA<1>	201	SA1	SCL	202	=I2C_SODIMMB_SCL	IN 48
			203	VTT	VTT	204		
		MTG PINS	205	MTG PIN	MTG PIN	206		
			207	MTG PIN	MTG PIN	208		
			209	MTG PIN	MTG PIN	210		
			211	MTG PIN	MTG PIN	212		

KEY

OMIT_TABLE

J3100 F-RT-BGA6 DDR3-SODIMM (1 OF 2) CRITICAL

			1	VREFDQ	VSS	2		
28	BI	=MEM_B_DQ<0>	3	VSS	DQ4	4	=MEM_B_DQ<4>	BI 28
28	BI	=MEM_B_DQ<1>	5	DQ0	DQ5	6	=MEM_B_DQ<5>	BI 28
			7	DQ1	VSS	8		
28	IN	=MEM_B_DM<0>	9	VSS	DQS0*	10	=MEM_B_DQS_N<0>	BI 28
			11	DM0	DQS0	12	=MEM_B_DQS_P<0>	BI 28
28	BI	=MEM_B_DQ<2>	13	VSS	VSS	14		
28	BI	=MEM_B_DQ<3>	15	DQ2	DQ6	16	=MEM_B_DQ<6>	BI 28
			17	DQ3	DQ7	18	=MEM_B_DQ<7>	BI 28
28	BI	=MEM_B_DQ<8>	19	VSS	VSS	20		
28	BI	=MEM_B_DQ<9>	21	DQ8	DQ12	22	=MEM_B_DQ<12>	BI 28
			23	DQ9	DQ13	24	=MEM_B_DQ<13>	BI 28
28	BI	=MEM_B_DQS_N<1>	25	VSS	VSS	26		
28	BI	=MEM_B_DQS_P<1>	27	DQS1*	DM1	28	=MEM_B_DM<1>	IN 28
			29	DQS1	RESET*	30	MEM_RESET_L	IN 26 27
28	BI	=MEM_B_DQ<10>	31	VSS	VSS	32		
28	BI	=MEM_B_DQ<11>	33	DQ10	DQ14	34	=MEM_B_DQ<14>	BI 28
			35	DQ11	DQ15	36	=MEM_B_DQ<15>	BI 28
28	BI	=MEM_B_DQ<16>	37	VSS	VSS	38		
28	BI	=MEM_B_DQ<17>	39	DQ16	DQ20	40	=MEM_B_DQ<20>	BI 28
			41	DQ17	DQ21	42	=MEM_B_DQ<21>	BI 28
28	BI	=MEM_B_DQS_N<2>	43	VSS	VSS	44		
28	BI	=MEM_B_DQS_P<2>	45	DQS2*	DM2	46	=MEM_B_DM<2>	IN 28
			47	DQS2	VSS	48		
28	BI	=MEM_B_DQ<18>	49	VSS	DQ22	50	=MEM_B_DQ<22>	BI 28
28	BI	=MEM_B_DQ<19>	51	DQ18	DQ23	52	=MEM_B_DQ<23>	BI 28
			53	DQ19	VSS	54		
28	BI	=MEM_B_DQ<24>	55	VSS	DQ28	56	=MEM_B_DQ<28>	BI 28
28	BI	=MEM_B_DQ<25>	57	DQ24	DQ29	58	=MEM_B_DQ<29>	BI 28
			59	DQ25	VSS	60		
28	IN	=MEM_B_DM<3>	61	VSS	DQS3*	62	=MEM_B_DQS_N<3>	BI 28
			63	DM3	DQS3	64	=MEM_B_DQS_P<3>	BI 28
28	BI	=MEM_B_DQ<26>	65	VSS	VSS	66		
28	BI	=MEM_B_DQ<27>	67	DQ26	DQ30	68	=MEM_B_DQ<30>	BI 28
			69	DQ27	DQ31	70	=MEM_B_DQ<31>	BI 28
			71	VSS	VSS	72		

KEY

PP0V75_S3_MEM_VREFCA_B 31

C3135 2.2UF 20% 6.3V CERM 402-LF
C3136 0.1UF 20% 10V CERM 402

7 =PPSPD_S0_MEM_B

C3140 2.2UF 20% 6.3V CERM 402-LF
R3140 10K 5% 1/16W MF-LF 402
R3141 10K 5% 1/16W MF-LF 402

SPD ADDR=0xA4(WR)/0xA5(RD)

7 =PP0V75_S0_MEM_VTT_B

C3150 C3151 C3152 C3153 1UF 10% 10V X5R 402

"Expansion" (bottom) slot

SYNC_MASTER=K90I_MLB SYNC_DATE=02/15/2011

PAGE TITLE: DDR3 SO-DIMM Connector B

Apple Inc.

DRAWING NUMBER: 051-9058 SIZE: D
REVISION: 6.0.0
BRANCH:
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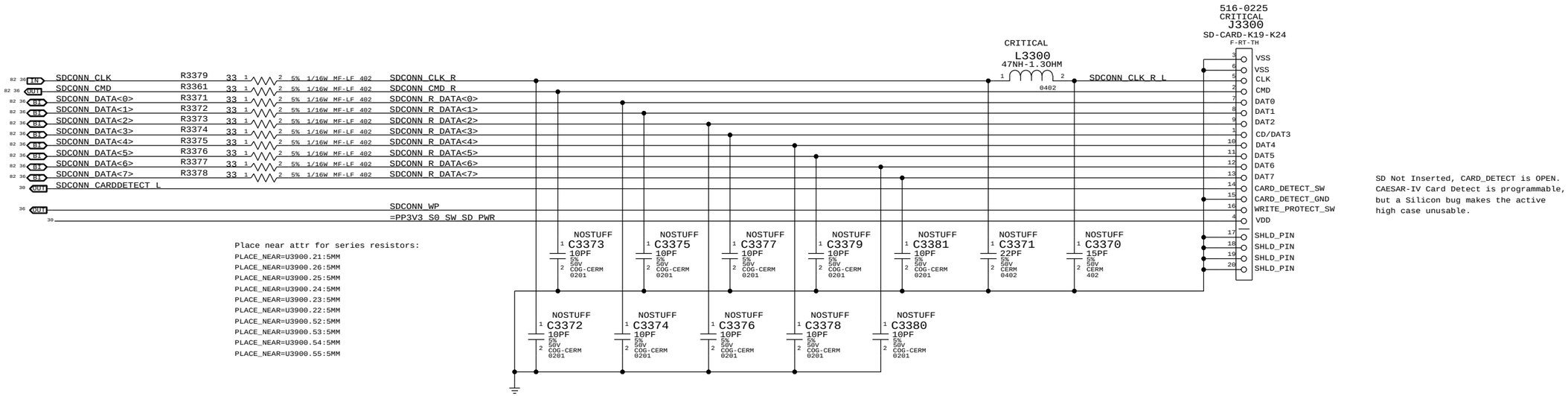
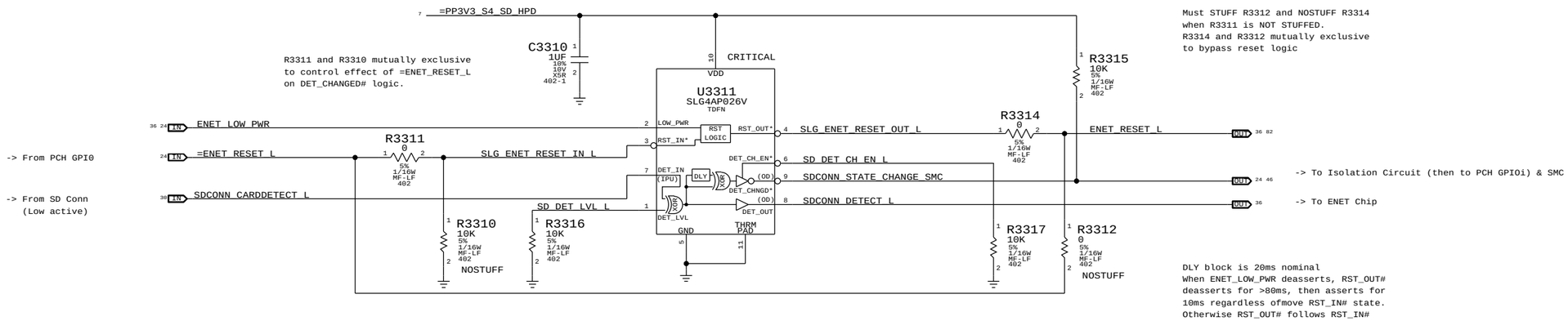
SD Card Connector



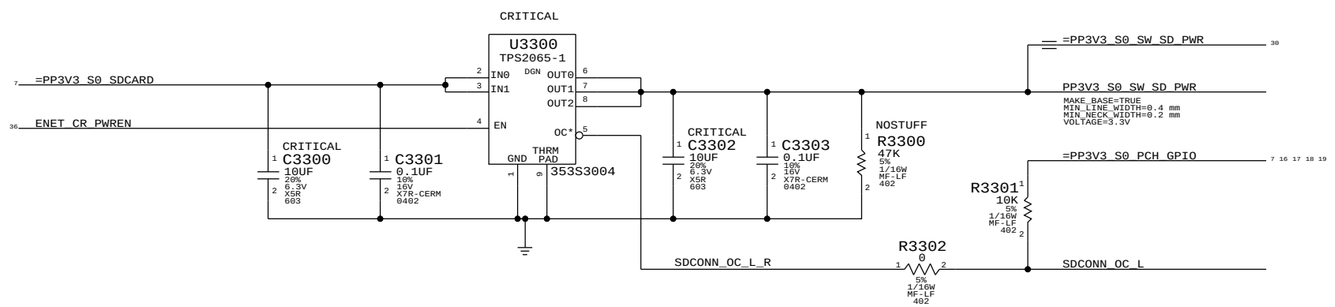
SD Detect & Reset Logic

SDCONN_DETECT Debounce, Inversion, Detect-Changed PCH GPIO Latch Circuit
Converts SDCONN from active-low level signal to active-high pulses.



SD Card 3.3V Overcurrent Protection

TPS2065-1 (1.0A limit) has active load discharge so R4810 is NOSTUFF.



SYNC_MASTER=YONAS_J30 SYNC_DATE=11/03/2011

PAGE TITLE: SD Card Connector

Apple Inc.

DRAWING NUMBER: 051-9058 SIZE: D

REVISION: 6.0.0

BRANCH:

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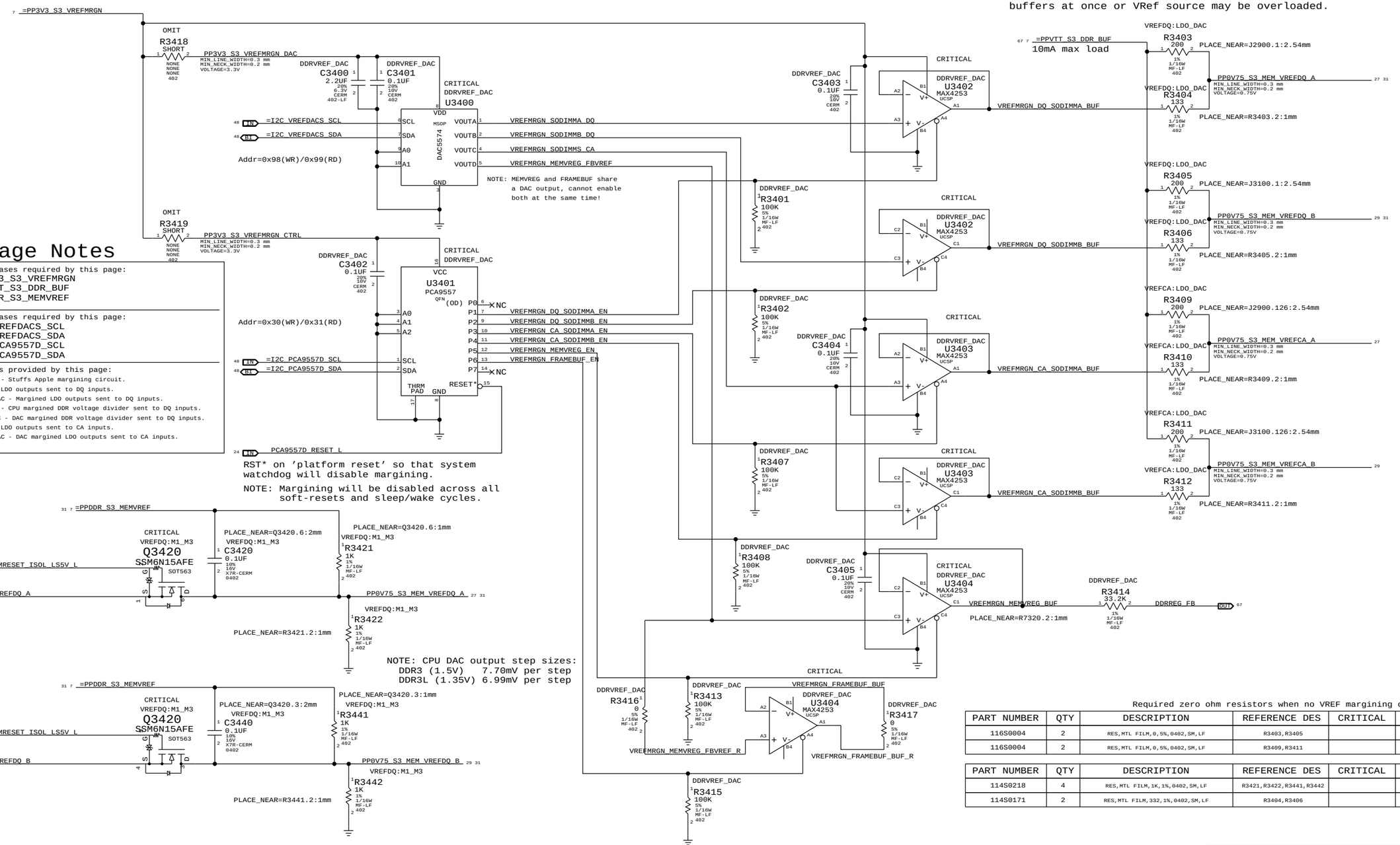

Page Notes

Power aliases required by this page:
- =PP3V3_S3_VREFMRGN
- =PPVTT_S3_DDR_BUF
- =PPDDR_S3_MEMVREF

Signal aliases required by this page:
- =I2C_VREFDACS_SCL
- =I2C_VREFDACS_SDA
- =I2C_PCA9557D_SCL
- =I2C_PCA9557D_SDA

BOM options provided by this page:

DDRVREF_DAC - Stuffs Apple margining circuit.
VREFDQ:LDO - LDO outputs sent to DQ inputs.
VREFDQ:LDO_DAC - Margined LDO outputs sent to DQ inputs.
VREFDQ:M1_M3 - CPU margined DDR voltage divider sent to DQ inputs.
VREFDQ:M1_DAC - DAC margined DDR voltage divider sent to DQ inputs.
VREFCA:LDO - LDO outputs sent to CA inputs.
VREFCA:LDO_DAC - DAC margined LDO outputs sent to CA inputs.

Required zero ohm resistors when no VREF margining circuit stuffed

PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
116S0004	2	RES,MTL FILM,0,5%,0402,SM,LF	R3403,R3405		VREFDQ:LDO
116S0004	2	RES,MTL FILM,0,5%,0402,SM,LF	R3409,R3411		VREFCA:LDO

PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
114S0218	4	RES,MTL FILM,1K,1%,0402,SM,LF	R3421,R3422,R3441,R3442		VREFDQ:M1_DAC
114S0171	2	RES,MTL FILM,332,1%,0402,SM,LF	R3404,R3406		VREFDQ:M1_DAC

	MEM A VREF DQ	MEM B VREF DQ	MEM A VREF CA	MEM B VREF CA	MEM VREG	GPU Frame Buffer (1.8V, 70% VRef)
DAC Channel:	A	B	C	C	D	D
PCA9557D Pin:	1	2	3	4	5	6
Nominal value	0.75V (DAC: 0x3A)				1.5V (DAC: 0x3A)	1.267V (DAC: 0x8B)
Margined target:	0.300V - 1.200V (+/- 450mV)				1.000V - 2.000V (+/- 500mV)	1.056V - 1.442V (+/- 180mV)
DAC range:	0.000V - 1.501V (0x00 - 0x74)				0.000V - 3.000V (0x00 - 0x74)	0.000V - 3.300V (0x00 - 0xFF)
VRef current:	+3.4mA - -3.4mA (- = sourced)				+61uA - -61uA (- = sourced)	+6.0mA - -5.0mA (- = sourced)
DAC step size:	7.69mV / step @ output				8.59mV / step @ output	1.51mV / step @ output

SYNC MASTER=J31_MLB SYNC DATE=06/13/2011

PAGE TITLE: DDR3/FRAMEBUF VREF MARGINING

Apple Inc.

DRAWING NUMBER: 051-9058 SIZE: D
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AIRPORT

C3531 0.1UF 10% 16V X5R-CERM 0201 — PCIE_AP_R2D_C_P, PCIE_AP_R2D_C_N
C3530 0.1UF 10% 16V X5R-CERM 0201

R3510 0 5% 1/20W MF 201 — PCIE_AP_D2R_P
R3511 0 5% 1/20W MF 201 — PCIE_AP_D2R_N

R3500 0 5% 1/16W MF-LF 402 — AP_TEMP_SMB_SDA_R → =AP_TEMP_SMB_SDA
R3501 0 5% 1/16W MF-LF 402 — AP_TEMP_SMB_SCL_R → =AP_TEMP_SMB_SCL
R3502 0 5% 1/16W MF-LF 402 — WIFI_EVENT_L_R → WIFI_EVENT_L

516S0582
CRITICAL
J3501
500913-0302
F-ST-SM

PCIE_AP_R2D_P
PCIE_AP_R2D_N
PCIE_AP_D2R_PI_P
PCIE_AP_D2R_PI_N
PCIE_CLK100M_AP_CONN_P
PCIE_CLK100M_AP_CONN_N

CRITICAL
L3501
330-OHM-80MA
DLP11S
PCIE_CLK100M_AP_P
PCIE_CLK100M_AP_N
PLACE_NEAR=J3501.11:2.54mm

3V S3 WLAN FET

MOSFET	TPCP8102
CHANNEL	P-TYPE
RDS(ON)	20-30 MOHM @2.5V
LOADING	0.727 A (EDP)

CRITICAL
Q3550
DMP2018LFK
DFN2563-6

727 MA PEAK
606 MA NOMINAL MAX
155S0367
L3504
FERR-120-OHM-3A
MIN_NECK_WIDTH=0.4 mm
MIN_LINE_WIDTH=1 mm
PP3V3_WLAN → PP3V3_WLAN_F
MIN_LINE_WIDTH=4 mm
MIN_NECK_WIDTH=0.2 mm

C3522 0.1UF 10% 16V CERM 402
C3521 0.1UF 10% 16V CERM 402
C3520 10UF 20% 10V X5R 805
C3550 0.1UF 10% 16V X5R 402-1
C3551 0.033UF 10% 16V X5R 402
R3550 33K 5% 1/16W MF-LF 402
R3551 10K 5% 1/16W MF-LF 402
=PP3V3_S3_WLAN
P3V3WLAN_SS
PM_WLAN_EN_L

BLUETOOTH

USB_BT_CONN_P
USB_BT_CONN_N
PP3V3_S3RS4_BT_F → L3505 BTPWR:S4 FERR-120-OHM-1.5A 0402-LF → =PP3V3_S4_BT
L3506 BTPWR:S3 FERR-120-OHM-1.5A 0402-LF → =PP3V3_S3_BT
C3532 0.01UF 10% 16V X7R-CERM 0402

NOSTUFF BTPWR:S3 R3517 15K 1% 1/20W MF 201
NOSTUFF BTPWR:S3 R3518 0 5% 1/20W MF 201
NOSTUFF R3515 15K 1% 1/20W MF 201
NOSTUFF R3516 15K 1% 1/20W MF 201

U3510
PI3USB102ZLE
TQFN
CRITICAL
VCC, GND, SEL
Y+, Y-, M+, M-, D+, D-, OE*
USB_BT_WAKEP
USB_BT_WAKEN
USB_BT_P
USB_BT_N

BTPWR:S4 R3519 0 5% 1/20W MF 201 — PM_SLP_S4_L → BTMUX_SEL
NOSTUFF C3511 0.01UF 10% 16V X7R-CERM 0402

SEL	OUTPUT
L	USB_BT_WAKE
H	USB_BT

PP3V3_S3RS4_BT_F
C3510 0.1UF 10% 6.3V X5R 201
NOSTUFF R3514 15K 1% 1/20W MF 201
BTPWR:S4 R3512 15K 1% 1/20W MF 201
NOSTUFF R3513 15K 1% 1/20W MF 201

BTPWR:S4
CRITICAL
Q3510
SSM3K15AMFVAPE
=BT_WAKE_L

Supervisor & CLKFREG # ISolation
Delay = 60 ms +/- 20%

PP3V3_WLAN_F
=PP3V3_S3_WLAN
CRITICAL
U3540
SLG4AP016V
TDFN
VDD, SENSE, 0.7V, RDLY, RESET*, MR*, EN, IN, OUT (OD), THRM PAD, GND
P3V3WLAN_VMON
AP_RESET_L
AP_PWR_EN
AP_CLKREQ_L
C3540 0.1UF 10% 16V CERM 402
R3553 100K 1% 1/16W MF-LF 402
R3554 232K 1% 1/16W MF-LF 402
R3555 100K 1% 1/16W MF-LF 402

PCIE_WAKE_L

518S0815
CRITICAL
J3502
8190-3506-K281
FRT-SM1

PP5V_S3_ALSCAMERA_F
=I2C_ALS_SCL
=I2C_ALS_SDA
USB_CAMERA_CONN_P
USB_CAMERA_CONN_N
MIN_LINE_WIDTH=0.5 mm
MIN_NECK_WIDTH=0.2 mm

ALS CAMERA

275 mA peak
206 mA nominal max

CRITICAL
L3507
90-OHM
DLP0NS
USB_CAMERA_P
USB_CAMERA_N
PLACE_NEAR=J3502.2:2.54MM

PLACE_NEAR=J3502.6:2.54MM
L3508
FERR-120-OHM-1.5A
0402-LF
=PP5V_S3_ALSCAMERA
C3552 0.1UF 20% 10V CERM 402

SYNC_MASTER=K90I_MLB SYNC_DATE=02/15/2011

PAGE TITLE
X19/ALS/CAMERA CONNECTOR

Apple Inc.

DRAWING NUMBER 051-9058 SIZE D
REVISION 6.0.0
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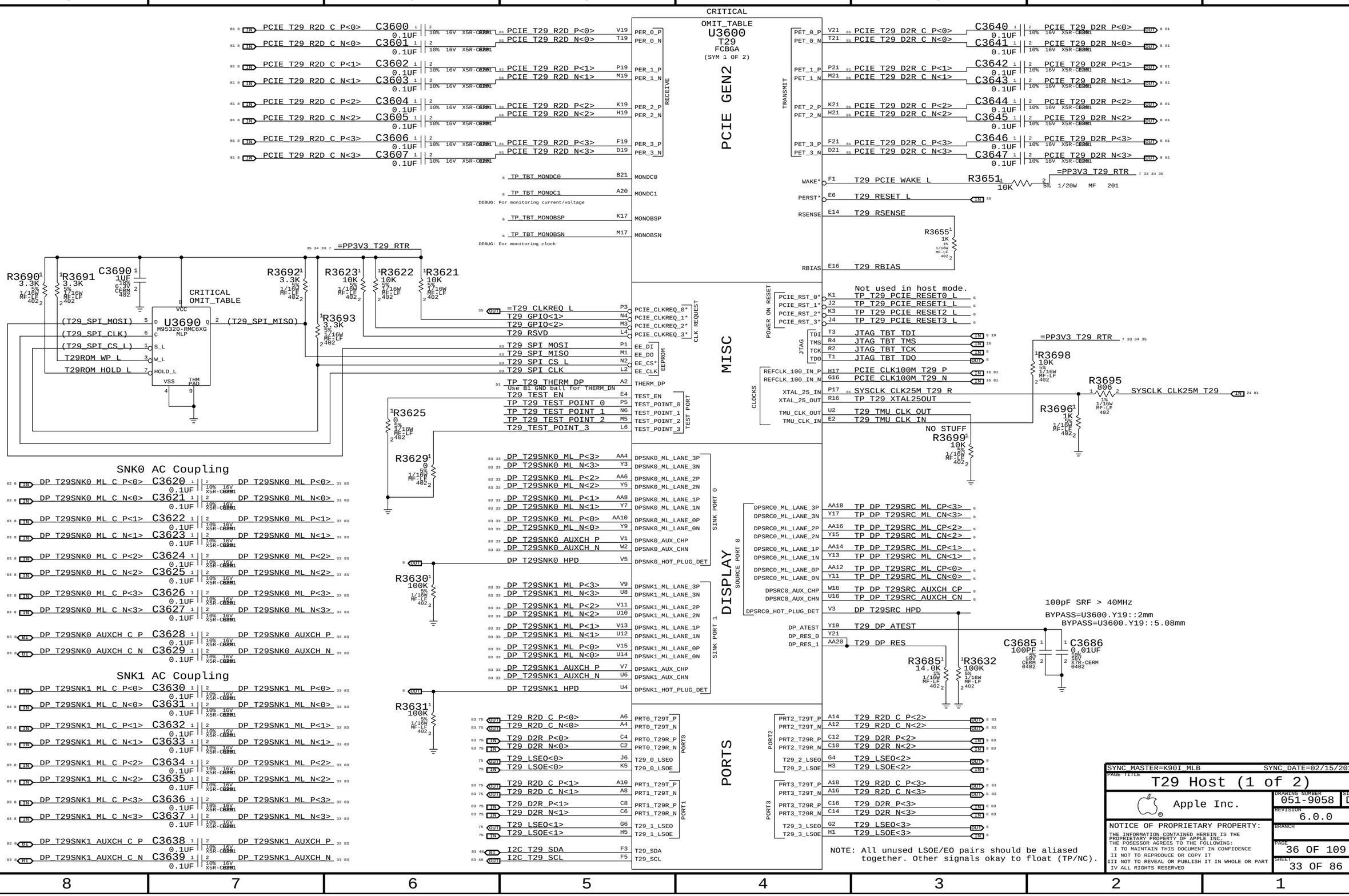
CRITICAL
OMIT_TABLE
U3600
T29
FCBGA
(SYM 1 OF 2)
PCIE GEN2
RECEIVE
TRANSMIT
PCIE T29 R2D C P<0>
PCIE T29 R2D C N<0>
PCIE T29 R2D C P<1>
PCIE T29 R2D C N<1>
PCIE T29 R2D C P<2>
PCIE T29 R2D C N<2>
PCIE T29 R2D C P<3>
PCIE T29 R2D C N<3>
PCIE T29 D2R C P<0>
PCIE T29 D2R C N<0>
PCIE T29 D2R C P<1>
PCIE T29 D2R C N<1>
PCIE T29 D2R C P<2>
PCIE T29 D2R C N<2>
PCIE T29 D2R C P<3>
PCIE T29 D2R C N<3>
TP_TBT_MONDC0
TP_TBT_MONDC1
DEBUG: For monitoring current/voltage
TP_TBT_MONOBSP
TP_TBT_MONOBSN
DEBUG: For monitoring clock
=PP3V3_T29_RTR
WAKE*
PERST*
RSENSE
RBIAS
T29 PCIE WAKE L
T29 RESET L
T29 RSENSE
T29 RBIAS
R3651 10K
R3655 1K
MISC
POWER ON RESET
Not used in host mode.
TP_T29_PCIE_RESET0_L
TP_T29_PCIE_RESET1_L
TP_T29_PCIE_RESET2_L
TP_T29_PCIE_RESET3_L
JTAG
JTAG_TBT_TDI
JTAG_TBT_TMS
JTAG_TBT_TCK
JTAG_TBT_TDO
CLOCKS
PCIE CLK100M T29 P
PCIE CLK100M T29 N
SYSCLK CLK25M T29 R
T29 XTAL25OUT
T29 TMU CLK OUT
T29 TMU CLK IN
R3698 10K
R3695 806
SYSCLK CLK25M T29
R3696 1K
NO STUFF
R3699 10K
CLK REQUEST
=T29_CLKREQ_L
T29_GPIO<1>
T29_GPIO<2>
T29_RSVD
EEPROM
T29_SPI_MOSI
T29_SPI_MISO
T29_SPI_CS_L
T29_SPI_CLK
TEST PORT
TP_T29_THERM_DP
Use B1 GND ball for THERM_DN
T29_TEST_EN
TP_T29_TEST_POINT_0
TP_T29_TEST_POINT_1
TP_T29_TEST_POINT_2
TP_T29_TEST_POINT_3
R3625 0
R3629 0
R3630 100K
R3631 100K
DISPLAY
SOURCE PORT 0
SINK PORT 0
SINK PORT 1
DP_T29SNK0_ML_P<3>
DP_T29SNK0_ML_N<3>
DP_T29SNK0_ML_P<2>
DP_T29SNK0_ML_N<2>
DP_T29SNK0_ML_P<1>
DP_T29SNK0_ML_N<1>
DP_T29SNK0_ML_P<0>
DP_T29SNK0_ML_N<0>
DP_T29SNK0_AUXCH_P
DP_T29SNK0_AUXCH_N
DP_T29SNK0_HPD
DP_T29SNK1_ML_P<3>
DP_T29SNK1_ML_N<3>
DP_T29SNK1_ML_P<2>
DP_T29SNK1_ML_N<2>
DP_T29SNK1_ML_P<1>
DP_T29SNK1_ML_N<1>
DP_T29SNK1_ML_P<0>
DP_T29SNK1_ML_N<0>
DP_T29SNK1_AUXCH_P
DP_T29SNK1_AUXCH_N
DP_T29SNK1_HPD
TP_DP_T29SRC_ML_CP<3>
TP_DP_T29SRC_ML_CN<3>
TP_DP_T29SRC_ML_CP<2>
TP_DP_T29SRC_ML_CN<2>
TP_DP_T29SRC_ML_CP<1>
TP_DP_T29SRC_ML_CN<1>
TP_DP_T29SRC_ML_CP<0>
TP_DP_T29SRC_ML_CN<0>
TP_DP_T29SRC_AUXCH_CP
TP_DP_T29SRC_AUXCH_CN
T29_DP_SRC_HPD
T29_DP_ATEST
T29_DP_RES
100pF SRF > 40MHz
BYPASS=U3600.Y19::2mm
BYPASS=U3600.Y19::5.08mm
C3685 100PF
C3686 0.01UF
R3685 14.0K
R3632 100K
PORTS
PORT0
PORT1
PORT2
PORT3
T29_R2D_C_P<0>
T29_R2D_C_N<0>
T29_D2R_P<0>
T29_D2R_N<0>
T29_LSEO<0>
T29_LSOE<0>
T29_R2D_C_P<1>
T29_R2D_C_N<1>
T29_D2R_P<1>
T29_D2R_N<1>
T29_LSEO<1>
T29_LSOE<1>
I2C_T29_SDA
I2C_T29_SCL
T29_R2D_C_P<2>
T29_R2D_C_N<2>
T29_D2R_P<2>
T29_D2R_N<2>
T29_LSEO<2>
T29_LSOE<2>
T29_R2D_C_P<3>
T29_R2D_C_N<3>
T29_D2R_P<3>
T29_D2R_N<3>
T29_LSEO<3>
T29_LSOE<3>
NOTE: All unused LSOE/EO pairs should be aliased together. Other signals okay to float (TP/NC).
SNK0 AC Coupling
SNK1 AC Coupling
C3600 0.1UF
C3601 0.1UF
C3602 0.1UF
C3603 0.1UF
C3604 0.1UF
C3605 0.1UF
C3606 0.1UF
C3607 0.1UF
C3640 0.1UF
C3641 0.1UF
C3642 0.1UF
C3643 0.1UF
C3644 0.1UF
C3645 0.1UF
C3646 0.1UF
C3647 0.1UF
C3620 0.1UF
C3621 0.1UF
C3622 0.1UF
C3623 0.1UF
C3624 0.1UF
C3625 0.1UF
C3626 0.1UF
C3627 0.1UF
C3628 0.1UF
C3629 0.1UF
C3630 0.1UF
C3631 0.1UF
C3632 0.1UF
C3633 0.1UF
C3634 0.1UF
C3635 0.1UF
C3636 0.1UF
C3637 0.1UF
C3638 0.1UF
C3639 0.1UF
R3690 3.3K
R3691 3.3K
C3690 1UF
U3690 M95320-RMC6XG MLP
(T29_SPI_MOSI)
(T29_SPI_CLK)
(T29_SPI_CS_L)
T29ROM_WP_L
T29ROM_HOLD_L
(T29_SPI_MISO)
R3692 3.3K
R3623 10K
R3622 10K
R3621 10K
R3693 3.3K
SYNC_MASTER=K90I MLB
SYNC_DATE=02/15/2011
PAGE TITLE
T29 Host (1 of 2)
Apple Inc.
DRAWING NUMBER
051-9058
SIZE
D
REVISION
6.0.0
BRANCH
PAGE
36 OF 109
SHEET
33 OF 86
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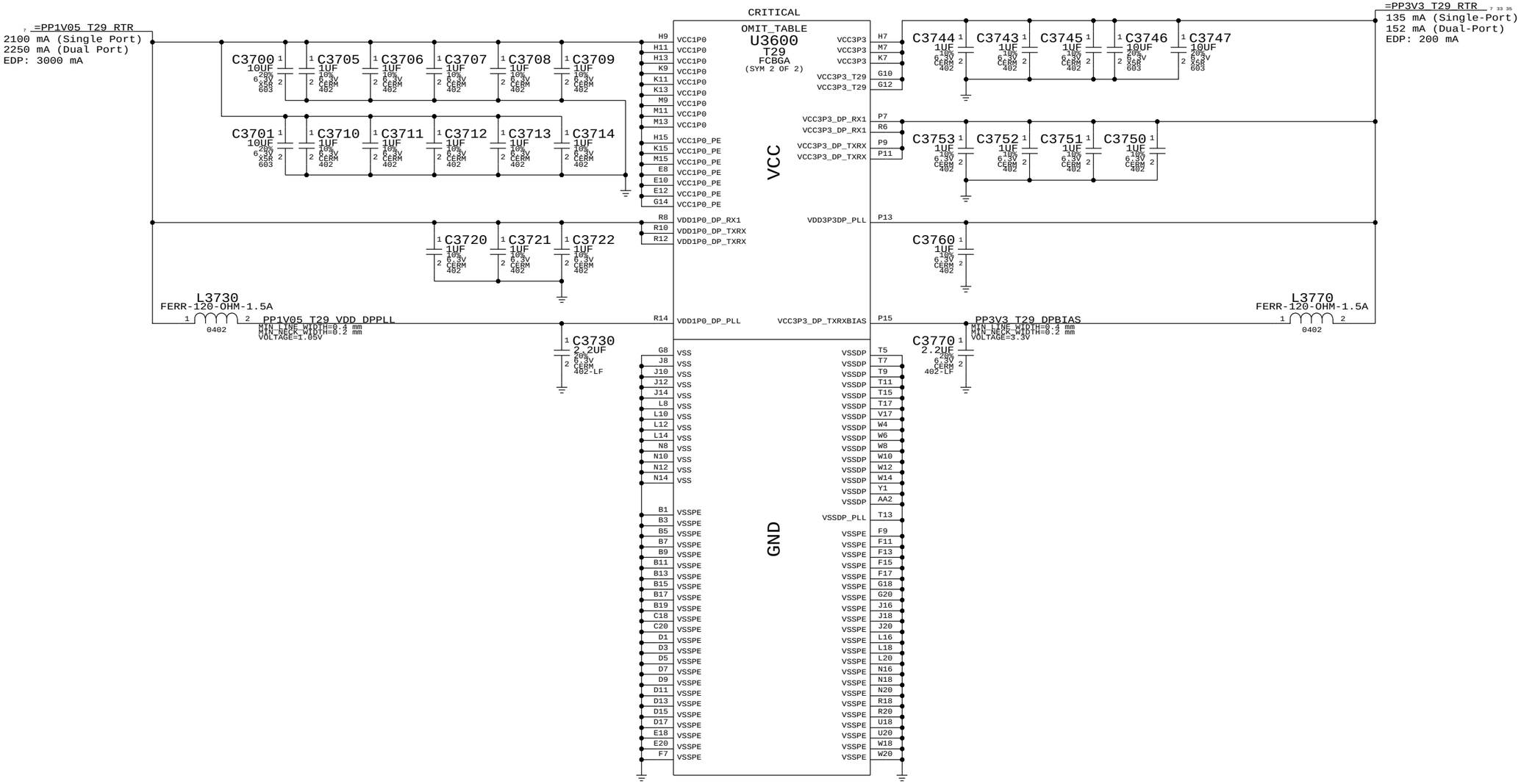


Current numbers from Vendor slide (<REDACTED> power measure 1.ppt), emailed 6/21/2010, TDP @ 90C.

SYNC_MASTER=K90I_MLB SYNC_DATE=02/15/2011

PAGE TITLE: T29 Host (2 of 2)

Apple Inc.

DRAWING NUMBER: 051-9058 SIZE: D

REVISION: 6.0.0

BRANCH:

PAGE: 37 OF 109

SHEET: 34 OF 86

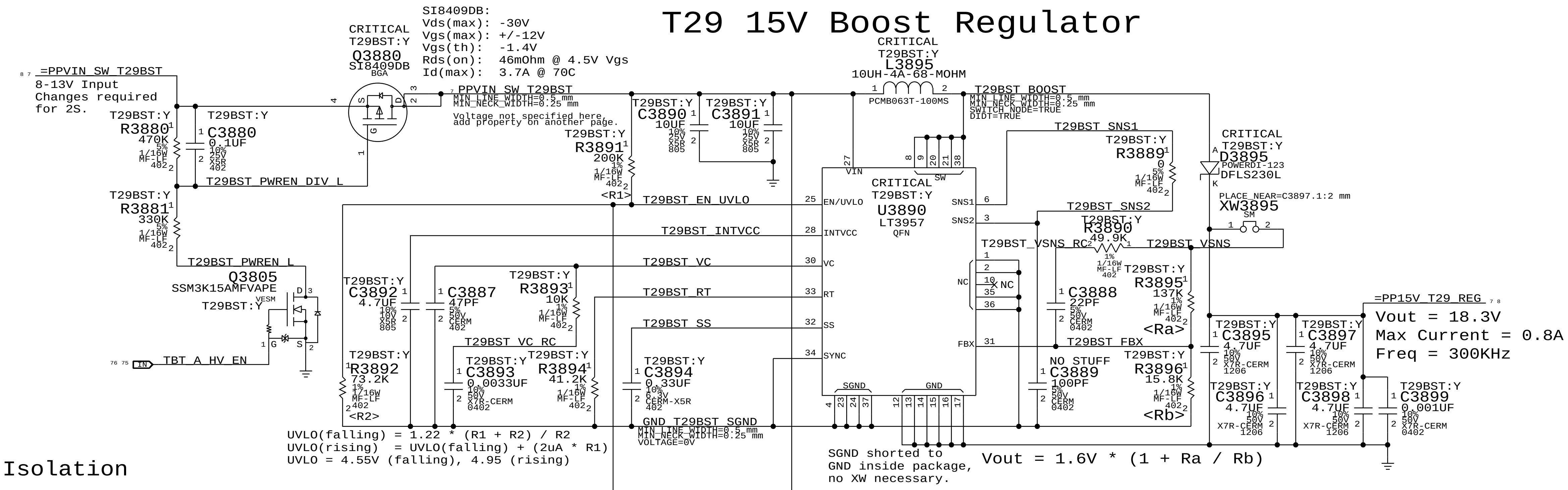
Page Notes

Power aliases required by this page:
- =PPVIN_SW_T29BST (8-13V Boost Input)
- =PP18V_T29_REG (18V Boost Output)
- =PP3V3_T29_P3V3T29FET (3.3V FET Input)
- =PP3V3_T29_FET (3.3V FET Output)
- =PP3V3_S0_T29PWRCTL
- =PP1V05_T29_P1V05T29FET (1.05V FET Input)
- =PP1V05_T29_FET (1.05V FET Output)

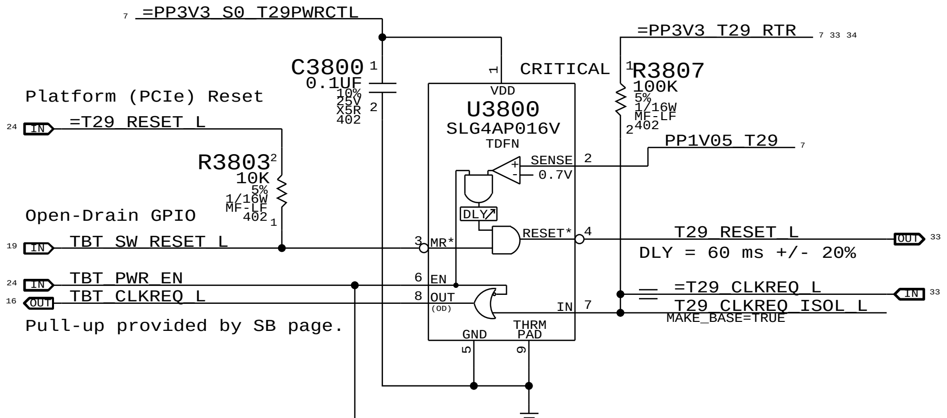
Signal aliases required by this page:
- =T29_CLKREQ_L
- =T29_RESET_L

BOM options provided by this page:
T29BST:Y - Stuffs 18V boost circuitry.

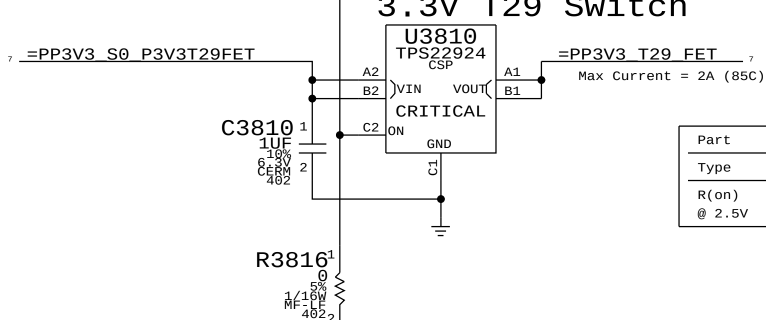
T29 15V Boost Regulator



Supervisor & CLKREQ# Isolation



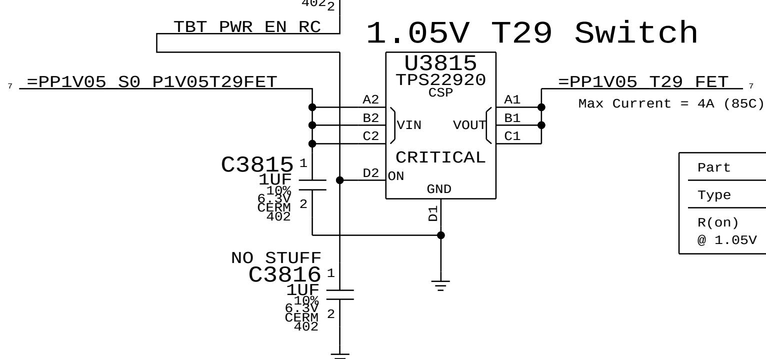
3.3V T29 Switch



U3810

Part	TPS22924C
Type	Load Switch
R(on) @ 2.5V	18.3 mOhm Typ 24 mOhm Max

1.05V T29 Switch



U3815

Part	TPS22920
Type	Load Switch
R(on) @ 1.05V	8 mOhm Typ 11.5 mOhm Max

SYNC_MASTER=K90I_MLB SYNC_DATE=02/15/2011

PAGE TITLE: T29 Power Support

Apple Inc.

DRAWING NUMBER: 051-9058 SIZE: D

REVISION: 6.0.0

BRANCH

BCM57765 ENET SR pins are internal 1.2V switching regulator. See note for SR_DISABLE below.
If disabled: Okay to float VDD, VDDP & LX pin. VFB must always connect to =PP1V2_S3_ENET_PHY.
If enabled: VDD/VDDP connect to =PP3V3_S3_ENET_PHY (add bypassing), LX connects to inductor.
Special Star routing needed on these pins. Decoupling on Pg 37.

71 36 24 7 =PP3V3_ENET_PHY
281mA (1000base-T max power, Caesar IV)

VDD for Card Reader I/O
36 =PP3V3R1V8_ENET_LR_OUT

CRITICAL L3900 FERR-600-OHM-0.5A SM — PP3V3_S3_ENET_PHY_XTALVDDH
MIN_LINE_WIDTH=0.4 mm MIN_NECK_WIDTH=0.2 mm VOLTAGE=3.3V
C3900 0.1UF 10% 16V X7R-CERM 0402

CRITICAL L3905 FERR-600-OHM-0.5A SM — PP3V3_S3_ENET_PHY_BIASVDDH
MIN_LINE_WIDTH=0.4 mm MIN_NECK_WIDTH=0.2 mm VOLTAGE=3.3V
C3905 0.1UF 10% 16V X7R-CERM 0402

CRITICAL L3910 FERR-600-OHM-0.5A SM — PP3V3_S3_ENET_PHY_AVDDH
MIN_LINE_WIDTH=0.4 mm MIN_NECK_WIDTH=0.2 mm VOLTAGE=3.3V
R3910 4.7K 5% 1/16W MF-LF 402
C3910 0.1UF 10% 16V X7R-CERM 0402
C3911 0.1UF 10% 16V X7R-CERM 0402

R3940 4.7K 5% 1/16W MF-LF 402
R3941 4.7K 5% 1/16W MF-LF 402
C3915 4.7UF 10% 6.3V X5R-CERM 603
C3916 0.1UF 10% 16V X7R-CERM 0402

7 =PP3V3_S0_ENETPHY
R3942 1K 5% 1/16W MF-LF 402 — Current Limiting Resistor

ENET_SR_LX 71
ENET_SR_VFB 71

Internal 1.2V Switching Regulator pins.

=PP1V2_ENET_PHY 71
???mA (1000base-T, Caesar V)

CRITICAL L3920 FERR-600-OHM-0.5A SM — PP1V2_ENET_PHY_AVDDL
MIN_LINE_WIDTH=0.4 mm MIN_NECK_WIDTH=0.2 mm VOLTAGE=1.2V
C3921 0.1UF 10% 16V X7R-CERM 0402
C3920 4.7UF 10% 6.3V X5R-CERM 603

CRITICAL L3925 FERR-600-OHM-0.5A SM — PP1V2_ENET_PHY_PCIEPLL
MIN_LINE_WIDTH=0.4 mm MIN_NECK_WIDTH=0.2 mm VOLTAGE=1.2V
C3926 0.1UF 10% 16V X7R-CERM 0402
C3925 4.7UF 10% 6.3V X5R-CERM 603

CRITICAL L3930 FERR-600-OHM-0.5A SM — PP1V2_ENET_PHY_GPHYPLL
MIN_LINE_WIDTH=0.4 mm MIN_NECK_WIDTH=0.2 mm VOLTAGE=1.2V
C3931 0.1UF 10% 16V X7R-CERM 0402
C3930 4.7UF 10% 6.3V X5R-CERM 603

C3936 0.1UF 10% 16V X7R-CERM 0402
CRITICAL C3935 10UF 10% 6.3V X5R 805

AVDDH 42,48 | BIASVDDH 37 | XTALVDDH 17 | VDDO 7,20,50,62 | SR_VDD 14 | SR_VDDP 15 | SR_LX 16 | SR_VFB 13 | AVDDL 39,45,51 | PCIE_PLLVDDL 29,32 | GPHY_PLLVDDL 36 | VDDC 35,61

U3900
BCM57765B0
QFN-8X8

LR_OUT/GPIO1 is used as a 3.3V/1.8V internal LDO out for the card reader on-chip I/O.
Connect only to U3900 pin 20.

=PP3V3R1V8_ENET_LR_OUT 36
PP3V3R1V8_ENET_LR_OUT_REG
MAKE_BASE=TRUE
MIN_LINE_WIDTH=0.3 mm MIN_NECK_WIDTH=0.2 mm VOLTAGE=1.8V
C3970 4.7UF 10% 6.3V X5R-CERM 603
C3971 0.1UF 10% 16V X7R-CERM 0402
C3972 0.1UF 10% 16V X7R-CERM 0402

81 16 OUT PCIE_ENET_D2R_N — C3950 0.1UF 10% 16V X7R-CERM 0402
81 16 OUT PCIE_ENET_D2R_P — C3951 0.1UF 10% 16V X7R-CERM 0402
81 16 IN PCIE_ENET_R2D_C_P — C3955 0.1UF 10% 16V X7R-CERM 0402
81 16 IN PCIE_ENET_R2D_C_N — C3956 0.1UF 10% 16V X7R-CERM 0402

ENET_VMAIN_PRSNT — 58 VMAIN_PRSNT (IPD)
81 PCIE_ENET_D2R_C_N — 27 PCIE_TXD_N
81 PCIE_ENET_D2R_C_P — 28 PCIE_TXD_P
81 PCIE_ENET_R2D_P — 33 PCIE_RXD_P
81 PCIE_ENET_R2D_N — 34 PCIE_RXD_N
81 16 IN PCIE_CLK100M_ENET_P — 31 PCIE_REFCLK_P
81 16 IN PCIE_CLK100M_ENET_N — 30 PCIE_REFCLK_N
82 30 IN ENET_RESET_L — 11 PERST* (IPD)
16 OUT ENET_CLKREQ_L — 12 CLKREQ* (OD)
ENET_WAKE_R_L — 3 WAKE* (OD)
30 24 IN ENET_LOW_PWR — 4 LOW_PWR (IPD)
BCM57765_SMB_CLK — 6 SMB_CLK
BCM57765_SMB_DATA — 10 SMB_DATA (IPD)
36 BCM57765_SCLK — 66 SCLK_SPD1000LED*
36 BCM57765_MISO — 64 SI/EEDATA
36 BCM57765_MOSI — 65 SO_LINKLED*
36 BCM57765_CS_L — 63 CS*/EECLK
(IPU)
TP_BCM57765_SPD100LED_L — 2 SPD100LED*/SERIAL_DO (OD)
TP_BCM57765_TRAFFICLED_L — 67 TRAFFICLED*/SERIAL_DI (OD)
81 24 IN SYSCLK_CLK25M_ENET — 18 XTALI
NC — 19 XTALO
BCM57765_RDAC — 38 RDAC
THRM_PAD 69

R3965 1.24K 1% 1/16W MF-LF 402

R3943 0 5% 1/16W MF-LF 402
24 OUT =ENET_WAKE_L (See note)

WAKE#
Must isolate from PCIe WAKE# if PHY is powered-down in S3/S5. Standard N-channel FET isolation suggested. If PHY is always powered then alias =ENET_WAKE_L to PCIE_WAKE_L.

GPIO_0/CR_ACT_LED* 5 — NC
GPIO_1/LR_OUT 8
GPIO_2/MEDIA_SENSE 9 — ENET_MEDIA_SENSE OUT 24
(IPD)
NOTE: "IPx" == Programmable pull-up/down
(IPx) SD_DETECT* 1 — SDCONN_DETECT_L IN 30
SD_DETECT can only be used active low due to errata.
(IPU) CR_CMD 26 — SDCONN_CMD IN 30 82
CR_CLK 21 — SDCONN_CLK OUT 30 82
(IPU)
CR_DATA0 25 — SDCONN_DATA<0> B4 30 82
CR_DATA1 24 — SDCONN_DATA<1> B3 30 82
CR_DATA2 23 — SDCONN_DATA<2> B2 30 82
CR_DATA3 22 — SDCONN_DATA<3> B1 30 82
CR_DATA4 52 — SDCONN_DATA<4> B1 30 82
CR_DATA5 53 — SDCONN_DATA<5> B2 30 82
CR_DATA6 54 — SDCONN_DATA<6> B3 30 82
CR_DATA7 55 — SDCONN_DATA<7> B4 30 82

(IPU)
MS_INS* 59 — TP_CE_L_MS_INS_L
CR_LED*/CR_BUS_PWR 60 — ENET_CR_PWREN OUT 30
CR_WP* 57 — SDCONN_WP IN 30
SR_DISABLE 68 — BDM57765_SR_DISABLE

No MS (Memory Stick) Insert feature needed.
Control signal to light LED or control SD bus power.

R3980 1K 5% 1/16W MF-LF 402

BCM57765 supports both active-levels for WP.

SR_DISABLE must be pulled down to use internal SR. IPD has a race condition.

PHY Non-Volatile Memory

ROM contains MAC address, PCIe config info as well as code for Bonjour proxy. Required for proper PHY operation.
(Required ROM size TBD)

71 36 24 7 =PP3V3_ENET_PHY
C3990 0.1UF 10% 16V X7R-CERM 0402
U3990 AT45DB011D SOIC-BS1
VCC, SCK, SI, CS*, SO, WP*, RESET*, GND, OMIT
36 BCM57765_SCLK — BCM57765_MOSI 36
36 BCM57765_CS_L — BCM57765_MISO 36
NOSTUFF R3990 4.7K 5% 1/16W MF-LF 402
R3997 4.7K 5% 1/16W MF-LF 402

NOTE: Pull-down on SO plus internal pull-ups on other 3 SPI pins configures ENET for the Atmel AT45DB011D (1Mbit) ROM. If a different ROM is used then the straps must change.
NOTE: ENETM requires SI pull-down instead of SO.

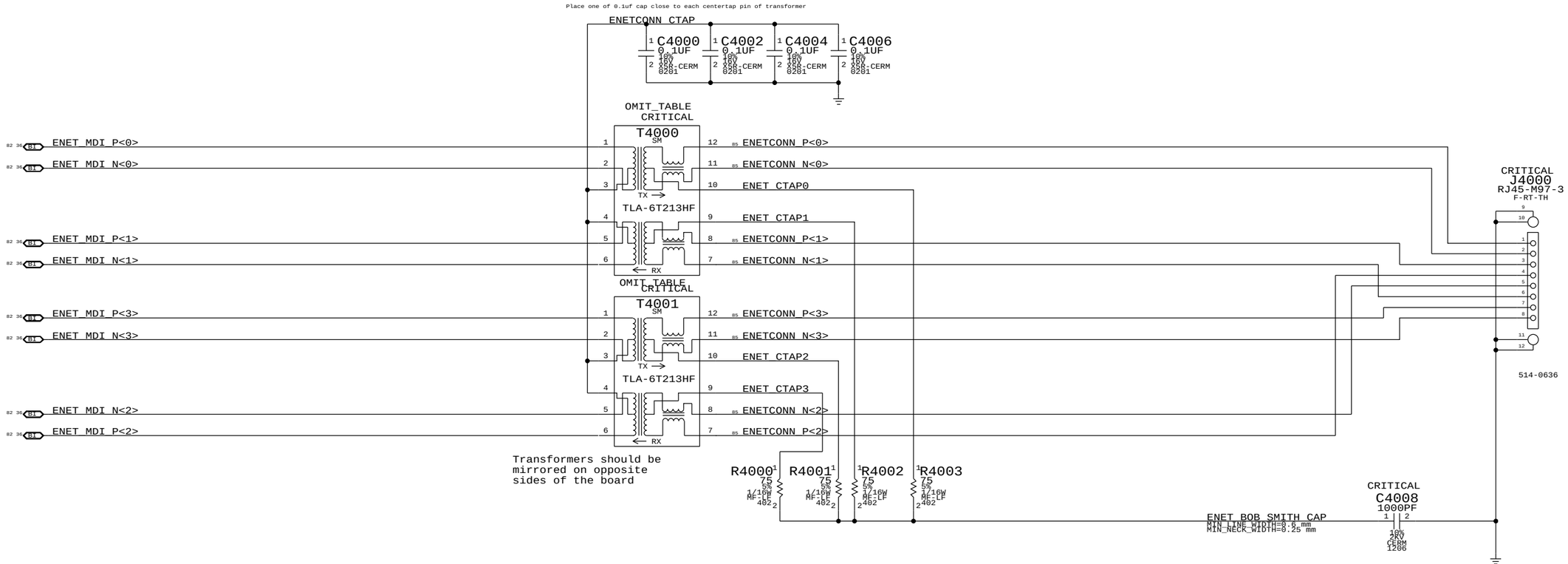
SYNC_MASTER=J31_MLB SYNC_DATE=06/15/2013
PAGE TITLE: ETHERNET PHY (CAESAR IV)
Apple Inc.
DRAWING NUMBER 051-9058 SIZE D
REVISION 6.0.0
BRANCH
PAGE 39 OF 109
SHEET 36 OF 86

Page Notes

Power aliases required by this page:
(NONE)

Signal aliases required by this page:
(NONE)

BOM options provided by this page:
(NONE)



PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
157S0084	2	XFMR,ISO,HALF-PORT,1000T,12P,SMD,HF	T4000,T4001	CRITICAL	

SYNC_MASTER=K90I_MLB SYNC_DATE=02/15/2013

PAGE TITLE: Ethernet Connector

Apple Inc.

DRAWING NUMBER: 051-9058 SIZE: D
REVISION: 6.0.0
BRANCH:
PAGE: 40 OF 109
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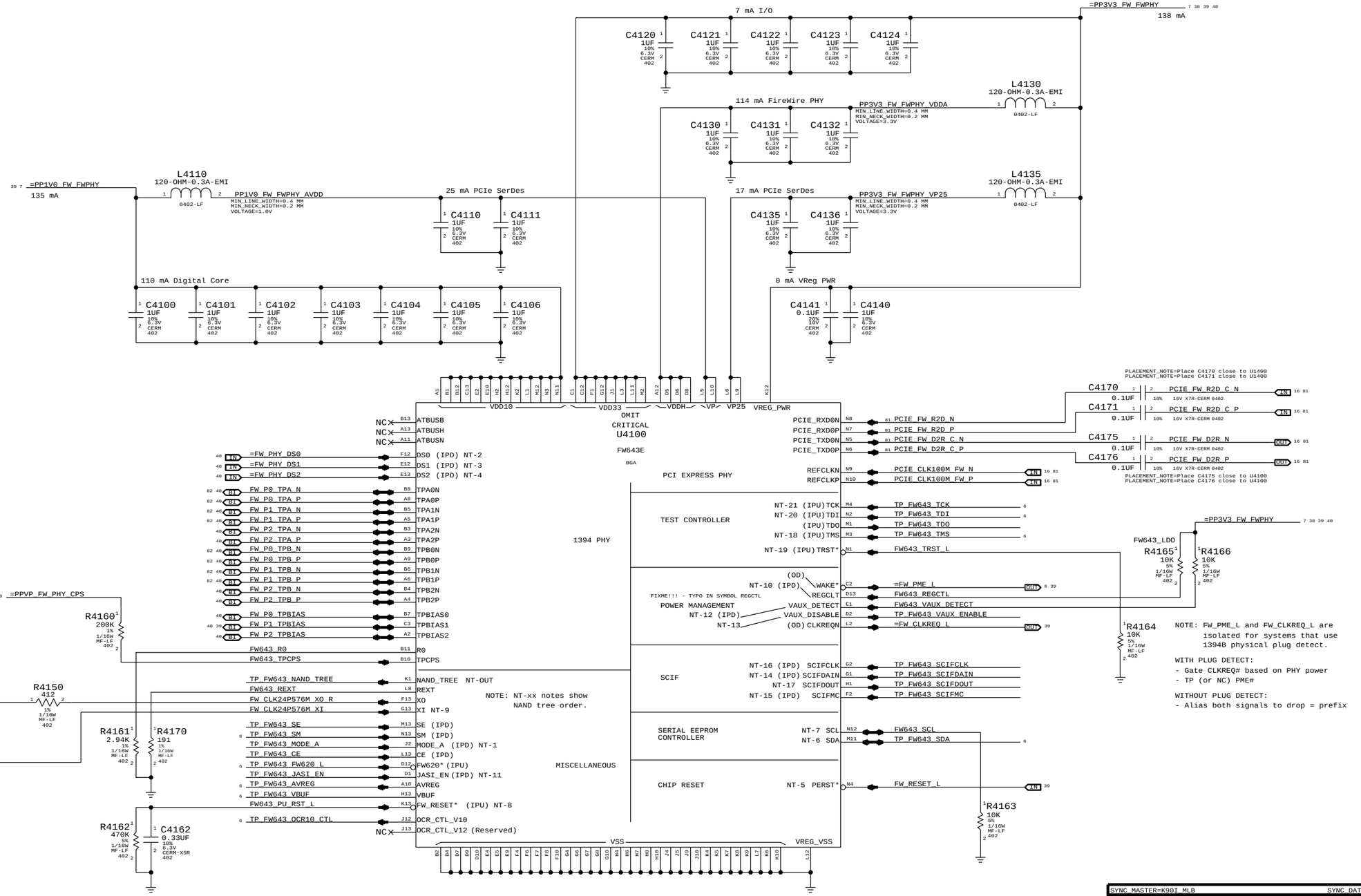

SYNC_MASTER=K90I_MLB SYNC_DATE=02/15/2013

PAGE TITLE

FireWire LLC/PHY (FW643E)

Apple Inc.

DRAWING NUMBER 051-9058 SIZE D

REVISION 6.0.0

BRANCH

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SHEET 38 OF 86

Page Notes

Power aliases required by this page:
- =PPBUS_S5_FWPWRSW (FW VP FET Input)
- =PPBUS_FW_FET (FW VP FET Output)
- =PP3V3_FW_P3V3FWFET (3.3V FET Input)
- =PP3V3_FW_FET (3.3V FET Output)
- =PP3V3_FW_FWPHY (PHY 3.3V Power)
- =PP3V3_S0_FWLATEVG
- =PP3V3_S0_FWPWRCTL
- =PP1V05_S0_FWPWRCTL (5KPD Bias Rail)
- =PP1V05_FW_P1V0FWFET (1.0V FET Input)
- =PP1V0_FW_FET_R (1.0V FET Output)
- =PP1V0_FW_FWPHY (PHY 1.0V)

Signal aliases required by this page:
- =FW_CLKREQ_L
- =FW_PME_L

BOM options provided by this page:
(NONE)

FireWire Port Power Switch

=PPBUS_S5_FWPWRSW

Q4262 provides for fast-off of Q4260 in S0 (Late-VG detection)

R4262 10K 5% 1/16W MF-LF 402

R4263 10 5% 1/16W MF-LF 402

FWPORT_FASTOFF_L_DIV

FWPORT_FASTOFF_L

Q4262 (CRITICAL) SOT-363 BSS8402DW (SYM-VER2)

=PP3V3_S0_FWLATEVG

Q4262 BSS8402DW SOT-363 (SYM-VER1)

R4260 300K 5% 1/16W MF-LF 402

R4261 470K 5% 1/16W MF-LF 402

FWPORT_PWREN_L_DIV

FWPORT_PWREN_L

Q4260 CRITICAL FDC638P_G SM

C4260 0.1UF 10% 25V X5R 402

PPBUS_FW_FWPWRSW_F MIN_LINE_WIDTH=0.5 mm MIN_NECK_WIDTH=0.25 mm VOLTAGE=12.6V

F4260 CRITICAL 1.1A-24V MINISMDC110H24

PPBUS_FW_FWPWRSW_D MIN_LINE_WIDTH=0.5 mm MIN_NECK_WIDTH=0.25 mm VOLTAGE=12.6V

D4260 CRITICAL SM CRS08-1.5A-30V

=PPBUS_FW_FET

Q4261 SSM3K15AMFVAPE VESM

NO STUFF C4261 0.1UF 10% 25V X5R 402

40 IN FWPORT_PWR_EN

Supervisor & CLKREQ# Isolation

=PP3V3_S0_FWPWRCTL

24 IN =FW_RESET_L

R4283 10K 5% 1/16W MF-LF 402

FW_RESET_R_L

C4290 0.1UF 10% 25V X5R 402

U4290 CRITICAL SLG4AP016V TDFN

VDD SENSE 0.7V DLY RESET* MR* EN OUT (OD) IN GND THRM PAD

R4290 100K 5% 1/16W MF-LF 402

=PP1V0_FW_FWPHY

FW_RESET_L

DLY = 60 ms +/- 20%

39 24 IN FW_PWR_EN

16 OUT FW_CLKREQ_L

=FW_CLKREQ_L

FW_CLKREQ_PHY_L MAKE_BASE=TRUE

Pull-up provided by another page.

FireWire Port 5K Pull-Down Detect

=PP1V05_S0_FWPWRCTL

R4275 1K 5% 1/16W MF-LF 402

All FireWire devices require 5K pull-down on TPB pair.
Host can detect as load on TPBIAS signal.
Current source only active when FW_PWR_EN is low.

FW_PWR_EN_L

39 24 IN FW_PWR_EN

CRITICAL Q4275 DMB53D0UV SOT-563

R4270 330K 5% 1/16W MF-LF 402

R4271 56K 5% 1/16W MF-LF 402

FW_5KPD_DET_RC

FW_5KPD_DET_L MAKE_BASE=TRUE

CRITICAL Q4275 DMB53D0UV SOT-563

C4270 0.1UF 10% 16V X7R-CERM 0402

CRITICAL Q4270 BC847CDXV6TXG SOT563

FWDET_MIRROR

FWDET_EMIT

R4272 1K 5% 1/16W MF-LF 402 PLACE_NEAR=C4360.1:2 mm

R4273 12K 5% 1/16W MF-LF 402

40 38 IN FW_P1_TPBIAS

FireWire PHY WAKE# Support

When PHY is powered, FW_5KPD_DET_L acts as legacy PME# signal.

40 38 7 =PP3V3_FW_FWPHY

R4277 10K 5% 1/16W MF-LF 402

R4276 100K 5% 1/16W MF-LF 402

FW_WAKE

NO STUFF C4276 0.1UF 10% 16V X7R-CERM 0402

CRITICAL Q4276 DMB53D0UV SOT-563

38 8 IN =FW_PME_L

8 FW643_WAKE_L MAKE_BASE=TRUE

FW_PME_L OUT 8 19

Dual-purpose output:

1) 5K Pull-down Detect when FW_PWR_EN is low.
2) FW643 WAKE# (PME#) when PHY is powered.

Pull-up provided on another page.

3.3V FW Switch

=PP3V3_FW_P3V3FWFET

U4201 TPS22924 CSP VIN VOUT ON GND CRITICAL

C4201 1UF 10% 6.3V CERM 402

=PP3V3_FW_FET

EDP = 0.14A (85C)

U4201 & U4202

Part	TPS22924C
Type	Load Switch
R(on)	18 mOhm Typ 50 mOhm Max

Max Output: 2A

1.0V FW Switch

=PP1V05_FW_P1V0FWFET

U4202 TPS22924 CSP VIN VOUT ON GND CRITICAL

C4202 1UF 10% 6.3V CERM 402

PP1V05_FW_FET MIN_LINE_WIDTH=0.4 mm MIN_NECK_WIDTH=0.2 mm VOLTAGE=1.05V

R4202 0.549 1% 1/16W MF 402

LSI FireWire PHY requires 1.0V.
To avoid an extra power supply,
1.05V is used with a series R
to reduce voltage.

=PP1V0_FW_FET_R

TEXT NOTE FOR 3.3V RAIL CURRENT CHANGED TO EDP NUMBER.

SYNC_MASTER=K90I_MLB SYNC_DATE=06/23/2011

PAGE TITLE: FireWire Port & PHY Power

Apple Inc.

DRAWING NUMBER: 051-9058 SIZE: D

REVISION: 6.0.0

BRANCH:

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SHEET: 39 OF 86

Page Notes

Power aliases required by this page:
- =PPVP_FW_PORT1
- =PPVP_FW_PHY_CPS_FET (From Port)
- =PPVP_FW_PHY_CPS (To PHY)
- =PP3V3_FW_FWPHY
- =PP3V3_S0_FWLATEVG

Signal aliases required by this page:
- =FW_PHY_DS0
- =FW_PHY_DS1
- =FW_PHY_DS2

NOTE: This page is expected to contain the necessary aliases to map the FireWire TPA/TPB pairs to their appropriate connectors and/or to properly terminate unused signals.

BOM options provided by this page:
(NONE)

1394b implementation based on Apple FireWire Design Guide (FWDG 0.6, 5/14/03)

FW643 TPCPS Leakage Protection

FW643 has internal leakage path from TPCPS pin to VDD33.
FET blocks current to TPCPS until VDD33 is powered.

=PPVP_FW_PHY_CPS_FET
From Port
R4311 470K 5% 1/16W MF-LF 402
Q4300 BSS8402DW (SYM-VER2) SOT-363
PPVP_FW_PHY_CPS
MIN_LINE_WIDTH=0.4 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=12.6V
MAKE_BASE=TRUE
=PPVP_FW_PHY_CPS
To FW643
CPS_EN_L_DIV
R4312 330K 5% 1/16W MF-LF 402
CPS_EN_L
=PP3V3_FW_FWPHY
Q4300 BSS8402DW SOT-363 (SYM-VER1)

Unused FireWire Ports

Disabled per LSI instructions
(All unused port signals TP/NC)

FW_P0_TPBIAS	NC_FW0_TPBIAS	MAKE_BASE=TRUE, NO_TEST=TRUE
FW_P0_TPA_P	NC_FW0_TPAP	MAKE_BASE=TRUE, NO_TEST=TRUE
FW_P0_TPA_N	NC_FW0_TPAN	MAKE_BASE=TRUE, NO_TEST=TRUE
FW_P0_TPB_P	NC_FW0_TPBP	MAKE_BASE=TRUE, NO_TEST=TRUE
FW_P0_TPB_N	NC_FW0_TPBN	MAKE_BASE=TRUE, NO_TEST=TRUE
FW_P2_TPBIAS	NC_FW2_TPBIAS	MAKE_BASE=TRUE, NO_TEST=TRUE
FW_P2_TPA_P	NC_FW2_TPAP	MAKE_BASE=TRUE, NO_TEST=TRUE
FW_P2_TPA_N	NC_FW2_TPAN	MAKE_BASE=TRUE, NO_TEST=TRUE
FW_P2_TPB_P	NC_FW2_TPBP	MAKE_BASE=TRUE, NO_TEST=TRUE
FW_P2_TPB_N	NC_FW2_TPBN	MAKE_BASE=TRUE, NO_TEST=TRUE

FireWire PHY Config Straps

Configures PHY for:
- Port "1" Bilingual (1394B)

=PP3V3_FW_FWPHY
R4382 10K 1% 1/16W MF-LF 402
R4380 10K 1% 1/16W MF-LF 402
R4381 10K 1% 1/16W MF-LF 402
FWPHY_DS0 = =FW_PHY_DS0 OUT
FWPHY_DS1 = =FW_PHY_DS1 OUT
FWPHY_DS2 = =FW_PHY_DS2 OUT

Termination

Place close to FireWire PHY

FW_P1_TPBIAS
C4360 0.33UF 10% 6.3V CERM-X5R 402
R4360 56.2 1% 1/16W MF-LF 402
R4361 56.2 1% 1/16W MF-LF 402
FW_P1_TPA_P = FW_PORT1_TPA_P
FW_P1_TPA_N = FW_PORT1_TPA_N
FW_P1_TPB_P = FW_PORT1_TPB_P
FW_P1_TPB_N = FW_PORT1_TPB_N
R4362 56.2 1% 1/16W MF-LF 402
R4363 56.2 1% 1/16W MF-LF 402
FW_PORT1_TPB_C
C4364 220PF 5% 25V C0G-CERM 0402
R4364 4.99K 1% 1/16W MF-LF 402

"Snapback" & "Late VG" Protection

=PP3V3_S0_FWLATEVG
PLACE_NEAR=U4350.1:2 mm
C4350 0.1UF 10% 16V X7R-CERM 0402
U4350 TPD4S1394 LLP
TP_FWLATEVG_VCLMP
FWPORT_PWR_EN
R4350 100K 5% 1/16W MF-LF 402
CRITICAL
(PINS 5/6 AND 7/8 ARE SWAPPED FOR BETTER ROUTING)
(FW_PORT1_TPA_P)
(FW_PORT1_TPA_N)
(FW_PORT1_TPB_P)
(FW_PORT1_TPB_N)

Cable Power

=PPVP_FW_PORT1
CRITICAL
L4310 FERR-250-OHM SM
Note: Trace PPVP_FW_PORT1 must handle up to 5A
PPVP_FW_PORT1_F
MIN_LINE_WIDTH=0.5 mm
MIN_NECK_WIDTH=0.25 mm
VOLTAGE=33V
C4314 0.01UF 10% 50V X7R 402
C4319 0.1uF 10% 50V X7R 603-1
PLACE_NEAR=J4310.5:2 mm
R4319 1M 5% 1/16W MF-LF 402

PORT 1

BILINGUAL
CRITICAL
J4310 1394B-M97 F-RT-TH

(FW_PORT1_TPB_N)	TPB-	OUTPUT
(FW_PORT1_BREF)	TPB+	
(FW_PORT1_TPB_P)	VP	
NC	SC/NC	
(GND)	VG	INPUT
(FW_PORT1_TPA_N)	TPA-	
FW_PORT1_AREF	TPA+	
(FW_PORT1_TPA_P)	CHASSIS GND	

514S0605

AREF needs to be isolated from all local grounds per 1394b spec

When a bilingual device is connected to a beta-only device, there is no DC path between them (to avoid ground offset issue)

BREF should be hard-connected to logic ground for speed signaling and connection

CANNOT SYNC THIS PAGE FROM T27, TPA AND TPB FOR U4350 IS SWAPPED

SYNC_MASTER=K90I_MLB
SYNC_DATE=02/15/2011

PAGE TITLE: FireWire Connector

Apple Inc.

DRAWING NUMBER: 051-9058
SIZE: D
REVISION: 6.0.0
BRANCH:
PAGE: 43 OF 109
SHEET: 40 OF 86

ODD Power Control

Note: 3.3V must be S0 if 5V is S3 or S5 to ensure the drive is unpowered in S3/S5.

=PP5V_S3_ODD
R4596 100K 5% 1/16W MF-LF 402
C4595 0.068UF 10% 10V X5R-CERM 0402
Q4590 CRITICAL DMP2018LFK DFN2563-6
PP5V_SW_ODD MIN_LINE_WIDTH=0.6MM MIN_NECK_WIDTH=0.4MM VOLTAGE=5V
C4596 0.01UF 10% 16V X7R-CERM 0402
R4595 100K 5% 1/16W MF-LF 402
ODD_PWR_EN_LS5V_L
ODD_PWR_SS
=PP3V3_S0_ODD
R4597 100K 5% 1/16W MF-LF 402
Q4596 SSM6N37FEAPE SOT563
ODD_PWR_EN
Q4596 SSM6N37FEAPE SOT563
ODD_PWR_EN_L
=PP3V3_S0_ODD
R4590 33K 5% 1/16W MF-LF 402
SMC_ODD_DETECT
Note: Indicates disc presence.

SATA ODD Connector

J4500 54722-0164 F-ST-SM
CRITICAL 516S0616

SATA_ODD_R2D_P → C4521 0.01UF → SATA_ODD_R2D_C_P
SATA_ODD_R2D_N → C4520 0.01UF → SATA_ODD_R2D_C_N
SATA_ODD_D2R_C_N → C4526 0.01UF → SATA_ODD_D2R_N
SATA_ODD_D2R_C_P → C4525 0.01UF → SATA_ODD_D2R_P

SATA OOB Comparator

Notes:
OOBD2R was OOB_TEMP, from SSD, to SMC
OOBR2D was TEMP_CTL, from SMC, to SSD

=PP3V3_S0_SMC
=PP1V5_S0_RDRVR
R4581 100K 5% 1/16W MF-LF 402
R4583 49.9K 1% 1/16W MF-LF 402
R4582 3.3K 5% 1/16W MF-LF 402
SSD_OOB1V0REF
SSD_OOBD2R_FTL_L
SSD_OOBD2R_R_L
U4580 LMV331 SC70-5
C4580 0.1UF 20% 10V CERM 402 PLACE_NEAR=U4580.8:2MM
R4585 1K 5% 1/16W MF-LF 402
R4584 100K 5% 1/16W MF-LF 402
C4584 0.1UF 20% 10V CERM 402
R4586 0 5% 1/16W MF-LF 402
SMC_SSD_OOBD2R_R_L → SMC_SSD_OOBD2R_L

SATA HDD Connector (Gen3)

L4500 FERR-70-OHM-4A 0603 CRITICAL PLACE_NEAR=J4501.9:6MM
PP5V_S0_HDD_FLT MIN_LINE_WIDTH=0.6MM MIN_NECK_WIDTH=0.4MM VOLTAGE=5V
=PP5V_S0_HDD
C4537 100UF 20% 10V X5R-CERM 1206 NOSTUFF
C4538 100UF 20% 10V X5R-CERM 1206 NOSTUFF
PLACE_NEAR=J4501.7:10MM
PLACE_NEAR=J4501.7:10MM
C4501 0.1UF 20% 10V CERM 402 PLACE_NEAR=L4500.1:2MM
C4502 0.1UF 20% 10V CERM 402 PLACE_NEAR=L4500.2:2MM
=PP3V3_S0_HDD
R4538 100K 5% 1/16W MF-LF 402

SSD_OOBR2D_L → R4537 453 1% 1/16W MF-LF 402 → SMC_SSD_OOBR2D_L
SSD_OOBD2R_L → L4539 FERR-220-OHM 0402 → SSD_OOBD2R_FTL_L
SYS_LED_ANODE_R → R4531 4.7 5% 1/16W MF-LF 402 → SYS_LED_ANODE
C4531 0.001UF 50V X7R-CERM 0402
IR_RX_OUT

J4501 54722-0224 F-ST-SM
GND_VOID
516S0687 CRITICAL

D2R Passive DeEmphasis
VALUE: 4.5 DB

SATA_HDD_D2R_C_P → R4536 68.1 → C4536 5.0PF 0201 → SATA_HDD_D2R_RC_P → C4516 0.01UF → SATA_HDD_D2R_RDRIN_P
SATA_HDD_D2R_C_N → C4535 5.0PF 0201 → SATA_HDD_D2R_RC_N → C4515 0.01UF → SATA_HDD_D2R_RDRIN_N
R4535 68.1

SATA_HDD_R2D_N → R4534 41.2 → C4534 15PF → SATA_HDD_R2D_RC_N → C4511 0.01UF → SATA_HDD_R2D_RDROUT_N
SATA_HDD_R2D_P → C4533 15PF → SATA_HDD_R2D_RC_P → C4510 0.01UF → SATA_HDD_R2D_RDROUT_P
R4533 41.2

R2D Passive DeEmphasis
VALUE: 3.0 DB

=PP5V_S3_IR
R4532 0 5% 1/16W MF-LF 402
PP5V_S3_IR_R MIN_LINE_WIDTH=0.5MM MIN_NECK_WIDTH=0.2MM VOLTAGE=5V
C4532 0.1UF 10% 16V X7R-CERM 0402

SATA Redriver

Internally PD ~150K
Write:0xB6 Read:0xB7

ADDR1	ADD0	Address (R/W)
L	L	0x96/0x97
L	H	0x98/0x99
H	L	0xB6/0xB7
H	H	0xB8/0xB9

SATARDRVR_EN
SATARDRVR_I2C_ADDR0
SATARDRVR_I2C_ADDR1
SATARDRVR_I2C_EN_L
SATARDRVR_TEST
SATARDRVR_REXT
=SATARDRVR_I2C_SCL
=SATARDRVR_I2C_SDA

U4510 PS8521A TQFN
338S0907 CRITICAL

=PP1V5_S0_RDRVR
R4510 4.7K 5% 1/16W MF-LF 402 NOSTUFF
R4511 0 5% 1/16W MF-LF 402
R4512 3.74K 1% 1/16W MF-LF 402
R4513 4.7K 5% 1/16W MF-LF 402
R4515 4.7K 5% 1/16W MF-LF 402 NO STUFF
SATARDRVR_I2C_ADDR0
SATARDRVR_I2C_ADDR1

C4514 0.1UF 20% 10V CERM 402 PLACE_NEAR=U4510.6:2MM
C4519 0.01UF 10% 16V X7R-CERM 0402 PLACE_NEAR=U4510.16:2MM

C4518 & C4517 Placement Note:
It is critical that these two should be near to U1800 pin AM1 and AM3.

SATA_HDD_D2R_RDROUT_P → C4518 0.01UF → SATA_HDD_D2R_P
SATA_HDD_D2R_RDROUT_N → C4517 0.01UF → SATA_HDD_D2R_N
PLACE_NEAR=U1800.AM1:5MM GND_VOID=TRUE
PLACE_NEAR=U1800.AM3:5MM GND_VOID=TRUE

SATA_HDD_R2D_RDRIN_N → C4513 0.01UF → SATA_HDD_R2D_C_N
SATA_HDD_R2D_RDRIN_P → C4512 0.01UF → SATA_HDD_R2D_C_P
PLACE_NEAR=U4510.12:5MM GND_VOID=TRUE
PLACE_NEAR=U4510.11:5MM GND_VOID=TRUE

SYNC_MASTER=YONAS_J30 SYNC_DATE=11/08/2013
PAGE TITLE: SATA/IR/SIL Connectors
Apple Inc.
DRAWING NUMBER 051-9058 SIZE D
REVISION 6.0.0
BRANCH
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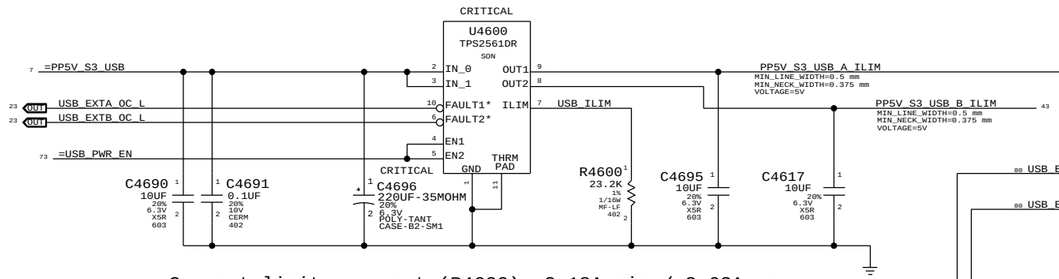
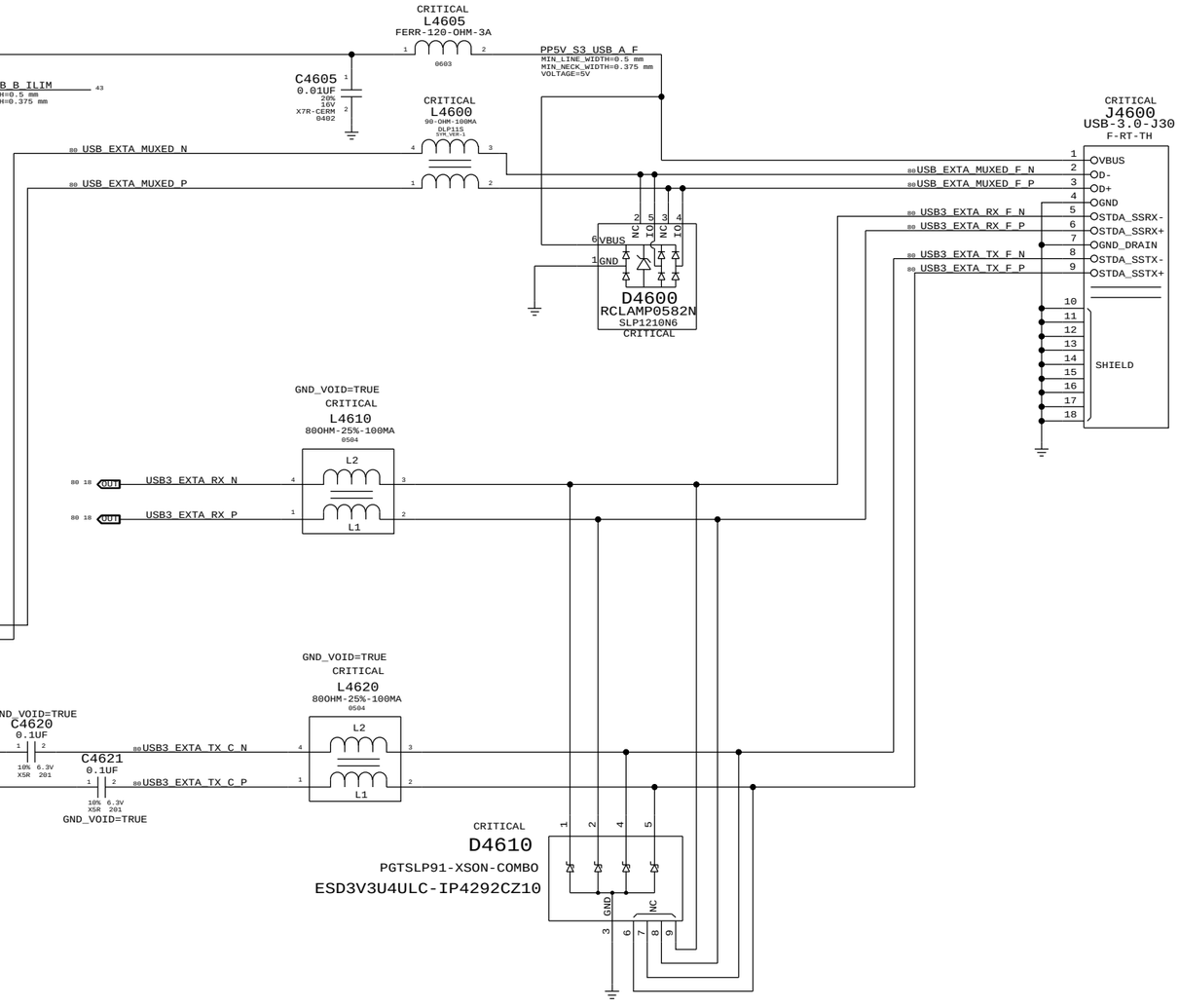
USB Port Power Switch

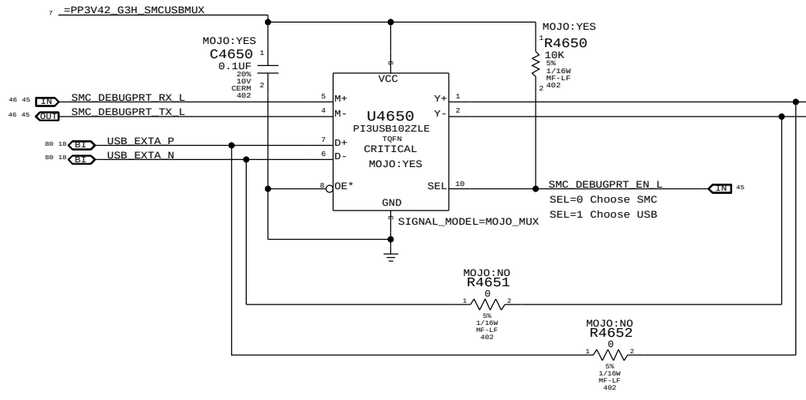


Current limit per port (R4600): 2.18A min / 2.63A max

USB Port A (Front Port)



Mojo SMC Debug Mux



SYNC_MASTER=J31_MLB	SYNC_DATE=07/08/2011
PAGE TITLE	External A USB3 Connector
Apple Inc.	DRAWING NUMBER 051-9058 SIZE D
	REVISION 6.0.0
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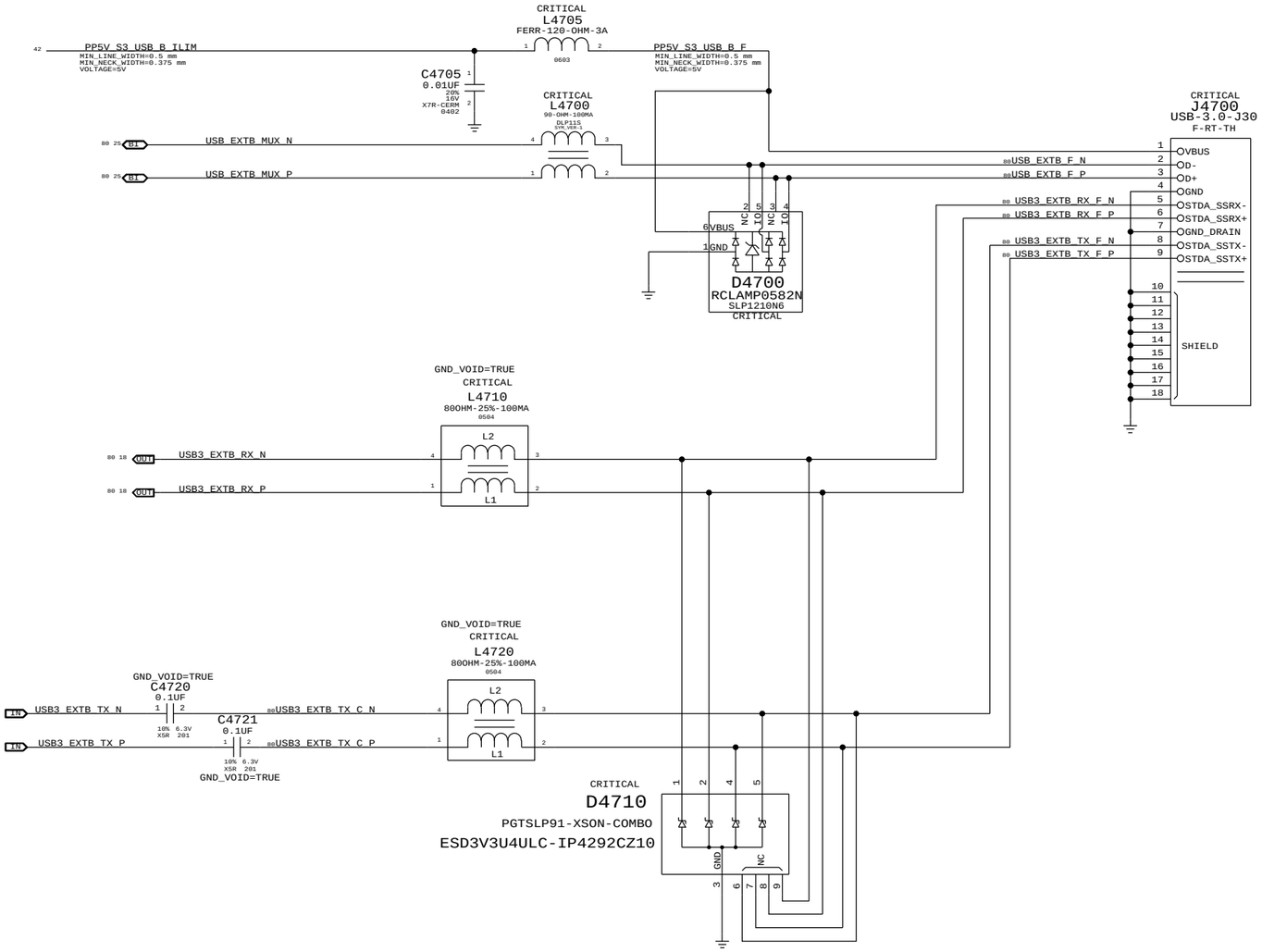
USB Port B (Back Port)



NOTE: Swapped pin4 and 5, pin6 and 7 for layout.

SYNC_MASTER=J31_MLB SYNC_DATE=07/08/2013

PAGE TITLE

External B USB3 Connector

Apple Inc.

DRAWING NUMBER 051-9058 SIZE D

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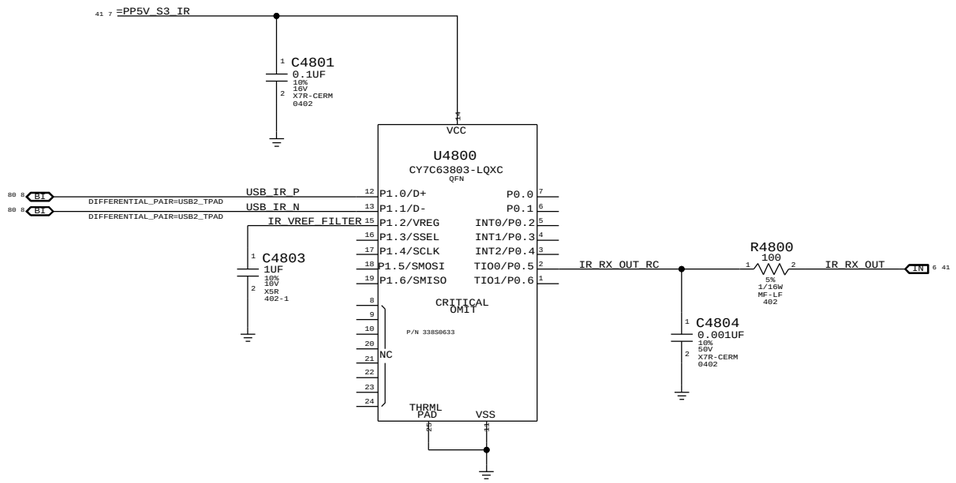
IR SUPPORT



SYNC_MASTER=K90I_MLB SYNC_DATE=02/15/2011

PAGE TITLE

Front Flex Support

Apple Inc.

DRAWING NUMBER 051-9058 SIZE D

REVISION 6.0.0

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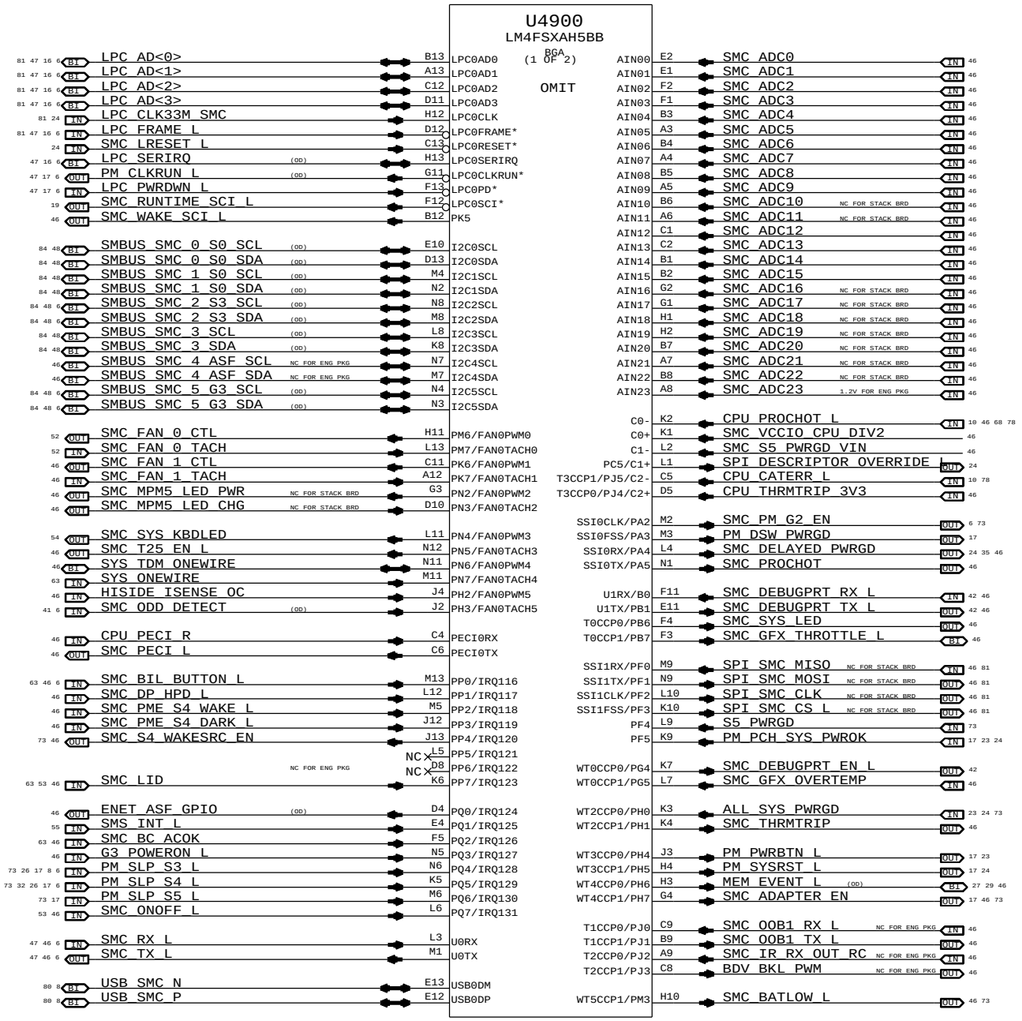
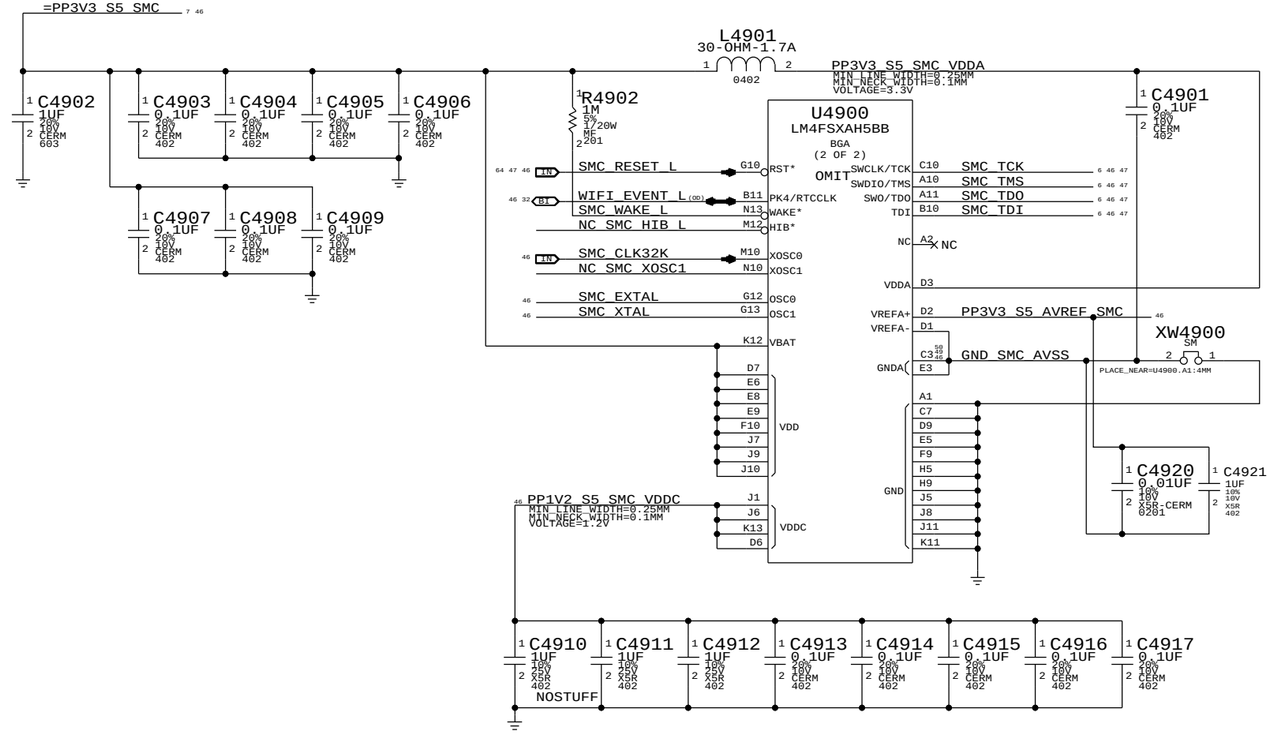


NOTE:
SMS Interrupt can be active high or low, rename net accordingly.
If SMS interrupt is not used, pull up to SMC rail.

NOTE:
Unused pins have "SMC_Pxx" names. Unused
pins designed as outputs can be left floating,
those designated as inputs require pull-ups.



SYNC_MASTER=YONAS_J30	SYNC_DATE=12/21/2011
PAGE TITLE	SMC
Apple Inc.	DRAWING NUMBER 051-9058
	SIZE D
	REVISION 6.0.0
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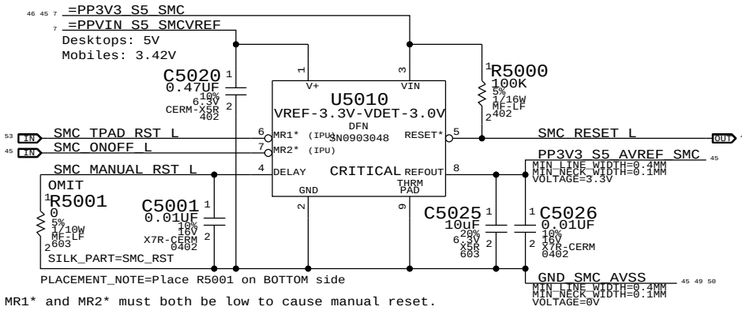
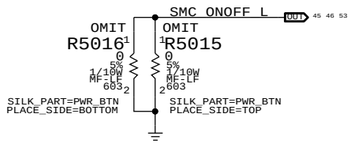
SMC Reset "Button", Supervisor & AVREF Supply



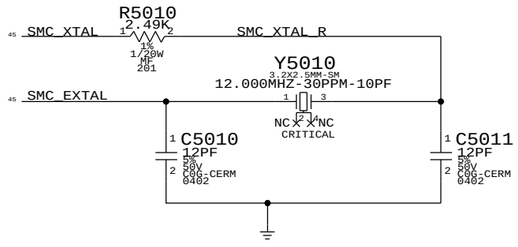
MR1* and MR2* must both be low to cause manual reset.
Used on mobiles to support SMC reset via keyboard.
NOTE: Internal pull-ups are to VIN, not V+.

Debug Power "Buttons"



SMC Crystal Circuit

SMC USB Clock require these crystal values:5,6,8,10,12,16,18,20,24,25 MHz



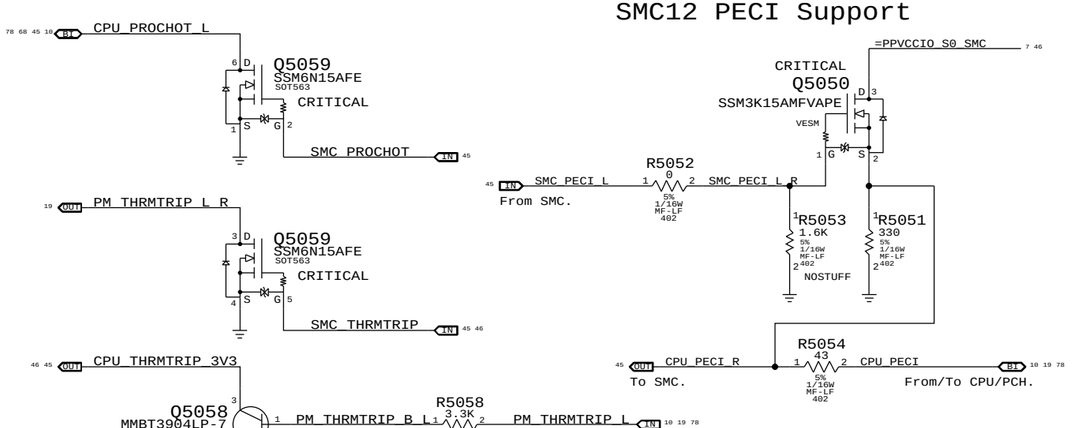
Note:
ADC10 and ADC11 are shared with comparators on Stack Board.

SMC_ADC0	SMC_CPU_VSENSE	MAKE_BASE=TRUE
SMC_ADC1	SMC_CPU_ISENSE	MAKE_BASE=TRUE
SMC_ADC2	NC_SMC_ADC2	MAKE_BASE=TRUE
SMC_ADC3	SMC_DCIN_VSENSE	MAKE_BASE=TRUE
SMC_ADC4	SMC_DCIN_ISENSE	MAKE_BASE=TRUE
SMC_ADC5	SMC_PBUS_VSENSE	MAKE_BASE=TRUE
SMC_ADC6	SMC_HDD_ISENSE	MAKE_BASE=TRUE
SMC_ADC7	SMC_BMON_ISENSE	MAKE_BASE=TRUE
SMC_ADC8	SMC_CPU_HI_ISENSE	MAKE_BASE=TRUE
SMC_ADC9	SMC_OTHER_HI_ISENSE	MAKE_BASE=TRUE
SMC_ADC10	SMC_MEM_ISENSE	MAKE_BASE=TRUE
SMC_ADC11	SMC_CPUVCCIO_ISENSE	MAKE_BASE=TRUE
SMC_ADC12	SMC_AXG_VSENSE	MAKE_BASE=TRUE
SMC_ADC13	NC_SMC_ADC13	MAKE_BASE=TRUE
SMC_ADC14	NC_SMC_ADC14	MAKE_BASE=TRUE
SMC_ADC15	NC_SMC_ADC15	MAKE_BASE=TRUE
SMC_ADC16	NC_SMC_ADC16	MAKE_BASE=TRUE
SMC_ADC17	NC_SCM_ADC17	MAKE_BASE=TRUE
SMC_ADC18	SMC_AXG_ISENSE	MAKE_BASE=TRUE
SMC_ADC19	NC_SMC_ADC19	MAKE_BASE=TRUE
SMC_ADC20	NC_SMC_ADC20	MAKE_BASE=TRUE
SMC_ADC21	NC_SMC_ADC21	MAKE_BASE=TRUE
SMC_ADC22	NC_SMC_ADC22	MAKE_BASE=TRUE
SMC_ADC23	SMC_ADC23	MAKE_BASE=TRUE
SMC_GFX_OVERTEMP	NC_SMC_GFX_OVERTEMP	MAKE_BASE=TRUE
SMC_GFX_THROTTLE_L	NC_SMC_GFX_THROTTLE_L	MAKE_BASE=TRUE
SMC_FAN_1_CTL	NC_SMC_FAN_1_CTL	MAKE_BASE=TRUE
SMC_FAN_1_TACH	NC_SMC_FAN_1_TACH	MAKE_BASE=TRUE
ENET_ASF_GPIO	NC_ENET_ASF_GPIO	MAKE_BASE=TRUE
SMC_MPM5_LED_PWR	NC_SMC_MPM5_LED_PWR	MAKE_BASE=TRUE
SMC_MPM5_LED_CHG	NC_SMC_MPM5_LED_CHG	MAKE_BASE=TRUE
SYS_TDM_ONEWIRE	NC_SYS_TDM_ONEWIRE	MAKE_BASE=TRUE
SMC_OOB1_RX_L	SMC_SSD_OOBD2R_L	MAKE_BASE=TRUE
SMC_OOB1_TX_L	SMC_SSD_OOBR2D_L	MAKE_BASE=TRUE
=CHGR_ACOK	SMC_BC_ACOK	MAKE_BASE=TRUE
HISIDE_ISENSE_OC	NC_HISIDE_ISENSE_OC	MAKE_BASE=TRUE
SMBUS_SMC_4_ASF_SCL	NC_SMBUS_SMC_4_ASF_SCL	MAKE_BASE=TRUE
SMBUS_SMC_4_ASF_SDA	NC_SMBUS_SMC_4_ASF_SDA	MAKE_BASE=TRUE
BDV_BKL_PWM	NC_BDV_BKL_PWM	MAKE_BASE=TRUE
SMC_PME_S4_DARK_L	SDCONN_STATE_CHANGE_SMC	MAKE_BASE=TRUE
SMC_SCI_L	SMC_WAKE_SCI_L	MAKE_BASE=TRUE
SMC_T25_EN_L	NC_SMC_T25_EN_L	MAKE_BASE=TRUE
SMC_IR_RX_OUT_RC	NC_SMC_IR_RX_OUT_RC	MAKE_BASE=TRUE

Note:
Pull-up for SMC_PME_S4_DARK_L are in page33 (R3315).

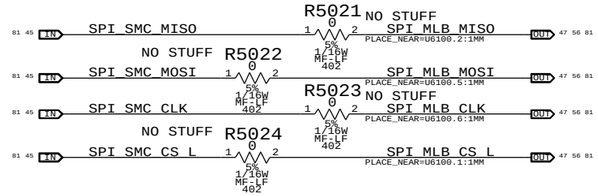
PM_CLK32K_SUSCLK_R — R5012 22 5% 1/20W MF 201 — SMC_CLK32K
PLACE_NEAR=U1800.N14:5MM

SMC12 PECI Support

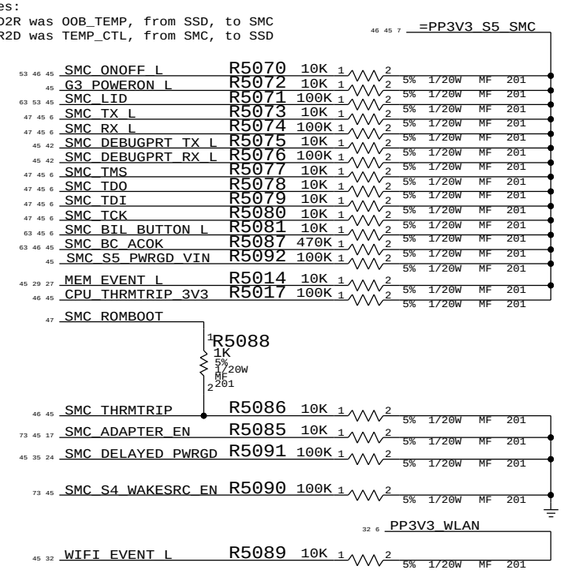


SMC12 SPI Support

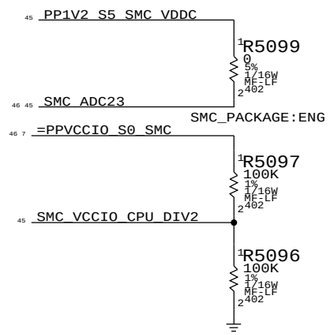
Series resistors are no stuffed until the topology of 2 SPI Masters are verified.



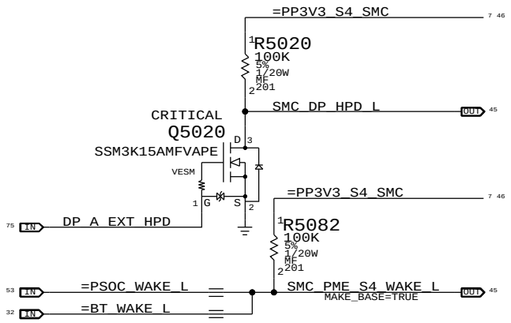
Notes:
OOBD2R was OOB_TEMP, from SSD, to SMC
OOBR2D was TEMP_CTL, from SMC, to SSD



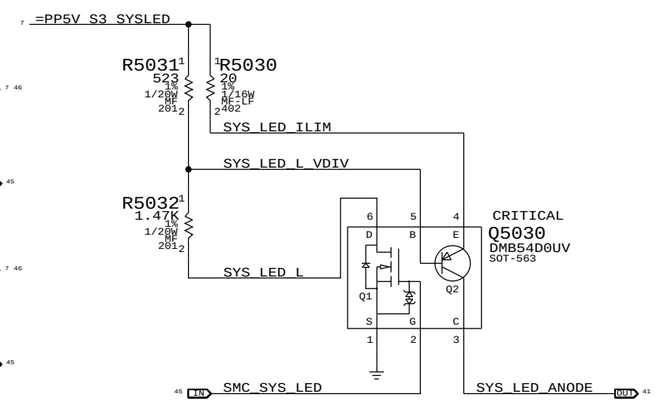
SCM12 Eng Pkg Support



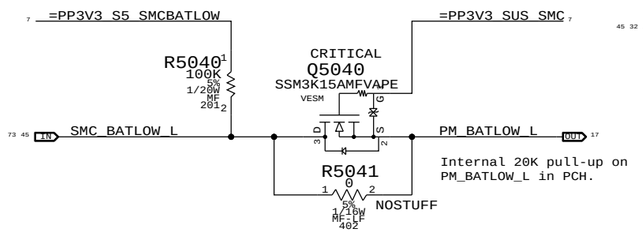
S4 HPD SMC Wake Source



System (Sleep) LED Circuit



BATLOW# Isolation



Internal 20K pull-up on PM_BATLOW_L in PCH.

SYNC_MASTER=YONAS_J30	SYNC_DATE=01/02/2012
PAGE TITLE	SMC Support
Apple Inc.	DRAWING NUMBER 051-9058 / SIZE D
	REVISION 6.0.0
	BRANCH
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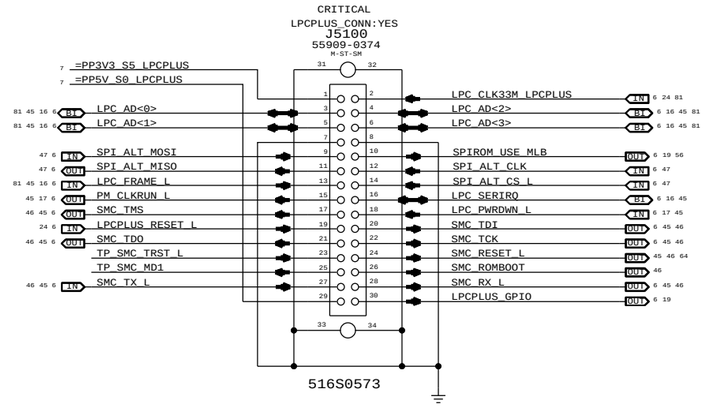
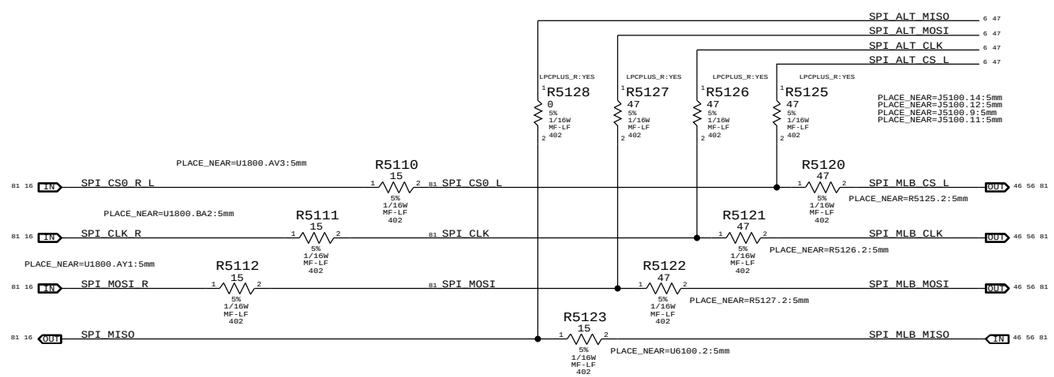
LPC+SPI Connector



SPI Bus Series Termination



SYNC_MASTER=J31_MLB	SYNC_DATE=06/15/2011
PAGE TITLE	LPC+SPI Debug Connector
Apple Inc.	DRAWING NUMBER 051-9058 · SIZE D
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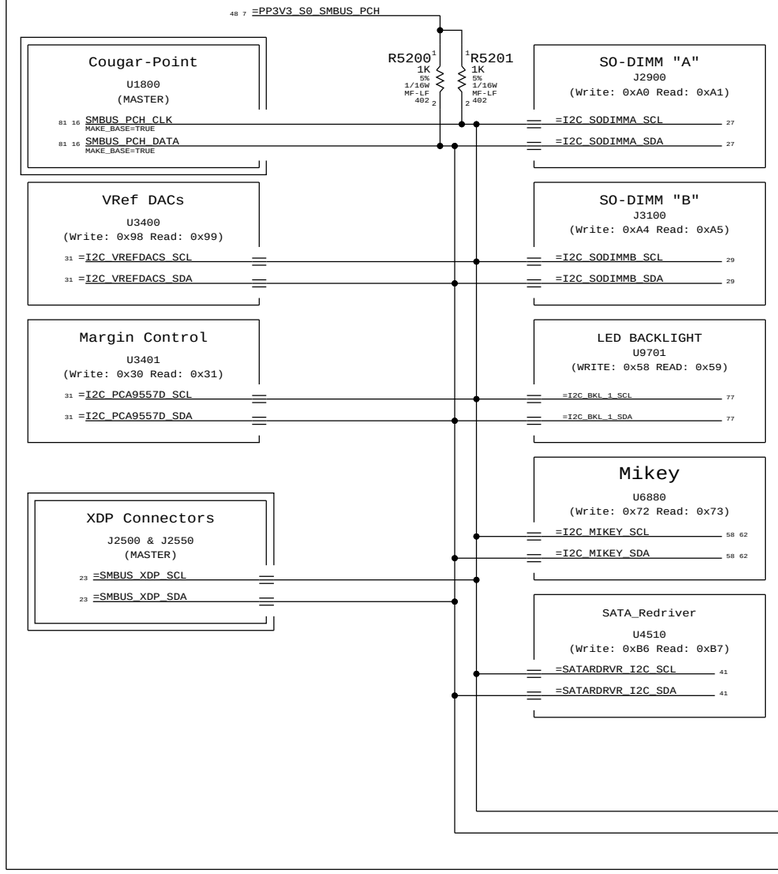
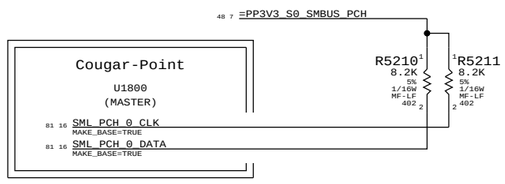
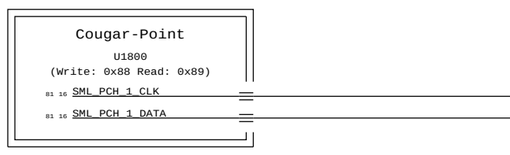
PCH SMBus "0" Connections



PCH "SMLink 0" Connections

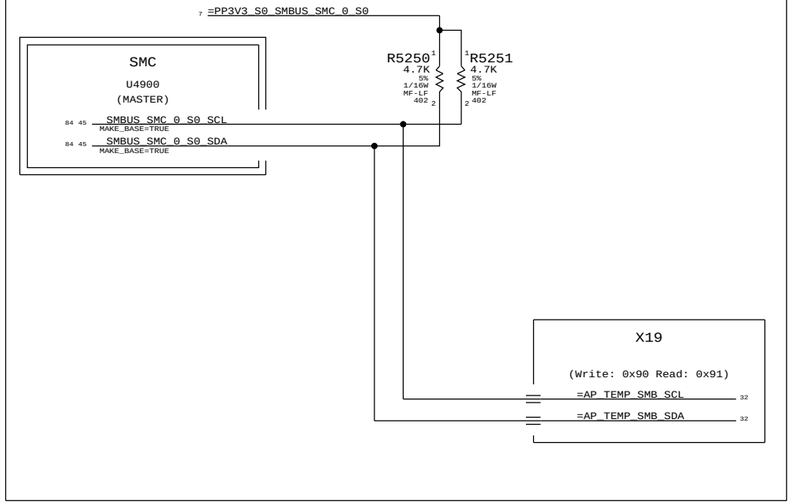


PCH "SMLink 1" Connections



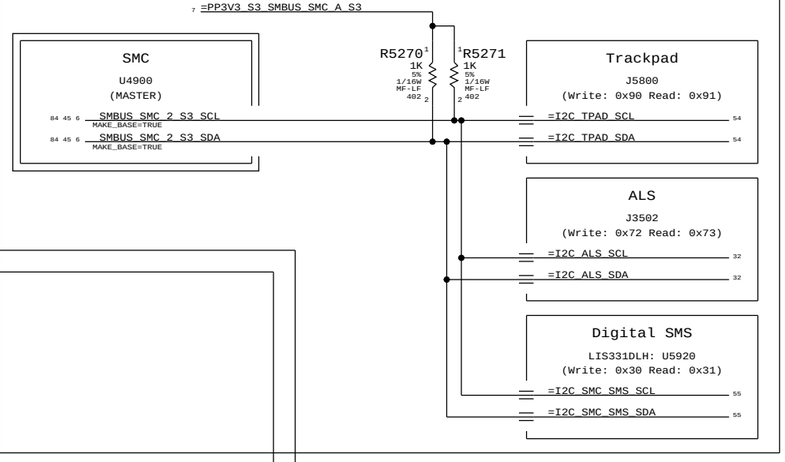
SMLink 1 is slave port to
access PCH & CPU via PECI.

SMC "0" SMBus Connections

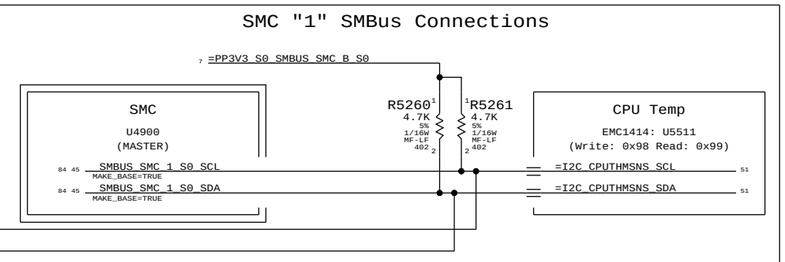


SMC "2" SMBus Connections

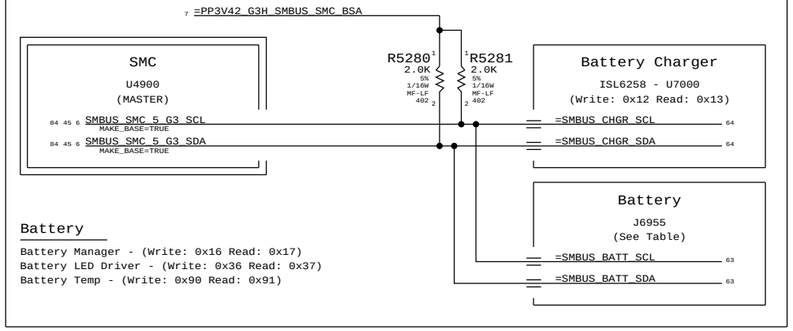
NOTE: SMC RMT bus remains powered and may be active in S3 state



SMC "1" SMBus Connections



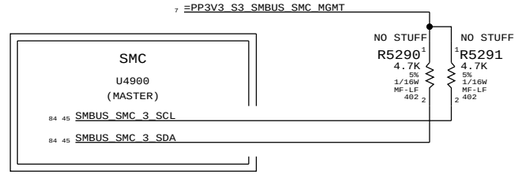
SMC "5" SMBus Connections



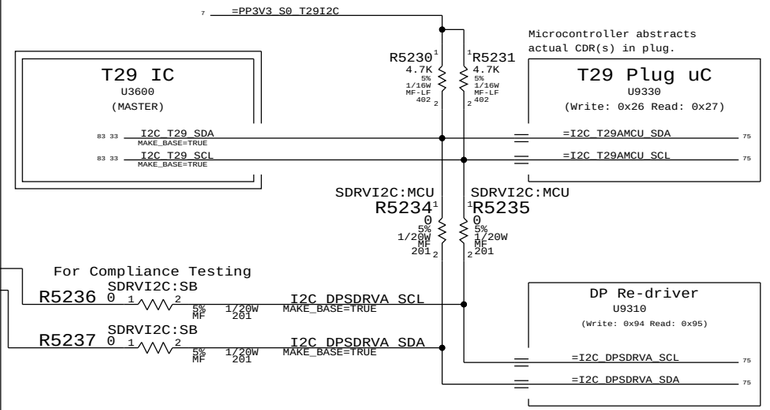
Battery

Battery Manager - (Write: 0x16 Read: 0x17)
Battery LED Driver - (Write: 0x36 Read: 0x37)
Battery Temp - (Write: 0x90 Read: 0x91)

SMC "3" SMBus Connections



T29 I2C Connections



SYNC_MASTER=K90I_MLB SYNC_DATE=02/15/2013

PAGE TITLE
SMBus Connections

Apple Inc.

DRAWING NUMBER 051-9058 SIZE D
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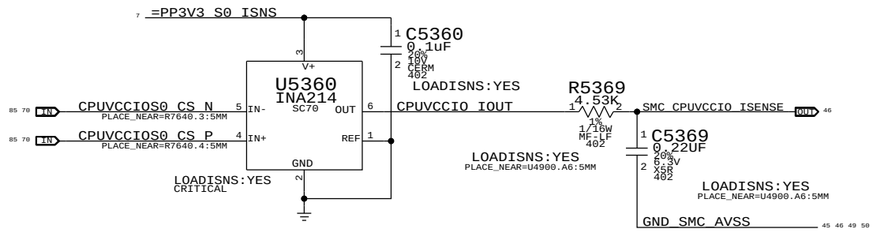
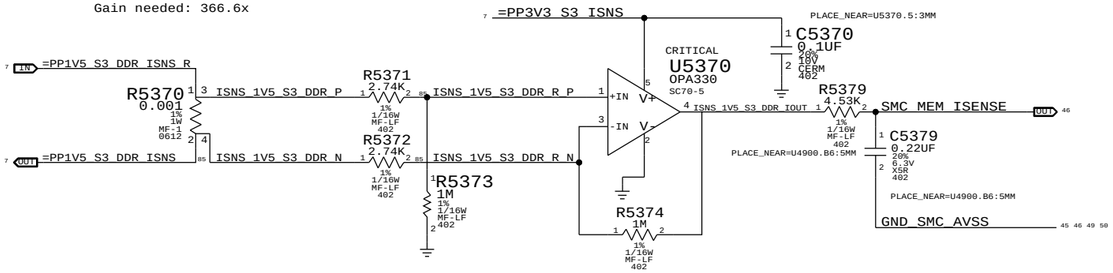
CPU VCCIO 1.05V Load Side Current Sense (IC1C)

Gain: 100x, EDP: 20.1 A
Rsense: 0.001 (R7640)
V across Rsense: 20.1 mV
Gain needed: 164.2x



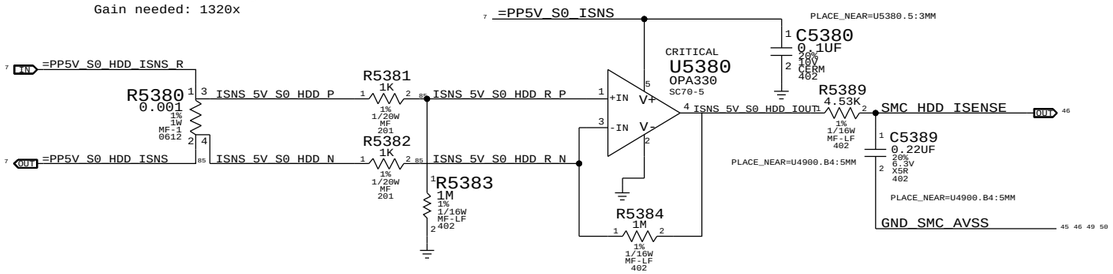
DDR 1.5V S3 (Memory) Current Sense (IM0C)

Gain: 364.9x, EDP: 9 A
Rsense: 0.001 (R5370)
V across Rsense: 9 mV
Gain needed: 366.6x

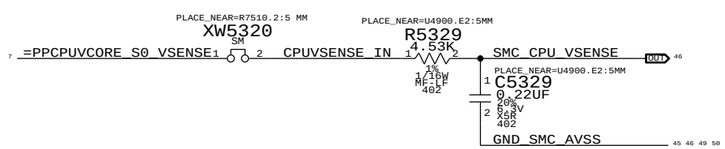


HDD Current Sense (IHDC)

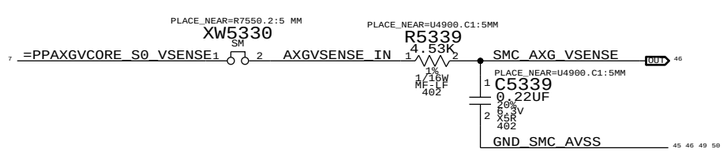
Gain: 1000x, EDP: 2.5 A (12.5 W)
Rsense: 0.001 (R5380)
V across Rsense: 2.5 mV
Gain needed: 1320x



CPU Core Voltage Sense (VC0C)

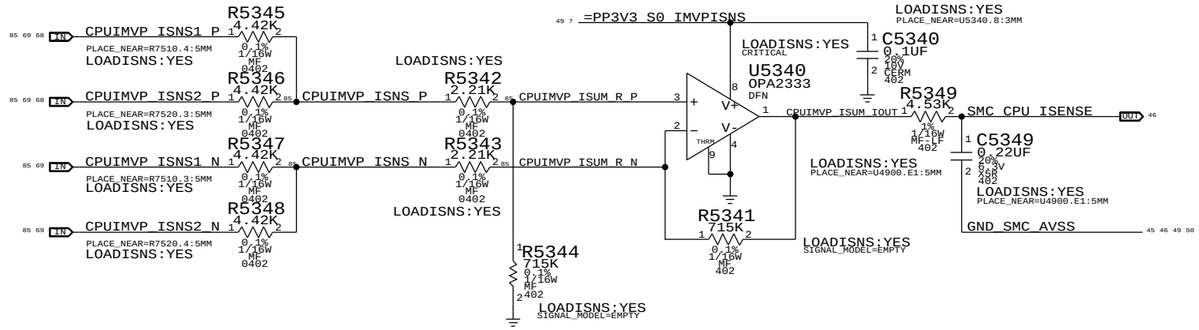


AXG Core Voltage Sense (VN0C)



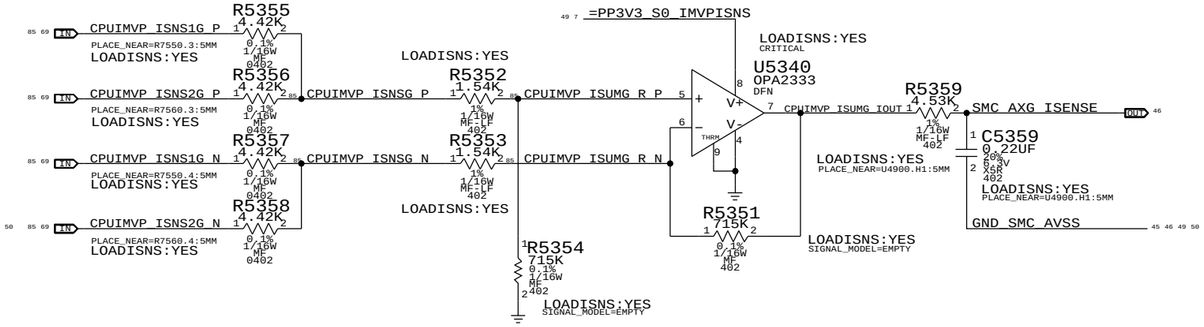
CPU Core Load Side Current Sense (IC0C)

Gain: 161.5x, EDP: 53 A
Rsense: 2x of 0.00075 (R7510, R7520), Rsum: 0.000375
V across Rsense: 19.8 mV
Gain needed: 166.1x



AXG Core Load Side Current Sense (IN0C)

Gain: 190.6x, EDP: 46 A
Rsense: 2x of 0.00075 (R7550, R7560), Rsum: 0.000375
V across Rsense: 17.25 mV
Gain needed: 191.3x



PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
116S0114	3	RES,MTL FLIM,100K,1/16W,0402,SMD,LF	C5349,C5359,C5369		LOADISNS:NO

SYNC_MASTER=LINDA_J30 SYNC_DATE=09/28/2011

PAGE TITLE
Power Sensors: Load Side

Apple Inc.

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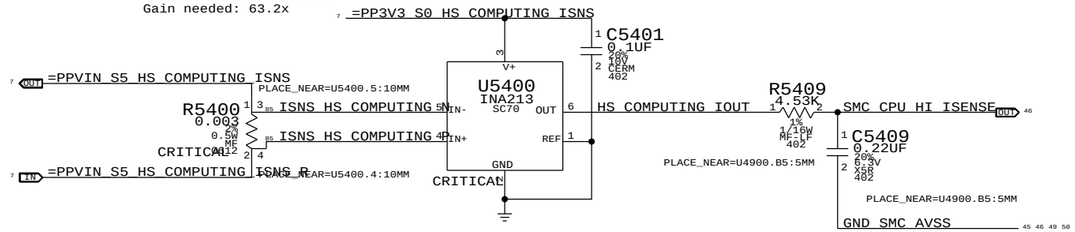
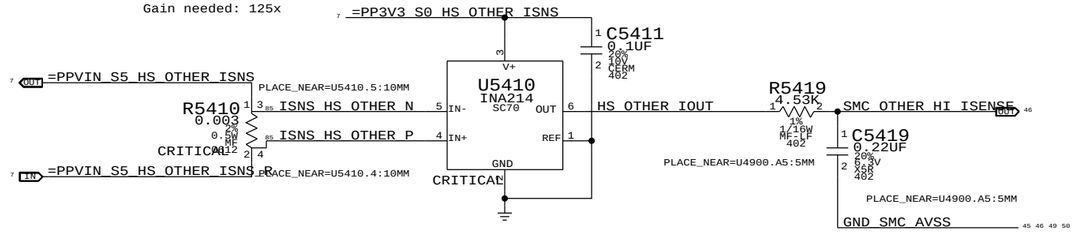
CPU High Side Current Sense (IC0R)

Gain: 50x, EDP: 17.4 A
Rsense: 0.003 (R5400)
V across Rsense: 52.2 mV
Gain needed: 63.2x



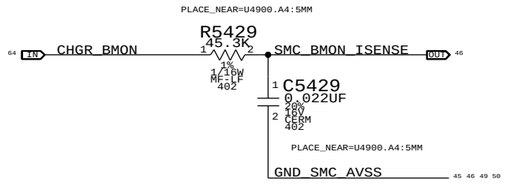
OTHER High Side Current Sense (IO0R)

Gain: 100x, EDP: 8.8 A
Rsense: 0.003 (R5410)
V across Rsense: 26.4 mV
Gain needed: 125x



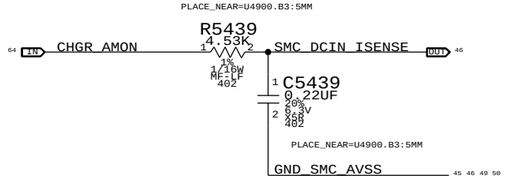
Charger (BMON Production) Current Sense (IPBR)

Charger Gain: 36x
Rsense: 0.010 (R7050)
Max Current Measured: 9.2 A

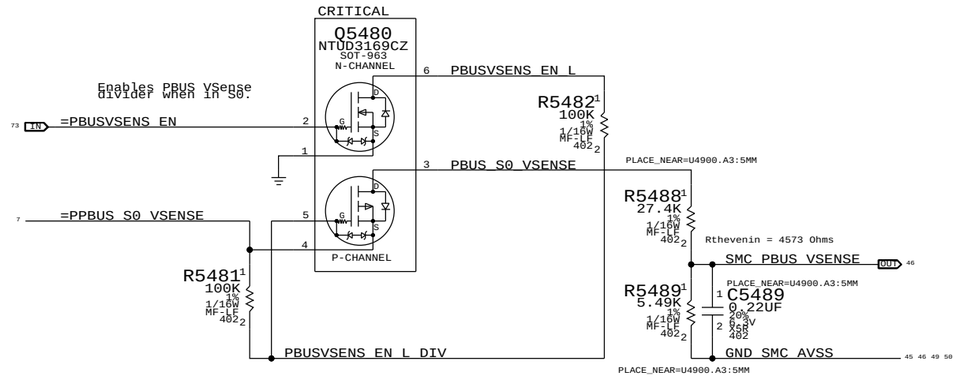


DC-In (AMON) Current Sense (ID0R)

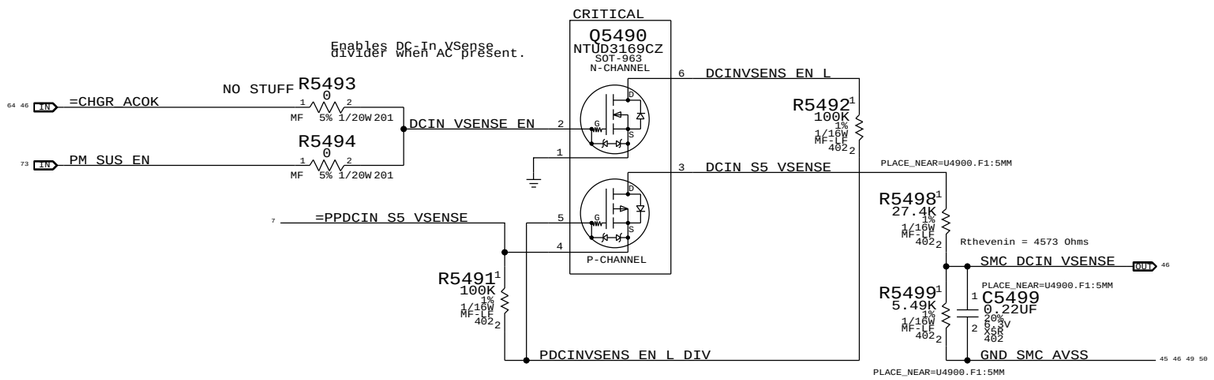
Charger Gain: 20x
Rsense: 0.020 (R7020)
Max Current Measured: 8.3 A



PBUS Voltage Sense & Enable (VP0R)



DC In Voltage Sense & Enable (VD0R)



SYNC_MASTER=YONAS_J30 SYNC_DATE=11/03/2011

PAGE TITLE
Power Sensors: High Side

Apple Inc.

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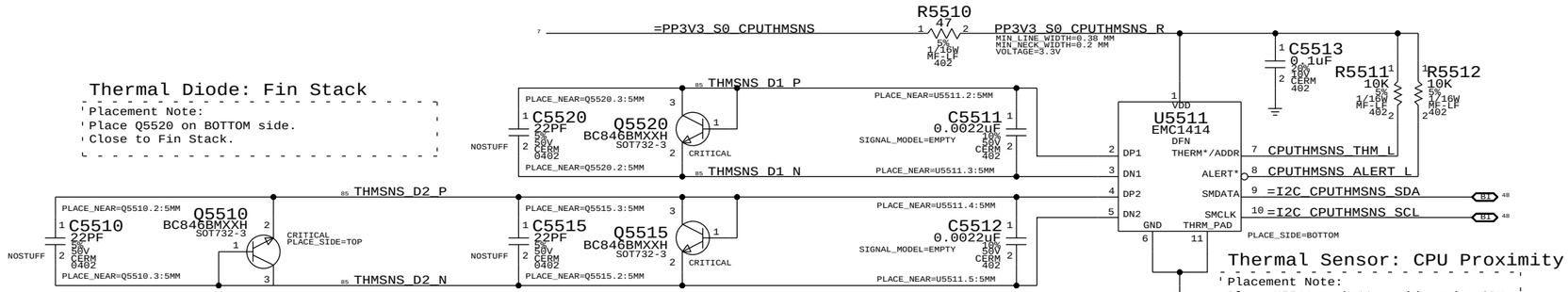
Thermal Sensor:
CPU Proximity, Fin Stack, Memory Proximity, 5V/3.3V Proximity

I2C Write, 0x98, I2C Read: 0x99



Thermal Diode: Fin Stack

Placement Note:
Place Q5520 on BOTTOM side.
Close to Fin Stack.

Thermal Sensor: CPU Proximity

Placement Note:
Place U5511 on bottom side under CPU

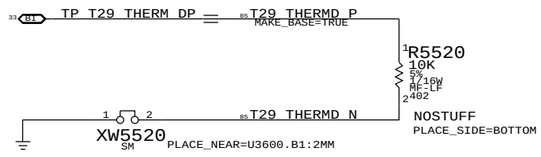
Thermal Diode: 5V/3.3V Proximity

Placement Note:
Place Q5510 on the TOP side,
Next to 5V and 3.3V power supplies.

Thermal Diode: Memory Proximity

Placement Note:
Place Q5515 on the EITHER side, on the
right of DIMM connectors.

Thermal Sensor: T29 Die



Note: Use GND pin B1 on U3600 for N leg.

SYNC_MASTER=YONAS_J30	SYNC_DATE=08/01/2011
PAGE TITLE: Thermal Sensors	
Apple Inc.	DRAWING NUMBER: 051-9058 SIZE: D
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	PAGE: 55 OF 109
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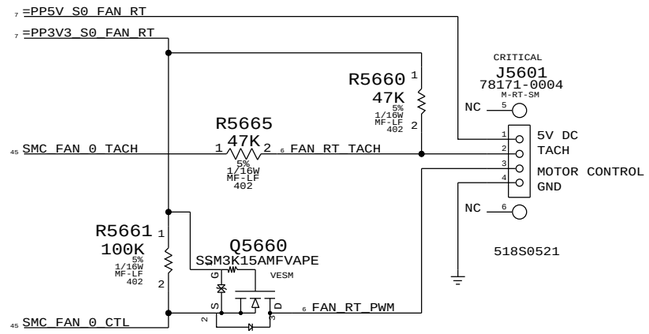

SYNC_MASTER=K90I_MLB SYNC_DATE=02/15/2011

PAGE TITLE

Fan

Apple Inc.

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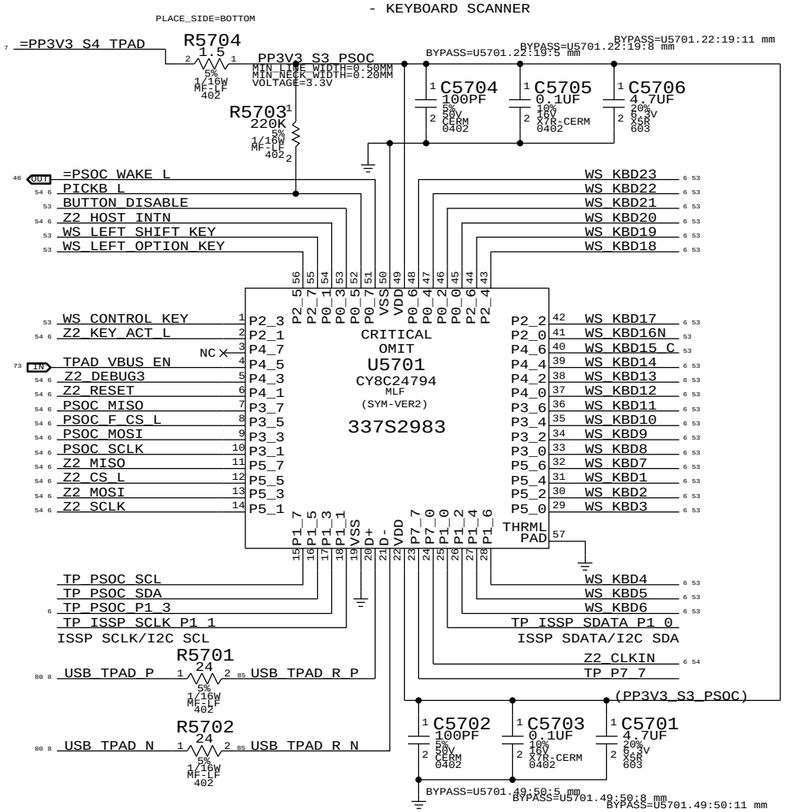
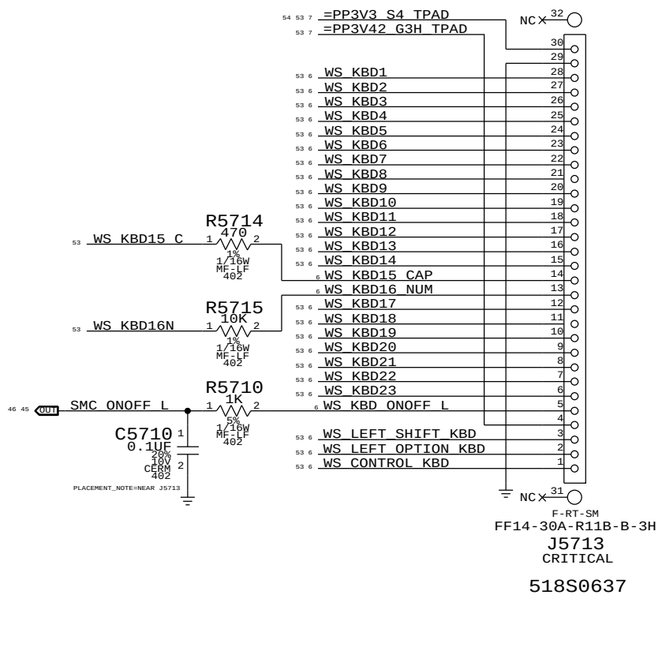
PSOC USB CONTROLLER

- USB INTERFACES TO MLB
- SPI HOST TO Z2
- TRACKPAD PICK BUTTONS
- KEYBOARD SCANNER



IC	PIN NAME	CURRENT	R_SNS	V_SNS	POWER
TMP102	V+	10UA	2.55 KOHM	0.0255 V	0.255E-6 W
		80UA		0.204 V	16.32E-6 W
3V3 LDO	VDD	60MA (MAX)	10 OHM	0.6 V	36E-3 W
	VOUT	60MA (MAX)	0.2 OHM	0.012 V	0.72E-3 W
PSOC	VDD	8MA (TYP)	1.5 OHM	0.012 V	96E-6 W
		14MA (MAX)		0.021 V	294E-6 W
18V BOOSTER	VIN	4MA (MAX)	4.7 OHM	0.0188 V	75.2E-6 W

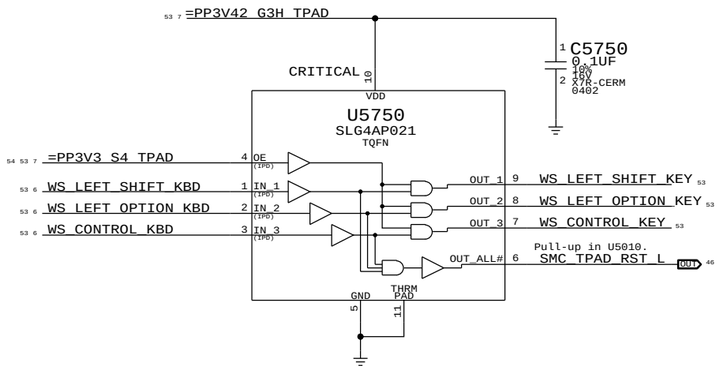
Keyboard Connector



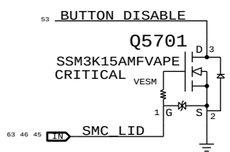
SMC Manual Reset & Isolation

Left shift, option & control keys combined with power button cause SMC RESET# assertion.

Keys ANDed with MSP power to isolate when MSP is not powered. No IPD on OE input pin PP3V3_S4 (symbol error).



TPAD Buttons Disable



PLACE THESE COMPONENTS CLOSE TO J5800
THIS ASSUMES THERE'S A PP3V42_G3H PULL UP ON MLB

THE TPAD BUTTONS WILL BE DISABLE
WHEN THE LID IS CLOSED
LID OPEN => SMC_LID_LC ~ 3.42V
LID CLOSE => SMC_LID_LC < 0.50V

SYNC_MASTER=J31_MLB SYNC_DATE=07/01/2011

PAGE TITLE: WELLSPRING 1

Apple Inc.

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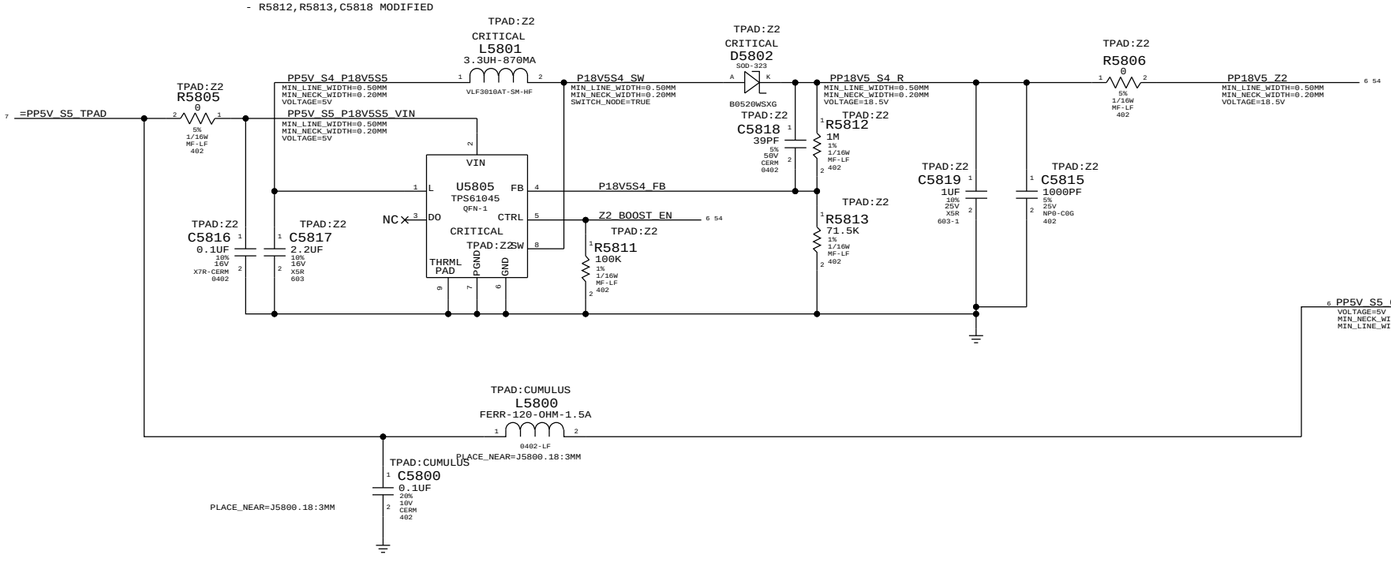
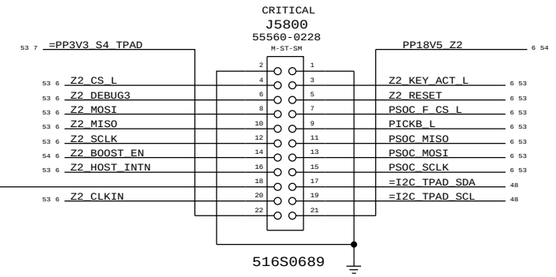
BOOSTER +18.5VDC FOR SENSORS

BOOSTER DESIGN CONSIDERATION:
- POWER CONSUMPTION
- DROOP LINE REGULATION
- RIPPLE TO MEET ERS
- 100-300 KHZ CLEAN SPECTRUM
- STARTUP TIME LESS THAN 2MS
- R5812,R5813,C5818 MODIFIED

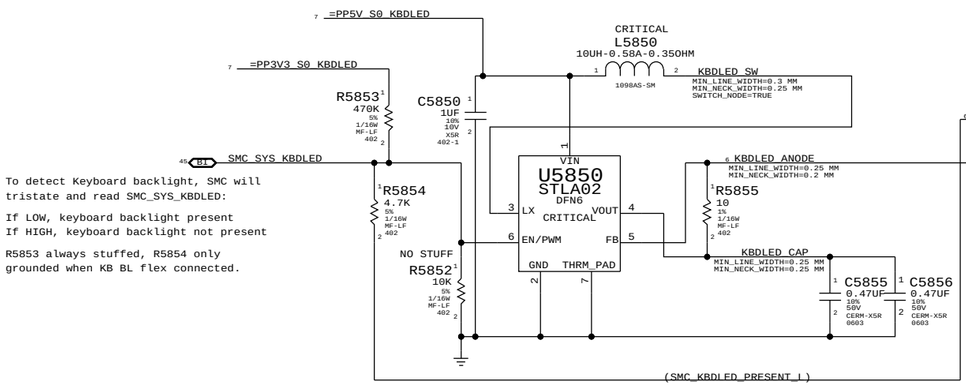


IPD Flex Connector



PIN 21 IS NC ON CUMULUS FLEX
PIN 18 IS NC ON Z2 FLEX

Keyboard Backlight Driver & Detection

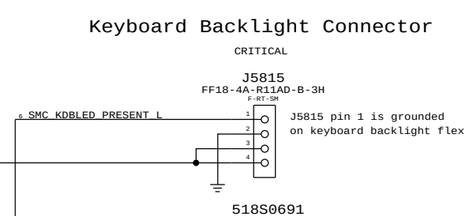


To detect Keyboard backlight, SMC will tristate and read SMC_SYS_KBDLED:

If LOW, keyboard backlight present
If HIGH, keyboard backlight not present

R5853 always stuffed, R5854 only grounded when KB BL flex connected.

Keyboard Backlight Connector



SYNC_MASTER=JACK_J30	SYNC_DATE=09/28/2011
PAGE TITLE	WELLSPRING 2
Apple Inc.	DRAWING NUMBER 051-9058 SIZE D
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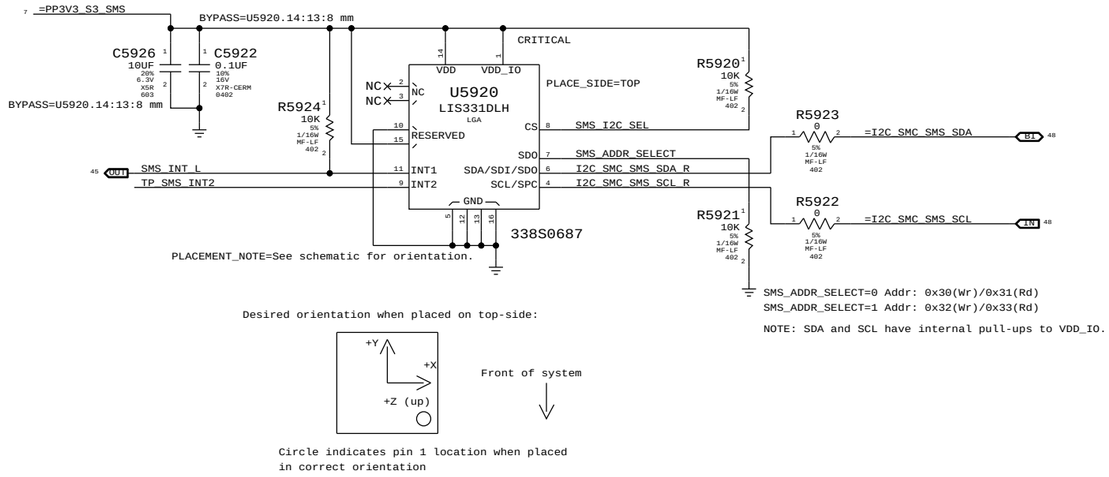

SMS_ADDR_SELECT=0 Addr: 0x30(Wr)/0x31(Rd)
SMS_ADDR_SELECT=1 Addr: 0x32(Wr)/0x33(Rd)

NOTE: SDA and SCL have internal pull-ups to VDD_IO.

Desired orientation when placed on top-side:

Circle indicates pin 1 location when placed in correct orientation

SYNC_MASTER=K90I_MLB SYNC_DATE=02/15/2011

PAGE TITLE: Digital Accelerometer

Apple Inc.

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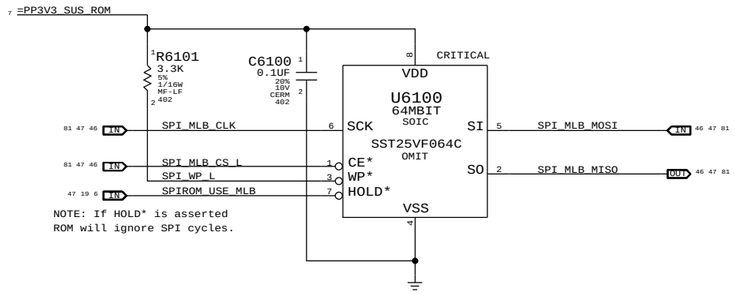

SYNC_MASTER=K90I_MLB SYNC_DATE=02/15/2011

PAGE TITLE

SPI ROM

Apple Inc.

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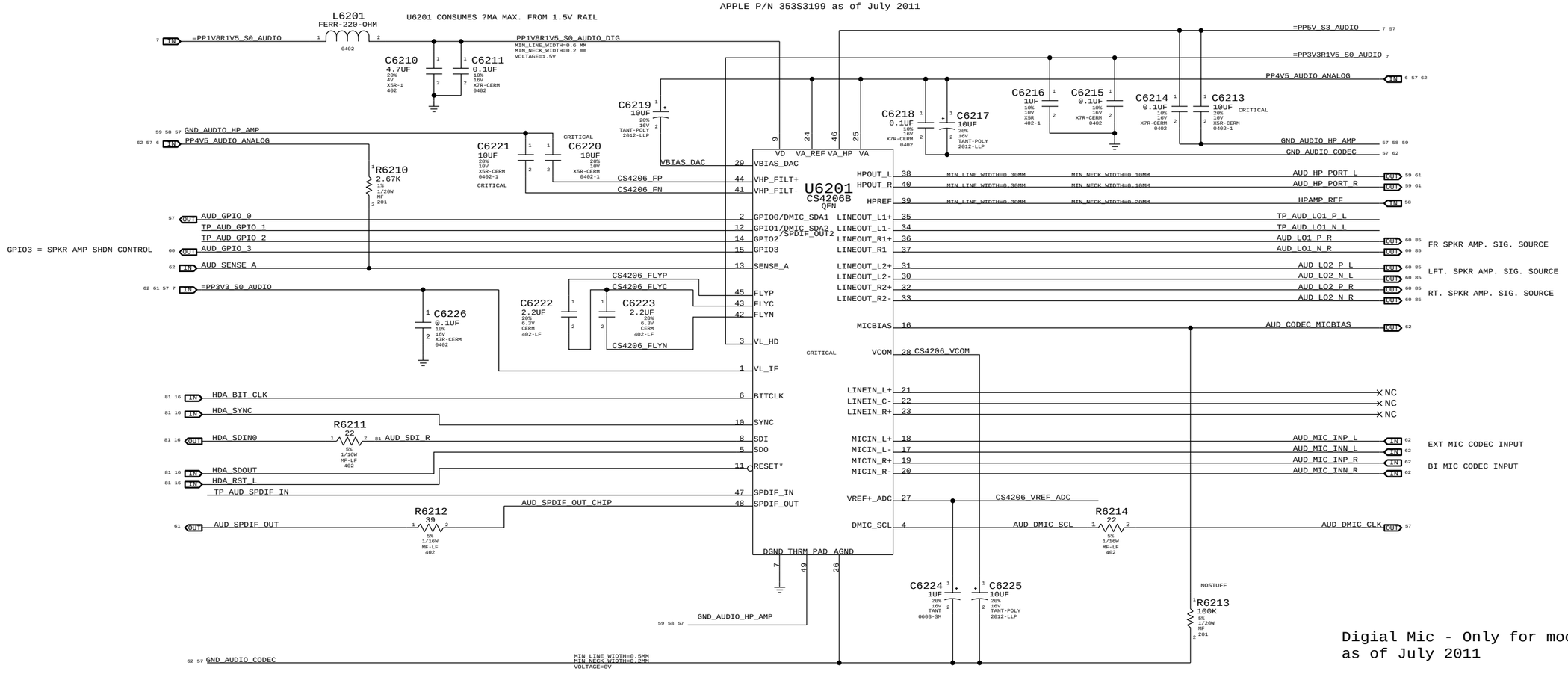
AUDIO CODEC

APPLE P/N 353S3199 as of July 2011



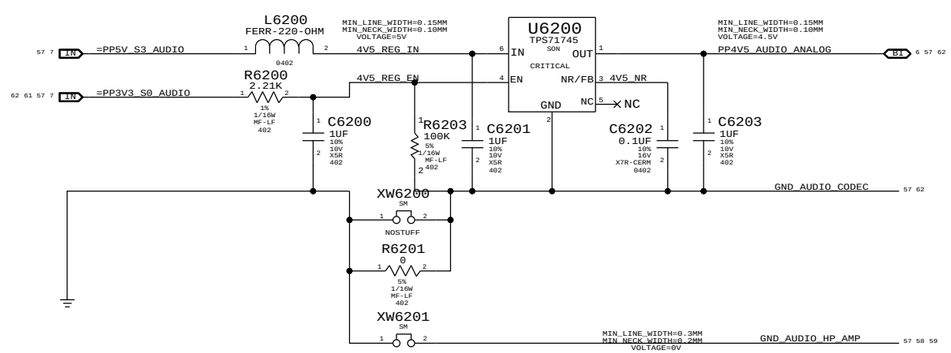
Digial Mic - Only for mock ups as of July 2011

AUD_DMIC_CLK — TP_AUD_DMIC_CLK (MAKE_BASE=TRUE)

AUD_GPIO_0 — TP_AUD_DMIC_SDATA (MAKE_BASE=TRUE)

4.5V POWER SUPPLY FOR CODEC

APPLE P/N 353S2281 as of July 2011



NOTES ON J30 audio

Codec HPamp used for Lineout/HPout. No external HPamp.
3 Spk amplifiers - 2 tweeters and a sub woofer
No line input capability
SPDIF out
China headset support

SYNC_MASTER=KAVITHA_J30 SYNC_DATE=07/25/2013

PAGE TITLE: AUDIO: CODEC/REGULATOR

Apple Inc.

DRAWING NUMBER: 051-9058 SIZE: D
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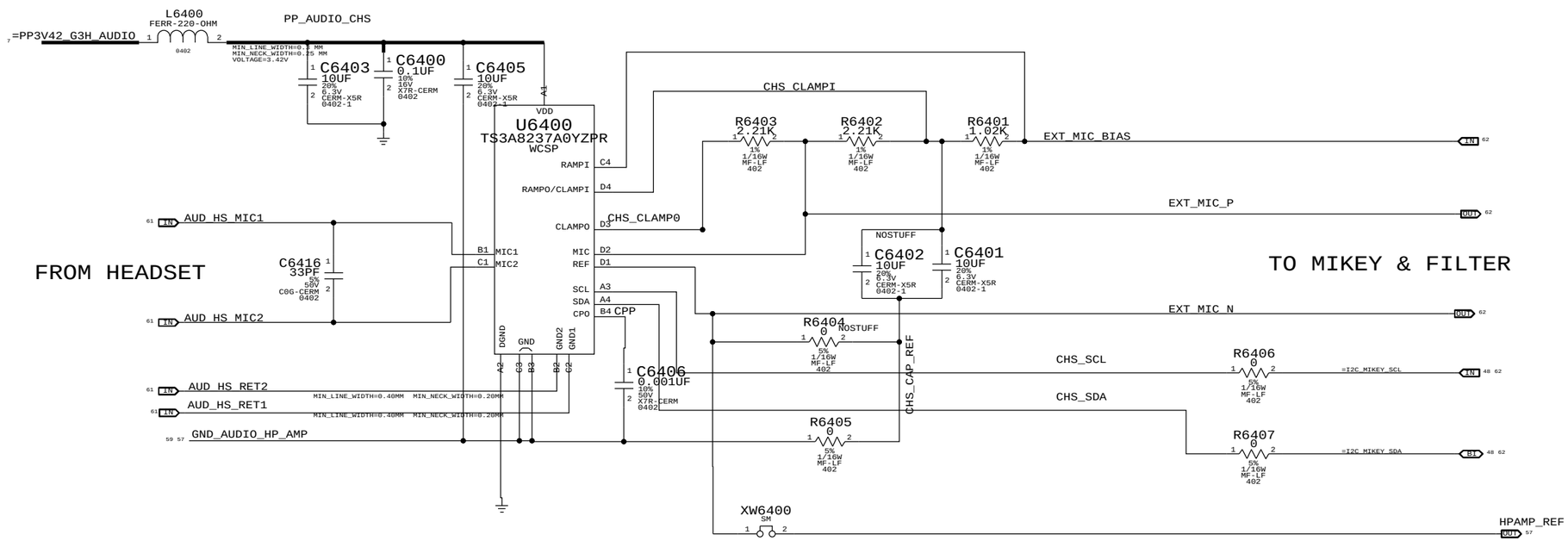
EXTERNAL (HEADSET) MIC INPUT CIRCUITRY APN:353S3066 as of July 2011



I2C ADDRESSES: CHS uses SMBus 0 connections

CHS	U6400	READ	0111	0111	0x77
CHS	U6400	WRITE	0111	0110	0x76

SYNC_MASTER=DIRK_J30 SYNC_DATE=02/16/2012

PAGE TITLE
AUDIO: DETECT/MIC BIAS

Apple Inc.

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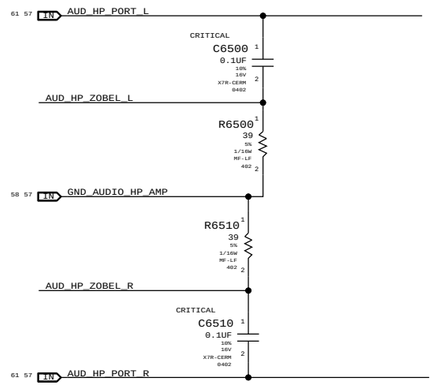
ZOBEL NETWORK & 1ST ORDER DAC FILTER PLACEHOLDER



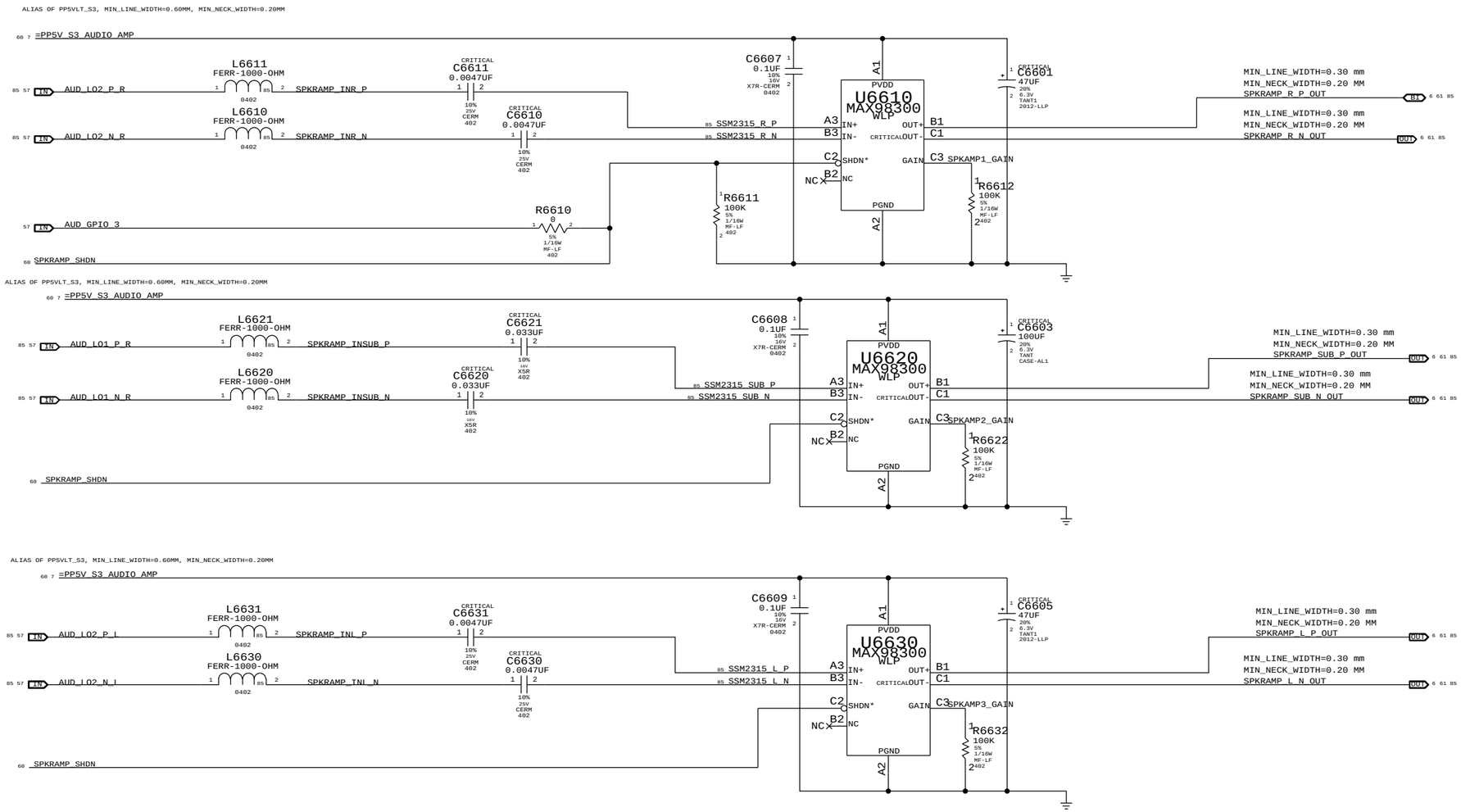
SYNC_MASTER=KAVITHA_J30	SYNC_DATE=07/25/2011
PAGE TITLE: AUDIO: HEADPHONE FILTER	
Apple Inc.	DRAWING NUMBER: 051-9058 SIZE: D
	REVISION: 6.0.0
	BRANCH:
	PAGE: 65 OF 109
	SHEET: 59 OF 86

SATELLITE & SUB TWEETER AMPLIFIER

APN:353S2888 as of July 2011

SATELLITE	FC=1.2kHz typical
SUB	FC= 172 HZ typical
GAIN	3DB with Rin=28k typical

Gain Pin	Gain dB
Connect to VDD	12
Connect to VDD through 100k	9
Not connected	6
Connect to GND through 100k	3
Connect to GND	0



SYNC_MASTER=KAVITHA_J30 SYNC_DATE=07/25/2013

PAGE TITLE

AUDIO: SPEAKER AMP

Apple Inc.

DRAWING NUMBER 051-9058 SIZE D

REVISION 6.0.0

BRANCH

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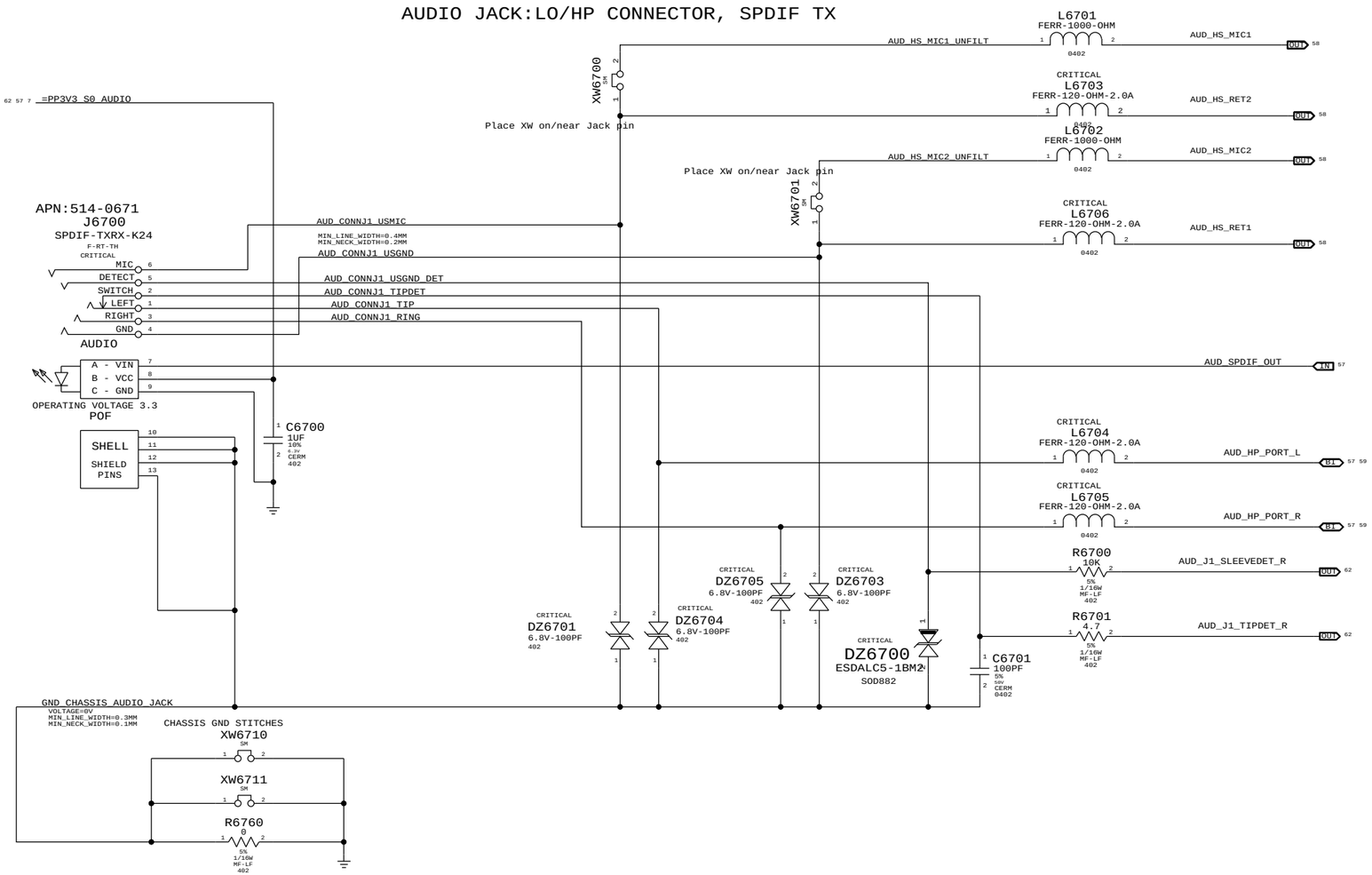
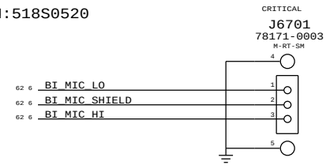
AUDIO JACK:LO/HP CONNECTOR, SPDIF TX



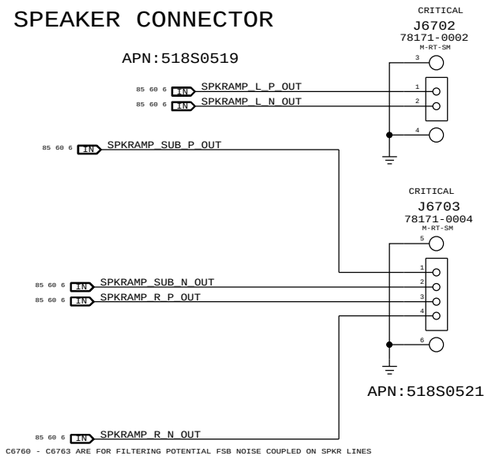
ANALOG MIC CONNECTOR

APN:518S0520



SPEAKER CONNECTOR

APN:518S0519



C6760 - C6763 ARE FOR FILTERING POTENTIAL FSB NOISE COUPLED ON SPKR LINES

SYNC_MASTER=DIRK_J30 SYNC_DATE=11/10/2011

PAGE TITLE: AUDIO: JACK

Apple Inc.

DRAWING NUMBER: 051-9058 SIZE: D

REVISION: 6.0.0

BRANCH:

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CODEC OUTPUT SIGNAL PATHS

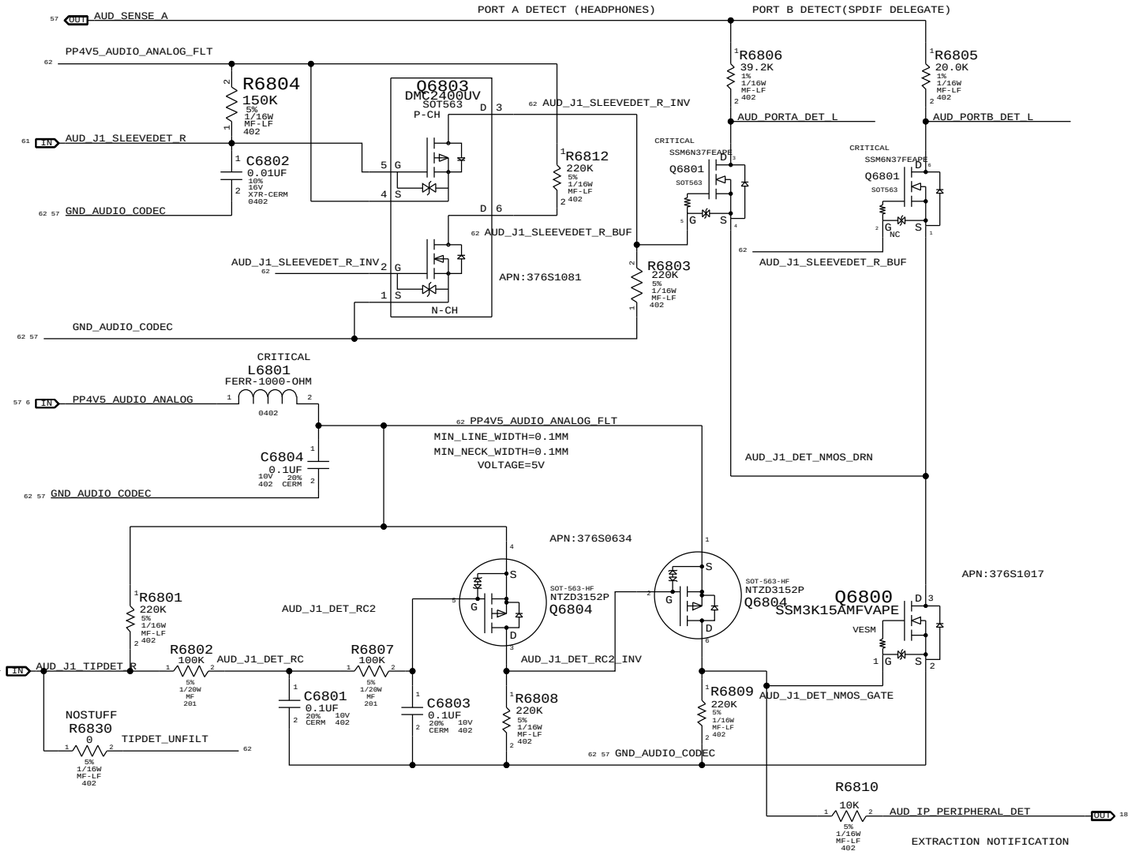
FUNCTION	VOLUME	CONVERTER	PIN COMPLEX	MUTE CONTROL	DET ASSIGNMENT
HP/LINE OUT	0X02 (2)	0X02 (2)	0X09 (9,A)	N/A	0X09 (A)
SATELLITES	0X04 (4)	0X04 (4)	0X0B (11)	GPIO_3	N/A
SUB	0X03 (3)	0X03 (03)	0X0A (10)	GPIO_3	N/A
SPDIF OUT	N/A	0X08 (8)	0X10 (16)	N/A	0X0D (B)

CODEC INPUT SIGNAL PATHS

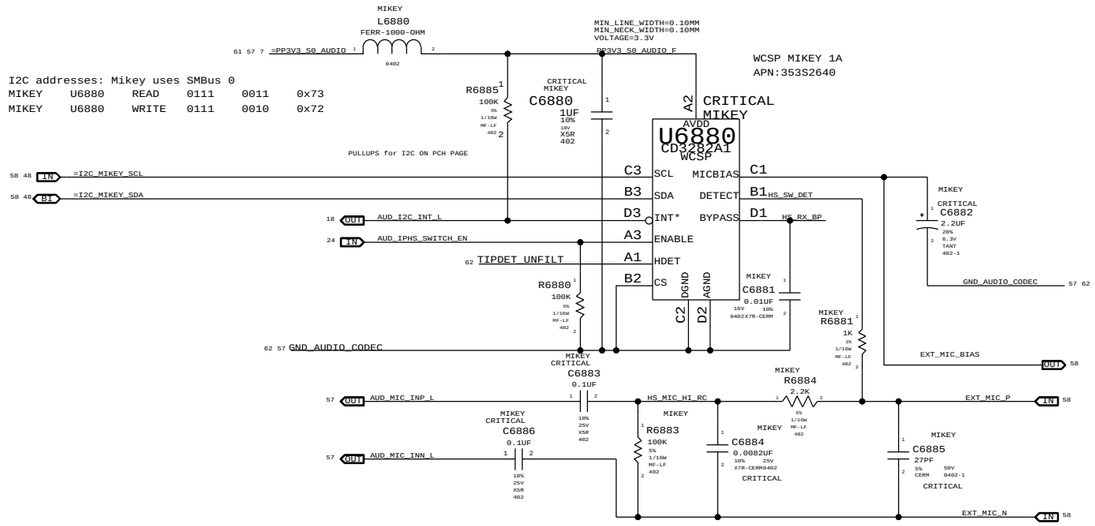
FUNCTION	CONVERTER	PIN COMPLEX	VREF	DET ASSIGNMENT
BUILT-IN MIC	0X06 (6)	0X0D (13,B,RIGHT)	MIC_BIAS (80%)	N/A
HEADSET MIC	0X06 (6)	0X0D (13,V22,B,LEFT)	MIKEY	MIKEY

SOUTHBRIDGE RESOURCES

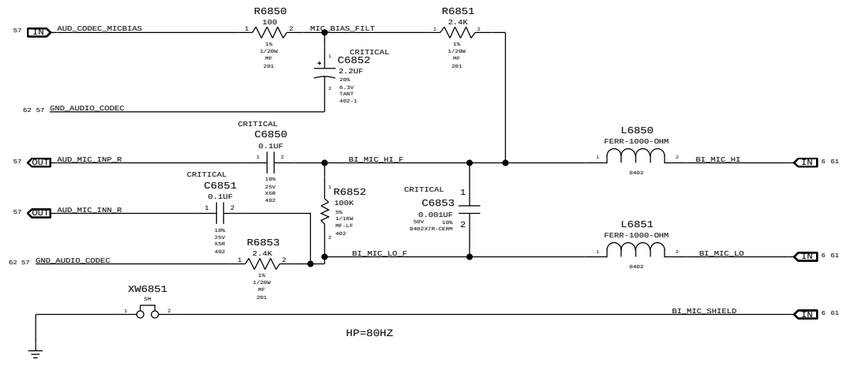
FUNCTION	SYSTEM GPIO	SYSTEM INTERRUPT
AUD_IPHS_SWITCH_EN	PANTHER_POINT GPIO16	N/A
AUD_I2C_INT_L	N/A	PANTHER_POINT GPIO5/PIRQH
AUD_IP_PERIPHERAL_DET	N/A	PANTHER_POINT GPIO3/PIRQH



PORT B LEFT(HEADSET MIC)
HP=80HZ, LP=8.82KHZ



PORT B RIGHT(BUILT-IN MIC)



SYNC MASTER=DIRK_J30	SYNC DATE=02/20/2012
PAGE TITLE	AUDIO:Jack Translators
Apple Inc.	DRAWING NUMBER 051-9058
	SIZE D
	REVISION 6.0.0
	BRANCH
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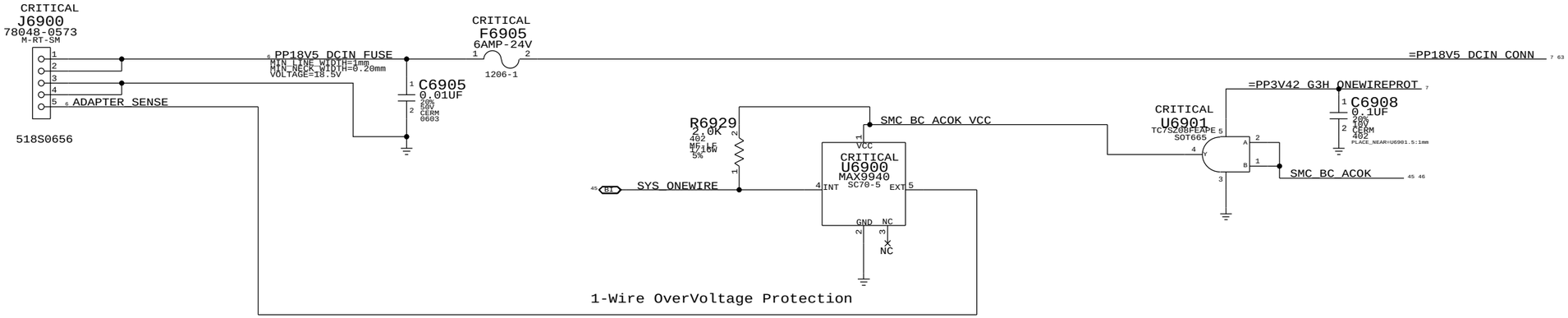
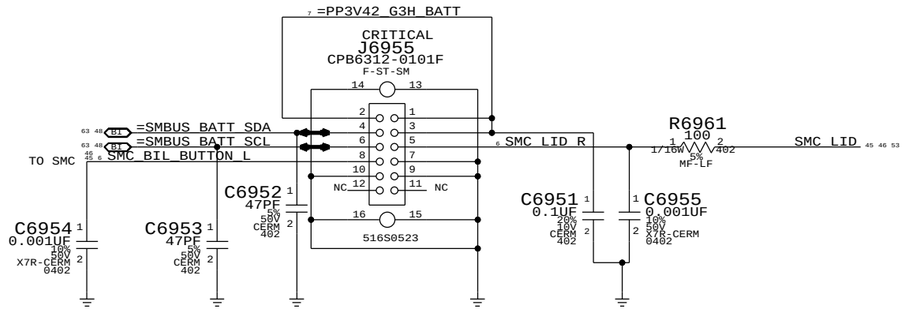
MagSafe DC Power Jack



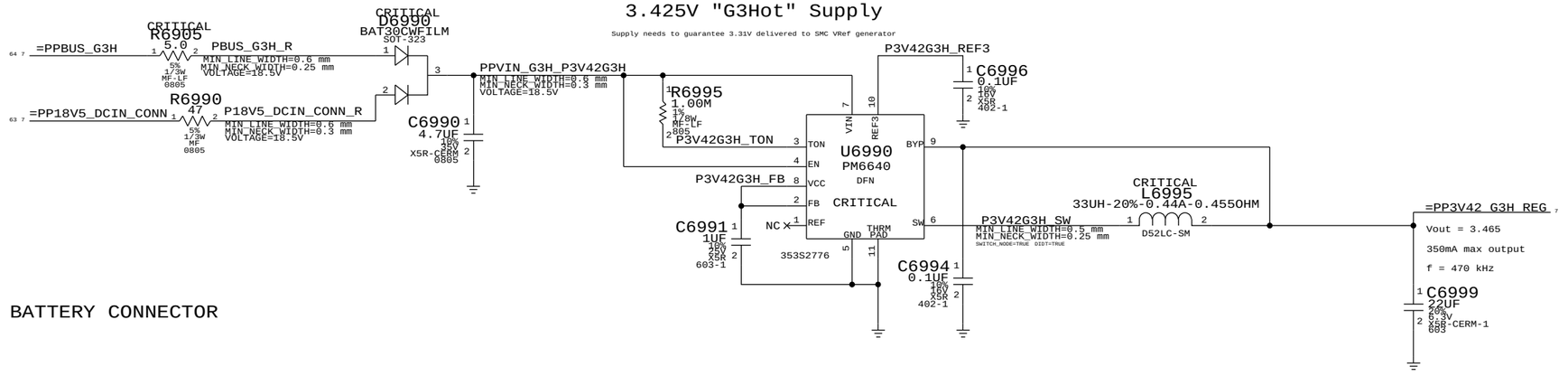
1-Wire OverVoltage Protection

BIL CONNECTOR

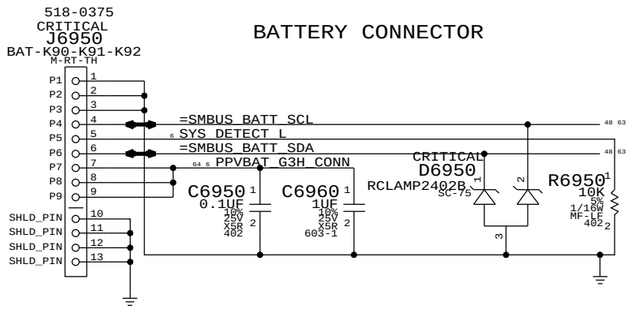


3.425V "G3Hot" Supply

Supply needs to guarantee 3.31V delivered to SMC VRef generator



BATTERY CONNECTOR



SYNC_MASTER=JACK_J30	SYNC_DATE=07/29/2011
PAGE TITLE	DC-In & Battery Connectors
Apple Inc.	DRAWING NUMBER 051-9058 · SIZE D
	REVISION 6.0.0
	BRANCH
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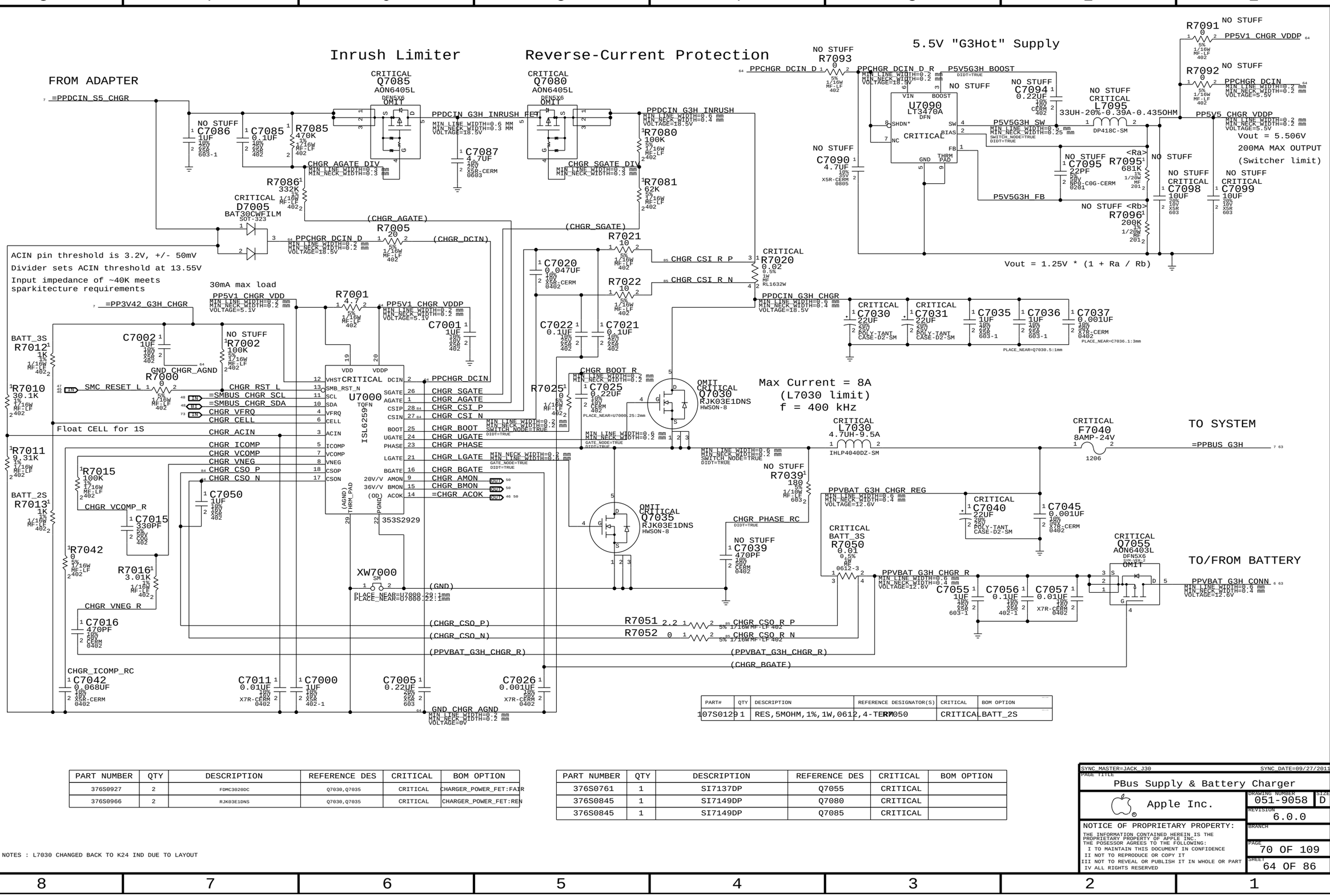

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
107S0012	1	RES,5MOHM,1%,1W,0612,4-TERM	R7050	CRITICAL	BATT_2S

PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
376S0927	2	FDMC3020DC	Q7030,Q7035	CRITICAL	CHARGER_POWER_FET:FAIR
376S0966	2	RJK03E1DNS	Q7030,Q7035	CRITIICAL	CHARGER_POWER_FET:REN

PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
376S0761	1	SI7137DP	Q7055	CRITICAL	
376S0845	1	SI7149DP	Q7080	CRITICAL	
376S0845	1	SI7149DP	Q7085	CRITICAL	

K6 NOTES : L7030 CHANGED BACK TO K24 IND DUE TO LAYOUT

SYNC_MASTER=JACK_J30 SYNC_DATE=09/27/2011

PAGE TITLE: PBus Supply & Battery Charger

Apple Inc.

DRAWING NUMBER: 051-9058 SIZE: D

REVISION: 6.0.0

BRANCH:

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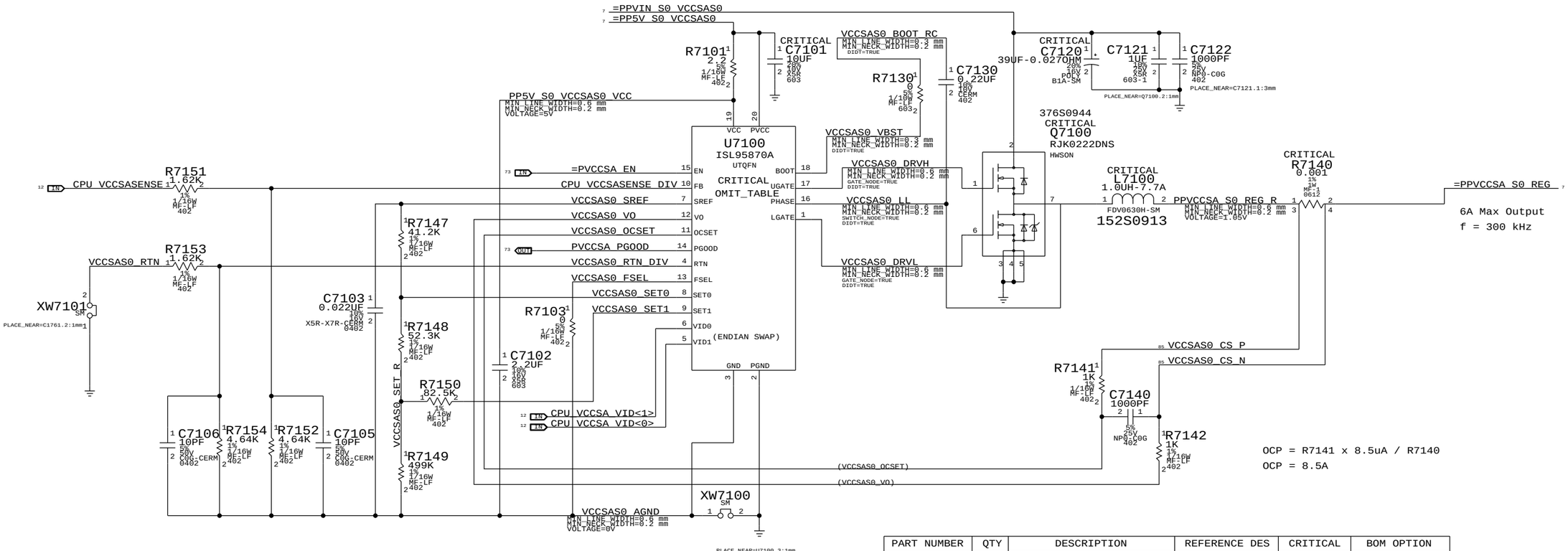
System Agent Power Supply



INTEL TABLE:

VID1	VID0	Voltage
0	0	0.9V
1	0	0.8V
0	1	0.725V
1	1	0.675V

PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
353S3074	1	IC,ISL95870A,PWM,2BIT-VID,RMOT-SNSE,20P	U7100	CRITICAL	

SYNC_MASTER=JACK_J30 SYNC_DATE=09/28/2011

PAGE TITLE: System Agent Supply

Apple Inc.

DRAWING NUMBER: 051-9058 SIZE: D

REVISION: 6.0.0

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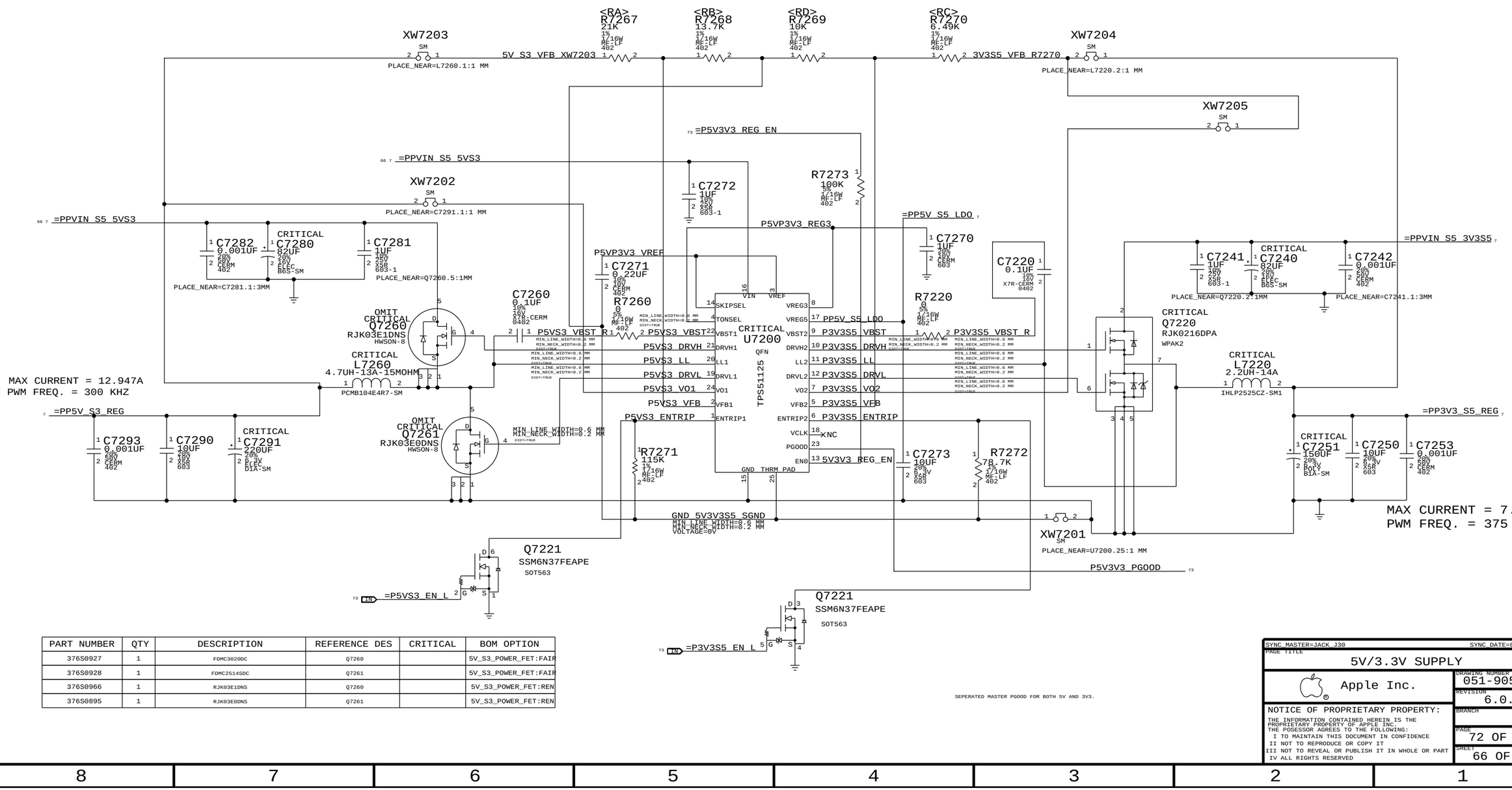
5V_S3/3.3V_S5 POWER SUPPLY

VOUT = (2 * RA / RB) + 2

VOUT = (2 * RC / RD) + 2



PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
376S0927	1	FDMC3020DC	Q7260		5V_S3_POWER_FET:FAIR
376S0928	1	FDMC2514SDC	Q7261		5V_S3_POWER_FET:FAIR
376S0966	1	RJK03E1DNS	Q7260		5V_S3_POWER_FET:REN
376S0895	1	RJK03E0DNS	Q7261		5V_S3_POWER_FET:REN

SEPERATED MASTER PGOOD FOR BOTH 5V AND 3V3.

SYNC_MASTER=JACK_J30 SYNC_DATE=08/22/2011

PAGE TITLE: 5V/3.3V SUPPLY

Apple Inc.

DRAWING NUMBER: 051-9058 SIZE: D

REVISION: 6.0.0

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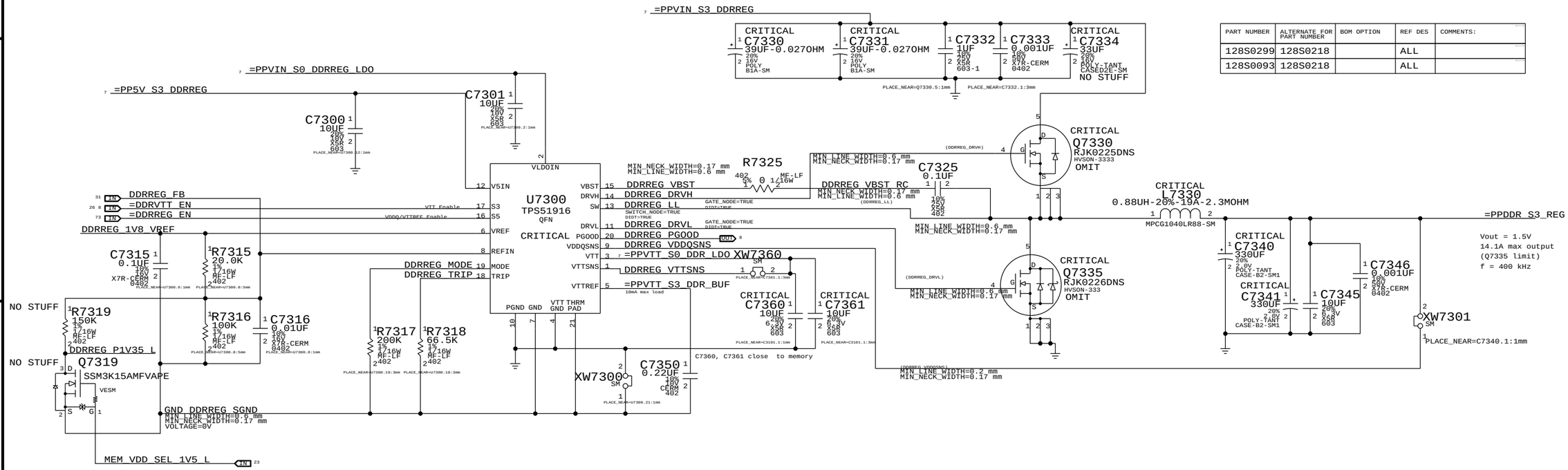

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
128S0299	128S0218		ALL	
128S0093	128S0218		ALL	

PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
376S0979	1	FDMC022S	Q7330		DDR_POWER_FET:FAIR
376S0874	1	FDMC0202S	Q7335		DDR_POWER_FET:FAIR

SYNC_MASTER=JACK_J30 SYNC_DATE=07/28/2011

PAGE TITLE: 1.5V DDR3 Supply

Apple Inc.

DRAWING NUMBER: 051-9058 SIZE: D

REVISION: 6.0.0

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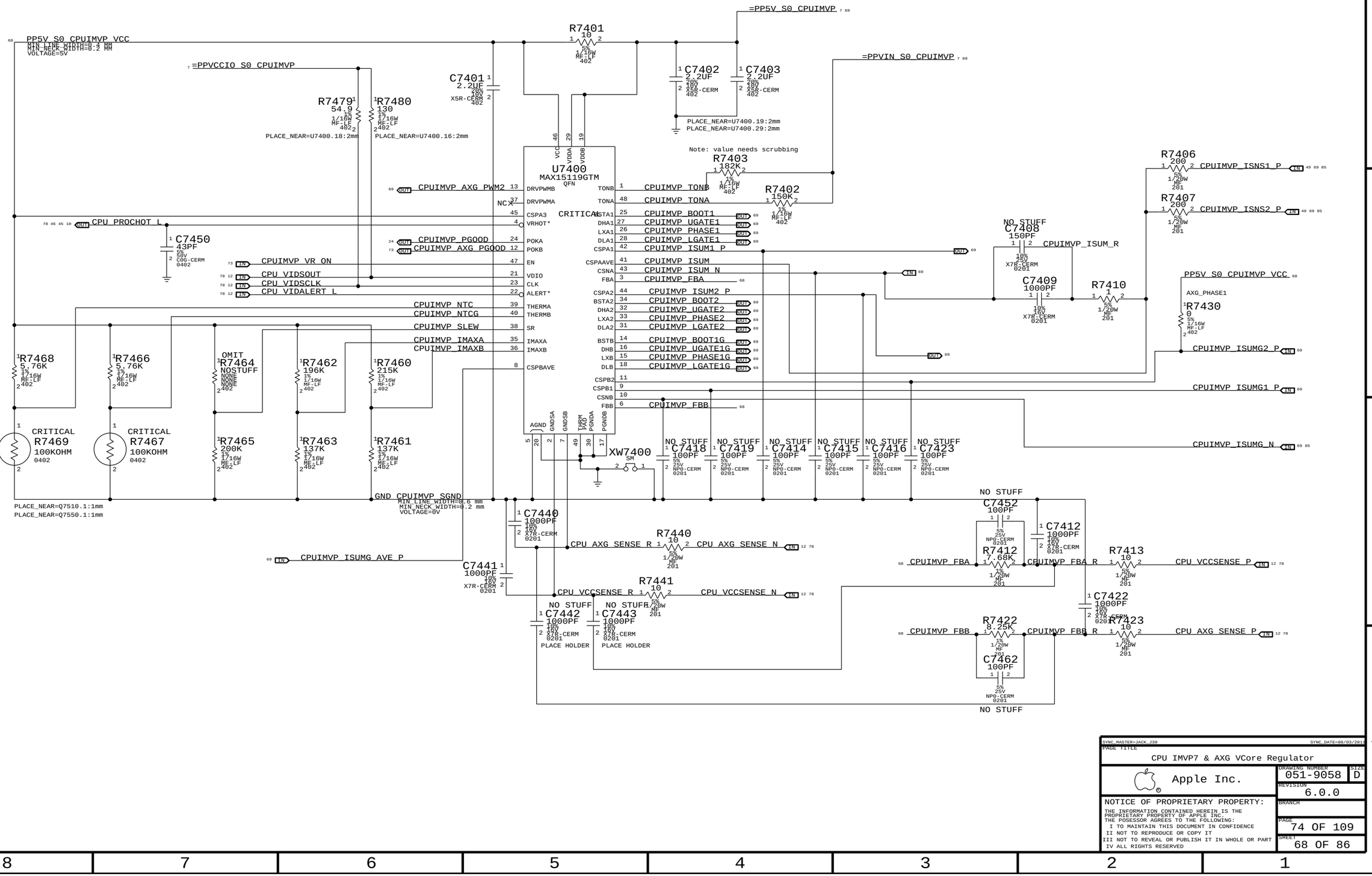

SYNC_MASTER=JACK_J30 SYNC_DATE=08/03/2011

PAGE TITLE: CPU IMVP7 & AXG VCore Regulator

Apple Inc.

DRAWING NUMBER: 051-9058 SIZE: D

REVISION: 6.0.0

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PAGE: 74 OF 109

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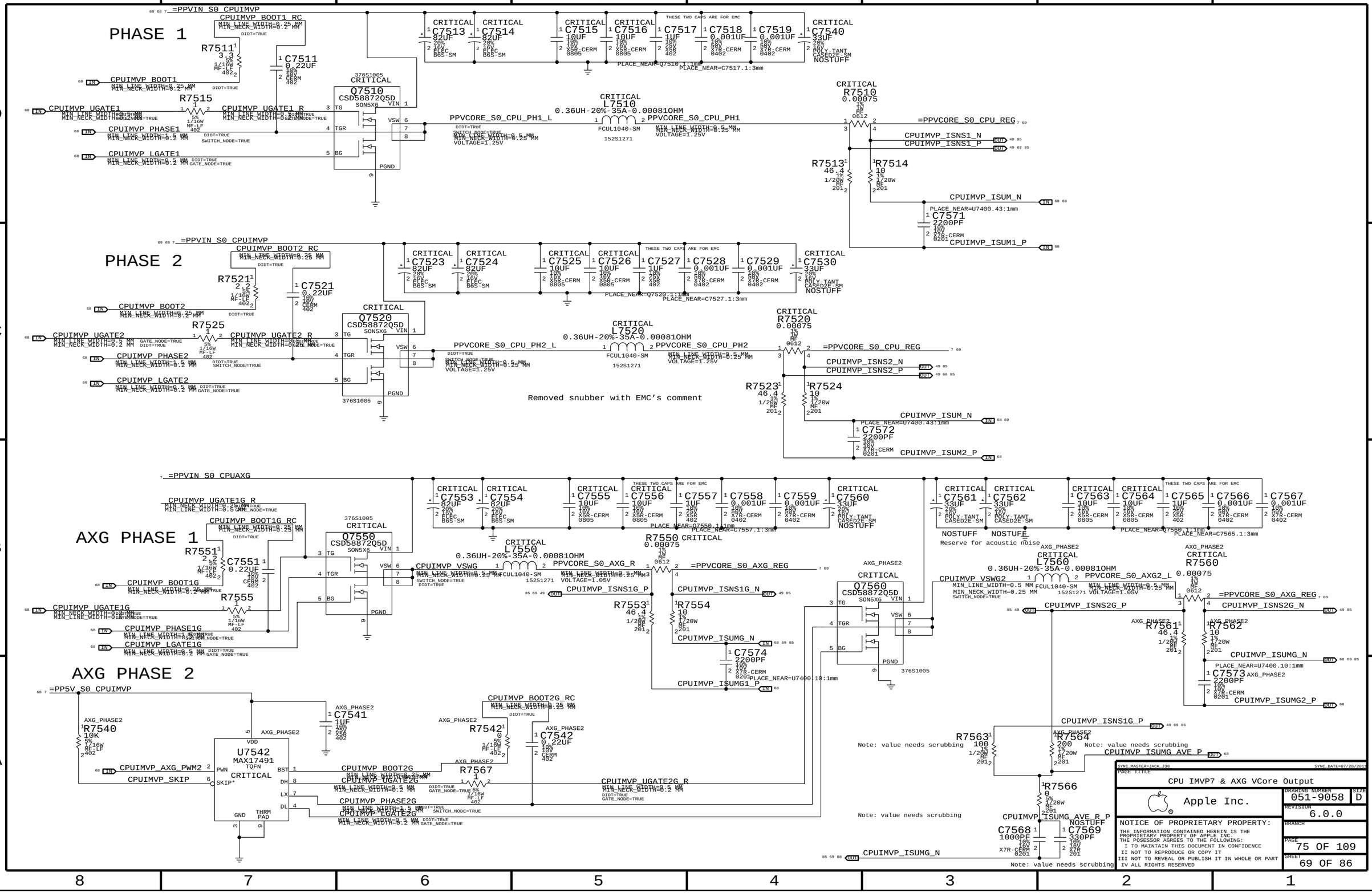
PHASE 1
=PPVIN_S0_CPUIMVP
CPUIMVP_BOOT1_RC
R7511 3.3 5% 1/10W MF-LF 402
C7511 0.22UF 10% 10V X7R-CERM 402
CPUIMVP_BOOT1
CPUIMVP_UGATE1
CPUIMVP_PHASE1
CPUIMVP_LGATE1
R7515 1 5% 1/10W MF-LF 402
CPUIMVP_UGATE1_R
376S1005
CRITICAL
Q7510
CSD58872Q5D
SON5X6
TG
TGR
BG
VIN
VSW
PGND
CRITICAL
L7510
0.36UH-20%-35A-0.000810HM
FCUL1040-SM
152S1271
PPVCORE_S0_CPU_PH1_L
PPVCORE_S0_CPU_PH1
CRITICAL
R7510
0.00075
1% 1W MF 0612
=PPVCORE_S0_CPU_REG
CPUIMVP_ISNS1_N
CPUIMVP_ISNS1_P
R7513 46.4 1% 1/20W MF 201
R7514 10 1% 1/20W MF 201
CPUIMVP_ISUM_N
PLACE_NEAR=U7400.43:1mm
C7571 2200PF 10% 10V X7R-CERM 0201
CPUIMVP_ISUM1_P
C7513 82UF 20% 16V ELEC B6S-SM
C7514 82UF 20% 16V ELEC B6S-SM
C7515 10UF 10% 16V X5R-CERM 0805
C7516 10UF 10% 16V X5R-CERM 0805
C7517 1UF 10% 25V X5R 402
C7518 0.001UF 10% 50V X7R-CERM 0402
C7519 0.001UF 10% 50V X7R-CERM 0402
C7540 33UF 20% 16V POLY-TANT CASED2E-SM NOSTUFF
THESE TWO CAPS ARE FOR EMC
PLACE_NEAR=Q7510.1:1mm
PLACE_NEAR=C7517.1:3mm
PHASE 2
=PPVIN_S0_CPUIMVP
CPUIMVP_BOOT2_RC
R7521 2.2 5% 1/10W MF-LF 402
C7521 0.22UF 10% 10V X7R-CERM 402
CPUIMVP_BOOT2
CPUIMVP_UGATE2
CPUIMVP_PHASE2
CPUIMVP_LGATE2
R7525 1 5% 1/10W MF-LF 402
CPUIMVP_UGATE2_R
CRITICAL
Q7520
CSD58872Q5D
SON5X6
376S1005
CRITICAL
L7520
0.36UH-20%-35A-0.000810HM
FCUL1040-SM
152S1271
PPVCORE_S0_CPU_PH2_L
PPVCORE_S0_CPU_PH2
CRITICAL
R7520
0.00075
1% 1W MF 0612
=PPVCORE_S0_CPU_REG
CPUIMVP_ISNS2_N
CPUIMVP_ISNS2_P
R7523 46.4 1% 1/20W MF 201
R7524 10 1% 1/20W MF 201
CPUIMVP_ISUM_N
PLACE_NEAR=U7400.43:1mm
C7572 2200PF 10% 10V X7R-CERM 0201
CPUIMVP_ISUM2_P
C7523 82UF 20% 16V ELEC B6S-SM
C7524 82UF 20% 16V ELEC B6S-SM
C7525 10UF 10% 16V X5R-CERM 0805
C7526 10UF 10% 16V X5R-CERM 0805
C7527 1UF 10% 25V X5R 402
C7528 0.001UF 10% 50V X7R-CERM 0402
C7529 0.001UF 10% 50V X7R-CERM 0402
C7530 33UF 20% 16V POLY-TANT CASED2E-SM NOSTUFF
THESE TWO CAPS ARE FOR EMC
PLACE_NEAR=Q7520.1:1mm
PLACE_NEAR=C7527.1:3mm
Removed snubber with EMC's comment
=PPVIN_S0_CPUAXG
AXG PHASE 1
CPUIMVP_UGATE1G_R
CPUIMVP_BOOT1G_RC
R7551 2.2 5% 1/10W MF-LF 402
C7551 0.22UF 10% 10V X7R-CERM 402
CPUIMVP_BOOT1G
CPUIMVP_UGATE1G
CPUIMVP_PHASE1G
CPUIMVP_LGATE1G
R7555 1 5% 1/10W MF-LF 402
376S1005
CRITICAL
Q7550
CSD58872Q5D
SON5X6
CRITICAL
L7550
0.36UH-20%-35A-0.00081OHM
FCUL1040-SM
152S1271
CPUIMVP_VSWG
PPVCORE_S0_AXG_R
CRITICAL
R7550
0.00075
1% 1W MF 0612
=PPVCORE_S0_AXG_REG
CPUIMVP_ISNS1G_N
CPUIMVP_ISNS1G_P
R7553 46.4 1% 1/20W MF 201
R7554 10 1% 1/20W MF 201
CPUIMVP_ISUMG_N
C7574 2200PF 10% 10V X7R-CERM 0201
CPUIMVP_ISUMG1_P
PLACE_NEAR=U7400.10:1mm
C7553 82UF 20% 16V ELEC B6S-SM
C7554 82UF 20% 16V ELEC B6S-SM
C7555 10UF 10% 16V X5R-CERM 0805
C7556 10UF 10% 16V X5R-CERM 0805
C7557 1UF 10% 25V X5R 402
C7558 0.001UF 10% 50V X7R-CERM 0402
C7559 0.001UF 10% 50V X7R-CERM 0402
C7560 33UF 20% 16V POLY-TANT CASED2E-SM NOSTUFF
THESE TWO CAPS ARE FOR EMC
PLACE_NEAR=Q7550.1:1mm
PLACE_NEAR=C7557.1:3mm
C7561 33UF 20% 16V POLY-TANT CASED2E-SM NOSTUFF
C7562 33UF 20% 16V POLY-TANT CASED2E-SM NOSTUFF
Reserve for acoustic noise
C7563 10UF 10% 16V X5R-CERM 0805
C7564 10UF 10% 16V X5R-CERM 0805
C7565 1UF 10% 25V X5R 402
C7566 0.001UF 10% 50V X7R-CERM 0402
C7567 0.001UF 10% 50V X7R-CERM 0402
THESE TWO CAPS ARE FOR EMC
PLACE_NEAR=Q7560.1:1mm
PLACE_NEAR=C7565.1:3mm
AXG PHASE 2
=PP5V_S0_CPUIMVP
U7542
MAX17491
TQFN
CRITICAL
R7540 10K 5% 1/16W MF-LF 402
C7541 1UF 10% 25V X5R 402
CPUIMVP_AXG_PWM2
CPUIMVP_SKIP
CPUIMVP_BOOT2G_RC
R7542 0 5% 1/10W MF-LF 402
C7542 0.22UF 10% 10V X7R-CERM 402
R7567 1 5% 1/10W MF-LF 402
CPUIMVP_BOOT2G
CPUIMVP_UGATE2G
CPUIMVP_PHASE2G
CPUIMVP_LGATE2G
CPUIMVP_UGATE2G_R
AXG_PHASE2
CRITICAL
Q7560
CSD58872Q5D
SON5X6
376S1005
CRITICAL
L7560
0.36UH-20%-35A-0.00081OHM
FCUL1040-SM
152S1271
CPUIMVP_VSWG2
PPVCORE_S0_AXG2_L
CRITICAL
R7560
0.00075
1% 1W MF 0612
=PPVCORE_S0_AXG_REG
CPUIMVP_ISNS2G_P
CPUIMVP_ISNS2G_N
R7561 46.4 1% 1/20W MF 201
R7562 10 1% 1/20W MF 201
CPUIMVP_ISUMG_N
PLACE_NEAR=U7400.10:1mm
C7573 2200PF 10% 10V X7R-CERM 0201
CPUIMVP_ISUMG2_P
CPUIMVP_ISNS1G_P
R7563 100 1% 1/20W MF 201
R7564 200 1% 1/20W MF 201
Note: value needs scrubbing
CPUIMVP_ISUMG_AVE_P
R7566 0 5% 1/20W MF 2201
CPUIMVP_ISUMG_AVE_R_P
C7568 1000PF 10% 16V X7R-CERM 0201
C7569 330PF 10% 16V X7R 201
CPUIMVP_ISUMG_N
Note: value needs scrubbing
SYNC_MASTER=JACK_J30
SYNC_DATE=07/28/2011
PAGE TITLE
CPU IMVP7 & AXG VCore Output
Apple Inc.
DRAWING NUMBER 051-9058
SIZE D
REVISION 6.0.0
BRANCH
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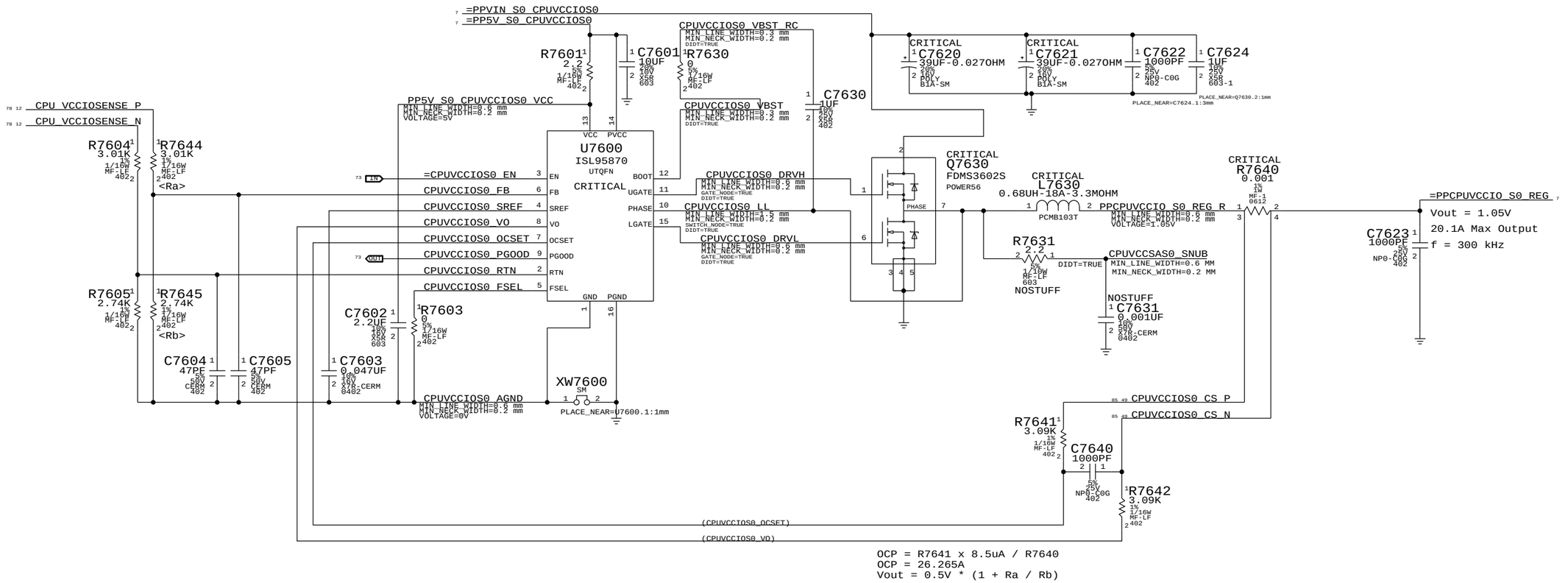
CPU VCCIO (1.05V S0) Regulator



SYNC_MASTER=JACK_J30 SYNC_DATE=09/28/2011

PAGE TITLE: CPUVCCIO (1.05V) Power Supply

Apple Inc.

DRAWING NUMBER: 051-9058 SIZE: D

REVISION: 6.0.0

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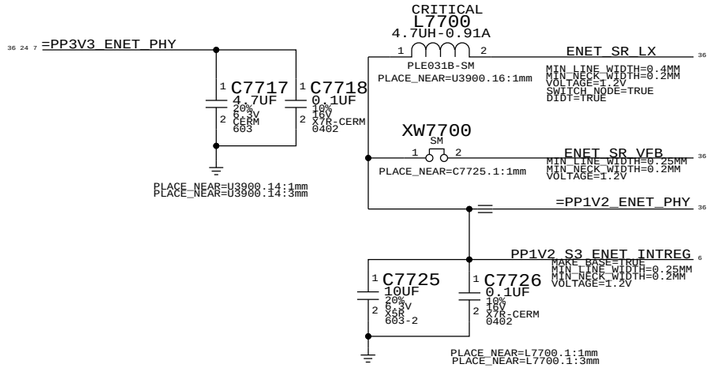
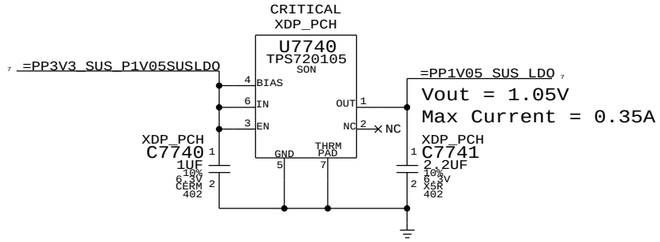
CAESAR IV 1.2V INT.VR CMPTS



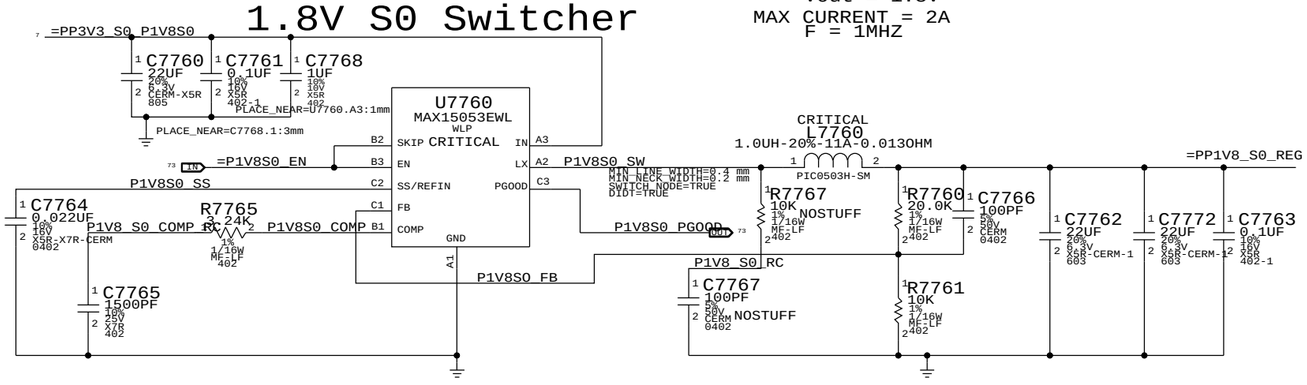
1.05V SUS LDO

Cougar Point requires JTAG pull-ups to be powered at 1.05V in SUS.
Pull-ups (3) must be 51 ohms to support XDP (not required in production).
70mA is required to support pull-ups. Alternative is strong voltage dividers (200/100) to 3.3V S5, which burns 100mW in all S-states.

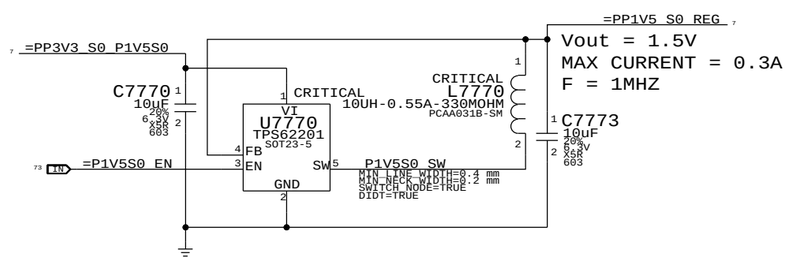


1.8V S0 Switcher

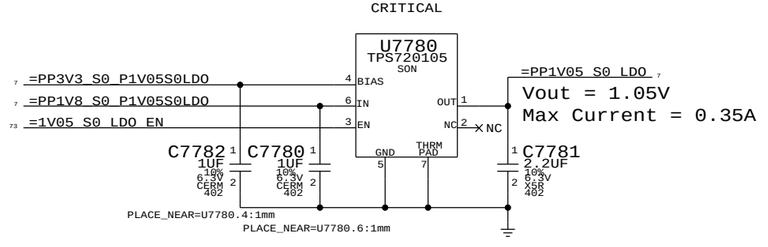
Vout = 1.8V
MAX CURRENT = 2A
F = 1MHZ



1.5V S0 Switcher



1.05V S0 LDO



SYNC_MASTER=JACK_J30 SYNC_DATE=07/28/2011

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Misc Power Supplies

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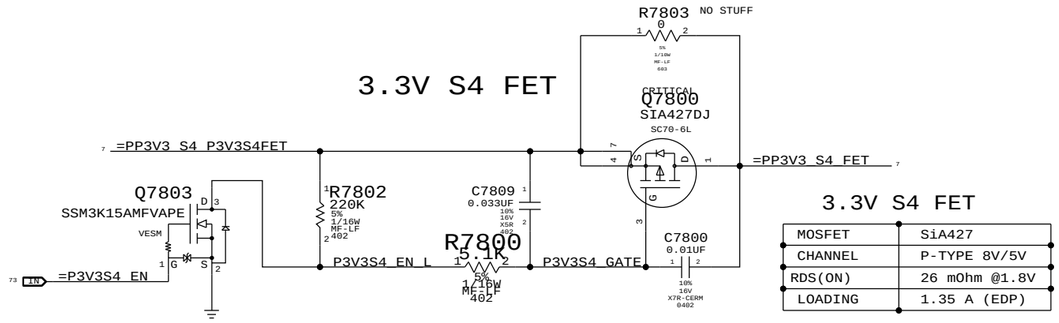
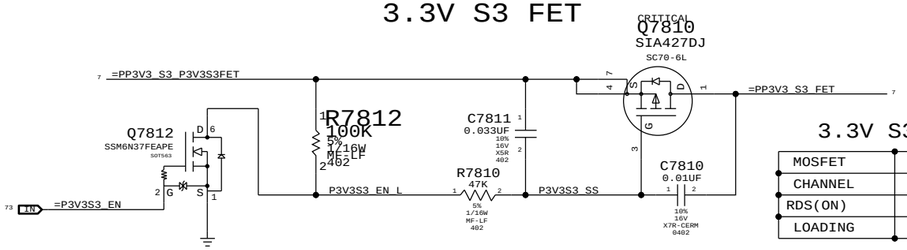
3.3V S4 FET



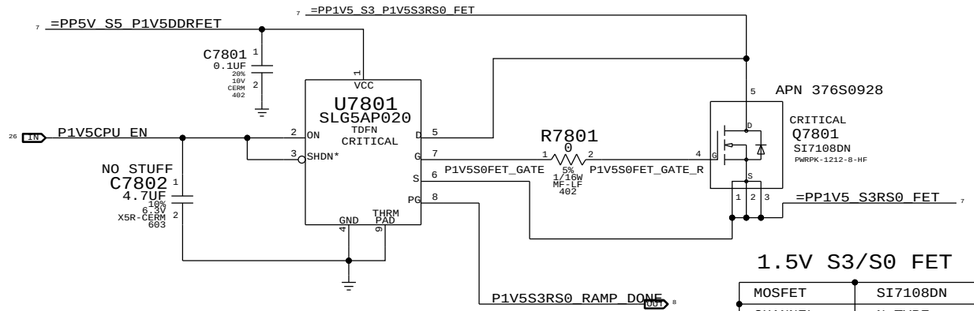
3.3V S4 FET	
MOSFET	SiA427
CHANNEL	P-TYPE 8V/5V
RDS(ON)	26 mOhm @1.8V
LOADING	1.35 A (EDP)

3.3V S3 FET



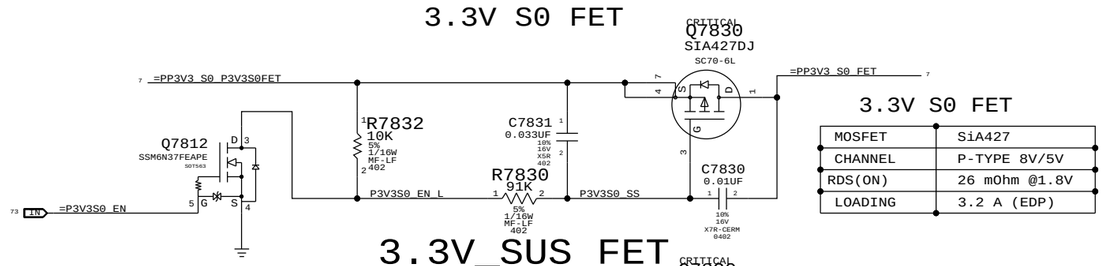
3.3V S3 FET	
MOSFET	SiA427
CHANNEL	P-TYPE 8V/5V
RDS(ON)	31 mOhm @1.8V
LOADING	1.608 A (EDP)

1.5V S3/S0 FET



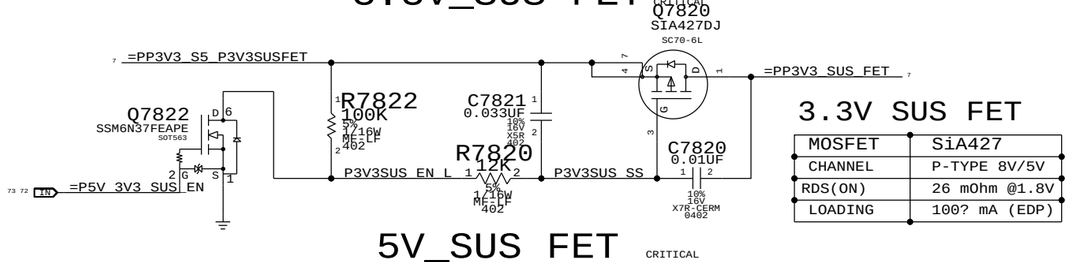
1.5V S3/S0 FET	
MOSFET	SI7108DN
CHANNEL	N-TYPE
RDS(ON)	6 mOhm @4.5V
LOADING	5 A (EDP)

3.3V S0 FET



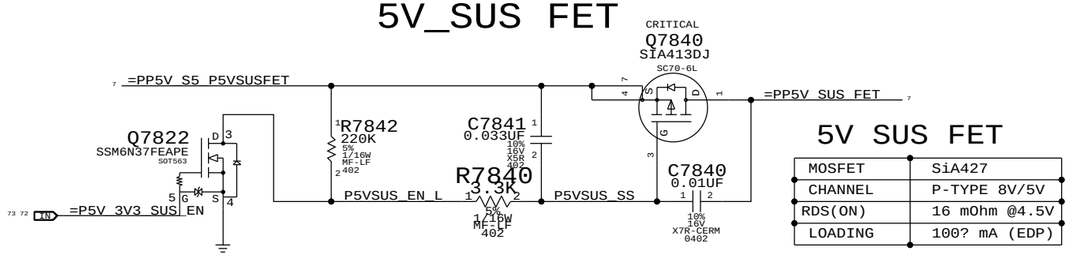
3.3V S0 FET	
MOSFET	SiA427
CHANNEL	P-TYPE 8V/5V
RDS(ON)	26 mOhm @1.8V
LOADING	3.2 A (EDP)

3.3V_SUS FET



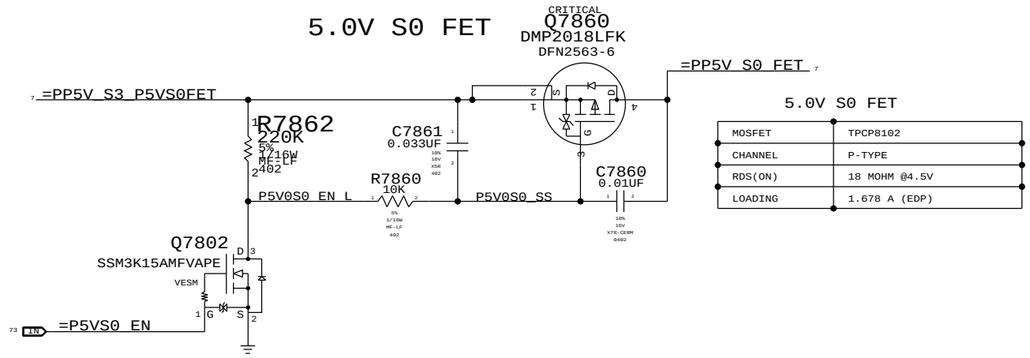
3.3V SUS FET	
MOSFET	SiA427
CHANNEL	P-TYPE 8V/5V
RDS(ON)	26 mOhm @1.8V
LOADING	100? mA (EDP)

5V_SUS FET



5V SUS FET	
MOSFET	SiA427
CHANNEL	P-TYPE 8V/5V
RDS(ON)	16 mOhm @4.5V
LOADING	100? mA (EDP)

5.0V S0 FET



5.0V S0 FET	
MOSFET	TPCP8102
CHANNEL	P-TYPE
RDS(ON)	18 MOHM @4.5V
LOADING	1.678 A (EDP)

SYNC MASTER=K90I MLB SYNC DATE=02/15/2011

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Power FETs

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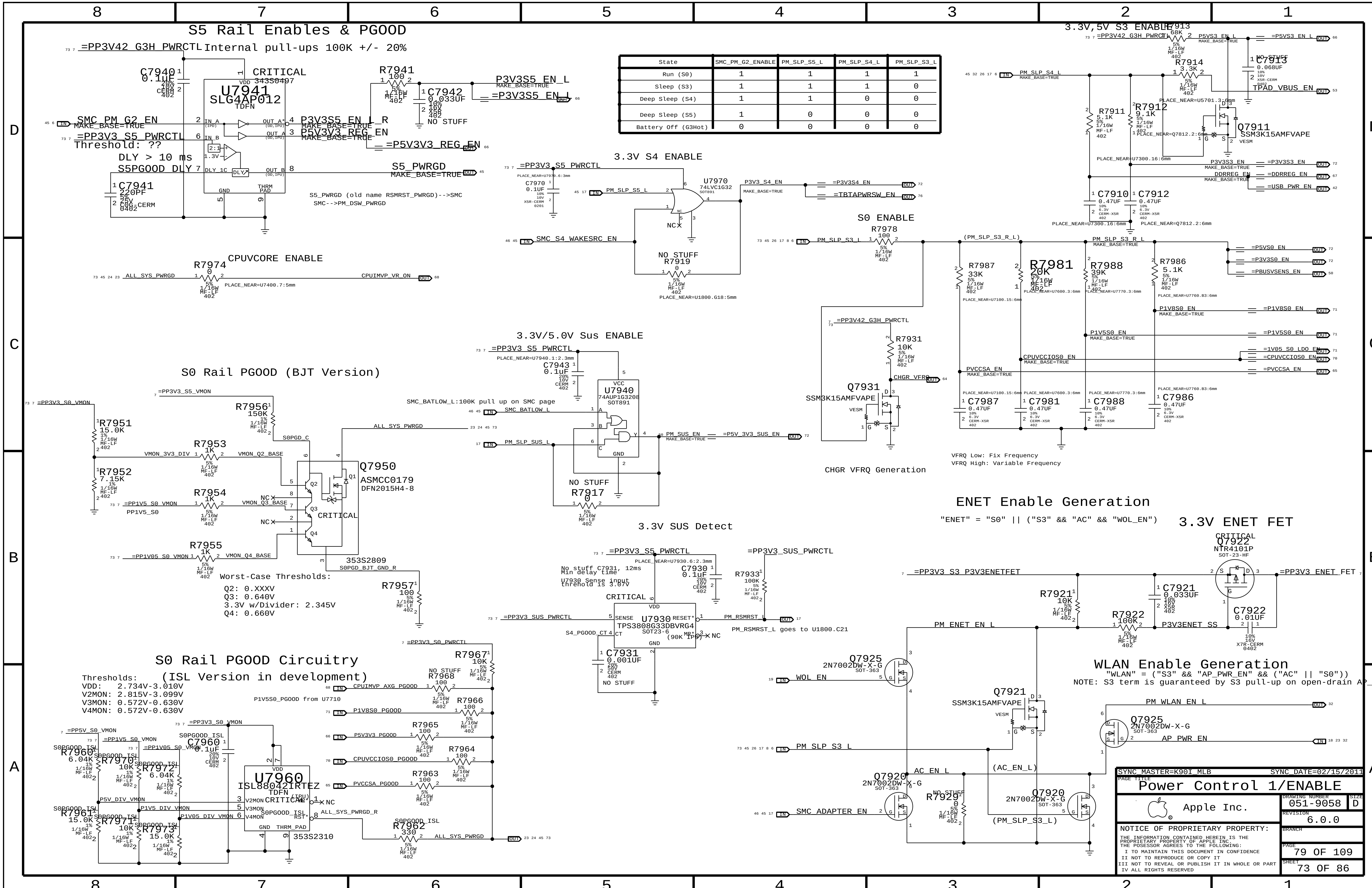

State	SMC_PM_G2_ENABLE	PM_SLP_S5_L	PM_SLP_S4_L	PM_SLP_S3_L
Run (S0)	1	1	1	1
Sleep (S3)	1	1	1	0
Deep Sleep (S4)	1	1	0	0
Deep Sleep (S5)	1	0	0	0
Battery Off (G3Hot)	0	0	0	0

SYNC_MASTER=K90I_MLB SYNC_DATE=02/15/2011

PAGE TITLE
Power Control 1/ENABLE

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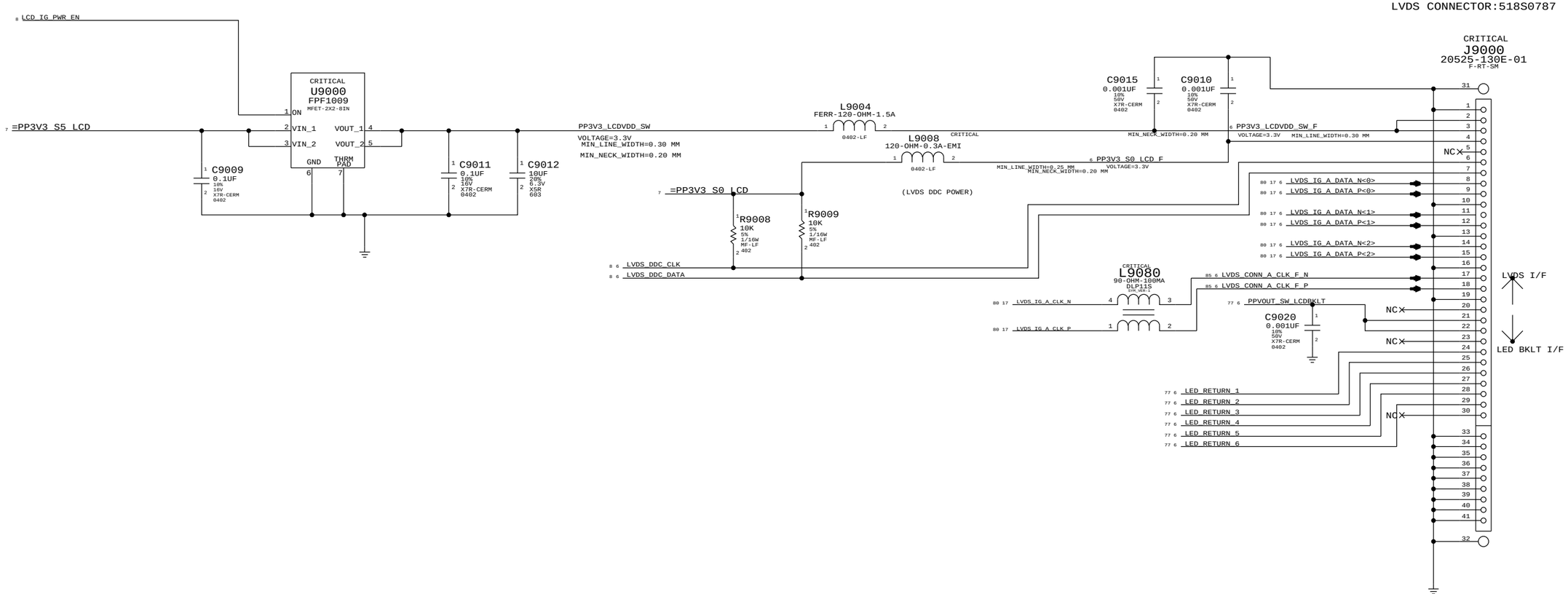
LCD CONNECTOR

LVDS CONNECTOR:518S0787



SYNC_MASTER=K90I_MLB	SYNC_DATE=02/15/2011
PAGE TITLE: LVDS CONNECTOR	
Apple Inc.	DRAWING NUMBER: 051-9058 SIZE: D
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T29 A High-Speed Signals

DP_EXTA_ML_C_P<0> C9300 0.1UF 10% 16V X5R-CERM 0201 DP_EXTA_ML_P<0>
DP_EXTA_ML_C_N<0> C9301 0.1UF 10% 16V X5R-CERM 0201 DP_EXTA_ML_N<0>
DP_EXTA_ML_C_P<1> C9302 0.1UF 10% 16V X5R-CERM 0201 DP_EXTA_ML_P<1>
DP_EXTA_ML_C_N<1> C9303 0.1UF 10% 16V X5R-CERM 0201 DP_EXTA_ML_N<1>
DP_EXTA_ML_C_P<2> C9304 0.1UF 10% 16V X5R-CERM 0201 DP_EXTA_ML_P<2>
DP_EXTA_ML_C_N<2> C9305 0.1UF 10% 16V X5R-CERM 0201 DP_EXTA_ML_N<2>
DP_EXTA_ML_C_P<3> C9306 0.1UF 10% 16V X5R-CERM 0201 DP_EXTA_ML_P<3>
DP_EXTA_ML_C_N<3> C9307 0.1UF 10% 16V X5R-CERM 0201 DP_EXTA_ML_N<3>
DP_EXTA_AUXCH_C_P C9308 0.1UF 10% 16V X5R-CERM 0201 DP_EXTA_AUXCH_P
DP_EXTA_AUXCH_C_N C9309 0.1UF 10% 16V X5R-CERM 0201 DP_EXTA_AUXCH_N

=PP3V3_S0_DPSDRVA R9309 1M 5% 1/20W MF 201 DP_EXTA_AUXCH_P
DP_EXTA_AUXCH_N R9308 1M 5% 1/20W MF 201

If GPU uses common pins for AUX_CH and DDC, alias nets together at GPU.

R9308/R9309 maintain bias on C9308/C9309 to prevent spikes when U9310 AUXDDC_OFF transitions from high to low.

T29_D2R_N<0> T29_D2R_P<0>
T29_R2D_C_N<0> T29_R2D_C_P<0>
T29_D2R_N<1> T29_D2R_P<1>
T29_R2D_C_N<1> T29_R2D_C_P<1>

T29 signals are P/N-swapped after AC caps to improve layout.

T29_A_BIAS_R2DP0 T29_A_BIAS_R2DN0 GND_VOID=TRUE (C9370/C9371)
C9370 0.47UF 20% 4V CERM-X5R-1 201
C9371 0.47UF 20% 4V CERM-X5R-1 201

GND_VOID=TRUE R9372 1.5K 5% 1/20W MF 201 T29_R2D_P<0>
GND_VOID=TRUE R9373 1.5K 5% 1/20W MF 201 T29_R2D_N<0>

C9372 0.47UF 20% 4V CERM-X5R-1 201
C9373 0.47UF 20% 4V CERM-X5R-1 201

T29_A_BIAS_R2DP1 T29_A_BIAS_R2DN1 GND_VOID=TRUE (C9380/C9381)
C9380 0.47UF 20% 4V CERM-X5R-1 201
C9381 0.47UF 20% 4V CERM-X5R-1 201

GND_VOID=TRUE R9382 1.5K 5% 1/20W MF 201 T29_R2D_P<1>
GND_VOID=TRUE R9383 1.5K 5% 1/20W MF 201 T29_R2D_N<1>

C9382 0.47UF 20% 4V CERM-X5R-1 201
C9383 0.47UF 20% 4V CERM-X5R-1 201

T29 Path Biasing

D9364 BAR90-02LRH TSLP-2-7 GND_VOID=TRUE (D9364.2)
D9372 BAR90-02LRH TSLP-2-7 T29: TX_0
D9373 BAR90-02LRH TSLP-2-7
D9365 BAR90-02LRH TSLP-2-7
CRITICAL (All 4 D's)
D9372/D9373: SIGNAL_MODEL=T29PIN
D9364/D9365: SIGNAL_MODEL=EMPTY

T29_D2R_C_P<0> T29_D2R_C_N<0>
T29DPA_ML_C_P<0> T29DPA_ML_C_N<0>
GND_VOID=TRUE (D9372/D9373)
GND_VOID=TRUE (D9365.2)
R9374 1.5K 5% 1/20W MF 201
R9375 1.5K 5% 1/20W MF 201
T29_D2R_C_P<1> T29_D2R_C_N<1>

D9360 BAR90-02LRH TSLP-2-7 GND_VOID=TRUE (D9360.2)
D9382 BAR90-02LRH TSLP-2-7 T29: TX_1
D9383 BAR90-02LRH TSLP-2-7
D9361 BAR90-02LRH TSLP-2-7
CRITICAL (All 4 D's)
SIGNAL_MODEL=T29PIN (D9382/D9383)
SIGNAL_MODEL=EMPTY (D9360/D9361)

T29DPA_ML_C_P<1> T29DPA_ML_C_N<1>
GND_VOID=TRUE (D9382/D9383)
GND_VOID=TRUE (D9361.2)
R9384 1.5K 5% 1/20W MF 201
R9385 1.5K 5% 1/20W MF 201

Both R's must connect to C in star topology.

DP A Super-Driver

=PP3V3_S0_DPSDRVA
C9310 2.2UF 20% 6.3V CERM 402-LF
C9311 0.1UF 10% 16V X5R-CERM 0201
C9312 0.1UF 10% 16V X5R-CERM 0201

PS8301 I2C Addresses:

A1	A0	Addr (W/R)
0	0	0x96/0x97
0	1	0xB6/0xB7
1	0	0x94/0x95
1	1	0xB4/0xB5

Note: Other Parade devices use 96/B6, so only 94/B4 are used for this part.

NO STUFF R9311 1K 5% 1/16W MF-LF 402
R9310 1K 5% 1/16W MF-LF 402
R9312 1K 5% 1/16W MF-LF 402

U9310 PS8301TQFN40GTR-A2 QFN CRITICAL

DP_EXTA_ML_P<0>	1 IN_D0P	OUT_D0P 30	DP_SDRVA_ML_C_P<0>
DP_EXTA_ML_N<0>	2 IN_D0N	OUT_D0N 29	DP_SDRVA_ML_C_N<0>
DP_EXTA_ML_P<1>	4 IN_D1P	OUT_D1P 28	DP_SDRVA_ML_C_P<1>
DP_EXTA_ML_N<1>	5 IN_D1N	OUT_D1N 27	DP_SDRVA_ML_C_N<1>
DP_EXTA_ML_P<2>	7 IN_D2P	OUT_D2P 25	DP_SDRVA_ML_C_P<2>
DP_EXTA_ML_N<2>	8 IN_D2N	OUT_D2N 24	DP_SDRVA_ML_C_N<2>
DP_EXTA_ML_P<3>	9 IN_D3P	OUT_D3P 23	DP_SDRVA_ML_C_P<3>
DP_EXTA_ML_N<3>	10 IN_D3N	OUT_D3N 22	DP_SDRVA_ML_C_N<3>
DP_EXTA_DDC_CLK	14 IN_SCL	AC_AUXP 20	DP_SDRVA_AUXCH_C_P
DP_EXTA_DDC_DATA	13 IN_SDA	AC_AUXN 19	DP_SDRVA_AUXCH_C_N
DP_EXTA_AUXCH_P	16 IN_AUXP	OUT_AUXP_SCL 18	(DP_SDRVA_AUXCH_P)
DP_EXTA_AUXCH_N	15 IN_AUXN	OUT_AUXN_SDA 17	(DP_SDRVA_AUXCH_N)
DP_EXTA_HPD	3 IN_HPD	(IPD) OUT_HPD 31	(DP_SDRVA_HPD)
DPSDRVA_I2C_CTL_EN	26 I2C_CTL_EN (IPU)	CA_DET 32	DP_A_CA_DET
DPSDRVA_I2C_ADDR0	36 I2C_ADDR0 (IPD)	CEXT 11	DPSDRVA_CEXT
DPSDRVA_I2C_ADDR1	35 I2C_ADDR1 (IPD)		
=I2C_DPSDRVA_SCL	38 SCL_CTL		
=I2C_DPSDRVA_SDA	37 SDA_CTL		
DPSDRVA_REXT	12 REXT		
DP_AUXCH_ISOL	39 AUXDDC_OFF (IPD)		
DP_A_PWRDWN_R	34 PD (IPD)		
	GND 6	THMPAD 41	

PS8301 has internal ~150K pull-down on PD pin. Okay to drive this pin even when VCC=0V per Parade (pin is 5V-tolerant).

SDRV_PD R9318 0 5% 1/20W MF 201
R9319 4.22K 1% 1/16W MF-LF 402

R9354 30 5% 1/20W MF 201 DP_SDRVA_ML_R_P<0>
R9355 30 5% 1/20W MF 201 DP_SDRVA_ML_R_N<0>
R9350 30 5% 1/20W MF 201 DP_SDRVA_ML_R_P<2>
R9351 30 5% 1/20W MF 201 DP_SDRVA_ML_R_N<2>

C9364 0.22UF 20% 6.3V X5R 0201 DP_SDRVA_ML_P<0>
C9365 0.22UF 20% 6.3V X5R 0201 DP_SDRVA_ML_N<0>
C9360 0.22UF 20% 6.3V X5R 0201 DP_SDRVA_ML_P<2>
C9361 0.22UF 20% 6.3V X5R 0201 DP_SDRVA_ML_N<2>

R9352 270 5% 1/20W MF 201
R9353 270 5% 1/20W MF 201

C9363 0.1UF 10% 16V X5R-CERM 0201
C9362 0.1UF 10% 16V X5R-CERM 0201
C9367 0.1UF 10% 16V X5R-CERM 0201
C9366 0.1UF 10% 16V X5R-CERM 0201

AUXCH Snoop Port, used by PS8301 during training.

C9369 0.1UF 10% 16V X5R-CERM 0201
C9368 0.1UF 10% 16V X5R-CERM 0201

C9319 2.2UF 20% 6.3V CERM 402-LF

=PP3V3_S0_DPSDRVA C9359 0.1UF 10% 6.3V X7R-CERM 0402
DP_A_PWRDWN CRITICAL U9359 74LVC1G04GBDCK SC70 DP_A_BIAS

IC supports input high while Vcc = 0V.

DP/T29 A Low-Speed MUX

PP3V3_SW_TBTAPWR
Must be 3.3V DP A port power

C9390 0.1UF 10% 16V X7R-CERM 402
C9391 0.1UF 10% 16V X7R-CERM 402

OMIT_TABLE U9390 CBTL04DP081 HVQFN CRITICAL

DP_SDRVA_ML_N<3>	31 DIN1_0+	DOUT_0+ 1	T29DPA_ML_N<3>
DP_SDRVA_ML_P<3>	30 DIN1_0-	DOUT_0- 2	T29DPA_ML_P<3>
DP_SDRVA_ML_N<1>	27 DIN1_1+		T29: Unused
DP_SDRVA_ML_P<1>	26 DIN1_1-		
DP_SDRVA_AUXCH_P	19 AUX1+	DOUT_1+ 4	T29DPA_ML_N<1>
DP_SDRVA_AUXCH_N	18 AUX1-	DOUT_1- 5	T29DPA_ML_P<1>
DP_SDRVA_HPD	17 HPD_1		T29: LSX_A_R2P/P2R (P/N)
CKPLUS_WAIVE=NdifPr_badTerm		AUX+ 6	DP_A_EXT_AUXCH_P
T29_A_RSVD_N	25 DIN2_0+	AUX- 7	DP_A_EXT_AUXCH_N
T29_A_RSVD_P	24 DIN2_0-		T29: RX_1 Bias Sink
(T29_A_LSX_P2R)	23 DIN2_1+	HPD_IN 8	DP_A_EXT_HPD
(T29_A_LSX_R2P)	22 DIN2_1-		
T29_D2R1_BIASP	15 AUX2+		
T29_D2R1_BIASN	14 AUX2-		
NC	13 HPD_2		
DP_A_PWRDWN	10 GPU_SEL		
T29_A_BIAS	32 AUX_SEL		LO=Port A HI=Port B
	11 NC		
	THMPAD 33	GND 28 21	

R9399 100K 5% 1/20W MF 201
R9398 100K 5% 1/20W MF 201

SIGNAL_MODEL=T29DP_MUX

R9392 51 5% 1/20W MF 201
R9393 51 5% 1/20W MF 201

R9396 1K 5% 1/20W MF 201
R9397 1K 5% 1/20W MF 201

CBTL04DP081 (353S3151) and PI3vEDP212 (353S3055) are footprint-compatible parts with similar pinouts. NXP uses pin 10 for ML and HPD, Pericom uses pin 10 for ML and pin 11 for HPD.

DP Path Biasing

R9361 1.5K 5% 1/20W MF 201 DP_A_BIAS0 VOLTAGE=3.3V
R9360 1.5K 5% 1/20W MF 201
R9365 1.5K 5% 1/20W MF 201 DP_A_BIAS2 VOLTAGE=3.3V
R9364 1.5K 5% 1/20W MF 201

R9362 51 5% 1/20W MF 201
R9363 51 5% 1/20W MF 201
C9358 0.1UF 10% 16V X7R-CERM 0402

Port A MCU

PP3V3_SW_TBTAPWR
Must be 3.3V DP A port power

U9330 LPC1112A HVQFN25 CRITICAL OMIT_TABLE

DP_A_CA_DET	1 RESET#/PIO0_0	R/PIO1_0/AD1 16	T29DPA_CONFIG1_RC
	2 PIO0_1/CLKOUT	R/PIO1_1/AD2 17	T29DPA_CONFIG2_RC
T29_LSEO<0>	7 PIO0_2/SSEL/CT16B0_CAP0	R/PIO1_2/AD3 18	TBT_A_HV_EN_R
	(IPU) SWDIO/PIO1_3/AD4 19		T29_A_UC_ADDR
=I2C_T29AMCU_SCL	8 PIO0_4/SCL (OD)	PIO1_4/AD5/WAKEUP 20	DP_A_EXT_HPD
=I2C_T29AMCU_SDA	9 PIO0_5/SDA (OD)		
T29DPA_HPD	10 PIO0_6/SCK	PIO1_6/RXD 23	T29_A_LSX_P2R
T29_A_BIAS_R	11 PIO0_7/CTS#	PIO1_7/TXD 24	T29_A_LSX_R2P
T29_LSOE<0>	12 PIO0_8/MISO/CT16B0_MAT0	PIO1_8/CT16B1_CAP0 6	T29_LSEO<1>
T29_LSOE<1>	13 PIO0_9/MOSI/CT16B0_MAT1		
	14 SWCLK/PIO0_10/SCK/CT16B0_MAT2 (OD)		
TBT_PWR_REQ_L	15 R/PIO0_11/AD0 (OD)	XTALIN 4	
	VSS 3	THRM PAD 25	

C9330 0.1UF 20% 10V CERM 402
C9331 0.1UF 20% 10V CERM 402

R9338 10K 5% 1/16W MF-LF 402
R9334 10K 5% 1/16W MF-LF 402
R9335 1K 5% 1/16W MF-LF 402
R9336 10K 5% 1/16W MF-LF 402

I2C Addr: 0x26/0x27 (Wr/Rd)

TBT_A_HV_EN

P2R = Plug to Receptacle
R2P = Receptacle to Plug

R9339 1M 5% 1/16W MF-LF 402

=TBT_WAKE_L:
Desktops use PCIe WAKE#
Mobiles use S4 WAKE#

=TBT_WAKE_L
OMIT R9330 0 5% 1/16W MF-LF 402
SWCLK
SWDIO
T29_A_UC_ADDR

R9330 provides pads for programming/debug of MCU, please make accessible.
If project has space for 10-pin programming header it should be used.

Note: U9390 ML/HPD defaults to T29 mode so that DP/T29 Display can detect host T29 support using I2C pull-ups on ML<3>. U9390 AUX defaults to DP mode because 100 ohm pull-downs would defeat DP Sink's detection of DP Source.

SYNC_MASTER=K90I_MLB SYNC_DATE=02/15/2011
PAGE TITLE: DisplayPort/T29 A MUXing
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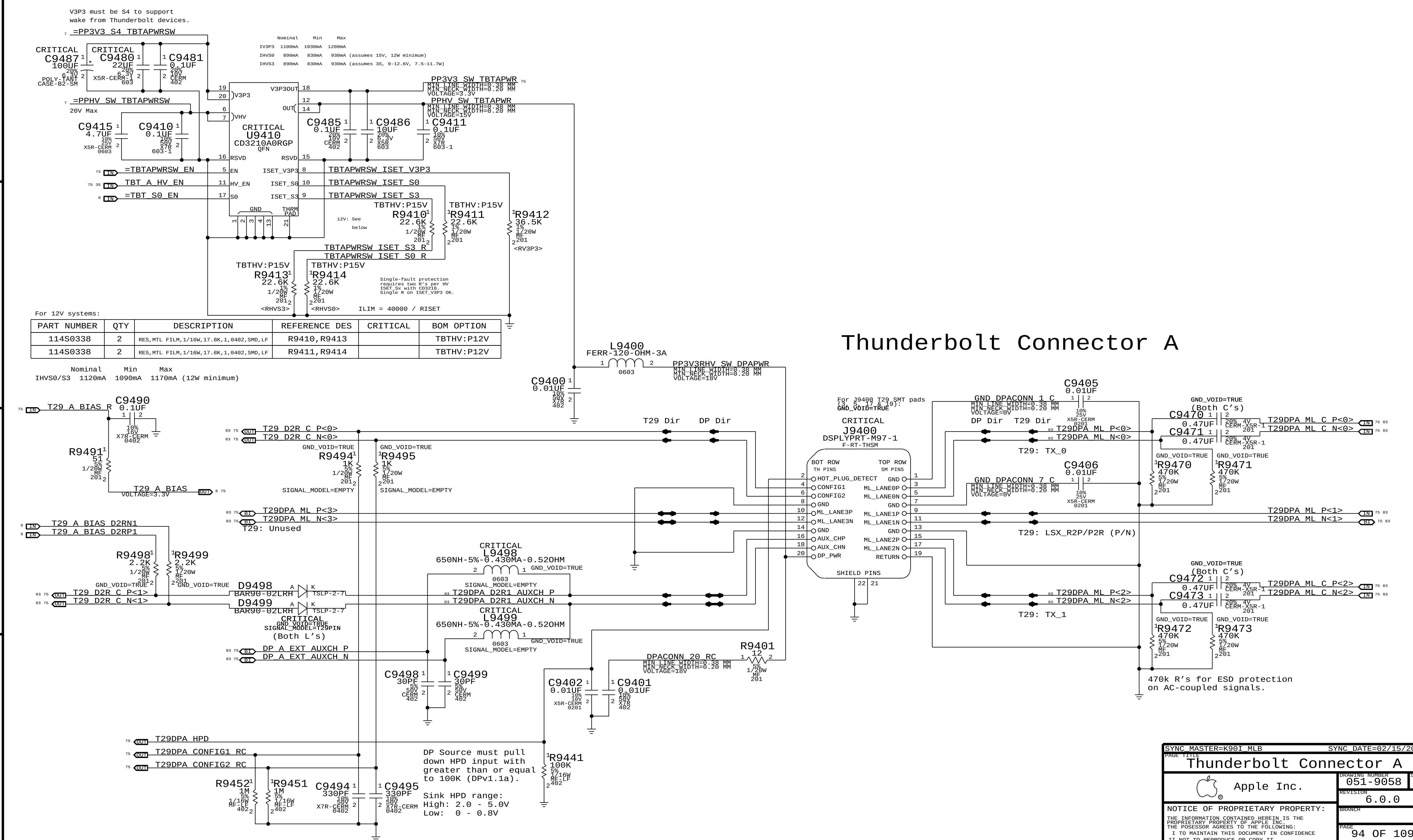
3.3V/HV Power MUX



PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
114S0338	2	RES,MTL FILM,1/16W,17.8K,1,0402,SMD,LF	R9410,R9413		TBTHV:P12V
114S0338	2	RES,MTL FILM,1/16W,17.8K,1,0402,SMD,LF	R9411,R9414		TBTHV:P12V

Thunderbolt Connector A

SYNC_MASTER=K90I_MLB SYNC_DATE=02/15/2011

PAGE TITLE: Thunderbolt Connector A

Apple Inc.

DRAWING NUMBER 051-9058 SIZE D

REVISION 6.0.0

BRANCH

PPBUS S0 LCDBKLT FET

MOSFET	FDC638APZ
CHANNEL	P-TYPE
RDS(ON)	43 mOhm @4.5V
LOADING	0.715 A (EDP)

=PPBUS_S0_LCDBKLT
F9700 3AMP-32V-467 603-HF BOTTOM
PPBUS_S0_LCDBKLT_FUSED
MIN_LINE_WIDTH=0.4 mm
MIN_NECK_WIDTH=0.25 mm
VOLTAGE=12.6V
CRITICAL Q9706 FDC638APZ_SBMS001 SSOT6-HF
PPBUS_SW_LCDBKLT_PWR
MIN_LINE_WIDTH=0.4 mm
MIN_NECK_WIDTH=0.25 mm
VOLTAGE=12.6V
THERE IS A SENSE RESISTOR BETWEEN PPBUS_SW_LCDBKLT_PWR AND PPBUS_SW_BKL ON THE SENSOR PAGE
R9788 301K 1% 1/16W MF-LF 402
C9782 0.1UF 10% 16V X7R-CERM 0402
LCDBKLT_EN_DIV
R9789 147K 1% 1/16W MF-LF 402
LCDBKLT_EN_L
Q9707 SSM6N15AFE SOT563
LCD_BKLT_EN
LCDBKLT_DISABLE
Q9707 SSM6N15AFE SOT563
BKLT_PLT_RST_L

*C9797 AND C9799 SHOULD BE PLACED IN T-BONE FOR ACOUSTICS
*PPBUS_SW_LCDBKLT_PWR_SW SHOULD BE KEPT AS SHORT AS POSSIBLE.
*LCD_BKLT_PWM SHOULD BE AWAY FROM BOOST CIRCUIT

=PP5V_S0_BKL
=PPBUS_SW_BKL
CRITICAL L9701 33UH-1.8A-110MOHM 1217AS-2SM
PPBUS_SW_LCDBKLT_PWR_SW
MIN_LINE_WIDTH=0.5 MM
MIN_NECK_WIDTH=0.2 MM
VOLTAGE=40V
SWITCH_NODE=TRUE
DIDT=TRUE
CRITICAL D9701 SOD-123 RB160M-60G
PPVOUT_SW_LCDBKLT
MIN_LINE_WIDTH=0.5 MM
MIN_NECK_WIDTH=0.375 MM
VOLTAGE=50V
CRITICAL C9712 10UF 10% 25V X5R 805
C9713 0.1UF 10% 25V X5R 402
C9796 220PF 10% 50V X7R-CERM 0402
CRITICAL C9797 10UF 10% 50V X5R 1210-1
CRITICAL C9799 10UF 10% 50V X5R 1210-1
C9710 1UF 10% 25V X5R 603-1
C9714 0.01UF 10% 16V X7R-CERM 0402
PPVOUT_SW_LCDBKLT_FB
VOLTAGE=40V
MIN_LINE_WIDTH=0.1 MM
MIN_NECK_WIDTH=0.1 MM
XW9720 SM
=PP3V3_S0_BKL_VDDIO
C9711 0.1UF 10% 16V X7R-CERM 0402
R9755 10K 5% 1/16W MF-LF 402
R9741 10K 5% 1/16W MF-LF 402
R9753 0 5% 1/16W MF-LF 402
R9757 0 5% 1/16W MF-LF 402
=I2C_BKL_1_SCL
=I2C_BKL_1_SDA
Addr: 0x58(Wr)/0x59(Rd)
PPBUS_SW_LCDBKLT_PWR
R9731 301K 1% 1/16W MF-LF 402
R9715 100K 1% 1/16W MF-LF 402
TP_BKL_FAULT
PLACE_SIDE=BOTTOM
R9704 33 5% 1/16W MF-LF 402
LCD_BKLT_PWM
C9704 33PF 5% 50V C0G-CERM 0402

U9701 25-BUMP-MICRO LP8550

VDDIO	C4	SW_0	B1
VLDO	D1	SW_1	B2
VIN	C1	FB	A5
VSYNC	D2	OUT1	E5
FILTER	C2	OUT2	D5
ISET	B3	OUT3	C5
FSET	B4	OUT4	E3
SCLK	D3	OUT5	E2
SDA	D4	OUT6	E1
PWM	A4	GND_S	B5
EN	A3	GND_L	E4
FAULT	C3	GND_SW	A1
		GND_SW	A2

BKL_VSYNC_R
BKL_FLTR
BKL_ISET
BKL_FSET
BKL_SCL
BKL_SDA
BKL_PWM
BKL_EN
BKL_ISEN1
BKL_ISEN2
BKL_ISEN3
BKL_ISEN4
BKL_ISEN5
BKL_ISEN6
I_LED=22.7mA
R9716 90.9K 1% 1/16W MF-LF 402
R9714 16.2K 1% 1/16W MF-LF 402
Fpwm=9.62kHz
see spec for others
PLACEMENT_NOTE=Keep away from noise nodes(E4, A1, A2, B1, B2 pins)
XW9710 SM
GND_BKL_SGND
MIN_LINE_WIDTH=0.4 MM
MIN_NECK_WIDTH=0.2 MM
VOLTAGE=0V
I_LED=369/Riset
(EEPROM should set EN_I_RES=1)

BKLT:PROD
R9717 0 5% 1/16W MF-LF 402
LED_RETURN_1
R9718 0 5% 1/16W MF-LF 402
LED_RETURN_2
R9719 0 5% 1/16W MF-LF 402
LED_RETURN_3
R9720 0 5% 1/16W MF-LF 402
LED_RETURN_4
R9721 0 5% 1/16W MF-LF 402
LED_RETURN_5
R9722 0 5% 1/16W MF-LF 402
LED_RETURN_6
MIN_LINE_WIDTH=0.5 mm
MIN_NECK_WIDTH=0.20 mm

PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
103S0198	3	RES,THIN FLIM,1/16W,10.2 OHM,0.1,0402,SMR	R9717,R9718,R9719		BKLT:ENG
103S0198	3	RES,THIN FLIM,1/16W,10.2 OHM,0.1,0402,SMR	R9720,R9721,R9722		BKLT:ENG

10.2 ohm resistors for current measurement on LED strings.

SYNC_MASTER=J31_MLB SYNC_DATE=07/08/2011
PAGE TITLE: LCD Backlight Driver
Apple Inc.
DRAWING NUMBER: 051-9058 SIZE: D
REVISION: 6.0.0
BRANCH:
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CPU Signal Constraints

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
CPU_50S	*	=50_OHM_SE	=50_OHM_SE	=50_OHM_SE	=50_OHM_SE	=STANDARD	=STANDARD
CPU_55S	*	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=STANDARD	=STANDARD
CPU_27P4S	*	=27P4_OHM_SE	=27P4_OHM_SE	=27P4_OHM_SE	=27P4_OHM_SE	7 MIL	7 MIL

NOTE: 7 mil gap is for VCCSense pair, which Intel says to route with 7 mil spacing without specifying a target impedance.

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
CPU_AGTL	*	=STANDARD	?
CPU_8MIL	*	8 MIL	?
CPU_COMP	*	20 MIL	?
CPU_ITP	*	=2:1_SPACING	?
CPU_VCCSENSE	*	25 MIL	?

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
CPU_AGTL	TOP,BOTTOM	=2x_DIELECTRIC	?

Most CPU signals with impedance requirements are 50-ohm single-ended.
Some signals require 27.4-ohm single-ended impedance.

SOURCE: Huron River SFF DG (DG-438297_v1.0), Section 4.18 and Huron River Platform Power Delivery DG v1.0 Section 2.7

PCI-Express

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
PCIE_85D	*	=85_OHM_DIFF	=85_OHM_DIFF	=85_OHM_DIFF	=85_OHM_DIFF	=85_OHM_DIFF	=85_OHM_DIFF
CLK_PCIE_90D	*	=90_OHM_DIFF	=90_OHM_DIFF	=90_OHM_DIFF	=90_OHM_DIFF	=90_OHM_DIFF	=90_OHM_DIFF

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
CLK_PCIE	*	20 MIL	?

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
PCIE_PCH_TX2TX	*	=3X_DIELECTRIC	?
PCIE_PCH_TX2RX	*	=4X_DIELECTRIC	?
PCIE_PCH_RX2RX	*	=3x_DIELECTRIC	?
PCIE_PCH_RX2TX	*	=4x_DIELECTRIC	?
PCIE_PCH_2OTHER	*	=3x_DIELECTRIC	?

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
PCIE_PCH_TX2TX	TOP,BOTTOM	=4X_DIELECTRIC	?
PCIE_PCH_TX2RX	TOP,BOTTOM	=5X_DIELECTRIC	?
PCIE_PCH_RX2RX	TOP,BOTTOM	=4x_DIELECTRIC	?
PCIE_PCH_RX2TX	TOP,BOTTOM	=4x_DIELECTRIC	?
PCIE_PCH_2OTHER	TOP,BOTTOM	=4x_DIELECTRIC	?

NET_SPACING_TYPE1	NET_SPACING_TYPE2	AREA_TYPE	SPACING_RULE_SET
PCIE_PCH_TX	*_PCH_TX	*	PCIE_PCH_TX2TX
PCIE_PCH_TX	*_PCH_RX	*	PCIE_PCH_TX2RX
PCIE_PCH_RX	*_PCH_RX	*	PCIE_PCH_RX2RX
PCIE_PCH_RX	*_PCH_TX	*	PCIE_PCH_RX2TX
PCIE_PCH_TX	*	*	PCIE_PCH_2OTHER
PCIE_PCH_RX	*	*	PCIE_PCH_2OTHER

SOURCE: 471984_Cheif_River_MS_PDG_1.0 and the spacing rule is adjusted per SI team feedback.

CPU Net Properties

ELECTRICAL_CONSTRAINT_SET	NET_TYPE PHYSICAL	NET_TYPE SPACING		
DMI_S2N	PCIE_85D	PCIE_PCH_TX	DMI_S2N_P<3:0>	9 17
DMI_S2N	PCIE_85D	PCIE_PCH_TX	DMI_S2N_N<3:0>	9 17
DMI_N2S	PCIE_85D	PCIE_PCH_RX	DMI_N2S_P<3:0>	9 17
DMI_N2S	PCIE_85D	PCIE_PCH_RX	DMI_N2S_N<3:0>	9 17
FDI_DATA	PCIE_85D	PCIE_PCH_RX	FDI_DATA_P<7:0>	9 17
FDI_DATA	PCIE_85D	PCIE_PCH_RX	FDI_DATA_N<7:0>	9 17
	CPU_50S	CPU_AGTL	FDI_FSYNC<1..0>	9 17
	CPU_50S	CPU_AGTL	FDI_LSYNC<1..0>	9 17
	CPU_50S	CPU_AGTL	FDI_INT	9 17
CPU_PECI	CPU_50S	CPU_COMP	CPU_PECI	10 19 46
PM_SYNC	CPU_50S	CPU_AGTL	PM_SYNC	10 17
PM_MEM_PWRGD	CPU_50S	CPU_AGTL	PM_MEM_PWRGD	10 17 26
	CPU_50S	CPU_ITP	XDP_DBRESET_L	10 23 24
	CPU_50S	CPU_ITP	XDP_CPU_PRDY_L	10 23
	CPU_50S	CPU_ITP	XDP_CPU_PREQ_L	10 23
	CPU_50S	CPU_AGTL	PM_EXT_TS_L<0>	
	CPU_50S	CPU_AGTL	PM_EXT_TS_L<1>	
CPU_SM_RCOMP	CPU_27P4S	CPU_COMP	CPU_SM_RCOMP<0>	10
CPU_SM_RCOMP	CPU_27P4S	CPU_COMP	CPU_SM_RCOMP<1>	10
CPU_SM_RCOMP	CPU_27P4S	CPU_COMP	CPU_SM_RCOMP<2>	10
	CPU_50S	CPU_ITP	CPU_CFG<11..0>	9 23
CPU_CATERR_L	CPU_50S	CPU_AGTL	CPU_CATERR_L	10 45
	CPU_50S	CPU_AGTL	CPU_VCCIO_SEL	8 12
CPU_PROCHOT_L	CPU_50S	CPU_AGTL	CPU_PROCHOT_L	10 45 46 68
CPU_PWRGD	CPU_50S	CPU_AGTL	CPU_PWRGD	10 19 23
PM_THRMTRIP_L	CPU_50S	CPU_AMTL	PM_THRMTRIP_L	10 19 46
DMI_CLK100M	CLK_PCIE_90D	CLK_PCIE	DMI_CLK100M_CPU_P	10 16
DMI_CLK100M	CLK_PCIE_90D	CLK_PCIE	DMI_CLK100M_CPU_N	10 16
ITPCPU_CLK100M	CLK_PCIE_90D	CLK_PCIE	ITPCPU_CLK100M_P	10 16
ITPCPU_CLK100M	CLK_PCIE_90D	CLK_PCIE	ITPCPU_CLK100M_N	10 16
ITPCPU_CLK100M	CLK_PCIE_90D	CLK_PCIE	ITPXDP_CLK100M_P	16 23
ITPCPU_CLK100M	CLK_PCIE_90D	CLK_PCIE	ITPXDP_CLK100M_N	16 23
ITPCPU_CLK100M	CLK_PCIE_90D	CLK_PCIE	XDP_CPU_CLK100M_P	23
ITPCPU_CLK100M	CLK_PCIE_90D	CLK_PCIE	XDP_CPU_CLK100M_N	23
	CPU_27P4S	CPU_COMP	EDP_COMP	9
	CPU_27P4S	CPU_COMP	CPU_PEG_COMP	9
XDP_TDI	CPU_50S	CPU_ITP	XDP_CPU_TDI	10 23
XDP_TDO	CPU_50S	CPU_ITP	XDP_CPU_TDO	10 23
XDP_TMS	CPU_50S	CPU_ITP	XDP_CPU_TMS	10 23
XDP_TCK	CPU_50S	CPU_ITP	XDP_CPU_TCK	10 23
XDP_TRST_L	CPU_50S	CPU_ITP	XDP_CPU_TRST_L	10 23
XDP_BPM_L	CPU_50S	CPU_ITP	XDP_BPM_L<3..0>	10 23
XDP_BPM_R_L	CPU_50S	CPU_ITP	CPU_CFG<15..12>	9 23
(FSB_CPURST_L)	CPU_50S	CPU_ITP	XDP_CPURST_L	23
CPU_VCCAXG_SENSE	CPU_27P4S	CPU_VCCSENSE	CPU_VCCSENSE_P	12 68
CPU_VCCAXG_SENSE	CPU_27P4S	CPU_VCCSENSE	CPU_VCCSENSE_N	12 68
CPU_VCCSENSE	CPU_27P4S	CPU_VCCSENSE	CPU_VCCIOSENSE_P	12 70
CPU_VCCSENSE	CPU_27P4S	CPU_VCCSENSE	CPU_VCCIOSENSE_N	12 70
CPU_VCCAXG_SENSE	CPU_27P4S	CPU_VCCSENSE	CPU_AXG_SENSE_P	12 68
CPU_VCCAXG_SENSE	CPU_27P4S	CPU_VCCSENSE	CPU_AXG_SENSE_N	12 68
CPU_VALSENSE	CPU_27P4S	CPU_VCCSENSE	CPU_VDDQ_SENSE_P	12
CPU_VALSENSE	CPU_27P4S	CPU_VCCSENSE	CPU_VDDQ_SENSE_N	12
CPU_VALSENSE	CPU_27P4S	CPU_VCCSENSE	CPU_AXG_VALSENSE_P	9
CPU_VALSENSE	CPU_27P4S	CPU_VCCSENSE	CPU_AXG_VALSENSE_N	9
CPU_VALSENSE	CPU_27P4S	CPU_VCCSENSE	CPU_VCC_VALSENSE_P	9
CPU_VALSENSE	CPU_27P4S	CPU_VCCSENSE	CPU_VCC_VALSENSE_N	9
CPU_SVIDALERT_L	CPU_50S	CPU_COMP	CPU_VIDALERT_L	12 68
CPU_SVIDSCLK	CPU_50S	CPU_COMP	CPU_VIDSCLK	12 68
CPU_SVIDSOUT	CPU_50S	CPU_COMP	CPU_VIDSOUT	12 68

CPU_VCCSA_VID<0>
CPU_VCCSA_VID<1>

SYNC_MASTER=K90I_MLB SYNC_DATE=02/15/2011

PAGE TITLE: CPU Constraints

Apple Inc.

DRAWING NUMBER: 051-9058 SIZE: D
REVISION: 6.0.0
BRANCH:
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Memory Bus Constraints

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
MEM_37S	*	=37_OHM_SE	=37_OHM_SE	=37_OHM_SE	=37_OHM_SE	=STANDARD	=STANDARD
MEM_40S	*	=40_OHM_SE	=40_OHM_SE	=40_OHM_SE	=40_OHM_SE	=STANDARD	=STANDARD
MEM_72D	*	=72_OHM_DIFF	=72_OHM_DIFF	=72_OHM_DIFF	=72_OHM_DIFF	=72_OHM_DIFF	=72_OHM_DIFF
MEM_50S	TOP,BOTTOM	Y	=50_OHM_SE	=50_OHM_SE	=50_OHM_SE	=STANDARD	=STANDARD
MEM_85D	TOP,BOTTOM	Y	=85_OHM_DIFF	=85_OHM_DIFF	=85_OHM_DIFF	=85_OHM_DIFF	=85_OHM_DIFF
MEM_50S	ISL10	N	=50_OHM_SE	=50_OHM_SE	=50_OHM_SE	=STANDARD	=STANDARD
MEM_85D	ISL10	N	=85_OHM_DIFF	=85_OHM_DIFF	=85_OHM_DIFF	=85_OHM_DIFF	=85_OHM_DIFF
MEM_50S	ISL3,ISL4,ISL9	Y	=50_OHM_SE	=50_OHM_SE	=50_OHM_SE	=STANDARD	=STANDARD
MEM_85D	ISL3,ISL4,ISL9	Y	=85_OHM_DIFF	=85_OHM_DIFF	=85_OHM_DIFF	=85_OHM_DIFF	=85_OHM_DIFF

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
MEM_CLK2MEM	*	=4:1_SPACING	?
MEM_CTRL2CTRL	*	=3:1_SPACING	?
MEM_CTRL2MEM	*	=2.5:1_SPACING	?
MEM_CMD2CMD	*	=1.5:1_SPACING	?
MEM_CMD2MEM	*	=3:1_SPACING	?
MEM_DATA2DATA	*	=1.5:1_SPACING	?
MEM_DATA2MEM	*	=3:1_SPACING	?
MEM_DQS2MEM	*	=3:1_SPACING	?
MEM_2OTHER	*	25 MILS	?

Memory Bus Spacing Group Assignments

NET_SPACING_TYPE1	NET_SPACING_TYPE2	AREA_TYPE	SPACING_RULE_SET
MEM_CLK	MEM_CLK	*	MEM_CLK2MEM
MEM_CLK	MEM_CTRL	*	MEM_CLK2MEM
MEM_CLK	MEM_CMD	*	MEM_CLK2MEM
MEM_CLK	MEM_DATA	*	MEM_CLK2MEM
MEM_CLK	MEM_DQS	*	MEM_CLK2MEM

NET_SPACING_TYPE1	NET_SPACING_TYPE2	AREA_TYPE	SPACING_RULE_SET
MEM_CMD	MEM_CLK	*	MEM_CMD2MEM
MEM_CMD	MEM_CTRL	*	MEM_CMD2MEM
MEM_CMD	MEM_CMD	*	MEM_CMD2CMD
MEM_CMD	MEM_DATA	*	MEM_CMD2MEM
MEM_CMD	MEM_DQS	*	MEM_CMD2MEM

NET_SPACING_TYPE1	NET_SPACING_TYPE2	AREA_TYPE	SPACING_RULE_SET
MEM_CTRL	MEM_CLK	*	MEM_CTRL2MEM
MEM_CTRL	MEM_CTRL	*	MEM_CTRL2CTRL
MEM_CTRL	MEM_CMD	*	MEM_CTRL2MEM
MEM_CTRL	MEM_DATA	*	MEM_CTRL2MEM
MEM_CTRL	MEM_DQS	*	MEM_CTRL2MEM

NET_SPACING_TYPE1	NET_SPACING_TYPE2	AREA_TYPE	SPACING_RULE_SET
MEM_DATA	MEM_CLK	*	MEM_DATA2MEM
MEM_DATA	MEM_CTRL	*	MEM_DATA2MEM
MEM_DATA	MEM_CMD	*	MEM_DATA2MEM
MEM_DATA	MEM_DATA	*	MEM_DATA2DATA
MEM_DATA	MEM_DQS	*	MEM_DATA2MEM

NET_SPACING_TYPE1	NET_SPACING_TYPE2	AREA_TYPE	SPACING_RULE_SET
MEM_DQS	MEM_CLK	*	MEM_DQS2MEM
MEM_DQS	MEM_CTRL	*	MEM_DQS2MEM
MEM_DQS	MEM_CMD	*	MEM_DQS2MEM
MEM_DQS	MEM_DATA	*	MEM_DQS2MEM
MEM_DQS	MEM_DQS	*	MEM_DQS2MEM

NET_SPACING_TYPE1	NET_SPACING_TYPE2	AREA_TYPE	SPACING_RULE_SET
MEM_CLK	*	*	MEM_2OTHER
MEM_CTRL	*	*	MEM_2OTHER
MEM_CMD	*	*	MEM_2OTHER
MEM_DATA	*	*	MEM_2OTHER
MEM_DQS	*	*	MEM_2OTHER

Need to support MEM_*-style wildcards!

DDR3: Sandybridge SFF 2C when routed on Type-3 (Through hole) should follow rPGA guidelines
per Huron River SFF DG rev1.0 (#438297).
DQS intra-pair matching should be within 0.127mm, no inter-pair matching requirement.
DQ to DQS matching per byte lane should be within 0.127mm.
DQS to clock matching should be within [CLK-63.5mm] and [CLK+38.1mm].
CLK intra-pair matching should be within 0.127mm, inter-pair matching should be within 0.0508mm.
CONTROL signals should be matched within [CLK-2.54mm] to [CLK+0.0mm] of CLK pairs.
A/BA/CMD signals should be matched within [CLK-12.7mm] to [CLK+12.7mm] of CLK pairs A/BA/CMD signals to each other should match within 5.08mm.
DQ/DQS/A/BA/cmd signal spacing is 4x dielectric, CLK is 5x dielectric.
Maximum length of any signal from die pad to SODIMM pad is 119.83mm, from procesor ball to SODIMM pad is 88.9mm.
SOURCE: Huron River Platform DG, Rev 1.01 (#436735), Section 2.5

Memory Net Properties

ELECTRICAL_CONSTRAINT_SET	NET_TYPE: PHYSICAL	NET_TYPE: SPACING		
MEM_A_CLK	MEM_72D	MEM_CLK	MEM_A_CLK_P<5..0>	11 27
MEM_A_CLK	MEM_72D	MEM_CLK	MEM_A_CLK_N<5..0>	11 27
MEM_A_CNTL	MEM_37S	MEM_CTRL	MEM_A_CKE<3..0>	11 27
MEM_A_CNTL	MEM_37S	MEM_CTRL	MEM_A_CS_L<3..0>	11 27
MEM_A_CNTL	MEM_37S	MEM_CTRL	MEM_A_ODT<3..0>	11 27
MEM_A_CMD	MEM_40S	MEM_CMD	MEM_A_A<15..0>	11 27
MEM_A_CMD	MEM_40S	MEM_CMD	MEM_A_BA<2..0>	11 27
MEM_A_CMD	MEM_40S	MEM_CMD	MEM_A_RAS_L	11 27
MEM_A_CMD	MEM_40S	MEM_CMD	MEM_A_CAS_L	11 27
MEM_A_CMD	MEM_40S	MEM_CMD	MEM_A_WE_L	11 27
MEM_A_DQ_BYTE0	MEM_50S	MEM_DATA	MEM_A_DQ<7..0>	11 28
MEM_A_DQ_BYTE1	MEM_50S	MEM_DATA	MEM_A_DQ<15..8>	11 28
MEM_A_DQ_BYTE2	MEM_50S	MEM_DATA	MEM_A_DQ<23..16>	11 28
MEM_A_DQ_BYTE3	MEM_50S	MEM_DATA	MEM_A_DQ<31..24>	11 28
MEM_A_DQ_BYTE4	MEM_50S	MEM_DATA	MEM_A_DQ<39..32>	11 28
MEM_A_DQ_BYTE5	MEM_50S	MEM_DATA	MEM_A_DQ<47..40>	11 28
MEM_A_DQ_BYTE6	MEM_50S	MEM_DATA	MEM_A_DQ<55..48>	11 28
MEM_A_DQ_BYTE7	MEM_50S	MEM_DATA	MEM_A_DQ<63..56>	11 28
MEM_A_DQS0	MEM_85D	MEM_DQS	MEM_A_DQS_P<0>	11 28
MEM_A_DQS0	MEM_85D	MEM_DQS	MEM_A_DQS_N<0>	11 28
MEM_A_DQS1	MEM_85D	MEM_DQS	MEM_A_DQS_P<1>	11 28
MEM_A_DQS1	MEM_85D	MEM_DQS	MEM_A_DQS_N<1>	11 28
MEM_A_DQS2	MEM_85D	MEM_DQS	MEM_A_DQS_P<2>	11 28
MEM_A_DQS2	MEM_85D	MEM_DQS	MEM_A_DQS_N<2>	11 28
MEM_A_DQS3	MEM_85D	MEM_DQS	MEM_A_DQS_P<3>	11 28
MEM_A_DQS3	MEM_85D	MEM_DQS	MEM_A_DQS_N<3>	11 28
MEM_A_DQS4	MEM_85D	MEM_DQS	MEM_A_DQS_P<4>	11 28
MEM_A_DQS4	MEM_85D	MEM_DQS	MEM_A_DQS_N<4>	11 28
MEM_A_DQS5	MEM_85D	MEM_DQS	MEM_A_DQS_P<5>	11 28
MEM_A_DQS5	MEM_85D	MEM_DQS	MEM_A_DQS_N<5>	11 28
MEM_A_DQS6	MEM_85D	MEM_DQS	MEM_A_DQS_P<6>	11 28
MEM_A_DQS6	MEM_85D	MEM_DQS	MEM_A_DQS_N<6>	11 28
MEM_A_DQS7	MEM_85D	MEM_DQS	MEM_A_DQS_P<7>	11 28
MEM_A_DQS7	MEM_85D	MEM_DQS	MEM_A_DQS_N<7>	11 28
MEM_B_CLK	MEM_72D	MEM_CLK	MEM_B_CLK_P<5..0>	11 29
MEM_B_CLK	MEM_72D	MEM_CLK	MEM_B_CLK_N<5..0>	11 29
MEM_B_CNTL	MEM_37S	MEM_CTRL	MEM_B_CKE<3..0>	11 29
MEM_B_CNTL	MEM_37S	MEM_CTRL	MEM_B_CS_L<3..0>	11 29
MEM_B_CNTL	MEM_37S	MEM_CTRL	MEM_B_ODT<3..0>	11 29
MEM_B_CMD	MEM_40S	MEM_CMD	MEM_B_A<15..0>	11 29
MEM_B_CMD	MEM_40S	MEM_CMD	MEM_B_BA<2..0>	11 29
MEM_B_CMD	MEM_40S	MEM_CMD	MEM_B_RAS_L	11 29
MEM_B_CMD	MEM_40S	MEM_CMD	MEM_B_CAS_L	11 29
MEM_B_CMD	MEM_40S	MEM_CMD	MEM_B_WE_L	11 29
MEM_B_DQ_BYTE0	MEM_50S	MEM_DATA	MEM_B_DQ<7..0>	11 28
MEM_B_DQ_BYTE1	MEM_50S	MEM_DATA	MEM_B_DQ<15..8>	11 28
MEM_B_DQ_BYTE2	MEM_50S	MEM_DATA	MEM_B_DQ<23..16>	11 28
MEM_B_DQ_BYTE3	MEM_50S	MEM_DATA	MEM_B_DQ<31..24>	11 28
MEM_B_DQ_BYTE4	MEM_50S	MEM_DATA	MEM_B_DQ<39..32>	11 28
MEM_B_DQ_BYTE5	MEM_50S	MEM_DATA	MEM_B_DQ<47..40>	11 28
MEM_B_DQ_BYTE6	MEM_50S	MEM_DATA	MEM_B_DQ<55..48>	11 28
MEM_B_DQ_BYTE7	MEM_50S	MEM_DATA	MEM_B_DQ<63..56>	11 28
MEM_B_DQS0	MEM_85D	MEM_DQS	MEM_B_DQS_P<0>	11 28
MEM_B_DQS0	MEM_85D	MEM_DQS	MEM_B_DQS_N<0>	11 28
MEM_B_DQS1	MEM_85D	MEM_DQS	MEM_B_DQS_P<1>	11 28
MEM_B_DQS1	MEM_85D	MEM_DQS	MEM_B_DQS_N<1>	11 28
MEM_B_DQS2	MEM_85D	MEM_DQS	MEM_B_DQS_P<2>	11 28
MEM_B_DQS2	MEM_85D	MEM_DQS	MEM_B_DQS_N<2>	11 28
MEM_B_DQS3	MEM_85D	MEM_DQS	MEM_B_DQS_P<3>	11 28
MEM_B_DQS3	MEM_85D	MEM_DQS	MEM_B_DQS_N<3>	11 28
MEM_B_DQS4	MEM_85D	MEM_DQS	MEM_B_DQS_P<4>	11 28
MEM_B_DQS4	MEM_85D	MEM_DQS	MEM_B_DQS_N<4>	11 28
MEM_B_DQS5	MEM_85D	MEM_DQS	MEM_B_DQS_P<5>	11 28
MEM_B_DQS5	MEM_85D	MEM_DQS	MEM_B_DQS_N<5>	11 28
MEM_B_DQS6	MEM_85D	MEM_DQS	MEM_B_DQS_P<6>	11 28
MEM_B_DQS6	MEM_85D	MEM_DQS	MEM_B_DQS_N<6>	11 28
MEM_B_DQS7	MEM_85D	MEM_DQS	MEM_B_DQS_P<7>	11 28
MEM_B_DQS7	MEM_85D	MEM_DQS	MEM_B_DQS_N<7>	11 28

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Digital Video Signal Constraints

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
DP_85D	*	=85_OHM_DIFF	=85_OHM_DIFF	=85_OHM_DIFF	=85_OHM_DIFF	=85_OHM_DIFF	=85_OHM_DIFF
LVDS_90D	*	=90_OHM_DIFF	=90_OHM_DIFF	=90_OHM_DIFF	=90_OHM_DIFF	=90_OHM_DIFF	=90_OHM_DIFF

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
DP_PCH	*	=3x_DIELECTRIC	?
DP_PCH_TX	*	=3x_DIELECTRIC	?
LVDS_PCH_TX	*	=3x_DIELECTRIC	?

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
DP_PCH	TOP,BOTTOM	=4x_DIELECTRIC	?
DP_PCH_TX	TOP,BOTTOM	=4x_DIELECTRIC	?
LVDS_PCH_TX	TOP,BOTTOM	=4x_DIELECTRIC	?

SATA Interface Constraints

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
SATA_90D	*	=90_OHM_DIFF	=90_OHM_DIFF	=90_OHM_DIFF	=90_OHM_DIFF	=90_OHM_DIFF	=90_OHM_DIFF

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
SATA_PCH_TX	*	=3x_DIELECTRIC	?
SATA_PCH_RX	*	=3x_DIELECTRIC	?
SATA_ICOMP	*	8 MIL	?

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
SATA_PCH_TX	TOP,BOTTOM	=4x_DIELECTRIC	?
SATA_PCH_RX	TOP,BOTTOM	=4x_DIELECTRIC	?

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
SATA3_PCH_TX2TX	*	=4X_DIELECTRIC	?
SATA3_PCH_TX2RX	*	=5X_DIELECTRIC	?
SATA3_PCH_RX2RX	*	=4x_DIELECTRIC	?
SATA3_PCH_RX2TX	*	=5x_DIELECTRIC	?
SATA3_PCH_2OTHER	*	=4x_DIELECTRIC	?

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
SATA3_PCH_TX2TX	TOP,BOTTOM	=5X_DIELECTRIC	?
SATA3_PCH_TX2RX	TOP,BOTTOM	=6X_DIELECTRIC	?
SATA3_PCH_RX2RX	TOP,BOTTOM	=5x_DIELECTRIC	?
SATA3_PCH_RX2TX	TOP,BOTTOM	=6x_DIELECTRIC	?
SATA3_PCH_2OTHER	TOP,BOTTOM	=5x_DIELECTRIC	?

NET_SPACING_TYPE1	NET_SPACING_TYPE2	AREA_TYPE	SPACING_RULE_SET
SATA3_PCH_TX	*_PCH_TX	*	SATA3_PCH_TX2TX
SATA3_PCH_TX	*_PCH_RX	*	SATA3_PCH_TX2RX
SATA3_PCH_RX	*_PCH_RX	*	SATA3_PCH_RX2RX
SATA3_PCH_RX	*_PCH_TX	*	SATA3_PCH_RX2TX
SATA3_PCH_TX	*	*	SATA3_PCH_2OTHER
SATA3_PCH_RX	*	*	SATA3_PCH_2OTHER

SOURCE: 471984_Cheif_River_MS_PDG_1.0 and the spacing rule is adjusted per SI team feedback.

USB 2.0 Interface Constraints

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
PCH_USB_RBIAS	*	=STANDARD	8 MIL	8 MIL	=STANDARD	=STANDARD	=STANDARD
USB_85D	*	=85_OHM_DIFF	=85_OHM_DIFF	=85_OHM_DIFF	=85_OHM_DIFF	=85_OHM_DIFF	=85_OHM_DIFF

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
USB	*	=2x_DIELECTRIC	?

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
USB	TOP,BOTTOM	=4x_DIELECTRIC	?

SOURCE: Calpella Platform Design Guide for Ibex Peak M (DG-398905-398905_v1.5), Section 3.8

USB 3.0 Interface Constraints

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
USB_85D	*	=85_OHM_DIFF	=85_OHM_DIFF	=85_OHM_DIFF	=85_OHM_DIFF	=85_OHM_DIFF	=85_OHM_DIFF

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
USB3_PCH_TX2TX	*	=4X_DIELECTRIC	?
USB3_PCH_TX2RX	*	=5X_DIELECTRIC	?
USB3_PCH_RX2RX	*	=4x_DIELECTRIC	?
USB3_PCH_RX2TX	*	=5x_DIELECTRIC	?
USB3_PCH_2OTHER	*	=4x_DIELECTRIC	?

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
USB3_PCH_TX2TX	TOP,BOTTOM	=5X_DIELECTRIC	?
USB3_PCH_TX2RX	TOP,BOTTOM	=6X_DIELECTRIC	?
USB3_PCH_RX2RX	TOP,BOTTOM	=5x_DIELECTRIC	?
USB3_PCH_RX2TX	TOP,BOTTOM	=6x_DIELECTRIC	?
USB3_PCH_2OTHER	TOP,BOTTOM	=5x_DIELECTRIC	?

NET_SPACING_TYPE1	NET_SPACING_TYPE2	AREA_TYPE	SPACING_RULE_SET
USB3_PCH_TX	*_PCH_TX	*	USB3_PCH_TX2TX
USB3_PCH_TX	*_PCH_RX	*	USB3_PCH_TX2RX
USB3_PCH_RX	*_PCH_RX	*	USB3_PCH_RX2RX
USB3_PCH_RX	*_PCH_TX	*	USB3_PCH_RX2TX
USB3_PCH_TX	*	*	USB3_PCH_2OTHER
USB3_PCH_RX	*	*	USB3_PCH_2OTHER

SOURCE: 471984_Cheif_River_MS_PDG_1.0 and the spacing rule is adjusted per SI team feedback.

PCH Net Properties

ELECTRICAL_CONSTRAINT_SET	NET_TYPE: PHYSICAL	NET_TYPE: SPACING		
LVDS_IG_A_CLK	LVDS_90D	LVDS_PCH_TX	LVDS_IG_A_CLK_P	17 74
LVDS_IG_A_CLK	LVDS_90D	LVDS_PCH_TX	LVDS_IG_A_CLK_N	17 74
LVDS_IG_A_DATA	LVDS_90D	LVDS_PCH_TX	LVDS_IG_A_DATA_P<2..0>	6 17 74
LVDS_IG_A_DATA	LVDS_90D	LVDS_PCH_TX	LVDS_IG_A_DATA_N<2..0>	6 17 74
	LVDS_90D	LVDS_PCH_TX	LVDS_IG_A_DATA_P<3>	8 17
	LVDS_90D	LVDS_PCH_TX	LVDS_IG_A_DATA_N<3>	8 17
	LVDS_90D	LVDS_PCH_TX	LVDS_IG_B_DATA_P<3..0>	8 17
T213	LVDS_90D	LVDS_PCH_TX	LVDS_IG_B_DATA_N<3..0>	8 17
T213	LVDS_90D	LVDS_PCH_TX	LVDS_IG_B_CLK_P	8 17
T213	LVDS_90D	LVDS_PCH_TX	LVDS_IG_B_CLK_N	8 17
T214				
SATA_HDD_R2D	SATA_90D	SATA3_PCH_TX	SATA_HDD_R2D_C_P	16 41
SATA_HDD_R2D	SATA_90D	SATA3_PCH_TX	SATA_HDD_R2D_C_N	16 41
SATA_HDD_R2D_CONN	SATA_90D	SATA3_PCH_TX	SATA_HDD_R2D_P	6 41
SATA_HDD_R2D_CONN	SATA_90D	SATA3_PCH_TX	SATA_HDD_R2D_N	6 41
SATA_HDD_D2R	SATA_90D	SATA3_PCH_RX	SATA_HDD_D2R_P	16 41
SATA_HDD_D2R	SATA_90D	SATA3_PCH_RX	SATA_HDD_D2R_N	16 41
SATA_HDD_D2R_CONN	SATA_90D	SATA3_PCH_RX	SATA_HDD_D2R_C_P	6 41
SATA_HDD_D2R_CONN	SATA_90D	SATA3_PCH_RX	SATA_HDD_D2R_C_N	6 41
SATA_ODD_R2D	SATA_90D	SATA_PCH_TX	SATA_ODD_R2D_C_P	16 41
SATA_ODD_R2D	SATA_90D	SATA_PCH_TX	SATA_ODD_R2D_C_N	16 41
SATA_ODD_R2D	SATA_90D	SATA_PCH_TX	SATA_ODD_R2D_P	6 41
SATA_ODD_R2D	SATA_90D	SATA_PCH_TX	SATA_ODD_R2D_N	6 41
SATA_ODD_D2R	SATA_90D	SATA_PCH_RX	SATA_ODD_D2R_P	16 41
SATA_ODD_D2R	SATA_90D	SATA_PCH_RX	SATA_ODD_D2R_N	16 41
SATA_HDD_R2D_CONN	SATA_90D	SATA3_PCH_TX	SATA_HDD_R2D_RC_P	41
SATA_HDD_R2D_CONN	SATA_90D	SATA3_PCH_TX	SATA_HDD_R2D_RC_N	41
SATA_HDD_D2R_CONN	SATA_90D	SATA3_PCH_RX	SATA_HDD_D2R_RC_P	41
SATA_HDD_D2R_CONN	SATA_90D	SATA3_PCH_RX	SATA_HDD_D2R_RC_N	41
PCH_SATA_ICOMP		SATA_ICOMP	PCH_SATAICOMP	16
USB_HUB1_UP	USB_85D	USB	USB_HUB_UP_P	18 25
	USB_85D	USB	USB_HUB_UP_N	18 25
USB_EXTA	USB_85D	USB	USB_EXTA_P	18 42
USB_EXTA	USB_85D	USB	USB_EXTA_N	18 42
USB_EXTB	USB_85D	USB	USB_EXTB_MUX_P	25 43
	USB_85D	USB	USB_EXTB_MUX_N	25 43
T215	USB_85D	USB	USB_EXTA_MUXED_F_P	42
T226	USB_85D	USB	USB_EXTA_MUXED_F_N	42
T227	USB_85D	USB	USB_EXTB_F_P	43
T227	USB_85D	USB	USB_EXTB_F_N	43
T223	USB_85D	USB	USB_EXTA_MUXED_P	42
T223	USB_85D	USB	USB_EXTA_MUXED_N	42
T228	USB_85D	USB	USB_EXTD_XHCI_P	8 18
T228	USB_85D	USB	USB_EXTD_XHCI_N	8 18
T247	USB_85D	USB	USB_EXTB_EHCI_P	18 25
T248	USB_85D	USB	USB_EXTB_EHCI_N	18 25
T250	USB_85D	USB	USB_EXTB_XHCI_P	18 25
T249	USB_85D	USB	USB_EXTB_XHCI_N	18 25
T222 USB3_EXT_RX	USB_85D	USB3_PCH_RX	USB3_EXTA_RX_P	18 42
T227	USB_85D	USB3_PCH_RX	USB3_EXTA_RX_N	18 42
T222 USB3_EXT_TX	USB_85D	USB3_PCH_TX	USB3_EXTA_TX_P	18 42
T235	USB_85D	USB3_PCH_TX	USB3_EXTA_TX_N	18 42
T231 USB3_EXT_RX	USB_85D	USB3_PCH_RX	USB3_EXTB_RX_P	18 43
T237	USB_85D	USB3_PCH_RX	USB3_EXTB_RX_N	18 43
T233 USB3_EXT_TX	USB_85D	USB3_PCH_TX	USB3_EXTB_TX_P	18 43
T233	USB_85D	USB3_PCH_TX	USB3_EXTB_TX_N	18 43
T235	USB_85D	USB3_PCH_RX	USB3_EXTA_RX_F_P	42
T236	USB_85D	USB3_PCH_RX	USB3_EXTA_RX_F_N	42
T238	USB_85D	USB3_PCH_TX	USB3_EXTA_TX_F_P	42
T237	USB_85D	USB3_PCH_TX	USB3_EXTA_TX_F_N	42
T240	USB_85D	USB3_PCH_RX	USB3_EXTB_RX_F_P	43
T239	USB_85D	USB3_PCH_RX	USB3_EXTB_RX_F_N	43
T241	USB_85D	USB3_PCH_TX	USB3_EXTB_TX_F_P	43
T242	USB_85D	USB3_PCH_TX	USB3_EXTB_TX_F_N	43
T243	USB_85D	USB3_PCH_TX	USB3_EXTA_TX_C_P	42
T244	USB_85D	USB3_PCH_TX	USB3_EXTA_TX_C_N	42
T245	USB_85D	USB3_PCH_TX	USB3_EXTB_TX_C_P	43
T246	USB_85D	USB3_PCH_TX	USB3_EXTB_TX_C_N	43
T251 USB_EXTA	USB_85D	USB	USB_SMC_P	8 45
T252	USB_85D	USB	USB_SMC_N	8 45
USB_EXTC	USB_85D	USB	USB_EXTC_P	8 18
	USB_85D	USB	USB_EXTC_N	8 18
USB_CAMERA	USB_85D	USB	USB_CAMERA_P	18 32
	USB_85D	USB	USB_CAMERA_N	18 32
USB_CAMERA	USB_85D	USB	USB_CAMERA_CONN_P	6 32
	USB_85D	USB	USB_CAMERA_CONN_N	6 32
USB_BT	USB_85D	USB	USB_BT_P	8 32
USB_BT	USB_85D	USB	USB_BT_N	8 32
USB_BT	USB_85D	USB	USB_BT_CONN_P	6 32
USB_BT	USB_85D	USB	USB_BT_CONN_N	6 32
USB_TPAD	USB_85D	USB	USB_TPAD_P	8 53
	USB_85D	USB	USB_TPAD_N	8 53
USB_IR	USB_85D	USB	USB_IR_P	8 44
	USB_85D	USB	USB_IR_N	8 44
PCH_USB_RBIAS	PCH_USB_RBIAS		PCH_USB_RBIAS	18
PCH_DIFFCLK_UNUSED	CLK_PCIE_90D	CLK_PCIE	PCIE_CLK100M_PCH_P	16
PCH_DIFFCLK_UNUSED	CLK_PCIE_90D	CLK_PCIE	PCIE_CLK100M_PCH_N	16
PCH_DIFFCLK_UNUSED	CLK_PCIE_90D	CLK_PCIE	PCH_CLK96M_DOT_P	16
PCH_DIFFCLK_UNUSED	CLK_PCIE_90D	CLK_PCIE	PCH_CLK96M_DOT_N	16
PCH_DIFFCLK_UNUSED	CLK_PCIE_90D	CLK_PCIE	PCH_CLK100M_SATA_P	16
PCH_DIFFCLK_UNUSED	CLK_PCIE_90D	CLK_PCIE	PCH_CLK100M_SATA_N	16
	CPU_50S	CLK_PCIE	PCH_CLK14P3M_REFCLK	16
LPC_CLK33M	CPU_50S	CLK_PCIE	PCH_CLK33M_PCIIN	16 24

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LPC Bus Constraints

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
LPC_50S	*	=50_OHM_SE	=50_OHM_SE	=50_OHM_SE	=50_OHM_SE	=STANDARD	=STANDARD
CLK_LPC_50S	*	=50_OHM_SE	=50_OHM_SE	=50_OHM_SE	=50_OHM_SE	=STANDARD	=STANDARD

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
LPC	*	6 MIL	?
CLK_LPC	*	8 MIL	?

SOURCE: Calpella Platform Design Guide for Ibex Peak M (DG-398905-398905_v1.5), Section 3.15

SMBus Interface Constraints

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
SMB_50S	*	=50_OHM_SE	=50_OHM_SE	=50_OHM_SE	=50_OHM_SE	=STANDARD	=STANDARD

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
SMB	*	=2x_DIELECTRIC	?

HD Audio Interface Constraints

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
HDA_50S	*	=50_OHM_SE	=50_OHM_SE	=50_OHM_SE	=50_OHM_SE	=STANDARD	=STANDARD

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
HDA	*	=2x_DIELECTRIC	?

SOURCE: Calpella Platform Design Guide for Ibex Peak M (DG-398905-398905_v1.5), Section 3.15

SIO Signal Constraints

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
CLK_SLOW_55S	*	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=STANDARD	=STANDARD

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
CLK_SLOW	*	8 MIL	?

SPI Interface Constraints

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
SPI_50S	*	=50_OHM_SE	=50_OHM_SE	=50_OHM_SE	=50_OHM_SE	=STANDARD	=STANDARD

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
SPI	*	8 MIL	?

PCI-Express Signal Constraints

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
PCIE_T29_TX2TX	*	=3X_DIELECTRIC	?
PCIE_T29_TX2RX	*	=4X_DIELECTRIC	?
PCIE_T29_RX2RX	*	=3x_DIELECTRIC	?
PCIE_T29_RX2TX	*	=4x_DIELECTRIC	?
PCIE_T29_2OTHER	*	=3x_DIELECTRIC	?

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
PCIE_T29_TX2TX	TOP,BOTTOM	=4X_DIELECTRIC	?
PCIE_T29_TX2RX	TOP,BOTTOM	=5X_DIELECTRIC	?
PCIE_T29_RX2RX	TOP,BOTTOM	=4x_DIELECTRIC	?
PCIE_T29_RX2TX	TOP,BOTTOM	=4x_DIELECTRIC	?
PCIE_T29_2OTHER	TOP,BOTTOM	=4x_DIELECTRIC	?

NET_SPACING_TYPE1	NET_SPACING_TYPE2	AREA_TYPE	SPACING_RULE_SET
PCIE_T29_TX	*_TX	*	PCIE_T29_TX2TX
PCIE_T29_TX	*_RX	*	PCIE_T29_TX2RX
PCIE_T29_RX	*_RX	*	PCIE_T29_RX2RX
PCIE_T29_RX	*_TX	*	PCIE_T29_RX2TX
PCIE_T29_TX	*	*	PCIE_T29_2OTHER
PCIE_T29_RX	*	*	PCIE_T29_2OTHER

SOURCE: 471984_Cheif_River_MS_PDG_1.0 and the spacing rule is adjusted per SI team feedback.

System Clock Signal Constraints

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
CLK_SLOW_55S	*	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=STANDARD	=STANDARD
CLK_25M_55S	*	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=STANDARD	=STANDARD

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
CLK_SLOW	*	=2x_DIELECTRIC	?
CLK_25M	*	=5x_DIELECTRIC	?

NOTE: 25MHz system clocks very sensitive to noise.

PCH Net Properties

ELECTRICAL_CONSTRAINT_SET	NET_TYPE PHYSICAL	NET_TYPE SPACING		
LPC_AD	LPC_50S	LPC	LPC_AD<3..0>	6 16 45 47
LPC_FRAME_L	LPC_50S	LPC	LPC_FRAME_L	6 16 45 47
LPC_RESET_L	LPC_50S	LPC	LPC_RESET_L	24
LPC_CLK33M	CLK_LPC_50S	CLK_LPC	LPC_CLK33M_SMC_R	18 24
LPC_CLK33M	CLK_LPC_50S	CLK_LPC	LPC_CLK33M_SMC	24 45
LPC_CLK33M	CLK_LPC_50S	CLK_LPC	LPC_CLK33M_LPCPLUS	6 24 47
SMBUS_PCH_CLK	SMB_50S	SMB	SMBUS_PCH_CLK	16 48
SMBUS_PCH_DATA	SMB_50S	SMB	SMBUS_PCH_DATA	16 48
SMBUS_PCH_0_CLK	SMB_50S	SMB	SML_PCH_0_CLK	16 48
SMBUS_PCH_0_DATA	SMB_50S	SMB	SML_PCH_0_DATA	16 48
SMBUS_SMC_0_S0_SCL	SMB_50S	SMB	SML_PCH_1_CLK	16 48
SMBUS_SMC_0_S0_SDA	SMB_50S	SMB	SML_PCH_1_DATA	16 48
HDA_BIT_CLK	HDA_50S	HDA	HDA_BIT_CLK	16 57
	HDA_50S	HDA	HDA_BIT_CLK_R	16
HDA_SYNC	HDA_50S	HDA	HDA_SYNC	16 57
	HDA_50S	HDA	HDA_SYNC_R	16
HDA_RST_L	HDA_50S	HDA	HDA_RST_R_L	16
	HDA_50S	HDA	HDA_RST_L	16 57
HDA_SDIN0	HDA_50S	HDA	HDA_SDIN0	16 57
	HDA_50S	HDA	AUD_SDI_R	57
HDA_SDOUT	HDA_50S	HDA	HDA_SDOUT	16 57
	HDA_50S	HDA	HDA_SDOUT_R	16 24
PM_SUS_CLK	CLK_SLOW_55S	CLK_SLOW	PM_CLK32K_SUSCLK	
SPI_CLK	SPI_50S	SPI	SPI_CLK_R	16 47
	SPI_50S	SPI	SPI_CLK	47
SPI_MOSI	SPI_50S	SPI	SPI_MOSI_R	16 47
	SPI_50S	SPI	SPI_MOSI	47
SPI_MISO	SPI_50S	SPI	SPI_MISO	16 47
SPI_CS0	SPI_50S	SPI	SPI_CS0_R_L	16 47
	SPI_50S	SPI	SPI_CS0_L	47
U49	SPI_50S	SPI	SPI_MLB_CLK	46 47 56
U48	SPI_50S	SPI	SPI_MLB_CS_L	46 47 56
U50	SPI_50S	SPI	SPI_MLB_MOSI	46 47 56
U51	SPI_50S	SPI	SPI_MLB_MISO	46 47 56
U52	SPI_50S	SPI	SPI_SMC_MISO	45 46
U53	SPI_50S	SPI	SPI_SMC_MOSI	45 46
U54	SPI_50S	SPI	SPI_SMC_CLK	45 46
U55	SPI_50S	SPI	SPI_SMC_CS_L	45 46
	PCIE_85D	PCIE_PCH_TX	PCIE_ENET_R2D_P	36
	PCIE_85D	PCIE_PCH_TX	PCIE_ENET_R2D_N	36
PCIE_ENET_R2D	PCIE_85D	PCIE_PCH_TX	PCIE_ENET_R2D_C_P	16 36
	PCIE_85D	PCIE_PCH_TX	PCIE_ENET_R2D_C_N	16 36
PCIE_ENET_D2R	PCIE_85D	PCIE_PCH_RX	PCIE_ENET_D2R_P	16 36
	PCIE_85D	PCIE_PCH_RX	PCIE_ENET_D2R_N	16 36
	PCIE_85D	PCIE_PCH_RX	PCIE_ENET_D2R_C_P	36
	PCIE_85D	PCIE_PCH_RX	PCIE_ENET_D2R_C_N	36
	PCIE_85D	PCIE_PCH_TX	PCIE_AP_R2D_P	6 32
	PCIE_85D	PCIE_PCH_TX	PCIE_AP_R2D_N	6 32
PCIE_AP_R2D	PCIE_85D	PCIE_PCH_TX	PCIE_AP_R2D_C_P	16 32
	PCIE_85D	PCIE_PCH_TX	PCIE_AP_R2D_C_N	16 32
PCIE_AP_D2R	PCIE_85D	PCIE_PCH_RX	PCIE_AP_D2R_P	16 32
	PCIE_85D	PCIE_PCH_RX	PCIE_AP_D2R_N	16 32
	PCIE_85D	PCIE_PCH_TX	PCIE_FW_R2D_P	38
	PCIE_85D	PCIE_PCH_TX	PCIE_FW_R2D_N	38
PCIE_FW_R2D	PCIE_85D	PCIE_PCH_TX	PCIE_FW_R2D_C_P	16 38
	PCIE_85D	PCIE_PCH_TX	PCIE_FW_R2D_C_N	16 38
PCIE_FW_D2R	PCIE_85D	PCIE_PCH_RX	PCIE_FW_D2R_P	16 38
	PCIE_85D	PCIE_PCH_RX	PCIE_FW_D2R_N	16 38
	PCIE_85D	PCIE_PCH_RX	PCIE_FW_D2R_C_P	38
	PCIE_85D	PCIE_PCH_RX	PCIE_FW_D2R_C_N	38
PCIE_AP_D2R	PCIE_85D	PCIE_PCH_RX	PCIE_AP_D2R_PI_P	6 32
	PCIE_85D	PCIE_PCH_RX	PCIE_AP_D2R_PI_N	6 32
PCIE_AP_R2D	PCIE_85D	PCIE_PCH_RX	PCIE_AP_R2D_PI_P	
	PCIE_85D	PCIE_PCH_RX	PCIE_AP_R2D_PI_N	
	CLK_PCIE_90D	CLK_PCIE	PEG_CLK100M_P	8 16
	CLK_PCIE_90D	CLK_PCIE	PEG_CLK100M_N	8 16
PCIE_CLK100M_ENET	CLK_PCIE_90D	CLK_PCIE	PCIE_CLK100M_ENET_P	16 36
	CLK_PCIE_90D	CLK_PCIE	PCIE_CLK100M_ENET_N	16 36
MCP_PE1_REFCLK	CLK_PCIE_90D	CLK_PCIE	PCIE_CLK100M_AP_P	16 32
	CLK_PCIE_90D	CLK_PCIE	PCIE_CLK100M_AP_N	16 32
MCP_PE2_REFCLK	CLK_PCIE_90D	CLK_PCIE	PCIE_CLK100M_FW_P	16 38
	CLK_PCIE_90D	CLK_PCIE	PCIE_CLK100M_FW_N	16 38
	CLK_PCIE_90D	CLK_PCIE	PCIE_CLK100M_EXCARD_P	8 16
	CLK_PCIE_90D	CLK_PCIE	PCIE_CLK100M_EXCARD_N	8 16
U35	CPU_27P4S	CPU_COMP	PCH_VSS_NCTF<1>	6
U36	CPU_27P4S	CPU_COMP	PCH_VSS_NCTF<2>	6
U37	CPU_27P4S	CPU_COMP	PCH_VSS_NCTF<5>	6
U38	CPU_27P4S	CPU_COMP	TP_PCH_VSS_NCTF<7>	
U39	CPU_27P4S	CPU_COMP	PCH_VSS_NCTF<9>	6 81
U40	CPU_27P4S	CPU_COMP	PCH_VSS_NCTF<9>	6 81
U41	CPU_27P4S	CPU_COMP	PCH_VSS_NCTF<11>	6
U42	CPU_27P4S	CPU_COMP	PCH_VSS_NCTF<12>	6
U43	CPU_27P4S	CPU_COMP	PCH_VSS_NCTF<15>	6
U44	CPU_27P4S	CPU_COMP	PCH_VSS_NCTF<17>	6
U45	CPU_27P4S	CPU_COMP	PCH_VSS_NCTF<19>	6
U46	CPU_27P4S	CPU_COMP	PCH_VSS_NCTF<21>	6
U47	CPU_27P4S	CPU_COMP	PCH_VSS_NCTF<22>	
U48	CPU_27P4S	CPU_COMP	PCH_VSS_NCTF<25>	6
U49	CPU_27P4S	CPU_COMP	PCH_VSS_NCTF<27>	6
U50	CPU_27P4S	CPU_COMP	PCH_VSS_NCTF<29>	6

Chipset Net Properties

ELECTRICAL_CONSTRAINT_SET	NET_TYPE PHYSICAL	NET_TYPE SPACING		
U262	DP_EXTA_ML	DP_85D	DP_PCH_TX	DP_EXTA_ML_C_P<3..0>	8 75
U263	DP_EXTA_ML	DP_85D	DP_PCH_TX	DP_EXTA_ML_C_N<3..0>	8 75
U265		DP_85D	DP_PCH_TX	DP_EXTA_ML_P<3..0>	75
U266		DP_85D	DP_PCH_TX	DP_EXTA_ML_N<3..0>	75
U264	DP_EXTA_AUXCH	DP_85D	DP_PCH	DP_EXTA_AUXCH_C_P	8 75
U269	DP_EXTA_AUXCH	DP_85D	DP_PCH	DP_EXTA_AUXCH_C_N	8 75
U267		DP_85D	DP_PCH	DP_EXTA_AUXCH_P	75
U268		DP_85D	DP_PCH	DP_EXTA_AUXCH_N	75
U271	PCIE_T29_R2D	PCIE_85D	PCIE_T29_RX	PCIE_T29_R2D_C_P<3..0>	8 33
U273	PCIE_T29_R2D	PCIE_85D	PCIE_T29_RX	PCIE_T29_R2D_C_N<3..0>	8 33
U272	PCIE_T29_R2D	PCIE_85D	PCIE_T29_RX	PCIE_T29_R2D_P<3..0>	33
U274	PCIE_T29_R2D	PCIE_85D	PCIE_T29_RX	PCIE_T29_R2D_N<3..0>	33
U276	PCIE_T29_D2R	PCIE_85D	PCIE_T29_TX	PCIE_T29_D2R_P<3..0>	8 33
U275	PCIE_T29_D2R	PCIE_85D	PCIE_T29_TX	PCIE_T29_D2R_N<3..0>	8 33
U277	PCIE_T29_D2R	PCIE_85D	PCIE_T29_TX	PCIE_T29_D2R_C_P<3..0>	33
U278	PCIE_T29_D2R	PCIE_85D	PCIE_T29_TX	PCIE_T29_D2R_C_N<3..0>	33
U279	PCIE_CLK100M_T29	CLK_PCIE_90D	CLK_PCIE	PCIE_CLK100M_T29_P	16 33
U280	PCIE_CLK100M_T29	CLK_PCIE_90D	CLK_PCIE	PCIE_CLK100M_T29_N	16 33

Clock Net Properties

ELECTRICAL_CONSTRAINT_SET	NET_TYPE PHYSICAL	NET_TYPE SPACING		
U281	SYSCLK_CLK32K_RTC	CLK_SLOW_55S	CLK_SLOW	SYSCLK_CLK32K_RTC	16 24
U282	SYSCLK_CLK25M_SB	CLK_25M_55S	CLK_25M	SYSCLK_CLK25M_SB	16 24
U283		CLK_25M_55S	CLK_25M	SYSCLK_CLK25M_SB_R	16
U284		CLK_25M_55S	CLK_25M	SYSCLK_CLK25M_ENET	24 36
U285		CLK_25M_55S	CLK_25M	SYSCLK_CLK25M_ENET_R	
U286	SYSCLK_CLK25M_T29	CLK_25M_55S	CLK_25M	SYSCLK_CLK25M_T29	24 33
U287		CLK_25M_55S	CLK_25M	SYSCLK_CLK25M_T29_R	33

SYNC_MASTER=K90I_MLB SYNC_DATE=02/15/2011

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Apple Inc.

DRAWING NUMBER: 051-9058 SIZE: D

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CAESAR IV (Ethernet) Constraints

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
ENET_50S	*	=50_OHM_SE	=50_OHM_SE	=50_OHM_SE	=50_OHM_SE	=STANDARD	=STANDARD

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
ENET_3X	*	=3:1_SPACING	?

SOURCE: Broadcom 5764-DS04-RDS Page 38

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
ENET_CR_DATA	*	8MIL	?

CAESAR IV (Ethernet PHY) Constraints

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
ENET_100D	*	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
ENET_MDI	*	0.6 MM	?

SOURCE: Broadcom 5764-DS04-RDS Page 38

FireWire Interface Constraints

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
FW_110D	*	=110_OHM_DIFF	=110_OHM_DIFF	=110_OHM_DIFF	=110_OHM_DIFF	=110_OHM_DIFF	=110_OHM_DIFF

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
FW_TP	*	=3:1_SPACING	?

Ethernet Net Properties

ELECTRICAL_CONSTRAINT_SET	NET_TYPE PHYSICAL	NET_TYPE SPACING		
	ENET_50S	ENET_3X	BCM5764_CLK25M_XTALI	
	ENET_50S	ENET_3X	BCM5764_CLK25M_XTALO	
	ENET_50S	ENET_3X	ENET_RESET_L	30 36
ENET_MDI	ENET_100D	ENET_MDI	ENET_MDI_P<3..0>	36 37
	ENET_100D	ENET_MDI	ENET_MDI_N<3..0>	36 37
CR_DATA	ENET_50S	ENET_CR_DATA	ENET_CR_DATA<7..0>	
CR_DATA	ENET_50S	ENET_CR_DATA	ENET_CR_CMD	
CR_CLK	ENET_50S	ENET_CR_DATA	ENET_CR_CLK	
CR_DATA	ENET_50S	ENET_CR_DATA	SDCONN_DATA<7..0>	30 36
CR_DATA	ENET_50S	ENET_CR_DATA	SDCONN_CMD	30 36
CR_CLK	ENET_50S	ENET_CR_DATA	SDCONN_CLK	30 36
CR_CLK	ENET_50S	ENET_CR_DATA	SDCONN_CLK_L	

FireWire Net Properties

ELECTRICAL_CONSTRAINT_SET	NET_TYPE PHYSICAL	NET_TYPE SPACING		
FW_P0_TPA	FW_110D	FW_TP	FW_P0_TPA_P	38 40
FW_P0_TPA	FW_110D	FW_TP	FW_P0_TPA_N	38 40
FW_P0_TPB	FW_110D	FW_TP	FW_P0_TPB_P	38 40
FW_P0_TPB	FW_110D	FW_TP	FW_P0_TPB_N	38 40
FW_P1_TPA	FW_110D	FW_TP	FW_P1_TPA_P	38 40
FW_P1_TPA	FW_110D	FW_TP	FW_P1_TPA_N	38 40
FW_P1_TPB	FW_110D	FW_TP	FW_P1_TPB_P	38 40
FW_P1_TPB	FW_110D	FW_TP	FW_P1_TPB_N	38 40

Port 2 Not Used

SYNC_MASTER=K90I_MLB SYNC_DATE=02/15/2011

PAGE TITLE: Ethernet/FW Constraints

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DisplayPort Signal Constraints

NOTE: DisplayPort Physical/Spacing Constraints provided by Chipset or GPU page.

T29 I2C Signal Constraints

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
T29_I2C_55S	*	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=STANDARD	=STANDARD

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
T29_I2C	*	=2x_DIELECTRIC	?

T29 SPI Signal Constraints

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
T29_SPI_55S	*	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=STANDARD	=STANDARD

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
T29_SPI	*	=2x_DIELECTRIC	?

T29/DP Connector Signal Constraints

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
T29DP_80D	*	=80_OHM_DIFF	=80_OHM_DIFF	=80_OHM_DIFF	=80_OHM_DIFF	=80_OHM_DIFF	=80_OHM_DIFF
T29DP_100D	*	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
T29DP	*	=5x_DIELECTRIC	?

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
T29DP	TOP,BOTTOM	=7x_DIELECTRIC	?

SOURCE: Bill Cornelius’s T29 Routing Notes

T29/DP Net Properties

	ELECTRICAL_CONSTRAINT_SET	NET_TYPE PHYSICAL	SPACING		
J2	T29_R2D0	T29DP_80D	T29DP	T29_R2D_P<0>	75
J2	T29_R2D0	T29DP_80D	T29DP	T29_R2D_N<0>	75
J4	T29_R2D1	T29DP_80D	T29DP	T29_R2D_P<1>	75
J4	T29_R2D1	T29DP_80D	T29DP	T29_R2D_N<1>	75
J6		T29DP_80D	T29DP	T29_R2D_C_F_P<1..0>	
J7		T29DP_80D	T29DP	T29_R2D_C_F_N<1..0>	
J8	T29_D2R0	T29DP_100D	T29DP	T29_D2R_C_P<0>	75 76
J8	T29_D2R0	T29DP_100D	T29DP	T29_D2R_C_N<0>	75 76
J9	T29_D2R1	T29DP_100D	T29DP	T29_D2R_C_P<1>	75 76
J10	T29_D2R1	T29DP_100D	T29DP	T29_D2R_C_N<1>	75 76
J11		T29DP_100D	T29DP	T29DPA_D2R1_AUXCH_P	76
J12		T29DP_100D	T29DP	T29DPA_D2R1_AUXCH_N	76
J13		T29DP_80D	T29DP	DP_SDRVA_ML_C_P<3..0>	75
J15		T29DP_80D	T29DP	DP_SDRVA_ML_C_N<3..0>	75
J14		T29DP_80D	T29DP	DP_SDRVA_ML_R_P<3..0>	75
J17		T29DP_80D	T29DP	DP_SDRVA_ML_R_N<3..0>	75
J16	DP_SDRVA_ML_EVEN	T29DP_80D	T29DP	DP_SDRVA_ML_P<2..0:2>	75 83
J18	DP_SDRVA_ML_EVEN	T29DP_80D	T29DP	DP_SDRVA_ML_N<2..0:2>	75 83
J19	DP_SDRVA_ML_ODD	T29DP_80D	T29DP	DP_SDRVA_ML_P<3..1:2>	75
J20	DP_SDRVA_ML_ODD	T29DP_80D	T29DP	DP_SDRVA_ML_N<3..1:2>	75
J21	DP_SDRVA_AUXCH	T29DP_80D	T29DP	DP_SDRVA_AUXCH_P	75
J22	DP_SDRVA_AUXCH	T29DP_80D	T29DP	DP_SDRVA_AUXCH_N	75
J23		T29DP_80D	T29DP	DP_SDRVA_AUXCH_C_P	75
J24		T29DP_80D	T29DP	DP_SDRVA_AUXCH_C_N	75
J25		T29DP_80D	T29DP	T29DPA_ML_P<3..0>	75 76
J26		T29DP_80D	T29DP	T29DPA_ML_N<3..0>	75 76
J27		T29DP_80D	T29DP	T29DPA_ML_C_P<3..0>	75 76
J28		T29DP_80D	T29DP	T29DPA_ML_C_N<3..0>	75 76
J29		T29DP_80D	T29DP	DP_A_EXT_AUXCH_P	75 76
J30		T29DP_80D	T29DP	DP_A_EXT_AUXCH_N	75 76
J31	T29_R2D2	T29DP_80D	T29DP	T29_R2D_P<2>	
J32	T29_R2D2	T29DP_80D	T29DP	T29_R2D_N<2>	
J34	T29_R2D3	T29DP_80D	T29DP	T29_R2D_P<3>	
J33	T29_R2D3	T29DP_80D	T29DP	T29_R2D_N<3>	
J35		T29DP_80D	T29DP	T29_R2D_C_F_P<3..2>	
J36		T29DP_80D	T29DP	T29_R2D_C_F_N<3..2>	
J37	T29_D2R2	T29DP_100D	T29DP	T29_D2R_C_P<2>	
J39	T29_D2R2	T29DP_100D	T29DP	T29_D2R_C_N<2>	
J38	T29_D2R3	T29DP_100D	T29DP	T29_D2R_C_P<3>	
J40	T29_D2R3	T29DP_100D	T29DP	T29_D2R_C_N<3>	
J41		T29DP_100D	T29DP	T29DPB_D2R3_AUXCH_P	
J42		T29DP_100D	T29DP	T29DPB_D2R3_AUXCH_N	
J43		T29DP_80D	T29DP	DP_SDRVB_ML_C_P<3..0>	
J44		T29DP_80D	T29DP	DP_SDRVB_ML_C_N<3..0>	
J46		T29DP_80D	T29DP	DP_SDRVB_ML_R_P<3..0>	
J45		T29DP_80D	T29DP	DP_SDRVB_ML_R_N<3..0>	
J47	DP_SDRVB_ML_EVEN	T29DP_80D	T29DP	DP_SDRVB_ML_P<2..0:2>	83
J48	DP_SDRVB_ML_EVEN	T29DP_80D	T29DP	DP_SDRVB_ML_N<2..0:2>	83
J49	DP_SDRVB_ML_ODD	T29DP_80D	T29DP	DP_SDRVB_ML_P<3..1:2>	
J50	DP_SDRVB_ML_ODD	T29DP_80D	T29DP	DP_SDRVB_ML_N<3..1:2>	
J51	DP_SDRVB_AUXCH	T29DP_80D	T29DP	DP_SDRVB_AUXCH_P	
J52	DP_SDRVB_AUXCH	T29DP_80D	T29DP	DP_SDRVB_AUXCH_N	
J53		T29DP_80D	T29DP	DP_SDRVB_AUXCH_C_P	
J54		T29DP_80D	T29DP	DP_SDRVB_AUXCH_C_N	
J55		T29DP_80D	T29DP	T29DPB_ML_P<3..0>	
J56		T29DP_80D	T29DP	T29DPB_ML_N<3..0>	
J57		T29DP_80D	T29DP	T29DPB_ML_C_P<3..0>	
J58		T29DP_80D	T29DP	T29DPB_ML_C_N<3..0>	
J59		T29DP_80D	T29DP	DP_B_EXT_AUXCH_P	
J60		T29DP_80D	T29DP	DP_B_EXT_AUXCH_N	

Only used on dual-port hosts.

T29 IC Net Properties

	ELECTRICAL_CONSTRAINT_SET	NET_TYPE PHYSICAL	SPACING		
J62		DP_85D	DP_PCH_TX	DP_T29SNK0_ML_C_P<3..0>	8 33
J61		DP_85D	DP_PCH_TX	DP_T29SNK0_ML_C_N<3..0>	8 33
J63	DP_T29SNK0_ML	DP_85D	DP_PCH_TX	DP_T29SNK0_ML_P<3..0>	33
J64	DP_T29SNK0_ML	DP_85D	DP_PCH_TX	DP_T29SNK0_ML_N<3..0>	33
J65		DP_85D	DP_PCH	DP_T29SNK0_AUXCH_C_P	8 33
J66		DP_85D	DP_PCH	DP_T29SNK0_AUXCH_C_N	8 33
J67	DP_T29SNK0_AUXCH	DP_85D	DP_PCH	DP_T29SNK0_AUXCH_P	33
J68	DP_T29SNK0_AUXCH	DP_85D	DP_PCH	DP_T29SNK0_AUXCH_N	33
J69		DP_85D	DP_PCH_TX	DP_T29SNK1_ML_C_P<3..0>	8 33
J70		DP_85D	DP_PCH_TX	DP_T29SNK1_ML_C_N<3..0>	8 33
J71	DP_T29SNK1_ML	DP_85D	DP_PCH_TX	DP_T29SNK1_ML_P<3..0>	33
J72	DP_T29SNK1_ML	DP_85D	DP_PCH_TX	DP_T29SNK1_ML_N<3..0>	33
J74		DP_85D	DP_PCH	DP_T29SNK1_AUXCH_C_P	8 33
J73		DP_85D	DP_PCH	DP_T29SNK1_AUXCH_C_N	8 33
J75	DP_T29SNK1_AUXCH	DP_85D	DP_PCH	DP_T29SNK1_AUXCH_P	33
J76	DP_T29SNK1_AUXCH	DP_85D	DP_PCH	DP_T29SNK1_AUXCH_N	33
J77		DP_85D	DISPLAYPORT	DP_T29SRC_ML_C_P<3..0>	
J78		DP_85D	DISPLAYPORT	DP_T29SRC_ML_C_N<3..0>	
J79		DP_85D	DISPLAYPORT	DP_T29SRC_AUXCH_C_P	
J80		DP_85D	DISPLAYPORT	DP_T29SRC_AUXCH_C_N	
J81	T29_I2C_55S	T29_I2C		I2C_T29_SCL	33 48
J82	T29_I2C_55S	T29_I2C		I2C_T29_SDA	33 48
J83	T29_SPI_CLK	T29_SPI_55S	T29_SPI	T29_SPI_CLK	33
J84	T29_SPI_MOSI	T29_SPI_55S	T29_SPI	T29_SPI_MOSI	33
J85	T29_SPI_MISO	T29_SPI_55S	T29_SPI	T29_SPI_MISO	33
J86	T29_SPI_CS_L	T29_SPI_55S	T29_SPI	T29_SPI_CS_L	33
J87		T29DP_80D	T29DP	T29_R2D_C_P<3..0>	8 33 75
J88		T29DP_80D	T29DP	T29_R2D_C_N<3..0>	8 33 75
J89		T29DP_100D	T29DP	T29_D2R_P<3..0>	8 33 75
J90		T29DP_100D	T29DP	T29_D2R_N<3..0>	8 33 75

Only used on hosts supporting T29 video-in

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PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
1TO1_DIFFPAIR	*	=STANDARD	=STANDARD	=STANDARD	=STANDARD	0.1 MM	0.1 MM

SMC SMBus Net Properties

ELECTRICAL_CONSTRAINT_SET	NET_TYPE: PHYSICAL	NET_TYPE: SPACING		
SMBUS_SMC_A_S3_SCL	SMB_50S	SMB	SMBUS_SMC_2_S3_SCL	6 45 48
SMBUS_SMC_A_S3_SDA	SMB_50S	SMB	SMBUS_SMC_2_S3_SDA	6 45 48
SMBUS_SMC_B_S0_SCL	SMB_50S	SMB	SMBUS_SMC_1_S0_SCL	45 48
SMBUS_SMC_B_S0_SDA	SMB_50S	SMB	SMBUS_SMC_1_S0_SDA	45 48
SMBUS_SMC_B_S0_SCL	SMB_50S	SMB	SMBUS_SMC_0_S0_SCL	45 48
SMBUS_SMC_B_S0_SDA	SMB_50S	SMB	SMBUS_SMC_0_S0_SDA	45 48
SMBUS_SMC_BSA_SCL	SMB_50S	SMB	SMBUS_SMC_5_G3_SCL	6 45 48
SMBUS_SMC_BSA_SDA	SMB_50S	SMB	SMBUS_SMC_5_G3_SDA	6 45 48
SMBUS_SMC_MGMT_SCL	SMB_50S	SMB	SMBUS_SMC_3_SCL	45 48
SMBUS_SMC_MGMT_SDA	SMB_50S	SMB	SMBUS_SMC_3_SDA	45 48

SMBus Charger Net Properties

ELECTRICAL_CONSTRAINT_SET	NET_TYPE: PHYSICAL	NET_TYPE: SPACING		
CHGR_CSI	1TO1_DIFFPAIR		CHGR_CSI_P	64
	1TO1_DIFFPAIR		CHGR_CSI_N	64
CHGR_CSO	1TO1_DIFFPAIR		CHGR_CSO_P	64
	1TO1_DIFFPAIR		CHGR_CSO_N	64

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PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
SENSE_1TO1_55S	*	=1:1_DIFFPAIR	=5S_OHM_SE	=5S_OHM_SE	=5S_OHM_SE	=1:1_DIFFPAIR	=1:1_DIFFPAIR
THERM_1TO1_55S	*	=1:1_DIFFPAIR	=5S_OHM_SE	=5S_OHM_SE	=5S_OHM_SE	=1:1_DIFFPAIR	=1:1_DIFFPAIR
DIFFPAIR	*	=1:1_DIFFPAIR			=1:1_DIFFPAIR	=1:1_DIFFPAIR	=1:1_DIFFPAIR

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
SENSE	*	=2:1_SPACING	?
THERM	*	=2:1_SPACING	?
AUDIO	*	=2:1_SPACING	?

NET_SPACING_TYPE1	NET_SPACING_TYPE2	AREA_TYPE	SPACING_RULE_SET
CPU_COMP	GND	*	GND_P2MM
CPU_VCCSENSE	GND	*	GND_P2MM

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
ENETCONN	*	25 MILS	?

NET_SPACING_TYPE1	NET_SPACING_TYPE2	AREA_TYPE	SPACING_RULE_SET
ENET_MDI	GND	*	GND_P2MM

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
GND	*	=STANDARD	?

NET_SPACING_TYPE1	NET_SPACING_TYPE2	AREA_TYPE	SPACING_RULE_SET
GND	CLK_PCIE	*	GND_P2MM
GND	PCIE*	*	GND_P2MM
GND	SATA*	*	GND_P2MM
GND	USB*	*	GND_P2MM
SB_POWER	CLK_PCIE	*	PWR_P2MM
SB_POWER	SATA*	*	PWR_P2MM
SB_POWER	SATA*	*	PWR_P2MM

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
GND_P2MM	*	0.20 MM	1000
PWR_P2MM	*	0.20 MM	1000

NET_SPACING_TYPE1	NET_SPACING_TYPE2	AREA_TYPE	SPACING_RULE_SET
MEM_CLK	GND	*	GND_P2MM
MEM_CMD	GND	*	GND_P2MM
MEM_CTRL	GND	*	GND_P2MM
MEM_DATA	GND	*	GND_P2MM
MEM_DQS	GND	*	GND_P2MM

NET_SPACING_TYPE1	NET_SPACING_TYPE2	AREA_TYPE	SPACING_RULE_SET
GND	LVDS*	*	GND_P2MM

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
MEM_40S OVERRIDE	* OVERRIDE	OVERRIDE	OVERRIDE	0.09 MM OVERRIDE	400 MIL OVERRIDE	OVERRIDE	OVERRIDE
MEM_72D OVERRIDE	* OVERRIDE	OVERRIDE	OVERRIDE	0.09 MM OVERRIDE	400 MIL OVERRIDE	OVERRIDE	OVERRIDE
MEM_37S OVERRIDE	* OVERRIDE	OVERRIDE	OVERRIDE	0.09 MM OVERRIDE	400 MIL OVERRIDE	OVERRIDE	OVERRIDE
MEM_85D OVERRIDE	* OVERRIDE	OVERRIDE	OVERRIDE	0.09 MM OVERRIDE	400 MIL OVERRIDE	OVERRIDE	OVERRIDE
PCIE_85D OVERRIDE	* OVERRIDE	OVERRIDE	OVERRIDE	0.076 MM OVERRIDE	10 mm OVERRIDE	OVERRIDE	OVERRIDE
USB_85D OVERRIDE	TOP OVERRIDE	OVERRIDE	OVERRIDE	0.1 MM OVERRIDE	500 MIL OVERRIDE	OVERRIDE	OVERRIDE
CPU_27P4S OVERRIDE	TOP OVERRIDE	OVERRIDE	OVERRIDE	0.09 MM OVERRIDE	400 MIL OVERRIDE	OVERRIDE	OVERRIDE
CLK_PCIE_90D OVERRIDE	TOP OVERRIDE	OVERRIDE	OVERRIDE	0.09 MM OVERRIDE	400 MIL OVERRIDE	OVERRIDE	OVERRIDE

Memory Constraint Relaxations

Allow 0.127 mm necks for >0.127 mm lines for ARD fanout.

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
MEM_72D	BOTTOM			0.127 MM	6.35 MM		
MEM_85D	TOP			0.1 MM	6.35 MM		

J30 Specific Net Properties

ELECTRICAL_CONSTRAINT_SET	NET_TYPE PHYSICAL	NET_TYPE SPACING		
	ENET_100D	ENETCONN	ENETCONN_P<3..0>	37
	ENET_100D	ENETCONN	ENETCONN_N<3..0>	37
	SATA_90D	SATA_PCH_RX	SATA_ODD_D2R_C_P	6 41
	SATA_90D	SATA_PCH_RX	SATA_ODD_D2R_C_N	6 41
	SATA_90D	SATA3_PCH_RX	SATA_HDD_D2R_RDROUT_P	41
	SATA_90D	SATA3_PCH_RX	SATA_HDD_D2R_RDROUT_N	41
	SATA_90D	SATA3_PCH_TX	SATA_HDD_R2D_RDRIN_P	41
	SATA_90D	SATA3_PCH_TX	SATA_HDD_R2D_RDRIN_N	41
J291	SATA_90D	SATA3_PCH_TX	SATA_HDD_D2R_RDRIN_P	41
J290	SATA_90D	SATA3_PCH_TX	SATA_HDD_D2R_RDRIN_N	41
J293	SATA_90D	SATA3_PCH_TX	SATA_HDD_R2D_RDROUT_P	41
J292	SATA_90D	SATA3_PCH_TX	SATA_HDD_R2D_RDROUT_N	41
SENSE_DIFFPAIR	THERM_1TO1_55S	THERM	THMSNS_D1_P	51
	THERM_1TO1_55S	THERM	THMSNS_D1_N	51
J287 SENSE_DIFFPAIR	THERM_1TO1_55S	THERM	THMSNS_D2_P	51
J288	THERM_1TO1_55S	THERM	THMSNS_D2_N	51
SENSE_DIFFPAIR	THERM_1TO1_55S	THERM	T29_THERMD_P	51
	THERM_1TO1_55S	THERM	T29_THERMD_N	51
SENSE_DIFFPAIR	THERM_1TO1_55S	THERM	T29THMSNS_D2_P	
	THERM_1TO1_55S	THERM	T29THMSNS_D2_N	
SENSE_DIFFPAIR	SENSE_1TO1_55S	SENSE	ISNS_HS_COMPUTING_N	50
	SENSE_1TO1_55S	SENSE	ISNS_HS_COMPUTING_P	50
SENSE_DIFFPAIR	SENSE_1TO1_55S	SENSE	ISNS_HS_OTHER_N	50
	SENSE_1TO1_55S	SENSE	ISNS_HS_OTHER_P	50
SENSE_DIFFPAIR	SENSE_1TO1_55S	SENSE	CPUVCCIOS0_CS_N	49 70
	SENSE_1TO1_55S	SENSE	CPUVCCIOS0_CS_P	49 70
SENSE_DIFFPAIR	SENSE_1TO1_55S	SENSE	CPUIMVP_ISNS1_P	49 68 69
	SENSE_1TO1_55S	SENSE	CPUIMVP_ISNS1_N	49 69
SENSE_DIFFPAIR	SENSE_1TO1_55S	SENSE	CPUIMVP_ISNS2_P	49 68 69
	SENSE_1TO1_55S	SENSE	CPUIMVP_ISNS2_N	49 69
SENSE_DIFFPAIR	SENSE_1TO1_55S	SENSE	CPUIMVP_ISNS1G_P	49 69
	SENSE_1TO1_55S	SENSE	CPUIMVP_ISNS1G_N	49 69
J311 SENSE_DIFFPAIR	SENSE_1TO1_55S	SENSE	CPUIMVP_ISNS2G_P	49 69
J310	SENSE_1TO1_55S	SENSE	CPUIMVP_ISNS2G_N	49 69
SENSE_DIFFPAIR	SENSE_1TO1_55S	SENSE	CPUIMVP_ISUM_R_P	49
	SENSE_1TO1_55S	SENSE	CPUIMVP_ISUM_R_N	49
SENSE_DIFFPAIR	SENSE_1TO1_55S	SENSE	CPUIMVP_ISUMG_R_P	49
	SENSE_1TO1_55S	SENSE	CPUIMVP_ISUMG_R_N	49
J322 SENSE_DIFFPAIR	SENSE_1TO1_55S	SENSE	CPUIMVP_ISNSG_P	49
J321	SENSE_1TO1_55S	SENSE	CPUIMVP_ISNSG_N	49
SENSE_DIFFPAIR	SENSE_1TO1_55S	SENSE	CPUIMVP_ISNS_P	49
	SENSE_1TO1_55S	SENSE	CPUIMVP_ISNS_N	49
J249 SENSE_DIFFPAIR	SENSE_1TO1_55S	SENSE	VCCSAS0_CS_P	65
J250	SENSE_1TO1_55S	SENSE	VCCSAS0_CS_N	65
J252 SENSE_DIFFPAIR	SENSE_1TO1_55S	SENSE	CPUIMVP_ISUMG_P	
J253	SENSE_1TO1_55S	SENSE	CPUIMVP_ISUMG_N	68 69
J251 SENSE_DIFFPAIR	SENSE_1TO1_55S	SENSE	CPU_THERMD_P	8 9
J254	SENSE_1TO1_55S	SENSE	CPU_THERMD_N	8 9
J256 SENSE_DIFFPAIR	SENSE_1TO1_55S	SENSE	ISNS_5V_S0_HDD_N	49
J255	SENSE_1TO1_55S	SENSE	ISNS_5V_S0_HDD_P	49
J281 SENSE_DIFFPAIR	SENSE_1TO1_55S	SENSE	ISNS_5V_S0_HDD_R_N	49
J282	SENSE_1TO1_55S	SENSE	ISNS_5V_S0_HDD_R_P	49
J283 SENSE_DIFFPAIR	SENSE_1TO1_55S	SENSE	ISNS_LCDBKLT_N	
J284	SENSE_1TO1_55S	SENSE	ISNS_LCDBKLT_P	
J292 SENSE_DIFFPAIR	SENSE_1TO1_55S	SENSE	ISNS_1V5_S3_DDR_P	49
J291	SENSE_1TO1_55S	SENSE	ISNS_1V5_S3_DDR_N	49
J310 SENSE_DIFFPAIR	SENSE_1TO1_55S	SENSE	ISNS_1V5_S3_DDR_R_P	49
J320	SENSE_1TO1_55S	SENSE	ISNS_1V5_S3_DDR_R_N	49
J293	LVDS_90D	LVDS_PCH_TX	LVDS_CONN_A_CLK_F_N	6 74
J294	LVDS_90D	LVDS_PCH_TX	LVDS_CONN_A_CLK_F_P	6 74

J30 Specific Net Properties

ELECTRICAL_CONSTRAINT_SET	NET_TYPE PHYSICAL	NET_TYPE SPACING		
PCIE_CLK100M_AP	CLK_PCIE_90D	CLK_PCIE	PCIE_CLK100M_AP_CONN_P	6 32
	CLK_PCIE_90D	CLK_PCIE	PCIE_CLK100M_AP_CONN_N	6 32
	1TO1_DIFFPAIR		CHGR_CSI_R_P	64
	1TO1_DIFFPAIR		CHGR_CSI_R_N	64
	1TO1_DIFFPAIR		CHGR_CSO_R_P	64
	1TO1_DIFFPAIR		CHGR_CSO_R_N	64
SPK_OUT	DIFFPAIR	AUDIO	SPKRAMP_L_P_OUT	6 60 61
SPK_OUT	DIFFPAIR	AUDIO	SPKRAMP_L_N_OUT	6 60 61
SPK_OUT	DIFFPAIR	AUDIO	SPKRAMP_SUB_P_OUT	6 60 61
SPK_OUT	DIFFPAIR	AUDIO	SPKRAMP_SUB_N_OUT	6 60 61
SPK_OUT	DIFFPAIR	AUDIO	SPKRAMP_R_P_OUT	6 60 61
SPK_OUT	DIFFPAIR	AUDIO	SPKRAMP_R_N_OUT	6 60 61
J300 AUD_DIFF	1TO1_DIFFPAIR	AUDIO	SSM2315_SUB_N	60
J300 AUD_DIFF	1TO1_DIFFPAIR	AUDIO	SSM2315_SUB_P	60
J302 AUD_DIFF	1TO1_DIFFPAIR	AUDIO	SSM2315_L_N	60
J303 AUD_DIFF	1TO1_DIFFPAIR	AUDIO	SSM2315_L_P	60
J304 AUD_DIFF	1TO1_DIFFPAIR	AUDIO	SSM2315_R_N	60
J305 AUD_DIFF	1TO1_DIFFPAIR	AUDIO	SSM2315_R_P	60
J306 AUD_DIFF	1TO1_DIFFPAIR	AUDIO	AUD_LO2_N_R	57 60
J307 AUD_DIFF	1TO1_DIFFPAIR	AUDIO	AUD_LO2_P_R	57 60
J308 AUD_DIFF	1TO1_DIFFPAIR	AUDIO	AUD_LO1_N_R	57 60
J310 AUD_DIFF	1TO1_DIFFPAIR	AUDIO	AUD_LO1_P_R	57 60
J311 AUD_DIFF	1TO1_DIFFPAIR	AUDIO	AUD_LO2_N_L	57 60
J309 AUD_DIFF	1TO1_DIFFPAIR	AUDIO	AUD_LO2_P_L	57 60
J313 AUD_DIFF	1TO1_DIFFPAIR	AUDIO	SPKRAMP_INL_P	60
J312 AUD_DIFF	1TO1_DIFFPAIR	AUDIO	SPKRAMP_INL_N	60
J315 AUD_DIFF	1TO1_DIFFPAIR	AUDIO	SPKRAMP_INR_P	60
J314 AUD_DIFF	1TO1_DIFFPAIR	AUDIO	SPKRAMP_INR_N	60
J316 AUD_DIFF	1TO1_DIFFPAIR	AUDIO	SPKRAMP_INSUB_P	60
J316 AUD_DIFF	1TO1_DIFFPAIR	AUDIO	SPKRAMP_INSUB_N	60
	USB_85D	USB	USB_TPAD_R_P	53
	USB_85D	USB	USB_TPAD_R_N	53
		SB_POWER	PP3V3_S5	6 7
		SB_POWER	PP3V3_S0	6 7
		SB_POWER	PP1V5_S3RS0	6 7
		GND	GND	

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K90i Board-Specific Spacing & Physical Constraints

BOARD LAYERS	BOARD AREAS	BOARD UNITS (MIL or MM)	ALLEGRO VERSION
TOP,ISL2,ISL3,ISL4,ISL5,ISL6,ISL7,ISL8,ISL9,ISL10,ISL11,BOTTOM	NO_TYPE,BGA	MM	16.2

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
DEFAULT	*	Y	=50_OHM_SE	=50_OHM_SE	10 MM	0 MM	0 MM
STANDARD	*	Y	=DEFAULT	=DEFAULT	10 MM	=DEFAULT	=DEFAULT

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
50_OHM_SE	TOP,BOTTOM	Y	0.110 MM	0.090 MM			
50_OHM_SE	*	Y	0.080 MM	0.080 MM	=STANDARD	=STANDARD	=STANDARD

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
40_OHM_SE	TOP,BOTTOM	Y	0.165 MM	0.165 MM			
40_OHM_SE	ISL10	N	0.126 MM	0.126 MM	=STANDARD	=STANDARD	=STANDARD
40_OHM_SE	ISL3,ISL4,ISL9	Y	0.126 MM	0.126 MM	=STANDARD	=STANDARD	=STANDARD
40_OHM_SE	*	N	=STANDARD	=STANDARD	=STANDARD	=STANDARD	=STANDARD

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
37_OHM_SE	TOP,BOTTOM	Y	0.190 MM	0.1 MM			
37_OHM_SE	ISL10	N	0.145 MM	0.1 MM	=STANDARD	=STANDARD	=STANDARD
37_OHM_SE	ISL3,ISL4,ISL9	Y	0.145 MM	0.1 MM	=STANDARD	=STANDARD	=STANDARD
37_OHM_SE	*	N	=STANDARD	=STANDARD	=STANDARD	=STANDARD	=STANDARD

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
27P4_OHM_SE	TOP,BOTTOM	Y	0.310 MM	0.2 MM			
27P4_OHM_SE	*	Y	0.235 MM	0.2 MM	=STANDARD	=STANDARD	=STANDARD

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
55_OHM_SE	TOP,BOTTOM	Y	0.090 MM	0.090 MM			
55_OHM_SE	*	Y	0.070 MM	0.070 MM	=STANDARD	=STANDARD	=STANDARD

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
72_OHM_DIFF	*	N	=STANDARD	=STANDARD	=STANDARD	=STANDARD	=STANDARD
72_OHM_DIFF	ISL3,ISL4,ISL9	Y	0.140 MM	0.140 MM		0.190 MM	0.190 MM
72_OHM_DIFF	ISL10	N	0.140MM	0.140 MM		0.190 MM	0.190 MM
72_OHM_DIFF	TOP,BOTTOM	Y	0.175 MM	0.175 MM		0.200 MM	0.200 MM

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
85_OHM_DIFF	*	N	=STANDARD	=STANDARD	=STANDARD	=STANDARD	=STANDARD
85_OHM_DIFF	ISL3,ISL4	Y	0.101 MM	0.1 MM		0.170 MM	0.170 MM
85_OHM_DIFF	ISL9,ISL10	Y	0.101 MM	0.1 MM		0.170 MM	0.170 MM
85_OHM_DIFF	TOP,BOTTOM	Y	0.125 MM	0.1 MM		0.190 MM	0.190 MM

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
90_OHM_DIFF	*	N	=STANDARD	=STANDARD	=STANDARD	=STANDARD	=STANDARD
90_OHM_DIFF	ISL3,ISL4	Y	0.091 MM	0.091 MM		0.180 MM	0.180 MM
90_OHM_DIFF	ISL9,ISL10	Y	0.091 MM	0.091 MM		0.180 MM	0.180 MM
90_OHM_DIFF	TOP,BOTTOM	Y	0.111 MM	0.111 MM		0.200 MM	0.200 MM

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
100_OHM_DIFF	*	N	=STANDARD	=STANDARD	=STANDARD	=STANDARD	=STANDARD
100_OHM_DIFF	ISL3,ISL4	Y	0.076 MM	0.076 MM		0.250 MM	0.250 MM
100_OHM_DIFF	ISL9,ISL10	Y	0.076 MM	0.076 MM		0.250 MM	0.250 MM
100_OHM_DIFF	TOP,BOTTOM	Y	0.085 MM	0.085 MM		0.200 MM	0.200 MM

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
110_OHM_DIFF	*	N	=STANDARD	=STANDARD	=STANDARD	=STANDARD	=STANDARD
110_OHM_DIFF	ISL3,ISL4	Y	0.068 MM	0.068 MM		0.250 MM	0.250 MM
110_OHM_DIFF	ISL9,ISL10	Y	0.068 MM	0.068 MM		0.250 MM	0.250 MM
110_OHM_DIFF	TOP,BOTTOM	Y	0.081 MM	0.081 MM		0.250 MM	0.250 MM

NOTE: These are Intel recommended impedances for PEG, unused on K90i.

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
48_OHM_SE	TOP,BOTTOM	Y	0.165 MM	0.165 MM			
48_OHM_SE	*	Y	0.090 MM	0.090 MM	=STANDARD	=STANDARD	=STANDARD

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
80_OHM_DIFF	*	N	=STANDARD	=STANDARD	=STANDARD	=STANDARD	=STANDARD
80_OHM_DIFF	ISL3,ISL4	Y	0.115 MM	0.115 MM		0.180 MM	0.180 MM
80_OHM_DIFF	ISL9,ISL10	Y	0.115 MM	0.115 MM		0.180 MM	0.180 MM
80_OHM_DIFF	TOP,BOTTOM	Y	0.140 MM	0.140 MM		0.190 MM	0.190 MM

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
DEFAULT	*	0.1 MM	?
STANDARD	*	=DEFAULT	?
BGA_P1MM	*	=DEFAULT	?
BGA_P2MM	*	=DEFAULT	?

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
1.5:1_SPACING	*	0.15 MM	?
2:1_SPACING	*	0.2 MM	?
2.5:1_SPACING	*	0.25 MM	?
3:1_SPACING	*	0.3 MM	?
4:1_SPACING	*	0.4 MM	?

NET_SPACING_TYPE1	NET_SPACING_TYPE2	AREA_TYPE	SPACING_RULE_SET
*	*	BGA	BGA_P1MM
MEM_CLK	*	BGA	BGA_P2MM
CLK_PCIE	*	BGA	BGA_P2MM
CLK_SLOW	*	BGA	BGA_P2MM

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
2X_DIELECTRIC	*	0.140 MM	?
3X_DIELECTRIC	*	0.210 MM	?
4X_DIELECTRIC	*	0.280 MM	?
5X_DIELECTRIC	*	0.350 MM	?
6X_DIELECTRIC	*	0.420 MM	?
7X_DIELECTRIC	*	0.490 MM	?

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
1:1_DIFFPAIR	*	Y	=STANDARD	=STANDARD	=STANDARD	0.1 MM	0.1 MM

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
85_DIFF_BGA	*	=85_OHM_DIFF	=85_OHM_DIFF	=85_OHM_DIFF	=85_OHM_DIFF	=85_OHM_DIFF	=85_OHM_DIFF
85_DIFF_BGA	ISL3,ISL4	Y	0.075 MM	0.075 MM		0.125 MM	0.125 MM
85_DIFF_BGA	ISL9,ISL10	Y	0.075 MM	0.075 MM		0.125 MM	0.125 MM

NOTE: 85_DIFF_BGA is 85-ohms differential impedance on outer layers and 80-ohms on inner layers.

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
90_DIFF_BGA	*	=90_OHM_DIFF	=90_OHM_DIFF	=90_OHM_DIFF	=90_OHM_DIFF	=90_OHM_DIFF	=90_OHM_DIFF
90_DIFF_BGA	ISL3,ISL4	Y	0.075 MM	0.075 MM		0.125 MM	0.125 MM
90_DIFF_BGA	ISL9,ISL10	Y	0.075 MM	0.075 MM		0.125 MM	0.125 MM

NOTE: 90_DIFF_BGA is 90-ohms differential impedance on outer layers and 85-ohms on inner layers.

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
100_DIFF_BGA	*	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF
100_DIFF_BGA	ISL3,ISL4	Y	0.075 MM	0.075 MM		0.125 MM	0.125 MM
100_DIFF_BGA	ISL9,ISL10	Y	0.075 MM	0.075 MM		0.125 MM	0.125 MM

NOTE: 100_DIFF_BGA is 100-ohms differential impedance on outer layers and 95-ohms on inner layers.

NOTE: 110_DIFF is 110-ohms differential impedance on outer layers and 105-ohms on inner layers.

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