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.

X1783 MLB-TKSB

REV	ECN	DESCRIPTION OF REVISION	CK APPD / DATE
2	0018963445	ENGINEERING RELEASED	2019-07-29

LAST_MODIFICATION=Mon Jul 29 19:28:46 2019

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
051-05232	1	SCH,MLB-TKSB,X1783	SCH	CRITICAL	SCHEM
820-01958	1	PCBF,MLB-TKSB,X1783	MLB	CRITICAL	PCBF

J230GHUB = https://github.pie.apple.com/MobileMacIX/j230_hw/blob/master/

RULER_RULE_SET=RIGID_2016 — MANUFACTURING CONFIGURATION — TABLE_REV_NUMBER=1

DIELECTRIC BASED SPACING RULES				DEFAULT SPACING MULTIPLES	VOID SPACE RATIO
MULTIPLES	SMDPIN MAX(UM)	MVIA MAX(UM)	SMDPIN2SMDPIN MAX(UM)		
1,1.5,1.75,2.6,2-7,7.5,8,9,10	80	80	80	1	2

LAYERS	MINIMUM CU WIDTH RATIO	MINIMUM CU SPACING RATIO	MINIMUM TO DEFAULT RATIO
TOP,BOTTOM	2.8	2.8	1.0
ISL2-ISL3,ISL6,ISL9,ISL12-ISL13	3.125	3.125	1.2
ISL4,ISL11	3.125	3.125	1.2
ISL5,ISL10	2.272	2.272	1.2
ISL7,ISL8	2.23	2.23	1.3

DRAWING TITLE: SCHEM,MLB-TKSB,X1783

Apple Inc.

DRAWING NUMBER: 051-05232 | SIZE: D
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Module Parts

CPU

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
337S00749	1	CPU,ICL-YN,QSLN,D1,64EU,1.0,1.1,BGA1044	U0500	CRITICAL	CPU_ICLY_P2:BEST
337S00750	1	CPU,ICL-YN,QSLQ,D1,48EU,0.7,1.05,BGA1044	U0500	CRITICAL	CPU_ICLY_P2:GOOD
998-17650	1	INTERPOSER,VTT ADAPTER,ICL-YN,BGA1044	U0500	CRITICAL	CPU_ICLY:INTERPOSER
337S00766	1	CPU,ICLYN,QSEQ,EES,D2,1,1.1,BGA1044	U0500	CRITICAL	CPU_ICLY:BEST
337S00767	1	CPU,ICLYN,QSES,EES,D2,.7,1.05,BGA1044	U0500	CRITICAL	CPU_ICLY:BEDRE
337S00765	1	CPU,ICLYN,QSVZ,EES,D2,1.1,.9,BGA1044	U0500	CRITICAL	CPU_ICLY:GOOD

NOTE: BEDRE is Danish for BETTER.

TBT Burnside Bridge

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
998-13316	2	IC,BURNSIDE BRIDGE,USB/TB RETIMER,BGA105	U2800,U2900	CRITICAL	TBT_BB:A0
338S00503	2	IC,TBT,BURNSIDE BRDGE,QURW,ES2,A1,BGA105	U2800,U2900	CRITICAL	TBT_BB:A1
338S00508	2	IC,TBT,BURNSIDE BRDGE,ES2,QS,A1,BGA105	U2800,U2900	CRITICAL	TBT_BB:QSA1
338S00561	2	IC,TBT,BURNSIDE BRDGE,PRQ,A1,BGA105	U2800,U2900	CRITICAL	TBT_BB:PRQA1

Ace2

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
353S01826	2	IC,CD3217,ACE2,B1,USB PWR SW W/HV,BGA123	U3100,U3200	CRITICAL	ACE2:B1_BGA
353S01960	2	IC,CD3217,ACE2,B2,USB PWR SW W/HV,BGA123	U3100,U3200	CRITICAL	ACE2:B2_BGA
353S02158	2	IC,CD3217,ACE2,B1,USB PWR SW W/HV,BGA123	U3100,U3200	CRITICAL	ACE2:B12_BGA

SOC

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
339S00370	1	POP,GIBRALTAR+1GB 20NM,M,B0,SCK,CSP1406	U3900	CRITICAL	SOC:B0_1G

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
339S00371	339S00370	SOC:B0_1G	ALL	Hynix 1GB SCK
339S00375	339S00370	SOC:B0_1G	ALL	Micron 1GB SCK
339S00376	339S00370	SOC:B0_1G	ALL	Hynix 1GB ATK

339S00372	1	POP,GIBRALTAR+2GB 20NM,M,B0,SCK,CSP1406	U3900	CRITICAL	SOC:B0_2G

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
339S00373	339S00372	SOC:B0_2G	ALL	Hynix 2GB SCK
339S00377	339S00372	SOC:B0_2G	ALL	Micron 2GB SCK
339S00378	339S00372	SOC:B0_2G	ALL	Hynix 2GB ATK

PMU

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
338S00267	1	IC,PMU,CALPE,D2249A0,OTP-AI,CSP324,0.4P	U7800	CRITICAL	PMU:A0_A

Wireless

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
339S00616	1	MODULE,WIFI/BT,SAPPORO,ES3.1,M,LGA451	U3701	CRITICAL	WIRELESS:P0

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
998-16405	339S00616	WIRELESS:P0	ALL	USI Wireless Module (ES2)

339S00616	1	MODULE,WIFI/BT,SAPPORO,ES3.1,M,LGA451	U3701	CRITICAL	WIRELESS:P1

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
339S00628	339S00616	WIRELESS:P1	ALL	USI Wireless Module (ES2)

339S00616	1	MODULE,WIFI/BT,SAPPORO,ES3.1,M,LGA451	U3701	CRITICAL	WIRELESS:P1B

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
339S00632	339S00616	WIRELESS:P1B	ALL	USI Wireless Module (ES3.1)

NAND - Landing 0

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
998-17175	1	NAND,3DV4,64GBT,S4E,256G,H,SUBX,SLGA110	U8600	CRITICAL	NAND_L0:ITLC_128G_HY

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
998-17176	998-17175	NAND_L0:ITLC_128G_HY	U8600	HY 64G Substrate 2 L0

998-16394	1	NAND,3DV4,64GBT,S4E,256G,T,SUB X,SLGA110	U8600	CRITICAL	NAND_L0:ITLC_128G_TO

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
998-16395	998-16394	NAND_L0:ITLC_128G_TO	U8600	TO 64G Substrate 2 L0

335S00416	1	NAND,3DV5,64GBT,S4E,256G,SS,SLGA110	U8600	CRITIICAL	NAND_L0:ITLC_128G_SS
998-16396	1	NAND,3DV4,128GBT,S4E,256G,T,SUBX,SLGA110	U8600	CRITICAL	NAND_L0:ITLC_256G_TO

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
998-16397	998-16396	NAND_L0:ITLC_256G_TO	U8600	TO 128G Substrate 2 L0

998-16945	1	NAND,3DV4,128GBT,S4E,256G,SD,SUBX,BGA110	U8600	CRITICAL	NAND_L0:ITLC_256G_SD

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
998-16970	998-16945	NAND_L0:ITLC_256G_SD	U8600	SD 128G Substrate 2 L0

335S00378	1	NAND,3DV4,128GBT,S4E,256G,H,SLGA110	U8600	CRITICAL	NAND_L0:ITLC_256G_HY
998-16400	1	NAND,3DV4,256GBT,S4E,256G,T,SUBX,SLGA110	U8600	CRITICAL	NAND_L0:ITLC_512G_TO

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
998-16401	998-16400	NAND_L0:ITLC_512G_TO	U8600	TO 256G Substrate 2 L0

335S00397	1	NAND,3DV4,320GBT,XXX,S4E,256G,T,SLGA110	U8600	CRITICAL	NAND_L0:ITLC_512G_TO_P1
335S00408	1	NAND,3DV4,320GBT,XXX,S4E,256G,SD,SLGA110	U8600	CRITICAL	NAND_L0:ITLC_512G_SD
335S00391	1	NAND,3DV4,512GBT,XXX,S4E,256G,SD,SLGA110	U8600	CRITICAL	NAND_L0:ITLC_1P0T_SD
335S00380	1	NAND,3DV4,512GBT,S4E,256G,H,SLGA110	U8600	CRITICAL	NAND_L0:ITLC_1P0T_HY
335S00433	1	NAND,3DV4,1TBT,XXX,S4E,512G,SD,SLGA110	U8600	CRITICAL	NAND_L0:ITLC_2P0T_SD
335S00444	1	NAND,3DV5,1024GBT,S4E,512G,H,SLGA110	U8600	CRITICAL	NAND_L0:ITLC_2P0T_HY

NAND - Landing 1

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
998-17175	1	NAND,3DV4,64GBT,S4E,256G,H,SUBX,SLGA110	U8700	CRITICAL	NAND_L1:ITLC_128G_HY

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
998-17176	998-17175	NAND_L1:ITLC_128G_HY	U8700	HY 64G Substrate 2 L1

998-16394	1	NAND,3DV4,64GBT,S4E,256G,T,SUB X,SLGA110	U8700	CRITICAL	NAND_L1:ITLC_128G_TO

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
998-16395	998-16394	NAND_L1:ITLC_128G_TO	U8700	TO 64G Substrate 2 L1

335S00416	1	NAND,3DV5,64GBT,S4E,256G,SS,SLGA110	U8700	CRITICAL	NAND_L1:ITLC_128G_SS
998-16396	1	NAND,3DV4,128GBT,S4E,256G,T,SUBX,SLGA110	U8700	CRITICAL	NAND_L1:ITLC_256G_TO

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
998-16397	998-16396	NAND_L1:ITLC_256G_TO	U8700	TO 128G Substrate 2 L1

998-16945	1	NAND,3DV4,128GBT,S4E,256G,SD,SUBX,BGA110	U8700	CRITICAL	NAND_L1:ITLC_256G_SD

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
998-16970	998-16945	NAND_L0:ITLC_256G_SD	U8700	SD 128G Substrate 2 L1

335S00378	1	NAND,3DV4,128GBT,S4E,256G,H,SLGA110	U8700	CRITIICAL	NAND_L1:ITLC_256G_HY
335S00396	1	NAND,3DV4,256GBT,XXX,S4E,256G,T,SLGA110	U8700	CRITICAL	NAND_L1:ITLC_512G_SSUB_TO
998-16946	1	NAND,3DV4,256GBT,S4E,256G,SD,SUBX,BGA110	U8700	CRITICAL	NAND_L1:ITLC_512G_SD

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
998-16971	998-16946	NAND_L1:ITLC_512G_SD	U8700	SD 128G Substrate 2 L1

335S00391	1	NAND,3DV4,512GBT,XXX,S4E,256G,SD,SLGA110	U8700	CRITICAL	NAND_L1:ITLC_1P0T_SD
335S00380	1	NAND,3DV4,512GBT,S4E,256G,H,SLGA110	U8700	CRITICAL	NAND_L1:ITLC_1P0T_HY
335S00433	1	NAND,3DV4,1TBT,XXX,S4E,512G,SD,SLGA110	U8700	CRITICAL	NAND_L1:ITLC_2P0T_SD
335S00444	1	NAND,3DV5,1024GBT,S4E,512G,H,SLGA110	U8700	CRITICAL	NAND_L1:ITLC_2P0T_HY

DRAM

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
333S00137	2	IC,LPDDR4X-3733,32GBIT,18NM,S,BGA432	U2300,U2500	CRITICAL	DRAM:P1_SAMSUNG_8GB
333S00138	2	IC,LPDDR4X-3733,64GBIT,18NM,S,BGA432	U2300,U2500	CRITICAL	DRAM:P1_SAMSUNG_16GB
333S00221	2	IC,LPDDR4X-4266,32GBIT,16NM,S,BGA432	U2300,U2500	CRITICAL	DRAM:SAMSUNG_8GB
333S00222	2	IC,LPDDR4X-4266,64GBIT,16NM,S,BGA432	U2300,U2500	CRITICAL	DRAM:SAMSUNG_16GB
333S00214	2	IC,LPDDR4X-4266,32GBIT,19NM,H,BGA432	U2300,U2500	CRITICAL	DRAM:HYNIX_8GB
333S00215	2	IC,LPDDR4X-4266,64GBIT,19NM,H,BGA432	U2300,U2500	CRITICAL	DRAM:HYNIX_16GB
333S00170	2	IC,LPDDR4X-3733,32GBIT,18NM,BGA432	U2300,U2500	CRITICAL	DRAM:MICRON_8GB
333S00171	2	IC,LPDDR4X-3733,64GBIT,18NM,BGA432	U2300,U2500	CRITICAL	DRAM:MICRON_16GB

Programmables

TBT ROM

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
335S00133	1	IC,SPI SERIAL FLASH,8MBITS,3.0V,USON8	U3060	CRITICAL	TBT_ROM:BLANK

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
335S00232	335S00133	TBT_ROM:BLANK	U3060	rdar://problem/50598337

341S01282	1	IC,NVM (V14.1) PROTO-0,X1418	U3060	CRITICAL	TBT_ROM:P0
341S01314	1	ROM,TBT (V14.1.1) PROTO-0-2,X1418	U3060	CRITICAL	TBT_ROM:P0A
341S01315	1	ROM,TBT (VXXXXXX) PROTO-0-3,X1418	U3060	CRITICAL	TBT_ROM:P0B
341S01337	1	ROM,TBT (V14.4) PROTO-1,X1418	U3060	CRITICAL	TBT_ROM:P1
341S01410	1	ROM,BBR (VXXXX) PROTO-2,X1418	U3060	CRITICAL	TBT_ROM:P2
341S01450	1	ROM,BBR,ACE (V18.9) PROTO-3,X1418	U3060	CRITICAL	TBT_ROM:P3
341S01470	1	ROM,BBR,ACE (V29.3) PROTO-4A,X1783	U3060	CRITICAL	TBT_ROM:P4A
341S01515	1	ROM,BBR/ACE (VXXXX) PROTO-4,X1783	U3060	CRITICAL	TBT_ROM:P4B

BT ROM

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
335S00400	1	IC,SPI SERIAL FLASH,4M BIT,1.8V,USON8	U3750	CRITICAL	BT_ROM:BLANK
341S01260	1	ROM,BT SFLASH (VXX) PROTO-1,X1536	U3750	CRITICAL	BT_ROM:P0

Wifi ROM

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
335S00214	1	IC,EEPROM,SER,UWIRE,16K,1.8V,DFN8	U3710	CRITICAL	WIFI_ROM:BLANK
341S01087	1	IC,WIFI ROM (V00) WW1,X1421	U3710	CRITICAL	WIFI_ROM:P0
341S01394	1	ROM,WIFI (VXX) (NEW FOR DVT) WW1,X1536	U3710	CRITICAL	WIFI_ROM:P2

SOC ROM

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
335S00203	1	IC,FLASH,SERIAL,SPI,4MX8,1.8V,4X3MM,DFN8	U4770	CRITICAL	SOC_ROM:BLANK

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BOM Groups

BOM GROUP	BOM OPTIONS
MLB_COMMON	SCHEM,PCBF,ALTERNATE,COMMON,MLB_PROGPARTS,MLB_USBC,MLB_POWER,MLB_WIRELESS,MLB_MECH,MLB_MISC,MLB_TBT,MLB_TBT_OPTS,PROTO4
MLB_USBC	TBT_BB:PRQA1,ACE2:B12_BGA
MLB_PROGPARTS	BT_ROM:P0,SOC_ROM:BLANK,TBT_ROM:P4B,WIFI_ROM:P2,SE:DEV_SW_N
MLB_POWER	PMU:A0_A
MLB_WIRELESS	WIRELESS:P1B
MLB_MECH	BRACKET,SHLD_CAN_DRAM,SHLD_CAN_BSB,SHLD_FNC_SOC
MLB_MISC	BOARDID0,BOARDID1,BOARDID2,BOARDID3,BOARDID4,BOARDID5,SYSDET:FET,BOOTCFG0,RAMCFG3_L,RAMCFG4_L
MLB_TBT	BSB_X_PWR:SWSW_VOUTLV,BSB_T_PWR:SWSW_VOUTLV,BSB_PERST:PLTRST
MLB_TBT_OPTS	BSB_FORCE_PWR:ACE,BSB_GP6:BSB_S0
MLB_DESENSE	DES:INTER
MLB_CPUCFG	CPUCFG:STRAPS

See <rdar://problem/50175583> for BOARDID straps

https://confluence.sd.apple.com/display/EMBEDDEDPLATFORM/BOARD_ID+Allocation

Build Specific Groups

BOM GROUP	BOM OPTIONS
PROTO4	BOARDREV0

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
685-00329	1	COMMON PARTS,MLB-TKSB,X1783	CBOM	CRITICAL	CMN_PARTS_BOM
985-01143	1	DEV PARTS,MLB-TKSB,X1783	DEV1	CRITICAL	DEV_PARTS_BOM

NAND Configs

BOM GROUP	BOM OPTIONS
NANDCFG:ITLC_S4E_128G_HY	NAND_L0:ITLC_128G_HY,NAND_L1:ITLC_128G_HY,SOC:B0_1G,S4E,SSD_PWR:S4E
NANDCFG:ITLC_S4E_128G_TO	NAND_L0:ITLC_128G_TO,NAND_L1:ITLC_128G_TO,SOC:B0_1G,S4E,SSD_PWR:S4E
NANDCFG:ITLC_S4E_128G_SS	NAND_L0:ITLC_128G_SS,NAND_L1:ITLC_128G_SS,SOC:B0_1G,S4E,SSD_PWR:S4E
NANDCFG:ITLC_S4E_256G_TO	NAND_L0:ITLC_256G_TO,NAND_L1:ITLC_256G_TO,SOC:B0_1G,S4E,SSD_PWR:S4E
NANDCFG:ITLC_S4E_256G_SD	NAND_L0:ITLC_256G_SD,NAND_L1:ITLC_256G_SD,SOC:B0_1G,S4E,SSD_PWR:S4E
NANDCFG:ITLC_S4E_256G_HY	NAND_L0:ITLC_256G_HY,NAND_L1:ITLC_256G_HY,SOC:B0_1G,S4E,SSD_PWR:S4E
NANDCFG:ITLC_S4E_512G_TO	NAND_L0:ITLC_512G_TO_P1,NAND_L1:ITLC_512G_SSUB_TO,SOC:B0_1G,S4E,SSD_PWR:S4E
NANDCFG:ITLC_S4E_512G_SD	NAND_L0:ITLC_512G_SD,NAND_L1:ITLC_512G_SD,SOC:B0_1G,S4E,SSD_PWR:S4E
NANDCFG:ITLC_S4E_1P0T_SD	NAND_L0:ITLC_1P0T_SD,NAND_L1:ITLC_1P0T_SD,SOC:B0_2G,S4E,SSD_PWR:S4E
NANDCFG:ITLC_S4E_1P0T_HY	NAND_L0:ITLC_1P0T_HY,NAND_L1:ITLC_1P0T_HY,SOC:B0_2G,S4E,SSD_PWR:S4E
NANDCFG:ITLC_S4E_2P0T_SD	NAND_L0:ITLC_2P0T_SD,NAND_L1:ITLC_2P0T_SD,SOC:B0_2G,S4E,SSD_PWR:S4E
NANDCFG:ITLC_S4E_2P0T_HY	NAND_L0:ITLC_2P0T_HY,NAND_L1:ITLC_2P0T_HY,SOC:B0_2G,S4E,SSD_PWR:S4E

CPU DRAM SPD Straps

BOM GROUP	BOM OPTIONS
DRAMCFG:SAMSUNG_8GB	DRAM:SAMSUNG_8GB,RAMCFG0_L
DRAMCFG:SAMSUNG_16GB	DRAM:SAMSUNG_16GB,RAMCFG0_L,RAMCFG2_L
DRAMCFG:HYNIX_8GB	DRAM:HYNIX_8GB,RAMCFG0_L,RAMCFG1_L
DRAMCFG:HYNIX_16GB	DRAM:HYNIX_16GB,RAMCFG0_L,RAMCFG1_L,RAMCFG2_L
DRAMCFG:MICRON_8GB	DRAM:MICRON_8GB
DRAMCFG:MICRON_16GB	DRAM:MICRON_16GB,RAMCFG2_L

RAMCFGx strap is low if in table.

CPU DRAM CFG Chart

Vendor	CFG 1	CFG 0
Hynix	0	0
Samsung	1	0
Unused	0	1
Micron	1	1

Vendor	CFG 2
8GB	1
16GB	0

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Shield Cans

Mounting Bracket

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
806-22435	1	BRKT,MOUNTING,MLB,NK,X1766	BRKT1	CRITICAL	BRACKET

DRAM Shield Can

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
806-12387	1	SHIELD CAN,DRAM,X1030	SHLD1	CRITICAL	SHLD_CAN_DRAM

Burnside Bridge Shield Can

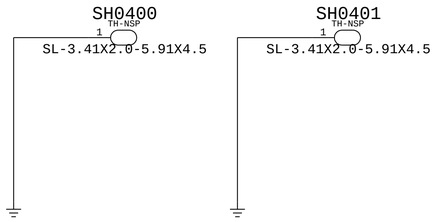
PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
806-19070	1	SHIELD CAN,BURNSIDE BRIDGE,X1419	SHLD3	CRITICAL	SHLD_CAN_BSB

SOC/NAND Shield Fence

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
806-19074	1	SHIELD FRAME,GIBRALTAR,X1419	SHLD4	CRITICAL	SHLD_FNC_SOC

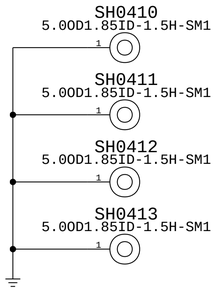
Mounting Holes

998-19374

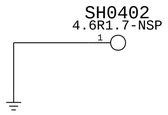


Heatsink Mounting Bosses

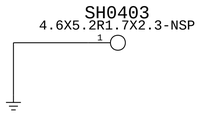
860-01043



998-11113

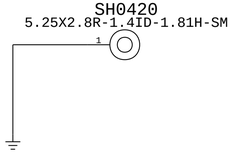


998-11114



Antenna Cowling Bosses

860-00974



BOM_COST_GROUP=MECHANICALS

PAGE TITLE: PD Parts

Apple Inc.

DRAWING NUMBER: 051-05232
SIZE: D
REVISION: 2.0.0
BRANCH: proto4b
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eDP Port Assignment:

Internal panel

CRITICAL
OMIT_TABLE

U0500
ICL_YN
BGA
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69	OUT	DP_INT_ML_C_P<3>	AF2	DDIA_TXP_3		
69	OUT	DP_INT_ML_C_N<3>	AE1	DDIA_TXN_3		
69	OUT	DP_INT_ML_C_P<2>	AH2	DDIA_TXP_2		
69	OUT	DP_INT_ML_C_N<2>	AG1	DDIA_TXN_2		
69	OUT	DP_INT_ML_C_P<1>	AF4	DDIA_TXP_1		
69	OUT	DP_INT_ML_C_N<1>	AE3	DDIA_TXN_1		
69	OUT	DP_INT_ML_C_P<0>	AG3	DDIA_TXP_0		
69	OUT	DP_INT_ML_C_N<0>	AH4	DDIA_TXN_0		
69	BI	DP_INT_AUXCH_C_P	AJ3	DDIA_AUX_P		
69	BI	DP_INT_AUXCH_C_N	AJ1	DDIA_AUX_N		
23 16 5	OUT	XDP_LSX_TBTA_R2P	CN17	GPP_E13/DDPA_CTRLCLK		
23 16 5	IN	XDP_LSX_TBTA_P2R	CR17	GPP_E14/DDPA_CTRLDATA		
23 16 5	OUT	XDP_LSX_TBTB_R2P	CM18	GPP_E15/DPPB_CTRLCLK/TBT_LSX1_TXD		
23 16 5	IN	XDP_LSX_TBTB_P2R	CL17	GPP_E16/DPPB_CTRLDATA/TBT_LSX1_RXD		
16		XDP_LSX_TBTC_R2P	CL19	GPP_E17/DPPC_CTRLCLK		
		NC_LSX_TBTC_P2R	CN19	GPP_E18/DPPC_CTRLDATA		
18	IN	PCH_BT_AUDIO_SYNC	CP36	GPP_A15/DDSP_HPDC/TIME_SYNC0		
18 5	IN	PCH_WLAN_AUDIO_SYNC	CN35	GPP_A16/DDSP_HPDB/TIME_SYNC1		
69 5	IN	DP_INT_HPD	CL35	GPP_A17/DDSP_HPDA		
69 5	OUT	EDP_PANEL_PWR_EN	CR35	EDP_VDDEN		
78 68 5	OUT	EDP_BKLT_EN	CN27	EDP_BKLTEN		
78 69	OUT	EDP_BKLT_PWM	CR29	EDP_BKLTCTL		
		NC_CPU_RSVD_H40	H40	RSVD_48		
		NC_DISP_UTILS	BU1	DISP_UTILS		
		DISP_RCOMP	AD2	DISP_RCOMP		
				TCP0_TX_P1	BD4	USBC_HSX_R2D_C_P<2> OUT 21
				TCP0_TX_N1	BC3	USBC_HSX_R2D_C_N<2> OUT 21
				TCP0_TX_P0	BE3	USBC_HSX_R2D_C_P<1> OUT 21
				TCP0_TX_N0	BF4	USBC_HSX_R2D_C_N<1> OUT 21
				TCP0_TXRX_P1	BJ3	USBC_HSX_D2R_C_P<2> BI 21
				TCP0_TXRX_N1	BH4	USBC_HSX_D2R_C_N<2> BI 21
				TCP0_TXRX_P0	BM4	USBC_HSX_D2R_C_P<1> BI 21
				TCP0_TXRX_N0	BN3	USBC_HSX_D2R_C_N<1> BI 21
				TCP0_AUX_P	BK4	USBC_HSX_AUXCH_C_P BI 23
				TCP0_AUX_N	BL3	USBC_HSX_AUXCH_C_N BI 23
				TCP1_TX_P1	AM4	USBC_HST_R2D_C_P<2> OUT 22
				TCP1_TX_N1	AL3	USBC_HST_R2D_C_N<2> OUT 22
				TCP1_TX_P0	AP4	USBC_HST_R2D_C_P<1> OUT 22
				TCP1_TX_N0	AN3	USBC_HST_R2D_C_N<1> OUT 22
				TCP1_TXRX_P1	AT4	USBC_HST_D2R_C_P<2> BI 22
				TCP1_TXRX_N1	AU3	USBC_HST_D2R_C_N<2> BI 22
				TCP1_TXRX_P0	AY4	USBC_HST_D2R_C_P<1> BI 22
				TCP1_TXRX_N0	BA3	USBC_HST_D2R_C_N<1> BI 22
				TCP1_AUX_P	AV4	USBC_HST_AUXCH_C_P BI 23
				TCP1_AUX_N	AW3	USBC_HST_AUXCH_C_N BI 23
				TC_RCOMP_P	AW1	TC_RCOMP_P
				TC_RCOMP_N	BA1	TC_RCOMP_N

R0531
150
1%
1/20W
MF
201

R0530
150
1%
1/20W
MF
201

Type-C Port Assignments:

USBC Sink 0

USBC Sink 1

PP3V3_S5 13 14 17 18 42 74

	R0550	100K	5%	1/20W	MF	201	EDP_BKLT_EN	5 68 78
	R0551	100K	5%	1/20W	MF	201	EDP_PANEL_PWR_EN	5 69
	R0552	100K	5%	1/20W	MF	201	DP_INT_HPD	5 69
	R0553	100K	5%	1/20W	MF	201	PCH_WLAN_AUDIO_SYNC	5 18
NOSTUFF	R0554	10K	5%	1/20W	MF	201	XDP_LSX_TBTA_R2P	5 16 23
NOSTUFF	R0555	1K	5%	1/20W	MF	201	XDP_LSX_TBTA_P2R	5 16 23
NOSTUFF	R0556	10K	5%	1/20W	MF	201	XDP_LSX_TBTB_R2P	5 16 23
NOSTUFF	R0557	1K	5%	1/20W	MF	201	XDP_LSX_TBTB_P2R	5 16 23

BOM_COST_GROUP=CPU & CHIPSET

SYNC_MASTER=MASTER SYNC_DATE=06/08/2018

PAGE TITLE
CPU GFX

Apple Inc.

DRAWING NUMBER 051-05232 SIZE D
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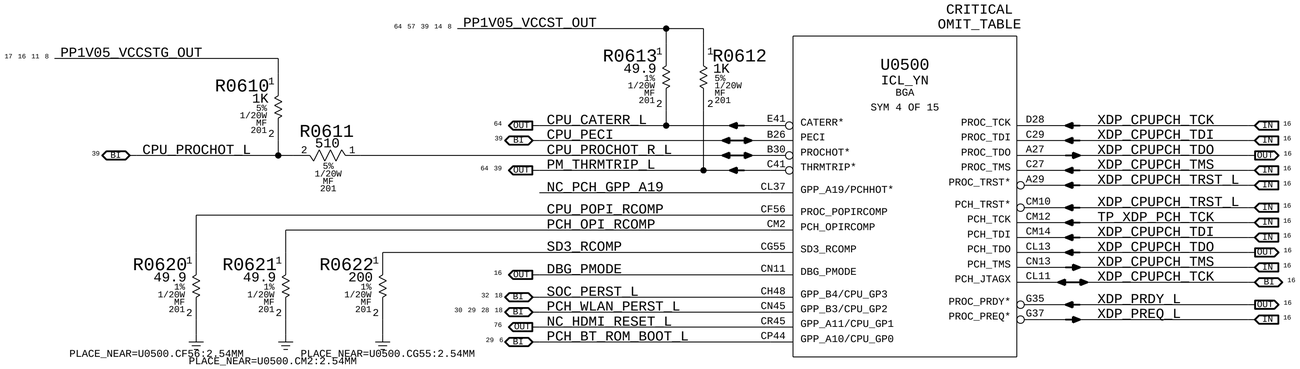
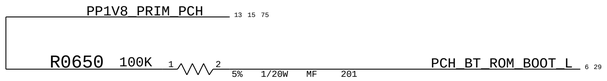
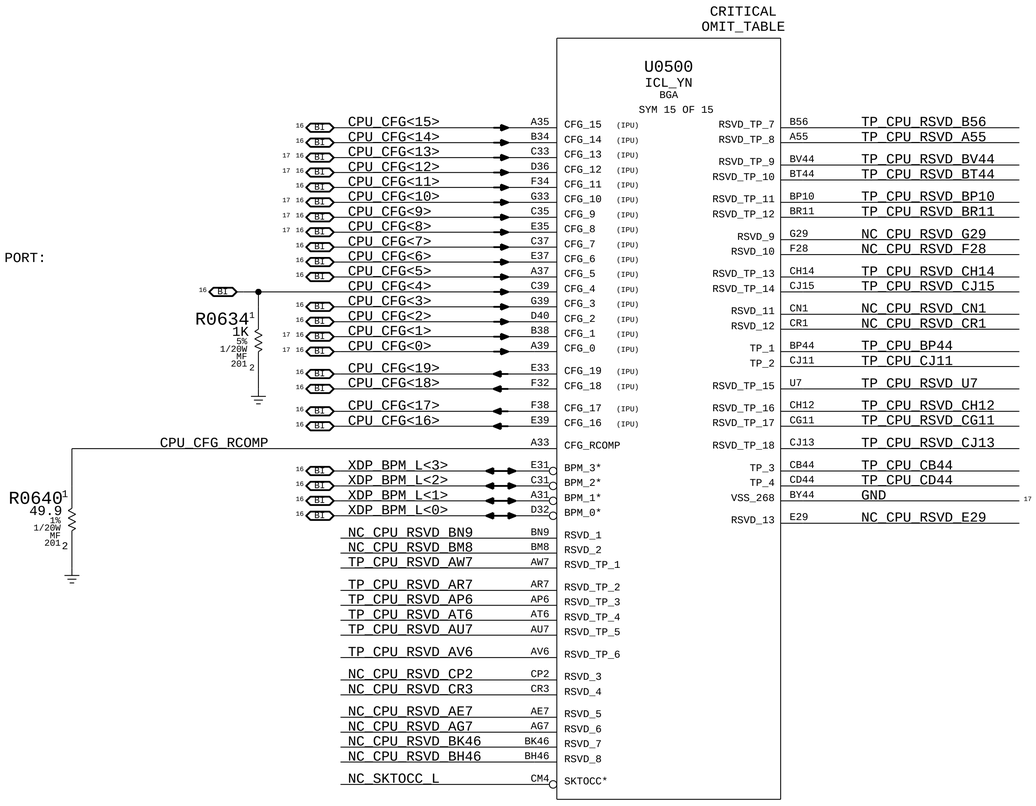
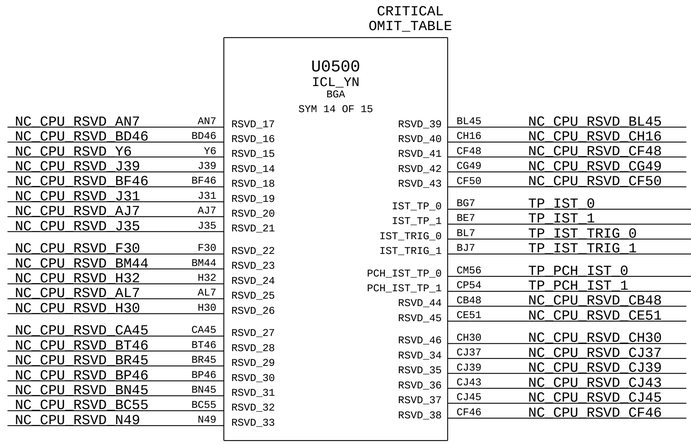
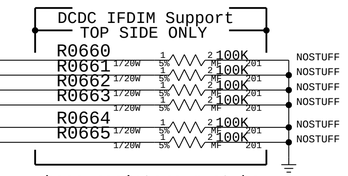






CFG(4) EMBEDDED DISPLAY PORT:
0: ENABLED
1: DISABLED





BOM_COST_GROUP=CPU & CHIPSET

SYNC_MASTER=CPU_CARD_ICL_Y SYNC_DATE=06/08/2018

PAGE TITLE
CPU Misc/JTAG/CFG/RSVD

Apple Inc.

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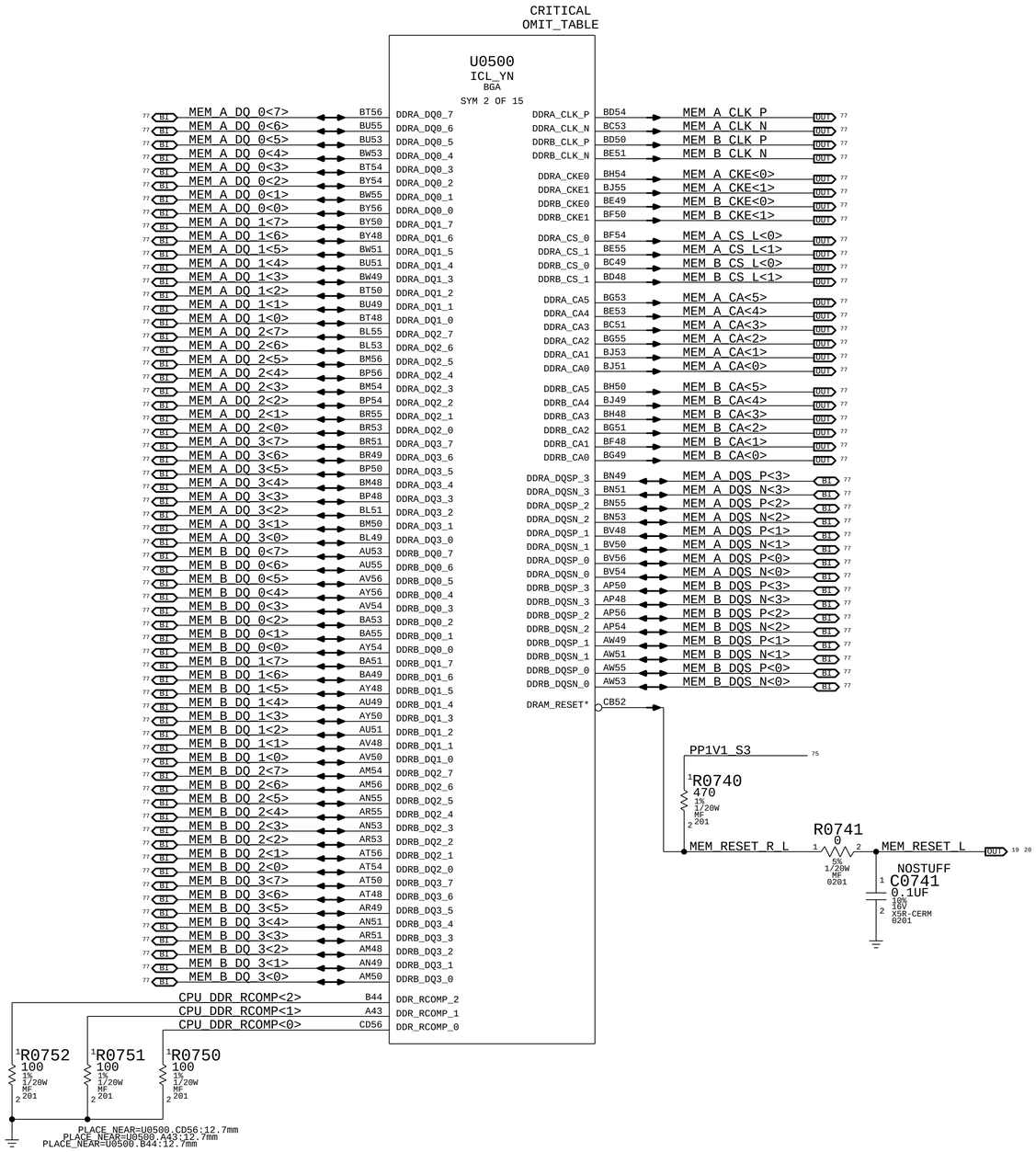

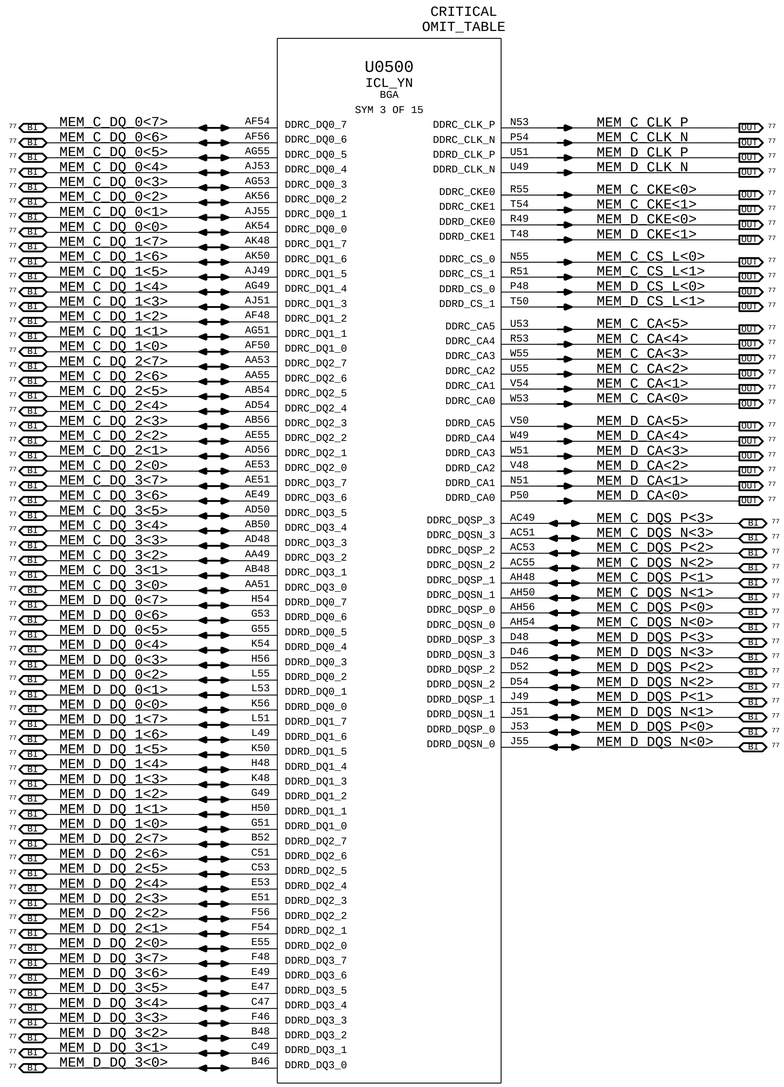

SYNC_MASTER=CPU_CARD_ICL_Y SYNC_DATE=06/08/2018

PAGE TITLE

CPU LPDDR4 Interface

Apple Inc.

DRAWING NUMBER 051-05232 SIZE D

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BOM_COST_GROUP=CPU & CHIPSET

CNL CPU-Y current estimates from Cannon Lake Processor EDS Vol 1, doc #566214, v0.7.
IccMax totals include all pins of same name. Some pin groups are split, IccMax is only specified once.

CRITICAL
OMIT_TABLE

U0500
ICL_YN
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75 46 11 8 PPVCC_S0_CPU
??A MAX

A13	VCCIN_1	VCCIN_51	F18
A15	VCCIN_2	VCCIN_52	F2
A19	VCCIN_3	VCCIN_53	F4
A7	VCCIN_4	VCCIN_54	F6
A9	VCCIN_5	VCCIN_55	F8
AA1	VCCIN_6	VCCIN_56	G13
AA3	VCCIN_7	VCCIN_57	G15
AA5	VCCIN_8	VCCIN_58	G19
AA7	VCCIN_9	VCCIN_59	G9
AB2	VCCIN_10	VCCIN_60	H10
AB4	VCCIN_11	VCCIN_61	H12
AB6	VCCIN_12	VCCIN_62	H16
AC5	VCCIN_13	VCCIN_63	H18
AC7	VCCIN_14	VCCIN_64	H2
AD6	VCCIN_15	VCCIN_65	H4
AF6	VCCIN_16	VCCIN_66	H6
AH6	VCCIN_17	VCCIN_67	H8
AK6	VCCIN_18	VCCIN_68	J1
AM6	VCCIN_19	VCCIN_69	J13
B10	VCCIN_20	VCCIN_70	J15
B12	VCCIN_21	VCCIN_71	J19
B16	VCCIN_22	VCCIN_72	J3
B18	VCCIN_23	VCCIN_73	J5
B4	VCCIN_24	VCCIN_74	J7
B6	VCCIN_25	VCCIN_75	J9
B8	VCCIN_26	VCCIN_76	K4
C13	VCCIN_27	VCCIN_77	L1
C15	VCCIN_28	VCCIN_78	L3
C19	VCCIN_29	VCCIN_79	L5
C3	VCCIN_30	VCCIN_80	L7
C5	VCCIN_31	VCCIN_81	M2
C7	VCCIN_32	VCCIN_82	M4
C9	VCCIN_33	VCCIN_83	M6
D10	VCCIN_34	VCCIN_84	P2
D12	VCCIN_35	VCCIN_85	P4
D16	VCCIN_36	VCCIN_86	P6
D18	VCCIN_37	VCCIN_87	R1
E1	VCCIN_38	VCCIN_88	R3
E11	VCCIN_39	VCCIN_89	R5
E13	VCCIN_40	VCCIN_90	R7
E15	VCCIN_41	VCCIN_91	T4
E17	VCCIN_42	VCCIN_92	U1
E19	VCCIN_43	VCCIN_93	U3
E3	VCCIN_44	VCCIN_94	U5
E5	VCCIN_45	VCCIN_95	V2
E7	VCCIN_46	VCCIN_96	V4
E9	VCCIN_47	VCCIN_97	V6
F10	VCCIN_48	VCCIN_98	W5
F12	VCCIN_49	VCCIN_99	Y2
F16	VCCIN_50	VCCIN_100	Y4
F42	VIDALERT*	VCCIN_SENSE	B20
H42	VIDSCK	VSSIN_SENSE	A21
G41	VIDSOUT		

PLACE_NEAR=U0500.B20:50.8mm
R0820 1 — 100 5% 1/20W MF 201 — 2
PPVCC_S0_CPU 8 11 46 75

CPU_VCCSENSE_P OUT 57
CPU_VCCSENSE_N OUT 57

PLACE_NEAR=U0500.A21:50.8mm
R0821 1 — 100 5% 1/20W MF 201 — 2

64 57 39 14 8 6 PP1V05_VCCST_OUT

R0802 1 — 100 1% 1/20W MF 201 — 2
NOSTUFF
R0801 1 — 42 1% 1/20W MF 201 — 2
R0800 1 — 56 1% 1/20W MF 201 — 2

R0810 1 — 0 5% 1/20W MF 0201 — 2
R0811 1 — 0 5% 1/20W MF 0201 — 2
R0812 1 — 0 5% 1/20W MF 0201 — 2

57 IN CPU_VIDALERT_L
57 OUT CPU_VIDSCLK
57 BI CPU_VIDSOUT

CPU_VIDALERT_R_L
CPU_VIDSCLK_R
CPU_VIDSOUT_R

R0800.2: PLACE_NEAR=U0500.F42:12.7mm
R0801.2: PLACE_NEAR=U0500.H42:12.7mm
R0802.2: PLACE_NEAR=U0500.G41:12.7mm

CRITICAL
OMIT_TABLE

U0500
ICL_YN
BGA
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75 11 8 PP1V1_S3
???A MAX

A45	VDDQ_1	VDDQ_26	N47
A49	VDDQ_2	VDDQ_27	P46
A53	VDDQ_3	VDDQ_28	P56
AA47	VDDQ_4	VDDQ_29	U47
AB46	VDDQ_5	VDDQ_30	V46
AE47	VDDQ_6	VDDQ_31	V56
AF46	VDDQ_7	VDDQ_32	Y56
AJ47	VDDQ_8	VCC1P8A_1	BR1
AK46	VDDQ_9	VCC1P8A_2	BR3
AL55	VDDQ_10	VCCFPGM	E43
AN47	VDDQ_11	VCCFPGM	D44
AP46	VDDQ_12	VCCFPGM	G43
AU47	VDDQ_13	VCCFPGM	C43
AV46	VDDQ_14	VCCFPGM	F44
BA47	VDDQ_15	VCCPLL	BU5
BB46	VDDQ_16	VCCPLL_OC	CB56
BB56	VDDQ_17	RSVD_47	BM46
BD56	VDDQ_18	VCCIO_OUT	H44
BH56	VDDQ_19		
BK56	VDDQ_20		
C55	VDDQ_21		
H46	VDDQ_22		
J47	VDDQ_23		
K46	VDDQ_24		
M56	VDDQ_25		
BV2	VCCST		
BT2	VCCSTG		
B42	VCCSTG_OUT		
A41	VCCST_OUT		

PP1V1_S3 8 11 75

PP1V8_S0SW_CPU 11 66
???MA MAX

PP1V05_VCCSTG_OUT 6 8 11 16 17
???MA MAX

PP1P05_S0_CPU_VCCPLL 9 11

PP1V1_S0SW_CPU_VCCPLL_OC 11 66

NC_CPU_RSVD_BM46

PPVCCIO_OUT 17 18
VOLTAGE=1V

???MA MAX 66 39 17 11 8 PP1V05_S0_CPU_VCCST
???MA MAX 66 11 PP1V05_S0_VCCSTG
17 16 11 8 6 PP1V05_VCCSTG_OUT
VOLTAGE=1.05V
64 57 39 14 8 6 PP1V05_VCCST_OUT
VOLTAGE=1.05V

BOM_COST_GROUP=CPU & CHIPSET

SYNC_MASTER=CPU_CARD_ICL_Y SYNC_DATE=06/08/2018

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CPU Power

Apple Inc.

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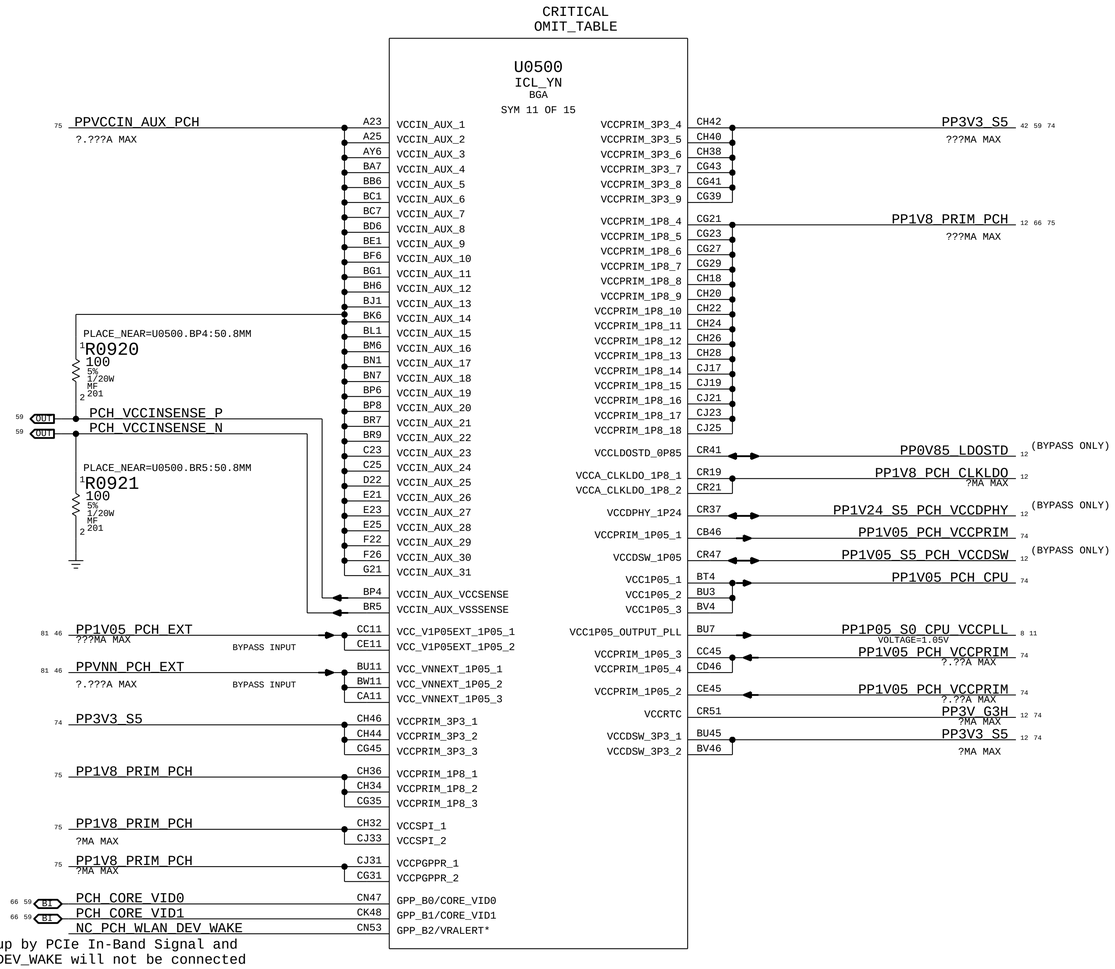
CNL PCH-Y CURRENT ESTIMATES FROM CANNON LAKE PCH-U/Y EDS VOL 1, DOC #566439, V0.7.
ICCMAX TOTALS INCLUDE ALL PINS OF SAME NAME. SOME PIN GROUPS ARE SPLIT, ICCMAX IS ONLY SPECIFIED ONCE.

NOTE: ALIASES NOT USED ON CPU SUPPLY OUTPUTS
TO AVOID ANY EXTRANEOUS CONNECTIONS.



WiFi will be woken up by PCIe In-Band Signal and
therefore PCH_WLAN_DEV_WAKE will not be connected

BOM_COST_GROUP=CPU & CHIPSET

SYNC_MASTER=CPU_CARD_ICL_Y SYNC_DATE=06/08/2018

PAGE TITLE
PCH Power

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CRITICAL
OMIT_TABLE

U0500
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CR55	VSS_1	VSS_68	CE5
CR53	VSS_2	VSS_69	CD52
CR15	VSS_3	VSS_70	CD10
CR9	VSS_4	VSS_71	CC47
CP56	VSS_5	VSS_72	CC5
CP50	VSS_6	VSS_73	CB10
CP46	VSS_7	VSS_74	CB8
CP42	VSS_8	VSS_75	CB6
CP38	VSS_9	VSS_76	CB4
CP34	VSS_10	VSS_77	CB2
CP30	VSS_11	VSS_78	CA55
CP26	VSS_12	VSS_79	CA53
CP22	VSS_13	VSS_80	CA51
CP18	VSS_14	VSS_81	CA49
CP14	VSS_15	VSS_82	CA47
CP12	VSS_16	VSS_83	BY52
CP10	VSS_17	VSS_84	BY10
CN55	VSS_18	VSS_85	BW47
CN9	VSS_19	VSS_86	BW5
CM54	VSS_20	VSS_87	BV52
CL9	VSS_21	VSS_88	BV10
CL7	VSS_22	VSS_89	BU47
CL5	VSS_23	VSS_90	BT52
CL1	VSS_24	VSS_91	BT10
CK54	VSS_25	VSS_92	BT8
CK50	VSS_26	VSS_93	BT6
CK46	VSS_27	VSS_94	BR47
CK44	VSS_28	VSS_95	BP52
CK42	VSS_29	VSS_96	BP2
CK40	VSS_30	VSS_97	BN47
CK38	VSS_31	VSS_98	BN5
CK36	VSS_32	VSS_99	BM52
CK34	VSS_33	VSS_100	BM2
CK32	VSS_34	VSS_101	BL47
CK30	VSS_35	VSS_102	BL5
CK28	VSS_36	VSS_103	BK54
CK26	VSS_37	VSS_104	BK52
CK24	VSS_38	VSS_105	BK50
CK22	VSS_39	VSS_106	BK48
CK20	VSS_40	VSS_107	BK2
CK18	VSS_41	VSS_108	BJ47
CK16	VSS_42	VSS_109	BJ5
CK14	VSS_43	VSS_110	BH52
CK12	VSS_44	VSS_111	BH2
CK10	VSS_45	VSS_112	BG47
CJ55	VSS_46	VSS_113	BG5
CJ47	VSS_47	VSS_114	BG3
CJ41	VSS_48	VSS_115	BF56
CJ35	VSS_49	VSS_116	BF52
CJ5	VSS_50	VSS_117	BF2
CH56	VSS_51	VSS_118	BE47
CH10	VSS_52	VSS_119	BE5
CG51	VSS_53	VSS_120	BD52
CG47	VSS_54	VSS_121	BD2
CG37	VSS_55	VSS_122	BC47
CG33	VSS_56	VSS_123	BC5
CG25	VSS_57	VSS_124	BB54
CG19	VSS_58	VSS_125	BB52
CG17	VSS_59	VSS_126	BB50
CG15	VSS_60	VSS_127	BB48
CG13	VSS_61	VSS_128	BB4
CG5	VSS_62	VSS_129	BB2
CF44	VSS_63	VSS_130	BA5
CF10	VSS_64	VSS_131	AY52
CE55	VSS_65	VSS_132	AY46
CE49	VSS_66	VSS_133	AY2
CE47	VSS_67	VSS_134	AW47

CRITICAL
OMIT_TABLE

U0500
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AW5	VSS_135	VSS_202	M46
AV52	VSS_136	VSS_203	L47
AV2	VSS_137	VSS_204	K52
AU5	VSS_138	VSS_205	K8
AU1	VSS_139	VSS_206	K6
AT52	VSS_140	VSS_207	K2
AT46	VSS_141	VSS_208	J45
AT2	VSS_142	VSS_209	J37
AR47	VSS_143	VSS_210	J33
AR5	VSS_144	VSS_211	J17
AR3	VSS_145	VSS_212	J11
AR1	VSS_146	VSS_213	H52
AP52	VSS_147	VSS_214	H38
AP2	VSS_148	VSS_215	H36
AN5	VSS_149	VSS_216	H34
AN1	VSS_150	VSS_217	H20
AM52	VSS_151	VSS_218	H14
AM46	VSS_152	VSS_219	G47
AM2	VSS_153	VSS_220	G45
AL53	VSS_154	VSS_221	G31
AL51	VSS_155	VSS_222	G17
AL49	VSS_156	VSS_223	G11
AL47	VSS_157	VSS_224	G7
AL5	VSS_158	VSS_225	G5
AL1	VSS_159	VSS_226	G3
AK52	VSS_160	VSS_227	G1
AK4	VSS_161	VSS_228	F52
AK2	VSS_162	VSS_229	F50
AJ5	VSS_163	VSS_230	F40
AH52	VSS_164	VSS_231	F36
AH46	VSS_165	VSS_232	F24
AG47	VSS_166	VSS_233	F20
AG5	VSS_167	VSS_234	F14
AF52	VSS_168	VSS_235	E45
AE5	VSS_169	VSS_236	D56
AD52	VSS_170	VSS_237	D50
AD46	VSS_171	VSS_238	D42
AD4	VSS_172	VSS_239	D38
AC47	VSS_173	VSS_240	D34
AC3	VSS_174	VSS_241	D30
AC1	VSS_175	VSS_242	D26
AB52	VSS_176	VSS_243	D24
Y54	VSS_177	VSS_244	D20
Y52	VSS_178	VSS_245	D14
Y50	VSS_179	VSS_246	D8
Y48	VSS_180	VSS_247	D6
Y46	VSS_181	VSS_248	D4
W47	VSS_182	VSS_249	D2
W7	VSS_183	VSS_250	C45
W3	VSS_184	VSS_251	C21
W1	VSS_185	VSS_252	C17
V52	VSS_186	VSS_253	C11
T56	VSS_187	VSS_254	B54
T52	VSS_188	VSS_255	B50
T46	VSS_189	VSS_256	B40
T6	VSS_190	VSS_257	B36
T2	VSS_191	VSS_258	B32
R47	VSS_192	VSS_259	B28
P52	VSS_193	VSS_260	B24
N7	VSS_194	VSS_261	B22
N5	VSS_195	VSS_262	B14
N3	VSS_196	VSS_263	A51
N1	VSS_197	VSS_264	A47
M54	VSS_198	VSS_265	A17
M52	VSS_199	VSS_266	A11
M50	VSS_200	VSS_267	A5
M48	VSS_201		

BOM_COST_GROUP=CPU & CHIPSET

SYNC_MASTER=CPU_CARD_ICL_Y SYNC_DATE=06/08/2018

PAGE TITLE
CPU & PCH Grounds

Apple Inc.

DRAWING NUMBER 051-05232 SIZE D
REVISION 2.0.0
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Intel recommendations based on #572907, Ice Lake U/Y Platform Design Guide, rev 1.21

CPU VccIN Decoupling

INTEL RECOMMENDATION (TABLE 10-49): 8X 1UF 0402, 13X 22UF 0402, 1X 220UF D-CASE
APPLE IMPLEMENTATION : 14x 1uF 0201, 30x 10uF 0402, 2x 180uF D1, 16x 10uF (NOSTUFF), 1x 180uF D1 (NOSTUFF)

75 46 8 PPVCC_S0_CPU

CRITICAL C1100 1UF 20% 6.3V X6S-CERM 0201
CRITICAL C1101 1UF 20% 6.3V X6S-CERM 0201
CRITICAL C1102 1UF 20% 6.3V X6S-CERM 0201
CRITICAL C1103 1UF 20% 6.3V X6S-CERM 0201
CRITICAL C1104 1UF 20% 6.3V X6S-CERM 0201
CRITICAL C1105 1UF 20% 6.3V X6S-CERM 0201
CRITICAL C1106 1UF 20% 6.3V X6S-CERM 0201
CRITICAL C1107 1UF 20% 6.3V X6S-CERM 0201
CRITICAL C1108 1UF 20% 6.3V X6S-CERM 0201
CRITICAL C1109 1UF 20% 6.3V X6S-CERM 0201
CRITICAL C110A 1UF 20% 6.3V X6S-CERM 0201
CRITICAL C110B 1UF 20% 6.3V X6S-CERM 0201
CRITICAL C110C 1UF 20% 6.3V X6S-CERM 0201
CRITICAL C110D 1UF 20% 6.3V X6S-CERM 0201
NOSTUFF CRITICAL C110E 10UF 20% 6.3V CER-X6S 0402
NOSTUFF CRITICAL C110F 10UF 20% 6.3V CER-X6S 0402
CRITICAL C110G 10UF 20% 6.3V CER-X6S 0402
CRITICAL C110H 10UF 20% 6.3V CER-X6S 0402
CRITICAL C110J 10UF 20% 6.3V CER-X6S 0402
CRITICAL C110K 10UF 20% 6.3V CER-X6S 0402
CRITICAL C110L 10UF 20% 6.3V CER-X6S 0402
CRITICAL C110M 10UF 20% 6.3V CER-X6S 0402

CRITICAL C1110 10UF 20% 6.3V CER-X6S 0402
CRITICAL C1111 10UF 20% 6.3V CER-X6S 0402
CRITICAL C1112 10UF 20% 6.3V CER-X6S 0402
CRITICAL C1113 10UF 20% 6.3V CER-X6S 0402
CRITICAL C1114 10UF 20% 6.3V CER-X6S 0402
CRITICAL C1115 10UF 20% 6.3V CER-X6S 0402
CRITICAL C1116 10UF 20% 6.3V CER-X6S 0402
CRITICAL C1117 10UF 20% 6.3V CER-X6S 0402
NOSTUFF CRITICAL C1118 10UF 20% 6.3V CER-X6S 0402
NOSTUFF CRITICAL C1119 10UF 20% 6.3V CER-X6S 0402
NOSTUFF CRITICAL C111A 10UF 20% 6.3V CER-X6S 0402
NOSTUFF CRITICAL C111B 10UF 20% 6.3V CER-X6S 0402
NOSTUFF CRITICAL C111C 10UF 20% 6.3V CER-X6S 0402
NOSTUFF CRITICAL C111D 10UF 20% 6.3V CER-X6S 0402
NOSTUFF CRITICAL C111E 10UF 20% 6.3V CER-X6S 0402
NOSTUFF CRITICAL C111F 10UF 20% 6.3V CER-X6S 0402
NOSTUFF CRITICAL C111G 10UF 20% 6.3V CER-X6S 0402
NOSTUFF CRITICAL C111H 10UF 20% 6.3V CER-X6S 0402
NOSTUFF CRITICAL C111J 10UF 20% 6.3V CER-X6S 0402
NOSTUFF CRITICAL C111K 10UF 20% 6.3V CER-X6S 0402

NOSTUFF CRITICAL C1150 10UF 20% 6.3V CER-X6S 0402
NOSTUFF CRITICAL C1151 10UF 20% 6.3V CER-X6S 0402
CRITICAL C1152 10UF 20% 6.3V CER-X6S 0402
CRITICAL C1153 10UF 20% 6.3V CER-X6S 0402
CRITICAL C1154 10UF 20% 6.3V CER-X6S 0402
CRITICAL C1155 10UF 20% 6.3V CER-X6S 0402
CRITICAL C1156 10UF 20% 6.3V CER-X6S 0402
CRITICAL C1157 10UF 20% 6.3V CER-X6S 0402
CRITICAL C1158 10UF 20% 6.3V CER-X6S 0402
CRITICAL C1159 10UF 20% 6.3V CER-X6S 0402
CRITICAL C115A 10UF 20% 6.3V CER-X6S 0402
CRITICAL C115B 10UF 20% 6.3V CER-X6S 0402
CRITICAL C115C 10UF 20% 6.3V CER-X6S 0402
CRITICAL C115D 10UF 20% 6.3V CER-X6S 0402
CRITICAL C115E 10UF 20% 6.3V CER-X6S 0402
CRITICAL C115F 10UF 20% 6.3V CER-X6S 0402
CRITICAL C115G 10UF 20% 6.3V CER-X6S 0402
CRITICAL C115H 10UF 20% 6.3V CER-X6S 0402

CRITICAL C1120 180UF 20% 2.5V POLY-AL SM
CRITICAL C1121 180UF 20% 2.5V POLY-AL SM
NOSTUFF CRITICAL C1122 180UF 20% 2.5V POLY-AL SM

INTEL RECOMMENDATION (TABLE 10-50): 7x47uF 0805, 8x 10uF 0402, 7x 1uF 0402, 3x 47uF 0805 (placeholder), 3x 10uF 0402 (placeholder).
APPLE IMPLEMENTATION : 2x 180uF D1, 16x 10uF 0402, 12x 1uF 0201, 6x 10uF 0402 (NOSTUFF).

80 75 59 PPVCCIN_AUX_PCH

CRITICAL C1130 1UF 20% 6.3V X6S-CERM 0201
CRITICAL C1131 1UF 20% 6.3V X6S-CERM 0201
CRITICAL C1132 1UF 20% 6.3V X6S-CERM 0201
CRITICAL C1133 1UF 20% 6.3V X6S-CERM 0201
CRITICAL C1134 1UF 20% 6.3V X6S-CERM 0201
CRITICAL C1135 1UF 20% 6.3V X6S-CERM 0201
CRITICAL C1136 1UF 20% 6.3V X6S-CERM 0201
CRITICAL C1137 1UF 20% 6.3V X6S-CERM 0201
CRITICAL C1138 1UF 20% 6.3V X6S-CERM 0201
CRITICAL C1139 1UF 20% 6.3V X6S-CERM 0201
CRITICAL C113A 1UF 20% 6.3V X6S-CERM 0201
CRITICAL C113B 1UF 20% 6.3V X6S-CERM 0201

CRITICAL C1140 10UF 20% 6.3V CER-X6S 0402
CRITICAL C1141 10UF 20% 6.3V CER-X6S 0402
CRITICAL C1142 10UF 20% 6.3V CER-X6S 0402
CRITICAL C1143 10UF 20% 6.3V CER-X6S 0402
CRITICAL C1144 10UF 20% 6.3V CER-X6S 0402
CRITICAL C1145 10UF 20% 6.3V CER-X6S 0402
CRITICAL C1146 10UF 20% 6.3V CER-X6S 0402
CRITICAL C1147 10UF 20% 6.3V CER-X6S 0402
NOSTUFF CRITICAL C1148 10UF 20% 6.3V CER-X6S 0402
NOSTUFF CRITICAL C1149 10UF 20% 6.3V CER-X6S 0402

75 8 PP1V1_S3

CRITICAL C1170 1UF 20% 6.3V X6S-CERM 0201
CRITICAL C1171 1UF 20% 6.3V X6S-CERM 0201
CRITICAL C1172 1UF 20% 6.3V X6S-CERM 0201
CRITICAL C1173 1UF 20% 6.3V X6S-CERM 0201
CRITICAL C1174 1UF 20% 6.3V X6S-CERM 0201
CRITICAL C1175 1UF 20% 6.3V X6S-CERM 0201
CRITICAL C1176 1UF 20% 6.3V X6S-CERM 0201
CRITICAL C1177 1UF 20% 6.3V X6S-CERM 0201

CRITICAL C1180 10UF 20% 6.3V CER-X6S 0402
CRITICAL C1181 10UF 20% 6.3V CER-X6S 0402
CRITICAL C1182 10UF 20% 6.3V CER-X6S 0402
CRITICAL C1183 10UF 20% 6.3V CER-X6S 0402
CRITICAL C1184 10UF 20% 6.3V CER-X6S 0402
CRITICAL C1185 10UF 20% 6.3V CER-X6S 0402
CRITICAL C1186 10UF 20% 6.3V CER-X6S 0402

17 16 8 6 PP1V05_VCCSTG_OUT

C1198 1UF 20% 6.3V X6S-CERM 0201

66 8 PP1V8_S0SW_CPU

CRITICAL C1195 10UF 20% 6.3V CER-X6S 0402
CRITICAL C1196 10UF 20% 6.3V CER-X6S 0402
NOSTUFF C1197 22UF 20% 4V X5R 0402-1

78 66 39 17 8 PP1V05_S0_CPU_VCCST

NOSTUFF C11A0 1UF 20% 6.3V X6S-CERM 0201
NOSTUFF C11A1 1UF 20% 6.3V X6S-CERM 0201

66 8 PP1V05_S0_VCCSTG

NOSTUFF C11A2 1UF 20% 6.3V X6S-CERM 0201
NOSTUFF C11A3 1UF 20% 6.3V X6S-CERM 0201

66 8 PP1V1_S0SW_CPU_VCCPLL_OC

NOSTUFF C11A4 1UF 20% 6.3V X6S-CERM 0201
NOSTUFF C11A5 1UF 20% 6.3V X6S-CERM 0201

9 8 PP1P05_S0_CPU_VCCPLL

NOSTUFF C11A6 1UF 20% 6.3V X6S-CERM 0201
NOSTUFF C11A7 1UF 20% 6.3V X6S-CERM 0201

BOM_COST_GROUP=CPU & CHIPSET

SYNC_MASTER=CPU_CARD_ICL_Y SYNC_DATE=06/08/2018

PAGE TITLE: CPU Decoupling

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DRAWING NUMBER: 051-05232 SIZE: D
REVISION: 2.0.0
BRANCH: proto4b
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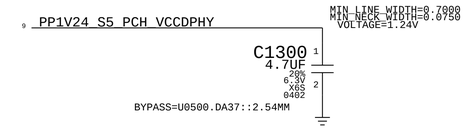

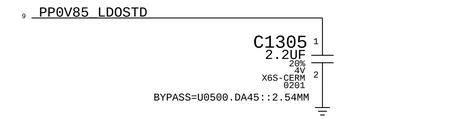

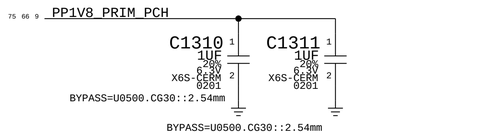

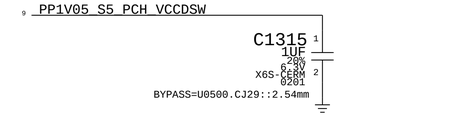

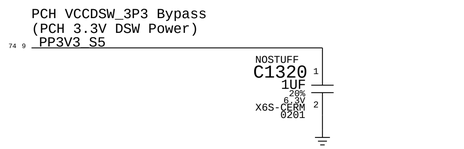

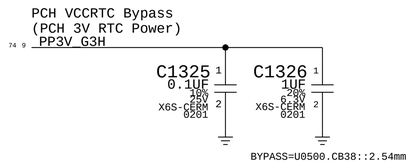

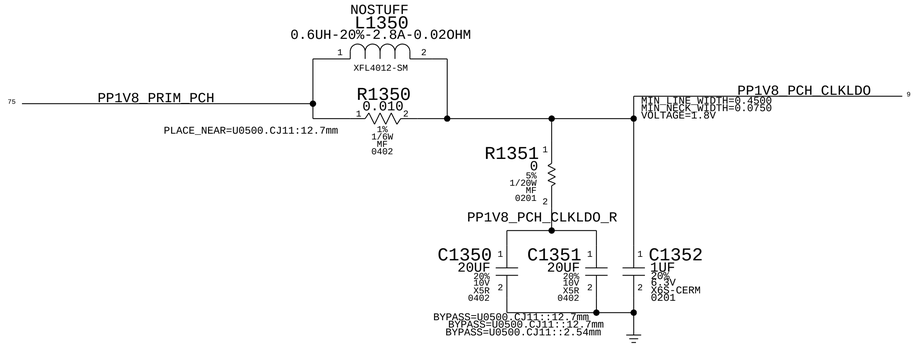

BOM_COST_GROUP=CPU & CHIPSET

SYNC_MASTER=CPU_CARD_ICL_Y SYNC_DATE=06/08/2018

PAGE TITLE: PCH Decoupling

Apple Inc.

DRAWING NUMBER: 051-05232 SIZE: D

REVISION: 2.0.0

BRANCH: proto4b

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CRITICAL
OMIT_TABLE

U0500
ICL_YN
BGA
SYM 5 OF 15

13 BI	TP_PCH_GPP_D10	CL31	GPP_D10/UART0A_RST*	GPP_A7/SMBCLK	CM46	SMBUS_PCH_CLK BI 42
13 BI	TP_PCH_GPP_D11	CM32	GPP_D11/UART0A_CTS*	GPP_A8/SMBDATA	CL47	SMBUS_PCH_DATA BI 42
13 BI	TP_PCH_GPP_D8	CR33	GPP_D8/UART0A_RXD	GPP_A9/SMBALERT*	CL45	NC_PCH_GPP_A9
13 BI	TP_PCH_GPP_D9	CP32	GPP_D9/UART0A_TXD	GPP_E10/SML0DATA	CN21	XDP_PCH_I2C_UPC_SDA BI 16 42
78 23 13 IN	PCH_UART_DEBUG_D2R	CR49	GPP_B17/UART2A_RXD	GPP_E9/SML0CLK	CL21	XDP_PCH_I2C_UPC_SCL BI 16 42
78 23 13 OUT	PCH_UART_DEBUG_R2D	CP48	GPP_B18/UART2A_TXD	GPP_B11/PMCALERT*	CL53	PCH_UPC_I2C_INT_L BI 42
16 BI	XDP_PCH_STRP_GPP_E0	CL23	GPP_E0	GPP_A5/ESPI_CLK	CL41	ESPI_CLK60M_R
16 13 BI	XDP_PCH_STRP_CNV_DISABLE	CM22	GPP_E1	GPP_A0/ESPI_IO0	CM44	ESPI_IO<0> BI 32
18 16 13 BI	XDP_MEM_OK	CP24	GPP_E2	GPP_A1/ESPI_IO1	CN43	ESPI_IO<1> BI 32
16 BI	XDP_PCH_OBSDATA_B0	CN25	GPP_E4	GPP_A2/ESPI_IO2	CR43	ESPI_IO<2> BI 32
16 13 BI	XDP_PCH_OBSDATA_B2	CR25	GPP_E6	GPP_A3/ESPI_IO3	CL43	ESPI_IO<3> BI 32
				GPP_A4/ESPI_CS*	CN41	ESPI_CS_L OUT 32
16 BI	XDP_LSX_TBTD_R2P	CN23	GPP_E11	GPP_A6/ESPI_RESET*	CM42	ESPI_RESET_L OUT 13 32
16 BI	XDP_LSX_TBTD_P2R	CM24	GPP_E12			
	NC_PCH_GPP_E20	CM16	GPP_E20	GPP_H3	CM36	TBT_POC_RESET BI 13 23 24 25
	NC_PCH_GPP_E21	CP16	GPP_E21	GPP_H4	CN33	JTAG_ISP_TDO BI 13 23
	NC_PCH_GPP_E22	CL15	GPP_E22	GPP_H5	CP40	NC_SDCON_OC_L
	NC_PCH_GPP_E23	CN15	GPP_E23	GPP_H8	CN37	PCH_GCON_INT_L BI 32
				GPP_H21	CJ27	NC_PCH_GPP_H21
23 13 BI	JTAG_ISP_TCK	CM30	GPP_C1	GPP_H22	CJ29	NC_PCH_GPP_H22
23 13 BI	JTAG_ISP_TDI	CN31	GPP_C2			
31 13 BI	PCH_SOC_SYNC	CL29	GPP_C7	GPP_R5	CM34	NC_PCH_GPP_R5
	NC_PCH_GPP_C8	CM28	GPP_C8	GPP_R6	CM38	NC_PCH_GPP_R6
	NC_PCH_GPP_C9	CN29	GPP_C9			
	NC_PCH_GPP_C10	CL27	GPP_C10			
25 24 23 13 BI	PCH_BSB_FORCE_PWR	CP28	GPP_C13			
13	MLB_RAMCFG0	CJ51	GPP_G0			
13	MLB_RAMCFG1	CD48	GPP_G2			
13	MLB_RAMCFG2	BW45	GPP_G3			
13	MLB_RAMCFG3	CH50	GPP_G4			
13	MLB_RAMCFG4	CD50	GPP_G5			
23 13 BI	JTAG_TBT_X_TMS	BY46	GPP_G6			
23 13 BI	JTAG_TBT_T_TMS	CC49	GPP_G7			

R1410 1 2 51 201 ESPI_CLK60M OUT 32

PP1V8_PRIM_PCH 6 15 75
PP3V3_S5 5 14 17 18 42 74

R1451	47K	5%	1/20W	MF	201	PCH_UART_DEBUG_D2R	13 23 78
R1452	47K	5%	1/20W	MF	201	PCH_UART_DEBUG_R2D	13 23 78
R1453	100K	5%	1/20W	MF	201	JTAG_ISP_TCK	13 23
R1454	100K	5%	1/20W	MF	201	JTAG_ISP_TDI	13 23
R1455	47K	5%	1/20W	MF	201	TP_PCH_GPP_D8	13
R1456	47K	5%	1/20W	MF	201	TP_PCH_GPP_D9	13
R1457	47K	5%	1/20W	MF	201	TP_PCH_GPP_D10	13
R1458	1K	5%	1/20W	MF	201	TP_PCH_GPP_D11	13
R1459	100K	5%	1/20W	MF	201	XDP_PCH_STRP_CNV_DISABLE	13 16
R1460	100K	5%	1/20W	MF	201	XDP_MEM_OK	13 16 18
R1461	10K	5%	1/20W	MF	201	JTAG_TBT_X_TMS	13 23
R1467	10K	5%	1/20W	MF	201	JTAG_TBT_T_TMS	13 23
R1462	100K	5%	1/20W	MF	201	TBT_POC_RESET	13 23 24 25
R1463	10K	5%	1/20W	MF	201	JTAG_ISP_TDO	13 23
R1464	100K	5%	1/20W	MF	201	XDP_PCH_OBSDATA_B2	13 16
R1465	100K	5%	1/20W	MF	201	ESPI_RESET_L	13 32
R1466	100K	5%	1/20W	MF	201	PCH_BSB_FORCE_PWR	13 23 24 25
R1468	100K	5%	1/20W	MF	201	PCH_SOC_SYNC	13 31

NOSTUFF

RAM Configuration Straps

MLB_RAMCFG0 13
MLB_RAMCFG1 13
MLB_RAMCFG2 13
MLB_RAMCFG3 13
MLB_RAMCFG4 13

RAMCFG0_L	RAMCFG1_L	RAMCFG2_L	RAMCFG3_L	RAMCFG4_L
R1490	R1491	R1492	R1493	R1494
1K 5% 1/20W MF 201	1K 5% 1/20W MF 201	1K 5% 1/20W MF 201	1K 5% 1/20W MF 201	1K 5% 1/20W MF 201

BOM_COST_GROUP=CPU & CHIPSET

SYNC_MASTER=CPU_CARD_ICL_Y SYNC_DATE=06/08/2018

PAGE TITLE: PCH ESPI/SMBUS/UART

Apple Inc.

DRAWING NUMBER: 051-05232 SIZE: D
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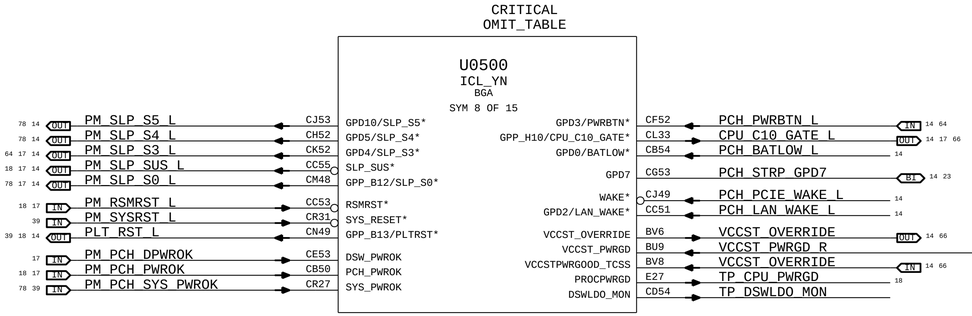
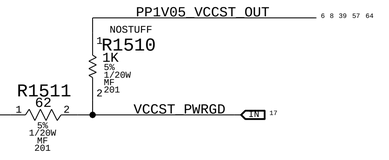
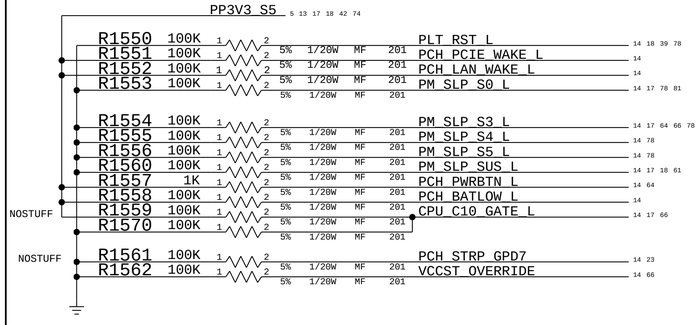
CRITICAL
OMIT_TABLE





Ⓐ PM_SLP_S0_L NOTE

PM_SLP_S0_L has an intenral pull-up before RSMRST# is released. This causes a voltage divider with the pull-down R1553. The signal is driven high after RSMRST# is released.



BOM_COST_GROUP=CPU & CHIPSET

SYNC_MASTER=CPU_CARD_ICL_Y SYNC_DATE=06/08/2018

PAGE TITLE
PCH Power Management

Apple Inc.

DRAWING NUMBER 051-05232 SIZE D
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PCIe Port Assignments:

SOC lane 3

SOC lane 2

SOC lane 1

SOC lane 0

CRITICAL
OMIT_TABLE

U0500
ICL_YN
BGA
SYM 6 OF 15

34 IN	PCIE_SOC_D2R_P<3>	CG1	PCIE4_RXP	PCIE8_RXP	CC1	USB3_BSSB_D2R_P	IN 23
34 IN	PCIE_SOC_D2R_N<3>	CG3	PCIE4_RXN	PCIE8_RXN	CC3	USB3_BSSB_D2R_N	IN 23
40 OUT	PCIE_SOC_R2D_C_P<3>	CH6	PCIE4_TXP	PCIE8_TXP	CD6	USB3_BSSB_R2D_C_P	OUT 23
40 OUT	PCIE_SOC_R2D_C_N<3>	CH8	PCIE4_TXN	PCIE8_TXN	CD8	USB3_BSSB_R2D_C_N	OUT 23
34 IN	PCIE_SOC_D2R_P<2>	CH2	PCIE3_RXP	PCIE7_RXP	CD4	NC_PCIE_PCH_ENETSD_D2RP	IN 76
34 IN	PCIE_SOC_D2R_N<2>	CH4	PCIE3_RXN	PCIE7_RXN	CD2	NC_PCIE_PCH_ENETSD_D2RN	IN 76
40 OUT	PCIE_SOC_R2D_C_P<2>	CG7	PCIE3_TXP	PCIE7_TXP	CC7	NC_PCIE_PCH_ENETSD_R2DCP	OUT 76
40 OUT	PCIE_SOC_R2D_C_N<2>	CG9	PCIE3_TXN	PCIE7_TXN	CC9	NC_PCIE_PCH_ENETSD_R2DCN	OUT 76
34 IN	PCIE_SOC_D2R_P<1>	CF2	PCIE2_RXP	PCIE6_RXP	CK2	USB3_FCT_D2R_P	IN 78
34 IN	PCIE_SOC_D2R_N<1>	CF4	PCIE2_RXN	PCIE6_RXN	CK4	USB3_FCT_D2R_N	IN 78
40 OUT	PCIE_SOC_R2D_C_P<1>	CF6	PCIE2_TXP	PCIE6_TXP	CK6	USB3_FCT_R2D_C_P	OUT 78
40 OUT	PCIE_SOC_R2D_C_N<1>	CF8	PCIE2_TXN	PCIE6_TXN	CK8	USB3_FCT_R2D_C_N	OUT 78
34 IN	PCIE_SOC_D2R_P<0>	CE1	PCIE1_RXP	PCIE5_RXP	CJ1	PCIE_PCH_WLAN_D2R_P	IN 29
34 IN	PCIE_SOC_D2R_N<0>	CE3	PCIE1_RXN	PCIE5_RXN	CJ3	PCIE_PCH_WLAN_D2R_N	IN 29
40 OUT	PCIE_SOC_R2D_C_P<0>	CE7	PCIE1_TXP	PCIE5_TXP	CJ7	PCIE_PCH_WLAN_R2D_C_P	OUT 29
40 OUT	PCIE_SOC_R2D_C_N<0>	CE9	PCIE1_TXN	PCIE5_TXN	CJ9	PCIE_PCH_WLAN_R2D_C_N	OUT 29
16 BI	XDP_PCH_OBSFN_C0	CR23	GPP_E8	USB2P_3	CM8	USB2_FCT_P	BI 78
				USB2N_3	CP8	USB2_FCT_N	BI 78
16 15 BI	XDP_PCH_STRP_SPIROM_SAF	CM20	GPP_E3				
16 BI	XDP_PCH_OBSDATA_B3	CP20	GPP_E7	USB2P_2	CM6	USB2_TBT_T_P	BI 25
				USB2N_2	CP6	USB2_TBT_T_N	BI 25
18 BI	USB_EXTA_OC_L	CN39	GPP_A18/USB_OC0*				
18 BI	USB_EXTD_OC_L	CR39	GPP_A12/USB_OC1*	USB2P_1	CR7	USB2_TBT_X_P	BI 24
18 BI	USB_EXTC_OC_L	CM40	GPP_A13/USB_OC2*	USB2N_1	CN7	USB2_TBT_X_N	BI 24
18 BI	USB_EXTB_OC_L	CL39	GPP_A14/USB_OC3*				
				USB_ID	CR5	GND	18
16 BI	XDP_PCH_OBSDATA_B1	CM26	GPP_E5				
				USB_VBUSSENSE	CN5	GND	18
	PCH_PCIE_RCOMP_P	CN3	PCIE_RCOMPP				
	PCH_PCIE_RCOMP_N	CL3	PCIE_RCOMPN	USB2_COMP	CP4	PCH_USB2_COMP	
			GPP_E19/IMGCLKOUT5/PCIE_LNK_DOWN		CL25	TP_PCH_PCIE_LINK_DOWN	

R1610 1 — 100 1% 1/20W MF 201 — 2
PLACE_NEAR=U0500.CG1:2.54mm

PLACE_NEAR=U0500.CP4:2.54mm
R1622 1 — 113 1% 1/20W MF 201 — 2

USB3 Port Assignments:

PCIe Port Assignments:

BSSB

ENET/SD

SPARE (SS)

WLAN

USB2 PORT ASSIGNMENTS:

FIXTURE (LS/FS/HS)

USB-C T (LS/FS/HS)

USB-C X (LS/FS/HS)

PP1V8_PRIM_PCH 6 13 15 75

R1650 1K 1 — 2 5% 1/20W MF 201 — PCH_STRP_NO_REBOOT 15
R1651 1K 1 — 2 5% 1/20W MF 201 — XDP_PCH_STRP_SPIROM_SAF 15 16

CRITICAL
OMIT_TABLE

U0500
ICL_YN
BGA
SYM 7 OF 15

76 OUT	NC_PCIE_CLK100M_DEBUGP	BY4	CLKOUT_PCIE_P0	CLKOUT_PCIE_P5	CA3	PCIE_CLK100M_SOC_P	OUT 34
76 OUT	NC_PCIE_CLK100M_DEBUGN	BY2	CLKOUT_PCIE_N0	CLKOUT_PCIE_N5	CA1	PCIE_CLK100M_SOC_N	OUT 34
76 18 15 BI	DEBUG_CLKREQ_STRAP_L	CP52	GPP_B5/SRCCLKREQ0*	GPP_B10/SRCCLKREQ5*	CL49	SOC_CLKREQ_BUF_L	BI 15 18
29 OUT	PCIE_CLK100M_PCH_WLAN_P	BY8	CLKOUT_PCIE_P1	RTCX1	CK56	PMU_CLK32K_PCH_1V0	
29 OUT	PCIE_CLK100M_PCH_WLAN_N	BY6	CLKOUT_PCIE_N1	RTCX2	CL55	NC_PCH_CLK32K_XTALOUT	
29 15 BI	PCH_WLAN_CLKREQ_L	CN51	GPP_B6/SRCCLKREQ1*				
				RTCRST*	CH54	PCH_RTC_RESET_L	IN 18 64
	TP_PCIE_CLK100M_PCH2P	CA9	CLKOUT_PCIE_P2				
	TP_PCIE_CLK100M_PCH2N	CA7	CLKOUT_PCIE_N2	SRTCRST*	CF54	PCH_RTC_RESET_L	IN 18
15	PCH_STRP_NO_REBOOT	CM50	GPP_B7/SRCCLKREQ2*	XTAL_IN	CR11	PCH_CLK38M4_XTALIN	IN 17
				XTAL_OUT	CR13	PCH_CLK38M4_XTALOUT	OUT 17
76 OUT	NC_PCIE_CLK100M_ENETSDP	BW3	CLKOUT_PCIE_P3				
76 OUT	NC_PCIE_CLK100M_ENETSDN	BW1	CLKOUT_PCIE_N3	XCLK_BIASREF	CA5	PCH_DIFFCLK_BIASREF	
	NC_PCH_ENETSD_CLKREQ_L	CM52	GPP_B8/SRCCLKREQ3*				
	TP_PCIE_CLK100M_PCH4P	BW9	CLKOUT_PCIE_P4				
	TP_PCIE_CLK100M_PCH4N	BW7	CLKOUT_PCIE_N4				
	TP_GPU_CLKREQ_L	CL51	GPP_B9/SRCCLKREQ4*				

R1673 100K 1% 1/20W MF 201 — 1 — 2 — PMU_CLK32K_PCH 1.0V <- 1.8V IN 64
R1672 127K 1% 1/20W MF 201 — 1 — 2
PLACE_NEAR=U0500.CL49:5mm
PLACE_NEAR=U0500.CL49:5mm

PLACE_NEAR=U0500.CK4:2.54mm
R1670 60.4 1% 1/20W MF 201 — 1 — 2

PP1V8_PRIM_PCH 6 13 15 75

R1660 47K 1 — 2 5% 1/20W MF 201 — SOC_CLKREQ_BUF_L 15 18
R1661 47K 1 — 2 5% 1/20W MF 201 — PCH_WLAN_CLKREQ_L 15 29
R1662 47K 1 — 2 5% 1/20W MF 201 — DEBUG_CLKREQ_STRAP_L 15 18 76
NOSTUFF

BOM_COST_GROUP=CPU & CHIPSET

SYNC_MASTER=CPU_CARD_ICL_Y SYNC_DATE=06/08/2018

PAGE TITLE
PCH PCIe/USB/CLK

Apple Inc.

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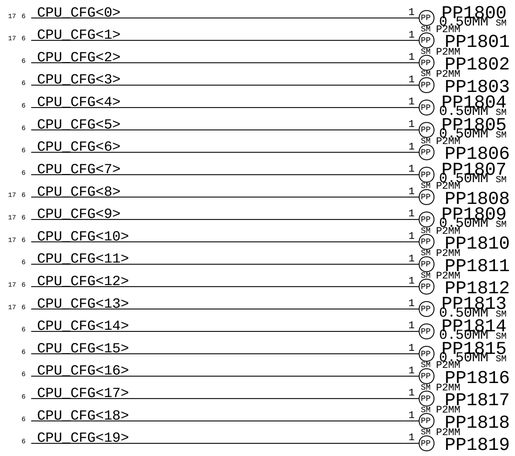
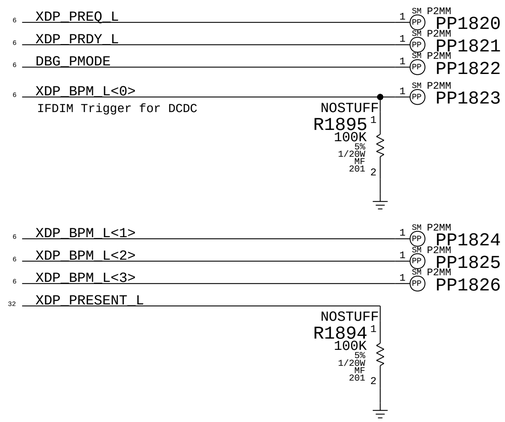
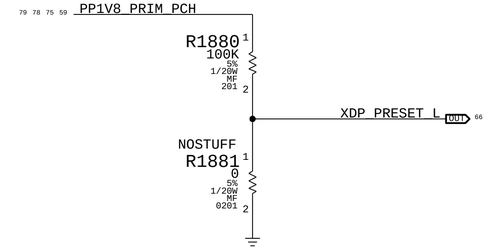


TP XDP Signals

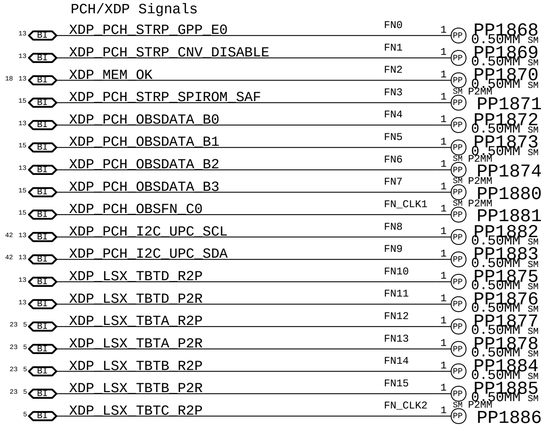




PCH XDP Signals

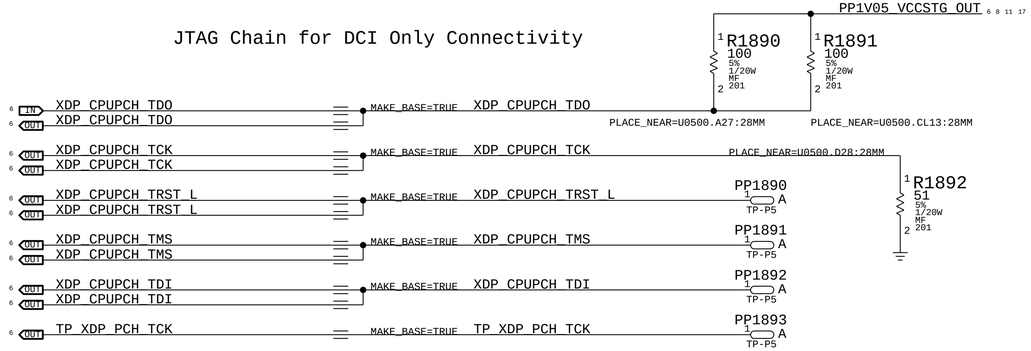
These signals do not connect to the Primary (Merged) XDP connector in this architecture because it does not exist.
The PDG puts them on a secondary XDP connector that is only needed in some PCH debugging situation, but also does not exist.
They are listed here to show their secondary XDP functions and to provide test points for signals that are not used elsewhere.
Unused GPIOs have TPs.

PCH/XDP Signals



Non-XDP Signals

JTAG Chain for DCI Only Connectivity



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SYNC_MASTER=X589_CPU_CNL_Y SYNC_DATE=03/13/2017

PAGE TITLE: CPU/PCH Merged XDP

Apple Inc.

DRAWING NUMBER: 051-05232 SIZE: D
REVISION: 2.0.0
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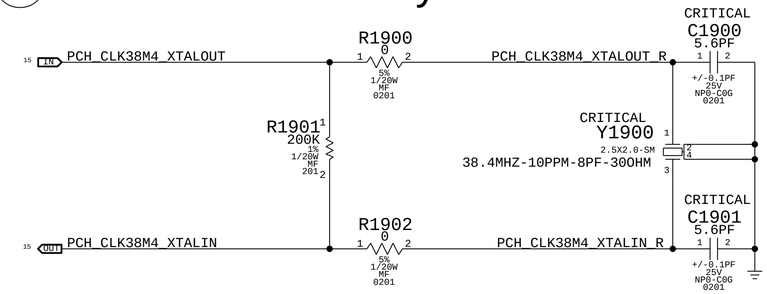
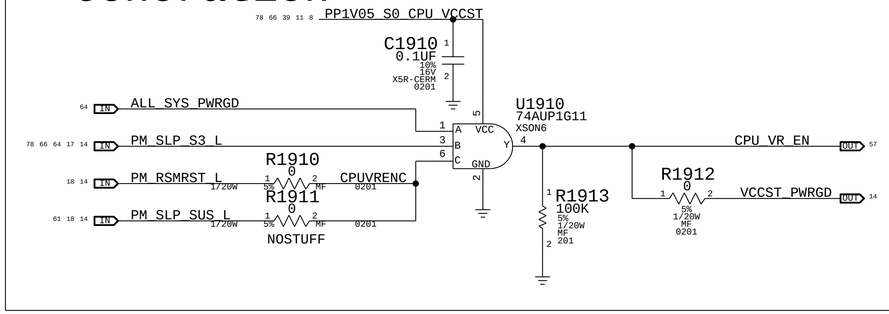
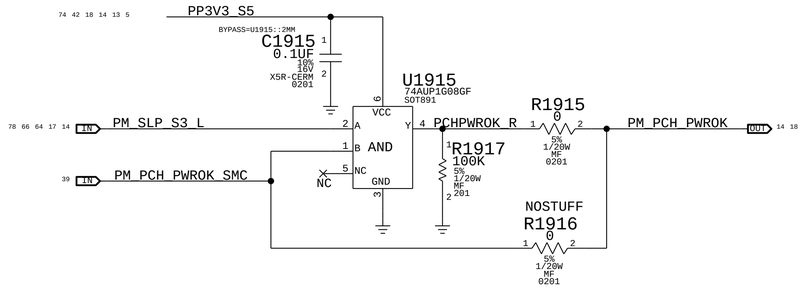
A PCH 38.4MHz Crystal



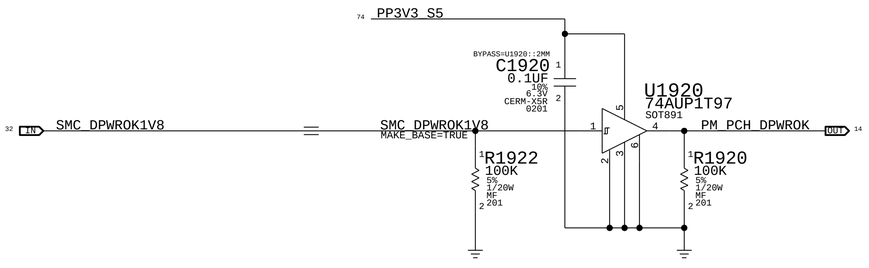
B VCCIN VR EN and VCCST_PWRGD Generation



C PCH_PWROK Generation



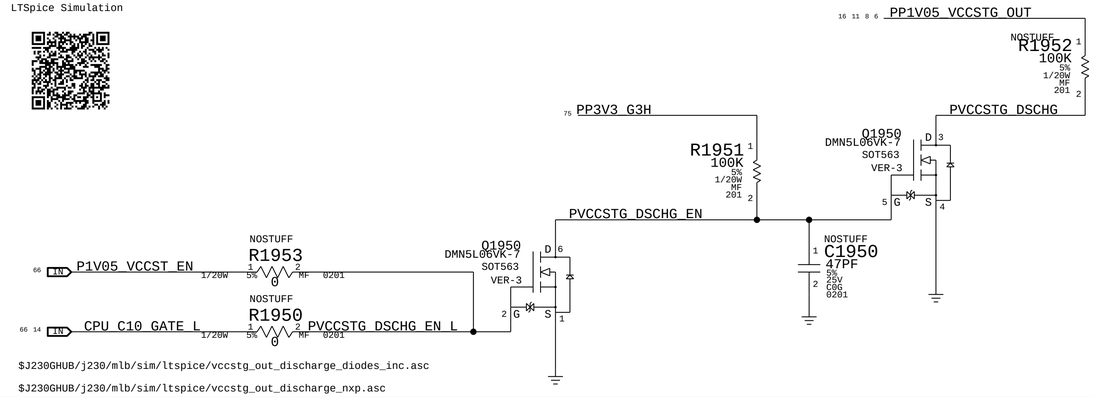
D DSW_PWROK 3.3V Level Shifter



E VCCSTG_OUT Discharge Circuit

Ensure VCCSTG_OUT <= VCCST during power-down (required at all times)

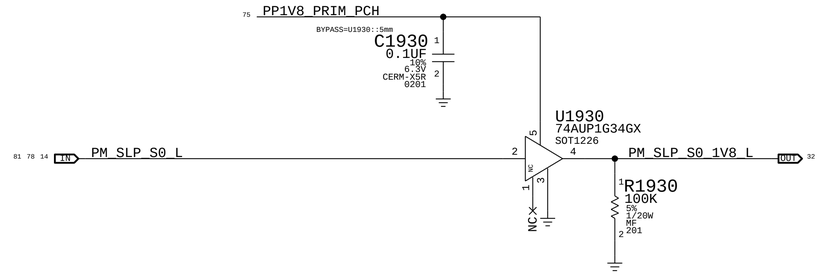
LTSpice Simulation



$J230GHUB/j230/mlb/sim/ltspice/vccstg_out_discharge_diodes_inc.asc

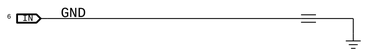
$J230GHUB/j230/mlb/sim/ltspice/vccstg_out_discharge_nxp.asc

F SLP_S0# 1.8V Level Shifter

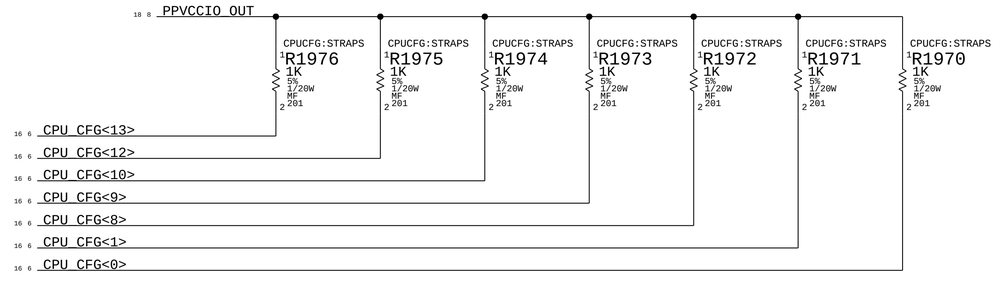


SoC Buffer Bypass

G VSS_268 GND Connection



H CFG Boot Straps



BOM_COST_GROUP=CPU & CHIPSET

SYNC_MASTER=CPU_CARD_ICL_Y SYNC_DATE=06/08/2018

PAGE TITLE: Chipset Shared Support

Apple Inc.

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BRANCH proto4b

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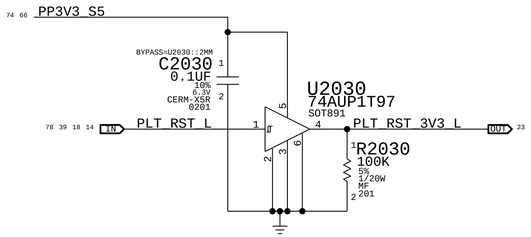
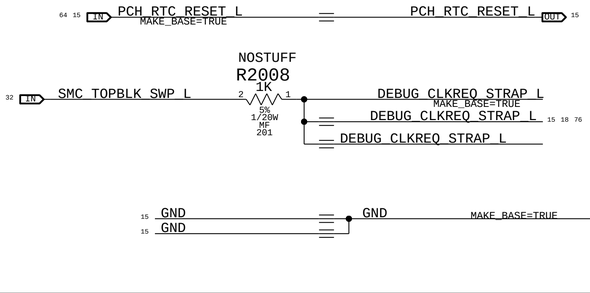
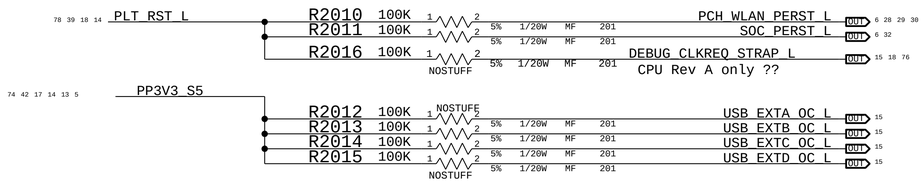
A PLTRST# 3.3V Level Shifter



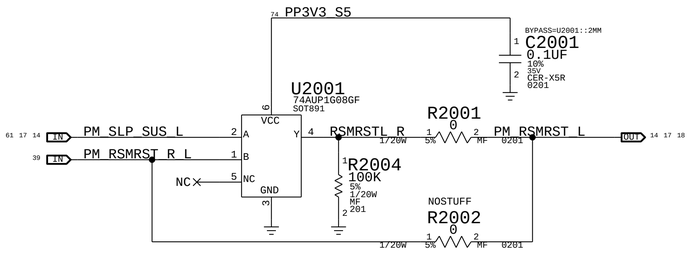
B Miscellaneous Signal Aliases



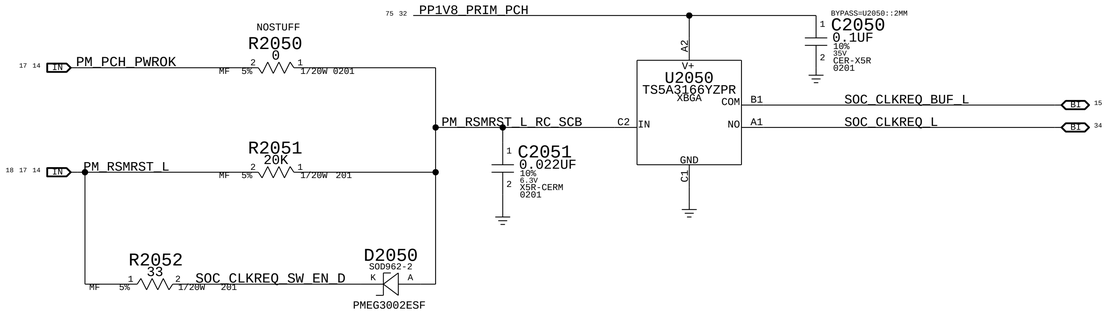
C Miscellaneous Pull-Ups



D PM_RSMRST Control



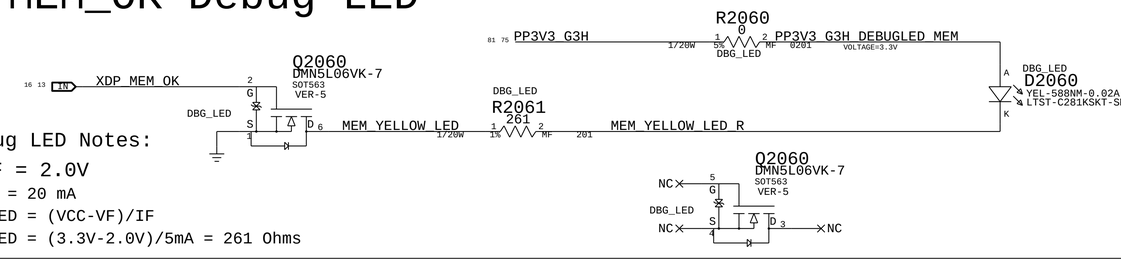
E SOC CLKREQ Control



tau = RC = 20k * 0.022uF = 440us

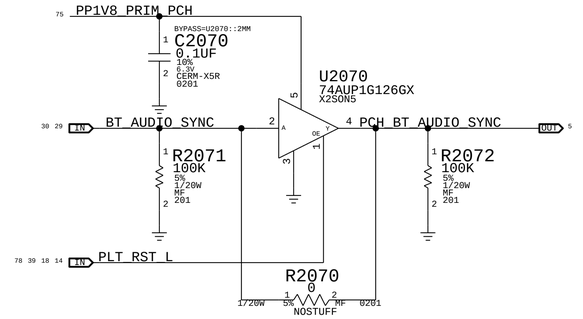
PCH latches SOC_CLKREQ_L boot strap 65us after RSMRST# de-assertion

F MEM_OK Debug LED

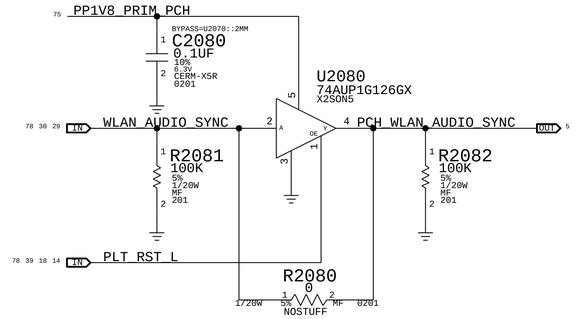


Debug LED Notes:
- VF = 2.0V
- IF = 20 mA
- RLED = (VCC-VF)/IF
- RLED = (3.3V-2.0V)/5mA = 261 Ohms

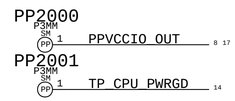
G BT Audio Sync Buf



H WiFi Audio Sync Buf



I Miscellaneous Probe Points



BOM_COST_GROUP=CPU & CHIPSET

SYNC_MASTER=CARD_CPU_ICL_YN SYNC_DATE=06/08/2018

PAGE TITLE: Chipset Project Support

Apple Inc.

DRAWING NUMBER: 051-05232 SIZE: D
REVISION: 2.0.0
BRANCH: proto4b
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LPDDR4x Sub-Channels A & B

CRITICAL
OMIT_TABLE

U2300
LPDDR4X-3200-64GBIT-18NM
FBGA
K3UH7H70MM-JGCJ
SYM 1 OF 4
DDRA

MEM_B_CKE<0>	F9	CKE0_A	CS0_A	G6	MEM_B_CS_L<0>
MEM_B_CKE<1>	G8	CKE1_A	CS1_A	F5	MEM_B_CS_L<1>
MEM_B_DQ_2<4>	B3	DQ0_A	DMI0_A	H3	
MEM_B_DQ_2<5>	C2	DQ1_A	DMI1_A	H11	
MEM_B_DQ_2<7>	E2	DQ2_A			
MEM_B_DQ_2<6>	G2	DQ3_A	ODT_CA_A	J4	
MEM_B_DQ_2<3>	D3	DQ4_A			
MEM_B_DQ_2<1>	C4	DQ5_A	CA0_A	B5	MEM_B_CA<0>
MEM_B_DQ_2<2>	E4	DQ6_A	CA1_A	D5	MEM_B_CA<1>
MEM_B_DQ_2<0>	H5	DQ7_A	CA2_A	C6	MEM_B_CA<2>
MEM_B_DQ_0<4>	B11	DQ8_A	CA3_A	C8	MEM_B_CA<3>
MEM_B_DQ_0<0>	C12	DQ9_A	CA4_A	B9	MEM_B_CA<4>
MEM_B_DQ_0<3>	E12	DQ10_A	CA5_A	D9	MEM_B_CA<5>
MEM_B_DQ_0<7>	G12	DQ11_A			
MEM_B_DQ_0<5>	D11	DQ12_A	DQS0_T_A	F3	MEM_B_DQS_P<2>
MEM_B_DQ_0<1>	C10	DQ13_A	DQS0_C_A	G4	MEM_B_DQS_N<2>
MEM_B_DQ_0<6>	E10	DQ14_A	DQS1_T_A	F11	MEM_B_DQS_P<0>
MEM_B_DQ_0<2>	H9	DQ15_A	DQS1_C_A	G10	MEM_B_DQS_N<0>
MEM_B_CLK_P	E6	CK_T_A	ZQ0_A	J10	MEM_1A_ZQ<0>
MEM_B_CLK_N	E8	CK_C_A	ZQ1_A	J12	MEM_1A_ZQ<1>

PP0V6_S3 → R2300 240 1% 1/20W MF 201 → MEM_1A_ZQ<0>
PP0V6_S3 → R2301 240 1% 1/20W MF 201 → MEM_1A_ZQ<1>
PLACE_NEAR=U2300.J10:12.7mm
PLACE_NEAR=U2300.J12:12.7mm

DDRB

MEM_A_CKE<0>	Y9	CKE0_B	CS0_B	W6	MEM_A_CS_L<0>
MEM_A_CKE<1>	W8	CKE1_B	CS1_B	Y5	MEM_A_CS_L<1>
MEM_A_DQ_2<0>	AD3	DQ0_B	DMI0_B	V3	
MEM_A_DQ_2<3>	AC2	DQ1_B	DMI1_B	V11	
MEM_A_DQ_2<5>	AA2	DQ2_B			
MEM_A_DQ_2<6>	W2	DQ3_B	ODT_CA_B	U4	
MEM_A_DQ_2<7>	AB3	DQ4_B			
MEM_A_DQ_2<1>	AC4	DQ5_B	CA0_B	AD5	MEM_A_CA<0>
MEM_A_DQ_2<2>	AA4	DQ6_B	CA1_B	AB5	MEM_A_CA<1>
MEM_A_DQ_2<4>	V5	DQ7_B	CA2_B	AC6	MEM_A_CA<2>
MEM_A_DQ_0<2>	AD11	DQ8_B	CA3_B	AC8	MEM_A_CA<3>
MEM_A_DQ_0<5>	AC12	DQ9_B	CA4_B	AD9	MEM_A_CA<4>
MEM_A_DQ_0<3>	AA12	DQ10_B	CA5_B	AB9	MEM_A_CA<5>
MEM_A_DQ_0<7>	W12	DQ11_B			
MEM_A_DQ_0<4>	AB11	DQ12_B	DQS0_T_B	Y3	MEM_A_DQS_P<2>
MEM_A_DQ_0<0>	AC10	DQ13_B	DQS0_C_B	W4	MEM_A_DQS_N<2>
MEM_A_DQ_0<6>	AA10	DQ14_B	DQS1_T_B	Y11	MEM_A_DQS_P<0>
MEM_A_DQ_0<1>	V9	DQ15_B	DQS1_C_B	W10	MEM_A_DQS_N<0>
MEM_A_CLK_P	AA6	CK_T_B			
MEM_A_CLK_N	AA8	CK_C_B	RESET*	U12	MEM_RESET_L

DDRC

MEM_B_CKE<0>	F23	CKE0_C	CS0_C	G20	MEM_B_CS_L<0>
MEM_B_CKE<1>	G22	CKE1_C	CS1_C	F19	MEM_B_CS_L<1>
MEM_B_DQ_3<0>	B17	DQ0_C	DMI0_C	H17	
MEM_B_DQ_3<1>	C16	DQ1_C	DMI1_C	H25	
MEM_B_DQ_3<2>	E16	DQ2_C			
MEM_B_DQ_3<3>	G16	DQ3_C	ODT_CA_C	J18	
MEM_B_DQ_3<4>	D17	DQ4_C			
MEM_B_DQ_3<5>	C18	DQ5_C	CA0_C	B19	MEM_B_CA<0>
MEM_B_DQ_3<6>	E18	DQ6_C	CA1_C	D19	MEM_B_CA<1>
MEM_B_DQ_3<7>	H19	DQ7_C	CA2_C	C20	MEM_B_CA<2>
MEM_B_DQ_1<0>	B25	DQ8_C	CA3_C	C22	MEM_B_CA<3>
MEM_B_DQ_1<1>	C26	DQ9_C	CA4_C	B23	MEM_B_CA<4>
MEM_B_DQ_1<2>	E26	DQ10_C	CA5_C	D23	MEM_B_CA<5>
MEM_B_DQ_1<3>	G26	DQ11_C			
MEM_B_DQ_1<4>	D25	DQ12_C	DQS0_T_C	F17	MEM_B_DQS_P<3>
MEM_B_DQ_1<5>	C24	DQ13_C	DQS0_C_C	G18	MEM_B_DQS_N<3>
MEM_B_DQ_1<6>	E24	DQ14_C	DQS1_T_C	F25	MEM_B_DQS_P<1>
MEM_B_DQ_1<7>	H23	DQ15_C	DQS1_C_C	G24	MEM_B_DQS_N<1>
MEM_B_CLK_P	E20	CK_T_C	ZQ0_C	J24	MEM_1C_ZQ<0>
MEM_B_CLK_N	E22	CK_C_C	ZQ1_C	J26	MEM_1C_ZQ<1>

PP0V6_S3 → R2350 240 1% 1/20W MF 201 → MEM_1C_ZQ<0>
PP0V6_S3 → R2351 240 1% 1/20W MF 201 → MEM_1C_ZQ<1>
PLACE_NEAR=U2300.J24:12.7mm
PLACE_NEAR=U2300.J26:12.7mm

DDRD

MEM_A_CKE<0>	Y23	CKE0_D	CS0_D	W20	MEM_A_CS_L<0>
MEM_A_CKE<1>	W22	CKE1_D	CS1_D	Y19	MEM_A_CS_L<1>
MEM_A_DQ_3<6>	AD17	DQ0_D	DMI0_D	V17	
MEM_A_DQ_3<5>	AC16	DQ1_D	DMI1_D	V25	
MEM_A_DQ_3<4>	AA16	DQ2_D			
MEM_A_DQ_3<0>	W16	DQ3_D	ODT_CA_D	U18	
MEM_A_DQ_3<3>	AB17	DQ4_D			
MEM_A_DQ_3<7>	AC18	DQ5_D	CA0_D	AD19	MEM_A_CA<0>
MEM_A_DQ_3<1>	AA18	DQ6_D	CA1_D	AB19	MEM_A_CA<1>
MEM_A_DQ_3<2>	V19	DQ7_D	CA2_D	AC20	MEM_A_CA<2>
MEM_A_DQ_1<0>	AD25	DQ8_D	CA3_D	AC22	MEM_A_CA<3>
MEM_A_DQ_1<6>	AC26	DQ9_D	CA4_D	AD23	MEM_A_CA<4>
MEM_A_DQ_1<5>	AA26	DQ10_D	CA5_D	AB23	MEM_A_CA<5>
MEM_A_DQ_1<1>	W26	DQ11_D			
MEM_A_DQ_1<3>	AB25	DQ12_D	DQS0_T_D	Y17	MEM_A_DQS_P<3>
MEM_A_DQ_1<7>	AC24	DQ13_D	DQS0_C_D	W18	MEM_A_DQS_N<3>
MEM_A_DQ_1<4>	AA24	DQ14_D	DQS1_T_D	Y25	MEM_A_DQS_P<1>
MEM_A_DQ_1<2>	V23	DQ15_D	DQS1_C_D	W24	MEM_A_DQS_N<1>
MEM_A_CLK_P	AA20	CK_T_D			
MEM_A_CLK_N	AA22	CK_C_D			

CRITICAL
OMIT_TABLE

U2300
LPDDR4X-3200-64GBIT-18NM
FBGA
K3UH7H70MM-JGCJ
SYM 2 OF 4

PP1V8_S3 → A2, B2, AD2, AE2, A12, B12, AD12, AE12, A16, B16, AD16, AE16, A26, B26, AD26, AE26 (VDD1)

J2	NC
J3	NC
J5	NC
U5	NC
J6	NC
U6	NC
J8	NC
U8	NC
U9	NC
J16	NC
J17	NC
J19	NC
J20	NC
U20	NC
J22	NC
U22	NC
J23	NC
U23	NC
J26	NC

PP1V1_S3 → A6, B6, D6, F6, H6, V6, Y6, AB6, AD6, AE6, A8, B8, D8, F8, H8, V8, Y8, AB8, AD8, AE8, A20, B20, D20, F20, H20, V20, Y20, AB20, AD20, AE20, A22, B22, D22, F22, H22, V22, Y22, AB22, AD22, AE22 (VDD2)

CRITICAL
OMIT_TABLE

U2300
LPDDR4X-3200-64GBIT-18NM
FBGA
K3UH7H70MM-JGCJ
SYM 4 OF 4

AA3, AA5, AA9, AA11, AA17, AA19, AA23, AA25, AB2, AB4, AB10, AB12, AB16, AB18, AB24, AB26, AC3, AC5, AC9, AC11, AC17, AC19, AC23, AC25, AD4, AD10, AD18, AD24, B4, B10, B18, B24, C3, C5, C9, C11, C17, C19, C23, C25, D2, D4, D10, D12, D16, D18, D24, D26, E3, E5, E9, E11, E17, E19, E23, E25, F2 → VSS

CRITICAL
OMIT_TABLE

U2300
LPDDR4X-3200-64GBIT-18NM
FBGA
K3UH7H70MM-JGCJ
SYM 3 OF 4

PP0V6_S3 → F4, F10, F12, F16, F18, F24, F26, G3, G5, G9, G11, G17, G19, G23, G25, H2, H4, H10, H12, H16, H18, H24, H26, J11, J25, U2, U3, U10, U11, U16, U17, U24, U25, V2, V4, V10, V12, V16, V18, V24, V26, W3, W5, W9, W11, W17, W19, W23, W25, Y2, Y4, Y10, Y12, Y16, Y18, Y24, Y26 (VSS)

A1, B1, C1, D1, E1, F1, G1, H1, J1, U1, V1, W1, Y1, AA1, AB1, AC1, AD1, AE1, A3, AE3, A4, AE4, A5, AE5, A9, AE9, A10, AE10, A11, AE11, A13, B13, C13, D13, E13, F13, G13, H13, J13, U13, V13, W13, Y13, AA13, AB13, AC13, AD13, AE13 → VDDQ

A15, B15, C15, D15, E15, F15, G15, H15, J15, U15, V15, W15, Y15, AA15, AB15, AC15, AD15, AE15, A17, AE17, A18, AE18, A19, AE19, A23, AE23, A24, AE24, A25, AE25, A27, B27, C27, D27, E27, F27, G27, H27, J27, U27, V27, W27, Y27, AA27, AB27, AC27, AD27, AE27 → VDDQ

PP0V6_S3 → C2300–C2311 1.0UF 20% 6.3V X5R 0201-1 / 10UF 20% 6.3V CERM 0402

PP1V1_S3 → C2320–C2331 1.0UF 20% 6.3V X5R 0201-1 / 10UF 20% 6.3V CERM 0402

PP1V8_S3 → C2340–C2345 1.0UF 20% 6.3V X5R 0201-1 / 10UF 20% 6.3V CERM 0402

BOM_COST_GROUP=DRAM

SYNC_MASTER=J140 SYNC_DATE=08/23/2018

PAGE TITLE: LPDDR4x Sub-Channels A & B

Apple Inc.

DRAWING NUMBER: 051-05232 SIZE: D
REVISION: 2.0.0
BRANCH: proto4b
PAGE: 23 OF 152
SHEET: 19 OF 86

LPDDR4x Sub-Channels C & D

U2500 — LPDDR4X-3200-64GBIT-18NM FBGA — K3UH7H70MM-JGCJ — SYM 1 OF 4 — DDRA

CRITICAL
OMIT_TABLE

MEM_D_CKE<0>	F9	CKE0_A	
MEM_D_CKE<1>	G8	CKE1_A	
MEM_D_DQ_0<5>	B3	DQ0_A	
MEM_D_DQ_0<3>	C2	DQ1_A	
MEM_D_DQ_0<4>	E2	DQ2_A	
MEM_D_DQ_0<1>	G2	DQ3_A	
MEM_D_DQ_0<7>	D3	DQ4_A	
MEM_D_DQ_0<6>	C4	DQ5_A	
MEM_D_DQ_0<0>	E4	DQ6_A	
MEM_D_DQ_0<2>	H5	DQ7_A	
MEM_D_DQ_2<6>	B11	DQ8_A	
MEM_D_DQ_2<3>	C12	DQ9_A	
MEM_D_DQ_2<5>	E12	DQ10_A	
MEM_D_DQ_2<2>	G12	DQ11_A	
MEM_D_DQ_2<7>	D11	DQ12_A	
MEM_D_DQ_2<4>	C10	DQ13_A	
MEM_D_DQ_2<0>	E10	DQ14_A	
MEM_D_DQ_2<1>	H9	DQ15_A	
MEM_D_CLK_P	E6	CK_T_A	
MEM_D_CLK_N	E8	CK_C_A	
MEM_D_CS_L<0>	G6	CS0_A	
MEM_D_CS_L<1>	F5	CS1_A	
	H3	DMI0_A	
	H11	DMI1_A	
	J4	ODT_CA_A	
MEM_D_CA<0>	B5	CA0_A	
MEM_D_CA<1>	D5	CA1_A	
MEM_D_CA<2>	C6	CA2_A	
MEM_D_CA<3>	C8	CA3_A	
MEM_D_CA<4>	B9	CA4_A	
MEM_D_CA<5>	D9	CA5_A	
MEM_D_DQS_P<0>	F3	DQS0_T_A	
MEM_D_DQS_N<0>	G4	DQS0_C_A	
MEM_D_DQS_P<2>	F11	DQS1_T_A	
MEM_D_DQS_N<2>	G10	DQS1_C_A	
MEM_2A_ZQ<0>	J10	ZQ0_A	
MEM_2A_ZQ<1>	J12	ZQ1_A	

U2500 — LPDDR4X-3200-64GBIT-18NM FBGA — K3UH7H70MM-JGCJ — SYM 2 OF 4

CRITICAL
OMIT_TABLE

PP1V8_S3	A2	VDD1
	B2	VDD1
	AD2	VDD1
	AE2	VDD1
	A12	VDD1
	B12	VDD1
	AD12	VDD1
	AE12	VDD1
	A16	VDD1
	B16	VDD1
	AD16	VDD1
	AE16	VDD1
	A26	VDD1
	B26	VDD1
	AD26	VDD1
	AE26	VDD1
	J2	NC
	J3	NC
	J5	NC
	U5	NC
	J6	NC
	U6	NC
	J8	NC
	U8	NC
	J9	NC
	U9	NC
	J16	NC
	J17	NC
	J19	NC
	J20	NC
	U20	NC
	J22	NC
	U22	NC
	J23	NC
	U23	NC
	J26	NC
PP1V1_S3	A6	VDD2
	B6	VDD2
	D6	VDD2
	F6	VDD2
	H6	VDD2
	V6	VDD2
	Y6	VDD2
	AB6	VDD2
	AD6	VDD2
	AE6	VDD2
	A8	VDD2
	B8	VDD2
	D8	VDD2
	F8	VDD2
	H8	VDD2
	V8	VDD2
	Y8	VDD2
	AB8	VDD2
	AD8	VDD2
	AE8	VDD2
	A20	VDD2
	B20	VDD2
	D20	VDD2
	F20	VDD2
	H20	VDD2
	V20	VDD2
	Y20	VDD2
	AB20	VDD2
	AD20	VDD2
	AE20	VDD2
	A22	VDD2
	B22	VDD2
	D22	VDD2
	F22	VDD2
	H22	VDD2
	V22	VDD2
	Y22	VDD2
	AB22	VDD2
	AD22	VDD2
	AE22	VDD2

U2500 — LPDDR4X-3200-64GBIT-18NM FBGA — K3UH7H70MM-JGCJ — SYM 4 OF 4

CRITICAL
OMIT_TABLE

PP1V1_S3	AA3	VDD2
	AA5	VDD2
	AA9	VDD2
	AA11	VDD2
	AA17	VDD2
	AA19	VDD2
	AA23	VDD2
	AA25	VDD2
	AB2	VDD2
	AB4	VDD2
	AB10	VDD2
	AB12	VDD2
	AB16	VDD2
	AB18	VDD2
	AB24	VDD2
	AB26	VDD2
	AC3	VDD2
	AC5	VDD2
	AC9	VDD2
	AC11	VDD2
	AC17	VDD2
	AC19	VDD2
	AC23	VDD2
	AC25	VDD2
	AD4	VDD2
	AD10	VDD2
	AD18	VDD2
	AD24	VDD2
	B4	VDD2
	B10	VDD2
	B18	VDD2
	B24	VDD2
	C3	VDD2
	C5	VDD2
	C9	VDD2
	C11	VDD2
	C17	VDD2
	C19	VDD2
	C23	VDD2
	C25	VDD2
	D2	VDD2
	D4	VDD2
	D10	VDD2
	D12	VDD2
	D16	VDD2
	D18	VDD2
	D24	VDD2
	D26	VDD2
	E3	VDD2
	E5	VDD2
	E9	VDD2
	E11	VDD2
	E17	VDD2
	E19	VDD2
	E23	VDD2
	E25	VDD2
	F2	VDD2
VSS		

U2500 — LPDDR4X-3200-64GBIT-18NM FBGA — K3UH7H70MM-JGCJ — SYM 3 OF 4

CRITICAL
OMIT_TABLE

PP0V6_S3	A1	VDDQ
	B1	VDDQ
	C1	VDDQ
	D1	VDDQ
	E1	VDDQ
	F1	VDDQ
	G1	VDDQ
	H1	VDDQ
	J1	VDDQ
	U1	VDDQ
	V1	VDDQ
	W1	VDDQ
	Y1	VDDQ
	AA1	VDDQ
	AB1	VDDQ
	AC1	VDDQ
	AD1	VDDQ
	AE1	VDDQ
	A3	VDDQ
	AE3	VDDQ
	A4	VDDQ
	AE4	VDDQ
	A5	VDDQ
	AE5	VDDQ
	A9	VDDQ
	AE9	VDDQ
	A10	VDDQ
	AE10	VDDQ
	A11	VDDQ
	AE11	VDDQ
	A13	VDDQ
	B13	VDDQ
	C13	VDDQ
	D13	VDDQ
	E13	VDDQ
	F13	VDDQ
	G13	VDDQ
	H13	VDDQ
	J13	VDDQ
	U13	VDDQ
	V13	VDDQ
	W13	VDDQ
	Y13	VDDQ
	AA13	VDDQ
	AB13	VDDQ
	AC13	VDDQ
	AD13	VDDQ
	AE13	VDDQ
	A15	VDDQ
	B15	VDDQ
	C15	VDDQ
	D15	VDDQ
	E15	VDDQ
	F15	VDDQ
	G15	VDDQ
	H15	VDDQ
	J15	VDDQ
	U15	VDDQ
	V15	VDDQ
	W15	VDDQ
	Y15	VDDQ
	AA15	VDDQ
	AB15	VDDQ
	AC15	VDDQ
	AD15	VDDQ
	AE15	VDDQ
	A17	VDDQ
	AE17	VDDQ
	A18	VDDQ
	AE18	VDDQ
	A19	VDDQ
	AE19	VDDQ
	A23	VDDQ
	AE23	VDDQ
	A24	VDDQ
	AE24	VDDQ
	A25	VDDQ
	AE25	VDDQ
	A27	VDDQ
	B27	VDDQ
	C27	VDDQ
	D27	VDDQ
	E27	VDDQ
	F27	VDDQ
	G27	VDDQ
	H27	VDDQ
	J27	VDDQ
	U27	VDDQ
	V27	VDDQ
	W27	VDDQ
	Y27	VDDQ
	AA27	VDDQ
	AB27	VDDQ
	AC27	VDDQ
	AD27	VDDQ
	AE27	VDDQ
VSS		

U2500 — LPDDR4X-3200-64GBIT-18NM FBGA — K3UH7H70MM-JGCJ — SYM 1 OF 4 — DDRB

MEM_C_CKE<0>	Y9	CKE0_B	
MEM_C_CKE<1>	W8	CKE1_B	
MEM_C_DQ_0<0>	AD3	DQ0_B	
MEM_C_DQ_0<1>	AC2	DQ1_B	
MEM_C_DQ_0<2>	AA2	DQ2_B	
MEM_C_DQ_0<3>	W2	DQ3_B	
MEM_C_DQ_0<4>	AB3	DQ4_B	
MEM_C_DQ_0<5>	AC4	DQ5_B	
MEM_C_DQ_0<6>	AA4	DQ6_B	
MEM_C_DQ_0<7>	V5	DQ7_B	
MEM_C_DQ_2<0>	AD11	DQ8_B	
MEM_C_DQ_2<1>	AC12	DQ9_B	
MEM_C_DQ_2<2>	AA12	DQ10_B	
MEM_C_DQ_2<3>	W12	DQ11_B	
MEM_C_DQ_2<4>	AB11	DQ12_B	
MEM_C_DQ_2<5>	AC10	DQ13_B	
MEM_C_DQ_2<6>	AA10	DQ14_B	
MEM_C_DQ_2<7>	V9	DQ15_B	
MEM_C_CLK_P	AA6	CK_T_B	
MEM_C_CLK_N	AA8	CK_C_B	
MEM_C_CS_L<0>	W6	CS0_B	
MEM_C_CS_L<1>	Y5	CS1_B	
	V3	DMI0_B	
	V11	DMI1_B	
	U4	ODT_CA_B	
MEM_C_CA<0>	AD5	CA0_B	
MEM_C_CA<1>	AB5	CA1_B	
MEM_C_CA<2>	AC6	CA2_B	
MEM_C_CA<3>	AC8	CA3_B	
MEM_C_CA<4>	AD9	CA4_B	
MEM_C_CA<5>	AB9	CA5_B	
MEM_C_DQS_P<0>	Y3	DQS0_T_B	
MEM_C_DQS_N<0>	W4	DQS0_C_B	
MEM_C_DQS_P<2>	Y11	DQS1_T_B	
MEM_C_DQS_N<2>	W10	DQS1_C_B	
MEM_RESET_L	U12	RESET*	7 19

U2500 — LPDDR4X-3200-64GBIT-18NM FBGA — K3UH7H70MM-JGCJ — SYM 1 OF 4 — DDRC

MEM_D_CKE<0>	F23	CKE0_C	
MEM_D_CKE<1>	G22	CKE1_C	
MEM_D_DQ_1<2>	B17	DQ0_C	
MEM_D_DQ_1<3>	C16	DQ1_C	
MEM_D_DQ_1<6>	E16	DQ2_C	
MEM_D_DQ_1<7>	G16	DQ3_C	
MEM_D_DQ_1<5>	D17	DQ4_C	
MEM_D_DQ_1<0>	C18	DQ5_C	
MEM_D_DQ_1<4>	E18	DQ6_C	
MEM_D_DQ_1<1>	H19	DQ7_C	
MEM_D_DQ_3<5>	B25	DQ8_C	
MEM_D_DQ_3<4>	C26	DQ9_C	
MEM_D_DQ_3<1>	E26	DQ10_C	
MEM_D_DQ_3<3>	G26	DQ11_C	
MEM_D_DQ_3<2>	D25	DQ12_C	
MEM_D_DQ_3<0>	C24	DQ13_C	
MEM_D_DQ_3<6>	E24	DQ14_C	
MEM_D_DQ_3<7>	H23	DQ15_C	
MEM_D_CLK_P	E20	CK_T_C	
MEM_D_CLK_N	E22	CK_C_C	
MEM_D_CS_L<0>	G20	CS0_C	
MEM_D_CS_L<1>	F19	CS1_C	
	H17	DMI0_C	
	H25	DMI1_C	
	J18	ODT_CA_C	
MEM_D_CA<0>	B19	CA0_C	
MEM_D_CA<1>	D19	CA1_C	
MEM_D_CA<2>	C20	CA2_C	
MEM_D_CA<3>	C22	CA3_C	
MEM_D_CA<4>	B23	CA4_C	
MEM_D_CA<5>	D23	CA5_C	
MEM_D_DQS_P<1>	F17	DQS0_T_C	
MEM_D_DQS_N<1>	G18	DQS0_C_C	
MEM_D_DQS_P<3>	F25	DQS1_T_C	
MEM_D_DQS_N<3>	G24	DQS1_C_C	
MEM_2C_ZQ<0>	J24	ZQ0_C	
MEM_2C_ZQ<1>	J26	ZQ1_C	

U2500 — LPDDR4X-3200-64GBIT-18NM FBGA — K3UH7H70MM-JGCJ — SYM 1 OF 4 — DDRD

MEM_C_CKE<0>	Y23	CKE0_D	
MEM_C_CKE<1>	W22	CKE1_D	
MEM_C_DQ_1<3>	AD17	DQ0_D	
MEM_C_DQ_1<4>	AC16	DQ1_D	
MEM_C_DQ_1<2>	AA16	DQ2_D	
MEM_C_DQ_1<0>	W16	DQ3_D	
MEM_C_DQ_1<1>	AB17	DQ4_D	
MEM_C_DQ_1<5>	AC18	DQ5_D	
MEM_C_DQ_1<6>	AA18	DQ6_D	
MEM_C_DQ_1<7>	V19	DQ7_D	
MEM_C_DQ_3<7>	AD25	DQ8_D	
MEM_C_DQ_3<5>	AC26	DQ9_D	
MEM_C_DQ_3<4>	AA26	DQ10_D	
MEM_C_DQ_3<2>	W26	DQ11_D	
MEM_C_DQ_3<3>	AB25	DQ12_D	
MEM_C_DQ_3<6>	AC24	DQ13_D	
MEM_C_DQ_3<0>	AA24	DQ14_D	
MEM_C_DQ_3<1>	V23	DQ15_D	
MEM_C_CLK_P	AA20	CK_T_D	
MEM_C_CLK_N	AA22	CK_C_D	
MEM_C_CS_L<0>	W20	CS0_D	
MEM_C_CS_L<1>	Y19	CS1_D	
	V17	DMI0_D	
	V25	DMI1_D	
	U18	ODT_CA_D	
MEM_C_CA<0>	AD19	CA0_D	
MEM_C_CA<1>	AB19	CA1_D	
MEM_C_CA<2>	AC20	CA2_D	
MEM_C_CA<3>	AC22	CA3_D	
MEM_C_CA<4>	AD23	CA4_D	
MEM_C_CA<5>	AB23	CA5_D	
MEM_C_DQS_P<1>	Y17	DQS0_T_D	
MEM_C_DQS_N<1>	W18	DQS0_C_D	
MEM_C_DQS_P<3>	Y25	DQS1_T_D	
MEM_C_DQS_N<3>	W24	DQS1_C_D	

Termination resistors

R2500	PP0V6_S3	MEM_2A_ZQ<0>	240 1% 1/20W MF 201	PLACE_NEAR=U2500.J10:12.7mm
R2501	PP0V6_S3	MEM_2A_ZQ<1>	240 1% 1/20W MF 201	PLACE_NEAR=U2500.J12:12.7mm
R2550	PP0V6_S3	MEM_2C_ZQ<0>	240 1% 1/20W MF 201	PLACE_NEAR=U2500.J24:12.7mm
R2551	PP0V6_S3	MEM_2C_ZQ<1>	240 1% 1/20W MF 201	PLACE_NEAR=U2500.J26:12.7mm

Decoupling capacitors

C2500	PP0V6_S3	1.0UF 20% 6.3V X5R 0201-1	
C2501	PP0V6_S3	1.0UF 20% 6.3V X5R 0201-1	
C2502	PP0V6_S3	1.0UF 20% 6.3V X5R 0201-1	
C2503	PP0V6_S3	1.0UF 20% 6.3V X5R 0201-1	
C2504	PP0V6_S3	1.0UF 20% 6.3V X5R 0201-1	
C2505	PP0V6_S3	1.0UF 20% 6.3V X5R 0201-1	
C2506	PP0V6_S3	1.0UF 20% 6.3V X5R 0201-1	
C2507	PP0V6_S3	1.0UF 20% 6.3V X5R 0201-1	
C2508	PP0V6_S3	10UF 20% 6.3V CERM 0402	
C2509	PP0V6_S3	10UF 20% 6.3V CERM 0402	
C2510	PP0V6_S3	10UF 20% 6.3V CERM 0402	
C2511	PP0V6_S3	10UF 20% 6.3V CERM 0402	
C2520	PP1V1_S3	1.0UF 20% 6.3V X5R 0201-1	
C2521	PP1V1_S3	1.0UF 20% 6.3V X5R 0201-1	
C2522	PP1V1_S3	1.0UF 20% 6.3V X5R 0201-1	
C2523	PP1V1_S3	1.0UF 20% 6.3V X5R 0201-1	
C2524	PP1V1_S3	1.0UF 20% 6.3V X5R 0201-1	
C2525	PP1V1_S3	1.0UF 20% 6.3V X5R 0201-1	
C2526	PP1V1_S3	1.0UF 20% 6.3V X5R 0201-1	
C2527	PP1V1_S3	1.0UF 20% 6.3V X5R 0201-1	
C2528	PP1V1_S3	10UF 20% 6.3V CERM 0402	
C2529	PP1V1_S3	10UF 20% 6.3V CERM 0402	
C2530	PP1V1_S3	10UF 20% 6.3V CERM 0402	
C2531	PP1V1_S3	10UF 20% 6.3V CERM 0402	
C2540	PP1V8_S3	1.0UF 20% 6.3V X5R 0201-1	
C2541	PP1V8_S3	1.0UF 20% 6.3V X5R 0201-1	
C2542	PP1V8_S3	10UF 20% 6.3V CERM 0402	
C2543	PP1V8_S3	10UF 20% 6.3V CERM 0402	
C2544	PP1V8_S3	10UF 20% 6.3V CERM 0402	
C2545	PP1V8_S3	10UF 20% 6.3V CERM 0402	

BOM_COST_GROUP=DRAM

SYNC_MASTER=J140 SYNC_DATE=08/23/2018

PAGE TITLE: LPDDR4x Sub-Channels C & D

Apple Inc.

DRAWING NUMBER: 051-05232 SIZE: D
REVISION: 2.0.0
BRANCH: proto4b
PAGE: 25 OF 152
SHEET: 20 OF 86

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
138S00035	4	CAP,CER,20UF,20%,2.5V,X6S,HRZTL,0402	C2862,C2863,C2864,C2865,C2866,C2867,C2868,C2869	CRITICAL	

USBC HIGH-SPEED 1 AC COUPLING

USBC_HSX_R2D_C_P<1>	C2820	0.22UF	USBC_HSX_R2D_P<1>	GND_VOID=TRUE
USBC_HSX_R2D_C_N<1>	C2821	0.22UF	USBC_HSX_R2D_N<1>	GND_VOID=TRUE
USBC_HSX_D2R_C_P<1>	C2822	0.22UF	USBC_HSX_D2R_P<1>	GND_VOID=TRUE
USBC_HSX_D2R_C_N<1>	C2823	0.22UF	USBC_HSX_D2R_N<1>	GND_VOID=TRUE
USBC_HSX_R2D_C_P<2>	C2824	0.22UF	USBC_HSX_R2D_P<2>	GND_VOID=TRUE
USBC_HSX_R2D_C_N<2>	C2825	0.22UF	USBC_HSX_R2D_N<2>	GND_VOID=TRUE
USBC_HSX_D2R_C_P<2>	C2826	0.22UF	USBC_HSX_D2R_P<2>	GND_VOID=TRUE
USBC_HSX_D2R_C_N<2>	C2827	0.22UF	USBC_HSX_D2R_N<2>	

All: 20% 6.3V X5R 0201

BB XTAL

TBT_X_XTAL25M_OUT_R — R2802 0 (0201 5% MF 1/20W) — TBT_X_XTAL25M_OUT

C2802 20PF 5% 25V C0G 0201

CRITICAL Y2800 25MHZ-25PPM-20PF-50OHM 2.00X1.60-SM

C2803 20PF 5% 25V C0G 0201

TBT_X_XTAL25M_IN_R — R2803 0 (0201 5% MF 1/20W) — TBT_X_XTAL25M_IN

U2800 BURNSIDE-BRIDGE BGA SYM 2 OF 2

CRITICAL OMIT_TABLE

USBC_HSX_R2D_P<1>	J1	ASSRXP1	
USBC_HSX_R2D_N<1>	J2	ASSRXN1	
USBC_HSX_R2D_P<2>	C1	ASSRXP2	
USBC_HSX_R2D_N<2>	C2	ASSRXN2	
USBC_HSX_D2R_P<1>	G1	ASSTXP1	
USBC_HSX_D2R_N<1>	G2	ASSTXN1	
USBC_HSX_D2R_P<2>	E1	ASSTXP2	
USBC_HSX_D2R_N<2>	E2	ASSTXN2	
USBC_HSX_AUXCH_C_P	L8	PA_AUX_P	INTERNAL CAPS, PU, PD
USBC_HSX_AUXCH_C_N	M8	PA_AUX_N	
XDP_LSX_TBTA_R2P	M7	PA_LSTX_SBU1	
XDP_LSX_TBTA_P2R	L7	PA_LSRX_SBU2	
I2C_UPC_X_INTM_L	A10	I2C_INT	
I2C_UPC_X_SCLM	C9	I2C_SCL	
I2C_UPC_X_SDAM	E7	I2C_SDA	
TBT_X_GPIO_5	B9	POC_GPIO_5	
TBT_X_GPIO_6	A8	POC_GPIO_6	
TBT_X_FLASH_SHARE_EN	A4	POC_GPIO_10	
TBT_X_FLASH_MSTR_H_SLV_L	A5	POC_GPIO_11	
TBT_X_GPIO_12	A6	POC_GPIO_12	
TBT_X_THERM_D_P	M11	THERMDA	
TBT_X_XTAL25M_IN	L9	XTAL_25_IN	
TBT_X_XTAL25M_OUT	M9	XTAL_25_OUT	
	L12	MONDC_SVR	
	A11	MONDC	
	M12	TEST_EDM	
	A12	NC_A12	
	J6	NC_J6	
	L3	NC_L3	
	J5	NC_J5	

BSSRXP1	J12	USBC_X_D2R_P<1>	BI 26
BSSRXN1	J11	USBC_X_D2R_N<1>	BI 26
BSSRXP2	C12	USBC_X_D2R_P<2>	BI 26
BSSRXN2	C11	USBC_X_D2R_N<2>	BI 26
BSSTXP1	G12	USBC_X_R2D_CR_P<1>	OUT 26
BSSTXN1	G11	USBC_X_R2D_CR_N<1>	OUT 26
BSSTXP2	E12	USBC_X_R2D_CR_P<2>	OUT 26
BSSTXN2	E11	USBC_X_R2D_CR_N<2>	OUT 26
BSBU1	M10	USBC_X_AUXLSX_P	BI 24
BSBU2	L10	USBC_X_AUXLSX_N	BI 24
PERST*	B8	TBT_XT_PERST_L	IN 23
RESET*	L11	USBC_X_RESET_L	IN 27
TDI	A3	JTAG_ISP_TDI	IN 23
TMS	C3	JTAG_TBT_X_TMS	IN 23
TCK	B5	JTAG_ISP_TCK	IN 23
TDO	C5	JTAG_ISP_TDO	OUT 23
EE_DI	C6	SPI_TBT_X_MOSI	OUT 23
EE_DO	B4	SPI_TBT_X_MISO	IN 23
EE_CS*	B6	SPI_TBT_X_CS_L	OUT 23
EE_CLK	C7	SPI_TBT_X_CLK	OUT 23
TEST_EN	B11		
TEST_PWR_GOOD	B3	TBT_X_TEST_PWR_GOOD	
RBIAS	L4	TBT_X_RBIAS	
RSENSE	L5	TBT_X_RSENSE	
ATEST_P	A1	NC	
ATEST_N	A2	NC	
FORCE_PWR	B10	TBT_X_FORCE_PWR	IN 23
FLASH_BUSY*	A9	TBT_XT_FLASH_BUSY_L	BI 23
FUSE_VQPS_64	B2		
SMBUS_SCL	A7	TP_SMBUS_TBT_X_SCL	
SMBUS_SDA	B7	TP_SMBUS_TBT_X_SDA	

R2808 NOSTUFF 20K 5% 1/20W MF 201 — R2809 20K 5% 1/20W MF 201

R2806 100 5% 1/20W MF 201

R2807 4.75K 0.5% 1/20W TF 0201 — PLACE_NEAR=U2800.L5:2MM, PLACE_NEAR=U2800.L4:2MM

XW2830 SM — TBT_X_THERM_D_N (OUT 47) — PLACE_NEAR=U2800.K11:2MM, NO_XNET_CONNECTION=1

CONNECT TO GND PIN CLOSEST TO THERMDA PIN

U2800 BURNSIDE-BRIDGE BGA SYM 2 OF 2

CRITICAL OMIT_TABLE

PP0V9_TBT_X_SVR	F6	VCC0P9_SVR_ANA	
	G6		
	E9	VCC0P9_SVR_PB_ANA	
	G9		
PP0V9_TBT_X_LVR	L6	VCC0P9_LVR	
	M6	VCC0P9_LVR_SENSE	
	E5	VCC3P3_LC	
PP3V3_TBT_X_ANA	L2	VCC3P3_ANA	
PP0V9_TBT_X_LC	J3	VCC0P9_LC	
	F3	VSS	
	F5		
	G5		
	B1	VSS_ANA	
	B12		
	D1		
	D11		
	D12		
	D2		
	F1		
	F11		
	F12		
	F2		

VCC3P3_SX	E6	PP3V3_TBT_X_VCCA
VCC3P3A	J7	
VCC3P3_SVR	M4	PP3V3_TBT_X_S0_SVR
	M5	
VCC0P9_SVR	E3	P0V9_TBT_X_SVR_PGND
	G3	
SVR_IND	L1	PP0V9_TBT_X_SVR_IND
	M1	
SVR_VSS	M2	
	M3	
VSS_ANA	F7	
	F9	
	G7	
	H1	
	H11	
	H12	
	H2	
	J9	
	K1	
	K11	
	K12	
	K2	

R2800 0 (1/16W MF-LF) — R2801 0 (1/16W MF-LF) — XW2801 SM — NO_XNET_CONNECTION=1

C2843 12PF 5% 25V NP0-C0G 0201

C2830 2.2UF 20% 6.3V X5R-CERM 0201

C2831 10UF 20% 6.3V CERM 0402

C2836 2.2UF 20% 6.3V X5R-CERM 0201

C2837 2.2UF 20% 6.3V X5R-CERM 0201

C2842 NOSTUFF 47UF 20% 6.3V CER-X5R 0603

C2832 10UF 20% 6.3V CERM 0402 BYPASS=U2800.M4:M3:3MM

C2833 10UF 20% 6.3V CERM 0402

C2834 10UF 20% 6.3V CERM 0402

C2835 10UF 20% 6.3V CERM 0402

XW2800 SM — PLACE_NEAR=C2832.2:2MM, NO_XNET_CONNECTION=1

C2838 12PF 5% 25V NP0-C0G 0201

C2839 4UF 20% 6.3V CER-X5R 0201

C2841 4UF 20% 6.3V CER-X5R 0201

C2840 47UF 20% 6.3V CER-X5R 0603

CRITICAL L2800 0.68UH-20%-4.3A-0.043OHM 0805

C2854 10UF 20% 6.3V CERM 0402

C2855 2.2UF 20% 6.3V X5R-CERM 0201

C2856 2.2UF 20% 6.3V X5R-CERM 0201

C2857 2.2UF 20% 6.3V X5R-CERM 0201

C2858 2.2UF 20% 6.3V X5R-CERM 0201

MIN_LINE_WIDTH=0.1400 MIN_NECK_WIDTH=0.0750 VOLTAGE=3.3V

PP3V3_TBT_X_SX	R2850 100K 5% 1/20W MF 201	TBT_X_GPIO_5
PP3V3_TBT_X_S0	BSB_GP6:BSB_S0	
	R2841 100K 5% 1/20W MF 201	TBT_X_GPIO_6
	NOSTUFF R2851 100K 5% 1/20W MF 201	
	NOSTUFF R2843 100K 5% 1/20W MF 201	TBT_X_FLASH_SHARE_EN
	NOSTUFF R2845 100K 5% 1/20W MF 201	TBT_X_GPIO_12

FROM USB-C PORT CONTROLLER (UPC)

PP3V3_TBT_X_SX (21 23 27) — NOSTUFF C2842 47UF 20% 6.3V CER-X5R 0603

PP3V3_TBT_X_S0 (21 23 27)

PP0V9_TBT_X_SVR (21) VOLTAGE=0.9V DIDT=TRUE

BOM_COST_GROUP=TBT

SYNC_MASTER=CPU_CARD_ICL_Y SYNC_DATE=06/08/2018

PAGE TITLE: USB-C HIGH SPEED X (REAR)

Apple Inc.

DRAWING NUMBER	051-05232
SIZE	D
REVISION	2.0.0
BRANCH	proto4b
PAGE	28 OF 152
SHEET	21 OF 86

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
138S00035	4	CAP,CER,20UF,20%,2.5V,X6S,HRZTL,0402	C2962,C2963,C2964,C2965,C2966,C2967,C2968,C2969	CRITICAL	

USBC HIGH-SPEED 1 AC COUPLING

IN	USBC_HST_R2D_C_P<1>	C2920	0.22UF 20% 6.3V X5R 0201	USBC_HST_R2D_P<1>	22
IN	USBC_HST_R2D_C_N<1>	C2921	0.22UF 20% 6.3V X5R 0201	USBC_HST_R2D_N<1>	22
BI	USBC_HST_D2R_C_P<1>	C2922	0.22UF 20% 6.3V X5R 0201	USBC_HST_D2R_P<1>	22
BI	USBC_HST_D2R_C_N<1>	C2923	0.22UF 20% 6.3V X5R 0201	USBC_HST_D2R_N<1>	22
IN	USBC_HST_R2D_C_P<2>	C2924	0.22UF 20% 6.3V X5R 0201	USBC_HST_R2D_P<2>	22
IN	USBC_HST_R2D_C_N<2>	C2925	0.22UF 20% 6.3V X5R 0201	USBC_HST_R2D_N<2>	22
BI	USBC_HST_D2R_C_P<2>	C2926	0.22UF 20% 6.3V X5R 0201	USBC_HST_D2R_P<2>	22
BI	USBC_HST_D2R_C_N<2>	C2927	0.22UF 20% 6.3V X5R 0201	USBC_HST_D2R_N<2>	22

GND_VOID=TRUE

BB XTAL

R2902 0 5% 1/20W MF 0201
TBT_T_XTALZ5M_OUT_R — TBT_T_XTAL25M_OUT 22

C2902 20PF 5% 25V C0G 0201
C2903 20PF 5% 25V C0G 0201

CRITICAL
Y2900 25MHZ-25PPM-20PF-50OHM
2.00X1.60-SM

R2903 0 5% 1/20W MF 0201
TBT_T_XTAL25M_IN_R — TBT_T_XTAL25M_IN 22

U2900 BURNSTIDE-BRIDGE BGA SYM 1 OF 2

CRITICAL
OMIT_TABLE

USBC_HST_R2D_P<1>	J1	ASSRXP1	BSSRXP1	J12	USBC_T_D2R_P<1> BI 26
USBC_HST_R2D_N<1>	J2	ASSRXN1	BSSRXN1	J11	USBC_T_D2R_N<1> BI 26
USBC_HST_R2D_P<2>	C1	ASSRXP2	BSSRXP2	C12	USBC_T_D2R_P<2> BI 26
USBC_HST_R2D_N<2>	C2	ASSRXN2	BSSRXN2	C11	USBC_T_D2R_N<2> BI 26
USBC_HST_D2R_P<1>	G1	ASSTXP1	BSSTXP1	G12	USBC_T_R2D_CR_P<1> OUT 26
USBC_HST_D2R_N<1>	G2	ASSTXN1	BSSTXN1	G11	USBC_T_R2D_CR_N<1> OUT 26
USBC_HST_D2R_P<2>	E1	ASSTXP2	BSSTXP2	E12	USBC_T_R2D_CR_P<2> OUT 26
USBC_HST_D2R_N<2>	E2	ASSTXN2	BSSTXN2	E11	USBC_T_R2D_CR_N<2> OUT 26
USBC_HST_AUXCH_C_P	L8	PA_AUX_P INTERNAL CAPS, PU, PD	BSBU1	M10	USBC_T_AUXLSX_P BI 23 25
USBC_HST_AUXCH_C_N	M8	PA_AUX_N	BSBU2	L10	USBC_T_AUXLSX_N BI 23 25
XDP_LSX_TBTB_R2P	M7	PA_LSTX_SBU1	PERST*	B8	TBT_XT_PERST_L IN 23
XDP_LSX_TBTB_P2R	L7	PA_LSRX_SBU2	RESET*	L11	USBC_T_RESET_L IN 27
I2C_UPC_T_INTM_L	A10	I2C_INT	TDI	A3	JTAG_ISP_TDI IN 23
I2C_UPC_T_SCLM	C9	I2C_SCL	TMS	C3	JTAG_TBT_T_TMS IN 23
I2C_UPC_T_SDAM	E7	I2C_SDA	TCK	B5	JTAG_ISP_TCK IN 23
TBT_T_GPIO_5	B9	POC_GPIO_5	TDO	C5	JTAG_ISP_TDO OUT 23
TBT_T_GPIO_6	A8	POC_GPIO_6	EE_DI	C6	SPI_TBT_T_MOSI OUT 23
TBT_T_FLASH_SHARE_EN	A4	POC_GPIO_10	EE_DO	B4	SPI_TBT_T_MISO IN 23
TBT_T_FLASH_MSTR_H_SLV_L	A5	POC_GPIO_11	EE_CS*	B6	SPI_TBT_T_CS_L OUT 23
TBT_T_GPIO_12	A6	POC_GPIO_12	EE_CLK	C7	SPI_TBT_T_CLK OUT 23
TBT_T_THERM_D_P	M11	THERMDA	TEST_EN	B11	
			TEST_PWR_GOOD	B3	TBT_T_TEST_PWR_GOOD
TBT_T_XTAL25M_IN	L9	XTAL_25_IN	RBIAS	L4	TBT_T_RBIAS
TBT_T_XTAL25M_OUT	M9	XTAL_25_OUT	RSENSE	L5	TBT_T_RSENSE
	L12	MONDC_SVR	ATEST_P	A1	NC
	A11	MONDC	ATEST_N	A2	NC
	M12	TEST_EDM	FORCE_PWR	B10	TBT_T_FORCE_PWR IN 23
NC	A12	NC_A12	FLASH_BUSY*	A9	TBT_XT_FLASH_BUSY_L BI 23
NC	J6	NC_J6	FUSE_VQPS_64	B2	
NC	L3	NC_L3	SMBUS_SCL	A7	TP_SMBUS_TBT_T_SCL
NC	J5	NC_J5	SMBUS_SDA	B7	TP_SMBUS_TBT_T_SDA

To SPI Flash

R2908 NOSTUFF 20K 5% 1/20W MF 201
R2909 20K 5% 1/20W MF 201

R2906 100 5% 1/20W MF 201

R2907 4.75K 0.5% 1/20W TF 0201
PLACE_NEAR=U2900.L5:2MM
PLACE_NEAR=U2900.L4:2MM

U2900 BURNSTIDE-BRIDGE BGA SYM 2 OF 2

CRITICAL
OMIT_TABLE

PP0V9_TBT_T_SVR	F6	VCC0P9_SVR_ANA	VCC3P3_SX	E6	PP3V3_TBT_T_SX 22 27
	G6		VCC3P3A	J7	
	E9	VCC0P9_SVR_PB_ANA			
	G9		VCC3P3_SVR	M4	PP3V3_TBT_T_S0_SVR
				M5	
PP0V9_TBT_T_LVR	L6	VCC0P9_LVR	VCC0P9_SVR	E3	
	M6	VCC0P9_LVR_SENSE		G3	
PP3V3_TBT_T_ANA	E5	VCC3P3_LC	SVR_IND	L1	
	L2	VCC3P3_ANA		M1	
PP0V9_TBT_T_LC	J3	VCC0P9_LC	SVR_VSS	M2	
	F3			M3	
	F5	VSS		F7	
	G5			F9	
	B1			G7	
	B12			H1	
	D1			H11	
	D11			H12	
	D12		VSS_ANA	H2	
	D2			J9	
	F1			K1	
	F11			K11	
	F12			K12	
	F2			K2	

C2954 10UF 20% 6.3V CERM 0402
C2955 2.2UF 20% 6.3V X5R-CERM 0201
C2956 2.2UF 20% 6.3V X5R-CERM 0201
C2957 2.2UF 20% 6.3V X5R-CERM 0201
C2958 2.2UF 20% 6.3V X5R-CERM 0201

MIN_LINE_WIDTH=0.1400
MIN_NECK_WIDTH=0.0750
VOLTAGE=3.3V

PP3V3_TBT_T_SX 22 27
PP3V3_TBT_T_S0 22 23 27

100K 5% 1/20W MF 201	R2950	BSB_GP6:BSB_S0	TBT_T_GPIO_5 22
100K 5% 1/20W MF 201	R2941		TBT_T_GPIO_6 22
NOSTUFF 100K 5% 1/20W MF 201	R2951		
NOSTUFF 100K 5% 1/20W MF 201	R2943		TBT_T_FLASH_SHARE_EN 22
NOSTUFF 100K 5% 1/20W MF 201	R2945		TBT_T_GPIO_12 22

PP0V9_TBT_T_SVR 22

NOSTUFF 20UF 20% 6.3V X6S-CERM 0402-1	C2969		
NOSTUFF 20UF 20% 6.3V X6S-CERM 0402-1	C2968		
NOSTUFF 20UF 20% 6.3V X6S-CERM 0402-1	C2967		
NOSTUFF 20UF 20% 6.3V X6S-CERM 0402-1	C2966		
OMIT_TABLE 20UF 20% 6.3V X6S-CERM 0402-1	C2965		
OMIT_TABLE 20UF 20% 6.3V X6S-CERM 0402-1	C2964		
OMIT_TABLE 20UF 20% 6.3V X6S-CERM 0402-1	C2963		
OMIT_TABLE 20UF 20% 6.3V X6S-CERM 0402-1	C2962		
4UF 20% 6.3V CER-X5R 0201	C2961		
4UF 20% 6.3V CER-X5R 0201	C2960		
4UF 20% 6.3V CER-X5R 0201	C2950		
4UF 20% 6.3V CER-X5R 0201	C2951		
4UF 20% 6.3V CER-X5R 0201	C2952		
4UF 20% 6.3V CER-X5R 0201	C2953		

PP3V3_TBT_T_VCCA

12PF 5% 25V NP0-C0G 0201	C2943	
2.2UF 20% 6.3V X5R-CERM 0201	C2930	
10UF 20% 6.3V CERM 0402	C2931	

R2900 0 5% 1/16W MF-LF 402
R2901 0 5% 1/16W MF-LF 402

FROM USB-C PORT CONTROLLER (UPC)
PP3V3_TBT_T_SX 22 27

2.2UF 20% 6.3V X5R-CERM 0201	C2936	
2.2UF 20% 6.3V X5R-CERM 0201	C2937	
NOSTUFF 47UF 20% 6.3V CER-X5R 0603	C2942	

XW2901 SM — NO_XNET_CONNECTION=1
PP3V3_TBT_T_S0 22 23 27

PP3V3_TBT_T_S0_SVR

10UF 20% 6.3V CERM 0402	C2932	BYPASS=U2900.M4:M3:3MM
10UF 20% 6.3V CERM 0402	C2933	
10UF 20% 6.3V CERM 0402	C2934	
10UF 20% 6.3V CERM 0402	C2935	

XW2900 SM — PLACE_NEAR=C2932.2:2MM, NO_XNET_CONNECTION=1
P0V9_TBT_T_SVR_PGND
PP0V9_TBT_T_SVR 22 — DIDT=TRUE, VOLTAGE=0.9V

12PF 5% 25V NP0-C0G 0201	C2938	
4UF 20% 6.3V CER-X5R 0201	C2939	
4UF 20% 6.3V CER-X5R 0201	C2941	

CRITICAL
L2900 0.68UH-20%-4.3A-0.043OHM 0805
PP0V9_TBT_T_SVR_IND — VOLTAGE=0.9V, DIDT=TRUE

C2940 47UF 20% 6.3V CER-X5R 0603

XW2930 SM — TBT_T_THERM_D_N 23
PLACE_NEAR=U2900.K11:2MM
NO_XNET_CONNECTION=1

CONNECT TO GND PIN
CLOSEST TO THERMDA PIN

BOM_COST_GROUP=TBT

SYNC_MASTER=CPU_CARD_ICL_Y SYNC_DATE=06/08/2018

PAGE TITLE
USB-C HIGH SPEED T (FRONT)

Apple Inc.

DRAWING NUMBER 051-05232 SIZE D
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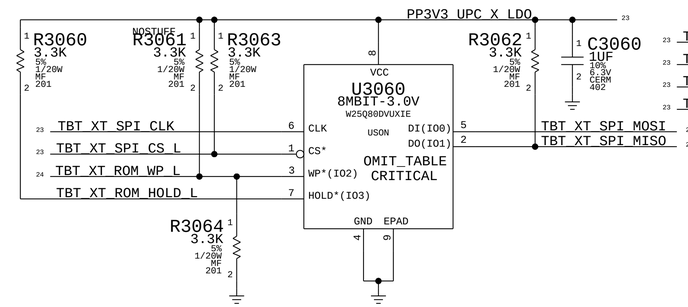


ROM

TBT_XT_SPI_CLK
TBT_XT_SPI_CS_L
TBT_XT_SPI_MOSI
TBT_XT_SPI_MISO

Ace

R3094	100	TBT_XT_SPI_CLK_DBG	
R3095	15	UPC_X_SPI_CLK	IN
R3096	15	UPC_X_SPI_CS_L	IN
R3097	15	UPC_X_SPI_MOSI	IN
R3098	15	UPC_X_SPI_MISO	OUT

BB

R3090	15	SPI_TBT_X_CLK	IN
R3091	15	SPI_TBT_X_CS_L	IN
R3092	15	SPI_TBT_X_MOSI	IN
R3093	15	SPI_TBT_X_MISO	OUT
R3099	15	SPI_TBT_T_CLK	IN
R309A	15	SPI_TBT_T_CS_L	IN

BB

R309B	15	SPI_TBT_T_MOSI	IN
R309C	15	SPI_TBT_T_MISO	OUT

All: 1/20W 5% MF 201, NO_XNET_CONNECTION=1

BB / ACE SPI ROM BUS

GND GND GND GND — MAKE_BASE=TRUE

SPI_TBT_X_CLK	SPI_TBT_X_CLK
SPI_TBT_X_CS_L	SPI_TBT_X_CS_L
SPI_TBT_X_MOSI	SPI_TBT_X_MOSI
SPI_TBT_X_MISO	SPI_TBT_X_MISO
SPI_TBT_T_CLK	SPI_TBT_T_CLK
SPI_TBT_T_CS_L	SPI_TBT_T_CS_L
SPI_TBT_T_MOSI	SPI_TBT_T_MOSI
SPI_TBT_T_MISO	SPI_TBT_T_MISO

MAKE_BASE=TRUE

JTAG_ISP_TDI	JTAG_ISP_TDI
JTAG_TBT_X_TMS	JTAG_TBT_X_TMS
JTAG_ISP_TCK	JTAG_ISP_TCK
JTAG_ISP_TDO	JTAG_ISP_TDO
	JTAG_ISP_TDI
JTAG_TBT_T_TMS	JTAG_TBT_T_TMS
	JTAG_TBT_T_TCK
	JTAG_TBT_T_TDO

MAKE_BASE=TRUE

SIGNAL ALIASES

PMU_ACTIVE_READY	PMU_ACTIVE_READY	31 64 78 81
SOC_DOCK_CONNECT	SOC_DOCK_CONNECT	23 32 78
SOC_DFU_STATUS	SOC_DFU_STATUS	31 40 78 81
SOC_FORCE_DFU	SOC_FORCE_DFU	31 64 78
PD_UPC_X_GPIO1	PD_UPC_X_GPIO1	23 32 78
SOC_DOCK_CONNECT	SOC_DOCK_CONNECT	23 32 78
PD_UPC_X_GPIO9	PD_UPC_X_GPIO9	23 32 78
PD_UPC_X_GPIO10	PD_UPC_X_GPIO10	23 32 78
TP_TBT_WAKE_L	TP_TBT_WAKE_L	

R3071 100K 5% 1/20W MF 201
R3074 100K 5% 1/20W MF 201
R3075 100K 5% 1/20W MF 201

TP3008 TP3006 TP3007 TP3004 TP3002 TP3005 TP3003 TP3001 TP-P5

USBC_HSX_AUXCH_C_P	USBC_HSX_AUXCH_C_P	
USBC_HSX_AUXCH_C_N	USBC_HSX_AUXCH_C_N	
XDP_LSX_TBTA_P2R	XDP_LSX_TBTA_P2R	
XDP_LSX_TBTA_R2P	XDP_LSX_TBTA_R2P	
USBC_HST_AUXCH_C_P	USBC_HST_AUXCH_C_P	
USBC_HST_AUXCH_C_N	USBC_HST_AUXCH_C_N	
XDP_LSX_TBTB_P2R	XDP_LSX_TBTB_P2R	
XDP_LSX_TBTB_R2P	XDP_LSX_TBTB_R2P	
DP_T_HST_HPD	DP_T_HST_HPD	

MAKE_BASE=TRUE

R3073 100K 5% 1/20W MF 201

UPC_X_UART_TX	UPC_X_UART_TX	23 24
UPC_X_UART_RX	UPC_X_UART_RX	23 24
PP3V3_UPC_X_LDO	PP3V3_UPC_X_LDO	23 24
PP3V3_UPC_T_LDO	PP3V3_UPC_T_LDO	23 25
GND		
NC_UPC_T_I2C_ADDR	NC_UPC_T_I2C_ADDR	

MAKE_BASE=TRUE

ACE A/B RPD STRAPPING

USBC_X_CC1	USBC_X_CC1	24 26
USBC_X_CC2	USBC_X_CC2	24 26
USBC_T_CC1	USBC_T_CC1	25 26
USBC_T_CC2	USBC_T_CC2	25 26

MAKE_BASE=TRUE

NC_UPC_X_VDDIO_CFG	NC_UPC_X_VDDIO_CFG	
NC_UPC_T_VDDIO_CFG	NC_UPC_T_VDDIO_CFG	

MAKE_BASE=TRUE

UPC_X_RESET	R3032 100K 5% 1/20W MF 201	
UPC_T_RESET	R3033 100K 5% 1/20W MF 201	
UPC_XT_5V_EN	R3034 100K 5% 1/20W MF 201	
UPC_T_GPIO5	R3072 100K 5% 1/20W MF 201	
PP1V8_AWAKE	R3081 0 1/20W 5% MF 0201 — SOC_USB_VBUS	31 78
UPC_PMU_RESET	UPC_PMU_RESET	55 64
UPC_PMU_RESET		
UPC_XT_5V_EN	UPC_XT_5V_EN	23
UPC_XT_5V_EN		

MAKE_BASE=TRUE

PP3V3_TBT_X_SX		21 27
PP3V3_G3H_RTC		24 27 75
10K	R3042	TBT_XT_FLASH_BUSY_L
		TBT_XT_FLASH_BUSY_L
		TBT_XT_FLASH_BUSY_L
		TBT_XT_FLASH_BUSY_L
NOSTUFF 100K	R3044	TBT_X_FLASH_MSTR_H_SLV_L 21
2.2K	R3047	TBT_T_FLASH_MSTR_H_SLV_L 22

TP3010 A TP-P5

5% 1/20W MF 201

Left Front Port

DEBUG/USB MUX ALIASES

R3022	100K	SPARE_UPC_T_DBG0_R	SPARE_UPC_T_DBG0_R IN 25 48
BOMOPTION=FANTACH:NODEBUG			
R3023	100K	SPARE_UPC_T_DBG1_R	SPARE_UPC_T_DBG1_R IN 25
R3024	100K	SPARE_UPC_T_DBG2_R	SPARE_UPC_T_DBG2_R OUT 25
R3025	100K	SPARE_UPC_T_DBG3_R	SPARE_UPC_T_DBG3_R OUT 25

1/20W 5% MF 201, MAKE_BASE=TRUE

SWD_SOC_SWCLK		SWD_SOC_SWCLK
SWD_SOC_SWDIO		SWD_SOC_SWDIO
PCH_UART_DEBUG_R2D		PCH_UART_DEBUG_R2D
PCH_UART_DEBUG_D2R		PCH_UART_DEBUG_D2R
USB_SOC_P		USB_SOC_P
USB_SOC_N		USB_SOC_N

MAKE_BASE=TRUE

R301A	100K	SPARE_UPC_T_USB3_RP	SPARE_UPC_T_USB3_RP
R301B	100K	SPARE_UPC_T_USB3_RN	SPARE_UPC_T_USB3_RN

1/20W 5% MF 201, MAKE_BASE=TRUE

Left Rear Port

USB3_BSSB_D2R_P	R3012 0	USB3_BSSB_D2R_R_P	USB3_BSSB_D2R_R_P
USB3_BSSB_D2R_N	R3013 0	USB3_BSSB_D2R_R_N	USB3_BSSB_D2R_R_N
USB3_BSSB_R2D_C_P	C3010 0.1UF 16V 10% X5R-CERM 0201	USB3_BSSB_R2D_P	USB3_BSSB_R2D_P
DCI PCH USB3			
USB3_BSSB_R2D_C_N	C3011 0.1UF 16V 10% X5R-CERM 0201	USB3_BSSB_R2D_N	USB3_BSSB_R2D_N

1/20W 5% MF 0201, MAKE_BASE=TRUE

SWD_SOC_SWCLK_R		SWD_SOC_SWCLK_R
SWD_SOC_SWDIO_R		SWD_SOC_SWDIO_R
SMC_DEBUGPRT_TX		SMC_DEBUGPRT_TX
SMC_DEBUGPRT_RX		SMC_DEBUGPRT_RX

MAKE_BASE=TRUE

R3028	100K	SPARE_UPC_X_USB2_RP	SPARE_UPC_X_USB2_RP
R3029	100K	SPARE_UPC_X_USB2_RN	SPARE_UPC_X_USB2_RN
R302A	100K	SPARE_UPC_X_USB3_RP	SPARE_UPC_X_USB3_RP
R302B	100K	SPARE_UPC_X_USB3_RN	SPARE_UPC_X_USB3_RN

1/20W 5% MF 201, MAKE_BASE=TRUE

AUXLSX Probe Points

Probe Points for Port X were removed due to layout disruption.

PP3012 P3MM SM — USBC_T_AUXLSX_P — 22 25

PP3013 P3MM SM — USBC_T_AUXLSX_N — 22 25

POWER ALIASES

PP3V3_UPC_X_LDO	PP3V3_UPC_X_LDO
PP3V3_UPC_X_LDO	
PP3V3_UPC_T_LDO	PP3V3_UPC_T_LDO
PP20V_USBC_X_VBUS	PP20V_USBC_X_VBUS
PP20V_USBC_X_VBUS	
PP20V_USBC_T_VBUS	PP20V_USBC_T_VBUS
PP20V_USBC_T_VBUS	

MAKE_BASE=TRUE

GND GND GND GND GND GND GND GND

TBT_T_THERM_D_P — PP3000 (P3MM SM)

TBT_T_THERM_D_N — PP3001 (P3MM SM)

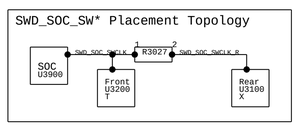
PLACE_NEAR=U3200.G16:2MM

SWD_SOC_SWCLK	R3027 0 1/20W 5% MF 0201	SWD_SOC_SWCLK_R
SWD_SOC_SWDIO	R3026 0 1/20W 5% MF 0201	SWD_SOC_SWDIO_R

PLACE_NEAR=U3200.F15:2MM

Per Will Ferry, SI will determine R3026 and R3027 values during characterization.

SWD_SOC_SW* Placement Topology



FUSES FOR UPC

CRITICAL 0603-1 F3000 6A-32V

PPDCIN_G3H — PPHV_INT_X_G3H — PPHV_INT_X_G3H

PLACE_NEAR=U3100:5MM

CRITICAL 0603-1 F3001 6A-32V

PPHV_INT_T_G3H — PPHV_INT_T_G3H

PLACE_NEAR=U3200:5MM

MAKE_BASE=TRUE

BSB_FORCE_PWR:ACE R3050 0 1/20W 5% MF 0201 — UPC_X_FORCE_PWR → TBT_X_FORCE_PWR

BSB_FORCE_PWR:PCH R3051 0 1/20W 5% MF 0201 — PCH_BSB_FORCE_PWR

BSB_FORCE_PWR:ACE R3052 0 1/20W 5% MF 0201 — UPC_T_FORCE_PWR → TBT_T_FORCE_PWR

BSB_FORCE_PWR:PCH R3053 0 1/20W 5% MF 0201

BSB_PERST:PLTRST R3055 100K 1/20W 5% MF 201 — PLT_RST_3V3_L → TBT_XT_PERST_L

BSB_PERST:GPD_7 R3056 0 1/20W 5% MF 0201 — PCH_STRP_GPD7

MAKE_BASE=TRUE

TBT_XT_PERST_L — TBT_XT_PERST_L

ACE ARKANOID CONN J3000

USBC_DBG 505070-1222 M-ST-SM

TBT_POC_RESET	1	2	PCH_UPC_I2C_INT_L
I2C_UPC_SCL	3	4	XDP_PCH_I2C_UPC_SDA_PCH
I2C_UPC_SDA SMC	5	6	XDP_PCH_I2C_UPC_SCL
UPC_I2C_INT_L	7	8	UPC_X_SER_DBG
TBT_XT_SPI_CLK_DBG	9	10	UPC_T_SER_DBG
UPC_X_UART_TX	11	12	UPC_X_UART_RX

13 14 15 16

BRIDGE ARKANOID CONN J3001

USBC_DBG 505070-1222 M-ST-SM

TBT_X_FORCE_PWR	1	2	I2C_UPC_X_INTM_L
PP3V3_TBT_X_S0	3	4	I2C_UPC_X_SCLM
PP0V9_TBT_X_LC	5	6	I2C_UPC_X_SDAM
TBT_XT_PERST_L	7	8	TBT_T_FORCE_PWR
PP3V3_TBT_T_S0	9	10	I2C_UPC_T_INTM_L
I2C_UPC_T_SDAM	11	12	I2C_UPC_T_SCLM

13 14 15 16

AARDVARKANOID CONN J3002

USBC_DBG 505070-1222 M-ST-SM

SPI ACE

PP3V3_UPC_X_LDO	1	2	TBT_XT_SPI_CS_L
UPC_X_SWD_DATA	3	4	TBT_XT_SPI_CLK
UPC_X_SWD_CLK	5	6	TBT_XT_SPI_MOSI
TBT_XT_SPI_MISO	7	8	UPC_T_SWD_CLK
XDP_PCH_I2C_UPC_SDA	9	10	UPC_T_SWD_DATA
XDP_PCH_I2C_UPC_SCL	11	12	PP3V3_UPC_T_LDO

UART ACE

13 14 15 16

BOM_COST_GROUP=TBT

SYNC_MASTER=CPU_CARD_ICL_Y SYNC_DATE=06/08/2018

PAGE TITLE: USB-C Support

Apple Inc.

DRAWING NUMBER 051-05232 SIZE D

REVISION 2.0.0

BRANCH proto4b

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PRIMARY ACE2 USB-C PORT CONTROLLER (UPC)

PP3V3_UPC_X_LDO
1M R3109 I2C_UPC_X_SCLM
1M R3108 I2C_UPC_X_SDAM
10K R3107 I2C_UPC_X_INTM_L
5% 1/20W MF 201

1M R3105 UPC_X_UART_RX
5% 1/20W MF 201

Either a Testpoint or Arkanoid connector must be present for GPIO0 (EVEN IN PRODUCTION)

CRITICAL
R3103 15K 0.1% 1/20W TF-LF 0201

GND_I2C_ADDR PRIMARY ONLY

TO SMC

REAR PORT: CONNECT UPC SPI TO ROM
FRONT PORT: GROUND UPC SPI

L3100
90-OHM-0.1A
EXCX4CE
USB2_TBT_X_P
USB2_TBT_X_N
PLACE_NEAR=U3100:5MM

PPHV_INT_X_G3H
MAX 100uF TOTAL ON RAIL
PP5V_G3S
PP5V_G3S
CAP FOR PP_5V0 ON VR PAGE

U3100
CD3217B12ACE
FCBGA
CRITICAL
OMIT_TABLE

PP_5V0: K9 L10 M9 M10 K11 L12 M11 N12
PP_CABLE: M14 M13
PP_HV: G2 G4 H1 H3 J2 J4 K1 K3 L2 L4 M1 M3 N2 N4
VBUS: G6 G8 H5 H7 J6 J8 K5 K7 L6 L8 M5 M7 N6 N8

DIGITAL CORE I/O & CONTROL

UPC_X_RESET	B13	HRESET	
TBT_POC_RESET	A14	MRESET	
USBC_X_RESET_L	B17	RESET*	
UPC_X_SER_DBG	A2		
	B1	GPIO0	
PD_UPC_X_GPIO1	D1	GPIO1	
I2C_UPC_X_INTM_L	F1	GPIO2	
UPC_XT_5V_EN	C2	GPIO3	
UPC_X_FORCE_PWR	E2	GPIO4	
TBT_XT_FLASH_BUSY_L	B3	GPIO5	
PCH_BSB_FORCE_PWR	C4	GPIO6	
SOC_DOCK_CONNECT	D3	GPIO7	
UPC_PMU_RESET	E4	GPIO8	
PD_UPC_X_GPIO9	F3	GPIO9	
PD_UPC_X_GPIO10	F7	GPIO10	
PP3V3_UPC_X_LDO	A18	BUSPOWER	
GND	M19	I2C_ADDR	IPU-BOOT
UPC_X_R_OSC	M21	R_OSC	
I2C_UPC_X_SDAM	A16	I2CM_SDA_CNFG	
I2C_UPC_X_SCLM	B15	I2CM_SCL_CNFG	
XDP_PCH_I2C_UPC_SDA	B5	I2C_SDA1	
XDP_PCH_I2C_UPC_SCL	A4	I2C_SCL1	
PCH_UPC_I2C_INT_L	D7	I2C_IRQ1*	
I2C_UPC_SDA	B7	I2C_SDA2	
I2C_UPC_SCL	A6	I2C_SCL2	
UPC_I2C_INT_L	C8	I2C_IRQ2*	
UPC_X_SPI_CLK	B9	SPI_CLK	
UPC_X_SPI_MOSI	B11	SPI_MOSI	
UPC_X_SPI_MISO	A10	SPI_MISO	
UPC_X_SPI_CS_L	A8	SPI_SSZ	
UPC_X_SWD_DATA	E20	SWD_DATA	IPU
UPC_X_SWD_CLK	E16	SWD_CLK	IPU
UPC_X_UART_RX	B19	UART_RX	
UPC_X_UART_TX	A20	UART_TX	
USB_UPC_X1_P	H19	USB_RP1_P	
USB_UPC_X1_N	H21	USB_RP1_N	
SPARE_UPC_X_USB2_RP	G20	USB_RP2_P	
SPARE_UPC_X_USB2_RN	G22	USB_RP2_N	
SPARE_UPC_X_USB3_RP	F19	USB_RP3_P	
SPARE_UPC_X_USB3_RN	F21	USB_RP3_N	
USBC_X_AUXLSX_P	J12	AUX_P	
USBC_X_AUXLSX_N	H11	AUX_N	
TBT_XT_ROM_WP_L	C12	HPD	
USB3_BSSB_D2R_R_P	G12	DEBUG0	
USB3_BSSB_D2R_R_N	F11	DEBUG1	
USB3_BSSB_R2D_P	E8	DEBUG2	
USB3_BSSB_R2D_N	E12	DEBUG3	
SWD_SOC_SWCLK_R	G16	DEBUG4	
SWD_SOC_SWDIO_R	F15	DEBUG5	
SMC_DEBUGPRT_TX	D15	DEBUG6	
SMC_DEBUGPRT_RX	D19	DEBUG7	

PORT_MUX

POWER

VIN_3V3	C20	
VDDIO	A12	
VDDIO_CFG	D11	NC_UPC_X_VDDIO_CFG
LDO_3V3	C22, D21	
VIN_LV	L20	
VOUT_LV	L18	
VRET	C16	UPC_X_VRET
SS	L22	UPC_X_SS
LDO_CORE	E22	PP1V5_UPC_X_LDO_CORE
VBUS_OPT	D5	PP20V_USBC_X_VBUS
PP_HV_OPT	F5	PPHV_INT_X_G3H

TYPE-C

C_CC1	M15, N16	USBC_X_CC1
C_CC2	M17, N18	USBC_X_CC2
RPD_G1	L14	USBC_X_CC1
RPD_G2	L16	USBC_X_CC2
C_USB_TP	K19	USBC_X_USB_TOP_P
C_USB_TN	K21	USBC_X_USB_TOP_N
C_USB_BP	J20	USBC_X_USB_BOT_P
C_USB_BN	J22	USBC_X_USB_BOT_N
C_SBU1	J16	USBC_X_SBU1
C_SBU2	H15	USBC_X_SBU2

GND

GND_OPT	C18	GND
GND_OPT	E18	GND
GND_OPT	D17	GND
GND_OPT	G18	GND

GND: A22 H9 N20 B21 K15 N22

PP20V_USBC_X_VBUS
C3101 1UF 10% 30V X5R 0402

PP3V3_G3H_RTC
C3100 10UF 20% 6.3V CERM 0402

PP1V8_SLPS2R
C3102 1.0UF 20% 6.3V X5R 0201-1

PP3V3_UPC_X_LDO
C3108 10UF 20% 6.3V CERM 0402

PP3V3_UPC_X_VOUTLV
C3106 1.0UF 20% 6.3V X5R 0201-1

R3120 0 5% 1/20W MF 0201
VOLTAGE=1.5V
MIN_LINE_WIDTH=0.2800
MIN_NECK_WIDTH=0.0750

C3109 0.68UF 5% 6.3V X6S 0402

C3105 10UF 20% 6.3V CERM 0402

MIN_LINE_WIDTH=0.4000
MIN_NECK_WIDTH=0.1500

C3114 220PF 10% 16V CER-X7R 0201

C3113 220PF 10% 16V CER-X7R 0201

BOM_COST_GROUP=USB-C

SYNC_MASTER=CPU_CARD_ICL_Y	SYNC_DATE=06/08/2018
PAGE TITLE	USB-C PORT CONTROLLER X (REAR)
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SECONDARY ACE2 USB-C PORT CONTROLLER (UPC)

PP3V3_UPC_T_LDO 23 25
VOLTAGE=3.3V
1M R3209 I2C_UPC_T_SCLM 22 23 25
1M R3208 I2C_UPC_T_SDAM 22 23 25
10K R3207 I2C_UPC_T_INTM_L 22 23 25
5% 1/20W MF 201

1M R3205 UPC_X_UART_TX 23 25
5% 1/20W MF 201

Either a Testpoint or Arkanoid connector must be present for GPIO0 (EVEN IN PRODUCTION)

CRITICAL
R3203 1 15K 0.1% 1/20W TF 0201 2
GND_I2C_ADDR PRIMARY ONLY

REAR PORT: CONNECT UPC SPI TO ROM
FRONT PORT: GROUND UPC SPI

L3200
90-OHM-0.1A
EXCX4CE
SYM_VER-1
USB2_TBT_T_P 15 BI
USB2_TBT_T_N 15 BI
PLACE_NEAR=U3200:5MM

23 PPHV_INT_T_G3H
MAX 100uF TOTAL ON RAIL
75 PP5V_G3S
75 PP5V_G3S
CAP FOR PP_5V0 ON VR PAGE

PP20V_USBC_T_VBUS 23
C3201 1UF 10% 30V X5R 0402
PP3V3_G3H_RTC 27 75
C3200 10UF 20% CERM 0402
PP1V8_SLPS2R 74
C3202 1.0UF 20% 6.3V X5R 0201-1

U3200
CD3217B12ACE
FCBGA
CRITICAL
OMIT_TABLE

PP_5V0: K9 L10 M9 M10 K11 L12 M11 N12
PP_CABLE: N14 M13
PP_HV: G2 G4 H1 H3 J2 J4 K1 K3 L2 L4 M1 M3 N2 N4
VBUS: G6 G8 H5 H7 J6 J8 K5 K7 L6 L8 M5 M7 N6 N8

23 IN	UPC_T_RESET	B13	HRESET	
24 23 13 IN	TBT_POC_RESET	A14	MRESET	
27 OUT	USBC_T_RST_L	B17	RESET*	
23 IN	UPC_T_SER_DBG	A2	GPIO0	
		B1		
23 IN	PMU_ACTIVE_READY	D1	GPIO1	
25 23 22 IN	I2C_UPC_T_INTM_L	F1	GPIO2	
23 OUT	UPC_XT_5V_EN	C2	GPIO3	
67 23 OUT	UPC_T_FORCE_PWR	E2	GPIO4	
23 OUT	UPC_T_GPIO5	B3	GPIO5	
24 23 13 IN	PCH_BSB_FORCE_PWR	C4	GPIO6	DIGITAL CORE I/O & CONTROL
23 OUT	SOC_DOCK_CONNECT	D3	GPIO7	
23 OUT	UPC_PMU_RESET	E4	GPIO8	
23 IN	SOC_DFU_STATUS	F3	GPIO9	
23 OUT	SOC_FORCE_DFU	F7	GPIO10	
23 IN	PP3V3_UPC_T_LDO	A18	BUSPOWER	
23	NC_UPC_T_I2C_ADDR	M19	I2C_ADDR IPU	
	UPC_T_R_OSC	M21	R_OSC	
25 23 22 BI	I2C_UPC_T_SDAM	A16	I2CM_SDA_CNFG	
25 23 22 BI	I2C_UPC_T_SCLM	B15	I2CM_SCL_CNFG	
42 BI	XDP_PCH_I2C_UPC_SDA	B5	I2C_SDA1	
42 BI	XDP_PCH_I2C_UPC_SCL	A4	I2C_SCL1	
42 OUT	PCH_UPC_I2C_INT_L	D7	I2C_IRQ1*	
42 BI	I2C_UPC_SDA	B7	I2C_SDA2	
42 BI	I2C_UPC_SCL	A6	I2C_SCL2	
42 OUT	UPC_I2C_INT_L	C8	I2C_IRQ2*	
23 OUT	GND	B9	SPI_CLK	
23 OUT	GND	B11	SPI_MOSI	
23 IN	GND	A10	SPI_MISO	
23 OUT	GND	A8	SPI_SSZ	
23 BI	UPC_T_SWD_DATA	E20	SWD_DATA IPU	
23 BI	UPC_T_SWD_CLK	E16	SWD_CLK IPU	
25 23 IN	UPC_X_UART_TX	B19	UART_RX	
23 OUT	UPC_X_UART_RX	A20	UART_TX	
	USB_UPC_T1_P	H19	USB_RP1_P	
	USB_UPC_T1_N	H21	USB_RP1_N	
23 BI	USB_SOC_P	G20	USB_RP2_P	PORT_MUX
23 BI	USB_SOC_N	G22	USB_RP2_N	
23 BI	SPARE_UPC_T_USB3_RP	F19	USB_RP3_P	
23 BI	SPARE_UPC_T_USB3_RN	F21	USB_RP3_N	
23 22 BI	USBC_T_AUXLSX_P	J12	AUX_P	
23 22 BI	USBC_T_AUXLSX_N	H11	AUX_N	
23 OUT	DP_T_HST_HPD	C12	HPD	
48 23 BI	SPARE_UPC_T_DBG0_R	G12	DEBUG0	
23 BI	SPARE_UPC_T_DBG1_R	F11	DEBUG1	
23 BI	SPARE_UPC_T_DBG2_R	E8	DEBUG2	
23 BI	SPARE_UPC_T_DBG3_R	E12	DEBUG3	
23 OUT	SWD_SOC_SWCLK	G16	DEBUG4	
23 BI	SWD_SOC_SWDIO	F15	DEBUG5	
23 IN	PCH_UART_DEBUG_R2D	D15	DEBUG6	
23 OUT	PCH_UART_DEBUG_D2R	D19	DEBUG7	

TO SMC

VIN_3V3	C20		
VDDIO	A12		
VDDIO_CFG	D11	NC_UPC_T_VDDIO_CFG 23	
LDO_3V3	C22	PP3V3_UPC_T_LDO	23 26
	D21		
VIN_LV	L20		
VOUT_LV	L18	PP3V3_UPC_T_VOUTLV	27 67
VRET	C16	UPC_T_VRET	
SS	L22	UPC_T_SS	
LDO_CORE	E22	PP1V5_UPC_T_LDO_CORE	
VBUS_OPT	D5	PP20V_USBC_T_VBUS 23	
PP_HV_OPT	F5	PPHV_INT_T_G3H 23	
C_CC1	M15	USBC_T_CC1	BI 23 26
	N16		
C_CC2	M17	USBC_T_CC2	BI 23 26
	N18		
RPD_G1	L14	USBC_T_CC1	BI 23
RPD_G2	L16	USBC_T_CC2	BI 23
C_USB_TP	K19	USBC_T_USB_TOP_P	BI 26
C_USB_TN	K21	USBC_T_USB_TOP_N	BI 26
C_USB_BP	J20	USBC_T_USB_BOT_P	BI 26
C_USB_BN	J22	USBC_T_USB_BOT_N	BI 26
C_SBU1	J16	USBC_T_SBU1	BI 26
C_SBU2	H15	USBC_T_SBU2	BI 26
GND_OPT	C18	GND	23
GND_OPT	E18	GND	23
GND_OPT	D17	GND	23
GND_OPT	G18	GND	23

POWER
TYPE-C
GND

MIN_LINE_WIDTH=0.2800
MIN_NECK_WIDTH=0.0750
C3208 10UF 20% 6.3V CERM 0402
0 R3220 5% 1/20W MF 0201
C3206 1.0UF 20% 6.3V X5S 0201-1
VOLTAGE=1.5V
MIN_LINE_WIDTH=0.2800
MIN_NECK_WIDTH=0.0750
C3209 0.68UF 5% 6.3V X6S 0402
C3205 10UF 20% 6.3V CERM 0402
MIN_LINE_WIDTH=0.4000
MIN_NECK_WIDTH=0.1500
MIN_LINE_WIDTH=0.2000
MIN_NECK_WIDTH=0.1000
C3214 220PF 10% 16V CER-X7R 0201
C3213 220PF 10% 16V CER-X7R 0201

GND
A22 H9 N20 B21 K15 N22

BOM_COST_GROUP=USB-C

SYNC_MASTER=CPU_CARD_ICL_Y SYNC_DATE=06/08/2018
PAGE TITLE
USB-C PORT CONTROLLER T (FRONT)

Apple Inc.

DRAWING NUMBER 051-05232 SIZE D
REVISION 2.0.0
BRANCH proto4b
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SHEET 25 OF 86

Left Rear Port

FOR POR, VERIFY 20% TOLERANCE ON 0.22UF AC COUPLING CAP IS OK

PLACE VBUS CAP NEAR EACH VBUS PIN

516S00457
Mates with:
x on y
(NO LANE REVERSALS ALLOWED)

J3300
20875-056E-01
F-ST-SM

PP20V_USBC_X_VBUS
MIN_LINE_WIDTH=0.2000
MIN_NECK_WIDTH=0.1000
VOLTAGE=20V

TP_USBC_PP20V_X

USBC_X_CC1
USBC_X_R2D_CR_N<1>
USBC_X_R2D_CR_P<1>
USBC_X_D2R_N<1>
USBC_X_D2R_P<1>
USBC_X_SBU2
USBC_X_USB_BOT_N
USBC_X_USB_BOT_P

USBC_X_CC2
USBC_X_R2D_N<2>
USBC_X_R2D_P<2>
USBC_X_D2R_CR_N<2>
USBC_X_D2R_CR_P<2>
USBC_X_USB_TOP_P
USBC_X_USB_TOP_N
USBC_T_SBU2

USBC_T_USB_BOT_N
USBC_T_USB_BOT_P
USBC_T_SBU1
USBC_T_R2D_CR_P<2>
USBC_T_R2D_CR_N<2>
USBC_T_D2R_P<2>
USBC_T_D2R_N<2>
USBC_T_CC2

USBC_T_R2D_P<1>
USBC_T_R2D_N<1>
USBC_T_D2R_CR_P<1>
USBC_T_D2R_CR_N<1>
USBC_T_USB_TOP_P
USBC_T_USB_TOP_N
USBC_T_CC1

TP_USBC_PP20V_T

FOR POR, VERIFY 20% TOLERANCE ON 0.22UF AC COUPLING CAP IS OK

PLACE VBUS CAP NEAR EACH VBUS PIN

PP20V_USBC_T_VBUS
MIN_LINE_WIDTH=0.2000
MIN_NECK_WIDTH=0.1000
VOLTAGE=20V

Cowling Bosses
860-01443

SH3300
3.10D1.65ID-1.12H-SM

SH3301
3.10D1.65ID-1.12H-SM

BOM_COST_GROUP=USB-C

Left Front Port

DESIGN: J230/MLB
LAST CHANGE: Mon Oct 1 21:40:18 2018

PAGE TITLE
USB-C CONNECTOR

Apple Inc.

DRAWING NUMBER 051-05232
SIZE D
REVISION 2.0.0
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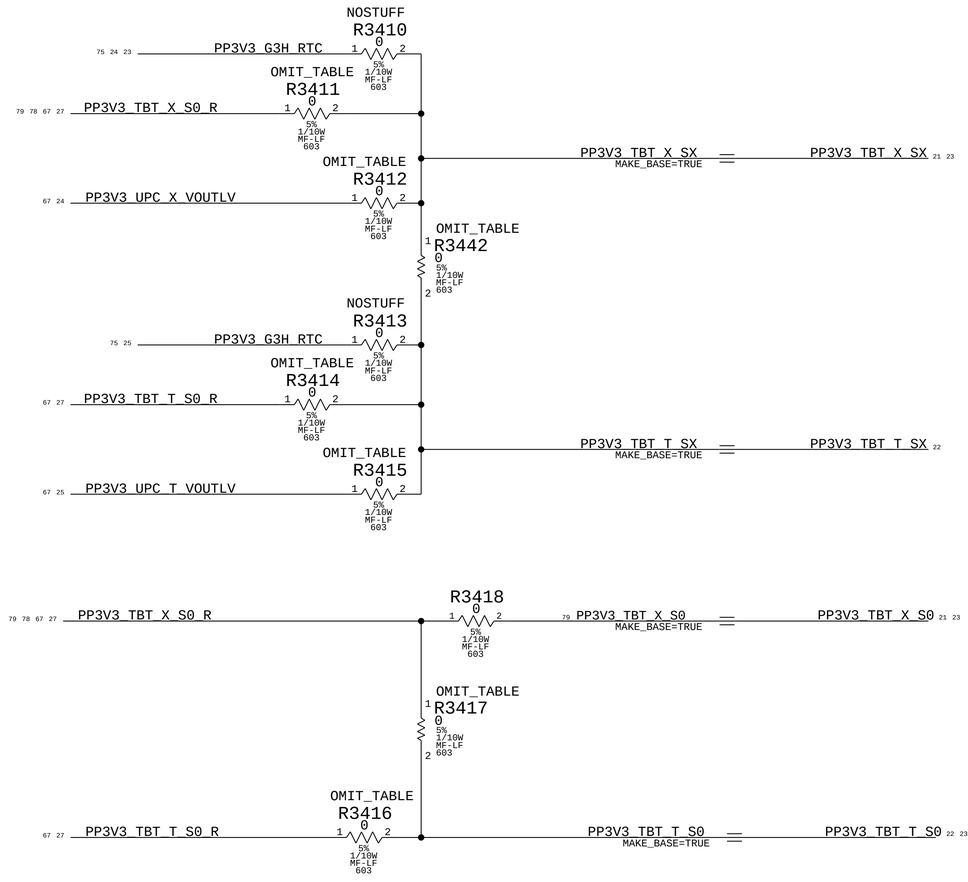
	BOMOPTION	BSB XA SX Rail	BSB XA S0 Rail	Load Switch Enable
a	VOUTLV_SW_CALPE	ACE2 VOUT_LV	LD-SW	CALPE/SMC
bi	SWSW_VOUTLV	LD-SW	LD-SW	ACE2 VOUT_LV
bii	SWSW_FORCEPWR	LD-SW	LD-SW	ACE2/PCH FORCEPWR

	BOMOPTION	BSB XA SX Rail	BSB XA S0 Rail	Load Switch Enable
a	VOUTLV_SW_CALPE	ACE2 VOUT_LV	LD-SW	CALPE/SMC
bi	SWSW_VOUTLV	LD-SW	LD-SW	ACE2 VOUT_LV
bii	SWSW_FORCEPWR	LD-SW	LD-SW	ACE2/PCH FORCEPWR
c	BSB_XA_PWR	BSB XA SX Rail	BSB XA S0 Rail	---

PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
113S0022	1	RES,MF,1A MAX,0OHM,5,0603,SMD,LF	R3412		BSB_X_PWR:VOUTLV_SW_CALPE
113S0022	1	RES,MF,1A MAX,0OHM,5,0603,SMD,LF	R3411		BSB_X_PWR:SWSW_VOUTLV
113S0022	2	RES,MF,1A MAX,0OHM,5,0603,SMD,LF	R3411,R3412		BSB_X_PWR:SWSW_FORCEPWR
113S0022	2	RES,MF,1A MAX,0OHM,5,0603,SMD,LF	R3415,R3416		BSB_X_PWR:VOUTLV_SW_CALPE
113S0022	2	RES,MF,1A MAX,0OHM,5,0603,SMD,LF	R3414,R3416		BSB_X_PWR:SWSW_VOUTLV
113S0022	3	RES,MF,1A MAX,0OHM,5,0603,SMD,LF	R3414,R3415,R3416		BSB_X_PWR:SWSW_FORCEPWR
113S0022	2	RES,MF,1A MAX,0OHM,5,0603,SMD,LF	R3417,R3442		BSB_T_PWR:BSB_X_PWR

PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
117S0201	1	RES,MF,1A MAX,0.0 OHM,5%,0201,BLACK	R3440		BSB_T_PWR:VOUTLV_SW_CALPE
117S0201	1	RES,MF,1A MAX,0.0 OHM,5%,0201,BLACK	R3440		BSB_T_PWR:SWSW_VOUTLV
117S0201	1	RES,MF,1A MAX,0.0 OHM,5%,0201,BLACK	R3440		BSB_T_PWR:SWSW_FORCEPWR
117S0201	1	RES,MF,1A MAX,0.0 OHM,5%,0201,BLACK	R3441		BSB_T_PWR:BSB_X_PWR



BOM_COST_GROUP=USB-C

SYNC_DATE=06/11/2018

PAGE TITLE

USB-C DEV SUPPORT

Apple Inc.

DRAWING NUMBER 051-05232 | SIZE D

REVISION 2.0.0

BRANCH proto4b

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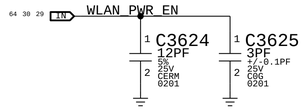
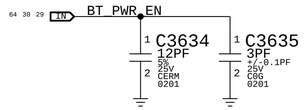
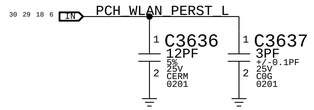
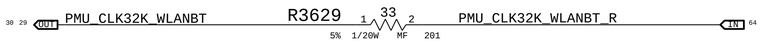
SHEET 27 OF 86

A Wireless Desense Capacitors









BOM_COST_GROUP=WIRELESS

PAGE TITLE

WIFI/BT Desense

Apple Inc.

DRAWING NUMBER 051-05232

SIZE D

REVISION 2.0.0

BRANCH proto4b

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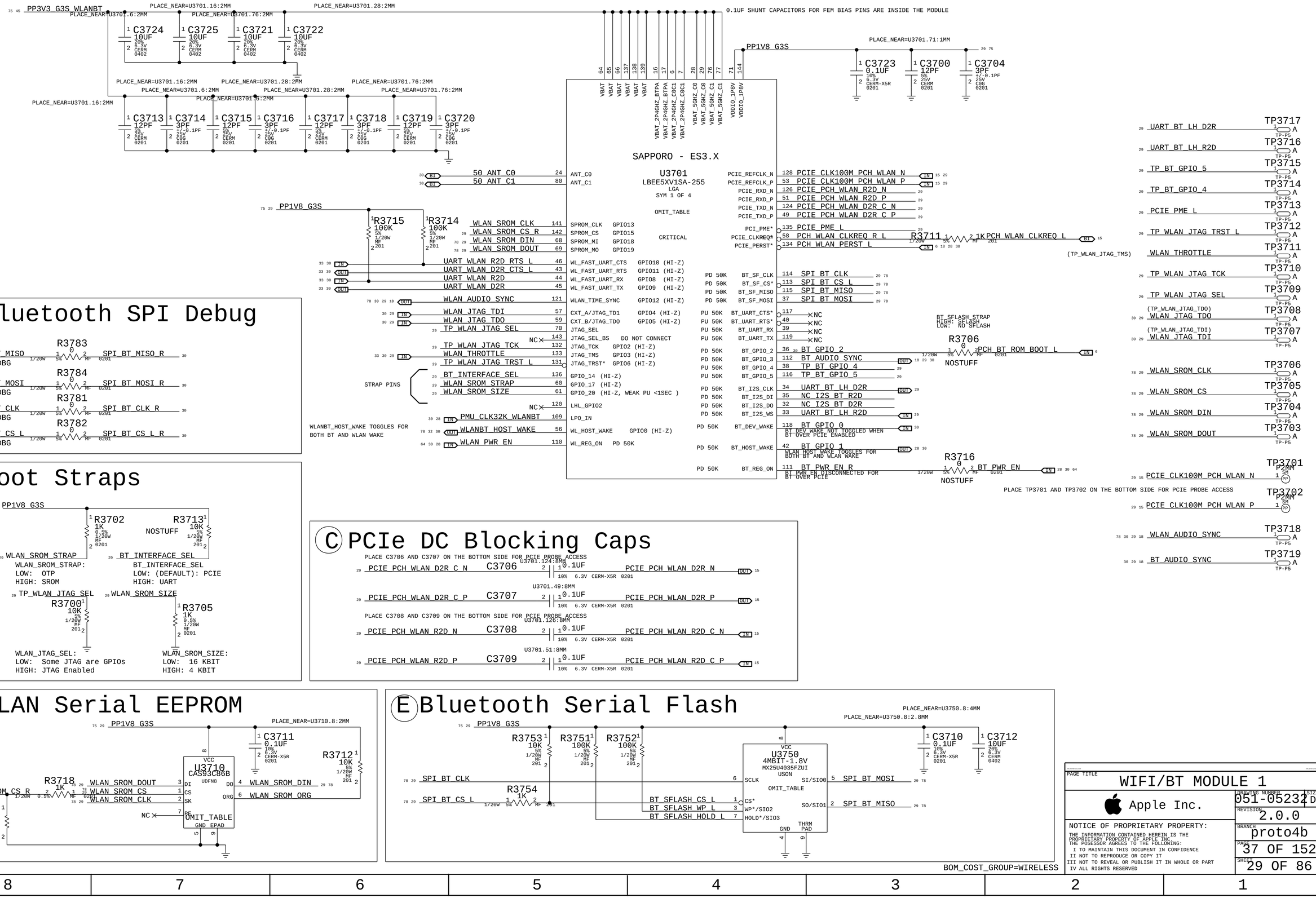
SHEET 28 OF 86


PP3V3_G3S_WLANBT
PLACE_NEAR=U3701.16:2MM
PLACE_NEAR=U3701.28:2MM
PLACE_NEAR=U3701.6:2MM
PLACE_NEAR=U3701.76:2MM
C3724 10UF 20% 6.3V CERM 0402
C3725 10UF 20% 6.3V CERM 0402
C3721 10UF 20% 6.3V CERM 0402
C3722 10UF 20% 6.3V CERM 0402
C3713 12PF 5% 25V CERM 0201
C3714 3PF +/-0.1PF 25V C0G 0201
C3715 12PF 5% 25V CERM 0201
C3716 3PF +/-0.1PF 25V C0G 0201
C3717 12PF 5% 25V CERM 0201
C3718 3PF +/-0.1PF 25V C0G 0201
C3719 12PF 5% 25V CERM 0201
C3720 3PF +/-0.1PF 25V C0G 0201
0.1UF SHUNT CAPACITORS FOR FEM BIAS PINS ARE INSIDE THE MODULE
PP1V8_G3S
PLACE_NEAR=U3701.71:1MM
C3723 0.1UF 10% 6.3V CERM-X5R 0201
C3700 12PF 5% 25V CERM 0201
C3704 3PF +/-0.1PF 25V C0G 0201
VBAT VBAT VBAT VBAT VBAT VBAT VBAT_2P4GHZ_BTPA VBAT_2P4GHZ_BTPA VBAT_2P4GHZ_C0C1 VBAT_2P4GHZ_C0C1 VBAT_5GHZ_C0 VBAT_5GHZ_C0 VBAT_5GHZ_C1 VBAT_5GHZ_C1 VDDIO_1P8V VDDIO_1P8V
64 65 66 137 138 139 16 17 6 7 28 29 76 77 71 144
SAPPORO - ES3.X
U3701
LBEE5XV1SA-255
LGA
SYM 1 OF 4
OMIT_TABLE
CRITICAL
ANT_C0
ANT_C1
50_ANT_C0
50_ANT_C1
PCIE_REFCLK_N
PCIE_REFCLK_P
PCIE_RXD_N
PCIE_RXD_P
PCIE_TXD_N
PCIE_TXD_P
PCI_PME*
PCIE_CLKREQ*
PCIE_PERST*
PCIE_CLK100M_PCH_WLAN_N
PCIE_CLK100M_PCH_WLAN_P
PCIE_PCH_WLAN_R2D_N
PCIE_PCH_WLAN_R2D_P
PCIE_PCH_WLAN_D2R_C_N
PCIE_PCH_WLAN_D2R_C_P
PCIE_PME_L
PCH_WLAN_CLKREQ_R_L
PCH_WLAN_CLKREQ_L
PCH_WLAN_PERST_L
R3711 1K 5% 1/20W MF 201
(TP_WLAN_JTAG_TMS)
WLAN_THROTTLE
PP1V8_G3S
R3715 100K 5% 1/20W MF 201
R3714 100K 5% 1/20W MF 201
WLAN_SROM_CLK
WLAN_SROM_CS_R
WLAN_SROM_DIN
WLAN_SROM_DOUT
SPROM_CLK GPIO13
SPROM_CS GPIO15
SPROM_MI GPIO18
SPROM_MO GPIO19
UART_WLAN_R2D_RTS_L
UART_WLAN_D2R_CTS_L
UART_WLAN_R2D
UART_WLAN_D2R
WL_FAST_UART_CTS GPIO10 (HI-Z)
WL_FAST_UART_RTS GPIO11 (HI-Z)
WL_FAST_UART_RX GPIO8 (HI-Z)
WL_FAST_UART_TX GPIO9 (HI-Z)
WLAN_AUDIO_SYNC
WLAN_TIME_SYNC GPIO12 (HI-Z)
WLAN_JTAG_TDI
WLAN_JTAG_TDO
TP_WLAN_JTAG_SEL
CXT_A/JTAG_TD1 GPIO4 (HI-Z)
CXT_B/JTAG_TDO GPIO5 (HI-Z)
JTAG_SEL
JTAG_SEL_BS DO NOT CONNECT
TP_WLAN_JTAG_TCK
WLAN_THROTTLE
TP_WLAN_JTAG_TRST_L
JTAG_TCK GPIO2 (HI-Z)
JTAG_TMS GPIO3 (HI-Z)
JTAG_TRST* GPIO6 (HI-Z)
BT_INTERFACE_SEL
WLAN_SROM_STRAP
WLAN_SROM_SIZE
STRAP PINS
GPIO_14 (HI-Z)
GPIO_17 (HI-Z)
GPIO_20 (HI-Z, WEAK PU <1SEC)
LHL_GPIO2
PMU_CLK32K_WLANBT
LPO_IN
WLANBT_HOST_WAKE
WLANBT_HOST_WAKE TOGGLES FOR BOTH BT AND WLAN WAKE
WL_HOST_WAKE GPIO0 (HI-Z)
WLAN_PWR_EN
WL_REG_ON PD 50K
PD 50K BT_SF_CLK
PD 50K BT_SF_CS*
PD 50K BT_SF_MISO
PD 50K BT_SF_MOSI
SPI_BT_CLK
SPI_BT_CS_L
SPI_BT_MISO
SPI_BT_MOSI
PD 50K BT_UART_CTS*
PD 50K BT_UART_RTS*
PD 50K BT_UART_RX
PD 50K BT_UART_TX
NC
PD 50K BT_GPIO_2
PD 50K BT_GPIO_3
PD 50K BT_GPIO_4
PD 50K BT_GPIO_5
BT_GPIO_2
BT_AUDIO_SYNC
TP_BT_GPIO_4
TP_BT_GPIO_5
PD 50K BT_I2S_CLK
PD 50K BT_I2S_DI
PD 50K BT_I2S_DO
PD 50K BT_I2S_WS
UART_BT_LH_D2R
NC_I2S_BT_R2D
NC_I2S_BT_D2R
UART_BT_LH_R2D
PD 50K BT_DEV_WAKE
BT_GPIO_0
BT DEV_WAKE NOT TOGGLED WHEN BT OVER PCIE ENABLED
PD 50K BT_HOST_WAKE
BT_GPIO_1
WLAN HOST WAKE TOGGLES FOR BOTH BT AND WLAN WAKE
PD 50K BT_REG_ON
BT_PWR_EN_R
BT PWR_EN DISCONNECTED FOR BT OVER PCIE
BT_PWR_EN
R3706 0 1/20W 5% MF 0201
PCH_BT_ROM_BOOT_L
NOSTUFF
BT_SFLASH_STRAP
HIGH: SFLASH
LOW: NO SFLASH
R3716 0 1/20W 5% MF 0201
NOSTUFF
TP3717 UART_BT_LH_D2R
TP3716 UART_BT_LH_R2D
TP3715 TP_BT_GPIO_5
TP3714 TP_BT_GPIO_4
TP3713 PCIE_PME_L
TP3712 TP_WLAN_JTAG_TRST_L
TP3711 WLAN_THROTTLE
TP3710 TP_WLAN_JTAG_TCK
TP3709 TP_WLAN_JTAG_SEL
TP3708 (TP_WLAN_JTAG_TDO) WLAN_JTAG_TDO
TP3707 (TP_WLAN_JTAG_TDI) WLAN_JTAG_TDI
TP3706 WLAN_SROM_CLK
TP3705 WLAN_SROM_CS
TP3704 WLAN_SROM_DIN
TP3703 WLAN_SROM_DOUT
TP-P5
TP3701 P2MM SM PP
TP3702 P2MM SM PP
PCIE_CLK100M_PCH_WLAN_N
PCIE_CLK100M_PCH_WLAN_P
PLACE TP3701 AND TP3702 ON THE BOTTOM SIDE FOR PCIE PROBE ACCESS
TP3718 WLAN_AUDIO_SYNC
TP3719 BT_AUDIO_SYNC
A Bluetooth SPI Debug
R3783 0 1/20W 5% MF 0201
SPI_BT_MISO
WIFI_DBG
SPI_BT_MISO_R
R3784 0 1/20W 5% MF 0201
SPI_BT_MOSI
WIFI_DBG
SPI_BT_MOSI_R
R3781 0 1/20W 5% MF 0201
SPI_BT_CLK
WIFI_DBG
SPI_BT_CLK_R
R3782 0 1/20W 5% MF 0201
SPI_BT_CS_L
WIFI_DBG
SPI_BT_CS_L_R
B Boot Straps
PP1V8_G3S
R3702 1K 0.5% 1/20W MF 0201
R3713 10K 5% 1/20W MF 201
NOSTUFF
WLAN_SROM_STRAP
BT_INTERFACE_SEL
WLAN_SROM_STRAP:
LOW: OTP
HIGH: SROM
BT_INTERFACE_SEL
LOW: (DEFAULT): PCIE
HIGH: UART
TP_WLAN_JTAG_SEL
WLAN_SROM_SIZE
R3700 10K 5% 1/20W MF 201
R3705 1K 0.5% 1/20W MF 0201
WLAN_JTAG_SEL:
LOW: Some JTAG are GPIOs
HIGH: JTAG Enabled
WLAN_SROM_SIZE:
LOW: 16 KBIT
HIGH: 4 KBIT
C PCIe DC Blocking Caps
PLACE C3706 AND C3707 ON THE BOTTOM SIDE FOR PCIE PROBE ACCESS
U3701.124:8MM
PCIE_PCH_WLAN_D2R_C_N
C3706 0.1UF 10% 6.3V CERM-X5R 0201
PCIE_PCH_WLAN_D2R_N
U3701.49:8MM
PCIE_PCH_WLAN_D2R_C_P
C3707 0.1UF 10% 6.3V CERM-X5R 0201
PCIE_PCH_WLAN_D2R_P
PLACE C3708 AND C3709 ON THE BOTTOM SIDE FOR PCIE PROBE ACCESS
U3701.126:8MM
PCIE_PCH_WLAN_R2D_N
C3708 0.1UF 10% 6.3V CERM-X5R 0201
PCIE_PCH_WLAN_R2D_C_N
U3701.51:8MM
PCIE_PCH_WLAN_R2D_P
C3709 0.1UF 10% 6.3V CERM-X5R 0201
PCIE_PCH_WLAN_R2D_C_P
D WLAN Serial EEPROM
PP1V8_G3S
PLACE_NEAR=U3710.8:2MM
C3711 0.1UF 10% 6.3V CERM-X5R 0201
U3710
CAS93C86B
UDFN8
VCC
DI
CS
SK
DO
ORG
PE
GND EPAD
OMIT_TABLE
R3712 10K 5% 1/20W MF 201
R3718 1K 1/20W 0.5% MF 0201
R3717 10K 5% 1/20W MF 201
WLAN_SROM_CS_R
WLAN_SROM_DOUT
WLAN_SROM_CS
WLAN_SROM_CLK
WLAN_SROM_DIN
WLAN_SROM_ORG
NC
E Bluetooth Serial Flash
PLACE_NEAR=U3750.8:4MM
PLACE_NEAR=U3750.8:2.8MM
PP1V8_G3S
R3753 10K 5% 1/20W MF 201
R3751 100K 5% 1/20W MF 201
R3752 100K 5% 1/20W MF 201
R3754 1K 1/20W 5% MF 201
U3750
4MBIT-1.8V
MX25U4035FZUI
USON
VCC
SCLK
SI/SIO0
CS*
SO/SIO1
WP*/SIO2
HOLD*/SIO3
GND
THRM PAD
OMIT_TABLE
C3710 0.1UF 10% 6.3V CERM-X5R 0201
C3712 10UF 20% 6.3V CERM 0402
SPI_BT_CLK
SPI_BT_CS_L
SPI_BT_MOSI
SPI_BT_MISO
BT_SFLASH_CS_L
BT_SFLASH_WP_L
BT_SFLASH_HOLD_L
BOM_COST_GROUP=WIRELESS
PAGE TITLE
WIFI/BT MODULE 1
Apple Inc.
DRAWING NUMBER 051-05232
SIZE D
REVISION 2.0.0
BRANCH proto4b
PAGE 37 OF 152
SHEET 29 OF 86
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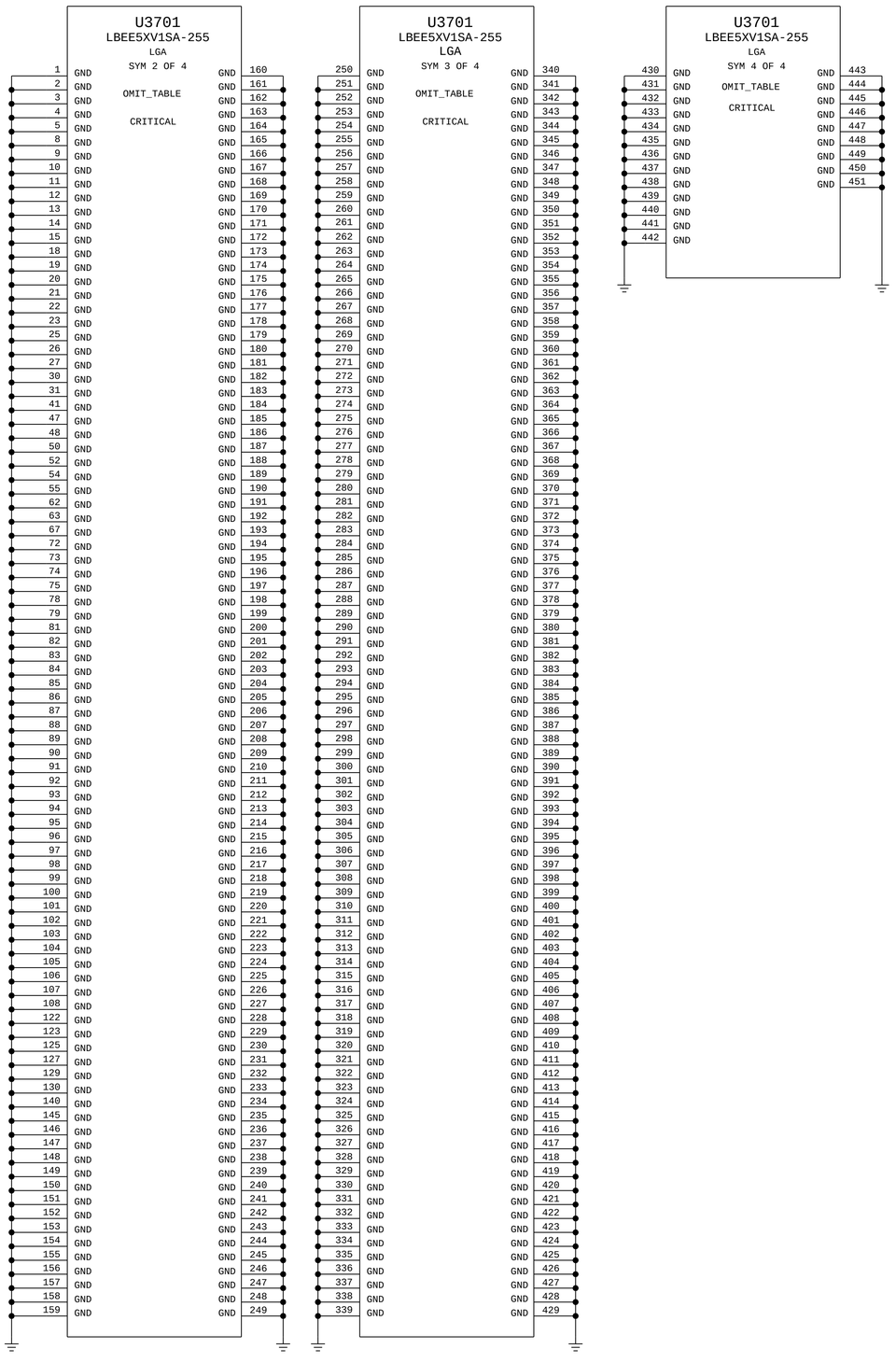
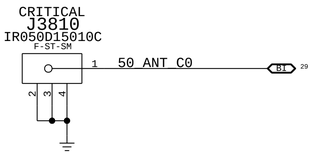
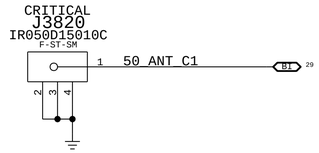
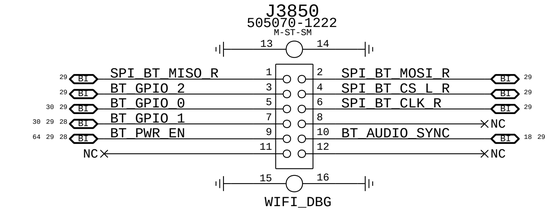


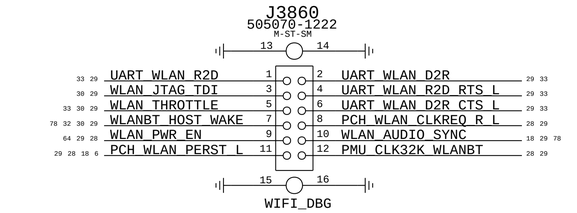
A RF Connectors





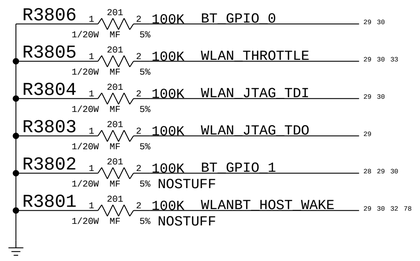
B WiFi/BT Debug Connectors





PLACE J3850 AND J3860 ON THE BOTTOM SIDE

C WiFi/Bluetooth Straps



BOM_COST_GROUP=WIRELESS

PAGE TITLE
WIFI/BT MODULE 2

Apple Inc.

DRAWING NUMBER 051-05232 SIZE D
REVISION 2.0.0
BRANCH proto4b
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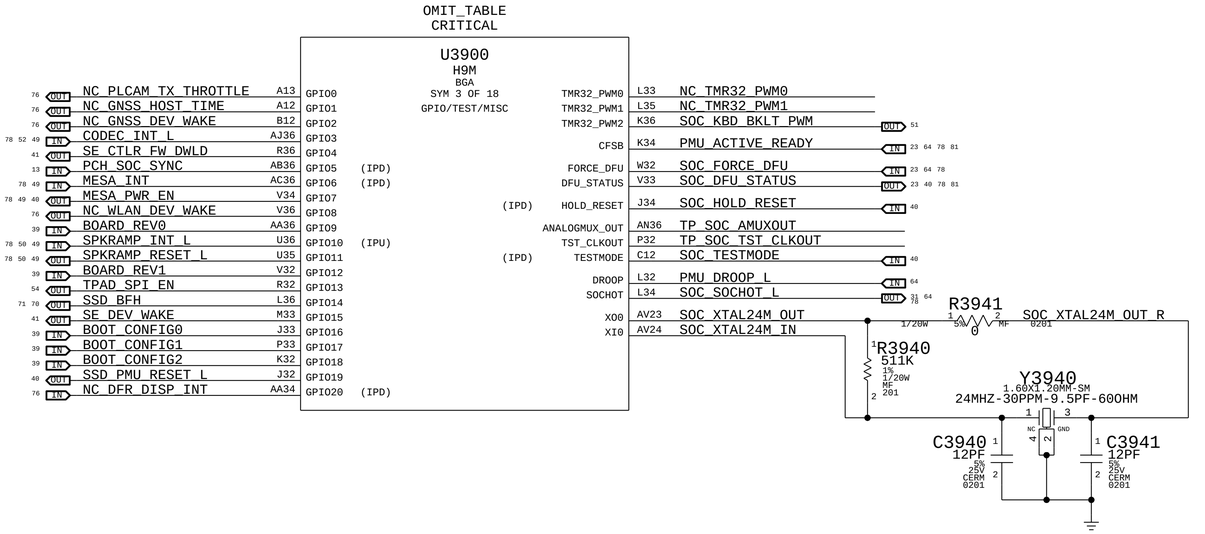
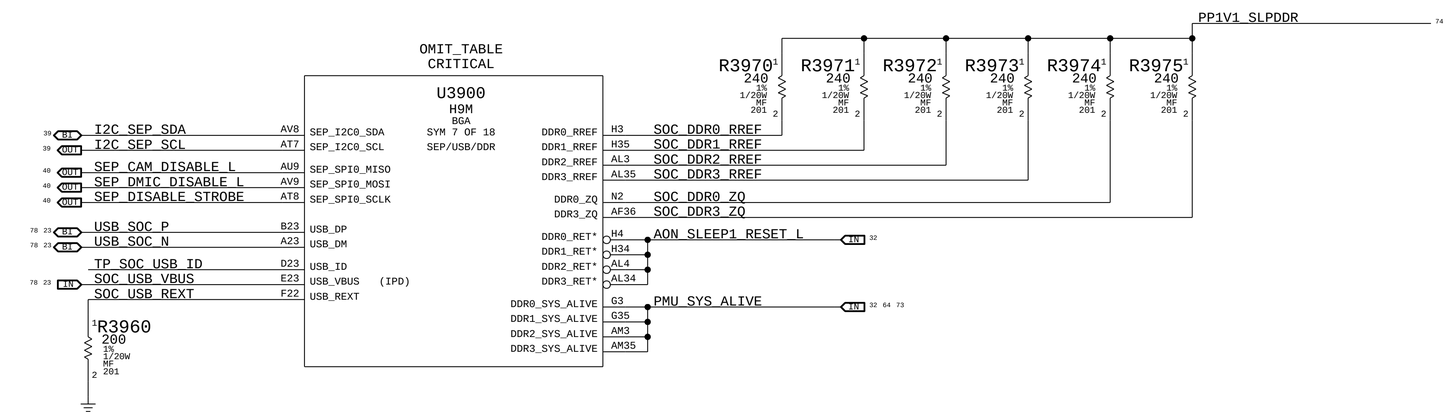
Note 1) IPU represents SW configured state, not HW default





PP1V8_SLPS2R
R3939 47K 5% 1/20W MF 201 SOC_SOCHOT_L

BOM_COST_GROUP=T290

SYNC_MASTER=X589_BIGSUR SYNC_DATE=03/15/2017

PAGE TITLE: SoC GPIO/SEP/USB/DDR/Test

Apple Inc.

DRAWING NUMBER: 051-05232 SIZE: D
REVISION: 2.0.0
BRANCH: proto4b
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OMIT_TABLE
CRITICAL

U3900
H9M
BGA
SYM 6 OF 18
AOP

		NC_AOP_FUNC0	D3	AOP_FUNC[0]		AOP_PDM_CLK0	P6	PDM_DMIC_CLK0_R
		NC_AOP_FUNC1	F4	AOP_FUNC[1]		AOP_PDM_CLK1	K2	PDM_DMIC_CLK1_R
		NC_GYRO_INT1	M6	AOP_FUNC[2]	(IPD)	AOP_PDM_CLK2	J6	TP_SMC_FIXTURE_MODE_L
		NC_GYRO_INT2	D4	AOP_FUNC[3]	(IPD)	AOP_PDM_CLK3	L6	NC_PLCAM_PROX_INT_L
40		SE_HOST_WAKE_R	F3	AOP_FUNC[4]		AOP_PDM_CLK4	L5	NC_PLCAM_ROMEO_B2B_DETECT
18 6		SOC_PERST_L	K6	AOP_FUNC[5]		AOP_PDM_DATA0	J5	PDM_DMIC_DATA0
76		NC_ALTIMETER_INT	E4	AOP_FUNC[6]	(IPD)	AOP_PDM_DATA1	K4	PDM_DMIC_DATA1
		NC_SPI_GYRO_CS_L	J3	AOP_FUNC[7]				
76		NC_SPI_ALTIMETER_CS_L	H6	AOP_FUNC[8]		AOP_SPI_MOSI	D2	NC_SPI_AOP_SENSOR_MOSI_R
						AOP_SPI_SCLK	F2	NC_SPI_AOP_SENSOR_CLK_R
43		NC_I2C_AOP_SCL	N6	AOP_I2C0_SCL		AOP_SPI_MISO	E2	NC_SPI_AOP_SENSOR_MISO
43		NC_I2C_AOP_SDA	G5	AOP_I2C0_SDA				

OMIT_TABLE
CRITICAL

U3900
H9M
BGA
SYM 5 OF 18
AON

76		NC_DFR_TOUCH_INT_L	AL6	AON_GPIO0		JTAG_TCK	AK6	SWD_SOC_SWCLK
39		CPU_SMC_THRMTRIP_L	AE6	AON_GPIO1		JTAG_TMS	AN5	SWD_SOC_SWDIO
76		NC_SMC_GFX_SELF_THROTTLE	AT5	AON_GPIO2	(IPD)	JTAG_TDI	AH6	TP_JTAG_SOC_TDI
18		SMC_TOPBLK_SWP_L	AN4	AON_GPIO3		JTAG_TDO	AP4	TP_JTAG_SOC_TDO
16		XDP_PRESENT_L	AK4	AON_GPIO4		JTAG_TRST*	AJ6	TP_JTAG_SOC_TRST_L
78 49		CODEC_RESET_L	AV5	AON_GPIO5		JTAG_SEL	AC6	SOC_JTAG_SEL (DAP=0, TAP=1)
		NC_AON_GPIO6_AR3	AR3	AON_GPIO6		DOCK_CONNECT	AN2	SOC_DOCK_CONNECT
76		NC_PCIEDN_WAKE_L	AG6	AON_GPIO7	(IPU)			
76		NC_ENET_LOW_PWR	AU5	AON_GPIO8		AON_SWD0_TMS	AJ4	TP_SWD_WLAN_SWDIO
40		TPAD_SPI_INT_L	AP2	AON_GPIO9		AON_SWD1_TMS	AH4	NC_MESA_MENUKEY_L
76		NC_SDCONN_STATE_CHANGE_L	AR4	AON_GPIO10	(IPU)	AON_SWD01_TCK	AJ2	TP_SWD_WLAN_SWCLK
76		NC_ENET_MEDIA_SENSE	AN3	AON_GPIO11	(IPD)	WDOG	AJ5	SOC_WDOG
64		PMU_INT_L	AT6	AON_GPIO12	(IPU)	AON_SLEEP1_RESET*	AF6	AON_SLEEP1_RESET_L
		SPMI_CLK_R	AD6	AON_SPMI_SCLK				
		SPMI_DATA_R	AR2	AON_SPMI_SDATA				
64		PMU_CLK32K_SOC	AR5	RT_CLK32768				
78		SOC_COLD_RESET_L	AK2	COLD_RESET*				
			AK3	CFSB_AON				
64 40		PMU_COLD_RESET_L						

PLACE_NEAR=U3900.AD6:5MM
PLACE_NEAR=U7800.M7:5MM

64 SPMI_CLK — R4036 20 — 5% 1/20W MF 201
64 SPMI_DATA — R4037 20 — 5% 1/20W MF 201

R4039 4.7K — 5% 1/20W MF 201

OMIT_TABLE
CRITICAL

U3900
H9M
BGA
SYM 9 OF 18
SMC

32 13		ESPI_IO<0>	V2	SMC_ESPI_IO0		SMC_GPIO0	Y4	CODEC_WAKE_L
32 13		ESPI_IO<1>	U3	SMC_ESPI_IO1		SMC_GPIO1	Y8	NC_SMC_GPIO1_Y8
32 13		ESPI_IO<2>	U4	SMC_ESPI_IO2		SMC_GPIO2	Y5	WLANBT_HOST_WAKE
32 13		ESPI_IO<3>	V8	SMC_ESPI_IO3		SMC_GPIO3	AA2	NC_SMC_GFX_THROTTLE_L
13		ESPI_CLK60M	U2	SMC_ESPI_CLK	(IPD)	SMC_GPIO4	Y7	LID_OPEN_RIGHT
32 13		ESPI_CS_L	V7	SMC_ESPI_CS*		SMC_GPIO5	Y6	NC_PCC_EVENT
13		ESPI_RESET_L	V6	SMC_ESPI_RESET*	(IPD)	SMC_GPIO6	AB2	NC_TPAD_VIBE_L
						SMC_GPIO7	AD5	TPAD_KBD_WAKE_L
39		SMC_PECI_RX	M5	SMC_PECI_IN	(IPD)	SMC_GPIO8	AD2	LID_OPEN_LEFT
39		SMC_PECI_TX	T6	SMC_PECI_OUT		SMC_GPIO9	AB4	SMC_DPWROK1V8
39		SMC_PCH_PWROK	W7	PCH_PWROK		SMC_GPIO10	AC2	NC_DISP_GCON_INT_L
78 39		SMC_PCH_SYS_PWROK	W8	SYS_PWROK		SMC_GPIO11	AC3	PCH_GCON_INT_L
						SMC_GPIO12	AA8	NC_TPAD_ACTUATOR_DISABLE_L
39		SMC_RSMRST_L	W6	RSMRST*		SMC_GPIO13	AB3	TP_TBT_WAKE_L
39		SMC_SYSRST_L	W4	SYS_RESET*		SMC_GPIO14	AE2	UPC_I2C_INT_L
17		PM_SLP_S0_1V8_L	AA4	SLP_S0B		SMC_GPIO15	L4	NC_GNSS_HOST_WAKE
57 40 39		SMC_PROCHOT_L	R5	PROCHOT*				
73 64 31		PMU_SYS_ALIVE	AA6	SYS_ALIVE		SMC_ADC0	AG2	SMC_DCIN_VSENSE
						SMC_ADC1	AC4	SMC_DCIN_ISENSE
42 23		I2C_UPC_SCL	M3	SMC_I2C0_SCL		SMC_ADC2	AH3	SMC_PBUS_VSENSE
42 23		I2C_UPC_SDA	J4	SMC_I2C0_SDA		SMC_ADC3	AD4	SMC_BMON_ISENSE
						SMC_ADC4	AB6	SMC_CPU_HS_ISENSE
42		NC_I2C_SNS0_S0_SCL	N4	SMC_I2C1_SCL		SMC_ADC5	AH2	SMC_3V3G3HMAIN_ISENSE
42		NC_I2C_SNS0_S0_SDA	P4	SMC_I2C1_SDA		SMC_ADC6	AG4	SMC_5VG3S_ISENSE
						SMC_ADC7	AC5	SMC_SSD0_ISENSE
42		I2C_SNS1_S0_SCL	U5	SMC_I2C2_SCL		REFP_ADC	AF4	PP1V25_SLPS2R_SMC_AVREF
42		I2C_SNS1_S0_SDA	M2	SMC_I2C2_SDA		REFM_ADC	AG3	GND_SMC_AVSS
42		I2C_DISP_SCL	U6	SMC_I2C3_SCL				
42		I2C_DISP_SDA	R4	SMC_I2C3_SDA		SMC_PWM0	J2	SMC_FAN_0_PWM
						SMC_TACH0	L3	SMC_FAN_0_TACH
78 42		I2C_PWR_SCL	P3	SMC_I2C4_SCL				
78 42		I2C_PWR_SDA	T4	SMC_I2C4_SDA		SMC_PWM1	R6	NC_SMC_FAN_1_PWM
						SMC_TACH1	L2	NC_SMC_FAN_1_TACH
42		I2C_SNS_G3S_SCL	R2	SMC_I2C5_SCL				
42		I2C_SNS_G3S_SDA	P2	SMC_I2C5_SDA		SMC_PWM2	M4	NC_SMC_LED_ONEWIRE
42		NC_I2C_SSD0_SCL	R3	SMC_I2C6_SCL	(IPU)	SMC_UART0_RXD	V4	SMC_DEBUGPRT_RX
42		NC_I2C_SSD0_SDA	T2	SMC_I2C6_SDA		SMC_UART0_TXD	V5	SMC_DEBUGPRT_TX
						SWD_OUT0_TCK	AE3	SSD0_SWCLK_UART_R2D
						SWD_OUT0_TMS	AA5	SSD0_SWDIO_UART_D2R
						SWD_OUT1_TCK	AF2	NC_SSD1_SWCLK_UART_R2D
						SWD_OUT1_TMS	AA7	NC_SSD1_SWDIO_UART_D2R

XW4089
SM
PLACE_NEAR=U3900.AG3:4MM

PP1V8_PRIM_PCH — 18 75

R4054	100K	5% 1/20W MF 201	ESPI_IO<0>	13 32
R4055	100K	5% 1/20W MF 201	ESPI_IO<1>	13 32
R4056	100K	5% 1/20W MF 201	ESPI_IO<2>	13 32
R4057	100K	5% 1/20W MF 201	ESPI_IO<3>	13 32
R4059	100K	5% 1/20W MF 201	ESPI_CS_L	13 32
R4046	10K	5% 1/20W MF 201	SOC_JTAG_SEL	32
R4047	100K	5% 1/20W MF 201	SOC_DOCK_CONNECT	23 32 78

BOM_COST_GROUP=T290

SYNC_MASTER=X589_BIGSUR SYNC_DATE=03/16/2017

PAGE TITLE
SoC AOP/AON/SMC

Apple Inc.

DRAWING NUMBER 051-05232 SIZE D
REVISION 2.0.0
BRANCH proto4b
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OMIT_TABLE
CRITICAL

U3900
H9M
BGA
SYM 4 OF 18
ISP

69 IN	MIPI_FTCAM_DATA_P<0>	B27	MIPI0C_DATA0_P		ISP_I2C0_SDA	AF32	I2C_FTCAM_SDA BI 43
69 IN	MIPI_FTCAM_DATA_N<0>	A27	MIPI0C_DATA0_N		ISP_I2C0_SCL	AH36	I2C_FTCAM_SCL OUT 43
76 IN	GND	B25	MIPI0C_DATA1_P		ISP_I2C1_SDA	AB32	NC_I2C_PLCAM_SDA BI 43
76 IN	GND	A25	MIPI0C_DATA1_N		ISP_I2C1_SCL	AG32	NC_I2C_PLCAM_SCL OUT 43
69 IN	MIPI_FTCAM_CLK_P	B26	MIPI0C_CLK_P		SENSOR0_CLK	AK35	NC_FTCAM_CLK12M_R OUT 76
69 IN	MIPI_FTCAM_CLK_N	A26	MIPI0C_CLK_N		SENSOR0_RST	AK34	NC_FTCAM_RESET_L OUT 76
					SENSOR0_ISTRB	AJ33	NC_DFR_TOUCH_RESET_L OUT 76
76 IN	GND	B28	MIPI1C_DATA0_P		SENSOR1_CLK	AD33	NC_PLCAM_RX_CLK12M_R OUT 76
76 IN	GND	A28	MIPI1C_DATA0_N		SENSOR1_RST	AC32	NC_PLCAM_RX_RESET_L OUT 76
76 IN	GND	B30	MIPI1C_DATA1_P		SENSOR1_ISTRB	AC34	NC_DFR_DISP_RESET_L OUT 76
76 IN	GND	A30	MIPI1C_DATA1_N				
76 IN	GND	B29	MIPI1C_CLK_P		SENSOR2_CLK	AD32	NC_PLCAM_TX_CLK12M_R OUT 76
76 IN	GND	A29	MIPI1C_CLK_N		SENSOR2_RST	AJ32	NC_PLCAM_TX_RESET_L OUT 76
				(IPD)	SENSOR_INT	AA33	NC_PLCAM_TX_INT IN 76
76 OUT	NC_MIPI_DFR_DATAP	B33	MIPID_DATA0_P				
76 OUT	NC_MIPI_DFR_DATAN	A33	MIPID_DATA0_N	(IPD)	DISP_TE	H32	NC_DFR_DISP_TE IN 76
76 OUT	NC_MIPI_DFR_CLKP	B32	MIPID_CLK_P		DISP_VSYNC	T36	BOARD_REV2 IN 39
76 OUT	NC_MIPI_DFR_CLKN	A32	MIPID_CLK_N		CLK32K_OUT	AK33	NC_DFR_TOUCH_CLK32K_RESET_L OUT 76
	SOC_MIPI0C_REXT	F23	MIPI0C_REXT				
	SOC_MIPI1C_REXT	F26	MIPI1C_REXT				
	SOC_MIPID_REXT	F27	MIPID_REXT				

[1]R4100 4.02K 1% 1/20W MF 201 (2)
[1]R4101 4.02K 1% 1/20W MF 201 (2)
[1]R4102 4.02K 1% 1/20W MF 201 (2)

OMIT_TABLE
CRITICAL

U3900
H9M
BGA
SYM 2 OF 18
I2C/UART/SPI/I2S

43 BI	I2C_SPKRAMP_L_SDA	AE35	I2C0_SDA		SPI0_MISO	AR9	SPI_SOCROM_MISO IN 39 40
43 OUT	I2C_SPKRAMP_L_SCL	AD35	I2C0_SCL		SPI0_MOSI	AR7	SPI_SOCROM_MOSI_R
					SPI0_SCLK	AU7	SPI_SOCROM_CLK_R
78 43 BI	I2C_SPKRAMP_R_SDA	AF34	I2C1_SDA		SPI0_SSIN	AT9	SPI_SOCROM_CS_L OUT 39
78 43 OUT	I2C_SPKRAMP_R_SCL	AG35	I2C1_SCL	(IPU)	SPI1_MISO	P36	SPI_TPAD_MISO IN 39 54
43 BI	TP_I2C_CODEC_SDA	M34	I2C2_SDA		SPI1_MOSI	N34	SPI_TPAD_MOSI_R OUT 40
43 OUT	TP_I2C_CODEC_SCL	R33	I2C2_SCL		SPI1_SCLK	P35	SPI_TPAD_CLK_R OUT 40
					SPI1_SSIN	T32	SPI_TPAD_CS_L OUT 54
43 BI	I2C_ALS_SDA	Y32	I2C3_SDA				
43 OUT	I2C_ALS_SCL	AE34	I2C3_SCL		SPI2_MISO	A19	SPI_MESA_MISO IN 49 78
					SPI2_MOSI	A20	SPI_MESA_MOSI_R OUT 40
43 BI	NC_I2C_DFR_SDA	T34	I2C4_SDA		SPI2_SCLK	C19	SPI_MESA_CLK_R OUT 40
43 OUT	NC_I2C_DFR_SCL	U32	I2C4_SCL		SPI2_SSIN	A18	WLAN_THROTTLE OUT 29 30
43 BI	NC_I2C_SOC_5_SDA	R35	I2C5_SDA				
43 OUT	NC_I2C_SOC_5_SCL	U33	I2C5_SCL		SPI3_MISO	C17	NC_SPI_DFR_MISO IN 76
					SPI3_MOSI	C18	NC_SPI_DFR_MOSI_R OUT 76
78 52 49 IN	SPKR_ID1	P34	I2C6_SDA (IPU)		SPI3_SCLK	B18	NC_SPI_DFR_CLK_R OUT 76
78 52 IN	SPKR_ID0	R34	I2C6_SCL (IPU)		SPI3_SSIN	A17	NC_SPI_DFR_CS_L OUT 76
78 IN	TP_SOC_DEBUGPRT_RX	Y33	UART0_RXD (IPU)				
78 OUT	TP_SOC_DEBUGPRT_TX	Y34	UART0_TXD	(IPD)	I2S0_DIN	AC33	I2S_SPKRAMP_L_D2R IN 49 50 78
					I2S0_DOUT	AG34	I2S_SPKRAMP_L_R2D_R OUT 40
41 IN	UART_SE_D2R	B15	UART1_RXD		I2S0_BCLK	AA32	I2S_SPKRAMP_L_BCLK_R OUT 40
41 OUT	UART_SE_R2D	A15	UART1_TXD		I2S0_LRCK	AG33	I2S_SPKRAMP_L_LRCLK OUT 40
41 IN	UART_SE_D2R_CTS_L	C15	UART1_CTS*		I2S0_MCK	AR35	NC_DFR_TOUCH_RSVD BI 76
41 OUT	UART_SE_R2D_RTS_L	D15	UART1_RTS*				
				(IPD)	I2S1_DIN	B20	I2S_SPKRAMP_R_D2R IN 52
76 IN	NC_UART_BT_D2R	J36	UART2_RXD		I2S1_DOUT	C20	I2S_SPKRAMP_R_R2D_R OUT 40
76 OUT	NC_UART_BT_R2D	J35	UART2_TXD		I2S1_BCLK	C21	I2S_SPKRAMP_R_BCLK_R OUT 40
76 IN	NC_UART_BT_D2R_CTS_L	N32	UART2_CTS*		I2S1_LRCK	A21	I2S_SPKRAMP_R_LRCLK OUT 40
76 OUT	NC_UART_BT_R2D_RTS_L	M32	UART2_RTS*		I2S1_MCK	D21	NC_PCHROM_SW_EN OUT 76
76 IN	NC_UART_GNSS_D2R	M36	UART3_RXD	(IPD)	I2S2_DIN	AH34	I2S_CODEC_D2R IN 49 78
76 OUT	NC_UART_GNSS_R2D	N36	UART3_TXD		I2S2_DOUT	AB34	I2S_CODEC_R2D_R OUT 40
76 IN	NC_UART_GNSS_D2R_CTS_L	M35	UART3_CTS*		I2S2_BCLK	AF33	I2S_CODEC_BCLK_R OUT 40
76 OUT	NC_UART_GNSS_R2D_RTS_L	U34	UART3_RTS*		I2S2_LRCK	AH35	I2S_CODEC_LRCLK OUT 49 78
					I2S2_MCK	AR33	NC_I2S_CODEC_MCLK OUT 76
30 29 IN	UART_WLAN_D2R	B14	UART4_RXD				
30 29 OUT	UART_WLAN_R2D	A14	UART4_TXD	(IPD)	I2S3_DIN	AD36	NC_I2S_HAWKING_D2R IN 76
30 29 IN	UART_WLAN_D2R_CTS_L	C14	UART4_CTS*		I2S3_DOUT	AB35	NC_I2S_CODEC1_R2D_R OUT 76
30 29 OUT	UART_WLAN_R2D_RTS_L	C13	UART4_RTS*		I2S3_BCLK	AE36	NC_I2S_HAWKING_BCLK_R OUT 76
					I2S3_LRCK	W34	NC_I2S_HAWKING_LRCLK OUT 76
					I2S3_MCK	AG36	NC_I2S_CODEC1_MCLK OUT 76

PLACE_NEAR=U3900:AR7:5MM
PLACE_NEAR=U3900:AU7:5MM
R4171 20 (1) (2) 5% 1/20W MF 201 SPI_SOCROM_MOSI OUT 39 40
R4172 20 (1) (2) 5% 1/20W MF 201 SPI_SOCROM_CLK OUT 39 40

BOM_COST_GROUP=T290

SYNC_MASTER=X589_BIGSUR SYNC_DATE=03/15/2017

PAGE TITLE
SoC ISP/I2C/UART/SPI/I2S

Apple Inc.

DRAWING NUMBER 051-05232 SIZE D
REVISION 2.0.0
BRANCH proto4b
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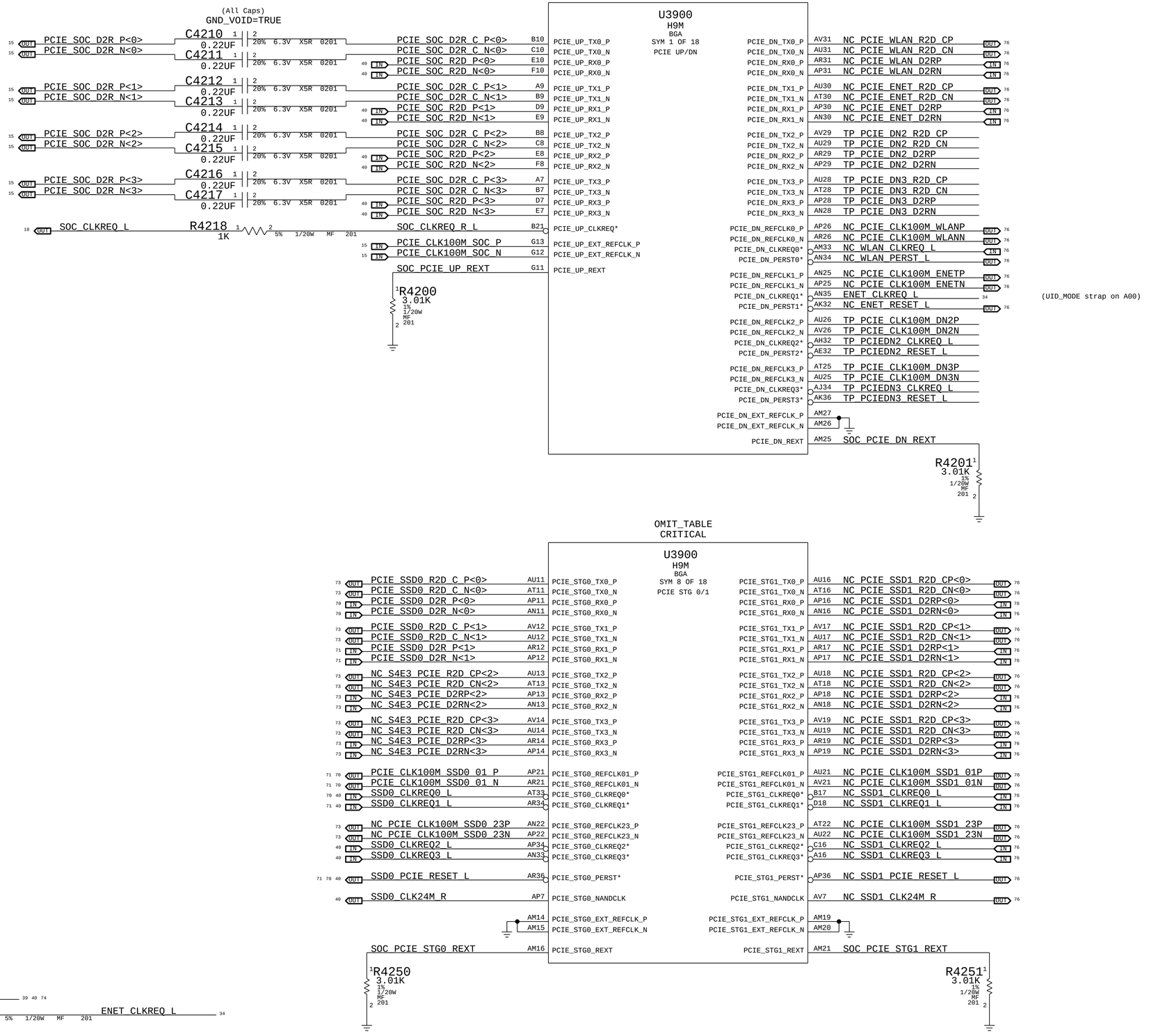
(All Caps)
GND_VOID=TRUE
C4210 0.22UF
C4211 0.22UF
C4212 0.22UF
C4213 0.22UF
C4214 0.22UF
C4215 0.22UF
C4216 0.22UF
C4217 0.22UF
20% 6.3V X5R 0201
PCIE SOC D2R P<0>
PCIE SOC D2R N<0>
PCIE SOC D2R P<1>
PCIE SOC D2R N<1>
PCIE SOC D2R P<2>
PCIE SOC D2R N<2>
PCIE SOC D2R P<3>
PCIE SOC D2R N<3>
SOC CLKREQ L
R4218 1K
5% 1/20W MF 201
PCIE SOC D2R C P<0>
PCIE SOC D2R C N<0>
PCIE SOC R2D P<0>
PCIE SOC R2D N<0>
PCIE SOC D2R C P<1>
PCIE SOC D2R C N<1>
PCIE SOC R2D P<1>
PCIE SOC R2D N<1>
PCIE SOC D2R C P<2>
PCIE SOC D2R C N<2>
PCIE SOC R2D P<2>
PCIE SOC R2D N<2>
PCIE SOC D2R C P<3>
PCIE SOC D2R C N<3>
PCIE SOC R2D P<3>
PCIE SOC R2D N<3>
SOC CLKREQ R L
PCIE CLK100M SOC P
PCIE CLK100M SOC N
SOC PCIE UP REXT
R4200 3.01K 1% 1/20W MF 201
OMIT_TABLE
CRITICAL
U3900
H9M
BGA
SYM 1 OF 18
PCIE UP/DN
PCIE_UP_TX0_P B10
PCIE_UP_TX0_N C10
PCIE_UP_RX0_P E10
PCIE_UP_RX0_N F10
PCIE_UP_TX1_P A9
PCIE_UP_TX1_N B9
PCIE_UP_RX1_P D9
PCIE_UP_RX1_N E9
PCIE_UP_TX2_P B8
PCIE_UP_TX2_N C8
PCIE_UP_RX2_P E8
PCIE_UP_RX2_N F8
PCIE_UP_TX3_P A7
PCIE_UP_TX3_N B7
PCIE_UP_RX3_P D7
PCIE_UP_RX3_N E7
PCIE_UP_CLKREQ* B21
PCIE_UP_EXT_REFCLK_P G13
PCIE_UP_EXT_REFCLK_N G12
PCIE_UP_REXT G11
PCIE_DN_TX0_P AV31
PCIE_DN_TX0_N AU31
PCIE_DN_RX0_P AR31
PCIE_DN_RX0_N AP31
PCIE_DN_TX1_P AU30
PCIE_DN_TX1_N AT30
PCIE_DN_RX1_P AP30
PCIE_DN_RX1_N AN30
PCIE_DN_TX2_P AV29
PCIE_DN_TX2_N AU29
PCIE_DN_RX2_P AR29
PCIE_DN_RX2_N AP29
PCIE_DN_TX3_P AU28
PCIE_DN_TX3_N AT28
PCIE_DN_RX3_P AP28
PCIE_DN_RX3_N AN28
PCIE_DN_REFCLK0_P AP26
PCIE_DN_REFCLK0_N AR26
PCIE_DN_CLKREQ0* AM33
PCIE_DN_PERST0* AN34
PCIE_DN_REFCLK1_P AN25
PCIE_DN_REFCLK1_N AP25
PCIE_DN_CLKREQ1* AN35
PCIE_DN_PERST1* AK32
PCIE_DN_REFCLK2_P AU26
PCIE_DN_REFCLK2_N AV26
PCIE_DN_CLKREQ2* AH32
PCIE_DN_PERST2* AE32
PCIE_DN_REFCLK3_P AT25
PCIE_DN_REFCLK3_N AU25
PCIE_DN_CLKREQ3* AJ34
PCIE_DN_PERST3* AK36
PCIE_DN_EXT_REFCLK_P AM27
PCIE_DN_EXT_REFCLK_N AM26
PCIE_DN_REXT AM25
NC PCIE WLAN R2D CP
NC PCIE WLAN R2D CN
NC PCIE WLAN D2RP
NC PCIE WLAN D2RN
NC PCIE ENET R2D CP
NC PCIE ENET R2D CN
NC PCIE ENET D2RP
NC PCIE ENET D2RN
TP PCIE DN2 R2D CP
TP PCIE DN2 R2D CN
TP PCIE DN2 D2RP
TP PCIE DN2 D2RN
TP PCIE DN3 R2D CP
TP PCIE DN3 R2D CN
TP PCIE DN3 D2RP
TP PCIE DN3 D2RN
NC PCIE CLK100M WLANP
NC PCIE CLK100M WLANN
NC WLAN CLKREQ L
NC WLAN PERST L
NC PCIE CLK100M ENETP
NC PCIE CLK100M ENETN
ENET CLKREQ L
NC ENET RESET L
TP PCIE CLK100M DN2P
TP PCIE CLK100M DN2N
TP PCIEDN2 CLKREQ L
TP PCIEDN2 RESET L
TP PCIE CLK100M DN3P
TP PCIE CLK100M DN3N
TP PCIEDN3 CLKREQ L
TP PCIEDN3 RESET L
SOC PCIE DN REXT
R4201 3.01K 1% 1/20W MF 201
(UID_MODE strap on A00)
OMIT_TABLE
CRITICAL
U3900
H9M
BGA
SYM 8 OF 18
PCIE STG 0/1
PCIE_STG0_TX0_P AU11
PCIE_STG0_TX0_N AT11
PCIE_STG0_RX0_P AP11
PCIE_STG0_RX0_N AN11
PCIE_STG0_TX1_P AV12
PCIE_STG0_TX1_N AU12
PCIE_STG0_RX1_P AR12
PCIE_STG0_RX1_N AP12
PCIE_STG0_TX2_P AU13
PCIE_STG0_TX2_N AT13
PCIE_STG0_RX2_P AP13
PCIE_STG0_RX2_N AN13
PCIE_STG0_TX3_P AV14
PCIE_STG0_TX3_N AU14
PCIE_STG0_RX3_P AR14
PCIE_STG0_RX3_N AP14
PCIE_STG0_REFCLK01_P AP21
PCIE_STG0_REFCLK01_N AR21
PCIE_STG0_CLKREQ0* AT33
PCIE_STG0_CLKREQ1* AR34
PCIE_STG0_REFCLK23_P AN22
PCIE_STG0_REFCLK23_N AP22
PCIE_STG0_CLKREQ2* AP34
PCIE_STG0_CLKREQ3* AN33
PCIE_STG0_PERST* AR36
PCIE_STG0_NANDCLK AP7
PCIE_STG0_EXT_REFCLK_P AM14
PCIE_STG0_EXT_REFCLK_N AM15
PCIE_STG0_REXT AM16
PCIE_STG1_TX0_P AV16
PCIE_STG1_TX0_N AT16
PCIE_STG1_RX0_P AP16
PCIE_STG1_RX0_N AN16
PCIE_STG1_TX1_P AV17
PCIE_STG1_TX1_N AU17
PCIE_STG1_RX1_P AR17
PCIE_STG1_RX1_N AP17
PCIE_STG1_TX2_P AU18
PCIE_STG1_TX2_N AT18
PCIE_STG1_RX2_P AP18
PCIE_STG1_RX2_N AN18
PCIE_STG1_TX3_P AV19
PCIE_STG1_TX3_N AU19
PCIE_STG1_RX3_P AR19
PCIE_STG1_RX3_N AP19
PCIE_STG1_REFCLK01_P AU21
PCIE_STG1_REFCLK01_N AV21
PCIE_STG1_CLKREQ0* B17
PCIE_STG1_CLKREQ1* D18
PCIE_STG1_REFCLK23_P AT22
PCIE_STG1_REFCLK23_N AU22
PCIE_STG1_CLKREQ2* C16
PCIE_STG1_CLKREQ3* A16
PCIE_STG1_PERST* AP36
PCIE_STG1_NANDCLK AV7
PCIE_STG1_EXT_REFCLK_P AM19
PCIE_STG1_EXT_REFCLK_N AM20
PCIE_STG1_REXT AM21
NC PCIE SSD1 R2D CP<0>
NC PCIE SSD1 R2D CN<0>
NC PCIE SSD1 D2RP<0>
NC PCIE SSD1 D2RN<0>
NC PCIE SSD1 R2D CP<1>
NC PCIE SSD1 R2D CN<1>
NC PCIE SSD1 D2RP<1>
NC PCIE SSD1 D2RN<1>
NC PCIE SSD1 R2D CP<2>
NC PCIE SSD1 R2D CN<2>
NC PCIE SSD1 D2RP<2>
NC PCIE SSD1 D2RN<2>
NC PCIE SSD1 R2D CP<3>
NC PCIE SSD1 R2D CN<3>
NC PCIE SSD1 D2RP<3>
NC PCIE SSD1 D2RN<3>
NC PCIE CLK100M SSD1 01P
NC PCIE CLK100M SSD1 01N
NC SSD1 CLKREQ0 L
NC SSD1 CLKREQ1 L
NC PCIE CLK100M SSD1 23P
NC PCIE CLK100M SSD1 23N
NC SSD1 CLKREQ2 L
NC SSD1 CLKREQ3 L
NC SSD1 PCIE RESET L
NC SSD1 CLK24M R
SOC PCIE STG0 REXT
SOC PCIE STG1 REXT
R4250 3.01K 1% 1/20W MF 201
R4251 3.01K 1% 1/20W MF 201
PP1V8_AWAKE
R4232 47K 5% 1/20W MF 201
ENET CLKREQ L
BOM_COST_GROUP=T290
SYNC_MASTER=X589_BIGSUR
SYNC_DATE=03/15/2017
PAGE TITLE
SoC PCIe
Apple Inc.
DRAWING NUMBER 051-05232
SIZE D
REVISION 2.0.0
BRANCH proto4b
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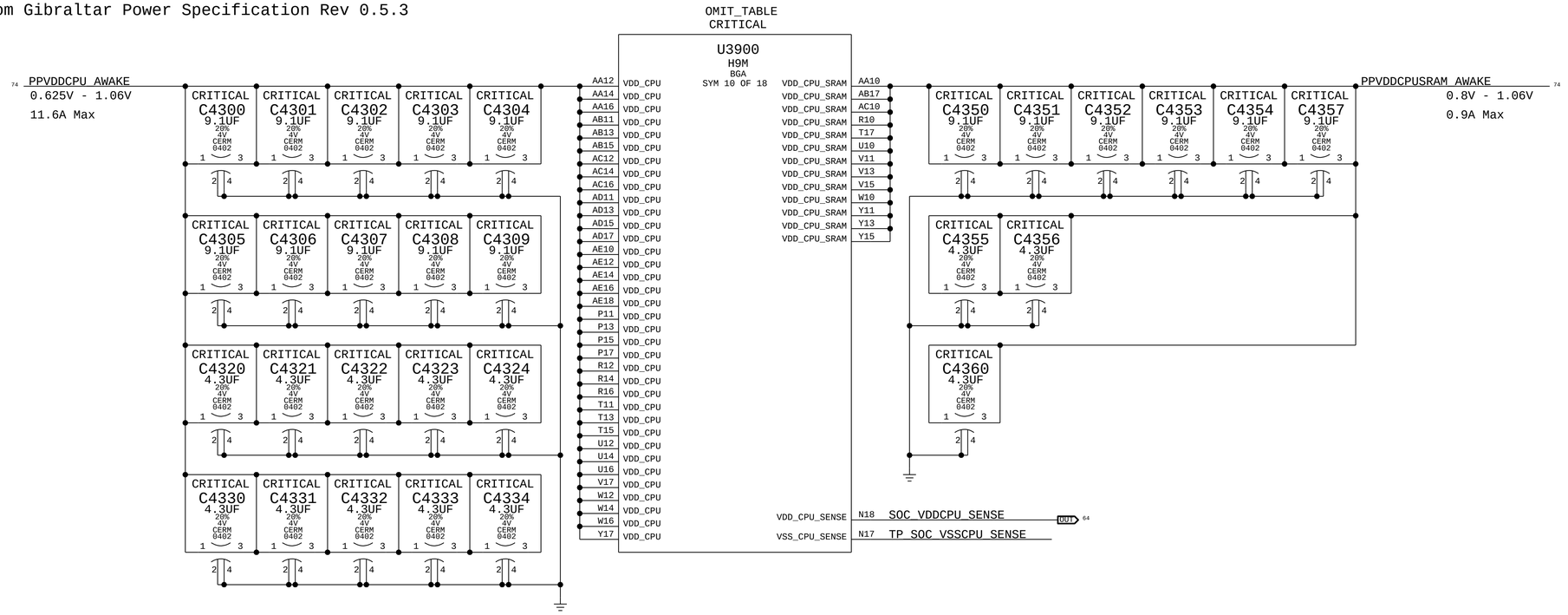
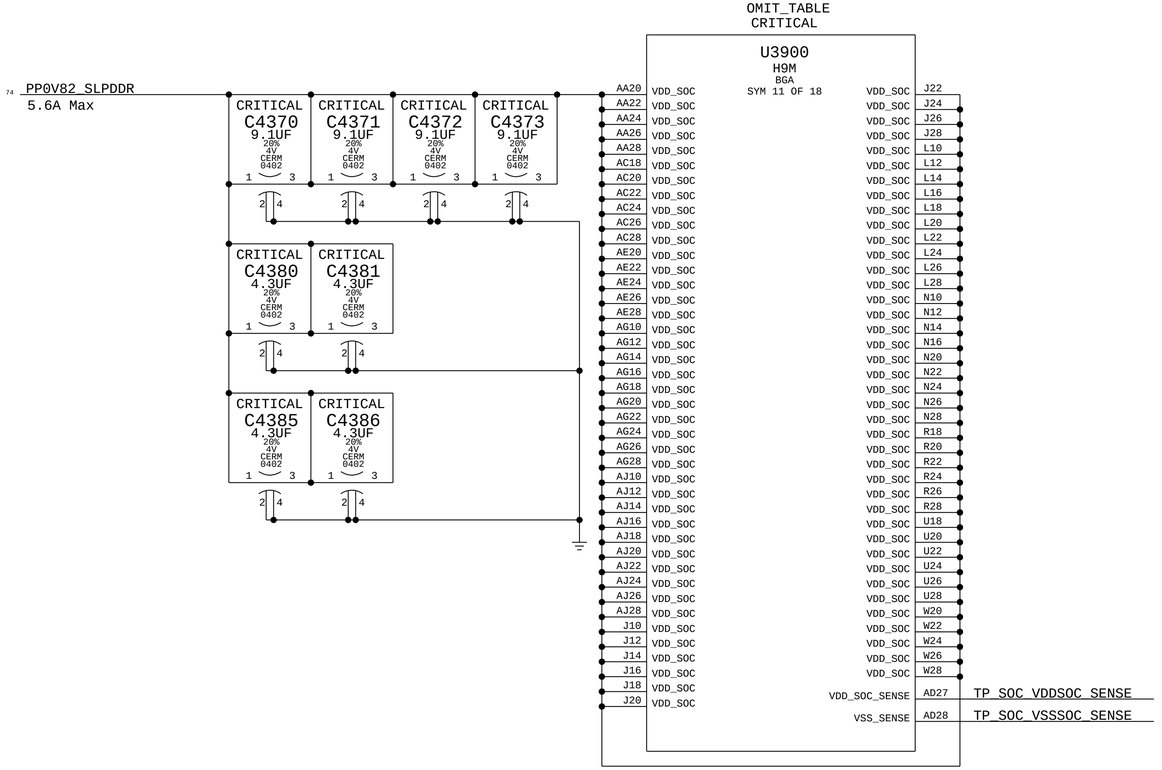
Current estimates @ 105C & 2GB from Gibraltar Power Specification Rev 0.5.3





BOM_COST_GROUP=T290

SYNC_MASTER=X589_BIGSUR SYNC_DATE=02/13/2017

PAGE TITLE: SoC Power 1

Apple Inc.

DRAWING NUMBER: 051-05232 SIZE: D
REVISION: 2.0.0
BRANCH: proto4b
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Current estimates @ 105C & 2GB from Gibraltar Power Specification Rev 0.5.3

R4460
5.1
1% 1/20W MF 0201

L4460
120-OHM-25%-0.48A-0.21DCR
0201

74 PP1V1_SLPDDR
8mA Max

PP1V1_SLPDDR_SOC_VDDIOPLLDDR_F
MIN_LINE_WIDTH=0.2000
MIN_NECK_WIDTH=0.0750
VOLTAGE=1.1V

Current included in VDD2

PP1V1_SLPS2R 74

74 PP1V1_SLPDDR
0.86A Max

OMIT_TABLE
CRITICAL

U3900
H9M
BGA
SYM 13 OF 18

VDDIO11_PLL_DDR	G9	C4460 0.22UF	C4461 0.22UF
VDDIO11_PLL_DDR	G29	C4462 0.22UF	C4463 0.22UF
VDDIO11_PLL_DDR	AM9		
VDDIO11_PLL_DDR	AK30		
VDDIO11_RET_DDR	G4	C4470 2.2UF	C4471 2.2UF
VDDIO11_RET_DDR	G34	C4472 2.2UF	C4473 2.2UF
VDDIO11_RET_DDR	AM4		
VDDIO11_RET_DDR	AM34		

C2	VDDIO11_DDR0	C4450 2.2UF	C4451 2.2UF
E1	VDDIO11_DDR0	C4452 2.2UF	C4453 2.2UF
G1	VDDIO11_DDR0	C4454 2.2UF	C4455 2.2UF
H8	VDDIO11_DDR0	C4456 2.2UF	C4457 2.2UF
J9	VDDIO11_DDR0		
K8	VDDIO11_DDR0		
L9	VDDIO11_DDR0		
M8	VDDIO11_DDR0		
N9	VDDIO11_DDR0		
P1	VDDIO11_DDR0		
R1	VDDIO11_DDR0		
U1	VDDIO11_DDR0		
C36	VDDIO11_DDR1		
E37	VDDIO11_DDR1		
G37	VDDIO11_DDR1		
H30	VDDIO11_DDR1		
J29	VDDIO11_DDR1		
K30	VDDIO11_DDR1		
L29	VDDIO11_DDR1		
M30	VDDIO11_DDR1		
N29	VDDIO11_DDR1		
P37	VDDIO11_DDR1		
R37	VDDIO11_DDR1		
U37	VDDIO11_DDR1		
AB1	VDDIO11_DDR2		
AD1	VDDIO11_DDR2		
AE1	VDDIO11_DDR2		
AF9	VDDIO11_DDR2		
AG8	VDDIO11_DDR2		
AH9	VDDIO11_DDR2		
AJ8	VDDIO11_DDR2		
AK9	VDDIO11_DDR2		
AL8	VDDIO11_DDR2		
AM1	VDDIO11_DDR2		
AP1	VDDIO11_DDR2		
AT2	VDDIO11_DDR2		
AB37	VDDIO11_DDR3		
AD30	VDDIO11_DDR3		
AD37	VDDIO11_DDR3		
AE29	VDDIO11_DDR3		
AE37	VDDIO11_DDR3		
AF30	VDDIO11_DDR3		
AG29	VDDIO11_DDR3		
AH30	VDDIO11_DDR3		
AJ29	VDDIO11_DDR3		
AM37	VDDIO11_DDR3		
AP37	VDDIO11_DDR3		
AT36	VDDIO11_DDR3		

74 PP0V9_SLPDDR
1.9A Max

C4400 9.1UF
C4401 9.1UF
C4402 9.1UF
C4405 4.3UF
C4406 4.3UF
C4410 4.3UF
C4411 4.3UF

U3900
H9M
BGA
SYM 12 OF 18
OMIT_TABLE
CRITICAL

AB19	VDD_FIXED	VDD_FIXED	K19
AB21	VDD_FIXED	VDD_FIXED	K21
AB23	VDD_FIXED	VDD_FIXED	K23
AB25	VDD_FIXED	VDD_FIXED	K25
AB27	VDD_FIXED	VDD_FIXED	K27
AD19	VDD_FIXED	VDD_FIXED	M11
AD21	VDD_FIXED	VDD_FIXED	M13
AD23	VDD_FIXED	VDD_FIXED	M15
AD25	VDD_FIXED	VDD_FIXED	M17
AF11	VDD_FIXED	VDD_FIXED	M19
AF13	VDD_FIXED	VDD_FIXED	M21
AF15	VDD_FIXED	VDD_FIXED	M23
AF17	VDD_FIXED	VDD_FIXED	M25
AF19	VDD_FIXED	VDD_FIXED	M27
AF21	VDD_FIXED	VDD_FIXED	P19
AF23	VDD_FIXED	VDD_FIXED	P21
AF25	VDD_FIXED	VDD_FIXED	P23
AF27	VDD_FIXED	VDD_FIXED	P25
AH11	VDD_FIXED	VDD_FIXED	P27
AH13	VDD_FIXED	VDD_FIXED	T19
AH15	VDD_FIXED	VDD_FIXED	T21
AH17	VDD_FIXED	VDD_FIXED	T23
AH19	VDD_FIXED	VDD_FIXED	T25
AH21	VDD_FIXED	VDD_FIXED	T27
AH23	VDD_FIXED	VDD_FIXED	V19
AH25	VDD_FIXED	VDD_FIXED	V21
AH27	VDD_FIXED	VDD_FIXED	V23
AK11	VDD_FIXED	VDD_FIXED	V25
K11	VDD_FIXED	VDD_FIXED	V27
K13	VDD_FIXED	VDD_FIXED	Y19
K15	VDD_FIXED	VDD_FIXED	Y21
K17	VDD_FIXED	VDD_FIXED	Y23
		VDD_FIXED	Y25
		VDD_FIXED	Y27

9mA Max
74 PP0V9_SLPDDR
W18 VDD_FIXED_CPU

74 PP0V9_SLPDDR
5mA Max
G22 VDD_FIXED_USB

74 PP0V9_SLPDDR
25mA Max
H23 VDD_FIXED_MIPI
H25 VDD_FIXED_MIPI
H27 VDD_FIXED_MIPI

C4420 4.3UF

74 PP0V8_SLPS2R
102mA Max
CRITICAL C4423 2.2UF

AB9	VDD_LOW	
AD9	VDD_LOW	
P9	VDD_LOW	
T9	VDD_LOW	
V9	VDD_LOW	
Y9	VDD_LOW	

74 36 PP0V9_SLPDDR
330mA Max
C4425 4.3UF
C4426 4.3UF

H11	VDD_FIXED_UP_PCIE_ANA	
H13	VDD_FIXED_UP_PCIE_ANA	
H15	VDD_FIXED_UP_PCIE_ANA	
J15	VDD_FIXED_UP_PCIE_CLK	
J11	VDD_FIXED_UP_PCIE_CLK	
J13	VDD_FIXED_UP_PCIE_CLK	

VDD_FIXED_STG0_PCIE_ANA	AL14	PP0V9_SLPDDR	36 74
VDD_FIXED_STG0_PCIE_ANA	AL16	C4430 4.3UF	C4431 4.3UF
VDD_FIXED_STG0_PCIE_ANA	AL12	330mA Max	
VDD_FIXED_STG0_PCIE_CLK	AK13		
VDD_FIXED_STG0_PCIE_CLK	AK15		
VDD_FIXED_STG0_PCIE_CLK	AK17		
VDD_FIXED_STG1_PCIE_ANA	AL18	PP0V9_SLPDDR	36 74
VDD_FIXED_STG1_PCIE_ANA	AL20	C4435 4.3UF	C4436 4.3UF
VDD_FIXED_STG1_PCIE_ANA	AL22	330mA Max	
VDD_FIXED_STG1_PCIE_CLK	AK19		
VDD_FIXED_STG1_PCIE_CLK	AK21		
VDD_FIXED_STG1_PCIE_CLK	AL17		
VDD_FIXED_DN_PCIE_ANA	AL26	PP0V9_SLPDDR	36 74
VDD_FIXED_DN_PCIE_ANA	AL28	C4440 4.3UF	C4441 4.3UF
VDD_FIXED_DN_PCIE_ANA	AL30	330mA Max	
VDD_FIXED_DN_PCIE_CLK	AK25		
VDD_FIXED_DN_PCIE_CLK	AK27		
VDD_FIXED_DN_PCIE_CLK	AK29		
VDD_FIXED_PCIE_REFBUF	AK23		
VDD_FIXED_PCIE_REFBUF	AJ15	PP0V9_SLPDDR_SOC_PCIEREFBUF	
VDD_FIXED_PCIE_REFBUF	AL24	MIN_LINE_WIDTH=0.2000	
VDD_FIXED_PCIE_REFBUF	AJ21	MIN_NECK_WIDTH=0.1000	
VDD_FIXED_PCIE_REFBUF	AJ27	VOLTAGE=0.9V	

C4445 4.3UF

R4445
0
5% 1/20W MF 0201

PP0V9_SLPDDR 36 74
45mA Max

BOM_COST_GROUP=T290

SYNC_MASTER=X589_BIGSUR	SYNC_DATE=02/13/2017
PAGE TITLE	SoC Power 2
Apple Inc.	DRAWING NUMBER 051-05232 SIZE D
	REVISION 2.0.0
	BRANCH proto4b
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Current estimates @ 105C & 2GB from Gibraltar Power Specification Rev 0.5.3

OMIT_TABLE
CRITICAL

U3900
H9M
BGA
SYM 14 OF 18

74 PP1V8_SLPS2R
134mA Max
CRITICAL C4500 2.2UF 20% 4V X6S-CERM 0201
CRITICAL C4501 2.2UF 20% 4V X6S-CERM 0201
CRITICAL C4502 2.2UF 20% 4V X6S-CERM 0201
CRITICAL C4503 2.2UF 20% 4V X6S-CERM 0201
A4 VDD1
AV34 VDD1
AV4 VDD1
B35 VDD1
W1 VDD1
W37 VDD1
Y1 VDD1
Y37 VDD1

74 PP1V8_SLPS2R
20mA Max
CRITICAL C4510 2.2UF 20% 4V X6S-CERM 0201
CRITICAL C4511 4.3UF 20% 4V CERM 0402
CRITICAL C4512 4.3UF 20% 4V CERM 0402
CRITICAL C4513 0.1UF 10% 6.3V X6S 0201
AA9 VDDIO18_AOP1
P8 VDDIO18_AOP1
R9 VDDIO18_AOP1
T8 VDDIO18_AOP1
U9 VDDIO18_AOP1
W9 VDDIO18_AOP1
AC9 VDDIO18_AOP2
AD8 VDDIO18_AOP2
AE9 VDDIO18_AOP2

74 PP1V8_SLPS2R
1mA Max
R4515 49.9 1% 1/20W MF 201
PP1V8_SLPS2R_SOC_LPADC_RC
VOLTAGE=1.8V
MIN_LINE_WIDTH=0.2000
MIN_NECK_WIDTH=0.1000
AB8 VDD18_LPADC

74 PP1V8_SLPS2R
1mA Max
R4519 49.9 1% 1/20W MF 201
PP1V8_SLPS2R_SOC_LPOSC_RC
VOLTAGE=1.8V
MIN_LINE_WIDTH=0.2000
MIN_NECK_WIDTH=0.1000
AB10 VDD18_LPOSC

CRITICAL C4519 2.2UF 20% 4V X6S-CERM 0201
CRITICAL C4515 20UF 20% 2.5V X6S-CERM 0402
AA29 VDDIO18_GRP1
AB30 VDDIO18_GRP1
AC29 VDDIO18_GRP1
P30 VDDIO18_GRP1
R29 VDDIO18_GRP1
T30 VDDIO18_GRP1
U29 VDDIO18_GRP1
V30 VDDIO18_GRP1
W29 VDDIO18_GRP1
Y30 VDDIO18_GRP1

74 PP1V8_AWAKE
40mA Max
CRITICAL C4521 2.2UF 20% 4V X6S-CERM 0201
CRITICAL C4522 2.2UF 20% 4V X6S-CERM 0201
CRITICAL C4523 2.2UF 20% 4V X6S-CERM 0201
CRITICAL C4524 4.3UF 20% 4V CERM 0402
CRITICAL C4525 4.3UF 20% 4V CERM 0402
CRITICAL C4526 4.3UF 20% 4V CERM 0402
CRITICAL C4527 4.3UF 20% 4V CERM 0402
G16 VDDIO18_GRP2
G18 VDDIO18_GRP2
G20 VDDIO18_GRP2
H17 VDDIO18_GRP2
H19 VDDIO18_GRP2
H21 VDDIO18_GRP2

AK31 VDDIO18_GRP3
AM31 VDDIO18_GRP3

AL11 VDDIO18_GRP4
AM10 VDDIO18_GRP4

74 PP1V8_AWAKE
2mA Max
R4530 0 5% 1/20W MF 0201
CRITICAL C4530 1UF 20% 6.3V X6S-CERM 0201
PP1V8_AWAKE_SOC_TSADC_RC
VOLTAGE=1.8V
MIN_LINE_WIDTH=0.2000
MIN_NECK_WIDTH=0.0750
AA18 VDD18_TSADC
P16 VDD18_TSADC
AD16 VDD18_TSADC
AF18 VDD18_TSADC
H28 VDD18_TSADC

74 PP1V8_AWAKE
7mA Max
CRITICAL C4535 2.2UF 20% 4V X6S-CERM 0201
CRITICAL C4536 0.1UF 10% 6.3V X6S 0201
G23 VDD18_MIPI
G25 VDD18_MIPI
G27 VDD18_MIPI

74 PP1V8_AWAKE
20mA Max
CRITICAL C4540 0.1UF 10% 6.3V X6S 0201
PP1V8_AWAKE_SOC_FMON_F
VOLTAGE=1.8V
MIN_LINE_WIDTH=0.0750
MIN_NECK_WIDTH=0.0750
H22 VDD18_USB
AF12 VDD18_FMON
AM30 VDD18_EFUSE1
AK12 VDD18_EFUSE2

74 PP1V8_AWAKE
1mA Max
R4545 49.9 1% 1/20W MF 201
CRITICAL C4545 1UF 20% 6.3V X6S-CERM 0201

VDD12_CPU_UVD Y18
PP1V2_AWAKE
CRITICAL C4550 2.2UF 20% 4V X6S-CERM 0201
10mA Max
VOLTAGE=1.2V
MIN_LINE_WIDTH=0.2000
MIN_NECK_WIDTH=0.1000

R4555 0 5% 1/20W MF 0201
CRITICAL C4555 0.1UF 10% 6.3V X6S 0201
PP1V2_AWAKE
13mA Max

VDD12_PLL_CPU V18
PP1V2_AWAKE_SOC_PLLCPU_F

VDD12_PCIE_REFBUF AK24
VDD12_PCIE_REFBUF AM23
PP1V2_AWAKE_SOC_PCIEREFBUF_F
VOLTAGE=1.2V
MIN_LINE_WIDTH=0.2000
MIN_NECK_WIDTH=0.1000

R4560 0 5% 1/20W MF 0201
CRITICAL C4560 0.1UF 10% 6.3V X6S 0201
CRITICAL C4561 0.1UF 10% 6.3V X6S 0201
CRITICAL C4562 2.2UF 20% 4V X6S-CERM 0201
PP1V2_AWAKE
80mA Max

VDD12_DN_PCIE AM29
VDD12_UP_PCIE G14
VDD12_STG0_PCIE AM13
VDD12_STG1_PCIE AM18
PP1V2_AWAKE_SOC_PCIEPLL_F
VOLTAGE=1.2V
MIN_LINE_WIDTH=0.2000
MIN_NECK_WIDTH=0.1000

R4565 0 5% 1/20W MF 0201
CRITICAL C4565 2.2UF 20% 4V X6S-CERM 0201
CRITICAL C4566 2.2UF 20% 4V X6S-CERM 0201
CRITICAL C4567 2.2UF 20% 4V X6S-CERM 0201
CRITICAL C4568 2.2UF 20% 4V X6S-CERM 0201
PP1V2_AWAKE
60mA Max

R4570 0 5% 1/20W MF 0201
CRITICAL C4570 0.1UF 10% 6.3V X6S 0201
CRITICAL C4571 0.1UF 10% 6.3V X6S 0201
CRITICAL C4572 2.2UF 20% 4V X6S-CERM 0201
PP1V2_AWAKE
31mA Max

VDD12_PLL_SOC AC23
VDD12_PLL_SOC AD24
VDD12_PLL_SOC AE23
PP1V2_AWAKE_SOC_PLLSOC_F
VOLTAGE=1.2V
MIN_LINE_WIDTH=0.2000
MIN_NECK_WIDTH=0.1000

VDD2 AG1
VDD2 AG37
VDD2 AJ1
VDD2 AJ37
VDD2 AK1
VDD2 AK37
VDD2 AU3
VDD2 AU34
VDD2 AU35
VDD2 AU4
VDD2 B3
VDD2 B4
VDD2 C34
VDD2 D34
VDD2 J1
VDD2 J37
VDD2 K1
VDD2 K37
VDD2 M1
VDD2 M37
VDD2 W3
VDD2 W35
VDD2 Y3
VDD2 Y35

PP1V1_SLPS2R
CRITICAL C4580 2.2UF 20% 4V X6S-CERM 0201
CRITICAL C4581 2.2UF 20% 4V X6S-CERM 0201
CRITICAL C4582 2.2UF 20% 4V X6S-CERM 0201
CRITICAL C4583 2.2UF 20% 4V X6S-CERM 0201
1.74A Max

R4590 5.1 1% 1/20W MF 0201
L4590 FERR-240OHM-25%-350MA 0201
VDD11_XTAL AN23
PP1V1_SLPDDR_SOC_XTAL_F
VOLTAGE=1.1V
MIN_LINE_WIDTH=0.2000
MIN_NECK_WIDTH=0.0750
PP1V1_SLPDDR
CRITICAL C4590 0.1UF 10% 6.3V X6S 0201
CRITICAL C4591 2.2UF 20% 4V X6S-CERM 0201
4mA Max

VDD33_USB F21
PP3V3_AWAKE
CRITICAL C4595 0.1UF 10% 6.3V X6S 0201
12mA Max

BOM_COST_GROUP=T290

SYNC_MASTER=X589_BIGSUR
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PAGE TITLE
SoC Power 3

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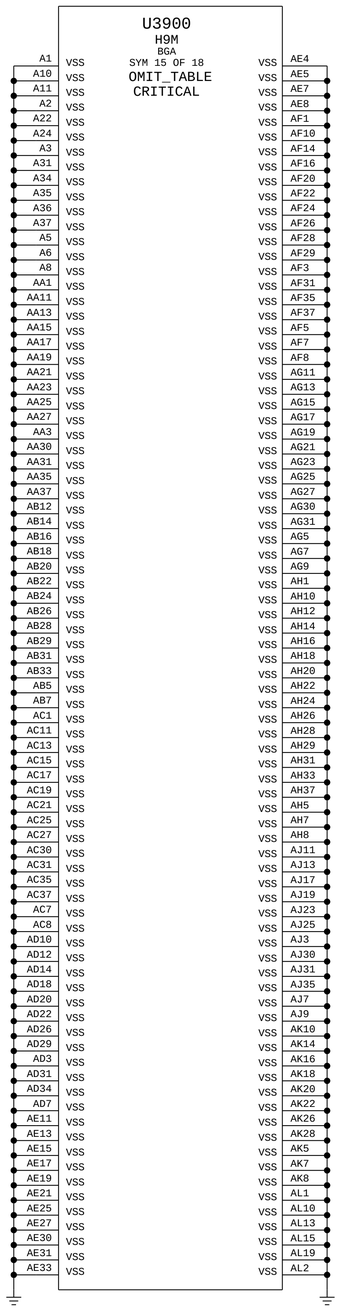

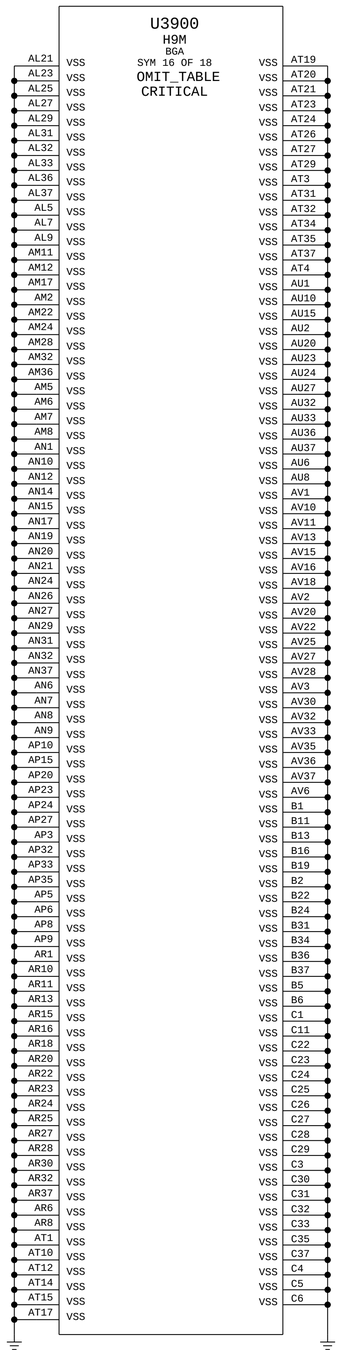

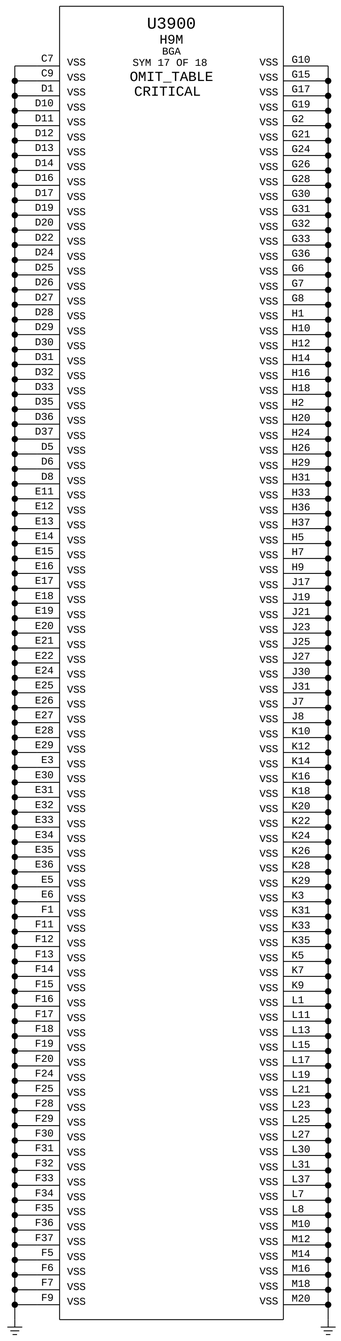

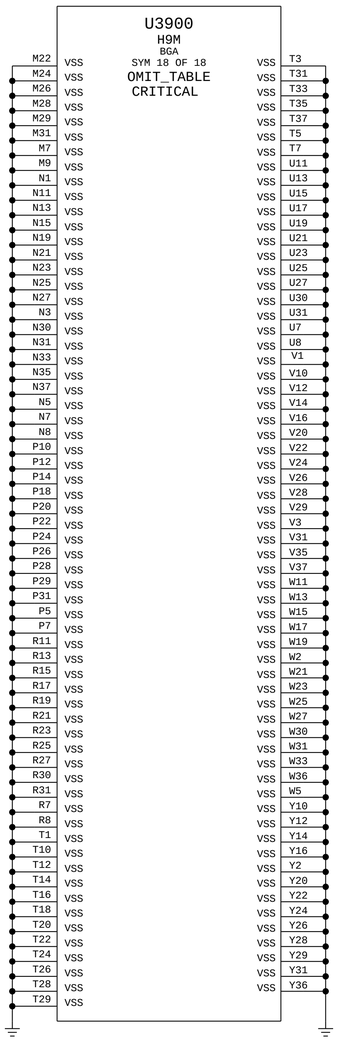

BOM_COST_GROUP=T290

SYNC_MASTER=X589_BIGSUR SYNC_DATE=02/13/2017

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SoC Ground

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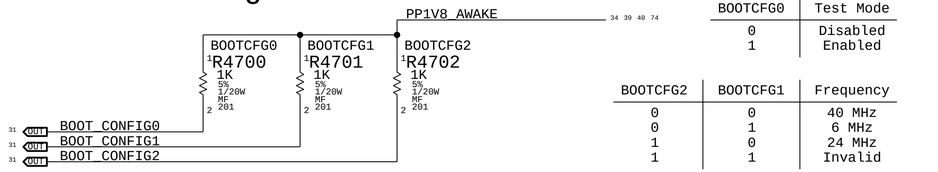
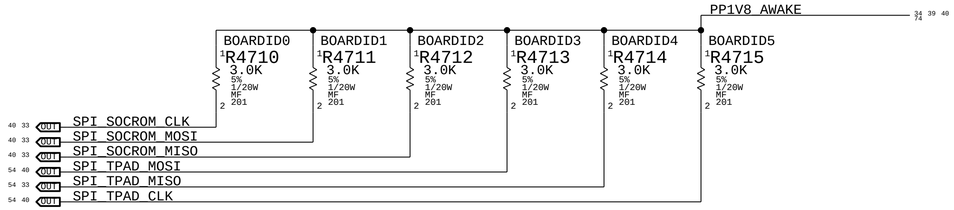
Boot Config



BOOTCFG0	Test Mode
0	Disabled
1	Enabled

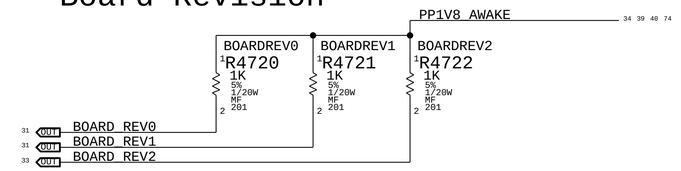
BOOTCFG2	BOOTCFG1	Frequency
0	0	40 MHz
0	1	6 MHz
1	0	24 MHz
1	1	Invalid

Board ID

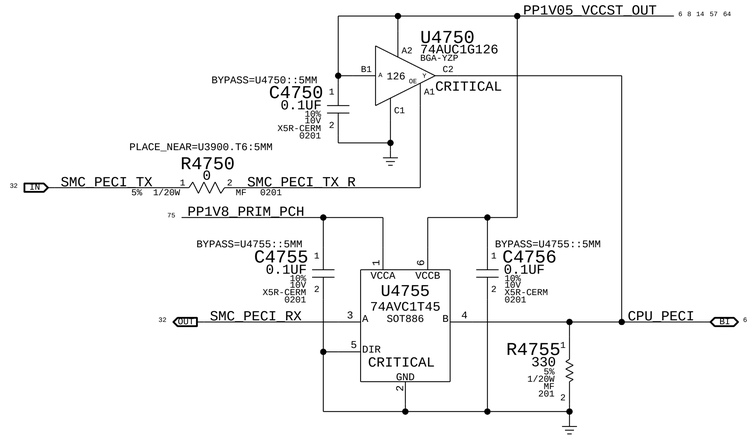


See <rdar://problem/50175583> for J230k assignments

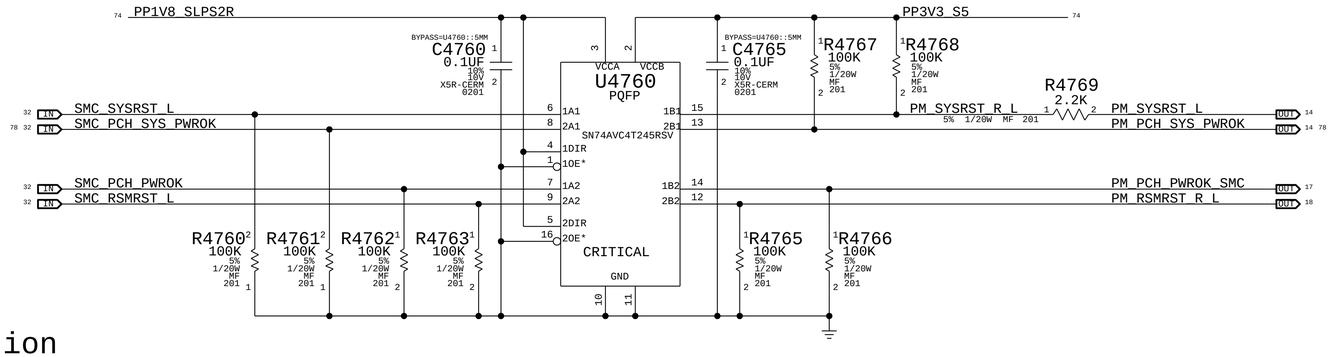
Board Revision



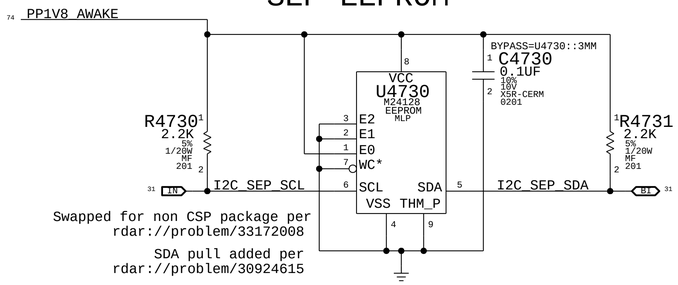
PECI Level Shifting



PCH PM Level Shifting



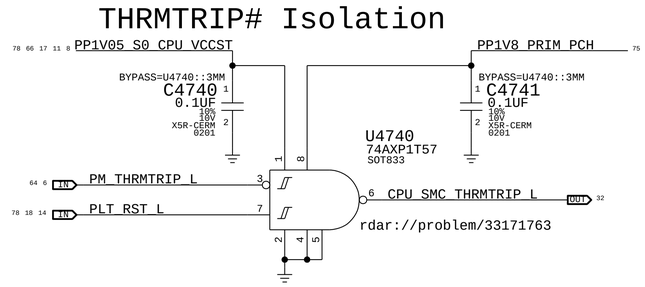
SEP EEPROM



Swapped for non CSP package per rdar://problem/33172008

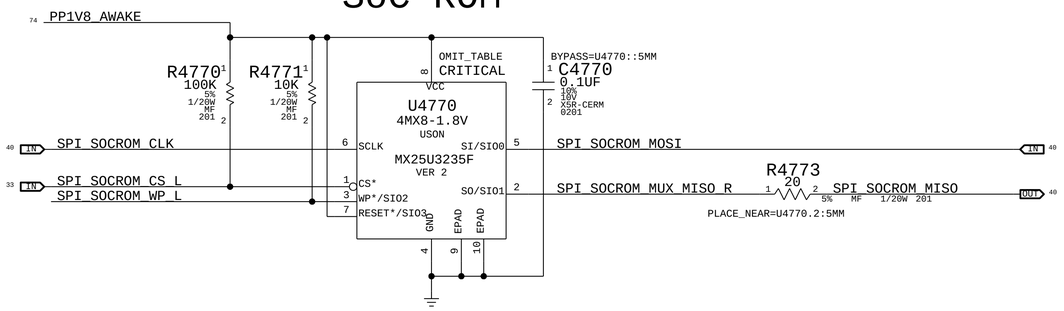
SDA pull added per rdar://problem/30924615

THRMTRIP# Isolation



rdar://problem/33171763

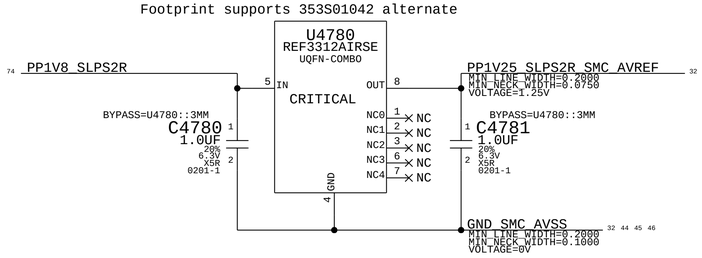
SoC ROM



PLACE_NEAR=U4770.2:5MM

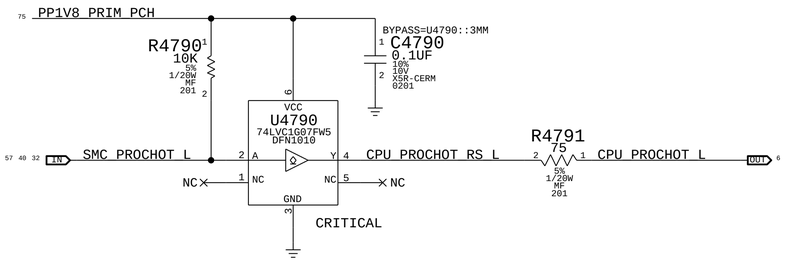
SMC AVREF Supply

Footprint supports 353S01042 alternate



PROCHOT# Level Shifting

rdar://problem/34583713



BOM_COST_GROUP=T290

SYNC_MASTER=X589_BIGSUR SYNC_DATE=03/16/2017

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Apple Inc.

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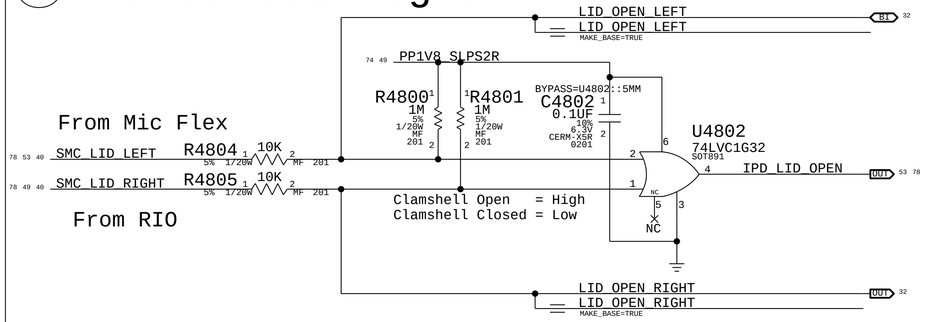
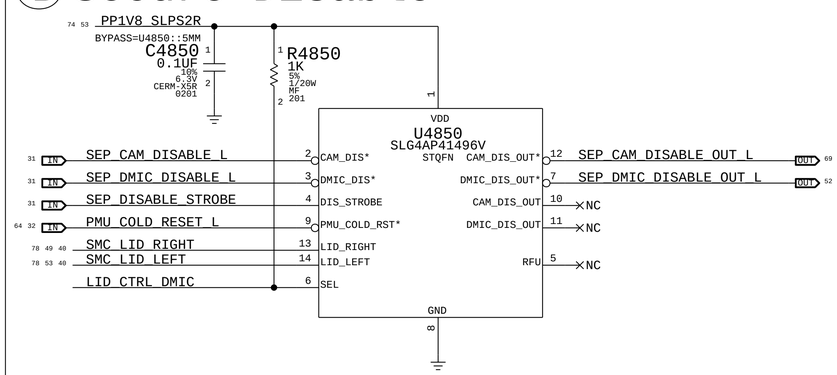
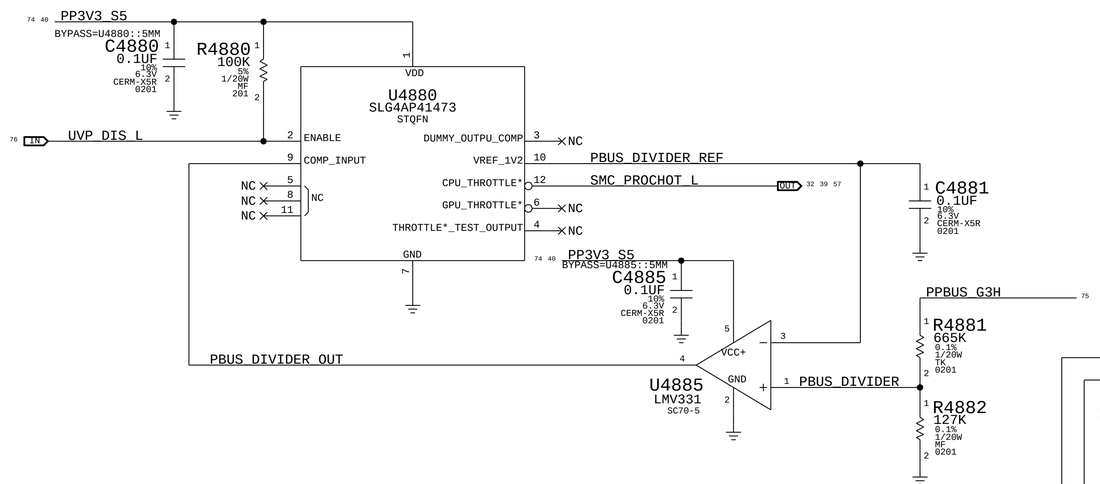
A Lid Detect Logic



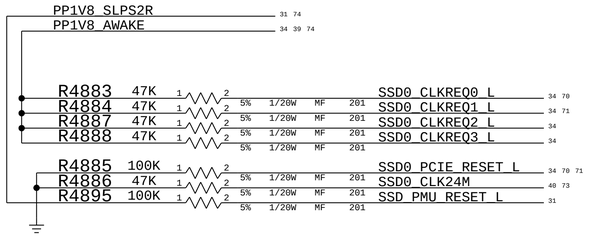
B Secure Disable



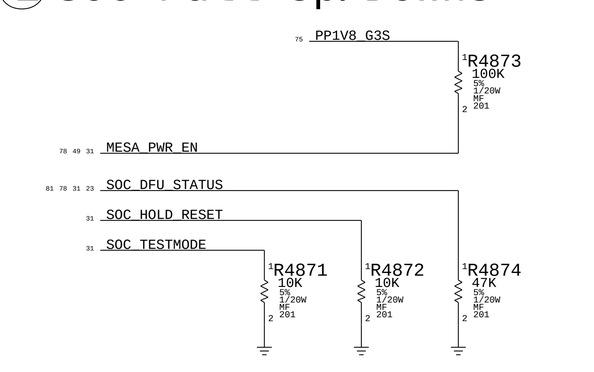
C SMC PROCHOT Control Circuit



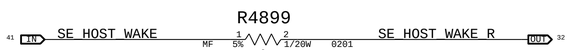
D SSD Pull-Up/Downs



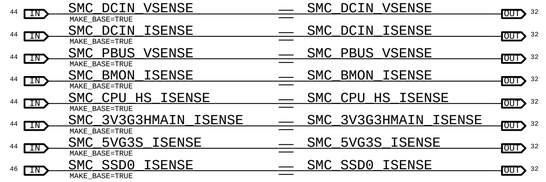
E SoC Pull-Up/Downs



F SE Host Wake

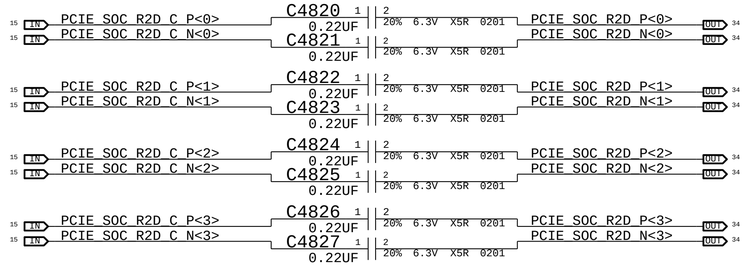


G SMC ADC Assignments

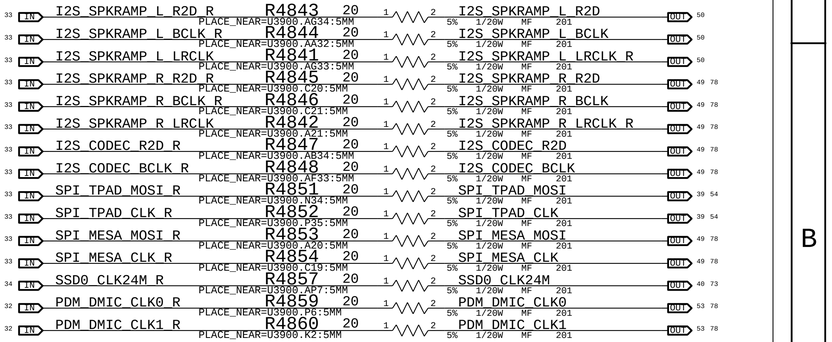


H PCIe Up R2D AC Caps

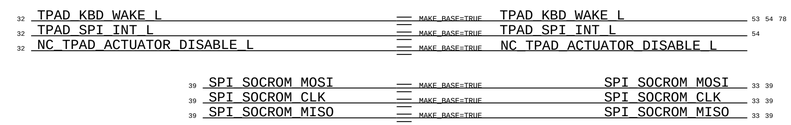
(All Caps)
GND_VOID=TRUE



I GPIO Source Termination



J Overloaded GPIOs



BOM_COST_GROUP=T290

SYNC_MASTER=X589_BIGSUR SYNC_DATE=02/13/2017

PAGE TITLE: SoC Project Support

Apple Inc.

DRAWING NUMBER: 051-05232 SIZE: D
REVISION: 2.0.0
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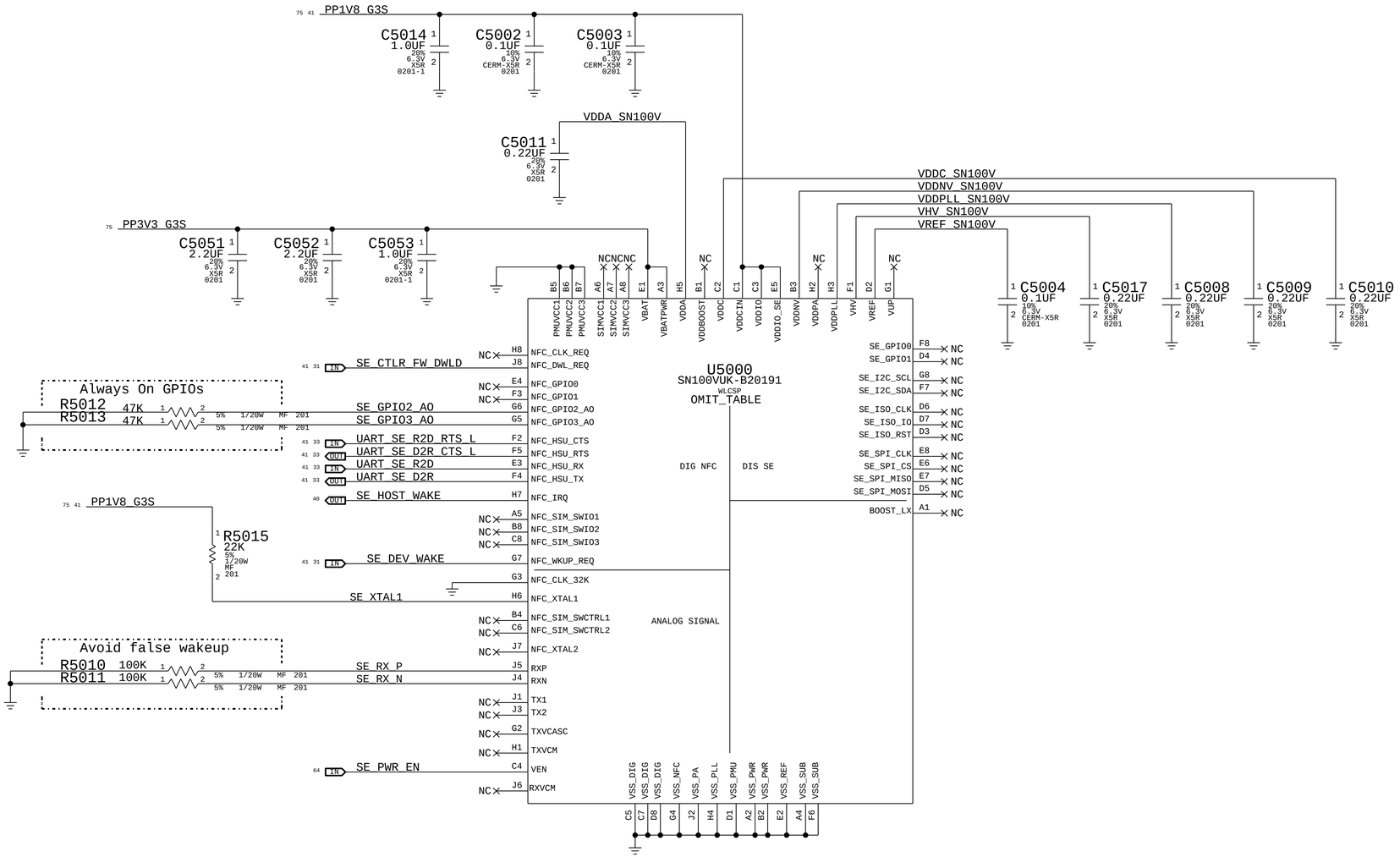
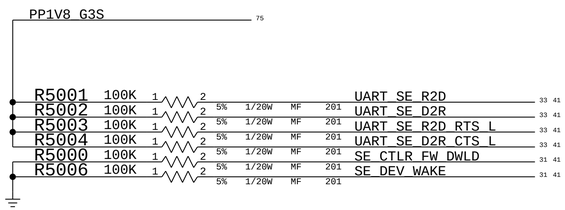
Venus - Secure Element



PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
998-15216	1	IC,SN100V,VENUS,DEV KEY,B2,S/W-M,WLCSP72	U5000	CRITICAL	SE:DEV_SW_N
338S00445	1	IC,SN100V,VENUS,PROD KEY,B2,SW-N,WLCSP72	U5000	CRITICAL	SE:PROD_SW_N



<rdar://problem/45108950> Mac - Venus Reference guide and De-coupling requirements

BOM_COST_GROUP=T151

SYNC_MASTER=X941_MLB SYNC_DATE=03/10/2017

PAGE TITLE: Secure Element

Apple Inc.

DRAWING NUMBER: 051-05232 SIZE: D

REVISION: 2.0.0

BRANCH: proto4b

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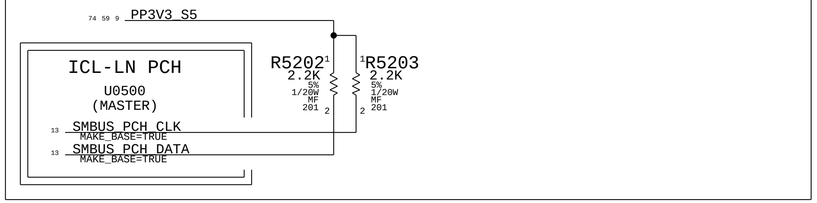
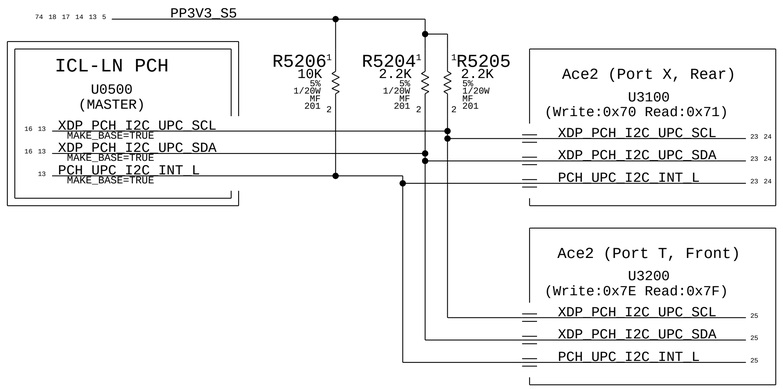
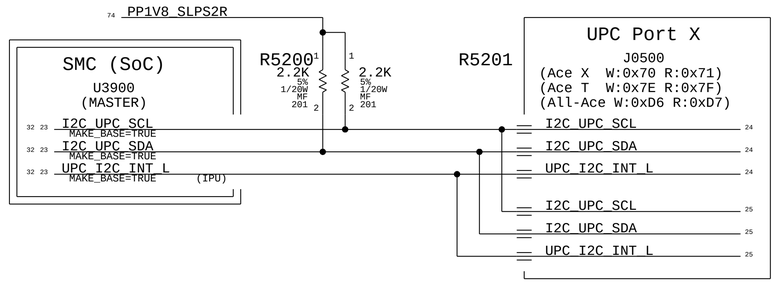
ICL-LN PCH S0 "SMBUS 0" Connections



ICL-LN PCH S0 "SMLINK 0" Connections



SMC I2C "0" G3H Connections



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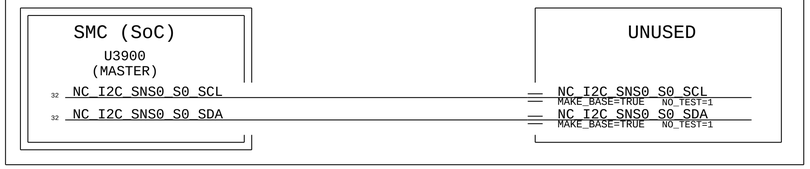
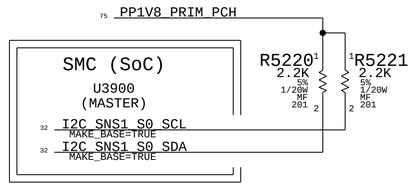


SMC I2C "2" S0 Connections



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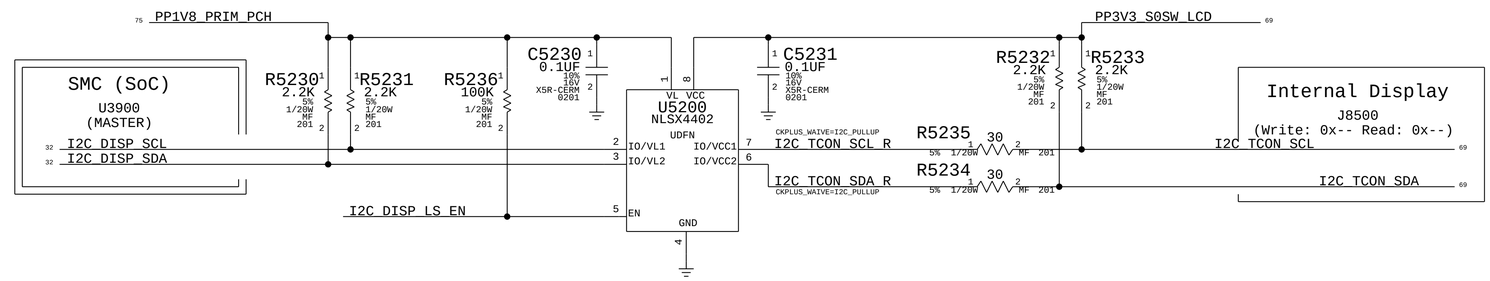
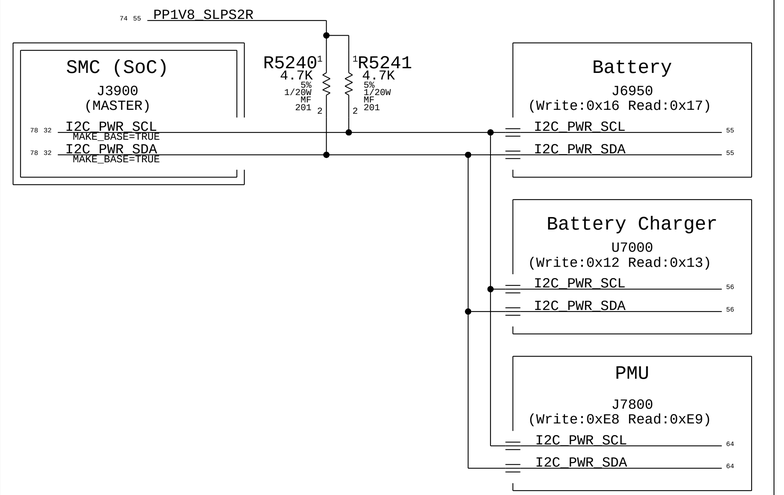
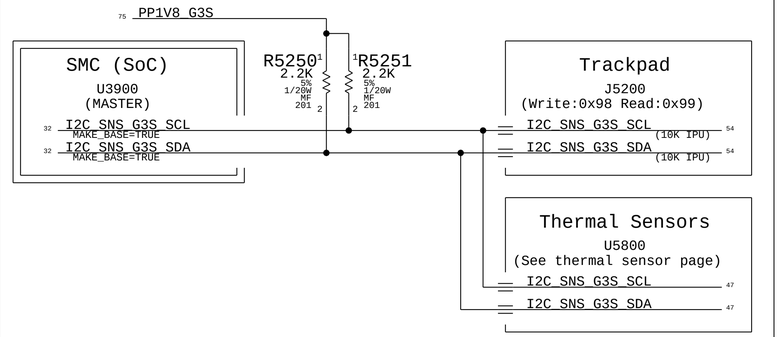


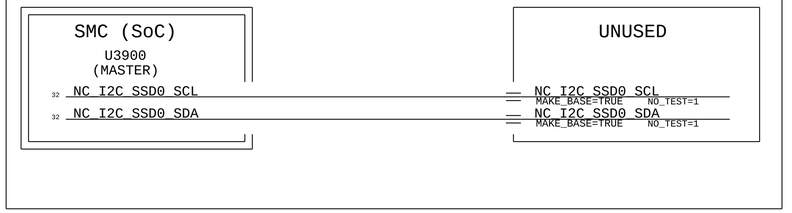
SMC I2C "4" G3H Connections



SMC I2C "5" G3S Connections



SMC I2C "6" G3H Connections



SYNC_MASTER=X589_BIGSUR SYNC_DATE=02/13/2017

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I2C Connections 1

Apple Inc.

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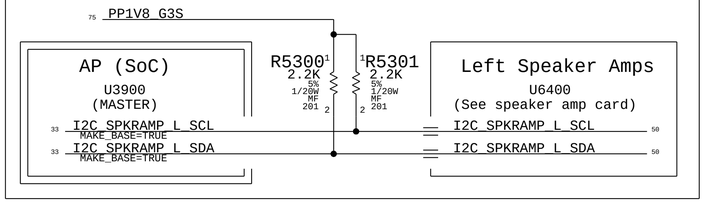
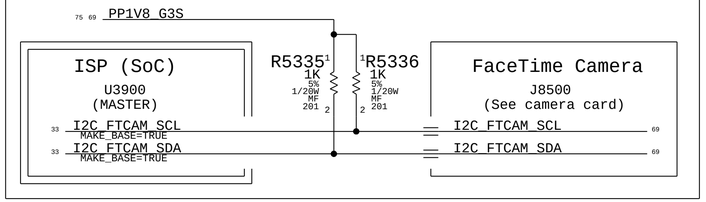
BOM_COST_GROUP=SOC

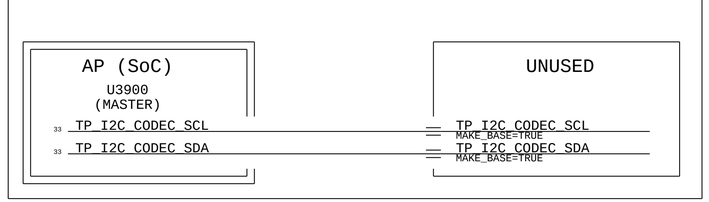
AP I2C "0" G3S Connections



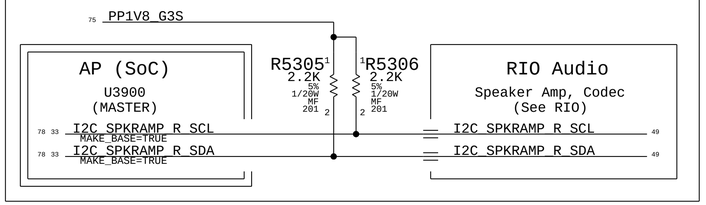
ISP I2C "0" G3S Connections



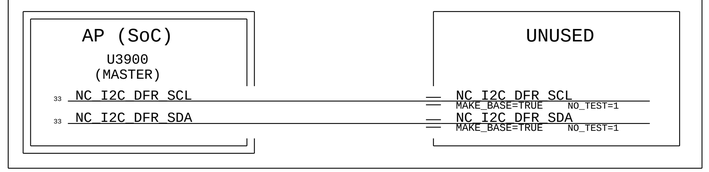
AP I2C "2" Codec Connections



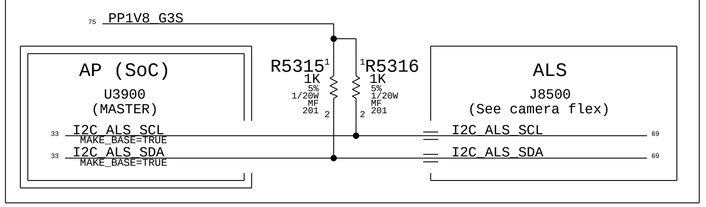
AP I2C "1" G3S Connections



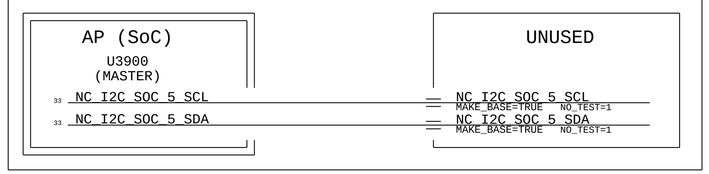
AP I2C "4" DFR Connections



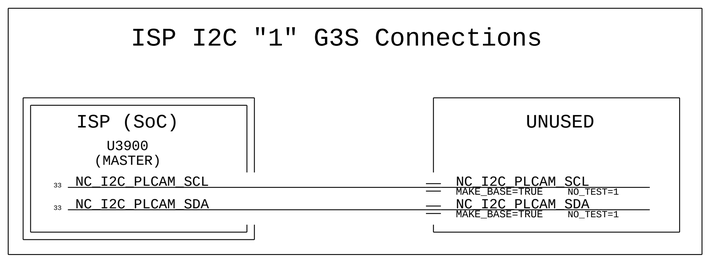
AP I2C "3" G3S Connections



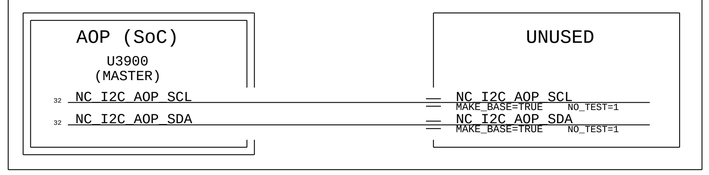
AP I2C "5" Awake Connections



ISP I2C "1" G3S Connections



AOP I2C G3H Connections



SYNC_MASTER=X589_BIGSUR SYNC_DATE=02/13/2017

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I2C Connections 2

Apple Inc.

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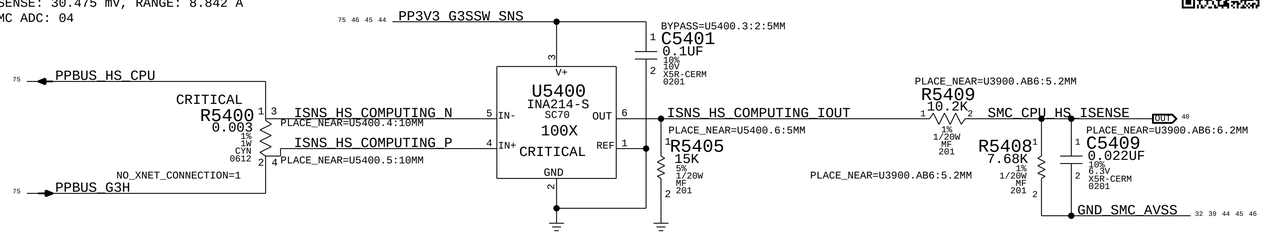
BOM_COST_GROUP=SOC

A CPU High Side Current Sense (IC0R)

GAIN: 100X, EDP: 10.16 A
Rsense: 0.003 (R5400)
VSENSE: 30.475 mV, RANGE: 8.842 A
SMC ADC: 04

LTSpice Simulation

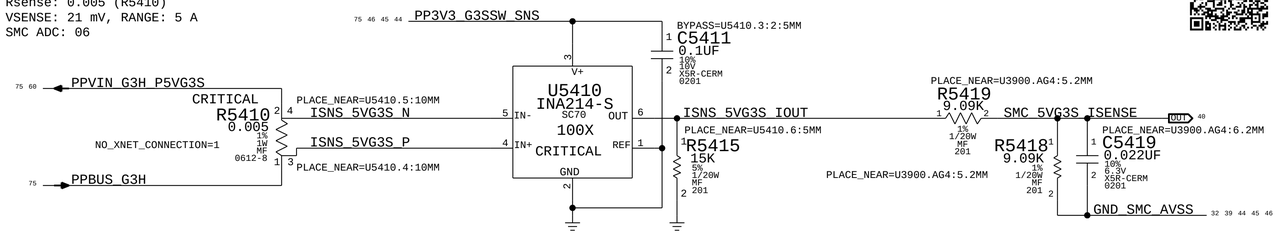


$J230GHUB/j230/mlb/sim/ltspice/ic0r_smc_cpu_hs_isense.asc

B 5V G3S High Side Current Sense (IO5R)

GAIN: 100X, EDP: 4.2 A
Rsense: 0.005 (R5410)
VSENSE: 21 mV, RANGE: 5 A
SMC ADC: 06

LTSpice Simulation

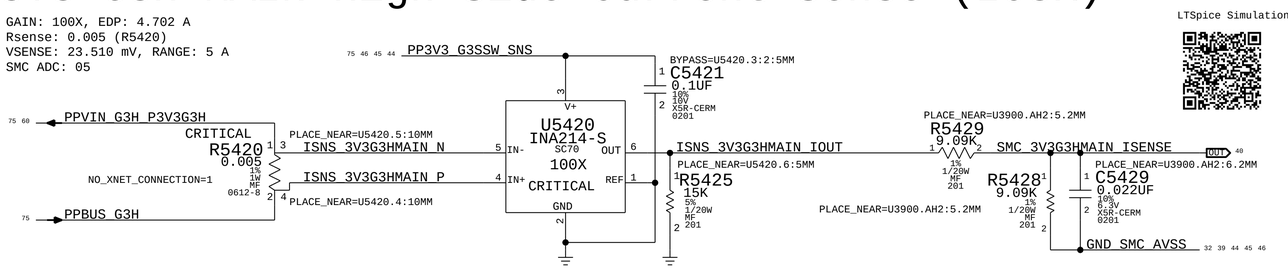


$J230GHUB/j230/mlb/sim/ltspice/io5r_smc_5vg3s_isense.asc

C 3V3 G3H MAIN High Side Current Sense (IO3R)

GAIN: 100X, EDP: 4.702 A
Rsense: 0.005 (R5420)
VSENSE: 23.510 mV, RANGE: 5 A
SMC ADC: 05

LTSpice Simulation



$J230GHUB/j230/mlb/sim/ltspice/io3r_smc_3v3g3hmain_isense.asc

D Sensor Documentation

Sensor information can be found in the ERS at the link below or by scanning the QR Code image.

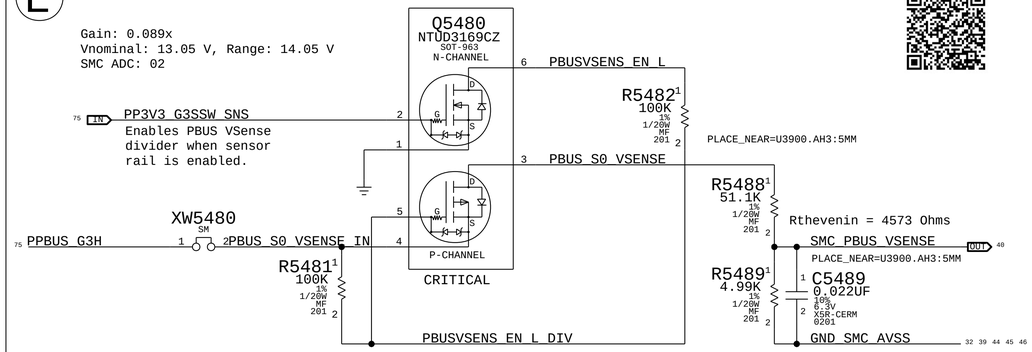
https://github.pie.apple.com/MobileMacIX/j230_hw/blob/master/j230/mlb/docs/sensor_ers/j230_sensor_ers.pdf

INA21X PARTS HAVE MINOR LEAKAGE PATH FROM INPUTS TO OUTPUT WHEN UNPOWERED. PULL-DOWN RESISTERS ON INA OUTPUTS BLEED OFF THE LEAKAGE CURRENT TO PREVENT SIGNAL PUMP-UP.

E PBUS Voltage Sense & Enable (VP0R)

Gain: 0.089x
Vnominal: 13.05 V, Range: 14.05 V
SMC ADC: 02

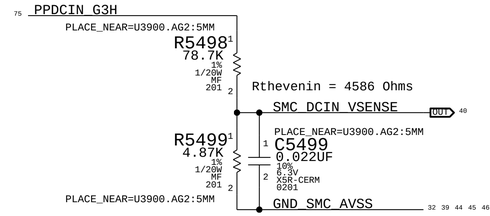
LTSpice Simulation



$J230GHUB/j230/mlb/sim/ltspice/vp0r_smc_pbus_vsense.asc

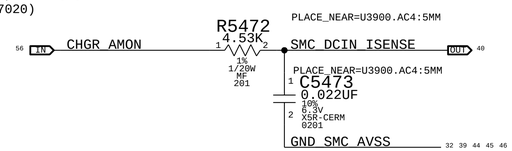
F DC In Voltage Sense (VD0R)

Gain: 0.148x
Vnominal: 16.5 V, Range: 22.29 V
SMC ADC: 00



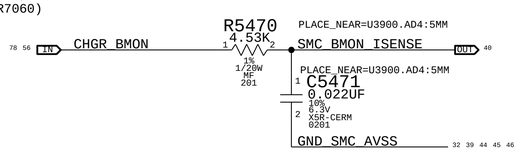
G DC-IN (AMON) Current Sense (ID0R)

Charger Gain: 20x, EDP: 3.0 A
RSENSE: 0.010 (R7020)
SMC ADC: 01



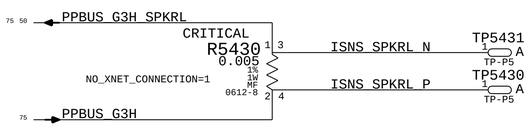
H Charger (BMON) Current Sense (IPBR)

Charger Gain: 7.9x, EDP: 6.5 A
RSENSE: 0.005 (R7060)
SMC ADC: 03



I Speaker Amp Sense (Ixxx)

RSENSE: 0.005
EDP: x A
SMC ADC: 03



BOM_COST_GROUP=SENSORS

DESIGN: J230/MLB
LAST CHANGE: Fri Sep 28 20:05:04 2018
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Power Sensors High Side

Apple Inc.

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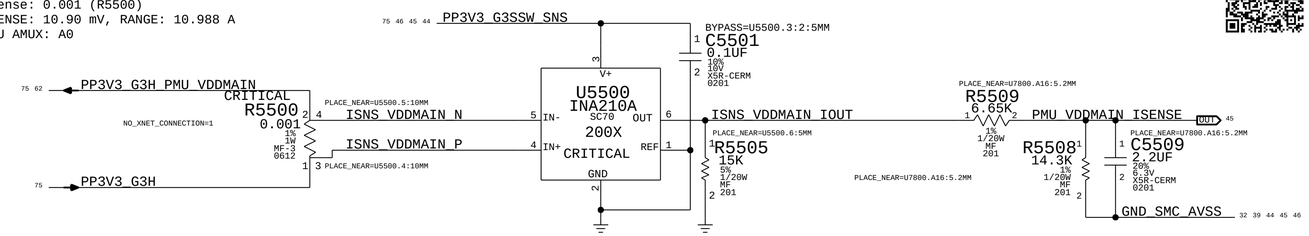
A VDDMAIN 3.3V Current Sense (ISLC)

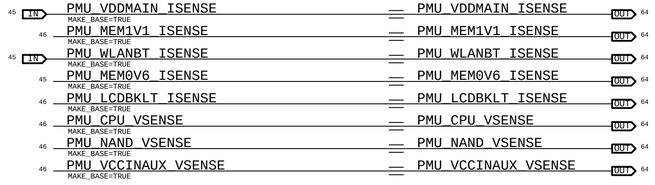
GAIN: 200X, EDP: 10.90 A
Rsense: 0.001 (R5500)
VSENSE: 10.90 mV, RANGE: 10.988 A
PMU AMUX: A0

LTSpice Simulation



$J230GHUB/j230/mlb/sim/ltspice/islc_pmu_vddmain_isense.asc

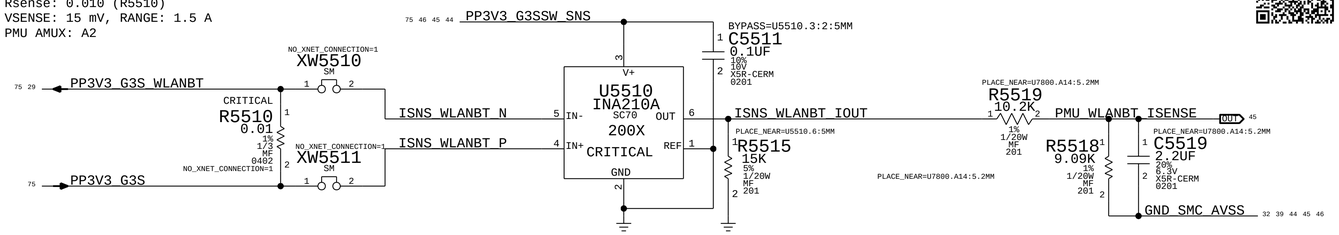
B PMU ADC AMUX_A ALIASES



C Wireless 3.3V Current Sense (IAPC)

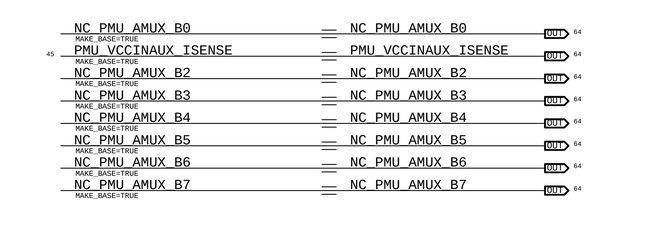
GAIN: 200X, EDP: 1.5 A
Rsense: 0.010 (R5510)
VSENSE: 15 mV, RANGE: 1.5 A
PMU AMUX: A2

LTSpice Simulation



$J230GHUB/j230/mlb/sim/ltspice/iapc_pmu_wlanbt_isense.asc

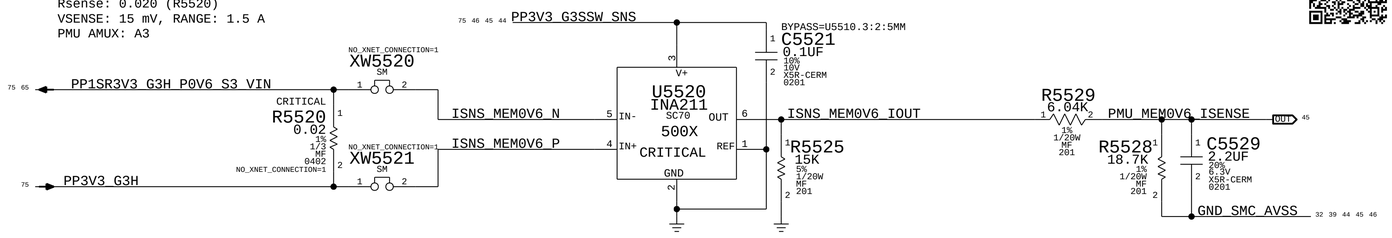
D PMU ADC AMUX_B ALIASES



E MEMORY 0.6V High-Side Current Sense (IM0C)

GAIN: 200X, EDP: 1.5 A
Rsense: 0.020 (R5520)
VSENSE: 15 mV, RANGE: 1.5 A
PMU AMUX: A3

LTSpice Simulation



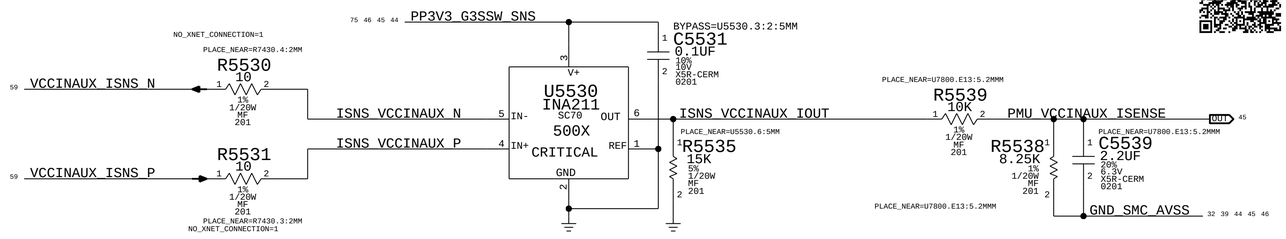
$J230GHUB/j230/mlb/sim/ltspice/im0c_pmu_mem0v6_isense.asc

F Sensor Documentation

Sensor information can be found in the ERS by scanning the QR Code image.

G VCCIN_AUX Current Sense (ICIC)

LTSpice Simulation



BOM_COST_GROUP=SENSORS

DESIGN: J230/MLB
LAST CHANGE: Fri Sep 28 20:05:04 2018
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Power Sensors Load Side

Apple Inc.

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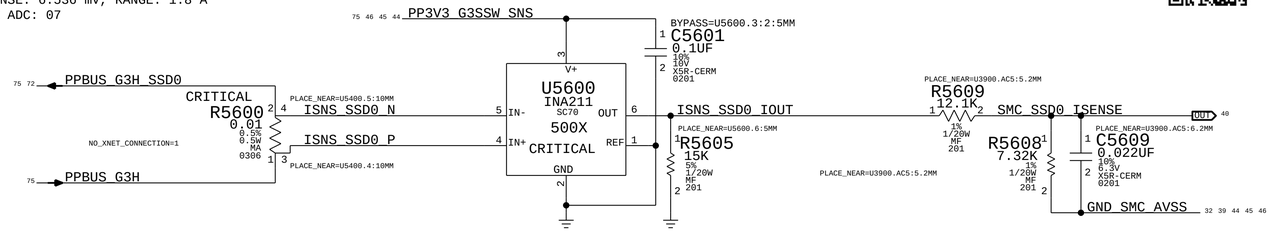
A SSD High Side (IH0R)

GAIN: 500X, EDP: 0.654 A
Rsense: 0.010 (R5600)
VSENSE: 6.536 mV, RANGE: 1.8 A
SMC ADC: 07

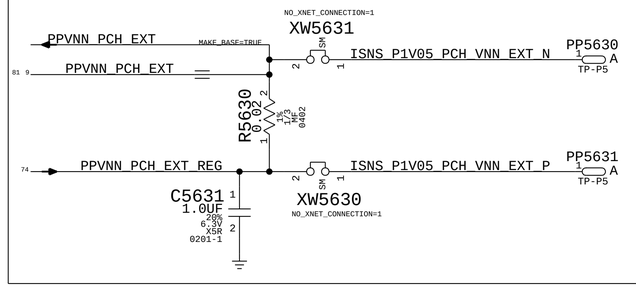
LTSpice Simulation



$J230GHUB/j230/mlb/sim/ltspice/ih0r_smc_ssd0_isense.asc

B PCH VNN BYPASS CURRENT SENSE

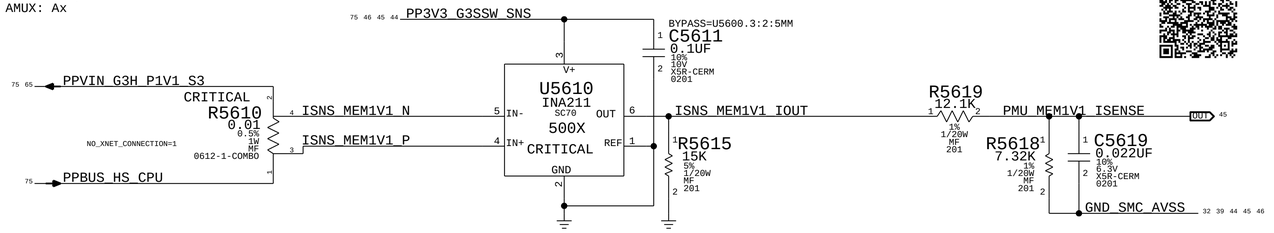
GAIN: 200X, EDP: 0.2 A



C Memory 1.1V High Side Current Sense (IM1C)

GAIN: x, EDP: 2.3 A
Rsense: 0.010 (R5610)
VSENSE: 23 mV, RANGE: 2.344 A
PMU AMUX: Ax

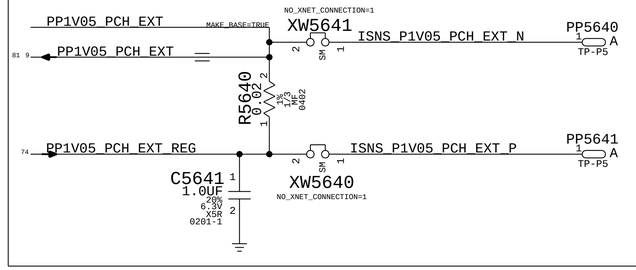
LTSpice Simulation



$J230GHUB/j230/mlb/sim/ltspice/im1c_pmu_mem1v1_isense.asc

D PCH 1.05V BYPASS CURRENT SENSE

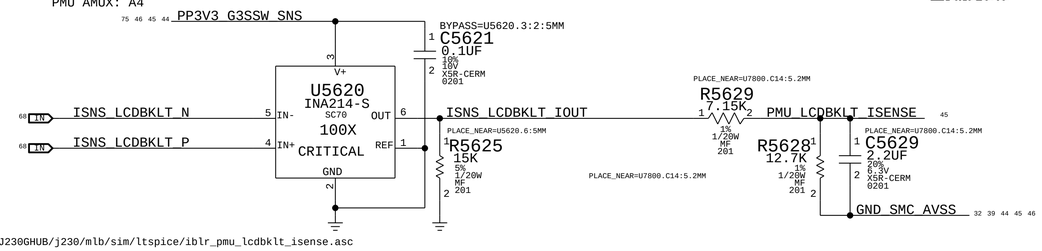
GAIN: 200X, EDP: 0.2 A



E LCD Backlight (IBLR)

GAIN: 100X, EDP: 0.902 A
Rsense: 0.025 (R8400)
VSENSE: 22.549 mV, RANGE: 0.902 A
PMU AMUX: A4

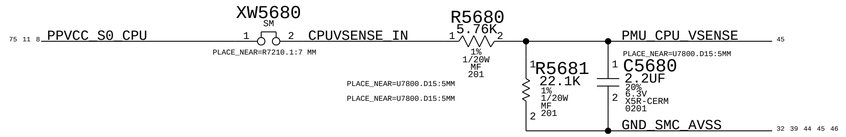
LTSpice Simulation



$J230GHUB/j230/mlb/sim/ltspice/iblr_pmu_lcdbklt_isense.asc

F CPU VCCIN VOLTAGE SENSE (VCAC)

PMU AMUX: A5

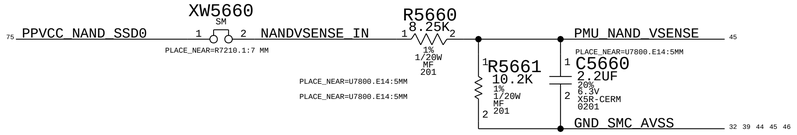


G Sensor Docs

Scan the QR Code
for sensor info.

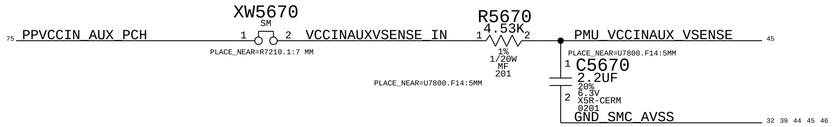
H NAND 2V5 VOLTAGE SENSE (VHNC)

PMU AMUX: A6



I VCCIN_AUX VOLTAGE SENSE (VCIC)

PMU AMUX: A7



BOM_COST_GROUP=SENSORS

DESIGN: J230/MLB
LAST CHANGE: Fri Sep 28 20:05:04 2018

PAGE TITLE
Power Sensors Extended

Apple Inc.

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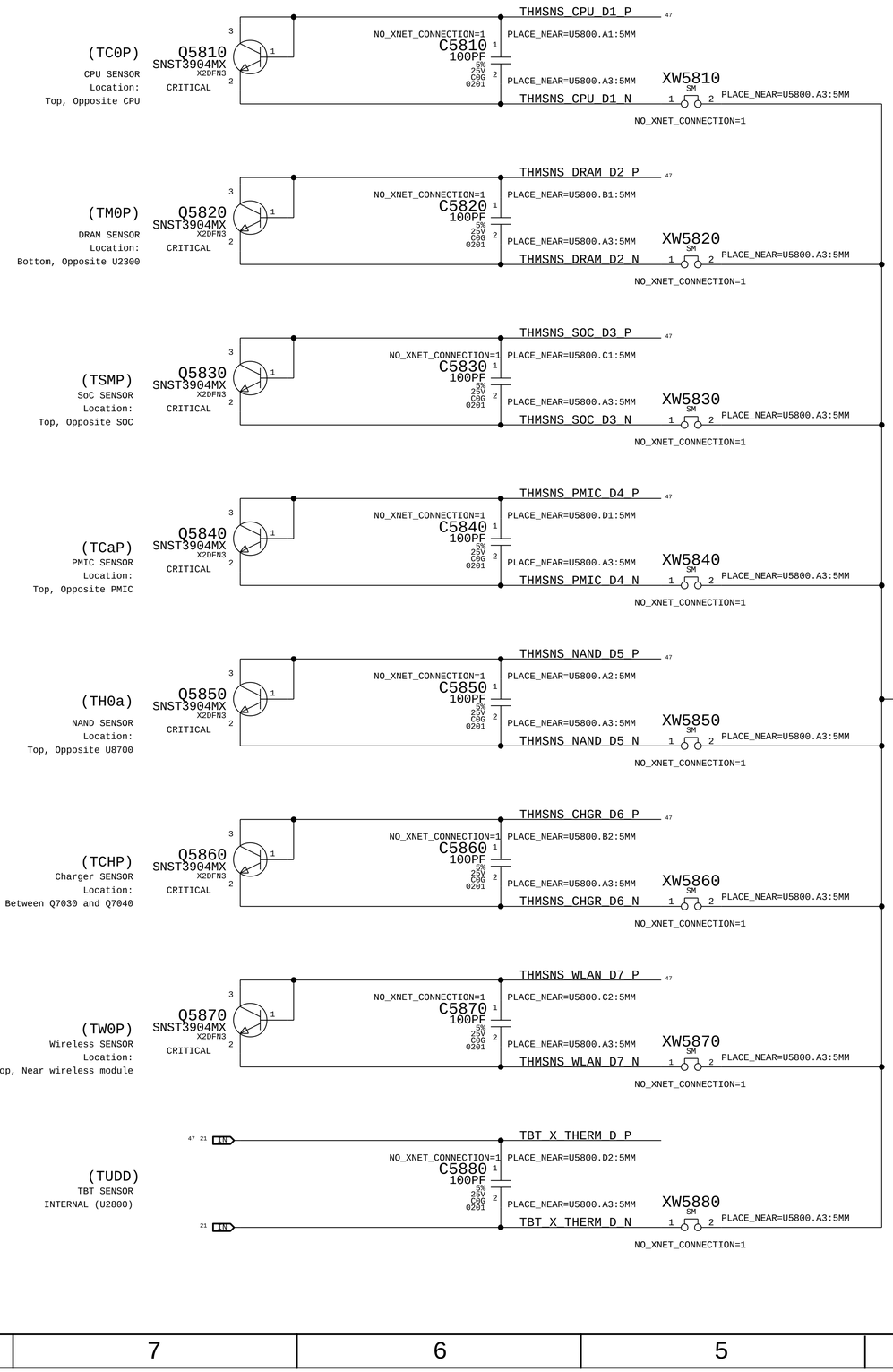

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DESIGN: J230/MLB

LAST CHANGE: Fri Sep 28 20:05:04 2018

PAGE TITLE

Thermal Sensors

Apple Inc.

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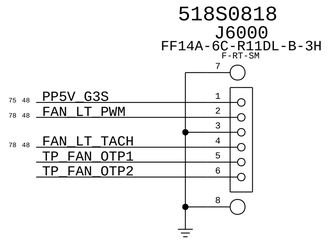
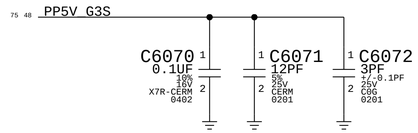
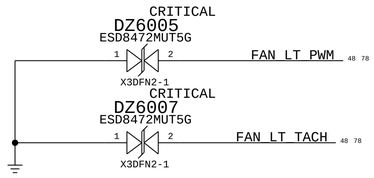
A FAN Connector



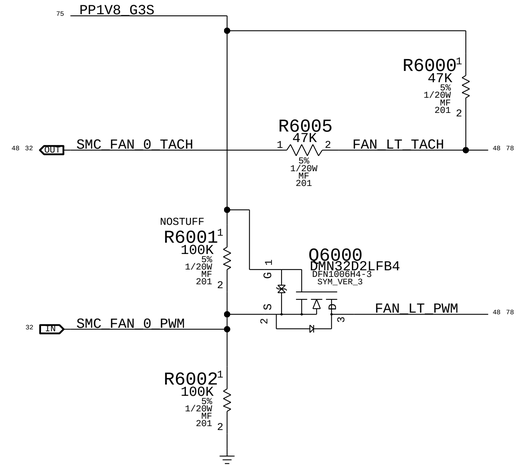
B FAN Bypass Capacitors



C FAN Protection Diodes

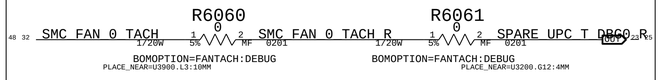


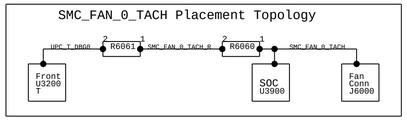
D FAN Support



E FAN Debug

<rdar://problem/47292431> J230 MLB route Fan TACH signals to ACE





BOM_COST_GROUP=FAN

SYNC_MASTER=X1032_MLB_P4BP SYNC_DATE=02/13/2017

PAGE TITLE: Fans

Apple Inc.

DRAWING NUMBER: 051-05232 SIZE: D
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A RIO Flex Connector

On RIO Board:
AMR
CODEC
MESA
SPKR AMP

J6100
502250-8045
F-RT-SM

49	PP3V3_G3S_G3H_RIO	7	8	PP3V3_G3S_G3H_RIO	49
75 52 50	PP1V8_G3S	9	10	CODEC_RESET_L	32 78
78 52 49 31	CODEC_INT_L	11	12	CODEC_WAKE_L	32 49 52 78
78 52 33	SPKR_ID1	13	14	I2C_SPKRAMP_R_SDA	43
43	I2C_SPKRAMP_R_SCL	15	16	I2S_CODEC_D2R	33 78
78 40	I2S_CODEC_BCLK	17	18	AUD_PWR_EN	64 78
78 40	I2S_CODEC_R2D	19	20	I2S_CODEC_LRCLK	33 78
78 33	SPI_MESA_MISO	21	22	MESA_INT	31 49 78
78 49	PMU_ONOFF_R_L_CONN	23	24	SPI_MESA_MOSI	40 78
78 40	SPI_MESA_CLK	25	26	MESA_PWR_EN	31 40 78
78 40	SMC_LID_RIGHT	27	28	I2S_SPKRAMP_L_D2R	33 50 78
78 40	I2S_SPKRAMP_R_BCLK	29	30	I2S_SPKRAMP_R_R2D	40 78
78 40	I2S_SPKRAMP_R_LRCLK_R	31	32	SPKRAMP_INT_L	31 49 50 78
78 50 49 31	SPKRAMP_RESET_L	33	34	NC	
75 49	PPBUS_G3H	35	36	PPBUS_G3H	49 75
75 49	PPBUS_G3H	37	38	PPBUS_G3H	49 75
75 49	PPBUS_G3H	39	40		
		41	42		
		43	44		
		45			
		47			
		49			

518S00155

Mates with 998-11285
on X1032 RIO Flex J0200

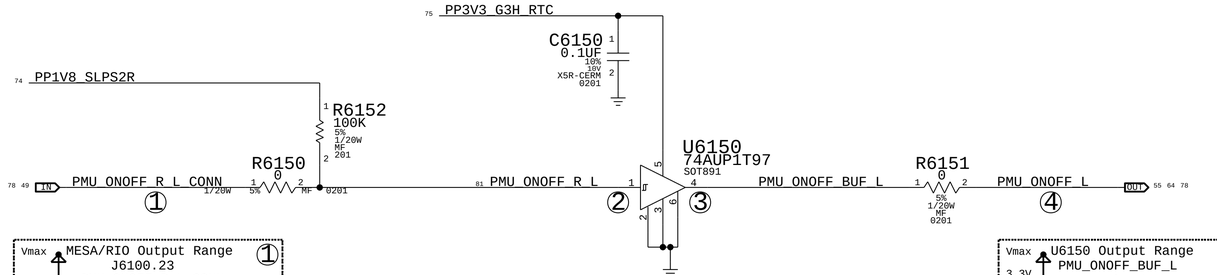
B RIO P3V3_G3H Connection

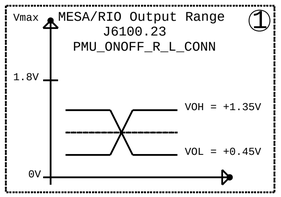
75 PP3V3_G3H — R6101 0 1/20W 5% MF 0201 — PP3V3_G3S_G3H_RIO 49
VOLTAGE=3.3V

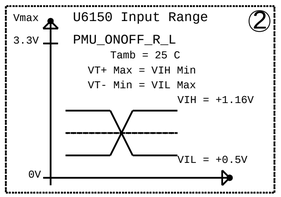
C RIO Control Signals

MESA_INT	C6100 100PF 5% 25V C0G 0201	31 49 78
CODEC_INT_L	C6101 100PF 5% 25V C0G 0201	31 49 52 78
CODEC_WAKE_L	C6102 100PF 5% 25V C0G 0201	32 49 52 78
SPKRAMP_INT_L	C6103 100PF 5% 25V C0G 0201	31 49 50 78
SPKRAMP_RESET_L	C6104 100PF 5% 25V C0G 0201	31 49 50 78

D PMU_ONOFF_L Level Shifter

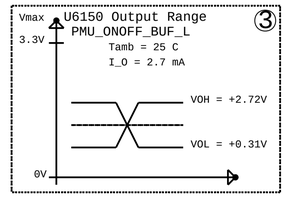


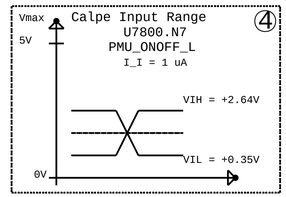




LTSpice Simulation

$J230GHUB/j230/mlb/sim/ltspice/pmu_onoff_level_shifter.asc





BOM_COST_GROUP=AUDIO

PAGE TITLE
RIO Connector

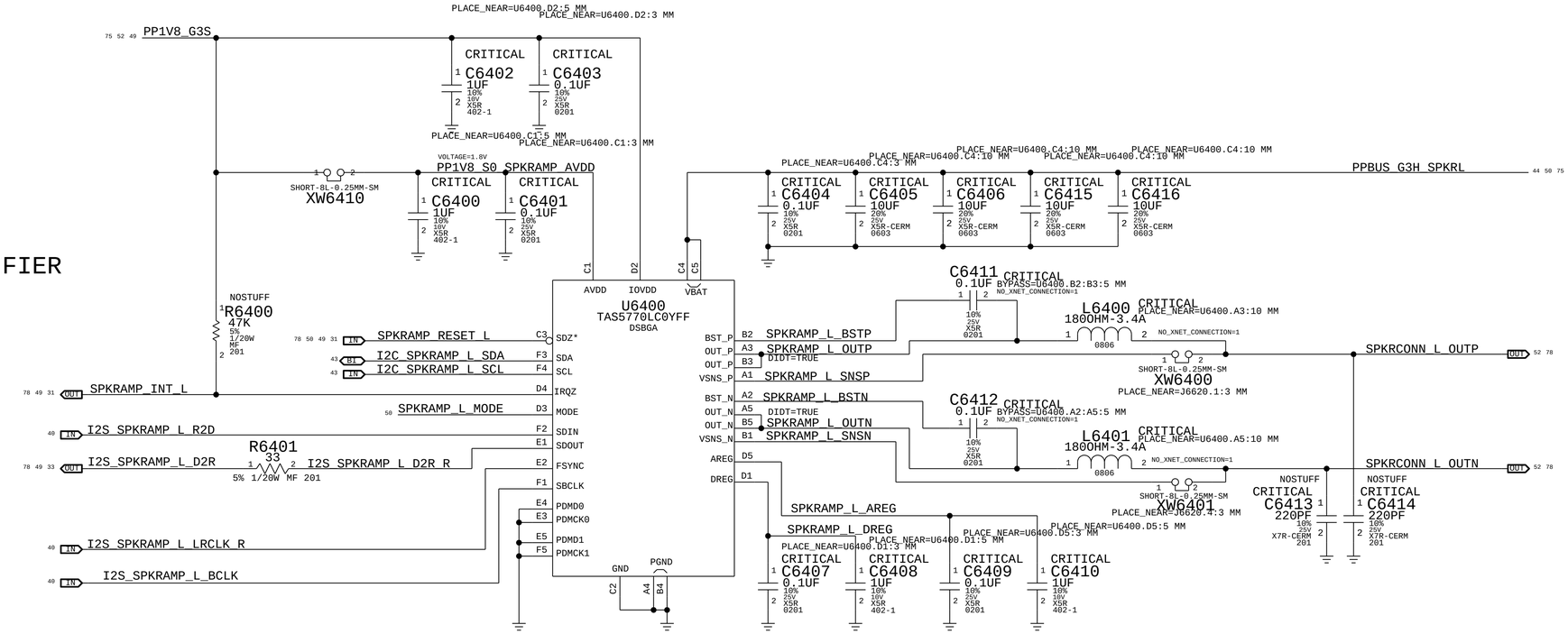
Apple Inc.

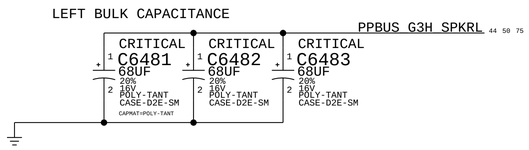
DRAWING NUMBER 051-05232
SIZE D
REVISION 2.0.0
BRANCH proto4b
PAGE 61 OF 152
SHEET 49 OF 86

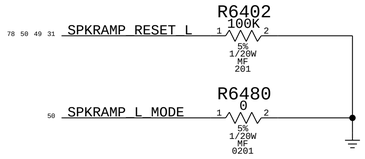
1X MONO SPEAKER AMPLIFIER

APN: 353S01629
GAIN: 0DBFS = 6.31 VRMS

LEFT AMPLIFIER







MODE PIN	I2C ADDR	CHANNEL
GND	0x31	LEFT
470 to GND	0x32	
470 to IOVDD	0x33	
2k2 to GND	0x34	
2k2 to IOVDD	0x35	
10k to GND	0x36	
10k to IOVDD	0x37	
47k to IOVDD	0x38	RIGHT

BOM_COST_GROUP=AUDIO

DESIGN: J230/MLB
LAST CHANGE: Fri Sep 28 20:05:04 2018

PAGE TITLE
Audio Speaker Amplifiers

Apple Inc.

DRAWING NUMBER 051-05232
SIZE D
REVISION 2.0.0
BRANCH proto4b
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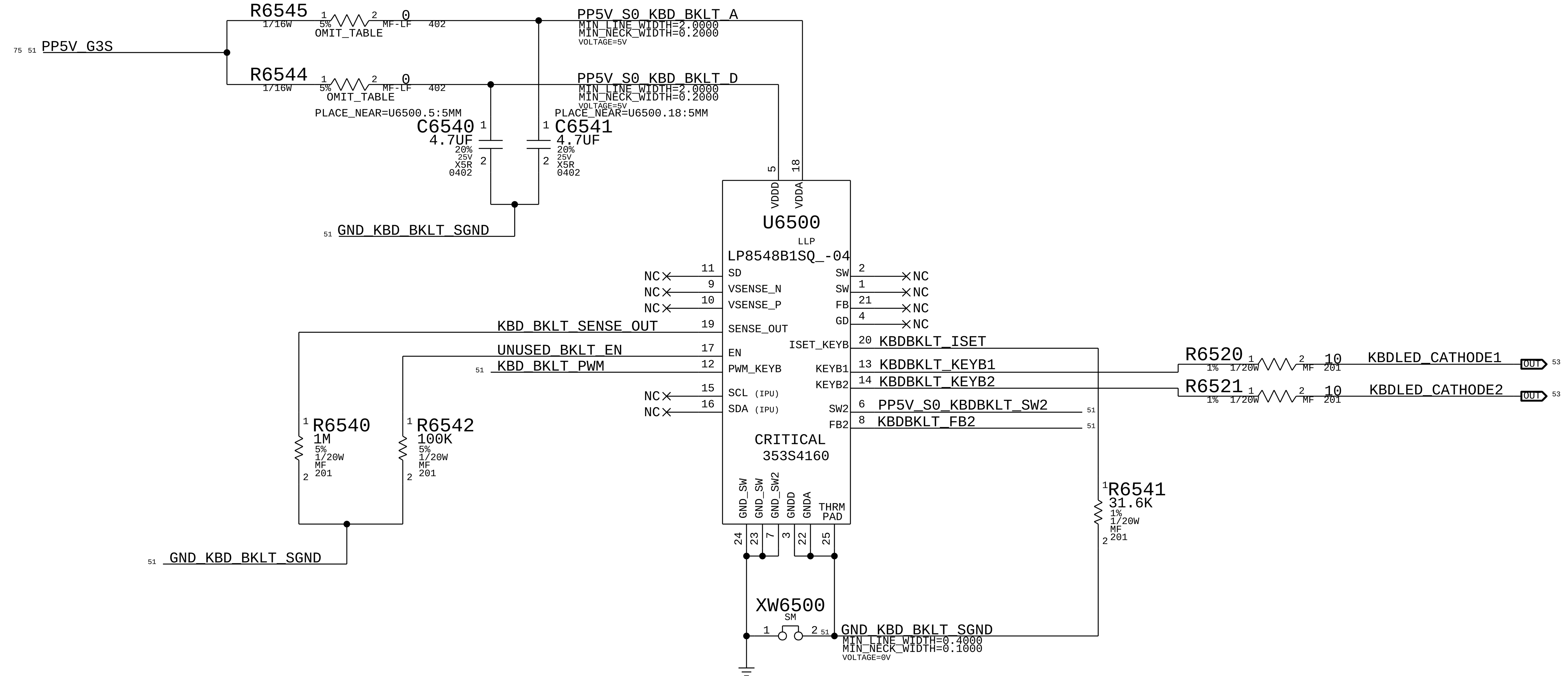
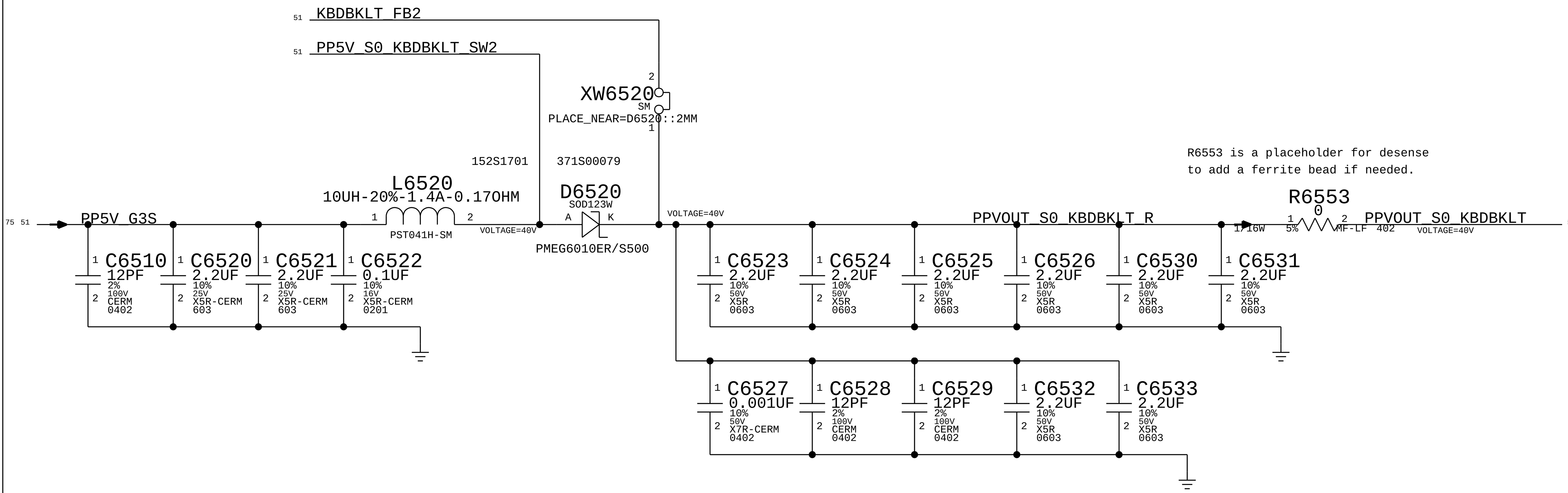
(A) Keyboard Backlight LED Driver

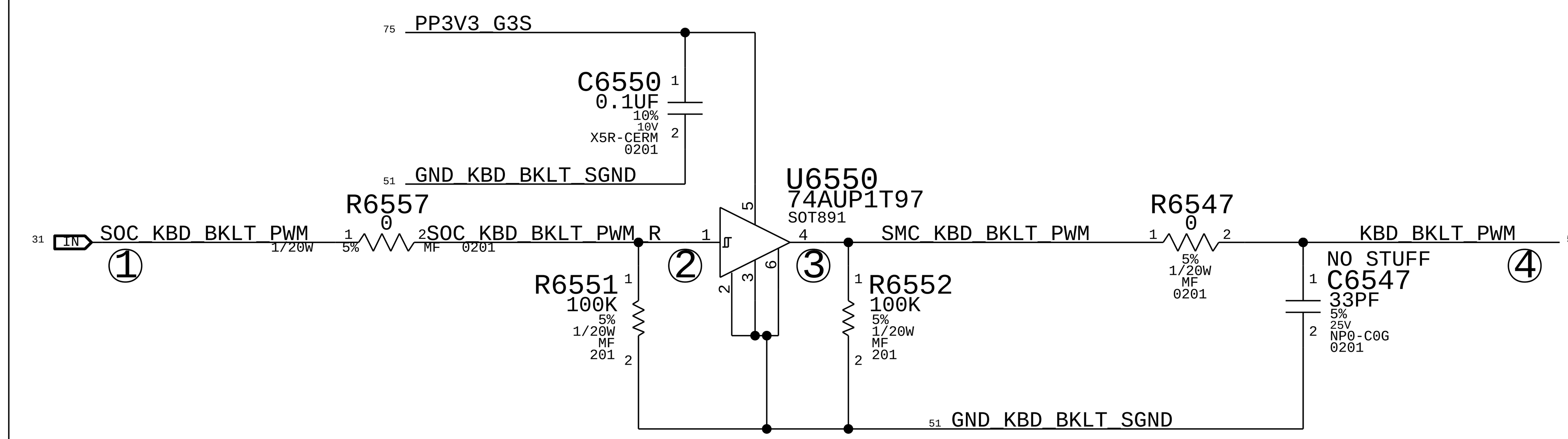
PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	BOM OPTION
114S0023	2	RES,MTL FLM,1/16W,10 OHM,1,0402,SMD,LF	R6544, R6545	

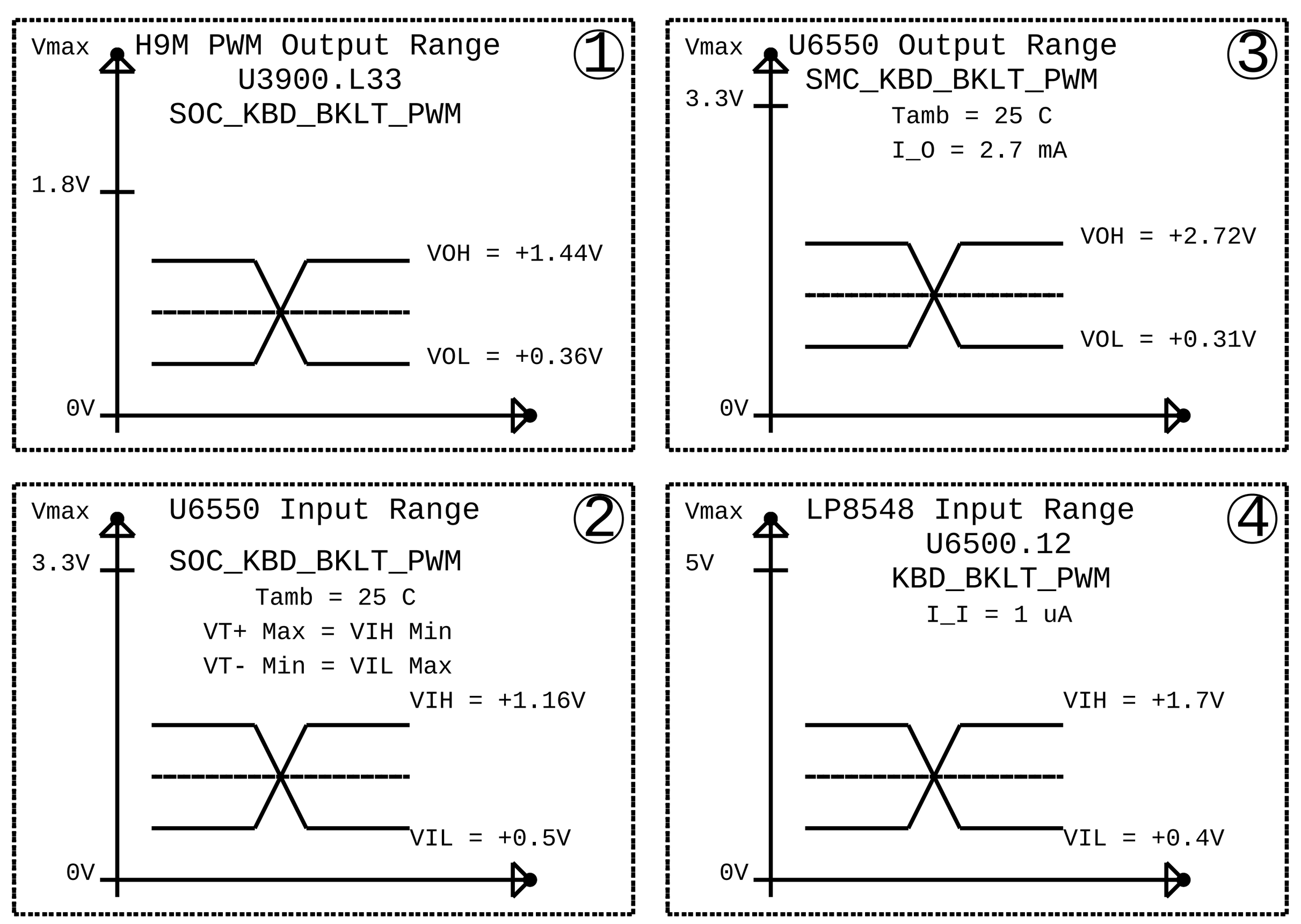


(B) Keyboard Boost Converter Support



(C) Keyboard PWM Level Shifter

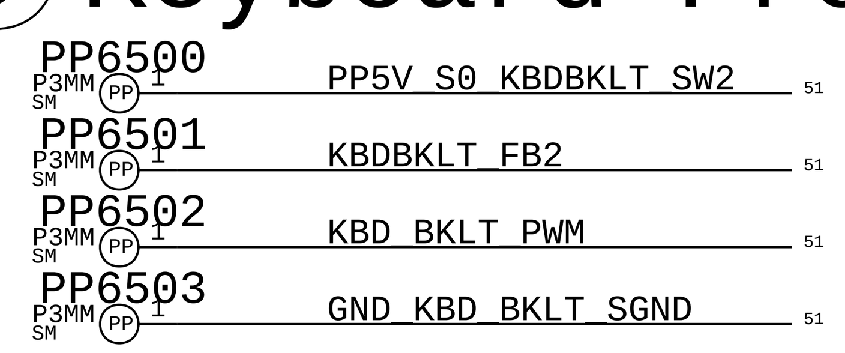




LTSpice Simulation

$J230GHUB/j230/mlb/sim/ltspice/keyboard_pwm_level_shifter.asc

(D) Keyboard Probe Points



BOM_COST_GROUP=DISPLAY

PAGE TITLE: Keyboard Backlight

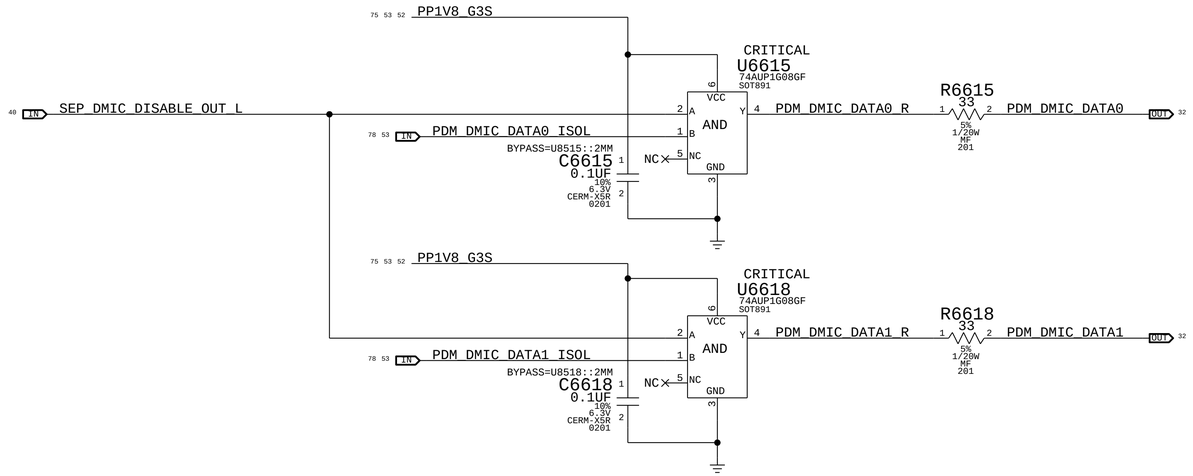
Apple Inc.

DRAWING NUMBER: 051-05232 | SIZE: D

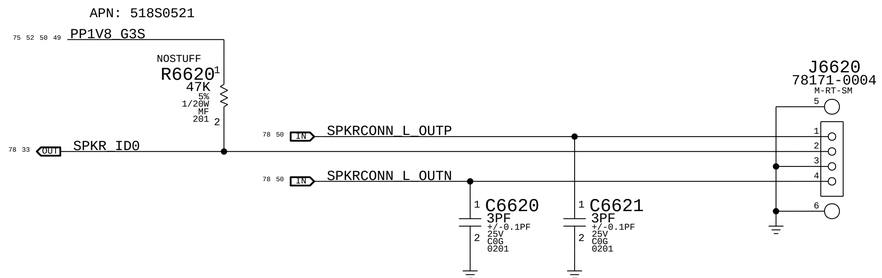
REVISION: 2.0.0

BRANCH: proto4b

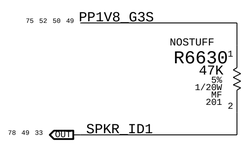
A DMIC Secure Disable



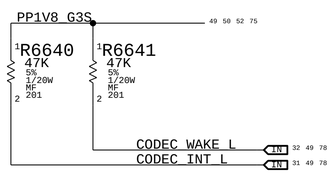
B Left Speaker Connector



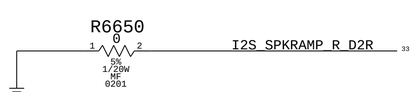
C Right Speaker ID



D Audio Codec Pull-Ups



E Speaker Amp Control



BOM_COST_GROUP=AUDIO

DESIGN: J230/MLB
LAST CHANGE: Fri Sep 28 20:05:04 2018

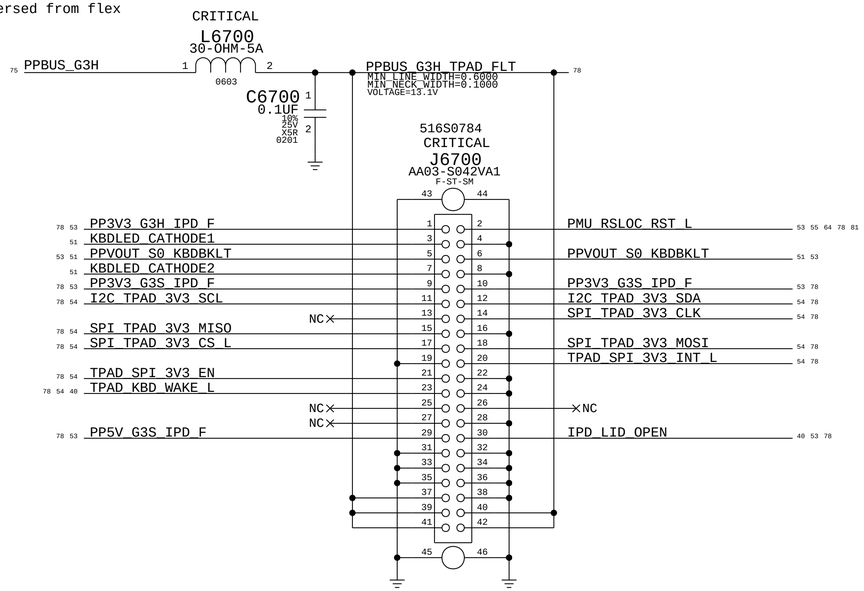
PAGE TITLE
Audio Connectors

Apple Inc.

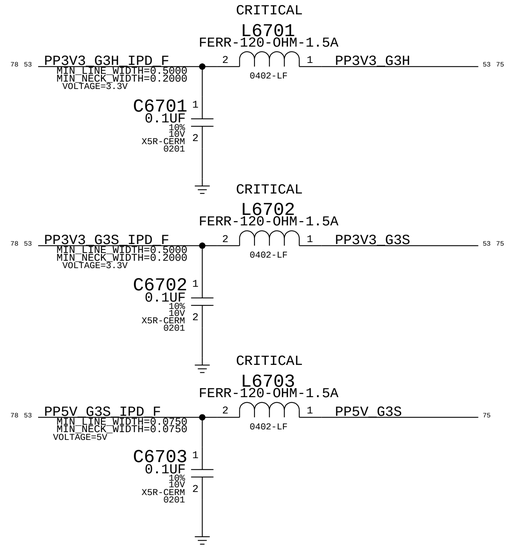
DRAWING NUMBER 051-05232
SIZE D
REVISION 2.0.0
BRANCH proto4b
PAGE 66 OF 152
SHEET 52 OF 86

A IPD B2B CONNECTOR

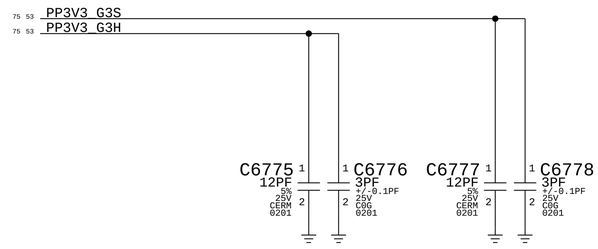
Bottom side contacts used
Pinout reversed from flex



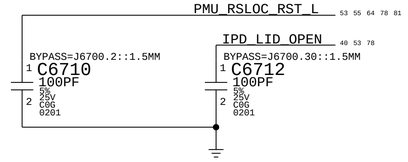
B IPD Power Filters



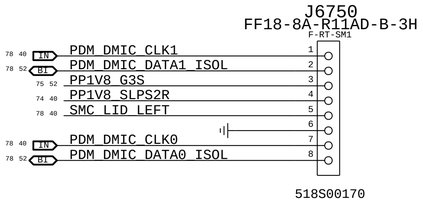
C IPD Desense



D IPD Control

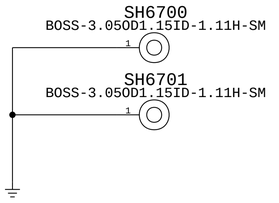


E Microphone Connector



518S00170

F IPD Connector Bosses



BOM_COST_GROUP=TRACKPAD

SYNC_MASTER=X260_MLB
SYNC_DATE=02/16/2017

PAGE TITLE
Keyboard & Trackpad 1

Apple Inc.

DRAWING NUMBER
051-05232

SIZE
D

REVISION
2.0.0

BRANCH
proto4b

PAGE
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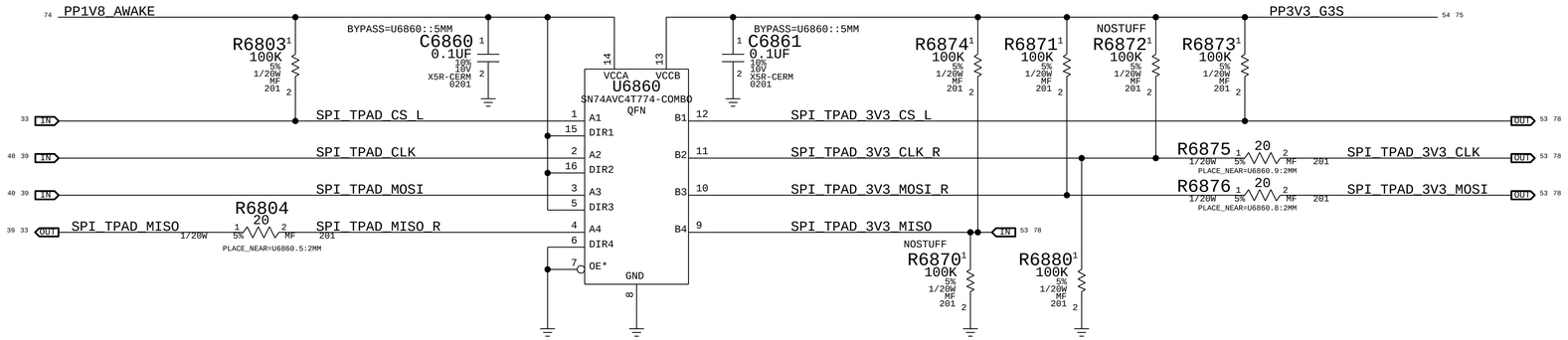
SHEET
53 OF 86

A Trackpad SPI Bus Level Shifter (+1.8V to +3.3V)



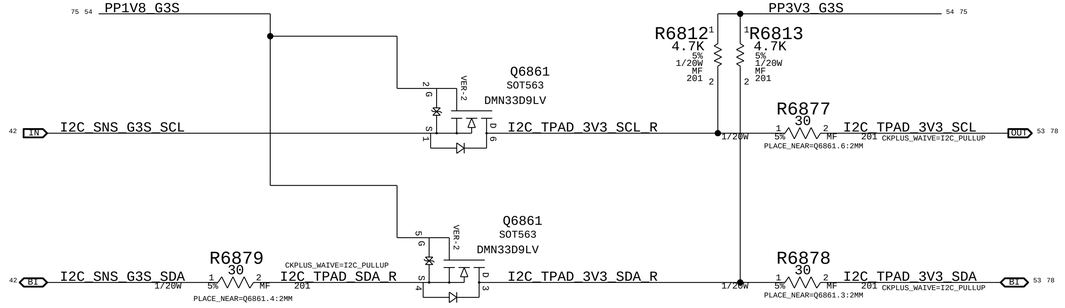
PROJECT	J230k = 0x3F
B	RESISTOR
BOARDID[5] = SPI_TPAD_CLK	1 pull-down
BOARDID[4] = SPI_TPAD_MISO*	1 pull-up
BOARDID[3] = SPI_TPAD_MOSI	1 pull-up
BOARDID[2] = SPI_SOCROM_MISO	1
BOARDID[1] = SPI_SOCROM_MOSI	1
BOARDID[0] = SPI_SOCROM_CLK	1

SPI_TPAD_CLK, SPI_TPAD_MOSI, and SPI_TPAD_CLK are shared signals with BOARDID on CSA 47.
Ensure signals that drive from +3.3V to +1.8V (i.e., towards Gibraltar) are properly strapped based on the desired BOARDID.

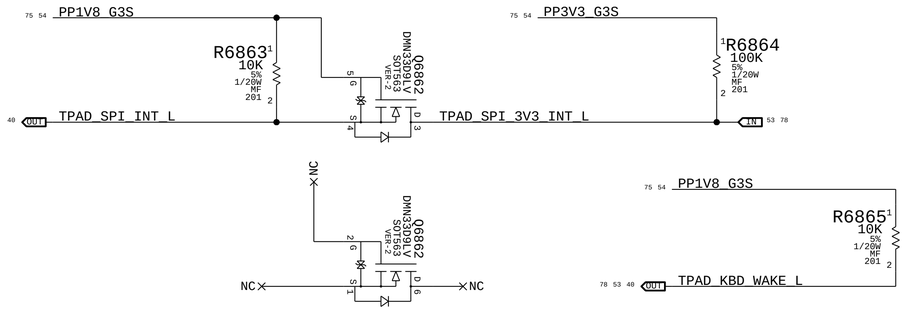
SN74AVC4T774 Truth Table

CTRL INPUTS		OUTPUT CIRCUITS		OPERATION
/OE	DIR	A PORT	B PORT	
L	L	Enabled	Hi-Z	B data to A data
L	H	Hi-Z	Enabled	A data to B data
H	X	Hi-Z	Hi-Z	Isolation

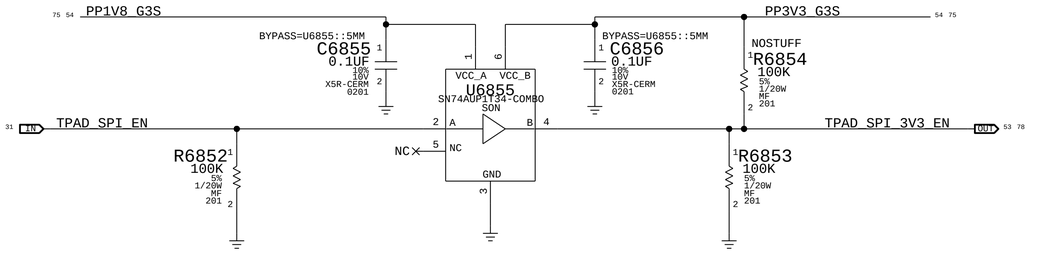
B Trackpad I2C Bus Level Shifter



C Trackpad Control Level Shifter



D Trackpad SPI Enable Level Shifter



BOM_COST_GROUP=TRACKPAD

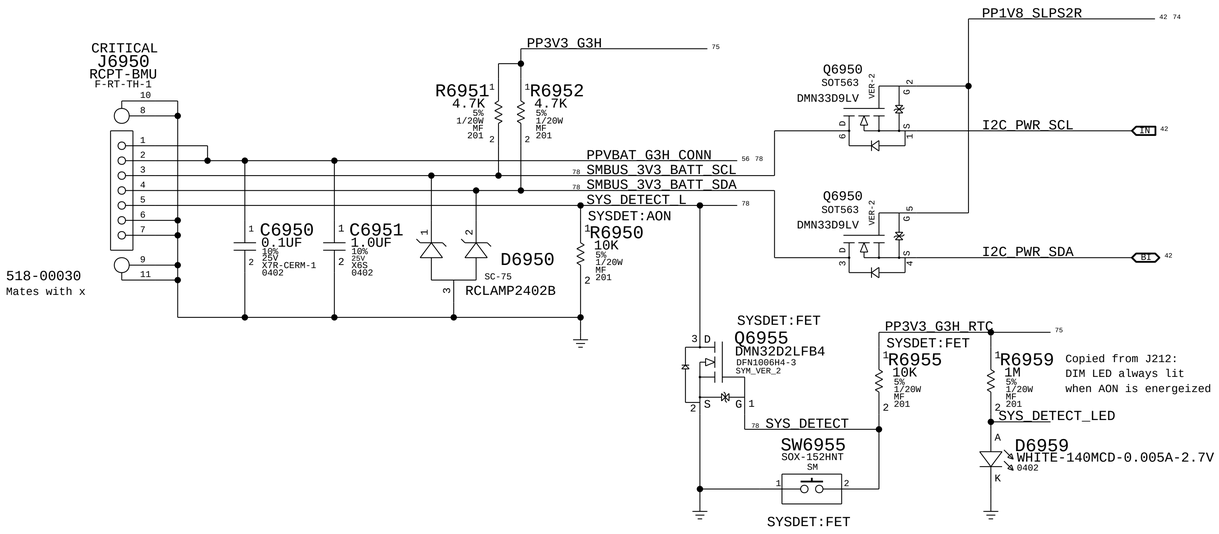
SYNC_MASTER=X589_CARD_IPD SYNC_DATE=02/16/2017

PAGE TITLE: Keyboard & Trackpad 2

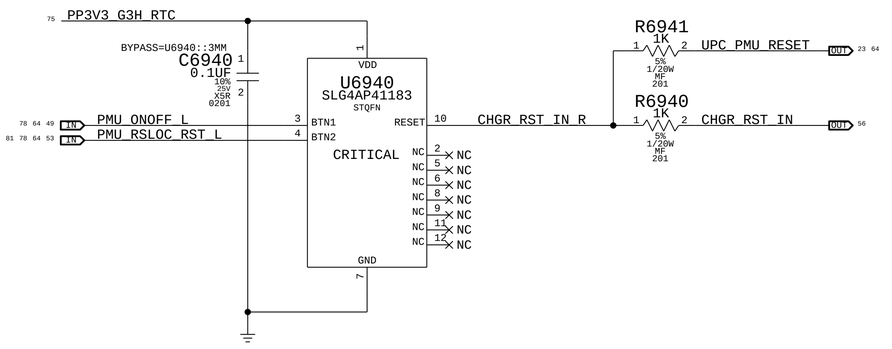
Apple Inc.

DRAWING NUMBER: 051-05232 SIZE: D
REVISION: 2.0.0
BRANCH: proto4b
PAGE: 68 OF 152
SHEET: 54 OF 86

A DC-In & Battery Connector



B Charger Reset Circuit



C 3.3V G3H RTC Voltage Regulator

Vout = 3.3V
Iout Max = 2.08A
f = 1.25 MHZ

BOM_COST_GROUP=PLATFORM POWER

SYNC_MASTER=psm SYNC_DATE=10/18/2018

PAGE TITLE: DC-In & Battery Connectors

Apple Inc.

DRAWING NUMBER: 051-05232 SIZE: D
REVISION: 2.0.0
BRANCH: proto4b
PAGE: 69 OF 152
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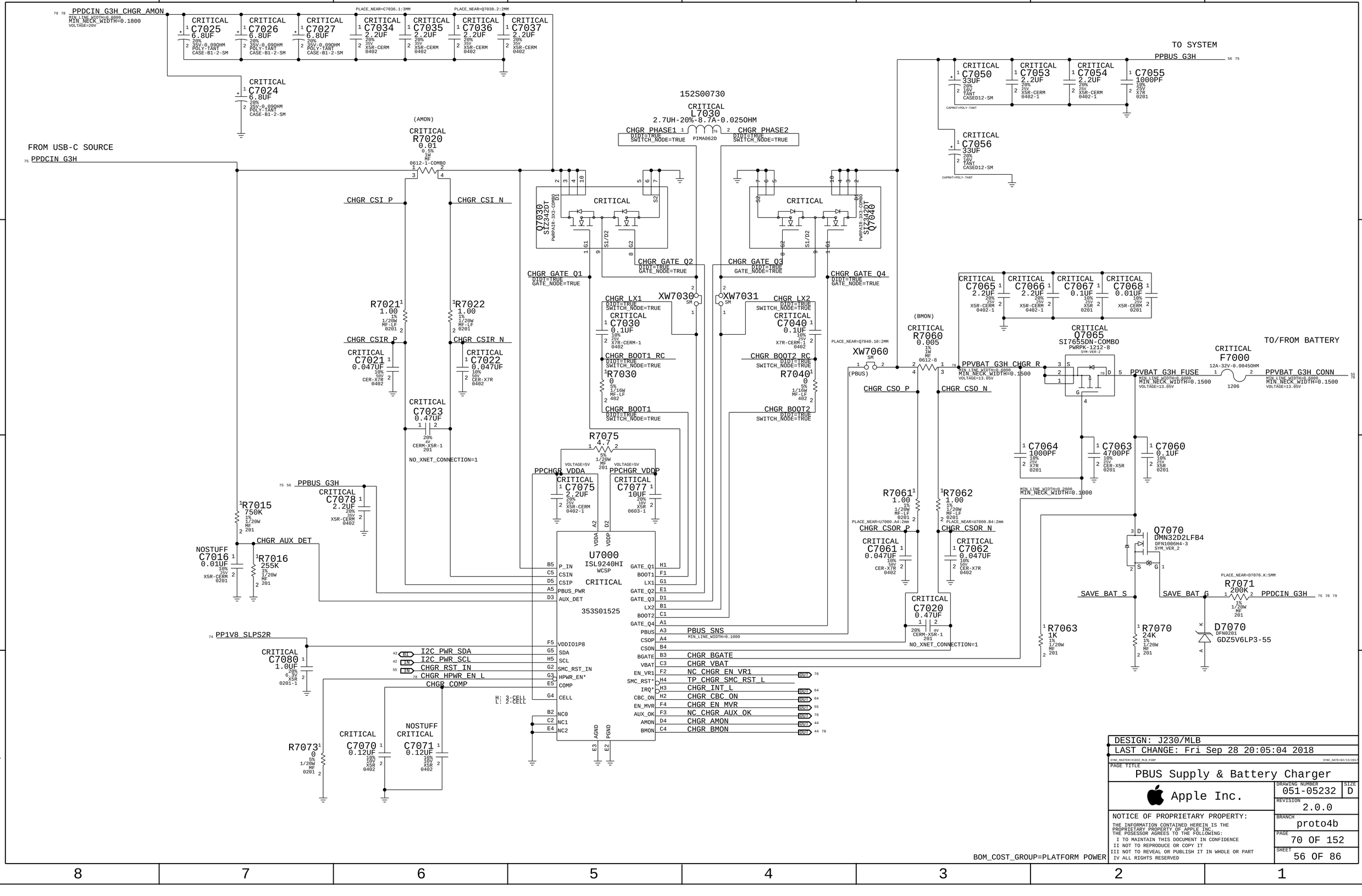


DESIGN: J230/MLB

LAST CHANGE: Fri Sep 28 20:05:04 2018

SYNC_MASTER=X1032_MLB_P48P

SYNC_DATE=02/13/2017

PAGE TITLE

PBUS Supply & Battery Charger

Apple Inc.

DRAWING NUMBER 051-05232

SIZE D

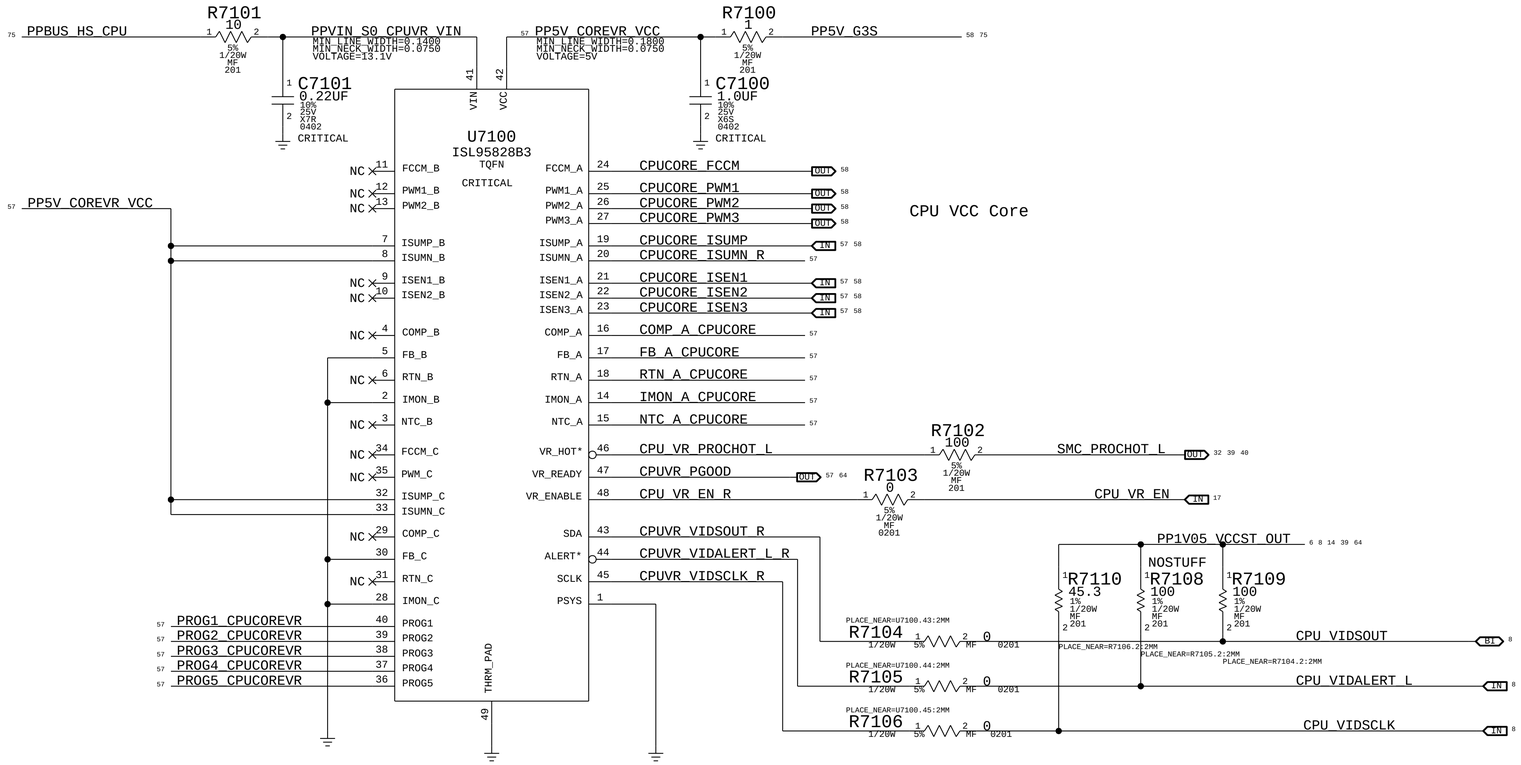
REVISION 2.0.0

BRANCH proto4b

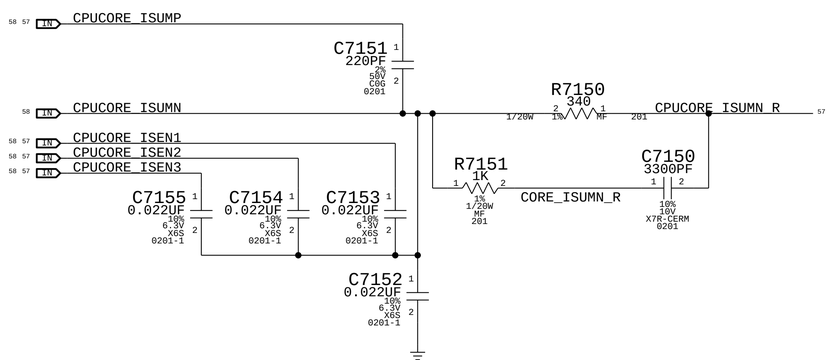
PAGE 70 OF 152

SHEET 56 OF 86

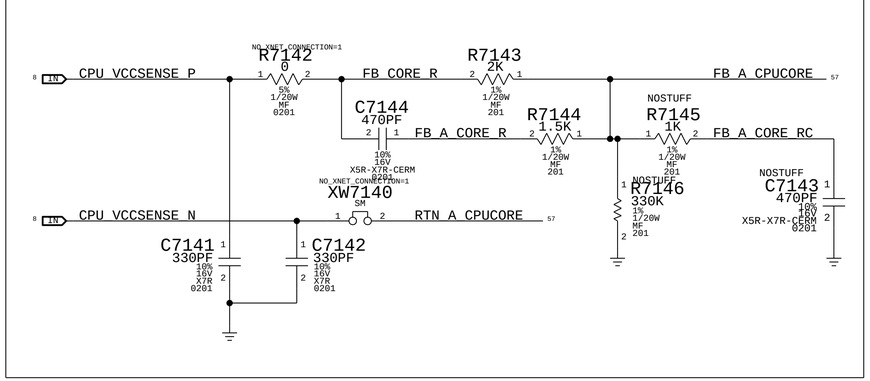
A CPU Core IMVP9 PWM Controller



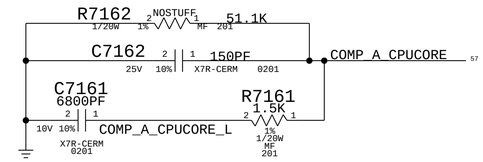
B CPU Core ISUM Network



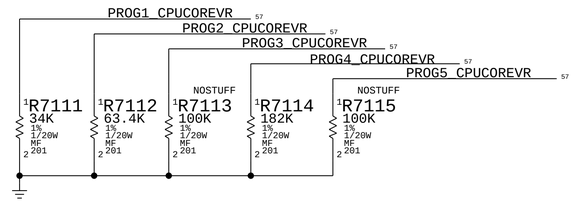
C CPU Core Feedback Network



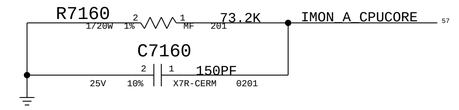
D CPU Core Comp Network



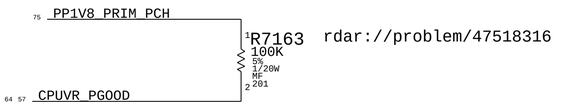
E CPU Core Prog Options



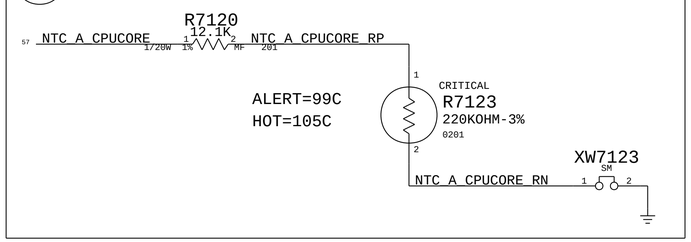
F CPU Core IMON Network



G CPU Core Power Good



H CPU Core Thermistor



BOM_COST_GROUP=CPU & CHIPSET

PAGE TITLE	IMVP9 IC
Apple Inc.	DRAWING NUMBER 051-05232 · SIZE D
	REVISION 2.0.0
	BRANCH proto4b
	PAGE 71 OF 152
	SHEET 57 OF 86

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Vout = 0.55 - 1.8V
IccMax = 49A
TDC = 18A
DCLL = 2mOhm
ACLL3 = 4.7mOhm
F = 750kHz

CPU VCC Phase 1

PPBUS_HS_CPU
PP5V_G3S
R7215 1 5% 1/16W MF-LF 402
VOLTAGE=5V
PP5V_MAIN_VCORE1
CRITICAL C7216 2.2UF 20% 25V X6S-CERM 0402
CRITICAL C7217 2.2UF 20% 25V X6S-CERM 0402
U7210 SIC535CD MLP4535
VIN, VCIN, VDRV, BOOT, PHASE, ZCD_EN*, PWM, VSWH, NC, GL, PGND, CGND
CPUCORE_FCCM
CPUCORE_PWM1
XW7210 SM
CPUCORE_CGND1
PLACE_NEAR=U7210.7:2MM
CPUCORE_SW1 MIN_LINE_WIDTH=0.0750 MIN_NECK_WIDTH=0.0750 DIDT=TRUE SWITCH_NODE=TRUE
CRITICAL L7210 0.33UH-20%-24A-0.007OHM PIMS052T-SM
PPVCC_CPU_PH1 MIN_LINE_WIDTH=0.0000 MIN_NECK_WIDTH=0.0750 VOLTAGE=1.5V
NOSTUFF R7218 2.2 5% 1/10W MF-LF 603
CPUCORE_SW1_SNUB DIDT=TRUE
C7218 0.001UF 10% 50V X7R-CERM 0402 NOSTUFF
CPUCORE_BOOT1 MIN_LINE_WIDTH=0.2500 MIN_NECK_WIDTH=0.2000 DIDT=TRUE
R7219 0 5% 1/16W MF-LF 402
CPUCORE_BP1 MIN_LINE_WIDTH=0.2500 MIN_NECK_WIDTH=0.2000 DIDT=TRUE
CRITICAL C7219 0.22UF 10% 25V X7R 0402
CPUCORE_PHASE1 MIN_LINE_WIDTH=0.2500 MIN_NECK_WIDTH=0.2000 DIDT=TRUE
CRITICAL C7210 33UF 20% 16V TANT CASED12-SM
CRITICAL C7211 33UF 20% 16V TANT CASED12-SM
CRITICAL C7213 2.2UF 20% 25V X6S-CERM 0402
CRITICAL C7214 2.2UF 20% 25V X6S-CERM 0402
CRITICAL R7210 0.001 1% 1W MF-3 0612
NO_XNET_CONNECTION=1
PPVCC_S0_CPUCORE
CPUCORE_ISNS1_P
CPUCORE_ISNS1_N
R7211 2.2 1% 1/20W MF 201
CPUCORE_ISUMN
R7212 1K 1% 1/20W MF 201
R7213 100K 1% 1/20W MF 201
CPUCORE_ISEN1
CPUCORE_ISUMP
R7214 100K 1% 1/20W MF 201
CPUCORE_ISNS2_N
R7216 100K 1% 1/20W MF 201
CPUCORE_ISNS3_N

CPU VCC Phase 2

PPBUS_HS_CPU
PP5V_G3S
R7225 1 5% 1/16W MF-LF 402
VOLTAGE=5V
PP5V_MAIN_VCORE2
CRITICAL C7226 2.2UF 20% 25V X6S-CERM 0402
CRITICAL C7227 2.2UF 20% 25V X6S-CERM 0402
U7220 SIC535CD MLP4535
VIN, VCIN, VDRV, BOOT, PHASE, ZCD_EN*, PWM, VSWH, NC, GL, PGND, CGND
CPUCORE_FCCM
CPUCORE_PWM2
XW7220 SM
CPUCORE_CGND2
PLACE_NEAR=U7220.7:2MM
CPUCORE_SW2 MIN_LINE_WIDTH=0.1000 MIN_NECK_WIDTH=0.0750 DIDT=TRUE SWITCH_NODE=TRUE
CRITICAL L7220 0.33UH-20%-24A-0.007OHM PIMS052T-SM
PPVCC_CPU_PH2 MIN_LINE_WIDTH=0.0000 MIN_NECK_WIDTH=0.0750 VOLTAGE=1.5V
NOSTUFF R7228 2.2 5% 1/10W MF-LF 603
CPUCORE_SW2_SNUB DIDT=TRUE
C7228 0.001UF 10% 50V X7R-CERM 0402 NOSTUFF
CPUCORE_BOOT2 MIN_LINE_WIDTH=0.2500 MIN_NECK_WIDTH=0.2000 DIDT=TRUE
R7229 0 5% 1/16W MF-LF 402
CPUCORE_BP2 MIN_LINE_WIDTH=0.2500 MIN_NECK_WIDTH=0.2000 DIDT=TRUE
CRITICAL C7229 0.22UF 10% 25V X7R 0402
CPUCORE_PHASE2 MIN_LINE_WIDTH=0.2500 MIN_NECK_WIDTH=0.2000 DIDT=TRUE
CRITICAL C7220 33UF 20% 16V TANT CASED12-SM
CRITICAL C7223 2.2UF 20% 25V X6S-CERM 0402
CRITICAL C7224 2.2UF 20% 25V X6S-CERM 0402
CRITICAL R7220 0.001 1% 1W MF-3 0612
NO_XNET_CONNECTION=1
CPUCORE_ISNS2_P
CPUCORE_ISNS2_N
R7221 2.2 1% 1/20W MF 201
CPUCORE_ISUMN
R7222 1K 1% 1/20W MF 201
R7223 100K 1% 1/20W MF 201
CPUCORE_ISEN2
CPUCORE_ISUMP
R7224 100K 1% 1/20W MF 201
CPUCORE_ISNS1_N
R7226 100K 1% 1/20W MF 201
CPUCORE_ISNS3_N

CPU VCC Phase 3

PPBUS_HS_CPU
PP5V_G3S
R7235 1 5% 1/16W MF-LF 402
VOLTAGE=5V
PP5V_MAIN_VCORE3
CRITICAL C7236 2.2UF 20% 25V X6S-CERM 0402
CRITICAL C7237 2.2UF 20% 25V X6S-CERM 0402
U7230 SIC535CD MLP4535
VIN, VCIN, VDRV, BOOT, PHASE, ZCD_EN*, PWM, VSWH, NC, GL, PGND, CGND
CPUCORE_FCCM
CPUCORE_PWM3
XW7230 SM
CPUCORE_CGND3
PLACE_NEAR=U7230.7:2MM
CPUCORE_SW3 MIN_LINE_WIDTH=0.1000 MIN_NECK_WIDTH=0.0750 DIDT=TRUE SWITCH_NODE=TRUE
CRITICAL L7230 0.33UH-20%-24A-0.007OHM PIMS052T-SM
PPVCC_CPU_PH3 MIN_LINE_WIDTH=0.0000 MIN_NECK_WIDTH=0.0750 VOLTAGE=1.5V
NOSTUFF R7238 2.2 5% 1/10W MF-LF 603
CPUCORE_SW3_SNUB DIDT=TRUE
C7238 0.001UF 10% 50V X7R-CERM 0402 NOSTUFF
CPUCORE_BOOT3 MIN_LINE_WIDTH=0.2500 MIN_NECK_WIDTH=0.2000 DIDT=TRUE
R7239 0 5% 1/16W MF-LF 402
CPUCORE_BP3 MIN_LINE_WIDTH=0.2500 MIN_NECK_WIDTH=0.2000 DIDT=TRUE
CRITICAL C7239 0.22UF 10% 25V X7R 0402
CPUCORE_PHASE3 MIN_LINE_WIDTH=0.2500 MIN_NECK_WIDTH=0.2000 DIDT=TRUE
CRITICAL C7230 33UF 20% 16V TANT CASED12-SM
CRITICAL C7233 2.2UF 20% 25V X6S-CERM 0402
CRITICAL C7234 2.2UF 20% 25V X6S-CERM 0402
CRITICAL R7230 0.001 1% 1W MF-3 0612
NO_XNET_CONNECTION=1
CPUCORE_ISNS3_P
CPUCORE_ISNS3_N
R7231 2.2 1% 1/20W MF 201
CPUCORE_ISUMN
R7232 1K 1% 1/20W MF 201
R7233 100K 1% 1/20W MF 201
CPUCORE_ISEN3
CPUCORE_ISUMP
R7234 100K 1% 1/20W MF 201
CPUCORE_ISNS1_N
R7236 100K 1% 1/20W MF 201
CPUCORE_ISNS2_N

BOM_COST_GROUP=CPU & CHIPSET

SYNC_MASTER=psm
SYNC_DATE=10/18/2018
PAGE TITLE
IMVP9 POWER BLOCK

Apple Inc.

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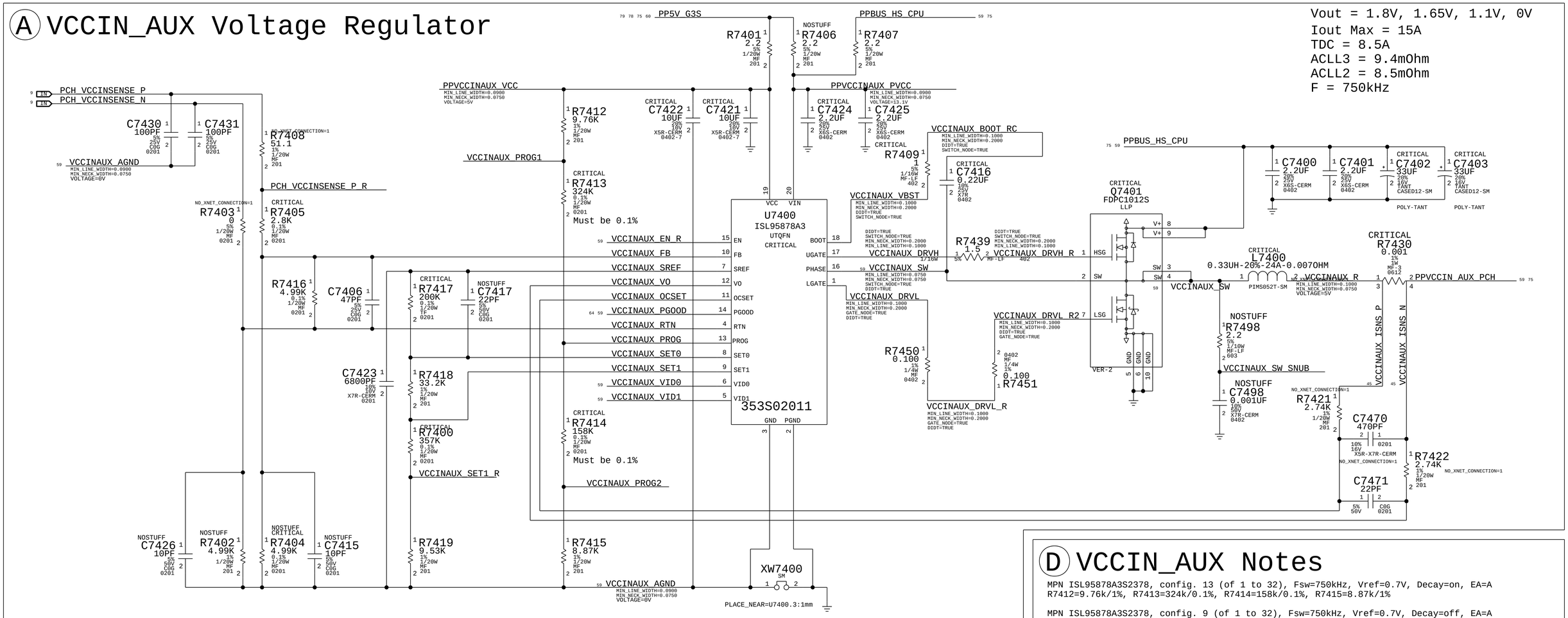
A VCCIN_AUX Voltage Regulator

Vout = 1.8V, 1.65V, 1.1V, 0V
Iout Max = 15A
TDC = 8.5A
ACLL3 = 9.4mOhm
ACLL2 = 8.5mOhm
F = 750kHz

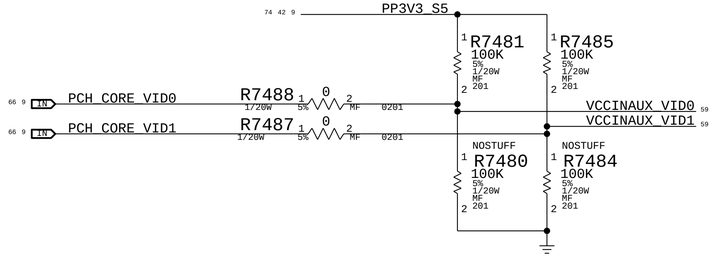


D VCCIN_AUX Notes

MPN ISL95878A3S2378, config. 13 (of 1 to 32), Fsw=750kHz, Vref=0.7V, Decay=on, EA=A
R7412=9.76k/1%, R7413=324k/0.1%, R7414=158k/0.1%, R7415=8.87k/1%

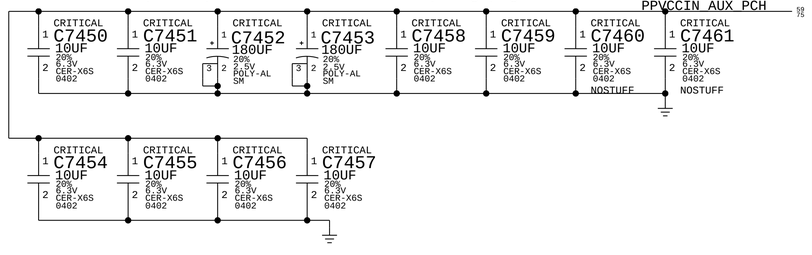
MPN ISL95878A3S2378, config. 9 (of 1 to 32), Fsw=750kHz, Vref=0.7V, Decay=off, EA=A
R7412=47.5k/1%, R7413=324k/0.1%, R7414=127k/0.1%, R7415=1.58k/1%

B VID Control



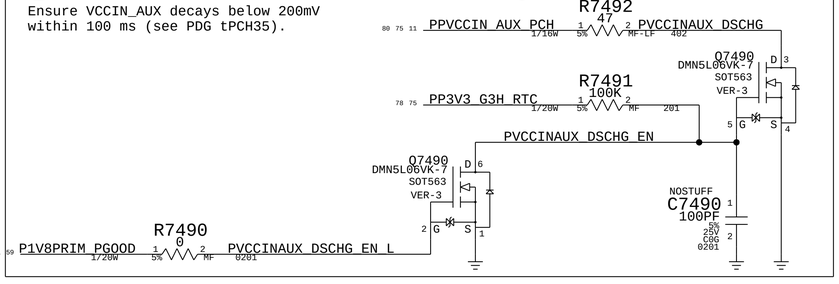
C VCCIN_AUX BHC Caps

Additional output caps are on the CPU decoupling page.

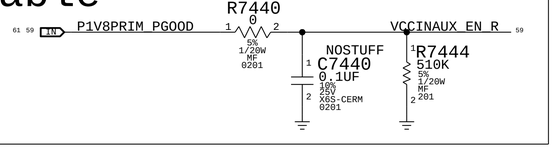


G VCCIN_AUX Discharge

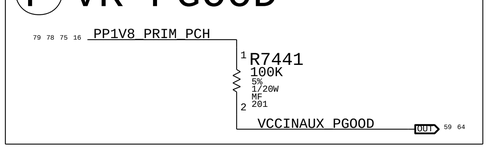
Ensure VCCIN_AUX decays below 200mV within 100 ms (see PDG tPCH35).



E VR Enable



F VR PGOOD



VID[1] Pin State	VID[0] Pin State	VCCIN_AUX (V)	USAGE
0	0	0	Power Saving State
0	1	1.1	Power Saving State
1	0	1.65	Full Current, ICL-Y
1	1	1.8	Initial boot for ICL-U/Y Full Current, ICL-U

BOM_COST_GROUP=PLATFORM POWER

PAGE TITLE: VR: VCCIN_AUX ISL

Apple Inc.

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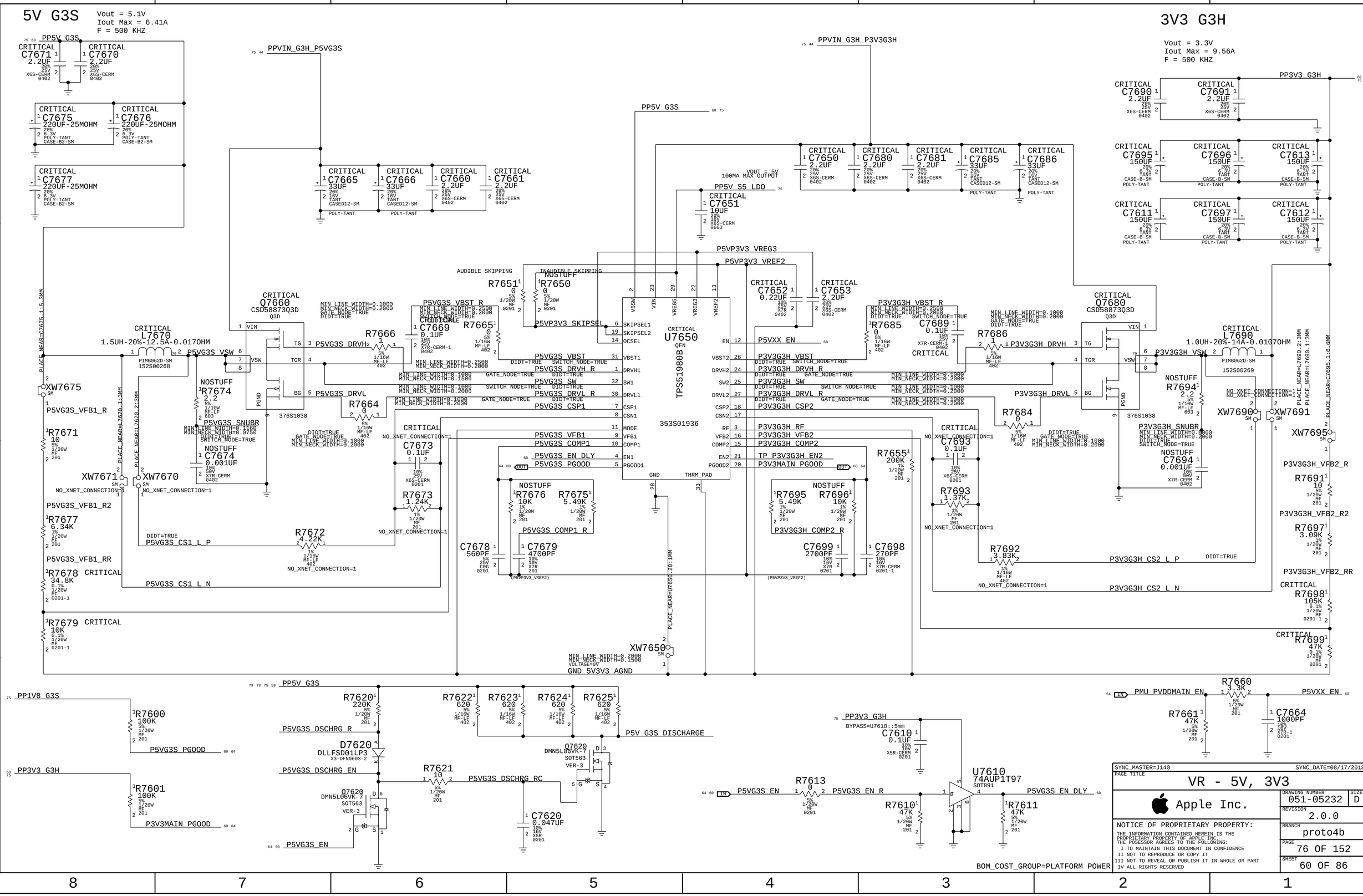
5V G3S
Vout = 5.1V
Iout Max = 6.41A
F = 500 KHZ
3V3 G3H
Vout = 3.3V
Iout Max = 9.56A
F = 500 KHZ
PP5V_G3S
PPVIN_G3H_P5VG3S
PPVIN_G3H_P3V3G3H
PP3V3_G3H
PP5V_S5_LDO
VOUT = 5V
100MA MAX OUTPUT
P5VP3V3_VREG3
P5VP3V3_VREF2
P5VP3V3_SKIPSEL
AUDIBLE SKIPPING
INAUDIBLE SKIPPING
U7650
TPS51980B
QFN
353S01936
P5VXX_EN
P5V_G3S_DISCHARGE
P5VG3S_VFB1_R
P5VG3S_VFB1_RR
P5VG3S_VFB1_R2
P5VG3S_CS1_L_P
P5VG3S_CS1_L_N
P5VG3S_DRVH
P5VG3S_DRVL
P5VG3S_VBST
P5VG3S_DRVH_R
P5VG3S_SW
P5VG3S_DRVL_R
P5VG3S_CSP1
P5VG3S_VFB1
P5VG3S_COMP1
P5VG3S_EN_DLY
P5VG3S_PGOOD
P5VG3S_COMP1_R
P5VG3S_DSCHRG_R
P5VG3S_DSCHRG_EN
P5VG3S_DSCHRG_RC
P5VG3S_EN
P5VG3S_EN_R
P3V3G3H_VBST
P3V3G3H_DRVH_R
P3V3G3H_SW
P3V3G3H_DRVL_R
P3V3G3H_CSP2
P3V3G3H_RF
P3V3G3H_VFB2
P3V3G3H_COMP2
TP_P3V3G3H_EN2
P3V3MAIN_PGOOD
P3V3G3H_VBST_R
P3V3G3H_DRVH
P3V3G3H_VSW
P3V3G3H_DRVL
P3V3G3H_SNUBR
P3V3G3H_CS2_L_P
P3V3G3H_CS2_L_N
P3V3G3H_VFB2_R
P3V3G3H_VFB2_R2
P3V3G3H_VFB2_RR
PMU_PVDDMAIN_EN
PP1V8_G3S
PP3V3_G3H
BYPASS=U7610::5mm
BOM_COST_GROUP=PLATFORM POWER
SYNC_MASTER=J140
SYNC_DATE=08/17/2018
PAGE TITLE
VR - 5V, 3V3
Apple Inc.
DRAWING NUMBER 051-05232
SIZE D
REVISION 2.0.0
BRANCH proto4b
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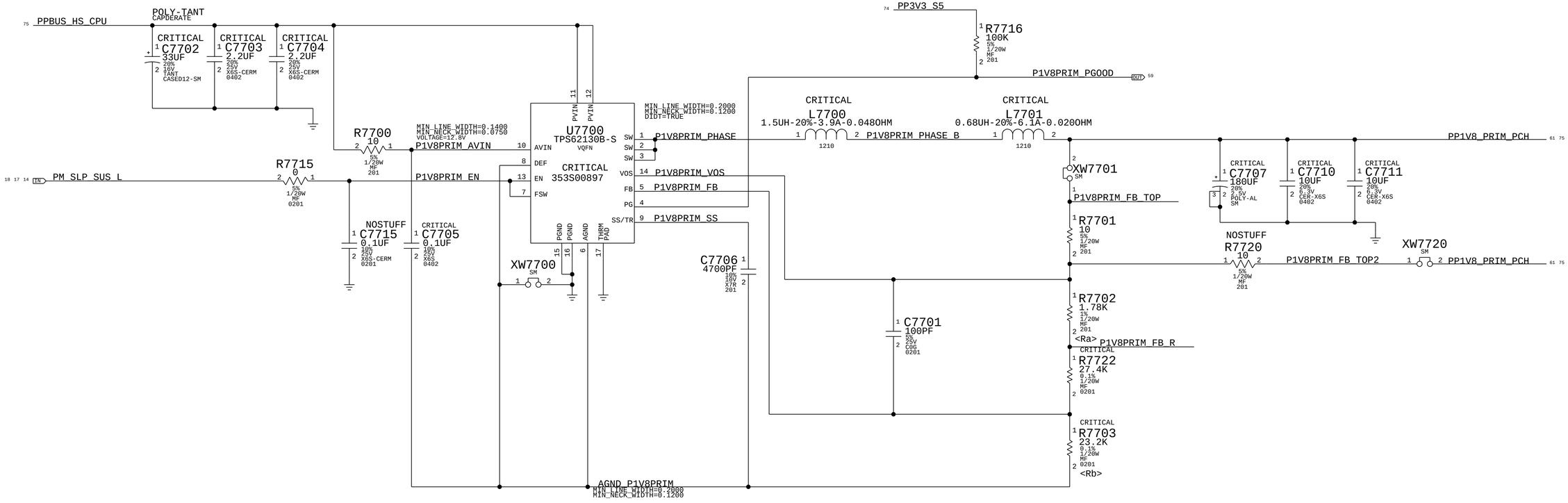
A VCCPRIM_1P8 Voltage Regulator

Output voltage: 1.8 V
Iout Max: 2.07 A
Switching freq: 1250 kHz



BOM_COST_GROUP=GRAPHICS

PAGE TITLE
VR: VCCPRIM_1P8

Apple Inc.

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Note : Design based on Calpe ERS - D2449-A0-110-00_0v3.pdf (Radar# 24696002)
System Block Diagram - T290 Power System Architecture . v9
Optimize componentS for individual projects based on EDP(A)

PP3V3_G3H_PMU_VDDMAIN

Note : All Bucks are default Local Sense

Buck 0,2,7,9 and 10 need to have option for Remote Sense for Future Use.

VOUT = 1.05V (0.76V in LPM)
Iout Max = 0.2A
F = 3MHz
PPVNN_PCH_EXT_REG

Vout = 1.05V
Iout Max = 0.2A
F = 3MHz
PP1V05_PCH_EXT_REG

Vout = 0.9V
Iout Max = 1.4A
F = 3MHz
PP0V9_SSD0

Vout = 1.8V
Iout Max = 1.3A
F = 3MHz
PPVCCQ_ANI_SSD0

Resistor Divider from PBUS
VDD_HI < 3.1V
PMU_VDD_HI
PP1V8_SLPS2R_PMUVDDGPIO

U7800
CALPE-PMU
BGA
SYM 2 OF 4
CRITICAL
OMIT_TABLE

VDD_MAIN_E
VDD_MAIN_N
VDD_MAIN_S
VDD_MAIN_W
VDD_HI
VDD_GPIO
VDD_BUCK0_01
VDD_BUCK0_23
VDD_BUCK16
VDD_BUCK2
VDD_BUCK3
VDD_BUCK4
VDD_BUCK5
VDD_BUCK7
VDD_BUCK8
VDD_BUCK910
BUCK6_LX0
BUCK6_IN
BUCK6_FB
BUCK7_LX0
BUCK7_LX1
BUCK7_RTP
BUCK7_RTN
BUCK8_LX0
BUCK8_LX1
BUCK8_FB
BUCK8_IN
BUCK9_LX0
BUCK9_RTP
BUCK9_RTN
BUCK10_LX0
BUCK10_FB

L7806 1UH-20%-3.8A-0.055OHM — PVDDCPUAWAKE_SW0 — BUCK0_LX0
L7807 0.22UH-20%-6.7A-0.023OHM — PVDDCPUAWAKE_SW1 — BUCK0_LX1
L7808 0.22UH-20%-6.7A-0.023OHM — PVDDCPUAWAKE_SW2 — BUCK0_LX2
L7809 0.22UH-20%-6.7A-0.023OHM — PVDDCPUAWAKE_SW3 — BUCK0_LX3
PVDDCPUAWAKE_FB — BUCK0_FB
R7806 0 PLACE_NEAR=L7806.2:5MM
R7807 0 NOSTUFF PVDDCPUAWAKE_FB_XW — XW7807 SM

Vout = 0.625V - 1.06V
Iout Max = 12.5A
F = 2MHz & 4MHz
PPVDDCPU_AWAKE

L7810 1.0UH-20%-2.6A-0.095OHM — PVDDCPUSRAMAWAKE_SW0 — BUCK1_LX0
R7811 0 PLACE_NEAR=L7810.2:5MM
PVDDCPUSRAMAWAKE_FB — BUCK1_FB

Vout = 0.8V - 1.06V
Iout Max = 0.923A
F = 3MHz
PPVDDCPUSRAM_AWAKE

L7811 1UH-20%-4.7A-0.040HM — P0V8SLPDDR_SW0 — BUCK2_LX0
L7812 0.47UH-20%-4.8A-0.034OHM — P0V8SLPDDR_SW1 — BUCK2_LX1
R7812 NOSTUFF 0 PLACE_NEAR=L7812.2:5MM
P0V8SLPDDR_FB — BUCK2_FB

Vout = 0.82V
Iout Max = 3.93A
F = 3MHz
PP0V82_SLPDDR

L7813 1UH-20%-3.8A-0.055OHM — P1V8SLPS2R_SW0 — BUCK3_LX0
R7813 0 PLACE_NEAR=L7813.2:5MM
P1V8SLPS2R_FB — BUCK3_FB
PP1V8_SLPS2R — BUCK3_IN

Vout = 1.8V
Iout Max = 1.5A
F = 3MHz
PP1V8_SLPS2R

L7814 1UH-20%-3.8A-0.055OHM — P1V1SLPS2R_SW0 — BUCK4_LX0
L7815 0.47UH-20%-4.8A-0.034OHM — P1V1SLPS2R_SW1 — BUCK4_LX1
R7814 0 PLACE_NEAR=L7815.2:5MM
P1V1SLPS2R_FB — BUCK4_FB
BUCK4_IN

Vout = 1.1V
Iout Max = 1.4A
F = 3MHz
PP1V1_SLPS2R

L7816 1UH-20%-3.8A-0.055OHM — P0V9SLPDDR_SW0 — BUCK5_LX0
L7817 0.47UH-20%-4.8A-0.034OHM — P0V9SLPDDR_SW1 — BUCK5_LX1
R7816 0 NOSTUFF PLACE_NEAR=L7816.2:5MM
P0V9SLPDDR_FB — BUCK5_FB

Vout = 0.9V
Iout Max = 2.64A
F = 3MHz
PP0V9_SLPDDR

L7819 0.47UH-20%-4.8A-0.034OHM — PVNN_PCH_EXT_SW0 — BUCK7_LX0
L7820 0.47UH-20%-4.8A-0.034OHM — PVNN_PCH_EXT_SW1 — BUCK7_LX1
R7819 0 PLACE_NEAR=L7819.1:5MM NOSTUFF — PVNN_PCH_EXT_FB_P — BUCK7_RTP
R7821 0 PLACE_NEAR=U7800.N15:5MM NOSTUFF — PVNN_PCH_EXT_FB_N — BUCK7_RTN

L7821 0.47UH-20%-4.8A-0.034OHM — P1V05_PCH_EXT_SW0 — BUCK8_LX0
L7822 0.47UH-20%-4.8A-0.034OHM — P1V05_PCH_EXT_SW1 — BUCK8_LX1
R7820 0 NOSTUFF PLACE_NEAR=L7822.1:5MM — P1V05_PCH_EXT_FB — BUCK8_FB
PP1V05_PCH_EXT_REG — BUCK8_IN

L7823 0.47UH-20%-4.8A-0.034OHM — P0V9SSD_SW0 — BUCK9_LX0
R7822 0 PLACE_NEAR=L7823.1:5MM — P0V9SSD_FB_P — BUCK9_RTP
R7824 0 PLACE_NEAR=U7800.N15:10MM — P0V9SSD_FB_N — BUCK9_RTN
XW7824 SM — P0V9SSD_FB_N_GND

L7824 0.47UH-20%-4.8A-0.034OHM — P1V8SSD_SW0 — BUCK10_LX0
R7823 0 PLACE_NEAR=L7824.1:5MM — P1V8SSD_FB — BUCK10_FB

Supplied Current

BUCK3_SW1	T8	PP1V8_AWAKE	0.3A
BUCK3_SW2	T11	PP1V8_SLPS2R_PMUVDDGPIO	0.3A
BUCK3_SW3	V11	TP_PMU_BUCK3SW3	
BUCK3_SW4	V8	TP_PMU_BUCK3SW4	
BUCK3_SW5	R8	PP1V8SW_VCCQIO_SSD0	
BUCK4_SW1	P6	TP_PP1V1_PMU_BUCK4SW1	
BUCK6_SW1	R6	TP_PMU_BUCK6SW1	
BUCK8_SW1	P13	TP_PMU_BUCK8SW1	
BUCK8_SW2	R13	TP_PMU_BUCK8SW2	0.3A

BOM_COST_GROUP=T290

SYNC_MASTER=X589_BIGSUR SYNC_DATE=03/16/2017

PAGE TITLE
PMIC BUCKS AND SWs

Apple Inc.

DRAWING NUMBER 051-05232 SIZE D
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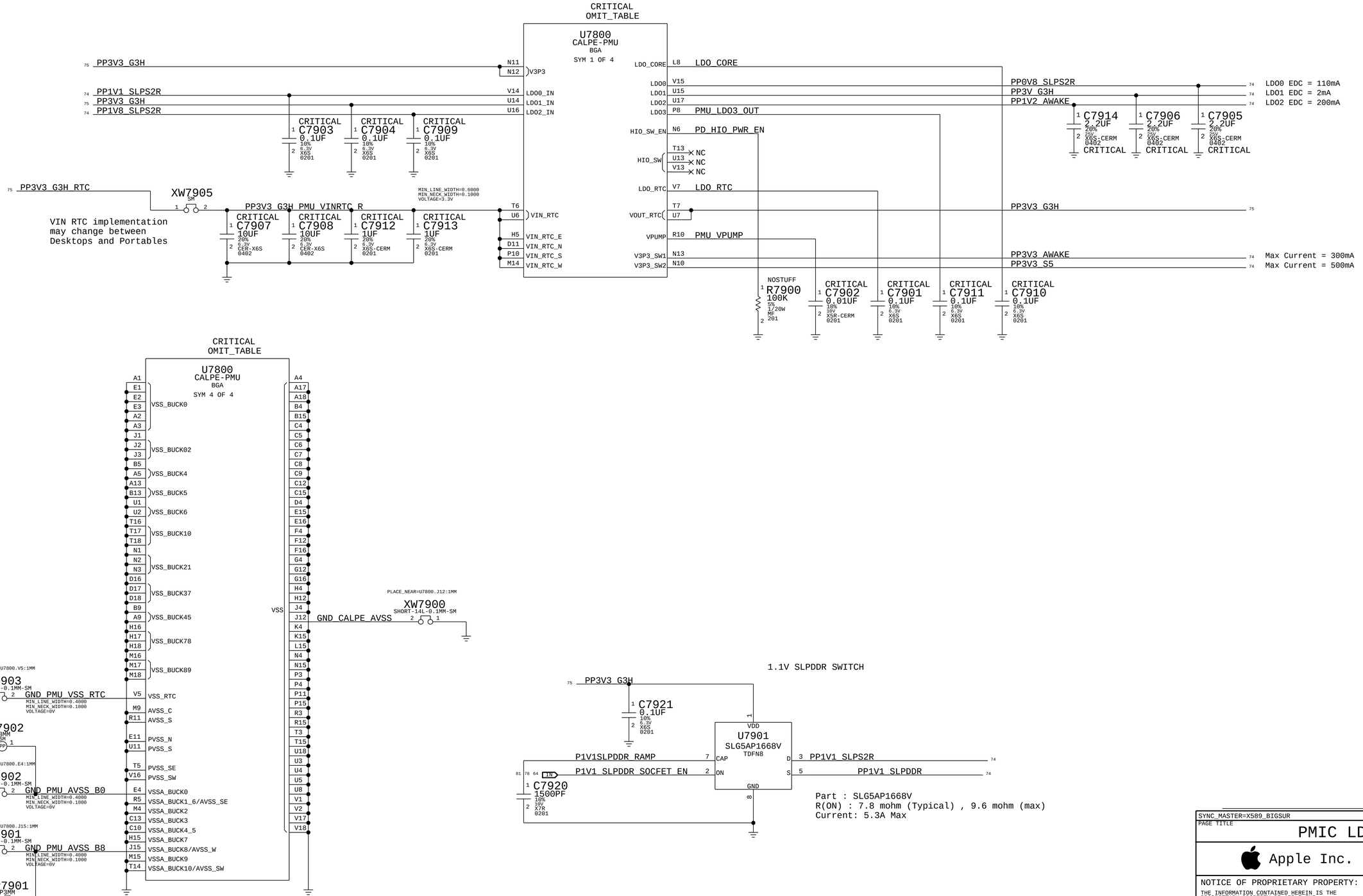
CRITICAL
OMIT_TABLE
U7800
CALPE-PMU
BGA
SYM 1 OF 4
PP3V3_G3H
V3P3
PP1V1_SLPS2R
PP3V3_G3H
PP1V8_SLPS2R
LDO0_IN
LDO1_IN
LDO2_IN
C7903 0.1UF
C7904 0.1UF
C7909 0.1UF
PP3V3_G3H_RTC
XW7905
PP3V3_G3H_PMU_VINRTC_R
MIN_LINE_WIDTH=0.6000
MIN_NECK_WIDTH=0.1000
VOLTAGE=3.3V
C7907 10UF
C7908 10UF
C7912 1UF
C7913 1UF
VIN_RTC
VIN_RTC_E
VIN_RTC_N
VIN_RTC_S
VIN_RTC_W
VIN RTC implementation
may change between
Desktops and Portables
LDO_CORE
LDO_CORE
PP0V8_SLPS2R
PP3V_G3H
PP1V2_AWAKE
C7914 2.2UF
C7906 2.2UF
C7905 2.2UF
LDO0 EDC = 110mA
LDO1 EDC = 2mA
LDO2 EDC = 200mA
PMU_LDO3_OUT
PD_HIO_PWR_EN
NC
NC
NC
LDO_RTC
LDO_RTC
PP3V3_G3H
PMU_VPUMP
R7900 100K
C7902 0.01UF
C7901 0.1UF
C7911 0.1UF
C7910 0.1UF
PP3V3_AWAKE
PP3V3_S5
Max Current = 300mA
Max Current = 500mA
CRITICAL
OMIT_TABLE
U7800
CALPE-PMU
BGA
SYM 4 OF 4
VSS_BUCK0
VSS_BUCK02
VSS_BUCK4
VSS_BUCK5
VSS_BUCK6
VSS_BUCK10
VSS_BUCK21
VSS_BUCK37
VSS_BUCK45
VSS_BUCK78
VSS_BUCK89
VSS_RTC
AVSS_C
AVSS_S
PVSS_N
PVSS_S
PVSS_SE
PVSS_SW
VSSA_BUCK0
VSSA_BUCK1_6/AVSS_SE
VSSA_BUCK2
VSSA_BUCK3
VSSA_BUCK4_5
VSSA_BUCK7
VSSA_BUCK8/AVSS_W
VSSA_BUCK9
VSSA_BUCK10/AVSS_SW
VSS
PLACE_NEAR=U7800.J12:1MM
XW7900
SHORT-14L-0.1MM-SM
GND_CALPE_AVSS
PLACE_NEAR=U7800.V5:1MM
XW7903
GND_PMU_VSS_RTC
PP7902
PLACE_NEAR=U7800.E4:1MM
XW7902
GND_PMU_AVSS_B0
PLACE_NEAR=U7800.J15:1MM
XW7901
GND_PMU_AVSS_B8
PP7901
1.1V SLPDDR SWITCH
PP3V3_G3H
C7921 0.1UF
U7901
SLG5AP1668V
TDFN8
P1V1SLPDDR_RAMP
P1V1_SLPDDR_SOCFET_EN
C7920 1500PF
PP1V1_SLPS2R
PP1V1_SLPDDR
Part : SLG5AP1668V
R(ON) : 7.8 mohm (Typical) , 9.6 mohm (max)
Current: 5.3A Max
BOM_COST_GROUP=T290
SYNC_MASTER=X589_BIGSUR
SYNC_DATE=03/16/2017
PAGE TITLE
PMIC LDOs
Apple Inc.
DRAWING NUMBER
051-05232
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REVISION
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CRITICAL
OMIT_TABLE

U7800
CALPE-PMU
BGA
SYM 3 OF 4

PMU_CLK32K_SOC
PMU_CLK32K_PCH
R8012 33 5% 1/20W MF 201
R8011 33 5% 1/20W MF 201

SOC_WDOG
SOC_SOCHOT_L
UPC_PMU_RESET
PM_THRMTRIP_L
NC_GPU_THRMTRIP
PMU_COLD_RESET_L
PM_SLP_S3_L
PMU_ACTIVE_READY
PMU_CLK32K_SOC_R
PMU_CLK32K_PCH_R
PMU_CLK32K_WLANBT_R
NC_PMU_CLK32K_GNSS_R
TP_PMU_CLK32K
PMU_SYS_ALIVE
PMU_FORCE_DFU
SOC_FORCE_DFU
R8010 2.2K 1/20W 201 5% MF
Use SOC's Internal Pull Up
PMU_INT_L
I2C_PWR_SCL
I2C_PWR_SDA
R8080 0 1/20W 0201 5% MF
R8081 0 1/20W 0201 5% MF
I2C_PMU_SCL_R
I2C_PMU_SDA_R
CKPLUS_WAIVE=I2C_PULLUP

RESET_IN1 (IPD) F5
RESET_IN2 E5
RESET_IN3 (IPD) K5
RESET_IN4 K6
RESET_IN5 (IPD) N5
RESET* L13
SYS_SLEEP* M12
ACTIVE_RDY J5
CLKOUT0_32K H6
CLKOUT1_32K H7
CLKOUT2_32K J7
CLKOUT3_32K K7
CLKOUT4_32K K8
SYS_ALIVE L11
FORCE_DFU D6
IRQ* L9
SCL M11
SDA L10

SPMI_CLK M8
SPMI_DATA M7
ALL_SYS_PWRGD K11
PCH_PWRBTN_L C11
SCLK
SDATA
SYS_ACTIVE
SYS_BTN

PMU_VDDMAIN_ISENSE A16
PMU_MEM1V1_ISENSE A15
PMU_WLANBT_ISENSE A14
PMU_MEM0V6_ISENSE B14
PMU_LCDBKLT_ISENSE C14
PMU_CPU_VSENSE D15
PMU_NAND_VSENSE E14
PMU_VCCINAUX_VSENSE F14
TP_PMU_AMUX_AY J14
NC_PMU_AMUX_B0 D13
PMU_VCCINAUX_ISENSE E13
NC_PMU_AMUX_B2 E12
NC_PMU_AMUX_B3 F13
NC_PMU_AMUX_B4 G13
NC_PMU_AMUX_B5 G14
NC_PMU_AMUX_B6 H14
NC_PMU_AMUX_B7 H13
TP_PMU_AMUX_BY J13
AMUX_A0
AMUX_A1
AMUX_A2
AMUX_A3
AMUX_A4
AMUX_A5
AMUX_A6
AMUX_A7
AMUX_AY
AMUX_B0
AMUX_B1
AMUX_B2
AMUX_B3
AMUX_B4
AMUX_B5
AMUX_B6
AMUX_B7
AMUX_BY

NC N9 LS_BID1 (IPU)
NC M10 LS_BID2 (IPU)

R8013 0 1/20W 0201 5% MF
PMU_XTAL1_R
CRITICAL Y8001 32.768KHZ-20PPM-12.5PF 1.60X1.00-SM
NOSTUFF
R8018 1M 5% 1/20W MF 201
C8002 18PF 5% 25V C0G-CERM 0201
C8003 18PF 5% 25V C0G-CERM 0201
PMU_XTAL1
PMU_XTAL2
XTAL1 V3
XTAL2 V4

CPU_CATERR_L
SYS_ERR* L6

PMU_VDD_MAX
CRITICAL C8004 0.1UF 10% 6.3V X6S 0201
VDD_MAX N8
VDD_OTP E6

IREF L12 PMU_IREF
VREF K12 PMU_VREF
CRITICAL C8001 0.1UF 10% 6.3V X6S 0201
R8001 200K 1% 1/20W MF 201

VDROOP L7 PMU_DROOP_L
VDROOP_DET M5 SOC_VDDCPU_SENSE
CHG_CBC_ON D9 CHGR_CBC_ON
NCHG_INT J6 CHGR_INT_L
CHG_POK L4 GND
VPWR_EN D5 PMU_PVDDMAIN_EN
LDO1_POK M13 PCH_RTC_RESET_L
PFN D8 NC
VIN_BBAT V6 GND

To be Grounded on Portables Only, RC on Coin Cell on Desktops

(IPU) BUTTON1 N7 PMU_ONOFF_L
(IPU) BUTTON2 M6 PMU_RSLOC_RST_L

PP3V3_G3H_RTC
NAND_MODE_1V2
R8040 100K 5% 1/20W MF 201

GPIO1 E9 P3V3MAIN_PGOOD
GPIO2 E8 NC_P3V3G3W_EN
GPIO3 E7 NAND_MODE_1V2_EN
GPIO4 F6 P5VG3S_EN
GPIO5 F7 P5VG3S_PGOOD
GPIO6 F8 P3V3G3S_EN
GPIO7 F9 P1V8G3S_EN
GPIO8 F10 CPUVR_PGOOD
GPIO9 G10 VCCINAUX_PGOOD
GPIO10 G9 PVCCST_EN
GPIO11 G8 PVDDQ_EN
GPIO12 G7 PVDDQ_PGOOD
GPIO13 G6 AUD_PWR_EN
GPIO14 H8 WLAN_PWR_EN
GPIO15 H9 BT_PWR_EN
GPIO16 J9 SE_PWR_EN
GPIO17 J8 SENSOR_PWR_EN
GPIO18 K9 PD_PVCCPLLOC_EN
GPIO19 K10 PVCCNAND_PGOOD
GPIO20 J10 PVCCNAND_EN
GPIO21 H10 NAND_DISCHARGE_EN
GPIO22 H11 NAND_RESET_L
GPIO23 G11 UVP_DIS_L
GPIO24 F11 TBT_PWR_EN
GPIO25 E10 P1V1_SLPDDR_SOCFET_EN

P3V3G3S_EN
TBT_PWR_EN
PD_PVCCPLLOC_EN
NOSTUFF R8065 47K 5% 1/20W MF 201
R8060 47K 5% 1/20W MF 201
R8061 47K 5% 1/20W MF 201

P1V8G3S_EN
PMU_ACTIVE_READY
PVDDQ_EN
NOSTUFF R8062 47K 5% 1/20W MF 201
NOSTUFF R8063 47K 5% 1/20W MF 201
NOSTUFF R8064 47K 5% 1/20W MF 201

PP1V05_VCCST_OUT
PP3V3_G3H_RTC
PP1V8_AWAKE
PP1V8_PRIM_PCH
PP1V8_SLPS2R

R8002 10K PMU_COLD_RESET_L
R8003 10K PMU_SYS_ALIVE
R8005 1K ALL_SYS_PWRGD
R8006 10K PMU_DROOP_L
R8015 10K PMU_ONOFF_L
R8014 10K PMU_RSLOC_RST_L
R8017 51 NOSTUFF CPU_CATERR_L
1/20W 201 5% MF

PPBUS_G3H
R8050 887K 0.1% 1/20W TF 0201
PMU_VDD_HI
NOSTUFF C8051 220PF 5% 50V C0G 0201
R8051 357K 0.1% 1/20W MF 0201

Caution : AMUX programmed with Gain 1
should not have inputs greater than 1.5V

BOM_COST_GROUP=T290

SYNC_MASTER=X589_BIGSUR SYNC_DATE=03/16/2017

PAGE TITLE
PMIC GPIOs & Control

Apple Inc.

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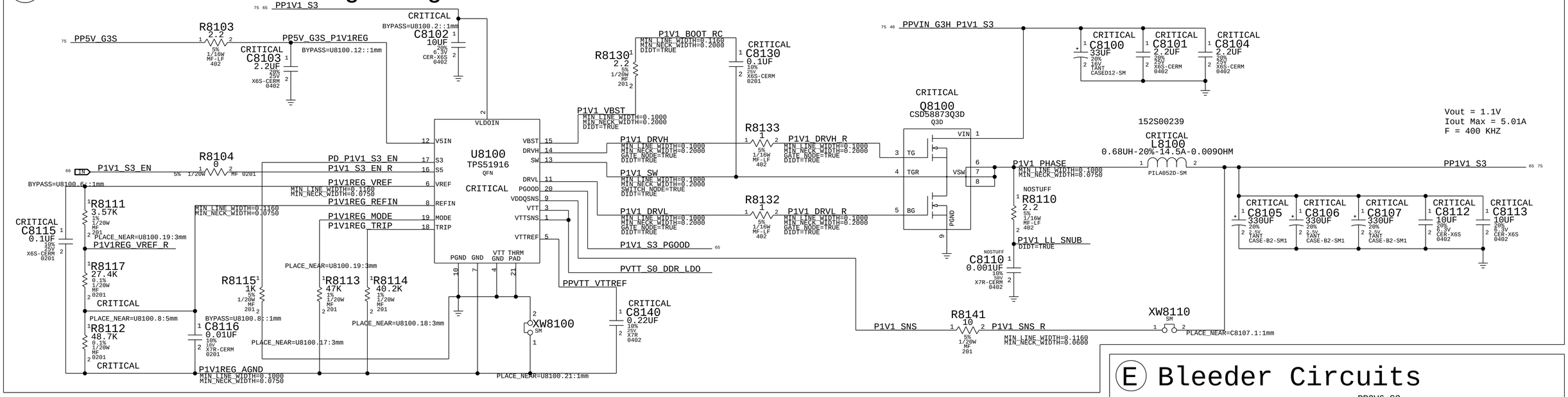
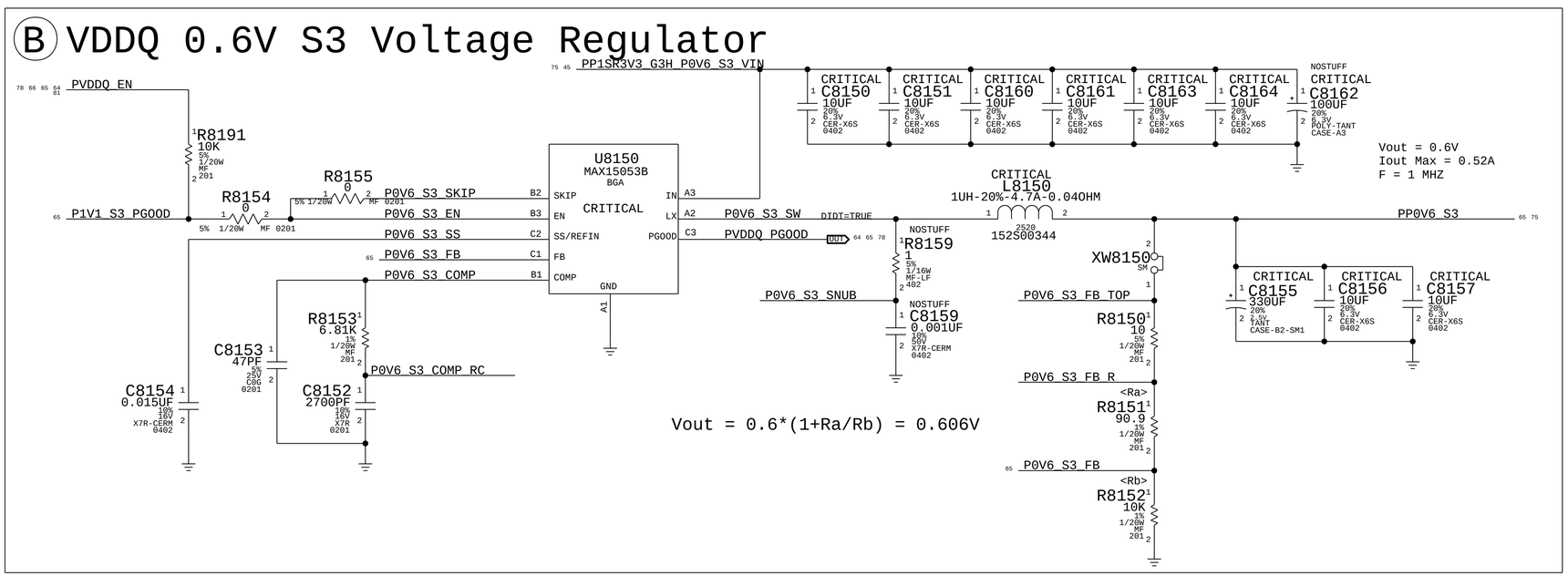
A VDD2 1.1V S3 Voltage Regulator

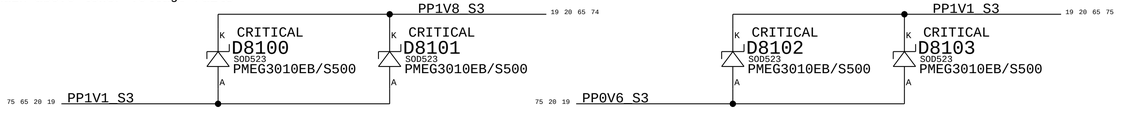


B VDDQ 0.6V S3 Voltage Regulator

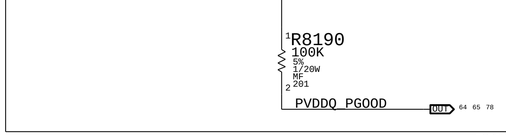


C Protection Diodes

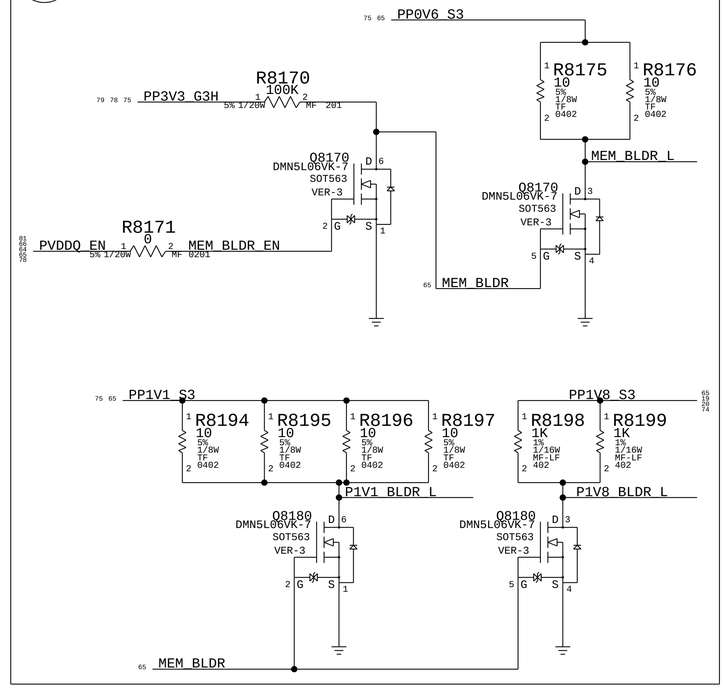
To ensure higher voltage rails
remain above lower voltage rails



D PVDDQ PGOOD



E Bleeder Circuits



SYNC_MASTER=X589_CPU_CNL_Y SYNC_DATE=10/12/2018

PAGE TITLE: POWER - MEMORY VRs

Apple Inc.

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BRANCH: proto4b
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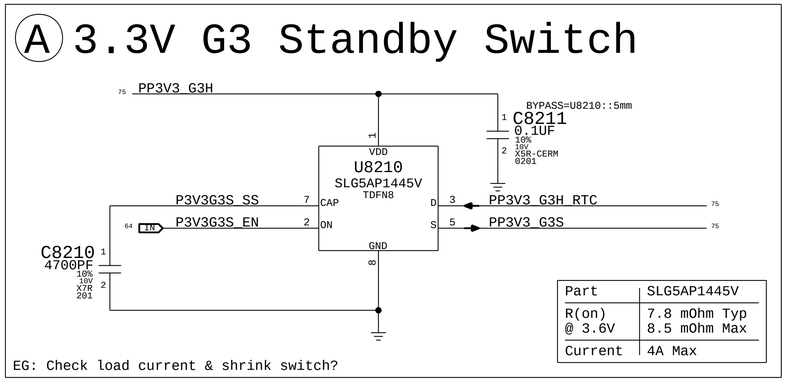
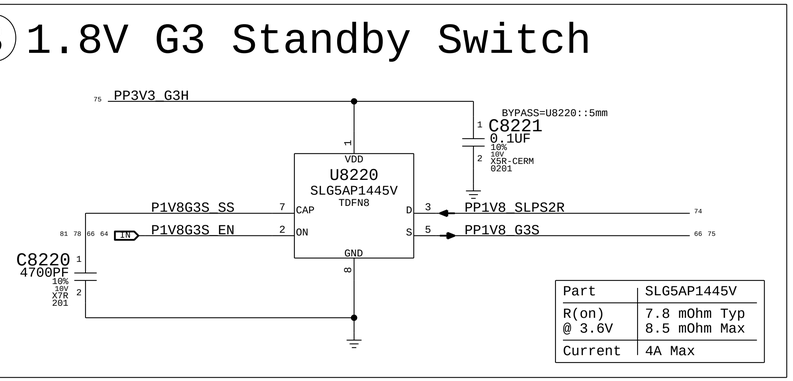
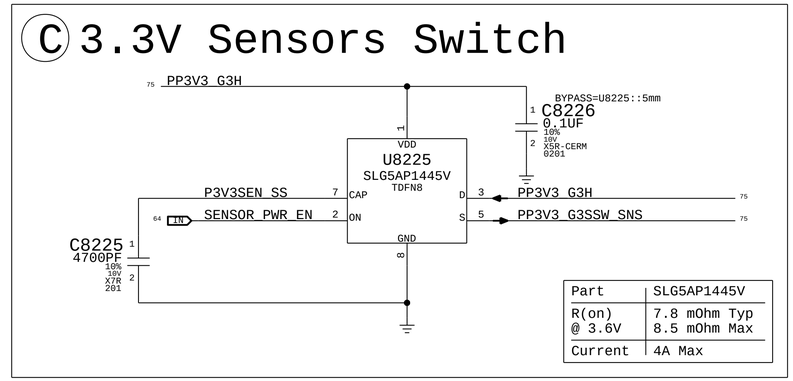
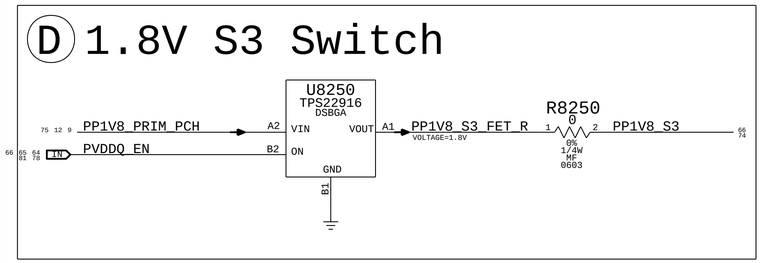
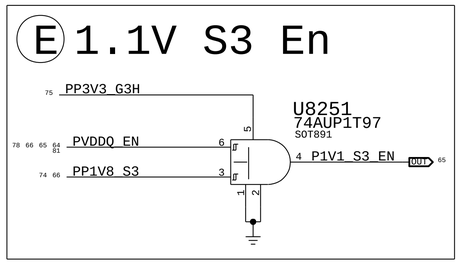
BOM_COST_GROUP=PLATFORM POWER

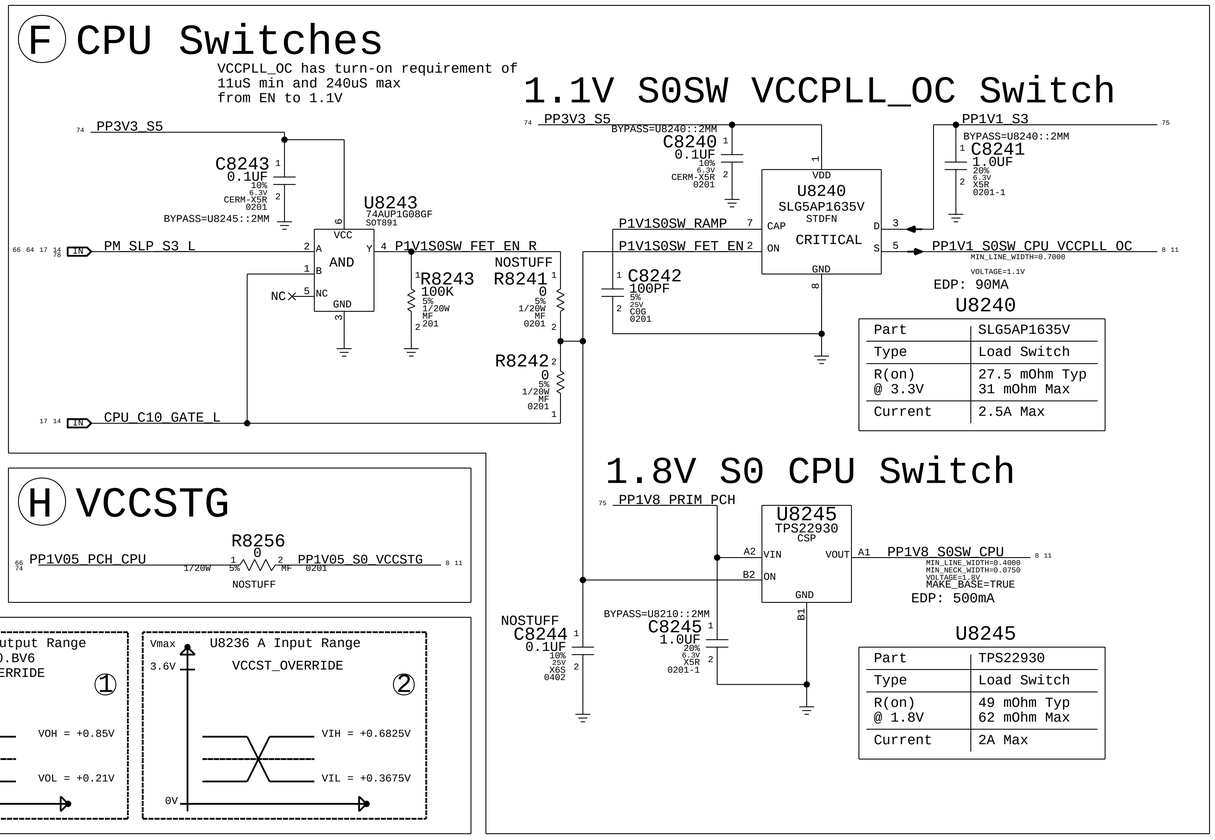


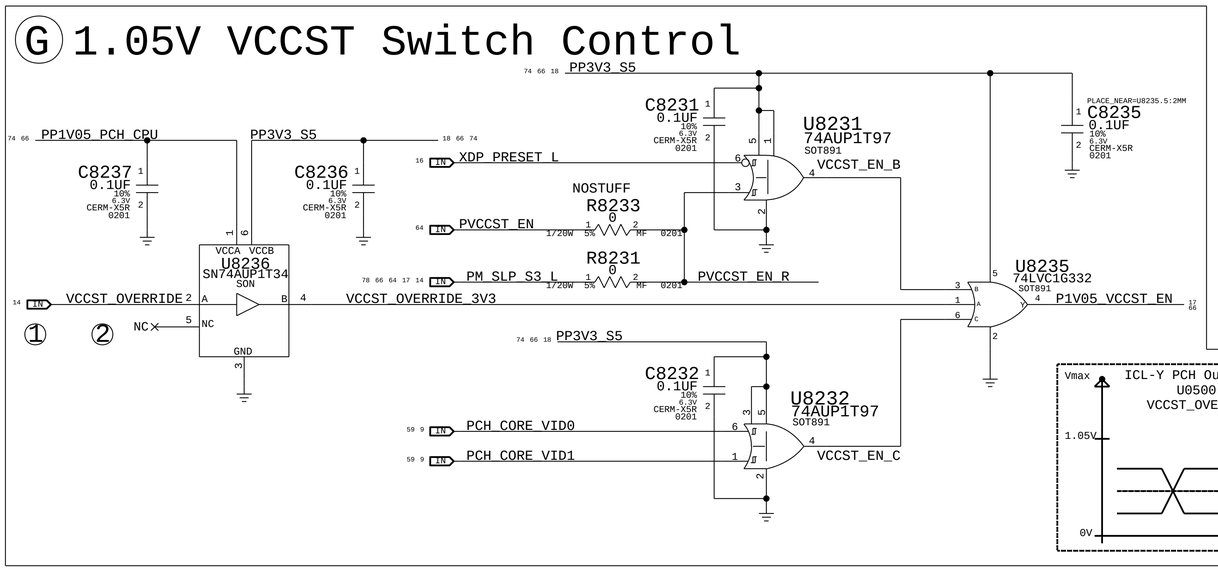


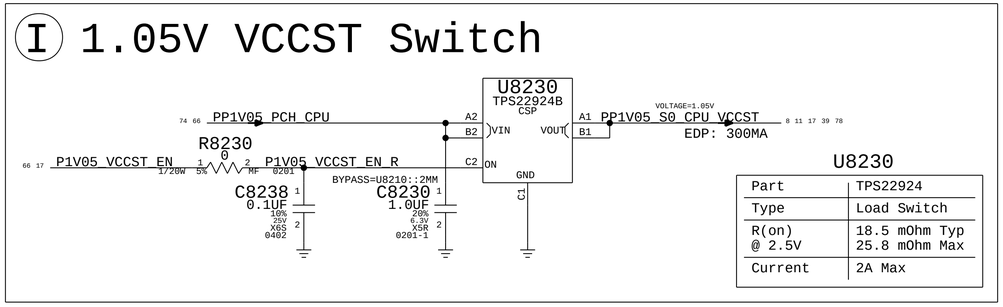


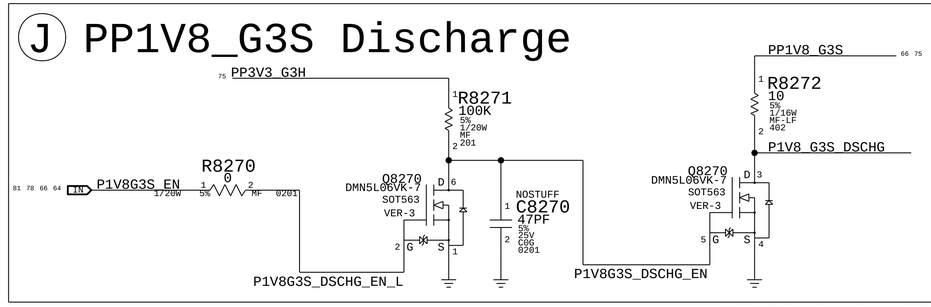












PAGE TITLE
Power FETs

Apple Inc.

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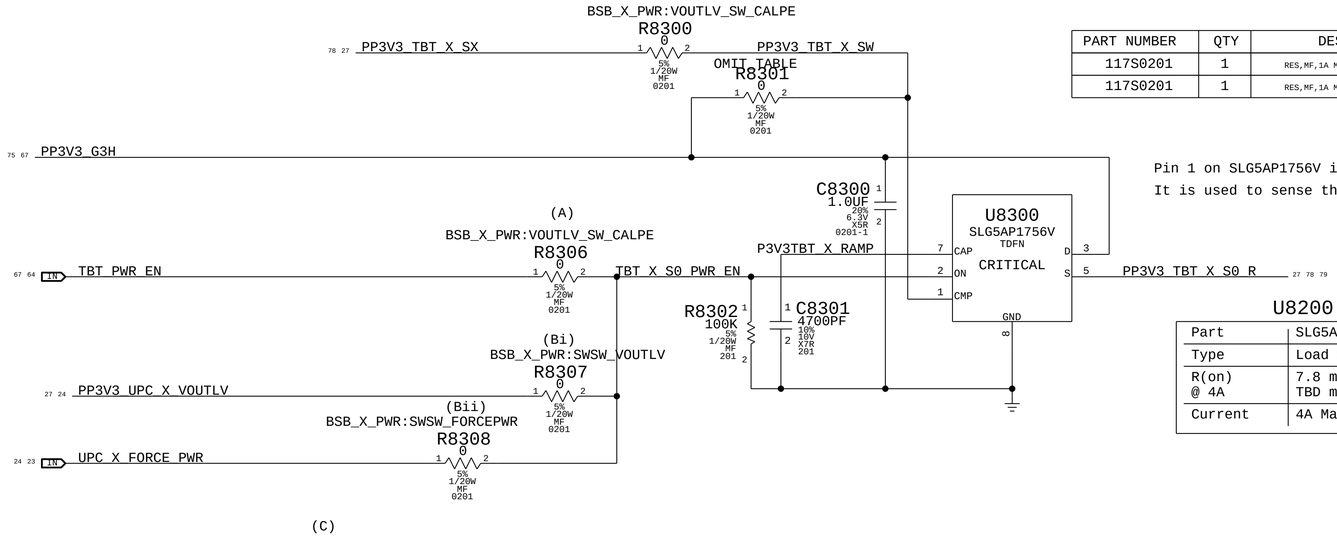
3.3V S0SW TBT Switch



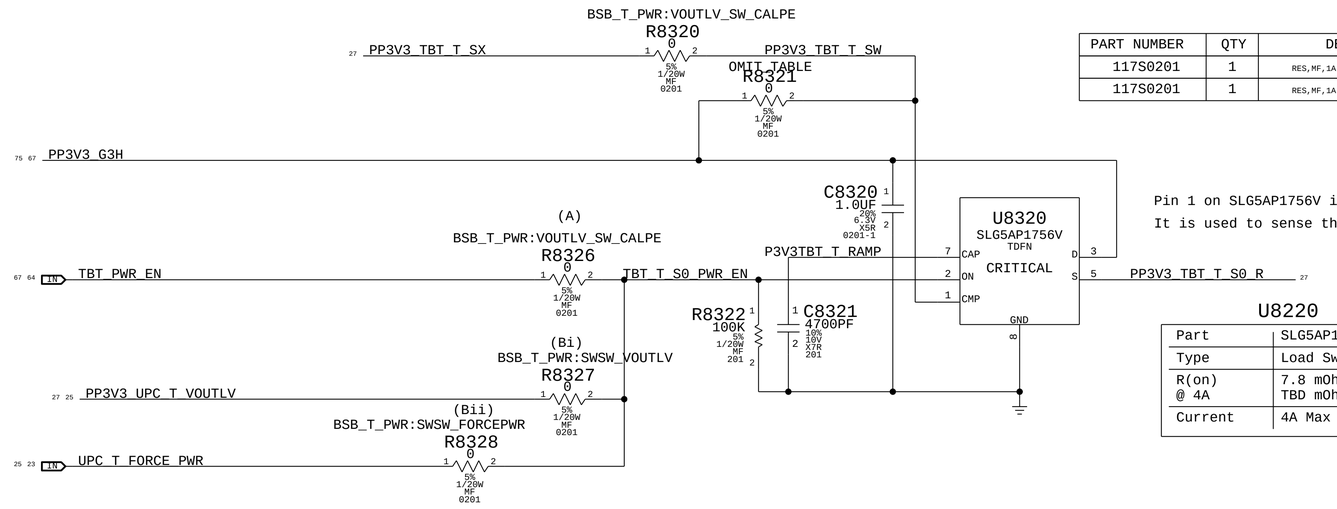
PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
117S0201	1	RES,MF,1A MAX,0.0 OHM,5%,0201,BLACK	R8301		BSB_X_PWR:SWSW_VOUTLV
117S0201	1	RES,MF,1A MAX,0.0 OHM,5%,0201,BLACK	R8301		BSB_X_PWR:SWSW_FORCEPWR

Pin 1 on SLG5AP1756V is a comparator input.
It is used to sense the presense of the SX rail.

U8200

Part	SLG5AP1756V
Type	Load Switch
R(on) @ 4A	7.8 mOhm Typ TBD mOhm Max
Current	4A Max

3.3V S0SW TBT Switch



PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
117S0201	1	RES,MF,1A MAX,0.0 OHM,5%,0201,BLACK	R8321		BSB_T_PWR:SWSW_VOUTLV
117S0201	1	RES,MF,1A MAX,0.0 OHM,5%,0201,BLACK	R8321		BSB_T_PWR:SWSW_FORCEPWR

Pin 1 on SLG5AP1756V is a comparator input.
It is used to sense the presense of the SX rail.

U8220

Part	SLG5AP1756V
Type	Load Switch
R(on) @ 4A	7.8 mOhm Typ TBD mOhm Max
Current	4A Max

BOM_COST_GROUP=PLATFORM POWER

SYNC_MASTER=CPU_CARD_ICL_Y SYNC_DATE=06/08/2018

PAGE TITLE: Power FETs TBT S0

Apple Inc.

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Page Notes

Power aliases required by this page:
- =PPVIN_S0SW_LCDBKLTFET (9-12.6V LCD BACKLIGHT INPUT)
- =PP5V_S0_BKLT (5V BACKLIGHT DRIVER INPUT)

PPBUS_G3H → F8400 3AMP-32V (740S0159) → PPVIN_S0SW_LCDBKLT_F → R8400 0.025 1% 1W MF 0612-1 (107S00034) → PPVIN_S0SW_LCDBKLT_R

PPVIN_S0SW_LCDBKLT_R: C8400 1000PF 10% 16V X7R-1 0201; R8401 80.6K 1% 1/16W MF-LF 402; Q8400 FDC638APZ_SBMS001 SSOT6-HF; NOSTUFF C8401 0.001UF 10% 50V X7R-CERM 0402

PPVIN_S0SW_LCDBKLT: MIN_LINE_WIDTH=2.0000 MIN_NECK_WIDTH=0.2000 VOLTAGE=12.6V MAKE_BASE=TRUE

C8413 12PF 5% 25V CERM 0201; C8414 3PF +/-0.1PF 25V C0G 0201

L8410 15UH-20%-1.9A-0.240HM (152S00253) PIME062D-SM

C8410 4.7UF 10% 25V X5S-CERM 0603; C8411 4.7UF 10% 25V X5S-CERM 0603; C8412 0.1UF 10% 25V X5R 402

PLACEMENT_NOTE: SANDWICH C8410 AND C8411

PPVIN_SW_LCDBKLT_SW: D8410 PMEG10020ELR-DFLS2100 SOD123-COMBO (371S00077); NOSTUFF C8402 12PF 5% 100V C0G 0201

XW8410 SM

LCDBKLT_TB_XWR: R8431 18.2K 1% 1/16W MF-LF 402; R8432 150K 1% 1/16W MF-LF 402; NOSTUFF C8432 100PF 5% 100V C0G-CERM 0603

L8420 FERR-470-OHM-0.2A 0402 OMIT_TABLE

PPVOUT_S0_LCDBKLT_F → PPVOUT_S0_LCDBKLT

CRITICAL C8460 2.2UF 10% 100V X5R-CERM 1206; CRITICAL C8461 2.2UF 10% 100V X5R-CERM 1206; CRITICAL C8462 2.2UF 10% 100V X5R-CERM 1206; CRITICAL C8463 2.2UF 10% 100V X5R-CERM 1206; CRITICAL C8464 2.2UF 10% 100V X5R-CERM 1206

CRITICAL C8465 2.2UF 10% 100V X5R-CERM 1206; CRITICAL C8466 2.2UF 10% 100V X5R-CERM 1206; CRITICAL C8467 2.2UF 10% 100V X5R-CERM 1206; CRITICAL C8468 2.2UF 10% 100V X5R-CERM 1206; CRITICAL C8469 2.2UF 10% 100V X5R-CERM 1206

CRITICAL C8470 2.2UF 10% 100V X5R-CERM 1206; CRITICAL C8471 2.2UF 10% 100V X5R-CERM 1206; CRITICAL C8472 2.2UF 10% 100V X5R-CERM 1206; CRITICAL C8473 2.2UF 10% 100V X5R-CERM 1206; C8474 12PF 5% 100V CERM 0402; C8475 12PF 5% 100V CERM 0402

C8476 3PF +/-0.1PF 100V C0G 0201; C8477 12PF 5% 100V C0G 0201; C8478 3PF +/-0.1PF 100V C0G 0201; C8479 12PF 5% 100V C0G 0201

Vout = 46V Typ, 55V Max
Iout = 0.12A Typ, 0.15A Max
Fs = 625kHz Typ (+/- 7%)

ISNS_LCDBKLT_P (OUT)
ISNS_LCDBKLT_N (OUT)

LCDBKLT_EN_L

PP5V_G3S → R8402 63.4K 1% 1/16W MF-LF 402

R8444 10 1% 1/16W MF-LF 402; R8445 10 1% 1/16W MF-LF 402

PP5V_S0_BKLT_A
PP5V_S0_BKLT_D

PLACE_NEAR=U8400.5:5MM
C8440 1UF 10% 10V X5R 402-1; C8441 1UF 10% 10V X5R 402-1
GND_BKLT_SGND
PLACE_NEAR=U8400.18:5MM

R8440 1M 5% 1/20W MF 201

U8400 LP8548B1SQ_-04 LLP

SD	11	SW	2
VSENSE_N	9	SW	1
VSENSE_P	10	FB	21
SENSE_OUT	19	GD	4
EN	17	ISET_KEYB	20
PWM_KEYB	12	KEYB1	13
SCL (IPU)	15	KEYB2	14
SDA (IPU)	16	SW2	6
		FB2	8
		VDDD	5
		VDDA	18
		GND_SW	24
		GND_SW	23
		GND_SW2	7
		GNDD	3
		GNDA	22
		THRM PAD	25

BKLT_SD
BKLT_SENSE_OUT
LCDBKLT_SW
LCDBKLT_FB
LCDBKLT_FET_DRV

R8410 10 5% 1/16W MF-LF 402
LCDBKLT_FET_DRV_R
GATE_NODE=TRUE DIDT=TRUE

CRITICAL Q8401 SI7812DN PWRPK-1212-8
PLACE_NEAR=U8400.1:3MM

DIDT=TRUE SWITCH_NODE=TRUE VOLTAGE=55V MIN_NECK_WIDTH=0.2000 MIN_LINE_WIDTH=2.0000

PLATFORM_RESET NO LONGER GATES THE BKLT_EN AS BOTH COME FROM PCH NOW

EDP_BKLT_EN (IN) → R8442 0 5% 1/20W MF 0201 → BKLT_EN_R

NOSTUFF C8442 33PF 5% 25V NP0-C0G 0201 → GND_BKLT_SGND

UNUSED_LP8548_PWM → R8447 10K 5% 1/20W MF 201 → GND_BKLT_SGND

PP5V_G3S → R8452 1.8K 5% 1/20W MF 201; R8453 1.8K 5% 1/20W MF 201

PLACE_NEAR=U8400.15:10MM
R8450 0 5% 1/20W MF 0201 (CKPLUS_WAIVE=I2C_PULLUP) I2C_BKLT_SCL (IN) → I2C_BKLT_SCL_R

R8451 0 5% 1/20W MF 0201 (CKPLUS_WAIVE=I2C_PULLUP) I2C_BKLT_SDA (BI) → I2C_BKLT_SDA_R
PLACE_NEAR=U8400.16:10MM

I2C ID DEDICATED.ONLY CONNECTS TO JERRY

XW8400 SM → GND_BKLT_SGND
MIN_LINE_WIDTH=0.4000 MIN_NECK_WIDTH=0.2000 VOLTAGE=0V

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
116S0004	1	RES,MTL FILM,0 OHM,1A MAX,0402,SMD	L8420		

LINE WIDTHS

PP5V_S0_BKLT_A: MIN_LINE_WIDTH=0.0750 MIN_NECK_WIDTH=0.0750 VOLTAGE=5V
PP5V_S0_BKLT_D: MIN_LINE_WIDTH=0.0750 MIN_NECK_WIDTH=0.0750 VOLTAGE=5V

PBUS LINE WIDTHS

PPVIN_S0SW_LCDBKLT_F: MIN_LINE_WIDTH=2.0000 MIN_NECK_WIDTH=0.2000 VOLTAGE=12.9V
PPVIN_S0SW_LCDBKLT_R: MIN_LINE_WIDTH=2.0000 MIN_NECK_WIDTH=0.2000 VOLTAGE=12.9V
PPVIN_S0SW_LCDBKLT: MIN_LINE_WIDTH=2.0000 MIN_NECK_WIDTH=0.2000 VOLTAGE=12.9V

LCD BKLT LINE WIDTHS

LCDBKLT_FET_DRV: MIN_LINE_WIDTH=0.6000 MIN_NECK_WIDTH=0.2000 VOLTAGE=5V GATE_NODE=TRUE DIDT=TRUE
PPVIN_SW_LCDBKLT_SW: MIN_LINE_WIDTH=2.0000 MIN_NECK_WIDTH=0.1200 VOLTAGE=55V SWITCH_NODE=TRUE DIDT=TRUE
PPVOUT_S0_LCDBKLT: MIN_LINE_WIDTH=0.5000 MIN_NECK_WIDTH=0.1500 VOLTAGE=55V
PPVOUT_S0_LCDBKLT_F (LM51): MIN_LINE_WIDTH=0.5000 MIN_NECK_WIDTH=0.1500 VOLTAGE=55V

BOM_COST_GROUP=DISPLAY

PAGE TITLE: LCD Backlight Driver

Apple Inc.

DRAWING NUMBER: 051-05232 SIZE: D
REVISION: 2.0.0
BRANCH: proto4b
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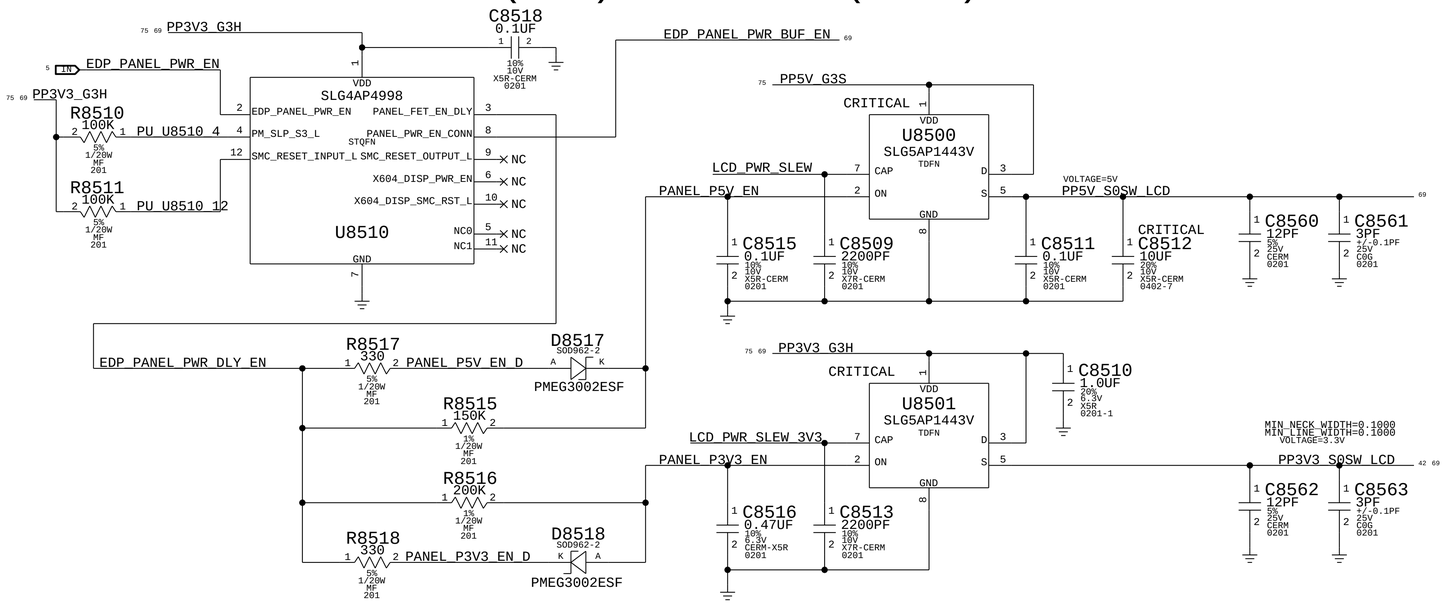
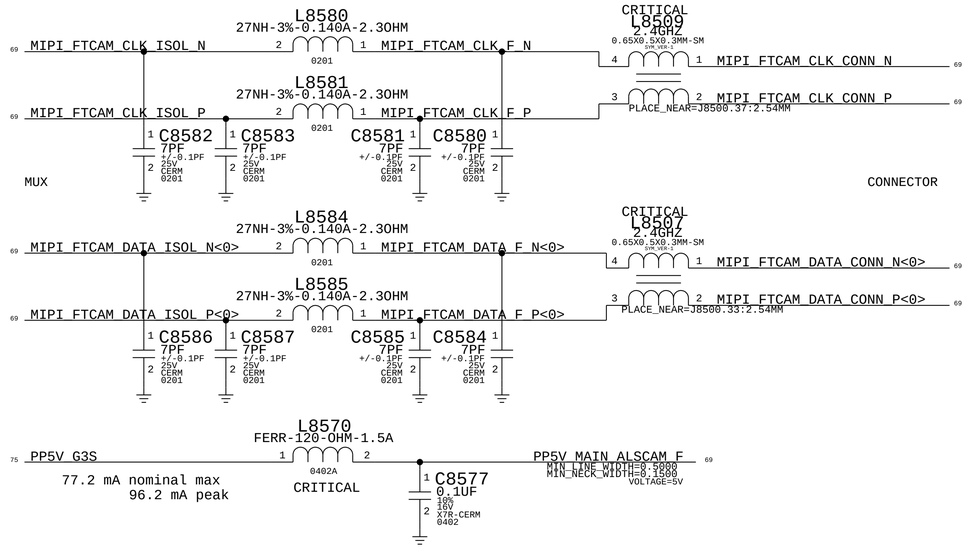
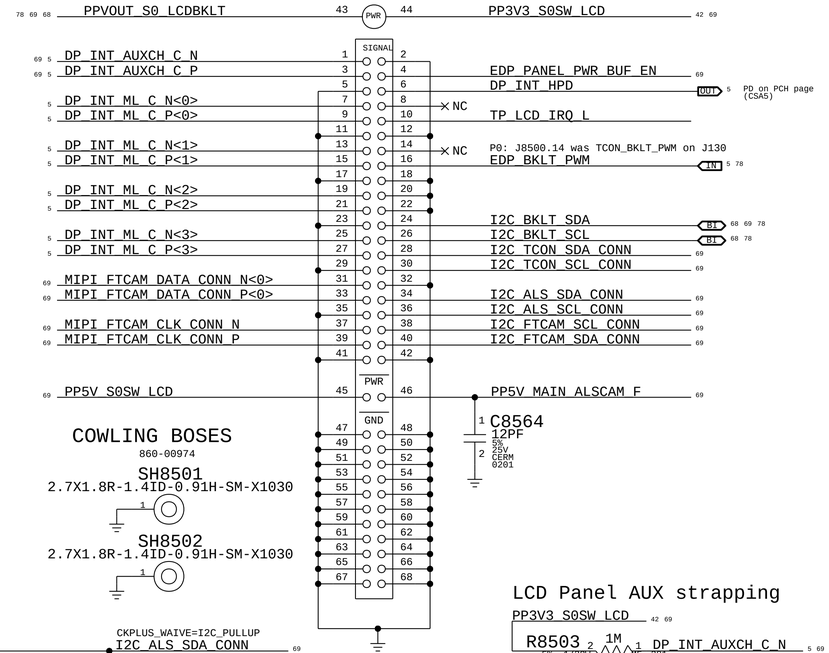
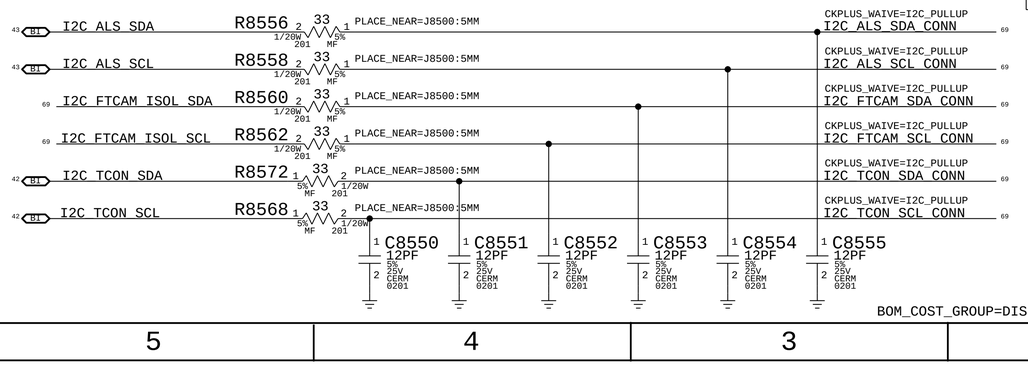
LCD PANEL INTERFACE (eDP) + Camera (MIPI)

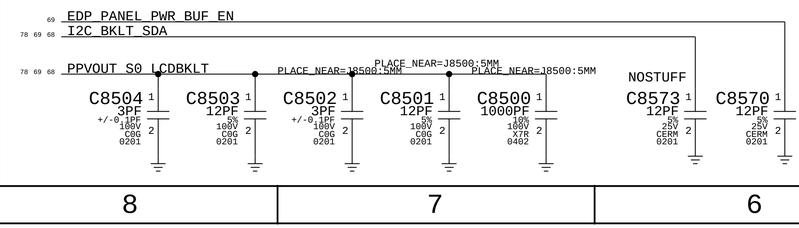




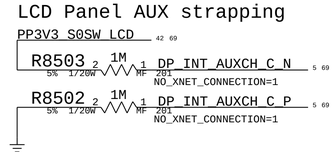


FTCAM Secure Disable





LCD Panel AUX strapping



SYNC_MASTER=X1032_MLB_P48P SYNC_DATE=12/06/2018

PAGE TITLE: eDP Display Connector

Apple Inc.

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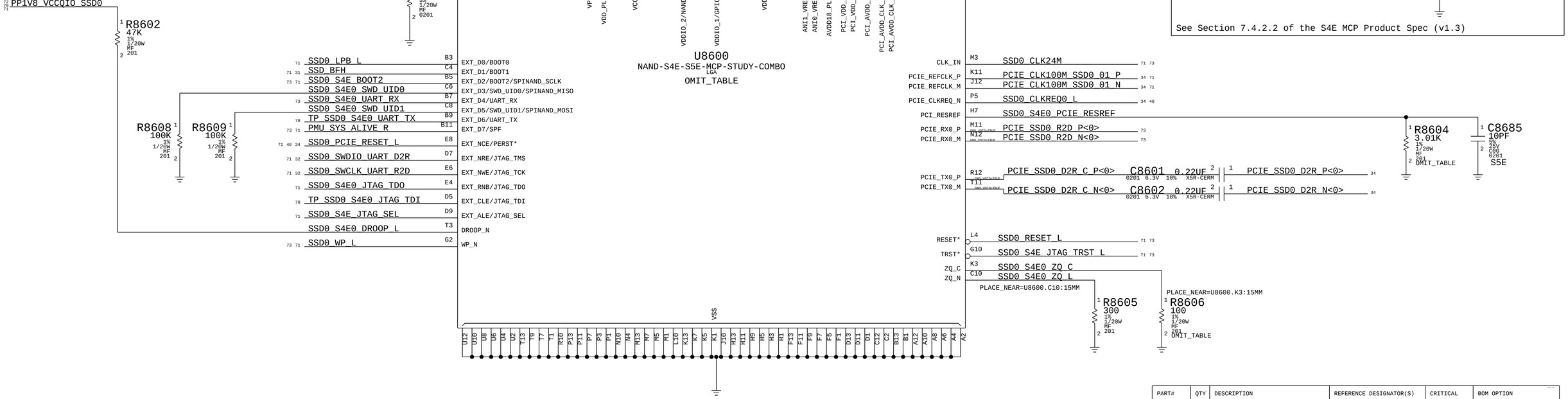
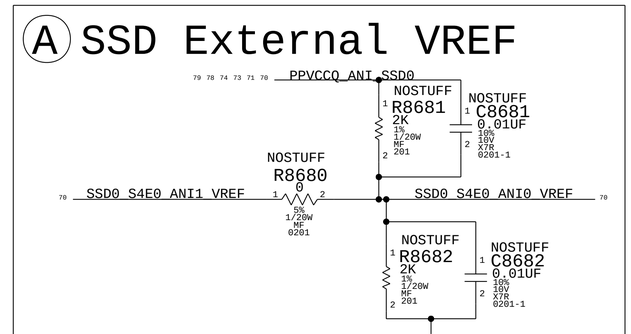
S4E0



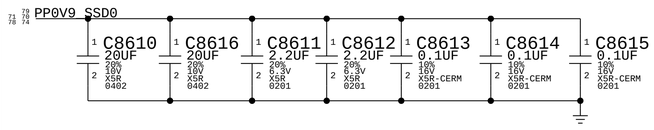
A SSD External VREF



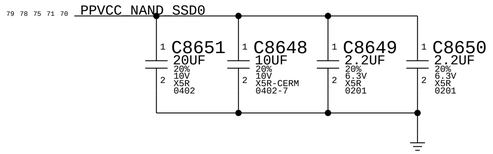
See Section 7.4.2.2 of the S4E MCP Product Spec (v1.3)

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
118S0279	1	RES,3.01KOHM,1%,1/20W,0201	R8604	CRITICAL	S4E
103S00429	1	RES,200OHM,0.1%,1/20W,0201	R8604	CRITICAL	S5E
118S0011	1	RES,100OHM,1%,1/20W,0201	R8606	CRITICAL	S4E
118S0273	1	RES,300OHM,1%,1/20W,0201	R8606	CRITICAL	S5E
117S0201	2	RES,0OHM,1/20W,0201	R8683,R8610,R8611	CRITICAL	S4E
155S00161	2	FERR BD,10OHM,0.05 DCR,0201	R8683,R8610	CRITICAL	S5E
118S0794	1	RES,MF,2OHM,1%,1/20W,0201	R8611	CRITICAL	S5E

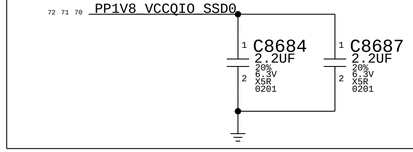
B S4E VDD Decoupling



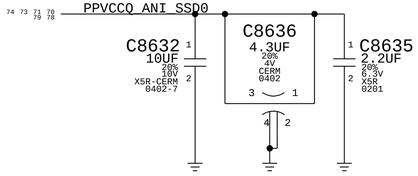
C S4E VCC Decoupling



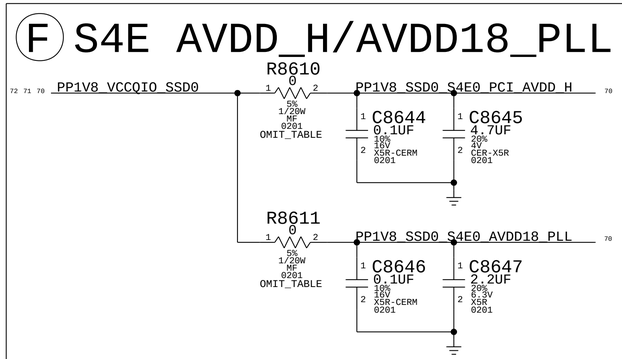
D S4E VDDIO_1



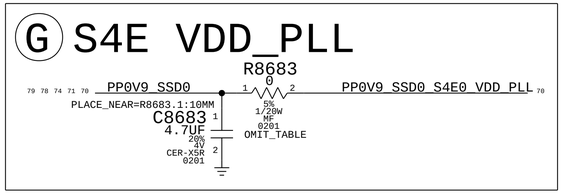
E S4E VDDIO_2



F S4E AVDD_H/AVDD18_PLL



G S4E VDD_PLL



BOM_COST_GROUP=SSD

PAGE TITLE: S4E<0>

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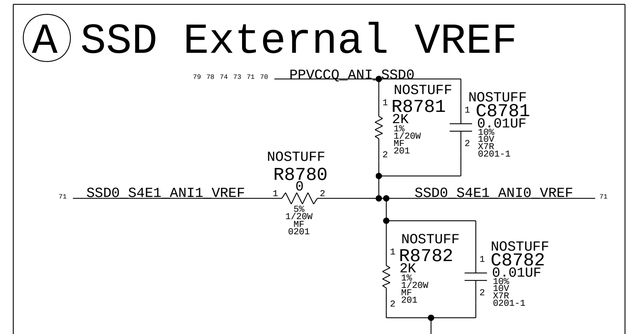
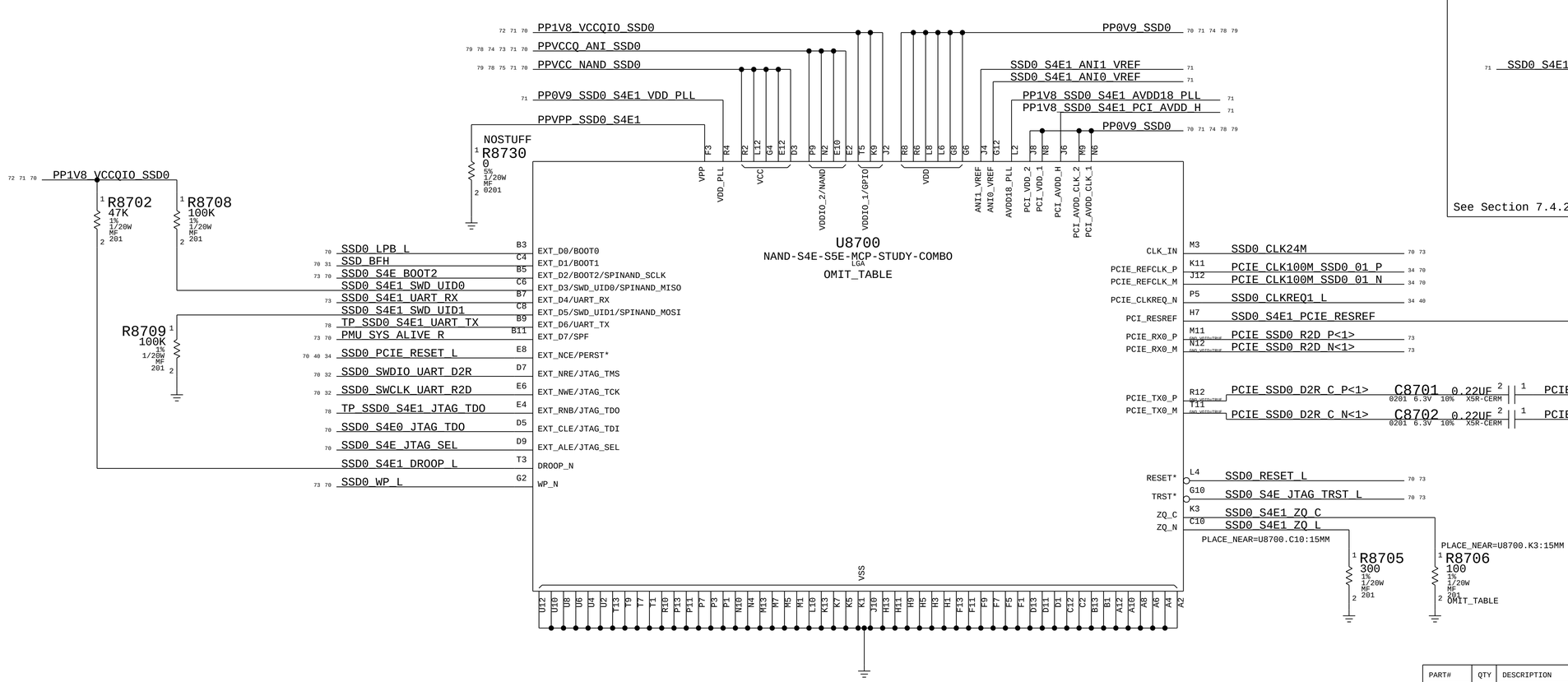
S4E1

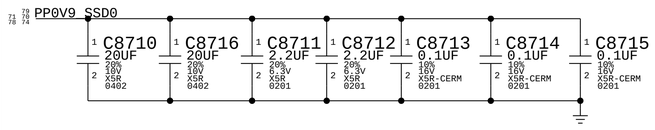
A SSD External VREF



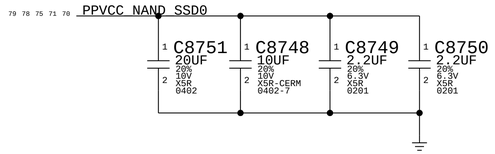
See Section 7.4.2.2 of the S4E MCP Product Spec (v1.3)



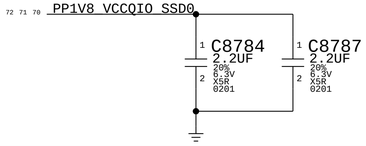
B S4E VDD Decoupling



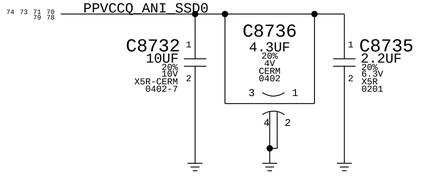
C S4E VCC Decoupling



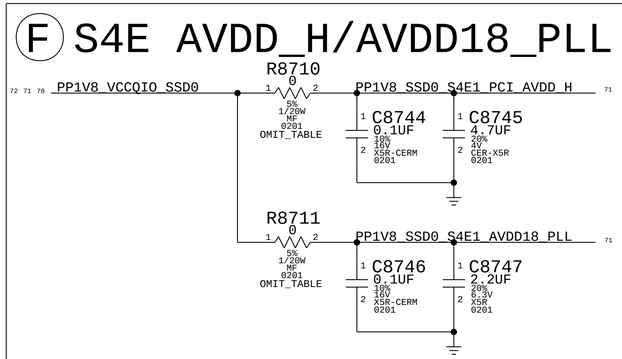
D S4E VDDIO_1



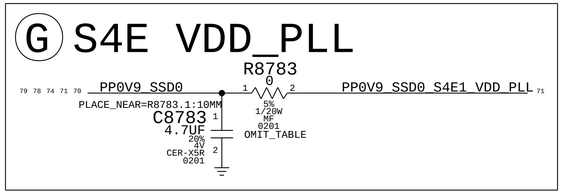
E S4E VDDIO_2



F S4E AVDD_H/AVDD18_PLL



G S4E VDD_PLL



BOM_COST_GROUP=SSD

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
118S0279	1	RES,3.01KOHM,1%,1/20W,0201	R8704	CRITICAL	S4E
103S00429	1	RES,200OHM,0.1%,1/20W,0201	R8704	CRITICAL	S5E
118S0011	1	RES,100OHM,1%,1/20W,0201	R8706	CRITICAL	S4E
118S0273	1	RES,300OHM,1%,1/20W,0201	R8706	CRITICAL	S5E
117S0201	2	RES,0OHM,1/20W,0201	R8783,R8710,R8711	CRITICAL	S4E
155S00161	2	FERR BD,10OHM,0.05 DCR,0201	R8783,R8710	CRITICAL	S5E
118S0794	1	RES,MF,2OHM,1%,1/20W,0201	R8711	CRITICAL	S5E

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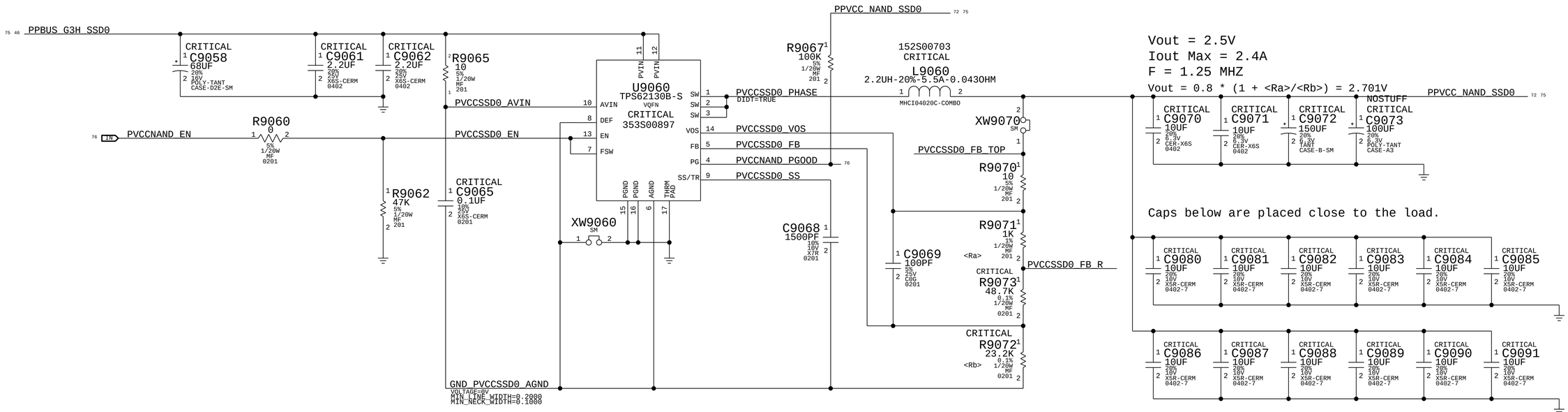
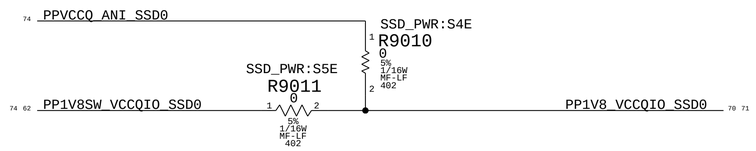
A NAND VCC (PPVCC_NAND_SSD0) Voltage Regulator



B NAND VCCQ I/O Selector



BOM_COST_GROUP=SSD

SYNC_MASTER=psm SYNC_DATE=10/18/2018

PAGE TITLE: NAND VCC VR

Apple Inc.

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A SSD PCIE AC Coupling Caps

(All Caps)
GND_VOID=TRUE

34 OUT	PCIE_SSD0_R2D_C_P<0>	C9110 0.22UF	20% 6.3V X5R 0201	PCIE_SSD0_R2D_P<0>	70
34 OUT	PCIE_SSD0_R2D_C_N<0>	C9111 0.22UF	20% 6.3V X5R 0201	PCIE_SSD0_R2D_N<0>	70
34 OUT	PCIE_SSD0_R2D_C_P<1>	C9112 0.22UF	20% 6.3V X5R 0201	PCIE_SSD0_R2D_P<1>	71
34 OUT	PCIE_SSD0_R2D_C_N<1>	C9113 0.22UF	20% 6.3V X5R 0201	PCIE_SSD0_R2D_N<1>	71

B SSD PCIE Net Aliases

34 OUT	NC_S4E3_PCIE_R2D_CP<2>	MAKE_BASE=TRUE NO_TEST=1	NC_S4E3_PCIE_R2D_CP<2>
34 OUT	NC_S4E3_PCIE_R2D_CN<2>	MAKE_BASE=TRUE NO_TEST=1	NC_S4E3_PCIE_R2D_CN<2>
34 IN	NC_S4E3_PCIE_D2RP<2>	MAKE_BASE=TRUE NO_TEST=1	NC_S4E3_PCIE_D2RP<2>
34 IN	NC_S4E3_PCIE_D2RN<2>	MAKE_BASE=TRUE NO_TEST=1	NC_S4E3_PCIE_D2RN<2>
34 OUT	NC_S4E3_PCIE_R2D_CP<3>	MAKE_BASE=TRUE NO_TEST=1	NC_S4E3_PCIE_R2D_CP<3>
34 OUT	NC_S4E3_PCIE_R2D_CN<3>	MAKE_BASE=TRUE NO_TEST=1	NC_S4E3_PCIE_R2D_CN<3>
34 IN	NC_S4E3_PCIE_D2RP<3>	MAKE_BASE=TRUE NO_TEST=1	NC_S4E3_PCIE_D2RP<3>
34 IN	NC_S4E3_PCIE_D2RN<3>	MAKE_BASE=TRUE NO_TEST=1	NC_S4E3_PCIE_D2RN<3>
34 IN	NC_PCIE_CLK100M_SSD0_23N	MAKE_BASE=TRUE NO_TEST=1	NC_PCIE_CLK100M_SSD0_23N
34 IN	NC_PCIE_CLK100M_SSD0_23P	MAKE_BASE=TRUE NO_TEST=1	NC_PCIE_CLK100M_SSD0_23P

C SSD Write Protect Control

79 78 74 71 70 PPVCCQ_ANI_SSD0

R9110 100 1% 1/20W MF 201

SSD0_WP_L 70 71

D SSD Miscellaneous Control

76 NAND_RESET_L — R9115 0 1/20W 5% MF 0201 — SSD0_RESET_L 70 71

64 32 31 PMU_SYS_ALIVE — R9117 0 1/20W 5% MF 0201 — PMU_SYS_ALIVE_R 70 71

E S4E Pull-Downs

SSD0_S4E_JTAG_TRST_L 70 71

SSD0_S4E_BOOT2 70 71

R9130 100K 1% 1/20W MF 201

R9131 100K 1% 1/20W MF 201

F S4E Control Aliases

40 SSD0_CLK24M (MAKE_BASE=TRUE) = SSD0_CLK24M 70 71

G SSD Discharge Circuit

75 PPVCC_NAND_SSD0

R9120 15.4 1% 1/10W MF-LF 603

R9121 15.4 1% 1/10W MF-LF 603

R9122 15.4 1% 1/10W MF-LF 603

R9123 15.4 1% 1/10W MF-LF 603

R9124 15.4 1% 1/10W MF-LF 603

R9125 15.4 1% 1/10W MF-LF 603

P2V7_SSD_DISCHARGE

Q9120 DMN2044UCB4 BGA

Q9121 DMN2044UCB4 BGA

76 NAND_DISCHARGE_EN

R9105 10K 5% 1/20W MF 201

NAND_DISCHARGE_EN_RC

R9106 10K 5% 1/20W MF 201

C9105 33000PF 10% 6.3V X5R 201

H SSD UART Test Points

70 SSD0_S4E0_UART_RX — PP9100 P3MM SM

71 SSD0_S4E1_UART_RX — PP9101 P3MM SM

BOM_COST_GROUP=SSD

PAGE TITLE: SSD Support

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PMIC Buck0 - SoC VDD_CPU

62 PPVDDCPU_AWAKE

Sourced from 3V3 G3H
Enabled by

PPVDDCPU_AWAKE
MIN_LINE_WIDTH=0.2000
MIN_NECK_WIDTH=0.0750
VOLTAGE=1.05V
MAKE_BASE=TRUE

PPVDDCPU_AWAKE 35

PMIC Buck1 - SoC VDD_CPU_SRAM

62 PPVDDCPUSRAM_AWAKE

Sourced from 3V3 G3H
Enabled by

PPVDDCPUSRAM_AWAKE
MIN_LINE_WIDTH=0.4000
MIN_NECK_WIDTH=0.0750
VOLTAGE=1.05V
MAKE_BASE=TRUE

PPVDDCPUSRAM_AWAKE 35

PMIC Buck2 - SoC VDD_SOC

62 PP0V82_SLPDDR

Sourced from 3V3 G3H
Enabled by

PP0V82_SLPDDR
MIN_LINE_WIDTH=0.7000
MIN_NECK_WIDTH=0.0750
VOLTAGE=0.82V
MAKE_BASE=TRUE

PP0V82_SLPDDR 35
PP0V82_SLPDDR 81

PMIC BUCK3 - SoC AOP/SMC/VDD1

81 62 PP1V8_SLPS2R

Sourced from 3V3 G3H
Enabled by

PP1V8_SLPS2R
MIN_LINE_WIDTH=0.1000
MIN_NECK_WIDTH=0.0750
VOLTAGE=1.8V
MAKE_BASE=TRUE

PP1V8_SLPS2R 62
PP1V8_SLPS2R 66
PP1V8_SLPS2R 63
PP1V8_SLPS2R 49
PP1V8_SLPS2R 39
PP1V8_SLPS2R 64
PP1V8_SLPS2R 40 53
PP1V8_SLPS2R 39
PP1V8_SLPS2R 31 40
PP1V8_SLPS2R 37
PP1V8_SLPS2R 37
PP1V8_SLPS2R 37
PP1V8_SLPS2R 37
PP1V8_SLPS2R 56
PP1V8_SLPS2R 42 55
PP1V8_SLPS2R 42
PP1V8_SLPS2R 40 49
PP1V8_SLPS2R 24
PP1V8_SLPS2R 25

PMIC BUCK3 SW 1

81 62 PP1V8_AWAKE

Sourced from PP1V8_SLPS2R
Enabled by

PP1V8_AWAKE
MIN_LINE_WIDTH=0.0900
MIN_NECK_WIDTH=0.0750
VOLTAGE=1.8V
MAKE_BASE=TRUE

PP1V8_AWAKE 64
PP1V8_AWAKE 39
PP1V8_AWAKE 37
PP1V8_AWAKE 37
PP1V8_AWAKE 37
PP1V8_AWAKE 37
PP1V8_AWAKE 37
PP1V8_AWAKE 34 39 40
PP1V8_AWAKE 39
PP1V8_AWAKE 54
PP1V8_AWAKE 23

PMIC BUCK3 SW 4 - VDD1

66 PP1V8_S3

Sourced from PP1V8_PRIM_PCH
Enabled by PVDDQ_EN

PP1V8_S3
MIN_LINE_WIDTH=0.1000
MIN_NECK_WIDTH=0.0750
VOLTAGE=1.8V
MAKE_BASE=TRUE

PP1V8_S3 19 20 65

PMIC BUCK3 SW 5 - SSD VCCQIO

74 72 62 PP1V8SW_VCCQIO_SSD0

Sourced from PP1V8_SLPS2R
Enabled by

PP1V8SW_VCCQIO_SSD0
MIN_LINE_WIDTH=0.1000
MIN_NECK_WIDTH=0.0750
VOLTAGE=1.8V
MAKE_BASE=TRUE

PP1V8SW_VCCQIO_SSD0 62 72 74

PMIC Buck4 - SDRAM VDD2

62 PP1V1_SLPS2R

Sourced from 3V3_G3H
Enabled by

PP1V1_SLPS2R
MIN_LINE_WIDTH=0.5000
MIN_NECK_WIDTH=0.0750
VOLTAGE=1.1V
MAKE_BASE=TRUE

PP1V1_SLPS2R 63
PP1V1_SLPS2R 63
PP1V1_SLPS2R 36
PP1V1_SLPS2R 37

U7901 - VDDIO_DDR & PLL

63 PP1V1_SLPDDR

Sourced from
Enabled by

PP1V1_SLPDDR
MIN_LINE_WIDTH=0.1000
MIN_NECK_WIDTH=0.0750
VOLTAGE=1.1V
MAKE_BASE=TRUE

PP1V1_SLPDDR 31
PP1V1_SLPDDR 36
PP1V1_SLPDDR 36
PP1V1_SLPDDR 37

PMIC Buck5 - VDD_FIXED

62 PP0V9_SLPDDR

Sourced from 3V3_G3H
Enabled by

PP0V9_SLPDDR
MIN_LINE_WIDTH=0.3000
MIN_NECK_WIDTH=0.0750
VOLTAGE=0.9V
MAKE_BASE=TRUE

PP0V9_SLPDDR 36
PP0V9_SLPDDR 36
PP0V9_SLPDDR 36
PP0V9_SLPDDR 36
PP0V9_SLPDDR 36
PP0V9_SLPDDR 81

PMIC Buck7 - VCCPRIM_CORE

62 PPVNN_PCH_EXT_REG

Sourced from 3V3_G3H
Enabled by

PPVNN_PCH_EXT_REG
MIN_LINE_WIDTH=0.0900
MIN_NECK_WIDTH=0.0750
VOLTAGE=1.0V
MAKE_BASE=TRUE

PPVNN_PCH_EXT_REG 46

PMIC Buck8 - VCCPRIM_1P0

62 PP1V05_PCH_EXT_REG

Sourced from 3V3_G3H
Enabled by

PP1V05_PCH_EXT_REG
MIN_LINE_WIDTH=4.5000
MIN_NECK_WIDTH=0.0750
VOLTAGE=1.05V
MAKE_BASE=TRUE

PP1V05_PCH_EXT_REG 62

PP1V05_PCH_EXT_REG 46

9 PP1V05_PCH_VCCPRIM

PP1V05_PCH_VCCPRIM
MIN_LINE_WIDTH=8.4000
MIN_NECK_WIDTH=0.0750
VOLTAGE=1.05V
MAKE_BASE=TRUE

PP1V05_PCH_VCCPRIM 9
PP1V05_PCH_VCCPRIM 9

9 PP1V05_PCH_CPU

PP1V05_PCH_CPU
MIN_LINE_WIDTH=2.7000
MIN_NECK_WIDTH=0.0750
VOLTAGE=1.05V
MAKE_BASE=TRUE

PP1V05_PCH_CPU 66

PMIC Buck9 - 0V9 SSD

62 PP0V9_SSD0

Sourced from 3V3 G3H
Enabled by

PP0V9_SSD0
MIN_LINE_WIDTH=0.4000
MIN_NECK_WIDTH=0.0750
VOLTAGE=0.9V
MAKE_BASE=TRUE

PP0V9_SSD0 81

PMIC Buck10 - 1V8 SSD

62 PPVCCQ_ANI_SSD0

Sourced from 3V3 G3H
Enabled by

PPVCCQ_ANI_SSD0
MIN_LINE_WIDTH=0.4000
MIN_NECK_WIDTH=0.0750
VOLTAGE=1.8V
MAKE_BASE=TRUE

PPVCCQ_ANI_SSD0 72
PPVCCQ_ANI_SSD0 81

PMIC LDO0 - VDD_LOW

63 PP0V8_SLPS2R

Sourced from PP1V1_SLP2R
Enabled by

PP0V8_SLPS2R
MIN_LINE_WIDTH=0.1000
MIN_NECK_WIDTH=0.0750
VOLTAGE=0.8V
MAKE_BASE=TRUE

PP0V8_SLPS2R 36

PMIC LDO1 - PCH VCCRTC

63 PP3V_G3H

Sourced from PP3V3_G3H
Enabled by

PP3V_G3H
MIN_LINE_WIDTH=0.1000
MIN_NECK_WIDTH=0.0750
VOLTAGE=3V
MAKE_BASE=TRUE

PP3V_G3H 9 12

PMIC LDO2 - PCIE_REFBUF/PLL

63 PP1V2_AWAKE

Sourced from PP1V8_SLPS2R
Enabled by

PP1V2_AWAKE
MIN_LINE_WIDTH=0.1000
MIN_NECK_WIDTH=0.0750
VOLTAGE=1.2V
MAKE_BASE=TRUE

PP1V2_AWAKE 37
PP1V2_AWAKE 37
PP1V2_AWAKE 37
PP1V2_AWAKE 37

PMIC V3P3 SW 1 - USB

63 PP3V3_AWAKE

Sourced from 3V3_G3H
Enabled by

PP3V3_AWAKE
MIN_LINE_WIDTH=0.1000
MIN_NECK_WIDTH=0.0750
VOLTAGE=3.3V
MAKE_BASE=TRUE

PP3V3_AWAKE 37

PMIC V3P3 SW 2 - VCCDSW_3P3, VCCPRIM_3P3

63 PP3V3_S5

Sourced from 3V3_G3H
Enabled by

PP3V3_S5
MIN_LINE_WIDTH=0.1500
MIN_NECK_WIDTH=0.0750
VOLTAGE=3.3V
MAKE_BASE=TRUE

PP3V3_S5 66
PP3V3_S5 66
PP3V3_S5 18 66 74
PP3V3_S5 17
PP3V3_S5 18 66 74
PP3V3_S5 18
PP3V3_S5 39
PP3V3_S5 5 13 14 17 18 42
PP3V3_S5 9 42 59
PP3V3_S5 9
PP3V3_S5 9 12

PP3V3_S5 40

PAGE TITLE

Power Aliases - 1

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PBUS Rails

U7000 - PBUS

56 PPBUS_G3H

PPBUS_G3H
MIN_LINE_WIDTH=0.1000
MIN_NECK_WIDTH=0.2000
VOLTAGE=13.1V
MAKE_BASE=TRUE
78 79

PPBUS_G3H 44
PPBUS_G3H 44
PPBUS_G3H 55
PPBUS_G3H 68
PPBUS_G3H 44

PPBUS_G3H 44
PPBUS_G3H 49
PPBUS_G3H 46
PPBUS_G3H 53 75
PPBUS_G3H 44
PPBUS_G3H 64

PPBUS_G3H 40

44 PPBUS_HS_CPU

PPBUS_HS_CPU
MIN_LINE_WIDTH=0.2000
MIN_NECK_WIDTH=0.0750
VOLTAGE=13.1V
MAKE_BASE=TRUE
79

PPBUS_HS_CPU 57
PPBUS_HS_CPU 58
PPBUS_HS_CPU 59
PPBUS_HS_CPU 61
PPBUS_HS_CPU 46

23 PPDCIN_G3H

PPDCIN_G3H
MIN_LINE_WIDTH=0.0900
MIN_NECK_WIDTH=0.0750
VOLTAGE=20V
MAKE_BASE=TRUE
56 78 79

PPDCIN_G3H 56
PPDCIN_G3H 44

U7550 - 5V G3S

60 PP5V_G3S

Sourced from PBus
Enabled by P5VG3S_EN

PP5V_G3S
MIN_LINE_WIDTH=0.0900
MIN_NECK_WIDTH=0.0750
VOLTAGE=5V
MAKE_BASE=TRUE
59 60 78 79

PP5V_G3S 53
PP5V_G3S 65
PP5V_G3S 69
PP5V_G3S 68
PP5V_G3S 48
PP5V_G3S 69
PP5V_G3S 57 58
PP5V_G3S 51

PP5V_G3S 24
PP5V_G3S 24
PP5V_G3S 25
PP5V_G3S 25

U7550 - 5V LDO - UNUSED

60 PP5V_S5_LDO

PP5V_S5_LDO
MIN_LINE_WIDTH=0.0900
MIN_NECK_WIDTH=0.0750
VOLTAGE=5V
MAKE_BASE=TRUE

Sensed Rails

60 44 PPVIN_G3H_P5VG3S

PPVIN_G3H_P5VG3S
MIN_LINE_WIDTH=0.1000
MIN_NECK_WIDTH=0.2000
VOLTAGE=13.1V
MAKE_BASE=TRUE
79

60 44 PPVIN_G3H_P3V3G3H

PPVIN_G3H_P3V3G3H
MIN_LINE_WIDTH=0.1000
MIN_NECK_WIDTH=0.2000
VOLTAGE=13.1V
MAKE_BASE=TRUE
79

55 PPVIN_G3H_P3V3G3HRTC

PPVIN_G3H_P3V3G3HRTC
MIN_LINE_WIDTH=0.1000
MIN_NECK_WIDTH=0.2000
VOLTAGE=13.1V
MAKE_BASE=TRUE

62 45 PP3V3_G3H_PMU_VDDMAIN

PP3V3_G3H_PMU_VDDMAIN
MIN_LINE_WIDTH=0.1000
MIN_NECK_WIDTH=0.2000
VOLTAGE=3.3V
MAKE_BASE=TRUE
79

45 29 PP3V3_G3S_WLANBT

PP3V3_G3S_WLANBT
MIN_LINE_WIDTH=0.1000
MIN_NECK_WIDTH=0.2000
VOLTAGE=3.3V
MAKE_BASE=TRUE
78

65 45 PP1SR3V3_G3H_P0V6_S3_VIN

PP1SR3V3_G3H_P0V6_S3_VIN
MIN_LINE_WIDTH=0.1000
MIN_NECK_WIDTH=0.2000
VOLTAGE=3.3V
MAKE_BASE=TRUE

72 46 PPBUS_G3H_SSD0

PPBUS_G3H_SSD0
MIN_LINE_WIDTH=0.1000
MIN_NECK_WIDTH=0.2000
VOLTAGE=13.1V
MAKE_BASE=TRUE

75 53 PPBUS_G3H

PPBUS_G3H
MIN_LINE_WIDTH=0.1000
MIN_NECK_WIDTH=0.2000
VOLTAGE=13.1V
MAKE_BASE=TRUE
79

65 46 PPVIN_G3H_P1V1_S3

PPVIN_G3H_P1V1_S3
MIN_LINE_WIDTH=0.1000
MIN_NECK_WIDTH=0.2000
VOLTAGE=13.1V
MAKE_BASE=TRUE

Digital Ground

GND
VOLTAGE=0V
MIN_LINE_WIDTH=0.0900
MIN_NECK_WIDTH=0.0750

3V3 Rails

U6960 - 3V3_G3H_RTC

55 PP3V3_G3H_RTC

Sourced from PBus
Enabled by CHGR_EN_MVR

PP3V3_G3H_RTC
MIN_LINE_WIDTH=0.2000
MIN_NECK_WIDTH=0.0750
VOLTAGE=3.3V
MAKE_BASE=TRUE
59 78

PP3V3_G3H_RTC 66
PP3V3_G3H_RTC 63
PP3V3_G3H_RTC 49

PP3V3_G3H_RTC 55
PP3V3_G3H_RTC 64
PP3V3_G3H_RTC 55
PP3V3_G3H_RTC 23 24 27
PP3V3_G3H_RTC 25 27

U7550 - 3V3_G3H VDD_MAIN

68 PP3V3_G3H
63 PP3V3_G3H

Sourced from PBus
Enabled by PMU_VDDMAIN_EN

VOUT_RTC sourced from
PP3V3_G3H_RTC input to PMIC

PP3V3_G3H
MIN_LINE_WIDTH=0.2000
MIN_NECK_WIDTH=0.0750
VOLTAGE=3.3V
MAKE_BASE=TRUE
65 78 79

PP3V3_G3H 45
PP3V3_G3H 66
PP3V3_G3H 63
PP3V3_G3H 63
PP3V3_G3H 45
PP3V3_G3H 66
PP3V3_G3H 66

PP3V3_G3H 63
PP3V3_G3H 66
PP3V3_G3H 66
PP3V3_G3H 66
PP3V3_G3H 60
PP3V3_G3H 17
PP3V3_G3H 18 81
PP3V3_G3H 55
PP3V3_G3H 53
PP3V3_G3H 49

PP3V3_G3H 69
PP3V3_G3H 67

U8225 - 3V3 Sensors

66 PP3V3_G3SSW_SNS

Sourced from 3V3_G3H_RTC
Enabled by SENSOR_PWR_EN

PP3V3_G3SSW_SNS
MIN_LINE_WIDTH=0.0900
MIN_NECK_WIDTH=0.0750
VOLTAGE=3.3V
MAKE_BASE=TRUE

PP3V3_G3SSW_SNS 44
PP3V3_G3SSW_SNS 44 45 46

U8210 - 3V3_G3S

66 PP3V3_G3S

Sourced from 3V3_G3H_RTC
Enabled by P3V3G3S_EN

PP3V3_G3S
MIN_LINE_WIDTH=0.2000
MIN_NECK_WIDTH=0.0750
VOLTAGE=3.3V
MAKE_BASE=TRUE
78 79

PP3V3_G3S 51
PP3V3_G3S 53
PP3V3_G3S 41
PP3V3_G3S 69
PP3V3_G3S 54
PP3V3_G3S 45

50 44 PPBUS_G3H_SPKRL

PPBUS_G3H_SPKRL
MIN_LINE_WIDTH=0.1000
MIN_NECK_WIDTH=0.2000
VOLTAGE=13.1V
MAKE_BASE=TRUE

U9080 - NAND 2V7

72 PPVCC_NAND_SSD0

Sourced from PBUS
Enabled by VR_P2V7_EN

PPVCC_NAND_SSD0
MIN_LINE_WIDTH=0.0900
MIN_NECK_WIDTH=0.0750
VOLTAGE=2.7V
MAKE_BASE=TRUE
70 71 78 79

PPVCC_NAND_SSD0 46
PPVCC_NAND_SSD0 73

64 GND

1V8 Rails

U8220 - 1V8_G3S

66 PP1V8_G3S

Sourced from 1V8 SLEEPS2R
Enabled by P1V8G3S_EN

PP1V8_G3S
MIN_LINE_WIDTH=0.0800
MIN_NECK_WIDTH=0.2000
VOLTAGE=1.8V
MAKE_BASE=TRUE
78 79

PP1V8_G3S 48
PP1V8_G3S 43
PP1V8_G3S 43 69
PP1V8_G3S 43
PP1V8_G3S 42
PP1V8_G3S 43
PP1V8_G3S 40

PP1V8_G3S 60
PP1V8_G3S 41
PP1V8_G3S 52 53
PP1V8_G3S 47
PP1V8_G3S 54
PP1V8_G3S 29

PP1V8_G3S 41
PP1V8_G3S 49 50 52

CPU/PCH Rails

U7210, U7230 - VCCIN

58 PPVCC_S0_CPU

Sourced from PBus
Enabled by CPU_VR_EN

PPVCC_S0_CPU
MIN_LINE_WIDTH=9.0000
MIN_NECK_WIDTH=0.0750
VOLTAGE=1.0V
MAKE_BASE=TRUE
78 79

PPVCC_S0_CPU
8 11 46

U7400 - VCCIN_AUX

59 PPVCCIN_AUX_PCH

Sourced from PBus
Enabled by P1V8PRIM_PGOOD

PPVCCIN_AUX_PCH
MIN_LINE_WIDTH=9.0000
MIN_NECK_WIDTH=0.0750
VOLTAGE=1.8V
MAKE_BASE=TRUE
11 59 80

PPVCCIN_AUX_PCH
9

PPVCCIN_AUX_PCH
46

U7700 - VCCPRIM_1P8

61 PP1V8_PRIM_PCH

Sourced from PBus
Enabled by PM_SLP_SUS_L

PP1V8_PRIM_PCH
MIN_LINE_WIDTH=0.1000
MIN_NECK_WIDTH=0.2000
VOLTAGE=1.8V
MAKE_BASE=TRUE
16 59 78 79

PP1V8_PRIM_PCH
9 12 66

PP1V8_PRIM_PCH
18 32
PP1V8_PRIM_PCH
9
PP1V8_PRIM_PCH
12
PP1V8_PRIM_PCH
9
PP1V8_PRIM_PCH
9

PP1V8_PRIM_PCH
64
PP1V8_PRIM_PCH
6 13 15
PP1V8_PRIM_PCH
42

PP1V8_PRIM_PCH
66
PP1V8_PRIM_PCH
18
PP1V8_PRIM_PCH
18

The power nets below were transferred
from Calpe BUCK3 SW3

PP1V8_PRIM_PCH
42
PP1V8_PRIM_PCH
17
PP1V8_PRIM_PCH
57
PP1V8_PRIM_PCH
39
PP1V8_PRIM_PCH
39
PP1V8_PRIM_PCH
39

Memory Rails

U8100 - Memory VDD2, VDDCA, VDDQ; CPU VDDQ

65 PP1V1_S3

Sourced from PBUS
Enabled by P1V1_S3_EN

PP1V1_S3
MIN_NECK_WIDTH=0.0750
VOLTAGE=1.1V
MAKE_BASE=TRUE
78 79

PP1V1_S3 7
PP1V1_S3 8 11
PP1V1_S3 66
PP1V1_S3 19 20 65

1.1V Rails

0.6V Rails

65 PP0V6_S3

Sourced from PP3V3_G3H
Enabled by P1V1_S3_PGOOD

PP0V6_S3
MIN_LINE_WIDTH=2.7000
MIN_NECK_WIDTH=0.0750
VOLTAGE=0.6V
MAKE_BASE=TRUE
80

PP0V6_S3
19 20 65

PAGE TITLE
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Apple Inc.

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Unused CPU/PCH Signals

15	IN	NC_PCIE_CLK100M_DEBUGP	MAKE_BASE=TRUE NO_TEST=1	NC_PCIE_CLK100M_DEBUGP
18	IN	NC_PCIE_CLK100M_DEBUGN	MAKE_BASE=TRUE NO_TEST=1	NC_PCIE_CLK100M_DEBUGN
15	IN	NC_PCIE_PCH_ENETSD_D2RP	MAKE_BASE=TRUE NO_TEST=1	NC_PCIE_PCH_ENETSD_D2RP
15	IN	NC_PCIE_PCH_ENETSD_D2RN	MAKE_BASE=TRUE NO_TEST=1	NC_PCIE_PCH_ENETSD_D2RN
15	IN	NC_PCIE_PCH_ENETSD_R2DCP	MAKE_BASE=TRUE NO_TEST=1	NC_PCIE_PCH_ENETSD_R2DCP
15	IN	NC_PCIE_PCH_ENETSD_R2DCN	MAKE_BASE=TRUE NO_TEST=1	NC_PCIE_PCH_ENETSD_R2DCN
15	IN	NC_PCIE_CLK100M_ENETSDP	MAKE_BASE=TRUE NO_TEST=1	NC_PCIE_CLK100M_ENETSDP
15	IN	NC_PCIE_CLK100M_ENETSDN	MAKE_BASE=TRUE NO_TEST=1	NC_PCIE_CLK100M_ENETSDN

Unused Misc Signals

64	NC_PMU_CLK32K_GNSS_R	MAKE_BASE=TRUE NO_TEST=1	NC_PMU_CLK32K_GNSS_R
64	NC_GPU_THRMTRIP	MAKE_BASE=TRUE NO_TEST=1	NC_GPU_THRMTRIP
64	NC_P3V3G3W_EN	MAKE_BASE=TRUE NO_TEST=1	NC_P3V3G3W_EN
56	NC_CHGR_EN_VR1	MAKE_BASE=TRUE NO_TEST=1	NC_CHGR_EN_VR1
56	NC_CHGR_AUX_OK	MAKE_BASE=TRUE NO_TEST=1	NC_CHGR_AUX_OK

Unused SoC Signals

32	NC_ALTIMETER_INT	MAKE_BASE=TRUE NO_TEST=1	NC_ALTIMETER_INT
31	NC_DFR_DISP_INT	MAKE_BASE=TRUE NO_TEST=1	NC_DFR_DISP_INT
33	NC_DFR_DISP_RESET_L	MAKE_BASE=TRUE NO_TEST=1	NC_DFR_DISP_RESET_L
33	NC_DFR_DISP_TE	MAKE_BASE=TRUE NO_TEST=1	NC_DFR_DISP_TE
33	NC_DFR_TOUCH_CLK32K_RESET_L	MAKE_BASE=TRUE NO_TEST=1	NC_DFR_TOUCH_CLK32K_RESET_L
32	NC_DFR_TOUCH_INT_L	MAKE_BASE=TRUE NO_TEST=1	NC_DFR_TOUCH_INT_L
33	NC_DFR_TOUCH_RESET_L	MAKE_BASE=TRUE NO_TEST=1	NC_DFR_TOUCH_RESET_L
33	NC_DFR_TOUCH_RSVD	MAKE_BASE=TRUE NO_TEST=1	NC_DFR_TOUCH_RSVD
32	NC_DISP_GCON_INT_L	MAKE_BASE=TRUE NO_TEST=1	NC_DISP_GCON_INT_L
32	NC_ENET_LOW_PWR	MAKE_BASE=TRUE NO_TEST=1	NC_ENET_LOW_PWR
32	NC_ENET_MEDIA_SENSE	MAKE_BASE=TRUE NO_TEST=1	NC_ENET_MEDIA_SENSE
34	NC_ENET_RESET_L	MAKE_BASE=TRUE NO_TEST=1	NC_ENET_RESET_L
33	NC_FTCAM_CLK12M_R	MAKE_BASE=TRUE NO_TEST=1	NC_FTCAM_CLK12M_R
33	NC_FTCAM_RESET_L	MAKE_BASE=TRUE NO_TEST=1	NC_FTCAM_RESET_L
31	NC_GNSS_DEV_WAKE	MAKE_BASE=TRUE NO_TEST=1	NC_GNSS_DEV_WAKE
31	NC_GNSS_HOST_TIME	MAKE_BASE=TRUE NO_TEST=1	NC_GNSS_HOST_TIME
32	NC_GNSS_HOST_WAKE	MAKE_BASE=TRUE NO_TEST=1	NC_GNSS_HOST_WAKE
33	NC_I2S_CODEC_MCLK	MAKE_BASE=TRUE NO_TEST=1	NC_I2S_CODEC_MCLK
33	NC_I2S_CODEC1_MCLK	MAKE_BASE=TRUE NO_TEST=1	NC_I2S_CODEC1_MCLK
33	NC_I2S_CODEC1_R2D_R	MAKE_BASE=TRUE NO_TEST=1	NC_I2S_CODEC1_R2D_R
33	NC_I2S_HAWKING_BCLK_R	MAKE_BASE=TRUE NO_TEST=1	NC_I2S_HAWKING_BCLK_R
33	NC_I2S_HAWKING_D2R	MAKE_BASE=TRUE NO_TEST=1	NC_I2S_HAWKING_D2R
33	NC_I2S_HAWKING_LRCLK	MAKE_BASE=TRUE NO_TEST=1	NC_I2S_HAWKING_LRCLK
32	NC_MESA_MENUKEY_L	MAKE_BASE=TRUE NO_TEST=1	NC_MESA_MENUKEY_L
33	NC_MIPI_DFR_CLKN	MAKE_BASE=TRUE NO_TEST=1	NC_MIPI_DFR_CLKN
33	NC_MIPI_DFR_CLKP	MAKE_BASE=TRUE NO_TEST=1	NC_MIPI_DFR_CLKP
33	NC_MIPI_DFR_DATAN	MAKE_BASE=TRUE NO_TEST=1	NC_MIPI_DFR_DATAN
33	NC_MIPI_DFR_DATAP	MAKE_BASE=TRUE NO_TEST=1	NC_MIPI_DFR_DATAP
32	NC_PCC_EVENT	MAKE_BASE=TRUE NO_TEST=1	NC_PCC_EVENT
34	NC_PCIE_CLK100M_ENETN	MAKE_BASE=TRUE NO_TEST=1	NC_PCIE_CLK100M_ENETN
34	NC_PCIE_CLK100M_ENETP	MAKE_BASE=TRUE NO_TEST=1	NC_PCIE_CLK100M_ENETP
34	NC_PCIE_CLK100M_SSD1_01N	MAKE_BASE=TRUE NO_TEST=1	NC_PCIE_CLK100M_SSD1_01N
34	NC_PCIE_CLK100M_SSD1_01P	MAKE_BASE=TRUE NO_TEST=1	NC_PCIE_CLK100M_SSD1_01P
34	NC_PCIE_CLK100M_SSD1_23N	MAKE_BASE=TRUE NO_TEST=1	NC_PCIE_CLK100M_SSD1_23N
34	NC_PCIE_CLK100M_SSD1_23P	MAKE_BASE=TRUE NO_TEST=1	NC_PCIE_CLK100M_SSD1_23P
34	NC_PCIE_CLK100M_WLANN	MAKE_BASE=TRUE NO_TEST=1	NC_PCIE_CLK100M_WLANN
34	NC_PCIE_CLK100M_WLANP	MAKE_BASE=TRUE NO_TEST=1	NC_PCIE_CLK100M_WLANP
34	NC_PCIE_ENET_D2RN	MAKE_BASE=TRUE NO_TEST=1	NC_PCIE_ENET_D2RN
34	NC_PCIE_ENET_D2RP	MAKE_BASE=TRUE NO_TEST=1	NC_PCIE_ENET_D2RP
34	NC_PCIE_ENET_R2D_CN	MAKE_BASE=TRUE NO_TEST=1	NC_PCIE_ENET_R2D_CN
34	NC_PCIE_ENET_R2D_CP	MAKE_BASE=TRUE NO_TEST=1	NC_PCIE_ENET_R2D_CP
34	NC_PCIE_SSD1_D2RN<3..0>	MAKE_BASE=TRUE NO_TEST=1	NC_PCIE_SSD1_D2RN<3..0>
34	NC_PCIE_SSD1_D2RP<3..0>	MAKE_BASE=TRUE NO_TEST=1	NC_PCIE_SSD1_D2RP<3..0>
34	NC_PCIE_SSD1_R2D_CN<3..0>	MAKE_BASE=TRUE NO_TEST=1	NC_PCIE_SSD1_R2D_CN<3..0>
34	NC_PCIE_SSD1_R2D_CP<3..0>	MAKE_BASE=TRUE NO_TEST=1	NC_PCIE_SSD1_R2D_CP<3..0>
34	NC_PCIE_WLAN_D2RN	MAKE_BASE=TRUE NO_TEST=1	NC_PCIE_WLAN_D2RN
34	NC_PCIE_WLAN_D2RP	MAKE_BASE=TRUE NO_TEST=1	NC_PCIE_WLAN_D2RP
34	NC_PCIE_WLAN_R2D_CN	MAKE_BASE=TRUE NO_TEST=1	NC_PCIE_WLAN_R2D_CN
34	NC_PCIE_WLAN_R2D_CP	MAKE_BASE=TRUE NO_TEST=1	NC_PCIE_WLAN_R2D_CP
32	NC_PCIEDN_WAKE_L	MAKE_BASE=TRUE NO_TEST=1	NC_PCIEDN_WAKE_L
32	NC_PLCAM_PROX_INT_L	MAKE_BASE=TRUE NO_TEST=1	NC_PLCAM_PROX_INT_L
32	NC_PLCAM_ROMEO_B2B_DETECT	MAKE_BASE=TRUE NO_TEST=1	NC_PLCAM_ROMEO_B2B_DETECT
33	NC_PLCAM_RX_CLK12M_R	MAKE_BASE=TRUE NO_TEST=1	NC_PLCAM_RX_CLK12M_R
33	NC_PLCAM_RX_RESET_L	MAKE_BASE=TRUE NO_TEST=1	NC_PLCAM_RX_RESET_L
33	NC_PLCAM_TX_CLK12M_R	MAKE_BASE=TRUE NO_TEST=1	NC_PLCAM_TX_CLK12M_R
33	NC_PLCAM_TX_INT	MAKE_BASE=TRUE NO_TEST=1	NC_PLCAM_TX_INT
33	NC_PLCAM_TX_RESET_L	MAKE_BASE=TRUE NO_TEST=1	NC_PLCAM_TX_RESET_L
31	NC_PLCAM_TX_THROTTLE	MAKE_BASE=TRUE NO_TEST=1	NC_PLCAM_TX_THROTTLE
32	NC_SDCONN_STATE_CHANGE_L	MAKE_BASE=TRUE NO_TEST=1	NC_SDCONN_STATE_CHANGE_L
32	NC_SMC_FAN_1_PWM	MAKE_BASE=TRUE NO_TEST=1	NC_SMC_FAN_1_PWM
32	NC_SMC_FAN_1_TACH	MAKE_BASE=TRUE NO_TEST=1	NC_SMC_FAN_1_TACH
32	NC_SMC_GFX_SELF_THROTTLE	MAKE_BASE=TRUE NO_TEST=1	NC_SMC_GFX_SELF_THROTTLE
32	NC_SMC_GFX_THROTTLE_L	MAKE_BASE=TRUE NO_TEST=1	NC_SMC_GFX_THROTTLE_L
32	NC_SMC_LED_ONEWIRE	MAKE_BASE=TRUE NO_TEST=1	NC_SMC_LED_ONEWIRE
32	NC_SPI_ALTIMETER_CS_L	MAKE_BASE=TRUE NO_TEST=1	NC_SPI_ALTIMETER_CS_L
34	NC_SSD1_CLK24M_R	MAKE_BASE=TRUE NO_TEST=1	NC_SSD1_CLK24M_R
34	NC_SSD1_CLKREQ0_L	MAKE_BASE=TRUE NO_TEST=1	NC_SSD1_CLKREQ0_L
34	NC_SSD1_CLKREQ1_L	MAKE_BASE=TRUE NO_TEST=1	NC_SSD1_CLKREQ1_L
34	NC_SSD1_CLKREQ2_L	MAKE_BASE=TRUE NO_TEST=1	NC_SSD1_CLKREQ2_L
34	NC_SSD1_CLKREQ3_L	MAKE_BASE=TRUE NO_TEST=1	NC_SSD1_CLKREQ3_L
34	NC_SSD1_PCIE_RESET_L	MAKE_BASE=TRUE NO_TEST=1	NC_SSD1_PCIE_RESET_L
32	NC_SSD1_SWCLK_UART_R2D	MAKE_BASE=TRUE NO_TEST=1	NC_SSD1_SWCLK_UART_R2D
32	NC_SSD1_SWDIO_UART_D2R	MAKE_BASE=TRUE NO_TEST=1	NC_SSD1_SWDIO_UART_D2R
32	NC_TPAD_VIBE_L	MAKE_BASE=TRUE NO_TEST=1	NC_TPAD_VIBE_L
33	NC_UART_GNSS_D2R_CTS_L	MAKE_BASE=TRUE NO_TEST=1	NC_UART_GNSS_D2R_CTS_L
33	NC_UART_GNSS_R2D_RTS_L	MAKE_BASE=TRUE NO_TEST=1	NC_UART_GNSS_R2D_RTS_L
33	NC_UART_GNSS_R2D	MAKE_BASE=TRUE NO_TEST=1	NC_UART_GNSS_R2D
33	NC_UART_GNSS_D2R	MAKE_BASE=TRUE NO_TEST=1	NC_UART_GNSS_D2R
34	NC_WLAN_CLKREQ_L	MAKE_BASE=TRUE NO_TEST=1	NC_WLAN_CLKREQ_L
31	NC_WLAN_DEV_WAKE	MAKE_BASE=TRUE NO_TEST=1	NC_WLAN_DEV_WAKE
34	NC_WLAN_PERST_L	MAKE_BASE=TRUE NO_TEST=1	NC_WLAN_PERST_L
33	NC_SPI_DFR_CS_L	MAKE_BASE=TRUE NO_TEST=1	NC_SPI_DFR_CS_L
33	NC_SPI_DFR_CLK_R	MAKE_BASE=TRUE NO_TEST=1	NC_SPI_DFR_CLK_R
33	NC_SPI_DFR_MOSI_R	MAKE_BASE=TRUE NO_TEST=1	NC_SPI_DFR_MOSI_R
33	NC_SPI_DFR_MISO	MAKE_BASE=TRUE NO_TEST=1	NC_SPI_DFR_MISO
33	NC_PCHROM_SW_EN	MAKE_BASE=TRUE NO_TEST=1	NC_PCHROM_SW_EN
6	NC_HDMI_RESET_L	MAKE_BASE=TRUE NO_TEST=1	NC_HDMI_RESET_L
33	NC_UART_BT_D2R	MAKE_BASE=TRUE NO_TEST=1	NC_UART_BT_D2R
33	NC_UART_BT_R2D	MAKE_BASE=TRUE NO_TEST=1	NC_UART_BT_R2D
33	NC_UART_BT_R2D_RTS_L	MAKE_BASE=TRUE NO_TEST=1	NC_UART_BT_R2D_RTS_L
33	NC_UART_BT_D2R_CTS_L	MAKE_BASE=TRUE NO_TEST=1	NC_UART_BT_D2R_CTS_L

18 15	DEBUG_CLKREQ_STRAP_L	MAKE_BASE=TRUE	DEBUG_CLKREQ_STRAP_L
32	TP_SWD_WLAN_SWDIO	MAKE_BASE=TRUE	TP_SWD_WLAN_SWDIO
32	TP_SWD_WLAN_SWCLK	MAKE_BASE=TRUE	TP_SWD_WLAN_SWCLK

Grounded Signals

33	GND	MAKE_BASE=TRUE
33	GND	
33	GND	
33	GND	
33	GND	
33	GND	
33	GND	
33	GND	
64	GND	

PMIC GPIO Config Select

64	PVCCNAND_PGOOD	MAKE_BASE=TRUE	PVCCNAND_PGOOD 72
64	PVCCNAND_EN	MAKE_BASE=TRUE	PVCCNAND_EN 72
64	NAND_DISCHARGE_EN	MAKE_BASE=TRUE	NAND_DISCHARGE_EN 73
64	NAND_RESET_L	MAKE_BASE=TRUE	NAND_RESET_L 73
64	UVP_DIS_L	MAKE_BASE=TRUE	UVP_DIS_L 40
64	PD_PVCCPLLOC_EN	MAKE_BASE=TRUE	PD_PVCCPLLOC_EN

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Apple Inc.

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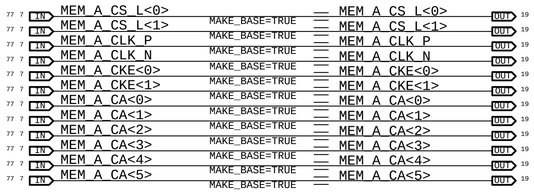
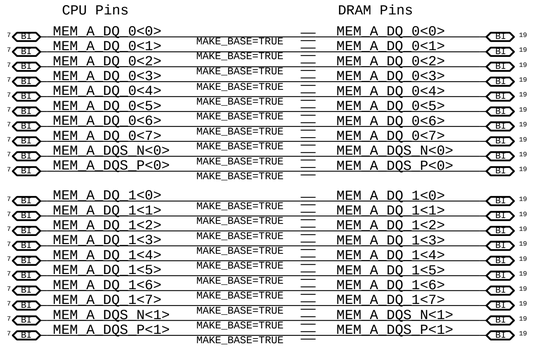
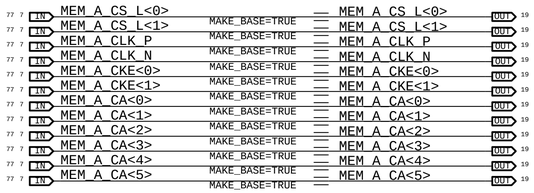
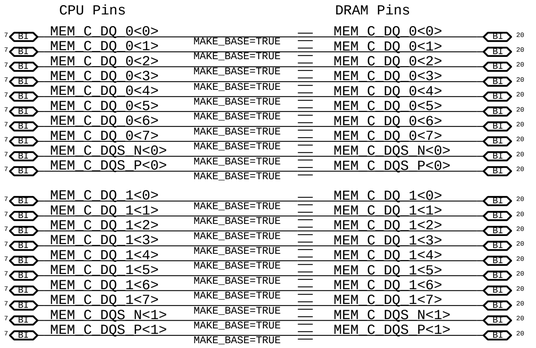
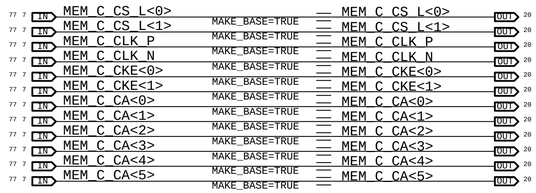
Memory Bit & Byte Swizzle

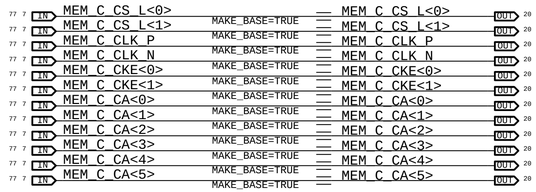


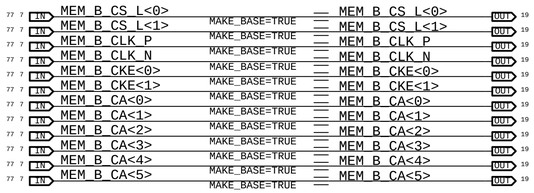


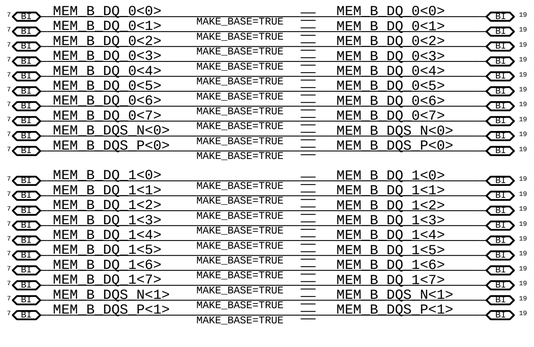


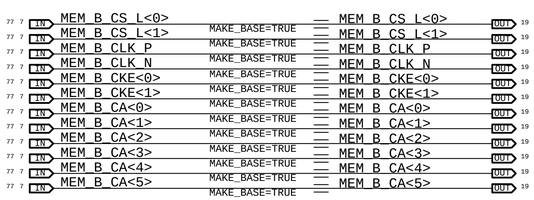


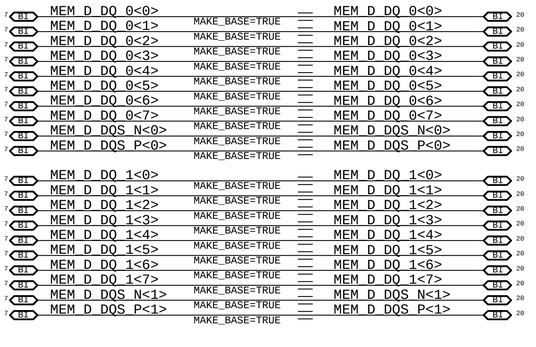


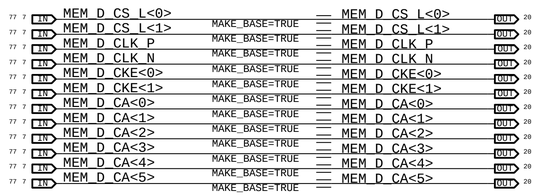


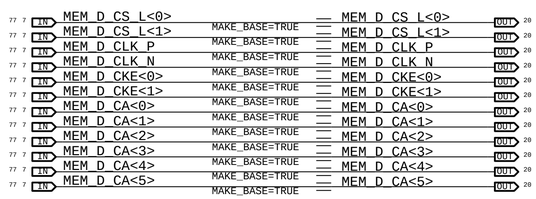












SYNC_MASTER=J140 SYNC_DATE=08/23/2018

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Memory Bit & Byte Swizzle

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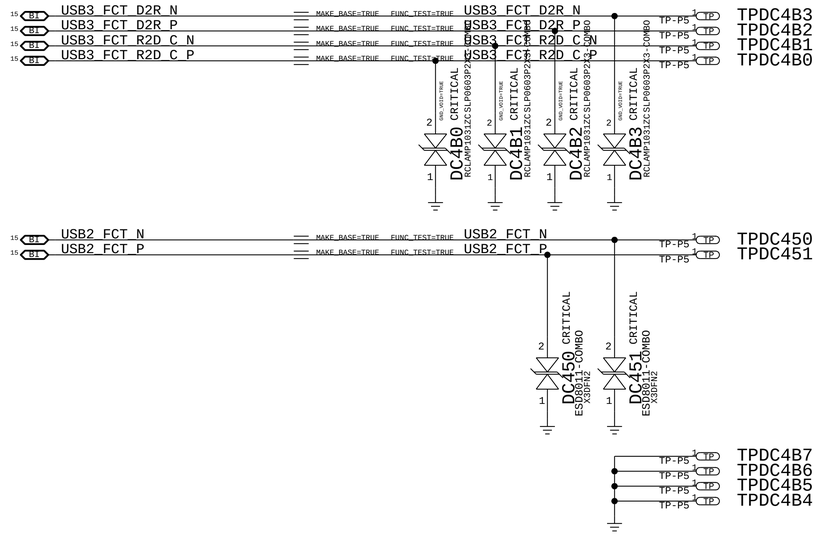
DFU/SoC/SWDL



SOC_USB_VBUS
SOC_FORCE_DFU
USB_SOC_N
USB_SOC_P
SOC_DFU_STATUS
SOC_DOCK_CONNECT
SOC_COLD_RESET_L
GND 7x

Debug

PCH_UART_DEBUG_D2R
PCH_UART_DEBUG_R2D
SWD_SOC_SWCLK
SWD_SOC_SWDIO
TP_SOC_DEBUGPRT_RX → TP_SOC_DEBUGPRT_RX
TP_SOC_DEBUGPRT_TX → TP_SOC_DEBUGPRT_TX
TP_JTAG_SOC_TDI
TP_JTAG_SOC_TDO
I2C_PWR_SCL
I2C_PWR_SDA
SMC_DEBUGPRT_RX → SMC_DEBUGPRT_RX
SMC_DEBUGPRT_TX → SMC_DEBUGPRT_TX

SSD

TP_SSD0_S4E1_UART_TX → TP_SSD0_S4E1_UART_TX
TP_SSD0_S4E0_UART_TX → TP_SSD0_S4E0_UART_TX
TP_SSD0_S4E0_JTAG_TDI → TP_SSD0_S4E0_JTAG_TDI
TP_SSD0_S4E1_JTAG_TDO → TP_SSD0_S4E1_JTAG_TDO

Display

To be probed at connector

Backlight

EDP_BKLT_EN
EDP_BKLT_PWM
PPVIN_S0SW_LCDBKLT_R
PPVOUT_S0_LCDBKLT

I2C_BKLT_SCL
I2C_BKLT_SDA
GND 5x

Power

PP20V_USBC_X_VBUS
PP20V_USBC_T_VBUS
PPDCIN_G3H
PPDCIN_G3H_CHGR_AMON
PPBUS_G3H
PP1V8_SLPS2R
PP1V1_SLPDDR
PP1V8_AWAKE
PP3V3_G3H_RTC
PP3V3_G3H
PP3V_G3H
PP5V_G3S
PP3V3_G3S
PP1V8_G3S
PP1V8_PRIM_PCH
PP1V8_S3
PP1V1_S3

PPVCC_NAND_SSD0
PPVCCQ_ANI_SSD0
PP0V9_SSD0
PP3V3_TBT_X_S0_R
PP3V3_TBT_X_SX

PP1V05_S0_CPU_VCCST
PP1V05_PCH_EXT_REG

PP1V2_AWAKE
PP0V82_SLPDDR
PPVDDCPU_AWAKE
PPVNN_PCH_EXT_REG
PPVCC_S0_CPU
TP_SMC_FIXTURE_MODE_L → TP_SMC_FIXTURE_MODE_L
GND

RIO - Speaker (R), Mesa, Headphone

SPI_MESA_CLK
SPI_MESA_MISO
SPI_MESA_MOSI
MESA_INT
MESA_PWR_EN
PMU_ONOFF_R_L_CONN
AUD_PWR_EN
I2S_CODEC_LRCLK
I2S_CODEC_R2D
I2S_CODEC_D2R
I2S_CODEC_BCLK
CODEC_INT_L
CODEC_WAKE_L
CODEC_RESET_L
SPKRAMP_RESET_L
SPKRAMP_INT_L
I2C_SPKRAMP_R_SDA
I2C_SPKRAMP_R_SCL
I2S_SPKRAMP_R_R2D
I2S_SPKRAMP_L_D2R
I2S_SPKRAMP_R_LRCLK_R
I2S_SPKRAMP_R_BCLK
SPKR_ID1
SMC_LID_RIGHT
PPBUS_G3H
PP3V3_G3S
PP1V8_G3S
PP1V8_SLPS2R
GND x

AMR/Mic

PDM_DMIC_CLK0
PDM_DMIC_DATA0_ISOL
PDM_DMIC_CLK1
PDM_DMIC_DATA1_ISOL
SMC_LID_LEFT
PP1V8_G3S
PP1V8_SLPS2R
GND 1x

Speaker (L)

SPKRCONN_L_OUTP
SPKRCONN_L_OUTN
SPKR_ID0
GND 1x

Fan

FAN_LT_PWM
FAN_LT_TACH
PP5V_G3S
GND 1x

Battery

CHGR_HPWR_EN_L
SMBUS_3V3_BATT_SCL
SMBUS_3V3_BATT_SDA
SYS_DETECT
SYS_DETECT_L
CHGR_BMON
PPVBAT_G3H_CHGR_R
PPVBAT_G3H_CONN 5x
GND 5x

PMU_ONOFF_L Level Shifter

PMU_ONOFF_L

IPD

IPD_LID_OPEN
PMU_RSLOC_RST_L
I2C_TPAD_3V3_SCL
I2C_TPAD_3V3_SDA
SPI_TPAD_3V3_CLK
SPI_TPAD_3V3_CS_L
SPI_TPAD_3V3_MISO
SPI_TPAD_3V3_MOSI

TPAD_SPI_3V3_EN
TPAD_SPI_3V3_INT_L
TPAD_KBD_WAKE_L
PPBUS_G3H_TPAD_FLT
PP5V_G3S_IPD_F
PP3V3_G3H_IPD_F
PP3V3_G3S_IPD_F
GND 2x

Wireless

WLAN_AUDIO_SYNC
WLAN_SROM_CLK
WLAN_SROM_CS
WLAN_SROM_DIN
WLAN_SROM_DOUT
SPI_BT_CLK
SPI_BT_CS_L
SPI_BT_MOSI
SPI_BT_MISO
WLANBT_HOST_WAKE

PP3V3_G3S_WLANBT
GND

Power Sequencing

PLT_RST_L
PM_PCH_SYS_PWROK
PM_SLP_S0_L
PM_SLP_S3_L
PM_SLP_S4_L
PM_SLP_S5_L
PVDDQ_PGOOD
PVDDQ_EN
PMU_ACTIVE_READY
P1V1_SLPDDR_SOCFET_EN

P1V8G3S_EN
SMC_PCH_SYS_PWROK
SOC_SOCHOT_L

BOM_COST_GROUP=DEBUG

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	Apple Inc.
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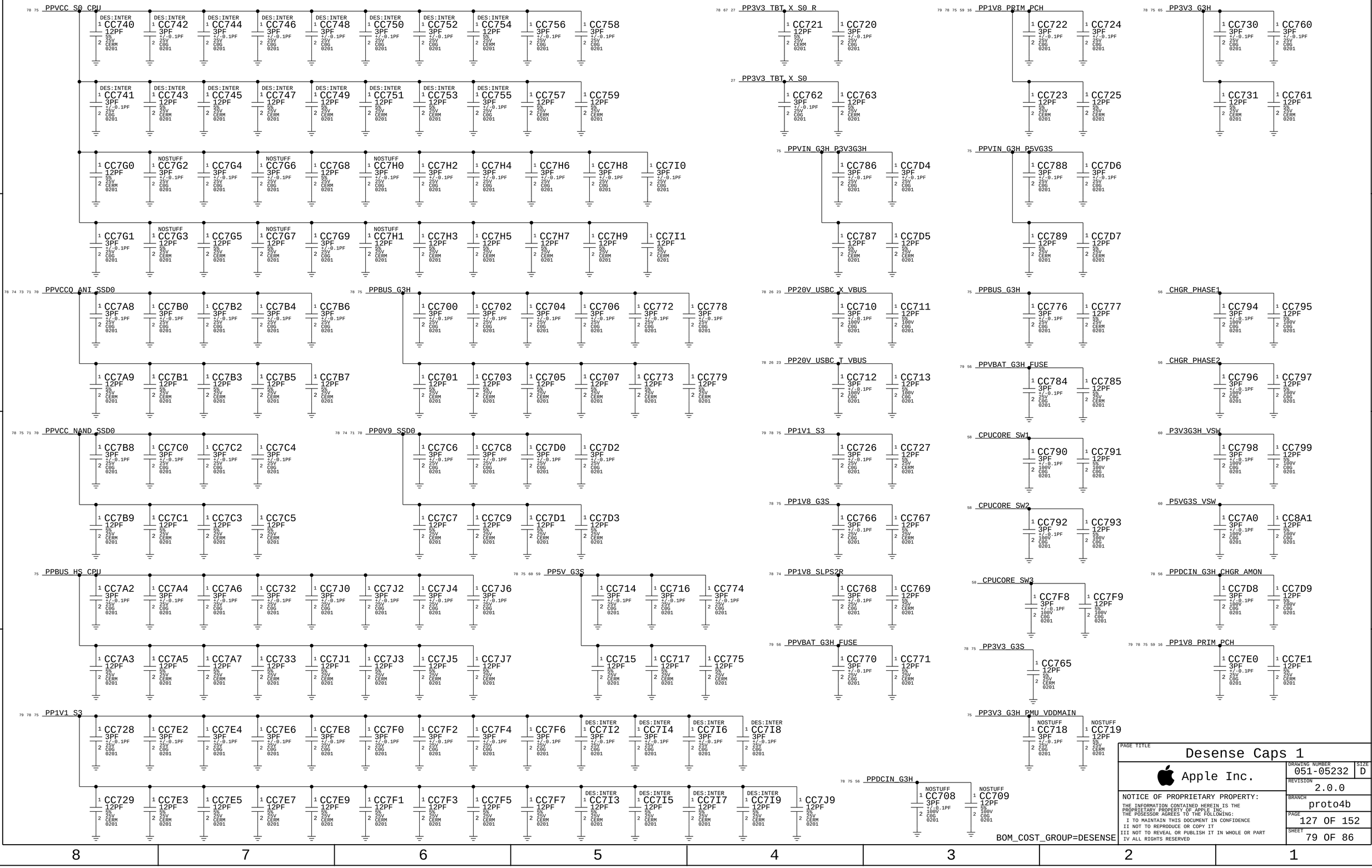

PAGE TITLE

Desense Caps 1

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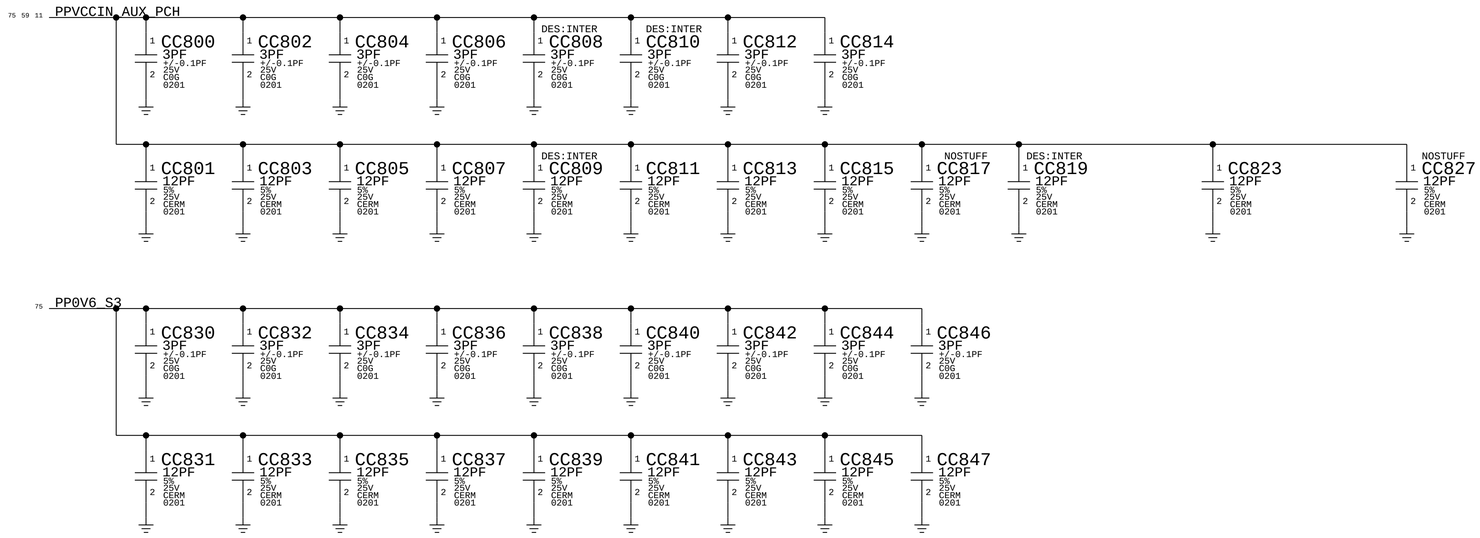

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PAGE TITLE: Desense Caps 2

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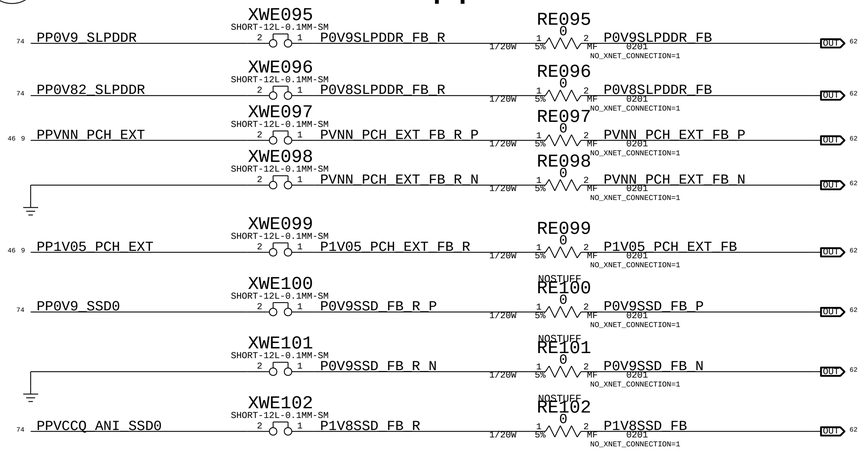
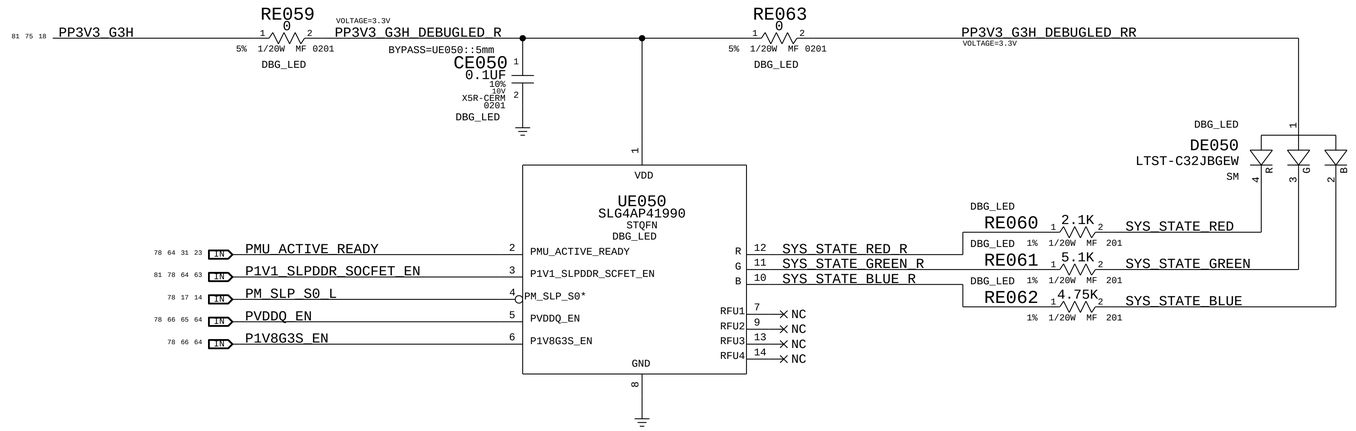
A Remote Sense Support



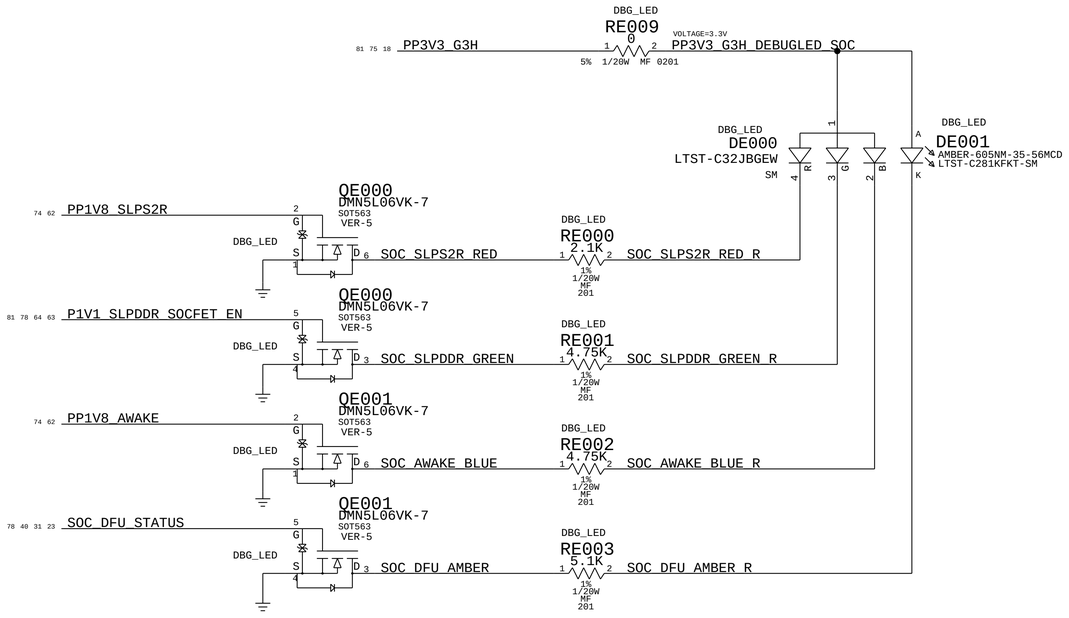
B System State LED



Inputs					Outputs			Color	State		
PMU ACT RDY	P1V1_SLPDDR SOCFET_EN	PM_SLP S0_L	PVDDQ EN	P1V8G3S EN	R	G	B		System	SoC	CPU
0	0	0	0	0	BLINK	OFF	OFF	Blinking Red	Shutdown (G3H)	OFF	OFF
0	0	0	0	1	ON	OFF	OFF	Red	Standby (G3S)	SLPS2R	OFF
1	1	0	0	1	ON	ON	OFF	Yellow	Standby (G3S)	AWAKE	OFF
0	0	0	1	1	ON	ON	ON	White	Sleep	SLPS2R	S0i
1	1	0	1	1	OFF	OFF	ON	Blue	Sleep	AWAKE	S0i
1	1	1	1	1	OFF	ON	OFF	Green	Run	AWAKE	S0
1	1	0	0	0	BLINK	ON	OFF	Blinking Yellow & Green			

All other states are magenta

C SoC State LEDs

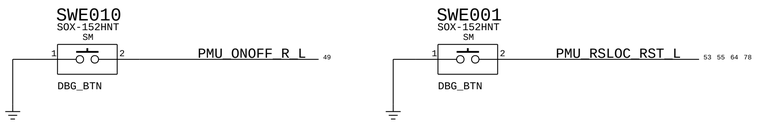


D System Power States

System State:	Shutdown (G3H)		Standby (G3S)		Standby (S4)		Sleep (S0i/S3)		Run (S0)
CPU/PCH State:	Off (RTC Only)		Off (RTC Only)		Standby		Sleep		Run
Rails / SoC State:	S2R	Awake	S2R	Awake	S2R	Awake	S2R	Awake	Awake
PP*_S2R (0.8,1.1,1.8V)	On	On	On	On	On	On	On	On	On
PP*_DDR (0.8,0.9,1.1V)	Off	On	Off	On	Off	On	Off	On	On
PP*_AWAKE (CPU,SRAM,1.2,1.8,3.3V)	Off	On	Off	On	Off	On	Off	On	On
PP3V3_G3H (VR1)	On	On	On	On	On	On	On	On	On
PP1S_G3H	On	On	On	On	On	On	On	On	On
PP*_G3S (1.8,3.3,5V)	Off	On	On	On	On	On	On	On	On
PP*_S5 (1.8,3.3V)	Off	Off	Off	Off	On	On	On	On	On
CPU/PCH VRs	Off	Off	Off	Off	Off/On	Off/On	Off/On	Off/On	On

* System: Shutdown Awake is a transition state only.
* SoC: SLP_DDR is a transition state only.
* CPU/PCH: S4 is only used by desktops for USB wakes.
* CPU/PCH: S5 is a transition state. May also be used for RTC wakes.

E Debug Buttons



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SYNC_MASTER=X589_BIGSUR SYNC_DATE=04/12/2017

PAGE TITLE: Dev Support

Apple Inc.

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BOM Variants

EEEE	BOM NUMBER	BOM NAME	BOM OPTIONS
	685-00329	COMMON PARTS,MLB-TKSB,X1783	MLB_COMMON,MLB_DESENSE,MLB_CPUCFG
	985-01143	DEV PARTS,MLB-TKSB,X1783	DBG_BTN,DBG_LED,USBC_DBG,WIFI_DBG,FANTACH:DEBUG
MVWL	939-08188	PCBA,MLB-TKSB,DCDC,X1783	ALTERNATE,COMMON,DEV_PARTS_BOM,SCHEM,PCBF,CPU_ICLY:INTERPOSER,MLB_POWER,MLB_MISC

EEEE	BOM NUMBER	BOM NAME	BOM OPTIONS
N4JL	639-08928	PCBA,MLB-TKSB,BEST,HY-8G,HY-128G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEST,DRAMCFG:HYNIX_8GB,NANDCFG:ITLC_S4E_128G_HY
MTPF	639-08638	PCBA,MLB-TKSB,BEST,HY-8G,SS-128G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEST,DRAMCFG:HYNIX_8GB,NANDCFG:ITLC_S4E_128G_SS
MXCP	639-08703	PCBA,MLB-TKSB,BEST,HY-8G,TO-128G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEST,DRAMCFG:HYNIX_8GB,NANDCFG:ITLC_S4E_128G_TO
N4JY	639-08929	PCBA,MLB-TKSB,BEST,MI-8G,HY-128G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEST,DRAMCFG:MICRON_8GB,NANDCFG:ITLC_S4E_128G_HY
MXD2	639-08704	PCBA,MLB-TKSB,BEST,MI-8G,SS-128G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEST,DRAMCFG:MICRON_8GB,NANDCFG:ITLC_S4E_128G_SS
MXDF	639-08705	PCBA,MLB-TKSB,BEST,MI-8G,TO-128G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEST,DRAMCFG:MICRON_8GB,NANDCFG:ITLC_S4E_128G_TO
N4KJ	639-08930	PCBA,MLB-TKSB,BEST,SS-8G,HY-128G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEST,DRAMCFG:SAMSUNG_8GB,NANDCFG:ITLC_S4E_128G_HY
MXDR	639-08706	PCBA,MLB-TKSB,BEST,SS-8G,SS-128G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEST,DRAMCFG:SAMSUNG_8GB,NANDCFG:ITLC_S4E_128G_SS
MXF4	639-08707	PCBA,MLB-TKSB,BEST,SS-8G,TO-128G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEST,DRAMCFG:SAMSUNG_8GB,NANDCFG:ITLC_S4E_128G_TO
N4KY	639-08931	PCBA,MLB-TKSB,BEST,HY-16G,HY-128G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEST,DRAMCFG:HYNIX_16GB,NANDCFG:ITLC_S4E_128G_HY
MXFH	639-08708	PCBA,MLB-TKSB,BEST,HY-16G,SS-128G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEST,DRAMCFG:HYNIX_16GB,NANDCFG:ITLC_S4E_128G_SS
MXFV	639-08709	PCBA,MLB-TKSB,BEST,HY-16G,TO-128G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEST,DRAMCFG:HYNIX_16GB,NANDCFG:ITLC_S4E_128G_TO
N4LF	639-08932	PCBA,MLB-TKSB,BEST,MI-16G,HY-128G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEST,DRAMCFG:MICRON_16GB,NANDCFG:ITLC_S4E_128G_HY
MXG6	639-08710	PCBA,MLB-TKSB,BEST,MI-16G,SS-128G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEST,DRAMCFG:MICRON_16GB,NANDCFG:ITLC_S4E_128G_SS
MXGK	639-08711	PCBA,MLB-TKSB,BEST,MI-16G,TO-128G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEST,DRAMCFG:MICRON_16GB,NANDCFG:ITLC_S4E_128G_TO
N4LR	639-08933	PCBA,MLB-TKSB,BEST,SS-16G,HY-128G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEST,DRAMCFG:SAMSUNG_16GB,NANDCFG:ITLC_S4E_128G_HY
MXGX	639-08712	PCBA,MLB-TKSB,BEST,SS-16G,SS-128G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEST,DRAMCFG:SAMSUNG_16GB,NANDCFG:ITLC_S4E_128G_SS
MXH8	639-08713	PCBA,MLB-TKSB,BEST,SS-16G,TO-128G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEST,DRAMCFG:SAMSUNG_16GB,NANDCFG:ITLC_S4E_128G_TO
MXHM	639-08714	PCBA,MLB-TKSB,BEST,HY-8G,HY-256G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEST,DRAMCFG:HYNIX_8GB,NANDCFG:ITLC_S4E_256G_HY
MXJ0	639-08715	PCBA,MLB-TKSB,BEST,HY-8G,SD-256G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEST,DRAMCFG:HYNIX_8GB,NANDCFG:ITLC_S4E_256G_SD
MXJC	639-08716	PCBA,MLB-TKSB,BEST,HY-8G,TO-256G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEST,DRAMCFG:HYNIX_8GB,NANDCFG:ITLC_S4E_256G_TO
MXJQ	639-08717	PCBA,MLB-TKSB,BEST,MI-8G,HY-256G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEST,DRAMCFG:MICRON_8GB,NANDCFG:ITLC_S4E_256G_HY
MXK3	639-08718	PCBA,MLB-TKSB,BEST,MI-8G,SD-256G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEST,DRAMCFG:MICRON_8GB,NANDCFG:ITLC_S4E_256G_SD
MXKG	639-08719	PCBA,MLB-TKSB,BEST,MI-8G,TO-256G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEST,DRAMCFG:MICRON_8GB,NANDCFG:ITLC_S4E_256G_TO
MXKT	639-08720	PCBA,MLB-TKSB,BEST,SS-8G,HY-256G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEST,DRAMCFG:SAMSUNG_8GB,NANDCFG:ITLC_S4E_256G_HY
MXL5	639-08721	PCBA,MLB-TKSB,BEST,SS-8G,SD-256G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEST,DRAMCFG:SAMSUNG_8GB,NANDCFG:ITLC_S4E_256G_SD
MXLJ	639-08722	PCBA,MLB-TKSB,BEST,SS-8G,TO-256G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEST,DRAMCFG:SAMSUNG_8GB,NANDCFG:ITLC_S4E_256G_TO
MXLW	639-08723	PCBA,MLB-TKSB,BEST,HY-16G,HY-256G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEST,DRAMCFG:HYNIX_16GB,NANDCFG:ITLC_S4E_256G_HY
MXM7	639-08724	PCBA,MLB-TKSB,BEST,HY-16G,SD-256G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEST,DRAMCFG:HYNIX_16GB,NANDCFG:ITLC_S4E_256G_SD
MXML	639-08725	PCBA,MLB-TKSB,BEST,HY-16G,TO-256G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEST,DRAMCFG:HYNIX_16GB,NANDCFG:ITLC_S4E_256G_TO
MXMY	639-08726	PCBA,MLB-TKSB,BEST,MI-16G,HY-256G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEST,DRAMCFG:MICRON_16GB,NANDCFG:ITLC_S4E_256G_HY
MXN9	639-08727	PCBA,MLB-TKSB,BEST,MI-16G,SD-256G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEST,DRAMCFG:MICRON_16GB,NANDCFG:ITLC_S4E_256G_SD
MXNN	639-08728	PCBA,MLB-TKSB,BEST,MI-16G,TO-256G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEST,DRAMCFG:MICRON_16GB,NANDCFG:ITLC_S4E_256G_TO
MXP1	639-08729	PCBA,MLB-TKSB,BEST,SS-16G,HY-256G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEST,DRAMCFG:SAMSUNG_16GB,NANDCFG:ITLC_S4E_256G_HY
MXPD	639-08730	PCBA,MLB-TKSB,BEST,SS-16G,SD-256G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEST,DRAMCFG:SAMSUNG_16GB,NANDCFG:ITLC_S4E_256G_SD
MXPQ	639-08731	PCBA,MLB-TKSB,BEST,SS-16G,TO-256G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEST,DRAMCFG:SAMSUNG_16GB,NANDCFG:ITLC_S4E_256G_TO
MXQ3	639-08732	PCBA,MLB-TKSB,BEST,HY-8G,SD-512G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEST,DRAMCFG:HYNIX_8GB,NANDCFG:ITLC_S4E_512G_SD
MXQG	639-08733	PCBA,MLB-TKSB,BEST,HY-8G,TO-512G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEST,DRAMCFG:HYNIX_8GB,NANDCFG:ITLC_S4E_512G_TO
MXQT	639-08734	PCBA,MLB-TKSB,BEST,MI-8G,SD-512G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEST,DRAMCFG:MICRON_8GB,NANDCFG:ITLC_S4E_512G_SD
MXR5	639-08735	PCBA,MLB-TKSB,BEST,MI-8G,TO-512G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEST,DRAMCFG:MICRON_8GB,NANDCFG:ITLC_S4E_512G_TO
MXRJ	639-08736	PCBA,MLB-TKSB,BEST,SS-8G,SD-512G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEST,DRAMCFG:SAMSUNG_8GB,NANDCFG:ITLC_S4E_512G_SD
MXRW	639-08737	PCBA,MLB-TKSB,BEST,SS-8G,TO-512G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEST,DRAMCFG:SAMSUNG_8GB,NANDCFG:ITLC_S4E_512G_TO
MXT7	639-08738	PCBA,MLB-TKSB,BEST,HY-16G,SD-512G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEST,DRAMCFG:HYNIX_16GB,NANDCFG:ITLC_S4E_512G_SD
MXTN	639-08739	PCBA,MLB-TKSB,BEST,HY-16G,TO-512G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEST,DRAMCFG:HYNIX_16GB,NANDCFG:ITLC_S4E_512G_TO
MXV1	639-08740	PCBA,MLB-TKSB,BEST,MI-16G,SD-512G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEST,DRAMCFG:MICRON_16GB,NANDCFG:ITLC_S4E_512G_SD
MXVD	639-08741	PCBA,MLB-TKSB,BEST,MI-16G,TO-512G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEST,DRAMCFG:MICRON_16GB,NANDCFG:ITLC_S4E_512G_TO
MXVQ	639-08742	PCBA,MLB-TKSB,BEST,SS-16G,SD-512G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEST,DRAMCFG:SAMSUNG_16GB,NANDCFG:ITLC_S4E_512G_SD
MXW3	639-08743	PCBA,MLB-TKSB,BEST,SS-16G,TO-512G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEST,DRAMCFG:SAMSUNG_16GB,NANDCFG:ITLC_S4E_512G_TO
MXWG	639-08744	PCBA,MLB-TKSB,BEST,HY-8G,HY-1.0T,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEST,DRAMCFG:HYNIX_8GB,NANDCFG:ITLC_S4E_1P0T_HY
MXWT	639-08745	PCBA,MLB-TKSB,BEST,HY-8G,SD-1.0T,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEST,DRAMCFG:HYNIX_8GB,NANDCFG:ITLC_S4E_1P0T_SD
MXX5	639-08746	PCBA,MLB-TKSB,BEST,MI-8G,HY-1.0T,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEST,DRAMCFG:MICRON_8GB,NANDCFG:ITLC_S4E_1P0T_HY
MXXJ	639-08747	PCBA,MLB-TKSB,BEST,MI-8G,SD-1.0T,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEST,DRAMCFG:MICRON_8GB,NANDCFG:ITLC_S4E_1P0T_SD
MXXW	639-08748	PCBA,MLB-TKSB,BEST,SS-8G,HY-1.0T,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEST,DRAMCFG:SAMSUNG_8GB,NANDCFG:ITLC_S4E_1P0T_HY
MXY8	639-08749	PCBA,MLB-TKSB,BEST,SS-8G,SD-1.0T,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEST,DRAMCFG:SAMSUNG_8GB,NANDCFG:ITLC_S4E_1P0T_SD
MXYM	639-08750	PCBA,MLB-TKSB,BEST,HY-16G,HY-1.0T,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEST,DRAMCFG:HYNIX_16GB,NANDCFG:ITLC_S4E_1P0T_HY
MY11	639-08751	PCBA,MLB-TKSB,BEST,HY-16G,SD-1.0T,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEST,DRAMCFG:HYNIX_16GB,NANDCFG:ITLC_S4E_1P0T_SD
MY1F	639-08752	PCBA,MLB-TKSB,BEST,MI-16G,HY-1.0T,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEST,DRAMCFG:MICRON_16GB,NANDCFG:ITLC_S4E_1P0T_HY
MY1R	639-08753	PCBA,MLB-TKSB,BEST,MI-16G,SD-1.0T,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEST,DRAMCFG:MICRON_16GB,NANDCFG:ITLC_S4E_1P0T_SD
MY25	639-08754	PCBA,MLB-TKSB,BEST,SS-16G,HY-1.0T,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEST,DRAMCFG:SAMSUNG_16GB,NANDCFG:ITLC_S4E_1P0T_HY
MY2L	639-08755	PCBA,MLB-TKSB,BEST,SS-16G,SD-1.0T,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEST,DRAMCFG:SAMSUNG_16GB,NANDCFG:ITLC_S4E_1P0T_SD

EEEE	BOM NUMBER	BOM NAME	BOM OPTIONS
NRDT	639-09922	PCBA,MLB-TKSB,BEST,HY-8G,HY-2.0T,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEST,DRAMCFG:HYNIX_8GB,NANDCFG:ITLC_S4E_2P0T_HY
MY2Y	639-08756	PCBA,MLB-TKSB,BEST,HY-8G,SD-2.0T,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEST,DRAMCFG:HYNIX_8GB,NANDCFG:ITLC_S4E_2P0T_SD
NRF5	639-09923	PCBA,MLB-TKSB,BEST,MI-8G,HY-2.0T,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEST,DRAMCFG:MICRON_8GB,NANDCFG:ITLC_S4E_2P0T_HY
MY39	639-08757	PCBA,MLB-TKSB,BEST,MI-8G,SD-2.0T,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEST,DRAMCFG:MICRON_8GB,NANDCFG:ITLC_S4E_2P0T_SD
NRFJ	639-09924	PCBA,MLB-TKSB,BEST,SS-8G,HY-2.0T,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEST,DRAMCFG:SAMSUNG_8GB,NANDCFG:ITLC_S4E_2P0T_HY
MY3N	639-08758	PCBA,MLB-TKSB,BEST,SS-8G,SD-2.0T,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEST,DRAMCFG:SAMSUNG_8GB,NANDCFG:ITLC_S4E_2P0T_SD
NRFW	639-09925	PCBA,MLB-TKSB,BEST,HY-16G,HY-2.0T,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEST,DRAMCFG:HYNIX_16GB,NANDCFG:ITLC_S4E_2P0T_HY
MY41	639-08759	PCBA,MLB-TKSB,BEST,HY-16G,SD-2.0T,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEST,DRAMCFG:HYNIX_16GB,NANDCFG:ITLC_S4E_2P0T_SD
NRG7	639-09926	PCBA,MLB-TKSB,BEST,MI-16G,HY-2.0T,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEST,DRAMCFG:MICRON_16GB,NANDCFG:ITLC_S4E_2P0T_HY
MY4D	639-08760	PCBA,MLB-TKSB,BEST,MI-16G,SD-2.0T,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEST,DRAMCFG:MICRON_16GB,NANDCFG:ITLC_S4E_2P0T_SD
NRGL	639-09927	PCBA,MLB-TKSB,BEST,SS-16G,HY-2.0T,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEST,DRAMCFG:SAMSUNG_16GB,NANDCFG:ITLC_S4E_2P0T_HY
MY4Q	639-08761	PCBA,MLB-TKSB,BEST,SS-16G,SD-2.0T,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEST,DRAMCFG:SAMSUNG_16GB,NANDCFG:ITLC_S4E_2P0T_SD

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N4M6	639-08934	PCBA,MLB-TKSB,BEDRE,HY-8G,HY-128G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEDRE,DRAMCFG:HYNIX_8GB,NANDCFG:ITLC_S4E_128G_HY
N4MM	639-08935	PCBA,MLB-TKSB,BEDRE,HY-8G,SS-128G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEDRE,DRAMCFG:HYNIX_8GB,NANDCFG:ITLC_S4E_128G_SS
N4P1	639-08936	PCBA,MLB-TKSB,BEDRE,HY-8G,TO-128G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEDRE,DRAMCFG:HYNIX_8GB,NANDCFG:ITLC_S4E_128G_TO
N4PD	639-08937	PCBA,MLB-TKSB,BEDRE,MI-8G,HY-128G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEDRE,DRAMCFG:MICRON_8GB,NANDCFG:ITLC_S4E_128G_HY
N4PQ	639-08938	PCBA,MLB-TKSB,BEDRE,MI-8G,SS-128G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEDRE,DRAMCFG:MICRON_8GB,NANDCFG:ITLC_S4E_128G_SS
N4Q3	639-08939	PCBA,MLB-TKSB,BEDRE,MI-8G,TO-128G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEDRE,DRAMCFG:MICRON_8GB,NANDCFG:ITLC_S4E_128G_TO
N4QH	639-08940	PCBA,MLB-TKSB,BEDRE,SS-8G,HY-128G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEDRE,DRAMCFG:SAMSUNG_8GB,NANDCFG:ITLC_S4E_128G_HY
N4QV	639-08941	PCBA,MLB-TKSB,BEDRE,SS-8G,SS-128G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEDRE,DRAMCFG:SAMSUNG_8GB,NANDCFG:ITLC_S4E_128G_SS
N4T7	639-08942	PCBA,MLB-TKSB,BEDRE,SS-8G,TO-128G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEDRE,DRAMCFG:SAMSUNG_8GB,NANDCFG:ITLC_S4E_128G_TO
N4TL	639-08943	PCBA,MLB-TKSB,BEDRE,HY-16G,HY-128G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEDRE,DRAMCFG:HYNIX_16GB,NANDCFG:ITLC_S4E_128G_HY
N4TY	639-08944	PCBA,MLB-TKSB,BEDRE,HY-16G,SS-128G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEDRE,DRAMCFG:HYNIX_16GB,NANDCFG:ITLC_S4E_128G_SS
N4VC	639-08945	PCBA,MLB-TKSB,BEDRE,HY-16G,TO-128G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEDRE,DRAMCFG:HYNIX_16GB,NANDCFG:ITLC_S4E_128G_TO
N4VP	639-08946	PCBA,MLB-TKSB,BEDRE,MI-16G,HY-128G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEDRE,DRAMCFG:MICRON_16GB,NANDCFG:ITLC_S4E_128G_HY
N4W2	639-08947	PCBA,MLB-TKSB,BEDRE,MI-16G,SS-128G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEDRE,DRAMCFG:MICRON_16GB,NANDCFG:ITLC_S4E_128G_SS
N4WG	639-08948	PCBA,MLB-TKSB,BEDRE,MI-16G,TO-128G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEDRE,DRAMCFG:MICRON_16GB,NANDCFG:ITLC_S4E_128G_TO
N4WT	639-08949	PCBA,MLB-TKSB,BEDRE,SS-16G,HY-128G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEDRE,DRAMCFG:SAMSUNG_16GB,NANDCFG:ITLC_S4E_128G_HY
N4X5	639-08950	PCBA,MLB-TKSB,BEDRE,SS-16G,SS-128G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEDRE,DRAMCFG:SAMSUNG_16GB,NANDCFG:ITLC_S4E_128G_SS
N4XJ	639-08951	PCBA,MLB-TKSB,BEDRE,SS-16G,TO-128G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEDRE,DRAMCFG:SAMSUNG_16GB,NANDCFG:ITLC_S4E_128G_TO
N4XW	639-08952	PCBA,MLB-TKSB,BEDRE,HY-8G,HY-256G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEDRE,DRAMCFG:HYNIX_8GB,NANDCFG:ITLC_S4E_256G_HY
N4Y8	639-08953	PCBA,MLB-TKSB,BEDRE,HY-8G,SD-256G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEDRE,DRAMCFG:HYNIX_8GB,NANDCFG:ITLC_S4E_256G_SD
N4YM	639-08954	PCBA,MLB-TKSB,BEDRE,HY-8G,TO-256G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEDRE,DRAMCFG:HYNIX_8GB,NANDCFG:ITLC_S4E_256G_TO
N500	639-08955	PCBA,MLB-TKSB,BEDRE,MI-8G,HY-256G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEDRE,DRAMCFG:MICRON_8GB,NANDCFG:ITLC_S4E_256G_HY
N50G	639-08956	PCBA,MLB-TKSB,BEDRE,MI-8G,SD-256G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEDRE,DRAMCFG:MICRON_8GB,NANDCFG:ITLC_S4E_256G_SD
N510	639-08957	PCBA,MLB-TKSB,BEDRE,MI-8G,TO-256G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEDRE,DRAMCFG:MICRON_8GB,NANDCFG:ITLC_S4E_256G_TO
N51G	639-08958	PCBA,MLB-TKSB,BEDRE,SS-8G,HY-256G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEDRE,DRAMCFG:SAMSUNG_8GB,NANDCFG:ITLC_S4E_256G_HY
N51W	639-08959	PCBA,MLB-TKSB,BEDRE,SS-8G,SD-256G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEDRE,DRAMCFG:SAMSUNG_8GB,NANDCFG:ITLC_S4E_256G_SD
N527	639-08960	PCBA,MLB-TKSB,BEDRE,SS-8G,TO-256G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEDRE,DRAMCFG:SAMSUNG_8GB,NANDCFG:ITLC_S4E_256G_TO
N52L	639-08961	PCBA,MLB-TKSB,BEDRE,HY-16G,HY-256G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEDRE,DRAMCFG:HYNIX_16GB,NANDCFG:ITLC_S4E_256G_HY
N52Y	639-08962	PCBA,MLB-TKSB,BEDRE,HY-16G,SD-256G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEDRE,DRAMCFG:HYNIX_16GB,NANDCFG:ITLC_S4E_256G_SD
N539	639-08963	PCBA,MLB-TKSB,BEDRE,HY-16G,TO-256G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEDRE,DRAMCFG:HYNIX_16GB,NANDCFG:ITLC_S4E_256G_TO
N53Q	639-08964	PCBA,MLB-TKSB,BEDRE,MI-16G,HY-256G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEDRE,DRAMCFG:MICRON_16GB,NANDCFG:ITLC_S4E_256G_HY
N555	639-08965	PCBA,MLB-TKSB,BEDRE,MI-16G,SD-256G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEDRE,DRAMCFG:MICRON_16GB,NANDCFG:ITLC_S4E_256G_SD
N55J	639-08966	PCBA,MLB-TKSB,BEDRE,MI-16G,TO-256G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEDRE,DRAMCFG:MICRON_16GB,NANDCFG:ITLC_S4E_256G_TO
N55W	639-08967	PCBA,MLB-TKSB,BEDRE,SS-16G,HY-256G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEDRE,DRAMCFG:SAMSUNG_16GB,NANDCFG:ITLC_S4E_256G_HY
N567	639-08968	PCBA,MLB-TKSB,BEDRE,SS-16G,SD-256G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEDRE,DRAMCFG:SAMSUNG_16GB,NANDCFG:ITLC_S4E_256G_SD
N56L	639-08969	PCBA,MLB-TKSB,BEDRE,SS-16G,TO-256G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEDRE,DRAMCFG:SAMSUNG_16GB,NANDCFG:ITLC_S4E_256G_TO
N56Y	639-08970	PCBA,MLB-TKSB,BEDRE,HY-8G,SD-512G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEDRE,DRAMCFG:HYNIX_8GB,NANDCFG:ITLC_S4E_512G_SD
N579	639-08971	PCBA,MLB-TKSB,BEDRE,HY-8G,TO-512G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEDRE,DRAMCFG:HYNIX_8GB,NANDCFG:ITLC_S4E_512G_TO
N57N	639-08972	PCBA,MLB-TKSB,BEDRE,MI-8G,SD-512G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEDRE,DRAMCFG:MICRON_8GB,NANDCFG:ITLC_S4E_512G_SD
N591	639-08973	PCBA,MLB-TKSB,BEDRE,MI-8G,TO-512G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEDRE,DRAMCFG:MICRON_8GB,NANDCFG:ITLC_S4E_512G_TO
N59D	639-08974	PCBA,MLB-TKSB,BEDRE,SS-8G,SD-512G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEDRE,DRAMCFG:SAMSUNG_8GB,NANDCFG:ITLC_S4E_512G_SD
N59Q	639-08975	PCBA,MLB-TKSB,BEDRE,SS-8G,TO-512G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEDRE,DRAMCFG:SAMSUNG_8GB,NANDCFG:ITLC_S4E_512G_TO
N5C4	639-08976	PCBA,MLB-TKSB,BEDRE,HY-16G,SD-512G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEDRE,DRAMCFG:HYNIX_16GB,NANDCFG:ITLC_S4E_512G_SD
N5CH	639-08977	PCBA,MLB-TKSB,BEDRE,HY-16G,TO-512G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEDRE,DRAMCFG:HYNIX_16GB,NANDCFG:ITLC_S4E_512G_TO
N5CV	639-08978	PCBA,MLB-TKSB,BEDRE,MI-16G,SD-512G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEDRE,DRAMCFG:MICRON_16GB,NANDCFG:ITLC_S4E_512G_SD
N5D6	639-08979	PCBA,MLB-TKSB,BEDRE,MI-16G,TO-512G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEDRE,DRAMCFG:MICRON_16GB,NANDCFG:ITLC_S4E_512G_TO
N5DK	639-08980	PCBA,MLB-TKSB,BEDRE,SS-16G,SD-512G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEDRE,DRAMCFG:SAMSUNG_16GB,NANDCFG:ITLC_S4E_512G_SD
N5DX	639-08981	PCBA,MLB-TKSB,BEDRE,SS-16G,TO-512G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEDRE,DRAMCFG:SAMSUNG_16GB,NANDCFG:ITLC_S4E_512G_TO
N5F8	639-08982	PCBA,MLB-TKSB,BEDRE,HY-8G,HY-1.0T,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEDRE,DRAMCFG:HYNIX_8GB,NANDCFG:ITLC_S4E_1P0T_HY
N5FM	639-08983	PCBA,MLB-TKSB,BEDRE,HY-8G,SD-1.0T,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEDRE,DRAMCFG:HYNIX_8GB,NANDCFG:ITLC_S4E_1P0T_SD
N5G0	639-08984	PCBA,MLB-TKSB,BEDRE,MI-8G,HY-1.0T,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEDRE,DRAMCFG:MICRON_8GB,NANDCFG:ITLC_S4E_1P0T_HY
N5GC	639-08985	PCBA,MLB-TKSB,BEDRE,MI-8G,SD-1.0T,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEDRE,DRAMCFG:MICRON_8GB,NANDCFG:ITLC_S4E_1P0T_SD
N5GP	639-08986	PCBA,MLB-TKSB,BEDRE,SS-8G,HY-1.0T,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEDRE,DRAMCFG:SAMSUNG_8GB,NANDCFG:ITLC_S4E_1P0T_HY
N5H3	639-08987	PCBA,MLB-TKSB,BEDRE,SS-8G,SD-1.0T,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEDRE,DRAMCFG:SAMSUNG_8GB,NANDCFG:ITLC_S4E_1P0T_SD
N5HG	639-08988	PCBA,MLB-TKSB,BEDRE,HY-16G,HY-1.0T,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEDRE,DRAMCFG:HYNIX_16GB,NANDCFG:ITLC_S4E_1P0T_HY
N5HV	639-08989	PCBA,MLB-TKSB,BEDRE,HY-16G,SD-1.0T,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEDRE,DRAMCFG:HYNIX_16GB,NANDCFG:ITLC_S4E_1P0T_SD
N5J6	639-08990	PCBA,MLB-TKSB,BEDRE,MI-16G,HY-1.0T,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEDRE,DRAMCFG:MICRON_16GB,NANDCFG:ITLC_S4E_1P0T_HY
N5JL	639-08991	PCBA,MLB-TKSB,BEDRE,MI-16G,SD-1.0T,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEDRE,DRAMCFG:MICRON_16GB,NANDCFG:ITLC_S4E_1P0T_SD
N5JY	639-08992	PCBA,MLB-TKSB,BEDRE,SS-16G,HY-1.0T,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEDRE,DRAMCFG:SAMSUNG_16GB,NANDCFG:ITLC_S4E_1P0T_HY
N5KC	639-08993	PCBA,MLB-TKSB,BEDRE,SS-16G,SD-1.0T,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEDRE,DRAMCFG:SAMSUNG_16GB,NANDCFG:ITLC_S4E_1P0T_SD

EEEE	BOM NUMBER	BOM NAME	BOM OPTIONS
NRGY	639-09928	PCBA,MLB-TKSB,BEDRE,HY-8G,HY-2.0T,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEDRE,DRAMCFG:HYNIX_8GB,NANDCFG:ITLC_S4E_2P0T_HY
N5KP	639-08994	PCBA,MLB-TKSB,BEDRE,HY-8G,SD-2.0T,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEDRE,DRAMCFG:HYNIX_8GB,NANDCFG:ITLC_S4E_2P0T_SD
NRH9	639-09929	PCBA,MLB-TKSB,BEDRE,MI-8G,HY-2.0T,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEDRE,DRAMCFG:MICRON_8GB,NANDCFG:ITLC_S4E_2P0T_HY
N5L2	639-08995	PCBA,MLB-TKSB,BEDRE,MI-8G,SD-2.0T,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEDRE,DRAMCFG:MICRON_8GB,NANDCFG:ITLC_S4E_2P0T_SD
NRHN	639-09930	PCBA,MLB-TKSB,BEDRE,SS-8G,HY-2.0T,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEDRE,DRAMCFG:SAMSUNG_8GB,NANDCFG:ITLC_S4E_2P0T_HY
N5LF	639-08996	PCBA,MLB-TKSB,BEDRE,SS-8G,SD-2.0T,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEDRE,DRAMCFG:SAMSUNG_8GB,NANDCFG:ITLC_S4E_2P0T_SD
NRJ1	639-09931	PCBA,MLB-TKSB,BEDRE,HY-16G,HY-2.0T,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEDRE,DRAMCFG:HYNIX_16GB,NANDCFG:ITLC_S4E_2P0T_HY
N5LR	639-08997	PCBA,MLB-TKSB,BEDRE,HY-16G,SD-2.0T,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEDRE,DRAMCFG:HYNIX_16GB,NANDCFG:ITLC_S4E_2P0T_SD
NRJD	639-09932	PCBA,MLB-TKSB,BEDRE,MI-16G,HY-2.0T,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEDRE,DRAMCFG:MICRON_16GB,NANDCFG:ITLC_S4E_2P0T_HY
N5M4	639-08998	PCBA,MLB-TKSB,BEDRE,MI-16G,SD-2.0T,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEDRE,DRAMCFG:MICRON_16GB,NANDCFG:ITLC_S4E_2P0T_SD
NRJQ	639-09933	PCBA,MLB-TKSB,BEDRE,SS-16G,HY-2.0T,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEDRE,DRAMCFG:SAMSUNG_16GB,NANDCFG:ITLC_S4E_2P0T_HY
N5MH	639-08999	PCBA,MLB-TKSB,BEDRE,SS-16G,SD-2.0T,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:BEDRE,DRAMCFG:SAMSUNG_16GB,NANDCFG:ITLC_S4E_2P0T_SD

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EEEE	BOM NUMBER	BOM NAME	BOM OPTIONS
N5MV	639-09000	PCBA,MLB-TKSB,GOOD,HY-8G,HY-128G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:GOOD,DRAMCFG:HYNIX_8GB,NANDCFG:ITLC_S4E_128G_HY
MY53	639-08762	PCBA,MLB-TKSB,GOOD,HY-8G,SS-128G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:GOOD,DRAMCFG:HYNIX_8GB,NANDCFG:ITLC_S4E_128G_SS
MY5G	639-08763	PCBA,MLB-TKSB,GOOD,HY-8G,TO-128G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:GOOD,DRAMCFG:HYNIX_8GB,NANDCFG:ITLC_S4E_128G_TO
N5N6	639-09001	PCBA,MLB-TKSB,GOOD,MI-8G,HY-128G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:GOOD,DRAMCFG:MICRON_8GB,NANDCFG:ITLC_S4E_128G_HY
MY5T	639-08764	PCBA,MLB-TKSB,GOOD,MI-8G,SS-128G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:GOOD,DRAMCFG:MICRON_8GB,NANDCFG:ITLC_S4E_128G_SS
MY65	639-08765	PCBA,MLB-TKSB,GOOD,MI-8G,TO-128G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:GOOD,DRAMCFG:MICRON_8GB,NANDCFG:ITLC_S4E_128G_TO
N5NK	639-09002	PCBA,MLB-TKSB,GOOD,SS-8G,HY-128G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:GOOD,DRAMCFG:SAMSUNG_8GB,NANDCFG:ITLC_S4E_128G_HY
MY6J	639-08766	PCBA,MLB-TKSB,GOOD,SS-8G,SS-128G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:GOOD,DRAMCFG:SAMSUNG_8GB,NANDCFG:ITLC_S4E_128G_SS
MY6W	639-08767	PCBA,MLB-TKSB,GOOD,SS-8G,TO-128G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:GOOD,DRAMCFG:SAMSUNG_8GB,NANDCFG:ITLC_S4E_128G_TO
N5NX	639-09003	PCBA,MLB-TKSB,GOOD,HY-16G,HY-128G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:GOOD,DRAMCFG:HYNIX_16GB,NANDCFG:ITLC_S4E_128G_HY
MY77	639-08768	PCBA,MLB-TKSB,GOOD,HY-16G,SS-128G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:GOOD,DRAMCFG:HYNIX_16GB,NANDCFG:ITLC_S4E_128G_SS
MY7L	639-08769	PCBA,MLB-TKSB,GOOD,HY-16G,TO-128G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:GOOD,DRAMCFG:HYNIX_16GB,NANDCFG:ITLC_S4E_128G_TO
N5P9	639-09004	PCBA,MLB-TKSB,GOOD,MI-16G,HY-128G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:GOOD,DRAMCFG:MICRON_16GB,NANDCFG:ITLC_S4E_128G_HY
MY7Y	639-08770	PCBA,MLB-TKSB,GOOD,MI-16G,SS-128G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:GOOD,DRAMCFG:MICRON_16GB,NANDCFG:ITLC_S4E_128G_SS
MY89	639-08771	PCBA,MLB-TKSB,GOOD,MI-16G,TO-128G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:GOOD,DRAMCFG:MICRON_16GB,NANDCFG:ITLC_S4E_128G_TO
N5PN	639-09005	PCBA,MLB-TKSB,GOOD,SS-16G,HY-128G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:GOOD,DRAMCFG:SAMSUNG_16GB,NANDCFG:ITLC_S4E_128G_HY
MY8N	639-08772	PCBA,MLB-TKSB,GOOD,SS-16G,SS-128G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:GOOD,DRAMCFG:SAMSUNG_16GB,NANDCFG:ITLC_S4E_128G_SS
MY91	639-08773	PCBA,MLB-TKSB,GOOD,SS-16G,TO-128G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:GOOD,DRAMCFG:SAMSUNG_16GB,NANDCFG:ITLC_S4E_128G_TO
MY9D	639-08774	PCBA,MLB-TKSB,GOOD,HY-8G,HY-256G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:GOOD,DRAMCFG:HYNIX_8GB,NANDCFG:ITLC_S4E_256G_HY
MY9Q	639-08775	PCBA,MLB-TKSB,GOOD,HY-8G,SD-256G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:GOOD,DRAMCFG:HYNIX_8GB,NANDCFG:ITLC_S4E_256G_SD
MYC3	639-08776	PCBA,MLB-TKSB,GOOD,HY-8G,TO-256G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:GOOD,DRAMCFG:HYNIX_8GB,NANDCFG:ITLC_S4E_256G_TO
MYCG	639-08777	PCBA,MLB-TKSB,GOOD,MI-8G,HY-256G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:GOOD,DRAMCFG:MICRON_8GB,NANDCFG:ITLC_S4E_256G_HY
MYCT	639-08778	PCBA,MLB-TKSB,GOOD,MI-8G,SD-256G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:GOOD,DRAMCFG:MICRON_8GB,NANDCFG:ITLC_S4E_256G_SD
MYD5	639-08779	PCBA,MLB-TKSB,GOOD,MI-8G,TO-256G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:GOOD,DRAMCFG:MICRON_8GB,NANDCFG:ITLC_S4E_256G_TO
MYDJ	639-08780	PCBA,MLB-TKSB,GOOD,SS-8G,HY-256G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:GOOD,DRAMCFG:SAMSUNG_8GB,NANDCFG:ITLC_S4E_256G_HY
MYDW	639-08781	PCBA,MLB-TKSB,GOOD,SS-8G,SD-256G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:GOOD,DRAMCFG:SAMSUNG_8GB,NANDCFG:ITLC_S4E_256G_SD
MYF7	639-08782	PCBA,MLB-TKSB,GOOD,SS-8G,TO-256G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:GOOD,DRAMCFG:SAMSUNG_8GB,NANDCFG:ITLC_S4E_256G_TO
MYFL	639-08783	PCBA,MLB-TKSB,GOOD,HY-16G,HY-256G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:GOOD,DRAMCFG:HYNIX_16GB,NANDCFG:ITLC_S4E_256G_HY
MYFY	639-08784	PCBA,MLB-TKSB,GOOD,HY-16G,SD-256G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:GOOD,DRAMCFG:HYNIX_16GB,NANDCFG:ITLC_S4E_256G_SD
MYG9	639-08785	PCBA,MLB-TKSB,GOOD,HY-16G,TO-256G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:GOOD,DRAMCFG:HYNIX_16GB,NANDCFG:ITLC_S4E_256G_TO
MYGN	639-08786	PCBA,MLB-TKSB,GOOD,MI-16G,HY-256G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:GOOD,DRAMCFG:MICRON_16GB,NANDCFG:ITLC_S4E_256G_HY
MYH1	639-08787	PCBA,MLB-TKSB,GOOD,MI-16G,SD-256G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:GOOD,DRAMCFG:MICRON_16GB,NANDCFG:ITLC_S4E_256G_SD
MYHD	639-08788	PCBA,MLB-TKSB,GOOD,MI-16G,TO-256G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:GOOD,DRAMCFG:MICRON_16GB,NANDCFG:ITLC_S4E_256G_TO
MYHQ	639-08789	PCBA,MLB-TKSB,GOOD,SS-16G,HY-256G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:GOOD,DRAMCFG:SAMSUNG_16GB,NANDCFG:ITLC_S4E_256G_HY
MYJ3	639-08790	PCBA,MLB-TKSB,GOOD,SS-16G,SD-256G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:GOOD,DRAMCFG:SAMSUNG_16GB,NANDCFG:ITLC_S4E_256G_SD
MYJG	639-08791	PCBA,MLB-TKSB,GOOD,SS-16G,TO-256G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:GOOD,DRAMCFG:SAMSUNG_16GB,NANDCFG:ITLC_S4E_256G_TO
MYK5	639-08792	PCBA,MLB-TKSB,GOOD,HY-8G,SD-512G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:GOOD,DRAMCFG:HYNIX_8GB,NANDCFG:ITLC_S4E_512G_SD
MYKJ	639-08793	PCBA,MLB-TKSB,GOOD,HY-8G,TO-512G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:GOOD,DRAMCFG:HYNIX_8GB,NANDCFG:ITLC_S4E_512G_TO
MYKW	639-08794	PCBA,MLB-TKSB,GOOD,MI-8G,SD-512G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:GOOD,DRAMCFG:MICRON_8GB,NANDCFG:ITLC_S4E_512G_SD
MYL7	639-08795	PCBA,MLB-TKSB,GOOD,MI-8G,TO-512G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:GOOD,DRAMCFG:MICRON_8GB,NANDCFG:ITLC_S4E_512G_TO
MYLL	639-08796	PCBA,MLB-TKSB,GOOD,SS-8G,SD-512G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:GOOD,DRAMCFG:SAMSUNG_8GB,NANDCFG:ITLC_S4E_512G_SD
MYLY	639-08797	PCBA,MLB-TKSB,GOOD,SS-8G,TO-512G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:GOOD,DRAMCFG:SAMSUNG_8GB,NANDCFG:ITLC_S4E_512G_TO
MYM9	639-08798	PCBA,MLB-TKSB,GOOD,HY-16G,SD-512G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:GOOD,DRAMCFG:HYNIX_16GB,NANDCFG:ITLC_S4E_512G_SD
MYMN	639-08799	PCBA,MLB-TKSB,GOOD,HY-16G,TO-512G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:GOOD,DRAMCFG:HYNIX_16GB,NANDCFG:ITLC_S4E_512G_TO
MYN1	639-08800	PCBA,MLB-TKSB,GOOD,MI-16G,SD-512G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:GOOD,DRAMCFG:MICRON_16GB,NANDCFG:ITLC_S4E_512G_SD
MYND	639-08801	PCBA,MLB-TKSB,GOOD,MI-16G,TO-512G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:GOOD,DRAMCFG:MICRON_16GB,NANDCFG:ITLC_S4E_512G_TO
MYNQ	639-08802	PCBA,MLB-TKSB,GOOD,SS-16G,SD-512G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:GOOD,DRAMCFG:SAMSUNG_16GB,NANDCFG:ITLC_S4E_512G_SD
MYP3	639-08803	PCBA,MLB-TKSB,GOOD,SS-16G,TO-512G,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:GOOD,DRAMCFG:SAMSUNG_16GB,NANDCFG:ITLC_S4E_512G_TO
MYPG	639-08804	PCBA,MLB-TKSB,GOOD,HY-8G,HY-1.0T,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:GOOD,DRAMCFG:HYNIX_8GB,NANDCFG:ITLC_S4E_1P0T_HY
MYPT	639-08805	PCBA,MLB-TKSB,GOOD,HY-8G,SD-1.0T,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:GOOD,DRAMCFG:HYNIX_8GB,NANDCFG:ITLC_S4E_1P0T_SD
MYQ5	639-08806	PCBA,MLB-TKSB,GOOD,MI-8G,HY-1.0T,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:GOOD,DRAMCFG:MICRON_8GB,NANDCFG:ITLC_S4E_1P0T_HY
MYQJ	639-08807	PCBA,MLB-TKSB,GOOD,MI-8G,SD-1.0T,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:GOOD,DRAMCFG:MICRON_8GB,NANDCFG:ITLC_S4E_1P0T_SD
MYQW	639-08808	PCBA,MLB-TKSB,GOOD,SS-8G,HY-1.0T,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:GOOD,DRAMCFG:SAMSUNG_8GB,NANDCFG:ITLC_S4E_1P0T_HY
MYR7	639-08809	PCBA,MLB-TKSB,GOOD,SS-8G,SD-1.0T,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:GOOD,DRAMCFG:SAMSUNG_8GB,NANDCFG:ITLC_S4E_1P0T_SD
MYRL	639-08810	PCBA,MLB-TKSB,GOOD,HY-16G,HY-1.0T,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:GOOD,DRAMCFG:HYNIX_16GB,NANDCFG:ITLC_S4E_1P0T_HY
MYRY	639-08811	PCBA,MLB-TKSB,GOOD,HY-16G,SD-1.0T,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:GOOD,DRAMCFG:HYNIX_16GB,NANDCFG:ITLC_S4E_1P0T_SD
MYT9	639-08812	PCBA,MLB-TKSB,GOOD,MI-16G,HY-1.0T,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:GOOD,DRAMCFG:MICRON_16GB,NANDCFG:ITLC_S4E_1P0T_HY
MYTN	639-08813	PCBA,MLB-TKSB,GOOD,MI-16G,SD-1.0T,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:GOOD,DRAMCFG:MICRON_16GB,NANDCFG:ITLC_S4E_1P0T_SD
MYV1	639-08814	PCBA,MLB-TKSB,GOOD,SS-16G,HY-1.0T,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:GOOD,DRAMCFG:SAMSUNG_16GB,NANDCFG:ITLC_S4E_1P0T_HY
MYVR	639-08816	PCBA,MLB-TKSB,GOOD,SS-16G,SD-1.0T,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:GOOD,DRAMCFG:SAMSUNG_16GB,NANDCFG:ITLC_S4E_1P0T_SD

EEEE	BOM NUMBER	BOM NAME	BOM OPTIONS
NRK3	639-09934	PCBA,MLB-TKSB,GOOD,HY-8G,HY-2.0T,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:GOOD,DRAMCFG:HYNIX_8GB,NANDCFG:ITLC_S4E_2P0T_HY
MYW4	639-08817	PCBA,MLB-TKSB,GOOD,HY-8G,SD-2.0T,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:GOOD,DRAMCFG:HYNIX_8GB,NANDCFG:ITLC_S4E_2P0T_SD
NRKG	639-09935	PCBA,MLB-TKSB,GOOD,MI-8G,HY-2.0T,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:GOOD,DRAMCFG:MICRON_8GB,NANDCFG:ITLC_S4E_2P0T_HY
MYWH	639-08818	PCBA,MLB-TKSB,GOOD,MI-8G,SD-2.0T,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:GOOD,DRAMCFG:MICRON_8GB,NANDCFG:ITLC_S4E_2P0T_SD
NRKT	639-09936	PCBA,MLB-TKSB,GOOD,SS-8G,HY-2.0T,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:GOOD,DRAMCFG:SAMSUNG_8GB,NANDCFG:ITLC_S4E_2P0T_HY
MYWV	639-08819	PCBA,MLB-TKSB,GOOD,SS-8G,SD-2.0T,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:GOOD,DRAMCFG:SAMSUNG_8GB,NANDCFG:ITLC_S4E_2P0T_SD
NRL5	639-09937	PCBA,MLB-TKSB,GOOD,HY-16G,HY-2.0T,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:GOOD,DRAMCFG:HYNIX_16GB,NANDCFG:ITLC_S4E_2P0T_HY
MYX6	639-08820	PCBA,MLB-TKSB,GOOD,HY-16G,SD-2.0T,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:GOOD,DRAMCFG:HYNIX_16GB,NANDCFG:ITLC_S4E_2P0T_SD
NRLJ	639-09938	PCBA,MLB-TKSB,GOOD,MI-16G,HY-2.0T,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:GOOD,DRAMCFG:MICRON_16GB,NANDCFG:ITLC_S4E_2P0T_HY
MYXK	639-08821	PCBA,MLB-TKSB,GOOD,MI-16G,SD-2.0T,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:GOOD,DRAMCFG:MICRON_16GB,NANDCFG:ITLC_S4E_2P0T_SD
NRLW	639-09939	PCBA,MLB-TKSB,GOOD,SS-16G,HY-2.0T,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:GOOD,DRAMCFG:SAMSUNG_16GB,NANDCFG:ITLC_S4E_2P0T_HY
MYXX	639-08822	PCBA,MLB-TKSB,GOOD,SS-16G,SD-2.0T,X1783	CMN_PARTS_BOM,DEV_PARTS_BOM,ALTERNATE,CPU_ICLY:GOOD,DRAMCFG:SAMSUNG_16GB,NANDCFG:ITLC_S4E_2P0T_SD

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BOM Variants 3

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Alternates

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
107S00033	107S00034		ALL	rdar://problem/31026333
107S00076	107S00044		ALL	rdar://problem/31026474
107S00139	107S0178		ALL	rdar://problem/31026896
107S0248	107S0250		ALL	rdar://problem/31026938
128S00087	128S00011		ALL	rdar://problem/31104542
128S00026	128S00011		ALL	rdar://problem/31104542
128S00031	128S00011		ALL	rdar://problem/31104542
197S00120	197S00118		ALL	rdar://problem/32474316
152S00368	152S00269		ALL	rdar://problem/32986667
152S00786	152S00344		ALL	rdar://problem/32988704
152S00785	152S00477		ALL	rdar://problem/32988930
152S00182	152S00703		ALL	rdar://problem/32989310
128S0364	128S0264		ALL	rdar://problem/32981497
128S00039	128S00038		ALL	rdar://problem/32984088
128S0302	128S00038		ALL	rdar://problem/32984088
128S0631	128S0352		ALL	rdar://problem/32984967
152S00734	152S00730		ALL	rdar://problem/32986265
107S00029	107S00087		ALL	rdar://problem/33006830
376S00227	376S00203		ALL	rdar://problem/32990227
376S00204	376S00203		ALL	rdar://problem/32990227
376S00226	376S00203		ALL	rdar://problem/32990227
152S00800	152S00268		ALL	rdar://problem/32986455
128S0445	128S0436		ALL	rdar://problem/32981936
128S0392	128S0436		ALL	rdar://problem/32981936
128S00042	128S0311		ALL	rdar://problem/32982452
128S00043	128S0311		ALL	rdar://problem/32982452
128S0329	128S0311		ALL	rdar://problem/32982452
128S00058	128S00098		ALL	rdar://problem/32983704
376S00007	376S1179		ALL	rdar://problem/33006121
376S00228	376S1179		ALL	rdar://problem/33006121
138S00084	138S00060		ALL	rdar://problem/31227858
197S00047	197S00036		ALL	rdar://problem/31509365
197S00048	197S00036		ALL	rdar://problem/31509365
197S00046	197S00036		ALL	rdar://problem/31509365
311S00060	311S0273		ALL	rdar://problem/31512477
138S1101	138S0738		ALL	rdar://problem/31491081
371S00180	371S00077		ALL	rdar://problem/31927114
138S00049	138S0831		ALL	rdar://problem/31284882
138S00109	138S0914		ALL	rdar://problem/46640234
138S00291	138S0835		ALL	rdar://problem/48092454
138S00181	138S0835		ALL	rdar://problem/48092454
353S01320	353S01346		ALL	rdar://problem/48088900
132S00229	132S00010		ALL	rdar://problem/47305238
353S4376	353S3384		ALL	rdar://problem/48088312
371S00220	371S00181		ALL	rdar://problem/48058127

Alternate Vendor	Primary Vendor
TFT	Cyntec
Yageo	Cyntec
Panasonic	Murata
TFT	Cyntec
Panasonic	Kemet
NEC	Kemet
Rohm	Kemet
Epson	TXC
NEC	Cyntec
Cyntec	Murata
Chilisin	Murata
Cyntec	Chilisin
Kemet	Panasonic
NEC	Kemet
Panasonic	Kemet
NEC	Panasonic
Chilisin	Cyntec
TFT	Yageo
Fairchild	Vishay
Diodes	Vishay
Vishay	Vishay
NEC	Cyntec
Panasonic	Kemet
Panasonic	Panasonic
Kemet	NEC
Panasonic	NEC
Panasonic	NEC
Rohm	NEC
AOS	Vishay
Fairchild	Vishay
Taiyo	Murata
Kyocera	TXC
Murata	TXC
Epson	TXC
Diodes	Philips
Murata	Samsung
Diodes	NXP
Kyocera	Murata
Kyocera	Murata
Kyocera	Murata
Samsung	Murata
NXP	ON Semi
Taiyo	Murata
ON Semi	TI
ON Semi	Diodes

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
138S00077	138S00035		ALL	rdar://problem/31167038
138S00093	138S00035		ALL	rdar://problem/31167038
132S00012	132S0401		ALL	rdar://problem/31180314
138S00015	138S0777		ALL	rdar://problem/31254330
138S0786	138S0847		ALL	rdar://problem/31253709
152S00398	152S00204		ALL	rdar://problem/33011314
152S00724	152S00311		ALL	rdar://problem/33011211
152S00726	152S00592		ALL	rdar://problem/33011437
152S00725	152S00590		ALL	rdar://problem/33011526
155S00190	155S0914		ALL	rdar://problem/32364855
155S00007	155S0667		ALL	rdar://problem/32415629
155S00203	155S0894		ALL	rdar://problem/32435328
740S0118	740S00028		ALL	rdar://problem/32477706
155S00067	155S00401		ALL	Per CE
155S0741	155S0361		ALL	rdar://problem/32406745
311S00121	311S0398		ALL	rdar://problem/32474809
138S00056	138S1100		ALL	rdar://problem/31411109
311S00104	311S00091		ALL	rdar://problem/31509861
353S01041	353S01042		ALL	rdar://problem/31816775
311S00156	311S00129		ALL	rdar://problem/31941459
138S0775	138S0860		ALL	rdar://problem/46642485
138S0846	138S0811		ALL	rdar://problem/30812097
376S1053	376S0604		ALL	rdar://problem/30812097
152S00359	152S00253		ALL	rdar://problem/30812097
740S00041	740S0159		ALL	rdar://problem/30812097
376S1106	376S0678		ALL	rdar://problem/30812097
371S00074	371S0602		ALL	rdar://problem/33675478
132S00176	132S0640		ALL	rdar://problem/33924830
311S0426	311S00007		ALL	
155S0665	155S00232		ALL	rdar://problem/32364084
311S00138	311S0436		ALL	rdar://problem/32474939
335S00270	335S00203		ALL	rdar://problem/33516617
335S00213	335S0888		ALL	rdar://problem/33927828
378S00029	378S00002		ALL	rdar://problem/33932183
311S00178	311S00177		ALL	rdar://problem/39513462
138S00116	138S00071		ALL	rdar://problem/46491734
138S00117	138S00071		ALL	rdar://problem/46491734
152S00765	152S00239		ALL	rdar://problem/40632537
152S00737	152S00733		ALL	rdar://problem/46492368
152S00997	152S00476		ALL	rdar://problem/46492529
311S00247	311S00139		ALL	rdar://problem/52919470
353S01615	353S4160		ALL	rdar://problem/52860697
376S00401	376S00398		ALL	per J214
376S00403	376S00398		ALL	per J214

Alternate Vendor	Primary Vendor
Taiyo	Murata
Kyocera	Murata
Murata/TDK	Taiyo
Samsung/Taiyo	Murata
Samsung	Murata/Taiyo
Taiyo	Cyntec
Chilisin	Cyntec
Chilisin	Cyntec
Chilisin	Cyntec
Taiyo	Panasonic
Taiyo	Panasonic
Taiyo	Murata
Polytronics	Bussman
TDK	Murata
Murata	TDK
Diodes	NXP/Nexperia
Taiyo/TDK	Murata
TI	ON Semi
ST	TI
Nexperia	TI
Samsung	Murata
Samsung	Murata
Diodes	Fairchild
Chilisin	Cyntec
Bourns	Littlefuse
Fairchild	Vishay
Infineon	NXP
Yageo	Murata
NXP	Diodes
Murata	TDK
Nexperia	TI
Adesto	Macronix
ON Semi	STMicro
Lite-On	Everlight
On Semi	TI
Taiyo	Murata
Keyocera	Murata
Chilisin	Cyntec
Chilisin	Cyntec
Chilisin	Murata
Nexperia	TI
TI	TI
Toshiba	Diodes
NXP	Diodes

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
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376S00399	376S0855		ALL	per J214
107S0240	107S0255		ALL	rdar://problem/33930580
377S00123	377S00031		ALL	rdar://problem/35399063
377S0077	377S0183		ALL	rdar://problem/35403837
377S0184	377S0155		ALL	rdar://problem/35404095
376S1137	376S00019		ALL	rdar://problem/33955940
155S0706	155S0302		ALL	rdar://problem/32364222
131S00134	131S00041		ALL	rdar://problem/36353852
353S02004	353S01989		ALL	rdar://problem/48583206
353S02005	353S2216		ALL	rdar://problem/36563854
132S00202	132S00175		ALL	rdar://problem/36674713
311S0562	311S0372		ALL	rdar://problem/47654696
376S00282	376S1128		ALL	rdar://problem/33904000
131S00142	132S0312		ALL	rdar://problem/36993892
107S00053	107S00071		ALL	rdar://problem/40145084
371S00085	371S00190		ALL	rdar://problem/40314867
353S00525	353S4471		ALL	rdar://problem/46491385
353S00832	353S4471		ALL	rdar://problem/46491385
376S00281	376S1147		ALL	rdar://problem/46491572
152S01090	152S01085		ALL	rdar://problem/46487936
376S00373	376S1038		ALL	rdar://problem/46490666
138S00229	138S00107		ALL	rdar://problem/46631987
138S00022	138S0801		ALL	rdar://problem/40667960
372S0183	372S00033		ALL	rdar://problem/50349170
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353S01824	353S02068		ALL	rdar://problem/48583357
353S02064	353S4471		ALL	rdar://problem/46491385
353S02065	353S4471		ALL	rdar://problem/46491385
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371S00217	371S00079		ALL	rdar://problem/50601049
197S00244	197S00227		ALL	rdar://problem/50678168
371S00193	371S00064		ALL	rdar://problem/50831008
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138S00097	138S0750		ALL	rdar://problem/51371269
138S00164	138S00138		ALL	rdar://problem/51370814
138S00139	138S00138		ALL	rdar://problem/51370814
311S00096	311S00040		ALL	rdar://problem/51371859
138S0852	138S0818		ALL	rdar://problem/51371555
353S02017	353S4471		ALL	rdar://problem/52837421

Alternate Vendor	Primary Vendor
Taiyo	Murata
Chilisin	Murata
Diodes	ON Semi
ON Semi	Diodes
TFT	Cyntec
Semtech	ON Semi
ST	Infineon
Infineon	ON Semi
Vishay	Diodes
Taiyo	Murata
Murata	Taiyo
ON Semi	TI
ON Semi	TI
Murata/Taiyo	Kyocera/Samsung
TI	NXP/Nexperia
Nexperia	Diodes
Samsung	Murata
Cyntec	Yageo
ON Semi	Diodes
Vishay	Vishay
Fairchild	Vishay
Alpha Omega	ON Semi
Chilisin	Murata
Diodes	TI
Kyocera	Murata
Taiyo Yuden	Murata
Diodes	ON Semi
Panasonic	Cyntec
ON Semi	TI
Vishay	Vishay
Vishay	Vishay
ON Semi	Semtech
ROHM	Nexperia
TXC	NDK
ROHM	NXP
Chilisin	Cyntec
Taiyo	Murata
Taiyo	Murata
Taiyo	Kyocera
Murata	Kyocera
Diodes	NXP
Samsung	Murata
AOS	Vishay

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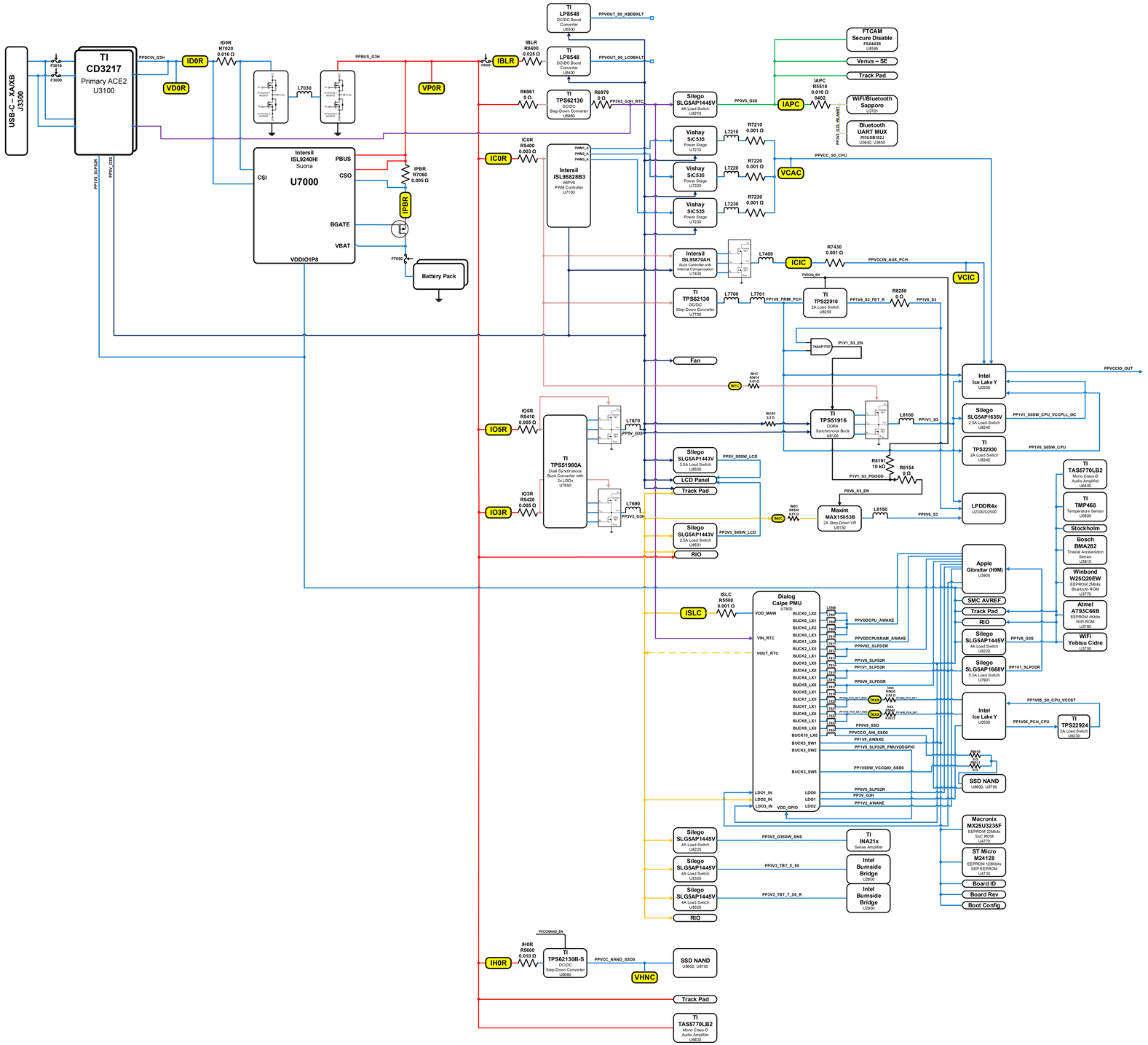
Power Supply Sub-System



PAGE TITLE	Power Block Diagram
	Apple Inc.
DRAWING NUMBER	051-05232
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REVISION	2.0.0
BRANCH	proto4b
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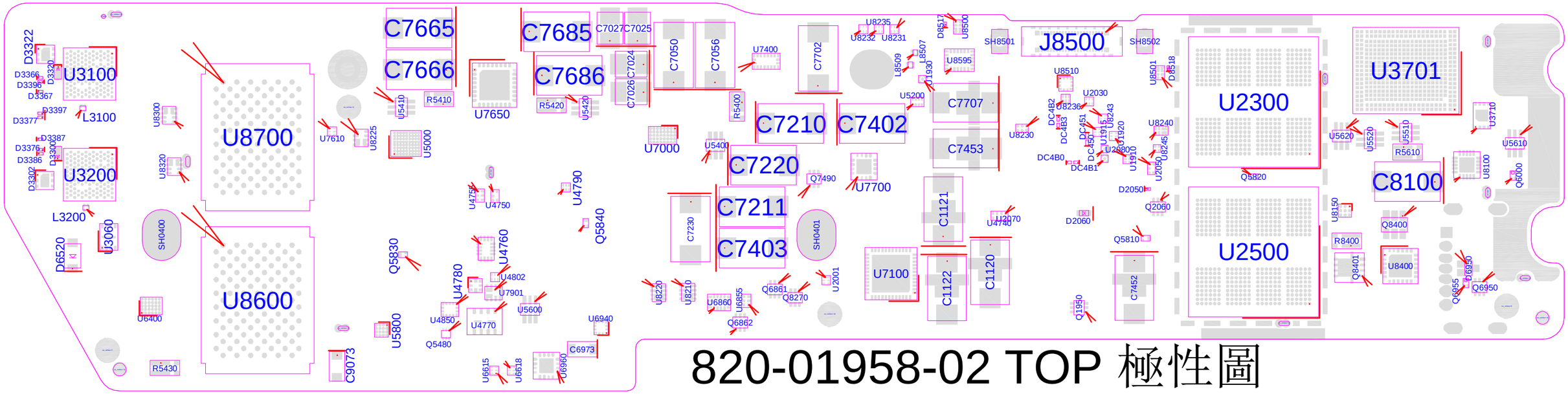
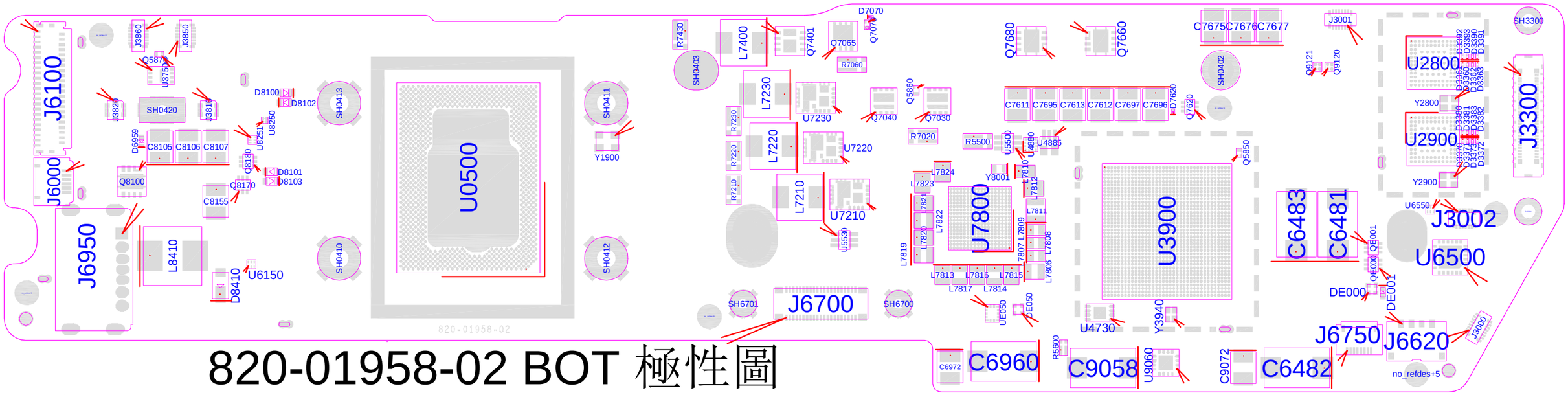


820-01958-02 TOP 極性圖

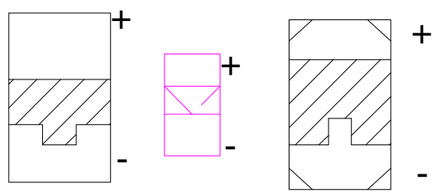


820-01958-02 BOT 極性圖

1.EE確認:D3360,D3361,D3362,D3363,D3370,D3371,D3372,D3373,D3380,D3381,D3382,D3383,D3390,D3391,D3392,D3393,QE000,QE001電路對稱

2.特殊物料(LED)極性:

D6959
378S00029



378S00002

DE001
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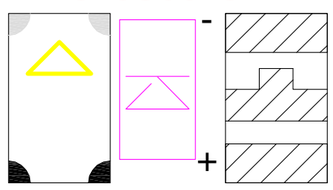

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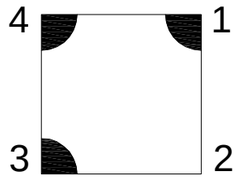

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