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.

X1782 MLB SCHEMATIC

REV	ECN	DESCRIPTION OF REVISION	CK APPD / DATE
5	0021434873	ENGINEERING RELEASED	2019-12-20

LAST_MODIFICATION=Mon Dec 16 17:32:55 2019

DRAWING TITLE: SCHEM,MLB,X1782

Apple Inc.

DRAWING NUMBER: 051-05309 | SIZE: D
REVISION: 5.1.0
BRANCH:
PAGE: 1 OF 500
SHEET: 1 OF 98

DESIGN	DESCRIPTION	SCHEMATIC	BOARD	MCO	PANEL
J223/MLB	POR CFL MLB	051-05309	820-01987	056-09380	057-01595-D
J213/FLEX_AUDIOJACK	AUDIO JACK, AMR, AND MESA	051-04122	821-02091	056-07548-27	N/A
J680/FLEX_USBC	LEFT SIDE USB TONGUE FLEX	051-03140	821-01646	056-05483-A	N/A
J130/FLEX_BMU_SIGNAL	SIGNALS TO BMU	051-01247	821-01726	056-05589-A	N/A
J130/FLEX_BMU_PWR	POWER TO/FROM BMU	051-01195	821-00583	056-02919-A	N/A
J130/FLEX_TCON_MLB_A	DISPLAYPORT FROM MLB TO TCON	051-01897	821-00981	056-02852-A	N/A
J213/FLEX_TRACKPAD	MLB TO TRACKPAD	051-04335	821-02218	056-07655-08	N/A
J130/FLEX_KB	KB FLEX FOR ALL 3 KB TYPES	051-02011	821-01046	056-03725-B	N/A
J213/FLEX_3MIC	MIC FLEX	051-04441	821-02265	056-07754-24	N/A
J79/GRAPE_FLEX	DFR TOUCH FLEX	051-01338	821-00681	056-02220-A	N/A
DFR DAUGHTER FLEX	DFR DAUGHTER FLEX	VENDOR	VENDOR	099-14398	N/A

PAGE TITLE: SYSTEM PCB SUMMARY

Apple Inc.

DRAWING NUMBER: 051-05309
SIZE: D
REVISION: 5.1.0
BRANCH:
PAGE: 2 OF 500
SHEET: 2 OF 98

TOP SIDE STANDOFFS

OMIT_TABLE
Z0400
2.80D1.2ID-1.49H-SM
CRITICAL

860-01216
EAST OF NAND ALIGNED WITH BOTTOM SIDE STANDOFF

OMIT_TABLE
Z0401
2.80D1.2ID-1.49H-SM
CRITICAL

860-01216
NORTH OF NAND

OMIT_TABLE
Z0402
2.80D1.2ID-1.49H-SM
CRITICAL

860-01216
NORTH OF NAND

OMIT_TABLE
Z0404
2.80D1.2ID-1.49H-SM
CRITICAL

860-01216
FAR SIDE NEAR AJ CONN

OMIT_TABLE
Z0405
2.80D1.2ID-1.49H-SM
CRITICAL

860-01216
SOUTH OF NAND

OMIT_TABLE
Z0406
2.80D1.2ID-1.49H-SM
CRITICAL

860-01216
NORTH OF NAND

BOTTOM SIDE TALL STANDOFF

OMIT_TABLE
Z0460
2.80D1.2ID-3.15H-SM

860-01485
EAST OF NAND ALIGNED WITH TOP SIDE STANDOFF

POGO PIN HEAT PIPE

CRITICAL
PP0499
POGO-2.30D-4.0H-SM
SM-1

870-09667

USB-C BOSS

CRITICAL
Z0420
3.40D1.75ID-1.12H-SM

860-00392

CRITICAL
Z0421
3.40D1.75ID-1.12H-SM

860-00392

DFR BOSS

CRITICAL
Z0430
3.40D1.75ID-1.5H-SM

860-01484

TRACKPAD BOSS

CRITICAL
Z0440
3.50D1.85ID-1.41H-SM

860-00381

CRITICAL
Z0441
3.50D1.85ID-1.41H-SM

860-00381

DISPLAY BOSS

CRITICAL
Z0450
2.7X1.8R-1.4ID-0.91H-SM

860-00469

CRITICAL
Z0451
2.7X1.8R-1.4ID-0.91H-SM

860-00469

AJ FLEX COWLING BOSS

CRITICAL
Z0470
3.50D1.85ID-1.92H-SM

860-00382

DFR WASHER

CRITICAL
Z0431
4.75OD2.73ID-H0.2
RING-TH

860-01519

WIFI WASHER

CRITICAL
Z0432
4.75OD2.73ID-H0.2
RING-TH

860-01519

POGO PIN FAN

CRITICAL
PP0430
POGO-2.30D-4.0H-SM
SM-1

870-09667

SHIELD CAN ALIGMENT HOLES

CRITICAL
ZT0441
TH-NSP
SL-1.2X0.4-1.5X0.7

998-04440

CRITICAL
ZT0442
TH-NSP
SL-1.2X0.4-1.5X0.7

998-04440

CRITICAL
ZT0443
TH-NSP
SL-1.2X0.4-1.5X0.7

998-04440

CRITICAL
ZT0444
TH-NSP
SL-1.2X0.4-1.5X0.7

998-04440

CRITICAL
ZT0445
TH-NSP
SL-1.2X0.4-1.5X0.7

998-04440

CRITICAL
ZT0446
TH-NSP
SL-1.2X0.4-1.5X0.7

998-04440

POGO PINS BACKLIGHT

CRITICAL
PP0400
POGO-2.30D-4.06H-SM
SM-1

870-09670

POGO PIN DISPLAY

CRITICAL
PP0420
POGO-2.30D-4.0H-SM
SM-1

870-09667

POGO PINS DRAM

CRITICAL
PP0410
POGO-2.30D-4.0H-SM
SM-1

870-09667

CRITICAL
PP0411
POGO-2.30D-4.0H-SM
SM-1

870-09667

MLB MTG HOLES 2.1X3.36 MM

CRITICAL
ZT0420
TH-NSP
SL-2.1X3.51-4.6X6.01

998-19711
NEAR RIGHT SPKR CONNECTOR

CRITICAL
ZT0421
TH-NSP
SL-2.1X3.51-4.6X6.01

998-19711
NEAR TRACKPAD CONNECTOR

CRITICAL
ZT0422
TH-NSP
SL-2.1X3.51-4.6X6.01

998-19711
NEAR LEFT SPKR CONNECTOR

CPU THERM STAGE HOLES 3.15 MM

CRITICAL
ZT0400
3P9R3P15

998-0845
CORNER NEAREST KEYBOARD

CPU THERM STAGE HOLES 3.6 MM

CRITICAL
ZT0401
4.0R3.6-NSP

998-03850

CRITICAL
ZT0402
4.0R3.6-NSP

998-03850

CRITICAL
ZT0403
4.0R3.6-NSP

998-03850

FAN MTG HOLE 2.0X2.6 MM

CRITICAL
ZT0430
TH-NSP
SL-2.6X2.0-4.7X4.1

998-03974

SHIELD CAN ALIGNMENT SLOTS DRAM

CRITICAL
SL0490
TH-NSP
SL-1.2X0.4-1.5X0.7

998-04440

CRITICAL
SL0491
TH-NSP
SL-1.2X0.4-1.5X0.7

998-04440

2X PLATED SLOTS IN MEM AREA DUE TO SPACE CONSTRAINTS <RDAR://44382678> ALL OTHER SHIELD ALIGNMENT SLOTS ARE NPTH + GND RING FOR BETTER TOLERANCE

NOTE: REFER TO BOM TABLES. ONLY SOLDERED PARTS REMAIN IN RAMP/PVT SMT BOM. OTHERS MOVED TO POST-SMT ENCLOSURE BOM

USB-C SHIELD

806-19049	1	SHIELD CAN,HOLES,TITAN RIDGE,X1533	USBC_CAN	CRITICAL	USBC_SHLD
870-08656	1	TAPE,NON COND,STIFFENER,TITAN RIDGE,CAN,X1533	USBC_CAN_TAPE	CRITICAL	USBC_TAPE

MEGA SHIELD

604-25986	1	MEGA CAN,INSULATED,X1533	MEGA_CAN	CRITICAL	MEGA_SHLD

DRAM SHIELD TOP

806-18560	1	FENCE,DRAM,UNIV,X1533	DRAM_TOP_FENCE	CRITICAL	DRAM_TOP_FENC
870-07840	1	TAPE,COND,DRAM,UNIV,X1533	DRAM_TOP_FENCE_TAPE	CRITICAL	DRAM_TOP_TAPE

DRAM SHIELD BOTTOM

806-19048	1	SHIELD CAN,HOLES,DRAM,UNIV,X1533	DRAM_BOT_CAN	CRITICAL	DRAM_BOT_CAN
870-08657	1	TAPE,NON COND,STIFFENER,DRAM,CAN	DRAM_BOT_CAN_TAPE	CRITICAL	DRAM_BOT_TAPE

LIQUID SPILL INDICATOR

825-00493	4	LSI,BLACK,REEL,X1030	LSI1,LSI2,LSI3,LSI4	CRITICAL	LSI

CPU SLEDS

806-14839	2	SLED,METAL,MATT NICKEL,X940	SLED1,SLED2	CRITICAL	CPU_SLEDS

TOP SIDE STANDOFFS

860-01216	6	BOSS,STANDOFF,MLB,X1533	Z0400-Z0402,Z0404-Z0406	CRITICAL	STANDOFFS_TOP

BOTTOM SIDE STANDOFFS

860-01485	1	BOSS,STANDOFF,MLB,TALL,X1533	Z0460	CRITICAL	STANDOFFS_BOT

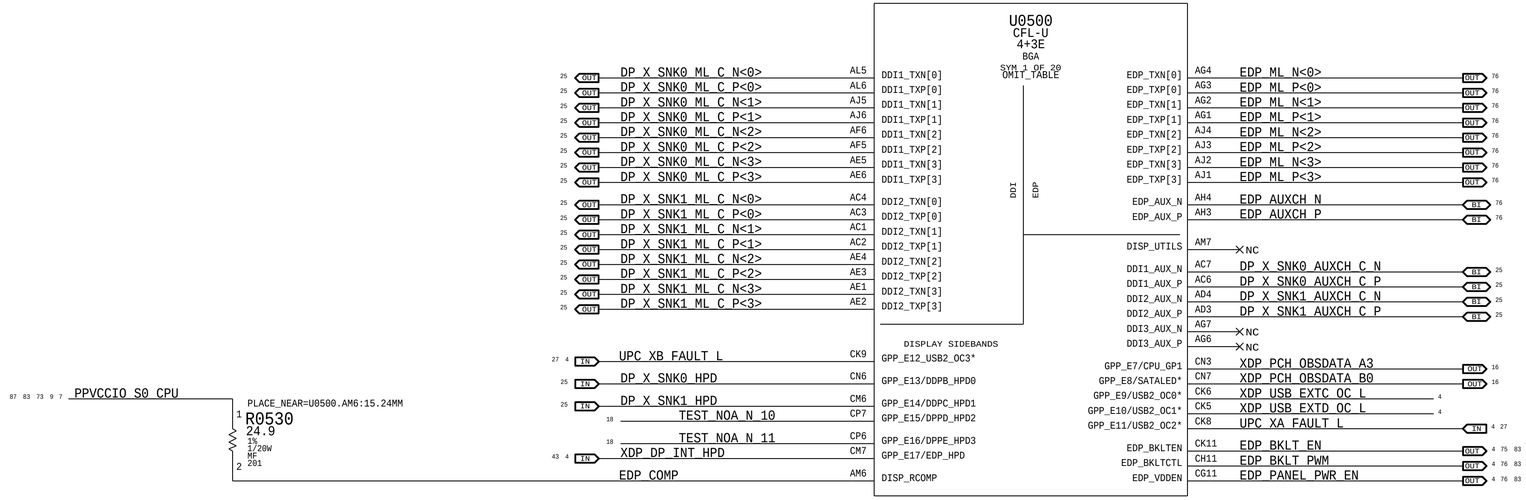
BOM_COST_GROUP=MECHANICALS

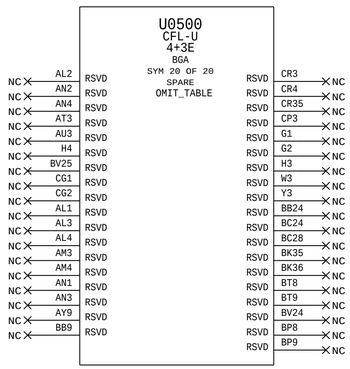
SYNC_MASTER=
SYNC_DATE=

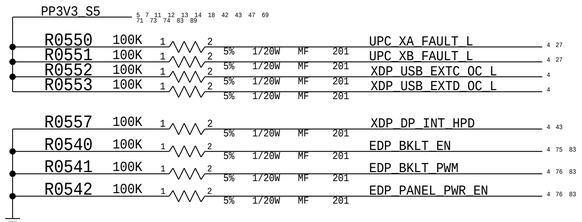
PAGE TITLE
PD PARTS

Apple Inc.

DRAWING NUMBER 051-05309
SIZE D
REVISION 5.1.0
BRANCH
PAGE 4 OF 500
SHEET 3 OF 98





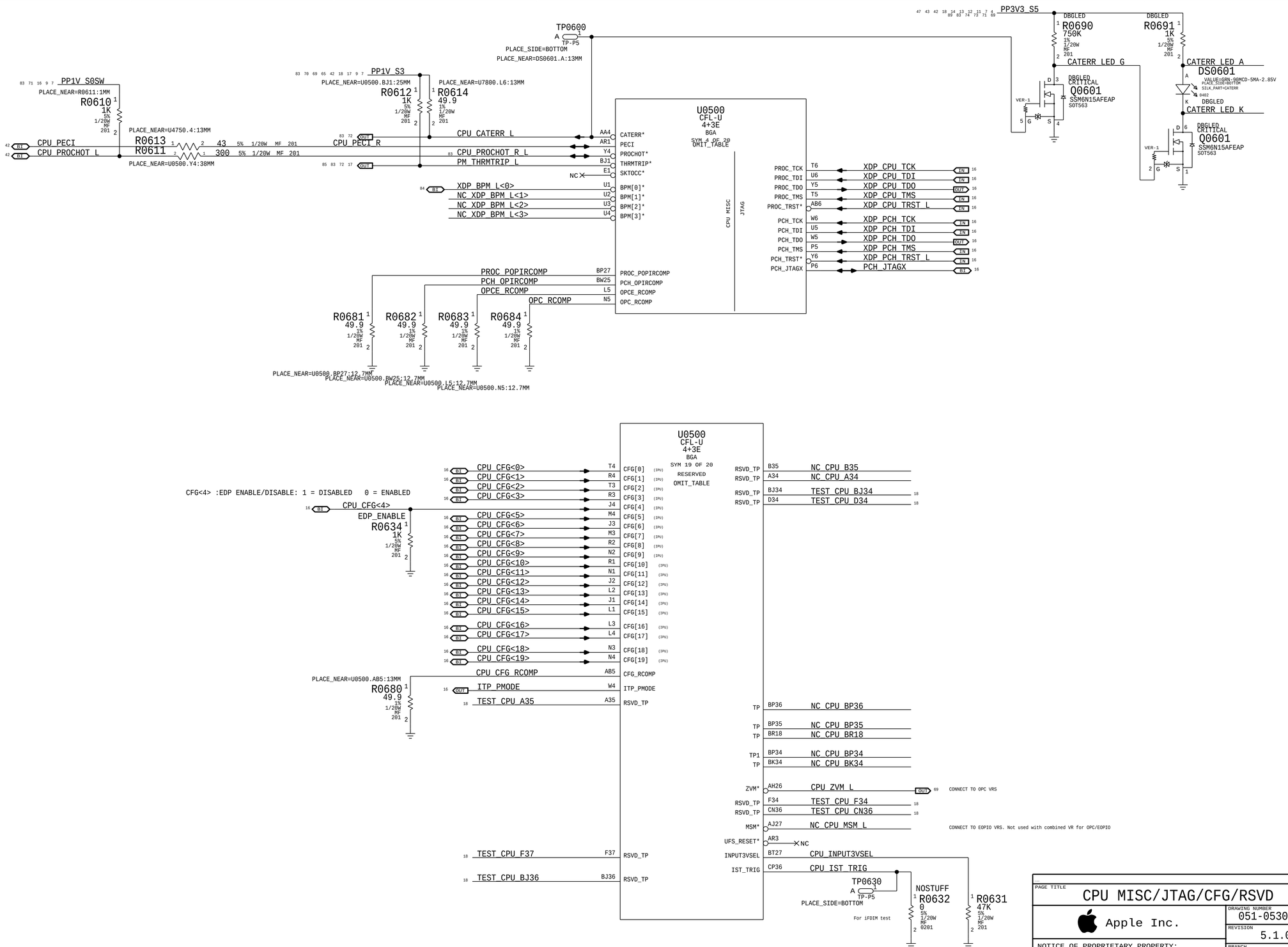


BOM_COST_GROUP=CPU & CHIPSET

PAGE TITLE
CPU GFX

Apple Inc.

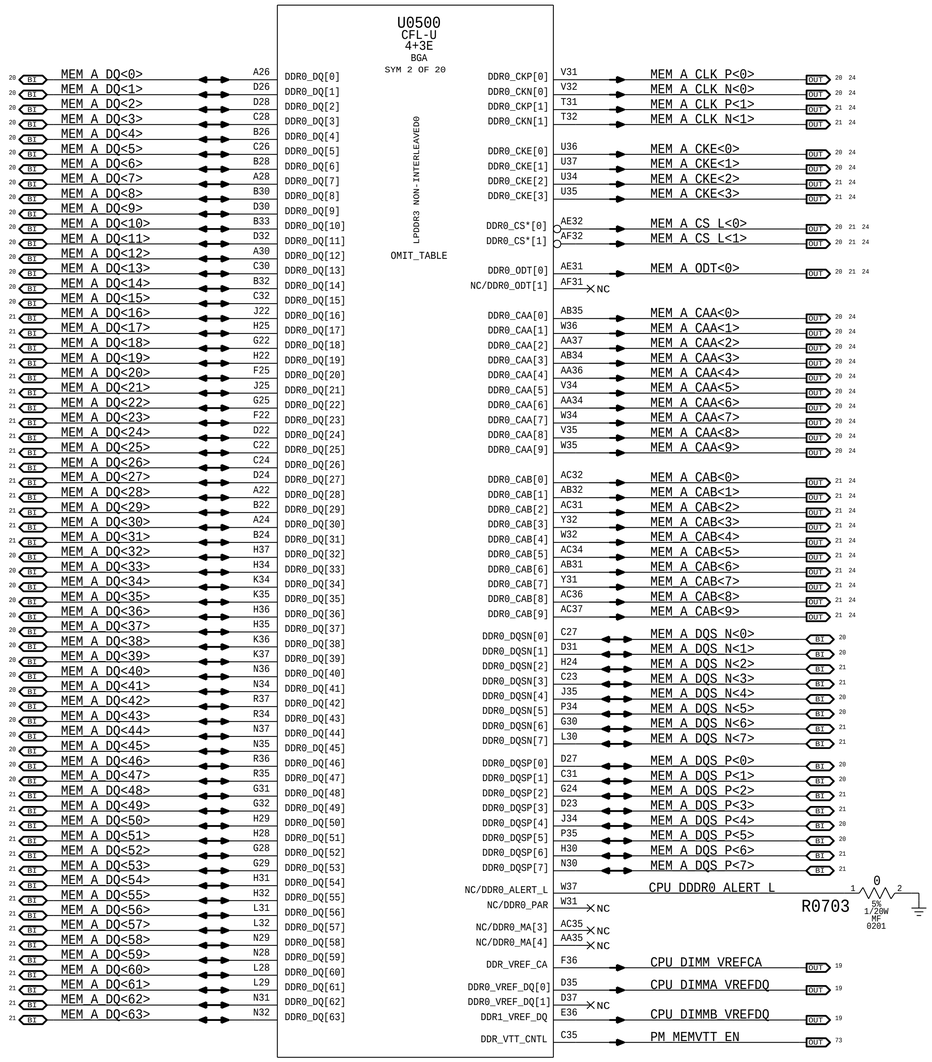
DRAWING NUMBER 051-05309
SIZE D
REVISION 5.1.0
BRANCH
PAGE 5 OF 500
SHEET 4 OF 98

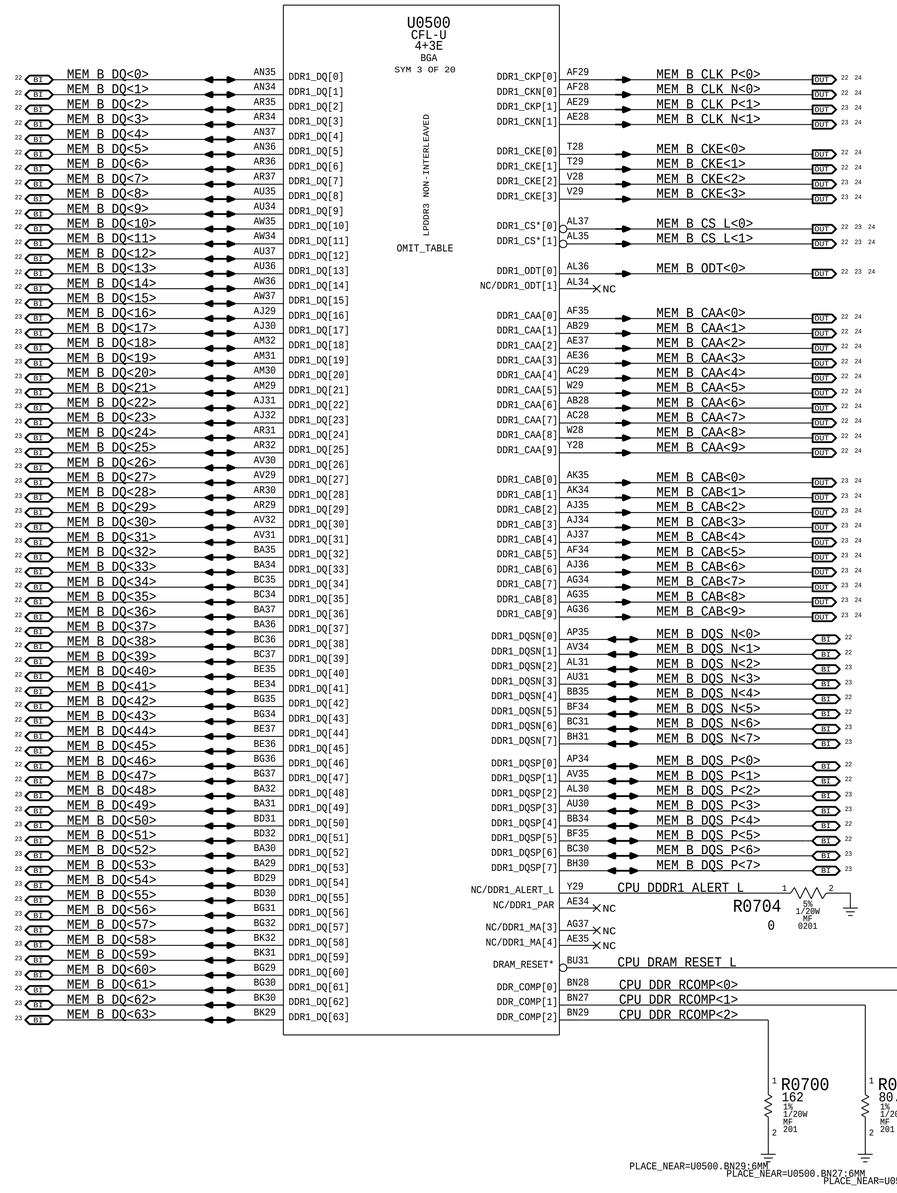


PAGE TITLE
CPU MISC/JTAG/CFG/RSVD

Apple Inc.

DRAWING NUMBER 051-05309 | SIZE D
REVISION 5.1.0
BRANCH
PAGE 6 OF 500
SHEET 5 OF 98



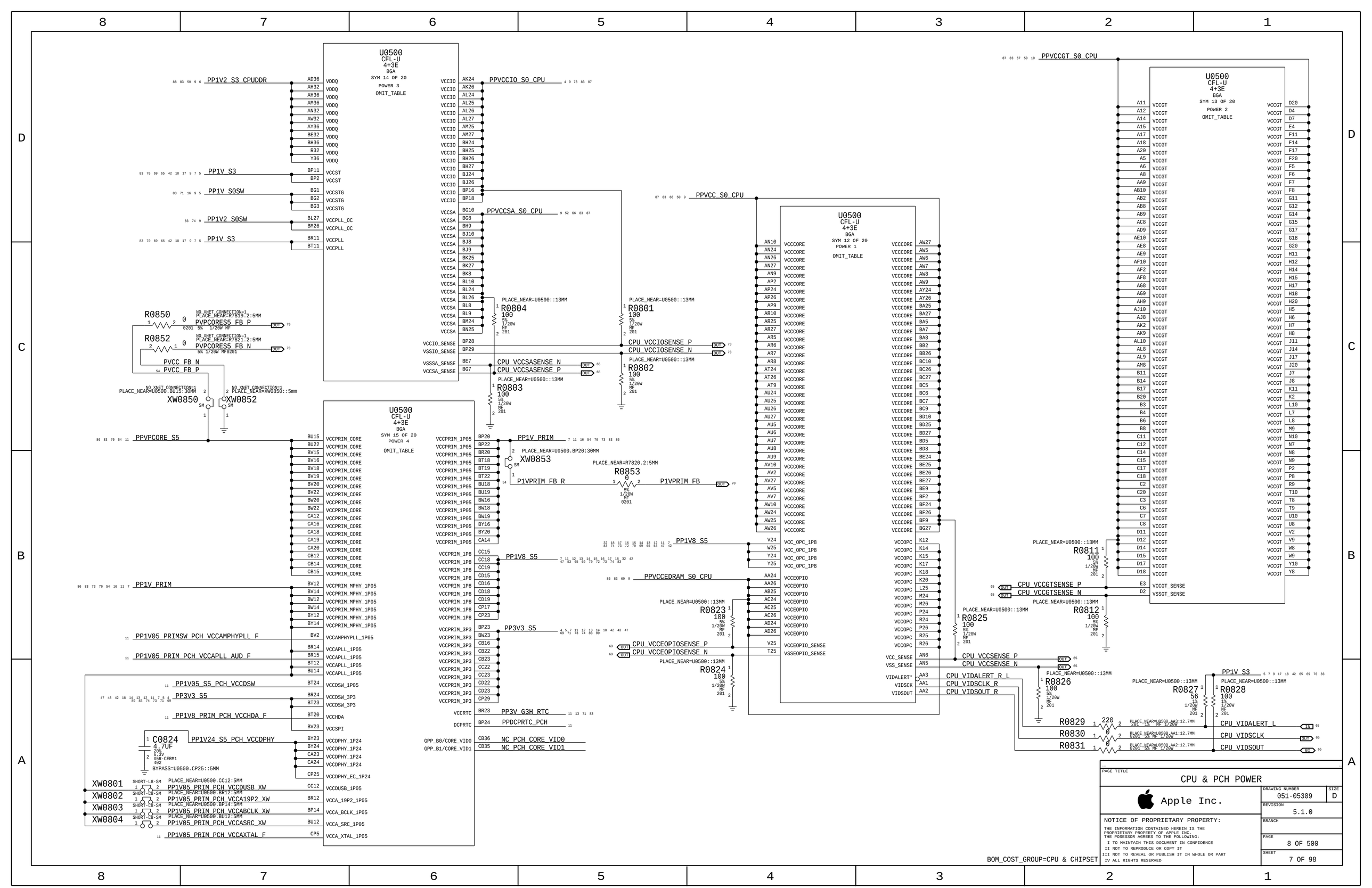


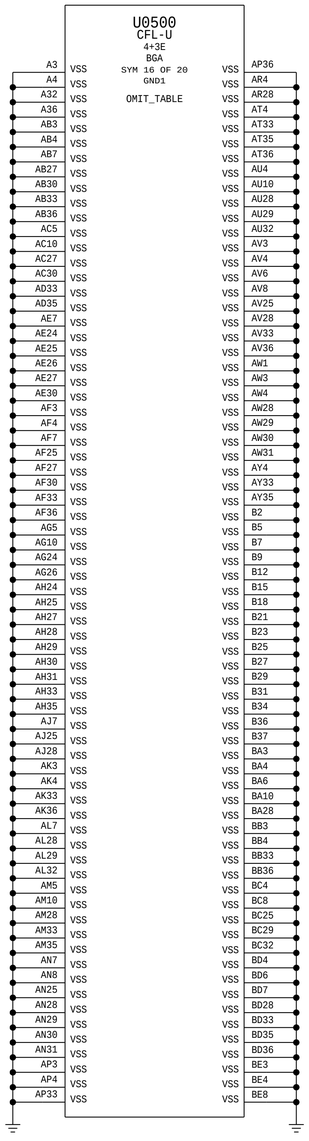
BOM_COST_GROUP=CPU & CHIPSET

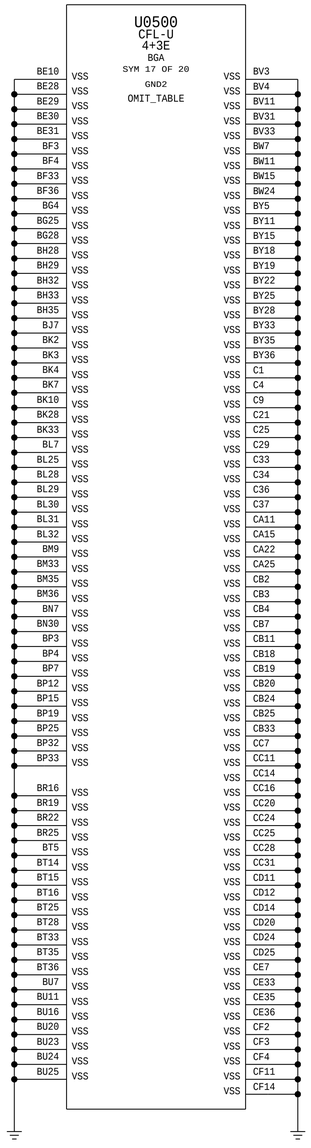
PAGE TITLE
CPU LPDDR3 INTERFACE

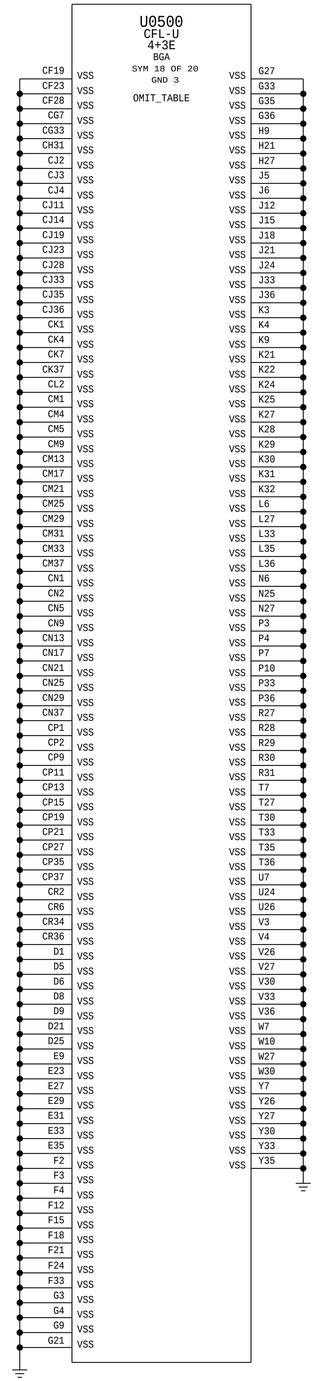
Apple Inc.

DRAWING NUMBER	051-05309
SIZE	D
REVISION	5.1.0
BRANCH	
PAGE	7 OF 500
SHEET	6 OF 98


U0500
CFL-U
4+3E
BGA
SYM 14 OF 20
POWER 3
OMIT_TABLE
PP1V2_S3_CPUDDR
VDDQ
PP1V_S3
VCCST
PP1V_S0SW
VCCSTG
PP1V2_S0SW
VCCPLL_OC
PP1V_S3
VCCPLL
PPVCCIO_S0_CPU
VCCIO
PPVCCSA_S0_CPU
VCCSA
CPU_VCCIOSENSE_P
CPU_VCCIOSENSE_N
CPU_VCCSASENSE_N
CPU_VCCSASENSE_P
VCCIO_SENSE
VSSIO_SENSE
VSSSA_SENSE
VCCSA_SENSE
R0804
R0801
R0802
R0803
100
5%
1/20W
MF
201
PLACE_NEAR=U0500::13MM
R0850
R0852
PVPCORES5_FB_P
PVPCORES5_FB_N
NO_XNET_CONNECTION=1
PLACE_NEAR=R7819.2:5MM
PLACE_NEAR=R7821.2:5MM
0201 5% 1/20W MF
5% 1/20W MF0201
PVCC_FB_N
PVCC_FB_P
XW0850
XW0852
PLACE_NEAR=U0500.BU15:30MM
PLACE_NEAR=XW0850::5mm
C0824
4.7UF
20%
6.3V
X5R-CERM1
402
BYPASS=U0500.CP25::5MM
PP1V24_S5_PCH_VCCDPHY
U0500
CFL-U
4+3E
BGA
SYM 15 OF 20
POWER 4
OMIT_TABLE
PPVPCORE_S5
VCCPRIM_CORE
PP1V_PRIM
VCCPRIM_MPHY_1P05
PP1V05_PRIMSW_PCH_VCCAMPHYPLL_F
VCCAMPHYPLL_1P05
PP1V05_PRIM_PCH_VCCAPLL_AUD_F
VCCAPLL_1P05
PP1V05_S5_PCH_VCCDSW
VCCDSW_1P05
PP3V3_S5
VCCDSW_3P3
PP1V8_PRIM_PCH_VCCHDA_F
VCCHDA
VCCSPI
VCCDPHY_1P24
VCCDPHY_EC_1P24
VCCDUSB_1P05
VCCA_19P2_1P05
VCCA_BCLK_1P05
VCCA_SRC_1P05
VCCA_XTAL_1P05
PP1V05_PRIM_PCH_VCCDUSB_XW
PP1V05_PRIM_PCH_VCCA19P2_XW
PP1V05_PRIM_PCH_VCCABCLK_XW
PP1V05_PRIM_PCH_VCCASRC_XW
PP1V05_PRIM_PCH_VCCAXTAL_F
XW0801
XW0802
XW0803
XW0804
SHORT-L8-SM
PLACE_NEAR=U0500.CC12:5MM
PLACE_NEAR=U0500.BR12:5MM
PLACE_NEAR=U0500.BP14:5MM
PLACE_NEAR=U0500.BU12:5MM
PP1V_PRIM
PLACE_NEAR=U0500.BP20:30MM
XW0853
P1VPRIM_FB_R
PLACE_NEAR=R7820.2:5MM
R0853
0
5%
1/20W
MF
0201
P1VPRIM_FB
VCCPRIM_1P8
VCCPRIM_3P3
PP1V8_S5
PP3V3_S5
VCCRTC
DCPRTC
PP3V_G3H_RTC
PPDCPRTC_PCH
GPP_B0/CORE_VID0
GPP_B1/CORE_VID1
NC_PCH_CORE_VID0
NC_PCH_CORE_VID1
PPVCC_S0_CPU
VCCCORE
PPVCCEDRAM_S0_CPU
VCCEOPIO
CPU_VCCEOPIOSENSE_P
CPU_VCCEOPIOSENSE_N
VCCEOPIO_SENSE
VSSEOPIO_SENSE
VCC_OPC_1P8
VCC_SENSE
VSS_SENSE
VIDALERT*
VIDSCK
VIDSOUT
CPU_VCCSENSE_P
CPU_VCCSENSE_N
CPU_VIDALERT_R_L
CPU_VIDSCLK_R
CPU_VIDSOUT_R
R0825
R0826
R0827
R0828
R0829
R0830
R0831
56
1%
1/20W
MF
201
220
PLACE_NEAR=U0500.AA3:12.7MM
PLACE_NEAR=U0500.AA1:12.7MM
PLACE_NEAR=U0500.AA2:12.7MM
0201 5% MF 1/20W
CPU_VIDALERT_L
CPU_VIDSCLK
CPU_VIDSOUT
PPVCCGT_S0_CPU
VCCGT
VCCGT_SENSE
VSSGT_SENSE
CPU_VCCGTSENSE_P
CPU_VCCGTSENSE_N
R0811
R0812
PP1V_S3
PAGE TITLE
CPU & PCH POWER
Apple Inc.
DRAWING NUMBER
051-05309
SIZE
D
REVISION
5.1.0
BRANCH
PAGE
8 OF 500
SHEET
7 OF 98
NOTICE OF PROPRIETARY PROPERTY:
THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE INC.
THE POSESSOR AGREES TO THE FOLLOWING:
I TO MAINTAIN THIS DOCUMENT IN CONFIDENCE
II NOT TO REPRODUCE OR COPY IT
III NOT TO REVEAL OR PUBLISH IT IN WHOLE OR PART
IV ALL RIGHTS RESERVED
BOM_COST_GROUP=CPU & CHIPSET







BOM_COST_GROUP=CPU & CHIPSET

PAGE TITLE

CPU & PCH Grounds

Apple Inc.

DRAWING NUMBER 051-05309

SIZE D

REVISION 5.1.0

BRANCH

PAGE 9 OF 500

SHEET 8 OF 98


PP1V2_S3_CPUDDR
C1070 20UF 20% 2.5V X6S-CERM 0402-1
C1071 1UF 20% 6.3V X6S-CERM 0201
Primary
Backside
C1050 C1051 C1064 C1065 C1066 C1060 C1061 C1062 C1063 20UF 20% 2.5V X6S-CERM 0402-1
C1052 C1053 C1054 C1055 1UF 20% 6.3V X6S-CERM 0201
PPVCC_S0_CPU
CRITICAL
C10G0 C10G1 C10H1 C10G3 C10G4 220UF 20% 2V ELEC SM
C1010 C1011 C1012 C1013 C1014 C1015 C1016 C1017 C1018 C1019 20UF 20% 2.5V X6S-CERM 0402
C1020 C1021 C1022 C1023 C1024 C1025 C1026 C1027 C1028 C1029 20UF 20% 2.5V X6S-CERM
NOSTUFF
C1030 C1031 C1032 C1033 C1034 C1035 C1036 C1037 C1038 C1039 C1040 C1041 C1042 C1043 C1044 C1045 20UF 20% 2.5V X6S-CERM 0402-1
C1000 C1001 C1002 C1003 C1004 C1005 C1006 C1007 C1008 C1009 C100A C100B C100C C100D C100E C100F C100G C100H 1UF 20% 6.3V X6S-CERM 0201
C100I C100J C100K C100L C100M C100N C100O C100P C100Q C100R C100S C100T C100U C100V C100W C100X C100Y 1UF 20% 6.3V X6S-CERM 0201
PPVCCIO_S0_CPU
C1080 C1081 20UF 20% 2.5V X6S-CERM 0402-1
C1087 3.0PF +/-0.1PF 25V NP0-C0G 0201
C1082 C1083 C1084 C1085 1UF 20% 6.3V X6S-CERM 0201
C1090 C1091 C1092 C1093 C1094 C1095 20UF 20% 2.5V X6S-CERM 0402-1
CRITICAL
C1086 220UF 20% 2V ELEC SM
PPVCCSA_S0_CPU
CRITICAL
C10H0 220UF 20% 2V ELEC SM
C10B0 C10B1 C10B2 C10B3 20UF 20% 2.5V X6S-CERM 0402-1
C10B6 C10B7 20UF 20% 2.5V X6S-CERM 0402-1
C10A0 C10A1 C10A2 C10A3 C10A4 C10A5 C10A6 1UF 20% 6.3V X6S-CERM 0201
PPVCCEDRAM_S0_CPU
CRITICAL
C10H2 220UF 20% 2V ELEC SM
C10D0 C10H3 C10E0 C10E1 C10E2 C10E3 C10E4 C10E5 20UF 20% 2.5V X6S-CERM 0402-1
C10D1 C10D2 C10D3 C10D4 C10D5 C10D6 1UF 20% 6.3V X6S-CERM 0201
PP1V_S3
C10F0 1UF 20% 6.3V X6S-CERM 0201
PP1V2_S0SW
C10F1 1UF 20% 6.3V X6S-CERM 0201
PP1V_S3
C10F2 1UF 20% 6.3V X6S-CERM 0201
PP1V_S0SW
C10F3 1UF 20% 6.3V X6S-CERM 0201

BOM_COST_GROUP=CPU & CHIPSET

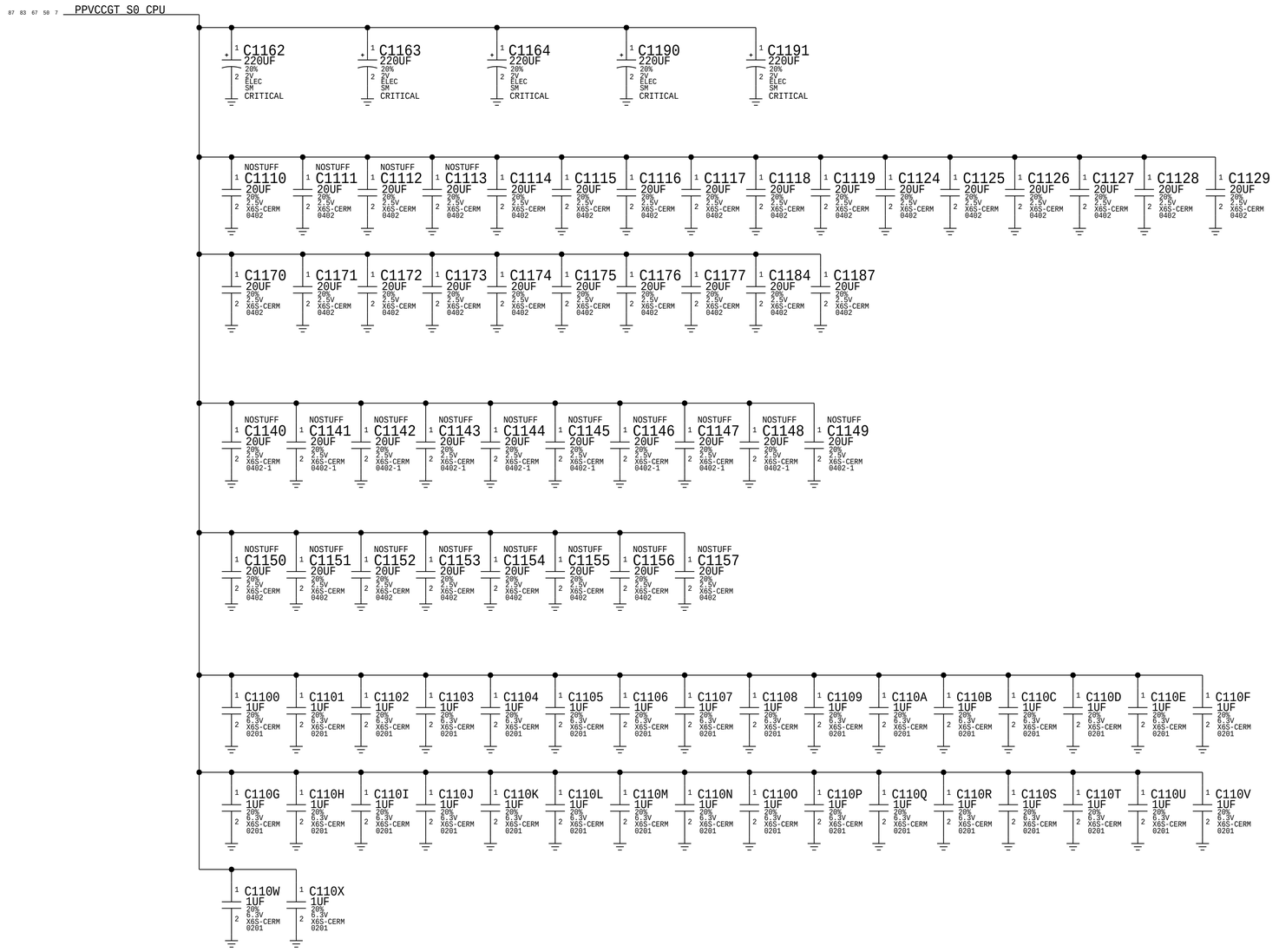
PAGE TITLE
CPU Core Decoupling

Apple Inc.

DRAWING NUMBER 051-05309 SIZE D

REVISION 5.1.0

BRANCH



BOM_COST_GROUP=CPU & CHIPSET

PAGE TITLE: CPU GT Decoupling

Apple Inc.

DRAWING NUMBER: 051-05309

SIZE: D

REVISION: 5.1.0

BRANCH:

PAGE: 11 OF 500

SHEET: 10 OF 98

FILTERS

RAIL SIDE

PCH SIDE

PPVPCORE_S5
NOSTUFF C1200 1UF 20% 6.3V X6S-CERM 0201
BYPASS=U0500.BV18::3MM

PP1V_PRIM
C1201 1UF 20% 6.3V X6S-CERM 0201
BYPASS=U0500.BP20::3MM

PP1V_PRIM
CRITICAL C1203 20UF 20% 6.3V CERM-X5R 0402
BYPASS=U0500.BV12::12MM

PP1V8_S5
C1205 1UF 20% 6.3V X6S-CERM 0201
NOSTUFF C1206 1UF 20% 6.3V X6S-CERM 0201
BYPASS=U0500.CP23::3MM
BYPASS=U0500.CP17::3MM

PP3V3_S5
C1207 3.0PF +/-0.1PF 25V NP0-C0G 0201
NOSTUFF C1208 0.1UF 10% 10V X5R-CERM 0201
BYPASS=U0500.CP29::3MM
BYPASS=U0500.CD23::7MM

PP3V3_S5
NOSTUFF C1221 1UF 20% 6.3V X6S-CERM 0201
BYPASS=U0500.BR24::3MM

PP1V05_S5_PCH_VCCDSW
MIN_LINE_WIDTH=0.2000
MIN_NECK_WIDTH=0.1000
C1232 1UF 20% 6.3V X6S-CERM 0201
BYPASS=U0500.BT24::3MM

PP3V_G3H_RTC
C1227 1UF 10% 6.3V X6S-CERM 0201
C1228 0.1UF 10% 10V X5R-CERM 0201
BYPASS=U0500.BR23::3MM
BYPASS=U0500.BR23::3MM

PPDCPRTC_PCH
MIN_LINE_WIDTH=0.2000
MIN_NECK_WIDTH=0.1000
C1231 0.1UF 10% 10V X5R-CERM 0201
BYPASS=U0500.BP24::3MM

PP1V8_S5
L1260 220-OHM-0.7A-0.28-OHM 0402-1 U0500.BT20::10mm
C1265 3.0PF +/-0.1PF 25V NP0-C0G 0201
C1226 2.0PF +/-0.1PF 25V C0G-CERM 0201
C1260 4.7UF 20% 6.3V X5R-CERM1 402
MIN_LINE_WIDTH=0.2000
MIN_NECK_WIDTH=0.1000
PP1V8_PRIM_PCH_VCCHDA_F
BYPASS=U0500.BT20::10MM
BYPASS=U0500.BT20::10mm

PP1V_PRIM
L1261 220-OHM-0.7A-0.28-OHM 0402-1 U0500.BR15::3mm
C1267 3.0PF +/-0.1PF 25V NP0-C0G 0201
C1262 2.0PF +/-0.1PF 25V C0G-CERM 0201
C1261 4.7UF 20% 6.3V X5R-CERM1 402
MIN_LINE_WIDTH=0.2000
MIN_NECK_WIDTH=0.1000
PP1V05_PRIM_PCH_VCCAPLL_AUD_F
BYPASS=U0500.BR15::3MM
BYPASS=U0500.BR15::3mm

PP1V_PRIM
R1250 0 5% 1/10W MF-LF 402
CRITICAL C1250 20UF 20% 6.3V CERM-X5R 0402
CRITICAL C1251 20UF 20% 6.3V CERM-X5R 0402
C1252 1UF 20% 6.3V X6S-CERM 0201
MIN_LINE_WIDTH=0.2000
MIN_NECK_WIDTH=0.1000
PP1V05_PRIMSW_PCH_VCCAMPHYPLL_F
BYPASS=U0500.BV2::3MM
BYPASS=U0500.BV2::4MM
BYPASS=U0500.BV2::5MM

PP1V_PRIM
R1253 0 5% 1/10W MF-LF 402
CRITICAL C1253 20UF 20% 6.3V CERM-X5R 0402
CRITICAL C1254 20UF 20% 6.3V CERM-X5R 0402
C1255 1UF 20% 6.3V X6S-CERM 0201
MIN_LINE_WIDTH=0.2000
MIN_NECK_WIDTH=0.1000
PP1V05_PRIM_PCH_VCCAXTAL_F
BYPASS=U0500.CP5::3MM
BYPASS=U0500.CP5::3MM

BOM_COST_GROUP=CPU & CHIPSET

PAGE TITLE: PCH Decoupling

Apple Inc.

DRAWING NUMBER: 051-05309
SIZE: D
REVISION: 5.1.0
BRANCH:
PAGE: 12 OF 500
SHEET: 11 OF 98

MEMORY CONFIGURATION STRAPS:

(PCH INTERNAL PULL-UPS ARE TO 1.8V)

MLB_RAMCFG0
MLB_RAMCFG1
MLB_RAMCFG2
MLB_RAMCFG3
MLB_RAMCFG4

R1334 1K 5% 1/20W MF 201 — RAMCFG4_L
R1333 1K 5% 1/20W MF 201 — RAMCFG3_L
R1332 1K 5% 1/20W MF 201 — RAMCFG2_L
R1331 1K 5% 1/20W MF 201 — RAMCFG1_L
R1330 1K 5% 1/20W MF 201 — RAMCFG0_L

PP3V3_S5 (4,5,7,11,13,14,18,42,43,47,69)

R1399 1K 5% 1/20W MF 201 NOSTUFF — PCH_STRP_SPIROM_SAF (12)

R1346 100K 5% 1/20W MF 201 — PCH_STRP_JTAGODTDIS (12)
R1355 10K 5% 1/20W MF 201 — JTAG_TBT_X_TMS (12,25)
R1356 10K 5% 1/20W MF 201 — JTAG_TBT_T_TMS (12)
R1359 10K 5% 1/20W MF 201 — JTAG_ISP_TDO (12,25)
R1347 100K 5% 1/20W MF 201 — CPU_C10_GATE_L (12,71,73,74,83)

R1366 100K 5% 1/20W MF 201 — SPI_PCHROM_MOSI (12)
R1367 100K 5% 1/20W MF 201 — SPI_PCHROM_IO<2> (12,16)
R1368 100K 5% 1/20W MF 201 — SPI_PCHROM_IO<3> (12)

R1340 2.2K 5% 1/20W MF 201 — PCH_DDPB_CTRLDATA (12)
R1341 2.2K 5% 1/20W MF 201 — PCH_DDPC_CTRLDATA (12)

ENABLE DPPB/C INTERFACES

R1358 10K 5% 1/20W MF 201 NOSTUFF

PP1V8_S5 (7,11,13,14,15,16,17,18,32,42,47,53,65,69,70,72,73,74,83)

R1344 100K 5% 1/20W MF 201 NOSTUFF — PCH_BT_AUDIO_SYNC (12,18)
R1345 1K 5% 1/20W MF 201 — PCH_STRP_ESPI (12)
R1352 47K 5% 1/20W MF 201 — PCH_UART_DEBUG_D2R (12,27,83)
R1353 47K 5% 1/20W MF 201 — PCH_UART_DEBUG_R2D (12,27,83)
R1363 1K 5% 1/20W MF 201 — PCH_STRP_SPIROM_SAF (12)
R1365 1K 5% 1/20W MF 201 — PCH_STRP_XTAL_24MHZ (12)

R1348 100K 5% 1/20W MF 201 — ESPI_IO<0> (12,35)
R1349 100K 5% 1/20W MF 201 — ESPI_IO<1> (12,35)
R1350 100K 5% 1/20W MF 201 — ESPI_IO<2> (12,35)
R1351 100K 5% 1/20W MF 201 — ESPI_IO<3> (12,35)
R1357 100K 5% 1/20W MF 201 — ESPI_CS_L (12,35)

R1369 100K 5% 1/20W MF 201 NOSTUFF — PCH_WLAN_AUDIO_SYNC (12,18)
R1375 2.2K 5% 1/20W MF 201 — SML_PCH_1_CLK (12,47)
R1376 2.2K 5% 1/20W MF 201 — SML_PCH_1_DATA (12,47)

PM_SLP_S3_L (13,15,25,83,89)

R1371 100K 5% 1/20W MF 201 — TBT_X_CIO_PWR_EN (12,25,28,29)
R1372 100K 5% 1/20W MF 201 — TBT_X_USB_PWR_EN (12,25,28,29)

R1360 100K 5% 1/20W MF 201 — JTAG_ISP_TCK (12,25)
R1361 100K 5% 1/20W MF 201 — JTAG_ISP_TDI (12,25)
R1354 47K 5% 1/20W MF 201 — PCH_UART2_CTS_L (12)
R1362 100K 5% 1/20W MF 201 — TBT_POC_RESET (12,28,29)
R1364 100K 5% 1/20W MF 201 — PCH_WLAN_AUDIO_SYNC (12,18)
R1374 100K 5% 1/20W MF 201 — PCH_BT_AUDIO_SYNC (12,18)

U0500 CFL-U 4+3E BGA

SYM 7 OF 20 OMIT_TABLE

AUDIO

NC_PCH_I2S0_SYNC — BN34 — HDA_SYNC/I2S0_SFRM
NC_PCH_I2S0_CLK — BN37 — HDA_BCLK/I2S0_SCLK
NC_HDA_SDOUT — BN36 — HDA_SDO/I2S0_TXD
NC_PCH_I2S0_D2R — BN35 — HDA_SDI0/I2S0_RXD
NC — BL36 — HDA_SDI1/I2S1_RXD
NC_PCH_I2S1_CLK — BL35 — HDA_RST*/I2S1_SCLK
NC_PCH_GPP_D17 — CK25 — GPP_D17/DMIC_CLK1
NC — BL37 — I2S1_SFRM
NC — BL34 — I2S1_TXD

JTAG_TBT_X_TMS (25,12 OUT) — CC8 — GPP_E18/DPPB_CTRLCLK
PCH_DDPB_CTRLDATA (12) — CC9 — GPP_E19/DPPB_CTRLDATA (STRAP)
JTAG_TBT_T_TMS (12) — CH4 — GPP_E20/DPPC_CTRLCLK
PCH_DDPC_CTRLDATA (12) — CH3 — GPP_E21/DPPC_CTRLDATA (STRAP)
MLB_RAMCFG0 (12) — CM24 — GPP_D13/ISH_UART0_RXD/SML0BDATA/I2C4B_SDA
MLB_RAMCFG1 (12) — CN23 — GPP_D14/ISH_UART0_TXD/SML0BCLK/I2C4B_SCL
NC_PCH_GPP_D11 — CM22 — GPP_D11
PCH_STRP_JTAGODTDIS (12) — CP22 — GPP_D12 (BSSB_CLK)
NC_PCH_STRP_TOPBLK_SWP_L — CF35 — GPP_B14/SPKR (STRAP) (BSSB_DATA_IN)

NC_PCH_GPP_F0 — CP20 — GPP_F0/CNV_PA_BLANKING
NC_PCH_GPP_F1 — CK19 — GPP_F1
NC_PCH_GPP_F2 — CG17 — GPP_F2
NC_PCH_GPP_F3 — CN20 — GPP_F3
NC_PCH_I2C_UPC_SDA — CF27 — GPP_H4/I2C2_SDA
NC_PCH_I2C_UPC_SCL — CF29 — GPP_H5/I2C2_SCL
NC_PCH_GPP_H6 — CH27 — GPP_H6/I2C3_SDA
NC_PCH_GPP_H7 — CH28 — GPP_H7/I2C3_SCL
NC_PCH_GPP_H8 — CJ30 — GPP_H8/I2C4_SDA
NC_PCH_GPP_H9 — CJ31 — GPP_H9/I2C4_SCL
NC_PCH_GPP_H10 — CJ27 — GPP_H10/I2C5_SDA/ISH_I2C2_SDA
NC_PCH_GPP_H11 — CJ29 — GPP_H11/I2C5_SCL/ISH_I2C2_SCL

SDIO/SDXC

(1.8V) GPP_F18/EMMC_DATA6 — CP18 — NC_PCH_GPP_F18
GPP_F19/EMMC_DATA7 — CM18 — NC_PCH_GPP_F19
GPP_F20/EMMC_RCLK — CM16 — NC_PCH_GPP_F20
GPP_F21/EMMC_CLK — CP16 — NC_PCH_GPP_F21
GPP_F22/EMMC_RESET* — CN16 — NC_PCH_GPP_F22
GPP_F23 — CF17 — NC_PCH_GPP_F23
GPP_G0/SD_CMD — CH36 — TBT_X_CIO_PWR_EN (OUT 12,25,28,29)
GPP_G1/SD3_DATA0 — CL35 — TBT_X_USB_PWR_EN (OUT 12,25,28,29)
GPP_A17/SD_VDD1_PWR_EN*/ISH_GP7 — BW36 — NC_PCH_GPP_A17
GPP_A16/SD_1P8_SEL — BY31 — NC_PCH_GPP_A16
SD_1P8_RCOMP — CK33 — SD_RCOMP
SD_3P3_RCOMP — CM34
(1.8V) GPP_F17/EMMC_DATA5 — CR18 — NC_PCH_GPP_F17

R1370 200 1% 1/20W MF 201 — PLACE_NEAR=U0500.CK33:12.7MM

ALL GPP_F* PINS ARE 1.8V ONLY!

GPP_H12/M2_SKT2/CFG[0] — CR28 — JTAG_ISP_TCK (OUT 12,25)
GPP_H13/M2_SKT2/CFG[1] — CP28 — JTAG_ISP_TDI (OUT 12,25)
GPP_H14/M2_SKT2/CFG[2] — CN28 — JTAG_ISP_TDO (IN 12,25)
GPP_H15/M2_SKT2/CFG[3] — CM28 — TBT_POC_RESET (OUT 12,28,29)
GPP_H16/DDPF_CTRLCLK — CR26 — NC_PCH_GPP_H16
GPP_H17/DDPF_CTRLDATA — CP26 — NC_PCH_DDPF_CTRLDATA
GPP_H18/CPU_C10_GATE* — CN27 — CPU_C10_GATE_L (OUT 12,71,73,74,83)
GPP_H19/TIMESYNC[0] — CM27 — PCH_WLAN_AUDIO_SYNC (IN 12,18)
GPP_H20/IMGCLKOUT[1] — CH25 — NC_PCH_GPP_H20
GPP_H21 — CF25 — PCH_STRP_XTAL_24MHZ (12)
GPP_H22 — CN26 — NC_PCH_GPP_H22
GPP_H23 — CM26 — PCH_STRP_SPIROM_SAF (12)

U0500 CFL-U 4+3E BGA

SYM 5 OF 20 OMIT_TABLE

SPI-FLASH

TP_SPI_PCHROM_CLK — CH37 — SPI0_CLK
NC_SPI_PCHROM_MISO — CF37 — SPI0_MISO
SPI_PCHROM_MOSI (12) — CF36 — SPI0_MOSI (IO1)
SPI_PCHROM_IO<2> (16,12) — CF34 — SPI0_IO2 (IO0)
SPI_PCHROM_IO<3> (12) — CG34 — SPI0_IO3
TP_SPI_PCHROM_CS_L — CG36 — SPI0_CS0*
NC_SPI_CS1_L — CG35 — SPI0_CS1*
NC_SPI_CS2_L — CH34 — SPI0_CS2*

SMBUS,SML_INK

GPP_C0/SMBCLK — CK14 — SMBUS_PCH_CLK (OUT 47)
GPP_C1/SMBDATA — CH15 — SMBUS_PCH_DATA (BI 47)
GPP_C2/SMBALERT* — CJ15 — NC_PCH_STRP_TLSCONF
(STRAP) GPP_C3/SML0CLK — CH14 — SML_PCH_0_CLK (OUT 47)
GPP_C4/SML0DATA — CF15 — SML_PCH_0_DATA (BI 47)
GPP_C5/SML0ALERT* — CG15 — PCH_STRP_ESPI (12)
(STRAP) GPP_C6/SML1CLK — CN15 — SML_PCH_1_CLK (OUT 12,47)
GPP_C7/SML1DATA — CM15 — SML_PCH_1_DATA (BI 12,47)
GPP_B23/SML1ALERT*/PCHHOT* — CC34 — NC_PCH_STRP_BSSB_SEL_GPIO

SPI-TOUCH

(STRAP) GPP_A1/LAD0/ESPI_IO0 — CA29 — ESPI_IO_PCH<0> — R1320 20 — ESPI_IO<0> (BI 12,35)
GPP_A2/LAD1/ESPI_IO1 — BY29 — ESPI_IO_PCH<1> — R1321 20 — ESPI_IO<1> (BI 12,35)
GPP_A3/LAD2/ESPI_IO2 — BY27 — ESPI_IO_PCH<2> — R1322 20 — ESPI_IO<2> (BI 12,35)
GPP_A4/LAD3/ESPI_IO3 — BV27 — ESPI_IO_PCH<3> — R1323 20 — ESPI_IO<3> (BI 12,35)
GPP_A5/LFRAME*/ESPI_CS* — CA28 — ESPI_CS_PCH_L — R1324 20 — ESPI_CS_L (OUT 12,35)
GPP_A14/SUS_STAT*/ESPI_RESET* — CA27 — ESPI_RESET_L (OUT 12,35)

LPC

GPP_A9/CLKOUT_LPC0/ESPI_CLK — BV32 — ESPI_CLK60M_R — R1327 22 — ESPI_CLK60M (OUT 12,35)
GPP_A10/CLKOUT_LPC1 — BV30 — NC_PCH_GPP_A10
GPP_A8/CLKRUN* — BV30 — NC_PCH_GPP_A8

C_LINK

NC — CH7 — CL_CLK
NC — CH8 — CL_DATA
NC — CH9 — CL_RST*

PCH_BT_AUDIO_SYNC (18,12) — BV29 — GPP_A0/RCIN*
PCH_GPP_A6 — BV28 — GPP_A6/SERIRQ

ESPI ANALYZER CONNECTOR

516S00115

505070-1222

J1301 M-ST-SM — ESPI_DBG

ESPI_IO<0> (35,12)	R1380	43	1/20W 5% MF 201	ESPI_IO_DBG<0>	3	4	NC
ESPI_IO<1> (35,12)	R1381	43	1/20W 5% MF 201	ESPI_IO_DBG<1>	5	6	ESPI_CLK60M_DBG — R1385 43 201 MF 1/20W 5% — ESPI_CLK60M (12,35)
ESPI_IO<2> (35,12)	R1382	43	1/20W 5% MF 201	ESPI_IO_DBG<2>	7	8	NC
ESPI_IO<3> (35,12)	R1383	43	1/20W 5% MF 201	ESPI_IO_DBG<3>	9	10	NC
ESPI_CS_L (35,12)	R1384	43	1/20W 5% MF 201	ESPI_DBG_CS_L	11	12	NC

ESPI_DBG
ESPI_DBG
ESPI_DBG
ESPI_DBG
ESPI_DBG

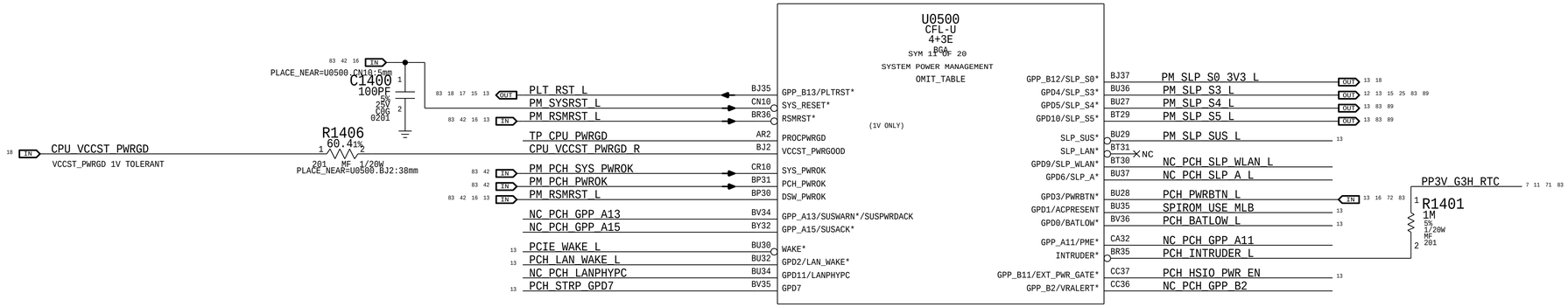
ESPI_RESET_L (12,35)

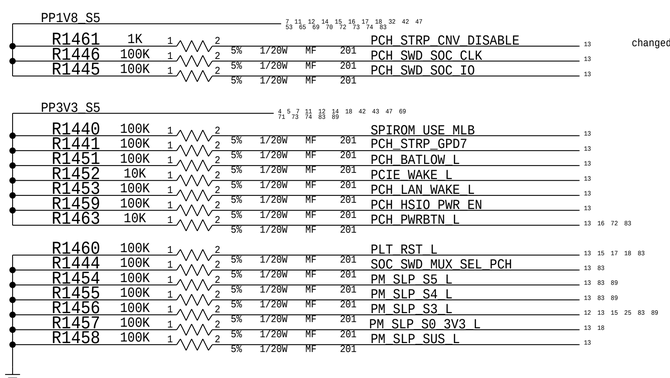
BOM_COST_GROUP=CPU & CHIPSET

PAGE TITLE: PCH AUDIO/LPC/SPI/SMBUS

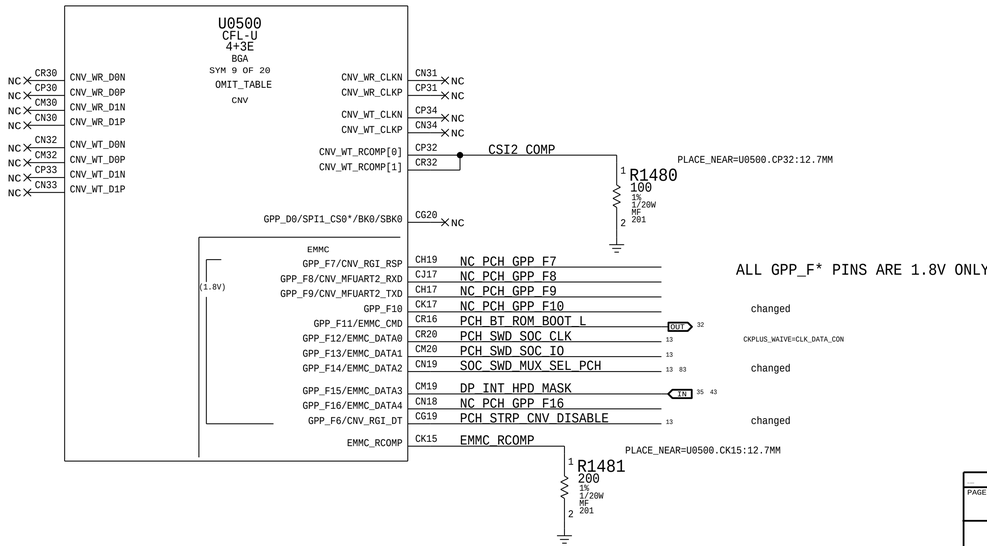
Apple Inc.

DRAWING NUMBER: 051-05309
SIZE: D
REVISION: 5.1.0
BRANCH:
PAGE: 13 OF 500
SHEET: 12 OF 98





NOTE: =PM_SLP_S0_L HAS INTERNAL PULL-UP BEFORE RSMRST_L IS RELEASED.
THIS CAUSES A VOLTAGE DIVIDER WITH THE PULL-DOWN HERE.
THE SIGNAL IS DRIVEN HI AFTER RSMRST_L IS RELEASED.

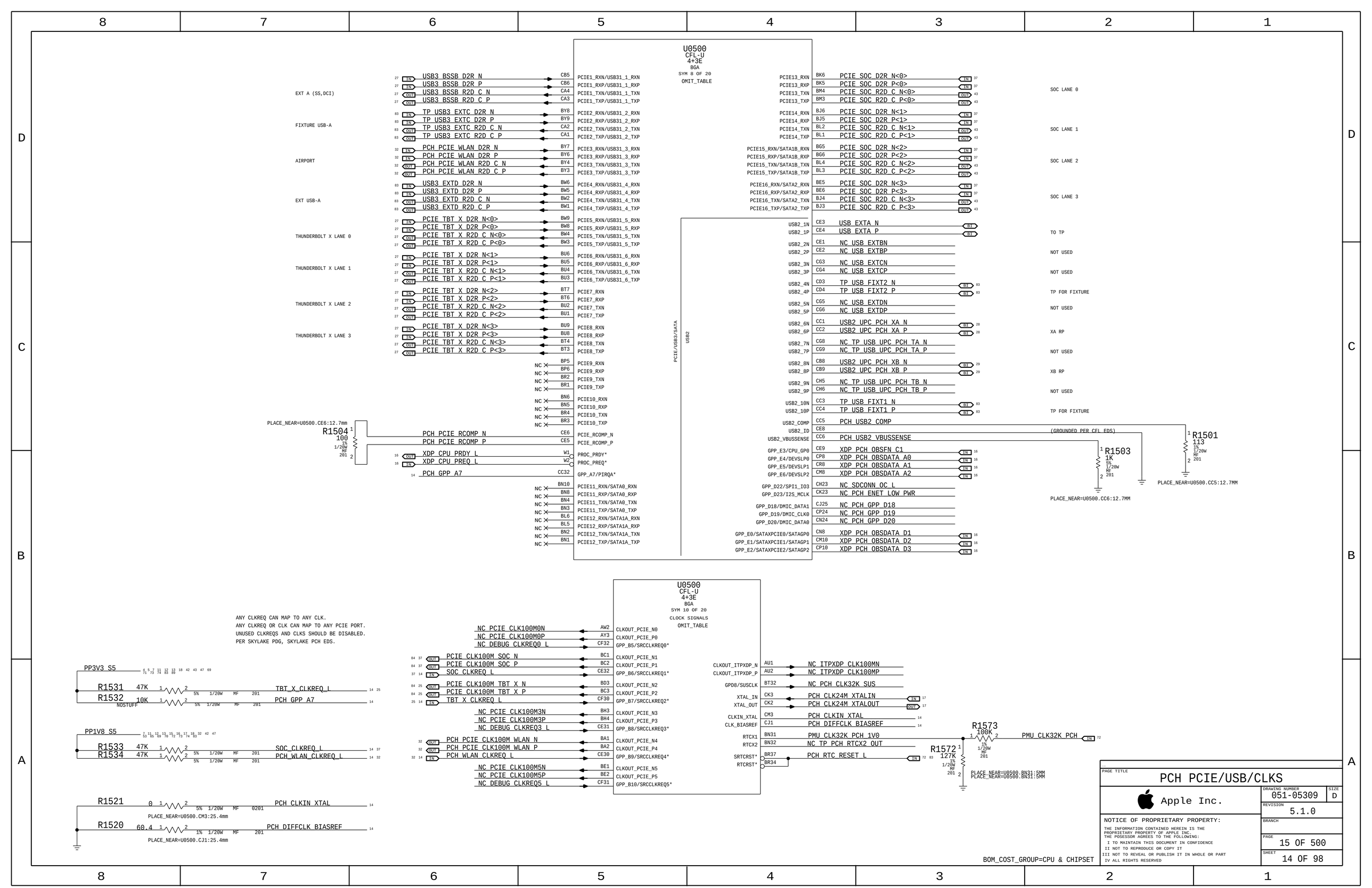


BOM_COST_GROUP=CPU & CHIPSET

PAGE TITLE
PCH POWER MANAGEMENT

Apple Inc.

DRAWING NUMBER 051-05309
SIZE D
REVISION 5.1.0
BRANCH
PAGE 14 OF 500
SHEET 13 OF 98


U0500
CFL-U
4+3E
BGA
SYM 8 OF 20
OMIT_TABLE
EXT A (SS,DCI)
USB3_BSSB_D2R_N
USB3_BSSB_D2R_P
USB3_BSSB_R2D_C_N
USB3_BSSB_R2D_C_P
FIXTURE USB-A
TP_USB3_EXTC_D2R_N
TP_USB3_EXTC_D2R_P
TP_USB3_EXTC_R2D_C_N
TP_USB3_EXTC_R2D_C_P
AIRPORT
PCH_PCIE_WLAN_D2R_N
PCH_PCIE_WLAN_D2R_P
PCH_PCIE_WLAN_R2D_C_N
PCH_PCIE_WLAN_R2D_C_P
EXT USB-A
USB3_EXTD_D2R_N
USB3_EXTD_D2R_P
USB3_EXTD_R2D_C_N
USB3_EXTD_R2D_C_P
THUNDERBOLT X LANE 0
PCIE_TBT_X_D2R_N<0>
PCIE_TBT_X_D2R_P<0>
PCIE_TBT_X_R2D_C_N<0>
PCIE_TBT_X_R2D_C_P<0>
THUNDERBOLT X LANE 1
PCIE_TBT_X_D2R_N<1>
PCIE_TBT_X_D2R_P<1>
PCIE_TBT_X_R2D_C_N<1>
PCIE_TBT_X_R2D_C_P<1>
THUNDERBOLT X LANE 2
PCIE_TBT_X_D2R_N<2>
PCIE_TBT_X_D2R_P<2>
PCIE_TBT_X_R2D_C_N<2>
PCIE_TBT_X_R2D_C_P<2>
THUNDERBOLT X LANE 3
PCIE_TBT_X_D2R_N<3>
PCIE_TBT_X_D2R_P<3>
PCIE_TBT_X_R2D_C_N<3>
PCIE_TBT_X_R2D_C_P<3>
PCIE1_RXN/USB31_1_RXN
PCIE1_RXP/USB31_1_RXP
PCIE1_TXN/USB31_1_TXN
PCIE1_TXP/USB31_1_TXP
PCIE2_RXN/USB31_2_RXN
PCIE2_RXP/USB31_2_RXP
PCIE2_TXN/USB31_2_TXN
PCIE2_TXP/USB31_2_TXP
PCIE3_RXN/USB31_3_RXN
PCIE3_RXP/USB31_3_RXP
PCIE3_TXN/USB31_3_TXN
PCIE3_TXP/USB31_3_TXP
PCIE4_RXN/USB31_4_RXN
PCIE4_RXP/USB31_4_RXP
PCIE4_TXN/USB31_4_TXN
PCIE4_TXP/USB31_4_TXP
PCIE5_RXN/USB31_5_RXN
PCIE5_RXP/USB31_5_RXP
PCIE5_TXN/USB31_5_TXN
PCIE5_TXP/USB31_5_TXP
PCIE6_RXN/USB31_6_RXN
PCIE6_RXP/USB31_6_RXP
PCIE6_TXN/USB31_6_TXN
PCIE6_TXP/USB31_6_TXP
PCIE7_RXN
PCIE7_RXP
PCIE7_TXN
PCIE7_TXP
PCIE8_RXN
PCIE8_RXP
PCIE8_TXN
PCIE8_TXP
PCIE9_RXN
PCIE9_RXP
PCIE9_TXN
PCIE9_TXP
PCIE10_RXN
PCIE10_RXP
PCIE10_TXN
PCIE10_TXP
PCIE_RCOMP_N
PCIE_RCOMP_P
PROC_PRDY*
PROC_PREQ*
GPP_A7/PIRQA*
PCIE11_RXN/SATA0_RXN
PCIE11_RXP/SATA0_RXP
PCIE11_TXN/SATA0_TXN
PCIE11_TXP/SATA0_TXP
PCIE12_RXN/SATA1A_RXN
PCIE12_RXP/SATA1A_RXP
PCIE12_TXN/SATA1A_TXN
PCIE12_TXP/SATA1A_TXP
PLACE_NEAR=U0500.CE6:12.7mm
R1504
100
1%
1/20W
MF
201
PCH_PCIE_RCOMP_N
PCH_PCIE_RCOMP_P
XDP_CPU_PRDY_L
XDP_CPU_PREQ_L
PCH_GPP_A7
PCIE13_RXN
PCIE13_RXP
PCIE13_TXN
PCIE13_TXP
PCIE14_RXN
PCIE14_RXP
PCIE14_TXN
PCIE14_TXP
PCIE15_RXN/SATA1B_RXN
PCIE15_RXP/SATA1B_RXP
PCIE15_TXN/SATA1B_TXN
PCIE15_TXP/SATA1B_TXP
PCIE16_RXN/SATA2_RXN
PCIE16_RXP/SATA2_RXP
PCIE16_TXN/SATA2_TXN
PCIE16_TXP/SATA2_TXP
PCIE_SOC_D2R_N<0>
PCIE_SOC_D2R_P<0>
PCIE_SOC_R2D_C_N<0>
PCIE_SOC_R2D_C_P<0>
PCIE_SOC_D2R_N<1>
PCIE_SOC_D2R_P<1>
PCIE_SOC_R2D_C_N<1>
PCIE_SOC_R2D_C_P<1>
PCIE_SOC_D2R_N<2>
PCIE_SOC_D2R_P<2>
PCIE_SOC_R2D_C_N<2>
PCIE_SOC_R2D_C_P<2>
PCIE_SOC_D2R_N<3>
PCIE_SOC_D2R_P<3>
PCIE_SOC_R2D_C_N<3>
PCIE_SOC_R2D_C_P<3>
SOC LANE 0
SOC LANE 1
SOC LANE 2
SOC LANE 3
PCIE/USB3/SATA
USB2
USB2_1N
USB2_1P
USB2_2N
USB2_2P
USB2_3N
USB2_3P
USB2_4N
USB2_4P
USB2_5N
USB2_5P
USB2_6N
USB2_6P
USB2_7N
USB2_7P
USB2_8N
USB2_8P
USB2_9N
USB2_9P
USB2_10N
USB2_10P
USB2_COMP
USB2_ID
USB2_VBUSSENSE
USB_EXTA_N
USB_EXTA_P
NC_USB_EXTBN
NC_USB_EXTBP
NC_USB_EXTCN
NC_USB_EXTCP
TP_USB_FIXT2_N
TP_USB_FIXT2_P
NC_USB_EXTDN
NC_USB_EXTDP
USB2_UPC_PCH_XA_N
USB2_UPC_PCH_XA_P
NC_TP_USB_UPC_PCH_TA_N
NC_TP_USB_UPC_PCH_TA_P
USB2_UPC_PCH_XB_N
USB2_UPC_PCH_XB_P
NC_TP_USB_UPC_PCH_TB_N
NC_TP_USB_UPC_PCH_TB_P
TP_USB_FIXT1_N
TP_USB_FIXT1_P
PCH_USB2_COMP
(GROUNDED PER CFL EDS)
PCH_USB2_VBUSSENSE
R1501
113
1%
1/20W
MF
201
PLACE_NEAR=U0500.CC5:12.7MM
R1503
1K
5%
1/20W
MF
201
PLACE_NEAR=U0500.CC6:12.7MM
TO TP
NOT USED
NOT USED
TP FOR FIXTURE
NOT USED
XA RP
NOT USED
XB RP
NOT USED
TP FOR FIXTURE
GPP_E3/CPU_GP0
GPP_E4/DEVSLP0
GPP_E5/DEVSLP1
GPP_E6/DEVSLP2
GPP_D22/SPI1_IO3
GPP_D23/I2S_MCLK
GPP_D18/DMIC_DATA1
GPP_D19/DMIC_CLK0
GPP_D20/DMIC_DATA0
GPP_E0/SATAXPCIE0/SATAGP0
GPP_E1/SATAXPCIE1/SATAGP1
GPP_E2/SATAXPCIE2/SATAGP2
XDP_PCH_OBSFN_C1
XDP_PCH_OBSDATA_A0
XDP_PCH_OBSDATA_A1
XDP_PCH_OBSDATA_A2
NC_SDCONN_OC_L
NC_PCH_ENET_LOW_PWR
NC_PCH_GPP_D18
NC_PCH_GPP_D19
NC_PCH_GPP_D20
XDP_PCH_OBSDATA_D1
XDP_PCH_OBSDATA_D2
XDP_PCH_OBSDATA_D3
ANY CLKREQ CAN MAP TO ANY CLK.
ANY CLKREQ OR CLK CAN MAP TO ANY PCIE PORT.
UNUSED CLKREQS AND CLKS SHOULD BE DISABLED.
PER SKYLAKE PDG, SKYLAKE PCH EDS.
U0500
CFL-U
4+3E
BGA
SYM 10 OF 20
CLOCK SIGNALS
OMIT_TABLE
CLKOUT_PCIE_N0
CLKOUT_PCIE_P0
GPP_B5/SRCCLKREQ0*
CLKOUT_PCIE_N1
CLKOUT_PCIE_P1
GPP_B6/SRCCLKREQ1*
CLKOUT_PCIE_N2
CLKOUT_PCIE_P2
GPP_B7/SRCCLKREQ2*
CLKOUT_PCIE_N3
CLKOUT_PCIE_P3
GPP_B8/SRCCLKREQ3*
CLKOUT_PCIE_N4
CLKOUT_PCIE_P4
GPP_B9/SRCCLKREQ4*
CLKOUT_PCIE_N5
CLKOUT_PCIE_P5
GPP_B10/SRCCLKREQ5*
NC_PCIE_CLK100M0N
NC_PCIE_CLK100M0P
NC_DEBUG_CLKREQ0_L
PCIE_CLK100M_SOC_N
PCIE_CLK100M_SOC_P
SOC_CLKREQ_L
PCIE_CLK100M_TBT_X_N
PCIE_CLK100M_TBT_X_P
TBT_X_CLKREQ_L
NC_PCIE_CLK100M3N
NC_PCIE_CLK100M3P
NC_DEBUG_CLKREQ3_L
PCH_PCIE_CLK100M_WLAN_N
PCH_PCIE_CLK100M_WLAN_P
PCH_WLAN_CLKREQ_L
NC_PCIE_CLK100M5N
NC_PCIE_CLK100M5P
NC_DEBUG_CLKREQ5_L
CLKOUT_ITPXDP_N
CLKOUT_ITPXDP_P
GPD8/SUSCLK
XTAL_IN
XTAL_OUT
CLKIN_XTAL
CLK_BIASREF
RTCX1
RTCX2
SRTCRST*
RTCRST*
NC_ITPXDP_CLK100MN
NC_ITPXDP_CLK100MP
NC_PCH_CLK32K_SUS
PCH_CLK24M_XTALIN
PCH_CLK24M_XTALOUT
PCH_CLKIN_XTAL
PCH_DIFFCLK_BIASREF
PMU_CLK32K_PCH_1V0
NC_TP_PCH_RTCX2_OUT
PCH_RTC_RESET_L
R1573
100K
1%
1/20W
MF
201
PMU_CLK32K_PCH
R1572
127K
1%
1/20W
MF
201
PLACE_NEAR=U0500.BN31:5MM
PLACE_NEAR=U0500.BN31:5MM
PP3V3_S5
R1531
47K
TBT_X_CLKREQ_L
R1532
10K
NOSTUFF
PCH_GPP_A7
PP1V8_S5
R1533
47K
SOC_CLKREQ_L
R1534
47K
PCH_WLAN_CLKREQ_L
R1521
0
PCH_CLKIN_XTAL
PLACE_NEAR=U0500.CM3:25.4mm
R1520
60.4
PCH_DIFFCLK_BIASREF
PLACE_NEAR=U0500.CJ1:25.4mm
BOM_COST_GROUP=CPU & CHIPSET
PAGE TITLE
PCH PCIE/USB/CLKS
Apple Inc.
DRAWING NUMBER
051-05309
SIZE
D
REVISION
5.1.0
BRANCH
PAGE
15 OF 500
SHEET
14 OF 98
NOTICE OF PROPRIETARY PROPERTY:
THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE INC.
THE POSESSOR AGREES TO THE FOLLOWING:
I TO MAINTAIN THIS DOCUMENT IN CONFIDENCE
II NOT TO REPRODUCE OR COPY IT
III NOT TO REVEAL OR PUBLISH IT IN WHOLE OR PART
IV ALL RIGHTS RESERVED

ALL GPP_F* PINS ARE 1.8V ONLY!

83 18 17 13 IN PLT_RST_L

R1675 100K 5% 1/20W MF 201 (1–2)

R1676 100K 5% 1/20W MF 201 (1–2)

34 15 OUT PCH_SOC_SYNC

85 35 OUT SOC_PERST_L

32 OUT PCH_WLAN_PERST_L

15 PCH_WLAN_DEV_WAKE

U0500
CFL-U
4+3E
BGA
SYM 6 OF 20
OMIT_TABLE

	LPSS		ISH		
CC27	GPP_B15/GSPI0_CS0*	CK22	GPP_D5/ISH_I2C0_SDA	CK22	NC_PCH_GPP_D5
CE28	GPP_B16/GSPI0_CLK	CH20	GPP_D6/ISH_I2C0_SCL	CH20	NC_PCH_GPP_D6
CE27	GPP_B17/GSPI0_MISO	CH22	GPP_D7/ISH_I2C1_SDA	CH22	NC_PCH_GPP_D7
CE29	GPP_B18/GSPI0_MOSI	CJ22	GPP_D8/ISH_I2C1_SCL	CJ22	NC_PCH_UPC_I2C_INT_L
	(STRAP)				
CA31	GPP_B19/GSPI1_CS0*	CF20	GPP_D1/SPI1_CLK	CF20	NC_PCH_GPP_D1
CC29	GPP_B20/GSPI1_CLK	CG22	GPP_D2/SPI1_MISO_IO1	CG22	NC_PCH_GPP_D2
CC30	GPP_B21/GSPI1_MISO	CF22	GPP_D3/SPI1_MOSI_IO0	CF22	NC_PCH_GPP_D3
CA30	GPP_B22/GSPI1_MOSI	CG25	GPP_D4/IMGCLKOUT0	CG25	NC_PCH_GPP_D4
	(STRAP)				
CR14	GPP_C8/UART0_RXD	CJ20	GPP_F4/CNV_BRI_DT	CJ20	NC_PCH_GPP_F4
CP14	GPP_C9/UART0_TXD (1.8V)	CK20	GPP_F5/CNV_BRI_RSP	CK20	NC_PCH_GPP_F5
CN14	GPP_C10/UART0_RTS* (1.8V)	CK36	GPP_G6/SD_CLK	CK36	NC_TBT_X_DPMUX_SEL
CM14	GPP_C11/UART0_CTS*	CN22	GPP_D9	CN22	TBT_X_PLUG_EVENT_L
CM11	GPP_C16/I2C0_SDA	CR22	GPP_D10	CR22	TBT_T_PLUG_EVENT_L
CN11	GPP_C17/I2C0_SCL	CK34	GPP_G7/SD_WP	CK34	NC_TBT_T_DPMUX_SEL
CK12	GPP_C18/I2C1_SDA	CL36	GPP_G2/SD3_DATA1	CL36	NC_TBT_T_CIO_PWR_EN
CJ12	GPP_C19/I2C1_SCL	CM35	GPP_G3/SD3_DATA2	CM35	NC_TBT_T_USB_PWR_EN
CG12	GPP_C12/UART1_RXD/ISH_UART1_RXD	CN35	GPP_G4/SD_DATA3	CN35	TBT_X_PCI_RESET_L
CH12	GPP_C13/UART1_TXD/ISH_UART1_TXD	CH35	GPP_G5/SD_CD*	CH35	NC_TBT_T_PCI_RESET_L
CF12	GPP_C14/UART1_RTS*/ISH_UART1_RTS*	BW35	GPP_A18/ISH_GP0	BW35	NC_PCH_GPP_A18
CG14	GPP_C15/UART1_CTS*/ISH_UART1_CTS*	BW34	GPP_A19/ISH_GP1	BW34	NC_PCH_GPP_A19
CP4	GPP_E22/DPPD_CTRLCLK	CA37	GPP_A20/ISH_GP2	CA37	NC_PCH_GPP_A20
CN4	GPP_E23/DPPD_CTRLDATA	CA36	GPP_A21/ISH_GP3	CA36	NC_PCH_GPP_A21
CH32	GPP_H0/I2S2_SCLK/CNV_BT_I2S_SCLK (1.8V)	CA35	GPP_A22/ISH_GP4	CA35	NC_BTI2SMUX_SEL_PCH
CJ32	GPP_H1/I2S2_SFRM/CNV_BT_I2S_BCLK	CA34	GPP_A23/ISH_GP5	CA34	NC_PCH_BT_DEV_WAKE
CH29	GPP_H2/I2S2_TXD/CNV_BT_I2S_SDI	BW37	GPP_A12/ISH_GP6/BM_BUSY*/ SX_EXIT_HOLDOFF*	BW37	NC_PCH_GPP_A12
CH30	GPP_H3/I2S2_RXD/CNV_BT_I2S_SDO				
CB34	GPP_B3/CPU_GP2				
CC35	GPP_B4/CPU_GP3				

NC_PCH_ENETSD_RESET_L

PCH_STRP_NO_REBOOT (15)

NC_PCH_BT_UART_D2R IN

NC_PCH_BT_UART_R2D OUT

NC_PCH_BT_UART_RTS_L OUT

NC_PCH_BT_UART_CTS_L IN

R1671 100K 5% 1/20W MF 201 (1–2)

R1670 100K 5% 1/20W MF 201 (1–2)

PM_SLP_S3_L 12 13 25 83 89

TBT_T_PLUG_EVENT_L IN 25

NC_TBT_T_PCI_RESET_L OUT 18 25

PP1V8_S5 7 11 12 13 14 16 17 18 32 42 47 53 65 69 70 72 73 74 83

R1656 1K 5% 1/20W MF 201 (1–2) PCH_STRP_NO_REBOOT 15

R1677 100K 5% 1/20W MF 201 (1–2) PCH_WLAN_DEV_WAKE 15

R1674 100K 5% 1/20W MF 201 (1–2) PCH_SOC_SYNC 15 34

BOM_COST_GROUP=CPU & CHIPSET

PAGE TITLE: PCH SPI/UART/GPIO

Apple Inc.

DRAWING NUMBER: 051-05309

SIZE: D

REVISION: 5.1.0

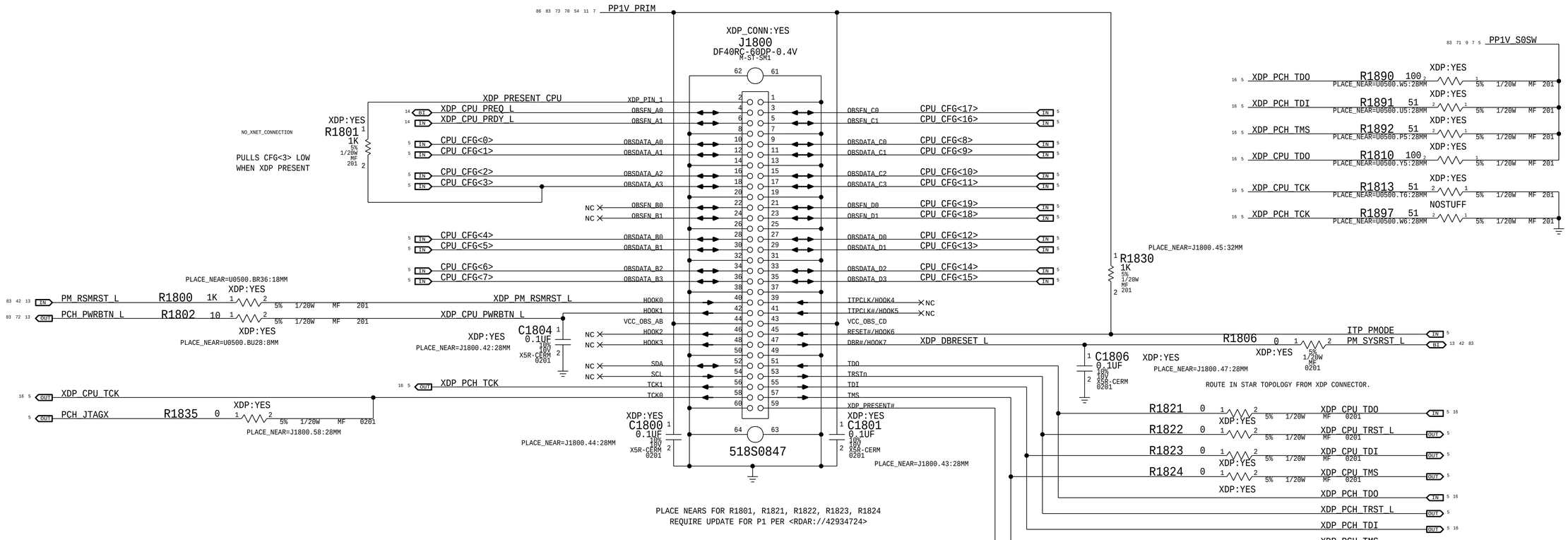
BRANCH:

PAGE: 16 OF 500

SHEET: 15 OF 98

Primary / Merged (CPU/PCH) Micro2-XDP

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



PCH XDP Signals

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

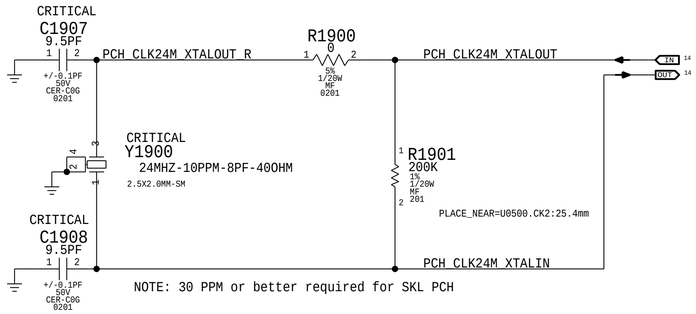
PCH/XDP Signals	Non-XDP Signals
XDP_PCH_OBSDATA_A0	TP1868
XDP_PCH_OBSDATA_A1	TP1869
XDP_PCH_OBSDATA_A2	TP1870
XDP_PCH_OBSDATA_A3	TP1871
XDP_PCH_OBSDATA_B0	TP1872
XDP_PCH_OBSDATA_D1	TP1878
XDP_PCH_OBSDATA_D2	TP1879
XDP_PCH_OBSDATA_D3	TP1880
XDP_PCH_OBSFN_C1	TP1881

Unused GPIOs have TPs.

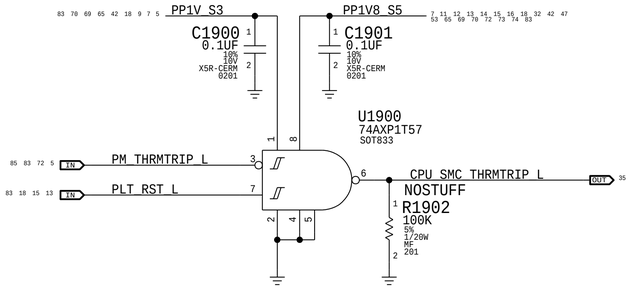
BOM_COST_GROUP=DEBUG

PAGE TITLE	CPU/PCH Merged XDP
	Apple Inc.
DRAWING NUMBER	051-05309
SIZE	D
REVISION	5.1.0
BRANCH	
PAGE	18 OF 500
SHEET	16 OF 98

24MHz CLOCK



THRMTRIP# ISOLATION & LEVEL-SHIFT TO 1V8



BOM_COST_GROUP=CPU & CHIPSET

PAGE TITLE

Chipset Support 1

Apple Inc.

DRAWING NUMBER 051-05309

SIZE D

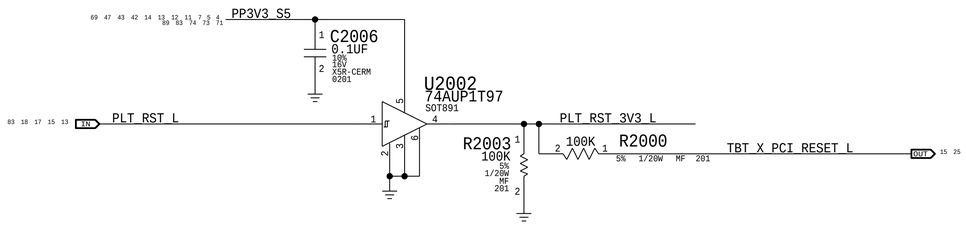
REVISION 5.1.0

BRANCH

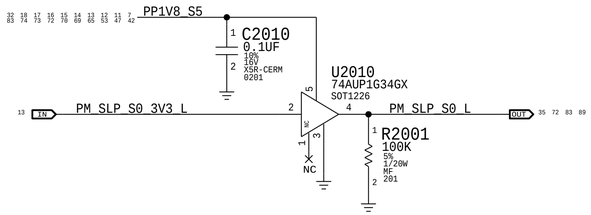
PAGE 19 OF 500

SHEET 17 OF 98

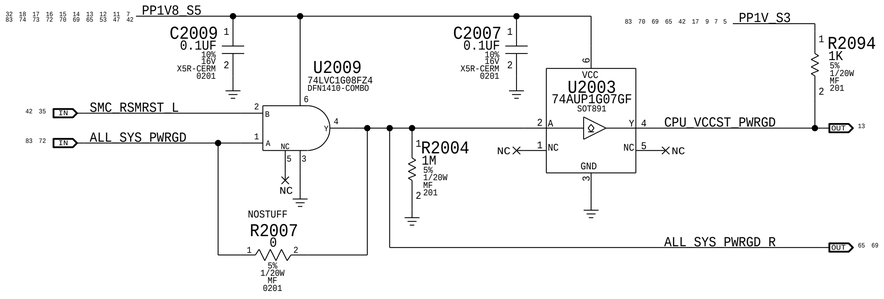
PLATFORM RESET LEVEL-SHIFTER TO 3V3



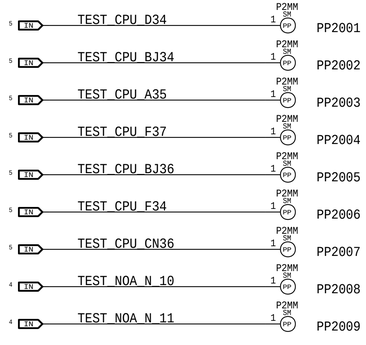
SLP_S0# LEVEL SHIFTER TO 1V8



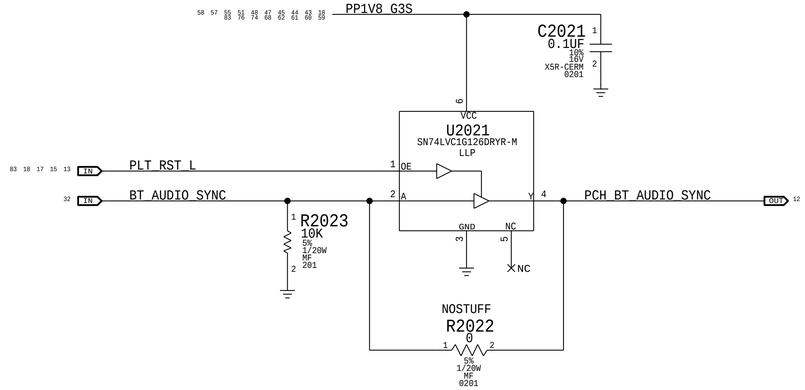
ALL_SYS_PWRGD QUALIFIER & VCCST_PWRGD LEVEL SHIFTER TO 1V



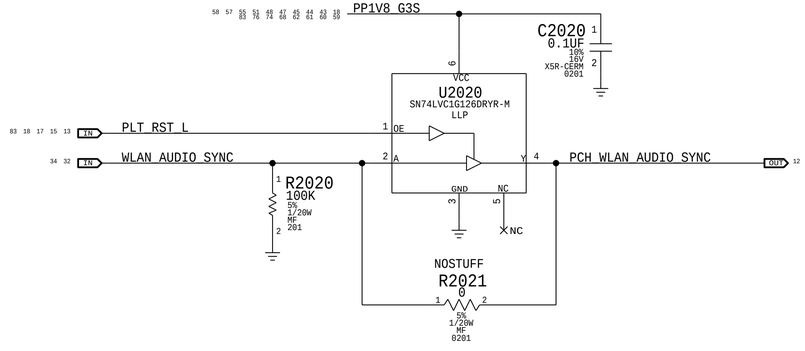
TPs for Chipset Debug Pins



BT AUDIO SYNC BUFFER



WLAN AUDIO SYNC BUFFER



BOM_COST_GROUP=CPU & CHIPSET

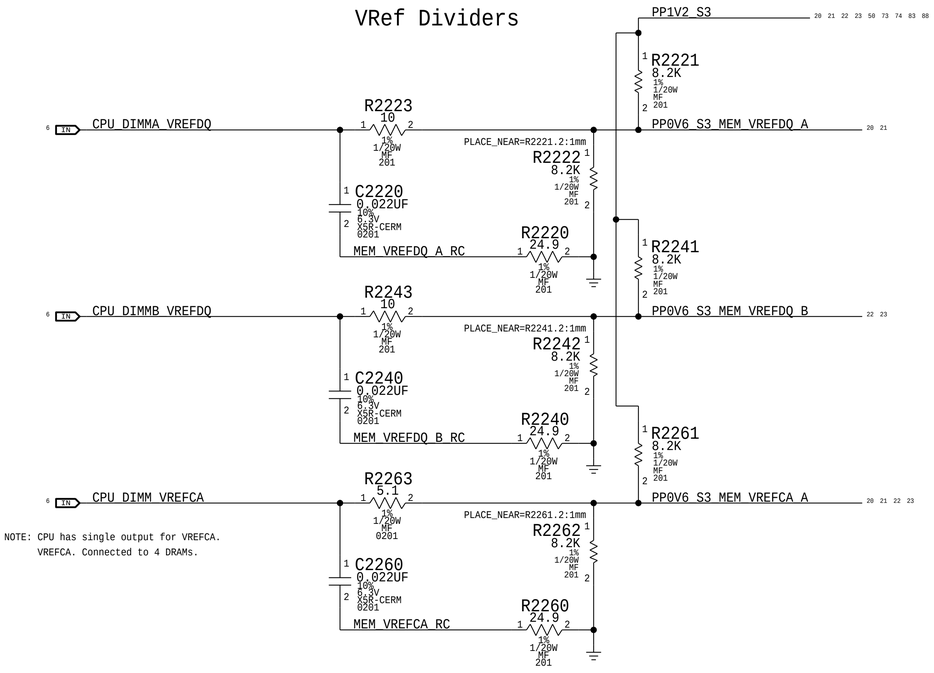
PAGE TITLE
CHIPSET SUPPORT 2

Apple Inc.

DRAWING NUMBER 051-05309
SIZE D
REVISION 5.1.0
BRANCH
PAGE 20 OF 500
SHEET 18 OF 98

CPU-Based Margining

VRef Dividers



NOTE: CPU has single output for VREFCA.
VREFCA. Connected to 4 DRAMs.

BOM_COST_GROUP=CPU & CHIPSET

SYNC_MASTER: SYNC_DATE:

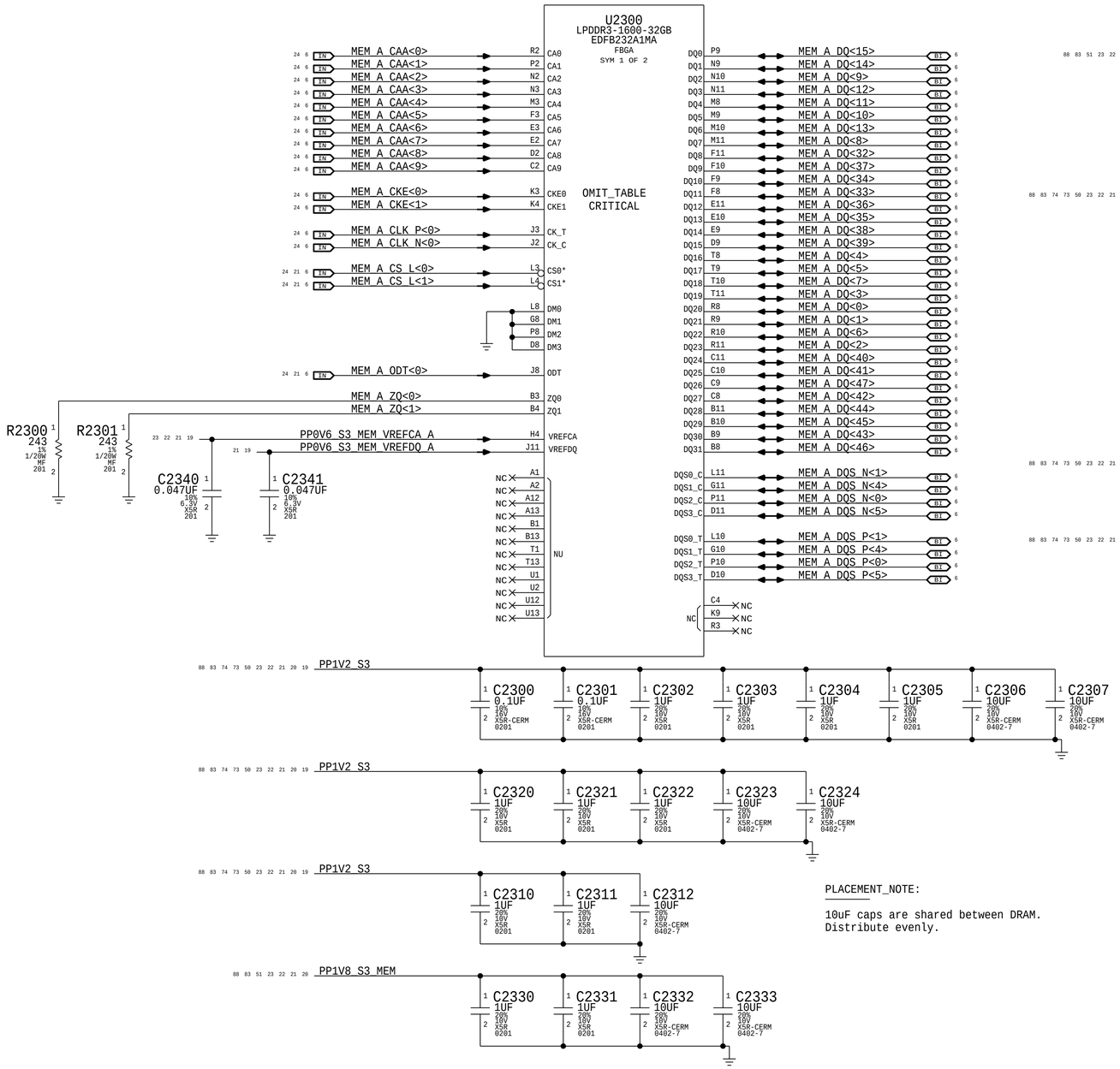
PAGE TITLE

LPDDR3 VREF MARGINING

Apple Inc.

DRAWING NUMBER 051-05309
SIZE D
REVISION 5.1.0
BRANCH
PAGE 22 OF 500
SHEET 19 OF 98

LPDDR3 CHANNEL A (0-31)



PLACEMENT_NOTE:

10uF caps are shared between DRAM.
Distribute evenly.

BOM_COST_GROUP=DRAM

SYNC_MASTER=

SYNC_DATE=

PAGE TITLE

LPDDR3 DRAM Channel A (00-31)

Apple Inc.

DRAWING NUMBER 051-05309

SIZE D

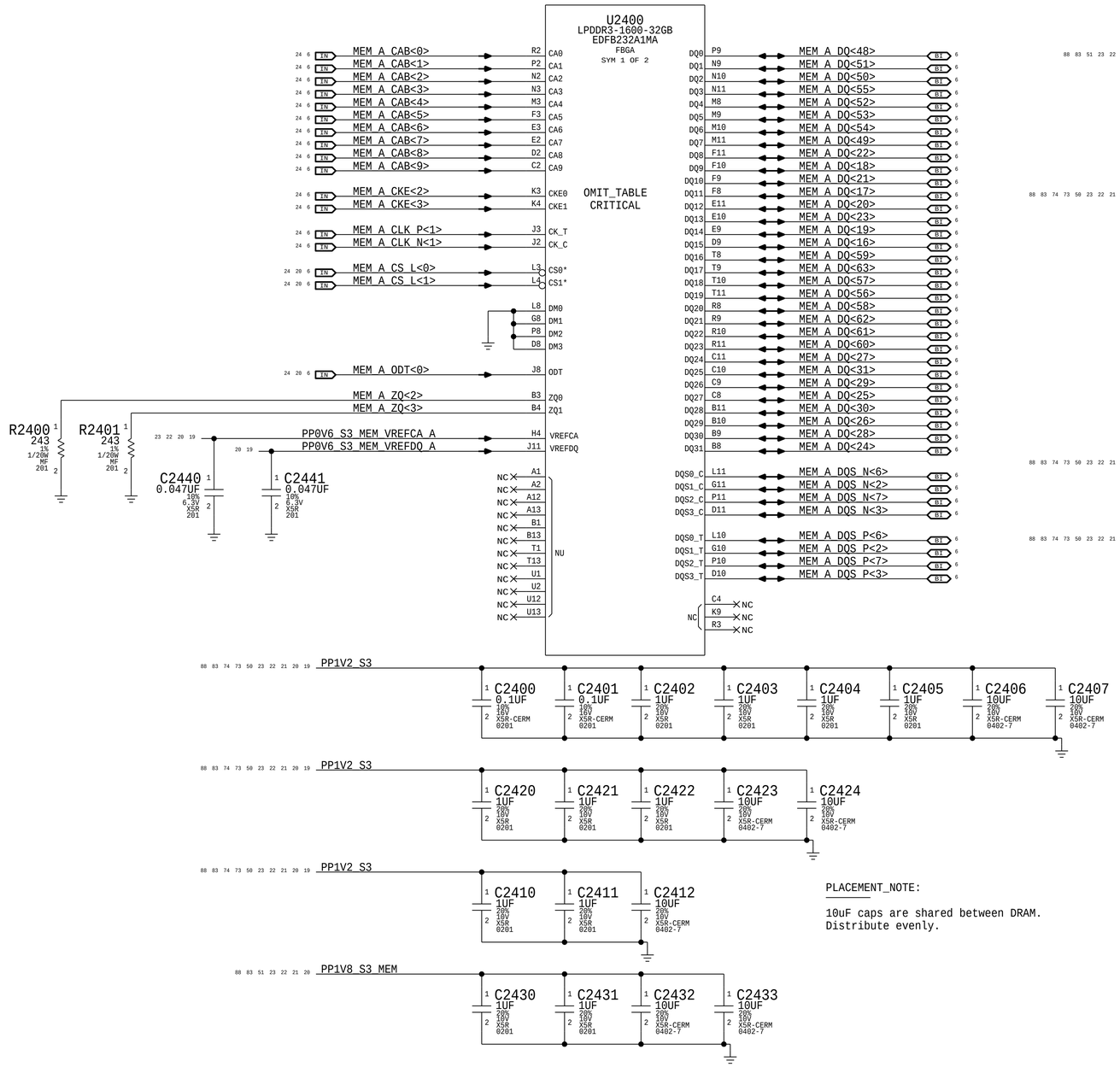
REVISION 5.1.0

BRANCH

PAGE 23 OF 500

SHEET 20 OF 98

LPDDR3 CHANNEL A (32-63)



PLACEMENT_NOTE:

10uF caps are shared between DRAM.
Distribute evenly.

BOM_COST_GROUP=DRAM

SYNC_MASTER=

SYNC_DATE=

PAGE TITLE

LPDDR3 DRAM Channel A (32-63)

Apple Inc.

DRAWING NUMBER 051-05309

SIZE D

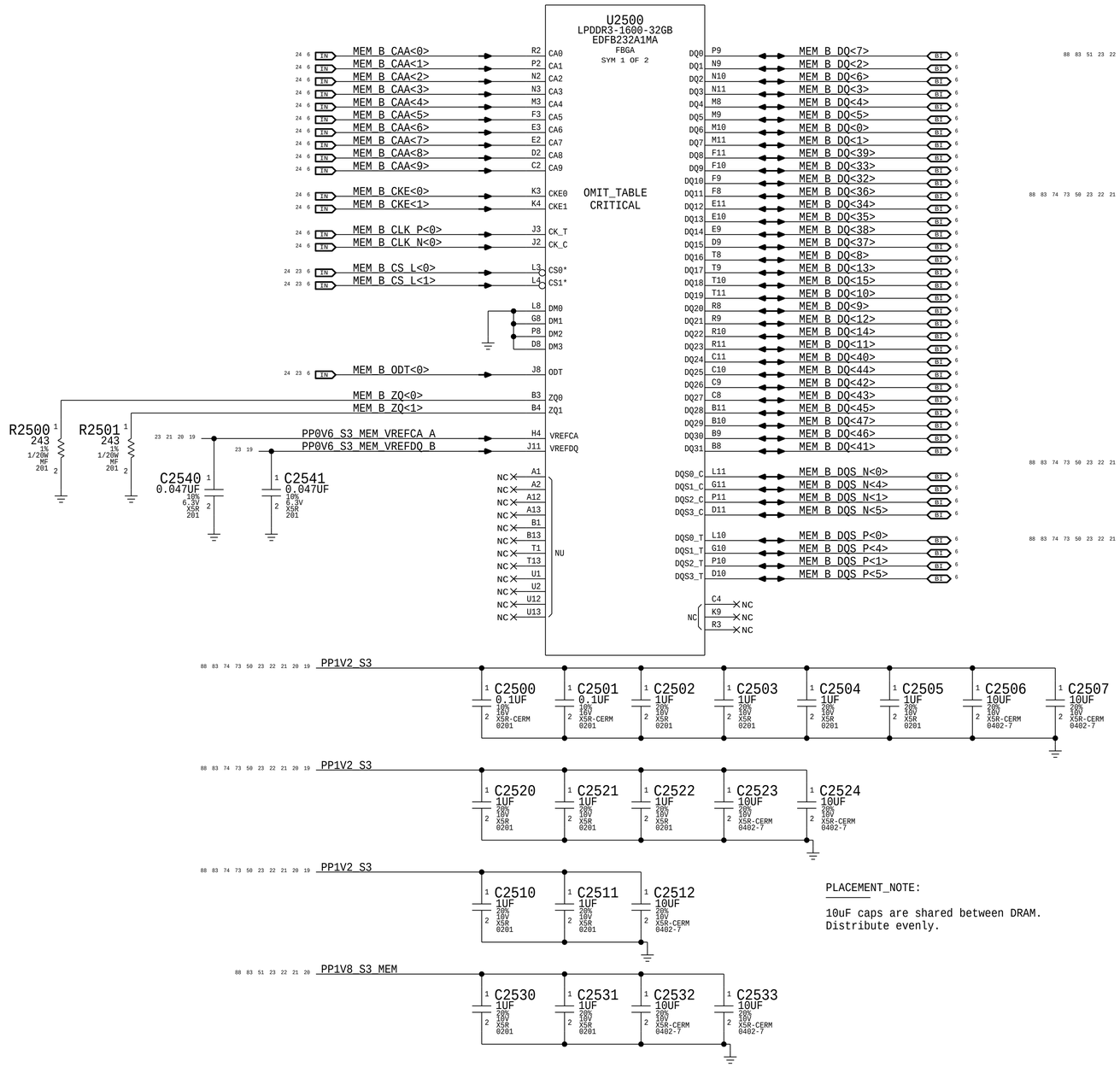
REVISION 5.1.0

BRANCH

PAGE 24 OF 500

SHEET 21 OF 98

LPDDR3 CHANNEL B (0-31)



PLACEMENT_NOTE:

10uF caps are shared between DRAM.
Distribute evenly.

BOM_COST_GROUP=DRAM

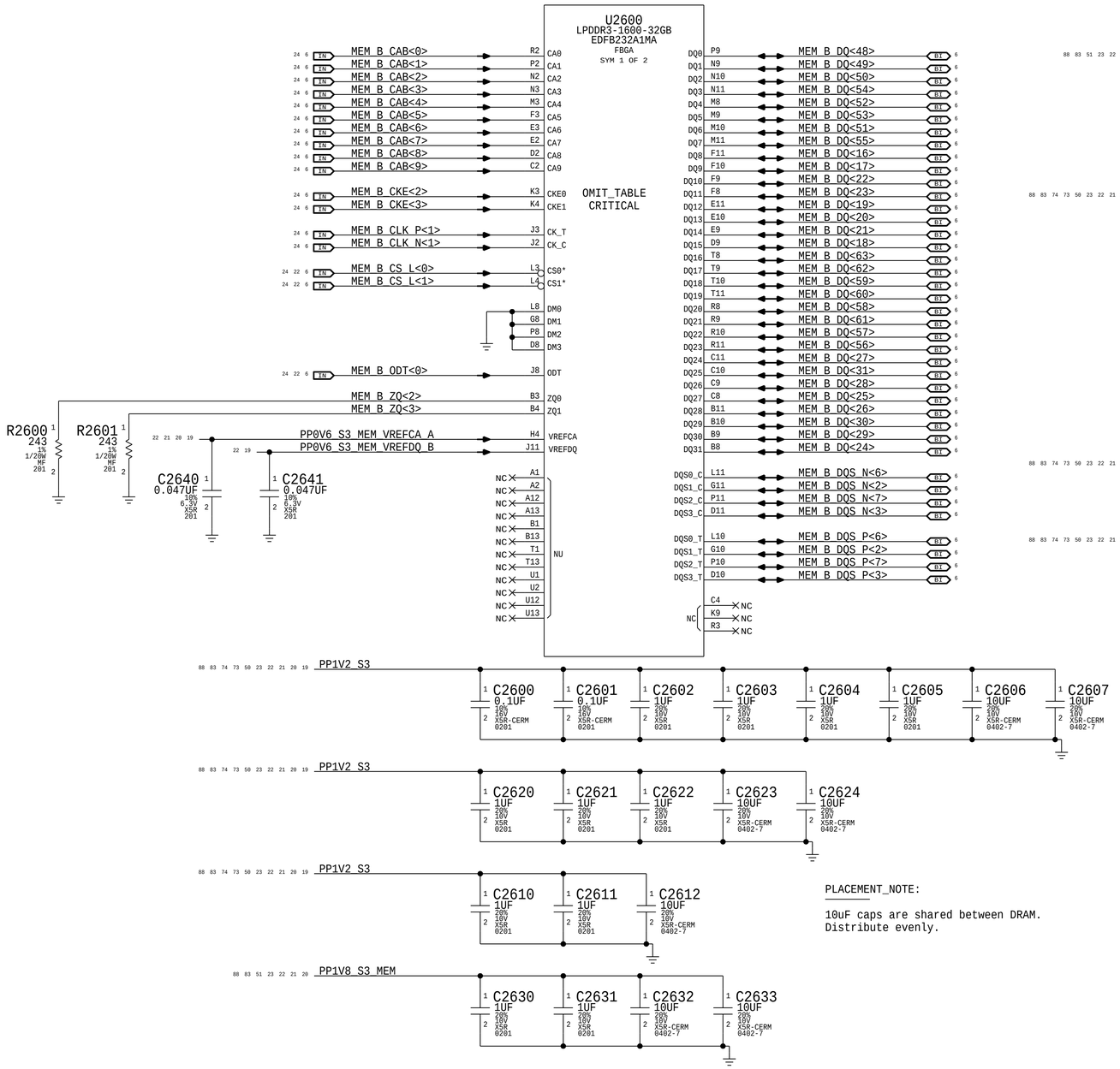
SYNC_MASTER= SYNC_DATE=

PAGE TITLE
LPDDR3 DRAM Channel B (00-31)

Apple Inc.

DRAWING NUMBER 051-05309
SIZE D
REVISION 5.1.0
BRANCH
PAGE 25 OF 500
SHEET 22 OF 98

LPDDR3 CHANNEL B (32-63)



PLACEMENT_NOTE:

10uF caps are shared between DRAM.
Distribute evenly.

BOM_COST_GROUP=DRAM

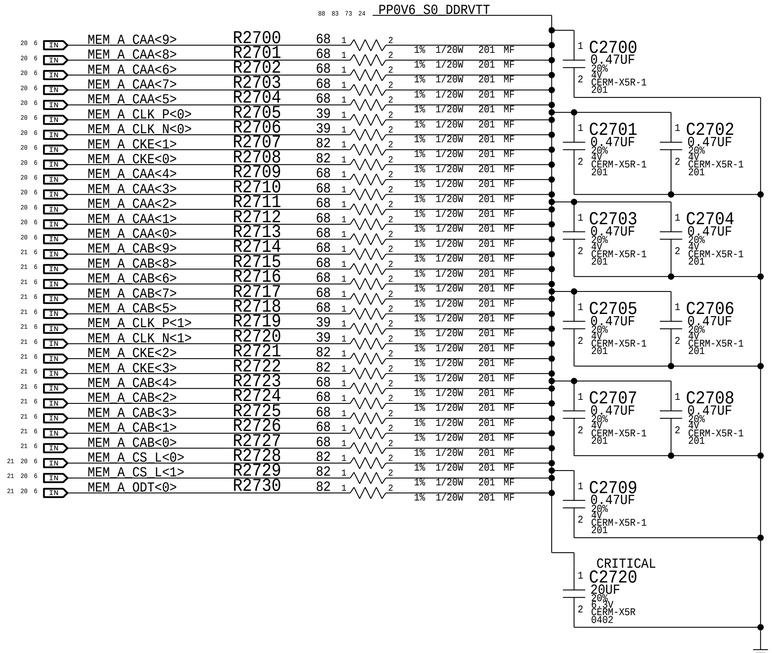
SYNC_MASTER=
SYNC_DATE=

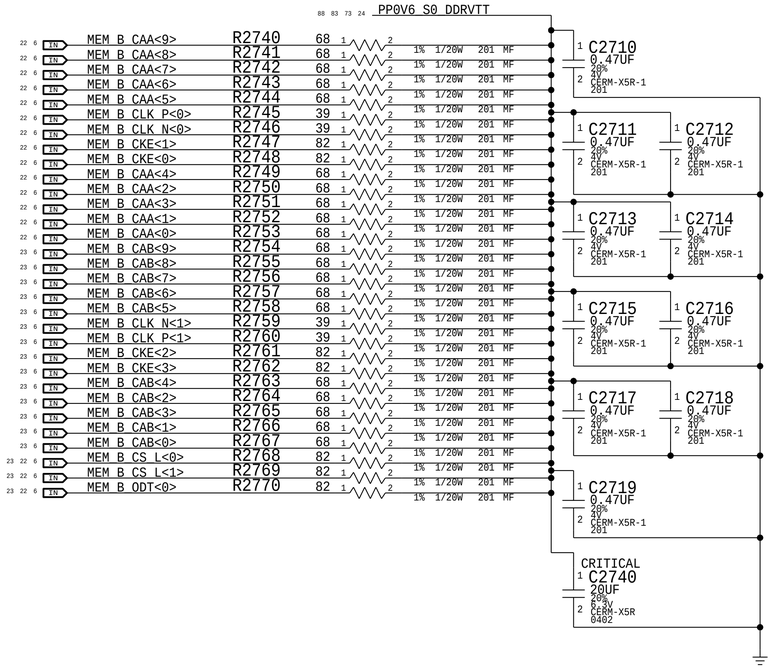
PAGE TITLE
LPDDR3 DRAM Channel B (32-63)

Apple Inc.

DRAWING NUMBER 051-05309
SIZE D
REVISION 5.1.0
BRANCH
PAGE 26 OF 500
SHEET 23 OF 98

Intel recommends 68 Ohm for CMD/ADDR, 80 Ohm for CTRL/CKE, 38 Ohm for CLK





BOM_COST_GROUP=DRAM

SYNC_MASTER= SYNC_DATE=

PAGE TITLE

LPDDR3 DRAM Termination

Apple Inc.

DRAWING NUMBER 051-05309 SIZE D

REVISION 5.1.0

BRANCH

PAGE 27 OF 500

SHEET 24 OF 98


PP3V3_UPC_XB_LDO
R2890 3.3K 5% 1/20W MF 201
R2891 3.3K 5% 1/20W MF 201
R2893 3.3K 5% 1/20W MF 201
R2892 3.3K 5% 1/20W MF 201
C2890 1UF 10% 6.3V CERM 402
U2890 8MBIT-3.0V W25Q80DVUXIE USON OMIT_TABLE CRITICAL
TBT_X_SPI_CLK
TBT_X_SPI_CS_L
TBT_X_ROM_WP_L
TBT_X_ROM_HOLD_L
TBT_X_SPI_MOSI
TBT_X_SPI_MISO
SNK0 AC Coupling
DP_X_SNK0_ML_C_P<0> C2820 0.22UF DP_X_SNK0_ML_P<0>
DP_X_SNK0_ML_C_N<0> C2821 0.22UF DP_X_SNK0_ML_N<0>
DP_X_SNK0_ML_C_P<1> C2822 0.22UF DP_X_SNK0_ML_P<1>
DP_X_SNK0_ML_C_N<1> C2823 0.22UF DP_X_SNK0_ML_N<1>
DP_X_SNK0_ML_C_P<2> C2824 0.22UF DP_X_SNK0_ML_P<2>
DP_X_SNK0_ML_C_N<2> C2825 0.22UF DP_X_SNK0_ML_N<2>
DP_X_SNK0_ML_C_P<3> C2826 0.22UF DP_X_SNK0_ML_P<3>
DP_X_SNK0_ML_C_N<3> C2827 0.22UF DP_X_SNK0_ML_N<3>
DP_X_SNK0_AUXCH_C_P C2828 0.22UF DP_X_SNK0_AUXCH_P
DP_X_SNK0_AUXCH_C_N C2829 0.22UF DP_X_SNK0_AUXCH_N
SNK1 AC Coupling
DP_X_SNK1_ML_C_P<0> C2830 0.22UF DP_X_SNK1_ML_P<0>
DP_X_SNK1_ML_C_N<0> C2831 0.22UF DP_X_SNK1_ML_N<0>
DP_X_SNK1_ML_C_P<1> C2832 0.22UF DP_X_SNK1_ML_P<1>
DP_X_SNK1_ML_C_N<1> C2833 0.22UF DP_X_SNK1_ML_N<1>
DP_X_SNK1_ML_C_P<2> C2834 0.22UF DP_X_SNK1_ML_P<2>
DP_X_SNK1_ML_C_N<2> C2835 0.22UF DP_X_SNK1_ML_N<2>
DP_X_SNK1_ML_C_P<3> C2836 0.22UF DP_X_SNK1_ML_P<3>
DP_X_SNK1_ML_C_N<3> C2837 0.22UF DP_X_SNK1_ML_N<3>
DP_X_SNK1_AUXCH_C_P C2838 0.22UF DP_X_SNK1_AUXCH_P
DP_X_SNK1_AUXCH_C_N C2839 0.22UF DP_X_SNK1_AUXCH_N
PP3V3_TBT_X_SX
R2864 100K TBT_X_BATLOW_L
R2839 10K NOSTUFF PU for NVM
R2863 100K TBT_X_TMU_CLK_IN
R2873 100K TBT_X_TMU_CLK_OUT
R2862 100K DP_XA_HPD
R2872 100K DP_XB_HPD
R2860 100K TBT_XA_USB2_MXCTL
R2861 100K TBT_XB_USB2_MXCTL
U2800 TITAN-RIDGE-DP CSP SYM 1 OF 2 OMIT_TABLE CRITICAL
PCIE_TBT_X_R2D_P<0>
PCIE_TBT_X_R2D_N<0>
PCIE_TBT_X_R2D_P<1>
PCIE_TBT_X_R2D_N<1>
PCIE_TBT_X_R2D_P<2>
PCIE_TBT_X_R2D_N<2>
PCIE_TBT_X_R2D_P<3>
PCIE_TBT_X_R2D_N<3>
PCIE_CLK100M_TBT_X_P
PCIE_CLK100M_TBT_X_N
TBT_X_CLKREQ_R_L
R2828 1K TBT_X_CLKREQ_L
PCIE_TBT_X_D2R_C_P<0>
PCIE_TBT_X_D2R_C_N<0>
PCIE_TBT_X_D2R_C_P<1>
PCIE_TBT_X_D2R_C_N<1>
PCIE_TBT_X_D2R_C_P<2>
PCIE_TBT_X_D2R_C_N<2>
PCIE_TBT_X_D2R_C_P<3>
PCIE_TBT_X_D2R_C_N<3>
TBT_X_PCI_RESET_L
TBT_X_PCIE_BIAS
PLACE_NEAR=U2800.N16:2MM
R2851 3.01K
NC_DP_X_SRC_ML_P<0>
NC_DP_X_SRC_ML_N<0>
NC_DP_X_SRC_ML_P<1>
NC_DP_X_SRC_ML_N<1>
NC_DP_X_SRC_ML_P<2>
NC_DP_X_SRC_ML_N<2>
NC_DP_X_SRC_ML_P<3>
NC_DP_X_SRC_ML_N<3>
NC_DP_X_SRC_AUX_P
NC_DP_X_SRC_AUX_N
DP_X_SRC_HPD
TBT_X_HDMI_DDC_DATA
TBT_X_HDMI_DDC_CLK
TBT_X_ROM_WP_L
TBT_X_TMU_CLK_OUT
TBT_WAKE_3V3_L
TBT_X_PLUG_EVENT_L
TBT_X_TMU_CLK_IN
I2C_TBT_X_SCL
I2C_TBT_X_SDA
TBT_X_USB_PWR_EN
TBT_X_CIO_PWR_EN
TBT_X_BATLOW_L
PM_SLP_S3_L
TBT_X_RTD3_PWR_EN
PU at PCH
R2834 2.2K
R2835 2.2K
R2810 100K
PP3V3_TBT_X_SX
USBC_X_RESET_L
TBT_X_XTAL25M_IN
TBT_X_XTAL25M_OUT
UPC_X_SPI_MOSI
UPC_X_SPI_MISO
UPC_X_SPI_CS_L
UPC_X_SPI_CLK
To SPI Flash
R2830 100K
R2831 100K
JTAG_ISP_TDI
JTAG_TBT_X_TMS
JTAG_ISP_TCK
JTAG_ISP_TDO
TBT_X_TEST_EN
TBT_X_TEST_PWR_GOOD
R2825 100
R2829 100
USBC_XA_D2R_P<2>
USBC_XA_D2R_N<2>
USBC_XA_R2D_CR_P<2>
USBC_XA_R2D_CR_N<2>
USBC_XA_R2D_CR_P<1>
USBC_XA_R2D_CR_N<1>
USBC_XA_D2R_P<1>
USBC_XA_D2R_N<1>
USBC_XA_AUXLSX1
USBC_XA_AUXLSX2
R2836 2.2K NOSTUFF
DP_XA_HPD
I2C_TBT_XA_INT_L
TBT_XA_USB2_MXCTL
TBT_XA_USB2_RBIAS
PLACE_NEAR=U2800.H19:2MM
R2854 200
TBT_X_RBIAS
TBT_X_RSENSE
R2855 4.75K
PLACE_NEAR=U2800.J5:2MM
PLACE_NEAR=U2800.J6:2MM
USBC_XB_D2R_P<2>
USBC_XB_D2R_N<2>
USBC_XB_R2D_CR_P<2>
USBC_XB_R2D_CR_N<2>
USBC_XB_R2D_CR_P<1>
USBC_XB_R2D_CR_N<1>
USBC_XB_D2R_P<1>
USBC_XB_D2R_N<1>
USBC_XB_AUXLSX1
USBC_XB_AUXLSX2
R2837 2.2K NOSTUFF
DP_XB_HPD
I2C_TBT_XB_INT_L
TBT_XB_USB2_MXCTL
TBT_XB_USB2_RBIAS
PLACE_NEAR=U2800.F19:2MM
R2853 200
TBTTHMSNS_D1_P
USE NEAREST GND BALL (V9) FOR THERM_D_N
DEBUG
SINK PORT 1
SINK PORT 2
SOURCE PORT
LC GPIO
POC GPIO
USBSS
JTAG
FLASH
TBT PORT A
TBT PORT B
PCIE GEN3

PAGE TITLE

USB-C HIGH SPEED 1

Apple Inc.

DRAWING NUMBER 051-05309 SIZE D

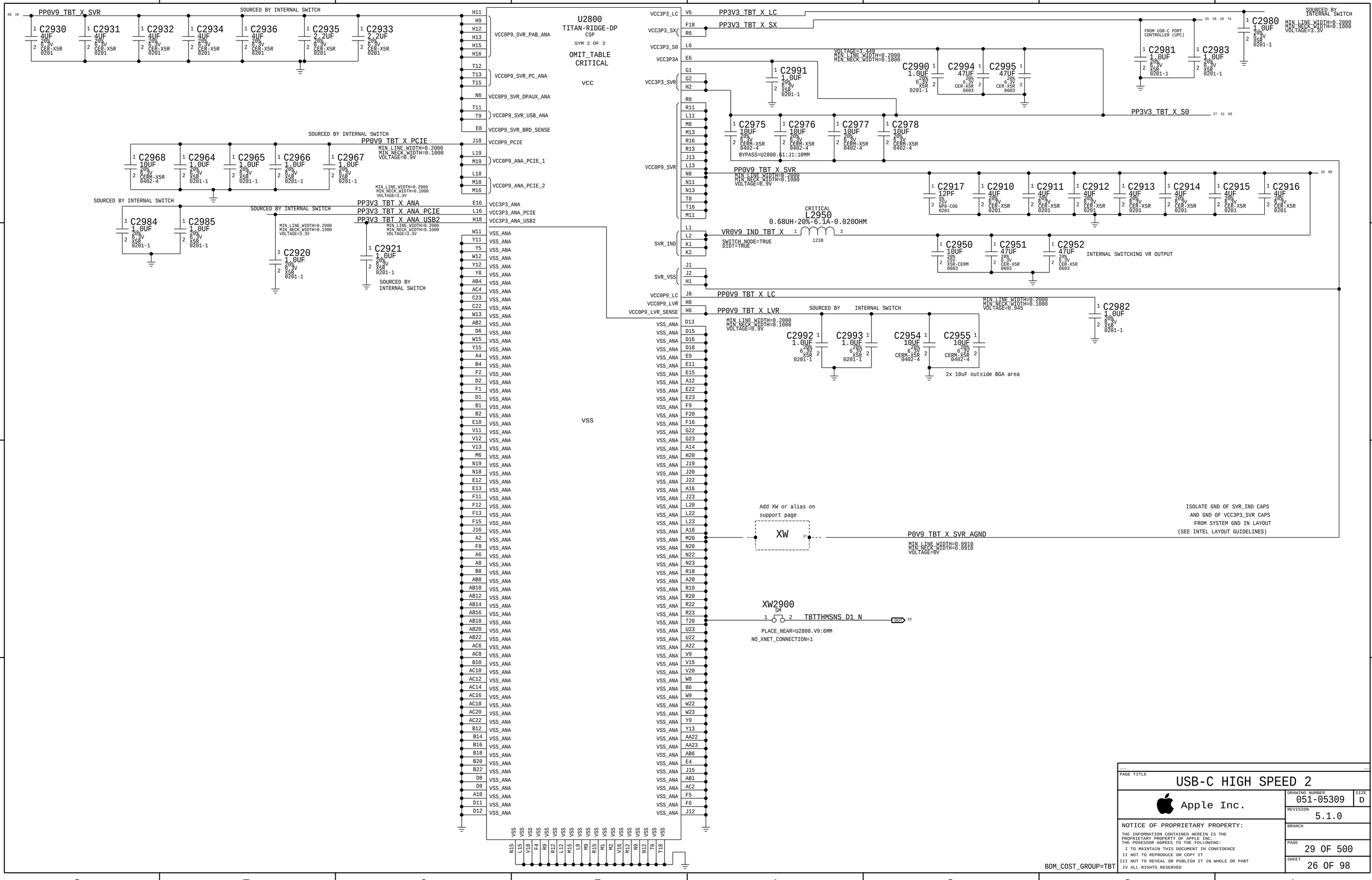
REVISION 5.1.0

BRANCH

PAGE 28 OF 500

SHEET 25 OF 98

BOM_COST_GROUP=TBT



PAGE TITLE: USB-C HIGH SPEED 2

Apple Inc.

DRAWING NUMBER: 051-05309 | SIZE: D

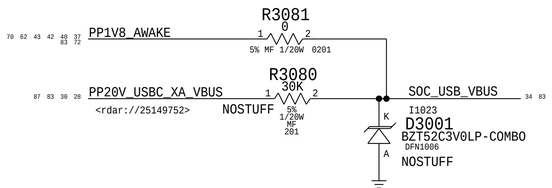
REVISION: 5.1.0

BRANCH:

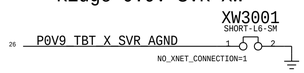
PAGE: 29 OF 500

SHEET: 26 OF 98

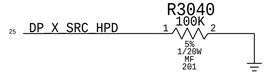
USB VBUS Detect



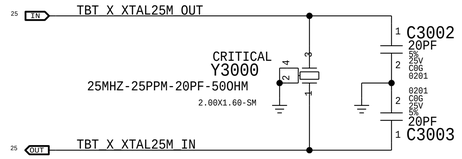
Ridge 0.9V SVR XW



DP SRC OPTIONS



TR XTAL



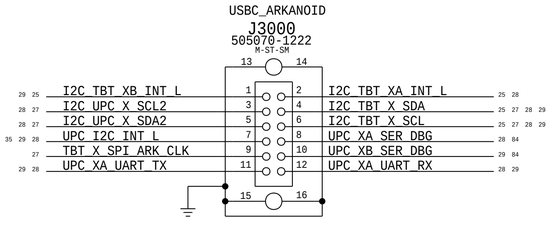
RIDGE TBT X ARKANOID CONN

NOTE:J3001 IS DELETED DUE

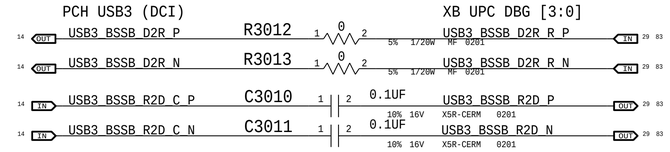
TO SPACE LIMITATION.

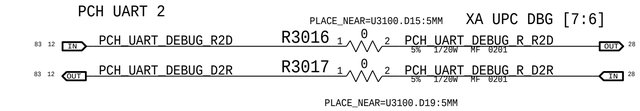
SIGNALS CAN BE CONNECTED AT ICT TP

ACE2 ARKANOID DEBUG CONN

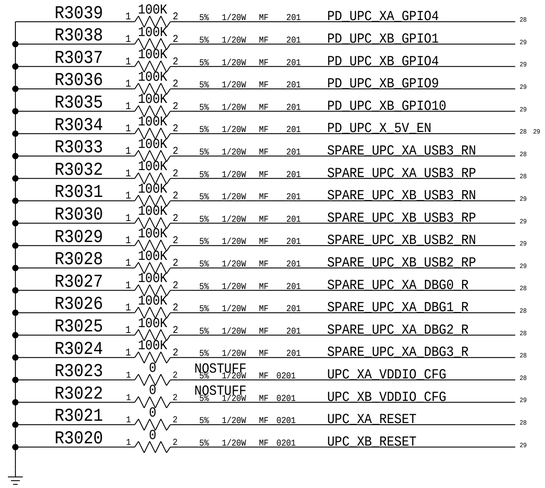


DEBUG PATHS



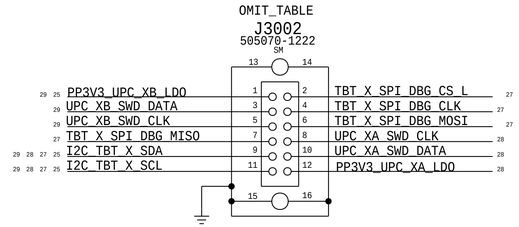


ACE2 PULL DOWNS

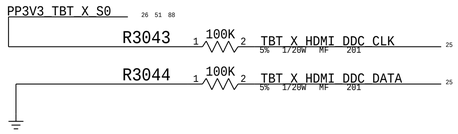


AARDVARKANOID CONN

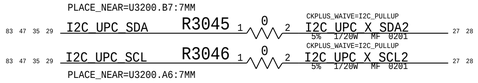
NO 3D BODY PART USED PER <RDAR://48050692>



RIDGE PULL UP/DOWN



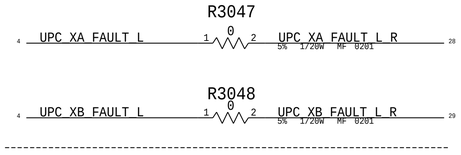
X ACE-SMC I2C SERIES R'S

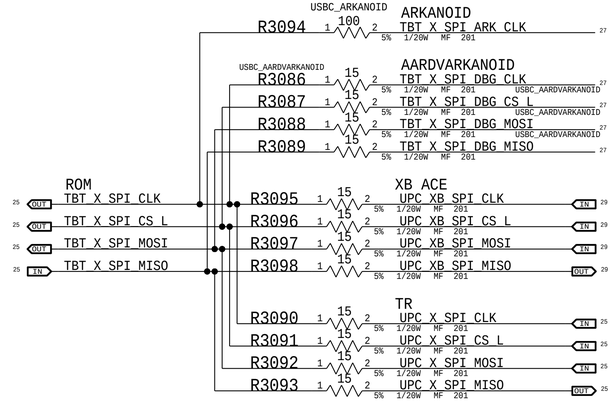


FOR LAYOUT PURPOSES: DIRECTLY CONNECT TO XB

THEN BRANCH OFF TO XA AND ARKANOID CONNECTOR

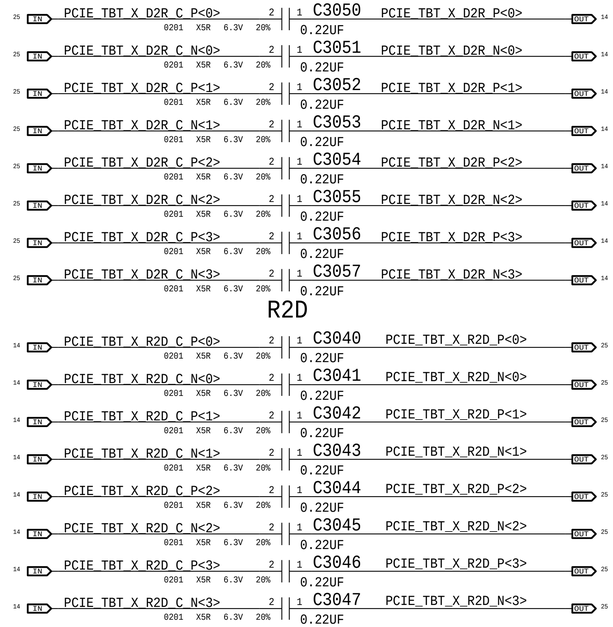
USB2 OC





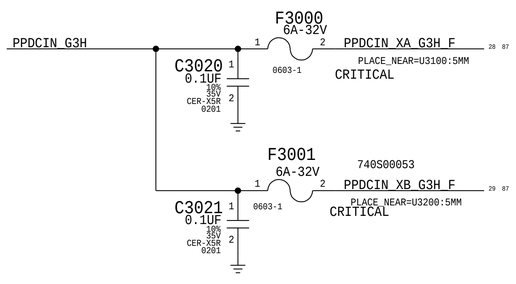
Ridge PCIE Caps

D2R



R2D

FUSES FOR UPC



BOM_COST_GROUP=TBT

PAGE TITLE: USB-C SUPPORT

Apple Inc.

DRAWING NUMBER: 051-05309

SIZE: D

REVISION: 5.1.0

BRANCH:

PAGE: 30 OF 500

SHEET: 27 OF 98

PRIMARY USB-C PORT CONTROLLER (UPC) [FRONT LEFT]

PPDCIN_XA_G3H_F
MAX 100UF TOTAL ON RAIL
PP5V_G3S
NOSTUFF C3111 2.2UF 20% 25V X6S-CERM 0402 CRITICAL <CPP_5V0>
PP_5V0 PP_CABLE PP_HV VBUS

PP20V_USBC_XA_VBUS
C3101 1UF 10% 35V X5R 0402 <CVBUS>
PP3V3_G3H_RTC
C3100 10UF 20% 6.3V CERM-X5R 0402-1 <CVIN_3V3>
PP1V8_SLPS2R
C3102 1.0UF 20% 6.3V X5R 0201-1 <CVDDIO>

OMIT_TABLE
U3100 CD3217 FCBGA VER-2 CRITICAL

UPC_XA_RESET	B13	HRESET	(LDO_CORE)	
TBT_POC_RESET	A14	MRESET	(LDO_3V3)	
NC_USBC_XA_RESET_L	B17	RESET*	(LDO_3V3)	
UPC_XA_SER_DBG	A2	GPIO0	(T.B.D.)	
	B1			
PMU_ACTIVE_READY	D1	GPIO1	(VDDIO)	
TBT_X_CIO_PWR_EN	F1	GPIO2	(LDO_3V3)	
PD_UPC_X_5V_EN	C2	GPIO3	(LDO_3V3)	
PD_UPC_XA_GPIO4	E2	GPIO4	(LDO_3V3)	
UPC_XA_FAULT_L_R	B3	GPIO5	(LDO_3V3)	
TBT_X_USB_PWR_EN	C4	GPIO6	(LDO_3V3)	
SOC_DOCK_CONNECT	D3	GPIO7	(VDDIO, PMOS O/D)	
UPC_PMU_RESET	E4	GPIO8	(VDDIO)	
SOC_DFU_STATUS	F3	GPIO9	(VDDIO)	
SOC_FORCE_DFU	F7	GPIO10	(VDDIO)	
PP3V3_UPC_XA_LDO	A18	BUSPOWER	(LDO_3V3)	
	M19	I2C_ADDR	(LDO_3V3)	
UPC_XA_R_OSC	M21	R_OSC	(LDO_CORE)	
I2C_UPC_XA_DBG_CTL_SDA	A16	I2CM_SDA_CNFG	(LDO_3V3, 4K IPU)	
I2C_UPC_XA_DBG_CTL_SCL	B15	I2CM_SCL_CNFG	(LDO_3V3, 4K IPU)	
I2C_TBT_X_SDA	B5	I2C_SDA1	(LDO_3V3)	
I2C_TBT_X_SCL	A4	I2C_SCL1	(LDO_3V3)	
I2C_TBT_XA_INT_L	D7	I2C_IRQ1*	(N/A, NMOS O/D)	
I2C_UPC_X_SDA2	B7	I2C_SDA2	(VDDIO)	
I2C_UPC_X_SCL2	A6	I2C_SCL2	(VDDIO)	
UPC_I2C_INT_L	C8	I2C_IRQ2*	(N/A, NMOS O/D)	
	B9	SPI_CLK		
	B11	SPI_MOSI		
	A10	SPI_MISO		
	A8	SPI_SSZ		
UPC_XA_SWD_DATA	E20	SWD_DATA	(LDO_3V3)	
UPC_XA_SWD_CLK	E16	SWD_CLK	(LDO_3V3)	
UPC_XA_UART_RX	B19	UART_RX	(LDO_3V3)	
UPC_XA_UART_TX	A20	UART_TX	(LDO_3V3)	
USB2_UPC_PCH_XA_F_P	H19	USB_RP1_P		
USB2_UPC_PCH_XA_F_N	H21	USB_RP1_N		
USB_SOC_TYPEC_P	G20	USB_RP2_P		
USB_SOC_TYPEC_N	G22	USB_RP2_N		
SPARE_UPC_XA_USB3_RP	F19	USB_RP3_P		
SPARE_UPC_XA_USB3_RN	F21	USB_RP3_N		
USBC_XA_AUXLSX1	J12	AUX_P		
USBC_XA_AUXLSX2	H11	AUX_N		
DP_XA_HPD	C12	HPD		
SPARE_UPC_XA_DBG0_R	G12	DEBUG0	(T.B.D.)	
SPARE_UPC_XA_DBG1_R	F11	DEBUG1	(T.B.D.)	
SPARE_UPC_XA_DBG2_R	E8	DEBUG2	(T.B.D.)	
SPARE_UPC_XA_DBG3_R	E12	DEBUG3	(T.B.D.)	
SWD_SOC_DEBUG_SWCLK	G16	DEBUG4	(T.B.D.)	
SWD_SOC_DEBUG_SWDIO	F15	DEBUG5	(T.B.D.)	
PCH_UART_DEBUG_R_R2D	D15	DEBUG6	(T.B.D.)	
PCH_UART_DEBUG_R_D2R	D19	DEBUG7	(T.B.D.)	

DIGITAL CORE I/O & CONTROL

POWER

VIN_3V3	C20	
VDDIO	A12	
VDDIO_CFG	D11	UPC_XA_VDDIO_CFG
LDO_3V3	C22	PP3V3_UPC_XA_LDO
	D21	
VIN_LV	L20	
VOUT_LV	L18	PP3V3_TBT_X_SX
VRET	C16	
SS	L22	UPC_XA_SS
LDO_CORE	E22	PP1V5_UPC_XA_LDO_CORE

C3108 10UF 20% 6.3V CERM-X5R 0402-1 <CLDO_3V3>
C3109 0.68UF 10% 6.3V X6S 0402 <CSS>
C3105 10UF 20% 6.3V CERM-X5R 0402-1 <CLDO_CORE>

TYPE-C

C_CC1	M15	USBC_XA_CC1
	N16	
C_CC2	M17	USBC_XA_CC2
	N18	
RPD_G1	L14	USBC_XA_CC1
RPD_G2	L16	USBC_XA_CC2
C_USB_TP	K19	USBC_XA_USB_TOP_P
C_USB_TN	K21	USBC_XA_USB_TOP_N
C_USB_BP	J20	USBC_XA_USB_BOT_P
C_USB_BN	J22	USBC_XA_USB_BOT_N
C_SBU1	J16	USBC_XA_SBU1
C_SBU2	H15	USBC_XA_SBU2

C3114 220PF 10% 16V C0G-X7R 0201
C3113 220PF 10% 16V C0G-X7R 0201

PORT_MUX

GND

DNU	E18	
DNU	C18	
DNU	F5	PPDCIN_XA_G3H_F
DNU	D5	PP20V_USBC_XA_VBUS
DNU	D17	
DNU	G18	

GND
A22 H9 N20 B21 K15 N22

GND_I2C_ADDR
PRIMARY ONLY
R3103 15K 0.1% 1/20W TF-LF 0201
TO SMC

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

L3100 90-OHM-0.1A EXCX4CE
USB2_UPC_PCH_XA_P
USB2_UPC_PCH_XA_N
PLACE_NEAR=U3100:5MM

PP3V3_UPC_XA_LDO
R3109 1M 5% 1/20W MF 201 I2C_UPC_XA_DBG_CTL_SCL
R3108 1M 5% 1/20W MF 201 I2C_UPC_XA_DBG_CTL_SDA
R3105 1M 5% 1/20W MF 201 UPC_XA_UART_RX

BOM_COST_GROUP=USB-C

PAGE TITLE	USB-C PORT CONTROLLER A
Apple Inc.	DRAWING NUMBER 051-05309
	SIZE D
	REVISION 5.1.0
	BRANCH
	PAGE 31 OF 500
	SHEET 28 OF 98

NOTICE OF PROPRIETARY PROPERTY:
THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE INC.
THE POSESSOR AGREES TO THE FOLLOWING:
I TO MAINTAIN THIS DOCUMENT IN CONFIDENCE
II NOT TO REPRODUCE OR COPY IT
III NOT TO REVEAL OR PUBLISH IT IN WHOLE OR PART
IV ALL RIGHTS RESERVED

SECONDARY USB-C PORT CONTROLLER (UPC) [REAR LEFT]

PPDCIN_XB_G3H_F
MAX 100UF TOTAL ON RAIL
PP5V_G3S
NOSTUFF C3211 2.2UF 20% 25V X6S-CERM 0402 CRITICAL <CPP_5V0>
PP_5V0 PP_CABLE PP_HV VBUS

PP20V_USBC_XB_VBUS
C3201 1UF 10% 35V X5R 0402 <CVBUS>
PP3V3_G3H_RTC
C3200 10UF 20% 6.3V CERM-X5R 0402-1 <CVIN_3V3>
PP1V8_SLPS2R
C3202 1.0UF 20% 6.3V X5S 0201-1 <CVDDIO>

OMIT_TABLE
U3200
CD3217
FCBGA
VER-2
CRITICAL

UPC_XB_RESET	B13	HRESET	(LDO_CORE)
TBT_POC_RESET	A14	MRESET	(LDO_3V3)
USBC_X_RESET_L	B17	RESET*	(LDO_3V3)
UPC_XB_SER_DBG	A2	GPIO0	(T.B.D.)
	B1		
PD_UPC_XB_GPIO1	D1	GPIO1	(VDDIO)
TBT_X_CIO_PWR_EN	F1	GPIO2	(LDO_3V3)
PD_UPC_X_5V_EN	C2	GPIO3	(LDO_3V3)
PD_UPC_XB_GPIO4	E2	GPIO4	(LDO_3V3)
UPC_XB_FAULT_L_R	B3	GPIO5	(LDO_3V3)
TBT_X_USB_PWR_EN	C4	GPIO6	(LDO_3V3)
SOC_DOCK_CONNECT	D3	GPIO7	(VDDIO, PMOS O/D)
UPC_PMU_RESET	E4	GPIO8	(VDDIO)
PD_UPC_XB_GPIO9	F3	GPIO9	(VDDIO)
PD_UPC_XB_GPIO10	F7	GPIO10	(VDDIO)
PP3V3_UPC_XB_LDO	A18	BUSPOWER	(LDO_3V3)
NC_UPC_XB_I2C_ADDR	M19	I2C_ADDR	(LDO_3V3)
UPC_XB_R_OSC	M21	R_OSC	(LDO_CORE)
I2C_UPC_XB_DBG_CTL_SDA	A16	I2CM_SDA_CNFG	(LDO_3V3, 4K IPU)
I2C_UPC_XB_DBG_CTL_SCL	B15	I2CM_SCL_CNFG	(LDO_3V3, 4K IPU)
I2C_TBT_X_SDA	B5	I2C_SDA1	(LDO_3V3)
I2C_TBT_X_SCL	A4	I2C_SCL1	(LDO_3V3)
I2C_TBT_XB_INT_L	D7	I2C_IRQ1*	(N/A, NMOS O/D)
I2C_UPC_SDA	B7	I2C_SDA2	(VDDIO)
I2C_UPC_SCL	A6	I2C_SCL2	(VDDIO)
UPC_I2C_INT_L	C8	I2C_IRQ2*	(N/A, NMOS O/D)
UPC_XB_SPI_CLK	B9	SPI_CLK	
UPC_XB_SPI_MOSI	B11	SPI_MOSI	
UPC_XB_SPI_MISO	A10	SPI_MISO	
UPC_XB_SPI_CS_L	A8	SPI_SSZ	
			DIGITAL CORE I/O & CONTROL
UPC_XB_SWD_DATA	E20	SWD_DATA	(VDDIO, IPU)
UPC_XB_SWD_CLK	E16	SWD_CLK	(VDDIO, IPU)
UPC_XA_UART_TX	B19	UART_RX	(LDO_3V3)
UPC_XA_UART_RX	A20	UART_TX	(LDO_3V3)
USB2_UPC_PCH_XB_F_P	H19	USB_RP1_P	
USB2_UPC_PCH_XB_F_N	H21	USB_RP1_N	
SPARE_UPC_XB_USB2_RP	G20	USB_RP2_P	
SPARE_UPC_XB_USB2_RN	G22	USB_RP2_N	PORT_MUX
SPARE_UPC_XB_USB3_RP	F19	USB_RP3_P	
SPARE_UPC_XB_USB3_RN	F21	USB_RP3_N	
USBC_XB_AUXLSX1	J12	AUX_P	
USBC_XB_AUXLSX2	H11	AUX_N	
DP_XB_HPD	C12	HPD	
USB3_BSSB_D2R_R_P	G12	DEBUG0	(T.B.D.)
USB3_BSSB_D2R_R_N	F11	DEBUG1	(T.B.D.)
USB3_BSSB_R2D_P	E8	DEBUG2	(T.B.D.)
USB3_BSSB_R2D_N	E12	DEBUG3	(T.B.D.)
SWD_SOC_SWCLK_XB	G16	DEBUG4	(T.B.D.)
SWD_SOC_SWDIO_XB	F15	DEBUG5	(T.B.D.)
SMC_DEBUGPRT_R_TX	D15	DEBUG6	(T.B.D.)
SMC_DEBUGPRT_R_RX	D19	DEBUG7	(T.B.D.)

POWER
TYPE-C
GND

VIN_3V3	C20	
VDDIO	A12	
VDDIO_CFG	D11	UPC_XB_VDDIO_CFG
LDO_3V3	C22	PP3V3_UPC_XB_LDO
	D21	
VIN_LV	L20	
VOUT_LV	L18	PP3V3_TBT_X_SX
VRET	C16	
SS	L22	UPC_XB_SS
LDO_CORE	E22	PP1V5_UPC_XB_LDO_CORE
C_CC1	M15	USBC_XB_CC1
	N16	
C_CC2	M17	USBC_XB_CC2
	N18	
RPD_G1	L14	USBC_XB_CC1
RPD_G2	L16	USBC_XB_CC2
C_USB_TP	K19	USBC_XB_USB_TOP_P
C_USB_TN	K21	USBC_XB_USB_TOP_N
C_USB_BP	J20	USBC_XB_USB_BOT_P
C_USB_BN	J22	USBC_XB_USB_BOT_N
C_SBU1	J16	USBC_XB_SBU1
C_SBU2	H15	USBC_XB_SBU2

C3208 10UF 20% 6.3V CERM-X5R 0402-1 <CLDO_3V3>
C3209 0.68UF 10% 6.3V X6S 0402 <CSS>
C3205 10UF 20% 6.3V CERM-X5R 0402-1 <CLDO_CORE>
C3214 220PF 10% 16V C0G-X7R 0201
C3213 220PF 10% 16V C0G-X7R 0201

DNU	E18	
DNU	C18	
DNU	F5	PPDCIN_XB_G3H_F
DNU	D5	PP20V_USBC_XB_VBUS
DNU	D17	
DNU	G18	

GND: A22 H9 N20 B21 K15 N22

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

L3200 90-OHM-0.1A EXCX4CE

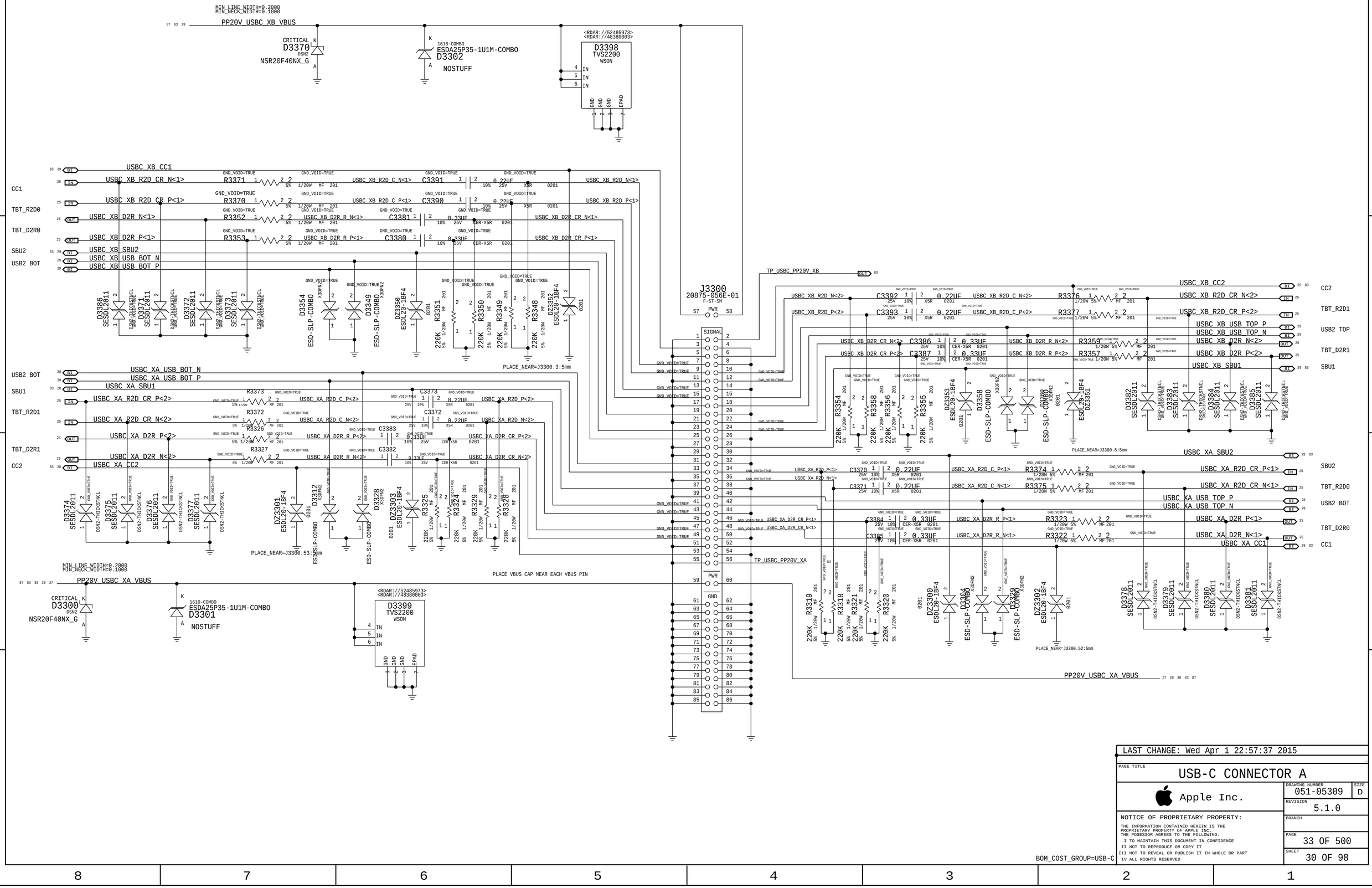
USB2_UPC_PCH_XB_P
USB2_UPC_PCH_XB_N
PLACE_NEAR=U3100:5MM

PP3V3_UPC_XB_LDO
R3209 1M 5% 1/20W MF 201 — I2C_UPC_XB_DBG_CTL_SCL
R3208 1M 5% 1/20W MF 201 — I2C_UPC_XB_DBG_CTL_SDA
R3205 1M 5% 1/20W MF 201 — UPC_XA_UART_TX

CRITICAL R3203 15K 0.1% 1/20W TF-LF 0201

BOM_COST_GROUP=USB-C

PAGE TITLE: USB-C PORT CONTROLLER B
Apple Inc.
DRAWING NUMBER: 051-05309
SIZE: D
REVISION: 5.1.0
BRANCH:
PAGE: 32 OF 500
SHEET: 29 OF 98


MIN_LINE_WIDTH=0.2000
MIN_NECK_WIDTH=0.1000
PP20V_USBC_XB_VBUS
CRITICAL
D3370
DSN2
NSR20F40NX_G
1610-COMBO
ESDA25P35-1U1M-COMBO
D3302
NOSTUFF
<RDAR://52485973>
<RDAR://48380003>
D3398
TVS2200
WSON
IN
GND
EPAD
J3300
20875-056E-01
F-ST-SM
PWR
SIGNAL
GND
TP_USBC_PP20V_XB
TP_USBC_PP20V_XA
PLACE_NEAR=J3300.3:5mm
PLACE_NEAR=J3300.6:5mm
PLACE_NEAR=J3300.53:5mm
PLACE_NEAR=J3300.52:5mm
PLACE VBUS CAP NEAR EACH VBUS PIN
USBC_XB_CC1
USBC_XB_CC2
USBC_XB_SBU2
USBC_XB_USB_BOT_N
USBC_XB_USB_BOT_P
USBC_XB_SBU1
USBC_XA_USB_BOT_N
USBC_XA_USB_BOT_P
USBC_XA_SBU1
USBC_XA_SBU2
USBC_XA_CC2
USBC_XA_CC1
USBC_XB_R2D_CR_N<1>
USBC_XB_R2D_CR_P<1>
USBC_XB_D2R_N<1>
USBC_XB_D2R_P<1>
USBC_XB_R2D_CR_N<2>
USBC_XB_R2D_CR_P<2>
USBC_XB_D2R_N<2>
USBC_XB_D2R_P<2>
USBC_XA_R2D_CR_P<2>
USBC_XA_R2D_CR_N<2>
USBC_XA_D2R_P<2>
USBC_XA_D2R_N<2>
USBC_XA_R2D_CR_P<1>
USBC_XA_R2D_CR_N<1>
USBC_XA_D2R_P<1>
USBC_XA_D2R_N<1>
USBC_XB_R2D_C_N<1>
USBC_XB_R2D_C_P<1>
USBC_XB_D2R_R_N<1>
USBC_XB_D2R_R_P<1>
USBC_XB_R2D_C_N<2>
USBC_XB_R2D_C_P<2>
USBC_XB_D2R_R_N<2>
USBC_XB_D2R_R_P<2>
USBC_XA_R2D_C_P<2>
USBC_XA_R2D_C_N<2>
USBC_XA_D2R_R_P<2>
USBC_XA_D2R_R_N<2>
USBC_XA_R2D_C_P<1>
USBC_XA_R2D_C_N<1>
USBC_XA_D2R_R_P<1>
USBC_XA_D2R_R_N<1>
USBC_XB_R2D_CR_N<1>
USBC_XB_R2D_CR_P<1>
USBC_XB_D2R_CR_N<1>
USBC_XB_D2R_CR_P<1>
USBC_XB_R2D_CR_N<2>
USBC_XB_R2D_CR_P<2>
USBC_XB_D2R_CR_N<2>
USBC_XB_D2R_CR_P<2>
USBC_XA_R2D_CR_P<2>
USBC_XA_R2D_CR_N<2>
USBC_XA_D2R_CR_P<2>
USBC_XA_D2R_CR_N<2>
USBC_XA_R2D_CR_P<1>
USBC_XA_R2D_CR_N<1>
USBC_XA_D2R_CR_P<1>
USBC_XA_D2R_CR_N<1>
USBC_XB_USB_TOP_P
USBC_XB_USB_TOP_N
USBC_XA_USB_TOP_P
USBC_XA_USB_TOP_N
PP20V_USBC_XB_VBUS
PP20V_USBC_XA_VBUS
CC1
CC2
SBU1
SBU2
TBT_R2D0
TBT_R2D1
TBT_D2R0
TBT_D2R1
USB2 BOT
USB2 TOP
BOM_COST_GROUP=USB-C
LAST CHANGE: Wed Apr 1 22:57:37 2015
PAGE TITLE
USB-C CONNECTOR A
Apple Inc.
DRAWING NUMBER
051-05309
SIZE
D
REVISION
5.1.0
BRANCH
PAGE
33 OF 500
SHEET
30 OF 98
NOTICE OF PROPRIETARY PROPERTY:
THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE INC.
THE POSESSOR AGREES TO THE FOLLOWING:
I TO MAINTAIN THIS DOCUMENT IN CONFIDENCE
II NOT TO REPRODUCE OR COPY IT
III NOT TO REVEAL OR PUBLISH IT IN WHOLE OR PART
IV ALL RIGHTS RESERVED

BOM_COST_GROUP=WIRELESS

PAGE TITLE

WIFI/BT SUPPORT

Apple Inc.

DRAWING NUMBER 051-05309

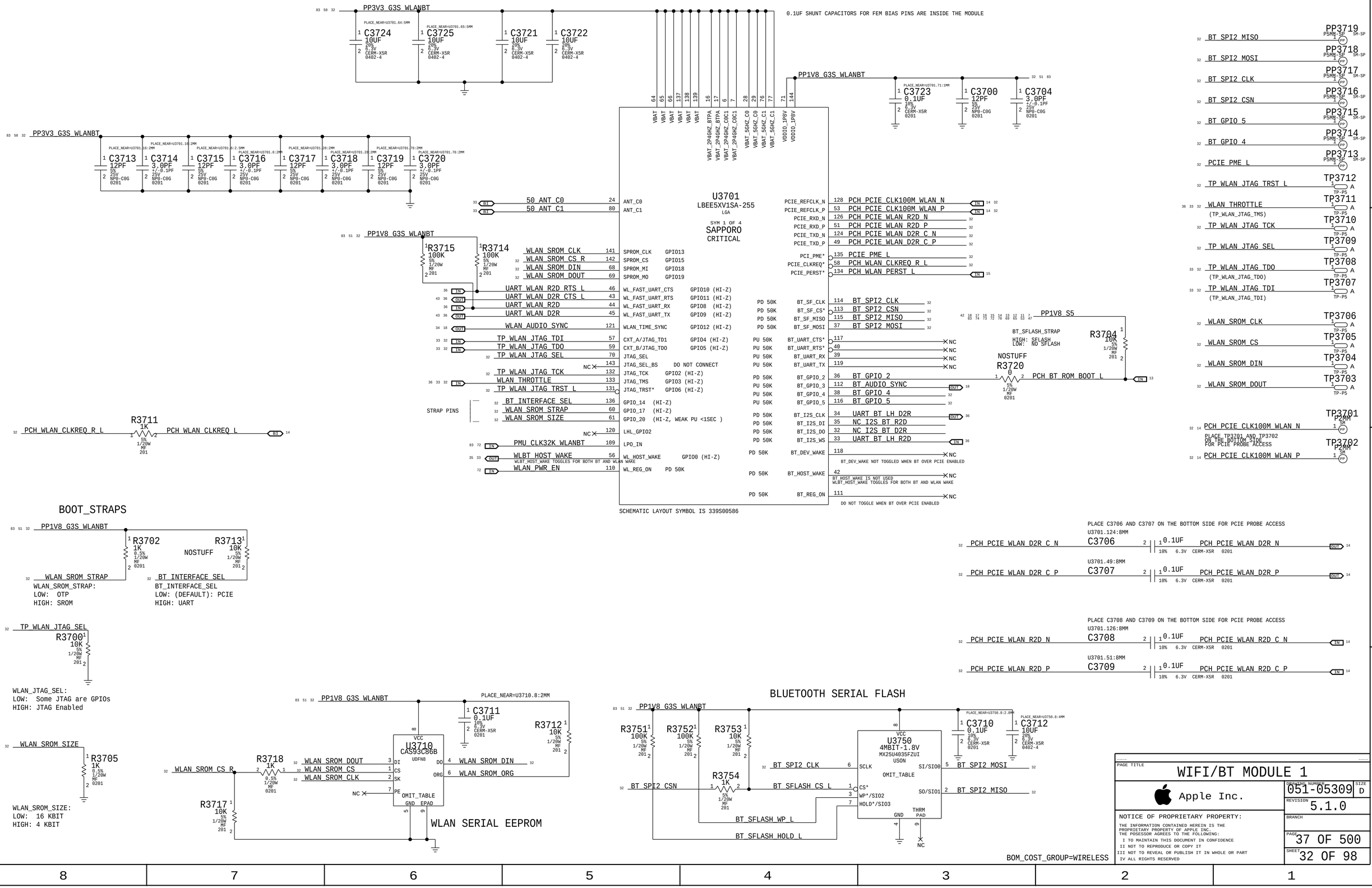
SIZE D

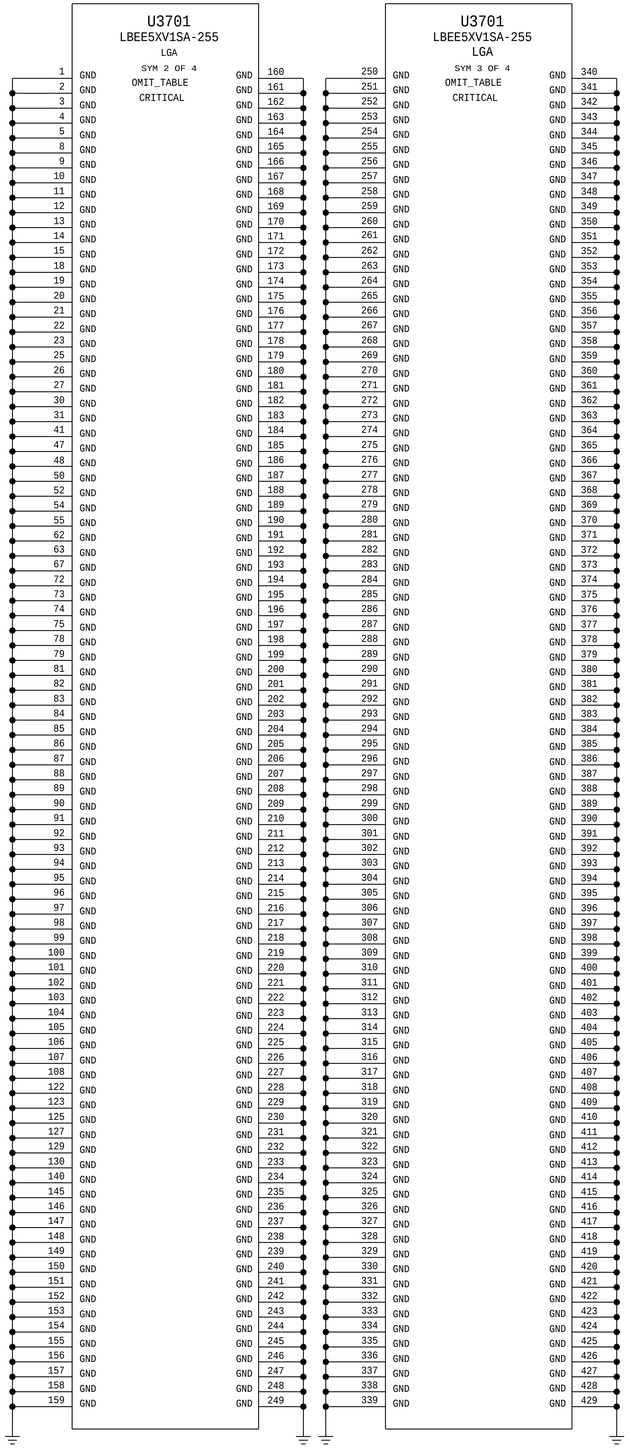
REVISION 5.1.0

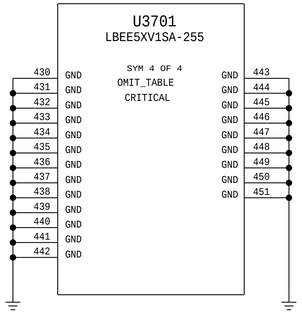
BRANCH

PAGE 36 OF 500

SHEET 31 OF 98

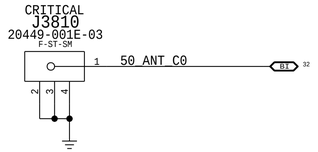

PP3V3_G3S_WLANBT
C3724 10UF 20% 6.3V CERM-X5R 0402-4
C3725 10UF 20% 6.3V CERM-X5R 0402-4
C3721 10UF 20% 6.3V CERM-X5R 0402-4
C3722 10UF 20% 6.3V CERM-X5R 0402-4
0.1UF SHUNT CAPACITORS FOR FEM BIAS PINS ARE INSIDE THE MODULE
PP1V8_G3S_WLANBT
C3723 0.1UF 10% 6.3V CERM-X5R 0201
C3700 12PF 5% 25V NP0-C0G 0201
C3704 3.0PF +/-0.1PF 25V NP0-C0G 0201
C3713 12PF 5% 25V NP0-C0G 0201
C3714 3.0PF +/-0.1PF 25V NP0-C0G 0201
C3715 12PF 5% 25V NP0-C0G 0201
C3716 3.0PF +/-0.1PF 25V NP0-C0G 0201
C3717 12PF 5% 25V NP0-C0G 0201
C3718 3.0PF +/-0.1PF 25V NP0-C0G 0201
C3719 12PF 5% 25V NP0-C0G 0201
C3720 3.0PF +/-0.1PF 25V NP0-C0G 0201
U3701
LBEE5XV1SA-255
LGA
SYM 1 OF 4
SAPPORO
CRITICAL
50 ANT C0
50 ANT C1
PP1V8_G3S_WLANBT
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
UART_WLAN_R2D_RTS_L
UART_WLAN_D2R_CTS_L
UART_WLAN_R2D
UART_WLAN_D2R
WLAN_AUDIO_SYNC
TP_WLAN_JTAG_TDI
TP_WLAN_JTAG_TDO
TP_WLAN_JTAG_SEL
TP_WLAN_JTAG_TCK
WLAN_THROTTLE
TP_WLAN_JTAG_TRST_L
STRAP PINS
BT_INTERFACE_SEL
WLAN_SROM_STRAP
WLAN_SROM_SIZE
PMU_CLK32K_WLANBT
WLBT_HOST_WAKE
WLBT_HOST_WAKE TOGGLES FOR BOTH BT AND WLAN WAKE
WLAN_PWR_EN
PCIE_REFCLK_N
PCIE_REFCLK_P
PCIE_RXD_N
PCIE_RXD_P
PCIE_TXD_N
PCIE_TXD_P
PCI_PME*
PCIE_CLKREQ*
PCIE_PERST*
PCH_PCIE_CLK100M_WLAN_N
PCH_PCIE_CLK100M_WLAN_P
PCH_PCIE_WLAN_R2D_N
PCH_PCIE_WLAN_R2D_P
PCH_PCIE_WLAN_D2R_C_N
PCH_PCIE_WLAN_D2R_C_P
PCIE_PME_L
PCH_WLAN_CLKREQ_R_L
PCH_WLAN_PERST_L
BT_SF_CLK
BT_SF_CS*
BT_SF_MISO
BT_SF_MOSI
BT_SPI2_CLK
BT_SPI2_CSN
BT_SPI2_MISO
BT_SPI2_MOSI
BT_UART_CTS*
BT_UART_RTS*
BT_UART_RX
BT_UART_TX
BT_GPIO_2
BT_GPIO_3
BT_GPIO_4
BT_GPIO_5
BT_I2S_CLK
BT_I2S_DI
BT_I2S_DO
BT_I2S_WS
BT_DEV_WAKE
BT_HOST_WAKE
BT_REG_ON
BT_DEV_WAKE NOT TOGGLED WHEN BT OVER PCIE ENABLED
BT_HOST_WAKE IS NOT USED
WLBT_HOST_WAKE TOGGLES FOR BOTH BT AND WLAN WAKE
DO NOT TOGGLE WHEN BT OVER PCIE ENABLED
UART_BT_LH_D2R
NC_I2S_BT_R2D
NC_I2S_BT_D2R
UART_BT_LH_R2D
BT_GPIO_2
BT_AUDIO_SYNC
BT_GPIO_4
BT_GPIO_5
PCH_BT_ROM_BOOT_L
PP1V8_S5
BT_SFLASH_STRAP
HIGH: SFLASH
LOW: NO SFLASH
NOSTUFF
R3720 0 5% 1/20W MF 0201
R3704 10K 5% 1/20W MF 201
SCHEMATIC LAYOUT SYMBOL IS 339S00586
R3711 1K 5% 1/20W MF 201
PCH_WLAN_CLKREQ_R_L
PCH_WLAN_CLKREQ_L
BOOT_STRAPS
PP1V8_G3S_WLANBT
R3702 1K 0.5% 1/20W MF 0201
R3713 10K 5% 1/20W MF 201
NOSTUFF
WLAN_SROM_STRAP
WLAN_SROM_STRAP:
LOW: OTP
HIGH: SROM
BT_INTERFACE_SEL
BT_INTERFACE_SEL
LOW: (DEFAULT): PCIE
HIGH: UART
TP_WLAN_JTAG_SEL
R3700 10K 5% 1/20W MF 201
WLAN_JTAG_SEL:
LOW: Some JTAG are GPIOs
HIGH: JTAG Enabled
WLAN_SROM_SIZE
R3705 1K 0.5% 1/20W MF 0201
WLAN_SROM_SIZE:
LOW: 16 KBIT
HIGH: 4 KBIT
PP1V8_G3S_WLANBT
PLACE_NEAR=U3710.8:2MM
C3711 0.1UF 10% 6.3V CERM-X5R 0201
R3712 10K 5% 1/20W MF 201
R3718 1K 0.5% 1/20W MF 0201
R3717 10K 5% 1/20W MF 201
U3710
CAS93C86B
UDFN8
WLAN_SROM_CS_R
WLAN_SROM_DOUT
WLAN_SROM_CS
WLAN_SROM_CLK
WLAN_SROM_DIN
WLAN_SROM_ORG
OMIT_TABLE
WLAN SERIAL EEPROM
BLUETOOTH SERIAL FLASH
PP1V8_G3S_WLANBT
R3751 100K 5% 1/20W MF 201
R3752 100K 5% 1/20W MF 201
R3753 10K 5% 1/20W MF 201
R3754 1K 5% 1/20W MF 201
U3750
4MBIT-1.8V
MX25U4035FZUI
USON
OMIT_TABLE
BT_SPI2_CLK
BT_SPI2_CSN
BT_SFLASH_CS_L
BT_SFLASH_WP_L
BT_SFLASH_HOLD_L
BT_SPI2_MOSI
BT_SPI2_MISO
C3710 0.1UF 10% 6.3V CERM-X5R 0201
C3712 10UF 20% 6.3V CERM-X5R 0402-4
BOM_COST_GROUP=WIRELESS
PP3719
PP3718
PP3717
PP3716
PP3715
PP3714
PP3713
BT_SPI2_MISO
BT_SPI2_MOSI
BT_SPI2_CLK
BT_SPI2_CSN
BT_GPIO_5
BT_GPIO_4
PCIE_PME_L
TP3712
TP3711
TP3710
TP3709
TP3708
TP3707
TP3706
TP3705
TP3704
TP3703
TP3701
TP3702
PCH_PCIE_CLK100M_WLAN_N
PCH_PCIE_CLK100M_WLAN_P
PLACE TP3701 AND TP3702 ON THE BOTTOM SIDE FOR PCIE PROBE ACCESS
PLACE C3706 AND C3707 ON THE BOTTOM SIDE FOR PCIE PROBE ACCESS
U3701.124:8MM
C3706 0.1UF 10% 6.3V CERM-X5R 0201
U3701.49:8MM
C3707 0.1UF 10% 6.3V CERM-X5R 0201
PLACE C3708 AND C3709 ON THE BOTTOM SIDE FOR PCIE PROBE ACCESS
U3701.126:8MM
C3708 0.1UF 10% 6.3V CERM-X5R 0201
U3701.51:8MM
C3709 0.1UF 10% 6.3V CERM-X5R 0201
PAGE TITLE
WIFI/BT MODULE 1
Apple Inc.
051-05309
REVISION 5.1.0
BRANCH
PAGE 37 OF 500
SHEET 32 OF 98
SIZE D
NOTICE OF PROPRIETARY PROPERTY:
THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE INC.
THE POSESSOR AGREES TO THE FOLLOWING:
I TO MAINTAIN THIS DOCUMENT IN CONFIDENCE
II NOT TO REPRODUCE OR COPY IT
III NOT TO REVEAL OR PUBLISH IT IN WHOLE OR PART
IV ALL RIGHTS RESERVED

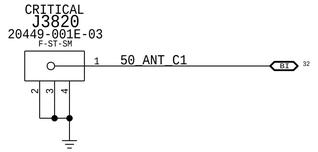




WIRELESS MODULE GND PINS

RF CONNECTORS





BOM_COST_GROUP=WIRELESS

PAGE TITLE: WIFI/BT MODULE 2

Apple Inc.

DRAWING NUMBER: 051-05309 | SIZE: D

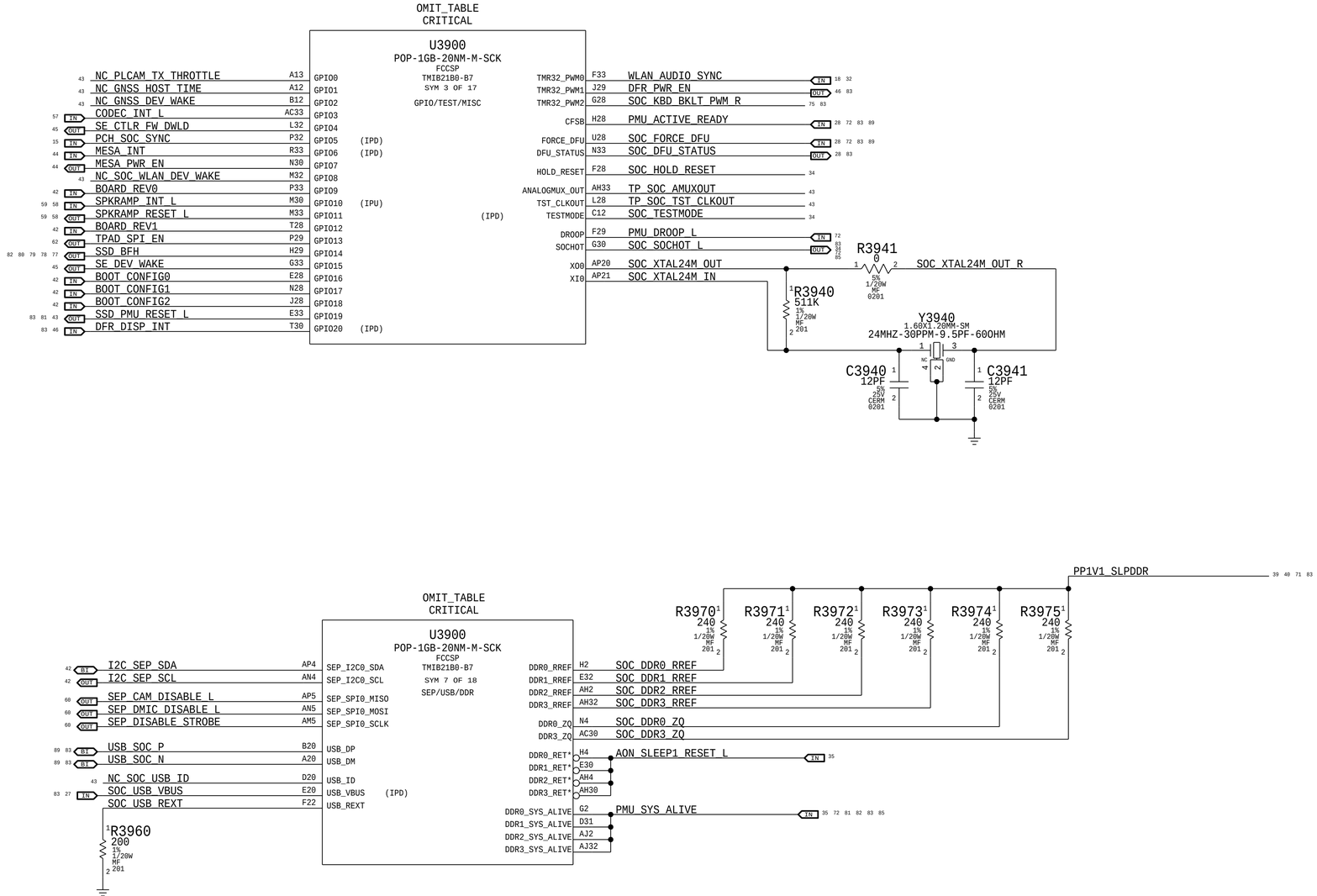
REVISION: 5.1.0

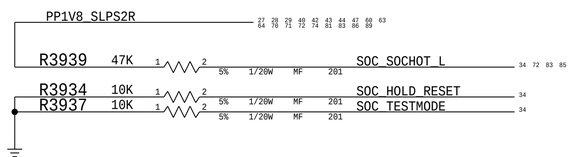
BRANCH:

PAGE: 38 OF 500

SHEET: 33 OF 98

Note IPU/IPD represents SW configured state, not HW default





BOM_COST_GROUP=SOC

PAGE TITLE
SOC GPIO/SEP/USB/DDR/TEST

Apple Inc.

DRAWING NUMBER 051-05309
SIZE D
REVISION 5.1.0
BRANCH
PAGE 39 OF 500
SHEET 34 OF 98

OMIT_TABLE
CRITICAL

U3900
POP-1GB-20NM-M-SCK
FCCSP
TMIB21B0-B7
SYM 6 OF 17
AOP

43	NC_WLAN_CONTEXT_A	B5	AOP_FUNC[0]		AOP_PDM_CLK0	N6	PDM_DMIC_CLK0_R → OUT 43
43	NC_WLAN_CONTEXT_B	D4	AOP_FUNC[1]		AOP_PDM_CLK1	J6	PDM_DMIC_CLK1_R → OUT 43
84 43	IN ACCEL_INT1	G1	AOP_FUNC[2]	(IPD)	AOP_PDM_CLK2	(IPU) F5	TP_SMC_FIXTURE_MODE_L → 83
43	IN ACCEL_INT2	C5	AOP_FUNC[3]	(IPD)	AOP_PDM_CLK3	F2	NC_PLCAM_PROX_INT_L → 43
45	SE_HOST_WAKE_R	D1	AOP_FUNC[4]		AOP_PDM_CLK4	J4	NC_PLCAM_ROMEO_B2B_DETECT → 43
85 15	IN SOC_PERST_L	E4	AOP_FUNC[5]				
43	NC_ALTIMETER_INT	C4	AOP_FUNC[6]	(IPD)	AOP_PDM_DATA0	F1	PDM_DMIC_DATA0 → IN 60
84 43	OUT SPI_ACCEL_CS_L	F4	AOP_FUNC[7]	(IPD)	AOP_PDM_DATA1	J1	PDM_DMIC_DATA1 → IN 60
43	NC_SPI_ALTIMETER_CS_L	E1	AOP_FUNC[8]		AOP_SPI_MOSI	A5	SPI_AOP_SENSOR_MOSI_R → OUT 43
					AOP_SPI_SCLK	E5	SPI_AOP_SENSOR_CLK_R → OUT 43
43	NC_I2C_AOP_SCL	H6	AOP_I2C0_SCL		AOP_SPI_MISO	C2	SPI_AOP_SENSOR_MISO → IN 43 84
43	NC_I2C_AOP_SDA	G6	AOP_I2C0_SDA				

OMIT_TABLE
CRITICAL

U3900
POP-1GB-20NM-M-SCK
FCCSP
TMIB21B0-B7
SYM 5 OF 17
AON

83 46	IN DFR_TOUCH_INT_L	AG6	AON_GPIO0		JTAG_TCK	(IPU) AF6	SWD_SOC_SWCLK → IN 89
17	IN CPU_SMC_THRMTRIP_L	AB6	AON_GPIO1	(IPU)	JTAG_TMS	(IPU) AH1	SWD_SOC_SWDIO → BI 89
43	NC_SMC_GFX_SELF_THROTTLE	AL1	AON_GPIO2		JTAG_TDI	(IPU) AE6	DEBUG_JTAG_SOC_TDI → IN 83
43	NC_SMC_TOPBLK_SWP_L	AH5	AON_GPIO3		JTAG_TDO	AK1	DEBUG_JTAG_SOC_TDO → OUT 83
16	IN XDP_PRESENT_L	AG1	AON_GPIO4	(IPD)	JTAG_TRST*	AH6	TP_JTAG_SOC_TRST_L → 83
57	OUT CODEC_RESET_L	AL4	AON_GPIO5		JTAG_SEL	Y8	SOC_JTAG_SEL → 35
	OUT NC_BT_DEV_WAKE	AK4	AON_GPIO6				(DAP=0, TAP=1)
43	NC_PCIEDN_WAKE_L	AD6	AON_GPIO7		DOCK_CONNECT	AJ5	SOC_DOCK_CONNECT → IN 28 29 35 83
43	NC_ENET_LOW_PWR	AM1	AON_GPIO8		AON_SWD0_TMS	AF2	NC_SOC_WLAN_JTAG_TMS → 43
62	IN TPAD_SPI_INT_L	AJ6	AON_GPIO9		AON_SWD1_TMS	AE4	NC_MESA_MENUKEY_L → 43
43	NC_SDCONN_STATE_CHANGE_L	AK5	AON_GPIO10		AON_SWD01_TCK	AE5	NC_SOC_WLAN_JTAG_TCK → 43
43	NC_ENET_MEDIA_SENSE	AJ1	AON_GPIO11				
72	IN PMU_INT_L	AL6	AON_GPIO12	(IPU)	WDOG	AF5	SOC_WDOG → OUT 72 83 85
					AON_SLEEP1_RESET*	AC6	AON_SLEEP1_RESET_L → OUT 34
			AON_SPMI_SCLK				
			AON_SPMI_SDATA				
83 72	IN PMU_CLK32K_SOC	AK6	RT_CLK32768				
83	SOC_COLD_RESET_L	AG4	COLD_RESET*				
		AF4	CFSB_AON				

PLACE_NEAR=U3900.AA6:5MM
72 OUT SPMI_CLK — R4036 20 1/20W MF 201 5% — SPMI_CLK_R AA6
72 BI SPMI_DATA — R4037 20 1/20W MF 201 5% — SPMI_DATA_R AK2
PLACE_NEAR=U7800.M7:5MM

85 83 72 66 IN PMU_COLD_RESET_L — R4039 4.7K 1/20W MF 201 5% — AF4

COLD_RESET and CFSB_AON requires isolation per <rdar://30222445>

OMIT_TABLE
CRITICAL

U3900
POP-1GB-20NM-M-SCK
FCCSP
TMIB21B0-B7
SYM 9 OF 17
SMC

PLACE_NEAR=U3900.R4:5MM
PLACE_NEAR=U3900.R1:5MM
PLACE_NEAR=U3900.T5:5MM
PLACE_NEAR=U3900.T6:5MM

12 BI ESPI_IO<0> — R4050 20 1/20W MF 201 5%	ESPI_IO_R<0>	R4	SMC_ESPI_IO0		SMC_GPIO0	V4	CODEC_WAKE_L → IN 57
12 BI ESPI_IO<1> — R4051 20 1/20W MF 201 5%	ESPI_IO_R<1>	R1	SMC_ESPI_IO1	(IPD)	SMC_GPIO1	V8	NC_BT_HOST_WAKE → IN
12 BI ESPI_IO<2> — R4052 20 1/20W MF 201 5%	ESPI_IO_R<2>	T5	SMC_ESPI_IO2	(IPD)	SMC_GPIO2	V6	WLBT_HOST_WAKE → IN 32 33
12 BI ESPI_IO<3> — R4053 20 1/20W MF 201 5%	ESPI_IO_R<3>	T6	SMC_ESPI_IO3		SMC_GPIO3	U4	DP_INT_HPD_MASK → OUT 15 43
12 IN ESPI_CLK60M		P2	SMC_ESPI_CLK	(IPD)	SMC_GPIO4	V7	SMC_LID_RIGHT → IN 43 83
12 IN ESPI_CS_L		T4	SMC_ESPI_CS*		SMC_GPIO5	U6	NC_PCC_EVENT → 43
12 IN ESPI_RESET_L		T2	SMC_ESPI_RESET*	(IPD)	SMC_GPIO6	V1	NC_TPAD_VIBE_L → 43
					SMC_GPIO7	W5	TPAD_KBD_WAKE_L → IN 62 83
42 IN SMC_PECI_RX		M6	SMC_PECI_IN	(IPD)	SMC_GPIO8	AC1	SMC_LID_LEFT → IN 43 83
42 OUT SMC_PECI_TX		R6	SMC_PECI_OUT		SMC_GPIO9	AB2	NC_SPI_DESCRIPTOR_OVERRIDE_L → 43
42 OUT SMC_PCH_PWROK		U7	PCH_PWROK		SMC_GPIO10	AB1	NC_DISP_GCON_INT_L → 43
42 OUT SMC_PCH_SYS_PWROK		U8	SYS_PWROK		SMC_GPIO11	AA4	NC_PCH_GCON_INT_L → 43
					SMC_GPIO12	W8	TPAD_ACTUATOR_DISABLE_L → BI 62
42 18 OUT SMC_RSMRST_L		U1	RSMRST*		SMC_GPIO13	(IPU) AA1	TBT_WAKE_L → IN 27
83 42 OUT SMC_SYSRST_L		U5	SYS_RESET*		SMC_GPIO14	(IPU) AC2	UPC_I2C_INT_L → IN 27 28 29 47
89 83 72 18 IN PM_SLP_S0_L		W1	SLP_S0B		SMC_GPIO_15	(IPU) K2	DP_INT_HPD_L → IN 43
65 43 42 BI SMC_PROCHOT_L		P6	PROCHOT*				
85 83 82 81 72 34 IN PMU_SYS_ALIVE		W6	SYS_ALIVE		SMC_ADC0	AE1	SMC_CPU_HS_ISENSE → IN 49
					SMC_ADC1	Y5	SMC_PBUS_VSENSE → IN 49
83 47 29 27 OUT I2C_UPC_SCL		K4	SMC_I2C0_SCL		SMC_ADC2	AE2	SMC_BMON_ISENSE → IN 49
83 47 29 27 BI I2C_UPC_SDA		H1	SMC_I2C0_SDA		SMC_ADC3	AB5	SMC_DCIN_ISENSE → IN 49
					SMC_ADC4	Y7	SMC_DCIN_VSENSE → IN 49
47 OUT I2C_SNS0_S0_SCL		L4	SMC_I2C1_SCL		SMC_ADC5	AD4	SMC_PP3V3_WLANBT_ISENSE → IN 50
47 BI I2C_SNS0_S0_SDA		L5	SMC_I2C1_SDA		SMC_ADC6	AF1	SMC_PP1V8_WLANBT_ISENSE → IN 51
					SMC_ADC7	Y6	SMC_CALPE_ISENSE → IN 52
47 OUT I2C_THMSNS_SCL		M4	SMC_I2C2_SCL		REFP_ADC	AC5	PP1V25_SLPS2R_SMC_AVREF → 42
47 BI I2C_THMSNS_SDA		K1	SMC_I2C2_SDA		REFM_ADC	AC4	GND_SMC_AVSS → 42 49 50 51 52
47 OUT I2C_DISP_SCL		L2	SMC_I2C3_SCL				
47 BI I2C_DISP_SDA		P5	SMC_I2C3_SDA		SMC_PWM0	E2	SMC_FAN_0_PWM → OUT 55
					SMC_TACH0	K6	SMC_FAN_0_TACH → IN 55 60
83 72 47 OUT I2C_PWR_SCL		L1	SMC_I2C4_SCL		SMC_PWM1	N5	NC_SMC_FAN_1_PWM → 43
83 72 47 BI I2C_PWR_SDA		M1	SMC_I2C4_SDA		SMC_TACH1	L6	NC_SMC_FAN_1_TACH → 43
47 OUT I2C_SENSE_SCL		N1	SMC_I2C5_SCL		SMC_PWM2	K5	NC_SMC_LED_ONEWIRE → 43
47 BI I2C_SENSE_SDA		N2	SMC_I2C5_SDA				
81 47 OUT I2C_SSD_SCL		P1	SMC_I2C6_SCL	(IPU)	SMC_UART0_RXD	U2	SMC_DEBUGPRT_RX → IN 83 89
81 47 BI I2C_SSD_SDA		P4	SMC_I2C6_SDA		SMC_UART0_TXD	T1	SMC_DEBUGPRT_TX → OUT 83 89
					SWD_OUT0_TCK	AB4	SSD0_SWCLK → OUT 77 78 79 80 82
					SWD_OUT0_TMS	Y1	SSD0_SWDIO → BI 77 78 79 80 82
					SWD_OUT1_TCK	AD1	NC_SSD1_SWCLK_UART_R2D → 43
					SWD_OUT1_TMS	W7	NC_SSD1_SWDIO_UART_D2R → 43

1 PLACE_NEAR=U3900.AC4:4MM
XW4089
2 SM

R4046 10K — SOC_JTAG_SEL → 35
R4047 100K — SOC_DOCK_CONNECT → 28 29 35 83
1/20W MF 201 5%

BOM_COST_GROUP=SOC

PAGE TITLE
SOC AOP/AON/SMC

Apple Inc.

DRAWING NUMBER 051-05309
SIZE D
REVISION 5.1.0
BRANCH
PAGE 40 OF 500
SHEET 35 OF 98

OMIT_TABLE
CRITICAL

U3900
POP-1GB-20NM-M-SCK
FCCSP
TMIB21B0-B7
SYM 4 OF 17
ISP

84 76	IN	MIPI_FTCAM_DATA_P<0>	B24	MIPI0C_DATA0_P			
84 76	IN	MIPI_FTCAM_DATA_N<0>	A24	MIPI0C_DATA0_N			
			B22	MIPI0C_DATA1_P			
			A22	MIPI0C_DATA1_N			
84 76	IN	MIPI_FTCAM_CLK_P	B23	MIPI0C_CLK_P			
84 76	IN	MIPI_FTCAM_CLK_N	A23	MIPI0C_CLK_N			
			B25	MIPI1C_DATA0_P			
			A25	MIPI1C_DATA0_N			
			B27	MIPI1C_DATA1_P			
			A27	MIPI1C_DATA1_N			
			B26	MIPI1C_CLK_P			
			A26	MIPI1C_CLK_N			
46	OUT	MIPI_DFR_DATA_P	B30	MIPID_DATA0_P			
46	OUT	MIPI_DFR_DATA_N	A30	MIPID_DATA0_N			
46	OUT	MIPI_DFR_CLK_P	B29	MIPID_CLK_P			
46	OUT	MIPI_DFR_CLK_N	A29	MIPID_CLK_N			
		SOC_MIPI0C_REXT	F23	MIPI0C_REXT			
		SOC_MIPI1C_REXT	F25	MIPI1C_REXT			
		SOC_MIPID_REXT	F26	MIPID_REXT			
				ISP_I2C0_SDA	AC28	I2C_FTCAM_SDA	BI 48
				ISP_I2C0_SCL	AD33	I2C_FTCAM_SCL	OUT 48
				ISP_I2C1_SDA	AA29	NC_I2C_PLCAM_SDA	43
				ISP_I2C1_SCL	AD30	NC_I2C_PLCAM_SCL	43
				SENSOR0_CLK	AF32	NC_FTCAM_CLK12M_R	43
				SENSOR0_RST	AF30	NC_FTCAM_RESET_L	43
				SENSOR0_ISTRB	AC29	DFR_TOUCH_RESET_L	OUT 46 83
				SENSOR1_CLK	AA28	NC_PLCAM_RX_CLK12M_R	43
				SENSOR1_RST	AB30	NC_PLCAM_RX_RESET_L	43
				SENSOR1_ISTRB	AA30	DFR_DISP_RESET_L	OUT 46 83
				SENSOR2_CLK	AB28	NC_PLCAM_TX_CLK12M_R	43
				SENSOR2_RST	AD28	NC_PLCAM_TX_RESET_L	43
				SENSOR_INT	W28	NC_PLCAM_TX_INT	43
			(IPD)	DISP_TE	D33	DFR_DISP_TE	IN 46 83
				DISP_VSYNC	L30	BOARD_REV2	IN 42
				CLK32K_OUT	AF29	DFR_TOUCH_CLK32K_RESET_L	OUT 46 83

[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

PLACE_NEAR=U3900.F23:5MM
PLACE_NEAR=U3900.F25:5MM
PLACE_NEAR=U3900.F26:5MM

OMIT_TABLE
CRITICAL

U3900
POP-1GB-20NM-M-SCK
FCCSP
TMIB21B0-B7
SYM 2 OF 17
I2C/UART/SPI/I2S

58 48	BI	I2C_SPKRAMP_L_SDA	W33	I2C0_SDA			
58 48	OUT	I2C_SPKRAMP_L_SCL	U30	I2C0_SCL			
59 48	BI	I2C_SPKRAMP_R_SDA	AB32	I2C1_SDA			
59 48	OUT	I2C_SPKRAMP_R_SCL	V30	I2C1_SCL			
57 48	BI	I2C_CODEC_SDA	H30	I2C2_SDA			
57 48	OUT	I2C_CODEC_SCL	P28	I2C2_SCL			
48	BI	I2C_ALS_SDA	V28	I2C3_SDA			
48	OUT	I2C_ALS_SCL	AB33	I2C3_SCL			
48	BI	I2C_DFR_SDA	L33	I2C4_SDA			
48	OUT	I2C_DFR_SCL	R29	I2C4_SCL			
43		NC_I2C_SOC_5_SDA	M29	I2C5_SDA			
43		NC_I2C_SOC_5_SCL	R30	I2C5_SCL			
83 59	IN	SPKR_ID1	J33	I2C6_SDA	(IPU)		
83 58	IN	SPKR_ID0	L29	I2C6_SCL	(IPU)		
83		SOC_DEBUGPRT_RX	V32	UART0_RXD	(IPU)		
83		SOC_DEBUGPRT_TX	U32	UART0_TXD			
45	IN	UART_SE_D2R	B15	UART1_RXD			
45	OUT	UART_SE_R2D	A15	UART1_TXD			
45	IN	UART_SE_D2R_CTS_L	D13	UART1_CTS*			
45	OUT	UART_SE_R2D_RTS_L	E12	UART1_RTS*			
43		NC_UART_BT_D2R	F32	UART2_RXD			
43		NC_UART_BT_R2D	F30	UART2_TXD			
43		NC_UART_BT_D2R_CTS_L	M28	UART2_CTS*			
43		NC_UART_BT_R2D_RTS_L	K28	UART2_RTS*			
32	IN	UART_BT_LH_D2R	H32	UART3_RXD	(IPD)		
32	OUT	UART_BT_LH_R2D	J32	UART3_TXD			
43		NC_UART_GNSS_D2R_CTS_L	H33	UART3_CTS*			
43		NC_UART_GNSS_R2D_RTS_L	P30	UART3_RTS*			
43 32	IN	UART_WLAN_D2R	B14	UART4_RXD			
32	OUT	UART_WLAN_R2D	A14	UART4_TXD			
43 32	IN	UART_WLAN_D2R_CTS_L	C13	UART4_CTS*			
32	OUT	UART_WLAN_R2D_RTS_L	D12	UART4_RTS*			
				SPI0_MISO	AN6	SPI_SOCROM_MISO	IN 42
				SPI0_MOSI	AM4	SPI_SOCROM_MOSI_R	
				SPI0_SCLK	AN3	SPI_SOCROM_CLK_R	
				SPI0_SSIN	AP6	SPI_SOCROM_CS_L	OUT 42
			(IPU)	SPI1_MISO	K30	SPI_TPAD_MISO	IN 42 43
				SPI1_MOSI	J30	SPI_TPAD_MOSI_R	OUT 43
				SPI1_SCLK	K33	SPI_TPAD_CLK_R	OUT 43
				SPI1_SSIN	R28	SPI_TPAD_CS_L	OUT 62
				SPI2_MISO	B17	SPI_MESA_MISO	IN 44
				SPI2_MOSI	C17	SPI_MESA_MOSI_R	OUT 43
				SPI2_SCLK	D16	SPI_MESA_CLK_R	OUT 43
				SPI2_SSIN	A17	WLAN_THROTTLE	OUT 32 33
				SPI3_MISO	C14	SPI_DFR_MISO	IN 43
				SPI3_MOSI	D15	SPI_DFR_MOSI_R	OUT 43
				SPI3_SCLK	C16	SPI_DFR_CLK_R	OUT 43
				SPI3_SSIN	A16	SPI_DFR_CLK_R	OUT 46 83
			(IPD)	I2S0_DIN	Y28	I2S_SPKRAMP_L_D2R	IN 58 59
				I2S0_DOUT	AC32	I2S_SPKRAMP_L_R2D_R	OUT 43
				I2S0_BCLK	Y29	I2S_SPKRAMP_L_BCLK_R	OUT 43
				I2S0_LRCK	AE32	I2S_SPKRAMP_L_LRCLK	OUT 43
				I2S0_MCK	AM33	NC_DFR_TOUCH_RSVD	43
				I2S1_DIN	C18	I2S_SPKRAMP_R_D2R	IN 43
				I2S1_DOUT	E17	I2S_SPKRAMP_R_R2D_R	OUT 43
				I2S1_BCLK	D17	I2S_SPKRAMP_R_BCLK_R	OUT 43
				I2S1_LRCK	B18	I2S_SPKRAMP_R_LRCLK	OUT 43
				I2S1_MCK	D18	NC_PCHROM_SW_EN	43
			(IPD)	I2S2_DIN	Y33	I2S_CODEC_D2R	IN 57
				I2S2_DOUT	AA33	I2S_CODEC_R2D_R	OUT 43
				I2S2_BCLK	AE33	I2S_CODEC_BCLK_R	OUT 43
				I2S2_LRCK	V29	I2S_CODEC_LRCLK	OUT 43
				I2S2_MCK	AL30	NC_I2S_CODEC_MCLK	43
				I2S3_DIN	R32	NC_I2S_HAWKING_D2R	43
				I2S3_DOUT	U33	NC_I2S_CODEC1_R2D_R	43
				I2S3_BCLK	T33	NC_I2S_HAWKING_BCLK_R	43
				I2S3_LRCK	U29	NC_I2S_HAWKING_LRCLK	43
				I2S3_MCK	V33	NC_I2S_CODEC1_MCLK	43

PLACE_NEAR=U3900.AM4:5MM
PLACE_NEAR=U3900.AN3:5MM
R4171 20 1 2 5% 1/20W MF 201 SPI_SOCROM_MOSI OUT 42
R4172 20 1 2 5% 1/20W MF 201 SPI_SOCROM_CLK OUT 42

BOM_COST_GROUP=SOC

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

Apple Inc.

DRAWING NUMBER 051-05309
SIZE D
REVISION 5.1.0
BRANCH
PAGE 41 OF 500
SHEET 36 OF 98

OMIT_TABLE
CRITICAL

U3900
POP-1GB-20NM-M-SCK
FCCSP
TMIB21B0-B7
SYM 1 OF 17
PCIE UP/DN

14 OUT	PCIE_SOC_D2R_P<0>	C4210 0.22UF	PCIE_SOC_D2R_C_P<0>	B10	PCIE_UP_TX0_P
14 OUT	PCIE_SOC_D2R_N<0>	C4211 0.22UF	PCIE_SOC_D2R_C_N<0>	C10	PCIE_UP_TX0_N
			PCIE_SOC_R2D_P<0>	E10	PCIE_UP_RX0_P
			PCIE_SOC_R2D_N<0>	F10	PCIE_UP_RX0_N
14 OUT	PCIE_SOC_D2R_P<1>	C4212 0.22UF	PCIE_SOC_D2R_C_P<1>	A9	PCIE_UP_TX1_P
14 OUT	PCIE_SOC_D2R_N<1>	C4213 0.22UF	PCIE_SOC_D2R_C_N<1>	B9	PCIE_UP_TX1_N
			PCIE_SOC_R2D_P<1>	D9	PCIE_UP_RX1_P
			PCIE_SOC_R2D_N<1>	E9	PCIE_UP_RX1_N
14 OUT	PCIE_SOC_D2R_P<2>	C4214 0.22UF	PCIE_SOC_D2R_C_P<2>	B8	PCIE_UP_TX2_P
14 OUT	PCIE_SOC_D2R_N<2>	C4215 0.22UF	PCIE_SOC_D2R_C_N<2>	C8	PCIE_UP_TX2_N
			PCIE_SOC_R2D_P<2>	E8	PCIE_UP_RX2_P
			PCIE_SOC_R2D_N<2>	F8	PCIE_UP_RX2_N
14 OUT	PCIE_SOC_D2R_P<3>	C4216 0.22UF	PCIE_SOC_D2R_C_P<3>	A7	PCIE_UP_TX3_P
14 OUT	PCIE_SOC_D2R_N<3>	C4217 0.22UF	PCIE_SOC_D2R_C_N<3>	B7	PCIE_UP_TX3_N
			PCIE_SOC_R2D_P<3>	D7	PCIE_UP_RX3_P
			PCIE_SOC_R2D_N<3>	E7	PCIE_UP_RX3_N
14 OUT	SOC_CLKREQ_L	R4218 1K	SOC_CLKREQ_R_L	A18	PCIE_UP_CLKREQ*
			PCIE_CLK100M_SOC_P	G12	PCIE_UP_EXT_REFCLK_P
			PCIE_CLK100M_SOC_N	G11	PCIE_UP_EXT_REFCLK_N
			SOC_PCIE_UP_REXT	G10	PCIE_UP_REXT

C4210–C4217: 0.22UF, 20% 6.3V X5R 0201
R4218: 1K, 5% 1/20W MF 201

PLACE_NEAR=U3900.G10:5MM
R4200 3.01K 1% 1/20W MF 201

PCIE_DN_TX0_P	AP28	NC_PCIE_WLAN_R2D_C_P	43
PCIE_DN_TX0_N	AN28	NC_PCIE_WLAN_R2D_C_N	43
PCIE_DN_RX0_P	AL28	NC_PCIE_WLAN_D2R_P	43
PCIE_DN_RX0_N	AK28	NC_PCIE_WLAN_D2R_N	43
PCIE_DN_TX1_P	AN27	NC_PCIE_ENET_R2D_C_P	43
PCIE_DN_TX1_N	AM27	NC_PCIE_ENET_R2D_C_N	43
PCIE_DN_RX1_P	AK27	NC_PCIE_ENET_D2R_P	43
PCIE_DN_RX1_N	AJ27	NC_PCIE_ENET_D2R_N	43
PCIE_DN_TX2_P	AP26	NC_PCIE_DN2_R2D_C_P	43
PCIE_DN_TX2_N	AN26	NC_PCIE_DN2_R2D_C_N	43
PCIE_DN_RX2_P	AL26	NC_PCIE_DN2_D2R_P	43
PCIE_DN_RX2_N	AK26	NC_PCIE_DN2_D2R_N	43
PCIE_DN_TX3_P	AN25	NC_PCIE_DN3_R2D_C_P	43
PCIE_DN_TX3_N	AM25	NC_PCIE_DN3_R2D_C_N	43
PCIE_DN_RX3_P	AK25	NC_PCIE_DN3_D2R_P	43
PCIE_DN_RX3_N	AJ25	NC_PCIE_DN3_D2R_N	43
PCIE_DN_REFCLK0_P	AK23	NC_PCIE_CLK100M_WLAN_P	43
PCIE_DN_REFCLK0_N	AL23	NC_PCIE_CLK100M_WLAN_N	43
PCIE_DN_CLKREQ0*	AG29	NC_WLAN_CLKREQ_L	43
PCIE_DN_PERST0*	AJ33	NC_WLAN_PERST_L	43
PCIE_DN_REFCLK1_P	AJ22	NC_PCIE_CLK100M_ENET_P	43
PCIE_DN_REFCLK1_N	AK22	NC_PCIE_CLK100M_ENET_N	43
PCIE_DN_CLKREQ1*	AG30	ENET_CLKREQ_L	37
PCIE_DN_PERST1*	AG33	NC_ENET_RESET_L	43
PCIE_DN_REFCLK2_P	AN23	NC_PCIE_CLK100M_DN2_P	43
PCIE_DN_REFCLK2_N	AP23	NC_PCIE_CLK100M_DN2_N	43
PCIE_DN_CLKREQ2*	AD29	NC_PCIEDN2_CLKREQ_L	43
PCIE_DN_PERST2*	AH29	NC_PCIEDN2_RESET_L	43
PCIE_DN_REFCLK3_P	AN22	NC_PCIE_CLK100M_DN3_P	43
PCIE_DN_REFCLK3_N	AN22	NC_PCIE_CLK100M_DN3_N	43
PCIE_DN_CLKREQ3*	AF33	NC_PCIEDN3_CLKREQ_L	43
PCIE_DN_PERST3*	AE30	NC_PCIEDN3_RESET_L	43
PCIE_DN_EXT_REFCLK_P	AH25		
PCIE_DN_EXT_REFCLK_N	AH24		
PCIE_DN_REXT	AH23	SOC_PCIE_DN_REXT	

(UID_MODE strap on A00)

PLACE_NEAR=U3900.AH23:5MM
R4201 3.01K 1% 1/20W MF 201

OMIT_TABLE
CRITICAL

U3900
POP-1GB-20NM-M-SCK
FCCSP
TMIB21B0-B7
SYM 8 OF 17
PCIE STG 0/1

77 OUT	PCIE_SSD0_R2D_C_P<0>	AN8	PCIE_STG0_TX0_P	PCIE_STG1_TX0_P	AN13	NC_PCIE_SSD1_R2D_C_P<0>	43
77 OUT	PCIE_SSD0_R2D_C_N<0>	AM8	PCIE_STG0_TX0_N	PCIE_STG1_TX0_N	AM13	NC_PCIE_SSD1_R2D_C_N<0>	43
84 77 IN	PCIE_SSD0_D2R_P<0>	AK8	PCIE_STG0_RX0_P	PCIE_STG1_RX0_P	AK13	NC_PCIE_SSD1_D2R_P<0>	43
84 77 IN	PCIE_SSD0_D2R_N<0>	AJ8	PCIE_STG0_RX0_N	PCIE_STG1_RX0_N	AJ13	NC_PCIE_SSD1_D2R_N<0>	43
78 OUT	PCIE_SSD0_R2D_C_P<1>	AP9	PCIE_STG0_TX1_P	PCIE_STG1_TX1_P	AP14	NC_PCIE_SSD1_R2D_C_P<1>	43
78 OUT	PCIE_SSD0_R2D_C_N<1>	AN9	PCIE_STG0_TX1_N	PCIE_STG1_TX1_N	AN14	NC_PCIE_SSD1_R2D_C_N<1>	43
78 IN	PCIE_SSD0_D2R_P<1>	AL9	PCIE_STG0_RX1_P	PCIE_STG1_RX1_P	AL14	NC_PCIE_SSD1_D2R_P<1>	43
78 IN	PCIE_SSD0_D2R_N<1>	AK9	PCIE_STG0_RX1_N	PCIE_STG1_RX1_N	AK14	NC_PCIE_SSD1_D2R_N<1>	43
79 OUT	PCIE_SSD0_R2D_C_P<2>	AN10	PCIE_STG0_TX2_P	PCIE_STG1_TX2_P	AN15	NC_PCIE_SSD1_R2D_C_P<2>	43
79 OUT	PCIE_SSD0_R2D_C_N<2>	AM10	PCIE_STG0_TX2_N	PCIE_STG1_TX2_N	AM15	NC_PCIE_SSD1_R2D_C_N<2>	43
79 IN	PCIE_SSD0_D2R_P<2>	AK10	PCIE_STG0_RX2_P	PCIE_STG1_RX2_P	AK15	NC_PCIE_SSD1_D2R_P<2>	43
79 IN	PCIE_SSD0_D2R_N<2>	AJ10	PCIE_STG0_RX2_N	PCIE_STG1_RX2_N	AJ15	NC_PCIE_SSD1_D2R_N<2>	43
80 OUT	PCIE_SSD0_R2D_C_P<3>	AP11	PCIE_STG0_TX3_P	PCIE_STG1_TX3_P	AP16	NC_PCIE_SSD1_R2D_C_P<3>	43
80 OUT	PCIE_SSD0_R2D_C_N<3>	AN11	PCIE_STG0_TX3_N	PCIE_STG1_TX3_N	AN16	NC_PCIE_SSD1_R2D_C_N<3>	43
80 IN	PCIE_SSD0_D2R_P<3>	AL11	PCIE_STG0_RX3_P	PCIE_STG1_RX3_P	AL16	NC_PCIE_SSD1_D2R_P<3>	43
80 IN	PCIE_SSD0_D2R_N<3>	AK11	PCIE_STG0_RX3_N	PCIE_STG1_RX3_N	AK16	NC_PCIE_SSD1_D2R_N<3>	43
84 78 77 OUT	PCIE_CLK100M_SSD0_01_P	AK18	PCIE_STG0_REFCLK01_P	PCIE_STG1_REFCLK01_P	AN18	NC_PCIE_CLK100M_SSD1_01_P	43
84 78 77 OUT	PCIE_CLK100M_SSD0_01_N	AL18	PCIE_STG0_REFCLK01_N	PCIE_STG1_REFCLK01_N	AP18	NC_PCIE_CLK100M_SSD1_01_N	43
77 43 IN	SSD0_CLKREQ0_L	AM30	PCIE_STG0_CLKREQ0*	PCIE_STG1_CLKREQ0*	C15	NC_SSD1_CLKREQ0_L	43
78 43 IN	SSD0_CLKREQ1_L	AK30	PCIE_STG0_CLKREQ1*	PCIE_STG1_CLKREQ1*	E15	NC_SSD1_CLKREQ1_L	43
84 80 79 OUT	PCIE_CLK100M_SSD0_23_P	AJ19	PCIE_STG0_REFCLK23_P	PCIE_STG1_REFCLK23_P	AM19	NC_PCIE_CLK100M_SSD1_23_P	43
84 80 79 OUT	PCIE_CLK100M_SSD0_23_N	AK19	PCIE_STG0_REFCLK23_N	PCIE_STG1_REFCLK23_N	AN19	NC_PCIE_CLK100M_SSD1_23_N	43
79 43 IN	SSD0_CLKREQ2_L	AL33	PCIE_STG0_CLKREQ2*	PCIE_STG1_CLKREQ2*	E14	NC_SSD1_CLKREQ2_L	43
80 43 IN	SSD0_CLKREQ3_L	AK33	PCIE_STG0_CLKREQ3*	PCIE_STG1_CLKREQ3*	D14	NC_SSD1_CLKREQ3_L	43
80 79 78 77 43 OUT	SSD0_PCIE_RESET_L	AM32	PCIE_STG0_PERST*	PCIE_STG1_PERST*	AK32	NC_SSD1_PCIE_RESET_L	43
43 OUT	SSD0_CLK24M_R	AM6	PCIE_STG0_NANDCLK	PCIE_STG1_NANDCLK	AM2	NC_SSD1_CLK24M_R	43
		AH12	PCIE_STG0_EXT_REFCLK_P	PCIE_STG1_EXT_REFCLK_P	AH17		
		AH13	PCIE_STG0_EXT_REFCLK_N	PCIE_STG1_EXT_REFCLK_N	AH18		
	SOC_PCIE_STG0_REXT	AH14	PCIE_STG0_REXT	PCIE_STG1_REXT	AH19	SOC_PCIE_STG1_REXT	

PLACE_NEAR=U3900.AH14:5MM
R4250 3.01K 1% 1/20W MF 201

PLACE_NEAR=U3900.AH19:5MM
R4251 3.01K 1% 1/20W MF 201

PP1V8_AWAKE 27 40 42 43 62 70 72 83
R4232 47K 5% 1/20W MF 201
ENET_CLKREQ_L 37

BOM_COST_GROUP=SOC

PAGE TITLE
SOC PCIE

Apple Inc.

DRAWING NUMBER 051-05309
SIZE D
REVISION 5.1.0
BRANCH
PAGE 42 OF 500
SHEET 37 OF 98

Current estimates @ 105C & 2GB from Gibraltar Power Specification Rev 0.5.3

OMIT_TABLE
CRITICAL

U3900
POP-1GB-20NM-M-SCK
FCCSP
TMIB21B0-B7
SYM 10 OF 17

86 83 70 43 PPVDDCPU_AWAKE
0.625V - 1.06V
11.6A Max

C4300 C4301 C4302 C4303 C4304
C4305 C4306 C4307 C4308 C4309
C4320 C4321 C4322 C4323 C4324
C4330 C4331 C4332 C4333 C4334
9.1UF 20% 4V CERM 0402

VDD_CPU: AA12 AA14 AA16 AB11 AB13 AB15 N12 N14 N16 P11 P13 P15 R10 R12 R14 U12 U14 U16 W10 W12 W14 Y11 Y13 Y15

VDD_CPU_SRAM: AA10 N10 R16 T11 T13 T15 U10 V11 V13 V15 W16

C4350 C4351 C4352 C4353 C4354 C4357
C4355 C4356 C4360
9.1UF 20% 4V CERM 0402

PPVDDCPUSRAM_AWAKE
0.8V - 1.06V
0.9A Max

VDD_CPU_SENSE M17 SOC_VDDCPU_SENSE → OUT 72 84
VSS_CPU_SENSE M16 NC_SOC_VSSCPU_SENSE

OMIT_TABLE
CRITICAL

U3900
POP-1GB-20NM-M-SCK
FCCSP
TMIB21B0-B7
SYM 11 OF 17

86 83 70 43 PP0V82_SLPDDR
5.6A Max

C4370 C4371 C4372 C4373
C4380 C4381
C4385 C4386
9.1UF 20% 4V CERM 0402

VDD_SOC: AC10 AC12 AC14 AC16 AC18 AC20 AC22 AC24 AD11 AD13 AD15 AD17 AD19 AD21 AD23 AD25 L10 L12 L14 L16 L18 L20 L22 L24 M11 M13 M15 M19 M21 M23 M25

VDD_SOC: R18 R20 R22 R24 T19 T21 T23 T25 W18 W20 W22 W24 Y17 Y19 Y21 Y23

VDD_SOC_SENSE Y25 NC_SOC_VDDSOC_SENSE
VSS_SENSE Y26 NC_SOC_VSSSOC_SENSE

BOM_COST_GROUP=SOC

PAGE TITLE: SOC POWER 1

Apple Inc.

DRAWING NUMBER: 051-05309
SIZE: D
REVISION: 5.1.0
BRANCH:
PAGE: 43 OF 500
SHEET: 38 OF 98

Current estimates @ 105C & 2GB from Gibraltar Power Specification Rev 0.5.3

OMIT_TABLE
CRITICAL

U3900
POP-1GB-20NM-M-SCK
FCCSP
TMIB21B0-B7
13 OF 17

83 71 40 39 34 PP1V1_SLPDDR
0.86A Max

C4450 2.2UF 20% 4V X6S-CERM 0201
C4451 2.2UF 20% 4V X6S-CERM 0201
C4452 2.2UF 20% 4V X6S-CERM 0201
C4453 2.2UF 20% 4V X6S-CERM 0201
C4454 2.2UF 20% 4V X6S-CERM 0201
C4455 2.2UF 20% 4V X6S-CERM 0201
C4456 2.2UF 20% 4V X6S-CERM 0201
C4457 2.2UF 20% 4V X6S-CERM 0201

C3 E3 G3 H8 J9 K8 L9 P3 R3 U3 — VDDIO11_DDR0
C33 E31 G31 H27 J26 K27 L26 P31 R31 U31 — VDDIO11_DDR1
AB3 AC9 AD3 AD8 AE3 AE9 AF8 AK3 AM3 — VDDIO11_DDR2
AA27 AB26 AB31 AC27 AD26 AD31 AE27 AE31 AK31 AM31 — VDDIO11_DDR3

VDDIO11_PLL_DDR0 H9
VDDIO11_PLL_DDR1 G26
VDDIO11_PLL_DDR2 AG8
VDDIO11_PLL_DDR3 AF26

C4460 0.22UF 20% 6.3V X6S-CERM 0201
C4461 0.22UF 20% 6.3V X6S-CERM 0201
C4462 0.22UF 20% 6.3V X6S-CERM 0201
C4463 0.22UF 20% 6.3V X6S-CERM 0201

R4460 5.1 1% 1/20W MF 0201
FL4400 120-OHM-25%-0.48A-0.21DCR 0201

83 71 40 39 34 PP1V1_SLPDDR
8mA Max

PP1V1_SLPDDR_SOC_VDDIOPLLDDR_F
MIN_LINE_WIDTH=0.2000
MIN_NECK_WIDTH=0.1000
VOLTAGE=1.1V

VDDIO11_RET_DDR0 G4
VDDIO11_RET_DDR1 D30
VDDIO11_RET_DDR2 AJ4
VDDIO11_RET_DDR3 AJ30

C4470 2.2UF 20% 4V X6S-CERM 0201
C4471 2.2UF 20% 4V X6S-CERM 0201
C4472 2.2UF 20% 4V X6S-CERM 0201
C4473 2.2UF 20% 4V X6S-CERM 0201

PP1V1_SLPS2R
40 70 71 83 86
Current included in VDD2

86 83 70 43 39 PP0V9_SLPDDR
1.9A Max

C4400 9.1UF 20% 4V CERM 0402
C4401 9.1UF 20% 4V CERM 0402
C4402 9.1UF 20% 4V CERM 0402
C4405 9.1UF 20% 4V CERM 0402
C4406 9.1UF 20% 4V CERM 0402
C4410 9.1UF 20% 4V CERM 0402
C4411 9.1UF 20% 4V CERM 0402

OMIT_TABLE
CRITICAL

U3900
POP-1GB-20NM-M-SCK
FCCSP
TMIB21B0-B7
SYM 12 OF 17

AA18 AA20 AA22 AA24 AB17 AB19 AB21 AB23 AB25 AE10 AE12 AE14 AE16 AE18 AE20 AE22 AE24 AE26 AG9 J10 J12 J14 J16 J18 J20 J22 J24 K11 K13 K15 K17 K19 — VDD_FIXED

K21 K23 K25 N18 N20 N22 N24 P17 P19 P21 P23 P25 U18 U20 U22 U24 V19 V21 V23 V25 — VDD_FIXED

9mA Max
86 83 70 43 39 PP0V9_SLPDDR — U17 — VDD_FIXED_CPU

86 83 70 43 39 PP0V9_SLPDDR — G19 — VDD_FIXED_USB
5mA Max

86 83 70 43 39 PP0V9_SLPDDR
25mA Max

C4420 4.3UF 20% 4V CERM 0402

H20 H22 H24 — VDD_FIXED_MIPI

M9 P9 T9 V9 Y9 — VDD_LOW

83 71 PP0V8_SLPS2R
102mA Max

C4423 2.2UF 20% 4V X6S-CERM 0201

H10 H12 H14 — VDD_FIXED_UP_PCIE_ANA

86 83 70 43 39 PP0V9_SLPDDR
330mA Max

C4425 4.3UF 20% 4V CERM 0402
C4426 4.3UF 20% 4V CERM 0402

H13 J11 J13 — VDD_FIXED_UP_PCIE_CLK

VDD_FIXED_STG0_PCIE_ANA AG11 AG12 AG14
VDD_FIXED_STG0_PCIE_CLK AF11 AF13 AF15
VDD_FIXED_STG1_PCIE_ANA AG16 AG18 AG20
VDD_FIXED_STG1_PCIE_CLK AF17 AF19 AG15
VDD_FIXED_DN_PCIE_ANA AG23 AG24 AG26
VDD_FIXED_DN_PCIE_CLK AF23 AF24 AF25
VDD_FIXED_PCIE_REFBUF AE13 AE19 AE23 AF21 AG22

PP0V9_SLPDDR
39 43 70 83 86
330mA Max

C4430 4.3UF 20% 4V CERM 0402
C4431 4.3UF 20% 4V CERM 0402

PP0V9_SLPDDR
39 43 70 83 86
330mA Max

C4435 4.3UF 20% 4V CERM 0402
C4436 4.3UF 20% 4V CERM 0402

PP0V9_SLPDDR
39 43 70 83 86
330mA Max

C4440 4.3UF 20% 4V CERM 0402
C4441 4.3UF 20% 4V CERM 0402

PP0V9_SLPDDR_SOC_PCIEREFBUF
MIN_LINE_WIDTH=0.2000
MIN_NECK_WIDTH=0.1000
VOLTAGE=0.9V

C4445 4.3UF 20% 4V CERM 0402

R4445 0 5% 1/20W MF 0201

PP0V9_SLPDDR
39 43 70 83 86
45mA Max

BOM_COST_GROUP=SOC

PAGE TITLE
SOC POWER 2

Apple Inc.

DRAWING NUMBER 051-05309
SIZE D
REVISION 5.1.0
BRANCH
PAGE 44 OF 500
SHEET 39 OF 98

Current estimates @ 105C & 2GB from Gibraltar Power Specification Rev 0.5.3

OMIT_TABLE
CRITICAL

U3900
POP-1GB-20NM-M-SCK
FCCSP
TMIB2180-B7
SYM 14 OF 17

PP1V8_SLPS2R
134mA Max
C4500 2.2UF 20% 4V X6S-CERM 0201
C4501 2.2UF 20% 4V X6S-CERM 0201
C4502 2.2UF 20% 4V X6S-CERM 0201
C4503 2.2UF 20% 4V X6S-CERM 0201
VDD1

PP1V8_SLPS2R
20mA Max
C4510 2.2UF 20% 4V X6S-CERM 0201
C4511 9.1UF 20% 4V CERM 0402
C4512 9.1UF 20% 4V CERM 0402
C4513 0.1UF 10% 6.3V X6S 0201
VDDIO18_AOP1
VDDIO18_AOP2

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

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
VDD18_LPOSC

C4519 2.2UF 20% 4V X6S-CERM 0201
C4515 20UF 20% 2.5V X6S-CERM 0402
VDDIO18_GRP1

PP1V8_AWAKE
40mA Max
C4521 2.2UF 20% 4V X6S-CERM 0201
C4522 2.2UF 20% 4V X6S-CERM 0201
C4523 2.2UF 20% 4V X6S-CERM 0201
C4524 9.1UF 20% 4V CERM 0402
C4525 9.1UF 20% 4V CERM 0402
C4526 9.1UF 20% 4V CERM 0402
C4527 9.1UF 20% 4V CERM 0402
VDDIO18_GRP2

VDDIO18_GRP3
VDDIO18_GRP4

PP1V8_AWAKE
2MA MAX
R4530 0 5% 1/20W MF 0201
PP1V8_AWAKE_SOC_TSADC_RC
VOLTAGE=1.8V
MIN_LINE_WIDTH=0.2000
MIN_NECK_WIDTH=0.1000
C4530 1UF 20% 6.3V X6S-CERM 0201
VDD18_TSADC

PP1V8_AWAKE
7mA Max
C4535 2.2UF 20% 4V X6S-CERM 0201
C4536 0.1UF 10% 6.3V X6S 0201
VDDIO18_MIPI

PP1V8_AWAKE
20mA Max
C4540 0.1UF 10% 6.3V X6S 0201
VDD18_USB

PP1V8_AWAKE
1mA Max
R4545 49.9 1% 1/20W MF 201
PP1V8_AWAKE_SOC_FMON_RC
VOLTAGE=1.8V
MIN_LINE_WIDTH=0.2000
MIN_NECK_WIDTH=0.1000
C4545 1UF 20% 6.3V X6S-CERM 0201
VDD18_FMON
VDDIO18_EFUSE1
VDDIO18_EFUSE2

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

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

VDD12_PLL_CPU
PP1V2_AWAKE_SOC_PLLCPU_F
R4560 0 5% 1/20W MF 0201
PP1V2_AWAKE
80mA Max
C4560 0.1UF 10% 6.3V X6S 0201
C4561 0.1UF 10% 6.3V X6S 0201
C4562 2.2UF 20% 4V X6S-CERM 0201

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

VDD12_DN_PCIE
VDD12_UP_PCIE
VDD12_STG0_PCIE
VDD12_STG1_PCIE
PP1V2_AWAKE_SOC_PCIEPLL_F
VOLTAGE=1.2V
MIN_LINE_WIDTH=0.2000
MIN_NECK_WIDTH=0.1000
C4565 2.2UF 20% 4V X6S-CERM 0201
C4566 2.2UF 20% 4V X6S-CERM 0201
C4567 2.2UF 20% 4V X6S-CERM 0201
C4568 2.2UF 20% 4V X6S-CERM 0201

R4565 0 5% 1/20W MF 0201
PP1V2_AWAKE
60mA Max

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

VDD12_PLL_SOC
PP1V2_AWAKE_SOC_PLLSOC_F
VOLTAGE=1.2V
MIN_LINE_WIDTH=0.2000
MIN_NECK_WIDTH=0.1000

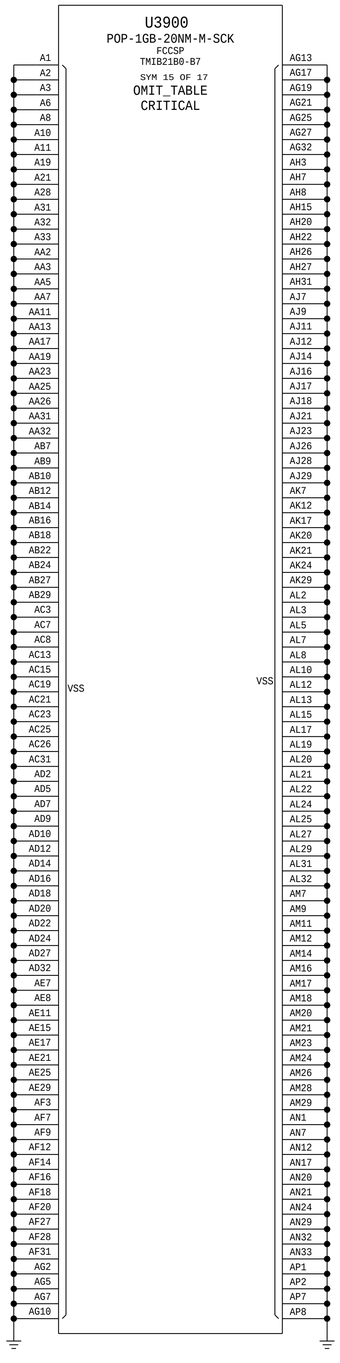
PP1V1_SLPS2R
1.74A Max
VDD2
C4580 2.2UF 20% 4V X6S-CERM 0201
C4581 2.2UF 20% 4V X6S-CERM 0201
C4582 2.2UF 20% 4V X6S-CERM 0201
C4583 2.2UF 20% 4V X6S-CERM 0201

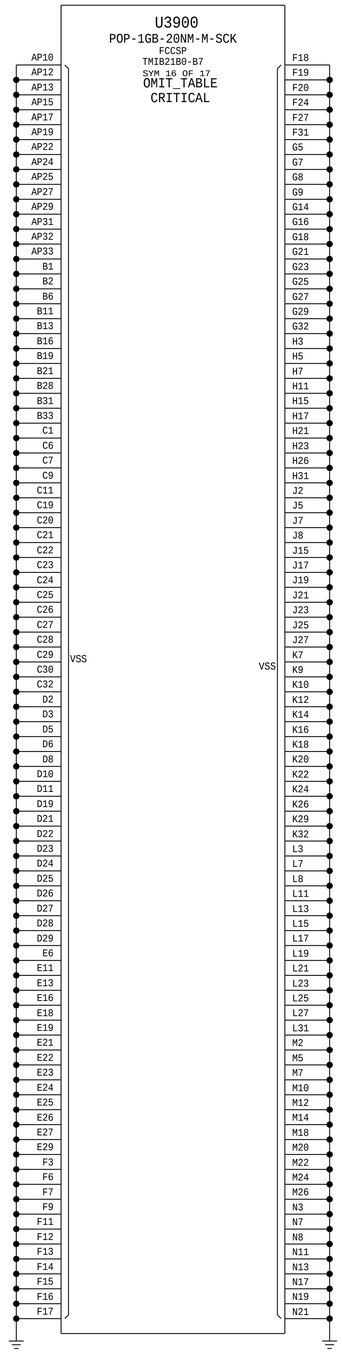
R4590 5.1 1% 1/20W MF 0201
L4590 FERR-2400HM-25%-350MA 0201
VDD11_XTAL
PP1V1_SLPDDR_SOC_XTAL_F
VOLTAGE=1.1V
MIN_LINE_WIDTH=0.2000
MIN_NECK_WIDTH=0.1000
PP1V1_SLPDDR
4mA Max
C4590 0.1UF 10% 6.3V X6S 0201
C4591 2.2UF 20% 4V X6S-CERM 0201

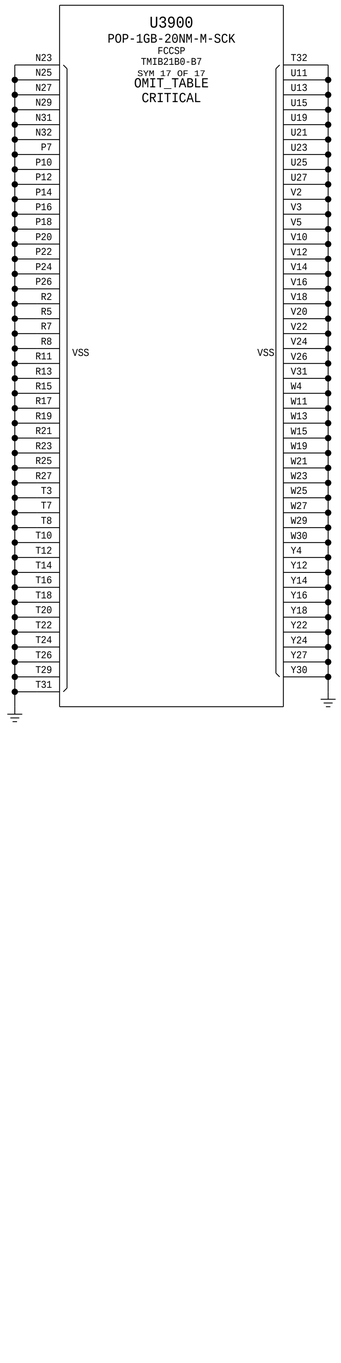
VDD33_USB
PP3V3_AWAKE
12mA Max
C4595 0.1UF 10% 6.3V X6S 0201

BOM_COST_GROUP=SOC

PAGE TITLE	SOC POWER 3
Apple Inc.	
DRAWING NUMBER	051-05309
SIZE	D
REVISION	5.1.0
BRANCH	
PAGE	45 OF 500
SHEET	40 OF 98







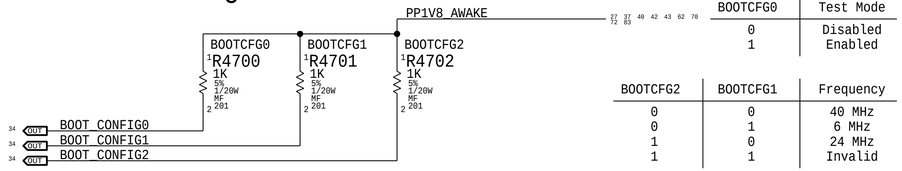
BOM_COST_GROUP=SOC

PAGE TITLE
SOC GROUND

Apple Inc.

DRAWING NUMBER 051-05309
SIZE D
REVISION 5.1.0
BRANCH
PAGE 46 OF 500
SHEET 41 OF 98

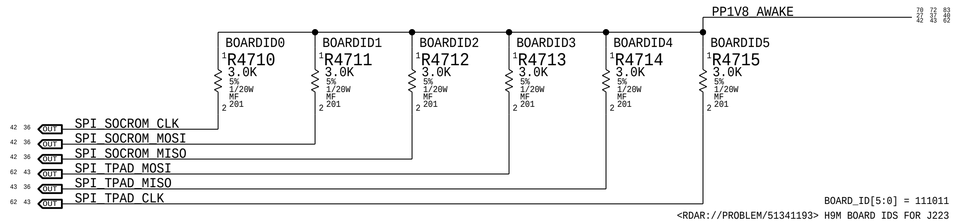
Boot Config



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

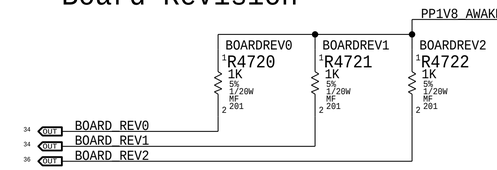
Board ID



BOARD_ID[5:0] = 111011

<RDAR://PROBLEM/51341193> H9M BOARD IDS FOR J223

Board Revision

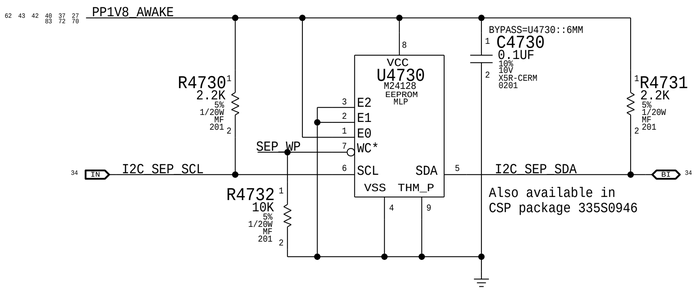


BUILD	BOARDREV <2>	<1>	<0>
PROTO 0	0	0	0
PROTO 0	0	0	1
PROTO 1A	0	1	0
PROTO 1B	0	1	1
EVT	1	0	0
PVT	1	0	1

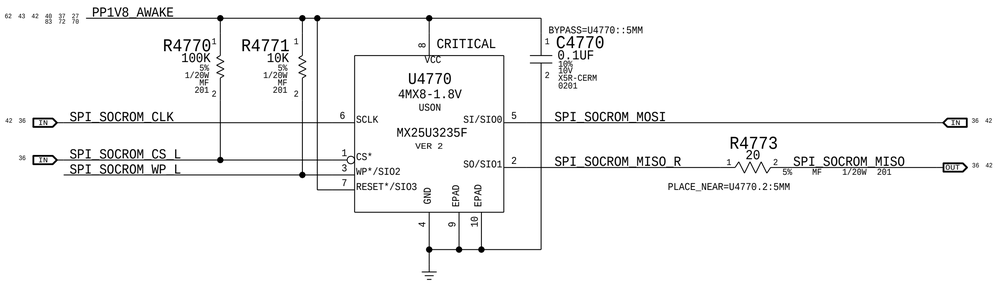
0=NO_STUFF, 1=STUFF

SEP EEPROM

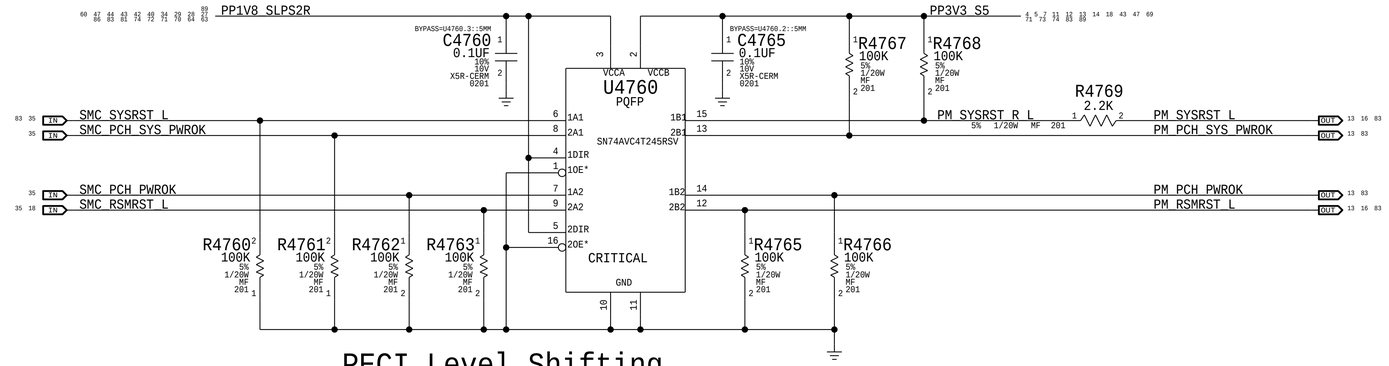
(Write: 0xA2, Read 0xA3)



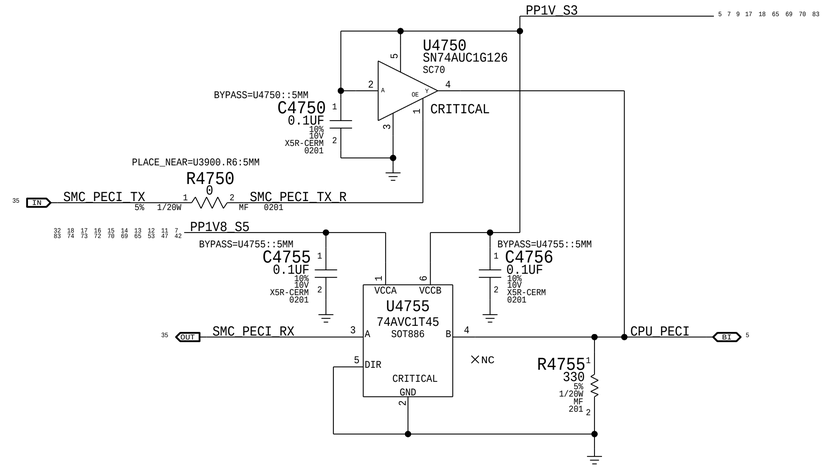
SoC ROM



PCH PM Level Shifting

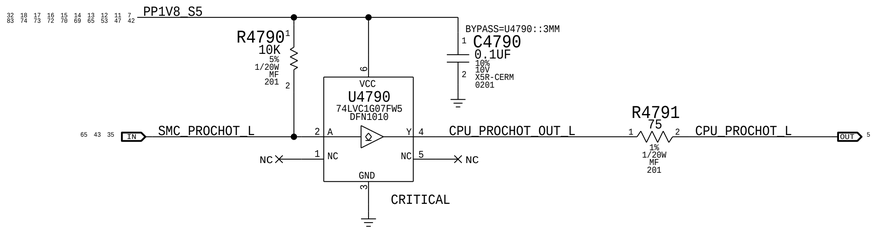


PECI Level Shifting



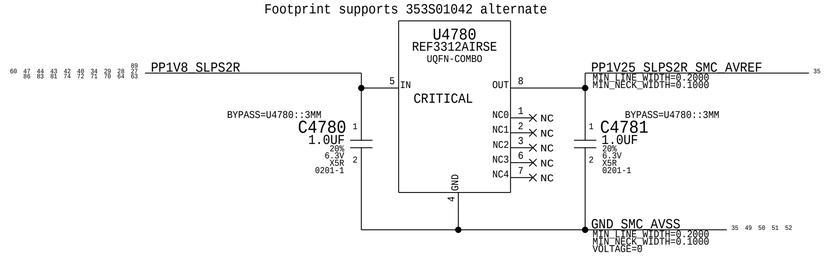
PROCHOT# Level Shifting

rdar://problem/34583713



SMC AVREF Supply

Footprint supports 353S01042 alternate



BOM_COST_GROUP=SOC

PAGE TITLE: SOC SHARED SUPPORT

Apple Inc.

DRAWING NUMBER: 051-05309 | SIZE: D

REVISION: 5.1.0

BRANCH:

PAGE: 47 OF 500

SHEET: 42 OF 98

PCIe Up R2D AC Caps

C4820	0.22UF	20%	6.3V	X5R	0201	PCIE_SOC_R2D_C_P<0>	PCIE_SOC_R2D_C_P<0>	OUT	37
C4821	0.22UF	20%	6.3V	X5R	0201	PCIE_SOC_R2D_C_N<0>	PCIE_SOC_R2D_C_N<0>	OUT	37
C4822	0.22UF	20%	6.3V	X5R	0201	PCIE_SOC_R2D_C_P<1>	PCIE_SOC_R2D_C_P<1>	OUT	37
C4823	0.22UF	20%	6.3V	X5R	0201	PCIE_SOC_R2D_C_N<1>	PCIE_SOC_R2D_C_N<1>	OUT	37
C4824	0.22UF	20%	6.3V	X5R	0201	PCIE_SOC_R2D_C_P<2>	PCIE_SOC_R2D_C_P<2>	OUT	37
C4825	0.22UF	20%	6.3V	X5R	0201	PCIE_SOC_R2D_C_N<2>	PCIE_SOC_R2D_C_N<2>	OUT	37
C4826	0.22UF	20%	6.3V	X5R	0201	PCIE_SOC_R2D_C_P<3>	PCIE_SOC_R2D_C_P<3>	OUT	37
C4827	0.22UF	20%	6.3V	X5R	0201	PCIE_SOC_R2D_C_N<3>	PCIE_SOC_R2D_C_N<3>	OUT	37

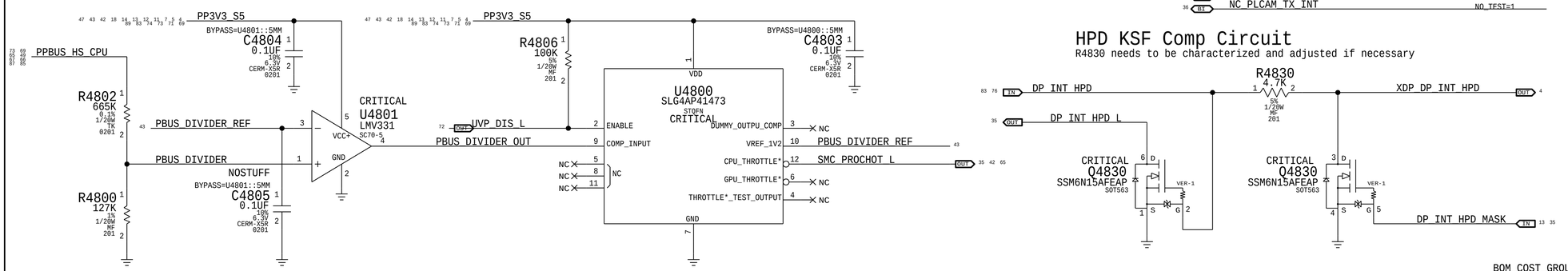
GPIO Source Termination

I2S_SPKRAMP_L_R2D_R	R4843	20	PLACE_NEAR=U3900.AC32:5MM	5% 1/20W MF 201	I2S_SPKRAMP_L_R2D	OUT	58
I2S_SPKRAMP_L_BCLK_R	R4844	20	PLACE_NEAR=U3900.Y29:5MM	5% 1/20W MF 201	I2S_SPKRAMP_L_BCLK	OUT	58
I2S_SPKRAMP_L_LRCLK_R	R4863	20	PLACE_NEAR=U3900.AE32:5MM	5% 1/20W MF 201	I2S_SPKRAMP_L_LRCLK	IN	36
I2S_SPKRAMP_R_R2D_R	R4845	20	PLACE_NEAR=U3900.E17:5MM	5% 1/20W MF 201	I2S_SPKRAMP_R_R2D	OUT	59
I2S_SPKRAMP_R_BCLK_R	R4846	20	PLACE_NEAR=U3900.D17:5MM	5% 1/20W MF 201	I2S_SPKRAMP_R_BCLK	OUT	59
I2S_SPKRAMP_R_LRCLK_R	R4864	20	PLACE_NEAR=U3900.B18:5MM	5% 1/20W MF 201	I2S_SPKRAMP_R_LRCLK	IN	36
I2S_CODEC_R2D_R	R4847	20	PLACE_NEAR=U3900.AA33:5MM	5% 1/20W MF 201	I2S_CODEC_R2D	OUT	57
I2S_CODEC_BCLK_R	R4848	20	PLACE_NEAR=U3900.AE33:5MM	5% 1/20W MF 201	I2S_CODEC_BCLK	OUT	57
I2S_CODEC_LRCLK_R	R4865	20	PLACE_NEAR=U3900.V29:5MM	5% 1/20W MF 201	I2S_CODEC_LRCLK	IN	36
SPI_TPAD_MOSI_R	R4851	20	PLACE_NEAR=U3900.J30:5MM	5% 1/20W MF 201	SPI_TPAD_MOSI	OUT	42 62
SPI_TPAD_CLK_R	R4852	20	PLACE_NEAR=U3900.K33:5MM	5% 1/20W MF 201	SPI_TPAD_CLK	OUT	42 62
SPI_TPAD_MISO_R	R4867	20	PLACE_NEAR=U8860.4:2MM	5% 1/20W MF 201	SPI_TPAD_MISO	OUT	36 42
SPI_MESA_MOSI_R	R4853	20	PLACE_NEAR=U3900.A20:5MM	5% 1/20W MF 201	SPI_MESA_MOSI	OUT	44
SPI_MESA_CLK_R	R4854	20	PLACE_NEAR=U3900.D16:5MM	5% 1/20W MF 201	SPI_MESA_CLK	OUT	44
SPI_DFR_MISO_R	R4866	20	PLACE_NEAR=J5100.7:7MM	5% 1/20W MF 201	SPI_DFR_MISO	OUT	36
SPI_DFR_MOSI_R	R4855	20	PLACE_NEAR=U3900.C17:5MM	5% 1/20W MF 201	SPI_DFR_MOSI	OUT	46 83
SPI_DFR_CLK_R	R4856	20	PLACE_NEAR=U3900.C16:5MM	5% 1/20W MF 201	SPI_DFR_CLK	OUT	46 83
SSD0_CLK24M_R	R4857	0	PLACE_NEAR=U3900.AM6:7MM	5% 1/20W MF 0201	SSD0_CLK24M	OUT	43 77 79
PDM_DMIC_CLK0_R	R4859	20	PLACE_NEAR=U3900.N6:5MM	5% 1/20W MF 201	PDM_DMIC_CLK0	OUT	60 83
PDM_DMIC_CLK1_R	R4860	20	PLACE_NEAR=U3900.J6:5MM	5% 1/20W MF 201	PDM_DMIC_CLK1	OUT	60 83
SPI_AOP_SENSOR_MOSI_R	R4861	20	PLACE_NEAR=U3900.A5:5MM	5% 1/20W MF 201	SPI_AOP_SENSOR_MOSI		43
SPI_AOP_SENSOR_CLK_R	R4862	20	PLACE_NEAR=U3900.E5:5MM	5% 1/20W MF 201	SPI_AOP_SENSOR_CLK		43
SPI_AOP_SENSOR_MISO_R	R4869	20	PLACE_NEAR=U4870.3:5MM	5% 1/20W MF 201	SPI_AOP_SENSOR_MISO	OUT	35 43 84

Remote Feedback Sense (Buck 0, 2 & 5)

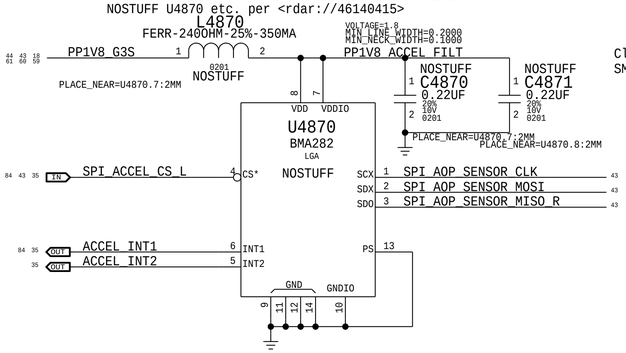
XW4820 SM	PLACE_NEAR=U3900.AA12:5MM	PPVDDCPU_AWAKE	R4820	0	NOSTUFF	PLACE_NEAR=R7806.1:1MM	PVDDCPUAWAKE_FB	OUT	70
XW4821 SM	PLACE_NEAR=U3900.M25:5MM	PP0V82_SLPDDR	R4821	0		PLACE_NEAR=R7812.1:1MM	P0V8SLPDDR_FB	OUT	70
XW4822 SM	PLACE_NEAR=U3900.AE22:5MM	PP0V9_SLPDDR	R4822	0		PLACE_NEAR=R7816.1:1MM	P0V9SLPDDR_FB	OUT	70

Droop Circuit



Triaxial acceleration sensor

NOSTUFF U4870 etc. per <rdar://46140415>



Project Specific Pull-Ups

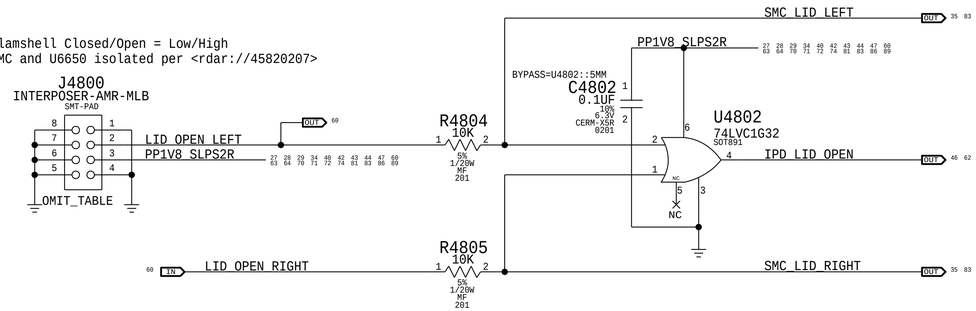
PP1V8_SLPS2R	R4895	100K	5% 1/20W MF 201	SSD_PMU_RESET_L		34 81 83
PP1V8_AWAKE	R4883	47K	5% 1/20W MF 201	SSD0_CLKREQ0_L		37 77
	R4884	47K	5% 1/20W MF 201	SSD0_CLKREQ1_L		37 78
	R4887	47K	5% 1/20W MF 201	SSD0_CLKREQ2_L		37 79
	R4888	47K	5% 1/20W MF 201	SSD0_CLKREQ3_L		37 80
PP1V8_G3S	R4871	100K	5% 1/20W MF 201	SPI_ACCEL_CS_L		35 43 84
	R4872	100K	5% 1/20W MF 201	SPI_AOP_SENSOR_CLK		43
	R4873	100K	5% 1/20W MF 201	SPI_AOP_SENSOR_MOSI		43
	R4874	100K	5% 1/20W MF 201	SPI_AOP_SENSOR_MISO		35 43 84
	R4875	100K	5% 1/20W MF 201	UART_WLAN_D2R		32 36
	R4876	100K	5% 1/20W MF 201	UART_WLAN_D2R_CTS_L		32 36
	R4885	100K	5% 1/20W MF 201	SSD0_PCIE_RESET_L		37 77 78 79 80
	R4886	47K	5% 1/20W MF 201	SSD0_CLK24M		43 77 79
	R4870	47K	5% 1/20W MF 201	PLACE_NEAR=R4857.1:1MM I2S_SPKRAMP_R_D2R		36

SoC Test Points

TP_SOC_AMUXOUT	PP4801	SM-SP
TP_SOC_TST_CLKOUT	PP4802	SM-SP

Lid Detect Sensors

Clamshell Closed/Open = Low/High
SMC and U6650 isolated per <rdar://45820207>



Unused SOC Signals

NC_PLCAM_TX_THROTTLE	NO_TEST=1	
NC_GNSS_HOST_TIME	NO_TEST=1	
NC_GNSS_DEV_WAKE	NO_TEST=1	
NC_SOC_WLAN_DEV_WAKE	NO_TEST=1	
NC_SOC_USB_ID	NO_TEST=1	
NC_ALTIMETER_INT	NO_TEST=1	
NC_SPI_ALTIMETER_CS_L	NO_TEST=1	
NC_I2C_AOP_SCL	NO_TEST=1	
NC_I2C_AOP_SDA	NO_TEST=1	
NC_UART_BT_D2R	NO_TEST=1	
NC_UART_BT_R2D	NO_TEST=1	
NC_UART_BT_D2R_CTS_L	NO_TEST=1	
NC_UART_BT_R2D_RTS_L	NO_TEST=1	
NC_UART_GNSS_D2R_CTS_L	NO_TEST=1	
NC_UART_GNSS_R2D_RTS_L	NO_TEST=1	
NC_PLCAM_PROX_INT_L	NO_TEST=1	
NC_PLCAM_ROMEO_B2B_DETECT	NO_TEST=1	
NC_SMC_GFX_SELF_THROTTLE	NO_TEST=1	
NC_SMC_TOPBLK_SWP_L	NO_TEST=1	
NC_PCIEDN_WAKE_L	NO_TEST=1	
NC_ENET_LOW_PWR	NO_TEST=1	
NC_SDCONN_STATE_CHANGE_L	NO_TEST=1	
NC_ENET_MEDIA_SENSE	NO_TEST=1	
NC_SOC_WLAN_JTAG_TMS	NO_TEST=1	
NC_MESA_MENUKEY_L	NO_TEST=1	
NC_SOC_WLAN_JTAG_TCK	NO_TEST=1	
NC_PCC_EVENT	NO_TEST=1	
NC_TPAD_VIBE_L	NO_TEST=1	
NC_SPI_DESCRIPTOR_OVERRIDE_L	NO_TEST=1	
NC_DISP_GCON_INT_L	NO_TEST=1	
NC_PCH_GCON_INT_L	NO_TEST=1	
NC_SMC_FAN_1_PWM	NO_TEST=1	
NC_SMC_FAN_1_TACH	NO_TEST=1	
NC_SMC_LED_ONEWIRE	NO_TEST=1	
NC_SSD1_SWCLK_UART_R2D	NO_TEST=1	
NC_SSD1_SWDIO_UART_D2R	NO_TEST=1	
NC_I2C_SOC_5_SDA	NO_TEST=1	
NC_I2C_SOC_5_SCL	NO_TEST=1	
NC_DFR_TOUCH_RSVD	NO_TEST=1	
NC_PCHROM_SW_EN	NO_TEST=1	
NC_I2S_CODEC_MCLK	NO_TEST=1	
NC_I2S_HAWKING_D2R	NO_TEST=1	
NC_I2S_CODEC1_R2D_R	NO_TEST=1	
NC_I2S_HAWKING_BCLK_R	NO_TEST=1	
NC_I2S_HAWKING_LRCLK	NO_TEST=1	
NC_I2S_CODEC1_MCLK	NO_TEST=1	
NC_I2C_PLCAM_SDA	NO_TEST=1	
NC_I2C_PLCAM_SCL	NO_TEST=1	
NC_FTCAM_CLK12M_R	NO_TEST=1	
NC_FTCAM_RESET_L	NO_TEST=1	
NC_PLCAM_RX_CLK12M_R	NO_TEST=1	
NC_PLCAM_RX_RESET_L	NO_TEST=1	
NC_PLCAM_TX_CLK12M_R	NO_TEST=1	
NC_PLCAM_TX_RESET_L	NO_TEST=1	
NC_PLCAM_TX_INT	NO_TEST=1	

NC_PCIE_WLAN_R2D_C_P	NO_TEST=1	
NC_PCIE_WLAN_R2D_C_N	NO_TEST=1	
NC_PCIE_WLAN_D2R_P	NO_TEST=1	
NC_PCIE_WLAN_D2R_N	NO_TEST=1	
NC_PCIE_ENET_R2D_C_P	NO_TEST=1	
NC_PCIE_ENET_R2D_C_N	NO_TEST=1	
NC_PCIE_ENET_D2R_P	NO_TEST=1	
NC_PCIE_ENET_D2R_N	NO_TEST=1	
NC_PCIE_DN2_R2D_C_P	NO_TEST=1	
NC_PCIE_DN2_R2D_C_N	NO_TEST=1	
NC_PCIE_DN2_D2R_P	NO_TEST=1	
NC_PCIE_DN2_D2R_N	NO_TEST=1	
NC_PCIE_DN3_R2D_C_P	NO_TEST=1	
NC_PCIE_DN3_R2D_C_N	NO_TEST=1	
NC_PCIE_DN3_D2R_P	NO_TEST=1	
NC_PCIE_DN3_D2R_N	NO_TEST=1	
NC_PCIE_CLK100M_WLAN_P	NO_TEST=1	
NC_PCIE_CLK100M_WLAN_N	NO_TEST=1	
NC_WLAN_CLKREQ_L	NO_TEST=1	
NC_WLAN_PERST_L	NO_TEST=1	
NC_PCIE_CLK100M_ENET_P	NO_TEST=1	
NC_PCIE_CLK100M_ENET_N	NO_TEST=1	
NC_ENET_RESET_L	NO_TEST=1	
NC_PCIE_CLK100M_DN2_P	NO_TEST=1	
NC_PCIE_CLK100M_DN2_N	NO_TEST=1	
NC_PCIEDN2_CLKREQ_L	NO_TEST=1	
NC_PCIEDN2_RESET_L	NO_TEST=1	
NC_PCIE_CLK100M_DN3_P	NO_TEST=1	
NC_PCIE_CLK100M_DN3_N	NO_TEST=1	
NC_PCIEDN3_CLKREQ_L	NO_TEST=1	
NC_PCIEDN3_RESET_L	NO_TEST=1	
NC_PCIE_SSD1_R2D_C_P<0>	NO_TEST=1	
NC_PCIE_SSD1_R2D_C_N<0>	NO_TEST=1	
NC_PCIE_SSD1_D2R_P<0>	NO_TEST=1	
NC_PCIE_SSD1_D2R_N<0>	NO_TEST=1	
NC_PCIE_SSD1_R2D_C_P<1>	NO_TEST=1	
NC_PCIE_SSD1_R2D_C_N<1>	NO_TEST=1	
NC_PCIE_SSD1_D2R_P<1>	NO_TEST=1	
NC_PCIE_SSD1_D2R_N<1>	NO_TEST=1	
NC_PCIE_SSD1_R2D_C_P<2>	NO_TEST=1	
NC_PCIE_SSD1_R2D_C_N<2>	NO_TEST=1	
NC_PCIE_SSD1_D2R_P<2>	NO_TEST=1	
NC_PCIE_SSD1_D2R_N<2>	NO_TEST=1	
NC_PCIE_SSD1_R2D_C_P<3>	NO_TEST=1	
NC_PCIE_SSD1_R2D_C_N<3>	NO_TEST=1	
NC_PCIE_SSD1_D2R_P<3>	NO_TEST=1	
NC_PCIE_SSD1_D2R_N<3>	NO_TEST=1	
NC_PCIE_CLK100M_SSD1_01_P	NO_TEST=1	
NC_PCIE_CLK100M_SSD1_01_N	NO_TEST=1	
NC_SSD1_CLKREQ0_L	NO_TEST=1	
NC_SSD1_CLKREQ1_L	NO_TEST=1	
NC_PCIE_CLK100M_SSD1_23_P	NO_TEST=1	
NC_PCIE_CLK100M_SSD1_23_N	NO_TEST=1	
NC_SSD1_CLKREQ2_L	NO_TEST=1	
NC_SSD1_CLKREQ3_L	NO_TEST=1	
NC_SSD1_PCIE_RESET_L	NO_TEST=1	
NC_SSD1_CLK24M_R	NO_TEST=1	
NC_WLAN_CONTEXT_A	NO_TEST=1	
NC_WLAN_CONTEXT_B	NO_TEST=1	

HPD KSF Comp Circuit

R4830 needs to be characterized and adjusted if necessary

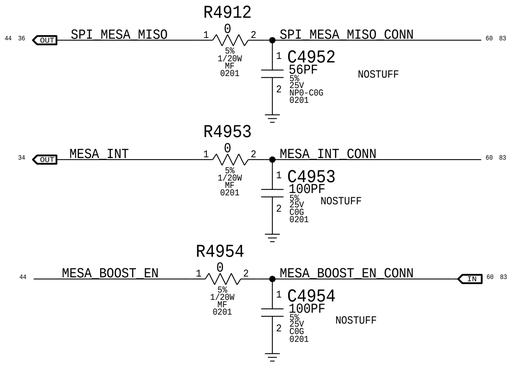
BOM_COST_GROUP=SOC

PAGE TITLE	SOC PROJECT SUPPORT
	Apple Inc.
DRAWING NUMBER	051-05309
SIZE	D
REVISION	5.1.0
BRANCH	
PAGE	48 OF 500
SHEET	43 OF 98

T151 FLEX CONNECTOR

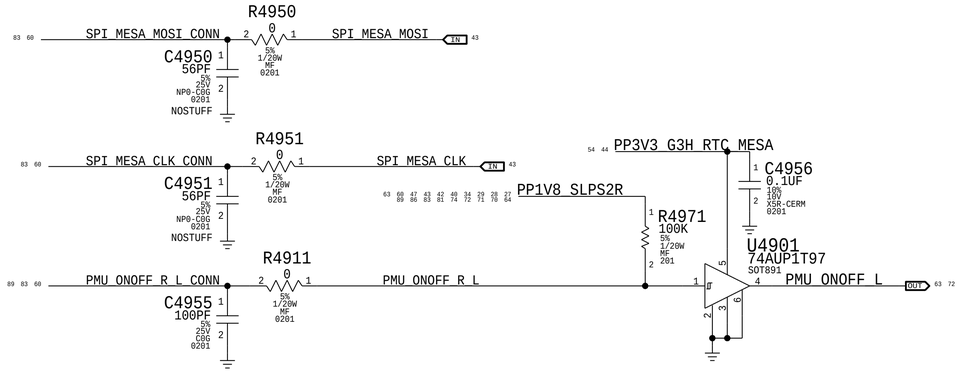
ISOLATE FROM OTHER COMPONENTS/NETS AS MUCH AS POSSIBLE

ESD Filters



ISOLATE FROM OTHER COMPONENTS/NETS AS MUCH AS POSSIBLE

ESD Filters

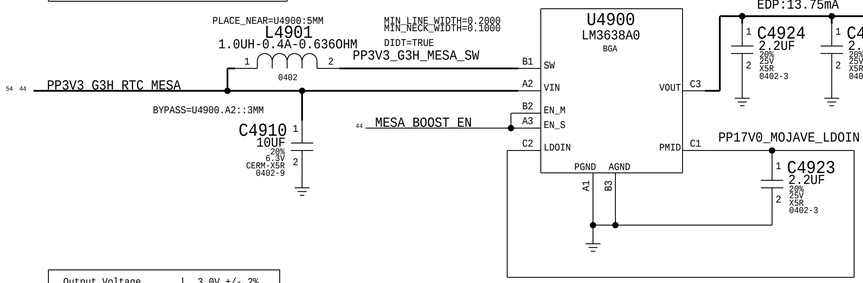


Mesa Power Sequencing Requirements

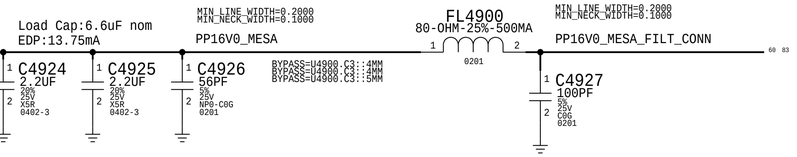
Power On: 1V8 -> 3V3 -> 16V0

Output Voltage	16.0V +/- 2%
Iout (max avg)	6mA
OCP (min)	13 mA
Active Discharge	15 mA sink
Max Output Cap	0.5uF @ 16V

MOJAVE 16V BOOST

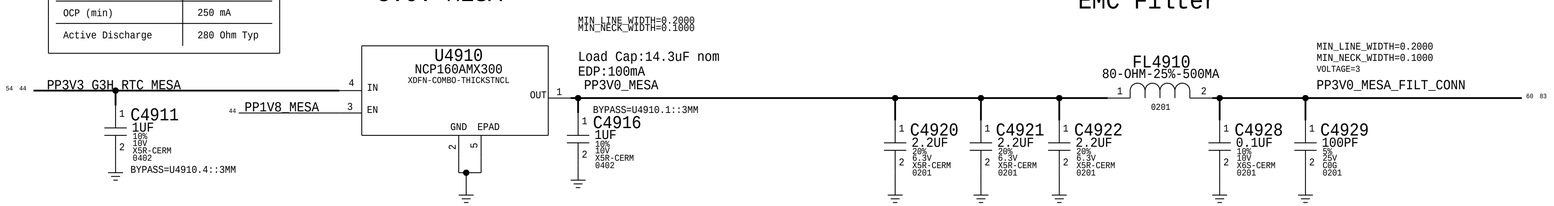


EMC Filter

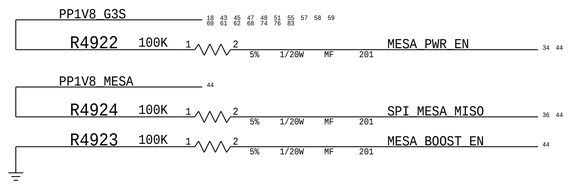


Output Voltage	3.0V +/- 2%
Iout (max avg)	250mA
Dropout Voltage	155mV
OCP (min)	250 mA
Active Discharge	280 Ohm Typ

3.0V MESA

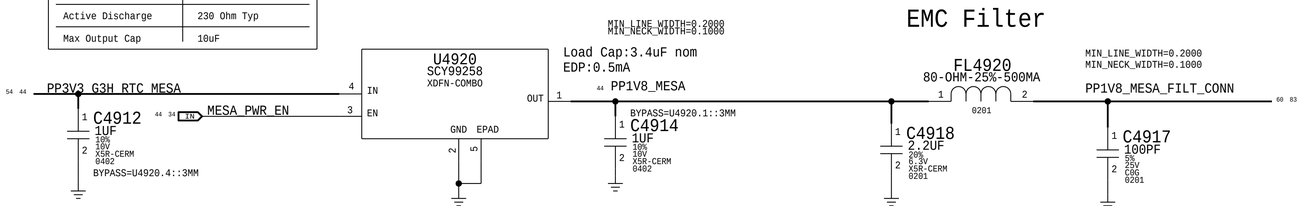


EMC Filter



Output Voltage	1.85V +/- 2%
Iout (max avg)	250mA
Dropout Voltage	50mV Typ @ 100mA
OCP (min)	250 mA
Active Discharge	230 Ohm Typ
Max Output Cap	10uF

1.85V MESA



EMC Filter

BOM_COST_GROUP=MESA

PAGE TITLE: T151

Apple Inc.

DRAWING NUMBER: 051-05309 | SIZE: D

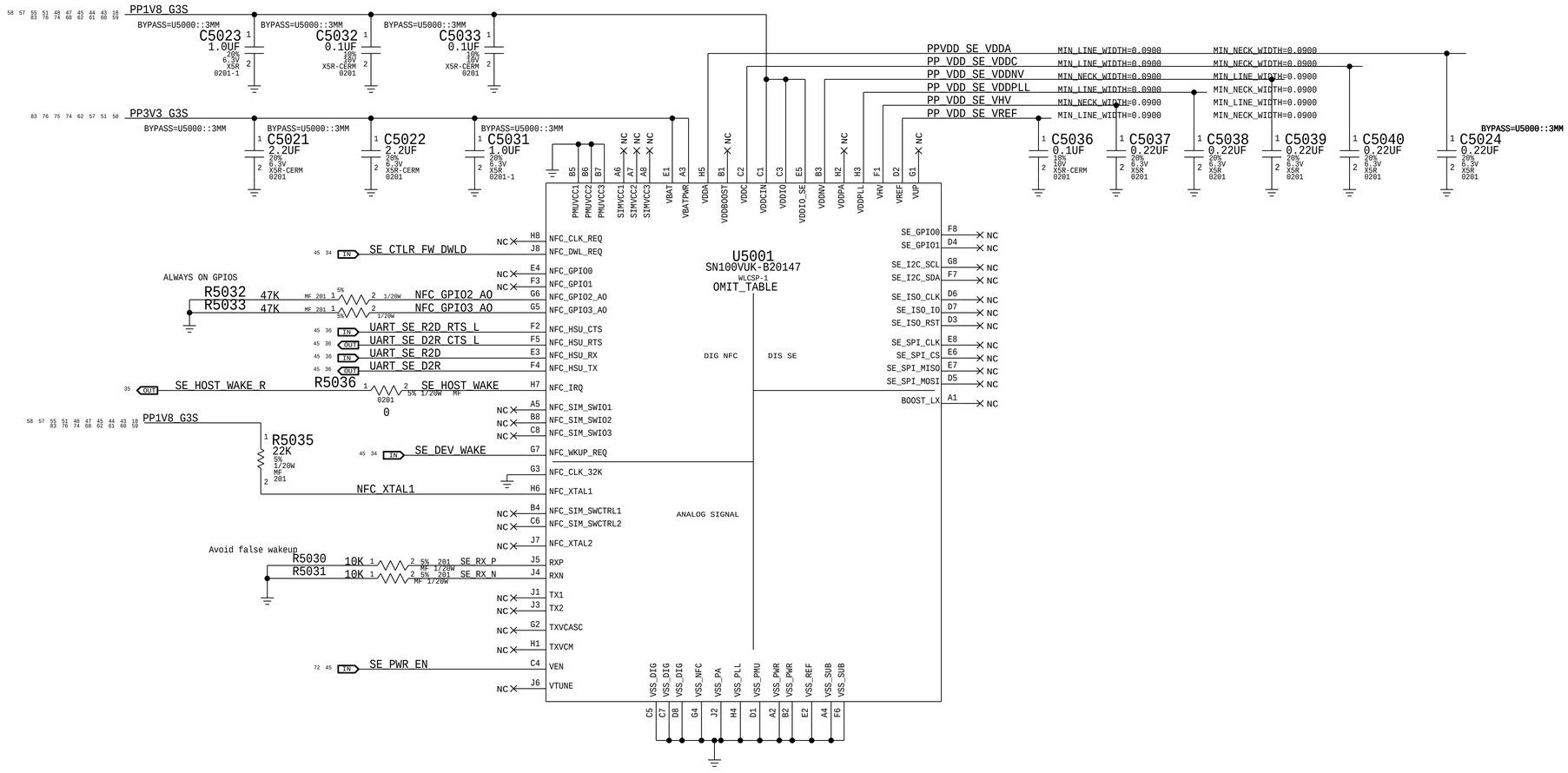
REVISION: 5.1.0

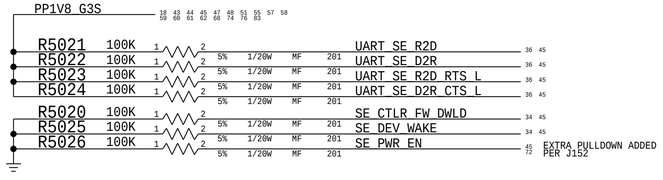
BRANCH:

PAGE: 49 OF 500

SHEET: 44 OF 98

VENUS





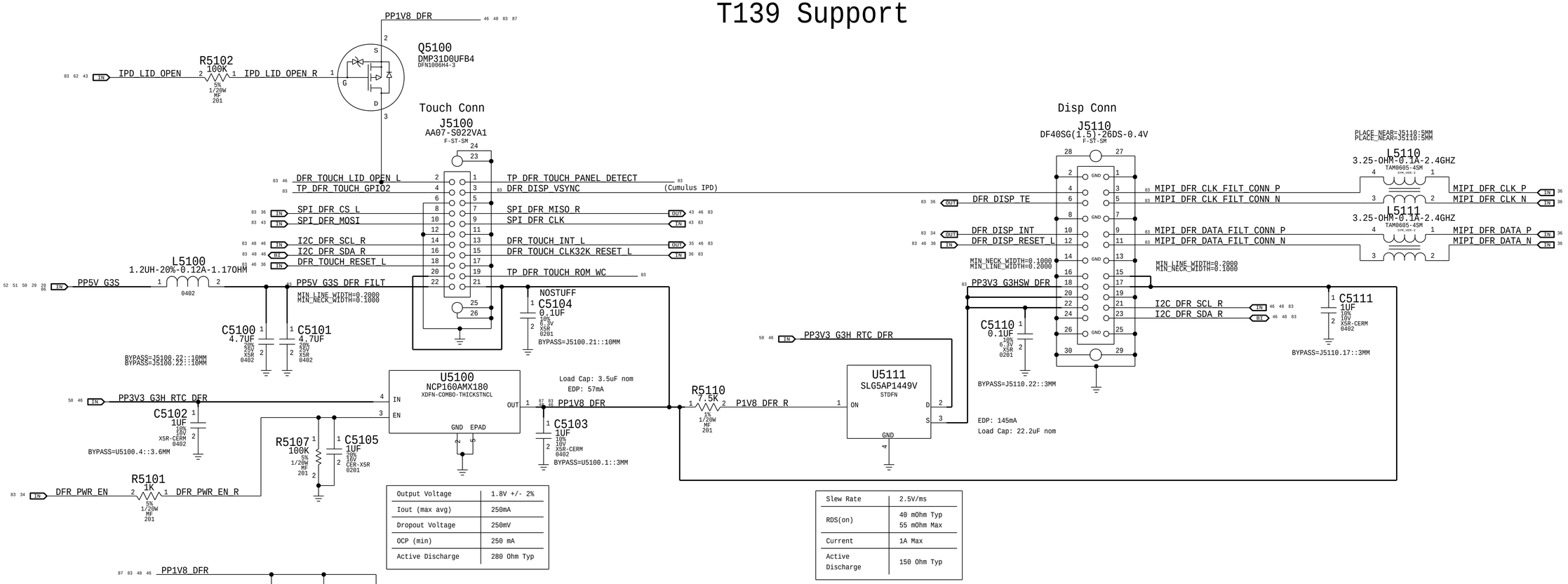
BOM_COST_GROUP=SOC

PAGE TITLE: SECURE ELEMENT

Apple Inc.

DRAWING NUMBER: 051-05309
SIZE: D
REVISION: 5.1.0
BRANCH:
PAGE: 50 OF 500
SHEET: 45 OF 98

T139 Support



Output Voltage	1.8V +/- 2%
Iout (max avg)	250mA
Dropout Voltage	250mV
OCP (min)	250 mA
Active Discharge	280 Ohm Typ

Slew Rate	2.5V/ms
RDS(on)	40 mOhm Typ 55 mOhm Max
Current	1A Max
Active Discharge	150 Ohm Typ

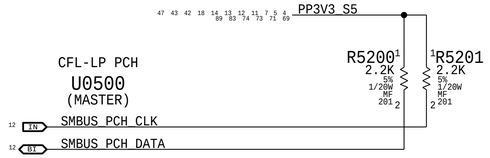
BOM_COST_GROUP=DFR

PAGE TITLE: T139 SUPPORT

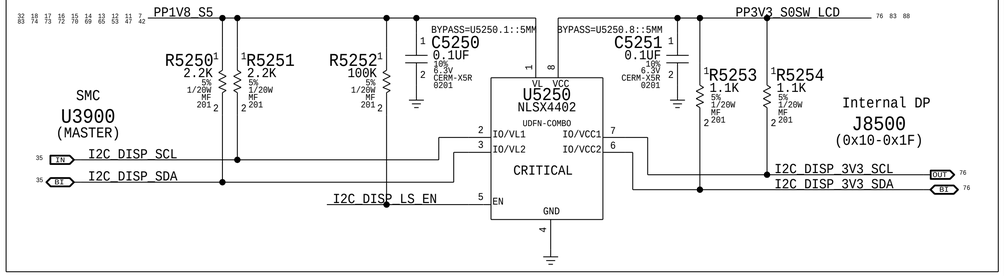
Apple Inc.

DRAWING NUMBER: 051-05309
SIZE: D
REVISION: 5.1.0
BRANCH:
PAGE: 51 OF 500
SHEET: 46 OF 98

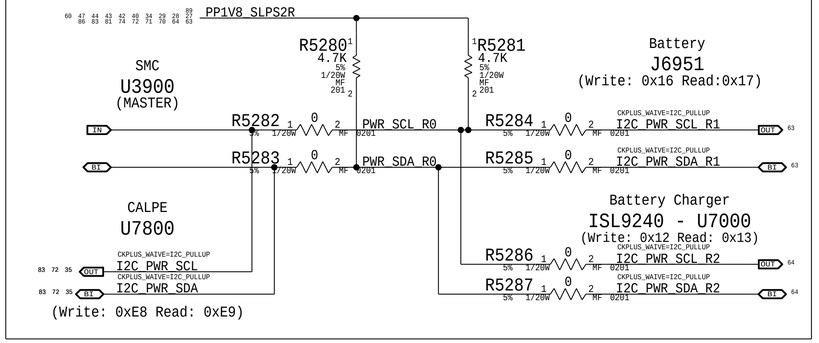
CFL PCH S0 "SMBUS 0" CONNECTIONS



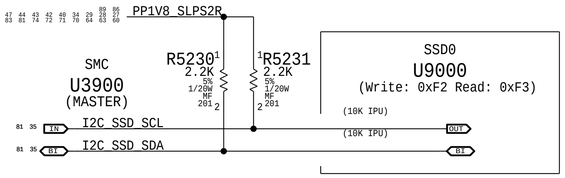
SMC I2C "3" S0 Connections



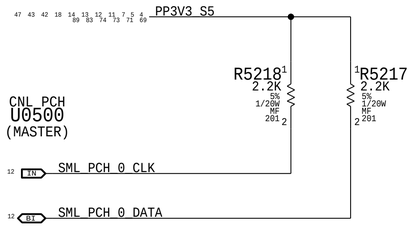
SMC I2C "4" G3H Connections



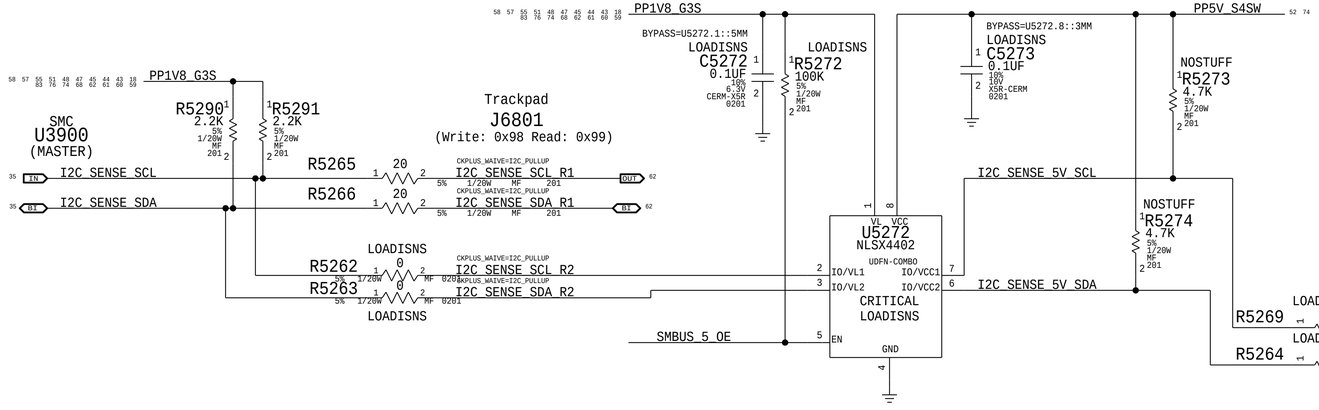
SMC I2C "6" G3H Connections



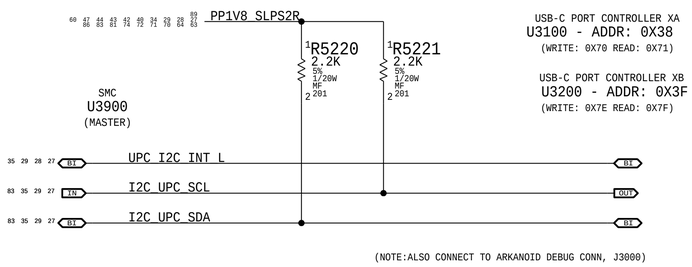
CFL I2C PCH "SML0" CONNECTIONS



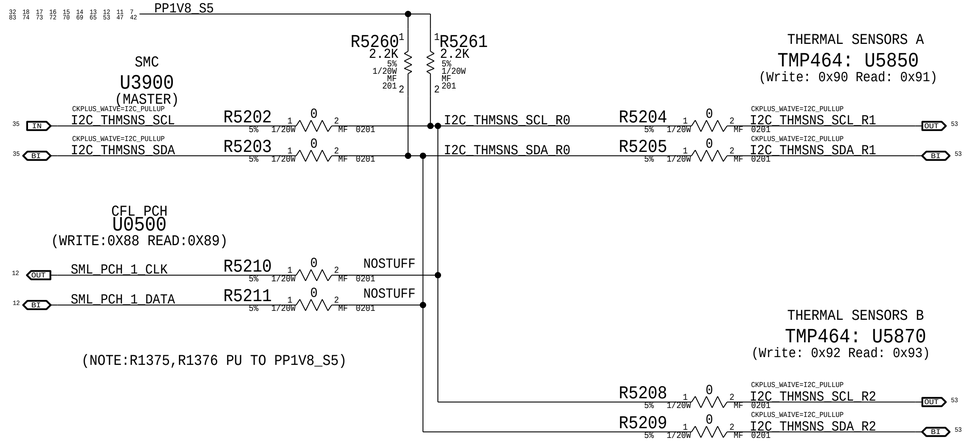
SMC I2C "5" G3S Connections



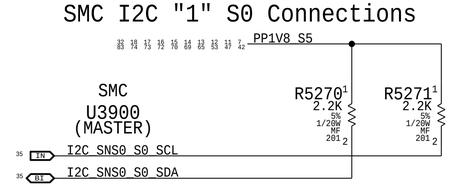
SMC I2C "0" G3H CONNECTIONS



SMC I2C "2" S0 Connections



SMC I2C "1" S0 Connections



BOM_COST_GROUP=SMC

PAGE TITLE: I2C CONNECTIONS 1

Apple Inc.

DRAWING NUMBER: 051-05309 | SIZE: D

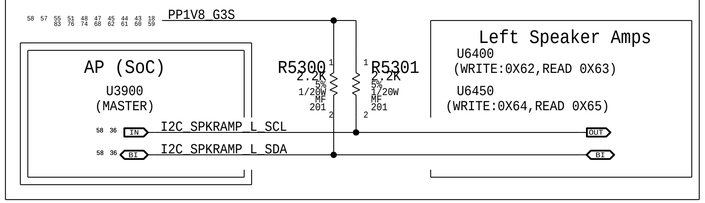
REVISION: 5.1.0

BRANCH:

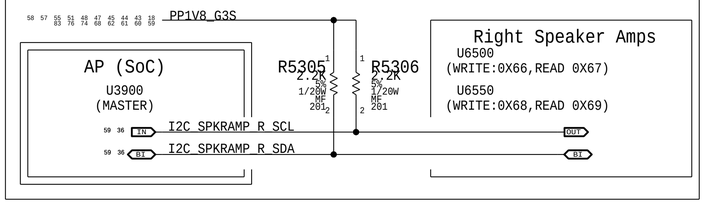
PAGE: 52 OF 500

SHEET: 47 OF 98

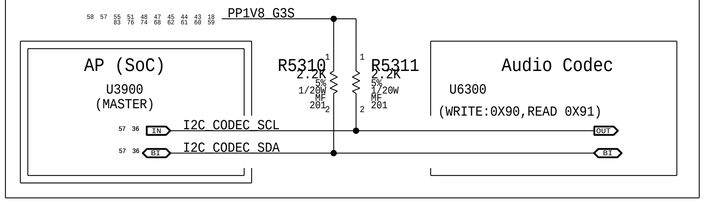
AP I2C "0" G3S Connections



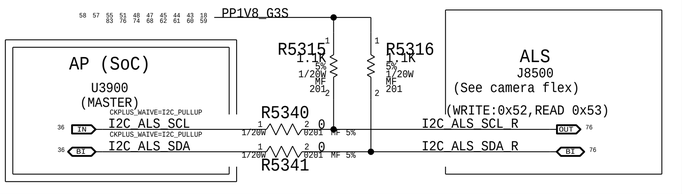
AP I2C "1" G3S Connections



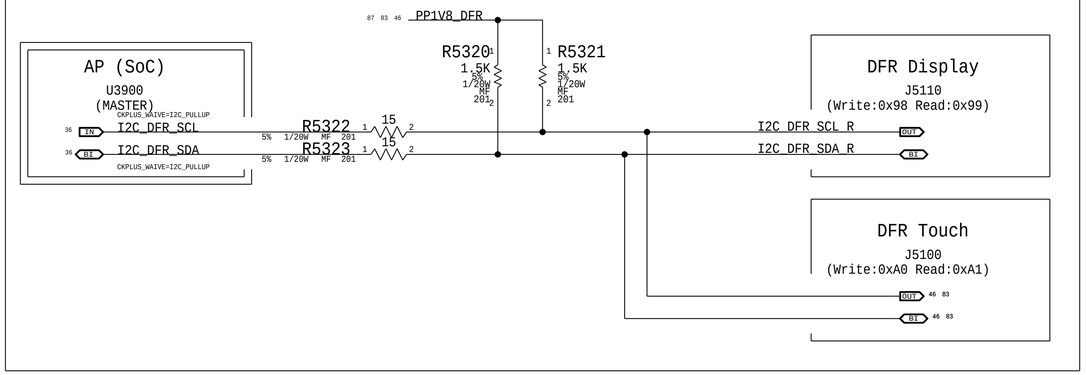
AP I2C "2" Codec Connections



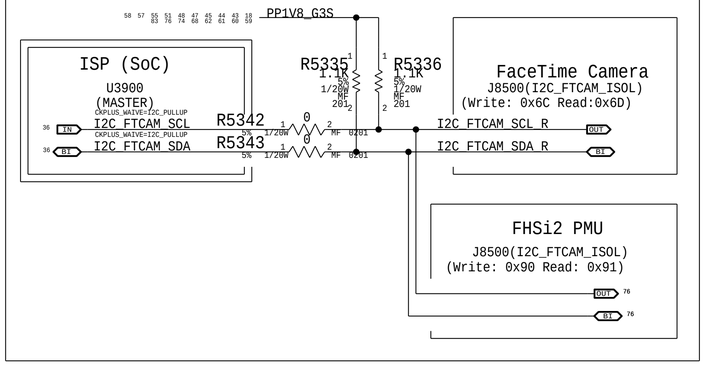
AP I2C "3" G3S Connections



AP I2C "4" DFR Connections



ISP I2C "0" G3S Connections



Device	SMC IF	ADDR. (8b)
ACE XA	I2C0	0X70/1
ACE XB	I2C0	0X7E/F
NC.	I2C1	
TEMP. SENSOR A	I2C2	0X90/1
TEMP. SENSOR B	I2C2	0X92/3
TCON	I2C3	0X10-1F
Charger	I2C4	0X12/3
Battery	I2C4	0X16/7
Calpe	I2C4	0XE8/9
Trackpad	I2C5	0X98/9
EADC1	I2C5	0X10/1
EADC2	I2C5	0X12/3
SSD	I2C6	0XF2/3
SOC IF (AP)		
Left Spkr Amp.(U6400)	I2C0	0X62/3
Left Spkr Amp.(U6450)	I2C0	0X64/5
Right Spkr Amp.(U6500)	I2C1	0X66/7
Right Spkr Amp.(U6550)	I2C1	0X68/9
Audio Codec	I2C2	0X90/1
ALS	I2C3	0X52/3
DFR Display	I2C4	0X98/9
DFR Touch	I2C4	0XA0/1
NC.	I2C5	
Spkr ID1	I2C6	
Spkr ID0	I2C6	
SIP IF (ISP)		
FT Camera	I2C0	0X6C/D
FHSi2	I2C0	0X90/1
NC.	I2C1	
AOP IF		
NC.	I2C0	

BOM_COST_GROUP=SMC

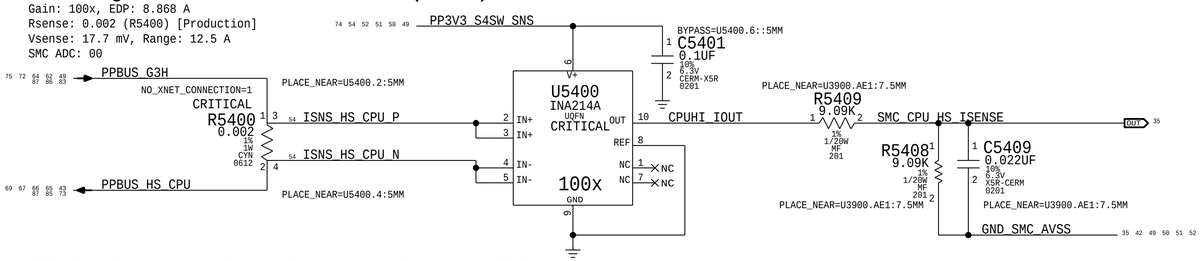
PAGE TITLE: I2C CONNECTIONS 2

Apple Inc.

DRAWING NUMBER: 051-05309
SIZE: D
REVISION: 5.1.0
BRANCH:
PAGE: 53 OF 500
SHEET: 48 OF 98

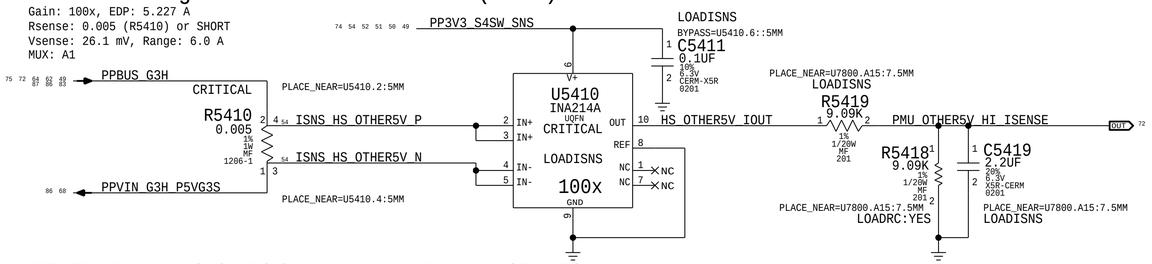
CPU High Side Current Sense (IC0R)

Gain: 100x, EDP: 8.868 A
Rsense: 0.002 (R5400) [Production]
Vsense: 17.7 mV, Range: 12.5 A
SMC ADC: 00



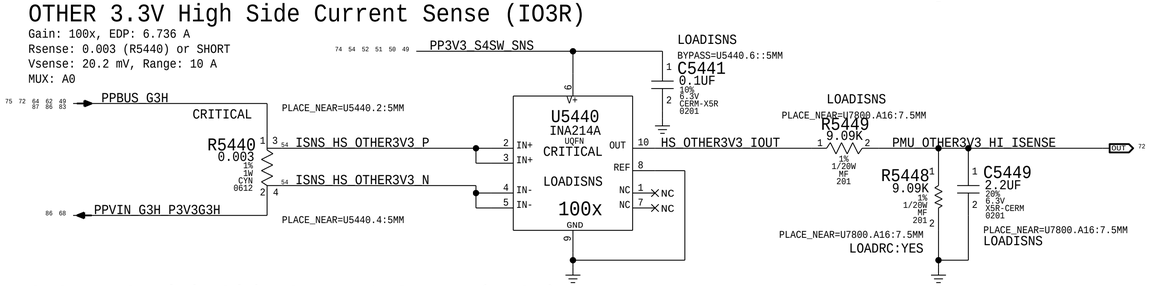
OTHER 5V High Side Current Sense (IO5R)

Gain: 100x, EDP: 5.227 A
Rsense: 0.005 (R5410) or SHORT
Vsense: 26.1 mV, Range: 6.0 A
MUX: A1



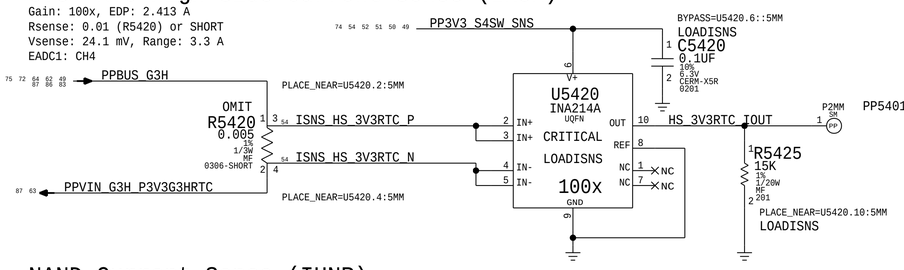
OTHER 3.3V High Side Current Sense (IO3R)

Gain: 100x, EDP: 6.736 A
Rsense: 0.003 (R5440) or SHORT
Vsense: 20.2 mV, Range: 10 A
MUX: A0



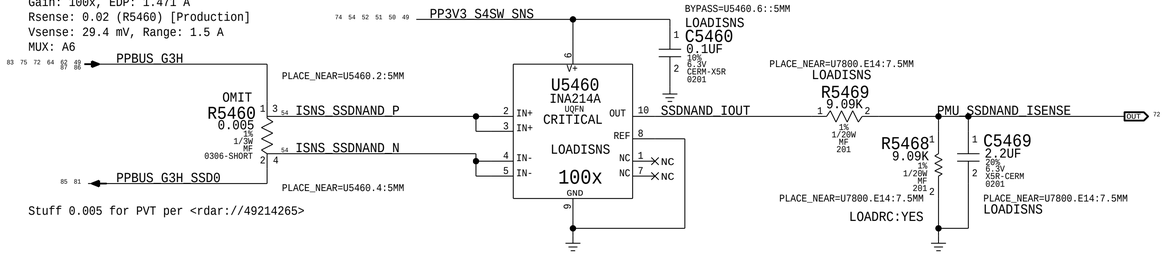
3.3V RTC High Side Current Sense (IR3R)

Gain: 100x, EDP: 2.413 A
Rsense: 0.01 (R5420) or SHORT
Vsense: 24.1 mV, Range: 3.3 A
EADC1: CH4



NAND Current Sense (IHNR)

Gain: 100x, EDP: 1.471 A
Rsense: 0.02 (R5460) [Production]
Vsense: 29.4 mV, Range: 1.5 A
MUX: A6

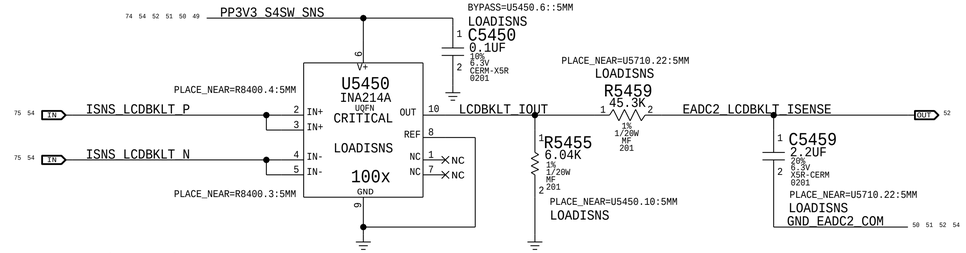


Stuff 0.005 for PVT per <rdar://49214265>

PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
117S0008	3	RES,MTL FLIM,100K,1/16W,0201,SMD,L	FR5418,R5448, R5468		LOADRC:NO

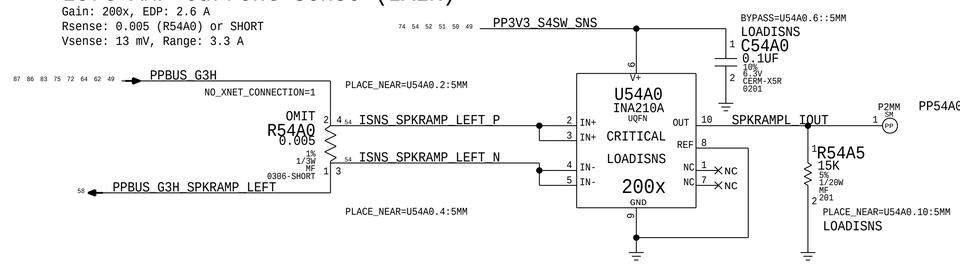
LCD Backlight Current Sense (IBLR)

Gain: 100x. EDP: 0.902 A
Rsense: 0.025 (R8400)
Vsense: 22.6 mV, Range: 1.32 A



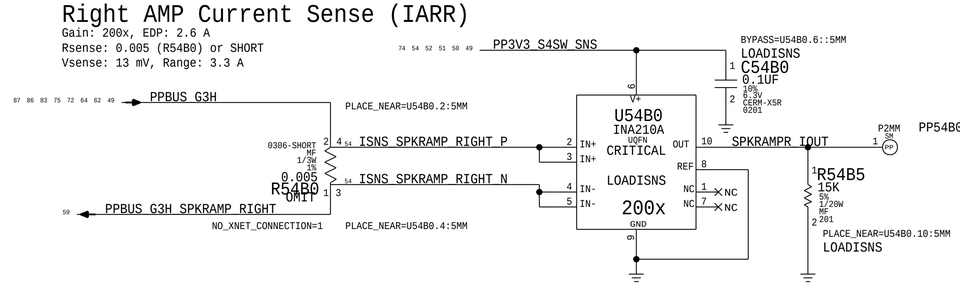
Left AMP Current Sense (IALR)

Gain: 200x, EDP: 2.6 A
Rsense: 0.005 (R54A0) or SHORT
Vsense: 13 mV, Range: 3.3 A



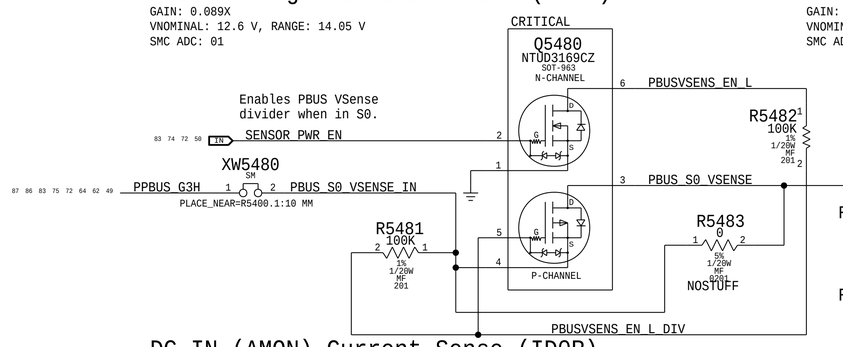
Right AMP Current Sense (IARR)

Gain: 200x, EDP: 2.6 A
Rsense: 0.005 (R54B0) or SHORT
Vsense: 13 mV, Range: 3.3 A



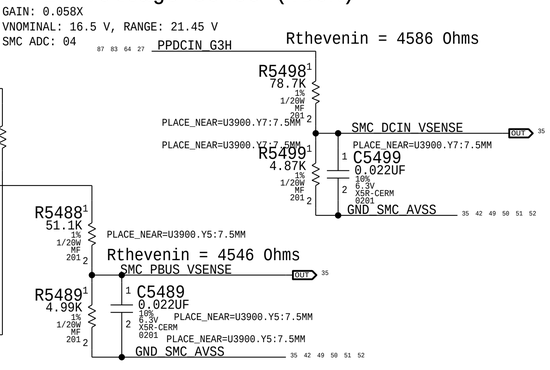
PBUS Voltage Sense & Enable (VP0R)

GAIN: 0.089X
VNOMINAL: 12.6 V, RANGE: 14.05 V
SMC ADC: 01

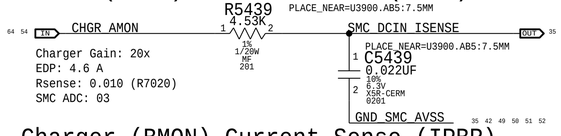


DC In Voltage Sense (VD0R)

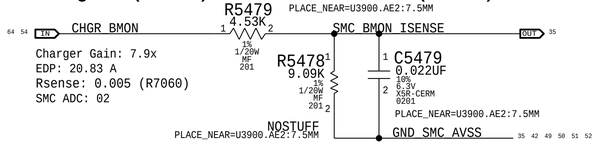
GAIN: 0.058X
VNOMINAL: 16.5 V, RANGE: 21.45 V
SMC ADC: 04



DC-IN (AMON) Current Sense (ID0R)



Charger (BMON) Current Sense (IPBR)



BOM_COST_GROUP=SENSORS

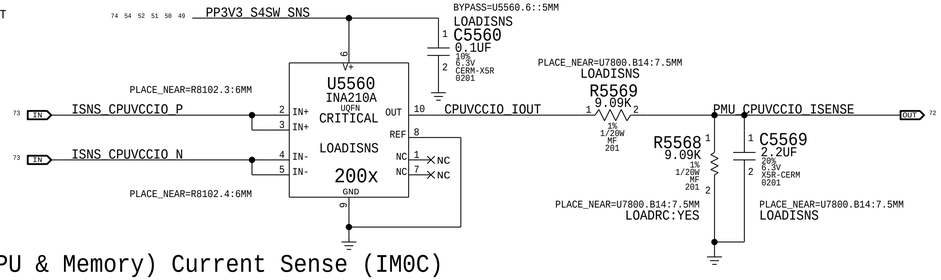
PAGE TITLE
POWER SENSORS HIGH SIDE

Apple Inc.

DRAWING NUMBER 051-05309
SIZE D
REVISION 5.1.0
BRANCH
PAGE 54 OF 500
SHEET 49 OF 98

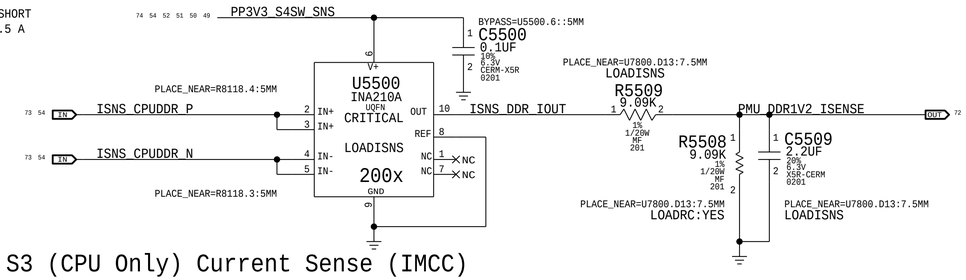
CPU VCCIO Current Sense (IC1C)

Gain: 200x, EDP: 3.6 A
Rsense: 0.003 (R8102) or SHORT
Vsense: 10.8 mV, Range: 5 A
PMU AMUX: A3



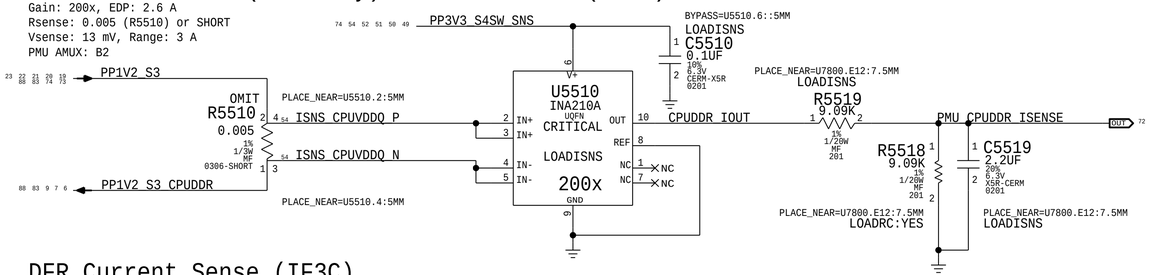
DDR 1.2V S3 (CPU & Memory) Current Sense (IM0C)

Gain: 200x, EDP: 6.9 A
Rsense: 0.002 (R8118) or SHORT
Vsense: 13.8 mV, Range: 7.5 A
PMU AMUX: A4



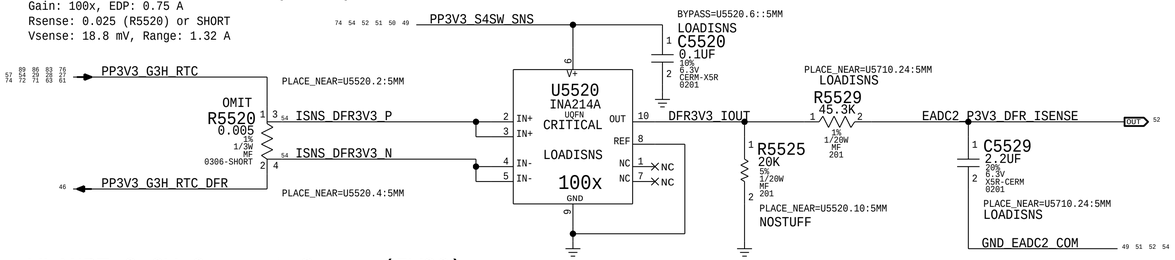
CPU DDR 1.2V S3 (CPU Only) Current Sense (IMCC)

Gain: 200x, EDP: 2.6 A
Rsense: 0.005 (R5510) or SHORT
Vsense: 13 mV, Range: 3 A
PMU AMUX: B2



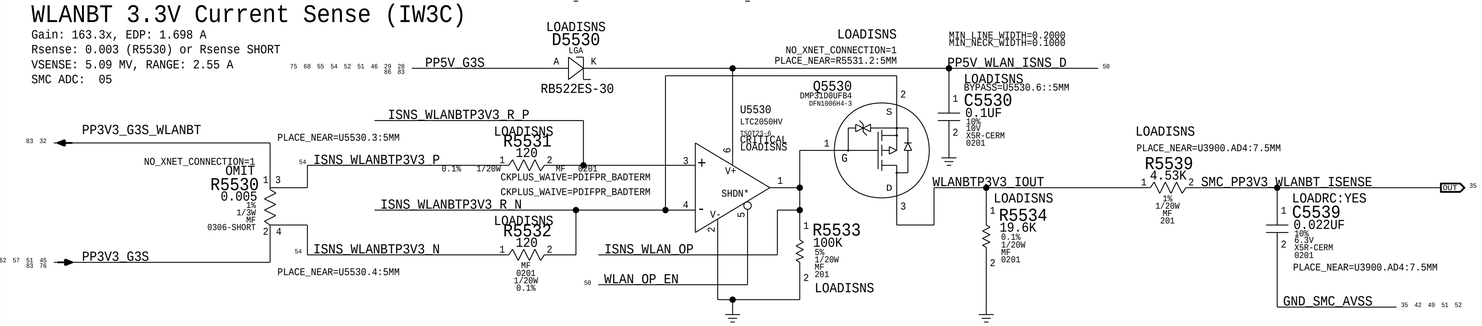
DFR Current Sense (IF3C)

Gain: 100x, EDP: 0.75 A
Rsense: 0.025 (R5520) or SHORT
Vsense: 18.8 mV, Range: 1.32 A



WLANBT 3.3V Current Sense (IW3C)

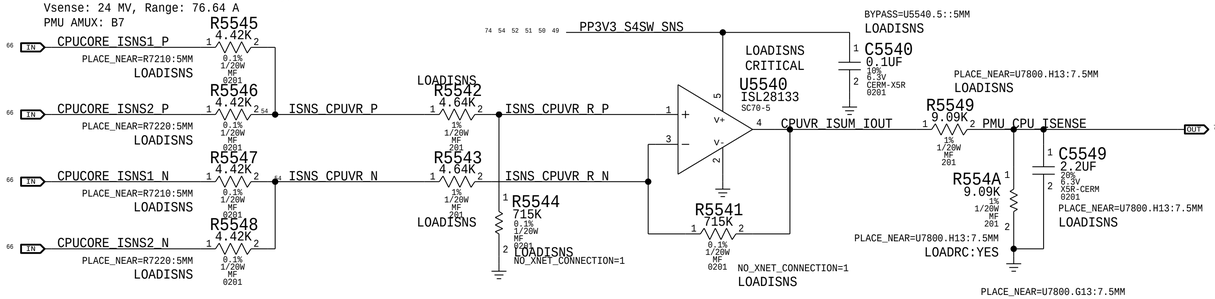
Gain: 163.3x, EDP: 1.698 A
Rsense: 0.003 (R5530) or Rsense SHORT
VSENSE: 5.09 MV, RANGE: 2.55 A
SMC ADC: 05



PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
117S0008	6	RES,MTL FLIM,100K,1/16W,0201,SMD,LF	R5508,R5518,R5568,R554A,R558A,C5539		LOADRC:NO

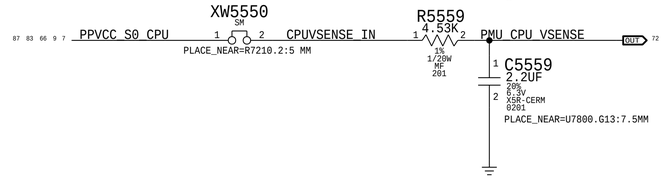
CPU Core Current Sense (ICAC)

Gain: 104.38x, EDP: 64 A
Rsense: 2x of 0.00075 (R7310, R7320), Rsum: 0.000375
Vsense: 24 MV, Range: 76.64 A
PMU AMUX: B7



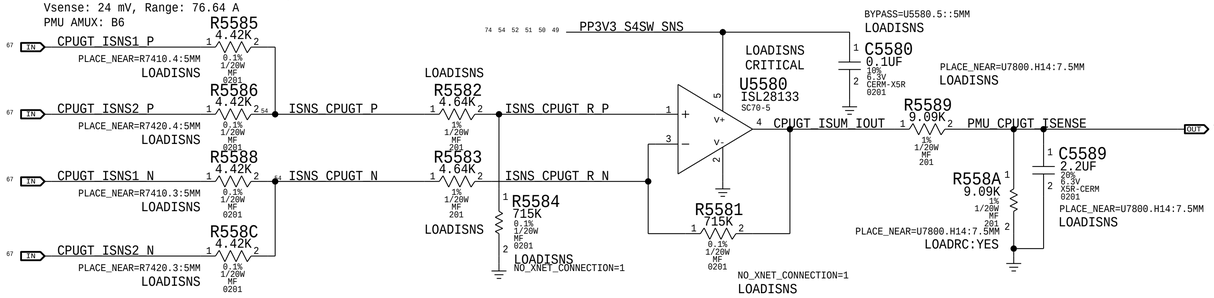
CPU Core Voltage Sense (VCAC)

PMU AMUX: B4



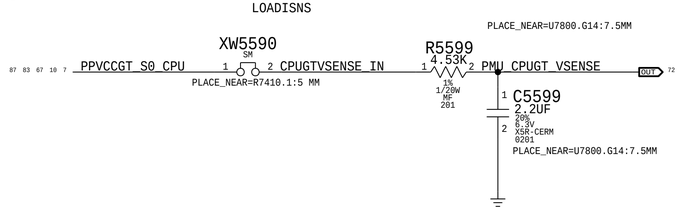
CPU GT+GTX Current Sense (ICGC)

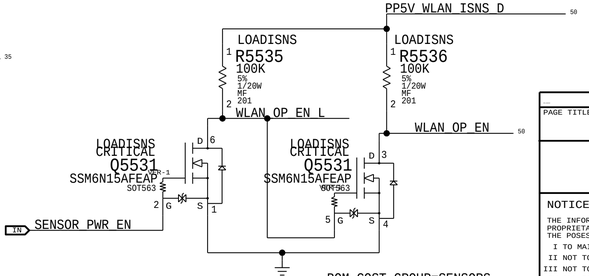
Gain: 104.38x, EDP: 64 A
Rsense: 2x of 0.00075 (R7410, R7420), Rsum: 0.000375
Vsense: 24 mV, Range: 76.64 A
PMU AMUX: B6



CPU GT Voltage Sense (VCGC)

PMU AMUX: B5





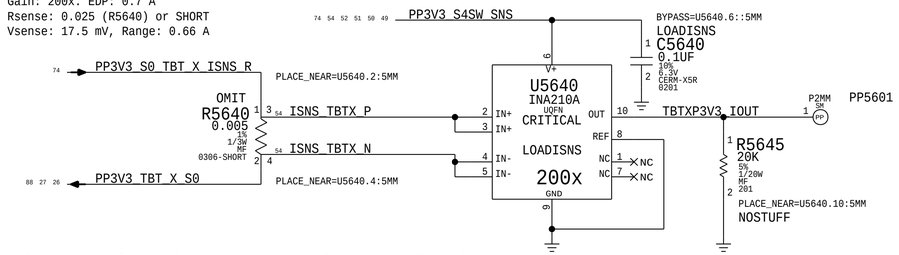
PAGE TITLE: POWER SENSORS LOAD SIDE

Apple Inc.

DRAWING NUMBER: 051-05309
SIZE: D
REVISION: 5.1.0
BRANCH:
PAGE: 55 OF 500
SHEET: 50 OF 98

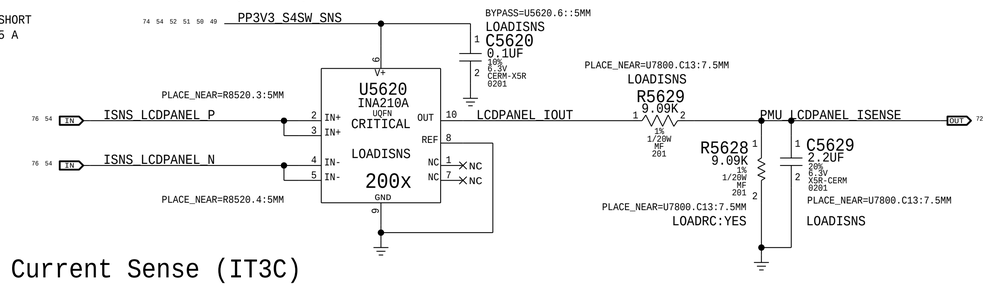
Thunderbolt TBD Left Current Sense (IULC)

Gain: 200x. EDP: 0.7 A
Rsense: 0.025 (R5640) or SHORT
Vsense: 17.5 mV, Range: 0.66 A



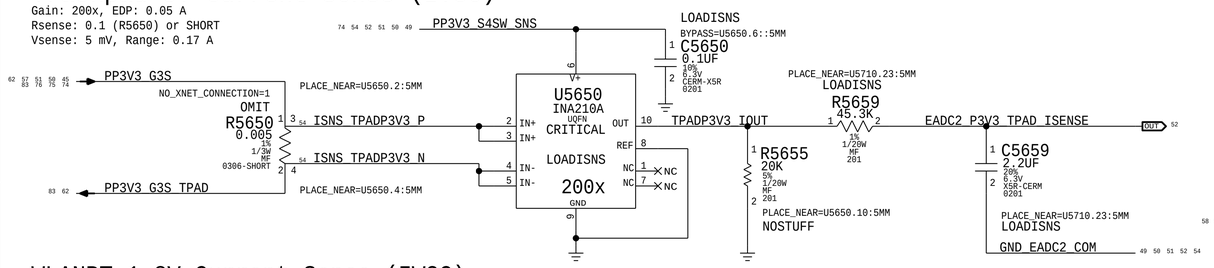
LCD Panel 3.3V Current Sense (ILDC)

Gain: 200x. EDP: 1 A
RSENSE: 0.01 (R8520) or SHORT
Vsense: 10 mV, Range: 1.5 A



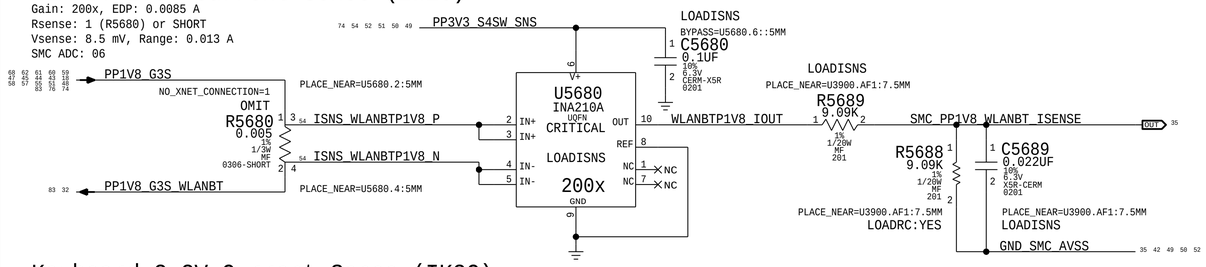
Trackpad 3V Current Sense (IT3C)

Gain: 200x, EDP: 0.05 A
Rsense: 0.1 (R5650) or SHORT
Vsense: 5 mV, Range: 0.17 A



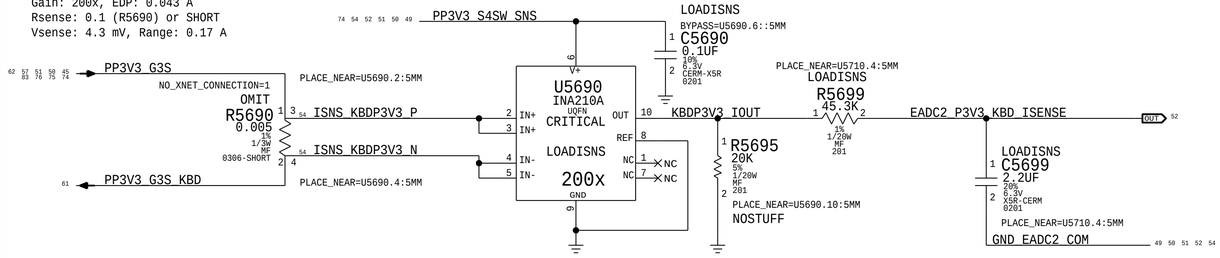
WLANBT 1.8V Current Sense (IW2C)

Gain: 200x, EDP: 0.0085 A
Rsense: 1 (R5680) or SHORT
Vsense: 8.5 mV, Range: 0.013 A
SMC ADC: 06



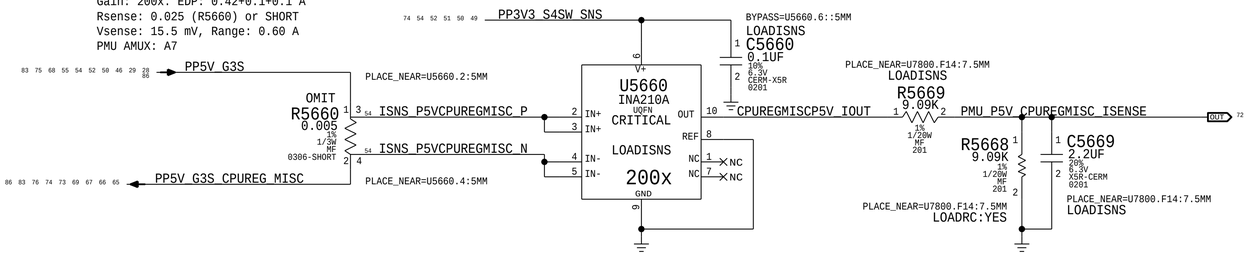
Keyboard 3.3V Current Sense (IK3C)

Gain: 200x, EDP: 0.043 A
Rsense: 0.1 (R5690) or SHORT
Vsense: 4.3 mV, Range: 0.17 A



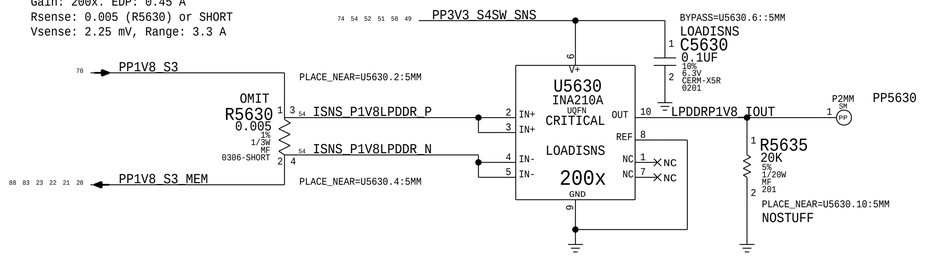
CPU Reg. ALSCAM, LCD 5V Current Sense (IC5C)

Gain: 200x. EDP: 0.42+0.1+0.1 A
Rsense: 0.025 (R5660) or SHORT
Vsense: 15.5 mV, Range: 0.60 A
PMU AMUX: A7



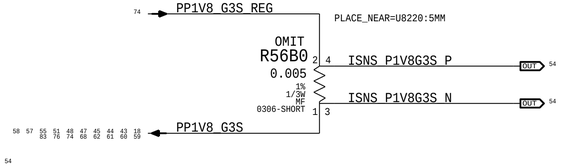
LPDDR 1.8V Current Sense (IM1C)

Gain: 200x. EDP: 0.45 A
Rsense: 0.005 (R5630) or SHORT
Vsense: 2.25 mV, Range: 3.3 A



1.8V Standby Current Sense

Gain: None. EDP: 0.65 A
Rsense: 0.025 (R56B0) or SHORT
Vsense: 16.25 mV



PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
117S0008	3	RES,MTL FLIM,100K,1/16W,0201,SMD,LF	R5628,R5668,R5688		LOADRC:NO

BOM_COST_GROUP=SENSORS

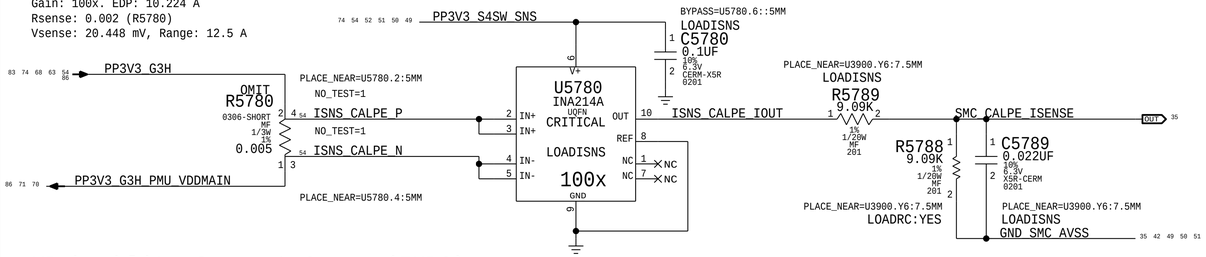
PAGE TITLE
POWER SENSORS EXTENDED

Apple Inc.

DRAWING NUMBER 051-05309
SIZE D
REVISION 5.1.0
BRANCH
PAGE 56 OF 500
SHEET 51 OF 98

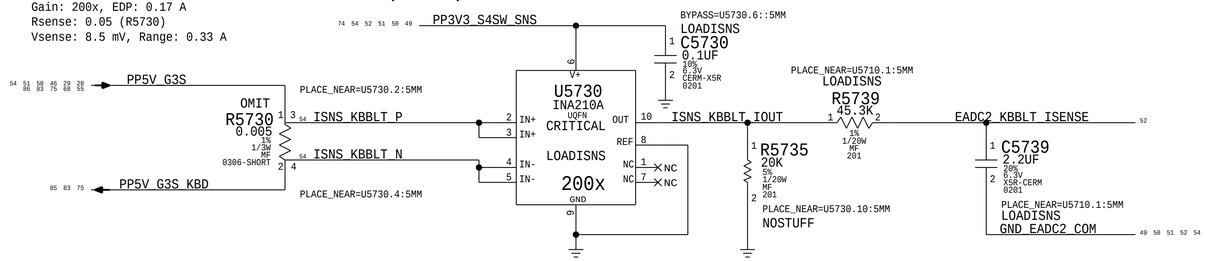
Calpe 3.3V Input Current Left (IP3C)

Gain: 100x. EDP: 10.224 A
Rsense: 0.002 (R5780)
Vsense: 20.448 mV, Range: 12.5 A



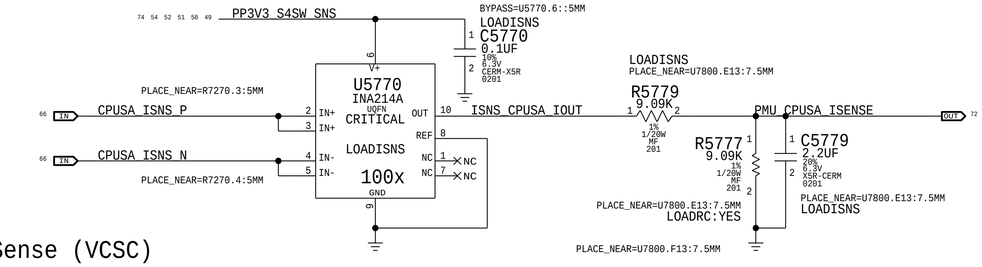
KB backlite Current Sense (IKBC)

Gain: 200x, EDP: 0.17 A
Rsense: 0.05 (R5730)
Vsense: 8.5 mV, Range: 0.33 A



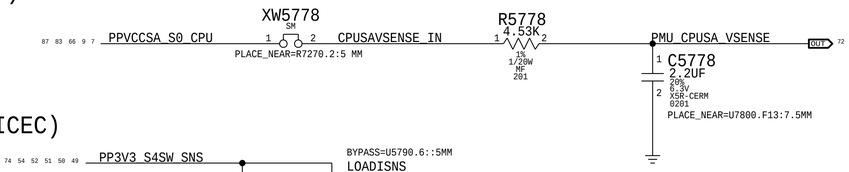
CPU SA Current Sense (ICSC)

Gain: 100X, EDP: 9.5 A
Rsense: 0.002 (R7270)
Vsense: 19 mV, Range: 15 A
PMU AMUX: B1



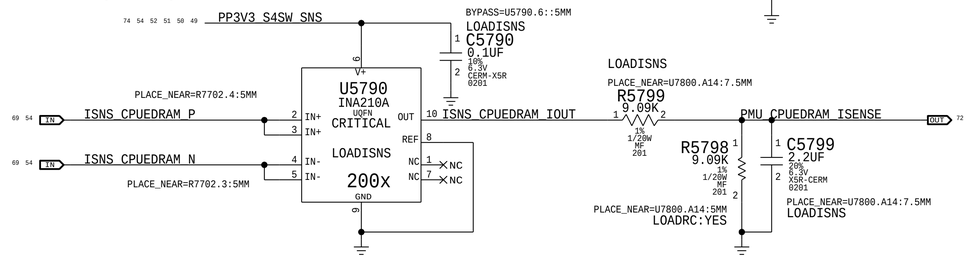
CPU SA Voltage Sense (VCSC)

PMU AMUX: B3



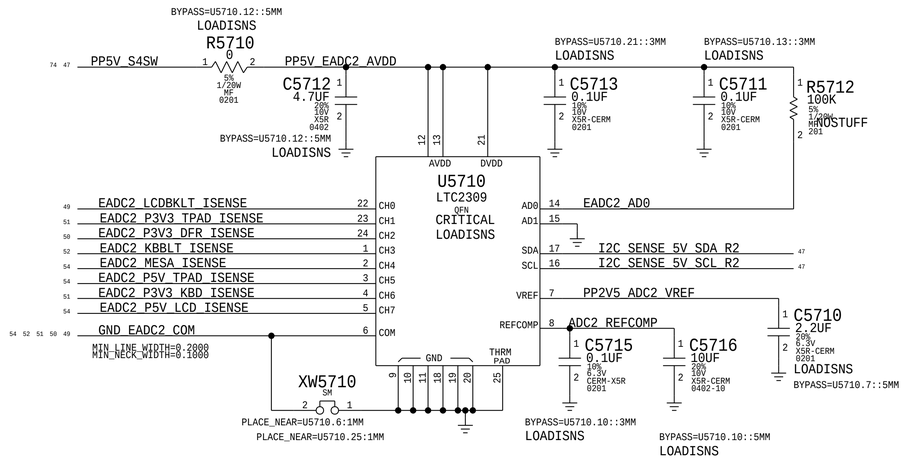
CPU EDRAM Current Sense (ICEC)

Gain: 200x, EDP: 6.2 A
Rsense: 0.002 (R7702) or SHORT
Vsense: 12.4 mV, Range: 7.5 A
PMU AMUX: A2



EADC2

(Write: 0x12 Read: 0x13)



PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
117S0008	3	RES,MTL FLIM,100K,1/16W,0201,SMD,LF	R5777,R5788,R5798		LOADRC:NO

BOM_COST_GROUP=SENSORS

PAGE TITLE
POWER SENSORS EXTENDED 2

Apple Inc.

DRAWING NUMBER 051-05309
SIZE D
REVISION 5.1.0
BRANCH
PAGE 57 OF 500
SHEET 52 OF 98

Thermal Sensor A:
TBT Die, NAND, WIFI, I/O proximity

I2C Write: 0x90, I2C Read: 0x91

TBT Die Thermal Diode (TTLD)

Placement Note:
The P leg connects to THERMDA of TBT die.
The N leg connectd to GND pin close to THERMDA.

WIFI Proximity (TW0P)

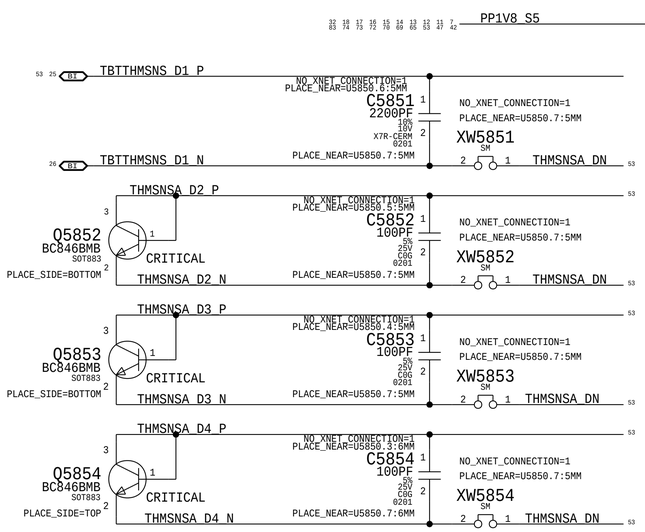
Placement Note:
BOTTOM side of WIFI/BT module

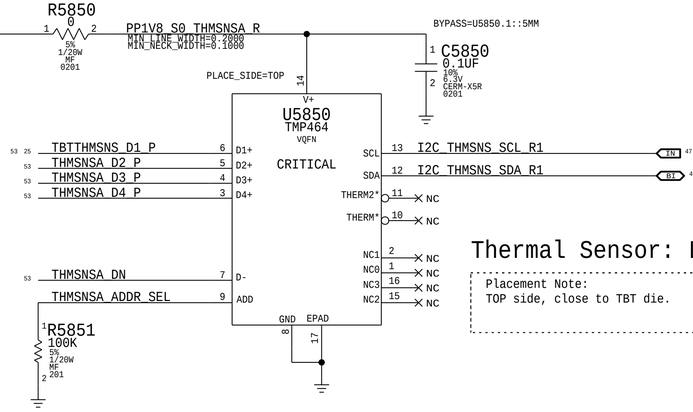
NAND Proximity #1 (TH0b)

Placement note:
BOTTOM side between NAND devices

NAND Proximity #2 (TH0a)

Placement note:
TOP side between NAND devices





Thermal Sensor: LEFT IO proximity (TI0P)

Placement Note:
TOP side, close to TBT die.

Thermal Sensor B
Fin Stack, CPU Proximity, Memory Proximity, and CPU VR

I2C Write: 0x92, I2C Read: 0x93

Thermal Diode: Ambient (TMLB)

Placement Note:
Airflow thermal indicator, TOP side.

CPU Proximity (TC0P)

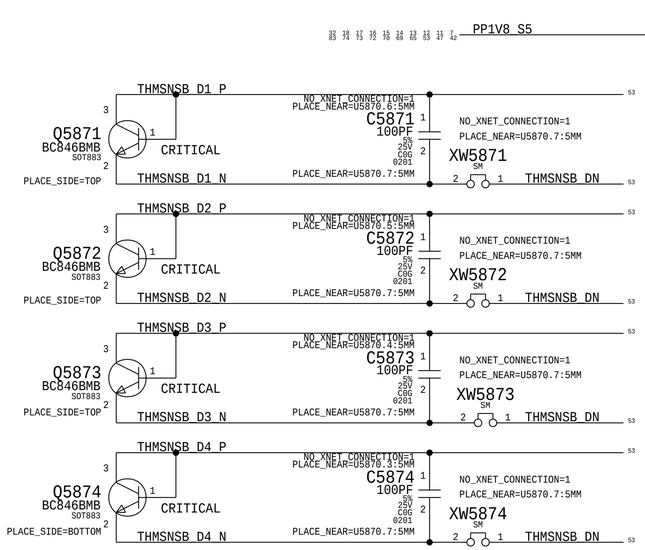
Placement Note:
TOP side of CPU.

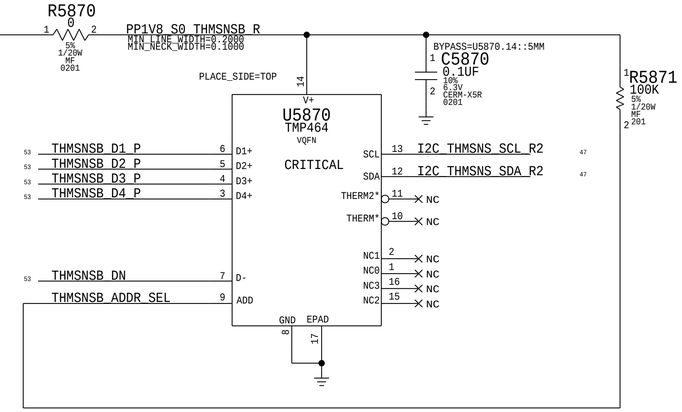
Memory Proximity (TM0P)

Placement Note:
TOP side between main memory devices.

Memory Proximity (TM1P)

Placement Note:
BOTTOM side between main memory devices.





Thermal Sensor: Fin Stack (Th1H)

Placement Note:
TOP side, top right of MLB.

BOM_COST_GROUP=SENSORS

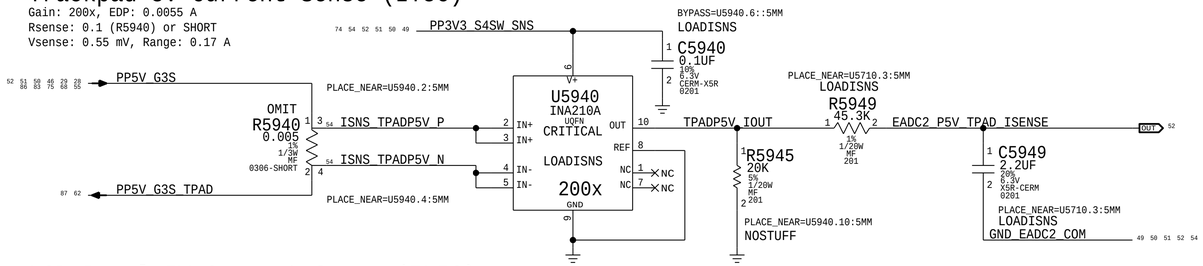
PAGE TITLE: THERMAL SENSORS

Apple Inc.

DRAWING NUMBER: 051-05309
SIZE: D
REVISION: 5.1.0
BRANCH:
PAGE: 58 OF 500
SHEET: 53 OF 98

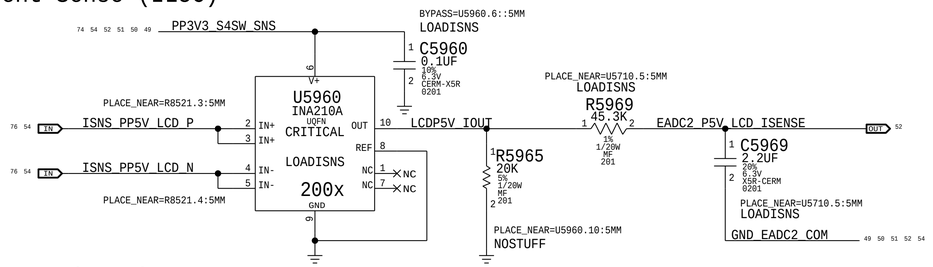
Trackpad 5V Current Sense (IT5C)

Gain: 200x, EDP: 0.0055 A
Rsense: 0.1 (R5940) or SHORT
Vsense: 0.55 mV, Range: 0.17 A



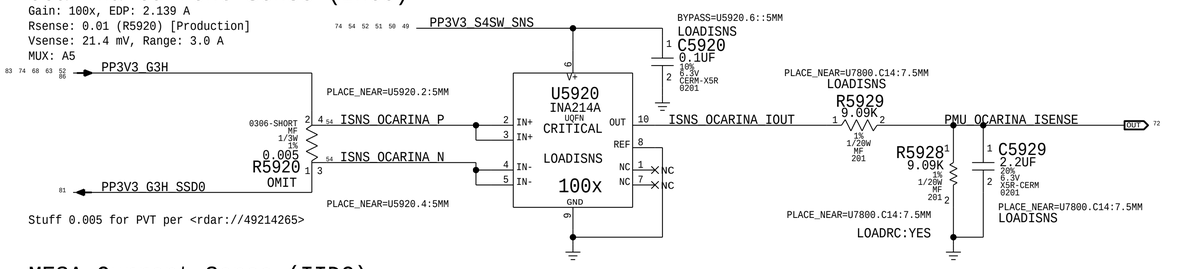
LCD Panel 5V Current Sense (IL5C)

Gain: 200x, EDP: 0.1 A
Rsense: 0.1 (R8521) or SHORT
Vsense: 10 mV, Range: 0.17 A



Ocarina Current Sense (IHCC)

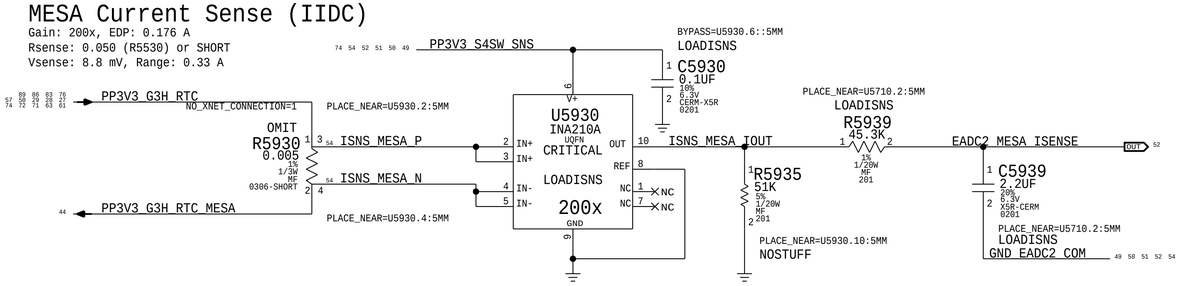
Gain: 100x, EDP: 2.139 A
Rsense: 0.01 (R5920) [Production]
Vsense: 21.4 mV, Range: 3.0 A
MUX: A5



Stuff 0.005 for PVT per <rdar://49214265>

MESA Current Sense (IIDC)

Gain: 200x, EDP: 0.176 A
Rsense: 0.050 (R5530) or SHORT
Vsense: 8.8 mV, Range: 0.33 A



TP5983 TP PLACE_SIDE=TOP
TP5984 TP PLACE_SIDE=TOP
TP5985 TP PLACE_SIDE=TOP
TP5986 TP PLACE_SIDE=TOP

PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
117S0008	1	RES,MTL FLIM,100K,1/16W,0201,SMD,LF	R5928		LOADRC:NO

Probe Points for Power Validation

49 IN ISNS_HS_CPU_P	TP5901	PLACE_SIDE=TOP PLACE_NEAR=R5400:5MM
49 IN ISNS_HS_CPU_N	TP5902	PLACE_SIDE=TOP PLACE_NEAR=R5400:5MM
49 IN ISNS_HS_OTHER5V_P	TP5903	PLACE_SIDE=TOP PLACE_NEAR=R5410:6MM
49 IN ISNS_HS_OTHER5V_N	TP5904	PLACE_SIDE=TOP PLACE_NEAR=R5410:6MM
49 IN ISNS_HS_OTHER3V3_P	TP5905	PLACE_SIDE=TOP PLACE_NEAR=R5440:5MM
49 IN ISNS_HS_OTHER3V3_N	TP5906	PLACE_SIDE=TOP PLACE_NEAR=R5440:5MM
49 IN ISNS_HS_3V3RTC_P	TP5907	PLACE_SIDE=TOP PLACE_NEAR=R5420:5MM
49 IN ISNS_HS_3V3RTC_N	TP5908	PLACE_SIDE=TOP PLACE_NEAR=R5420:5MM
49 IN ISNS_SSDNAND_P	TP5909	PLACE_SIDE=TOP PLACE_NEAR=R5460:5MM
49 IN ISNS_SSDNAND_N	TP5910	PLACE_SIDE=TOP PLACE_NEAR=R5460:5MM
75 49 IN ISNS_LCDBKLT_P	TP5911	PLACE_SIDE=TOP PLACE_NEAR=R8400:30MM
75 49 IN ISNS_LCDBKLT_N	TP5912	PLACE_SIDE=TOP PLACE_NEAR=R8400:30MM
49 IN ISNS_SPKRAMP_LEFT_P	TP5913	PLACE_SIDE=TOP PLACE_NEAR=R54A0:5MM
49 IN ISNS_SPKRAMP_LEFT_N	TP5914	PLACE_SIDE=TOP PLACE_NEAR=R54A0:5MM
49 IN ISNS_SPKRAMP_RIGHT_P	TP5915	PLACE_SIDE=TOP PLACE_NEAR=R54B0:5MM
49 IN ISNS_SPKRAMP_RIGHT_N	TP5916	PLACE_SIDE=TOP PLACE_NEAR=R54B0:5MM
64 IN CHGR_CSI_R_P	TP5917	PLACE_SIDE=TOP PLACE_NEAR=R7020:5MM
64 IN CHGR_CSI_R_N	TP5918	PLACE_SIDE=TOP PLACE_NEAR=R7020:5MM
64 49 IN CHGR_AMON	TP5919	PLACE_SIDE=TOP
	TP5981	PLACE_SIDE=TOP PLACE_NEAR=TP5919:5MM
64 IN CHGR_CSO_R_P	TP5920	PLACE_SIDE=TOP PLACE_NEAR=R7060:30MM
64 IN CHGR_CSO_R_N	TP5921	PLACE_SIDE=TOP PLACE_NEAR=R7060:30MM
64 49 IN CHGR_BMON	TP5922	PLACE_SIDE=TOP
	TP5982	PLACE_SIDE=TOP PLACE_NEAR=TP5922:5MM
73 IN PVCCIOS0_CS_P	TP5923	PLACE_SIDE=TOP PLACE_NEAR=R8102:5MM
73 IN PVCCIOS0_CS_N	TP5924	PLACE_SIDE=TOP PLACE_NEAR=R8102:5MM
73 50 IN ISNS_CPUDDR_P	TP5925	PLACE_SIDE=TOP PLACE_NEAR=R8118:5MM
73 50 IN ISNS_CPUDDR_N	TP5926	PLACE_SIDE=TOP PLACE_NEAR=R8118:5MM
50 IN ISNS_CPUVDDQ_P	TP5927	PLACE_SIDE=TOP PLACE_NEAR=R5510:5MM
50 IN ISNS_CPUVDDQ_N	TP5928	PLACE_SIDE=TOP PLACE_NEAR=R5510:5MM
50 IN ISNS_DFR3V3_P	TP5929	PLACE_SIDE=TOP PLACE_NEAR=R5520:5MM
50 IN ISNS_DFR3V3_N	TP5930	PLACE_SIDE=TOP PLACE_NEAR=R5520:5MM
50 IN ISNS_WLANBTP3V3_P	TP5931	PLACE_SIDE=TOP PLACE_NEAR=R5530:5MM
50 IN ISNS_WLANBTP3V3_N	TP5932	PLACE_SIDE=TOP PLACE_NEAR=R5530:5MM
50 IN ISNS_CPUVR_P	TP5933	PLACE_SIDE=TOP PLACE_NEAR=R5542:30MM
50 IN ISNS_CPUVR_N	TP5934	PLACE_SIDE=TOP PLACE_NEAR=R5543:30MM
50 IN ISNS_CPUGT_P	TP5935	PLACE_SIDE=TOP PLACE_NEAR=R5582:10MM
50 IN ISNS_CPUGT_N	TP5936	PLACE_SIDE=TOP PLACE_NEAR=R5583:10MM
51 IN ISNS_TBTX_P	TP5937	PLACE_SIDE=TOP PLACE_NEAR=R5640:5MM
51 IN ISNS_TBTX_N	TP5938	PLACE_SIDE=TOP PLACE_NEAR=R5640:5MM
76 51 IN ISNS_LCDPANEL_P	TP5939	PLACE_SIDE=TOP PLACE_NEAR=R8520:5MM
76 51 IN ISNS_LCDPANEL_N	TP5940	PLACE_SIDE=TOP PLACE_NEAR=R8520:5MM
51 IN ISNS_TPADP3V3_P	TP5941	PLACE_SIDE=TOP PLACE_NEAR=R5650:10MM
51 IN ISNS_TPADP3V3_N	TP5942	PLACE_SIDE=TOP PLACE_NEAR=R5650:10MM
51 IN ISNS_WLANBTP1V8_P	TP5943	PLACE_SIDE=TOP PLACE_NEAR=R5680:5MM
51 IN ISNS_WLANBTP1V8_N	TP5944	PLACE_SIDE=TOP PLACE_NEAR=R5680:5MM
52 IN ISNS_CALPE_P	TP5945	PLACE_SIDE=TOP PLACE_NEAR=R5780:5MM
52 IN ISNS_CALPE_N	TP5946	PLACE_SIDE=TOP PLACE_NEAR=R5780:5MM
52 IN ISNS_KBBLT_P	TP5947	PLACE_SIDE=TOP PLACE_NEAR=R5730:5MM
52 IN ISNS_KBBLT_N	TP5948	PLACE_SIDE=TOP PLACE_NEAR=R5730:5MM
66 IN CPUSA_ISNS_R_P	TP5949	PLACE_SIDE=TOP PLACE_NEAR=R7274:5MM
66 IN CPUSA_ISNS_R_N	TP5950	PLACE_SIDE=TOP PLACE_NEAR=R7272:5MM
69 52 IN ISNS_CPUEDRAM_P	TP5951	PLACE_NEAR=R7702:5MM
69 52 IN ISNS_CPUEDRAM_N	TP5952	PLACE_NEAR=R7702:5MM
54 ISNS_TPADP5V_P	TP5953	PLACE_SIDE=TOP PLACE_NEAR=R5940:10MM
54 ISNS_TPADP5V_N	TP5954	PLACE_SIDE=TOP PLACE_NEAR=R5940:10MM
76 54 ISNS_PP5V_LCD_P	TP5955	PLACE_SIDE=TOP PLACE_NEAR=R8521:5MM
76 54 ISNS_PP5V_LCD_N	TP5956	PLACE_SIDE=TOP PLACE_NEAR=R8521:5MM
54 ISNS_OCARINA_P	TP5957	PLACE_SIDE=TOP PLACE_NEAR=R5920:5MM
54 ISNS_OCARINA_N	TP5958	PLACE_SIDE=TOP PLACE_NEAR=R5920:5MM
54 ISNS_MESA_P	TP5959	PLACE_SIDE=TOP PLACE_NEAR=R5930:5MM
54 ISNS_MESA_N	TP5960	PLACE_SIDE=TOP PLACE_NEAR=R5930:5MM
86 83 70 11 7 IN PPVPCORE_S5	TP5961	PLACE_SIDE=TOP PLACE_NEAR=L7820:5MM
7 IN PVCC_FB_P	TP5962	PLACE_SIDE=TOP PLACE_NEAR=R0850:10MM
86 83 73 70 16 11 7 IN PP1V_PRIM	TP5963	PLACE_SIDE=TOP PLACE_NEAR=L7821:5MM
7 IN P1VPRIM_FB_R	TP5964	PLACE_SIDE=TOP PLACE_NEAR=R0853:10MM
51 IN ISNS_KBDP3V3_P	TP5965	PLACE_SIDE=TOP PLACE_NEAR=R5690:5MM
51 IN ISNS_KBDP3V3_N	TP5966	PLACE_SIDE=TOP PLACE_NEAR=R5690:5MM
51 IN ISNS_P5VCPUREGMISC_P	TP5967	PLACE_SIDE=TOP PLACE_NEAR=R5660:5MM
51 IN ISNS_P5VCPUREGMISC_N	TP5968	PLACE_SIDE=TOP PLACE_NEAR=R5660:5MM
51 IN ISNS_P1V8LPDDR_P	TP5969	PLACE_SIDE=TOP PLACE_NEAR=R5630:5MM
51 IN ISNS_P1V8LPDDR_N	TP5970	PLACE_SIDE=TOP PLACE_NEAR=R5630:5MM
51 IN ISNS_P1V8G3S_P	TP5971	PLACE_SIDE=TOP PLACE_NEAR=R56B0:5MM
51 IN ISNS_P1V8G3S_N	TP5972	PLACE_SIDE=TOP PLACE_NEAR=R56B0:5MM

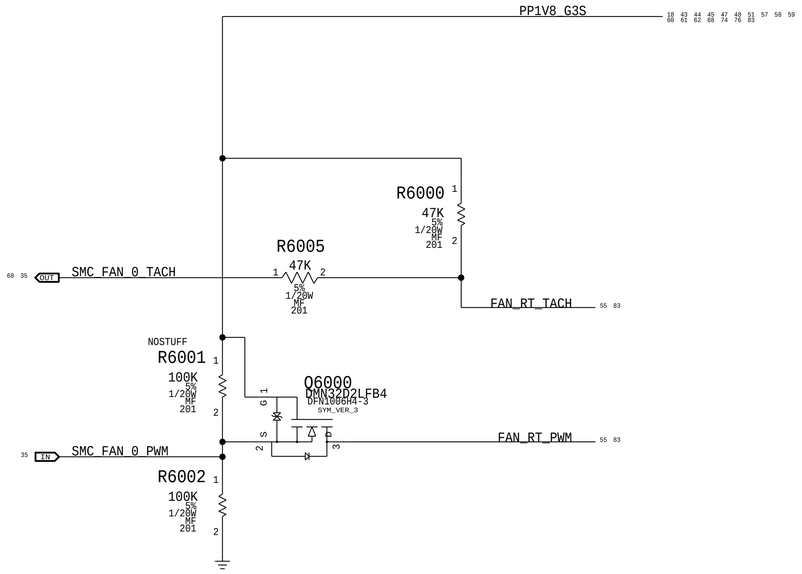
BOM_COST_GROUP=SENSORS

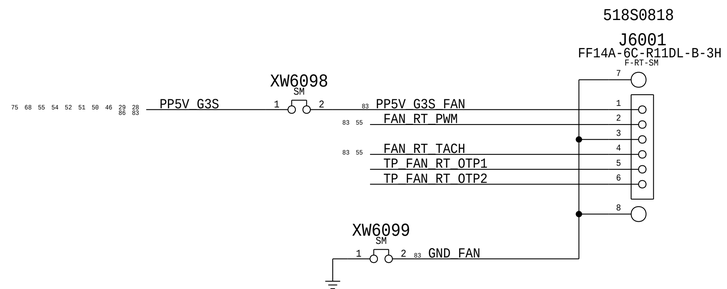
PAGE TITLE: POWER SENSORS EXTENDED 3

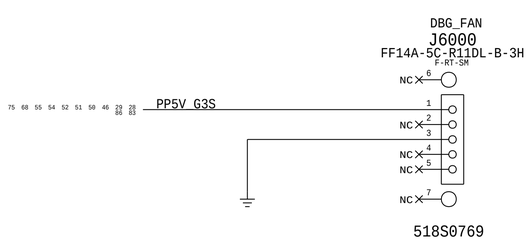
Apple Inc.

DRAWING NUMBER: 051-05309 SIZE: D
REVISION: 5.1.0
BRANCH:
PAGE: 59 OF 500
SHEET: 54 OF 98

FAN CONTROL







BOM_COST_GROUP=FAN

PAGE TITLE

Fans/SMC/AMUX Support

Apple Inc.

DRAWING NUMBER 051-05309

SIZE D

REVISION 5.1.0

BRANCH

PAGE 60 OF 500

SHEET 55 OF 98

BOM_COST_GROUP=AUDIO

SYNC_MASTER=

SYNC_DATE=

PAGE TITLE

AUDIO PLACEHOLDER

Apple Inc.

DRAWING NUMBER 051-05309

SIZE D

REVISION 5.1.0

BRANCH

PAGE 62 OF 500

SHEET 56 OF 98

AUDIO JACK CODEC I2C ADDRESS		
AD1	AD0	ADDRESS
GND	GND	0x48 <--
GND	1.8V	0x49
1.8V	GND	0x4A
1.8V	1.8V	0x4B

PP1V8_G3S

L6300 FERR-22-OHM-1A-0.055OHM 0201
MIN_LINE_WIDTH=0.2000 MIN_NECK_WIDTH=0.1000
PP1V8_CODEC_VCP MIN_LINE_WIDTH=0.2000 MIN_NECK_WIDTH=0.1000 VOLTAGE=1.8V

BYPASS=U6300.B1:C2:4MM C6301 2.2UF 20% 10V X5R-CERM 402
GND_AUDIO_CODEC

L6301 FERR-22-OHM-1A-0.055OHM 0201
MIN_LINE_WIDTH=0.2000 MIN_NECK_WIDTH=0.1000
PP1V8_CODEC_VL MIN_LINE_WIDTH=0.2000 MIN_NECK_WIDTH=0.1000
BYPASS=U6300.A3:B3:5MM C6303 0.1UF 10% 10V X7R-CERM 0402

L6302 FERR-22-OHM-1A-0.055OHM 0201
PP3V3_G3H_RTC
PP3V3_CODEC_VP MIN_LINE_WIDTH=0.2000 MIN_NECK_WIDTH=0.1000
BYPASS=U6300.D7:C7:5MM C6304 10UF 20% 10V X5R-CERM 0402-7

XW6300 SHORT-8L-0.25MM-SM
GND_AUDIO_CODEC

CRITICAL
BYPASS=U6300.D6:F6:4MM C6302 2.2UF 20% 10V X5R-CERM 402 NO_XNET_CONNECTION=1
L83_VCP_FILT_GND MIN_LINE_WIDTH=0.5000 MIN_NECK_WIDTH=0.1130
XW6301 SM

CRITICAL
BYPASS=U6300.E6:F6:4MM C6305 4.7UF 20% 10V X5R-CERM 0402 NO_XNET_CONNECTION=1
L83_VCP_FILTP MIN_LINE_WIDTH=0.5000 MIN_NECK_WIDTH=0.2000

CRITICAL
BYPASS=U6300.G6:F6:4MM C6306 4.7UF 20% 10V X5R-CERM 0402 NO_XNET_CONNECTION=1
L83_VCP_FILTN MIN_LINE_WIDTH=0.5000 MIN_NECK_WIDTH=0.2000

PP1V8_G3S
R6302 47K 5% 1/20W MF 201
R6303 47K 5% 1/20W MF 201
R6304 47K 5% 1/20W MF 201
C6320 1000PF 10% 25V X7R 0201

CODEC_INT_L
CODEC_WAKE_L
CODEC_RESET_L

AUD_HP_PORT_L
R6300 1K 5% 1/20W MF 201
GND_AUDIO_CODEC
R6301 1K 5% 1/20W MF 201
AUD_HP_PORT_R

AUD_HP_SENSE_L
AUD_HP_SENSE_R
AUD_HP_PORT_CH_GND
AUD_HP_PORT_US_GND
AUD_HS_MIC_P
AUD_HS_MIC_N
XW6302 SHORT-8L-0.25MM-SM PLACE_NEAR=FL6609.1:5MM
XW6303 SHORT-8L-0.25MM-SM PLACE_NEAR=FL6610.1:5MM
AUD_HS4_REF
AUD_HS3_REF
AUD_RING_SENSE
AUD_TIP_SENSE

L83_HSBIAS_FILT MIN_LINE_WIDTH=0.2000 MIN_NECK_WIDTH=0.1000
C6309 4.7UF 20% 10V X5R-CERM 0402 CRITICAL BYPASS=U6300.F3:E3:4MM
L83_HSBIAS_FILT_REF MIN_LINE_WIDTH=0.2000 MIN_NECK_WIDTH=0.1000

CRITICAL
U6300
CS42L83A
WLCSP-SKT

D5	HPSENSA	+VCP_FILT	E6
E5	HPOUTA	-VCP_FILT	G6
F5	HPSENSB	GNDCP	F6
G5	HPOUTB	VL_SEL	C4
F1	HS4	DIGLDO_PDN*	D4
E2	HS_CLAMP2	INT*	B7
E1	HSIN+	WAKE*	C6
G2	HS3	RESET*	C5
F2	HS_CLAMP1	SPDIF_TX	A6 NC
D1	HSIN-	SWIRE_SEL	D3
F4	HS4_REF	ASP_LRCK/FSYNC	B5
G4	HS3_REF	SWIRE_SD/ASP_SDIN	A5
G3	RING_SENSE	ASP_SDOUT	A4
E4	TIP_SENSE	SWIRE_CLK/ASP_SCLK	B4
F3	HSBIAS_FILT	AD0	C3
E3	HSBIAS_FILT_REF	AD1	B2
		SDA	A1
		SCL	A2
		FLYP	E7
		FLYC	F7
		FLYN	G7
		FILT_P	C1
VP	A3		
VL	NC A7		
VD_FILT	B1		
VA	D6		
GNDL	B3		
GNDD	B6 C7		
GNDHS	G1 C2		
GNDA	D2		

PLACE_NEAR=U6300.A4:5mm
L83_SDOUT R6307 33 5% 1/20W MF 201

I2S_CODEC_LRCLK_R
I2S_CODEC_R2D
I2S_CODEC_D2R
I2S_CODEC_BCLK
I2C_CODEC_SDA
I2C_CODEC_SCL
L83_FLYP
L83_FLYC
L83_FLYN

CRITICAL
BYPASS=U6300.E7:F7:4MM C6307 2.2UF 20% 10V X5R-CERM 402
MIN_LINE_WIDTH=0.2000 MIN_NECK_WIDTH=0.1000
CRITICAL
BYPASS=U6300.G7:F7:4MM C6308 2.2UF 20% 10V X5R-CERM 402
MIN_LINE_WIDTH=0.2000 MIN_NECK_WIDTH=0.1000

L83_FILT MIN_LINE_WIDTH=0.2000 MIN_NECK_WIDTH=0.1000
BYPASS=U6300.C1:C2:3 MM CRITICAL C6310 10UF 20% 10V X5R 0603
GND_AUDIO_CODEC

TP6307 PP3V3_G3S PLACE_NEAR=L6302.1:20MM
TP6308 PP1V8_G3S
TP6309 CODEC_RESET_L PLACE_NEAR=U6300.C5:20MM
TP6300 I2S_CODEC_LRCLK_R PLACE_NEAR=U6300.B5:30MM
TP6301 I2S_CODEC_R2D PLACE_NEAR=U6300.A5:30MM
TP6302 I2S_CODEC_D2R PLACE_NEAR=U3900.Y3:30MM
TP6303 I2S_CODEC_BCLK PLACE_NEAR=U6300.B4:30MM
TP6304 I2C_CODEC_SDA PLACE_NEAR=U6300.A1:30MM
TP6305 I2C_CODEC_SCL PLACE_NEAR=U6300.A2:30MM
TP6306 PLACE_NEAR=TP6303.1:20MM

BOM_COST_GROUP=AUDIO

SYNC_MASTER= SYNC_DATE=
PAGE TITLE: AUDIO JACK CODEC
Apple Inc.
DRAWING NUMBER: 051-05309 SIZE: D
REVISION: 5.1.0
BRANCH:
PAGE: 63 OF 500
SHEET: 57 OF 98

2X MONO SPEAKER LEFT AMPLIFIERS

APN: 353S01252
GAIN: 0DBFS = xxVRMS

PLACE_NEAR=U6400.C1:5 MM
PLACE_NEAR=U6400.C1:3 MM
PLACE_NEAR=U6400.D2:5 MM
PLACE_NEAR=U6400.D2:3 MM
PP1V8_G3S
C6400 1UF 20% 16V CER-X5R 0201
C6401 0.1UF 10% 25V X5R 0201
C6402 1UF 20% 16V CER-X5R 0201
C6403 0.1UF 10% 25V X5R 0201
PLACE_NEAR=U6400.C4:10 MM
PLACE_NEAR=U6400.C4:3 MM
PPBUS_G3H_SPKRAMP_LEFT
C6404 0.1UF 10% 25V X5R 0201
C6405 10UF 20% 25V X5R-CERM 0603
C6406 10UF 20% 25V X5R-CERM 0603
SPKRAMP_RESET_L
R6402 47K 5% 1/20W MF 201
NOSTUFF R6400 47K 5% 1/20W MF 201
I2C_SPKRAMP_L_SDA
I2C_SPKRAMP_L_SCL
SPKRAMP_INT_L
SPKRAMP_RL_MODE
I2S_SPKRAMP_L_R2D
R6401 33 5% 1/20W MF 201
I2S_SPKRAMP_L_D2R
I2S_SPKRAMP_L_D2R_R1
I2S_SPKRAMP_L_LRCLK_R
I2S_SPKRAMP_L_BCLK
U6400 PTAS5770LB2 CSP
CRITICAL
OMIT_TABLE
AVDD IOVDD VBAT GND PGND
SDZ* SDA SCL IRQZ MODE SDIN SDOUT FSYNC SBCLK PDMD0 PDMCK0 PDMD1 PDMCK1
BST_P OUT_P OUT_P VSNS_P BST_N OUT_N OUT_N VSNS_N AREG DREG
SPKRAMP_RL_BSTP
SPKRAMP_RL_SNSP
SPKRAMP_RL_BSTN
SPKRAMP_RL_SNSN
SPKRAMP_RL_AREG
SPKRAMP_RL_DREG
C6411 0.1UF 10% 25V X5R 0201
C6412 0.1UF 10% 25V X5R 0201
BYPASS=U6400.B2:B3:5 MM
NO_XNET_CONNECTION=1
BYPASS=U6400.A2:A5:5 MM
NO_XNET_CONNECTION=1
DIDT=TRUE
SHORT-8L-0.25MM-SM XW6400 PLACE_NEAR=J6410.13:5 MM
SHORT-8L-0.25MM-SM XW6401 PLACE_NEAR=J6410.10:5 MM
MIN_LINE_WIDTH=0.4000
MIN_NECK_WIDTH=0.1500
SPKRCONN_RL_OUTP
SPKRCONN_RL_OUTN
NOSTUFF C6413 220PF 10% 16V X7R-CERM 201
NOSTUFF C6414 220PF 10% 25V X7R-CERM 201
C6407 0.1UF 10% 25V X5R 0201
C6408 1UF 20% 16V CER-X5R 0201
C6409 0.1UF 10% 25V X5R 0201
C6410 1UF 20% 16V CER-X5R 0201
PLACE_NEAR=U6400.D1:3 MM
PLACE_NEAR=U6400.D1:5 MM
PLACE_NEAR=U6400.D5:3 MM
PLACE_NEAR=U6400.D5:5 MM
PP1V8_G3S
NOSTUFF R6490 47K 5% 1/20W MF 201
SPKR_ID0
APN:518S00019
CRITICAL
J6410
FF14A-14C-R11DL-B-3H
F-RT-SM1

PLACE_NEAR=U6450.C1:5 MM
PLACE_NEAR=U6450.C1:3 MM
PLACE_NEAR=U6450.D2:5 MM
PLACE_NEAR=U6450.D2:3 MM
PP1V8_G3S
C6450 1UF 20% 16V CER-X5R 0201
C6451 0.1UF 10% 25V X5R 0201
C6452 1UF 20% 16V CER-X5R 0201
C6453 0.1UF 10% 25V X5R 0201
PLACE_NEAR=U6450.C4:10 MM
PLACE_NEAR=U6450.C4:3 MM
PPBUS_G3H_SPKRAMP_LEFT
C6454 0.1UF 10% 25V X5R 0201
C6455 10UF 20% 25V X5R-CERM 0603
C6456 10UF 20% 25V X5R-CERM 0603
SPKRAMP_RESET_L
I2C_SPKRAMP_L_SDA
I2C_SPKRAMP_L_SCL
SPKRAMP_INT_L
SPKRAMP_FL_MODE
I2S_SPKRAMP_L_R2D
R6451 33 5% 1/20W MF 201
I2S_SPKRAMP_L_D2R
I2S_SPKRAMP_L_D2R_R2
I2S_SPKRAMP_L_LRCLK_R
I2S_SPKRAMP_L_BCLK
U6450 PTAS5770LB2 CSP
CRITICAL
OMIT_TABLE
AVDD IOVDD VBAT GND PGND
SDZ* SDA SCL IRQZ MODE SDIN SDOUT FSYNC SBCLK PDMD0 PDMCK0 PDMD1 PDMCK1
BST_P OUT_P OUT_P VSNS_P BST_N OUT_N OUT_N VSNS_N AREG DREG
SPKRAMP_FL_BSTP
SPKRAMP_FL_SNSP
SPKRAMP_FL_BSTN
SPKRAMP_FL_SNSN
SPKRAMP_FL_AREG
SPKRAMP_FL_DREG
C6461 0.1UF 10% 25V X5R 0201
C6462 0.1UF 10% 25V X5R 0201
BYPASS=U6450.B2:B3:5 MM
NO_XNET_CONNECTION=1
BYPASS=U6450.A2:A5:5 MM
NO_XNET_CONNECTION=1
DIDT=TRUE
SHORT-8L-0.25MM-SM XW6450 PLACE_NEAR=J6410.7:5 MM
SHORT-8L-0.25MM-SM XW6451 PLACE_NEAR=J6410.4:5 MM
MIN_LINE_WIDTH=0.4000
MIN_NECK_WIDTH=0.1500
SPKRCONN_FL_OUTP
SPKRCONN_FL_OUTN
NOSTUFF C6463 220PF 10% 16V X7R-CERM 201
NOSTUFF C6464 220PF 10% 25V X7R-CERM 201
C6457 0.1UF 10% 25V X5R 0201
C6458 1UF 20% 16V CER-X5R 0201
C6459 0.1UF 10% 25V X5R 0201
C6460 1UF 20% 16V CER-X5R 0201
PLACE_NEAR=U6450.D1:3 MM
PLACE_NEAR=U6450.D1:5 MM
PLACE_NEAR=U6450.D5:3 MM
PLACE_NEAR=U6450.D5:5 MM

LEFT BULK CAPACITANCE
PPBUS_G3H_SPKRAMP_LEFT
CRITICAL C6483 33UF 20% 16V TANT-POLY CASE-B3-1
CRITICAL C6484 33UF 20% 16V TANT-POLY CASE-B3-1
CRITICAL C6485 33UF 20% 16V TANT-POLY CASE-B3-1
CRITICAL C6486 33UF 20% 16V TANT-POLY CASE-B3-1
CRITICAL C6487 33UF 20% 16V TANT-POLY CASE-B3-1
CRITICAL C6488 33UF 20% 16V TANT-POLY CASE-B3-1

PP1V8_G3S
NOSTUFF R6480 10K 5% 1/20W MF 201
NOSTUFF R6482 2.2K 5% 1/20W MF 201
SPKRAMP_RL_MODE
SPKRAMP_FL_MODE
R6481 0 5% 1/20W MF 0201
R6483 470 5% 1/20W MF 201

MODE PIN	I2C ADDR	CHANNEL
GND	0x31	REAR LEFT
470 to GND	0x32	FRONT LEFT
470 to IOVDD	0x33	REAR RIGHT
2K2 to GND	0x34	FRONT RIGHT
2K2 to IOVDD	0x35	
10k to GND	0x36	
10k to IOVDD	0x37	
47k to IOVDD	0x38	

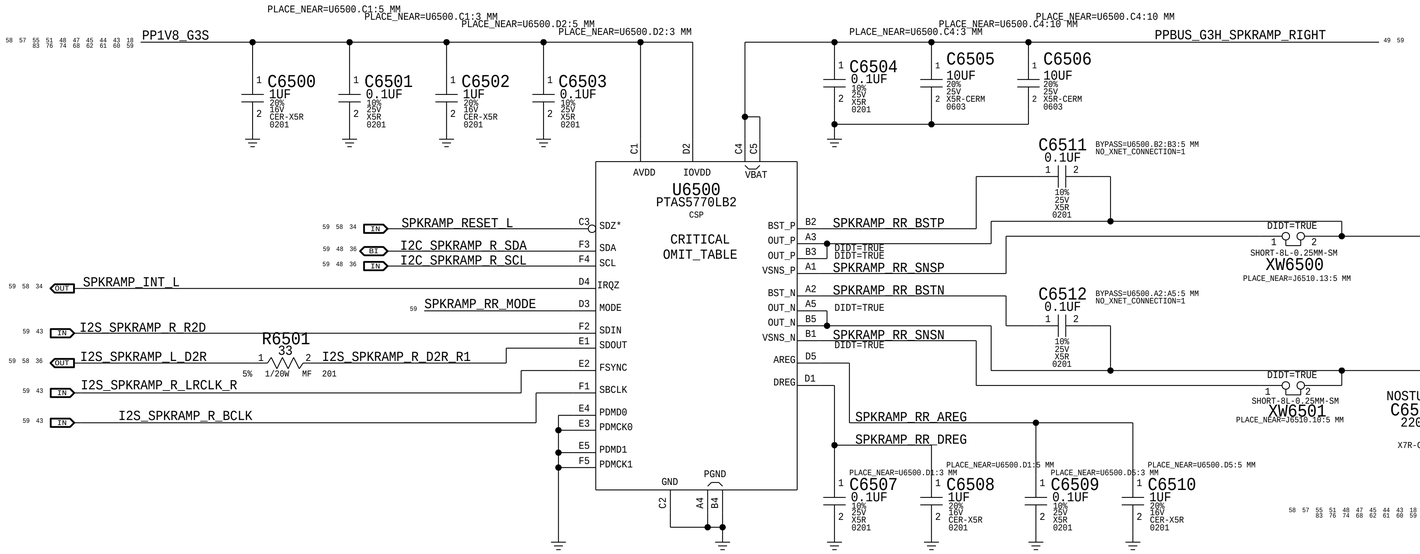
TP6400 I2S_SPKRAMP_L_LRCLK_R PLACE_NEAR=U6400.E2:30MM
PP6401 I2S_SPKRAMP_L_R2D PLACE_NEAR=U6400.F2:30MM
PP6402 I2S_SPKRAMP_L_D2R PLACE_NEAR=U3900.Y28:30MM
PP6403 I2S_SPKRAMP_L_BCLK PLACE_NEAR=U6400.F1:30MM
TP6404 I2C_SPKRAMP_L_SDA PLACE_NEAR=U6400.F3:30MM
TP6405 I2C_SPKRAMP_L_SCL PLACE_NEAR=U6400.F4:30MM
TP6406 PLACE_NEAR=PP6403.1:20MM
PP6407 PPBUS_G3H_SPKRAMP_LEFT PLACE_NEAR=U6400.C4:20MM
TP6408 PP1V8_G3S PLACE_NEAR=U6400.C1:20MM
TP6409 SPKRAMP_RESET_L PLACE_NEAR=U6400.C3:20MM

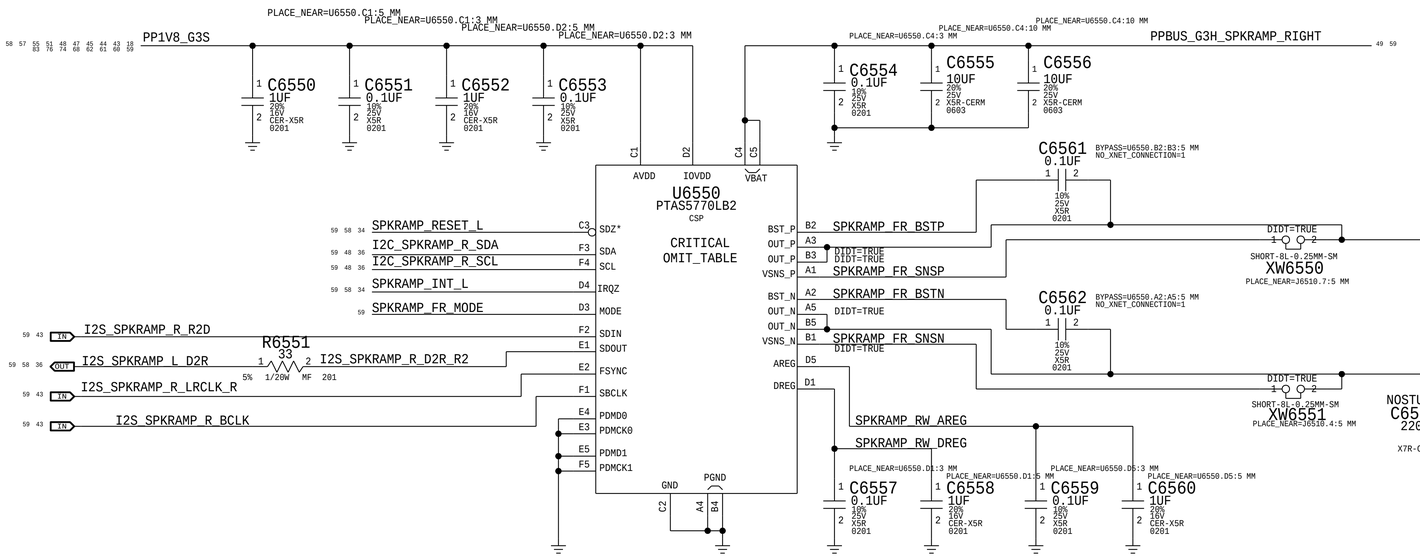
BOM_COST_GROUP=AUDIO

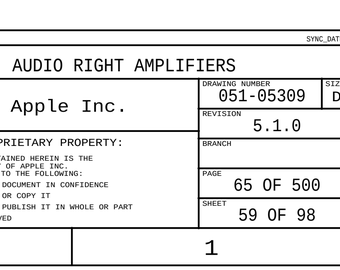
SYNC_MASTER= SYNC_DATE=
PAGE TITLE
AUDIO LEFT AMPLIFIERS
Apple Inc.
DRAWING NUMBER 051-05309
SIZE D
REVISION 5.1.0
BRANCH
PAGE 64 OF 500
SHEET 58 OF 98

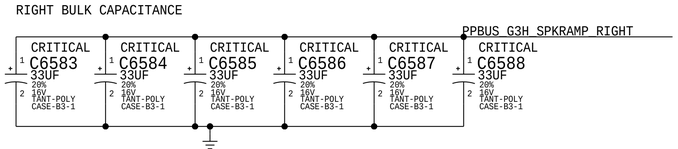
2X MONO SPEAKER RIGHT AMPLIFIERS

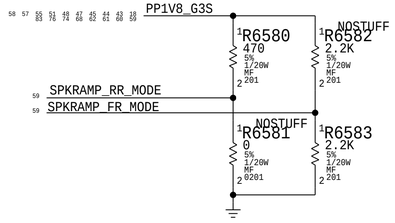
APN: 353S01252
GAIN: 0DBFS = xxVRMS



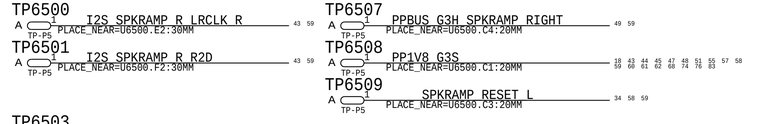








MODE PIN	I2C ADDR	CHANNEL
GND	0x31	LEFT REAR
470 to GND	0x32	LEFT FRONT
470 to IOVDD	0x33	RIGHT REAR
2K2 to GND	0x34	RIGHT FRONT
2K2 to IOVDD	0x35	
10k to GND	0x36	
10k to IOVDD	0x37	
47k to IOVDD	0x38	



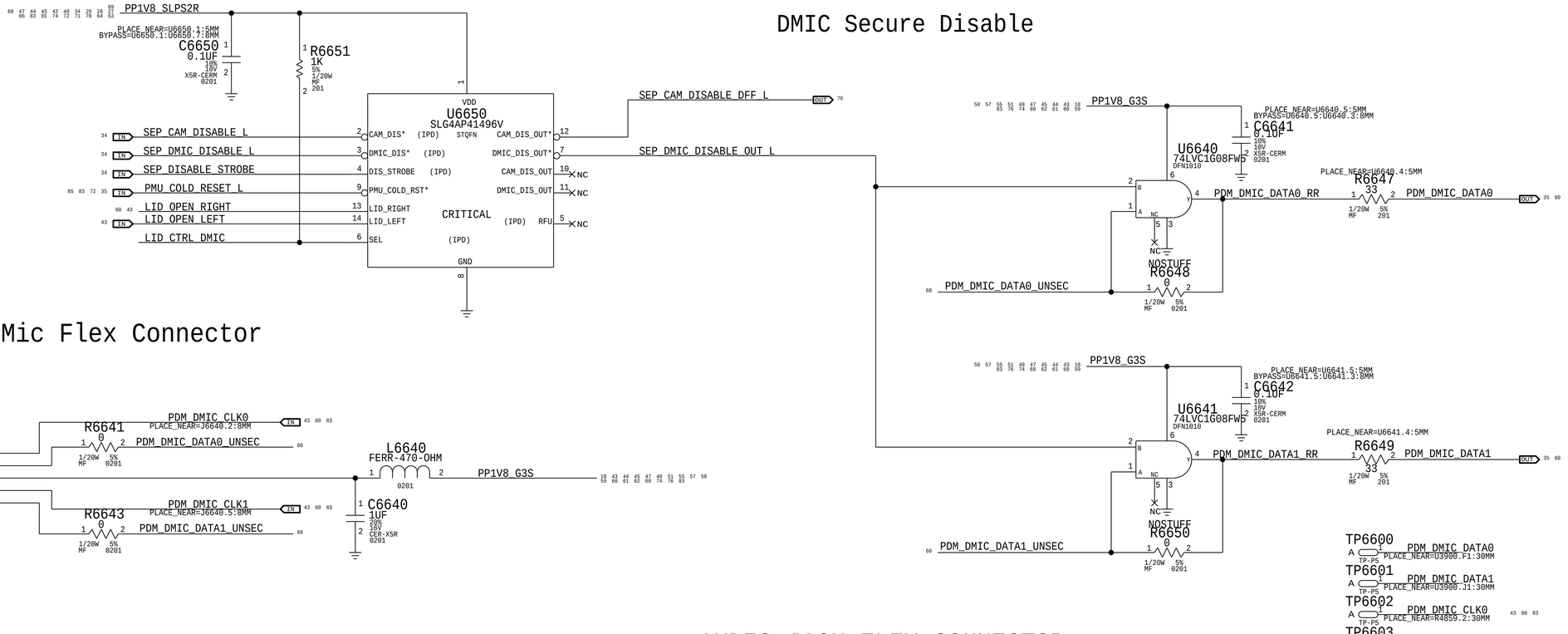
BOM_COST_GROUP=AUDIO

SYNC_MASTER= SYNC_DATE=
PAGE TITLE
AUDIO RIGHT AMPLIFIERS

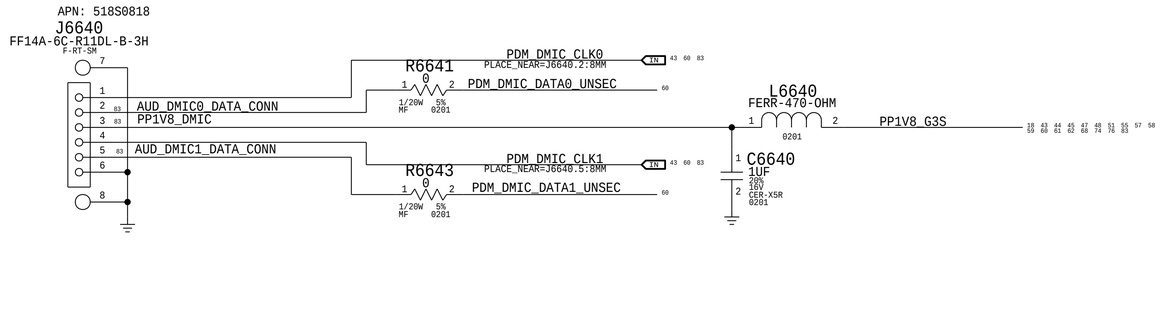
Apple Inc.

DRAWING NUMBER	051-05309
SIZE	D
REVISION	5.1.0
BRANCH	
PAGE	65 OF 500
SHEET	59 OF 98

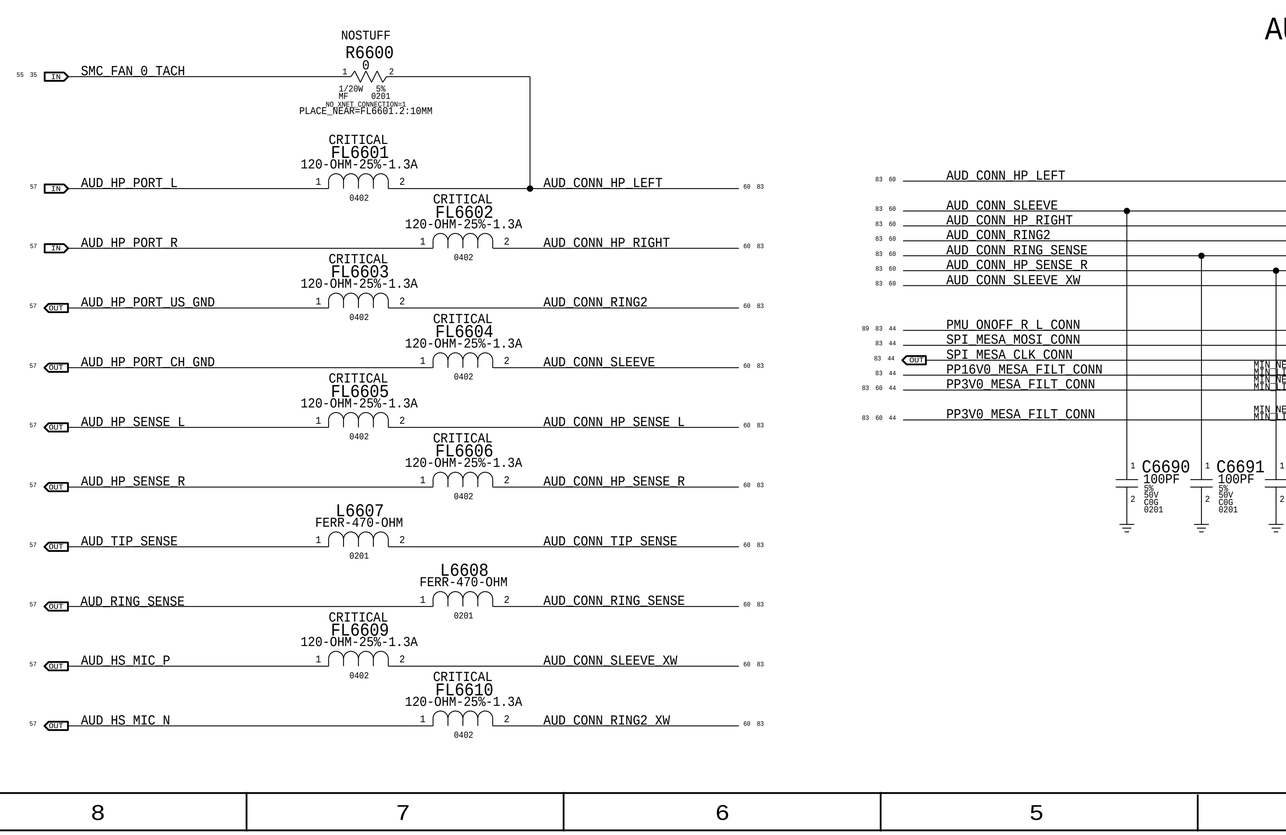
DMIC Secure Disable



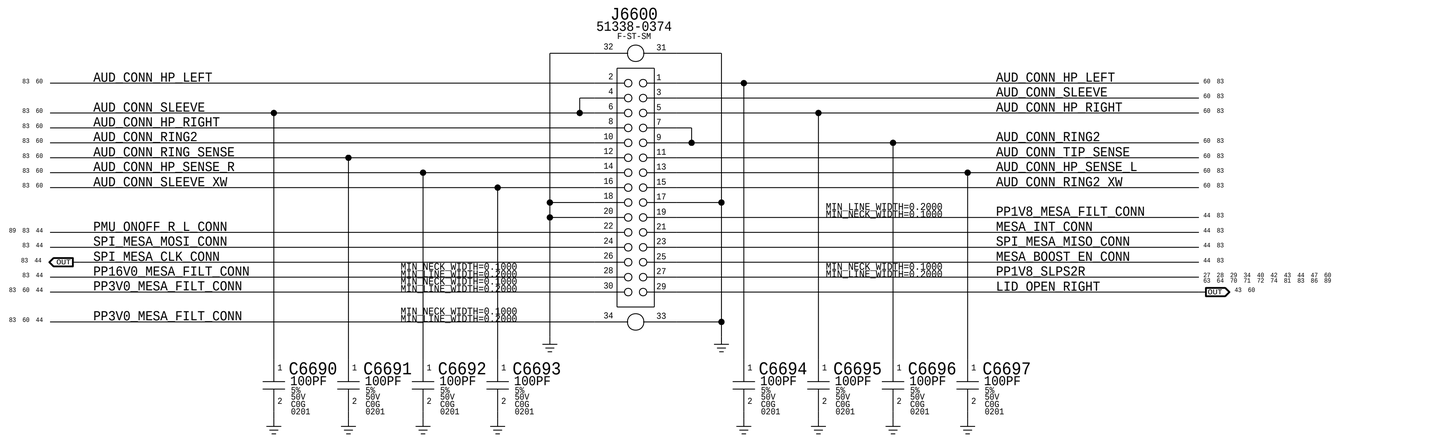
Digital Mic Flex Connector



AUDIO JACK FLEX CONNECTOR



APN: 516S1064
MATES WITH APN: 516S0573 ON FLEX



TP6600 PDM_DMIC_DATA0 PLACE_NEAR=U3900.F1:30MM
TP6601 PDM_DMIC_DATA1 PLACE_NEAR=U3900.J1:30MM
TP6602 PDM_DMIC_CLK0 PLACE_NEAR=R4859.2:30MM
TP6603 PDM_DMIC_CLK1 PLACE_NEAR=R4860.2:30MM
PP6606 PLACE_NEAR=TP6602.1:30MM

BOM_COST_GROUP=AUDIO

PAGE TITLE: AUDIO FLEX CONNECTORS

Apple Inc.

DRAWING NUMBER 051-05309 SIZE D
REVISION 5.1.0
BRANCH
PAGE 66 OF 500
SHEET 60 OF 98

KBD_ID PIN		CONNECTION ON MEMBRANE KBD
ANSI	FLOAT	NC
ISO	HIGH	PP1V8_G3S
JIS	GND	GND

PAGE TITLE

KEYBOARD & TRACKPAD 1

Apple Inc.

DRAWING NUMBER 051-05309 SIZE D

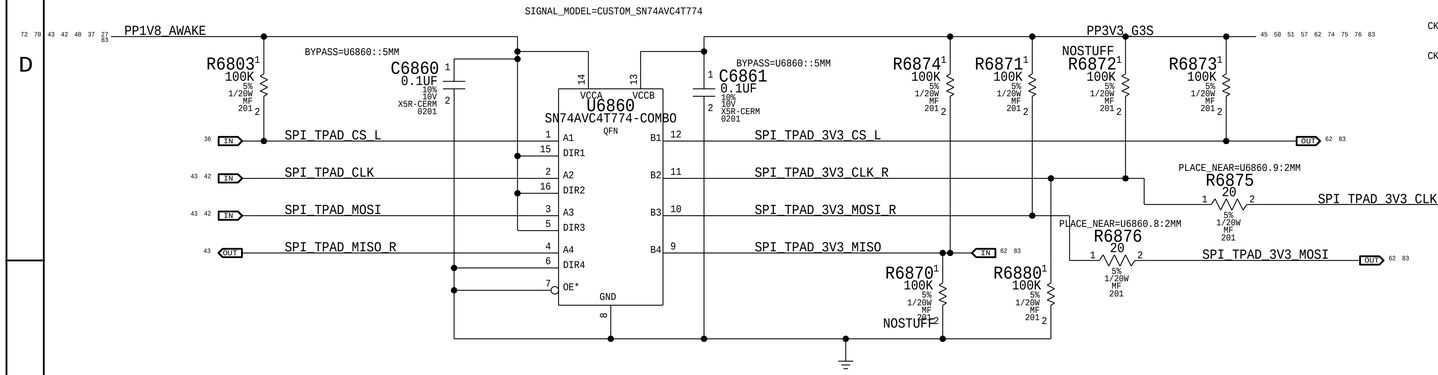
REVISION 5.1.0

BRANCH

PAGE 67 OF 500

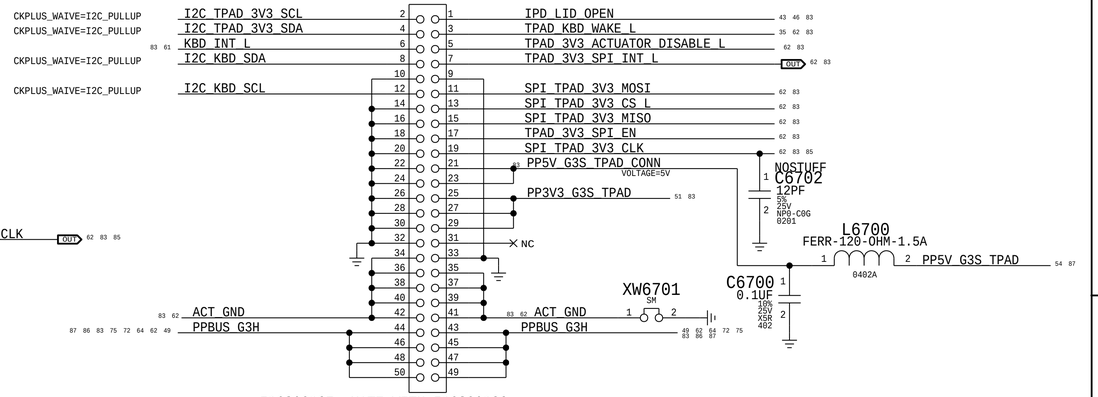
SHEET 61 OF 98

Trackpad Level Shifting

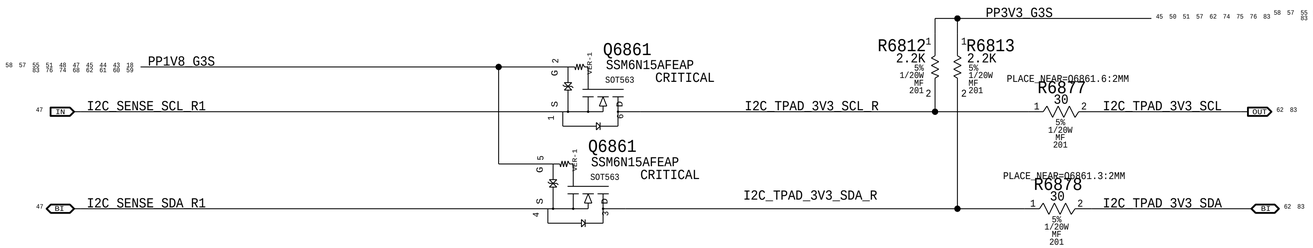


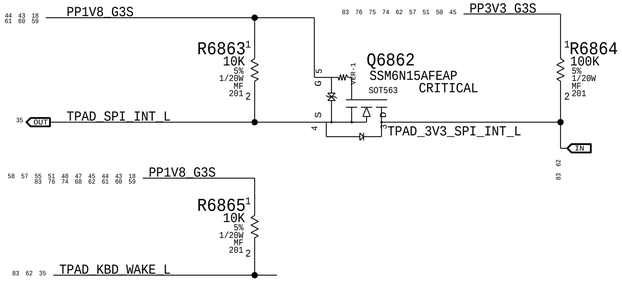
TPAD CONNECTOR

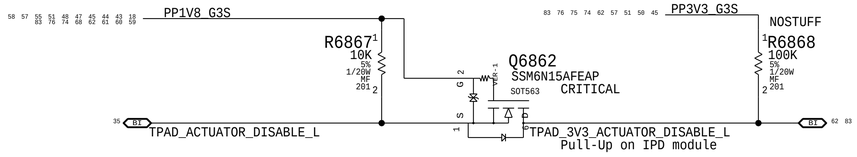
J6801
DF40C-50DS-0.4V-51
F-ST-SM

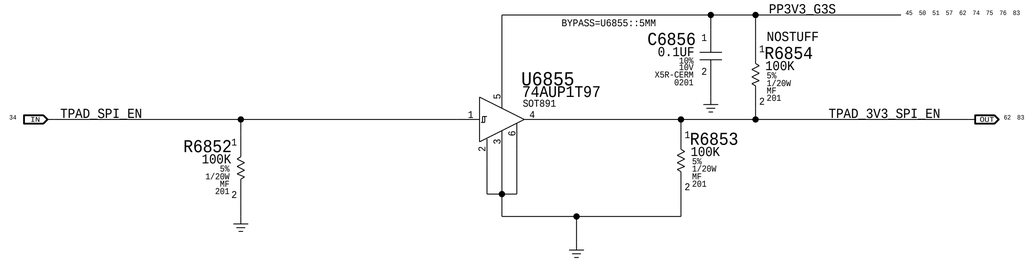


516S00187, MATE WITH 516S00188





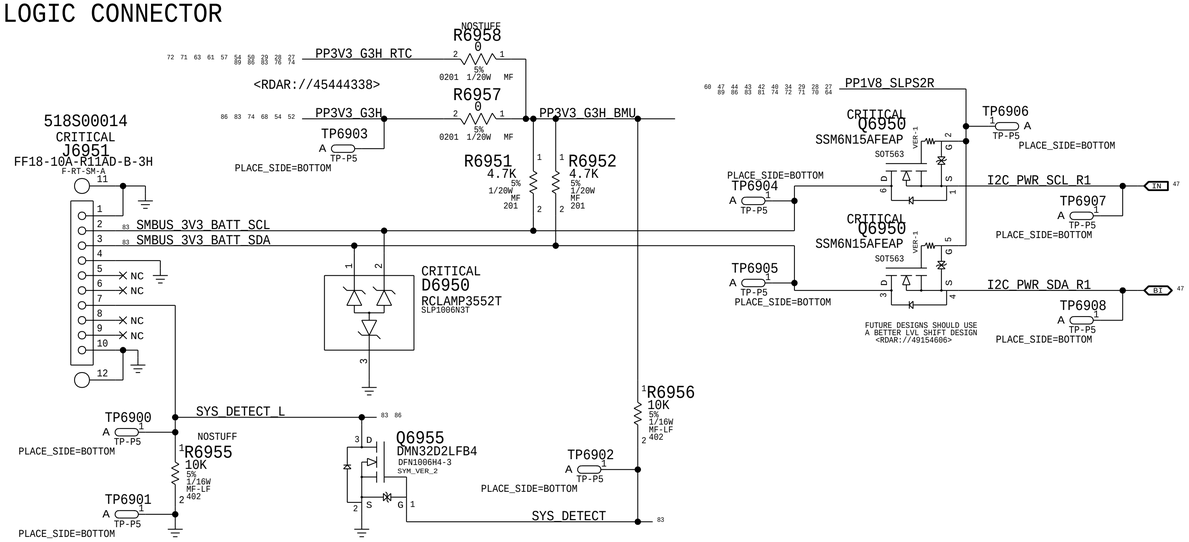




BOM_COST_GROUP=TRACKPAD

PAGE TITLE	Keyboard & Trackpad 2
	Apple Inc.
DRAWING NUMBER	051-05309
SIZE	D
REVISION	5.1.0
BRANCH	
PAGE	68 OF 500
SHEET	62 OF 98

BMU LOGIC CONNECTOR

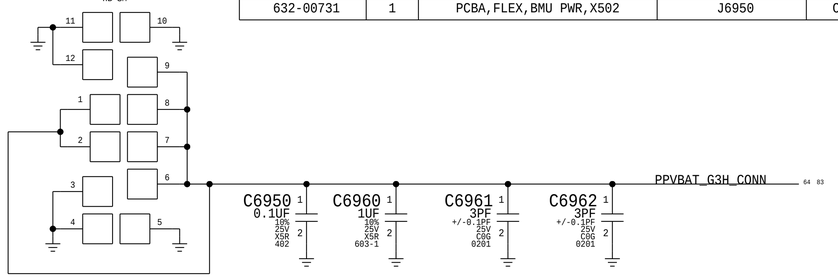


BATTERY (BMU) FLEX SOLDER PADS

BMU POWER FLEX IS SOLDERED TO MLB.

998-03828
CRITICAL
J6950
PWR-MLB-X520
HB-SM

PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
632-00731	1	PCBA,FLEX,BMU PWR,X502	J6950	CRITICAL	



SMC Reset Circuit

Right Shift & Left Option Control
followed by ON OFF button press.

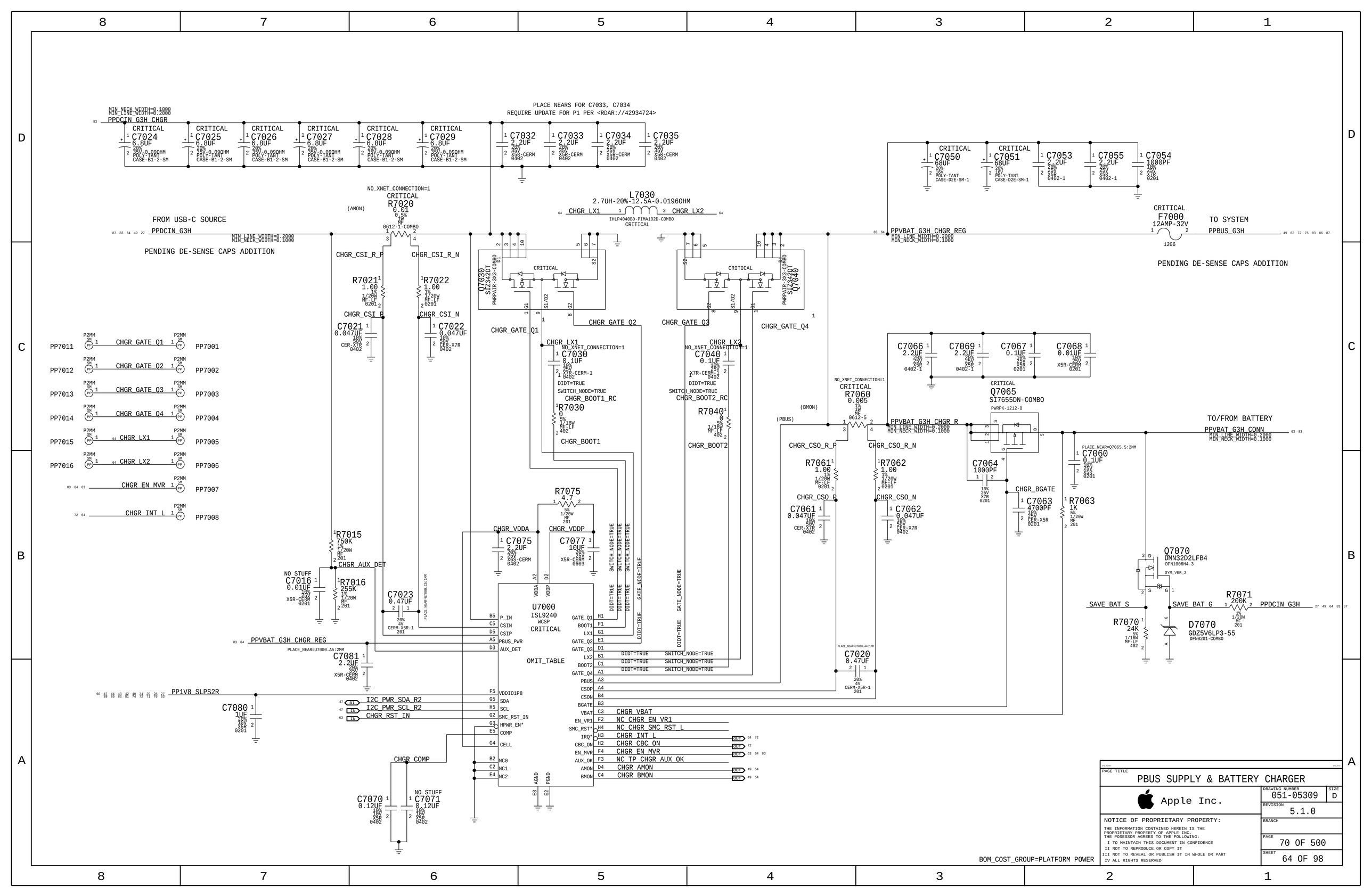
3.3V G3H RTC VR

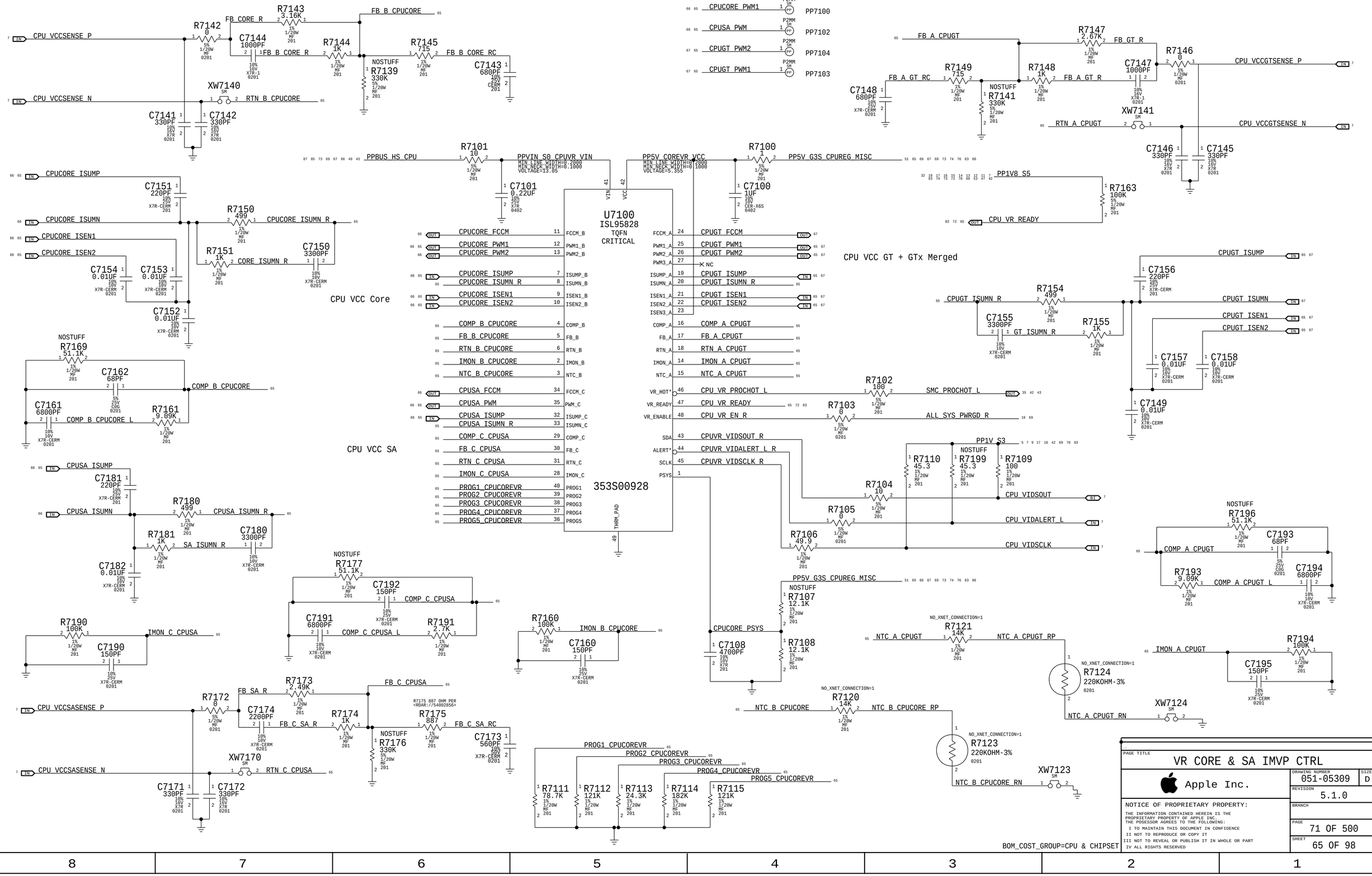
BOM_COST_GROUP=PLATFORM POWER

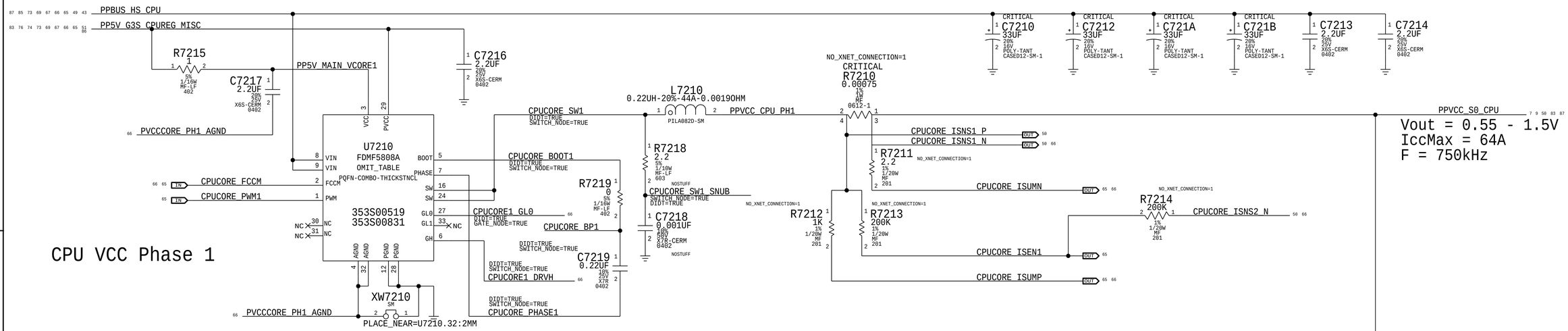
PAGE TITLE
BATTERY CONN, 3V3 G3H RTC VR

Apple Inc.

DRAWING NUMBER 051-05309
SIZE D
REVISION 5.1.0
BRANCH
PAGE 69 OF 500
SHEET 63 OF 98


PPDCIN_G3H_CHGR
MIN_NECK_WIDTH=0.1000
MIN_LINE_WIDTH=0.2000
PLACE NEARS FOR C7033, C7034
REQUIRE UPDATE FOR P1 PER <RDAR://42934724>
C7024 6.8UF
C7025 6.8UF
C7026 6.8UF
C7027 6.8UF
C7028 6.8UF
C7029 6.8UF
C7032 2.2UF
C7033 2.2UF
C7034 2.2UF
C7035 2.2UF
C7050 68UF
C7051 68UF
C7053 2.2UF
C7055 2.2UF
C7054 1000PF
F7000 12AMP-32V
TO SYSTEM
PPBUS_G3H
PPVBAT_G3H_CHGR_REG
PENDING DE-SENSE CAPS ADDITION
FROM USB-C SOURCE
PPDCIN_G3H
R7020 0.01
L7030 2.7UH-20%-12.5A-0.01960HM
IHLP4040BD-PIMA102D-COMBO
CHGR_LX1
CHGR_LX2
Q7030 SI7342DT
Q7040 SI7342DT
PWRPAIR-3X3-COMBO
CHGR_CSI_R_P
CHGR_CSI_R_N
R7021 1.00
R7022 1.00
C7021 0.047UF
C7022 0.047UF
CHGR_GATE_Q1
CHGR_GATE_Q2
CHGR_GATE_Q3
CHGR_GATE_Q4
C7030 0.1UF
C7040 0.1UF
CHGR_BOOT1_RC
CHGR_BOOT2_RC
R7030 0
R7040 0
CHGR_BOOT1
CHGR_BOOT2
C7066 2.2UF
C7069 2.2UF
C7067 0.1UF
C7068 0.01UF
Q7065 SI7655DN-COMBO
PWRPK-1212-8
R7060 0.005
PPVBAT_G3H_CHGR_R
TO/FROM BATTERY
PPVBAT_G3H_CONN
CHGR_CSO_R_P
CHGR_CSO_R_N
R7061 1.00
R7062 1.00
C7061 0.047UF
C7062 0.047UF
C7064 1000PF
C7063 4700PF
CHGR_BGATE
C7060 0.1UF
R7063 1K
Q7070 DMN32D2LFB4
DFN1006H4-3
R7071 200K
R7070 24K
D7070 GDZ5V6LP3-55
DFN0201-COMBO
SAVE_BAT_S
SAVE_BAT_G
PPDCIN_G3H
C7020 0.47UF
R7075 4.7
C7075 2.2UF
C7077 10UF
C7023 0.47UF
R7015 750K
R7016 255K
C7016 0.01UF
C7081 2.2UF
C7080 1UF
C7070 0.12UF
C7071 0.12UF
U7000 ISL9240 WCSP CRITICAL
OMIT_TABLE
CHGR_VBAT
NC_CHGR_EN_VR1
NC_CHGR_SMC_RST_L
CHGR_INT_L
CHGR_CBC_ON
CHGR_EN_MVR
NC_TP_CHGR_AUX_OK
CHGR_AMON
CHGR_BMON
I2C_PWR_SDA_R2
I2C_PWR_SCL_R2
CHGR_RST_IN
PP1V8_SLPS2R
CHGR_COMP
CHGR_VDDA
CHGR_VDDP
CHGR_AUX_DET
PPVBAT_G3H_CHGR_REG
PP7011 CHGR_GATE_Q1 PP7001
PP7012 CHGR_GATE_Q2 PP7002
PP7013 CHGR_GATE_Q3 PP7003
PP7014 CHGR_GATE_Q4 PP7004
PP7015 CHGR_LX1 PP7005
PP7016 CHGR_LX2 PP7006
CHGR_EN_MVR PP7007
CHGR_INT_L PP7008
BOM_COST_GROUP=PLATFORM POWER
PAGE TITLE
PBUS SUPPLY & BATTERY CHARGER
Apple Inc.
DRAWING NUMBER 051-05309
SIZE D
REVISION 5.1.0
BRANCH
PAGE 70 OF 500
SHEET 64 OF 98
NOTICE OF PROPRIETARY PROPERTY:
THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE INC.
THE POSESSOR AGREES TO THE FOLLOWING:
I TO MAINTAIN THIS DOCUMENT IN CONFIDENCE
II NOT TO REPRODUCE OR COPY IT
III NOT TO REVEAL OR PUBLISH IT IN WHOLE OR PART
IV ALL RIGHTS RESERVED


CPU_VCCSENSE_P
CPU_VCCSENSE_N
R7142 0
C7144 1000PF
R7143 3.16K
FB_CORE_R
FB_B_CPUCORE
FB_B_CORE_R
R7144 1K
R7145 715
FB_B_CORE_RC
NOSTUFF R7139 330K
C7143 680PF
XW7140 SM
RTN_B_CPUCORE
C7141 330PF
C7142 330PF
CPUCORE_PWM1
CPUSA_PWM
CPUGT_PWM2
CPUGT_PWM1
PP7100
PP7102
PP7104
PP7103
FB_A_CPUGT
FB_A_GT_RC
R7147 2.67K
FB_GT_R
R7149 715
R7148 1K
FB_A_GT_R
NOSTUFF R7141 330K
C7147 1000PF
R7146 0
CPU_VCCGTSENSE_P
C7148 680PF
XW7141 SM
RTN_A_CPUGT
CPU_VCCGTSENSE_N
C7146 330PF
C7145 330PF
CPUCORE_ISUMP
CPUCORE_ISUMN
CPUCORE_ISEN1
CPUCORE_ISEN2
C7151 220PF
R7150 499
CPUCORE_ISUMN_R
R7151 1K
CORE_ISUMN_R
C7150 3300PF
C7154 0.01UF
C7153 0.01UF
C7152 0.01UF
CPU VCC Core
R7101 10
PPBUS_HS_CPU
PPVIN_S0_CPUVR_VIN
MIN_LINE_WIDTH=0.2000
MIN_NECK_WIDTH=0.1000
VOLTAGE=13.05
C7101 0.22UF
R7100 1
PP5V_COREVR_VCC
VOLTAGE=5.355
C7100 1UF
PP5V_G3S_CPUREG_MISC
PP1V8_S5
R7163 100K
CPU_VR_READY
U7100
ISL95828
TQFN
CRITICAL
353S00928
THRM_PAD
CPUCORE_FCCM
CPUCORE_PWM1
CPUCORE_PWM2
CPUCORE_ISUMP
CPUCORE_ISUMN_R
CPUCORE_ISEN1
CPUCORE_ISEN2
COMP_B_CPUCORE
FB_B_CPUCORE
RTN_B_CPUCORE
IMON_B_CPUCORE
NTC_B_CPUCORE
CPUSA_FCCM
CPUSA_PWM
CPUSA_ISUMP
CPUSA_ISUMN_R
COMP_C_CPUSA
FB_C_CPUSA
RTN_C_CPUSA
IMON_C_CPUSA
PROG1_CPUCOREVR
PROG2_CPUCOREVR
PROG3_CPUCOREVR
PROG4_CPUCOREVR
PROG5_CPUCOREVR
CPUGT_FCCM
CPUGT_PWM1
CPUGT_PWM2
CPUGT_ISUMP
CPUGT_ISUMN_R
CPUGT_ISEN1
CPUGT_ISEN2
COMP_A_CPUGT
FB_A_CPUGT
RTN_A_CPUGT
IMON_A_CPUGT
NTC_A_CPUGT
CPU_VR_PROCHOT_L
CPU_VR_READY
CPU_VR_EN_R
CPUVR_VIDSOUT_R
CPUVR_VIDALERT_L_R
CPUVR_VIDSCLK_R
R7102 100
SMC_PROCHOT_L
R7103 0
ALL_SYS_PWRGD_R
PP1V_S3
R7110 45.3
R7199 45.3
R7109 100
R7104 10
CPU_VIDSOUT
R7105 0
CPU_VIDALERT_L
R7106 49.9
CPU_VIDSCLK
CPU VCC GT + GTx Merged
R7154 499
CPUGT_ISUMN_R
C7155 3300PF
GT_ISUMN_R
R7155 1K
C7156 220PF
CPUGT_ISUMP
CPUGT_ISUMN
CPUGT_ISEN1
CPUGT_ISEN2
C7157 0.01UF
C7158 0.01UF
C7149 0.01UF
CPU VCC SA
CPUSA_ISUMP
CPUSA_ISUMN
CPUSA_ISUMN_R
SA_ISUMN_R
C7181 220PF
R7180 499
R7181 1K
C7180 3300PF
C7182 0.01UF
NOSTUFF R7177 51.1K
C7192 150PF
COMP_C_CPUSA_L
C7191 6800PF
R7191 2.7K
R7190 100K
IMON_C_CPUSA
C7190 150PF
R7160 100K
IMON_B_CPUCORE
C7160 150PF
PP5V_G3S_CPUREG_MISC
CPUCORE_PSYS
C7108 4700PF
R7107 12.1K
R7108 12.1K
NOSTUFF R7196 51.1K
COMP_A_CPUGT
C7193 68PF
R7193 9.09K
COMP_A_CPUGT_L
C7194 6800PF
NO_XNET_CONNECTION=1
R7121 14K
NTC_A_CPUGT
NTC_A_CPUGT_RP
R7124 220KOHM-3%
NTC_A_CPUGT_RN
XW7124 SM
IMON_A_CPUGT
R7194 100K
C7195 150PF
NTC_B_CPUCORE
R7120 14K
NTC_B_CPUCORE_RP
R7123 220KOHM-3%
NTC_B_CPUCORE_RN
XW7123 SM
NOSTUFF R7169 51.1K
C7162 68PF
COMP_B_CPUCORE
C7161 6800PF
COMP_B_CPUCORE_L
R7161 9.09K
CPU_VCCSASENSE_P
CPU_VCCSASENSE_N
R7172 0
R7173 2.49K
FB_SA_R
FB_C_CPUSA
FB_C_SA_R
C7174 2200PF
R7174 1K
R7175 887
R7175.887 OHM PER <ROAR://54082856>
FB_C_SA_RC
NOSTUFF R7176 330K
C7173 560PF
XW7170 SM
RTN_C_CPUSA
C7171 330PF
C7172 330PF
PROG1_CPUCOREVR
PROG2_CPUCOREVR
PROG3_CPUCOREVR
PROG4_CPUCOREVR
PROG5_CPUCOREVR
R7111 78.7K
R7112 121K
R7113 24.3K
R7114 182K
R7115 121K
BOM_COST_GROUP=CPU & CHIPSET
PAGE TITLE
VR CORE & SA IMVP CTRL
Apple Inc.
DRAWING NUMBER 051-05309
SIZE D
REVISION 5.1.0
BRANCH
PAGE 71 OF 500
SHEET 65 OF 98
NOTICE OF PROPRIETARY PROPERTY:
THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE INC. THE POSESSOR AGREES TO THE FOLLOWING:
I TO MAINTAIN THIS DOCUMENT IN CONFIDENCE
II NOT TO REPRODUCE OR COPY IT
III NOT TO REVEAL OR PUBLISH IT IN WHOLE OR PART
IV ALL RIGHTS RESERVED



PAGE TITLE

VR CORE & SA IMVP

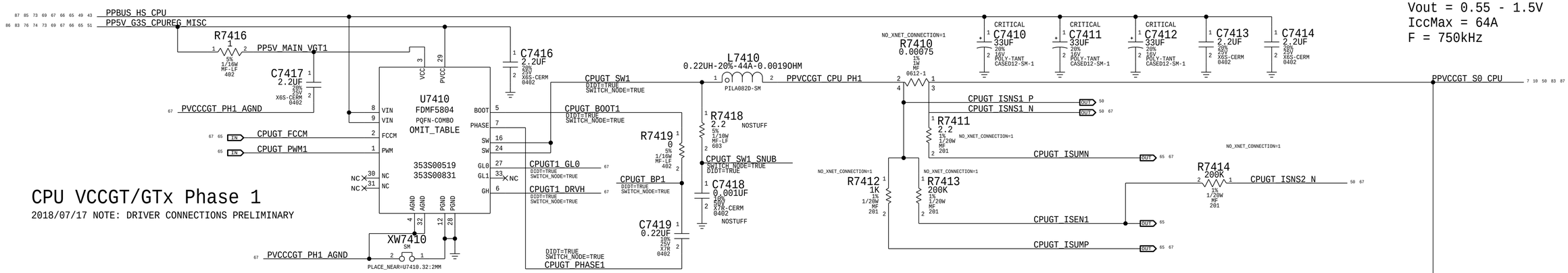
Apple Inc.

DRAWING NUMBER	051-05309
SIZE	D
REVISION	5.1.0
BRANCH	
PAGE	72 OF 500
SHEET	66 OF 98

Vout = 0.55 - 1.5V
IccMax = 64A
F = 750kHz

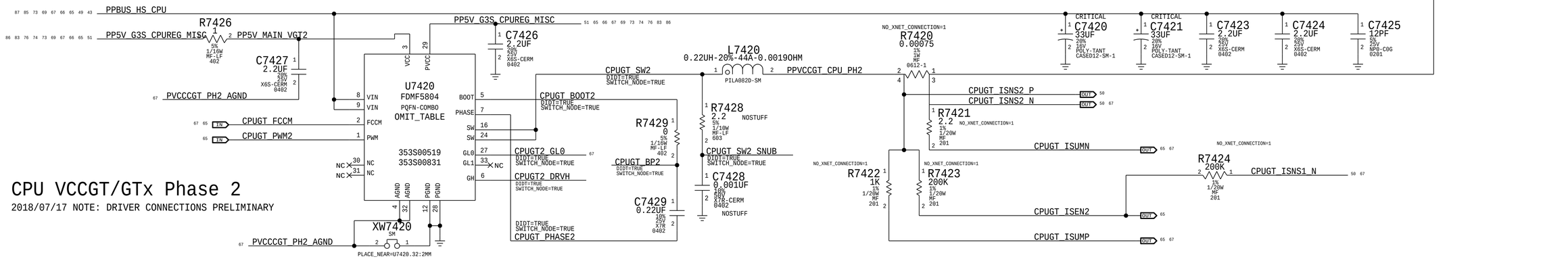
CPU VCCGT/GTx Phase 1

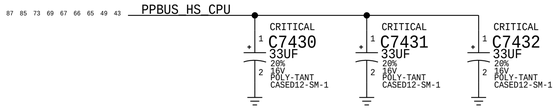
2018/07/17 NOTE: DRIVER CONNECTIONS PRELIMINARY

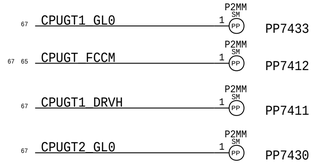


CPU VCCGT/GTx Phase 2

2018/07/17 NOTE: DRIVER CONNECTIONS PRELIMINARY







BOM_COST_GROUP=CPU & CHIPSET

PAGE TITLE: VR GT & GTX IMVP

Apple Inc.

DRAWING NUMBER: 051-05309
SIZE: D
REVISION: 5.1.0
BRANCH:
PAGE: 74 OF 500
SHEET: 67 OF 98

5V G3S

Vout = 5.1V
IOUT MAX = 7.997A
F = 500 KHZ

3V3 G3H

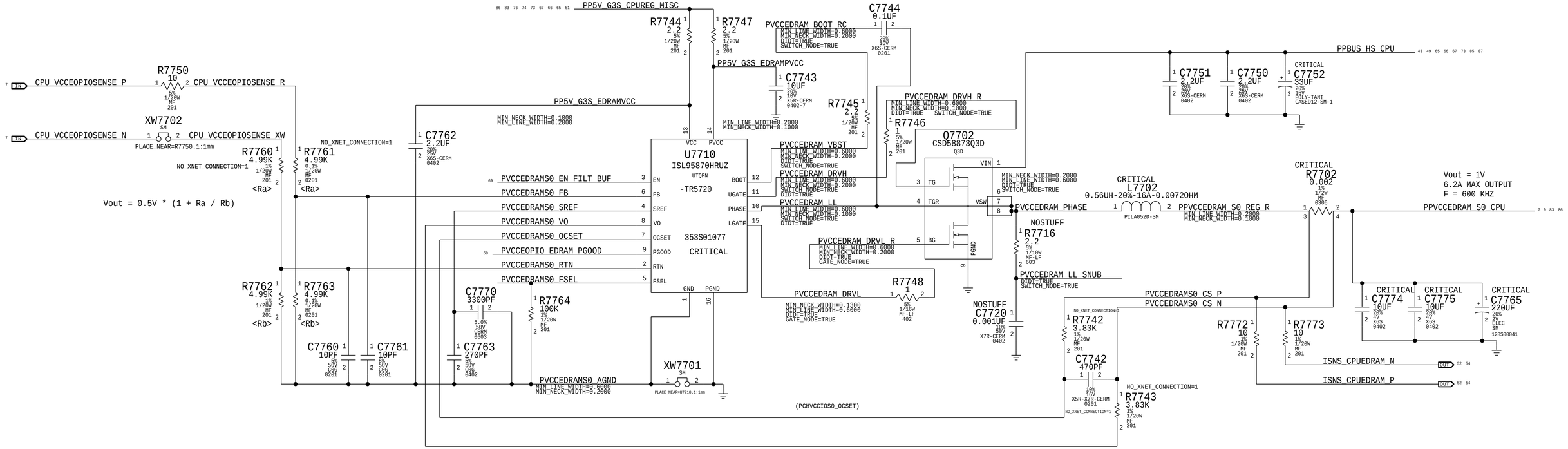
Vout = 3.3V
Iout Max = 10.9A
F = 500 KHZ

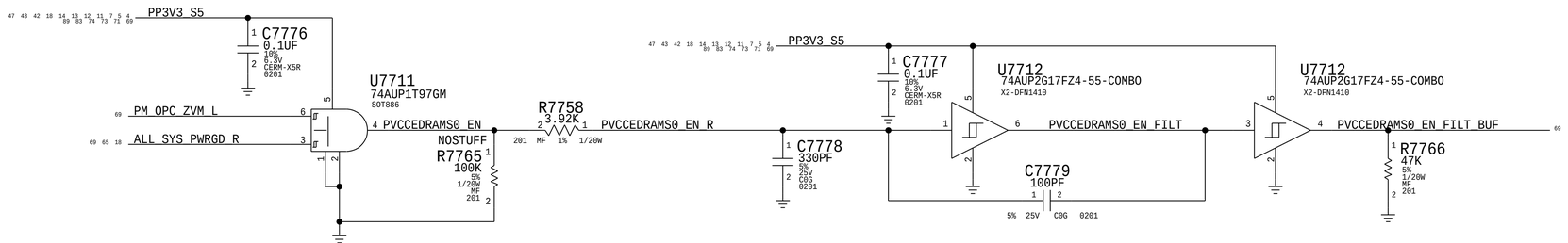
PP5V_G3S
PP3V3_G3H
PPVIN_G3H_P3V3G3H
PPVIN_G3H_P5VG3S
P5V_G3H_LDO
VOUT = 5V
100MA MAX OUTPUT
P5VP3V3_VREG3
P5VP3V3_VREF2
P5VP3V3_SKIPSEL
AUDIBLE SKIPPING
INAUDIBLE SKIPPING
NOSTUFF
CRITICAL
C7650 2.2UF 20% 25V X6S-CERM 0402
C7651 10UF 20% 16V X6S-CERM 0603
C7652 0.22UF 10% 16V CERM 402
C7653 2.2UF 20% 25V X6S-CERM 0402
C7660 2.2UF 20% 25V X6S-CERM 0402
C7661 2.2UF 20% 25V X6S-CERM 0402
C7665 33UF 20% 16V POLY-TANT CASED12-SM-1
C7666 33UF 20% 16V POLY-TANT CASED12-SM-1
C7669 0.1UF 10% 25V X7R-CERM-1 0402
C7670 2.2UF 20% 25V X6S-CERM 0402
C7671 2.2UF 20% 25V X6S-CERM 0402
C7675 220UF-25MOHM 20% 6.3V POLY-TANT CASE-B2-SM
C7676 220UF-25MOHM 20% 6.3V POLY-TANT CASE-B2-SM
C7677 220UF-25MOHM 20% 6.3V POLY-TANT CASE-B2-SM
C7680 2.2UF 20% 25V X6S-CERM 0402
C7681 2.2UF 20% 25V X6S-CERM 0402
C7685 33UF 20% 16V POLY-TANT CASED12-SM-1
C7686 33UF 20% 16V POLY-TANT CASED12-SM-1
C7687 33UF 20% 16V POLY-TANT CASED12-SM-1
C7689 0.1UF 10% 25V X7R-CERM-1 0402
C7690 2.2UF 20% 25V X6S-CERM 0402
C7691 2.2UF 20% 25V X6S-CERM 0402
C7695 150UF 20% 6.3V TANT CASE-B-SM
C7696 150UF 20% 6.3V TANT CASE-B-SM
C7613 150UF 20% 6.3V TANT CASE-B-SM
C7611 150UF 20% 6.3V TANT CASE-B-SM
C7697 150UF 20% 6.3V TANT CASE-B-SM
C7612 150UF 20% 6.3V TANT CASE-B-SM
R7651 0 5% 1/20W MF 0201
R7650 0 5% 1/20W MF 0201
R7665 0 5% 1/16W MF-LF 402
R7666 1 5% 1/16W MF-LF 402
R7664 0 5% 1/16W MF-LF 402
R7685 0 5% 1/16W MF-LF 402
R7686 1 5% 1/16W MF-LF 402
R7684 0 5% 1/16W MF-LF 402
R7694 2.2 5% 1/10W MF-LF 603
R7674 2.2 5% 1/10W MF-LF 603
R7673 1.2K 1% 1/20W MF 201
R7672 4.42K 1% 1/20W MF 201
R7693 1.37K 1% 1/20W MF 201
R7692 3.83K 1% 1/20W MF 201
R7691 10 5% 1/20W MF 201
R7697 3.09K 1% 1/20W MF 201
R7698 105K 0.1% 1/20W MF 0201-1
R7699 47K 0.1% 1/20W MF 0201
R7671 10 5% 1/20W MF 201
R7677 6.34K 1% 1/20W MF 201
R7678 34.8K 0.1% 1/20W MF 0201-1
R7679 10K 0.1% 1/20W MF 0201-1
R7675 5.49K 1% 1/20W MF 201
R7676 10K 1% 1/20W MF 201
R7695 5.49K 1% 1/20W MF 201
R7696 10K 1% 1/20W MF 201
R7655 200K 1% 1/20W MF 201
C7673 0.1UF 10% 25V X6S-CERM 0201
C7674 0.001UF 10% 50V CERM 402
C7694 0.001UF 10% 50V CERM 402
C7678 330PF 10% 16V X7R 0201
C7679 4700PF 10% 16V X7R 0201
C7698 270PF 10% 16V X7R-CERM 0201-1
C7693 0.1UF 10% 25V X6S-CERM 0201
Q7660 CSD58873Q3D Q3D
Q7680 CSD58873Q3D Q3D
L7670 1.5UH-20%-12.5A-0.017OHM PIMB062D-SM 152S00268
L7690 1.0UH-20%-14A-0.0107OHM PIMB062D-SM 152S0269
U7650 TPS51980B QFN 353S01936
376S1038
XW7650 XW7671 XW7670 XW7675 XW7690 XW7691 XW7695
P5VG3S_VBST_R P5VG3S_VBST P5VG3S_DRVH_R P5VG3S_SW P5VG3S_DRVL_R P5VG3S_CSP1 P5VG3S_DRVH P5VG3S_SW P5VG3S_DRVL P5VG3S_SNUBR P5VG3S_VFB1 P5VG3S_COMP1 P5VG3S_EN_DLY P5VG3S_PGOOD P5VG3S_VFB1_R P5VG3S_VFB1_R2 P5VG3S_VFB1_RR P5VG3S_CS1_L_P P5VG3S_CS1_L_N P5VG3S_COMP1_R
P3V3G3H_VBST_R P3V3G3H_VBST P3V3G3H_DRVH_R P3V3G3H_SW P3V3G3H_DRVL_R P3V3G3H_CSP2 P3V3G3H_DRVH P3V3G3H_SW P3V3G3H_DRVL P3V3G3H_SNUBR P3V3G3H_RF P3V3G3H_VFB2 P3V3G3H_COMP2 P3V3G3H_VFB2_R P3V3G3H_VFB2_R2 P3V3G3H_VFB2_RR P3V3G3H_CS2_L_P P3V3G3H_CS2_L_N P3V3G3H_COMP2_R
TP_P3V3G3H_EN2 P3V3MAIN_PGOOD
P5VXX_EN
GND GND_5V3V3_AGND THRM_PAD
PMU_PVDDMAIN_EN
PP1V8_G3S PP3V3_G3H
R7600 100K 5% 1/20W MF 201
R7601 100K 5% 1/20W MF 201
R7660 3.3K 5% 1/20W MF 201
R7661 47K 5% 1/20W MF 201
C7664 1000PF 10% 16V X7R-1 0201
C7610 0.1UF 10% 10V X5R-CERM 0201
U7610 74AUP1T97 SOT891
P5VG3S_EN
P5VG3S_EN_R
P5VG3S_EN_DLY
R7613 0 5% 1/20W MF 0201
R7610 47K 5% 1/20W MF 201
R7611 47K 5% 1/20W MF 201
BOM_COST_GROUP=PLATFORM POWER

SYNC_MASTER=
SYNC_DATE=
PAGE TITLE: VR 5V, 3V3
Apple Inc.
DRAWING NUMBER: 051-05309
SIZE: D
REVISION: 5.1.0
BRANCH:
PAGE: 76 OF 500
SHEET: 68 OF 98

NOTICE OF PROPRIETARY PROPERTY:
THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE INC.
THE POSESSOR AGREES TO THE FOLLOWING:
I TO MAINTAIN THIS DOCUMENT IN CONFIDENCE
II NOT TO REPRODUCE OR COPY IT
III NOT TO REVEAL OR PUBLISH IT IN WHOLE OR PART
IV ALL RIGHTS RESERVED

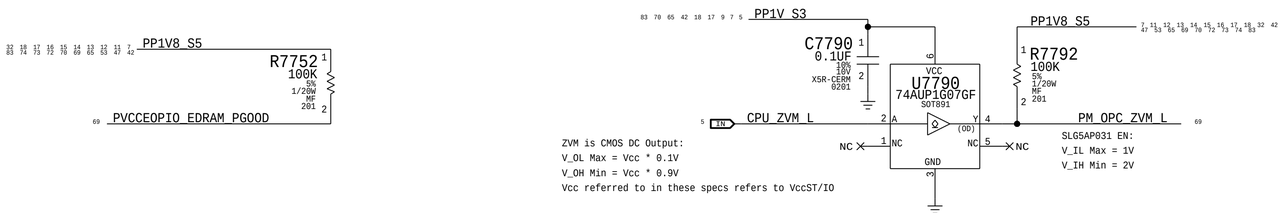
1V EDRAM & EOPIO





EDRAM EN BYPASS

LEVEL SHIFT



BOM_COST_GROUP=CPU & CHIPSET

PAGE TITLE: VR EOPIO EDRAM

Apple Inc.

DRAWING NUMBER: 051-05309
SIZE: D
REVISION: 5.1.0
BRANCH:
PAGE: 77 OF 500
SHEET: 69 OF 98

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)
Buck 0, 2, 5, 7, 8, 9 and 10 have option for Remote Sense.

PP3V3_G3H_PMU_VDDMAIN

C7801 10UF 20% 6.3V X6S-CERM 0402
C7802 10UF 20% 6.3V X6S-CERM 0402
C7803 10UF 20% 6.3V X6S-CERM 0402
C7804 10UF 20% 6.3V X6S-CERM 0402
C7805 10UF 20% 6.3V X6S-CERM 0402
C7806 10UF 20% 6.3V X6S-CERM 0402
C7807 10UF 20% 6.3V X6S-CERM 0402
C7808 10UF 20% 6.3V X6S-CERM 0402
C7809 10UF 20% 6.3V X6S-CERM 0402
C7810 10UF 20% 6.3V X6S-CERM 0402
C7891 10UF 20% 6.3V X6S-CERM 0402
C7895 10UF 20% 6.3V X6S-CERM 0402
C78A3 10UF 20% 6.3V X6S-CERM 0402
C78E2 10UF 20% 6.3V X6S-CERM 0402

Resistor Divider from PBUS

PMU_VDD_HI (IN)
PP1V8_SLPS2R_PMUVDDGPIO
MIN_LINE_WIDTH=0.2000
MIN_NECK_WIDTH=0.1000
VOLTAGE=1.89

C7800 0.1UF 10% 6.3V X6S 0201

C7892 1UF 20% 6.3V X6S-CERM 0201
C7893 1UF 20% 6.3V X6S-CERM 0201
C7894 1UF 20% 6.3V X6S-CERM 0201
C78A0 1UF 20% 6.3V X6S-CERM 0201
C78A1 1UF 20% 6.3V X6S-CERM 0201
C78A2 1UF 20% 6.3V X6S-CERM 0201
C78CA 1UF 20% 6.3V X6S-CERM 0201
C78A4 1UF 20% 6.3V X6S-CERM 0201
C78A5 1UF 20% 6.3V X6S-CERM 0201
PLACE_SIDE=BOTTOM

C78A6 1UF 20% 6.3V X6S-CERM 0201
C78A7 1UF 20% 6.3V X6S-CERM 0201
C78A8 1UF 20% 6.3V X6S-CERM 0201
C78A9 1UF 20% 6.3V X6S-CERM 0201
C78B0 1UF 20% 6.3V X6S-CERM 0201
C78B1 1UF 20% 6.3V X6S-CERM 0201
C78E1 1UF 20% 6.3V X6S-CERM 0201
C78E3 1UF 20% 6.3V X6S-CERM 0201
C78E4 1UF 20% 6.3V X6S-CERM 0201
PLACE_SIDE=BOTTOM

C78C2 1UF 20% 6.3V X6S-CERM 0201
C78C3 1UF 20% 6.3V X6S-CERM 0201
C78C4 1UF 20% 6.3V X6S-CERM 0201
C78C5 1UF 20% 6.3V X6S-CERM 0201
C78C6 1UF 20% 6.3V X6S-CERM 0201
C78C7 1UF 20% 6.3V X6S-CERM 0201
C78C8 1UF 20% 6.3V X6S-CERM 0201
C78C9 1UF 20% 6.3V X6S-CERM 0201
C78CB 1UF 20% 6.3V X6S-CERM 0201
C78CC 1UF 20% 6.3V X6S-CERM 0201
PLACE_SIDE=BOTTOM PLACE_SIDE=BOTTOM PLACE_SIDE=BOTTOM PLACE_SIDE=BOTTOM PLACE_SIDE=BOTTOM

VOUT = 0.7-1 V, IOUT_MAX = 4 A, F = 3MHz, PPVPCORE_S5

C7860 20UF 20% 2.5V X6S-CERM 0402
C7861 20UF 20% 2.5V X6S-CERM 0402
C7862 20UF 20% 2.5V X6S-CERM 0402
C7863 20UF 20% 2.5V X6S-CERM 0402
C7864 20UF 20% 2.5V X6S-CERM 0402
C7865 20UF 20% 2.5V X6S-CERM 0402
C7889 20UF 20% 2.5V X6S-CERM 0402
C7890 20UF 20% 2.5V X6S-CERM 0402
C7866 20UF 20% 2.5V X6S-CERM 0402
C7867 20UF 20% 2.5V X6S-CERM 0402
C7868 20UF 20% 2.5V X6S-CERM 0402
C7869 20UF 20% 2.5V X6S-CERM 0402
C7870 20UF 20% 2.5V X6S-CERM 0402
C7871 20UF 20% 2.5V X6S-CERM 0402

CRITICAL
0.47UH-20%-4.8A-0.034OHM
L7819 0806-COMBO PVPCORES5_SW0
MIN_LINE_WIDTH=0.6000
MIN_NECK_WIDTH=0.1000
SWITCH_NODE=TRUE
DIDT=TRUE

CRITICAL
0.47UH-20%-4.8A-0.034OHM
L7820 0806-COMBO PVPCORES5_SW1
MIN_LINE_WIDTH=0.6000
MIN_NECK_WIDTH=0.1000
SWITCH_NODE=TRUE
DIDT=TRUE
PLACE_NEAR=L7819.1:6MM
NOSTUFF
R7819 0 0201 5% MF 1/20W PVPCORES5_FB_P
PLACE_NEAR=U7800.G15:6MM
NOSTUFF
R7821 0 0201 5% MF 1/20W PVPCORES5_FB_N

VOUT = 1.05 V, IOUT_MAX = 6 A, F = 3MHz, PP1V_PRIM

C78D0 20UF 20% 2.5V X6S-CERM 0402
C78D1 20UF 20% 2.5V X6S-CERM 0402
C78D2 20UF 20% 2.5V X6S-CERM 0402
C78D3 20UF 20% 2.5V X6S-CERM 0402
C78D4 20UF 20% 2.5V X6S-CERM 0402
C78D5 20UF 20% 2.5V X6S-CERM 0402
C7898 20UF 20% 2.5V X6S-CERM 0402
C7872 20UF 20% 2.5V X6S-CERM 0402
C7873 20UF 20% 2.5V X6S-CERM 0402
C7874 20UF 20% 2.5V X6S-CERM 0402
C7875 20UF 20% 2.5V X6S-CERM 0402
C7876 20UF 20% 2.5V X6S-CERM 0402
C7899 20UF 20% 2.5V X6S-CERM 0402
C7877 20UF 20% 2.5V X6S-CERM 0402
C7878 20UF 20% 2.5V X6S-CERM 0402
C7879 20UF 20% 2.5V X6S-CERM 0402
C7880 20UF 20% 2.5V X6S-CERM 0402
C7881 20UF 20% 2.5V X6S-CERM 0402

CRITICAL
0.47UH-20%-4.8A-0.034OHM
L7821 0806-COMBO P1VPRIM_SW0
MIN_LINE_WIDTH=0.6000
MIN_NECK_WIDTH=0.1000
SWITCH_NODE=TRUE
DIDT=TRUE

CRITICAL
0.47UH-20%-4.8A-0.034OHM
L7822 0806-COMBO P1VPRIM_SW1
MIN_LINE_WIDTH=0.6000
MIN_NECK_WIDTH=0.1000
SWITCH_NODE=TRUE
DIDT=TRUE
PLACE_NEAR=L7822.1:5MM
NOSTUFF
R7820 0 0201 5% MF 1/20W P1VPRIM_FB

VOUT = 0.9 V, IOUT_MAX = 3 A, F = 3MHz, PP0V9_SSD0

R7823 should be stuffed when Buck9 is unused

C7882 20UF 20% 2.5V X6S-CERM 0402
C7883 20UF 20% 2.5V X6S-CERM 0402
C7884 20UF 20% 2.5V X6S-CERM 0402
C7885 20UF 20% 2.5V X6S-CERM 0402
C7886 20UF 20% 2.5V X6S-CERM 0402
C7887 20UF 20% 2.5V X6S-CERM 0402
SSD:2L

CRITICAL
0.47UH-20%-4.8A-0.034OHM
L7823 0806-COMBO P0V9SSD_SW0
MIN_LINE_WIDTH=0.6000
MIN_NECK_WIDTH=0.1000
DIDT=TRUE
SWITCH_NODE=TRUE
PLACE_NEAR=L7823.1:10MM
SSD:2L
R7822 0 0201 5% MF 1/20W P0V9SSD_FB_P
NO_TEST=1

VOUT = 1.2/1.8 V, IOUT_MAX = 3 A, F = 3MHz, PPVCCQ_ANI_SSD0

C78B2 20UF 20% 2.5V X6S-CERM 0402
C78B3 20UF 20% 2.5V X6S-CERM 0402
C78B4 20UF 20% 2.5V X6S-CERM 0402
C78B5 20UF 20% 2.5V X6S-CERM 0402
C78B6 20UF 20% 2.5V X6S-CERM 0402
C78B7 20UF 20% 2.5V X6S-CERM 0402
C78B8 20UF 20% 2.5V X6S-CERM 0402
C78B9 20UF 20% 2.5V X6S-CERM 0402
C78C0 20UF 20% 2.5V X6S-CERM 0402
C78C1 20UF 20% 2.5V X6S-CERM 0402
SSD:2L

CRITICAL
0.47UH-20%-4.8A-0.034OHM
L7824 0806-COMBO PVCCQSSD_SW0
MIN_LINE_WIDTH=0.6000
MIN_NECK_WIDTH=0.1000
DIDT=TRUE
SWITCH_NODE=TRUE
PLACE_NEAR=L7824.1:5MM
SSD:2L
R7824 0 0201 5% MF 1/20W PVCCQSSD_FB

U7800 D2449A0P0FUAVAE2 WLCSP SYM 2 OF 4

CRITICAL OMIT_TABLE

P6	VDD_MAIN_E	
E10	VDD_MAIN_N	
P10	VDD_MAIN_S	
K14	VDD_MAIN_W	
K13	VDD_HI	
J11	VDD_GPIO	
D3	VDD_BUCK0_01	
D2		
D1		
G1	VDD_BUCK0_23	
G2		
G3		
P2	VDD_BUCK16	
P1		
L1	VDD_BUCK2	
L2		
L3		
C18	VDD_BUCK3	
C17		
C16		
A7	VDD_BUCK4	
B7		
C7		
A11	VDD_BUCK5	
B11		
C11		
F17	VDD_BUCK7	
F18		
G16		
K16	VDD_BUCK8	
K17		
K18		
N18	VDD_BUCK910	
N17		
N16		
R2	BUCK6_LX0	NC
R1		NC
R7	BUCK6_IN	
R5	BUCK6_FB	NC
E17	BUCK7_LX0	
E18		
G17	BUCK7_LX1	
G18		
F15	BUCK7_RTP	
G15	BUCK7_RTN	
L16	BUCK8_LX0	
L17		
L18		
J16	BUCK8_LX1	
J17		
J18		
L14	BUCK8_FB	
R12	BUCK8_IN	
T12		
U12		
V12		
M18	BUCK9_LX0	
M17		
M16		
P14	BUCK9_RTP	
N14	BUCK9_RTN	
P16	BUCK10_LX0	
P17		
P18		
R14	BUCK10_FB	

BUCK_INPUT

PVDDCPUAWAKE_SW0 — L7806 — Vout = 0.625V - 1.06V, Iout_Max = 13.4A, F = 2MHz & 4MHz, PPVDDCPU_AWAKE

CRITICAL 1UH-20%-3.8A-0.055OHM 2016-COMBO
BUCK0_LX0 → C3, C2, C1
SWITCH_NODE=TRUE, MIN_LINE_WIDTH=0.2000, MIN_NECK_WIDTH=0.1750, DIDT=TRUE

C7811 C7812 C7813 C7821 C7822 C7823 20UF 20% 2.5V X6S-CERM 0402
C7824 C7825 C7826 C7827 C7828 20UF 20% 2.5V X6S-CERM 0402

PVDDCPUAWAKE_SW1 — L7807

CRITICAL 0.22UH-20%-6.7A-0.023OHM PINA20121T-SM
BUCK0_LX1 → E3, E2, E1
SWITCH_NODE=TRUE, MIN_NECK_WIDTH=0.2000, MIN_LINE_WIDTH=0.1750, DIDT=TRUE

PVDDCPUAWAKE_SW2 — L7808

CRITICAL 0.22UH-20%-6.7A-0.023OHM PINA20121T-SM
BUCK0_LX2 → F1, F2, F3
SWITCH_NODE=TRUE, MIN_NECK_WIDTH=0.2000, MIN_LINE_WIDTH=0.1750, DIDT=TRUE

PVDDCPUAWAKE_SW3 — L7809

CRITICAL 0.22UH-20%-6.7A-0.023OHM PINA20121T-SM
BUCK0_LX3 → H1, H2, H3
SWITCH_NODE=TRUE, MIN_NECK_WIDTH=0.2000, MIN_LINE_WIDTH=0.1750, DIDT=TRUE

PLACE_NEAR=L7806.2:5MM
BUCK0_FB → G5 PVDDCPUAWAKE_FB
R7806 0 0201 5% MF 1/20W (IN 43)

PVDDCPUSRAMAWAKE_SW0 — L7810 — Vout = 0.8V - 1.06V, Iout_Max = 1A, F = 3MHz, PPVDDCPUSRAM_AWAKE

CRITICAL 1.0UH-20%-2.6A-0.095OHM 0805-COMBO
BUCK1_LX0 → N2, N1
SWITCH_NODE=TRUE, MIN_NECK_WIDTH=0.2000, MIN_LINE_WIDTH=0.1750, DIDT=TRUE

PLACE_NEAR=L7810.2:5MM
BUCK1_FB → P5 PVDDCPUSRAMAWAKE_FB
R7811 0 0201 5% MF 1/20W

C7829 C7830 10UF 20% 4V X6S 0402-1

P0V8SLPDDR_SW0 — L7811 — Vout = 0.82V, Iout_Max = 6A, F = 3MHz, PP0V82_SLPDDR

CRITICAL 1UH-20%-4.7A-0.040HM 2520
BUCK2_LX0 → K1, K2, K3
SWITCH_NODE=TRUE, MIN_NECK_WIDTH=0.2000, MIN_LINE_WIDTH=0.1750, DIDT=TRUE

C7833 C7834 C7835 C7836 C7837 C7838 20UF 20% 2.5V X6S-CERM 0402

P0V8SLPDDR_SW1 — L7812

CRITICAL 0.47UH-20%-4.8A-0.034OHM 0806-COMBO
BUCK2_LX1 → M1, M2, M3
SWITCH_NODE=TRUE, MIN_NECK_WIDTH=0.2000, MIN_LINE_WIDTH=0.1750, DIDT=TRUE

PLACE_NEAR=L7812.2:5MM
NOSTUFF
BUCK2_FB → L5 P0V8SLPDDR_FB
R7812 0 0201 5% MF 1/20W (IN 43)

C7814 C7815 C7831 C7832 20UF 20% 2.5V X6S-CERM 0402

P1V8SLPS2R_SW0 — L7813 — Vout = 1.8V, Iout_Max = 2.5A, F = 3MHz, PP1V8_SLPS2R

CRITICAL 1UH-20%-3.8A-0.055OHM 2016-COMBO
BUCK3_LX0 → D18, D17, D16
SWITCH_NODE=TRUE, MIN_NECK_WIDTH=0.2000, MIN_LINE_WIDTH=0.1750, DIDT=TRUE

PLACE_NEAR=L7813.2:5MM
BUCK3_FB → D14 P1V8SLPS2R_FB
R7813 0 0201 5% MF 1/20W

C7839 C7840 C7841 C7842 C7843 C7844 C7845 20UF 20% 2.5V X6S-CERM 0402

BUCK3_IN → R9 PP1V8_SLPS2R, T10, T9, U10, U9, V10, V9

P1V1SLPS2R_SW0 — L7814 — Vout = 1.1V, Iout_Max = 4A, F = 3MHz, PP1V1_SLPS2R

CRITICAL 1UH-20%-3.8A-0.055OHM 2016-COMBO
BUCK4_LX0 → A8, B8
SWITCH_NODE=TRUE, MIN_NECK_WIDTH=0.2000, MIN_LINE_WIDTH=0.1750, DIDT=TRUE

C7846 C7847 C7848 C7849 C7850 C7851 20UF 20% 2.5V X6S-CERM 0402

P1V1SLPS2R_SW1 — L7815

CRITICAL 0.47UH-20%-4.8A-0.034OHM 0806-COMBO
BUCK4_LX1 → A6, B6
SWITCH_NODE=TRUE, MIN_NECK_WIDTH=0.2000, MIN_LINE_WIDTH=0.1750, DIDT=TRUE

PLACE_NEAR=L7815.2:5MM
BUCK4_FB → D7 P1V1SLPS2R_FB
R7814 0 0201 5% MF 1/20W

C7816 C7817 20UF 20% 2.5V X6S-CERM 0402

BUCK4_IN → P8

P0V9SLPDDR_SW0 — L7816 — Vout = 0.9V, Iout_Max = 4A, F = 3MHz, PP0V9_SLPDDR

CRITICAL 1UH-20%-3.8A-0.055OHM 2016-COMBO
BUCK5_LX0 → A10, B10
SWITCH_NODE=TRUE, MIN_NECK_WIDTH=0.2000, MIN_LINE_WIDTH=0.1750, DIDT=TRUE

C7852 C7853 C7854 C7855 C7856 C7818 C7819 20UF 20% 2.5V X6S-CERM 0402

P0V9SLPDDR_SW1 — L7817

CRITICAL 0.47UH-20%-4.8A-0.034OHM 0806-COMBO
BUCK5_LX1 → A12, B12
SWITCH_NODE=TRUE, MIN_NECK_WIDTH=0.2000, MIN_LINE_WIDTH=0.1750, DIDT=TRUE

PLACE_NEAR=L7816.2:5MM
BUCK5_FB → D12 P0V9SLPDDR_FB
R7816 0 0201 5% MF 1/20W NOSTUFF (IN 43)

SWITCH OUTPUTS — Supplied Current

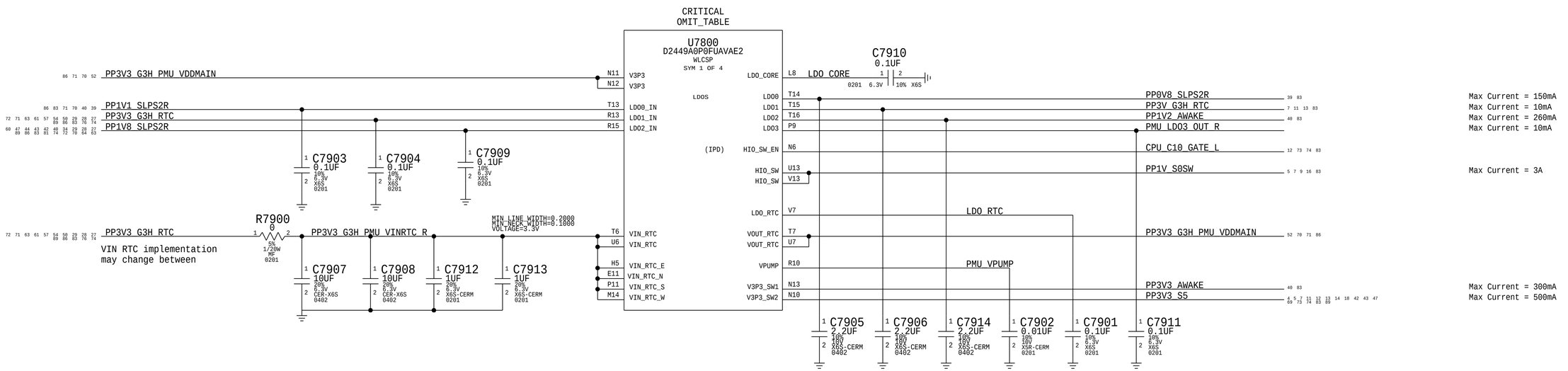
BUCK3_SW1	T8	PP1V8_AWAKE	0.3A
BUCK3_SW2	R11	PP1V8_SLPS2R_PMUVDDGPIO	0.3A
BUCK3_SW3_0	U11	PP1V8_S5	1.0A
BUCK3_SW3_1	V11		
BUCK3_SW4_0	V8	PP1V8_S3	1.0A
BUCK3_SW4_1	U8		
BUCK3_SW5	R8	PP1V8_IO_SSD0_R	0.5A
BUCK4_SW1	P7	NC	0.5A
BUCK6_SW1	R6	NC	0.3A
BUCK8_SW1	P13	NC_PPBUCK8_SW1	0.3A
BUCK8_SW2	P12	PP1V_S3	0.3A

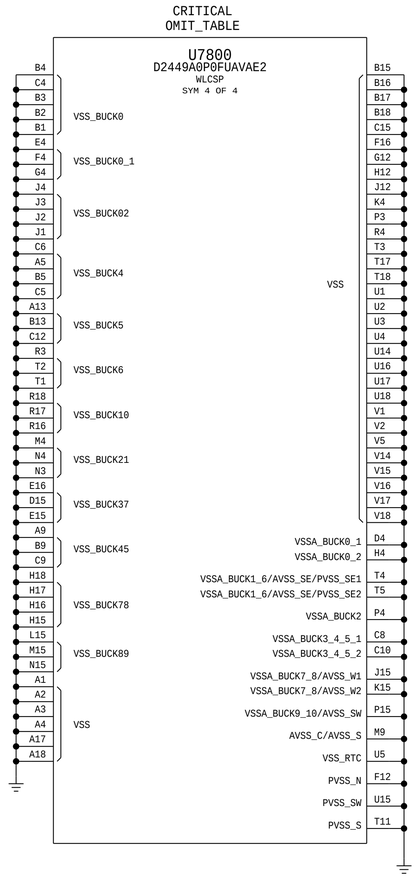
BOM_COST_GROUP=PLATFORM POWER

PAGE TITLE: PMIC BUCKS AND SWS

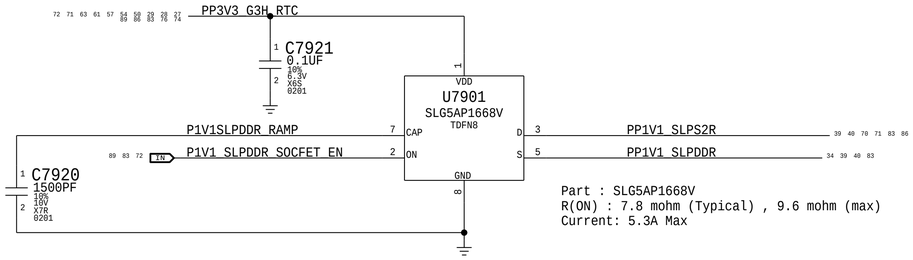
Apple Inc.

DRAWING NUMBER: 051-05309
SIZE: D
REVISION: 5.1.0
BRANCH:
PAGE: 78 OF 500
SHEET: 70 OF 98





1.1V SLPDDR SWITCH



BOM_COST_GROUP=PLATFORM POWER

PAGE TITLE
PMIC LDOS

Apple Inc.

DRAWING NUMBER 051-05309
SIZE D
REVISION 5.1.0
BRANCH
PAGE 79 OF 500
SHEET 71 OF 98

VDD_HI Threshold Select

Rising Vth (2.15V)	Falling Vth (2.0V)
7.49V	6.97V

BOM_COST_GROUP=PLATFORM POWER

PAGE TITLE
PMIC GPIOS & CONTROL

Apple Inc.

DRAWING NUMBER 051-05309 SIZE D
REVISION 5.1.0
BRANCH
PAGE 80 OF 500
SHEET 72 OF 98

1.2V VDDQ & 0.6V VTT

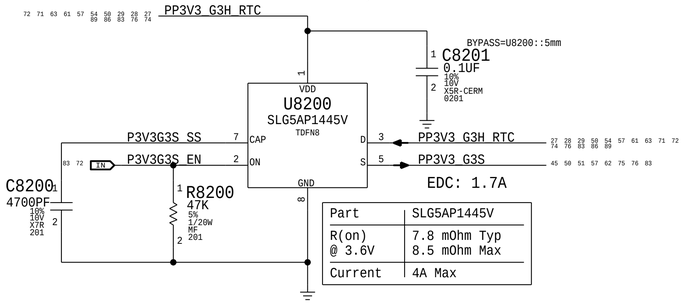
PP1V2_S3
R8154 0 0201 MF 1/20W 5% MIN_LINE_WIDTH=0.2000 VOLTAGE=5V MIN_NECK_WIDTH=0.1000
PP5V_G3S_CPUREG_MISC
PP5V_EDRAM_V5IN
BYPASS=U8100.12::2.5MM
C8103 10UF 20% 10V X5R-CERM 0402-1
BYPASS=U8100.2::3MM
C8102 10UF 20% 10V X5R-CERM 0402-1
BYPASS=U8100.2::4MM
C8114 10UF 20% 10V X5R-CERM 0402-1
MEMVTT_EN
PVDDQ_EN
R8153 47K 5% 1/20W MF 201 NOSTUFF
R8156 0 5% 1/20W MF 0201
R8155 0 5% 1/20W MF 0201
MEMVTT_EN_R
PVDDQ_EN_R
VLDOIN
U8100 TPS51916 QFN CRITICAL
VSIN S3 S5 VREF REFIN MODE TRIP
VBST DRVH SW DRVL PGOOD VDDQSNS VTT VTTSNS VTTREF
PGND GND VTT_THRM GND_PAD
P1V2REG_VREF
MIN_LINE_WIDTH=0.0910 MIN_NECK_WIDTH=0.0910
PVCCEDRAM_REFIN
P1V2REG_MODE
P1V2REG_TRIP
R8111 3.3K 1% 1/20W MF 201
P1V2REG_VREF_R
C8115 0.1UF 10% 6.3V CERM-X5R 0201
R8117 21K 0.1% 1/20W MF 0201
R8112 48.7K 0.1% 1/20W MF 0201
C8116 0.01UF 10% 10V X7R-CERM 0201
P1V2REG_AGND
MIN_LINE_WIDTH=0.0910 MIN_NECK_WIDTH=0.0910 VOLTAGE=0V
R8113 200K 1% 1/20W MF 201
R8114 51.1K 1% 1/20W MF 201
PLACE_NEAR=U8100.19:3mm
PLACE_NEAR=U8100.18:3mm
PLACE_NEAR=U8100.8:5mm
PLACE_NEAR=U8100.21:1mm
XW8100 SM
C8140 0.22UF 10% 16V CERM 402
PVTT_VTTSNS
PPVTT_VTTREF
R8157 0 0201 MF 5% 1/20W
DDRREG_VTTSNS
PLACE_NEAR=U8100.1:5mm
XW8105 SM
PLACE_NEAR=U2300.J3:10MM
PP0V6_S0_DDRVTT
C8131 15UF 20% 2V X6S 0402
C8132 15UF 20% 2V X6S 0402
C8133 15UF 20% 2V X6S 0402
C8134 15UF 20% 2V X6S 0402
C8136 15UF 20% 2V X6S 0402
C8137 15UF 20% 2V X6S 0402
LEVEL SHIFT
P1V2_BOOT_RC MIN_LINE_WIDTH=0.2500 MIN_NECK_WIDTH=0.2000 DIDT=TRUE SWITCH_NODE=TRUE
R8130 2.2 5% 1/20W MF 201
C8130 0.1UF 10% 25V X6S-CERM 0201
P1V2_VBST MIN_LINE_WIDTH=0.2500 DIDT=TRUE SWITCH_NODE=TRUE
P1V2_DRVH MIN_LINE_WIDTH=0.6000 MIN_NECK_WIDTH=0.2000 SWITCH_NODE=TRUE DIDT=TRUE
R8133 1 5% 1/20W MF 201
P1V2_DRVH_R MIN_LINE_WIDTH=0.6000 MIN_NECK_WIDTH=0.2000 SWITCH_NODE=TRUE DIDT=TRUE
P1V2_SW MIN_LINE_WIDTH=0.6000 SWITCH_NODE=TRUE DIDT=TRUE
R8132 1 5% 1/20W MF 201
P1V2_DRVL_R MIN_LINE_WIDTH=0.6000 GATE_NODE=TRUE DIDT=TRUE
P1V2_DRVL MIN_LINE_WIDTH=0.6000 GATE_NODE=TRUE DIDT=TRUE
PVDDQ_PGOOD OUT
Q8100 CSD58873Q3D Q3D
VIN TG TGR VSW BG PGND
PPBUS_HS_CPU
MIN_NECK_WIDTH=0.0910 MIN_LINE_WIDTH=0.0910 SWITCH_NODE=TRUE DIDT=TRUE
P1V2_PHASE
L8100 1.0UH-20%-14A-0.0107OHM PIMB062D-SM
R8110 2.2 5% 1/10W MF-LF 603 NOSTUFF
P1V2_LL_SNUB DIDT=TRUE SWITCH_NODE=TRUE
C8110 0.001UF 10% 50V X7R-CERM 0402 NOSTUFF
R8118 0.002 1% 1/2W MF 0306
PP1V2_S3_REG_R MIN_LINE_WIDTH=0.2000 MIN_NECK_WIDTH=0.1000
ISNS_CPUDDR_P OUT
ISNS_CPUDDR_N OUT
C8101 2.2UF 20% 25V X6S-CERM 0402
C8104 2.2UF 20% 25V X6S-CERM 0402
C8109 33UF 20% 16V POLY-TANT CASED12-SM-1 CRITICAL
C8100 33UF 20% 16V POLY-TANT CASED12-SM-1 CRITICAL
C81A8 12PF 5% 25V NP0-C0G 0201
C81A9 3.0PF +/-0.1PF 25V NP0-C0G 0201
Vout = 1.2V
7.0A MAX OUTPUT
F = 400 KHZ
PP1V2_S3
C81A2 12PF 5% 25V NP0-C0G 0201
C81A3 3.0PF +/-0.1PF 25V NP0-C0G 0201
C81A4 3.0PF +/-0.1PF 25V NP0-C0G 0201
C8105 330UF 20% 2.0V POLY-TANT CASE-B2-SM1 CRITICAL
C8106 330UF 20% 2.0V POLY-TANT CASE-B2-SM1 CRITICAL
C8107 330UF 20% 2.0V POLY-TANT CASE-B2-SM1 CRITICAL
C8112 10UF 20% 4V X6S 0402 CRITICAL
C8113 10UF 20% 4V X6S 0402 CRITICAL
PLACE_NEAR=C8107.1:1mm
XW8110 SM
PP1V2_S3
C8108 220UF 20% 2V ELEC SM 128S00041 CRITICAL
TO BE PLACED AT THE OTHER SIDE OF MEMORY
R8141 10 1% 1/20W MF 201
P1V2_SNS
P1V2_SNS_R MIN_LINE_WIDTH=0.1000 MIN_NECK_WIDTH=0.0910

VTT Vout = 0.6V
IccMax = 0.512A MAX OUTPUT
0.95V VCCIO

PP1V_PRIM
C8190 0.1UF 10% 16V X5R-CERM 0201
U8190 SN74AUP1T34-COMBO SON
VCC_A VCC_B A B (OD) NC NC GND
PP1V8_S5
TPS51916 Ileak) = +/-1uA
V3R(min) = 1.5V
C8191 0.1UF 10% 16V X5R-CERM 0201
PM_MEMVTT_EN
MEMVTT_EN
R8191 100K 5% 1/20W MF 201
R8190 100K 5% 1/20W MF 201
PP5V_G3S_CPUREG_MISC
R8144 2.2 5% 1/20W MF 201
R8147 2.2 5% 1/20W MF 201
PP5V_G3S_VCCIOPVCC
C8143 10UF 20% 10V X5R-CERM 0402-7
R8145 2.2 5% 1/20W MF 201
C8144 0.1UF 10% 25V X6S-CERM 0201
PVCCIO_BOOT_RC MIN_LINE_WIDTH=0.3000 MIN_NECK_WIDTH=0.2000 DIDT=TRUE SWITCH_NODE=TRUE
PVCCIO_DRVH_R MIN_LINE_WIDTH=0.6000 MIN_NECK_WIDTH=0.2000 DIDT=TRUE SWITCH_NODE=TRUE
R8146 1 5% 1/20W MF 201
Q8102 CSD58889Q3D Q3D
PVCCIO_VBST MIN_LINE_WIDTH=0.6000 MIN_NECK_WIDTH=0.2000 SWITCH_NODE=TRUE DIDT=TRUE
PVCCIO_DRVH MIN_LINE_WIDTH=0.6000 MIN_NECK_WIDTH=0.2000 SWITCH_NODE=TRUE DIDT=TRUE
PVCCIO_LL MIN_LINE_WIDTH=0.6000 MIN_NECK_WIDTH=0.2000 SWITCH_NODE=TRUE DIDT=TRUE
PVCCIO_DRVL_R MIN_LINE_WIDTH=0.6000 MIN_NECK_WIDTH=0.2000 DIDT=TRUE GATE_NODE=TRUE
R8148 1 5% 1/20W MF 201
PVCCIO_DRVL MIN_NECK_WIDTH=0.2000 MIN_LINE_WIDTH=0.6000 GATE_NODE=TRUE
PPBUS_HS_CPU
C8152 33UF 20% 16V POLY-TANT CASED12-SM-1 CRITICAL
C8151 2.2UF 20% 25V X6S-CERM 0402
C8150 2.2UF 20% 25V X6S-CERM 0402
C81A0 12PF 5% 25V NP0-C0G 0201
C81A1 3.0PF +/-0.1PF 25V NP0-C0G 0201
Vout = 0.95V
IccMax = 3.6A
F = 600kHz
L8102 0.68UH-20%-14.5A-0.009OHM PILA052D-SM
PVCCIO_PHASE
PP0V95_S0_CPUVCCIO_REG_R MIN_LINE_WIDTH=0.2000 MIN_NECK_WIDTH=0.1000
R8102 0.003 1% 1/2W MF 0306 CRITICAL
PPVCCIO_S0_CPU
C8174 10UF 20% 6.3V X6S 0402 CRITICAL
C8175 10UF 20% 6.3V X6S 0402 CRITICAL
C81A6 12PF 5% 25V NP0-C0G 0201
C81A7 3.0PF +/-0.1PF 25V NP0-C0G 0201
R8116 2.2 5% 1/10W MF-LF SWITCH_NODE=TRUE 603 DIDT=TRUE NOSTUFF
PVCCIO_LL_SNUB
PVCCIOS0_CS_P
PVCCIOS0_CS_N
R8142 4.42K 1% 1/20W MF 201 NO_XNET_CONNECTION=1
C8142 470PF 10% 16V X5R-X7R-CERM 0201 NO_XNET_CONNECTION=1
R8143 4.42K 1% 1/20W MF 201 NO_XNET_CONNECTION=1
C8120 0.001UF 10% 50V X7R-CERM 0402 NOSTUFF
R8171 10 1% 1/20W MF 201
R8170 10 1% 1/20W MF 201
ISNS_CPUVCCIO_N OUT
ISNS_CPUVCCIO_P OUT
CPU_VCCIOSENSE_P
CPU_VCCIOSENSE_R
R8150 75 1% 1/20W MF 201
XW8102 SM
CPU_VCCIOSENSE_N
CPU_VCCIOSENSE_XW
PLACE_NEAR=R8150.1:1mm
R8160 4.42K 1% 1/20W MF 0201 <Ra>
R8161 4.42K 0.1% 1/20W MF 0201 <Ra>
NO_XNET_CONNECTION=1
Vout = 0.5V * (1 + Ra / Rb)
PVCCIOS0_EN_FILT_BUF
PVCCIOS0_FB
PVCCIOS0_SREF
PVCCIOS0_VO
PVCCOIOS0_OCSET
PVCCIO_PGOOD
PVCCIOS0_RTN
PVCCIOS0_FSEL
U8110 ISL95870HRUZ UTQFN -TR5720 353S01077 CRITICAL
EN FB SREF VO OCSET PGOOD RTN FSEL
VCC PVCC BOOT UGATE PHASE LGATE GND PGND
C8162 2.2UF 20% 25V X6S-CERM 0402
PP1V8_S5
R8152 100K 5% 1/20W MF 201
R8101 100K 5% 1/20W MF 201
PVCCIO_PGOOD
PVDDQ_PGOOD
R8162 4.99K 1% 1/20W MF 201 <Rb>
R8163 4.99K 0.1% 1/20W MF 0201 <Rb>
C8160 10PF 5% 50V C0G 0201
C8161 10PF 5% 50V C0G 0201
C8170 3300PF 5.0% 50V CERM 0603
C8163 270PF 5% 50V C0G 0402
R8164 100K 1% 1/20W MF 201
PVCCIOS0_AGND
XW8101 SM
PLACE_NEAR=U8110.1:1mm
(PCHVCCIOS0_OCSET)
(PCHVCCIOS0_VO)
VCCIO EN LOGIC
PP3V3_S5
C8176 0.1UF 10% 6.3V CERM-X5R 0201
U8111 74AUP1T97GM SOT886
CPU_C10_GATE_L
PVCCIO_EN
PVCCIOS0_EN
R8158 3.92K 1% 1/20W
PVCCIOS0_EN_R
R8159 100K 5% 1/20W MF 201 NOSTUFF
C8178 330PF 5% 25V C0G 0201
C8177 0.1UF 10% 6.3V CERM-X5R 0201
U8112 74AUP2G17FZ4-55-COMBO X2-DFN1410
PVCCIOS0_EN_FILT
C8179 100PF 5% 25V C0G 0201
U8112 74AUP2G17FZ4-55-COMBO X2-DFN1410
PVCCIOS0_EN_FILT_BUF
R8166 47K 5% 1/20W MF 201
VCCIO EN BYPASS
R8165 0 0201 MF 5% 1/20W NOSTUFF
PVCCIO_EN
PVCCIOS0_EN_FILT_BUF
BOM_COST_GROUP=PLATFORM_POWER

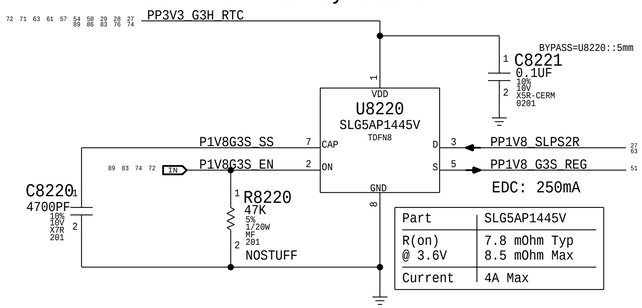
PAGE TITLE: VR VDDQ VCCIO
Apple Inc.
DRAWING NUMBER: 051-05309
SIZE: D
REVISION: 5.1.0
BRANCH:
PAGE: 81 OF 500
SHEET: 73 OF 98

3.3V G3 Standby Switch



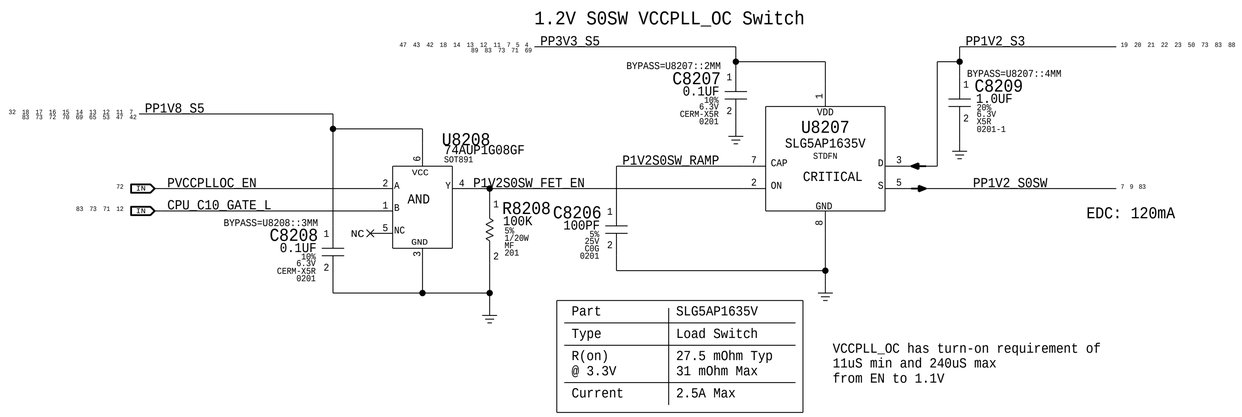
Part	SLG5AP1445V
R(on) @ 3.6V	7.8 mOhm Typ 8.5 mOhm Max
Current	4A Max

1.8V G3 Standby Switch



Part	SLG5AP1445V
R(on) @ 3.6V	7.8 mOhm Typ 8.5 mOhm Max
Current	4A Max

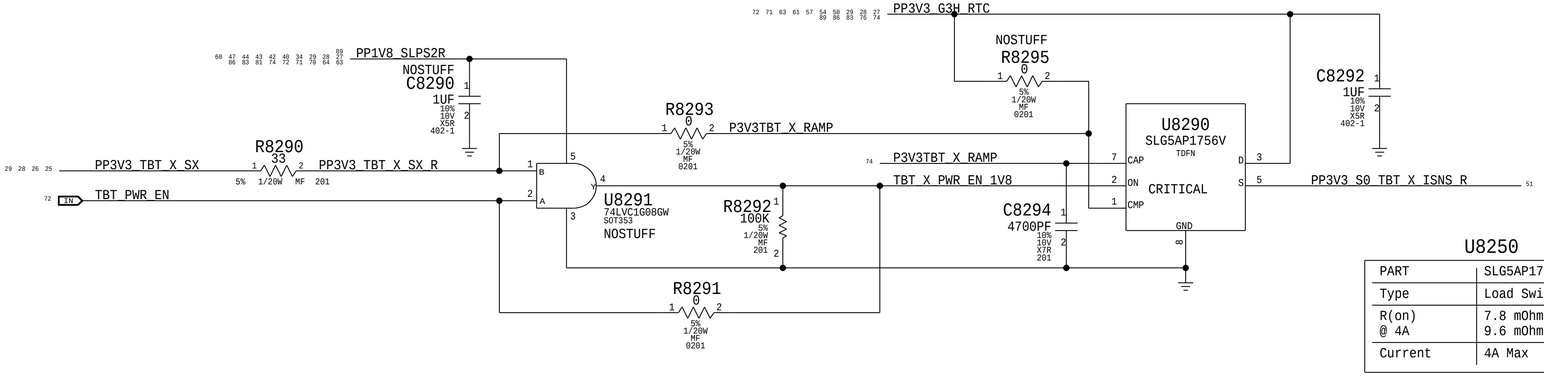
1.2V S0SW VCCPLL_OC Switch



Part	SLG5AP1635V
Type	Load Switch
R(on) @ 3.3V	27.5 mOhm Typ 31 mOhm Max
Current	2.5A Max

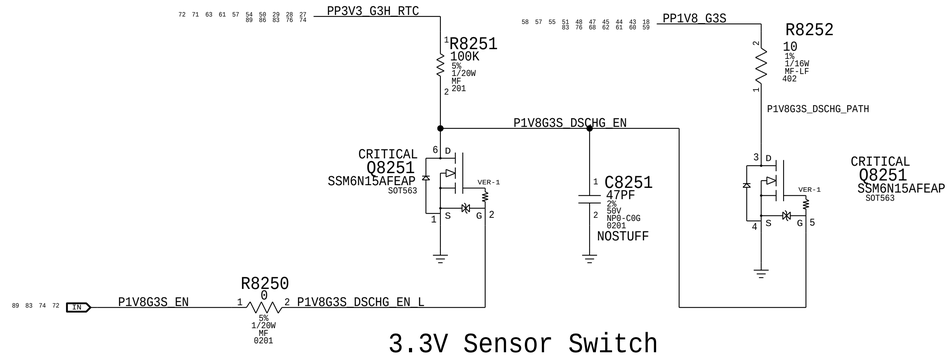
VCCPLL_OC has turn-on requirement of
11uS min and 240uS max
from EN to 1.1V

3.3V S0SW TBT X Switch

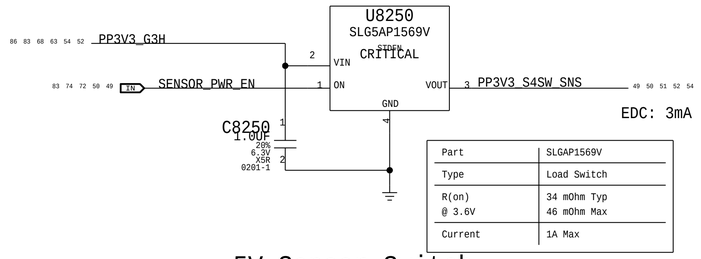


U8250

PART	SLG5AP1756V
Type	Load Switch
R(on) @ 4A	7.8 mOhm Typ 9.6 mOhm Max
Current	4A Max

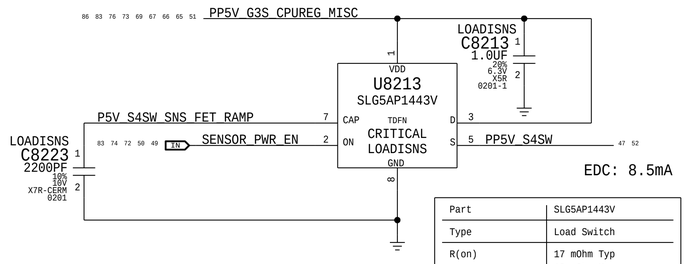


3.3V Sensor Switch



Part	SLGAP1569V
Type	Load Switch
R(on) @ 3.6V	34 mOhm Typ 46 mOhm Max
Current	1A Max

5V Sensor Switch



Part	SLG5AP1443V
Type	Load Switch
R(on)	17 mOhm Typ 19 mOhm Max
Current	2.5A

BOM_COST_GROUP=PLATFORM_POWER

PAGE TITLE

POWER FETS

Apple Inc.

DRAWING NUMBER 051-05309 | SIZE D

REVISION 5.1.0

BRANCH

PAGE 82 OF 500

SHEET 74 OF 98

Page Notes

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

740S0159
CRITICAL
F8400
3AMP-32V
0603-COMBO

PPBUS_G3H

107S00034
R8400
0.025
1%
1W
MF
0612-1

PPVIN_S0SW_LCDBKLT_F

CRITICAL
Q8400
FDC638APZ_SBMS001
SSOT6-HF

PPVIN_S0SW_LCDBKLT_R

C8400 1000PF 10% 16V X7R-1 0201

R8401 80.6K 1% 1/16W MF-LF 402

NOSTUFF C8401 0.001UF 10% 50V CERM 402

PPVIN_S0SW_LCDBKLT
MIN_LINE_WIDTH=0.1500
MIN_NECK_WIDTH=0.2000
VOLTAGE=12.6V
MAKE_BASE=TRUE

ISNS_LCDBKLT_P
ISNS_LCDBKLT_N

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

LCDBKLT_EN_L

PP5V_G3S

R8444 10 5% 1/16W MF-LF 402

R8445 10 5% 1/16W MF-LF 402

PP5V_S0_BKLT_A
PP5V_S0_BKLT_D

C8440 4.7UF 20% 25V X5R 0402
PLACE_NEAR=U8400.5:5MM

C8441 4.7UF 20% 25V X5R 0402
PLACE_NEAR=U8400.18:5MM

GND_BKLT_SGND

R8440 1M 5% 1/20W MF 201

BKLT_SD

BKLT_SENSE_OUT

U8400
LLP
LP8548B1SQ_-04

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

PLACEMENT_NOTE:
SANDWICH C8210 AND C8211

PLACE_NEAR=L8410.1:5MM
C8410 4.7UF 10% 25V X5S-CERM 0603
C8411 4.7UF 10% 25V X5S-CERM 0603

PLACE_NEAR=Q8401.5:3MM
CRITICAL
L8410
15UH-20%-1.9A-0.24OHM
PIME062D-SM
152S00253

C8412 0.1UF 10% 25V X5R 402

PLACE_NEAR=L8410.2:3MM
371S00180 (Combo)
CRITICAL
D8410
POWERD123-COMBO
DFLS2100

DESENSE C8476 12PF 5% 100V C0G 0201

PPVIN_SW_LCDBKLT_SW

DIDT=TRUE
SWITCH_NODE=TRUE

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

LCDBKLT_FET_DRV_R

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

R8433 10 1% 1/16W MF-LF 402

MIN_LINE_WIDTH=0.6000
MIN_NECK_WIDTH=0.2000
VOLTAGE=5V
GATE_NODE=TRUE DIDT=TRUE

LCDBKLT_FET_DRV
LCDBKLT_FB
BKLT_ISET_KEYB
BKLT_KEYB1
BKLT_KEYB2
KBDBKLT_SW2
PPVOUT_BKLT_FB2

R8435 10 1% 1/16W MF-LF 402
PP_KBDLED_CATHODE1

R8436 10 1% 1/16W MF-LF 402
PP_KBDLED_CATHODE2

MIN_LINE_WIDTH=0.5000
MIN_NECK_WIDTH=0.2000
VOLTAGE=40V

MIN_LINE_WIDTH=0.5000
MIN_NECK_WIDTH=0.2500
SWITCH_NODE=TRUE
DIDT=TRUE

XW8450 SM
PLACE_NEAR=C8458.1:10MM

D8450 SOD123W PMEG6010ER/S500

PPVOUT_S0_KBDLED_R

R8446 0 5% 1/16W MF-LF 402

C8458 2.2UF 10% 50V X5R 0603
C8459 2.2UF 10% 50V X5R 0603
C8455 0.001UF 10% 50V X7R-CERM 0402

MIN_LINE_WIDTH=0.2000
MIN_NECK_WIDTH=0.1200
VOLTAGE=40V

C8453 2.2UF 10% 50V X5R 0603
C8454 2.2UF 10% 50V X5R 0603
DESENSE C8490 12PF 5% 100V CERM 0402
DESENSE C8491 12PF 5% 100V CERM 0402

C8456 2.2UF 10% 50V X5R 0603
C8457 2.2UF 10% 50V X5R 0603
C8493 2.2UF 10% 50V X5R 0603
C8494 2.2UF 10% 50V X5R 0603

XW8410 SM
PLACE_NEAR=D8410.:2MM

LCDBKLT_TB_XWR

R8431 18.2K 1% 1/16W MF-LF 402

R8432 150K 1% 1/16W MF-LF 402

NOSTUFF C8430 100PF 5% 100V C0G-CERM 0603

PPVOUT_S0_KBDLED
MIN_LINE_WIDTH=0.4000
MIN_NECK_WIDTH=0.2000
VOLTAGE=40V

OMIT_TABLE DESENSE
L8420
47-OHM-25%-300MA
0402
CRITICAL

PPVOUT_S0_LCDBKLT_F
PPVOUT_S0_LCDBKLT

PLACE_NEAR=D8410.K:5MM

C8460 2.2UF 10% 100V X5R 1206
C8461 2.2UF 10% 100V X5R 1206
C8462 2.2UF 10% 100V X5R 1206
C8463 2.2UF 10% 100V X5R 1206
C8464 2.2UF 10% 100V X5R 1206

C8465 2.2UF 10% 100V X5R 1206
C8466 2.2UF 10% 100V X5R 1206
C8467 2.2UF 10% 100V X5R 1206
C8468 2.2UF 10% 100V X5R 1206
C8469 2.2UF 10% 100V X5R 1206

C8470 2.2UF 10% 100V X5R 1206
C8471 2.2UF 10% 100V X5R 1206
C8472 2.2UF 10% 100V X5R 1206
C8473 2.2UF 10% 100V X5R 1206
DESENSE C8474 12PF 5% 100V C0G 0201
DESENSE C8475 12PF 5% 100V C0G 0201

J79 DISPLAY

Vout = 46V Typ, 55V Max

Iout = 0.12A Typ, 0.15A Max

Fs = 625kHz Typ (+/- 7%)

J8400
FF14A-6C-R11DL-B-3H
F-RT-SM

TOP VIEW RIGHT_FLEX

PP_KBDLED_CATHODE1_R
PP_KBDLED_CATHODE2_R

TOP VIEW MIDDLE_FLEX

J8402
FF14A-10C-R11DL-B-3H
F-RT-SM1

PP_KBDLED_CATHODE1
PP_KBDLED_CATHODE2

TOP VIEW LEFT_FLEX

J8401
FF14A-6C-R11DL-B-3H
F-RT-SM

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

EDP_BKLT_EN

R8442 0 5% 1/20W MF 0201

BKLT_EN_R

C8442 33PF 5% 25V NPO-C0G 0201
NO STUFF

GND_BKLT_SGND

PP3V3_G3S

C8483 0.1UF 10% 16V X5R-CERM 0201
PLACE_NEAR=U8472.6:5MM

U8472
74AUP1T97GM
SOT886

SOC_KBD_BKLT_PWM_R

R8455 0 5% 1/20W MF 0201

SOC_KBD_BKLT_PWM

R8481 100K 1% 1/20W MF 201

BKLT_PWM_KEYB_3V3

R8480 100K 1% 1/20W MF 201

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

I2C_BKLT_SCL
I2C_BKLT_SDA

R8451 0 5% 1/20W MF 0201
PLACE_NEAR=U8400.16:10MM

I2C ID DEDICATED.ONLY CONNECTS TO JERRY

TP
PP5V_G3S PPC84A
LCDBKLT_FB PPC841
PP5V_S0_BKLT_A PPC843
KBDBKLT_SW2 PPC845
PPVOUT_BKLT_FB2 PPC846
BKLT_ISET_KEYB PPC847
LCDBKLT_SW PPC849

L8450
10UH-20%-1.4A-0.17OHM
PST041H-SM

PP5V_G3S_KBD

C8452 2.2UF 10% 25V X5R-CERM 603
C8450 0.1UF 10% 16V X5R-CERM 0201
C8451 2.2UF 10% 25V X5R-CERM 603

NO STUFF C8495 12PF 5% 100V C0G 0201

LINE WIDTHS

PP5V_S0_BKLT_A
MIN_LINE_WIDTH=0.2000
MIN_NECK_WIDTH=0.1000
VOLTAGE=5V

PP5V_S0_BKLT_D
MIN_LINE_WIDTH=0.2000
MIN_NECK_WIDTH=0.1000
VOLTAGE=5V

BKLT_SD
MIN_LINE_WIDTH=0.2500
MIN_NECK_WIDTH=0.2000

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=0.1500
MIN_NECK_WIDTH=0.2000
VOLTAGE=12.5V

LCD BKLT LINE WIDTHS

LCDBKLT_FET_DRV_R
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=0.2000
VOLTAGE=55V
SWITCH_NODE=TRUE DIDT=TRUE

PPVOUT_S0_LCDBKLT
MIN_LINE_WIDTH=0.5000
MIN_NECK_WIDTH=0.1500
VOLTAGE=55V

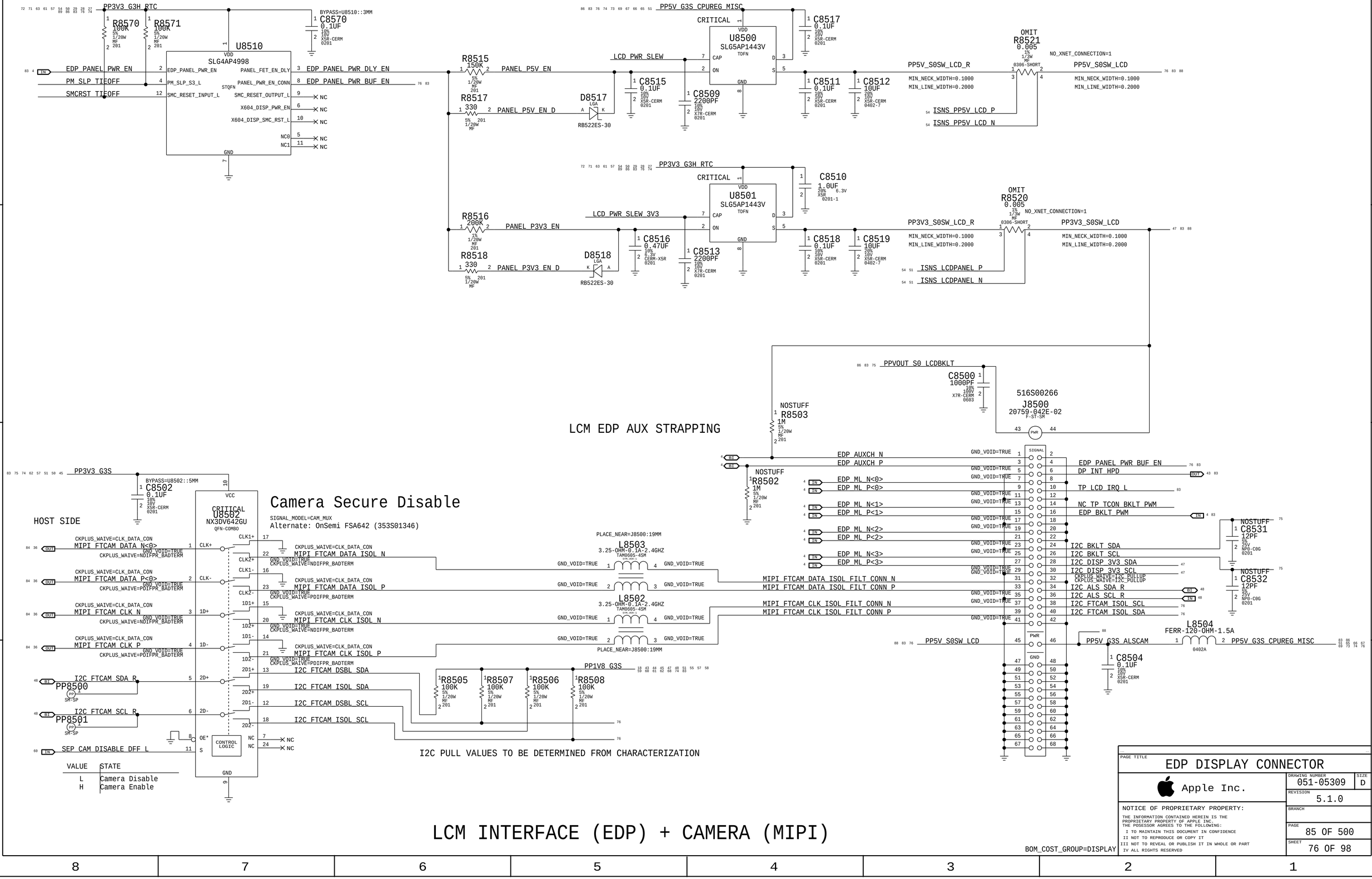
PPVOUT_S0_LCDBKLT_F
MIN_LINE_WIDTH=0.5000
MIN_NECK_WIDTH=0.1500
VOLTAGE=55V

BOM_COST_GROUP=DISPLAY

PAGE TITLE
LCD BACKLIGHT DRIVER

Apple Inc.

DRAWING NUMBER	051-05309
SIZE	D
REVISION	5.1.0
BRANCH	
PAGE	84 OF 500
SHEET	75 OF 98


PP3V3_G3H_RTC
R8570 100K 5% 1/20W MF 201
R8571 100K 5% 1/20W MF 201
U8510
SLG4AP4998
STQFN
BYPASS=U8510::3MM
C8570 0.1UF 10% 10V X5R-CERM 0201
EDP_PANEL_PWR_EN
PM_SLP_S3_L
SMCRST_TIEOFF
EDP_PANEL_PWR_EN
PM_SLP_S3_L
SMC_RESET_INPUT_L
PANEL_FET_EN_DLY
PANEL_PWR_EN_CONN
SMC_RESET_OUTPUT_L
X604_DISP_PWR_EN
X604_DISP_SMC_RST_L
NC0
NC1
EDP_PANEL_PWR_DLY_EN
EDP_PANEL_PWR_BUF_EN
NC
GND
PP5V_G3S_CPUREG_MISC
CRITICAL
U8500
SLG5AP1443V
TDFN
LCD_PWR_SLEW
R8515 150K 1% 1/20W MF 201
R8517 330 5% 1/20W MF 201
D8517 LGA RB522ES-30
PANEL_P5V_EN
PANEL_P5V_EN_D
C8515 0.1UF 10% 10V X5R-CERM 0201
C8509 2200PF 10% 10V X7R-CERM 0201
C8517 0.1UF 10% 10V X5R-CERM 0201
C8511 0.1UF 10% 10V X5R-CERM 0201
C8512 10UF 20% 10V X5R-CERM 0402-7
OMIT
R8521 0.005 1% 1/3W MF 0306-SHORT
NO_XNET_CONNECTION=1
PP5V_S0SW_LCD_R
PP5V_S0SW_LCD
MIN_NECK_WIDTH=0.1000
MIN_LINE_WIDTH=0.2000
ISNS_PP5V_LCD_P
ISNS_PP5V_LCD_N
PP3V3_G3H_RTC
U8501
SLG5AP1443V
TDFN
LCD_PWR_SLEW_3V3
R8516 200K 1% 1/20W MF 201
R8518 330 5% 1/20W MF 201
D8518 LGA RB522ES-30
PANEL_P3V3_EN
PANEL_P3V3_EN_D
C8516 0.47UF 10% 6.3V CERM-X5R 0201
C8513 2200PF 10% 10V X7R-CERM 0201
C8510 1.0UF 20% 6.3V X5R 0201-1
C8518 0.1UF 10% 10V X5R-CERM 0201
C8519 10UF 20% 10V X5R-CERM 0402-7
OMIT
R8520 0.005 1% 1/3W MF 0306-SHORT
NO_XNET_CONNECTION=1
PP3V3_S0SW_LCD_R
PP3V3_S0SW_LCD
MIN_NECK_WIDTH=0.1000
MIN_LINE_WIDTH=0.2000
ISNS_LCDPANEL_P
ISNS_LCDPANEL_N
PPVOUT_S0_LCDBKLT
C8500 1000PF 10% 100V X7R-CERM 0603
516S00266
J8500
20759-042E-02
F-ST-SM
PWR
NOSTUFF
R8503 1M 5% 1/20W MF 201
NOSTUFF
R8502 1M 5% 1/20W MF 201
LCM EDP AUX STRAPPING
EDP_AUXCH_N
EDP_AUXCH_P
EDP_ML_N<0>
EDP_ML_P<0>
EDP_ML_N<1>
EDP_ML_P<1>
EDP_ML_N<2>
EDP_ML_P<2>
EDP_ML_N<3>
EDP_ML_P<3>
GND_VOID=TRUE
SIGNAL
PWR
GND
EDP_PANEL_PWR_BUF_EN
DP_INT_HPD
TP_LCD_IRQ_L
NC_TP_TCON_BKLT_PWM
EDP_BKLT_PWM
I2C_BKLT_SDA
I2C_BKLT_SCL
I2C_DISP_3V3_SDA
I2C_DISP_3V3_SCL
I2C_ALS_SDA_R
I2C_ALS_SCL_R
I2C_FTCAM_ISOL_SCL
I2C_FTCAM_ISOL_SDA
CKPLUS_WAIVE=I2C_PULLUP
NOSTUFF C8531 12PF 5% 25V NP0-C0G 0201
NOSTUFF C8532 12PF 5% 25V NP0-C0G 0201
L8504
FERR-120-OHM-1.5A
0402A
PP5V_S0SW_LCD
PP5V_G3S_ALSCAM
PP5V_G3S_CPUREG_MISC
C8504 0.1UF 10% 10V X5R-CERM 0201
PP3V3_G3S
C8502 0.1UF 10% 10V X5R-CERM 0201
HOST SIDE
Camera Secure Disable
SIGNAL_MODEL=CAM_MUX
Alternate: OnSemi FSA642 (353S01346)
CRITICAL
U8502
NX3DV642GU
QFN-COMBO
VCC
CONTROL LOGIC
OE*
S
CKPLUS_WAIVE=CLK_DATA_CON
MIPI_FTCAM_DATA_N<0>
MIPI_FTCAM_DATA_P<0>
MIPI_FTCAM_CLK_N
MIPI_FTCAM_CLK_P
CKPLUS_WAIVE=CLK_DATA_CON
MIPI_FTCAM_DATA_ISOL_N
MIPI_FTCAM_DATA_ISOL_P
MIPI_FTCAM_CLK_ISOL_N
MIPI_FTCAM_CLK_ISOL_P
I2C_FTCAM_DSBL_SDA
I2C_FTCAM_ISOL_SDA
I2C_FTCAM_DSBL_SCL
I2C_FTCAM_ISOL_SCL
PP8500
PP8501
SM-SP
SEP_CAM_DISABLE_DFF_L
VALUE STATE
L Camera Disable
H Camera Enable
L8503
L8502
3.25-OHM-0.1A-2.4GHZ
TAM0605-4SM
PLACE_NEAR=J8500:19MM
MIPI_FTCAM_DATA_ISOL_FILT_CONN_N
MIPI_FTCAM_DATA_ISOL_FILT_CONN_P
MIPI_FTCAM_CLK_ISOL_FILT_CONN_N
MIPI_FTCAM_CLK_ISOL_FILT_CONN_P
PP1V8_G3S
R8505 100K 5% 1/20W MF 201
R8507 100K 5% 1/20W MF 201
R8506 100K 5% 1/20W MF 201
R8508 100K 5% 1/20W MF 201
I2C PULL VALUES TO BE DETERMINED FROM CHARACTERIZATION
LCM INTERFACE (EDP) + CAMERA (MIPI)
BOM_COST_GROUP=DISPLAY
PAGE TITLE
EDP DISPLAY CONNECTOR
Apple Inc.
DRAWING NUMBER 051-05309
SIZE D
REVISION 5.1.0
BRANCH
PAGE 85 OF 500
SHEET 76 OF 98
NOTICE OF PROPRIETARY PROPERTY:
THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE INC.
THE POSESSOR AGREES TO THE FOLLOWING:
I TO MAINTAIN THIS DOCUMENT IN CONFIDENCE
II NOT TO REPRODUCE OR COPY IT
III NOT TO REVEAL OR PUBLISH IT IN WHOLE OR PART
IV ALL RIGHTS RESERVED

S4E0

EXTERNAL VREF

PPVCCQ_ANI_SSD0 — R8681 2K 1% 1/20W MF 201 — C8681 0.01UF 10% 10V X7R 0201-1 — NOSTUFF

SSD0_S4E0_ANI1_VREF — R8680 0 5% 1/20W MF 0201 — SSD0_S4E0_ANI0_VREF — NOSTUFF

R8682 2K 1% 1/20W MF 201 — C8682 0.01UF 10% 10V X7R 0201-1 — NOSTUFF

U8600

NAND-S4E-S5E-MCP-STUDY-COMBO

LGA

OMIT_TABLE

PP1V8_IO_SSD0			
PPVCCQ_ANI_SSD0			
PP2V5_NAND_SSD0			
PP0V9_SSD0_S4E0_VDD_PLL			
PP_SSD0_S4E0_VPP	NOSTUFF R8630 0 5% 1/20W MF 201	F3	VPP
		R4	VDD_PLL
		R2	VCC
		L12	VCC
		G4	VCC
		E12	VCC
		D3	VCC
		P9	VDDIO_2/NAND
		N2	VDDIO_2/NAND
		E10	VDDIO_2/NAND
		F2	VDDIO_2/NAND
		J5	VDDIO_1/GPIO
		K9	VDDIO_1/GPIO
		J2	VDDIO_1/GPIO
		R8	VDD
		E6	VDD
		L8	VDD
		L6	VDD
		G8	VDD
		L6	VDD
PP0V9_SSD0		J4	ANI1_VREF
SSD0_S4E0_ANI1_VREF		G12	ANI0_VREF
SSD0_S4E0_ANI0_VREF		L2	AVDD18_PLL
PP1V8_SSD0_S4E0_AVDD18_PLL		J8	PCI_VDD_2
PP1V8_SSD0_S4E0_PCI_AVDD_H		N8	PCI_VDD_1
PP0V9_SSD0		J6	PCI_AVDD_H
		M9	PCI_AVDD_CLK_2
		N6	PCI_AVDD_CLK_1

PP1V8_IO_SSD0	NOSTUFF R8602 47K 1% 1/20W MF 201 — NOSTUFF R8603 47K 1% 1/20W MF 201		
SSD0_LPB_L		R3	EXT_D0/BOOT0
SSD_BFH		C4	EXT_D1/BOOT1
SSD0_S4E_BOOT2		B5	EXT_D2/BOOT2/SPINAND_SCLK
SSD0_S4E0_SWD_UID0		C6	EXT_D3/SWD_UID0/SPINAND_MISO
SSD0_S4E_UART_RX		B7	EXT_D4/UART_RX
SSD0_S4E0_SWD_UID1		C8	EXT_D5/SWD_UID1/SPINAND_MOSI
SSD0_S4E0_UART_TX		B9	EXT_D6/UART_TX
SSD0_OCARINA_PFN_L		B11	EXT_D7/SPF
SSD0_PCIE_RESET_L		F8	EXT_NCE/PERST*
SSD0_SWDIO		D7	EXT_NRE/JTAG_TMS
SSD0_SWCLK		F6	EXT_NWE/JTAG_TCK
SSD0_S4E0_JTAG_TDO		F4	EXT_RNB/JTAG_TDO
SSD0_S4E0_JTAG_TDI		D5	EXT_CLE/JTAG_TDI
SSD0_S4E_JTAG_SEL		D9	EXT_ALE/JTAG_SEL
SSD0_S4E0_DROOP_L		T3	DROOP_N
SSD0_WP_L		G2	WP_N
	R8620 100K 1% 1/20W MF 201 — R8608 100K 1% 1/20W MF 201 — R8609 100K 1% 1/20W MF 201		
		VSS	U12 U10 U8 U6 U4 U2 T13 T9 T7 T5 R10 P13 P11 P7 P3 P1 N10 N4 M13 M7 M5 M1 L10 K13 K7 K5 K1 J10 H13 H11 H9 H5 H3 H1 F13 F11 F9 F7 F5 F1 D13 D11 D1 C12 C2 B13 B1 A12 A10 A8 A6 A4 A2

	SSD0_CLK24M_01	CLK_IN	M3
	PCIE_CLK100M_SSD0_01_P	PCIE_REFCLK_P	K11
	PCIE_CLK100M_SSD0_01_N	PCIE_REFCLK_M	J12
	SSD0_CLKREQ0_L	PCIE_CLKREQ_N	P5
	SSD0_S4E0_PCIE_RESREF	PCI_RESREF	H7
	PCIE_SSD0_R2D_C_P<0> — C8603 0.22UF — PCIE_SSD0_R2D_C_P<0>	PCIE_RX0_P	M11
	PCIE_SSD0_R2D_C_N<0> — C8604 0.22UF — PCIE_SSD0_R2D_C_N<0>	PCIE_RX0_M	N12
	PCIE_SSD0_D2R_C_P<0> — C8601 0.22UF — PCIE_SSD0_D2R_P<0>	PCIE_TX0_P	R12
	PCIE_SSD0_D2R_C_N<0> — C8602 0.22UF — PCIE_SSD0_D2R_N<0>	PCIE_TX0_M	T11
	SSD0_RESET_L	RESET*	L4
	SSD0_S4E_JTAG_TRST_L	TRST*	G10
	SSD0_S4E0_ZQ_C	ZQ_C	K3
	SSD0_S4E0_ZQ_L	ZQ_N	C10

R8633 49.9 1% 1/20W MF 201 — SSD0_CLK24M

R8604 3.01K 1% 1/20W MF 201 — NOSTUFF C8685 10PF 5% 25V C0G 0201

R8605 300 1% 1/20W MF 201 — R8606 100 1% 1/20W MF 201 — R8600 100K 1% 1/20W MF 201

PLACE_NEAR=U8600.C10:15MM

PLACE_NEAR=U8600.K3:15MM

S4E VDD

PP0V9_SSD0 — C8610 20UF 20% 10V X5R 0402 — C8616 20UF 20% 10V X5R 0402 — C8611 2.2UF 20% 6.3V CER-X5R 0201 — C8612 2.2UF 20% 6.3V CER-X5R 0201 — C8613 0.1UF 10% 16V X5R-CERM 0201 — C8614 0.1UF 10% 16V X5R-CERM 0201 — C8615 0.1UF 10% 16V X5R-CERM 0201

S4E VDDIO_2

PPVCCQ_ANI_SSD0 — C8632 10UF 20% 10V X5R-CERM 0402-0.1MM-1 — 4.3UF 20% 4V CERM 0402 — C8636 — C8637 2.2UF 20% 6.3V CER-X5R 0201

PP0V9_SSD0 — R8683 0 5% 1/20W MF 0201 — PP0V9_SSD0_S4E0_VDD_PLL

C8683 4UF 20% 6.3V CER-X5R 0201

PLACE_NEAR=R8683.1:10MM

VCC CAP

PP1V8_IO_SSD0 — R8610 0 5% 1/20W MF 0201 — PP1V8_SSD0_S4E0_PCI_AVDD_H

C8644 0.1UF 10% 16V X5R-CERM 0201 — C8645 4UF 20% 6.3V CER-X5R 0201

R8611 0 5% 1/20W MF 0201 — PP1V8_SSD0_S4E0_AVDD18_PLL

C8646 0.1UF 10% 16V X5R-CERM 0201 — C8647 2.2UF 20% 6.3V CER-X5R 0201

PP2V5_NAND_SSD0 — C8651 20UF 20% 10V X5R 0402 — C8648 10UF 20% 10V X5R-CERM 0402-0.1MM-1 — C8649 2.2UF 20% 6.3V CER-X5R 0201 — C8650 2.2UF 20% 6.3V CER-X5R 0201

S4E VDDIO_1

PP1V8_IO_SSD0 — C8684 2.2UF 20% 6.3V CER-X5R 0201 — C8687 2.2UF 20% 6.3V CER-X5R 0201

BOM_COST_GROUP=SSD

PAGE TITLE: S4E<0>

Apple Inc.

DRAWING NUMBER: 051-05309 — SIZE: D

REVISION: 5.1.0

BRANCH:

PAGE: 86 OF 500

SHEET: 77 OF 98

S4E1

EXTERNAL VREF

PPVCCQ_ANI_SSD0 — R8781 2K 1% 1/20W MF 0201 — C8781 0.01UF 10% 10V X7R 0201-1 — NOSTUFF

SSD0_S4E1_ANI1_VREF — R8780 0 5% 1/20W MF 0201 — NOSTUFF — SSD0_S4E1_ANI0_VREF

R8782 2K 1% 1/20W MF 0201 — C8782 0.01UF 10% 10V X7R 0201-1 — NOSTUFF

U8700

NAND-S4E-S5E-MCP-STUDY-COMBO
LGA
OMIT_TABLE

PP1V8_IO_SSD0	F3	VPP
PP0V9_SSD0_S4E1_VDD_PLL	R4	VDD_PLL
PP2V5_NAND_SSD0	R2, L12, G4, E12	VCC
PP0V9_SSD0	D3	VCC
PP_SSD0_S4E1_VPP	P9, K2, E10	VDDIO_2/NAND
PP0V9_SSD0	E2	VDDIO_2/NAND
PP0V9_SSD0	T5, K9	VDDIO_1/GPIO
PP0V9_SSD0	J2	VDDIO_1/GPIO
PP0V9_SSD0	R8, K6, L8, L6, G8	VDD
PP0V9_SSD0	G6	VDD
SSD0_S4E1_ANI1_VREF	J4	ANI1_VREF
SSD0_S4E1_ANI0_VREF	G12	ANI0_VREF
PP1V8_SSD0_S4E1_AVDD18_PLL	L2	AVDD18_PLL
PP1V8_SSD0_S4E1_PCI_AVDD_H	J8	PCI_VDD_2
PP0V9_SSD0	N8	PCI_VDD_1
PP0V9_SSD0	J6	PCI_AVDD_H
PP0V9_SSD0	M9	PCI_AVDD_CLK_2
PP0V9_SSD0	N6	PCI_AVDD_CLK_1

PP1V8_IO_SSD0 — R8730 0 5% 1/20W MF 0201 — NOSTUFF

PP1V8_IO_SSD0 — R8708 100K 1% 1/20W MF 0201

R8709 100K 1% 1/20W MF 0201

PP1V8_IO_SSD0 — R8702 47K 1% 1/20W MF 0201

SSD0_LPB_L	B3	EXT_D0/BOOT0
SSD_BFH	C4	EXT_D1/BOOT1
SSD0_S4E_BOOT2	B5	EXT_D2/BOOT2/SPINAND_SCLK
SSD0_S4E1_SWD_UID0	C6	EXT_D3/SWD_UID0/SPINAND_MISO
SSD0_S4E_UART_RX	B7	EXT_D4/UART_RX
SSD0_S4E1_SWD_UID1	C8	EXT_D5/SWD_UID1/SPINAND_MOSI
SSD0_S4E1_UART_TX	B9	EXT_D6/UART_TX
SSD0_OCARINA_PFN_L	B11	EXT_D7/SPF
SSD0_PCIE_RESET_L	E8	EXT_NCE/PERST*
SSD0_SWDIO	D7	EXT_NRE/JTAG_TMS
SSD0_SWCLK	E6	EXT_NWE/JTAG_TCK
SSD0_S4E1_JTAG_TDO	E4	EXT_RNB/JTAG_TDO
SSD0_S4E0_JTAG_TDO	D5	EXT_CLE/JTAG_TDI
SSD0_S4E_JTAG_SEL	D9	EXT_ALE/JTAG_SEL
SSD0_S4E1_DROOP_L	T3	DROOP_N
SSD0_WP_L	G2	WP_N

CLK_IN	M3	SSD0_CLK24M_01
PCIE_REFCLK_P	K11	PCIE_CLK100M_SSD0_01_P
PCIE_REFCLK_M	J12	PCIE_CLK100M_SSD0_01_N
PCIE_CLKREQ_N	P5	SSD0_CLKREQ1_L
PCI_RESREF	H7	SSD0_S4E1_PCIE_RESREF
PCIE_RX0_P	M11	PCIE_SSD0_R2D_P<1>
PCIE_RX0_M	N12	PCIE_SSD0_R2D_N<1>
PCIE_TX0_P	R12	PCIE_SSD0_D2R_C_P<1>
PCIE_TX0_M	T11	PCIE_SSD0_D2R_C_N<1>
RESET*	L4	SSD0_RESET_L
TRST*	G10	SSD0_S4E_JTAG_TRST_L
ZQ_C	K3	SSD0_S4E1_ZQ_C
ZQ_N	C10	SSD0_S4E1_ZQ_L

PCIE_SSD0_R2D_C_P<1> — C8731 0.22UF — PCIE_SSD0_R2D_C_P<1>
PCIE_SSD0_R2D_C_N<1> — C8739 0.22UF — PCIE_SSD0_R2D_C_N<1>
PCIE_SSD0_D2R_C_P<1> — C8701 0.22UF — PCIE_SSD0_D2R_C_P<1>
PCIE_SSD0_D2R_C_N<1> — C8702 0.22UF — PCIE_SSD0_D2R_C_N<1>

R8704 3.01K 1% 1/20W MF 0201 — C8785 10PF 5% 25V C0G 0201 — NOSTUFF

R8705 300 1% 1/20W MF 0201 — PLACE_NEAR=U8700.C10:15MM

R8706 100 1% 1/20W MF 0201 — PLACE_NEAR=U8700.K3:15MM

S4E VDD

PP0V9_SSD0 — C8710 20UF 20% 10V X5R 0402 — C8716 20UF 20% 10V X5R 0402 — C8711 2.2UF 20% 6.3V CER-X5R 0201 — C8712 2.2UF 20% 6.3V CER-X5R 0201 — C8713 0.1UF 10% 16V X5R-CERM 0201 — C8714 0.1UF 10% 16V X5R-CERM 0201 — C8715 0.1UF 10% 16V X5R-CERM 0201

S4E VDDIO_2

PPVCCQ_ANI_SSD0 — C8732 10UF 20% 16V X5R-CERM 0402-0.1MM-1 — 4.3UF 20% 4V CERM 0402 — C8736 — C8737 2.2UF 20% 6.3V CER-X5R 0201

PP0V9_SSD0 — R8783 0 5% 1/20W MF 0201 — PP0V9_SSD0_S4E1_VDD_PLL

C8783 4UF 20% 6.3V CER-X5R 0201 — PLACE_NEAR=R8783.1:10MM

PP1V8_IO_SSD0 — R8710 0 5% 1/20W MF 0201 — PP1V8_SSD0_S4E1_PCI_AVDD_H

C8744 0.1UF 10% 16V X5R-CERM 0201 — C8745 4UF 20% 6.3V CER-X5R 0201

VCC CAP

PP2V5_NAND_SSD0 — C8751 20UF 20% 10V X5R 0402 — C8748 10UF 20% 10V X5R-CERM 0402-0.1MM-1 — C8749 2.2UF 20% 6.3V CER-X5R 0201 — C8750 2.2UF 20% 6.3V CER-X5R 0201

R8711 0 5% 1/20W MF 0201 — PP1V8_SSD0_S4E1_AVDD18_PLL

C8746 0.1UF 10% 16V X5R-CERM 0201 — C8747 2.2UF 20% 6.3V CER-X5R 0201

S4E VDDIO_1

PP1V8_IO_SSD0 — C8784 2.2UF 20% 6.3V CER-X5R 0201 — C8787 2.2UF 20% 6.3V CER-X5R 0201

BOM_COST_GROUP=SSD

PAGE TITLE: S4E<1>

Apple Inc.

DRAWING NUMBER: 051-05309 — SIZE: D
REVISION: 5.1.0
BRANCH:
PAGE: 87 OF 500
SHEET: 78 OF 98

S4E2

EXTERNAL VREF

PPVCCQ_ANI_SSD0 — R8881 2K 1% 1/20W MF 201 — C8881 0.01UF 10% 10V X7R 0201-1 — NOSTUFF

R8880 0 5% 1/20W MF 0201 — NOSTUFF

SSD0_S4E2_ANI1_VREF — SSD0_S4E2_ANI0_VREF

R8882 2K 1% 1/20W MF 201 — NOSTUFF

C8882 0.01UF 10% 10V X7R 0201-1 — NOSTUFF

U8800

NAND-S4E-S5E-MCP-STUDY-COMBO

LGA

OMIT_TABLE

PP1V8_IO_SSD0 — PP0V9_SSD0 — PPVCCQ_ANI_SSD0 — PP2V5_NAND_SSD0 — PP0V9_SSD0_S4E2_VDD_PLL — PP_SSD0_S4E2_VPP

SSD0_S4E2_ANI1_VREF — SSD0_S4E2_ANI0_VREF — PP1V8_SSD0_S4E2_AVDD18_PLL — PP1V8_SSD0_S4E2_PCI_AVDD_H — PP0V9_SSD0

R8830 0 5% 1/20W MF 201 — NOSTUFF

Ball	Net
F3	VPP
R4	VDD_PLL
R2	VCC
L12	VCC
G4	VCC
E12	VCC
D3	VCC
P9	VDDIO_2/NAND
N2	VDDIO_2/NAND
E10	VDDIO_2/NAND
E2	VDDIO_1/GPIO
T5	VDDIO_1/GPIO
K9	VDDIO_1/GPIO
J2	VDDIO_1/GPIO
R8	VDD
R6	VDD
L8	VDD
L6	VDD
G8	VDD
G6	VDD
J4	ANI1_VREF
G12	ANI0_VREF
L2	AVDD18_PLL
J8	PCI_VDD_2
N8	PCI_VDD_1
J6	PCI_AVDD_H
R9	PCI_AVDD_CLK_2
N6	PCI_AVDD_CLK_1
B3	EXT_D0/BOOT0
C4	EXT_D1/BOOT1
B5	EXT_D2/BOOT2/SPINAND_SCLK
C6	EXT_D3/SWD_UID0/SPINAND_MISO
B7	EXT_D4/UART_RX
C8	EXT_D5/SWD_UID1/SPINAND_MOSI
B9	EXT_D6/UART_TX
B11	EXT_D7/SPF
E8	EXT_NCE/PERST*
D7	EXT_NRE/JTAG_TMS
E6	EXT_NWE/JTAG_TCK
E4	EXT_RNB/JTAG_TDO
D5	EXT_CLE/JTAG_TDI
D9	EXT_ALE/JTAG_SEL
T3	DROOP_N
G2	WP_N

VSS: U12 U10 U8 U6 U4 U2 T13 T9 T7 T1 R10 P13 P11 P7 P3 P1 N10 N4 M13 M7 M5 M1 L10 K13 K7 K5 K1 J10 H13 H11 H9 H5 H3 H1 F13 F11 F9 F7 F5 F1 D13 D11 D1 C12 C2 B13 B1 A12 A10 A8 A6 A4 A2

PP1V8_IO_SSD0 — R8809 100K 1% 1/20W MF 201 — SSD:4L

R8808 100K 1% 1/20W MF 201 — SSD:4L

SSD0_LPB_L	EXT_D0/BOOT0
SSD_BFH	EXT_D1/BOOT1
SSD0_S4E_BOOT2	EXT_D2/BOOT2/SPINAND_SCLK
SSD0_S4E2_SWD_UID0	EXT_D3/SWD_UID0/SPINAND_MISO
SSD0_S4E_UART_RX	EXT_D4/UART_RX
SSD0_S4E2_SWD_UID1	EXT_D5/SWD_UID1/SPINAND_MOSI
SSD0_S4E2_UART_TX	EXT_D6/UART_TX
SSD0_OCARINA_PFN_L	EXT_D7/SPF
SSD0_PCIE_RESET_L	EXT_NCE/PERST*
SSD0_SWDIO	EXT_NRE/JTAG_TMS
SSD0_SWCLK	EXT_NWE/JTAG_TCK
SSD0_S4E2_JATG_TDO	EXT_RNB/JTAG_TDO
SSD0_S4E1_JTAG_TDO	EXT_CLE/JTAG_TDI
SSD0_S4E_JTAG_SEL	EXT_ALE/JTAG_SEL
S4E2_DROOP_L	DROOP_N
SSD0_WP_L	WP_N

PP1V8_IO_SSD0 — R8802 47K 1% 1/20W MF 201 — SSD:4L

SSD0_CLK24M_23 — R8833 49.9 1% 1/20W MF 201 — SSD:4L — SSD0_CLK24M

CLK_IN	SSD0_CLK24M_23
PCIE_REFCLK_P	PCIE_CLK100M_SSD0_23_P
PCIE_REFCLK_M	PCIE_CLK100M_SSD0_23_N
PCIE_CLKREQ_N	SSD0_CLKREQ2_L
PCI_RESREF	SSD0_S4E2_PCIE_RESREF
PCIE_RX0_P	PCIE_SSD0_R2D_P<2>
PCIE_RX0_M	PCIE_SSD0_R2D_N<2>
PCIE_TX0_P	PCIE_SSD0_D2R_C_P<2>
PCIE_TX0_M	PCIE_SSD0_D2R_C_N<2>
RESET*	SSD0_RESET_L
TRST*	SSD0_S4E_JTAG_TRST_L
ZQ_C	SSD0_S4E2_ZQ_C
ZQ_N	SSD0_S4E2_ZQ_L

C8871 0.22UF — PCIE_SSD0_R2D_C_P<2> — SSD:4L

C8872 0.22UF — PCIE_SSD0_R2D_C_N<2> — SSD:4L

R8804 3.01K 1% 1/20W MF 201 — SSD:4L

C8885 10PF 5% 25V C0G 0201 — NOSTUFF

C8801 0.22UF — PCIE_SSD0_D2R_P<2> — SSD:4L

C8802 0.22UF — PCIE_SSD0_D2R_N<2> — SSD:4L

R8805 300 1% 1/20W MF 201 — SSD:4L

R8806 100 1% 1/20W MF 201 — SSD:4L

PLACE_NEAR=U8800.C10:15MM

PLACE_NEAR=U8800.K3:15MM

S4E VDD

PP0V9_SSD0 — C8810 20UF 20% 10V X5R 0402 — C8816 20UF 20% 10V X5R 0402 — C8811 2.2UF 20% 6.3V CER-X5R 0201 — C8812 2.2UF 20% 6.3V CER-X5R 0201 — C8813 0.1UF 10% 16V X5R-CERM 0201 — C8814 0.1UF 10% 16V X5R-CERM 0201 — C8815 0.1UF 10% 16V X5R-CERM 0201 — SSD:4L

S4E VDDIO_2

PPVCCQ_ANI_SSD0 — C8832 10UF 20% 10V X5R-CERM 0402-0.1MM-1 — 4.3UF 20% 4V CERM 0402 — C8836 — C8837 2.2UF 20% 6.3V CER-X5R 0201 — SSD:4L

R8883 0 5% 1/20W MF 0201 — PP0V9_SSD0_S4E2_VDD_PLL — SSD:4L

C8883 4UF 20% 6.3V CER-X5R 0201 — SSD:4L

PLACE_NEAR=R8883.1:10MM

VCC CAP

PP2V5_NAND_SSD0 — C8851 20UF 20% 10V X5R 0402 — C8848 10UF 20% 10V X5R-CERM 0402-0.1MM-1 — C8849 2.2UF 20% 6.3V CER-X5R 0201 — C8850 2.2UF 20% 6.3V CER-X5R 0201 — SSD:4L

PP1V8_IO_SSD0 — R8810 0 5% 1/20W MF 0201 — PP1V8_SSD0_S4E2_PCI_AVDD_H — SSD:4L

C8844 0.1UF 10% 16V X5R-CERM 0201 — C8845 4UF 20% 6.3V CER-X5R 0201 — SSD:4L

R8811 0 5% 1/20W MF 0201 — PP1V8_SSD0_S4E2_AVDD18_PLL — SSD:4L

C8846 0.1UF 10% 16V X5R-CERM 0201 — C8847 2.2UF 20% 6.3V CER-X5R 0201 — SSD:4L

S4E VDDIO_1

PP1V8_IO_SSD0 — C8884 2.2UF 20% 6.3V CER-X5R 0201 — C8887 2.2UF 20% 6.3V CER-X5R 0201 — SSD:4L

BOM_COST_GROUP=SSD

PAGE TITLE	S4E<2>
	Apple Inc.
DRAWING NUMBER	051-05309
SIZE	D
REVISION	5.1.0
BRANCH	
PAGE	88 OF 500
SHEET	79 OF 98

S4E3

EXTERNAL VREF

PPVCCQ_ANI_SSD0 — R8981 2K 1% 1/20W MF 201 — C8981 0.01UF 10% 10V X7R 0201-1 — NOSTUFF
R8980 0 5% 1/20W MF 0201 — SSD0_S4E3_ANI1_VREF — SSD0_S4E3_ANI0_VREF
R8982 2K 1% 1/20W MF 201 — C8982 0.01UF 10% 10V X7R 0201-1 — NOSTUFF

U8900

NAND-S4E-S5E-MCP-STUDY-COMBO
LGA

PP1V8_IO_SSD0
PPVCCQ_ANI_SSD0
PP2V5_NAND_SSD0
PP0V9_SSD0_S4E3_VDD_PLL
PP_SSD0_S4E3_VPP — NOSTUFF R8930 0 5% 1/20W MF 201
PP0V9_SSD0
SSD0_S4E3_ANI1_VREF
SSD0_S4E3_ANI0_VREF
PP1V8_SSD0_S4E3_AVDD18_PLL
PP1V8_SSD0_S4E3_PCI_AVDD_H
PP0V9_SSD0

VPP, VDD_PLL, VCC, VDDIO_2/NAND, VDDIO_1/GPIO, VDD, ANI1_VREF, ANI0_VREF, AVDD18_PLL, PCI_VDD_2, PCI_VDD_1, PCI_AVDD_H, PCI_AVDD_CLK_2, PCI_AVDD_CLK_1

PP1V8_IO_SSD0 — R8908 100K 1% 1/20W MF 201 SSD:4L — R8909 100K 1% 1/20W MF 201 SSD:4L

SSD0_LPB_L	B3	EXT_D0/BOOT0
SSD_BFH	C4	EXT_D1/BOOT1
SSD0_S4E_BOOT2	B5	EXT_D2/BOOT2/SPINAND_SCLK
SSD0_S4E3_SWD_UID0	C6	EXT_D3/SWD_UID0/SPINAND_MISO
SSD0_S4E_UART_RX	B7	EXT_D4/UART_RX
SSD0_S4E3_SWD_UID1	C8	EXT_D5/SWD_UID1/SPINAND_MOSI
SSD0_S4E3_UART_TX	B9	EXT_D6/UART_TX
SSD0_OCARINA_PFN_L	B11	EXT_D7/SPF
SSD0_PCIE_RESET_L	E8	EXT_NCE/PERST*
SSD0_SWDIO	D7	EXT_NRE/JTAG_TMS
SSD0_SWCLK	E6	EXT_NWE/JTAG_TCK
SSD0_S4E3_JTAG_TDO	E4	EXT_RNB/JTAG_TDO
SSD0_S4E2_JATG_TDO	D5	EXT_CLE/JTAG_TDI
SSD0_S4E_JTAG_SEL	D9	EXT_ALE/JTAG_SEL
S4E3_DROOP_L	T3	DROOP_N
SSD0_WP_L	G2	WP_N

OMIT_TABLE

PP1V8_IO_SSD0 — R8902 47K 1% 1/20W MF 201 SSD:4L

CLK_IN	M3	SSD0_CLK24M_23
PCIE_REFCLK_P	K11	PCIE_CLK100M_SSD0_23_P
PCIE_REFCLK_M	J12	PCIE_CLK100M_SSD0_23_N
PCIE_CLKREQ_N	P5	SSD0_CLKREQ3_L
PCI_RESREF	H7	SSD0_S4E3_PCIE_RESREF
PCIE_RX0_P	M11	PCIE_SSD0_R2D_P<3>
PCIE_RX0_M	N12	PCIE_SSD0_R2D_N<3>
PCIE_TX0_P	R12	PCIE_SSD0_D2R_C_P<3>
PCIE_TX0_M	T11	PCIE_SSD0_D2R_C_N<3>
RESET*	L4	SSD0_RESET_L
TRST*	G10	SSD0_S4E_JTAG_TRST_L
ZQ_C	K3	SSD0_S4E3_ZQ_C
ZQ_N	C10	SSD0_S4E3_ZQ_L

PCIE_RX0_P/M: C8971 0.22UF SSD:4L, C8972 0.22UF SSD:4L → PCIE_SSD0_R2D_C_P<3>, PCIE_SSD0_R2D_C_N<3>
PCIE_TX0_P/M: C8901 0.22UF SSD:4L, C8902 0.22UF SSD:4L → PCIE_SSD0_D2R_P<3>, PCIE_SSD0_D2R_N<3>
R8904 3.01K 1% 1/20W MF 201 SSD:4L — C8985 10PF 5% 25V C0G 0201 NOSTUFF
R8905 300 1% 1/20W MF 201 SSD:4L — R8906 100 1% 1/20W MF 201 SSD:4L

PLACE_NEAR=U8900.C10:15MM
PLACE_NEAR=U8900.K3:15MM

VSS

S4E VDD

PP0V9_SSD0 — C8910 20UF 20% 10V X5R 0402; C8916 20UF 20% 10V X5R 0402; C8911 2.2UF 20% 6.3V CER-X5R 0201; C8912 2.2UF 20% 6.3V CER-X5R 0201; C8913 0.1UF 10% 16V X5R-CERM 0201; C8914 0.1UF 10% 16V X5R-CERM 0201; C8915 0.1UF 10% 16V X5R-CERM 0201 — SSD:4L

S4E VDDIO_2

PPVCCQ_ANI_SSD0 — C8932 10UF 20% 10V X5R-CERM 0402-0.1MM-1 SSD:4L — 4.3UF 20% 4V CERM 0402 — C8936 SSD:4L — C8937 2.2UF 20% 6.3V CER-X5R 0201 SSD:4L

VCC CAP

PP1V8_IO_SSD0 — R8910 0 5% 1/20W MF 0201 SSD:4L → PP1V8_SSD0_S4E3_PCI_AVDD_H
C8944 0.1UF 10% 16V X5R-CERM 0201 SSD:4L — C8945 4UF 20% 6.3V CER-X5R 0201 SSD:4L

PP1V8_IO_SSD0 — R8911 0 5% 1/20W MF 0201 SSD:4L → PP1V8_SSD0_S4E3_AVDD18_PLL
C8946 0.1UF 10% 16V X5R-CERM 0201 SSD:4L — C8947 2.2UF 20% 6.3V CER-X5R 0201 SSD:4L

PP2V5_NAND_SSD0 — C8953 20UF 20% 10V X5R 0402 SSD:4L; C8948 10UF 20% 10V X5R-CERM 0402-0.1MM-1 SSD:4L; C8949 2.2UF 20% 6.3V CER-X5R 0201 SSD:4L; C8950 2.2UF 20% 6.3V CER-X5R 0201 SSD:4L; C8951 2.2UF 20% 6.3V CER-X5R 0201 SSD:4L; C8952 2.2UF 20% 6.3V CER-X5R 0201 SSD:4L

S4E VDDIO_1

PP0V9_SSD0 — R8983 0 5% 1/20W MF 0201 SSD:4L → PP0V9_SSD0_S4E3_VDD_PLL
C8983 4UF 20% 6.3V CER-X5R 0201 SSD:4L
PLACE_NEAR=R8983.1:10MM

PP1V8_IO_SSD0 — C8984 2.2UF 20% 6.3V CER-X5R 0201 SSD:4L — C8987 2.2UF 20% 6.3V CER-X5R 0201 SSD:4L

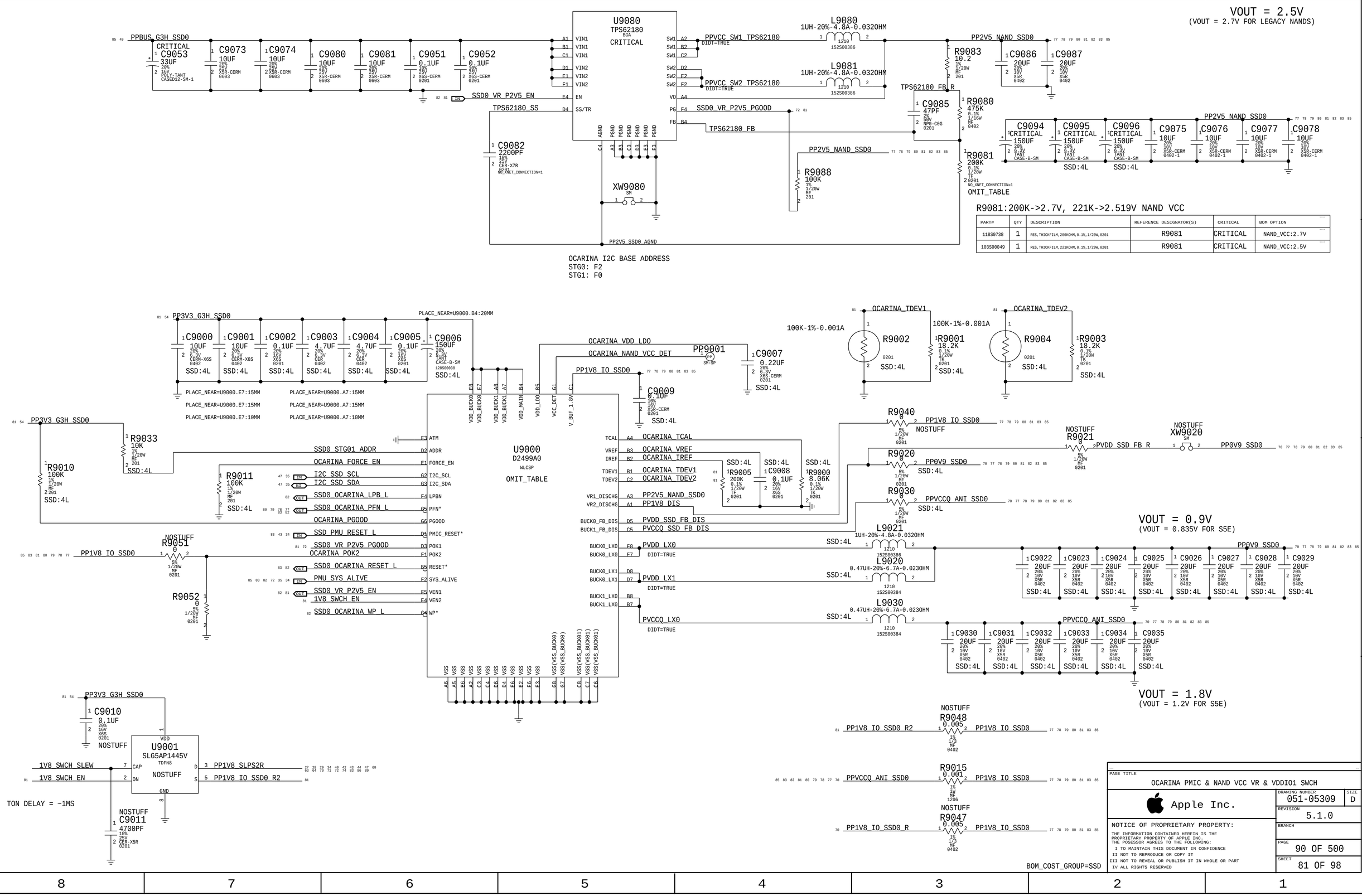
BOM_COST_GROUP=SSD

PAGE TITLE: S4E<3>

Apple Inc.

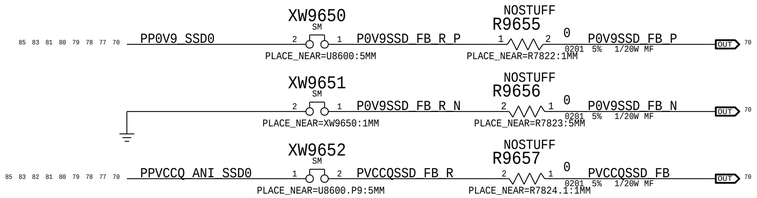
NOTICE OF PROPRIETARY PROPERTY:
THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE INC.
THE POSESSOR AGREES TO THE FOLLOWING:
I TO MAINTAIN THIS DOCUMENT IN CONFIDENCE
II NOT TO REPRODUCE OR COPY IT
III NOT TO REVEAL OR PUBLISH IT IN WHOLE OR PART
IV ALL RIGHTS RESERVED

DRAWING NUMBER	051-05309
SIZE	D
REVISION	5.1.0
BRANCH	
PAGE	89 OF 500
SHEET	80 OF 98

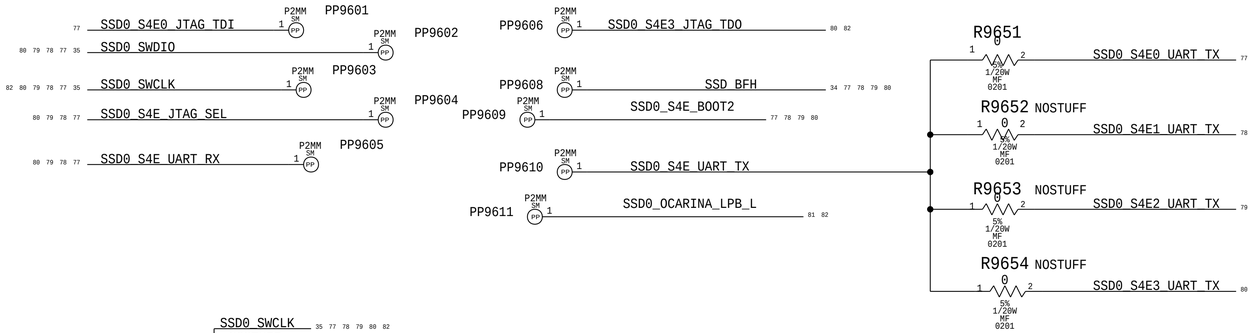


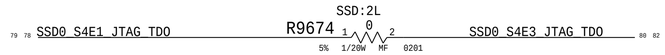
PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
118S0738	1	RES,THICKFILM,200KOHM,0.1%,1/20W,0201	R9081	CRITICAL	NAND_VCC:2.7V
103S00049	1	RES,THICKFILM,221KOHM,0.1%,1/20W,0201	R9081	CRITICAL	NAND_VCC:2.5V

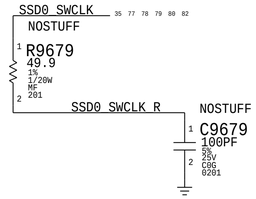
PMU BUCK 9 & 10 REMOTE SENSE OPTIONS

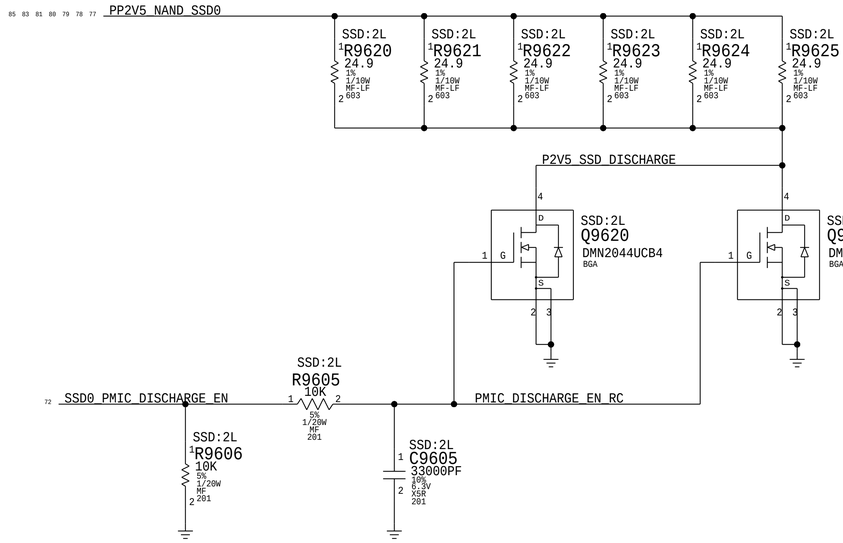


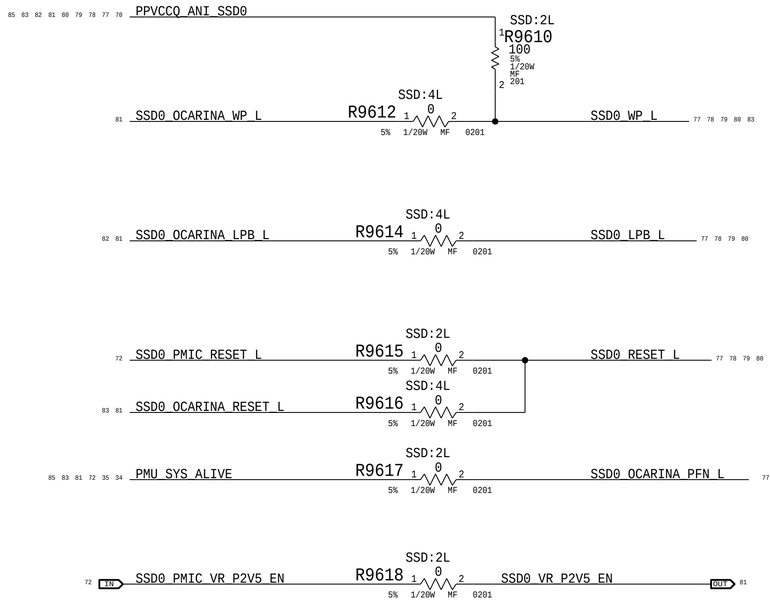
SSD0











BOM_COST_GROUP=SSD

PAGE TITLE
SSD SUPPORT

Apple Inc.

DRAWING NUMBER 051-05309
SIZE D
REVISION 5.1.0
BRANCH
PAGE 96 OF 500
SHEET 82 OF 98

Functional Test Points

J5110 - DFR Display Connector

46	IN	DFR_DISP_VSYNC	FUNC_TEST=TRUE
46 36	IN	DFR_DISP_TE	FUNC_TEST=TRUE
46 34	IN	DFR_DISP_INT	FUNC_TEST=TRUE
46 36	IN	DFR_DISP_RESET_L	FUNC_TEST=TRUE
46	IN	PP3V3_G3HSW_DFR	FUNC_TEST=TRUE
46	IN	MIPI_DFR_CLK_FILT_CONN_P	FUNC_TEST=TRUE
46	IN	MIPI_DFR_CLK_FILT_CONN_N	FUNC_TEST=TRUE
46	IN	MIPI_DFR_DATA_FILT_CONN_P	FUNC_TEST=TRUE
46	IN	MIPI_DFR_DATA_FILT_CONN_N	FUNC_TEST=TRUE
87 48 46	IN	PP1V8_DFR	FUNC_TEST=TRUE
48 46	IN	I2C_DFR_SCL_R	FUNC_TEST=TRUE
48 46	IN	I2C_DFR_SDA_R	FUNC_TEST=TRUE
		GND	FUNC_TEST=TRUE

3 TPS
4 TPS
6 TPS

J5100 - DFR Touch Connector

46	IN	DFR_TOUCH_LID_OPEN_L	FUNC_TEST=TRUE
46 36	IN	DFR_TOUCH_RESET_L	FUNC_TEST=TRUE
46 34	IN	DFR_PWR_EN	FUNC_TEST=TRUE
46	IN	TP_DFR_TOUCH_GPIO2	FUNC_TEST=TRUE
46	IN	PP5V_G3S_DFR_FILT	FUNC_TEST=TRUE
46 36	IN	SPI_DFR_CS_L	FUNC_TEST=TRUE
46 43	IN	SPI_DFR_MOSI	FUNC_TEST=TRUE
46 43	IN	SPI_DFR_MISO_R	FUNC_TEST=TRUE
46 43	IN	SPI_DFR_CLK	FUNC_TEST=TRUE
46 35	IN	DFR_TOUCH_INT_L	FUNC_TEST=TRUE
46 36	IN	DFR_TOUCH_CLK32K_RESET_L	FUNC_TEST=TRUE
46	IN	TP_DFR_TOUCH_PANEL_DETECT	FUNC_TEST=TRUE
46	IN	TP_DFR_TOUCH_ROM_WC	FUNC_TEST=TRUE
46	IN	GND	FUNC_TEST=TRUE

1 TPS
6 TPS

J6700 - Keyboard Connector

85 75 52	IN	PP5V_G3S_KBD	FUNC_TEST=TRUE
86 75	IN	PPVOUT_S0_KBDLED	FUNC_TEST=TRUE
75	IN	PP_KBDLED_CATHODE1	FUNC_TEST=TRUE
75	IN	PP_KBDLED_CATHODE2	FUNC_TEST=TRUE
75 34	IN	SOC_KBD_BKLT_PWM_R	FUNC_TEST=TRUE
61	IN	KBD_ID1	FUNC_TEST=TRUE
61	IN	KBD_DRIVE_Y0	FUNC_TEST=TRUE
61	IN	KBD_DRIVE_Y1	FUNC_TEST=TRUE
61	IN	KBD_DRIVE_Y2	FUNC_TEST=TRUE
61	IN	KBD_DRIVE_Y3	FUNC_TEST=TRUE
61	IN	KBD_DRIVE_Y4	FUNC_TEST=TRUE
61	IN	KBD_DRIVE_Y5	FUNC_TEST=TRUE
61	IN	KBD_DRIVE_Y6	FUNC_TEST=TRUE
61	IN	KBD_DRIVE_Y7	FUNC_TEST=TRUE
61	IN	KBD_SENSE_X0	FUNC_TEST=TRUE
61	IN	KBD_SENSE_X1	FUNC_TEST=TRUE
61	IN	KBD_SENSE_X2	FUNC_TEST=TRUE
61	IN	KBD_SENSE_X3	FUNC_TEST=TRUE
61	IN	KBD_SENSE_X4	FUNC_TEST=TRUE
61	IN	KBD_SENSE_X5	FUNC_TEST=TRUE
61	IN	KBD_SENSE_X6	FUNC_TEST=TRUE
61	IN	KBD_SENSE_X7	FUNC_TEST=TRUE
61	IN	KBD_SENSE_X8	FUNC_TEST=TRUE
61	IN	KBD_SENSE_X9	FUNC_TEST=TRUE
61	IN	KBD_SENSE_X10	FUNC_TEST=TRUE
61	IN	KBD_SENSE_X11	FUNC_TEST=TRUE
61	IN	KBD_SENSE_X12	FUNC_TEST=TRUE
61	IN	KBD_CAP_CATHODE	FUNC_TEST=TRUE
61	IN	PP3V3_G3H_RSLOC	FUNC_TEST=TRUE
61	IN	KBD_RIGHT_SHIFT_KEY	FUNC_TEST=TRUE
61	IN	KBD_LEFT_OPTION_KEY	FUNC_TEST=TRUE
61	IN	KBD_CONTROL_KEY	FUNC_TEST=TRUE
62 61	IN	I2C_KBD_SDA	FUNC_TEST=TRUE
62 61	IN	I2C_KBD_SCL	FUNC_TEST=TRUE
62 61	IN	KBD_INT_L	FUNC_TEST=TRUE
72 63 61 89	IN	PMU_RSLOC_RST_L	FUNC_TEST=TRUE
75	IN	PPVOUT_S0_KBDLED_R	FUNC_TEST=TRUE
61	IN	KBD_CAPSLOCK_LED	FUNC_TEST=TRUE
61	IN	IOXP_I2C_SCL	FUNC_TEST=TRUE
61	IN	IOXP2_INT_L	FUNC_TEST=TRUE
61	IN	IOXP_I2C_SDA	FUNC_TEST=TRUE
		GND	FUNC_TEST=TRUE

6 TPS

J6801 - TRACKPAD CONNECTOR

62	IN	ACT_GND	FUNC_TEST=TRUE
62	IN	PP5V_G3S_TPAD_CONN	FUNC_TEST=TRUE
62 51	IN	PP3V3_G3S_TPAD	FUNC_TEST=TRUE
62	IN	I2C_TPAD_3V3_SDA	FUNC_TEST=TRUE
62	IN	I2C_TPAD_3V3_SCL	FUNC_TEST=TRUE
85 62	IN	SPI_TPAD_3V3_CLK	FUNC_TEST=TRUE
62	IN	SPI_TPAD_3V3_MISO	FUNC_TEST=TRUE
62	IN	SPI_TPAD_3V3_CS_L	FUNC_TEST=TRUE
62	IN	SPI_TPAD_3V3_MOSI	FUNC_TEST=TRUE
62	IN	TPAD_3V3_SPI_EN	FUNC_TEST=TRUE
62	IN	TPAD_3V3_SPI_INT_L	FUNC_TEST=TRUE
62	IN	TPAD_3V3_ACTUATOR_DISABLE_L	FUNC_TEST=TRUE
62 35	IN	TPAD_KBD_WAKE_L	FUNC_TEST=TRUE
		GND	FUNC_TEST=TRUE

6 TPS

J6640 - MIC Connector

60 43	IN	PDM_DMIC_CLK0	FUNC_TEST=TRUE
	IN	AUD_DMIC0_DATA_CONN	FUNC_TEST=TRUE
60	IN	PP1V8_DMIC	FUNC_TEST=TRUE
60 43	IN	PDM_DMIC_CLK1	FUNC_TEST=TRUE
60	IN	AUD_DMIC1_DATA_CONN	FUNC_TEST=TRUE
		GND	FUNC_TEST=TRUE

2 TPS

J6410 - REAR LEFT CONNECTOR

58	IN	SPKRCONN_RL_OUTP	FUNC_TEST=TRUE
58	IN	SPKRCONN_RL_OUTN	FUNC_TEST=TRUE
58 36	IN	SPKR_ID0	FUNC_TEST=TRUE
		GND	FUNC_TEST=TRUE

2 TPS

J6410 - FRONT LEFT CONNECTOR

	IN	SPKRCONN_FL_OUTP	FUNC_TEST=TRUE
58	IN	SPKRCONN_FL_OUTN	FUNC_TEST=TRUE
		GND	FUNC_TEST=TRUE

2 TPS

J6510 - REAR RIGHT CONNECTOR

59	IN	SPKRCONN_RR_OUTP	FUNC_TEST=TRUE
59	IN	SPKRCONN_RR_OUTN	FUNC_TEST=TRUE
59 36	IN	SPKR_ID1	FUNC_TEST=TRUE
		GND	FUNC_TEST=TRUE

2 TPS

J6550 - FRONT RIGHT CONNECTOR

59	IN	SPKRCONN_FR_OUTP	FUNC_TEST=TRUE
59	IN	SPKRCONN_FR_OUTN	FUNC_TEST=TRUE
		GND	FUNC_TEST=TRUE

2 TPS

J6600 - Audio Jack Connector

60	IN	AUD_CONN_HP_LEFT	FUNC_TEST=TRUE
60	IN	AUD_CONN_HP_RIGHT	FUNC_TEST=TRUE
60	IN	AUD_CONN_RING2	FUNC_TEST=TRUE
60	IN	AUD_CONN_SLEEVE	FUNC_TEST=TRUE
60	IN	AUD_CONN_HP_SENSE_L	FUNC_TEST=TRUE
60	IN	AUD_CONN_HP_SENSE_R	FUNC_TEST=TRUE
60	IN	AUD_CONN_TIP_SENSE	FUNC_TEST=TRUE
60	IN	AUD_CONN_RING_SENSE	FUNC_TEST=TRUE
60	IN	AUD_CONN_SLEEVE_XW	FUNC_TEST=TRUE
60	IN	AUD_CONN_RING2_XW	FUNC_TEST=TRUE
		GND	FUNC_TEST=TRUE

2 TPS

J6950 - Battery Connector

64 63	IN	PPVBAT_G3H_CONN	FUNC_TEST=TRUE
		GND	FUNC_TEST=TRUE

8 TPS
8 TPS

J6951 - BATTERY SENSE CONNECTOR

86 63	IN	SYS_DETECT_L	FUNC_TEST=TRUE
63	IN	SYS_DETECT	FUNC_TEST=TRUE
63	IN	SMBUS_3V3_BATT_SCL	FUNC_TEST=TRUE
63	IN	SMBUS_3V3_BATT_SDA	FUNC_TEST=TRUE
74 72 50 49	IN	SENSOR_PWR_EN	FUNC_TEST=TRUE
		GND	FUNC_TEST=TRUE

1 TPS

J6001 FAN CONNECTOR

			0
55	IN	GND_FAN	BUNC_TEST=TRUE
55	IN	PP5V_G3S_FAN	FUNC_TEST=TRUE
55	IN	FAN_RT_TACH	FUNC_TEST=TRUE
55	IN	FAN_RT_PWM	FUNC_TEST=TRUE

2 TPS
2 TPS

J4900 - Mesa Connector

60 44	IN	PP3V0_MESA_FILT_CONN	FUNC_TEST=TRUE
44 60	IN	PP16V0_MESA_FILT_CONN	FUNC_TEST=TRUE
60 44	IN	PP1V8_MESA_FILT_CONN	FUNC_TEST=TRUE
60 44	IN	SPI_MESA_MISO_CONN	FUNC_TEST=TRUE
60 44	IN	SPI_MESA_MOSI_CONN	FUNC_TEST=TRUE
60 44	IN	SPI_MESA_CLK_CONN	FUNC_TEST=TRUE
60 44	IN	MESA_INT_CONN	FUNC_TEST=TRUE
60 44	IN	MESA_BOOST_EN_CONN	FUNC_TEST=TRUE
89 60 44	IN	PMU_ONOFF_R_L_CONN	FUNC_TEST=TRUE
		GND	FUNC_TEST=TRUE

2 TPS
1 TPS
1 TPS
4 TPS
2 TPS
3 TPS
1 TPS
6 TPS

J8500 - eDP Connector

86 75	IN	PPVOUT_S0_LCDBKLT_F	FUNC_TEST=TRUE
86 76 75	IN	PPVOUT_S0_LCDBKLT	FUNC_TEST=TRUE
76 4	IN	EDP_BKLT_PWM	FUNC_TEST=TRUE
75 4	IN	EDP_BKLT_EN	FUNC_TEST=TRUE
76 4	IN	EDP_PANEL_PWR_EN	FUNC_TEST=TRUE
76	IN	TP_LCD_IRQ_L	FUNC_TEST=TRUE
76 43	IN	DP_INT_HPD	FUNC_TEST=TRUE
76	IN	EDP_PANEL_PWR_BUF_EN	FUNC_TEST=TRUE
	IN	PP3V3_S0SW_LCD	FUNC_TEST=TRUE
88 76	IN	PP5V_S0SW_LCD	FUNC_TEST=TRUE
86 76 74 73 69 67 66 65 51	IN	PP5V_G3S_CPUREG_MISC	FUNC_TEST=TRUE
75	IN	PPVIN_S0SW_LCDBKLT	FUNC_TEST=TRUE
		GND	FUNC_TEST=TRUE

1 TPS
7 TPS
1 TPS
12 TPS

J3300 - Left USB-C Connector

87 30 28 27	IN	PP20V_USBC_XA_VBUS	FUNC_TEST=TRUE
30 28	IN	USBC_XA_CC1	FUNC_TEST=TRUE
30 28	IN	USBC_XA_CC2	FUNC_TEST=TRUE
30 28	IN	USBC_XA_SBU1	FUNC_TEST=TRUE
	IN	USBC_XA_SBU2	FUNC_TEST=TRUE
87 30 29	IN	PP20V_USBC_XB_VBUS	FUNC_TEST=TRUE
30 29	IN	USBC_XB_CC1	FUNC_TEST=TRUE
30 29	IN	USBC_XB_CC2	FUNC_TEST=TRUE
30 29	IN	USBC_XB_SBU1	FUNC_TEST=TRUE
30 29	IN	USBC_XB_SBU2	FUNC_TEST=TRUE
30	IN	TP_USBC_PP20V_XA	FUNC_TEST=TRUE
30	IN	TP_USBC_PP20V_XB	FUNC_TEST=TRUE
89 28	IN	USB_SOC_TYPEC_P	FUNC_TEST=TRUE
89 28	IN	USB_SOC_TYPEC_N	FUNC_TEST=TRUE
		GND	FUNC_TEST=TRUE

48 TPS

29 27	IN	USB3_BSSB_D2R_R_P	FUNC_TEST=TRUE
29 27	IN	USB3_BSSB_D2R_R_N	FUNC_TEST=TRUE
	IN	USB3_BSSB_R2D_P	FUNC_TEST=TRUE
29 27	IN	USB3_BSSB_R2D_N	FUNC_TEST=TRUE
		GND	FUNC_TEST=TRUE

12 TPS

PROBE BLOCK GRID - DFU/SOC/DCI

14	IN	TP_USB3_EXTC_R2D_C_N	
14	IN	TP_USB_FIXT1_N	
14	IN	TP_USB3_EXTC_D2R_N	
14	IN	TP_USB3_EXTC_D2R_P	
14	IN	TP_USB_FIXT1_P	
14	IN	TP_USB3_EXTC_R2D_C_P	
		GND	FUNC_TEST=TRUE

JC400 SWDL — OMIT — SM-TP-0.5MM

1	USB3_D2R_P	USB3_D2R_N	2
3	GND	GND	4
5	USB2_D_P	USB2_D_N	6
7	GND	GND	8
9	USB3_R2D_P	USB3_R2D_N	10

14	IN	USB3_EXTD_R2D_C_N	
14	IN	TP_USB_FIXT2_N	
14	IN	USB3_EXTD_R2D_N	
14	IN	USB3_EXTD_R2D_P	
14	IN	TP_USB_FIXT2_P	
14	IN	USB3_EXTD_R2D_C_P	
		GND	FUNC_TEST=TRUE

JC410 SWDL — OMIT — SM-TP-0.5MM

1	USB3_D2R_P	USB3_D2R_N	2
3	GND	GND	4
5	USB2_D_P	USB2_D_N	6
7	GND	GND	8
9	USB3_R2D_P	USB3_R2D_N	10

Hall Effect

43 35	IN	SMC_LID_LEFT	FUNC_TEST=TRUE
43 35	IN	SMC_LID_RIGHT	FUNC_TEST=TRUE
62 46 43	IN	IPD_LID_OPEN	FUNC_TEST=TRUE
		GND	FUNC_TEST=TRUE

1 TPS

DFU/SOC/FCT DEBUG

34 27	IN	SOC_USB_VBUS	FUNC_TEST=TRUE
89 72 34 28	IN	SOC_FORCE_DFU	FUNC_TEST=TRUE
34 28	IN	SOC_DFU_STATUS	FUNC_TEST=TRUE
35 29 28	IN	SOC_DOCK_CONNECT	FUNC_TEST=TRUE
89	IN	DFUMUX_SEL	FUNC_TEST=TRUE
13	IN	SOC_SWD_MUX_SEL_PCH	FUNC_TEST=TRUE
35	IN	SOC_COLD_RESET_L	FUNC_TEST=TRUE
89 34	IN	USB_SOC_N	FUNC_TEST=TRUE
89 34	IN	USB_SOC_P	FUNC_TEST=TRUE
27 12	IN	PCH_UART_DEBUG_R2D	FUNC_TEST=TRUE
27 12	IN	PCH_UART_DEBUG_D2R	FUNC_TEST=TRUE
29 27	IN	SWD_SOC_SWCLK_XB	FUNC_TEST=TRUE
29 27	IN	SWD_SOC_SWDIO_XB	FUNC_TEST=TRUE
35	IN	DEBUG_JTAG_SOC_TDI	FUNC_TEST=TRUE
35	IN	DEBUG_JTAG_SOC_TDO	FUNC_TEST=TRUE
35	IN	TP_JTAG_SOC_TRST_L	FUNC_TEST=TRUE
89 35	IN	SMC_DEBUGPRT_TX	FUNC_TEST=TRUE
89 35	IN	SMC_DEBUGPRT_RX	FUNC_TEST=TRUE
36	IN	SOC_DEBUGPRT_TX	FUNC_TEST=TRUE
36	IN	SOC_DEBUGPRT_RX	FUNC_TEST=TRUE
72 47 35	IN	I2C_PWR_SCL	FUNC_TEST=TRUE
72 47 35	IN	I2C_PWR_SDA	FUNC_TEST=TRUE
47 35 29 27	IN	I2C_UPC_SCL	FUNC_TEST=TRUE
47 35 29 27	IN	I2C_UPC_SDA	FUNC_TEST=TRUE
		GND	FUNC_TEST=TRUE

10 TPS

DFU/SOC/FCT DISCHARGE

64	IN	PPDCIN_G3H_CHGR	FUNC_TEST=TRUE
64	IN	PPVBAT_G3H_CHGR_REG	FUNC_TEST=TRUE

Memory Power

23 22 21 20 19 88 74 73	IN	PP1V2_S3	FUNC_TEST=TRUE
73 72	IN	PVDDQ_PGOOD	FUNC_TEST=TRUE
89 73 72	IN	PVDDQ_EN	FUNC_TEST=TRUE
88 51 23 22 21 20	IN	PP1V8_S3_MEM	FUNC_TEST=TRUE
88 50 9 7 6	IN	PP1V2_S3_CPUDDR	FUNC_TEST=TRUE
88 73 24	IN	PP0V6_S0_DDRVTT	FUNC_TEST=TRUE
		GND	FUNC_TEST=TRUE

4 TPS
4 TPS
5 TPS

Wireless/BT Power

50 32	IN	PP3V3_G3S_WLANBT	FUNC_TEST=TRUE
51 32	IN	PP1V8_G3S_WLANBT	FUNC_TEST=TRUE
		GND	FUNC_TEST=TRUE

2 TPS

DFU/SOC/FCT DMM/Power Sequence

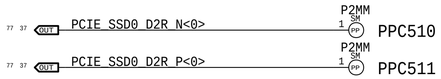
87 64 49 27	IN	PPDCIN_G3H	FUNC_TEST=TRUE
86 74 68 65 64 54 52	IN	PP3V3_G3H	FUNC_TEST=TRUE
87 66 50 9 7	IN	PPVCC_S0_CPU	FUNC_TEST=TRUE
87 67 50 10 7	IN	PPVCCGT_S0_CPU	FUNC_TEST=TRUE
87 66 52 9 7	IN	PPVCCSA_S0_CPU	FUNC_TEST=TRUE
87 73 9 7 4	IN	PPVCCIO_S0_CPU	FUNC_TEST=TRUE
86 69 9 7	IN	PPVCCEDRAM_S0_CPU	FUNC_TEST=TRUE
74 18 9 7	IN	PP1V_S0SW	FUNC_TEST=TRUE
74 9 7	IN	PP1V2_S0SW	FUNC_TEST=TRUE
70 69 65 42 18 17 9 7 5	IN	PP1V_S3	FUNC_TEST=TRUE
86 73 70 54 16 11 7	IN	PP1V_PRIM	FUNC_TEST=TRUE
86 70 54 11 7	IN	PPVPCORE_S5	FUNC_TEST=TRUE
71 13 11 7	IN	PP3V_G3H_RTC	FUNC_TEST=TRUE
72 18	IN	ALL_SYS_PWRGD	FUNC_TEST=TRUE
72 14	IN	PCH_RTC_RESET_L	FUNC_TEST=TRUE
42 13	IN	PM_PCH_PWROK	FUNC_TEST=TRUE
42 13	IN	PM_PCH_SYS_PWROK	FUNC_TEST=TRUE
42 16 13	IN	PM_RSMRST_L	FUNC_TEST=TRUE
89 25 15 13 12	IN	PM_SLP_S3_L	FUNC_TEST=TRUE
89 72 35 18	IN	PM_SLP_S0_L	FUNC_TEST=TRUE
18 17 15 13	IN	PLT_RST_L	FUNC_TEST=TRUE
85 72 17 5	IN	PM_THRMTRIP_L	FUNC_TEST=TRUE
72 16 13	IN	PCH_PWRBTN_L	FUNC_TEST=TRUE
5	IN	CPU_PROCHOT_R_L	FUNC_TEST=TRUE
72 5	IN	CPU_CATERR_L	FUNC_TEST=TRUE
72 65	IN	CPU_VR_READY	FUNC_TEST=TRUE
72 68	IN	PMU_PVDDMAIN_EN	FUNC_TEST=TRUE
85 72 63 29 28	IN	UPC_PMU_RESET	FUNC_TEST=TRUE
72 71 63 61 57 54 50 28 27 89 86 76 74	IN	PP3V3_G3H_RTC	FUNC_TEST=TRUE
64 63	IN	CHGR_EN_MVR	FUNC_TEST=TRUE
74 72	IN	P3V3G3S_EN	FUNC_TEST=TRUE
76 75 74 62 57 51 50 45	IN	PP3V3_G3S	FUNC_TEST=TRUE
89 74 72	IN	P1V8G3S_EN	FUNC_TEST=TRUE
85 81 80 79 78 77	IN	PP1V8_IO_SSD0	FUNC_TEST=TRUE
85 82 81 80 79 78 77 70	IN	PPVCCQ_ANI_SSD0	FUNC_TEST=TRUE
85 82 81 80 79 78 77 70	IN	PP0V9_SSD0	FUNC_TEST=TRUE
85 82 81 80 79 78 77	IN	PP2V5_NAND_SSD0	FUNC_TEST=TRUE
82 80 79 78 77	IN	SSD0_WP_L	FUNC_TEST=TRUE
82 81 80 79 78 77	IN	SSD0_OCARINA_PFN_L	FUNC_TEST=TRUE
82 81	IN	SSD0_OCARINA_RESET_L	FUNC_TEST=TRUE
81 43 34	IN	SSD_PMU_RESET_L	FUNC_TEST=TRUE
71 40	IN	PP3V3_AWAKE	FUNC_TEST=TRUE
85 72 60 35	IN	PMU_COLD_RESET_L	FUNC_TEST=TRUE
89 13	IN	PM_SLP_S4_L	FUNC_TEST=TRUE
89 13	IN	PM_SLP_S5_L	FUNC_TEST=TRUE
35	IN	TP_SMC_FIXTURE_MODE_L	FUNC_TEST=TRUE
60 47 44 43 42 40 34 29 28 27 89 80 81 74 73 72 71 70 64 63	IN	PP1V8_SLPS2R	FUNC_TEST=TRUE
85 72 34	IN	SOC_SOCHOT_L	FUNC_TEST=TRUE
71 40	IN	PP1V2_AWAKE	FUNC_TEST=TRUE
86 70 43 38	IN	PP0V82_SLPDDR	FUNC_TEST=TRUE
86 70 43 38	IN	PPVDDCPU_AWAKE	FUNC_TEST=TRUE
92 18 17 16 15 14 13 12 11 7 74 73 72 70 69 65 53 47 42	IN	PP1V8_S5	FUNC_TEST=TRUE
87 86 75 72 64 62 49	IN	PPBUS_G3H	FUNC_TEST=TRUE
58 57 55 51 48 47 45 44 43 18 76 74 68 62 61 60 59	IN	PP1V8_G3S	FUNC_TEST=TRUE
89 72 34 28	IN	PMU_ACTIVE_READY	FUNC_TEST=TRUE
47 43 42 18 14 13 12 11 7 5 4 89 74 73 71 69	IN	PP3V3_S5	FUNC_TEST=TRUE
73 72	IN	PVCCIO_EN	FUNC_TEST=TRUE
74 73 71 12	IN	CPU_C10_GATE_L	FUNC_TEST=TRUE
86 70 43 39	IN	PP0V9_SLPDDR	FUNC_TEST=TRUE
71 40 39 34	IN	PP1V1_SLPDDR	FUNC_TEST=TRUE
86 71 70 40 39	IN	PP1V1_SLPS2R	FUNC_TEST=TRUE
72 70 62 43 42 40 37 27	IN	PP1V8_AWAKE	FUNC_TEST=TRUE
70	IN	PP1V8_SLPS2R_PMUVDDGPIO	FUNC_TEST=TRUE
89 72 71	IN	P1V1_SLPDDR_SOCFET_EN	FUNC_TEST=TRUE
72 32	IN	PMU_CLK32K_WLANBT	FUNC_TEST=TRUE
85 72 35	IN	SOC_WDOG	FUNC_TEST=TRUE
72 35	IN	PMU_CLK32K_SOC	FUNC_TEST=TRUE
85 82 81 72 35 34	IN	PMU_SYS_ALIVE	FUNC_TEST=TRUE
72 68	IN	P5VG3S_EN	FUNC_TEST=TRUE
71 39	IN	PP0V8_SLPS2R	FUNC_TEST=TRUE
86 70 38	IN	PPVDDCPUSRAM_AWAKE	FUNC_TEST=TRUE
72 68	IN	P5VG3S_PGOOD	FUNC_TEST=TRUE
42 16 13	IN	PM_SYSRST_L	FUNC_TEST=TRUE
42 35	IN	SMC_SYSRST_L	FUNC_TEST=TRUE
75 68 55 54 52 51 50 46 29 88 80	IN	PP5V_G3S	FUNC_TEST=TRUE
77	IN	SSD0_S4E0_ANI0_VREF	FUNC_TEST=TRUE
77	IN	SSD0_S4E0_ANI1_VREF	FUNC_TEST=TRUE
78	IN	SSD0_S4E1_ANI0_VREF	FUNC_TEST=TRUE
78	IN	SSD0_S4E1_ANI1_VREF	FUNC_TEST=TRUE
79	IN	SSD0_S4E2_ANI0_VREF	FUNC_TEST=TRUE
79	IN	SSD0_S4E2_ANI1_VREF	FUNC_TEST=TRUE
80	IN	SSD0_S4E3_ANI0_VREF	FUNC_TEST=TRUE
80	IN	SSD0_S4E3_ANI1_VREF	FUNC_TEST=TRUE
		GND	FUNC_TEST=TRUE

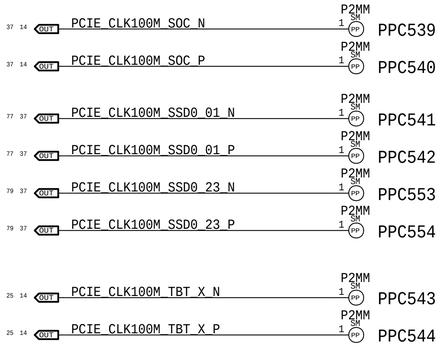
8 TPS
6 TPS

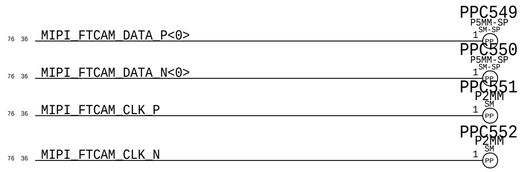
PAGE TITLE: FCT

Apple Inc.

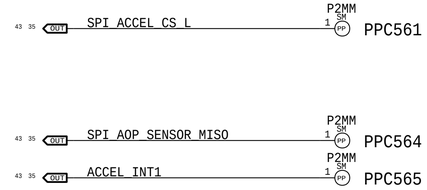
DRAWING NUMBER: 051-05309
SIZE: D
REVISION: 5.1.0
BRANCH:
PAGE: 124 OF 500
SHEET: 83 OF 98





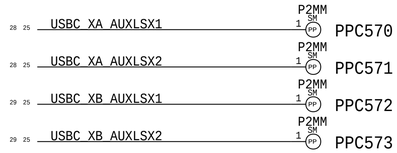


SAR Fusion Sensor Debug



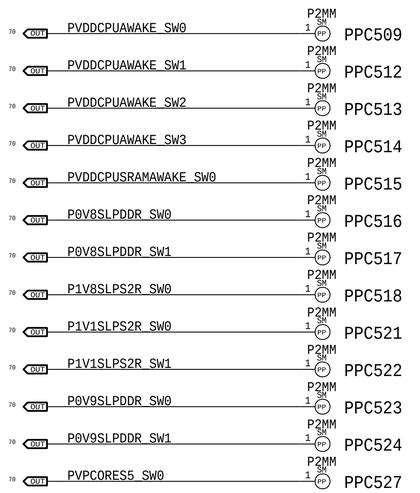
SOC SENSE

ACE-TR AUX/LS



ACE GPIO PPs

PMIC Switch Nodes



PAGE TITLE

PROBE POINTS

Apple Inc.

DRAWING NUMBER 051-05309

SIZE D

REVISION 5.1.0

BRANCH

PAGE 125 OF 500

SHEET 84 OF 98

KEYBOARD CONNECTOR 5V

PP5V_G3S_KBD

CD500 12PF 5% 25V NP0-C0G 0201

TRACKPAD SPI CLK

SPI_TPAD_3V3_CLK

CD510 12PF 5% 25V NP0-C0G 0201

EOPIO EDRAM VR HIGH SIDE

PPBUS_HS_CPU

CD520 12PF 5% 25V NP0-C0G 0201

CD521 3.0PF +/-0.1PF 25V NP0-C0G 0201

NAND VCC

PP2V5_NAND_SSD0

CD550 12PF 5% 25V NP0-C0G 0201

CD551 3.0PF +/-0.1PF 25V NP0-C0G 0201

CALPE BUCK 9

PP0V9_SSD0

CD532 12PF 5% 25V NP0-C0G 0201

CD533 3.0PF +/-0.1PF 25V NP0-C0G 0201

CALPE BUCK 10

PPVCCQ_ANI_SSD0

CD542 12PF 5% 25V NP0-C0G 0201

CD543 3.0PF +/-0.1PF 25V NP0-C0G 0201

S4E

PPBUS_G3H_SSD0

CD5N0 3.0PF 12PF 5% 25V NP0-C0G 0201

CD5N1 3.0PF +/-0.1PF 25V NP0-C0G 0201

OCARINA VDD

PP0V9_SSD0

CD530 12PF 5% 25V NP0-C0G 0201

CD531 3.0PF +/-0.1PF 25V NP0-C0G 0201

OCARINA VDDIO2

PPVCCQ_ANI_SSD0

CD540 12PF 5% 25V NP0-C0G 0201

CD541 3.0PF +/-0.1PF 25V NP0-C0G 0201

CD545 12PF 5% 25V NP0-C0G 0201

CD546 3.0PF +/-0.1PF 25V NP0-C0G 0201

S4E U8600 VDD

PP0V9_SSD0

CD560 12PF 5% 25V NP0-C0G 0201

CD561 12PF 5% 25V NP0-C0G 0201

CD562 3.0PF +/-0.1PF 25V NP0-C0G 0201

CD563 3.0PF +/-0.1PF 25V NP0-C0G 0201

CD564 12PF 5% 25V NP0-C0G 0201

CD565 3.0PF +/-0.1PF 25V NP0-C0G 0201

S4E U8600 VCC

PP2V5_NAND_SSD0

CD570 12PF 5% 25V NP0-C0G 0201

CD571 12PF 5% 25V NP0-C0G 0201

CD572 3.0PF +/-0.1PF 25V NP0-C0G 0201

CD573 3.0PF +/-0.1PF 25V NP0-C0G 0201

S4E U8600 VDDIO1

PP1V8_IO_SSD0

CD580 12PF 5% 25V NP0-C0G 0201

CD582 3.0PF +/-0.1PF 25V NP0-C0G 0201

S4E U8600 VDDIO2

PPVCCQ_ANI_SSD0

CD590 12PF 5% 25V NP0-C0G 0201

CD591 12PF 5% 25V NP0-C0G 0201

CD592 3.0PF +/-0.1PF 25V NP0-C0G 0201

CD593 3.0PF +/-0.1PF 25V NP0-C0G 0201

S4E U8700 VDD

PP0V9_SSD0

CD5A0 12PF 5% 25V NP0-C0G 0201

CD5A1 12PF 5% 25V NP0-C0G 0201

CD5A2 3.0PF +/-0.1PF 25V NP0-C0G 0201

CD5A3 3.0PF +/-0.1PF 25V NP0-C0G 0201

CD5A4 12PF 5% 25V NP0-C0G 0201

CD5A5 3.0PF +/-0.1PF 25V NP0-C0G 0201

S4E U8700 VCC

PP2V5_NAND_SSD0

CD5B0 12PF 5% 25V NP0-C0G 0201

CD5B1 12PF 5% 25V NP0-C0G 0201

CD5B2 3.0PF +/-0.1PF 25V NP0-C0G 0201

CD5B3 3.0PF +/-0.1PF 25V NP0-C0G 0201

S4E U8700 VDDIO1

PP1V8_IO_SSD0

CD5C0 12PF 5% 25V NP0-C0G 0201

CD5C2 3.0PF +/-0.1PF 25V NP0-C0G 0201

S4E U8700 VDDIO2

PPVCCQ_ANI_SSD0

CD5D0 12PF 5% 25V NP0-C0G 0201

CD5D2 3.0PF +/-0.1PF 25V NP0-C0G 0201

PMU_SYS_ALIVE

CD5DP0 100PF 5% 25V C0G 0201

PMU_COLD_RESET_L

CD5DP1 100PF 5% 25V C0G 0201

SOC_WDOG

CD5DP2 100PF 5% 25V C0G 0201

PM_THRMTRIP_L

CD5DP3 100PF 5% 25V C0G 0201

SOC_SOCHOT_L

CD5DP4 100PF 5% 25V C0G 0201

SOC_PERST_L

CD5DP5 100PF 5% 25V C0G 0201

UPC_PMU_RESET

CD5DP6 100PF 5% 25V C0G 0201

S4E U8800 VDD

PP0V9_SSD0

CD5E0 12PF 5% 25V NP0-C0G 0201

CD5E1 12PF 5% 25V NP0-C0G 0201

CD5E2 3.0PF +/-0.1PF 25V NP0-C0G 0201

CD5E3 3.0PF +/-0.1PF 25V NP0-C0G 0201

CD5E4 12PF 5% 25V NP0-C0G 0201

CD5E5 3.0PF +/-0.1PF 25V NP0-C0G 0201

S4E U8800 VCC

PP2V5_NAND_SSD0

CD5F0 12PF 5% 25V NP0-C0G 0201

CD5F1 12PF 5% 25V NP0-C0G 0201

CD5F2 3.0PF +/-0.1PF 25V NP0-C0G 0201

CD5F3 3.0PF +/-0.1PF 25V NP0-C0G 0201

S4E U8800 VDDIO1

PP1V8_IO_SSD0

CD5G0 12PF 5% 25V NP0-C0G 0201

CD5G2 3.0PF +/-0.1PF 25V NP0-C0G 0201

S4E U8800 VDDIO2

PPVCCQ_ANI_SSD0

CD5H0 12PF 5% 25V NP0-C0G 0201

CD5H2 3.0PF +/-0.1PF 25V NP0-C0G 0201

S4E U8900 VDD

PP0V9_SSD0

CD5J0 12PF 5% 25V NP0-C0G 0201

CD5J1 12PF 5% 25V NP0-C0G 0201

CD5J2 3.0PF +/-0.1PF 25V NP0-C0G 0201

CD5J3 3.0PF +/-0.1PF 25V NP0-C0G 0201

S4E U8900 VCC

PP2V5_NAND_SSD0

CD5K0 12PF 5% 25V NP0-C0G 0201

CD5K1 12PF 5% 25V NP0-C0G 0201

CD5K2 3.0PF +/-0.1PF 25V NP0-C0G 0201

CD5K3 3.0PF +/-0.1PF 25V NP0-C0G 0201

S4E U8900 VDDIO1

PP1V8_IO_SSD0

CD5L0 12PF 5% 25V NP0-C0G 0201

CD5L2 3.0PF +/-0.1PF 25V NP0-C0G 0201

S4E U8900 VDDIO2

PPVCCQ_ANI_SSD0

CD5M0 12PF 5% 25V NP0-C0G 0201

CD5M2 3.0PF +/-0.1PF 25V NP0-C0G 0201

BOM_COST_GROUP=DESENSE

SYNC_MASTER= SYNC_DATE=

PAGE TITLE

DESENSE 1

Apple Inc.

DRAWING NUMBER 051-05309

SIZE D

REVISION 5.1.0

BRANCH

PAGE 135 OF 500

SHEET 85 OF 98

CALPE VDD MAIN HIGH SIDE INPUT

71 70 52 PP3V3_G3H_PMU_VDDMAIN

CD670 12PF 5% 25V NP0-C0G 0201
CD671 12PF 5% 25V NP0-C0G 0201
CD672 12PF 5% 25V NP0-C0G 0201
CD673 12PF 5% 25V NP0-C0G 0201
CD674 12PF 5% 25V NP0-C0G 0201
CD675 12PF 5% 25V NP0-C0G 0201
CD676 12PF 5% 25V NP0-C0G 0201
CD677 12PF 5% 25V NP0-C0G 0201
CD678 12PF 5% 25V NP0-C0G 0201
CD679 12PF 5% 25V NP0-C0G 0201

CD6G0 3.0PF +/-0.1PF 25V NP0-C0G 0201
CD6G1 3.0PF +/-0.1PF 25V NP0-C0G 0201
CD6G2 3.0PF +/-0.1PF 25V NP0-C0G 0201
CD6G3 3.0PF +/-0.1PF 25V NP0-C0G 0201
CD6G4 3.0PF +/-0.1PF 25V NP0-C0G 0201
CD6G5 3.0PF +/-0.1PF 25V NP0-C0G 0201
CD6G6 3.0PF +/-0.1PF 25V NP0-C0G 0201
CD6G7 3.0PF +/-0.1PF 25V NP0-C0G 0201
CD6G8 3.0PF +/-0.1PF 25V NP0-C0G 0201
CD6G9 3.0PF +/-0.1PF 25V NP0-C0G 0201

VR 5V G3S

75 68 55 54 52 51 50 46 29 28 83 PP5V_G3S

CD620 12PF 5% 25V NP0-C0G 0201
CD621 12PF 5% 25V NP0-C0G 0201
CD622 12PF 5% 25V NP0-C0G 0201
CD623 3.0PF +/-0.1PF 25V NP0-C0G 0201
CD624 3.0PF +/-0.1PF 25V NP0-C0G 0201
CD625 3.0PF +/-0.1PF 25V NP0-C0G 0201

VR 3V3 G3H

3.3 PP3V3_G3H

CD630 12PF 5% 25V NP0-C0G 0201
CD631 12PF 5% 25V NP0-C0G 0201
CD632 12PF 5% 25V NP0-C0G 0201
CD633 3.0PF +/-0.1PF 25V NP0-C0G 0201
CD634 3.0PF +/-0.1PF 25V NP0-C0G 0201
CD635 3.0PF +/-0.1PF 25V NP0-C0G 0201

VR 3V3 G3H HIGH SIDE

68 49 PPVIN_G3H_P3V3G3H

CD640 12PF 5% 25V NP0-C0G 0201
CD641 3.0PF +/-0.1PF 25V NP0-C0G 0201

VR 5V G3S HIGH SIDE

68 49 PPVIN_G3H_P5VG3S

CD650 12PF 5% 25V NP0-C0G 0201
CD651 3.0PF +/-0.1PF 25V NP0-C0G 0201

BATTERY CONNECTOR SYS DETECT

83 63 SYS_DETECT_L

CD660 12PF 5% 25V NP0-C0G 0201
CD661 3.0PF +/-0.1PF 25V NP0-C0G 0201

VR 5V ALS

83 76 74 73 69 67 66 65 51 PP5V_G3S_CPUREG_MISC

CD6R1 12PF 5% 25V NP0-C0G 0201
CD6R2 3.0PF +/-0.1PF 25V NP0-C0G 0201

CALPE PCH 1V1 PRIM

83 73 70 54 16 11 7 PP1V_PRIM

CD680 12PF 5% 25V NP0-C0G 0201
CD681 12PF 5% 25V NP0-C0G 0201

CALPE 0V82 SLPDDR

83 70 43 38 PP0V82_SLPDDR

CD690 12PF 5% 25V NP0-C0G 0201
CD691 12PF 5% 25V NP0-C0G 0201

CALPE CPU AWAKE

83 70 43 30 PPVDDCPU_AWAKE

CD6A0 12PF 5% 25V NP0-C0G 0201
CD6A1 3.0PF +/-0.1PF 25V NP0-C0G 0201

CALPE CPU SRAM AWAKE

83 70 38 PPVDDCPUSRAM_AWAKE

CD6B0 12PF 5% 25V NP0-C0G 0201
CD6B1 3.0PF +/-0.1PF 25V NP0-C0G 0201

CALPE 1V8 SLPS2R

60 47 44 43 42 40 34 29 28 27 89 83 81 74 72 71 70 64 63 PP1V8_SLPS2R

CD6C0 12PF 5% 25V NP0-C0G 0201
CD6C1 3.0PF +/-0.1PF 25V NP0-C0G 0201

CALPE 1V1 SLPS2R

83 71 70 40 39 PP1V1_SLPS2R

CD6D0 12PF 5% 25V NP0-C0G 0201
CD6D1 3.0PF +/-0.1PF 25V NP0-C0G 0201

CALPE 0V9 SLPDDR

83 70 43 39 PP0V9_SLPDDR

CD6E0 12PF 5% 25V NP0-C0G 0201
CD6E1 3.0PF +/-0.1PF 25V NP0-C0G 0201

CALPE PCH VCORE

83 70 54 11 7 PPVPCORE_S5

CD6F0 12PF 5% 25V NP0-C0G 0201
CD6F1 3.0PF +/-0.1PF 25V NP0-C0G 0201

LCD BACKLIGHT DRIVER VOUT

83 75 PPVOUT_S0_LCDBKLT_F

CD600 3PF +/-0.1PF 100V C0G 0201
CD601 3PF +/-0.1PF 100V C0G 0201

83 76 75 PPVOUT_S0_LCDBKLT

CD6J0 3PF +/-0.1PF 100V C0G 0201
CD6J1 3PF +/-0.1PF 100V C0G 0201

EDRAM

83 69 9 7 PPVCCEDRAM_S0_CPU

CD6L0 12PF 5% 25V NP0-C0G 0201
CD6L1 3.0PF +/-0.1PF 25V NP0-C0G 0201
CD6L2 12PF 5% 25V NP0-C0G 0201
CD6L3 3.0PF +/-0.1PF 25V NP0-C0G 0201

72 71 63 61 57 54 50 29 28 27 89 83 76 74 PP3V3_G3H_RTC

CD6M0 12PF 5% 25V NP0-C0G 0201
CD6M1 3.0PF +/-0.1PF 25V NP0-C0G 0201

63 PPVIN_G3H_P3V3G3HRTC_R

CD6N0 12PF 5% 25V NP0-C0G 0201
CD6N1 3.0PF +/-0.1PF 25V NP0-C0G 0201

87 83 75 72 64 62 49 PPBUS_G3H

CD6P2 12PF 5% 25V NP0-C0G 0201
CD6P0 12PF 5% 25V NP0-C0G 0201
CD6P1 3.0PF +/-0.1PF 25V NP0-C0G 0201

83 75 PPVOUT_S0_KBDLED

CD6S0 12PF 5% 100V C0G 0201
CD6S1 12PF 5% 100V C0G 0201
CD6S2 12PF 5% 100V C0G 0201
CD6S3 12PF 5% 100V C0G 0201

BOM_COST_GROUP=DESENSE

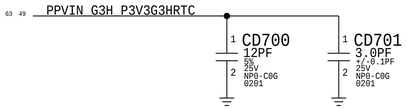
SYNC_MASTER= SYNC_DATE=

PAGE TITLE: DESENSE 2

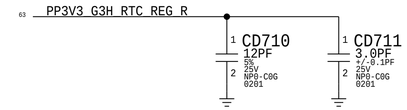
Apple Inc.

DRAWING NUMBER: 051-05309
SIZE: D
REVISION: 5.1.0
BRANCH:
PAGE: 136 OF 500
SHEET: 86 OF 98

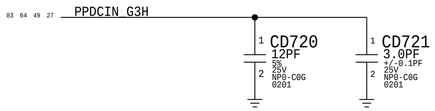
3V3 G3H RTC VR HIGH SIDE



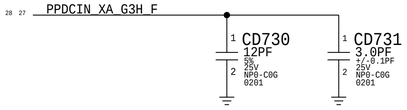
3V3 G3H RTC VR



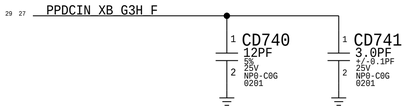
DCIN CHARGER



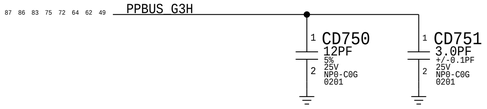
DCIN XA ACE2



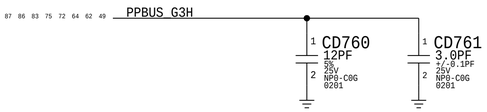
DCIN XB ACE2



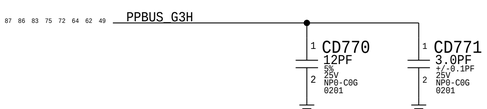
PBUS CHARGER



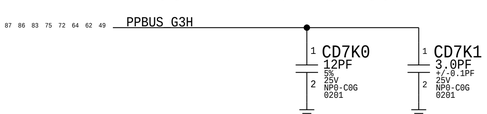
PBUS CPU HIGH SIDE SENSOR



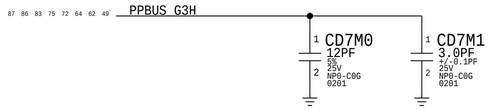
PBUS RIGHT AMP SENSOR



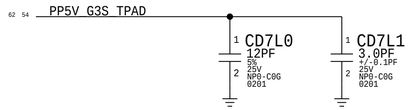
PBUS LEFT AMP SENSOR



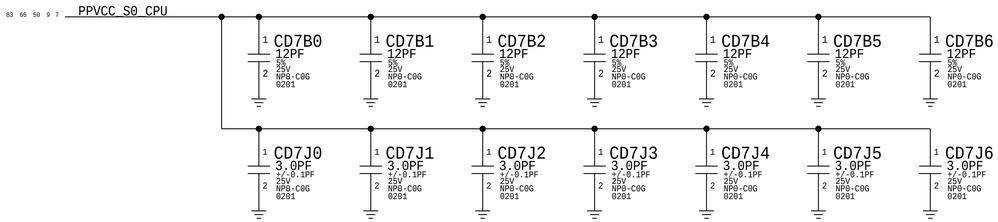
PBUS TRACKPAD



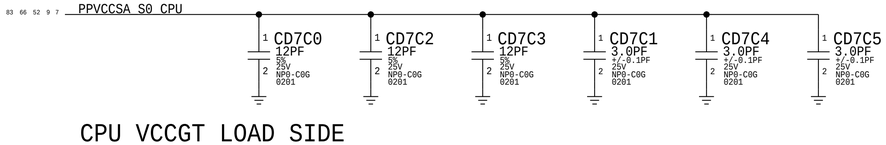
5V G3S TRACKPAD



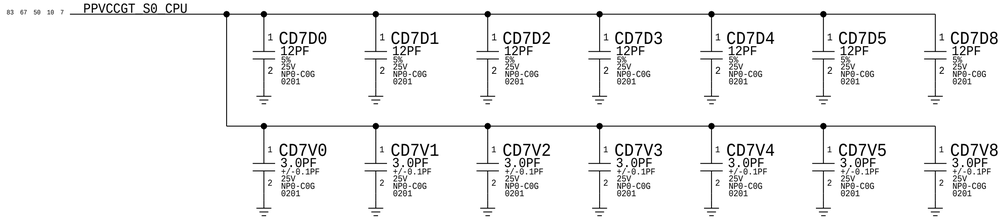
CPU CORE VR LOAD SIDE



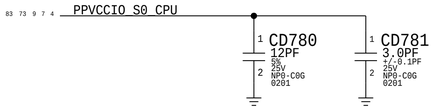
CPU VCCSA LOAD SIDE



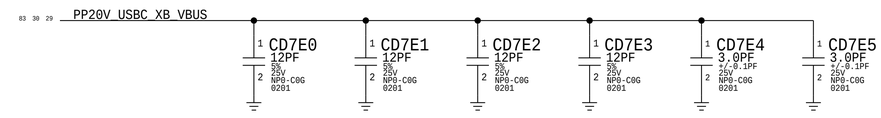
CPU VCCGT LOAD SIDE



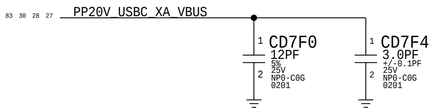
CPU VCCIO LOAD SIDE



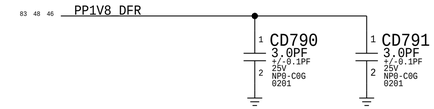
VBUS XB



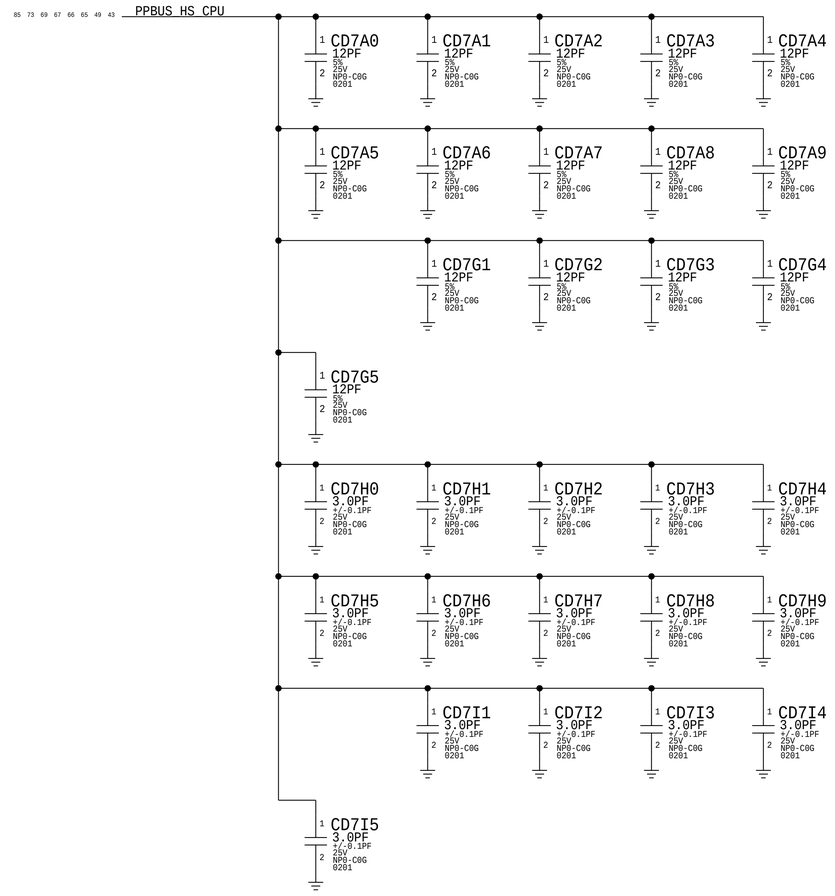
VBUS XA



DFR 1V8 VR



CPU CORE/VCCSA/GT VR HIGH SIDE



BOM_COST_GROUP=DESENSE

SYNC_MASTER= SYNC_DATE=

PAGE TITLE

DESENSE 3

Apple Inc.

DRAWING NUMBER 051-05309 SIZE D

REVISION 5.1.0

BRANCH

PAGE 137 OF 500

SHEET 87 OF 98

MEM 1V2 LOAD SIDE

73 50 23 22 21 20 19 83 74 PP1V2_S3

CD800 12PF 5% 25V NP0-C0G 0201
CD801 12PF 5% 25V NP0-C0G 0201
CD802 12PF 5% 25V NP0-C0G 0201
CD803 12PF 5% 25V NP0-C0G 0201
CD804 12PF 5% 25V NP0-C0G 0201
CD805 12PF 5% 25V NP0-C0G 0201
CD806 12PF 5% 25V NP0-C0G 0201
CD807 12PF 5% 25V NP0-C0G 0201

CD808 12PF 5% 25V NP0-C0G 0201
CD809 12PF 5% 25V NP0-C0G 0201
CD810 12PF 5% 25V NP0-C0G 0201
CD811 12PF 5% 25V NP0-C0G 0201
CD812 12PF 5% 25V NP0-C0G 0201
CD813 12PF 5% 25V NP0-C0G 0201
CD814 12PF 5% 25V NP0-C0G 0201
CD815 12PF 5% 25V NP0-C0G 0201

CD816 12PF 5% 25V NP0-C0G 0201
CD817 12PF 5% 25V NP0-C0G 0201
CD818 12PF 5% 25V NP0-C0G 0201
CD819 12PF 5% 25V NP0-C0G 0201
CD820 12PF 5% 25V NP0-C0G 0201
CD821 12PF 5% 25V NP0-C0G 0201
CD822 12PF 5% 25V NP0-C0G 0201
CD823 12PF 5% 25V NP0-C0G 0201

CD824 12PF 5% 25V NP0-C0G 0201
CD825 12PF 5% 25V NP0-C0G 0201
CD827 12PF 5% 25V NP0-C0G 0201
CD828 12PF 5% 25V NP0-C0G 0201

CD832 3.0PF +/-0.1PF 25V NP0-C0G 0201
CD833 3.0PF +/-0.1PF 25V NP0-C0G 0201
CD834 3.0PF +/-0.1PF 25V NP0-C0G 0201
CD835 3.0PF +/-0.1PF 25V NP0-C0G 0201
CD836 3.0PF +/-0.1PF 25V NP0-C0G 0201
CD837 3.0PF +/-0.1PF 25V NP0-C0G 0201
CD838 3.0PF +/-0.1PF 25V NP0-C0G 0201
CD839 3.0PF +/-0.1PF 25V NP0-C0G 0201

CD840 3.0PF +/-0.1PF 25V NP0-C0G 0201
CD841 3.0PF +/-0.1PF 25V NP0-C0G 0201
CD842 3.0PF +/-0.1PF 25V NP0-C0G 0201
CD843 3.0PF +/-0.1PF 25V NP0-C0G 0201
CD844 3.0PF +/-0.1PF 25V NP0-C0G 0201
CD845 3.0PF +/-0.1PF 25V NP0-C0G 0201
CD846 3.0PF +/-0.1PF 25V NP0-C0G 0201
CD847 3.0PF +/-0.1PF 25V NP0-C0G 0201

CD848 3.0PF +/-0.1PF 25V NP0-C0G 0201
CD849 3.0PF +/-0.1PF 25V NP0-C0G 0201
CD850 3.0PF +/-0.1PF 25V NP0-C0G 0201
CD851 3.0PF +/-0.1PF 25V NP0-C0G 0201
CD852 3.0PF +/-0.1PF 25V NP0-C0G 0201
CD853 3.0PF +/-0.1PF 25V NP0-C0G 0201
CD854 3.0PF +/-0.1PF 25V NP0-C0G 0201
CD855 3.0PF +/-0.1PF 25V NP0-C0G 0201

CD856 3.0PF +/-0.1PF 25V NP0-C0G 0201
CD857 3.0PF +/-0.1PF 25V NP0-C0G 0201
CD859 3.0PF +/-0.1PF 25V NP0-C0G 0201
CD860 3.0PF +/-0.1PF 25V NP0-C0G 0201
CD861 3.0PF +/-0.1PF 25V NP0-C0G 0201
CD862 3.0PF +/-0.1PF 25V NP0-C0G 0201
CD863 3.0PF +/-0.1PF 25V NP0-C0G 0201

CD864 3.0PF +/-0.1PF 25V NP0-C0G 0201
CD865 3.0PF +/-0.1PF 25V NP0-C0G 0201
CD866 3.0PF +/-0.1PF 25V NP0-C0G 0201
CD867 3.0PF +/-0.1PF 25V NP0-C0G 0201

MEM 1V8 LOAD SIDE

83 51 23 22 21 20 PP1V8_S3_MEM

CD870 12PF 5% 25V NP0-C0G 0201
CD871 12PF 5% 25V NP0-C0G 0201
CD872 12PF 5% 25V NP0-C0G 0201
CD873 12PF 5% 25V NP0-C0G 0201
CD874 12PF 5% 25V NP0-C0G 0201
CD875 12PF 5% 25V NP0-C0G 0201
CD876 12PF 5% 25V NP0-C0G 0201
CD877 12PF 5% 25V NP0-C0G 0201

CD880 3.0PF +/-0.1PF 25V NP0-C0G 0201
CD881 3.0PF +/-0.1PF 25V NP0-C0G 0201
CD882 3.0PF +/-0.1PF 25V NP0-C0G 0201
CD883 3.0PF +/-0.1PF 25V NP0-C0G 0201
CD884 3.0PF +/-0.1PF 25V NP0-C0G 0201
CD885 3.0PF +/-0.1PF 25V NP0-C0G 0201
CD886 3.0PF +/-0.1PF 25V NP0-C0G 0201
CD887 3.0PF +/-0.1PF 25V NP0-C0G 0201

MEM 0V6 DDRVTT LOAD SIDE

83 73 24 PP0V6_S0_DDRVTT

CD890 12PF 5% 25V NP0-C0G 0201
CD891 12PF 5% 25V NP0-C0G 0201
CD892 12PF 5% 25V NP0-C0G 0201
CD893 12PF 5% 25V NP0-C0G 0201
CD894 12PF 5% 25V NP0-C0G 0201
CD895 12PF 5% 25V NP0-C0G 0201
CD896 12PF 5% 25V NP0-C0G 0201
CD897 12PF 5% 25V NP0-C0G 0201

CD8A0 3.0PF +/-0.1PF 25V NP0-C0G 0201
CD8A1 3.0PF +/-0.1PF 25V NP0-C0G 0201
CD8A2 3.0PF +/-0.1PF 25V NP0-C0G 0201
CD8A3 3.0PF +/-0.1PF 25V NP0-C0G 0201
CD8A4 3.0PF +/-0.1PF 25V NP0-C0G 0201
CD8A5 3.0PF +/-0.1PF 25V NP0-C0G 0201
CD8A6 3.0PF +/-0.1PF 25V NP0-C0G 0201
CD8A7 3.0PF +/-0.1PF 25V NP0-C0G 0201

CPU 1V2 LOAD SIDE

83 50 9 7 6 PP1V2_S3_CPUDDR

CD8B0 12PF 5% 25V NP0-C0G 0201
CD8B1 12PF 5% 25V NP0-C0G 0201
CD8B2 12PF 5% 25V NP0-C0G 0201
CD8B3 12PF 5% 25V NP0-C0G 0201

CD8C0 3.0PF +/-0.1PF 25V NP0-C0G 0201
CD8C1 3.0PF +/-0.1PF 25V NP0-C0G 0201
CD8C2 3.0PF +/-0.1PF 25V NP0-C0G 0201
CD8C3 3.0PF +/-0.1PF 25V NP0-C0G 0201

TBT X SVR

26 PP0V9_TBT_X_SVR

CD8H0 12PF 5% 25V NP0-C0G 0201
CD8H1 3.0PF +/-0.1PF 25V NP0-C0G 0201

TBT X S0

51 27 26 PP3V3_TBT_X_S0

CD8D0 12PF 5% 25V NP0-C0G 0201
CD8D1 12PF 5% 25V NP0-C0G 0201
CD8D2 3.0PF +/-0.1PF 25V NP0-C0G 0201
CD8D3 3.0PF +/-0.1PF 25V NP0-C0G 0201

EDP CONNECTOR 5V LCD

83 76 PP5V_S0SW_LCD

CD8E0 12PF 5% 25V NP0-C0G 0201
CD8E1 3.0PF +/-0.1PF 25V NP0-C0G 0201

EDP CONNECTOR 5V ALS

76 PP5V_G3S_ALSCAM

CD8F0 12PF 5% 25V NP0-C0G 0201
CD8F1 3.0PF +/-0.1PF 25V NP0-C0G 0201

EDP CONNECTOR 3V3 LCD

83 76 47 PP3V3_S0SW_LCD

CD8G0 12PF 5% 25V NP0-C0G 0201
CD8G1 3.0PF +/-0.1PF 25V NP0-C0G 0201

BOM_COST_GROUP=DESENSE

SYNC_MASTER= SYNC_DATE=

PAGE TITLE: DESENSE 4

Apple Inc.

DRAWING NUMBER: 051-05309 SIZE: D
REVISION: 5.1.0
BRANCH:
PAGE: 138 OF 500
SHEET: 88 OF 98

Debug Power "Buttons"

DEBUG_BUTTON
PLACE_SIDE=TOP
SILK_PART=PWR_BTN
CRITICAL
SE031
SKSFABE010
PMU_ONOFF_R_L_CONN

DEBUG_BUTTON
PLACE_SIDE=TOP
SILK_PART=RSLOC
CRITICAL
SE029
SKSFABE010
PMU_RSLOC_RST_L

DEBUG_BUTTON
SILK_PART=FORCE_DFU
CRITICAL
SE032
SKSFABE010
SOC_FORCE_DFU
PP1V8_SLPS2R

DEBUG_BUTTON
PLACE_SIDE=BOTTOM
SILK_PART=PWR_BTN
CRITICAL
SE030
SKSGPCE010
PMU_ONOFF_R_L_CONN

DEBUG_BUTTON
PLACE_SIDE=BOTTOM
SILK_PART=RSLOC
CRITICAL
SE028
SKSGPCE010
PMU_RSLOC_RST_L

SOC DEBUG CONNECTOR TPS

Power State Debug LEDs

(For development only)

PP3V3_S5

DBGLED RE091 20K 5% 1/20W MF 201
DBGLED RE092 20K 5% 1/20W MF 201
DBGLED RE093 20K 5% 1/20W MF 201
DBGLED RE095 20K 5% 1/20W MF 201

DBGLED_S4
DBGLED_S3
DBGLED_S0I3
DBGLED_S0

DBGLED DSE006 GRN-90MCD-5MA-2.85V 0402 PLACE_SIDE=BOTTOM SILK_PART=STBY_ON
DBGLED DSE003 GRN-90MCD-5MA-2.85V 0402 PLACE_SIDE=BOTTOM SILK_PART=S3_ON
DBGLED DSE004 GRN-90MCD-5MA-2.85V 0402 PLACE_SIDE=BOTTOM SILK_PART=S0I3_ON
DBGLED DSE005 GRN-90MCD-5MA-2.85V 0402 PLACE_SIDE=BOTTOM SILK_PART=S0_ON

DBGLED_S4_D
DBGLED_S3_D
DBGLED_S0I3_D
DBGLED_S0_D

CRITICAL QE090 SSM6N15AFEAP SOT563
CRITICAL QE090 SSM6N15AFEAP SOT563
CRITICAL QE091 SSM6N15AFEAP SOT563
CRITICAL QE091 SSM6N15AFEAP SOT563

PM_SLP_S5_L
PM_SLP_S4_L
PM_SLP_S3_L
PM_SLP_S0_L

SoC USB DFU Mux

PP3V3_G3H_RTC

SOC_DBG RE012 20K 5% 1/20W MF 201

20K limits USB Mini-B from back powering MLB

SOC_DBG CE010 0.1UF 10% 16V X5R-CERM 0201
BYPASS=UE010::5mm

PP3V3_G3H_DFUMUX
VOLTAGE=3.449
MIN_LINE_WIDTH=0.2000
MIN_NECK_WIDTH=0.1000

2uA Max IDD

RE010 100K 5% 1/20W MF 201

SOC AUSB
PCH EXTA USB2
PCH EXTA USB3

DEBUG CONN
X ACE2

USB_SOC_DEBUG_P
USB_SOC_DEBUG_N
USB_SOC_TYPEC_P
USB_SOC_TYPEC_N

SOC_DBG UE010 PI3USB102EZLE TQFN CRITICAL

SOC
USB_SOC_P
USB_SOC_N

SEL	OUTPUT
L	Mini-B (M)
H	Type-C (D)

DFUMUX_SEL

RE013 0 5% 1/20W MF 0201 PLACE_NEAR=UE010:10MM
USB_SOC_TYPEC_P — SOC_DFU_BYPASS — USB_SOC_P

RE014 0 5% 1/20W MF 0201 PLACE_NEAR=UE010:10MM
USB_SOC_TYPEC_N — SOC_DFU_BYPASS — USB_SOC_N

UARTs

RE096 33 1/20W MF 201 5%
RE097 33 1/20W MF 201 5%
SWD_SOC_DEBUG_SWDIO
SWD_SOC_DEBUG_SWCLK

SWD_SOC_SWDIO
SWD_SOC_SWCLK
KANZI

RE099 0 5% 1/20W MF 0201
RE098 0 5% 1/20W MF 0201
SMC_DEBUGPRT_TX
SMC_DEBUGPRT_RX
SMC_DEBUGPRT_R_TX
SMC_DEBUGPRT_R_RX

PMU_ACTIVE_READY
P1V1_SLPDDR_SOCFET_EN
PM_SLP_S0_L
PVDDQ_EN
P1V8G3S_EN

P2MM 3M PP PPE022
P2MM 3M PP PPE023
P2MM 3M PP PPE024
P2MM 3M PP PPE025
P2MM 6M PP PPE026

BOM_COST_GROUP=DEBUG

PAGE TITLE: DEV SUPPORT 1

Apple Inc.

DRAWING NUMBER: 051-05309
SIZE: D
REVISION: 5.1.0
BRANCH:
PAGE: 140 OF 500
SHEET: 89 OF 98

UE020 SAK Truth Table:

INPUTS					OUTPUTS (OD)			
PMU_ACT_RDY	SLP_SCFET_EN	SLP_S0_L	VDDQ_EN	1V8G3S_EN	R	G	B	COLOR
0	0	0	0	0	BLINK	1	1	Blinking Red
0	0	0	0	1	0	1	1	Red
0	0	0	1	0	0	1	0	Magenta
0	0	0	1	1	0	0	0	White
0	0	1	0	0	0	1	0	Magenta
0	0	1	0	1	0	1	0	Magenta
0	0	1	1	0	0	1	0	Magenta
0	0	1	1	1	0	1	0	Magenta
0	1	0	0	0	0	1	0	Magenta
0	1	0	0	1	0	1	0	Magenta
0	1	0	1	0	0	1	0	Magenta
0	1	0	1	1	0	1	0	Magenta
0	1	1	0	0	0	1	0	Magenta
0	1	1	0	1	0	1	0	Magenta
0	1	1	1	0	0	1	0	Magenta
0	1	1	1	1	0	1	0	Magenta
1	0	0	0	0	0	1	0	Magenta
1	0	0	0	1	0	1	0	Magenta
1	0	0	1	0	0	1	0	Magenta
1	0	0	1	1	0	1	0	Magenta
1	0	1	0	0	0	1	0	Magenta
1	0	1	0	1	0	1	0	Magenta
1	0	1	1	0	0	1	0	Magenta
1	0	1	1	1	0	1	0	Magenta
1	1	0	0	0	BLINK	0	1	Blinking Green & Yellow
1	1	0	0	1	0	0	1	Yellow
1	1	0	1	0	0	1	0	Magenta
1	1	0	1	1	1	1	0	Blue
1	1	1	0	0	0	1	0	Magenta
1	1	1	0	1	0	1	0	Magenta
1	1	1	1	0	0	1	0	Magenta
1	1	1	1	1	1	0	1	Green

BOM_COST_GROUP=DEBUG

SYNC_MASTER= SYNC_DATE=

PAGE TITLE

DEV SUPPORT 2

Apple Inc.

DRAWING NUMBER 051-05309 SIZE D

REVISION 5.1.0

BRANCH

PAGE 141 OF 500

SHEET 90 OF 98

CPU

PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
337S00574	1	CPU,CFLU,SRCUU,QS,D0,2.3,28W,1.05,BGA1528	U0500	CRITICAL	CPU:28W_2P3G_SRCUU
337S00572	1	CPU,CFLU,SRCK5,QS,D0,2.7,28W,1.2,BGA1528	U0500	CRITICAL	CPU:28W_2P7G_SRCK5
337S00693	1	CPU,CFLU,QRH7,QS,D0,1.4,1.05,BGA1528	U0500	CRITICAL	CPU:15W_1P4G_QRH7
337S00692	1	CPU,CFLU,QRH6,QS,D0,1.7,1.15,BGA1528	U0500	CRITICAL	CPU:15W_1P7G_QRH6
337S00717	1	CPU,CFLU,SREZ2,PRQ,D0,1.4,4C,1.05,BGA1528	U0500	CRITICAL	CPU:15W_1P4G_SREZ2
337S00716	1	CPU,CFLU,SREZ1,PRQ,D0,1.7,4C,1.15,BGA1528	U0500	CRITICAL	CPU:15W_1P7G_SREZ1

SOC

PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
339S00386	1	POP,GIBRALTAR+1GB 20NM,M,DEV,SCK,CSP1122	U3900	CRITICAL	SOC:DEV_1G
339S00388	1	POP,GIBRALTAR+2GB 20NM,M,DEV,SCK,CSP1122	U3900	CRITICAL	SOC:DEV_2G
339S00601	1	POP,GIBRALTAR_L+1GB 16NM,M,B0,SCK,C1122	U3900	CRITICAL	SOC:PROD_B0_1G
339S00605	1	POP,GIBRALTAR_L+2GB 16NM,M,B0,SCK,C1122	U3900	CRITICAL	SOC:PROD_B0_2G

AMR ASSEMBLY

PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
677-19902	1	SUBASSY (T&R) PCBA,AMR INTERPOSER,X941	J4800	CRITICAL	AMR:POC

TBT

PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
338S00441	1	IC,TBT,TITAN RIDGE DP,SLMHS,PRQ,C1,CSP337	U2800	CRITICAL	TBT:TR_C1_PRQ

UPC

PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
353S02158	4	IC,CD3217,ACE2,B2,USB PWR SW W/HV,BGA123	U3100,U3200	CRITICAL	UPC:ACE2_B2

WIRELESS

PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
339S00586	1	MODULE,WIFI/BT,SAPPORO,ES2.1,M,LGA451	U3701	CRITICAL	MODULE:MUR__ES_2P1
339S00599	1	MODULE,WIFI/BT,SAPPORO,ES23,M,LGA451	U3701	CRITICAL	MODULE:MUR_ES_2P3
339S00616	1	MODULE,WIFI/BT,SAPPORO,ES3.1,M,LGA451	U3701	CRITICAL	MODULE:MUR_ES_3P1
339S00628	1	MODULE,WIFI/BT,SAPPORO,ES2.3,U,LGA451	U3701	CRITICAL	MODULE:USI_ES_2P3
339S00632	1	MODULE,WIFI/BT,SAPPORO,ES3.1,U,LGA451	U3701	CRITICAL	MODULE:USI_ES_3P1

PMU

PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
338S00466	1	IC,PMU,CALPE-L,D2249A0,OTP-BC,CSP324	U7800	CRITICAL	CALPE_L:OTP_BC

CHARGER IC

PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
353S01525	1	IC,ISL9240HIBOZ,PMU,SUONA,WCSP40,2.1X3.3	U7000	CRITICAL	CHARGER_IC:POC

DRAM

PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
333S00125	4	IC,SDRAM,LPDDR3-2133,16GBIT,21NM,H,BGA178	U2300,U2400,U2500,U2600	CRITICAL	DRAM:08GB_HY
333S00246	4	IC,SDRAM,LPDDR3-2133,16GBIT,18NM,BGA178	U2300,U2400,U2500,U2600	CRITICAL	DRAM:08GB_SS_D
333S00126	4	IC,SDRAM,LPDDR3-2133,32GBIT,21NM,H,BGA178	U2300,U2400,U2500,U2600	CRITICAL	DRAM:16GB_HY
333S00247	4	IC,SDRAM,LPDDR3-2133,32GBIT,18NM,BGA178	U2300,U2400,U2500,U2600	CRITICAL	DRAM:16GB_SS_D

SE

PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
998-15216	1	IC,SN100V,VENUS,DEV KEY,B2,S/W-M,WLCSP72	U5001	CRITICAL	SE:DEV_2019
338S00445	1	IC,SN100V,VENUS,PROD KEY,B2,SW-N,WLCSP72	U5001	CRITICAL	SE:PROD_2019

OCARINA

PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
338S00410	1	IC,PMU,OCARINA,D2499A0,OTP-AG,WLCSP56	U9000	CRITICAL	SSD:4L

VR INDUCTOR VCCSA

PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
152S00689	1	IND,MLD,0.47UH,4.7MO,17.5A,5.6X5.2X2.4MM	L7270	CRITICAL	IND_VCCSA:CYNTEC

BACKLIGHT VOUT FILTER

PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
116S00006	1	RES,MTL FILM,0 OHM,TIGHT TOL,3A,0402	L8420	CRITICAL	BKLT_FILT:ZERO_OHM

USBC AARDVARKANOID

PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
516S00115	1	CONN,PLUG,B2B,12*2P,P=0.35MM,H=0.6MM	J3002	CRITICAL	USBC_AARDVARKANOID

TBT ROM

PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
341S01553	1	ROM,BBR/ACE(V48.2) PROTO-1-B,X1782	U2890	CRITICAL	TBT_ROM:P1B
341S01591	1	ROM,BBR/ACE(V41.13) EVT,X1782	U2890	CRITICAL	TBT_ROM:EVT

BT ROM

PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
335S00348	1	IC,SPI SERIAL FLASH,4M BIT,1.8V,USON8	U3750	CRITICAL	BT_ROM:BLANK_WINBOND
335S00400	1	IC,SPI SERIAL FLASH,4M BIT,1.8V,USON8	U3750	CRITICAL	BT_ROM:BLANK_MACRONIX
341S01184	1	BT SFLASH ROM (V2) PROTO-0,X1536	U3750	CRITICAL	BT_ROM:P0
341S01260	1	ROM,BT SFLASH (VXX) PROTO-1,X1536	U3750	CRITICAL	BT_ROM:P1

WIFI ROM

PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
335S00214	1	IC,EEPROM,SER,UWIRE,16K,1.8V,DFN8	U3710	CRITICAL	WIFI_ROM:BLANK_ON
335S00216	1	IC,EEPROM,SER,UWIRE,16K,1.8V,DFN8	U3710	CRITICAL	WIFI_ROM:BLANK_ROHM
341S01087	1	IC,WIFI ROM (V1) WW1,X1536	U3710	CRITICAL	WIFI_ROM:V00
341S01394	1	ROM,WIFI (VXX) (NEW FOR DVT) WW1,X1536	U3710	CRITICAL	WIFI_ROM:DVT

SPEAKER AMP

PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
353S01629	4	IC,TAS5770L,B2,CLASS D AMP,CSP30	U6400,U6450,U6500,U6550	CRITICAL	SPEAKER_AMP:B2
353S01871	4	IC,TAS5770L,C0,CLASS D AMP,CSP30	U6400,U6450,U6500,U6550	CRITICAL	SPEAKER_AMP:C0

VR DRIVER CPU CORE

PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
353S00519	2	IC,SIC621,DR MOS,IMVP-8,60A,PQFN31,5X5MM	U7210,U7220	CRITICAL	DR_MOS_CORE:VISHAY

VR DRIVER CPU VCCSA

PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
353S00525	1	IC,SIC532,DR MOS,IMVP-8,30A,PQFN22,45X35	U7270	CRITICAL	DR_MOS_VCCSA:VISHAY

VR DRIVER CPU GT

PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
353S00519	2	IC,SIC621,DR MOS,IMVP-8,60A,PQFN31,5X5MM	U7410,U7420	CRITICAL	DR_MOS_GT:VISHAY

SYNC_MASTER= SYNC_DATE=

PAGE TITLE

BOM CONFIGURATION

Apple Inc.

DRAWING NUMBER 051-05309 SIZE D

REVISION 5.1.0

BRANCH

PAGE 400 OF 500

SHEET 91 OF 98

NAND U8600

PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
335S00377	1	NAND,3DV4,64GBT,S4E,256G,H,SLGA110	U8600	CRITICAL	NAND_U8600:2DP_HY
335S00393	1	NAND,3DV4,64GBT,XXX,S4E,256G,H,SLGA110	U8600	CRITICAL	NAND_U8600:2DP_TS
335S00388	1	NAND,3DV4,64GBT,XXX,S4E,256G,SD,SLGA110	U8600	CRITICAL	NAND_U8600:2DP_WD
335S00416	1	NAND,3DV5,64GBT,S4E,256G,SS,SLGA110	U8600	CRITICAL	NAND_U8600:2DP_SS
335T00001	1	NAND,3DV5,64GBT,XXX,S4E,256G,T,SLGA110	U8600	CRITICAL	NAND_U8600:2DP_TS_SLT
335T00017	1	NAND,3DV5,64GBT,S4E,256G,H,SLGA110	U8600	CRITICAL	NAND_U8600:2DP_HY_SLT
335T00008	1	NAND,3DV5,64GBT,S4E,256G,SS,SLGA110	U8600	CRITICAL	NAND_U8600:2DP_SS_SLT
335S00394	1	NAND,3DV4,128GBT,XXX,256G,T,SLGA110	U8600	CRITICAL	NAND_U8600:4DP_TS
335S00378	1	NAND,3DV4,128GBT,S4E,256G,H,SLGA110	U8600	CRITICAL	NAND_U8600:4DP_HY
335S00424	1	NAND,3DV5,128GBT,S4E,256G,SS,SLGA110	U8600	CRITICAL	NAND_U8600:4DP_SS
335T00002	1	NAND,3DV4,128GBT,XXX,S4E,256G,T,SLGA110	U8600	CRITICAL	NAND_U8600:4DP_TS_SLT
335T00018	1	NAND,3DV4,128GBT,S4E,256G,H,SLGA110	U8600	CRITICAL	NAND_U8600:4DP_HY_SLT
335T00009	1	NAND,3DV5,128GBT,S4E,256G,SS,SLGA110	U8600	CRITICAL	NAND_U8600:4DP_SS_SLT
335S00398	1	NAND,3DV4,192GBT,XXX,S4E,256G,H,SLGA110	U8600	CRITICAL	NAND_U8600:6DP_HY
335S00395	1	NAND,3DV4,192GBT,XXX,S4E,256G,T,SLGA110	U8600	CRITICAL	NAND_U8600:6DP_TS
335T00005	1	NAND,3DV4,192GBT,XXX,S4E,256G,T,SLGA110	U8600	CRITICAL	NAND_U8600:6DP_TS_SLT
335T00019	1	NAND,3DV4,192GBT,XXX,S4E,256G,H,SLGA110	U8600	CRITICAL	NAND_U8600:6DP_HY_SLT
335S00379	1	NAND,3DV4,256GBT,S4E,256G,H,SLGA110	U8600	CRITICAL	NAND_U8600:8DP_HY
335S00327	1	NAND,3DV3,256GBP,133,S4E,170G,SD,ULGA110	U8600	CRITICAL	NAND_U8600:8DP_WD
335S00396	1	NAND,3DV4,256GBT,XXX,S4E,256G,T,SLGA110	U8600	CRITICAL	NAND_U8600:8DP_TS
335T00006	1	NAND,3DV4,256GBT,XXX,S4E,256G,T,SLGA110	U8600	CRITICAL	NAND_U8600:8DP_TS_SLT
335T00020	1	NAND,3DV4,256GBT,S4E,256G,H,SLGA110	U8600	CRITICAL	NAND_U8600:8DP_HY_SLT
335S00399	1	NAND,3DV4,320GBT,XXX,S4E,256G,H,SLGA110	U8600	CRITICAL	NAND_U8600:10DP_HY
335S00397	1	NAND,3DV4,320GBT,XXX,S4E,256G,T,SLGA110	U8600	CRITICAL	NAND_U8600:10DP_TS
335T00021	1	NAND,3DV4,320GBT,XXX,S4E,256G,H,SLGA110	U8600	CRITICAL	NAND_U8600:10DP_HY_SLT
335T00007	1	NAND,3DV4,320GBT,XXX,S4E,256G,T,SLGA110	U8600	CRITICAL	NAND_U8600:10DP_TS_SLT
335S00380	1	NAND,3DV4,512GBT,S4E,256G,H,SLGA110	U8600	CRITICAL	NAND_U8600:16DP_HY
335S00391	1	NAND,3DV4,512GBT,XXX,S4E,256G,SD,SLGA110	U8600	CRITICAL	NAND_U8600:16DP_WD
335T00022	1	NAND,3DV4,512GBT,S4E,256G,H,SLGA110	U8600	CRITICAL	NAND_U8600:16DP_HY_SLT
335T00016	1	NAND,3DV4,512GBT,XXX,S4E,256G,SD,SLGA110	U8600	CRITICAL	NAND_U8600:16DP_WD_SLT

NAND U8700

PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
335S00377	1	NAND,3DV4,64GBT,S4E,256G,H,SLGA110	U8700	CRITICAL	NAND_U8700:2DP_HY
335S00393	1	NAND,3DV4,64GBT,XXX,S4E,256G,H,SLGA110	U8700	CRITICAL	NAND_U8700:2DP_TS
335S00388	1	NAND,3DV4,64GBT,XXX,S4E,256G,SD,SLGA110	U8700	CRITICAL	NAND_U8700:2DP_WD
335S00416	1	NAND,3DV5,64GBT,S4E,256G,SS,SLGA110	U8700	CRITICAL	NAND_U8700:2DP_SS
335T00001	1	NAND,3DV5,64GBT,XXX,S4E,256G,T,SLGA110	U8700	CRITICAL	NAND_U8700:2DP_TS_SLT
335T00017	1	NAND,3DV5,64GBT,S4E,256G,H,SLGA110	U8700	CRITICAL	NAND_U8700:2DP_HY_SLT
335T00008	1	NAND,3DV5,64GBT,S4E,256G,SS,SLGA110	U8700	CRITICAL	NAND_U8700:2DP_SS_SLT
335S00394	1	NAND,3DV4,128GBT,XXX,256G,T,SLGA110	U8700	CRITICAL	NAND_U8700:4DP_TS
335S00378	1	NAND,3DV4,128GBT,S4E,256G,H,SLGA110	U8700	CRITICAL	NAND_U8700:4DP_HY
335S00424	1	NAND,3DV5,128GBT,S4E,256G,SS,SLGA110	U8700	CRITICAL	NAND_U8700:4DP_SS
335T00002	1	NAND,3DV4,128GBT,XXX,S4E,256G,T,SLGA110	U8700	CRITICAL	NAND_U8700:4DP_TS_SLT
335T00018	1	NAND,3DV4,128GBT,S4E,256G,H,SLGA110	U8700	CRITICAL	NAND_U8700:4DP_HY_SLT
335T00009	1	NAND,3DV5,128GBT,S4E,256G,SS,SLGA110	U8700	CRITICAL	NAND_U8700:4DP_SS_SLT
335S00398	1	NAND,3DV4,192GBT,XXX,S4E,256G,H,SLGA110	U8700	CRITICAL	NAND_U8700:6DP_HY
335S00395	1	NAND,3DV4,192GBT,XXX,S4E,256G,T,SLGA110	U8700	CRITICAL	NAND_U8700:6DP_TS
335T00005	1	NAND,3DV4,192GBT,XXX,S4E,256G,T,SLGA110	U8700	CRITICAL	NAND_U8700:6DP_TS_SLT
335T00019	1	NAND,3DV4,192GBT,XXX,S4E,256G,H,SLGA110	U8700	CRITICAL	NAND_U8700:6DP_HY_SLT
335S00379	1	NAND,3DV4,256GBT,S4E,256G,H,SLGA110	U8700	CRITICAL	NAND_U8700:8DP_HY
335S00327	1	NAND,3DV3,256GBP,133,S4E,170G,SD,ULGA110	U8700	CRITICAL	NAND_U8700:8DP_WD
335S00396	1	NAND,3DV4,256GBT,XXX,S4E,256G,T,SLGA110	U8700	CRITICAL	NAND_U8700:8DP_TS
335T00006	1	NAND,3DV4,256GBT,XXX,S4E,256G,T,SLGA110	U8700	CRITICAL	NAND_U8700:8DP_TS_SLT
335T00020	1	NAND,3DV4,256GBT,S4E,256G,H,SLGA110	U8700	CRITICAL	NAND_U8700:8DP_HY_SLT
335S00399	1	NAND,3DV4,320GBT,XXX,S4E,256G,H,SLGA110	U8700	CRITICAL	NAND_U8700:10DP_HY
335S00397	1	NAND,3DV4,320GBT,XXX,S4E,256G,T,SLGA110	U8700	CRITICAL	NAND_U8700:10DP_TS
335T00021	1	NAND,3DV4,320GBT,XXX,S4E,256G,H,SLGA110	U8700	CRITICAL	NAND_U8700:10DP_HY_SLT
335T00007	1	NAND,3DV4,320GBT,XXX,S4E,256G,T,SLGA110	U8700	CRITICAL	NAND_U8700:10DP_TS_SLT
335S00380	1	NAND,3DV4,512GBT,S4E,256G,H,SLGA110	U8700	CRITICAL	NAND_U8700:16DP_HY
335S00391	1	NAND,3DV4,512GBT,XXX,S4E,256G,SD,SLGA110	U8700	CRITICAL	NAND_U8700:16DP_WD
335T00022	1	NAND,3DV4,512GBT,S4E,256G,H,SLGA110	U8700	CRITICAL	NAND_U8700:16DP_HY_SLT
335T00016	1	NAND,3DV4,512GBT,XXX,S4E,256G,SD,SLGA110	U8700	CRITICAL	NAND_U8700:16DP_WD_SLT

NAND U8800

PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
335S00377	1	NAND,3DV4,64GBT,S4E,256G,H,SLGA110	U8800	CRITICAL	NAND_U8800:2DP_HY
335S00393	1	NAND,3DV4,64GBT,XXX,S4E,256G,H,SLGA110	U8800	CRITICAL	NAND_U8800:2DP_TS
335S00388	1	NAND,3DV4,64GBT,XXX,S4E,256G,SD,SLGA110	U8800	CRITICAL	NAND_U8800:2DP_WD
335S00416	1	NAND,3DV5,64GBT,S4E,256G,SS,SLGA110	U8800	CRITICAL	NAND_U8800:2DP_SS
335T00001	1	NAND,3DV5,64GBT,XXX,S4E,256G,T,SLGA110	U8800	CRITICAL	NAND_U8800:2DP_TS_SLT
335T00017	1	NAND,3DV5,64GBT,S4E,256G,H,SLGA110	U8800	CRITICAL	NAND_U8800:2DP_HY_SLT
335T00008	1	NAND,3DV5,64GBT,S4E,256G,SS,SLGA110	U8800	CRITICAL	NAND_U8800:2DP_SS_SLT
335S00394	1	NAND,3DV4,128GBT,XXX,256G,T,SLGA110	U8800	CRITICAL	NAND_U8800:4DP_TS
335S00378	1	NAND,3DV4,128GBT,S4E,256G,H,SLGA110	U8800	CRITICAL	NAND_U8800:4DP_HY
335S00424	1	NAND,3DV5,128GBT,S4E,256G,SS,SLGA110	U8800	CRITICAL	NAND_U8800:4DP_SS
335T00002	1	NAND,3DV4,128GBT,XXX,S4E,256G,T,SLGA110	U8800	CRITICAL	NAND_U8800:4DP_TS_SLT
335T00018	1	NAND,3DV4,128GBT,S4E,256G,H,SLGA110	U8800	CRITICAL	NAND_U8800:4DP_HY_SLT
335T00009	1	NAND,3DV5,128GBT,S4E,256G,SS,SLGA110	U8800	CRITICAL	NAND_U8800:4DP_SS_SLT
335S00398	1	NAND,3DV4,192GBT,XXX,S4E,256G,H,SLGA110	U8800	CRITICAL	NAND_U8800:6DP_HY
335S00395	1	NAND,3DV4,192GBT,XXX,S4E,256G,T,SLGA110	U8800	CRITICAL	NAND_U8800:6DP_TS
335T00005	1	NAND,3DV4,192GBT,XXX,S4E,256G,T,SLGA110	U8800	CRITICAL	NAND_U8800:6DP_TS_SLT
335T00019	1	NAND,3DV4,192GBT,XXX,S4E,256G,H,SLGA110	U8800	CRITICAL	NAND_U8800:6DP_HY_SLT
335S00379	1	NAND,3DV4,256GBT,S4E,256G,H,SLGA110	U8800	CRITICAL	NAND_U8800:8DP_HY
335S00327	1	NAND,3DV3,256GBP,133,S4E,170G,SD,ULGA110	U8800	CRITICAL	NAND_U8800:8DP_WD
335S00396	1	NAND,3DV4,256GBT,XXX,S4E,256G,T,SLGA110	U8800	CRITICAL	NAND_U8800:8DP_TS
335T00006	1	NAND,3DV4,256GBT,XXX,S4E,256G,T,SLGA110	U8800	CRITICAL	NAND_U8800:8DP_TS_SLT
335T00020	1	NAND,3DV4,256GBT,S4E,256G,H,SLGA110	U8800	CRITICAL	NAND_U8800:8DP_HY_SLT
335S00399	1	NAND,3DV4,320GBT,XXX,S4E,256G,H,SLGA110	U8800	CRITICAL	NAND_U8800:10DP_HY
335S00397	1	NAND,3DV4,320GBT,XXX,S4E,256G,T,SLGA110	U8800	CRITICAL	NAND_U8800:10DP_TS
335T00021	1	NAND,3DV4,320GBT,XXX,S4E,256G,H,SLGA110	U8800	CRITICAL	NAND_U8800:10DP_HY_SLT
335T00007	1	NAND,3DV4,320GBT,XXX,S4E,256G,T,SLGA110	U8800	CRITICAL	NAND_U8800:10DP_TS_SLT
335S00380	1	NAND,3DV4,512GBT,S4E,256G,H,SLGA110	U8800	CRITICAL	NAND_U8800:16DP_HY
335S00391	1	NAND,3DV4,512GBT,XXX,S4E,256G,SD,SLGA110	U8800	CRITICAL	NAND_U8800:16DP_WD
335T00022	1	NAND,3DV4,512GBT,S4E,256G,H,SLGA110	U8800	CRITICAL	NAND_U8800:16DP_HY_SLT
335T00016	1	NAND,3DV4,512GBT,XXX,S4E,256G,SD,SLGA110	U8800	CRITICAL	NAND_U8800:16DP_WD_SLT

NAND U8900

PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
335S00377	1	NAND,3DV4,64GBT,S4E,256G,H,SLGA110	U8900	CRITICAL	NAND_U8900:2DP_HY
335S00393	1	NAND,3DV4,64GBT,XXX,S4E,256G,H,SLGA110	U8900	CRITICAL	NAND_U8900:2DP_TS
335S00388	1	NAND,3DV4,64GBT,XXX,S4E,256G,SD,SLGA110	U8900	CRITICAL	NAND_U8900:2DP_WD
335S00416	1	NAND,3DV5,64GBT,S4E,256G,SS,SLGA110	U8900	CRITICAL	NAND_U8900:2DP_SS
335T00001	1	NAND,3DV5,64GBT,XXX,S4E,256G,T,SLGA110	U8900	CRITICAL	NAND_U8900:2DP_TS_SLT
335T00017	1	NAND,3DV5,64GBT,S4E,256G,H,SLGA110	U8900	CRITICAL	NAND_U8900:2DP_HY_SLT
335T00008	1	NAND,3DV5,64GBT,S4E,256G,SS,SLGA110	U8900	CRITICAL	NAND_U8900:2DP_SS_SLT
335S00394	1	NAND,3DV4,128GBT,XXX,256G,T,SLGA110	U8900	CRITICAL	NAND_U8900:4DP_TS
335S00378	1	NAND,3DV4,128GBT,S4E,256G,H,SLGA110	U8900	CRITICAL	NAND_U8900:4DP_HY
335S00424	1	NAND,3DV5,128GBT,S4E,256G,SS,SLGA110	U8900	CRITICAL	NAND_U8900:4DP_SS
335T00002	1	NAND,3DV4,128GBT,XXX,S4E,256G,T,SLGA110	U8900	CRITICAL	NAND_U8900:4DP_TS_SLT
335T00018	1	NAND,3DV4,128GBT,S4E,256G,H,SLGA110	U8900	CRITICAL	NAND_U8900:4DP_HY_SLT
335T00009	1	NAND,3DV5,128GBT,S4E,256G,SS,SLGA110	U8900	CRITICAL	NAND_U8900:4DP_SS_SLT
335S00398	1	NAND,3DV4,192GBT,XXX,S4E,256G,H,SLGA110	U8900	CRITICAL	NAND_U8900:6DP_HY
335S00395	1	NAND,3DV4,192GBT,XXX,S4E,256G,T,SLGA110	U8900	CRITICAL	NAND_U8900:6DP_TS
335T00005	1	NAND,3DV4,192GBT,XXX,S4E,256G,T,SLGA110	U8900	CRITICAL	NAND_U8900:6DP_TS_SLT
335T00019	1	NAND,3DV4,192GBT,XXX,S4E,256G,H,SLGA110	U8900	CRITICAL	NAND_U8900:6DP_HY_SLT
335S00379	1	NAND,3DV4,256GBT,S4E,256G,H,SLGA110	U8900	CRITICAL	NAND_U8900:8DP_HY
335S00327	1	NAND,3DV3,256GBP,133,S4E,170G,SD,ULGA110	U8900	CRITICAL	NAND_U8900:8DP_WD
335S00396	1	NAND,3DV4,256GBT,XXX,S4E,256G,T,SLGA110	U8900	CRITICAL	NAND_U8900:8DP_TS
335T00006	1	NAND,3DV4,256GBT,XXX,S4E,256G,T,SLGA110	U8900	CRITICAL	NAND_U8900:8DP_TS_SLT
335T00020	1	NAND,3DV4,256GBT,S4E,256G,H,SLGA110	U8900	CRITICAL	NAND_U8900:8DP_HY_SLT
335S00399	1	NAND,3DV4,320GBT,XXX,S4E,256G,H,SLGA110	U8900	CRITICAL	NAND_U8900:10DP_HY
335S00397	1	NAND,3DV4,320GBT,XXX,S4E,256G,T,SLGA110	U8900	CRITICAL	NAND_U8900:10DP_TS
335T00021	1	NAND,3DV4,320GBT,XXX,S4E,256G,H,SLGA110	U8900	CRITICAL	NAND_U8900:10DP_HY_SLT
335T00007	1	NAND,3DV4,320GBT,XXX,S4E,256G,T,SLGA110	U8900	CRITICAL	NAND_U8900:10DP_TS_SLT
335S00380	1	NAND,3DV4,512GBT,S4E,256G,H,SLGA110	U8900	CRITICAL	NAND_U8900:16DP_HY
335S00391	1	NAND,3DV4,512GBT,XXX,S4E,256G,SD,SLGA110	U8900	CRITICAL	NAND_U8900:16DP_WD
335T00022	1	NAND,3DV4,512GBT,S4E,256G,H,SLGA110	U8900	CRITICAL	NAND_U8900:16DP_HY_SLT
335T00016	1	NAND,3DV4,512GBT,XXX,S4E,256G,SD,SLGA110	U8900	CRITICAL	NAND_U8900:16DP_WD_SLT

SYNC_MASTER= SYNC_DATE=

PAGE TITLE

BOM CONFIGURATION

Apple Inc.

DRAWING NUMBER 051-05309 SIZE D

REVISION 5.1.0

BRANCH

PAGE 401 OF 500

SHEET 92 OF 98

COMMON BOM GROUPS

BOM GROUP	BOM OPTIONS
X1782_COMMON_PARTS	SCH,PCB,ALT_CMN,COMMON,ALTERNATE:PART,X1782_USB,X1782_WIFI_MISC,X1782_X86,X1782_MISC,X1782_T290,SENSE_PROD
X1782_USB	TBT:TR_C1_PRQ,UPC:ACE2_B2,TBT_ROM:EVT,USBC_SHLD
X1782_WIFI_MISC	MODULE:MUR_ES_3P1,WIFI_ROM:DVT,BT_ROM:P1,STANDOFFS_TOP,STANDOFFS_BOT,CPU_SLEDS
X1782_X86	EDP_ENABLE,DR_MOS_CORE:VISHAY,DR_MOS_VCCSA:VISHAY,DR_MOS_GT:VISHAY,IND_VCCSA:CYNTEC,DRAM_TOP_FENC,DRAM_BOT_CAN
X1782_T290	BOARDID0,BOARDID1,BOARDID3,BOARDID4,BOARDID5,BOARDREV2,CALPE_L:OTP_BC,SE:PROD_2019,NAND_VCC:2.5V,MEGA_SHLD
X1782_MISC	CHARGER_IC:POC,AMR:POC,SPEAKER_AMP:B2,SOC_DFU_BYPASS,BKLT_FILT:ZERO_OHM,XDP:YES,WASHER_DFR,LOADRC:NO

DEBUG BOM PARTS

BOM GROUP	BOM OPTIONS
X1782_DEV_1	XDP_CONN:YES
X1782_DEV_2	USBC_AARDVARKANOID,USBC_ARKANOID

DRAM AND SPD

BOM GROUP	BOM OPTIONS
X1782_08GB_HY	DRAM:08GB_HY,RAMCFG4_L,RAMCFG3_L,RAMCFG2_L,RAMCFG1_L,RAMCFG0_L
X1782_08GB_SS	DRAM:08GB_SS_D,RAMCFG2_L,RAMCFG0_L
X1782_16GB_HY	DRAM:16GB_HY,RAMCFG4_L,RAMCFG3_L,RAMCFG1_L,RAMCFG0_L
X1782_16GB_SS	DRAM:16GB_SS_D,RAMCFG0_L
X1782_NO_DRAM	DRAM:OFF

CPU

BOM GROUP	BOM OPTIONS
X1782_CPU_1P4GHZ	CPU:15W_1P4G_SREZ2
X1782_CPU_1P7GHZ	CPU:15W_1P7G_SREZ1
X1782_CPU_NO_CPU	CPU:OFF

SOC AND NAND

BOM GROUP	BOM OPTIONS
X1782_TLC_128GB_HY	SOC:PROD_B0_1G,SSD:2L,NAND_U8600:2DP_HY_SLT,NAND_U8700:2DP_HY_SLT
X1782_TLC_128GB_TS	SOC:PROD_B0_1G,SSD:2L,NAND_U8600:2DP_TS_SLT,NAND_U8700:2DP_TS_SLT
X1782_TLC_256GB_HY	SOC:PROD_B0_1G,SSD:4L,NAND_U8600:4DP_HY_SLT,NAND_U8700:2DP_HY_SLT,NAND_U8800:2DP_HY_SLT,NAND_U8900:2DP_HY_SLT
X1782_TLC_256GB_TS	SOC:PROD_B0_1G,SSD:4L,NAND_U8600:4DP_TS_SLT,NAND_U8700:2DP_TS_SLT,NAND_U8800:2DP_TS_SLT,NAND_U8900:2DP_TS_SLT
X1782_TLC_256GB_SS	SOC:PROD_B0_1G,SSD:4L,NAND_U8600:4DP_SS_SLT,NAND_U8700:2DP_SS_SLT,NAND_U8800:2DP_SS_SLT,NAND_U8900:2DP_SS_SLT
X1782_TLC_512GB_HY	SOC:PROD_B0_1G,SSD:4L,NAND_U8600:6DP_HY_SLT,NAND_U8700:6DP_HY_SLT,NAND_U8800:4DP_HY_SLT,NAND_U8900:4DP_HY_SLT
X1782_TLC_512GB_TS	SOC:PROD_B0_1G,SSD:4L,NAND_U8600:6DP_TS_SLT,NAND_U8700:6DP_TS_SLT,NAND_U8800:4DP_TS_SLT,NAND_U8900:4DP_TS_SLT
X1782_TLC_001TB_HY	SOC:PROD_B0_2G,SSD:4L,NAND_U8600:10DP_HY_SLT,NAND_U8700:10DP_HY_SLT,NAND_U8800:8DP_HY_SLT,NAND_U8900:8DP_HY_SLT
X1782_TLC_001TB_TS	SOC:PROD_B0_2G,SSD:4L,NAND_U8600:10DP_TS_SLT,NAND_U8700:10DP_TS_SLT,NAND_U8800:8DP_TS_SLT,NAND_U8900:8DP_TS_SLT
X1782_TLC_002TB_HY	SOC:PROD_B0_2G,SSD:4L,NAND_U8600:16DP_HY_SLT,NAND_U8700:16DP_HY_SLT,NAND_U8800:16DP_HY_SLT,NAND_U8900:16DP_HY_SLT
X1782_TLC_002TB_WD	SOC:PROD_B0_2G,SSD:4L,NAND_U8600:16DP_WD_SLT,NAND_U8700:16DP_WD_SLT,NAND_U8800:16DP_WD_SLT,NAND_U8900:16DP_WD_SLT
X1782_NO_NAND_2_LD	SOC:OFF,SSD:2L,NAND_U8600:OFF,NAND_U8700:OFF,NAND_U8800:OFF,NAND_U8900:OFF
X1782_NO_NAND_4_LD	SOC:OFF,SSD:4L,NAND_U8600:OFF,NAND_U8700:OFF,NAND_U8800:OFF,NAND_U8900:OFF

CPU DRAM CFG[4:0] CHART

DIE REV	CFG 4
A	0
B	1

SPEED	CFG 3
2133	0
1866	1

CAPACITY	CFG 2
8GB	0
16GB	1

VENDOR	CFG 1	CFG 0
HYNIX	0	0
MICRON	0	1
SAMSUNG	1	0
N/A	1	1

SYSTEM PARTS

PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
051-05309	1	SCHEM,MLB,X1782	SCH	CRITICAL	SCH
820-01987	1	PCBF,MLB,X1782	PCB	CRITICAL	PCB
685-00331	1	COMMON PARTS,MLB,X1782	COMMON_PARTS	CRITICAL	X1782_COMMON_BOM
985-01184	1	DEV,COMMON PARTS,MLB,X1782	DEV_PARTS	CRITICAL	X1782_DEV_BOM

TOP LEVEL BOM

639-XXXX (POR) OR 939-XXXX (DEV)

- COMMON PARTS BOM
  685-00331
- DEBUG PARTS BOM
  985-01184

COMMON PARTS BOM

BOM NUMBER	BOM NAME	BOM OPTIONS
685-00331	COMMON_PARTS,MLB,X1782	X1782_COMMON_PARTS

DEBUG PARTS

BOM NUMBER	BOM NAME	BOM OPTIONS
985-01184	DEV,COMMON_PARTS,MLB,X1782	X1782_DEV_1,X1782_DEV_2

NOTES:

"SENSOR:DEV" IS FOR SENSE RESISTORS. WHEN CURRENT SENSING IS REMOVED AT DVT, THESE RESISTORS WILL BE REPLACED WITH A SPECIAL SYMBOL, A COPPER SHAPE SHORTING THE TWO TERMINALS

"LOADISNS" ARE CIRCUITS ONLY REQUIRED UNTIL DVT TO MEASURE/SENSE CURRENT. SENSE CIRCUITS REQUIRED BY SMC WILL NOT HAVE THIS OPTION SINCE THEY WILL STAY TILL PVT

"LOADRC:YES/NO" RC FILTERS INTO ADC WILL BE REPLACED BY 100K PD ONCE THE SENSE CIRCUITS GO AWAY

SYNC_MASTER= SYNC_DATE=

PAGE TITLE

BOM GROUPS

Apple Inc.

DRAWING NUMBER 051-05309 SIZE D

REVISION 5.1.0

BRANCH

PAGE 403 OF 500

SHEET 93 OF 98

POR BOMS - MLB-1 (1.4 GHZ CPU)

BOM NUMBER	BOM NAME	BOM OPTIONS
639-09103	MLB-1,SS-8GB,TS-128GB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P4GHZ,X1782_08GB_SS,X1782_TLC_128GB_TS
639-09102	MLB-1,HY-8GB,TS-128GB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P4GHZ,X1782_08GB_HY,X1782_TLC_128GB_TS
639-10001	MLB-1,SS-8GB,HY-128GB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P4GHZ,X1782_08GB_SS,X1782_TLC_128GB_HY
639-10002	MLB-1,HY-8GB,HY-128GB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P4GHZ,X1782_08GB_HY,X1782_TLC_128GB_HY
639-10003	MLB-1,SS-16GB,HY-128GB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P4GHZ,X1782_16GB_SS,X1782_TLC_128GB_HY
639-10004	MLB-1,SS-16GB,TS-128GB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P4GHZ,X1782_16GB_SS,X1782_TLC_128GB_TS
639-10005	MLB-1,HY-16GB,HY-128GB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P4GHZ,X1782_16GB_HY,X1782_TLC_128GB_HY
639-10006	MLB-1,HY-16GB,TS-128GB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P4GHZ,X1782_16GB_HY,X1782_TLC_128GB_TS
639-10007	MLB-1,SS-8GB,HY-256GB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P4GHZ,X1782_08GB_SS,X1782_TLC_256GB_HY
639-10008	MLB-1,SS-8GB,SS-256GB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P4GHZ,X1782_08GB_SS,X1782_TLC_256GB_SS
639-10009	MLB-1,SS-8GB,TS-256GB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P4GHZ,X1782_08GB_SS,X1782_TLC_256GB_TS
639-10010	MLB-1,HY-8GB,HY-256GB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P4GHZ,X1782_08GB_HY,X1782_TLC_256GB_HY
639-10011	MLB-1,HY-8GB,SS-256GB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P4GHZ,X1782_08GB_HY,X1782_TLC_256GB_SS
639-10012	MLB-1,HY-8GB,TS-256GB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P4GHZ,X1782_08GB_HY,X1782_TLC_256GB_TS
639-10013	MLB-1,SS-16GB,HY-256GB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P4GHZ,X1782_16GB_SS,X1782_TLC_256GB_HY
639-10014	MLB-1,SS-16GB,SS-256GB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P4GHZ,X1782_16GB_SS,X1782_TLC_256GB_SS
639-10015	MLB-1,SS-16GB,TS-256GB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P4GHZ,X1782_16GB_SS,X1782_TLC_256GB_TS
639-10016	MLB-1,HY-16GB,HY-256GB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P4GHZ,X1782_16GB_HY,X1782_TLC_256GB_HY
639-10017	MLB-1,HY-16GB,SS-256GB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P4GHZ,X1782_16GB_HY,X1782_TLC_256GB_SS
639-10018	MLB-1,HY-16GB,TS-256GB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P4GHZ,X1782_16GB_HY,X1782_TLC_256GB_TS
639-10019	MLB-1,SS-8GB,TS-512GB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P4GHZ,X1782_08GB_SS,X1782_TLC_512GB_TS
639-10020	MLB-1,HY-8GB,HY-512GB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P4GHZ,X1782_08GB_HY,X1782_TLC_512GB_HY
639-10021	MLB-1,HY-8GB,TS-512GB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P4GHZ,X1782_08GB_HY,X1782_TLC_512GB_TS
639-10022	MLB-1,SS-16GB,HY-512GB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P4GHZ,X1782_16GB_SS,X1782_TLC_512GB_HY
639-10023	MLB-1,SS-16GB,TS-512GB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P4GHZ,X1782_16GB_SS,X1782_TLC_512GB_TS
639-10024	MLB-1,HY-16GB,HY-512GB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P4GHZ,X1782_16GB_HY,X1782_TLC_512GB_HY
639-10025	MLB-1,HY-16GB,TS-512GB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P4GHZ,X1782_16GB_HY,X1782_TLC_512GB_TS
639-10026	MLB-1,SS-8GB,HY-1TB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P4GHZ,X1782_08GB_SS,X1782_TLC_001TB_HY
639-10027	MLB-1,SS-8GB,TS-1TB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P4GHZ,X1782_08GB_SS,X1782_TLC_001TB_TS
639-10028	MLB-1,HY-8GB,HY-1TB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P4GHZ,X1782_08GB_HY,X1782_TLC_001TB_HY
639-10029	MLB-1,HY-8GB,TS-1TB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P4GHZ,X1782_08GB_HY,X1782_TLC_001TB_TS
639-10030	MLB-1,SS-16GB,HY-1TB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P4GHZ,X1782_16GB_SS,X1782_TLC_001TB_HY
639-10031	MLB-1,SS-16GB,TS-1TB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P4GHZ,X1782_16GB_SS,X1782_TLC_001TB_TS
639-10032	MLB-1,HY-16GB,HY-1TB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P4GHZ,X1782_16GB_HY,X1782_TLC_001TB_HY
639-10033	MLB-1,HY-16GB,TS-1TB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P4GHZ,X1782_16GB_HY,X1782_TLC_001TB_TS
639-10034	MLB-1,SS-8GB,HY-2TB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P4GHZ,X1782_08GB_SS,X1782_TLC_002TB_HY
639-10035	MLB-1,SS-8GB,HY-512GB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P4GHZ,X1782_08GB_SS,X1782_TLC_512GB_HY
639-10036	MLB-1,HY-8GB,HY-2TB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P4GHZ,X1782_08GB_HY,X1782_TLC_002TB_HY
639-10037	MLB-1,HY-8GB,WD-2TB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P4GHZ,X1782_08GB_HY,X1782_TLC_002TB_WD
639-10038	MLB-1,SS-16GB,HY-2TB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P4GHZ,X1782_16GB_SS,X1782_TLC_002TB_HY
639-10039	MLB-1,SS-16GB,WD-2TB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P4GHZ,X1782_16GB_SS,X1782_TLC_002TB_WD
639-10040	MLB-1,HY-16GB,HY-2TB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P4GHZ,X1782_16GB_HY,X1782_TLC_002TB_HY
639-10041	MLB-1,HY-16GB,WD-2TB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P4GHZ,X1782_16GB_HY,X1782_TLC_002TB_WD
639-10084	MLB-1,SS-8GB,WD-2TB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P4GHZ,X1782_08GB_SS,X1782_TLC_002TB_WD

SYNC_MASTER= SYNC_DATE=

PAGE TITLE

BOM VARIANT TABLES

Apple Inc.

DRAWING NUMBER 051-05309 SIZE D

REVISION 5.1.0

BRANCH

PAGE 405 OF 500

SHEET 94 OF 98

POR BOMS - MLB-2 (1.7 GHZ CPU)

BOM NUMBER	BOM NAME	BOM OPTIONS
639-09104	MLB-2,SS-16GB,TS-256GB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P7GHZ,X1782_16GB_SS,X1782_TLC_256GB_TS
639-09105	MLB-2,HY-16GB,TS-1TB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P7GHZ,X1782_16GB_HY,X1782_TLC_001TB_TS
639-10042	MLB-2,SS-8GB,HY-128GB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P7GHZ,X1782_08GB_SS,X1782_TLC_128GB_HY
639-10043	MLB-2,SS-8GB,TS-128GB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P7GHZ,X1782_08GB_SS,X1782_TLC_128GB_TS
639-10044	MLB-2,HY-8GB,HY-128GB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P7GHZ,X1782_08GB_HY,X1782_TLC_128GB_HY
639-10045	MLB-2,HY-8GB,TS-128GB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P7GHZ,X1782_08GB_HY,X1782_TLC_128GB_TS
639-10046	MLB-2,SS-16GB,HY-128GB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P7GHZ,X1782_16GB_SS,X1782_TLC_128GB_HY
639-10047	MLB-2,SS-16GB,TS-128GB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P7GHZ,X1782_16GB_SS,X1782_TLC_128GB_TS
639-10048	MLB-2,HY-16GB,HY-128GB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P7GHZ,X1782_16GB_HY,X1782_TLC_128GB_HY
639-10049	MLB-2,HY-16GB,TS-128GB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P7GHZ,X1782_16GB_HY,X1782_TLC_128GB_TS
639-10050	MLB-2,SS-8GB,HY-256GB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P7GHZ,X1782_08GB_SS,X1782_TLC_256GB_HY
639-10051	MLB-2,SS-8GB,SS-256GB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P7GHZ,X1782_08GB_SS,X1782_TLC_256GB_SS
639-10052	MLB-2,SS-8GB,TS-256GB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P7GHZ,X1782_08GB_SS,X1782_TLC_256GB_TS
639-10053	MLB-2,HY-8GB,HY-256GB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P7GHZ,X1782_08GB_HY,X1782_TLC_256GB_HY
639-10054	MLB-2,HY-8GB,SS-256GB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P7GHZ,X1782_08GB_HY,X1782_TLC_256GB_SS
639-10055	MLB-2,HY-8GB,TS-256GB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P7GHZ,X1782_08GB_HY,X1782_TLC_256GB_TS
639-10056	MLB-2,SS-16GB,HY-256GB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P7GHZ,X1782_16GB_SS,X1782_TLC_256GB_HY
639-10057	MLB-2,SS-16GB,SS-256GB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P7GHZ,X1782_16GB_SS,X1782_TLC_256GB_SS
639-10058	MLB-2,HY-16GB,HY-256GB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P7GHZ,X1782_16GB_HY,X1782_TLC_256GB_HY
639-10059	MLB-2,HY-16GB,SS-256GB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P7GHZ,X1782_16GB_HY,X1782_TLC_256GB_SS
639-10060	MLB-2,HY-16GB,TS-256GB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P7GHZ,X1782_16GB_HY,X1782_TLC_256GB_TS
639-10061	MLB-2,SS-8GB,HY-512GB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P7GHZ,X1782_08GB_SS,X1782_TLC_512GB_HY
639-10062	MLB-2,SS-8GB,TS-512GB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P7GHZ,X1782_08GB_SS,X1782_TLC_512GB_TS
639-10063	MLB-2,HY-8GB,HY-512GB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P7GHZ,X1782_08GB_HY,X1782_TLC_512GB_HY
639-10064	MLB-2,HY-8GB,TS-512GB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P7GHZ,X1782_08GB_HY,X1782_TLC_512GB_TS
639-10065	MLB-2,SS-16GB,HY-512GB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P7GHZ,X1782_16GB_SS,X1782_TLC_512GB_HY
639-10066	MLB-2,SS-16GB,TS-512GB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P7GHZ,X1782_16GB_SS,X1782_TLC_512GB_TS
639-10067	MLB-2,HY-16GB,HY-512GB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P7GHZ,X1782_16GB_HY,X1782_TLC_512GB_HY
639-10068	MLB-2,HY-16GB,TS-512GB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P7GHZ,X1782_16GB_HY,X1782_TLC_512GB_TS
639-10069	MLB-2,SS-8GB,HY-1TB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P7GHZ,X1782_08GB_SS,X1782_TLC_001TB_HY
639-10070	MLB-2,SS-8GB,TS-1TB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P7GHZ,X1782_08GB_SS,X1782_TLC_001TB_TS
639-10071	MLB-2,HY-8GB,HY-1TB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P7GHZ,X1782_08GB_HY,X1782_TLC_001TB_HY
639-10072	MLB-2,HY-8GB,TS-1TB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P7GHZ,X1782_08GB_HY,X1782_TLC_001TB_TS
639-10073	MLB-2,SS-16GB,HY-1TB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P7GHZ,X1782_16GB_SS,X1782_TLC_001TB_HY
639-10074	MLB-2,SS-16GB,TS-1TB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P7GHZ,X1782_16GB_SS,X1782_TLC_001TB_TS
639-10075	MLB-2,HY-16GB,HY-1TB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P7GHZ,X1782_16GB_HY,X1782_TLC_001TB_HY
639-10076	MLB-2,SS-8GB,HY-2TB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P7GHZ,X1782_08GB_SS,X1782_TLC_002TB_HY
639-10077	MLB-2,SS-8GB,WD-2TB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P7GHZ,X1782_08GB_SS,X1782_TLC_002TB_WD
639-10078	MLB-2,HY-8GB,HY-2TB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P7GHZ,X1782_08GB_HY,X1782_TLC_002TB_HY
639-10079	MLB-2,HY-8GB,WD-2TB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P7GHZ,X1782_08GB_HY,X1782_TLC_002TB_WD
639-10080	MLB-2,SS-16GB,HY-2TB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P7GHZ,X1782_16GB_SS,X1782_TLC_002TB_HY
639-10081	MLB-2,SS-16GB,WD-2TB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P7GHZ,X1782_16GB_SS,X1782_TLC_002TB_WD
639-10082	MLB-2,HY-16GB,HY-2TB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P7GHZ,X1782_16GB_HY,X1782_TLC_002TB_HY
639-10083	MLB-2,HY-16GB,WD-2TB,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_DEV_BOM,X1782_CPU_1P7GHZ,X1782_16GB_HY,X1782_TLC_002TB_WD

SYNC_MASTER= SYNC_DATE=

PAGE TITLE

BOM VARIANT TABLES

Apple Inc.

DRAWING NUMBER 051-05309 SIZE D

REVISION 5.1.0

BRANCH

PAGE 406 OF 500

SHEET 95 OF 98

POR BOMS - MLB-2 (1.7 GHZ CPU)

BOM NUMBER	BOM NAME	BOM OPTIONS
939-09001	DEV,MLB-1,NO-CPU-MEM-NAND,2-LAND,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_CPU_NO_CPU,X1782_NO_DRAM,X1782_NO_NAND_2_LD
939-09002	DEV,MLB-1,NO-CPU-MEM-NAND,4-LAND,X1782	ALT_CMN,ALTERNATE:PART,X1782_COMMON_BOM,X1782_CPU_NO_CPU,X1782_NO_DRAM,X1782_NO_NAND_4_LD

SYNC_MASTER= SYNC_DATE=

PAGE TITLE

BOM VARIANT TABLES

Apple Inc.

DRAWING NUMBER 051-05309

SIZE D

REVISION 5.1.0

BRANCH

PAGE 407 OF 500

SHEET 96 OF 98

DC-DC

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:	
152S00403	152S00322	ALT_CMN	ALL	<RDAR://39801983>	MURATA PRIMARY, CHILISIN ALT IND,PWR,0.68UH,20%,6.3A,26MOHM,3225
128S00042	128S0311	ALT_CMN	ALL	<RDAR://40172980>	NEC PRIMARY, KEMET ALTERNATE CAP,TANT,POLY,220UF,6.3V,25MOHM,82
128S00043	128S0311	ALT_CMN	ALL	<RDAR://40172980>	NEC PRIMARY, PANASONIC ALTERNATE CAP,TANT,POLY,220UF,6.3V,25MOHM,82
128S0264	128S0364	ALT_CMN	ALL	<RDAR://44394151>	KEMET PRIMARY, PANASONIC ALTERNATE CAP,AL,POLY,68UF,20%,16V,40MOHM,D2
152S00726	152S00592	ALT_CMN	ALL	<RDAR://40221857>	CYNTEC PRIMARY, CHILISIN ALTERNATE IND,MLD,1UH,2.6A,95MOHM,2012
152S00724	152S00311	ALT_CMN	ALL	<RDAR://40221450>	CYNTEC PRIMARY, CHILISIN ALTERNATE IND,MLD,1UH,20%,3.8A,55MOHM,2016X1.2MM
152S00398	152S00204	ALT_CMN	ALL	<RDAR://40221612>	CYNTEC PRIMARY, TAIYO ALTERNATE IND,PWR,SHLD,0.22UH,6.7A,0.023 OHM,2012
152S00725	152S00590	ALT_CMN	ALL	<RDAR://40223132>	CYNTEC PRIMARY, CHILISIN ALTERNATE IND,MLD,0.47UH,4.8A,34MOHM,2016
152S00363	152S00048	ALT_CMN	ALL	<RDAR://40040471>	CYNTEC PRIMARY, NEC ALTERNATE IND,MLD,0.22UH,1.9MO,44,8.6X8.0X2.4MM
376S00227	376S00203	ALT_CMN	ALL	<RDAR://40169831>	VISHAY PRIMARY, FAIRCHILD ALTERNATE MOSFET,DL-N,30V,15.6A,13.8MOHM@4.5V,DFN8
376S00204	376S00203	ALT_CMN	ALL	<RDAR://40169831>	VISHAY PRIMARY, DIODES ALTERNATE MOSFET,DL-N,30V,15.6A,13.8MOHM@4.5V,DFN8
376S00226	376S00203	ALT_CMN	ALL	<RDAR://40169831>	VISHAY PRIMARY, VISHAY ALTERNATE MOSFET,DL-N,30V,15.6A,13.8MOHM@4.5V,DFN8
152S00786	152S00344	ALT_CMN	ALL	<RDAR://40169331>	MURATA PRIMARY, CYNTEC ALTERNATE IND,MLD,1UH,20%,4.7A,40MOHM,2520
376S00373	376S1038	ALT_CMN	ALL	<RDAR://40169426>	TI PRIMARY, DIODES ALTERNATE MOFET DUAL-N,30V,20A,9.45/3.6MOHN,3X3DFN
376S00007	376S1179	ALT_CMN	ALL	<RDAR://40170031>	VISHAY PRIMARY, AOS ALTERNATE MOSFET,P-CH,20V,40A,0.0039 OHM,8P,PWRPAK
376S00228	376S1179	ALT_CMN	ALL	<RDAR://40170031>	VISHAY PRIMARY, FAIRCHILD ALTERNATE MOSFET,P-CH,20V,40A,0.0039 OHM,8P,PWRPAK
107S00015	107S00011	ALT_CMN	ALL	<RDAR://40039575>	CYNTEC PRIMARY, TFT ALTERNATE RES,MTL FLM,0.00075OHM,1%,4-L,0612,BLK
128S0392	128S0445	ALT_CMN	ALL	<RDAR://40172491>	PANASONIC PRIMARY, PANASONIC ALTERNATE CAP,TANT,POLY,33UF,20%,16V,40MOHM,D12
353S00831	353S00519	ALT_CMN	ALL	<RDAR://43065874>	VISHAY PRIMARY, FAIRCHILD ALTERNATE IC,SIC621,DR MOS,IMVP-8,60A,PQFN31,5X5MM
128S00039	128S00038	ALT_CMN	ALL	<RDAR://40173276>	KEMET PRIMARY, NEC ALT CAP,TA,POLY,150UF,20%,6.3V,18MO,2A,B2
128S0302	128S00038	ALT_CMN	ALL	<RDAR://40173276>	KEMET PRIMARY, PANASONIC ALT CAP,TA,POLY,150UF,20%,6.3V,18MO,2A,B2
353S00832	353S00525	ALT_CMN	ALL	<RDAR://43067934>	VISHAY PRIMARY, FAIRCHILD ALT IC,SIC532,DR MOS,IMVP-8,30A,PQFN22,45X35
152S01024	152S00386	ALT_CMN	ALL	<RDAR://42185308>	MURATA PRIMARY, CHILISIN ALT IND,MLD,1.0UH,20%,32MOHM,4.8A,3225
152S00707	152S00689	ALT_CMN	ALL	<RDAR://43666396>	CYNTEC PRIMARY, CHILISIN ALT IND,MLD,0.47UH,4.7MO,17.5A,5.6X5.2X2.4MM
376S00303	376S00012	ALT_CMN	ALL	<RDAR://43066124>	TI PRIMARY, DIODES ALT MOSFET DUAL-N,30V,15A,18/5.5MOHM,3X3DFN
376S00282	376S1128	ALT_CMN	ALL	<RDAR://43067686>	DIODES PRIMARY, ON SEMI ALT XSTR,FET,N-CH,30V,300MA,3P DFN
376S00224	376S1128	ALT_CMN	ALL	<RDAR://44187449>	DIODES PRIMARY, NEXPERIA ALT XSTR,FET,N-CH,30V,300MA,3P DFN
128S0578	128S0351	ALT_CMN	ALL	<RDAR://43396612>	SANYO PRIMARY, KEMET ALT CAP,TANT,POLY,330UF,2V,13MOHM,B2
128S00050	128S0351	ALT_CMN	ALL	<RDAR://43396612>	SANYO PRIMARY, NEC ALT CAP,TANT,POLY,330UF,2V,13MOHM,B2
152S00841	152S00238	ALT_CMN	ALL	<RDAR://44152899>	CYNTEC PRIMARY, CHILISIN ALT IND,MLD,0.56UH,7.2MO,16A,5.4X5.2X2.4MM
152S00765	152S00239	ALT_CMN	ALL	<RDAR://44155454>	CYNTEC PRIMARY, CHILISIN ALT IND,MLD,0.68UH,9.0MO,14.5A,5.4X5.2X2.4MM
138S00047	138S00073	ALT_CMN	ALL	<RDAR://44159571>	MURATA PRIMARY, TAIYO ALT CAP,X6S,10UF,20%,6.3V,HZTL,MUR,0402
131S00308	131S00037	ALT_CMN	ALL	<RDAR://44160572>	MURATA PRIMARY, YAGEO ALT CAP,CER,C0G,3300PF,5%,50V,0603
107S00087	107S00029	ALT_CMN	ALL	<RDAR://44206108>	TFT PRIMARY, YAGEO ALT RES,MTL FLM,0.005OHM,1%,4-L,0612,BLK
128S00026	128S00011	ALT_CMN	ALL	<RDAR://44202728>	KEMET PRIMARY, NEC ALT CAP,TANT,POLY,6.8UF,20%,35V,90MOHM,B1.2
128S00087	128S00011	ALT_CMN	ALL	<RDAR://44202728>	KEMET PRIMARY, PANASONIC ALT CAP,TANT,POLY,6.8UF,20%,35V,90MOHM,B1.2
128S00031	128S00011	ALT_CMN	ALL	<RDAR://44202728>	KEMET PRIMARY, ROHM ALT CAP,TANT,POLY,6.8UF,20%,35V,90MOHM,B1.2
107S00076	107S00044	ALT_CMN	ALL	<RDAR://44205141>	CYNTEC PRIMARY, YAGEO ALT RES,MF,0.010 OHM,0.5%,0612-4T,BLK
152S00368	152S00269	ALT_CMN	ALL	<RDAR://44243170>	CYNTEC PRIMARY, TOKIN ALT IND,MLD,1.0UH,20%,14A,10.7MO,6.6X6.6X2.4
152S00800	152S00268	ALT_CMN	ALL	<RDAR://44244361>	CYNTEC PRIMARY, NEC-TOKIN ALT IND,MLD,1.5UH,20%,12.5A,17.0MO,7.0X6.6MM
138S00084	138S00060	ALT_CMN	ALL	<RDAR://44320030>	138S00060 PRIMARY, 138S00084 ALT CAP,CER,47UF,20%,6.3V,X5R,0603
138S0789	138S0941	ALT_CMN	ALL	<RDAR://44323944>	MURATA PRIMARY, SAMSUNG ALT CAP,CER,2.2UF,20%,25V,X5R,HRZTL,0402,MUR
138S00104	138S0978	ALT_CMN	ALL	<RDAR://44325053>	MURATA PRIMARY, TAIYO ALT CAP,CER,2.2UF,20%,25V,X5R,0402,H=0.55MM
152S00383	152S00198	ALT_CMN	ALL	<RDAR://44325096>	CYNTEC PRIMARY, VISHAY ALT IND,MLD,2.7UH,19.6MO,12.5A,10.9X10X2.4MM
152S00680	152S00198	ALT_CMN	ALL	<RDAR://44325096>	CYNTEC PRIMARY, CHILISIN ALT IND,MLD,2.7UH,19.6MO,12.5A,10.9X10X2.4MM
138S0863	138S0853	ALT_CMN	ALL	<RDAR://44326703>	MURATA PRIMARY, TAIYO YUDEN ALT CAP,CER,15UF,20%,2V,X6S,0402,MURATA
138S00229	138S00107	ALT_CMN	ALL	<RDAR://44362824>	MURATA PRIMARY, KYOCERA ALT CAP,X5R,20UF,20%,10V,0402,H=0.8MM
138S0786	138S0705	ALT_CMN	ALL	<RDAR://44321492>	MURATA PRIMARY, SAMSUNG ALT CAP,CER,X5R,10UF,20%,10V,0402
138S0746	138S0705	ALT_CMN	ALL	<RDAR://44321492>	MURATA PRIMARY, TAIYO YUDEN ALT CAP,CER,X5R,10UF,20%,10V,0402
107S0249	107S0251	ALT_CMN	ALL	<RDAR://44364242>	CYNTEC PRIMARY,TFT ALT RES,SENSE,0.002OHM,1W,4-TERM,1%,0612,CYN
132S00012	132S0401	ALT_CMN	ALL	<RDAR://44325754>	TAIYO YUDEN PRIMARY,MURATA ALT CAP,CER,0.22UF,10%,25V,X7R,0402
138S00077	138S00035	ALT_CMN	ALL	<RDAR://44363047>	MURATA PRIMARY,TAIYO ALT CAP,CER,20UF,20%,2.5V,X6S,HRZTL,0402
138S00093	138S00035	ALT_CMN	ALL	<RDAR://44363047>	MURATA PRIMARY,KYOCERA ALT CAP,CER,20UF,20%,2.5V,X6S,HRZTL,0402
132S00064	132S0409	ALT_CMN	ALL	<RDAR://44325817>	TAIYO PRIMARY,MURATA ALT CAP,CER,X6S,0.1UF,20%,16V,0201
371S00220	371S00181	ALT_CMN	ALL	<RDAR://44622207>	DIODES PRIMARY,ON SEMI ALT DIODE,ZENER,5.6V,250MW,DFN0201
152S01023	152S00384	ALT_CMN	ALL	<RDAR://44622443>	MURATA PRIMARY, CHILISIN ALT IND,MLD,0.48UH,20%,23MOHM,6.7A,3225
138S00015	138S0777	ALT_CMN	ALL	<RDAR://44658436>	MURATA PRIMARY, TAIYO YUDEN AND SAMSUNG ALT CAP,CER,10UF,20%,16V,X6S,0603
103S0321	103S0276	ALT_CMN	ALL	<RDAR://44660673>	CYNTEC PRIMARY, YAGEO ALT RES,MF,4.42K OHM,1/20W,0.1%,0201,SMD
107S00139	107S0178	ALT_CMN	ALL	<RDAR://44693560>	MURATA PRIMARY, PANASONIC ALT THERMISTOR,NTC,220K OHM,4485K,3%,0201
353S02017	353S00525	ALT_CMN	ALL	<RDAR://52858660>	VISHAY PRIMARY, AOS ALT IC,SIC532,DR MOS,IMVP-8,30A,PQFN22,45X35
353S02065	353S00525	ALT_CMN	ALL	<RDAR://52858660>	VISHAY, LOWER COST AS ALT IC,SIC532,DR MOS,IMVP-8,30A,PQFN22,45X35
353S02064	353S00525	ALT_CMN	ALL	<RDAR://52858660>	VISHAY, LOWER COST AS ALT IC,SIC532,DR MOS,IMVP-8,30A,PQFN22,45X35
353S02192	353S00519	ALT_CMN	ALL	<RDAR://52921454>	VISHAY, LOWER COST AS ALT IC,SIC621,DR MOS,IMVP-8,60A,PQFN31,5X5MM
128S0436	128S0445	ALT_CMN	ALL	<RDAR://54142831>	PANASONIC PRIMARY,KEMET AS ALT CAP, TANT,POLY,33UF,20%,16V,40MOHM,D12
128S00109	128S00041	ALT_CMN	ALL		JAPAN ONLY PRIMARY, DUAL FLOW AS ALT CAP,AL,POLY,220UF,20%,2V,2.5MOHM,6A,D1

SYSTEM EE

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:	
376S1080	376S0820	ALT_CMN	ALL	<RDAR://42561814>	ON SEMI PRIMARY, DIODES ALT XSTR,FET,DUAL COMP,20V,220/200MA,SOT963
353S01505	353S01389	ALT_CMN	ALL	<RDAR://42641759>	TI PRIMARY, ON SEMI ALT IC INA210A,CURRENT SENSE,200V/V,QFN10
353S01041	353S01042	ALT_CMN	ALL	<RDAR://42672116>	TI PRIMARY, ST MICRO ALT IC,REF3312,V-REF,1.25V,0.15%,5MA,QFN8
376S00146	376S1061	ALT_CMN	ALL	<RDAR://42560905>	DIODES PRIMARY, ROHM ALT XSTR,FET,P-CH,30V,400MA,ENH MODE,SOT883
371S00190	371S00085	ALT_CMN	ALL	<RDAR://42639806>	ON SEMI PRIMARY, DIODES ALT DIODE SCHOTTKY,40V,2A,LOW VF,0603
353S00750	353S00877	ALT_CMN	ALL	<RDAR://42677730>	ON SEMI PRIMARY, TI ALT IC,NCP160,LDO REG,1.8V,0.25A,XDFN5
353S01506	353S01404	ALT_CMN	ALL	<RDAR://42641429>	TI PRIMARY, ON SEMI ALT IC,INA214A,CURRENT SENSE,100V/V,QFN10
335S00213	335S0888	ALT_CMN	ALL	<RDAR://43152541>	ST PRIMARY, ON SEMI ALT IC,SERIAL I2C EEPROM,128KBIT,8P,MLP8
353S00636	353S4037	ALT_CMN	ALL	<RDAR://42639994>	DIODES PRIMARY, NXP ALT IC,PI3USB102E,DIFF.USB SW,SPDT,TQFN-10
377S00060	377S0183	ALT_CMN	ALL	<RDAR://56761205>	INFINEON PRIMARY, STM ALT TVS,DIODE,BIDIR,1LINE,22V,11.5PF,0201
353S00878	353S00599	ALT_CMN	ALL	<RDAR://43151782>	ON SEMI PRIMARY, TI ALT IC,NCP160,LDO REG,3.0V,0.25A,DFN4
311S00138	311S0436	ALT_CMN	ALL	<RDAR://43152801>	TI PRIMARY, NXP ALT IC,74AVC4T245,4BIT VOLT TRANSLATOR,QFP16
311S00060	311S0273	ALT_CMN	ALL	<RDAR://43153429>	PHILLIPS PRIMARY, DIODES ALT IC,74LVC1G32,SNGL 2-INPT OR GATE,SOT891
353S4376	353S3384	ALT_CMN	ALL	<RDAR://43953240>	TI PRIMARY, ON SEMI ALT IC,LMV331,COMP,OPEN COL,2.7V,60UA,SC70
311S0426	311S00007	ALT_CMN	ALL	<RDAR://43955202>	DIODES PRIMARY, NXP ALT IC,74LVC1G07,SNGL BFR W/OD OUT,DFN,6P
311S00192	311S00191	ALT_CMN	ALL	<RDAR://43955903>	DIODES PRIMARY, NEXPERIA ALT IC,74LVC1G07,SNGL BFR W/OD OUT,DFN,6P
107S0211	107S0210	ALT_CMN	ALL	<RDAR://44198222>	ROHM PRIMARY, VISHAY ALT RES,MTL,.005 OHM,1%,1W,1206
335S00270	335S00203	ALT_CMN	ALL	<RDAR://43152675>	MACRONIX PRIMARY, ADESTO ALT IC,FLASH,SERIAL,SPI,4MX8,1.8V,4X3MM,DFN8
138S00086	138S0884	ALT_CMN	ALL	<RDAR://44320169>	MURATA PRIMARY, TAIYO ALT CAP,CER,X5R,20UF,20%,6.3V,0402,H=0.7MM
138S0714	138S0713	ALT_CMN	ALL	<RDAR://44325434>	MURATA PRIMARY, SAMSUNG ALT CAP,CER,10UF,6.3V,X5R,0.7MM,0402,SAMSUNG
138S0715	138S0732	ALT_CMN	ALL	<RDAR://44325464>	MURATA PRIMARY, SAMSUNG ALT CAP,CER,X5R,1UF,10%,10V,0402,MURATA
138S00111	138S00036	ALT_CMN	ALL	<RDAR://44325659>	MURATA PRIMARY, TAIYO YUDEN ALT CAP,CER,20UF,20%,2.5V,X6S,LOW NOISE,0402
132S00176	132S0640	ALT_CMN	ALL	<RDAR://44325857>	MURATA PRIMARY, YAGEO ALT CAP,CER,0.047UH,10%,50V,X7R,0402
311S0596	311S0593	ALT_CMN	ALL	<RDAR://44345963>	NXP PRIMARY, TI ALT IC,VOLT-LEVEL TRANS,W/CONFIG GATE,SOT886
311S00156	311S00129	ALT_CMN	ALL	<RDAR://44347874>	TI PRIMARY, NEXPERIA ALT IC,XCVR,BUS,4-BIT,DL SPPLY,3-OUT,UQFN16
311S00013	311S0508	ALT_CMN	ALL	<RDAR://44348000>	NEXPERIA PRIMARY, DIODES ALT IC,74AUP1G07,SNGL BUFFER W/OD OUT,SOT891
152S00434	152S1829	ALT_CMN	ALL	<RDAR://44363291>	TDK PRIMARY, CYNTEC ALT IND,PWR,MULT,1UH,20%,0.4A,0.636 OHM,0402
155S00166	155S0391	ALT_CMN	ALL	<RDAR://44364823>	MURATA PRIMARY, TDK ALT FERR BD,220 OHM,25%,700MA,0.28 DCR,0402
155S0660	155S0513	ALT_CMN	ALL	<RDAR://44364960>	TDK PRIMARY, MURATA ALT FERR BD,22 OHM,25%,1A,55 MOHM DCR,0201
155S00018	155S0664	ALT_CMN	ALL	<RDAR://44365105>	MURATA PRIMARY, TAIYO ALT FERR BD,80 OHM,25%,500MA,0.18 DCR,0201
155S00007	155S0667	ALT_CMN	ALL	<RDAR://44365462>	PANASONIC PRIMARY, TAIYO ALT FLTR,COMMON MODE,90 OHM,100MA,0202
311S0562	311S0372	ALT_CMN	ALL	<RDAR://43153066>	NXP PRIMARY, TI ALT IC,VOLT-LEVEL TRANS,W/CONFIG GATE,SOT891
138S00117	138S00071	ALT_CMN	ALL	<RDAR://44325102>	MURATA PRIMARY, KYOCERA ALT CAP,CER,X5R,4UF,20%,6.3V,0201,T=0.55MM
155S0914	155S0897	ALT_CMN	ALL	<RDAR://44391467>	TDK PRIMARY, PANASONIC ALT FLTR,NOISE,2.4GHZ,0.1A,0.65X0.5MM,SMD4
155S00190	155S0897	ALT_CMN	ALL	<RDAR://44391467>	TDK PRIMARY, TAIYO YUDEN ALT FLTR,NOISE,2.4GHZ,0.1A,0.65X0.5MM,SMD4
197S00053	197S00050	ALT_CMN	ALL	<RDAR://44391613>	TXC PRIMARY, KYOCERA ALT XTAL,24MHZ,10PPM,8PF,40 OHM,2520
197S00054	197S00050	ALT_CMN	ALL	<RDAR://44391613>	TXC PRIMARY, NDK ALT XTAL,24MHZ,10PPM,8PF,40 OHM,2520
377S00079	377S00077	ALT_CMN	ALL	<RDAR://44391888>	ST MICRO PRIMARY, DIODES ALT TVS,DIODE,UNIDIR,22V,35A,1.6X1.0
377S0077	377S0183	ALT_CMN	ALL	<RDAR://44392851>	INFINEON PRIMARY, ST ALT SUPPR,TRANS,BIDIR,5.5V,6.2PF,0201
311S0271	311S00008	ALT_CMN	ALL	<RDAR://43955521>	DIODES PRIMARY, NXP ALT IC,74LVC1G08,SNGL 2-INPT AND GATE,DFN,6P
155S0694	155S0387	ALT_CMN	ALL	<RDAR://44363691>	TDK PRIMARY, MURATA ALT FERRITE BEAD,470OHM,0.1A,1.5MOHM DCR,060
138S1103	138S0719	ALT_CMN	ALL	<RDAR://44325533>	MURATA PRIMARY, TY ALT CAP,CER,X5R,4.7UF,20%,10V,0402,MURATA
138S0660	138S0684	ALT_CMN	ALL	<RDAR://44325201>	MURATA PRIMARY, TAIYO ALT CAP,CER,10UF,20%,10V,X5R,0603,MURATA
311S00104	311S00091	ALT_CMN	ALL	<RDAR://44346512>	ON SEMI PRIMARY, TI ALT IC,NLSX4402,2BIT DUAL LEVEL XLATOR,DFN8
107S00016	107S0118	ALT_CMN	ALL	<RDAR://44358912>	VISHAY PRIMARY, ROHM ALT RES,FILM,0.001 OHM,1W,1%,1206
138S0914	138S00109	ALT_CMN	ALL	<RDAR://44363107>	KYOCERA PRIMARY, MURATA ALT CAP,X5R,2.2UF,20%,6.3V,0201,0.35MM,KYO
138S00049	138S0831	ALT_CMN	ALL	<RDAR://44621837>	MURATA PRIMARY, KYOCERA ALT CAP,CER,X5R,2.2UF,20%,6.3V,0201
103S00250	103S00249	ALT_CMN	ALL	<RDAR://44623255>	MURATA PRIMARY, YAGEO ALT RES,TK,18.2 KOHM,0.1%,TOPPM,1/20W,0201
103S00248	103S00247	ALT_CMN	ALL	<RDAR://44623345>	CYNTEC PRIMARY, YAGEO ALT RES,TK,8.06 KOHM,0.1%,50PPM,1/20W,0201
376S1137	376S00019	ALT_CMN	ALL	<RDAR://44620634>	DIODES PRIMARY, VISHAY ALT XSTR,FET,N-CH,20V,4.5A,40MOHM,BGA4
138S0750	138S00097	ALT_CMN	ALL	<RDAR://44622531>	TAYIO YUDEN PRIMARY, MURATA ALT CAP,CER,4.7UF,20%,6.3V,X6S,TY,0402
353S01346	353S01320	ALT_CMN	ALL	<RDAR://43953321>	NXP PRIMARY, ONSEMI ALT IC,NX3DV642,3-LANE HS SW,TPDT,XQFN24
197S00048	197S00036	ALT_CMN	ALL	<RDAR://44391564>	TXC PRIMARY, KYOCERA ALT XTAL,25MHZ,25PPM,20PF,50OHM,500UW,2016
376S00332	376S00074	ALT_CMN	ALL	<RDAR://44620855>	TOSHIBA PRIMARY, NEXPERIA ALT MOSFET,DUAL N-CH30V,100MA,6P SOT563
740S00028	740S0118	ALT_CMN	ALL	<RDAR://44393058>	POLYTRONICS PRIMARY, BUSSMAN ALT FUSE,12A,32V,1206,FAST ACTING,SMD
138S00056	138S1100	ALT_CMN	ALL	<RDAR://44319895>	MURATA PRIMARY, TAIYO ALT CAP,CER,3-TERM,9.1UF,20%,4V,H0.7MM,0402
155S0665	155S00232	ALT_CMN	ALL	<RDAR://44363532>	TDK PRIMARY, MURATA ALT FERR BD,120 OHMZ,25%,480MA,0.21 OHM,0201
197S00120	197S00118	ALT_CMN	ALL	<RDAR://44391668>	TXC PRIMARY, EPSON ALT XTAL,24MHZ,30PPM,9.5PF,60 OHM MAX,1612
311S00133	311S00130	ALT_CMN	ALL	<RDAR://44396487>	NXP PRIMARY, DIODES ALT IC,74AVC1T45,XCVR,DL SUPPLY,1BIT,SON-6
107S00086	107S00056	ALT_CMN	ALL	<RDAR://44358149>	CYNTEC PRIMARY, TFT ALT RES,SENSE,0.003 OHM,1%,1/2W,0306-4T
311S00121	311S0398	ALT_CMN	ALL	<RDAR://43152868>	NXP PRIMARY, DIODES ALT IC,74AUP1G08,2-INPUT AND GATE,SOT891
107S00100	107S00057	ALT_CMN	ALL	<RDAR://44358232>	CYNTEC PRIMARY, TFT ALT RES,MF,0.002 OHM,1%,1/2W,0306-4T
107S00033	107S00034	ALT_CMN	ALL	<RDAR://44349741>	CYNTEC PRIMARY, TFT ALT RES,MF,0.025 OHM,1%,0612-4T,BLK

SYSTEM EE

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:	
155S00067	155S00401	ALT_CMN	ALL	<RDAR://44653410>	MURATA PRIMARY, TDK ALT FERR BD,240 OHM,25%,350MA,0.38 DCR,0201
138S0706	138S0739	ALT_CMN	ALL	<RDAR://44621676>	SAMSUNG PRIMARY, MURATA ALT CAP,CER,X5R,1UF,20%,10V,0201,SAMSUNG
138S0945	138S0739	ALT_CMN	ALL	<RDAR://44621676>	SAMSUNG PRIMARY, KYOCERA ALT CAP,CER,X5R,1UF,20%,10V,0201,SAMSUNG
152S00864	152S00851	ALT_CMN	ALL	<RDAR://44652690>	TDK PRIMARY, CYNTEC ALT IND,MULT,1.2UH,20%,120MA,1.17 OHM,0402
138S00181	138S0835	ALT_CMN	ALL	<RDAR://44621938>	MURATA PRIMARY, SAMSUNG ALT CAP,CER,3-TERM,4.3UF,20%,4V,0402
371S00185	371S00193	ALT_CMN	ALL	<RDAR://44610883>	ROHM PRIMARY, TOSHIBA ALT DIODE,SCHOTTKY,30V,100MA,0201
311S00196	311S00195	ALT_CMN	ALL	<RDAR://46735900>	DIODES PRIMARY, NEXPERIA ALT IC,74LVC1G08,SNGL 2-INPT AND G,DFN1410-6
377S00123	377S00031	ALT_CMN	ALL	<RDAR://44391823>	ON SEMI PRIMARY, SEMTECH ALT DIODE,TVS,5.5V,7.3VBR,0.2PF,0201
376S00292	376S00294	ALT_CMN	ALL	<RDAR://43910260>	DIODES PRIMARY, NEXPERIA ALT NFET,20V,1.35A,0.18 OHM,DFN3
107S00346	107S00116	ALT_CMN	ALL	<RDAR://46676880>	CYNTEC PRIMARY, YAGEO ALT RES,MF,0.10 OHM,1%,0.5W,150PPM,0603-4T
311S0525	311S0532	ALT_CMN	ALL	<RDAR://48407305>	TI PRIMARY, NXP ALT IC,SNGL 3-STATE BUFFER,6-PIN,DFN
116S00007	116S00006	ALT_CMN	ALL	<RDAR://48412393>	YAGEO PRIMARY, VISHAY ALT RES,MTL FILM,0 OHM,TIGHT TOL,3A,0402
107S0284	107S00021	ALT_CMN	ALL	<RDAR://48411982>	CYNTEC PRIMARY, TFT ALT RES,SENSE,0.020 OHM,1%,1/3W,0306-4T
107S0276	107S00020	ALT_CMN	ALL	<RDAR://48407669>	TAGEO PRIMARY, TFT ALT RES,SENSE,0.010 OHM,1/3W,4-TERM,1%,0306
132S00229	132S00010	ALT_CMN	ALL	<RDAR://53023881>	MURATA PRIMARY, TAIYO ALT CAP,CER,X5R,0.1UF,10%,35V,0201
377S00166	377S00106	ALT_CMN	ALL	<RDAR://53024719>	ONSIME PRIMARY, SEMTECH ALT TVS,DIODE,1VRWM,2.3VBR,0.2PF,0201
107S00101	107S00005	ALT_CMN	ALL	<RDAR://53024863>	YAGEO PRIMARY, CYNTEC ALT RES,SENSE,0.005OHM,1/3W,1%,100PPM,0306
138S0852	138S0818	ALT_CMN	ALL	<RDAR://53109945>	MURATA PRIMARY, SAMSUNG ALT CAP;CER,0.68UF,5%,6.3V,X6S,0402
152S00812	152S1701	ALT_CMN	ALL	<RDAR://53229916>	CYNTEC PRIMARY, CHILISIN ALT IND;PWR,10UH,20%,1.6A,150MOHM,4040X1.8MM
138S00087	138S1086	ALT_CMN	ALL	<RDAR://53229099>	MURATA PRIMARY, TAIYO ALT CAP,X5R,2.2UF,10%,50V,0603
353S01615	353S4160	ALT_CMN	ALL	<RDAR://53453766>	TI-MAINE PRIMARY, TI-AIZU ALT IC,LP8548B1-04,DC/DC CVTR,BOOST,QFN24
107S00297	107S00344	ALT_CMN	ALL	<RDAR://56910244>	MURATA PRIMARY, MURATA ALT THERMISTOR,NTC,100KOHM,1%,0.10MA,0201

H9M

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:	
339S00387	339S00386	ALT_CMN	ALL	<RDAR://41988491>	MICRON SCK PRIMARY, HYNIX SCK ALT POP,GIBRALTAR+1GB,20NM,M,DEV,SCK,CSP1122
339S00390	339S00386	ALT_CMN	ALL	<RDAR://41988491>	MICRON SCK PRIMARY, MICRON ATK ALT POP,GIBRALTAR+1GB,20NM,M,DEV,SCK,CSP1122
339S00391	339S00386	ALT_CMN	ALL	<RDAR://41988491>	MICRON SCK PRIMARY, HYNIX ATK ALT POP,GIBRALTAR+1GB,20NM,M,DEV,SCK,CSP1122
339S00389	339S00388	ALT_CMN	ALL	<RDAR://41988491>	MICRON SCK PRIMARY, HYNIX SCK ALT POP,GIBRALTAR+2GB,20NM,M,DEV,SCK,CSP1122
339S00392	339S00388	ALT_CMN	ALL	<RDAR://41988491>	MICRON SCK PRIMARY, MICRON ATK ALT POP,GIBRALTAR+2GB,20NM,M,DEV,SCK,CSP1122
339S00393	339S00388	ALT_CMN	ALL	<RDAR://41988491>	MICRON SCK PRIMARY, HYNIX ATK ALT POP,GIBRALTAR+2GB,20NM,M,DEV,SCK,CSP1122
339S00602	339S00601	ALT_CMN	ALL	<RDAR://41988491>	MICRON SCK PRIMARY, HYNIX SCK ALT POP,GIBRALTAR_L+1GB,16NM,M,B0,SCK,C1122
339S00603	339S00601	ALT_CMN	ALL	<RDAR://41988491>	MICRON SCK PRIMARY, MICRON ATK ALT POP,GIBRALTAR_L+1GB,16NM,M,B0,SCK,C1122
339S00604	339S00601	ALT_CMN	ALL	<RDAR://41988491>	MICRON SCK PRIMARY, HYNIX ATK ALT POP,GIBRALTAR_L+1GB,16NM,M,B0,SCK,C1122
339S00606	339S00605	ALT_CMN	ALL	<RDAR://41988491>	MICRON SCK PRIMARY, HYNIX SCK ALT POP,GIBRALTAR_L+2GB,16NM,M,B0,SCK,C1122
339S00607	339S00605	ALT_CMN	ALL	<RDAR://41988491>	MICRON SCK PRIMARY, MICRON ATK ALT POP,GIBRALTAR_L+2GB,16NM,M,B0,SCK,C1122
339S00608	339S00605	ALT_CMN	ALL	<RDAR://41988491>	MICRON SCK PRIMARY, HYNIX ATK ALT POP,GIBRALTAR_L+2GB,16NM,M,B0,SCK,C1122

BACKLIGHT

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:	
138S0738	138S1101	ALT_CMN	ALL	<RDAR://42360480>	MURATA PRIMARY, SAMSUNG ALT CAP,CER,2.2UF,10%,100V,X5R,1206,T:0.95MM
138S0846	138S0811	ALT_CMN	ALL	<RDAR://42360480>	MURATA PRIMARY, SAMSUNG ALT CAP,CER,4.7UF,10%,25V,X6S,0603
376S1053	376S0604	ALT_CMN	ALL	<RDAR://42360480>	FAIRCHILD PRIMARY, DIODES ALT XSTR,FET,P-CH,20V,4.5A,0.043 OHM,SS0T6
152S00359	152S00253	ALT_CMN	ALL	<RDAR://42360480>	CYNTEC PRIMARY, CHILISIN ALT IND,PWR,MLD,15UH,20%,1.9A,240MO,7368X24M
740S00041	740S0159	ALT_CMN	ALL	<RDAR://42360480>	LITTLEFUSE PRIMARY, BOURNS ALT FUSE,HIGH INRUSH,32V,3A,0603
371S00077	371S00180	ALT_CMN	ALL	<RDAR://42360480>	DIOES PRIMARY, NXP ALT DIODE,SCHOTTKY,100V,2A,SOD123
376S1106	376S0678	ALT_CMN	ALL	<RDAR://42360480>	VISHAY PRIMARY, FAIRCHILD ALT XSTR,MSFT,N-CH,75V,16A,0.046 OHM
371S00217	371S00079	ALT_CMN	ALL	<RDAR://53230880>	NXP PRIMARY, ROHM ALT DIODE,SCHOTKY,60V,1A,SOD123

WIFI

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:	
339S00632	339S00616	ALT_CMN	ALL	<RDAR://46651871>	MURATA PRIMARY, USI ALT MODULE,WIFI/BT,SAPPORO,ES3.1,M,LGA451

AUDIO

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:	
128S00009	128S00093	ALT_CMN	ALL	<RDAR://53110517>	TOKIN PRIMARY, KEMET ALT CAP TANT POLY,33UF,20%,16V,55MO,1.6A,B12
128S00103	128S00093	ALT_CMN	ALL	<RDAR://53110517>	TOKIN PRIMARY, SEMCO ALT CAP TANT POLY,33UF,20%,16V,55MO,1.6A,B12
155S00034	155S0706	ALT_CMN	ALL	<RDAR://53110248>	TAIYO PRIMARY, MURATA ALT FERR BD,120OHM,25%,1.3A,0.07DCR,0402

SYNC_DATE=

SYNC_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)		
1,2,3,4,5,6,7,8,9,10,11,12,13,14	120	120	100	1	2

LAYERS	MINIMUM CU WIDTH RATIO	MINIMUM CU SPACING RATIO	MINIMUM TO DEFAULT RATIO
SIGNAL 1/3 OZ, PLATED TO 0.031 MM — TOP,BOTTOM	2.0	2.36842	1.2
GND_PLANE 1/3 OZ, PLATED TO 0.020 MM — ISL2,ISL13	2.25	2.5	1.2
SIGNAL 1/3 OZ, PLATED TO 0.030 MM — ISL3,ISL12	2.0	2.25806	1.2
GND_PLANE 1/2 OZ, 0.016 MM — ISL4,ISL11	2.5	2.5	1.2
SIGNAL 1/2 OZ, 0.016 MM — ISL5,ISL10	2.5	2.5	1.2
GND_PLANE 1/2 OZ, 0.016 MM — ISL6,ISL9	2.5	2.5	1.2
POWER_PLANE 1 OZ, 0.031 MM — ISL7,ISL8	2.0	2.25806	1.2

MANUAL EDITS AFTER AUTOGENERATION:
OVERWROTE THROUGH VIA, BB VIA, AND UVIA SPACINGS TO DEFAULT VALUE, THE AUTOGEN ONES ARE TOO HIGH
UPDATE SAME NET SPACING FOR VIA TO HOLE, UVIA TO SMD PIN, FOR DEFAULT AND MIN, TO -1
CHANGED LINE TO SMD SAME NET SPACING FROM 0.1 TO 0.07 ON TOP/BOTTOM LAYERS
CHANGED MAX NECK LENGTH FOR THE DEFAULT PHYSICAL RULE TO 20MM
CHANGED UVIA TO LINE SAME NET SPACING TO 0.05
CHANGED BB VIA TO LINE, ABD BB VIA TO BB VIA SAME NET SPACING TO 0.0
CHANGED BB VIA TO UVIA SAME NET SPACING TO -1
CHANGED LINE TO SHAPE SAME NET SPACING TO 0.05
SET BB VIA STAGGER IN PHYSICAL RULES TO 0.2500 FOR MIN, 0.275 FOR ALL OTHER, FOR LAYERS 3 AND 12
COPIED THE RULES FROM 85 OHM DIFF TO 85 MIN STAGGER
SET ENABLE DRC BY LAYER IN SAME NET SPACING TO TRUE FOR ALL LAYERS
KEEP DEFAULT AS DEFAULT, GENERIC DP AS GENERIC DP
REPLACING ALL SPACINGS EXCEPT LINE TO LINE WITH DEFAULT VALUES
DECREASED NECK GAP FOR DIFF PAIRS TO VALUE FOR GENERIC DP
REASSIGN SPACING AND PHYSICAL REGION RULES AND NET CLASS ASSIGNMENTS
SET UVIA TO SHAPE SAME NET SPACING TO 0.1MM ON TOP/BOTTOM

SYNC_MASTER= SYNC_DATE=

PAGE TITLE
BOARD RULES

Apple Inc.

DRAWING NUMBER 051-05309 SIZE D
REVISION 5.1.0
BRANCH
PAGE 500 OF 500
SHEET 98 OF 98