

8

7

6

5

4

3

2

1

1. ALL RESISTANCE VALUES ARE IN OHMS, 0.1 WATT +/- 5%.

2. ALL CAPACITANCE VALUES ARE IN MICROFARADS.

3. ALL CRYSTALS & OSCILLATOR VALUES ARE IN HERTZ.

REV

ECN

DESCRIPTION OF REVISION

CK APPD
DATE

<REV>

<ECN>

<ECO_DESCRIPTION>

<ECODATE>

SCHEM,MLB,D1

8/8/12

Page

Contents

Sync

1

Table of Contents

MASTER

2

System Block Diagram

MASTER

3

Power Block Diagram

K17_REF

4

Revision History

MASTER

5

BOM Configuration

MASTER

6

BOM Configuration

MASTER

7

Functional / ICT Test

MASTER

8

Power Aliases

MASTER

9

Signal Aliases

D1_MLB_TEST

10

CPU DMI/PEG/FDI/RSVD

J30_MLB

11

CPU CLOCK/MISC/JTAG

J30_MLB

12

CPU DDR3 INTERFACES

J30_MLB

13

CPU POWER

J30_MLB

14

CPU GROUNDS

J30_MLB

15

CPU DECOUPLING-I

MASTER

16

CPU DECOUPLING-II

MASTER

17

PCH SATA/PCIe/CLK/LPC/SPI

J13_MLB

18

PCH DMI/FDI/PM/Graphics

J13_MLB

19

PCH PCI/USB/TP/RSVD

J13_MLB

20

PCH GPIO/MISC/NCTF

J13_MLB

21

PCH POWER

J13_MLB

22

PCH GROUNDS

J13_MLB

23

PCH DECOUPLING

J13_MLB

24

CPU & PCH XDP

J30_MLB

25

Chipset Support

MASTER

26

USB HUB & MUX

J5_AMD

27

CPU Memory S3 Support

J5_MLB

28

DDR3 SDRAM Bank A (Rank 0)

J5_MLB

29

DDR3 SDRAM Bank B (Rank 0)

J5_MLB

30

DDR3 Termination

MASTER

31

DDR3/FRAMEBUF VREF MARGINING

J5_MLB

32

ALS/CAMERA CONNECTOR

MASTER

33

Thunderbolt Host (1 of 2)

J5_MLB_KEPLER

34

Thunderbolt Host (2 of 2)

J5_MLB_KEPLER

35

Thunderbolt Power Support

J5_MLB_KEPLER

36

RIO CONNECTORS

MASTER

37

SSD/HDD Connectors

MASTER

38

USB 3.0 CONNECTORS

J5_AMD

39

SMC

D1_SENSORS

40

SMC Support

D1_SENSORS

41

LPC+SPI Debug Connector

D1_SENSORS

42

SMBus Connections

MASTER

43

Power Sensor: Load Side

D1_SENSORS

44

Power Sensor: High Side

D1_SENSORS

45

Thermal Sensors

D1_SENSORS

Page

Contents

Sync

46

Fan Connectors

J5_MLB

47

KEYBOARD/TRACKPAD (1 OF 2)

D2_MLB_KEPLER

48

KEYBOARD/TRACKPAD (2 OF 2)

D2_MLB_KEPLER

49

DIGITAL ACCELEROMETER & GYRO

J5_MLB

50

SPI ROM

J13_MLB

51

AUDIO: CODEC/REGULATOR

D1_AUDIO

52

AUDIO: HEADPHONE FILTER

D1_AUDIO

53

AUDIO: SPEAKER AMP

D1_AUDIO

54

AUDIO: JACK

D1_AUDIO

55

AUDIO: JACK TRANSLATORS

D1_AUDIO

56

DC-In & Battery Connectors

MASTER

57

PBus Supply & Battery Charger

MASTER

58

System Agent Supply

MASTER

59

5V / 3.3V Power Supply

MASTER

60

1.5V DDR3 Supply

MASTER

61

CPU IMVP7 & AXG VCore Regulator

MASTER

62

CPU IMVP7 & AXG VCore Output

MASTER

63

CPUVCCIO (1.05V) Power Supply

MASTER

64

Misc Power Supplies

MASTER

65

Power FETs

MASTER

66

Power Control 1/ENABLE

MASTER

67

eDP Display Connector

D1_SENSORS

68

DDC Crossbar

MASTER

69

Thunderbolt Connector A

J5_MLB_KEPLER

70

Thunderbolt Connector B

J5_MLB_KEPLER

71

LCD Backlight Driver (LP8545)

J5_MLB_KEPLER

72

CPU Constraints

J5_MLB

73

Memory Constraints

J5_MLB

74

PCH Constraints 1

J5_MLB_KEPLER

75

PCH Constraints 2

J5_MLB

76

Thunderbolt Constraints

T29_CR

77

SMC Constraints

J5_MLB

78

Project Specific Constraints

J5_MLB

79

PCB Rule Definitions

J5_MLB

80

Power Sensors: Extended

D1_SENSORS

8

7

6

5

4

3

2

1

SCHEMATIC / PCB #'s

PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
051-9216	1	SCHEM,MLB,D1	SCH	CRITICAL	
820-3462	1	PCBP,MLB (NEW) ,D1	PCB	CRITICAL	

DRAWING

TITLE=MLB
ABBREV=ABBREV
LAST_MODIFIED=THU Aug 9 12:34:09 2012

DRAWING TITLE

SCHEM,MLB,D1

Apple Inc.

THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE INC. THE POSSESSOR 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
<SCH_NUM>

REVISION
<E4LABEL>

BRANCH
<BRANCH>

PAGE
1 OF 132

SHEET
1 OF 80

8

7

6

5

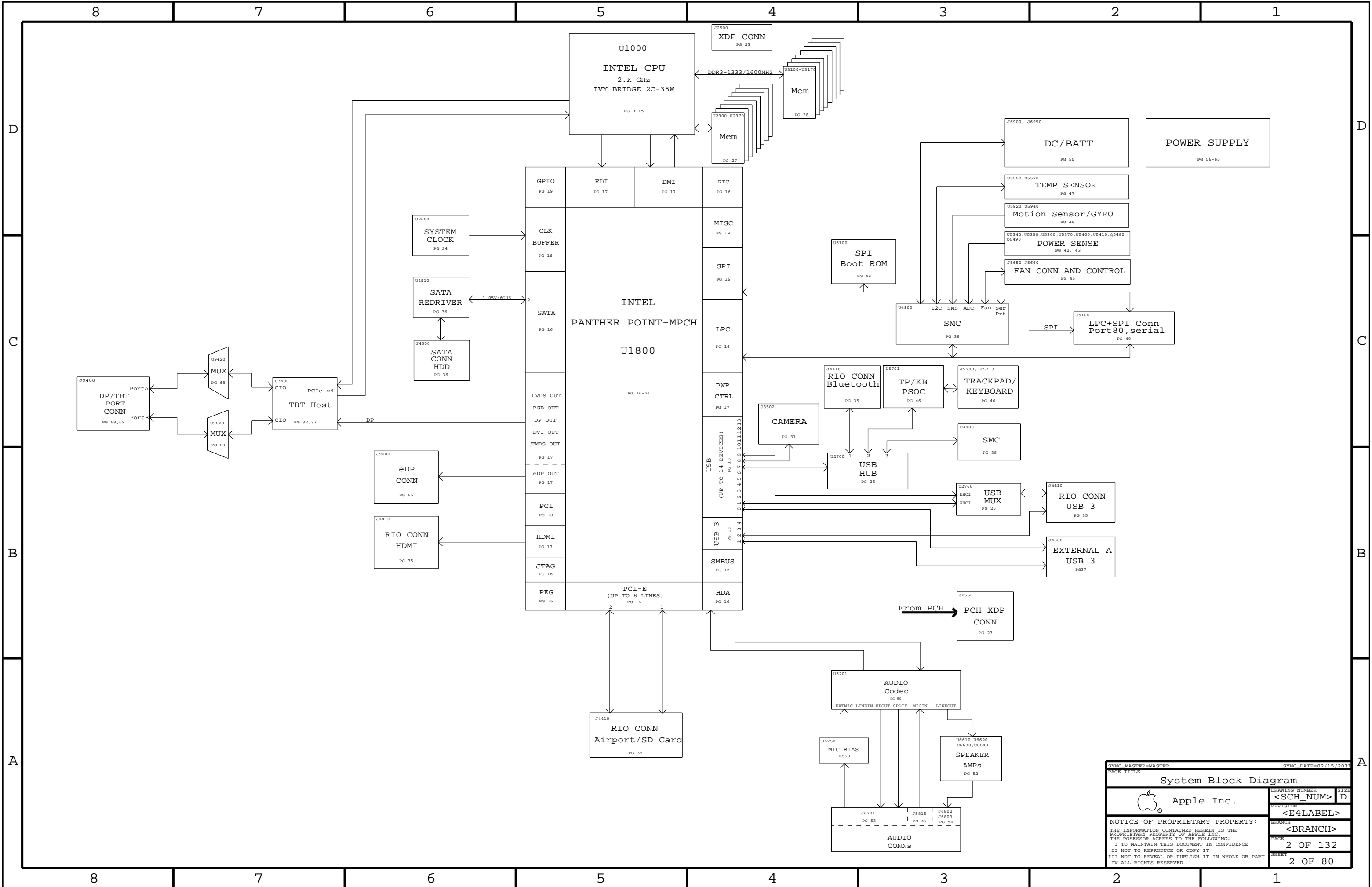
4

3

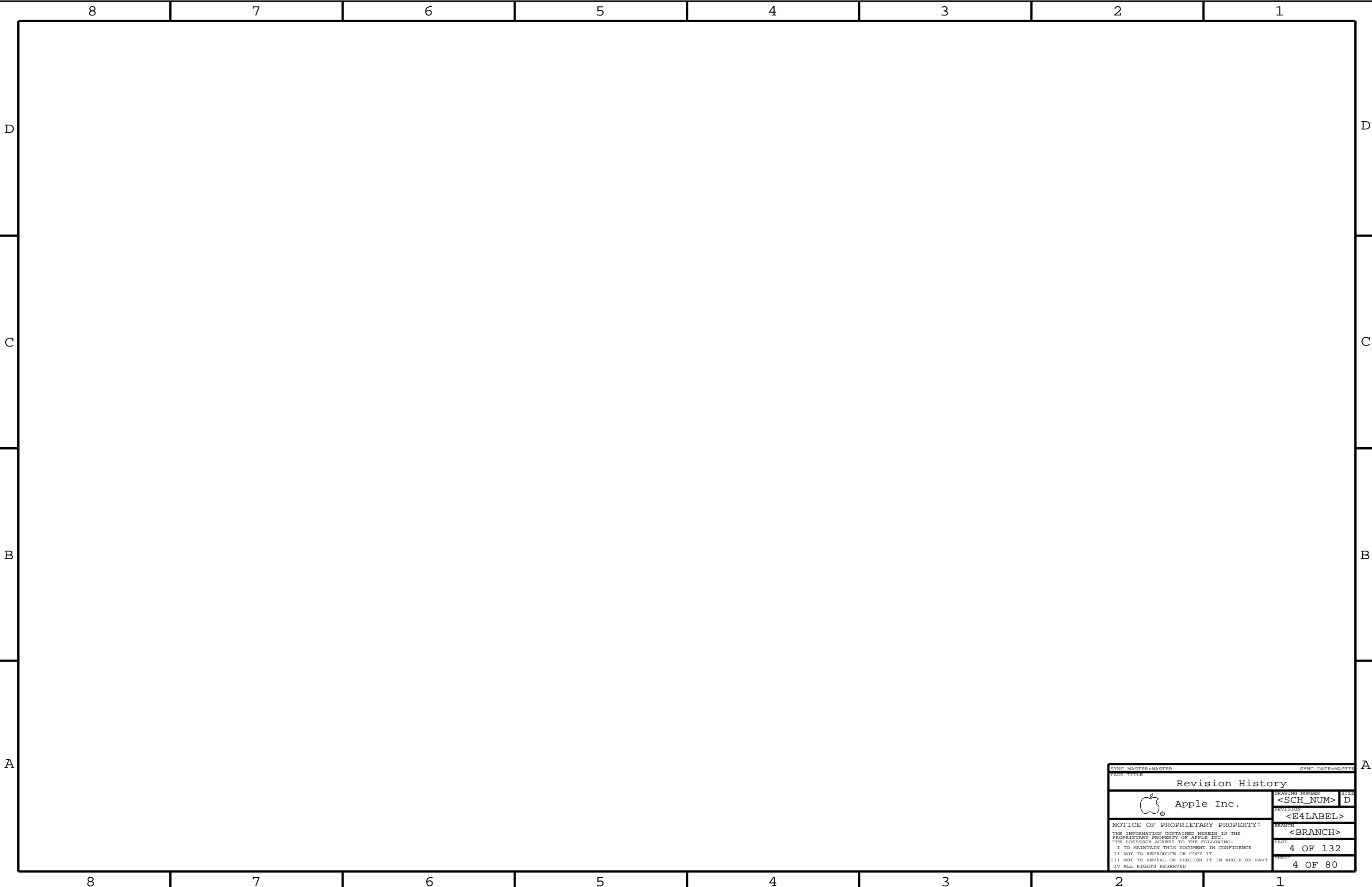
2

1

WWW.AliSaler.Com








SYNC MASTER=MASTER

SYNC DATE=MASTER

PAGE TITLE

Revision History

 Apple Inc.

NOTICE OF PROPRIETARY PROPERTY:
THE INFORMATION CONTAINED HEREIN IS THE
PROPRIETARY PROPERTY OF APPLE INC.
THE POSSESSOR 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

<SCH_NUM>

REVISION

<E4LABEL>

BRANCH

<BRANCH>

PAGE

4 OF 132

SHEET

4 OF 80

	8	7	6	5	4	3	2	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
D	BOM Variants			Bar Code Labels / EEE #'s			Alternate Parts																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
	<table><tr><th>BOM NUMBER</th><th>BOM NAME</th><th>BOM OPTIONS</th></tr><tr><td>085-4094</td><td>DEV BOM,MLB,D1</td><td>D1_DEVEL:PVB</td></tr><tr><td>607-9189</td><td>CMN PTS,PCBA,MLB,D1</td><td>D1_COMMON</td></tr><tr><td>639-3288</td><td>PCBA,2.5G,SS 6GB,MLB,D1</td><td>DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.5G,PCH_C1,EEEE:DWP2,RAM_6G_SAMSUNG_35NM_CH0_1600_S</td></tr><tr><td>639-3289</td><td>PCBA,2.9G,SS 6GB,MLB,D1</td><td>DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.9G,PCH_C1,EEEE:DWNV,RAM_6G_SAMSUNG_35NM_CH0_1600_S</td></tr><tr><td>639-3290</td><td>PCBA,2.5G,HYNIX 6GB,MLB,D1</td><td>DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.5G,PCH_C1,EEEE:DWP0,RAM_6G_HYNIX_CH0_1600_S</td></tr><tr><td>639-3291</td><td>PCBA,2.9G,HYNIX 6GB,MLB,D1</td><td>DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.9G,PCH_C1,EEEE:DWNW,RAM_6G_HYNIX_CH0_1600_S</td></tr><tr><td>639-3694</td><td>PCBA,2.5G,SS 8GB,MLB,D1</td><td>DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.5G,PCH_C1,EEEE:F16P,RAM_4G_SAMSUNG_35NM_1600_S</td></tr><tr><td>639-3695</td><td>PCBA,2.9G,SS 8GB,MLB,D1</td><td>DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.9G,PCH_C1,EEEE:F16M,RAM_4G_SAMSUNG_35NM_1600_S</td></tr><tr><td>639-3696</td><td>PCBA,2.9G,HYNIX 8GB,MLB,D1</td><td>DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.9G,PCH_C1,EEEE:F16N,RAM_4G_HYNIX_1600_S</td></tr><tr><td>639-3697</td><td>PCBA,2.5G,HYNIX 8GB,MLB,D1</td><td>DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.5G,PCH_C1,EEEE:F16V,RAM_4G_HYNIX_1600_S</td></tr><tr><td>639-3773</td><td>PCBA,2.5G,ELPIDA 6GB,MLB,D1</td><td>DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.5G,PCH_C1,EEEE:F26M,RAM_6G_ELPIDA_CH0_1600_S</td></tr><tr><td>639-3772</td><td>PCBA,2.9G,ELPIDA 6GB,MLB,D1</td><td>DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.9G,PCH_C1,EEEE:F26J,RAM_6G_ELPIDA_CH0_1600_S</td></tr><tr><td>639-3770</td><td>PCBA,2.5G,ELPIDA 8GB,MLB,D1</td><td>DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.5G,PCH_C1,EEEE:F26L,RAM_4G_ELPIDA_1600_S</td></tr><tr><td>639-3771</td><td>PCBA,2.9G,ELPIDA 8GB,MLB,D1</td><td>DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.9G,PCH_C1,EEEE:F26H,RAM_4G_ELPIDA_1600_S</td></tr><tr><td>639-3849</td><td>PCBA,2.5G,MICRON 6GB,MLB,D1</td><td>DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.5G,PCH_C1,EEEE:F2WT,RAM_6G_MICRON_CH0_1600_S</td></tr><tr><td>639-3848</td><td>PCBA,2.9G,MICRON 6GB,MLB,D1</td><td>DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.9G,PCH_C1,EEEE:F2WR,RAM_6G_MICRON_CH0_1600_S</td></tr><tr><td>639-3873</td><td>PCBA,2.6G,SS 6GB,MLB,D1</td><td>DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.6G,PCH_C1,EEEE:F33H,RAM_6G_SAMSUNG_35NM_CH0_1600_S</td></tr><tr><td>639-3874</td><td>PCBA,2.8G,SS 6GB,MLB,D1</td><td>DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.8G,PCH_C1,EEEE:F33P,RAM_6G_SAMSUNG_35NM_CH0_1600_S</td></tr><tr><td>639-3875</td><td>PCBA,2.6G,HYNIX 6GB,MLB,D1</td><td>DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.6G,PCH_C1,EEEE:F33L,RAM_6G_HYNIX_CH0_1600_S</td></tr><tr><td>639-3876</td><td>PCBA,2.8G,HYNIX 6GB,MLB,D1</td><td>DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.8G,PCH_C1,EEEE:F339,RAM_6G_HYNIX_CH0_1600_S</td></tr><tr><td>639-3881</td><td>PCBA,2.6G,SS 8GB,MLB,D1</td><td>DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.6G,PCH_C1,EEEE:F33G,RAM_4G_SAMSUNG_35NM_1600_S</td></tr><tr><td>639-3882</td><td>PCBA,2.8G,SS 8GB,MLB,D1</td><td>DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.8G,PCH_C1,EEEE:F33C,RAM_4G_SAMSUNG_35NM_1600_S</td></tr><tr><td>639-3884</td><td>PCBA,2.8G,HYNIX 8GB,MLB,D1</td><td>DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.8G,PCH_C1,EEEE:F337,RAM_4G_HYNIX_1600_S</td></tr><tr><td>639-3883</td><td>PCBA,2.6G,HYNIX 8GB,MLB,D1</td><td>DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.6G,PCH_C1,EEEE:F33D,RAM_4G_HYNIX_1600_S</td></tr><tr><td>639-3877</td><td>PCBA,2.6G,ELPIDA 6GB,MLB,D1</td><td>DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.6G,PCH_C1,EEEE:F33Q,RAM_6G_ELPIDA_CH0_1600_S</td></tr><tr><td>639-3878</td><td>PCBA,2.8G,ELPIDA 6GB,MLB,D1</td><td>DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.8G,PCH_C1,EEEE:F338,RAM_6G_ELPIDA_CH0_1600_S</td></tr><tr><td>639-3885</td><td>PCBA,2.6G,ELPIDA 8GB,MLB,D1</td><td>DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.6G,PCH_C1,EEEE:F33J,RAM_4G_ELPIDA_1600_S</td></tr><tr><td>639-3886</td><td>PCBA,2.8G,ELPIDA 8GB,MLB,D1</td><td>DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.8G,PCH_C1,EEEE:F33N,RAM_4G_ELPIDA_1600_S</td></tr><tr><td>639-3879</td><td>PCBA,2.6G,MICRON 6GB,MLB,D1</td><td>DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.6G,PCH_C1,EEEE:F33M,RAM_6G_MICRON_CH0_1600_S</td></tr><tr><td>639-3880</td><td>PCBA,2.8G,MICRON 6GB,MLB,D1</td><td>DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.8G,PCH_C1,EEEE:F336,RAM_6G_MICRON_CH0_1600_S</td></tr><tr><td>639-3846</td><td>PCBA,2.5G,MICRON 8GB,MLB,D1</td><td>DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.5G,PCH_C1,EEEE:F2WV,RAM_4G_MICRON_1600_S</td></tr><tr><td>639-3847</td><td>PCBA,2.9G,MICRON 8GB,MLB,D1</td><td>DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.9G,PCH_C1,EEEE:F2WQ,RAM_4G_MICRON_1600_S</td></tr><tr><td>639-3887</td><td>PCBA,2.6G,MICRON 8GB,MLB,D1</td><td>DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.6G,PCH_C1,EEEE:F33K,RAM_4G_MICRON_1600_S</td></tr><tr><td>639-3888</td><td>PCBA,2.8G,MICRON 8GB,MLB,D1</td><td>DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.8G,PCH_C1,EEEE:F33F,RAM_4G_MICRON_1600_S</td></tr></table>	BOM NUMBER	BOM NAME	BOM OPTIONS	085-4094	DEV BOM,MLB,D1	D1_DEVEL:PVB	607-9189	CMN PTS,PCBA,MLB,D1	D1_COMMON	639-3288	PCBA,2.5G,SS 6GB,MLB,D1	DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.5G,PCH_C1,EEEE:DWP2,RAM_6G_SAMSUNG_35NM_CH0_1600_S	639-3289	PCBA,2.9G,SS 6GB,MLB,D1	DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.9G,PCH_C1,EEEE:DWNV,RAM_6G_SAMSUNG_35NM_CH0_1600_S	639-3290	PCBA,2.5G,HYNIX 6GB,MLB,D1	DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.5G,PCH_C1,EEEE:DWP0,RAM_6G_HYNIX_CH0_1600_S	639-3291	PCBA,2.9G,HYNIX 6GB,MLB,D1	DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.9G,PCH_C1,EEEE:DWNW,RAM_6G_HYNIX_CH0_1600_S	639-3694	PCBA,2.5G,SS 8GB,MLB,D1	DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.5G,PCH_C1,EEEE:F16P,RAM_4G_SAMSUNG_35NM_1600_S	639-3695	PCBA,2.9G,SS 8GB,MLB,D1	DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.9G,PCH_C1,EEEE:F16M,RAM_4G_SAMSUNG_35NM_1600_S	639-3696	PCBA,2.9G,HYNIX 8GB,MLB,D1	DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.9G,PCH_C1,EEEE:F16N,RAM_4G_HYNIX_1600_S	639-3697	PCBA,2.5G,HYNIX 8GB,MLB,D1	DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.5G,PCH_C1,EEEE:F16V,RAM_4G_HYNIX_1600_S	639-3773	PCBA,2.5G,ELPIDA 6GB,MLB,D1	DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.5G,PCH_C1,EEEE:F26M,RAM_6G_ELPIDA_CH0_1600_S	639-3772	PCBA,2.9G,ELPIDA 6GB,MLB,D1	DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.9G,PCH_C1,EEEE:F26J,RAM_6G_ELPIDA_CH0_1600_S	639-3770	PCBA,2.5G,ELPIDA 8GB,MLB,D1	DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.5G,PCH_C1,EEEE:F26L,RAM_4G_ELPIDA_1600_S	639-3771	PCBA,2.9G,ELPIDA 8GB,MLB,D1	DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.9G,PCH_C1,EEEE:F26H,RAM_4G_ELPIDA_1600_S	639-3849	PCBA,2.5G,MICRON 6GB,MLB,D1	DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.5G,PCH_C1,EEEE:F2WT,RAM_6G_MICRON_CH0_1600_S	639-3848	PCBA,2.9G,MICRON 6GB,MLB,D1	DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.9G,PCH_C1,EEEE:F2WR,RAM_6G_MICRON_CH0_1600_S	639-3873	PCBA,2.6G,SS 6GB,MLB,D1	DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.6G,PCH_C1,EEEE:F33H,RAM_6G_SAMSUNG_35NM_CH0_1600_S	639-3874	PCBA,2.8G,SS 6GB,MLB,D1	DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.8G,PCH_C1,EEEE:F33P,RAM_6G_SAMSUNG_35NM_CH0_1600_S	639-3875	PCBA,2.6G,HYNIX 6GB,MLB,D1	DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.6G,PCH_C1,EEEE:F33L,RAM_6G_HYNIX_CH0_1600_S	639-3876	PCBA,2.8G,HYNIX 6GB,MLB,D1	DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.8G,PCH_C1,EEEE:F339,RAM_6G_HYNIX_CH0_1600_S	639-3881	PCBA,2.6G,SS 8GB,MLB,D1	DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.6G,PCH_C1,EEEE:F33G,RAM_4G_SAMSUNG_35NM_1600_S	639-3882	PCBA,2.8G,SS 8GB,MLB,D1	DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.8G,PCH_C1,EEEE:F33C,RAM_4G_SAMSUNG_35NM_1600_S	639-3884	PCBA,2.8G,HYNIX 8GB,MLB,D1	DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.8G,PCH_C1,EEEE:F337,RAM_4G_HYNIX_1600_S	639-3883	PCBA,2.6G,HYNIX 8GB,MLB,D1	DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.6G,PCH_C1,EEEE:F33D,RAM_4G_HYNIX_1600_S	639-3877	PCBA,2.6G,ELPIDA 6GB,MLB,D1	DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.6G,PCH_C1,EEEE:F33Q,RAM_6G_ELPIDA_CH0_1600_S	639-3878	PCBA,2.8G,ELPIDA 6GB,MLB,D1	DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.8G,PCH_C1,EEEE:F338,RAM_6G_ELPIDA_CH0_1600_S	639-3885	PCBA,2.6G,ELPIDA 8GB,MLB,D1	DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.6G,PCH_C1,EEEE:F33J,RAM_4G_ELPIDA_1600_S	639-3886	PCBA,2.8G,ELPIDA 8GB,MLB,D1	DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.8G,PCH_C1,EEEE:F33N,RAM_4G_ELPIDA_1600_S	639-3879	PCBA,2.6G,MICRON 6GB,MLB,D1	DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.6G,PCH_C1,EEEE:F33M,RAM_6G_MICRON_CH0_1600_S	639-3880	PCBA,2.8G,MICRON 6GB,MLB,D1	DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.8G,PCH_C1,EEEE:F336,RAM_6G_MICRON_CH0_1600_S	639-3846	PCBA,2.5G,MICRON 8GB,MLB,D1	DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.5G,PCH_C1,EEEE:F2WV,RAM_4G_MICRON_1600_S	639-3847	PCBA,2.9G,MICRON 8GB,MLB,D1	DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.9G,PCH_C1,EEEE:F2WQ,RAM_4G_MICRON_1600_S	639-3887	PCBA,2.6G,MICRON 8GB,MLB,D1	DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.6G,PCH_C1,EEEE:F33K,RAM_4G_MICRON_1600_S	639-3888	PCBA,2.8G,MICRON 8GB,MLB,D1	DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.8G,PCH_C1,EEEE:F33F,RAM_4G_MICRON_1600_S	<table><tr><th>PART NUMBER</th><th>QTY</th><th>DESCRIPTION</th><th>REFERENCE DES</th><th>CRITICAL</th><th>BOM OPTION</th></tr><tr><td>826-4393</td><td>1</td><td>LBL,P/N LABEL,PCB,28MM X 6 MM</td><td>[EEEE:DV7Q]</td><td>CRITICAL</td><td>EEEE:DV7Q</td></tr><tr><td>826-4393</td><td>1</td><td>LBL,P/N LABEL,PCB,28MM X 6 MM</td><td>[EEEE:DWNV]</td><td>CRITICAL</td><td>EEEE:DWNV</td></tr><tr><td>826-4393</td><td>1</td><td>LBL,P/N LABEL,PCB,28MM X 6 MM</td><td>[EEEE:DWNW]</td><td>CRITICAL</td><td>EEEE:DWNW</td></tr><tr><td>826-4393</td><td>1</td><td>LBL,P/N LABEL,PCB,28MM X 6 MM</td><td>[EEEE:DWP0]</td><td>CRITICAL</td><td>EEEE:DWP0</td></tr><tr><td>826-4393</td><td>1</td><td>LBL,P/N LABEL,PCB,28MM X 6 MM</td><td>[EEEE:DWP2]</td><td>CRITICAL</td><td>EEEE:DWP2</td></tr><tr><td>826-4393</td><td>1</td><td>LBL,P/N LABEL,PCB,28MM X 6 MM</td><td>[EEEE:F16M]</td><td>CRITICAL</td><td>EEEE:F16M</td></tr><tr><td>826-4393</td><td>1</td><td>LBL,P/N LABEL,PCB,28MM X 6 MM</td><td>[EEEE:F16N]</td><td>CRITICAL</td><td>EEEE:F16N</td></tr><tr><td>826-4393</td><td>1</td><td>LBL,P/N LABEL,PCB,28MM X 6 MM</td><td>[EEEE:F16P]</td><td>CRITICAL</td><td>EEEE:F16P</td></tr><tr><td>826-4393</td><td>1</td><td>LBL,P/N LABEL,PCB,28MM X 6 MM</td><td>[EEEE:F16V]</td><td>CRITICAL</td><td>EEEE:F16V</td></tr><tr><td>826-4393</td><td>1</td><td>LBL,P/N LABEL,PCB,28MM X 6 MM</td><td>[EEEE:F26H]</td><td>CRITICAL</td><td>EEEE:F26H</td></tr><tr><td>826-4393</td><td>1</td><td>LBL,P/N LABEL,PCB,28MM X 6 MM</td><td>[EEEE:F26J]</td><td>CRITICAL</td><td>EEEE:F26J</td></tr><tr><td>826-4393</td><td>1</td><td>LBL,P/N LABEL,PCB,28MM X 6 MM</td><td>[EEEE:F26L]</td><td>CRITICAL</td><td>EEEE:F26L</td></tr><tr><td>826-4393</td><td>1</td><td>LBL,P/N LABEL,PCB,28MM X 6 MM</td><td>[EEEE:F26M]</td><td>CRITICAL</td><td>EEEE:F26M</td></tr><tr><td>826-4393</td><td>1</td><td>LBL,P/N LABEL,PCB,28MM X 6 MM</td><td>[EEEE:F2WQ]</td><td>CRITICAL</td><td>EEEE:F2WQ</td></tr><tr><td>826-4393</td><td>1</td><td>LBL,P/N LABEL,PCB,28MM X 6 MM</td><td>[EEEE:F2WR]</td><td>CRITICAL</td><td>EEEE:F2WR</td></tr><tr><td>826-4393</td><td>1</td><td>LBL,P/N LABEL,PCB,28MM X 6 MM</td><td>[EEEE:F2WT]</td><td>CRITICAL</td><td>EEEE:F2WT</td></tr><tr><td>826-4393</td><td>1</td><td>LBL,P/N LABEL,PCB,28MM X 6 MM</td><td>[EEEE:F2WV]</td><td>CRITICAL</td><td>EEEE:F2WV</td></tr><tr><td>826-4393</td><td>1</td><td>LBL,P/N LABEL,PCB,28MM X 6 MM</td><td>[EEEE:F336]</td><td>CRITICAL</td><td>EEEE:F336</td></tr><tr><td>826-4393</td><td>1</td><td>LBL,P/N LABEL,PCB,28MM X 6 MM</td><td>[EEEE:F337]</td><td>CRITICAL</td><td>EEEE:F337</td></tr><tr><td>826-4393</td><td>1</td><td>LBL,P/N LABEL,PCB,28MM X 6 MM</td><td>[EEEE:F338]</td><td>CRITICAL</td><td>EEEE:F338</td></tr><tr><td>826-4393</td><td>1</td><td>LBL,P/N LABEL,PCB,28MM X 6 MM</td><td>[EEEE:F339]</td><td>CRITICAL</td><td>EEEE:F339</td></tr><tr><td>826-4393</td><td>1</td><td>LBL,P/N LABEL,PCB,28MM X 6 MM</td><td>[EEEE:F33C]</td><td>CRITICAL</td><td>EEEE:F33C</td></tr><tr><td>826-4393</td><td>1</td><td>LBL,P/N LABEL,PCB,28MM X 6 MM</td><td>[EEEE:F33D]</td><td>CRITICAL</td><td>EEEE:F33D</td></tr><tr><td>826-4393</td><td>1</td><td>LBL,P/N LABEL,PCB,28MM X 6 MM</td><td>[EEEE:F33F]</td><td>CRITICAL</td><td>EEEE:F33F</td></tr><tr><td>826-4393</td><td>1</td><td>LBL,P/N LABEL,PCB,28MM X 6 MM</td><td>[EEEE:F33G]</td><td>CRITICAL</td><td>EEEE:F33G</td></tr><tr><td>826-4393</td><td>1</td><td>LBL,P/N LABEL,PCB,28MM X 6 MM</td><td>[EEEE:F33H]</td><td>CRITICAL</td><td>EEEE:F33H</td></tr><tr><td>826-4393</td><td>1</td><td>LBL,P/N LABEL,PCB,28MM X 6 MM</td><td>[EEEE:F33J]</td><td>CRITICAL</td><td>EEEE:F33J</td></tr><tr><td>826-4393</td><td>1</td><td>LBL,P/N LABEL,PCB,28MM X 6 MM</td><td>[EEEE:F33K]</td><td>CRITICAL</td><td>EEEE:F33K</td></tr><tr><td>826-4393</td><td>1</td><td>LBL,P/N LABEL,PCB,28MM X 6 MM</td><td>[EEEE:F33L]</td><td>CRITICAL</td><td>EEEE:F33L</td></tr><tr><td>826-4393</td><td>1</td><td>LBL,P/N LABEL,PCB,28MM X 6 MM</td><td>[EEEE:F33M]</td><td>CRITICAL</td><td>EEEE:F33M</td></tr><tr><td>826-4393</td><td>1</td><td>LBL,P/N LABEL,PCB,28MM X 6 MM</td><td>[EEEE:F33N]</td><td>CRITICAL</td><td>EEEE:F33N</td></tr><tr><td>826-4393</td><td>1</td><td>LBL,P/N LABEL,PCB,28MM X 6 MM</td><td>[EEEE:F33P]</td><td>CRITICAL</td><td>EEEE:F33P</td></tr><tr><td>826-4393</td><td>1</td><td>LBL,P/N LABEL,PCB,28MM X 6 MM</td><td>[EEEE:F33Q]</td><td>CRITICAL</td><td>EEEE:F33Q</td></tr></table>	PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION	826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE:DV7Q]	CRITICAL	EEEE:DV7Q	826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE:DWNV]	CRITICAL	EEEE:DWNV	826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE:DWNW]	CRITICAL	EEEE:DWNW	826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE:DWP0]	CRITICAL	EEEE:DWP0	826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE:DWP2]	CRITICAL	EEEE:DWP2	826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE:F16M]	CRITICAL	EEEE:F16M	826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE:F16N]	CRITICAL	EEEE:F16N	826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE:F16P]	CRITICAL	EEEE:F16P	826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE:F16V]	CRITICAL	EEEE:F16V	826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE:F26H]	CRITICAL	EEEE:F26H	826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE:F26J]	CRITICAL	EEEE:F26J	826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE:F26L]	CRITICAL	EEEE:F26L	826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE:F26M]	CRITICAL	EEEE:F26M	826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE:F2WQ]	CRITICAL	EEEE:F2WQ	826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE:F2WR]	CRITICAL	EEEE:F2WR	826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE:F2WT]	CRITICAL	EEEE:F2WT	826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE:F2WV]	CRITICAL	EEEE:F2WV	826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE:F336]	CRITICAL	EEEE:F336	826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE:F337]	CRITICAL	EEEE:F337	826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE:F338]	CRITICAL	EEEE:F338	826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE:F339]	CRITICAL	EEEE:F339	826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE:F33C]	CRITICAL	EEEE:F33C	826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE:F33D]	CRITICAL	EEEE:F33D	826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE:F33F]	CRITICAL	EEEE:F33F	826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE:F33G]	CRITICAL	EEEE:F33G	826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE:F33H]	CRITICAL	EEEE:F33H	826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE:F33J]	CRITICAL	EEEE:F33J	826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE:F33K]	CRITICAL	EEEE:F33K	826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE:F33L]	CRITICAL	EEEE:F33L	826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE:F33M]	CRITICAL	EEEE:F33M	826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE:F33N]	CRITICAL	EEEE:F33N	826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE:F33P]	CRITICAL	EEEE:F33P	826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE:F33Q]	CRITICAL	EEEE:F33Q	<table><tr><th>PART NUMBER</th><th>ALTERNATE FOR PART NUMBER</th><th>BOM OPTION</th><th>REF DES</th><th>COMMENTS:</th></tr><tr><td>128S0364</td><td>128S0264</td><td></td><td>ALL</td><td>Kemet alt to Sanyo</td></tr><tr><td>128S0303</td><td>128S0353</td><td></td><td>ALL</td><td>Panasonic alt to Sanyo</td></tr><tr><td>376S0953</td><td>376S0958</td><td></td><td>ALL</td><td>RENESAS ALT TO FAIRCHILD</td></tr><tr><td>128S0311</td><td>128S0329</td><td></td><td>ALL</td><td>NEC ALT TO SANYO</td></tr><tr><td>353S3237</td><td>353S2192</td><td></td><td>ALL</td><td>TI ALT TO INTERSIL</td></tr><tr><td>376S0977</td><td>376S0859</td><td></td><td>ALL</td><td>Diodes alt to Toshiba</td></tr><tr><td>138S0722</td><td>138S0691</td><td></td><td>ALL</td><td>Multi alt to Samsung</td></tr><tr><td>197S0487</td><td>197S0485</td><td></td><td>ALL</td><td>Spsom alt to TSC</td></tr><tr><td>197S0484</td><td>197S0485</td><td></td><td>ALL</td><td>NEC alt to TSC</td></tr><tr><td>197S0479</td><td>197S0486</td><td></td><td>ALL</td><td>Spsom alt to TSC</td></tr><tr><td>197S0478</td><td>197S0486</td><td></td><td>ALL</td><td>NEC alt to TSC</td></tr><tr><td>197S0481</td><td>197S0480</td><td></td><td>ALL</td><td>Spsom alt to NEC</td></tr><tr><td>376S0972</td><td>376S0612</td><td></td><td>ALL</td><td>ROHM alt to Toshiba</td></tr><tr><td>376S1053</td><td>376S0604</td><td></td><td>ALL</td><td>Diodes alt to Fairchild</td></tr><tr><td>376S1017</td><td>376S0612</td><td></td><td>ALL</td><td>ROHM alt to Toshiba</td></tr><tr><td>138S0624</td><td>138S0677</td><td></td><td>ALL</td><td>Murata alt to Taiyo Yuden</td></tr><tr><td>138S0681</td><td>138S0638</td><td></td><td>ALL</td><td>Taiyo Yuden alt to Samsung</td></tr><tr><td>152S1703</td><td>152S1701</td><td></td><td>ALL</td><td>Susida alt to Cytac</td></tr><tr><td>371S0730</td><td>371S0490</td><td></td><td>ALL</td><td>Diodes alt to NXP</td></tr><tr><td>138S0725</td><td>138S0724</td><td></td><td>ALL</td><td>Samsung alt to Murata</td></tr><tr><td>138S0727</td><td>138S0709</td><td></td><td>ALL</td><td>Samsung alt to Murata</td></tr><tr><td>376S1080</td><td>376S0820</td><td></td><td>ALL</td><td>Diodes alt to ON Semi</td></tr><tr><td>372S0186</td><td>372S0185</td><td></td><td>ALL</td><td>NXP alt to Diodes</td></tr><tr><td>128S0363</td><td>128S0296</td><td></td><td>ALL</td><td>NEC alt to Sanyo</td></tr><tr><td>376S0903</td><td>376S0796</td><td></td><td>ALL</td><td>Fairchild alt to Siliconix</td></tr><tr><td>740S0144</td><td>740S0118</td><td></td><td>ALL</td><td>Littlefuse alt to Polytronic</td></tr><tr><td>152S1539</td><td>152S1598</td><td></td><td>ALL</td><td>Cytac alt to Toko</td></tr><tr><td>152S1645</td><td>152S0461</td><td></td><td>ALL</td><td>Cytac alt to Vishay</td></tr><tr><td>155S0667</td><td>155S0583</td><td></td><td>ALL</td><td>ROD LAYERS ALT TO MURATA</td></tr><tr><td>103S0305</td><td>103S0266</td><td></td><td>ALL</td><td>Yageo alt to Cytac</td></tr><tr><td>112S0274</td><td>112S0254</td><td></td><td>ALL</td><td>Yageo alt to Cytac</td></tr><tr></tr></table>	PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:	128S0364	128S0264		ALL	Kemet alt to Sanyo	128S0303	128S0353		ALL	Panasonic alt to Sanyo	376S0953	376S0958		ALL	RENESAS ALT TO FAIRCHILD	128S0311	128S0329		ALL	NEC ALT TO SANYO	353S3237	353S2192		ALL	TI ALT TO INTERSIL	376S0977	376S0859		ALL	Diodes alt to Toshiba	138S0722	138S0691		ALL	Multi alt to Samsung	197S0487	197S0485		ALL	Spsom alt to TSC	197S0484	197S0485		ALL	NEC alt to TSC	197S0479	197S0486		ALL	Spsom alt to TSC	197S0478	197S0486		ALL	NEC alt to TSC	197S0481	197S0480		ALL	Spsom alt to NEC	376S0972	376S0612		ALL	ROHM alt to Toshiba	376S1053	376S0604		ALL	Diodes alt to Fairchild	376S1017	376S0612		ALL	ROHM alt to Toshiba	138S0624	138S0677		ALL	Murata alt to Taiyo Yuden	138S0681	138S0638		ALL	Taiyo Yuden alt to Samsung	152S1703	152S1701		ALL	Susida alt to Cytac	371S0730	371S0490		ALL	Diodes alt to NXP	138S0725	138S0724		ALL	Samsung alt to Murata	138S0727	138S0709		ALL	Samsung alt to Murata	376S1080	376S0820		ALL	Diodes alt to ON Semi	372S0186	372S0185		ALL	NXP alt to Diodes	128S0363	128S0296		ALL	NEC alt to Sanyo	376S0903	376S0796		ALL	Fairchild alt to Siliconix	740S0144	740S0118		ALL	Littlefuse alt to Polytronic	152S1539	152S1598		ALL	Cytac alt to Toko	152S1645	152S0461		ALL	Cytac alt to Vishay	155S0667	155S0583		ALL	ROD LAYERS ALT TO MURATA	103S0305	103S0266		ALL	Yageo alt to Cytac	112S0274	112S0254		ALL
BOM NUMBER	BOM NAME	BOM OPTIONS																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
085-4094	DEV BOM,MLB,D1	D1_DEVEL:PVB																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
607-9189	CMN PTS,PCBA,MLB,D1	D1_COMMON																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
639-3288	PCBA,2.5G,SS 6GB,MLB,D1	DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.5G,PCH_C1,EEEE:DWP2,RAM_6G_SAMSUNG_35NM_CH0_1600_S																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
639-3289	PCBA,2.9G,SS 6GB,MLB,D1	DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.9G,PCH_C1,EEEE:DWNV,RAM_6G_SAMSUNG_35NM_CH0_1600_S																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
639-3290	PCBA,2.5G,HYNIX 6GB,MLB,D1	DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.5G,PCH_C1,EEEE:DWP0,RAM_6G_HYNIX_CH0_1600_S																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
639-3291	PCBA,2.9G,HYNIX 6GB,MLB,D1	DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.9G,PCH_C1,EEEE:DWNW,RAM_6G_HYNIX_CH0_1600_S																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
639-3694	PCBA,2.5G,SS 8GB,MLB,D1	DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.5G,PCH_C1,EEEE:F16P,RAM_4G_SAMSUNG_35NM_1600_S																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
639-3695	PCBA,2.9G,SS 8GB,MLB,D1	DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.9G,PCH_C1,EEEE:F16M,RAM_4G_SAMSUNG_35NM_1600_S																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
639-3696	PCBA,2.9G,HYNIX 8GB,MLB,D1	DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.9G,PCH_C1,EEEE:F16N,RAM_4G_HYNIX_1600_S																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
639-3697	PCBA,2.5G,HYNIX 8GB,MLB,D1	DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.5G,PCH_C1,EEEE:F16V,RAM_4G_HYNIX_1600_S																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
639-3773	PCBA,2.5G,ELPIDA 6GB,MLB,D1	DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.5G,PCH_C1,EEEE:F26M,RAM_6G_ELPIDA_CH0_1600_S																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
639-3772	PCBA,2.9G,ELPIDA 6GB,MLB,D1	DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.9G,PCH_C1,EEEE:F26J,RAM_6G_ELPIDA_CH0_1600_S																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
639-3770	PCBA,2.5G,ELPIDA 8GB,MLB,D1	DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.5G,PCH_C1,EEEE:F26L,RAM_4G_ELPIDA_1600_S																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
639-3771	PCBA,2.9G,ELPIDA 8GB,MLB,D1	DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.9G,PCH_C1,EEEE:F26H,RAM_4G_ELPIDA_1600_S																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
639-3849	PCBA,2.5G,MICRON 6GB,MLB,D1	DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.5G,PCH_C1,EEEE:F2WT,RAM_6G_MICRON_CH0_1600_S																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
639-3848	PCBA,2.9G,MICRON 6GB,MLB,D1	DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.9G,PCH_C1,EEEE:F2WR,RAM_6G_MICRON_CH0_1600_S																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
639-3873	PCBA,2.6G,SS 6GB,MLB,D1	DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.6G,PCH_C1,EEEE:F33H,RAM_6G_SAMSUNG_35NM_CH0_1600_S																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
639-3874	PCBA,2.8G,SS 6GB,MLB,D1	DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.8G,PCH_C1,EEEE:F33P,RAM_6G_SAMSUNG_35NM_CH0_1600_S																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
639-3875	PCBA,2.6G,HYNIX 6GB,MLB,D1	DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.6G,PCH_C1,EEEE:F33L,RAM_6G_HYNIX_CH0_1600_S																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
639-3876	PCBA,2.8G,HYNIX 6GB,MLB,D1	DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.8G,PCH_C1,EEEE:F339,RAM_6G_HYNIX_CH0_1600_S																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
639-3881	PCBA,2.6G,SS 8GB,MLB,D1	DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.6G,PCH_C1,EEEE:F33G,RAM_4G_SAMSUNG_35NM_1600_S																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
639-3882	PCBA,2.8G,SS 8GB,MLB,D1	DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.8G,PCH_C1,EEEE:F33C,RAM_4G_SAMSUNG_35NM_1600_S																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
639-3884	PCBA,2.8G,HYNIX 8GB,MLB,D1	DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.8G,PCH_C1,EEEE:F337,RAM_4G_HYNIX_1600_S																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
639-3883	PCBA,2.6G,HYNIX 8GB,MLB,D1	DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.6G,PCH_C1,EEEE:F33D,RAM_4G_HYNIX_1600_S																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
639-3877	PCBA,2.6G,ELPIDA 6GB,MLB,D1	DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.6G,PCH_C1,EEEE:F33Q,RAM_6G_ELPIDA_CH0_1600_S																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
639-3878	PCBA,2.8G,ELPIDA 6GB,MLB,D1	DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.8G,PCH_C1,EEEE:F338,RAM_6G_ELPIDA_CH0_1600_S																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
639-3885	PCBA,2.6G,ELPIDA 8GB,MLB,D1	DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.6G,PCH_C1,EEEE:F33J,RAM_4G_ELPIDA_1600_S																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
639-3886	PCBA,2.8G,ELPIDA 8GB,MLB,D1	DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.8G,PCH_C1,EEEE:F33N,RAM_4G_ELPIDA_1600_S																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
639-3879	PCBA,2.6G,MICRON 6GB,MLB,D1	DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.6G,PCH_C1,EEEE:F33M,RAM_6G_MICRON_CH0_1600_S																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
639-3880	PCBA,2.8G,MICRON 6GB,MLB,D1	DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.8G,PCH_C1,EEEE:F336,RAM_6G_MICRON_CH0_1600_S																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
639-3846	PCBA,2.5G,MICRON 8GB,MLB,D1	DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.5G,PCH_C1,EEEE:F2WV,RAM_4G_MICRON_1600_S																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
639-3847	PCBA,2.9G,MICRON 8GB,MLB,D1	DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.9G,PCH_C1,EEEE:F2WQ,RAM_4G_MICRON_1600_S																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
639-3887	PCBA,2.6G,MICRON 8GB,MLB,D1	DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.6G,PCH_C1,EEEE:F33K,RAM_4G_MICRON_1600_S																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
639-3888	PCBA,2.8G,MICRON 8GB,MLB,D1	DEVEL_BOM,BASE_BOM,CPU_IVB_2C_2.8G,PCH_C1,EEEE:F33F,RAM_4G_MICRON_1600_S																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE:DV7Q]	CRITICAL	EEEE:DV7Q																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE:DWNV]	CRITICAL	EEEE:DWNV																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE:DWNW]	CRITICAL	EEEE:DWNW																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE:DWP0]	CRITICAL	EEEE:DWP0																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE:DWP2]	CRITICAL	EEEE:DWP2																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE:F16M]	CRITICAL	EEEE:F16M																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE:F16N]	CRITICAL	EEEE:F16N																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE:F16P]	CRITICAL	EEEE:F16P																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE:F16V]	CRITICAL	EEEE:F16V																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE:F26H]	CRITICAL	EEEE:F26H																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE:F26J]	CRITICAL	EEEE:F26J																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE:F26L]	CRITICAL	EEEE:F26L																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE:F26M]	CRITICAL	EEEE:F26M																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE:F2WQ]	CRITICAL	EEEE:F2WQ																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE:F2WR]	CRITICAL	EEEE:F2WR																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE:F2WT]	CRITICAL	EEEE:F2WT																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE:F2WV]	CRITICAL	EEEE:F2WV																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE:F336]	CRITICAL	EEEE:F336																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE:F337]	CRITICAL	EEEE:F337																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE:F338]	CRITICAL	EEEE:F338																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE:F339]	CRITICAL	EEEE:F339																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE:F33C]	CRITICAL	EEEE:F33C																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE:F33D]	CRITICAL	EEEE:F33D																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE:F33F]	CRITICAL	EEEE:F33F																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE:F33G]	CRITICAL	EEEE:F33G																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE:F33H]	CRITICAL	EEEE:F33H																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE:F33J]	CRITICAL	EEEE:F33J																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE:F33K]	CRITICAL	EEEE:F33K																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE:F33L]	CRITICAL	EEEE:F33L																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE:F33M]	CRITICAL	EEEE:F33M																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE:F33N]	CRITICAL	EEEE:F33N																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE:F33P]	CRITICAL	EEEE:F33P																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE:F33Q]	CRITICAL	EEEE:F33Q																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
128S0364	128S0264		ALL	Kemet alt to Sanyo																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
128S0303	128S0353		ALL	Panasonic alt to Sanyo																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
376S0953	376S0958		ALL	RENESAS ALT TO FAIRCHILD																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
128S0311	128S0329		ALL	NEC ALT TO SANYO																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
353S3237	353S2192		ALL	TI ALT TO INTERSIL																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
376S0977	376S0859		ALL	Diodes alt to Toshiba																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
138S0722	138S0691		ALL	Multi alt to Samsung																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
197S0487	197S0485		ALL	Spsom alt to TSC																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
197S0484	197S0485		ALL	NEC alt to TSC																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
197S0479	197S0486		ALL	Spsom alt to TSC																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
197S0478	197S0486		ALL	NEC alt to TSC																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
197S0481	197S0480		ALL	Spsom alt to NEC																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
376S0972	376S0612		ALL	ROHM alt to Toshiba																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
376S1053	376S0604		ALL	Diodes alt to Fairchild																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
376S1017	376S0612		ALL	ROHM alt to Toshiba																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
138S0624	138S0677		ALL	Murata alt to Taiyo Yuden																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
138S0681	138S0638		ALL	Taiyo Yuden alt to Samsung																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
152S1703	152S1701		ALL	Susida alt to Cytac																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
371S0730	371S0490		ALL	Diodes alt to NXP																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
138S0725	138S0724		ALL	Samsung alt to Murata																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
138S0727	138S0709		ALL	Samsung alt to Murata																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
376S1080	376S0820		ALL	Diodes alt to ON Semi																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
372S0186	372S0185		ALL	NXP alt to Diodes																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
128S0363	128S0296		ALL	NEC alt to Sanyo																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
376S0903	376S0796		ALL	Fairchild alt to Siliconix																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
740S0144	740S0118		ALL	Littlefuse alt to Polytronic																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
152S1539	152S1598		ALL	Cytac alt to Toko																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
152S1645	152S0461		ALL	Cytac alt to Vishay																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
155S0667	155S0583		ALL	ROD LAYERS ALT TO MURATA																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
103S0305	103S0266		ALL	Yageo alt to Cytac																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
112S0274	112S0254		ALL	Yageo alt to Cytac																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			

D

C

B

A

D

C

B

A

PD Module Parts

PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
860-1533	1	STDOFF,BMU,TOPSIDE,D1,SM	J6950_63	CRITICAL	
860-1530	1	STDOFF-1.9D2,93H-TW-0.85-1.2	J6950_64	CRITICAL	
860-1529	1	STDOFF-1.80D1.53H-SM	J6950_65	CRITICAL	
825-7841	1	LBL,PART CONFIG,BOARDS,D2	CONFIG_LABEL	CRITICAL	
946-4350	1	D1 MLB LOCTITE UV GLUE 190024/S 0.24G	EDGE_BOND	CRITICAL	

DEVELOPMENT/BASE BOMs

PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
085-4094	1	D1 MLB DEVELOPMENT BOM	DEVEL	CRITICAL	DEVEL_BOM
607-9189	1	D1 MLB BASE BOM	BASE	CRITICAL	BASE_BOM

SMC

34183528	1	10,SMC12,PROTO3,D1	U4900	CRITICAL	SMC_PROG:P80T0
34183404	1	10,SMC DEVELOPMENT-P1B,D1	U4900	CRITICAL	SMC_PROG:P1B
34183405	1	10,SMC DEVELOPMENT-P1B,D1	U4900	CRITICAL	SMC_PROG:P1B
34183406	1	10,SMC DEVELOPMENT-P1B,D1	U4900	CRITICAL	SMC_PROG:P1B

EFI ROM

34183571	1	10,EFI_ROM,PROTO3,D1	U6100	CRITICAL	BOOTROM_PROG:P80T0
34183603	1	10,EFI_ROM,P1B,D1	U6100	CRITICAL	BOOTROM_PROG:P1B
34183636	1	10,EFI_ROM,P1B2,D1	U6100	CRITICAL	BOOTROM_PROG:P1B2
34183650	1	10,EFI_ROM,P1B,D1	U6100	CRITICAL	BOOTROM_PROG:P1B
3418XXXX	1	10,EFI_ROM,P1B2,D1	U6100	CRITICAL	BOOTROM_PROG:P1B2
34183667	1	10,EFI_ROM,P1B,D1	U6100	CRITICAL	BOOTROM_PROG:P1B

Programmables - All builds


33580809	1	64 MBIT SPI SERIAL SIGNAL 2/IO FLASH,Memoryless	U6100	CRITICAL	BOOTROM_BLANK
33580803	1	64 MBIT SPI SERIAL SIGNAL 2/IO FLASH,Memoryless	U6100	CRITICAL	BOOTROM_BLANK
34183670	1	10,T9_P80C,V224,P1B,D1	U5701	CRITICAL	TPAD_PROG:PROG
33782983	1	10,T9_P80C,Q1B,Blank	U5701	CRITICAL	TPAD_PROG:Blank
34183668	1	10,EEPROM,ON,V14.1,D1,P1B	U3690	CRITICAL	TWTRON:PROG
33580865	1	10,EEPROM,SERIAL,8Kb,30102	U3690	CRITICAL	TWTRON:Blank
33881098	1	10,SMC12-A3,LAN93AA86C10K3	U4900	CRITICAL	SMC_Blank
998-3919	1	SOCKET, SMC12	J4900	CRITICAL	SMC_SOCKET

SYNC MASTER=MASTER

SYNC DATE=MASTER

PAGE TITLE

BOM Configuration

 Apple Inc.

NOTICE OF PROPRIETARY PROPERTY:
THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE INC.
THE POSSESSOR 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
<SCH_NUM>

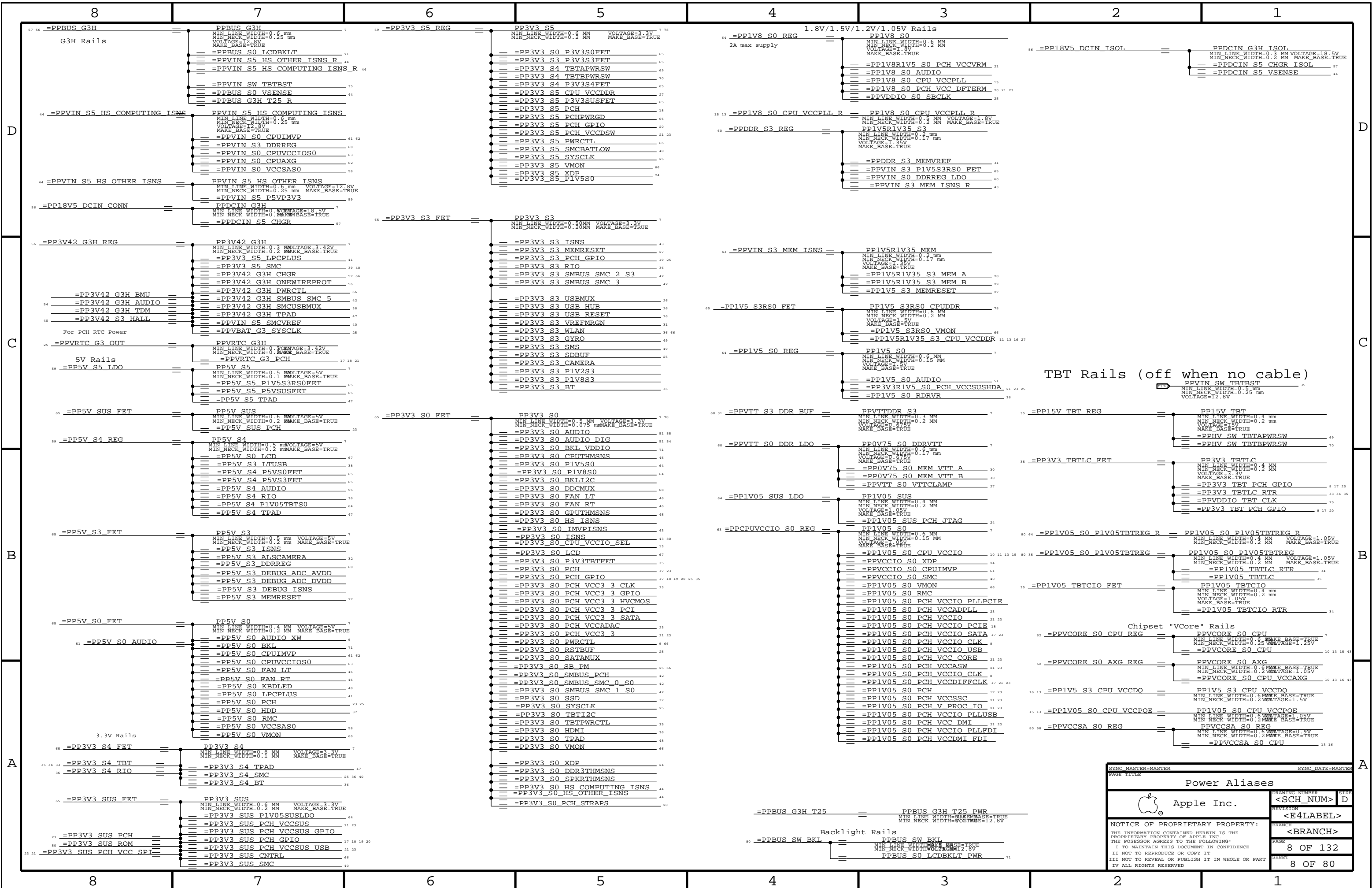
REVISION
<E4LABEL>

BRANCH
<BRANCH>

PAGE
6 OF 132

SHEET
6 OF 80

SIZE
D



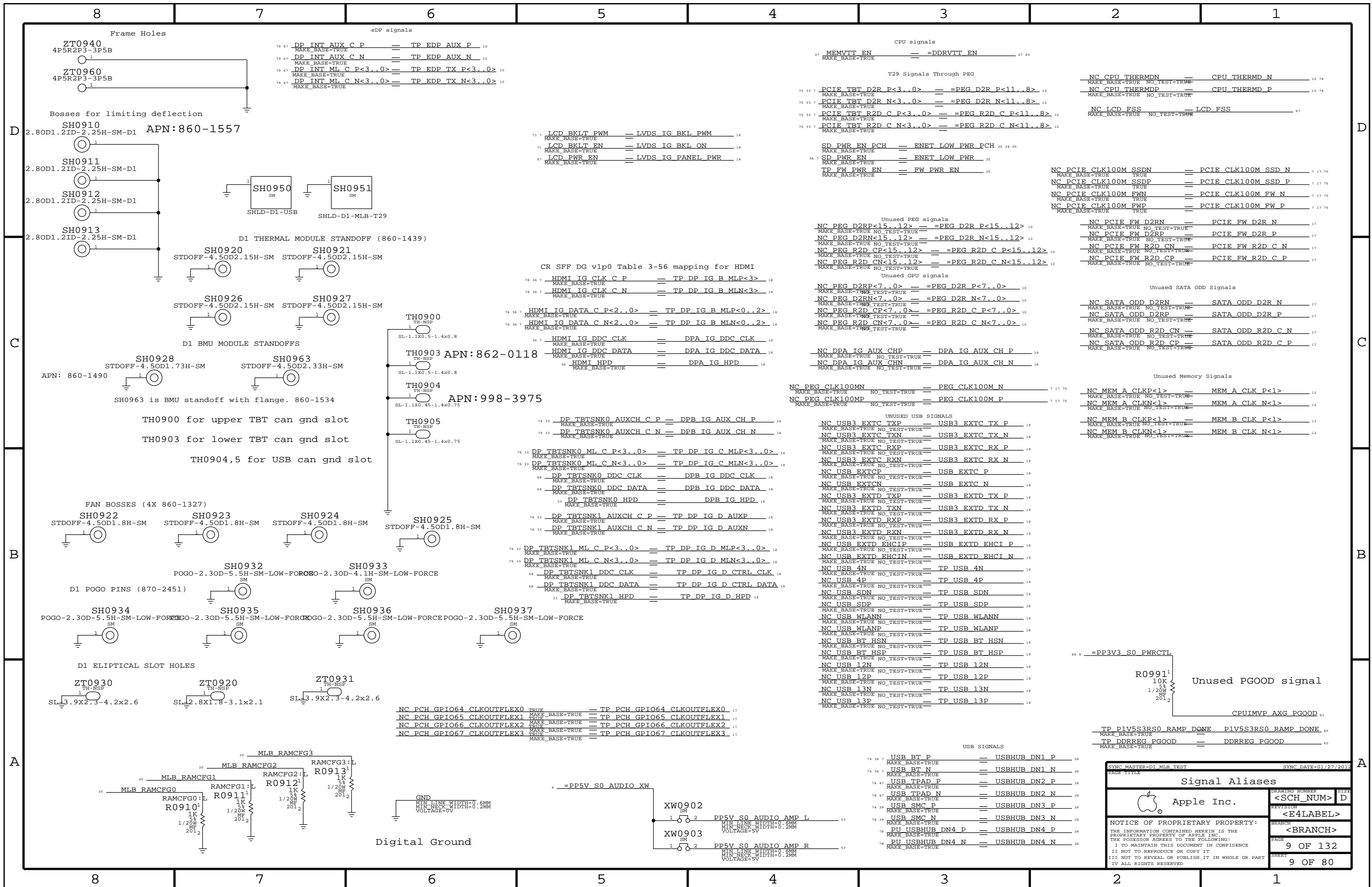




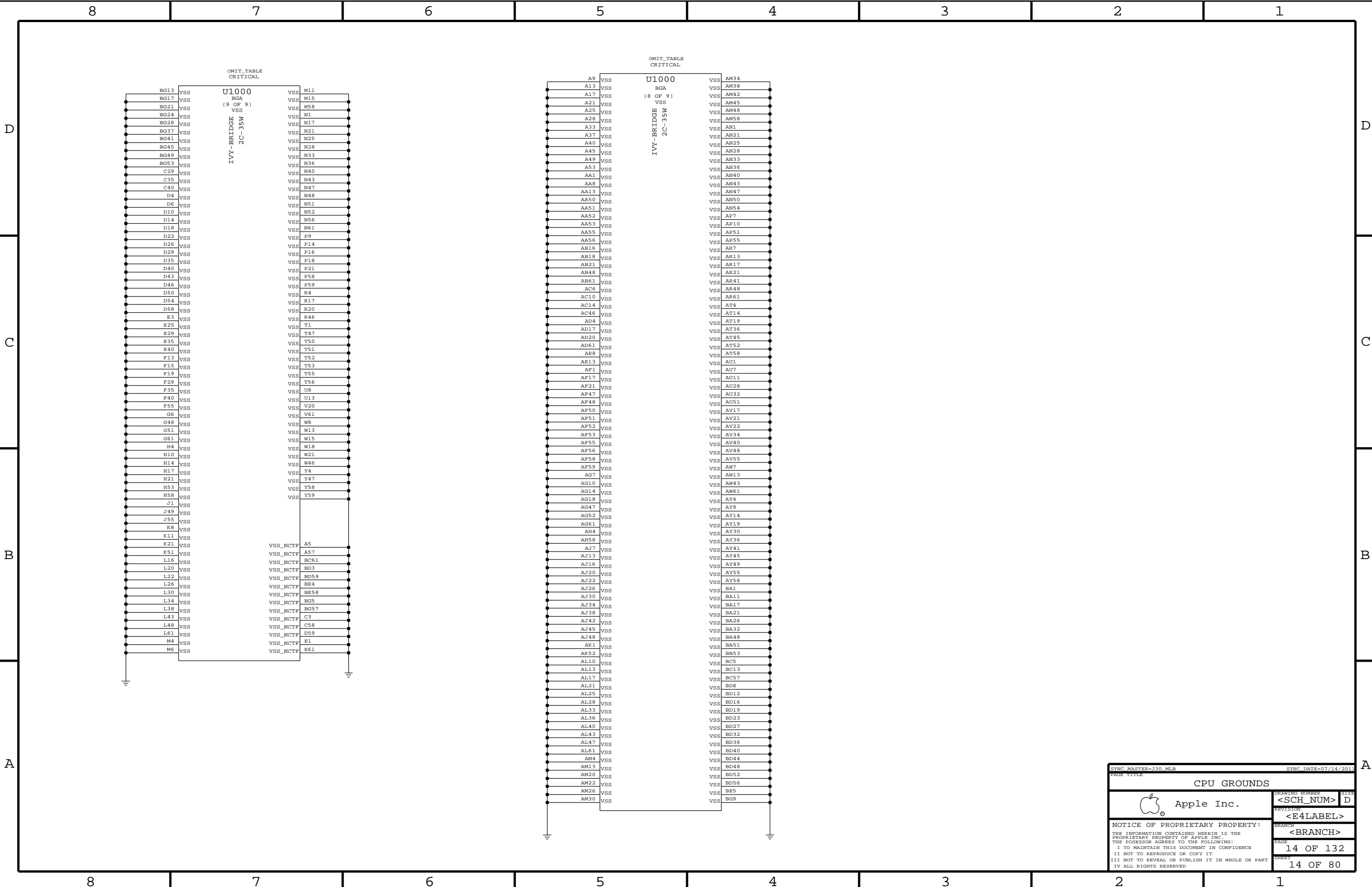
Diagram illustrating the CPU DDR3 Interfaces, showing memory channels (A, B, C, D) and their connections to the CPU. The diagram is organized into four main sections, each representing a memory channel (A, B, C, D). Each section contains a list of memory banks (e.g., SA_DQ_0, SB_DQ_0) and their corresponding connections to the CPU. The connections are labeled with memory bank names and their respective addresses (e.g., MEM A DO<0>, MEM B DO<0>).

The diagram is divided into four main sections, each representing a memory channel (A, B, C, D). Each section contains a list of memory banks (e.g., SA_DQ_0, SB_DQ_0) and their corresponding connections to the CPU. The connections are labeled with memory bank names and their respective addresses (e.g., MEM A DO<0>, MEM B DO<0>).

Key components and connections include:

- Memory Channels:** A, B, C, D.
- Memory Banks:** SA_DQ_0, SB_DQ_0, SA_DQ_1, SB_DQ_1, etc.
- Connections:** MEM A DO<0>, MEM B DO<0>, MEM A DO<1>, MEM B DO<1>, etc.






SYNC MASTER=J30 MLB

SYNC DATE=07/14/2013

CPU GROUNDS

 Apple Inc.

DRAWING NUMBER

<SCH_NUM>

REVISION

<E4LABEL>

BRANCH

<BRANCH>

THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE INC. THE POSSESSOR 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

14 OF 132

SHEET

14 OF 80

D

D



B

B

```
13 11 10 8 =PP1V05_S0_CPU_VCCIO
```

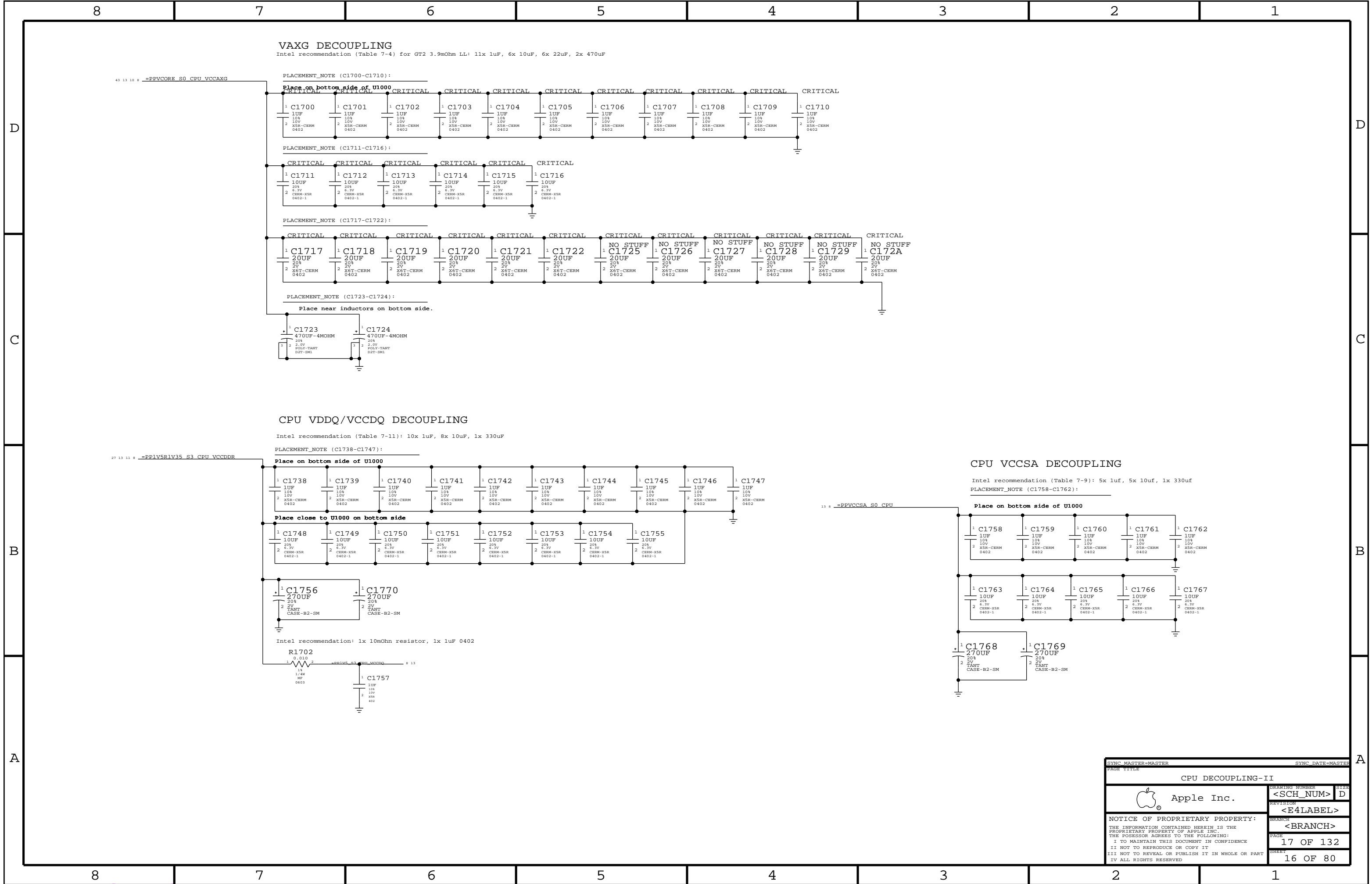
Intel recommendation (table 7-5): 2x 1uF, 1x 330uF

CPU VCCPLL Low pass filter



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

A





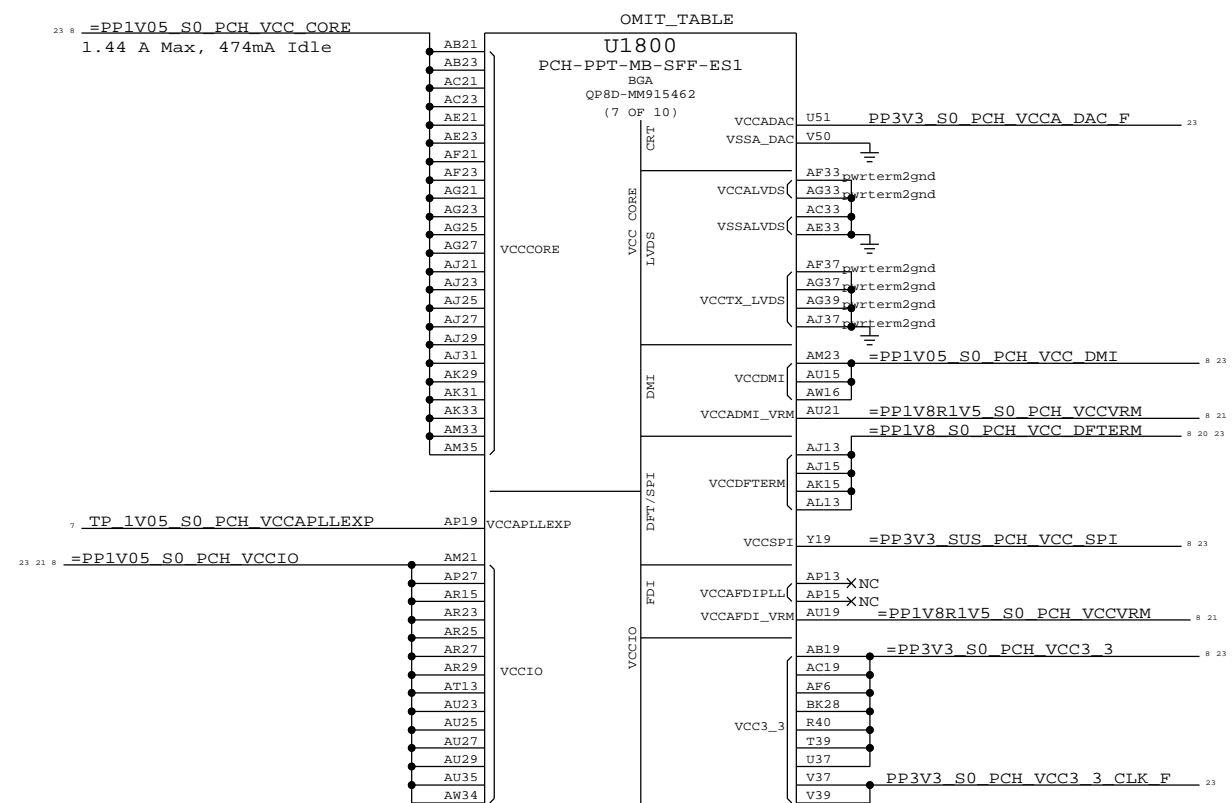
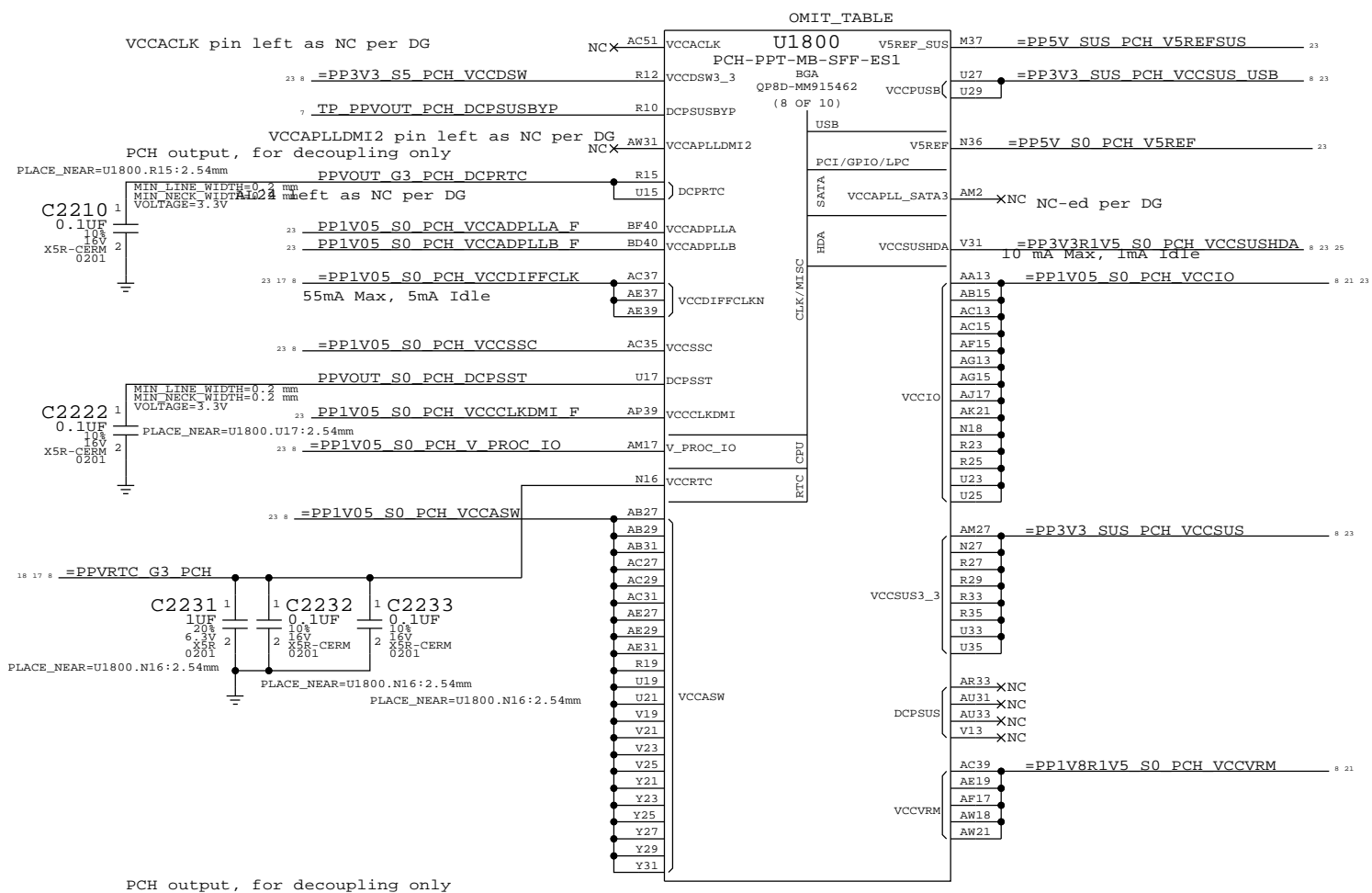


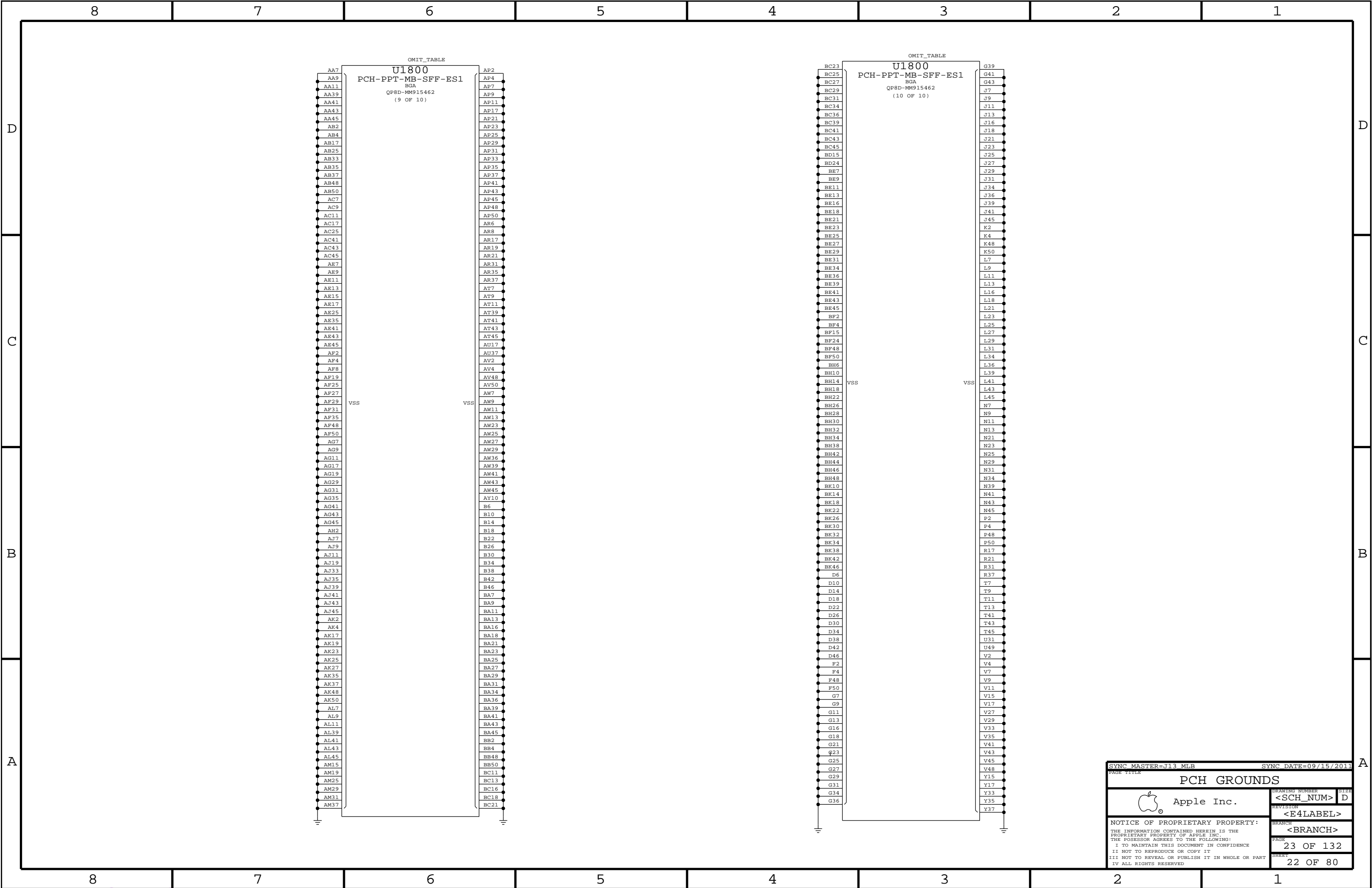
8	7	6	5	4	3	2	1
---	---	---	---	---	---	---	---

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



8	7	6	5	4	3	2	1
---	---	---	---	---	---	---	---






SYNC MASTER=J13 MLB

SYNC DATE=09/15/2011

PAGE TITLE

PCH GROUNDS

 Apple Inc.

DRAWING NUMBER

<SCH_NUM>

REVISION

<E4LABEL>

BRANCH

<BRANCH>

NOTICE OF PROPRIETARY PROPERTY:

THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE INC. THE POSSESSOR 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

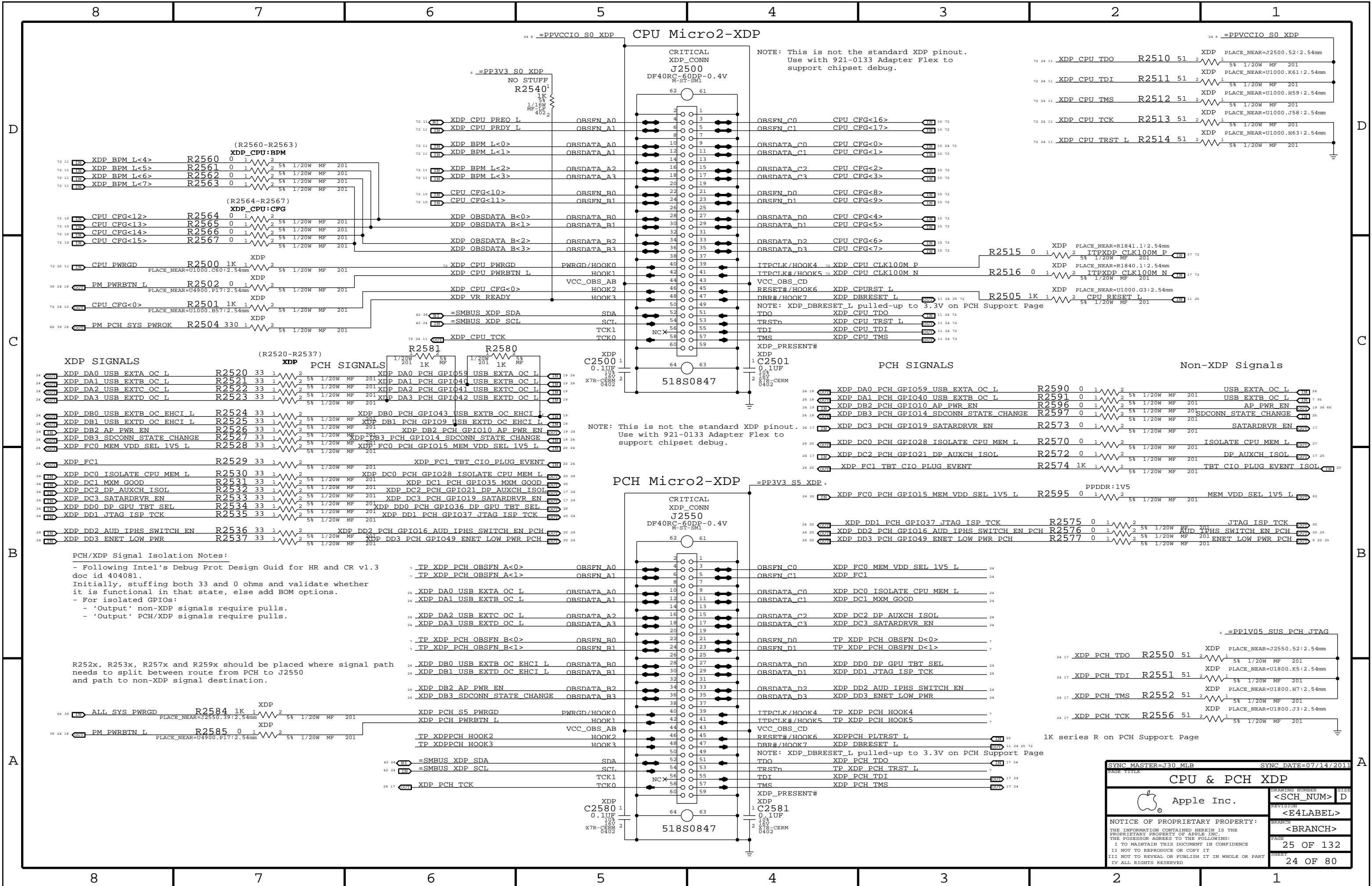
PAGE

23 OF 132

SHEET

22 OF 80





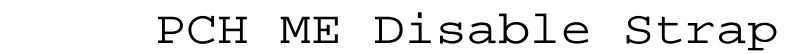
D



SDCONN_STATE_CHANGE ISOLATION



23V3 S0 RSTBUF	Buffered
----------------	----------



23 8 =PP5V_S0_PCH

100K
1/20W
R2620

Q2620
SSM6N37FEAPE
SOT563

SPI_DESCRIPTOR_OVERRIDE_LS5V

PP3V3R1V5_S0_PCH VCCSUSHDA

SPI_DESCRIPTOR_OVERRIDE

Q2620
SSM6N37FEAPE
SOT563

1K
1/20W
R2621


HDA_SDOUT_R

IPD = 9-50k

40 39 SPI_DESCRIPTOR_OVERRIDE_L

17 76

```
GreenClk 25MHz Power      : =PP3V3 S0 SYSCLK
```

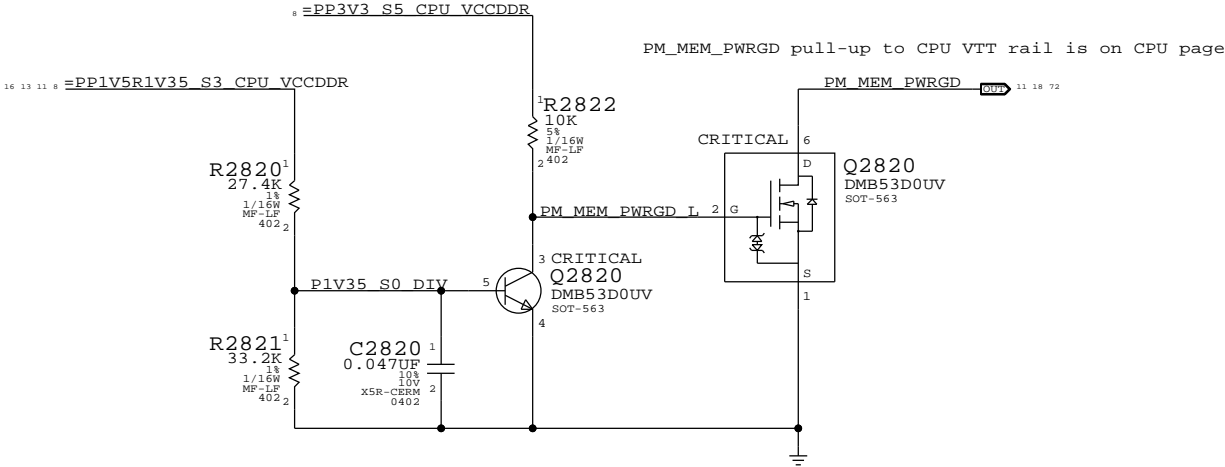
SYNC_MASTER-MASTER		SYNC_DATE-MASTER	
PAGE TITLE			
Chipset Support			
	Apple Inc.		DRAWING NUMBER <SCH_NUM>
			SIZE D
		REVISION <E4LABEL>	
NOTICE OF PROPRIETARY PROPERTY:		BRANCH	
THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE INC. THE POSSESSOR AGREES TO THE FOLLOWING:		<BRANCH>	
I TO MAINTAIN THIS DOCUMENT IN CONFIDENCE I NOT TO REPRODUCE OR COPY IT I WILL NOT TO REVEAL OR PUBLISH IT IN WHOLE OR PART I ALL RIGHTS RESERVED		PAGE 26 OF 132	
		SHEET 25 OF 80	

The circuit below handles CPU and VTT power during S0->S3->S0 transitions, as well as isolating the CPU's SM_DRAMRST# output from the SO-DIMMs when necessary.

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

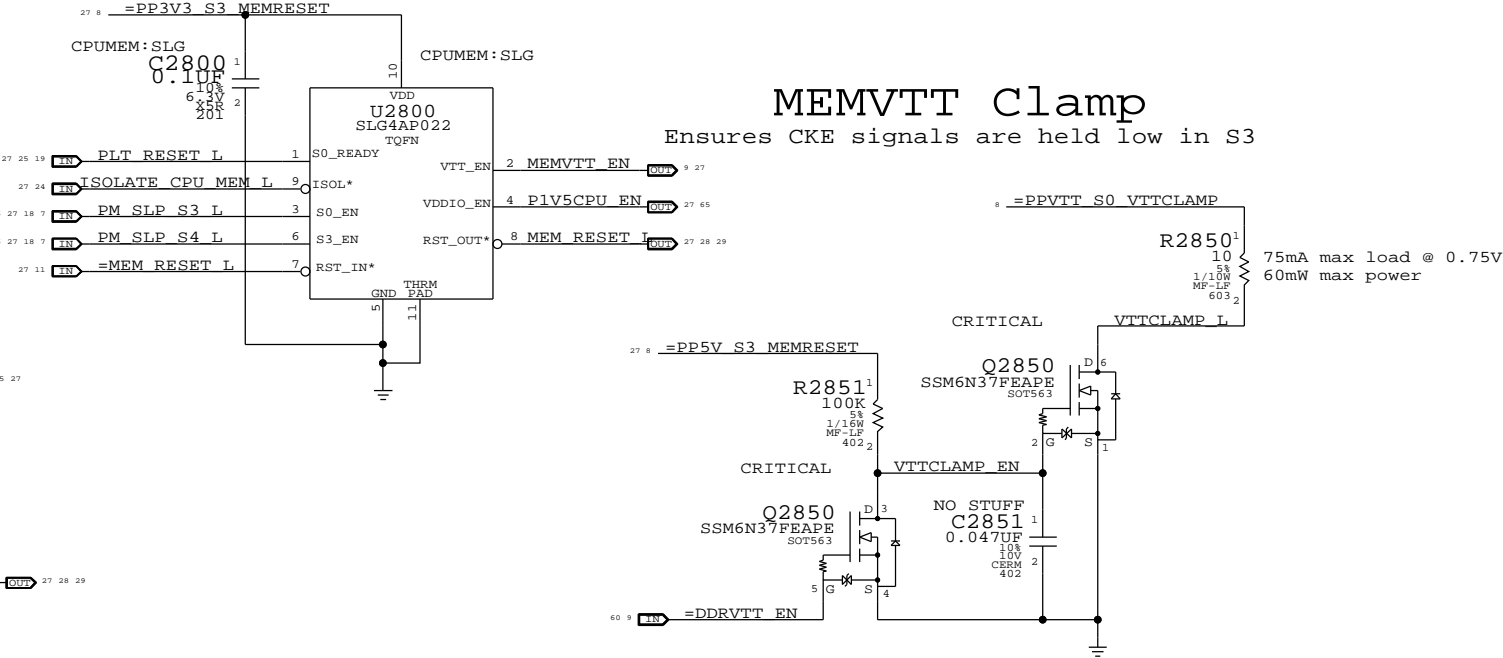
P1V5CPU_EN = (ISOLATE_CPU_MEM_L + PM_SLP_S3_L) * PM_SLP_S4_L
MEMVTT_EN = (ISOLATE_CPU_MEM_L + PLT_RST_L) * PM_SLP_S3_L
MEM_RESET_L = !ISOLATE_CPU_MEM_L + CPU_MEM_RESET_L

1V35 S0 "PGOOD" for CPU



MEMVTT Clamp

Ensures CKE signals are held low in S3

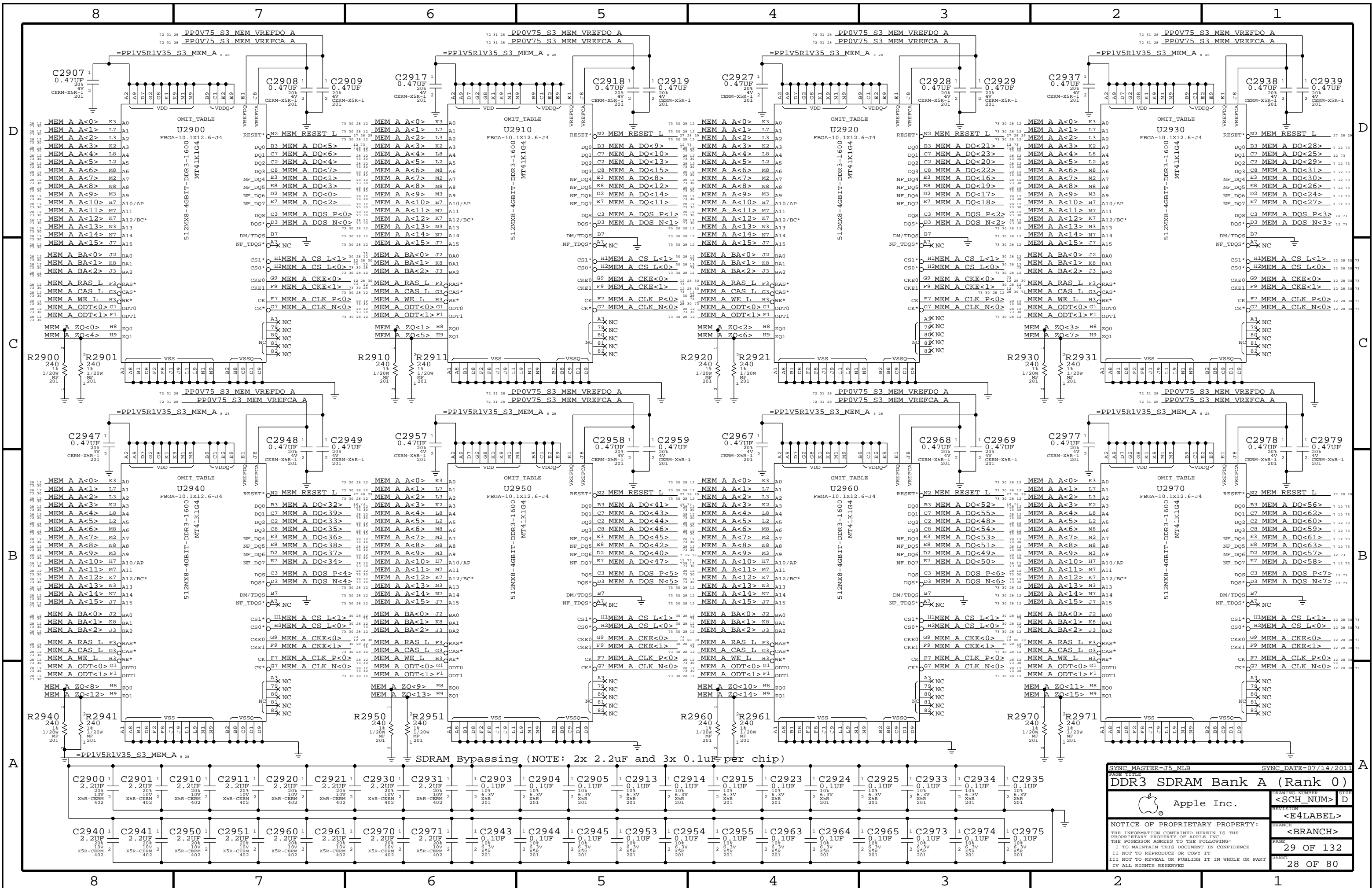


Step	ISOLATE_CPU_MEM_L	PLT_RST_L	PM_SLP_S3_L	PM_SLP_S4_L	CPU_MEM_RESET_L	MEM_RESET_L	MEMVTT_EN	P1V5CPU_EN
S0	0	1	1	1	1	CPU_MEM_RESET_L	1	1
to	1	0	1	1	1	1	1	1
2	0	0	1	1	1	1	0	1
3	0	0	0	1	X	1	0	0
4	0	0	1	1	X	1	0	1
5	0	1	1	1	0 (*)	1	1	1
6	0	1	1	1	1	1	1	1
S0	7	1	1	1	1	CPU_MEM_RESET_L	1	1

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

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

PAGE TITLE		SYNC DATE=07/29/2011	
CPU Memory S3 Support		DRAWING NUMBER	
Apple Inc.		<SCH_NUM>	
NOTICE OF PROPRIETARY PROPERTY:		REVISION	
THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE INC. THE POSSESSOR AGREES TO THE FOLLOWING:		<E4LABEL>	
I TO MAINTAIN THIS DOCUMENT IN CONFIDENCE		BRANCH	
II NOT TO REPRODUCE OR COPY IT		<BRANCH>	
III NOT TO REVEAL OR PUBLISH IT IN WHOLE OR PART		PAGE	
IV ALL RIGHTS RESERVED		28 OF 132	
		SHEET	
		27 OF 80	




SYNC MASTER=J5 MLB

SYNC DATE=07/14/2011

PAGE TITLE

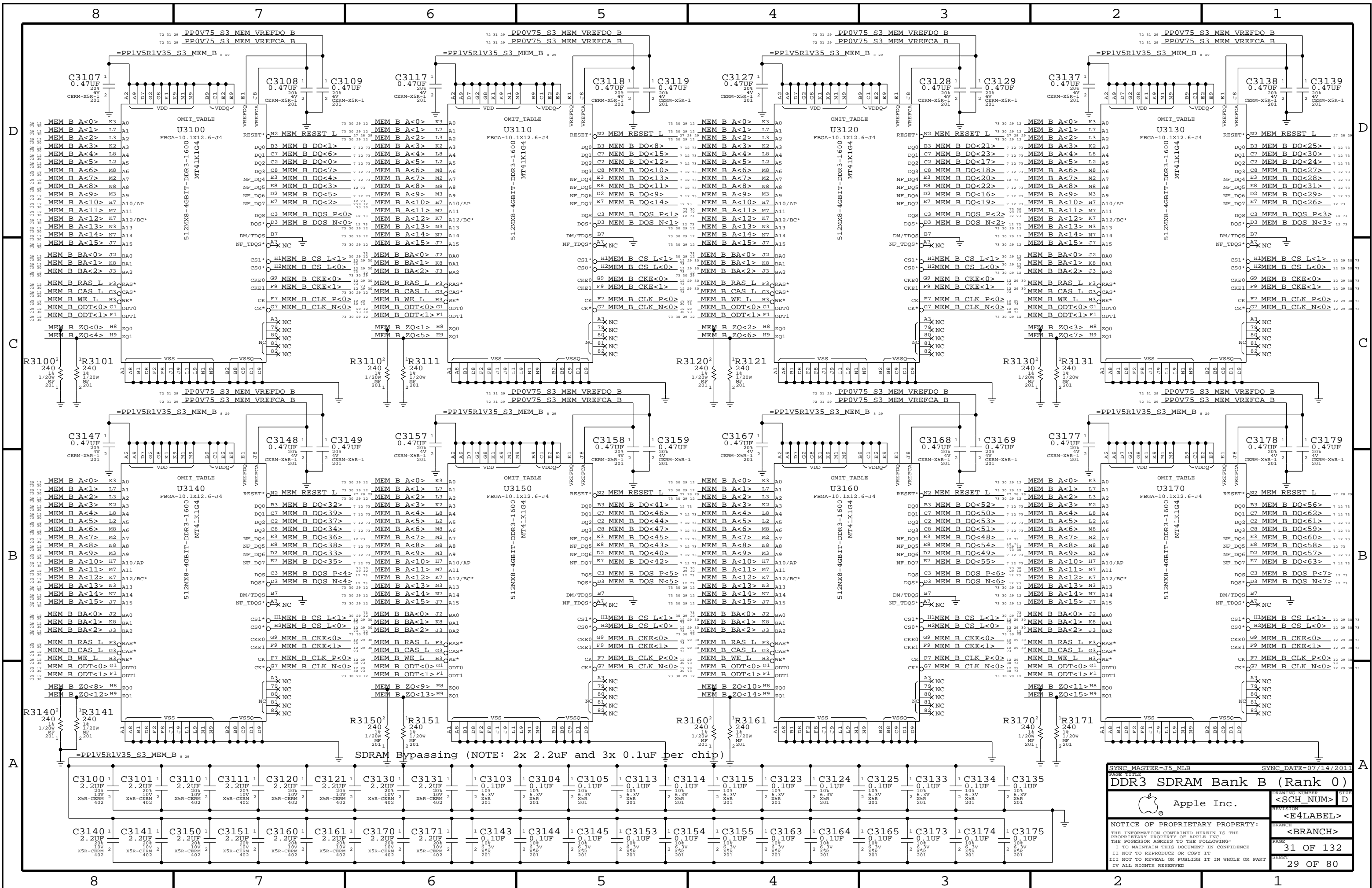
DDR3 SDRAM Bank A (Rank 0)

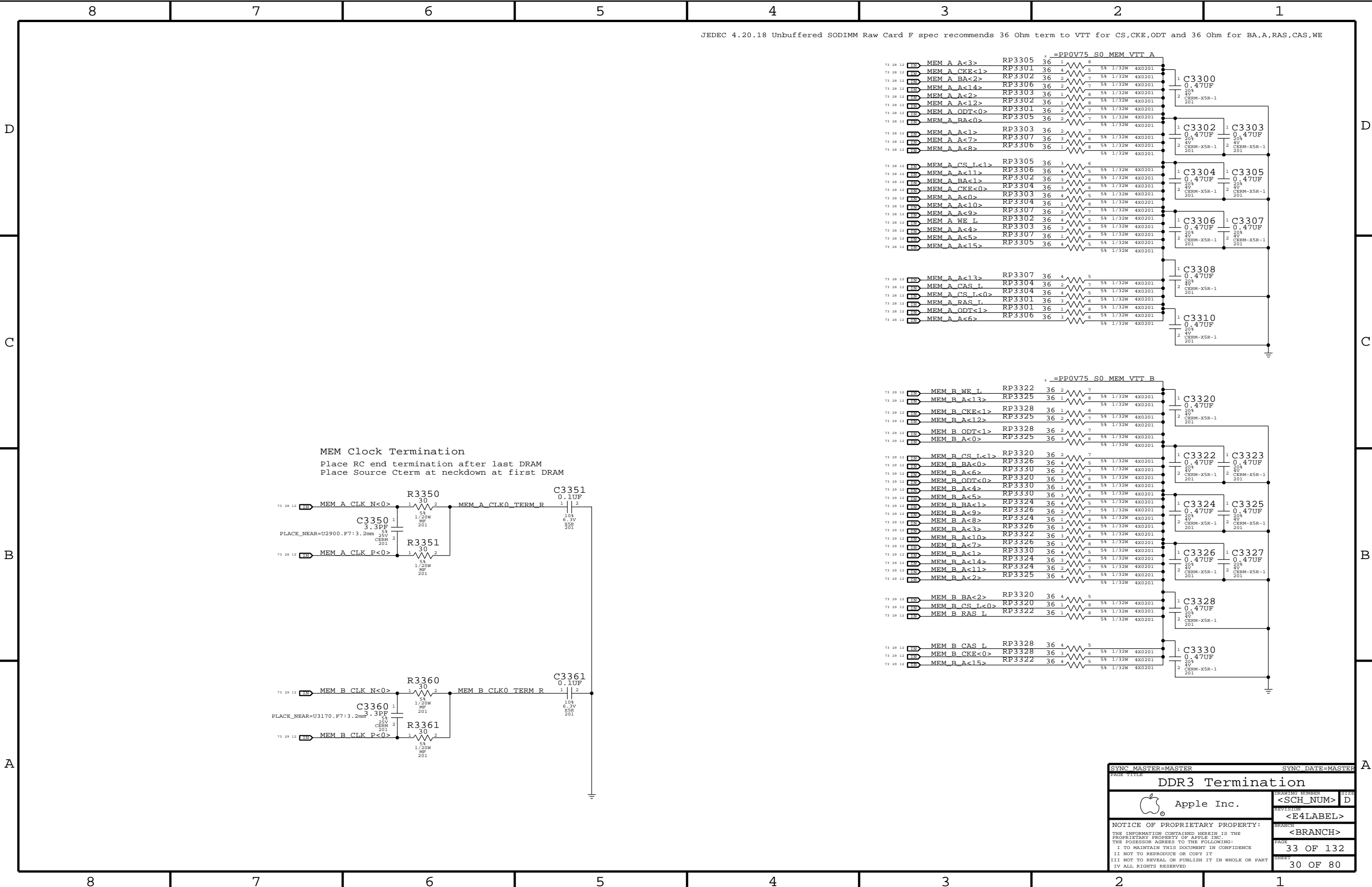
 Apple Inc.

DRAWING NUMBER
<SCH_NUM>
REVISION
<E4LABEL>
BRANCH
<BRANCH>
PAGE
29 OF 132
SHEET
28 OF 80

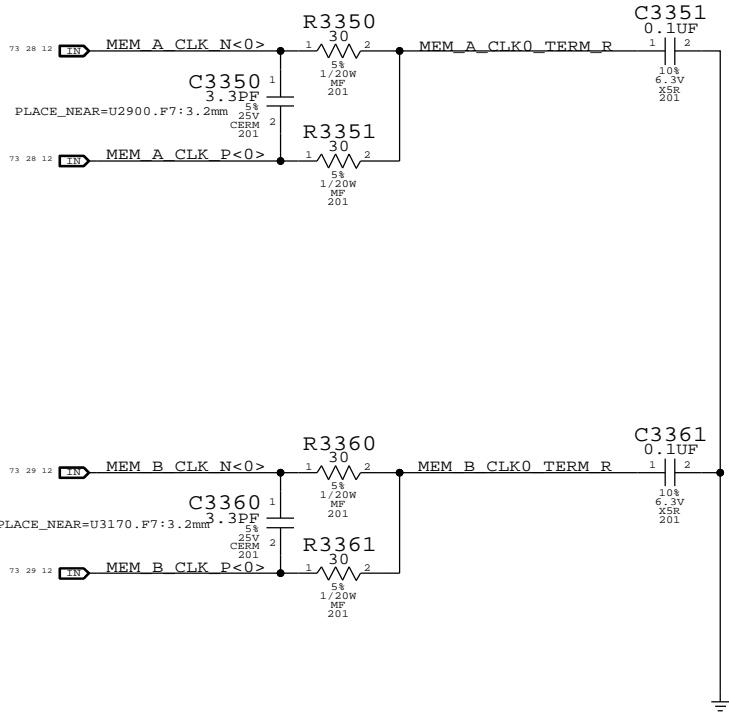
NOTICE OF PROPRIETARY PROPERTY:

THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE INC. THE POSSESSOR 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



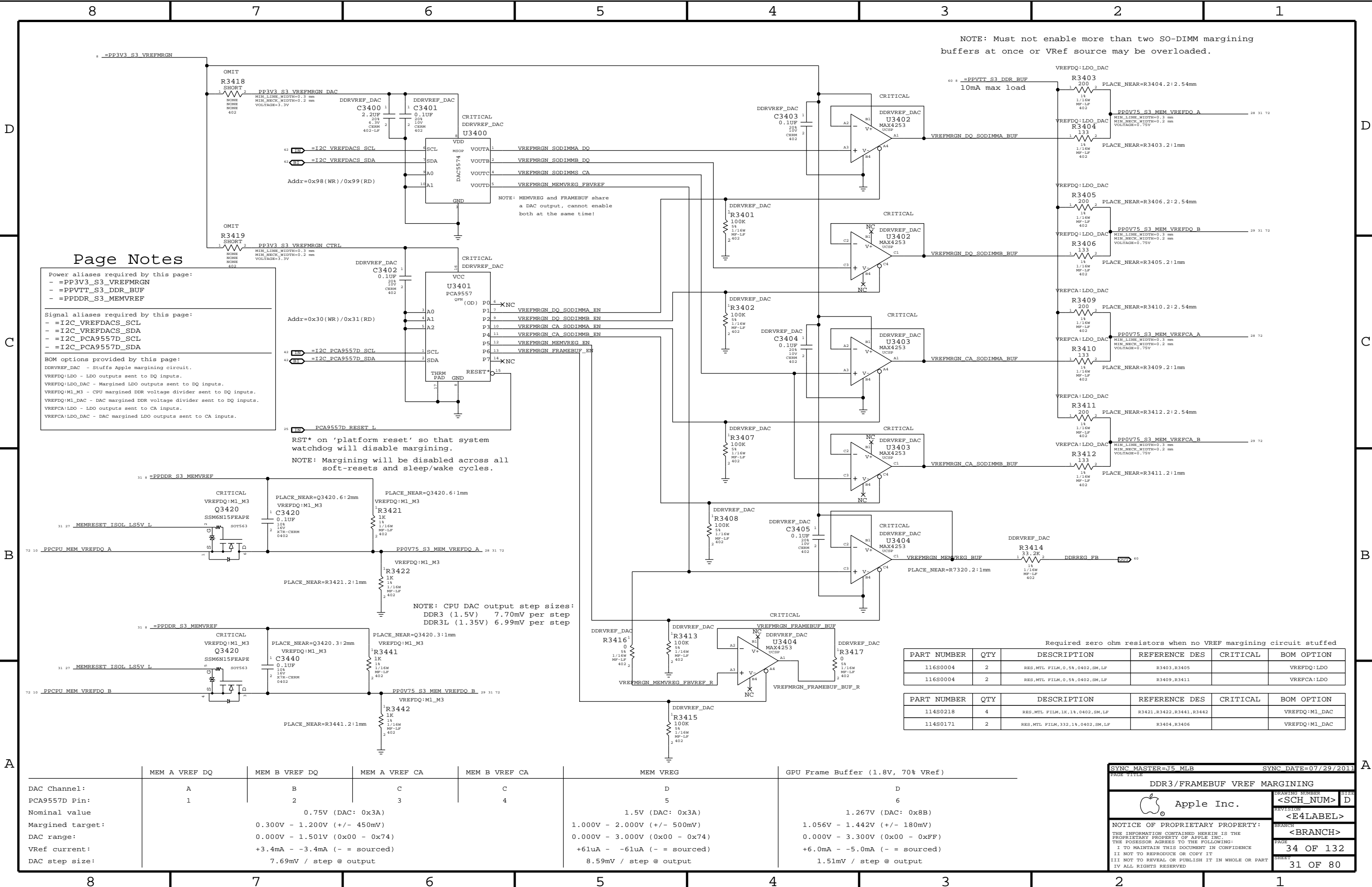


MEM Clock Termination
Place RC end termination after last DRAM
Place Source Cterm at neckdown at first DRAM



=PP0V75 S0 MEM VTT A									
73 28 12	MEM A A<3>	RP3305	36 1	8	5%	1/32W	4X0201	1	C3300
73 28 12	MEM A CKE<1>	RP3301	36 4	5	5%	1/32W	4X0201	2	0.47UF
73 28 12	MEM A BA<2>	RP3302	36 2	7	5%	1/32W	4X0201	1	C3302
73 28 12	MEM A A<14>	RP3306	36 2	7	5%	1/32W	4X0201	2	0.47UF
73 28 12	MEM A A<2>	RP3303	36 1	8	5%	1/32W	4X0201	1	C3303
73 28 12	MEM A A<12>	RP3302	36 1	8	5%	1/32W	4X0201	2	0.47UF
73 28 12	MEM A ODT<0>	RP3301	36 2	7	5%	1/32W	4X0201	1	C3304
73 28 12	MEM A BA<0>	RP3305	36 2	7	5%	1/32W	4X0201	2	0.47UF
73 28 12	MEM A A<1>	RP3303	36 2	7	5%	1/32W	4X0201	1	C3305
73 28 12	MEM A A<7>	RP3307	36 3	6	5%	1/32W	4X0201	2	0.47UF
73 28 12	MEM A A<8>	RP3306	36 1	8	5%	1/32W	4X0201	1	C3306
73 28 12	MEM A CS L<1>	RP3305	36 3	6	5%	1/32W	4X0201	2	0.47UF
73 28 12	MEM A A<11>	RP3306	36 4	5	5%	1/32W	4X0201	1	C3307
73 28 12	MEM A BA<1>	RP3302	36 3	6	5%	1/32W	4X0201	2	0.47UF
73 28 12	MEM A CKE<0>	RP3304	36 3	6	5%	1/32W	4X0201	1	C3308
73 28 12	MEM A A<0>	RP3303	36 4	5	5%	1/32W	4X0201	2	0.47UF
73 28 12	MEM A A<10>	RP3304	36 1	8	5%	1/32W	4X0201	1	C3309
73 28 12	MEM A A<9>	RP3307	36 2	7	5%	1/32W	4X0201	2	0.47UF
73 28 12	MEM A WE L	RP3302	36 4	5	5%	1/32W	4X0201	1	C3310
73 28 12	MEM A A<4>	RP3303	36 3	6	5%	1/32W	4X0201	2	0.47UF
73 28 12	MEM A A<5>	RP3307	36 1	8	5%	1/32W	4X0201	1	C3311
73 28 12	MEM A A<15>	RP3305	36 4	5	5%	1/32W	4X0201	2	0.47UF
73 28 12	MEM A A<13>	RP3307	36 4	5	5%	1/32W	4X0201	1	C3312
73 28 12	MEM A CAS L	RP3304	36 2	7	5%	1/32W	4X0201	2	0.47UF
73 28 12	MEM A CS L<0>	RP3304	36 4	5	5%	1/32W	4X0201	1	C3313
73 28 12	MEM A RAS L	RP3301	36 3	6	5%	1/32W	4X0201	2	0.47UF
73 28 12	MEM A ODT<1>	RP3301	36 1	8	5%	1/32W	4X0201	1	C3314
73 28 12	MEM A A<6>	RP3306	36 3	6	5%	1/32W	4X0201	2	0.47UF
=PP0V75 S0 MEM VTT B									
73 29 12	MEM B WF L	RP3322	36 2	7	5%	1/32W	4X0201	1	C3320
73 29 12	MEM B A<13>	RP3325	36 1	8	5%	1/32W	4X0201	2	0.47UF
73 29 12	MEM B CKE<1>	RP3328	36 1	8	5%	1/32W	4X0201	1	C3321
73 29 12	MEM B A<12>	RP3325	36 2	7	5%	1/32W	4X0201	2	0.47UF
73 29 12	MEM B ODT<1>	RP3328	36 2	7	5%	1/32W	4X0201	1	C3322
73 29 12	MEM B A<0>	RP3325	36 3	6	5%	1/32W	4X0201	2	0.47UF
73 29 12	MEM B CS L<1>	RP3320	36 2	7	5%	1/32W	4X0201	1	C3323
73 29 12	MEM B BA<0>	RP3326	36 4	5	5%	1/32W	4X0201	2	0.47UF
73 29 12	MEM B A<6>	RP3330	36 2	7	5%	1/32W	4X0201	1	C3324
73 29 12	MEM B ODT<0>	RP3320	36 3	6	5%	1/32W	4X0201	2	0.47UF
73 29 12	MEM B A<4>	RP3330	36 1	8	5%	1/32W	4X0201	1	C3325
73 29 12	MEM B A<5>	RP3330	36 3	6	5%	1/32W	4X0201	2	0.47UF
73 29 12	MEM B BA<1>	RP3324	36 4	5	5%	1/32W	4X0201	1	C3326
73 29 12	MEM B A<9>	RP3326	36 2	7	5%	1/32W	4X0201	2	0.47UF
73 29 12	MEM B A<8>	RP3324	36 1	8	5%	1/32W	4X0201	1	C3327
73 29 12	MEM B A<3>	RP3326	36 3	6	5%	1/32W	4X0201	2	0.47UF
73 29 12	MEM B A<10>	RP3322	36 3	6	5%	1/32W	4X0201	1	C3328
73 29 12	MEM B A<7>	RP3326	36 1	8	5%	1/32W	4X0201	2	0.47UF
73 29 12	MEM B A<1>	RP3330	36 4	5	5%	1/32W	4X0201	1	C3329
73 29 12	MEM B A<14>	RP3324	36 3	6	5%	1/32W	4X0201	2	0.47UF
73 29 12	MEM B A<11>	RP3324	36 2	7	5%	1/32W	4X0201	1	C3330
73 29 12	MEM B A<2>	RP3325	36 4	5	5%	1/32W	4X0201	2	0.47UF
73 29 12	MEM B BA<2>	RP3320	36 4	5	5%	1/32W	4X0201	1	C3331
73 29 12	MEM B CS L<0>	RP3320	36 1	8	5%	1/32W	4X0201	2	0.47UF
73 29 12	MEM B RAS L	RP3322	36 1	8	5%	1/32W	4X0201	1	C3332
73 29 12	MEM B CAS L	RP3328	36 4	5	5%	1/32W	4X0201	2	0.47UF
73 29 12	MEM B CKE<0>	RP3328	36 3	6	5%	1/32W	4X0201	1	C3333
73 29 12	MEM B A<15>	RP3322	36 4	5	5%	1/32W	4X0201	2	0.47UF

SYNC MASTER=MASTER		SYNC DATE=MASTER	
PAGE TITLE			
DDR3 Termination			
Apple Inc.		DRAWING NUMBER	SIZE
		<SCH_NUM>	D
		REVISION	
		<E4LABEL>	
		BRANCH	
		<BRANCH>	
NOTICE OF PROPRIETARY PROPERTY:			
THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE INC. THE POSSESSOR 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		33 OF 132	
SHEET		30 OF 80	



Page Notes

Power aliases required by this page:
- =PP3V3_S3_VREFMGRN
- =PPVTT_S3_DDR_BUF
- =PPDDR_S3_MEMVREF

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

BOM options provided by this page:
DDRREF_DAC - Stuffs Apple margining circuit.
VREFDQ:LDO - LDO outputs sent to DQ inputs.
VREFDQ:LDO_DAC - Margined LDO outputs sent to DQ inputs.
VREFDQ:M1_M3 - CPU margined DDR voltage divider sent to DQ inputs.
VREFDQ:M1_DAC - DAC margined DDR voltage divider sent to DQ inputs.
VREFCA:LDO - LDO outputs sent to CA inputs.
VREFCA:LDO_DAC - DAC margined LDO outputs sent to CA inputs.

RST* on 'platform reset' so that system watchdog will disable margining.
NOTE: Margining will be disabled across all soft-resets and sleep/wake cycles.

NOTE: CPU DAC output step sizes:
DDR3 (1.5V) 7.70mV per step
DDR3L (1.35V) 6.99mV per step

PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
116S0004	2	RES,MTL FILM,0.5%,0402,SM,LF	R3403,R3405		VREFDQ:LDO
116S0004	2	RES,MTL FILM,0.5%,0402,SM,LF	R3409,R3411		VREFCA:LDO

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

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

SYNC MASTER=J5 MLB

SYNC DATE=07/29/2011

DDR3/FRAMEBUF VREF MARGINING

Apple Inc.

NOTICE OF PROPRIETARY PROPERTY:

THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE INC. THE POSSESSOR 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

REVISION

BRANCH

PAGE

SHEET

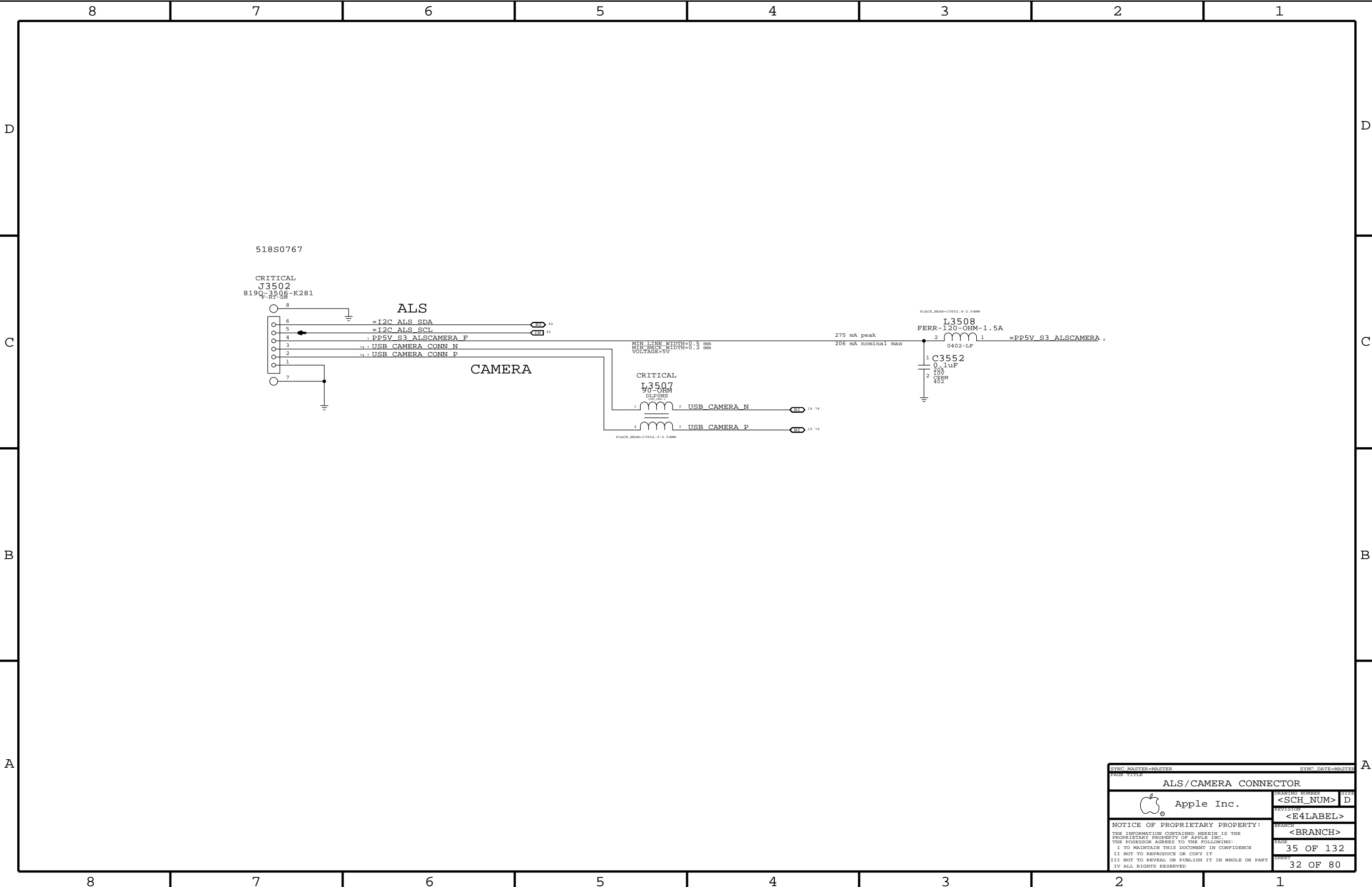
<SCH_NUM>


<E4LABEL>

<BRANCH>

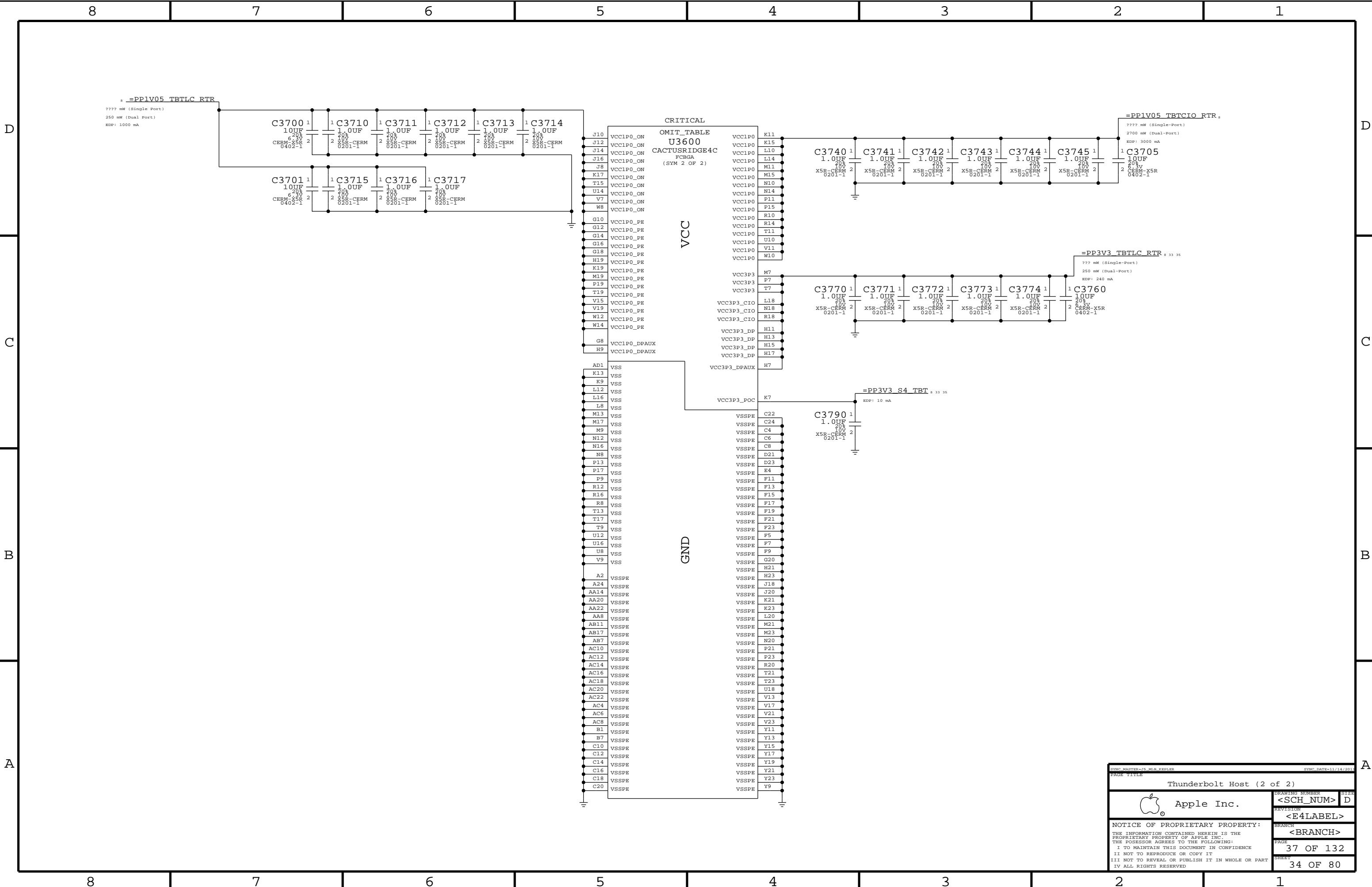
34 OF 132

31 OF 80



SYNC MASTER=MASTER		SYNC DATE=MASTER	
PAGE TITLE			
ALS/CAMERA CONNECTOR			
 Apple Inc.		DRAWING NUMBER	SIZE
		<SCH_NUM>	D
NOTICE OF PROPRIETARY PROPERTY: THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE INC. THE POSSESSOR 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		REVISION	
		<E4LABEL>	
		BRANCH	
		<BRANCH>	
		PAGE	35 OF 132
		SHEET	32 OF 80





Page Notes

Power aliases required by this page:

- PPVIN_SW_TBTBST (8-13V Boost Input)
- PP15V_TBT_REG (15V Boost Output)
- PP3V3_TBT_P3V3TBTFT (3.3V FET Input)
- PP3V3_TBTLC_FET (3.3V FET Output)
- PP3V3_S0_TBTWRCCTL
- PP1V05_TBT_P1V05TBTFT (1.05V FET Input)
- PP1V05_TBTLC_FET (1.05V FET Output)

Signal aliases required by this page:

- TBT_CLKREQ_L
- TBT_RESET_L

BOM options provided by this page:

TBTBST:Y - Stuffs 15V boost circuitry.

Thunderbolt 15V Boost Regulator

SI8409DB:

Vds(max): -30V
Vgs(max): +/-12V
Vgs(th): -1.4V
Rds(on): 46mOhm @ 4.5V Vgs
Id(max): 3.7A @ 70C

CRITICAL
TBTBST:Y
Q3880
SI8409DB

=PPVIN SW TBTBST
8-13V Input
Changes required
for 2S.

CRITICAL
TBTBST:Y
L3895
3.3UH-6.5A

TBTBST BOOST
MIN LINE WIDTH=0.5 mm
MIN NECK WIDTH=0.25 mm
SWITCHING MODE=TRUE
DIDT=TRUE

CRITICAL
TBTBST:Y
U3890
LT3957

TBTBST SNS1
TBTBST:Y
R3889

TBTBST SNS2
TBTBST:Y
R3889

TBTBST VSNS
TBTBST:Y
R3895

TBTBST FBX
TBTBST:Y
R3896

TBTBST FBX
TBTBST:Y
R3896

TBTBST FBX
TBTBST:Y
R3896

TBTBST FBX
TBTBST:Y
R3896

TBTBST FBX
TBTBST:Y
R3896

TBTBST FBX
TBTBST:Y
R3896

TBTBST FBX
TBTBST:Y
R3896

TBTBST FBX
TBTBST:Y
R3896

TBTBST FBX
TBTBST:Y
R3896

TBTBST FBX
TBTBST:Y
R3896

TBTBST FBX
TBTBST:Y
R3896

TBTBST FBX
TBTBST:Y
R3896

TBTBST FBX
TBTBST:Y
R3896

TBTBST FBX
TBTBST:Y
R3896

TBTBST FBX
TBTBST:Y
R3896

TBTBST FBX
TBTBST:Y
R3896

TBTBST FBX
TBTBST:Y
R3896

TBTBST FBX
TBTBST:Y
R3896

TBTBST FBX
TBTBST:Y
R3896

TBTBST FBX
TBTBST:Y
R3896

TBTBST FBX
TBTBST:Y
R3896

TBTBST FBX
TBTBST:Y
R3896

TBTBST FBX
TBTBST:Y
R3896

TBTBST FBX
TBTBST:Y
R3896

TBTBST FBX
TBTBST:Y
R3896

TBTBST FBX
TBTBST:Y
R3896

TBTBST FBX
TBTBST:Y
R3896

TBTBST FBX
TBTBST:Y
R3896

TBTBST FBX
TBTBST:Y
R3896

TBTBST FBX
TBTBST:Y
R3896

TBTBST FBX
TBTBST:Y
R3896

PPVIN SW TBTBST
MIN LINE WIDTH=0.5 mm
MIN NECK WIDTH=0.25 mm
Voltage not specified here,
add property on another page.

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

PPVIN SW TBTBST
MIN LINE WIDTH=0.5 mm
MIN NECK WIDTH=0.25 mm
Voltage not specified here,
add property on another page.

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

PPVIN SW TBTBST
MIN LINE WIDTH=0.5 mm
MIN NECK WIDTH=0.25 mm
Voltage not specified here,
add property on another page.

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

PPVIN SW TBTBST
MIN LINE WIDTH=0.5 mm
MIN NECK WIDTH=0.25 mm
Voltage not specified here,
add property on another page.

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

PPVIN SW TBTBST
MIN LINE WIDTH=0.5 mm
MIN NECK WIDTH=0.25 mm
Voltage not specified here,
add property on another page.

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

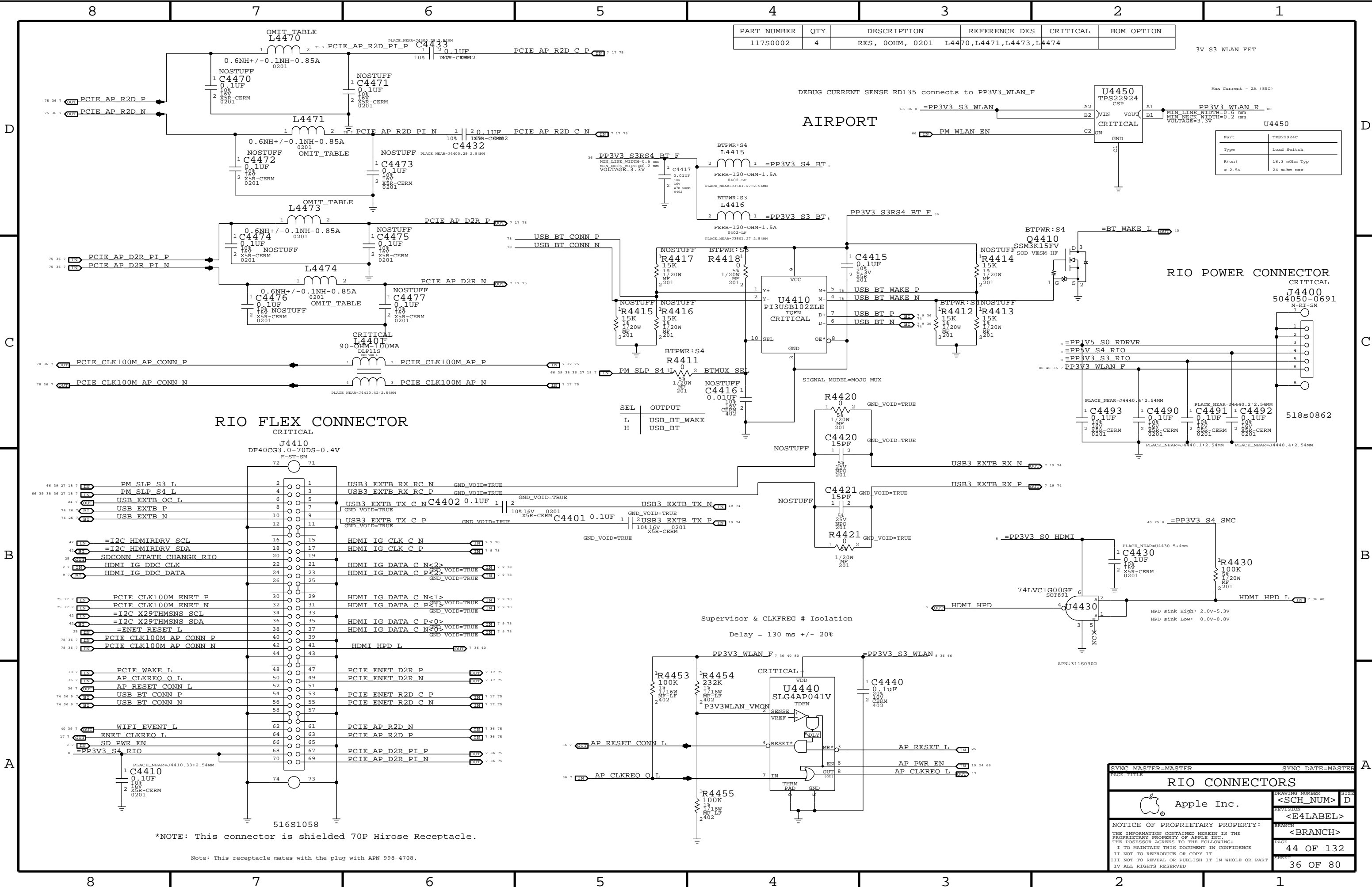
TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

TBTBST:Y
R3891
200K

PPVIN SW TBTBST
MIN LINE WIDTH=0.5 mm
MIN NE



PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
117S0002	4	RES, 00HM, 0201	L4470,L4471,L4473,L4474		

3V S3 WLAN FET

AIRPORT

RIO POWER CONNECTOR

RIO FLEX CONNECTOR

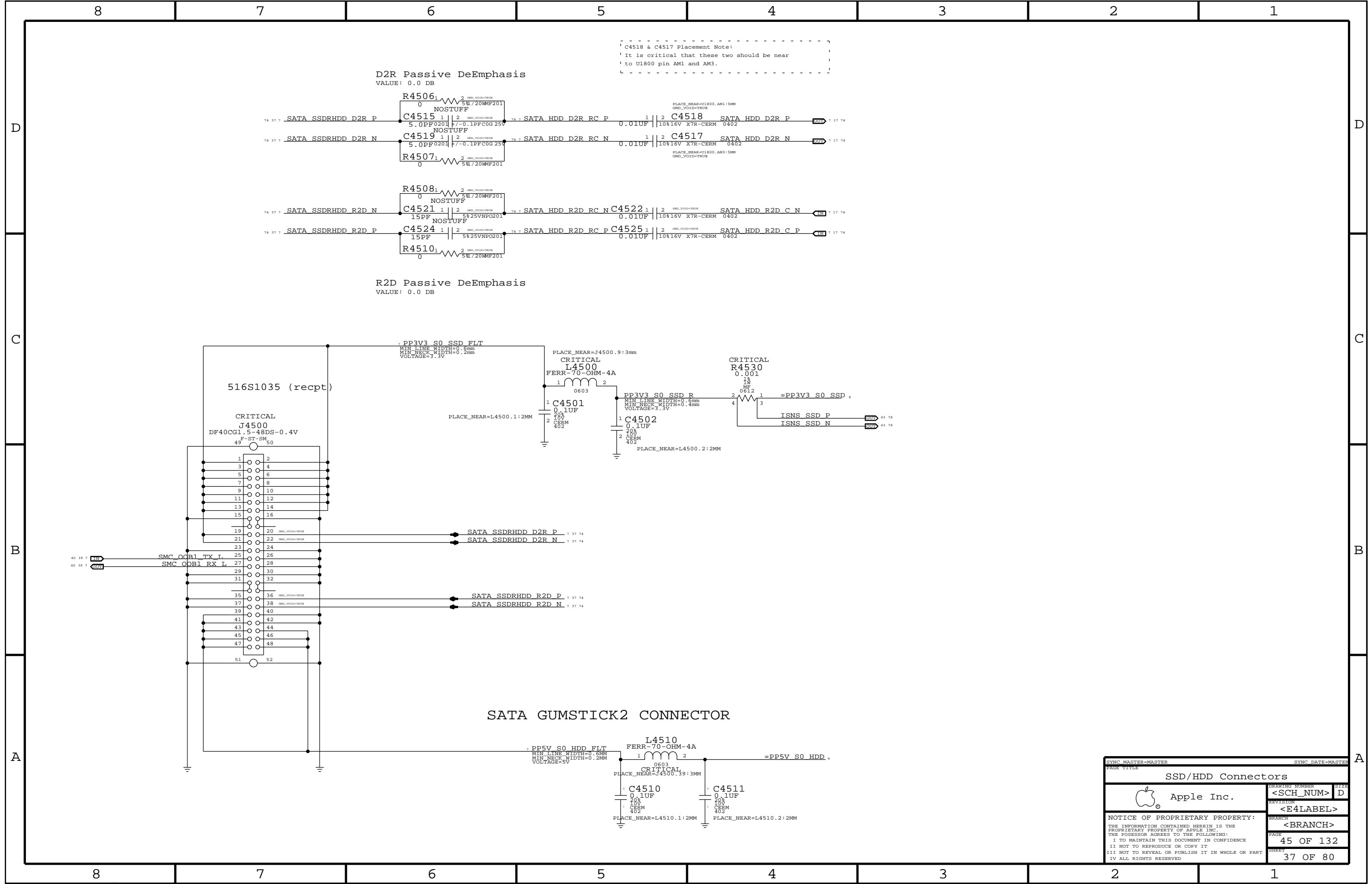
Supervisor & CLKFREG # Isolation

Delay = 130 ms +/- 20%

*NOTE: This connector is shielded 70P Hirose Receptacle.

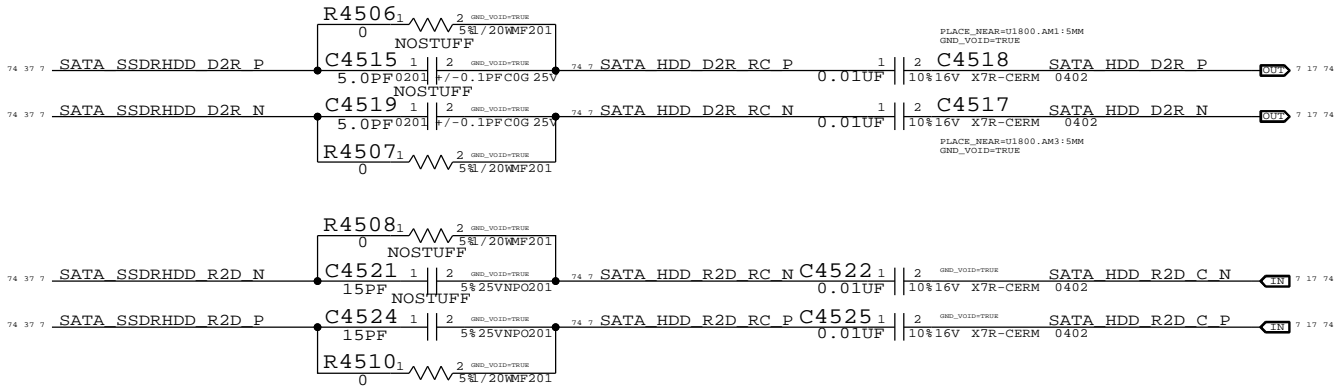
Note: This receptacle mates with the plug with APN 998-4708.

SYNC MASTER=MASTER		SYNC DATE=MASTER	
PAGE TITLE		DRAWING NUMBER	
RIO CONNECTORS		<SCH_NUM> D	
Apple Inc.		REVISION	
		<E4LABEL>	
NOTICE OF PROPRIETARY PROPERTY:		BRANCH	
THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE INC. THE POSSESSOR AGREES TO THE FOLLOWING:		<BRANCH>	
I TO MAINTAIN THIS DOCUMENT IN CONFIDENCE		PAGE	
II NOT TO REPRODUCE OR COPY IT		44 OF 132	
III NOT TO REVEAL OR PUBLISH IT IN WHOLE OR PART		SHEET	
IV ALL RIGHTS RESERVED		36 OF 80	

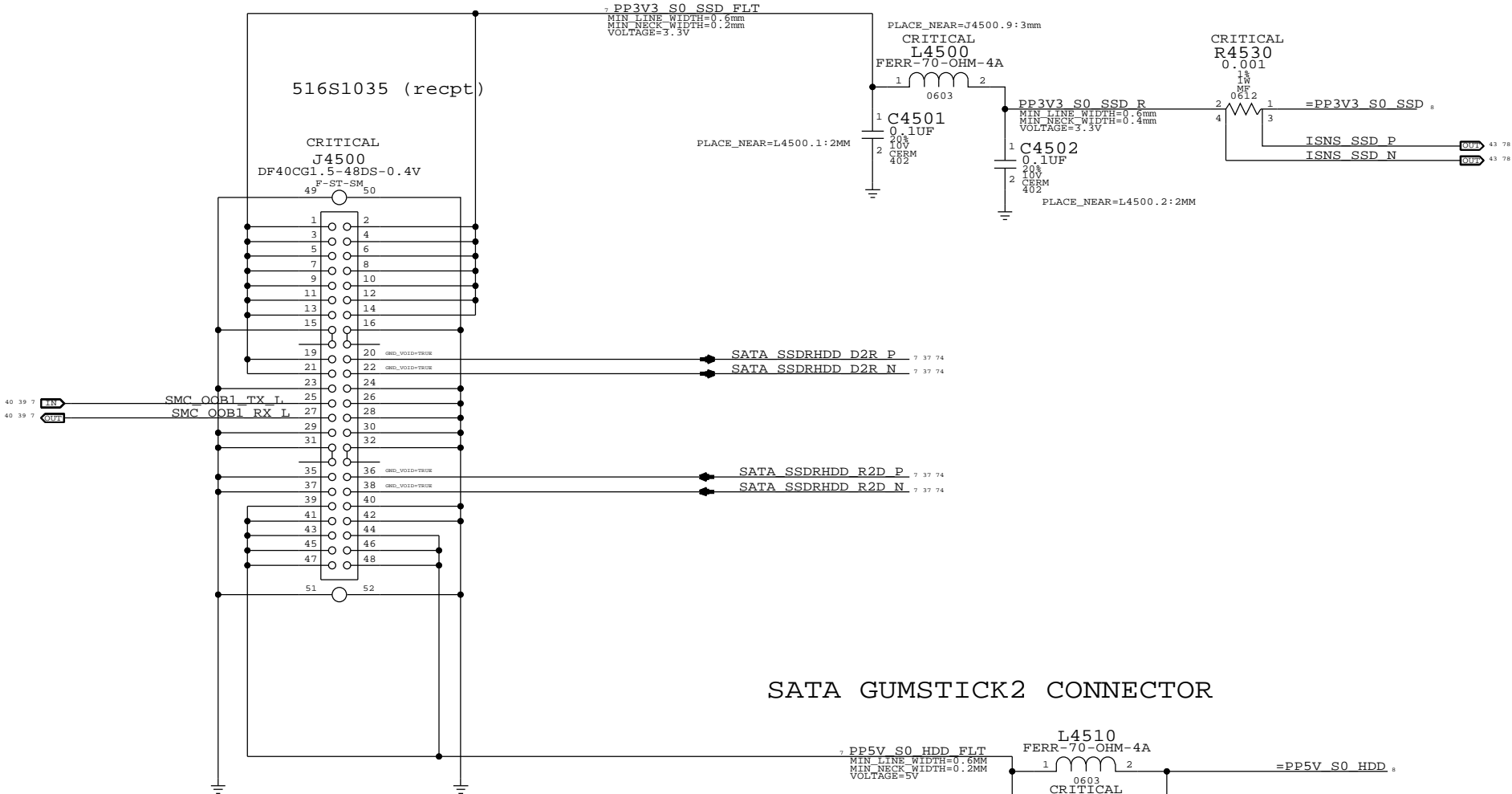


C4518 & C4517 Placement Note:
It is critical that these two should be near
to U1800 pin AM1 and AM3.


D2R Passive DeEmphasis
VALUE: 0.0 DB

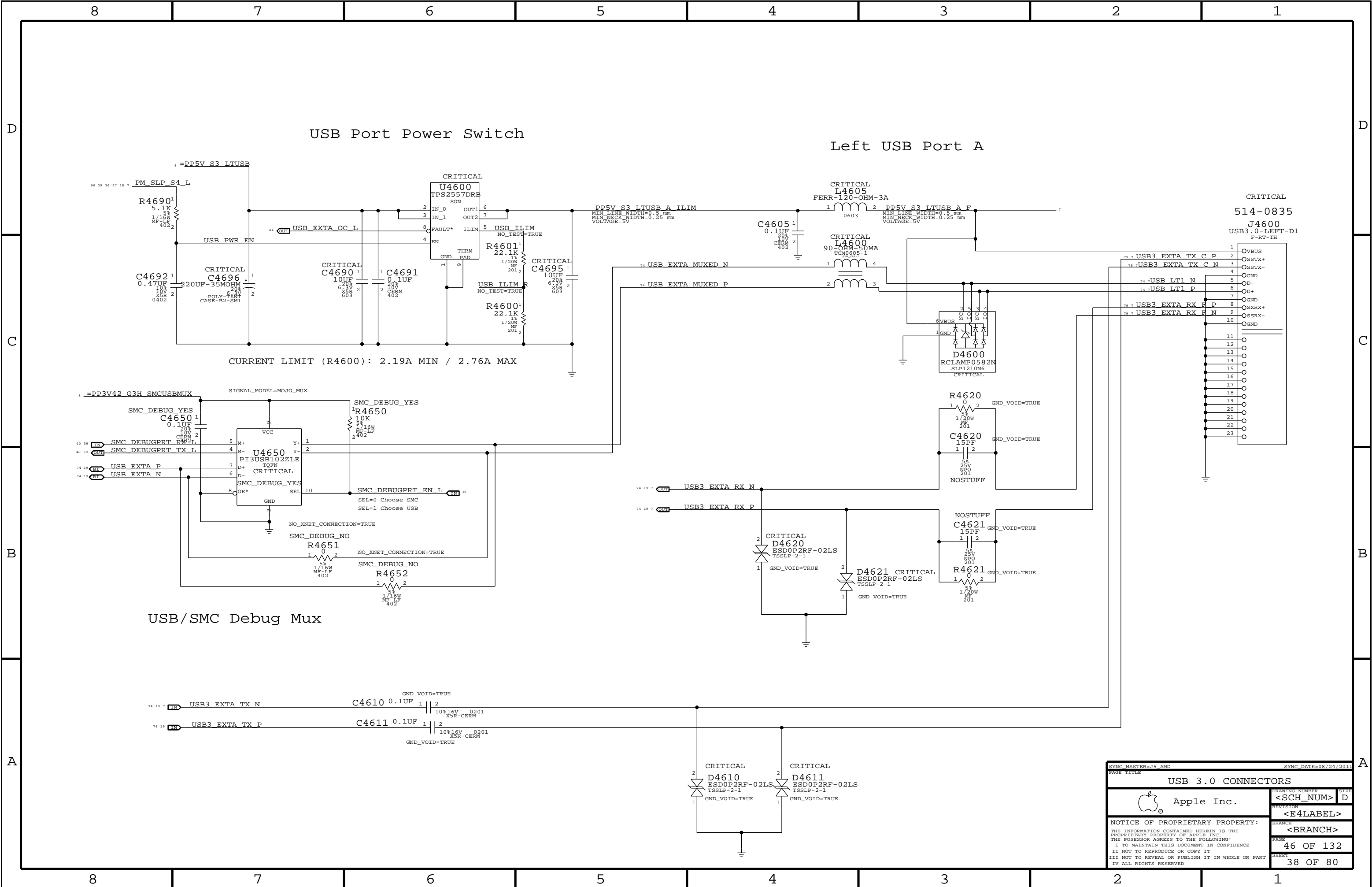


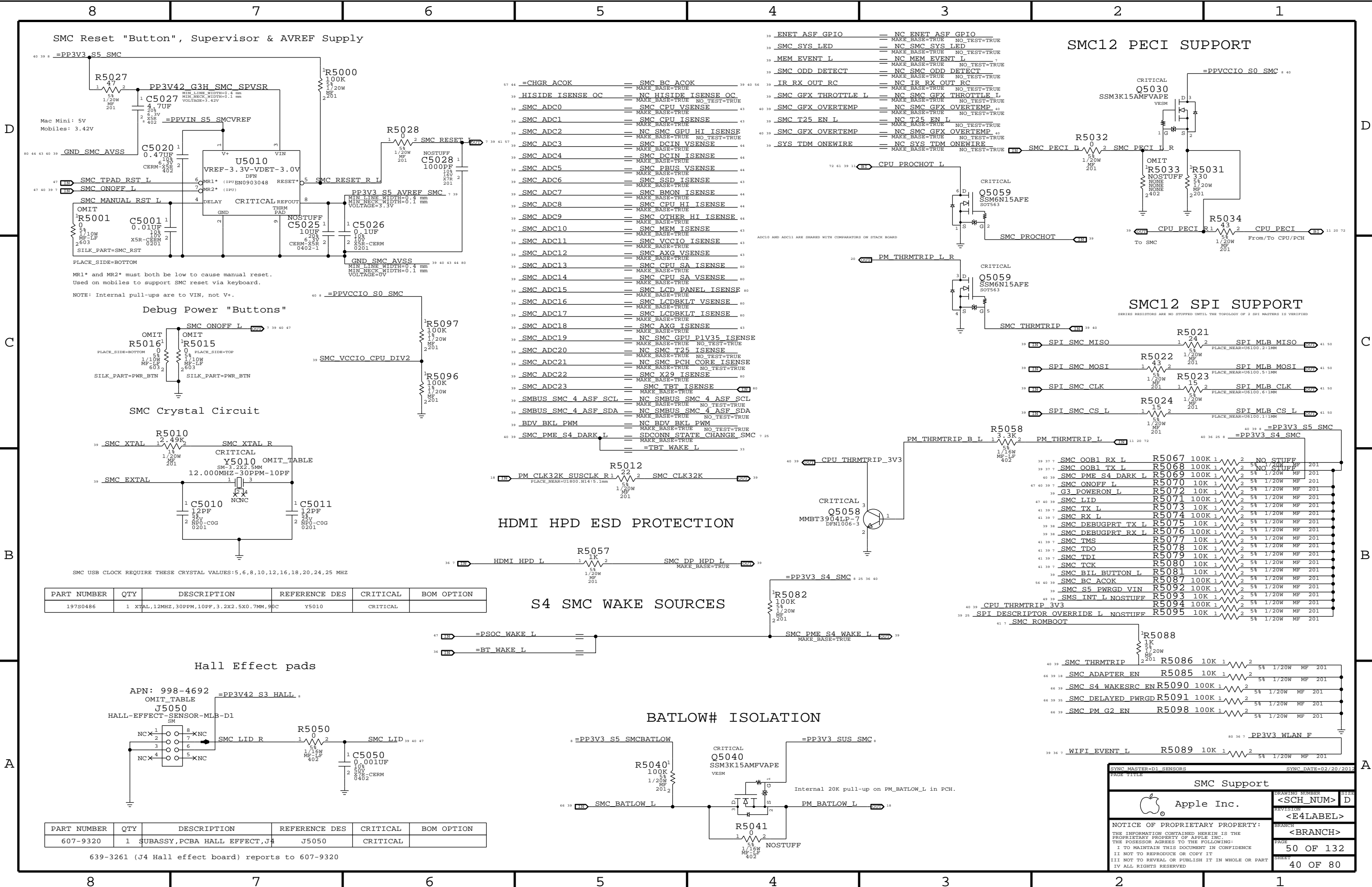
R2D Passive DeEmphasis
VALUE: 0.0 DB



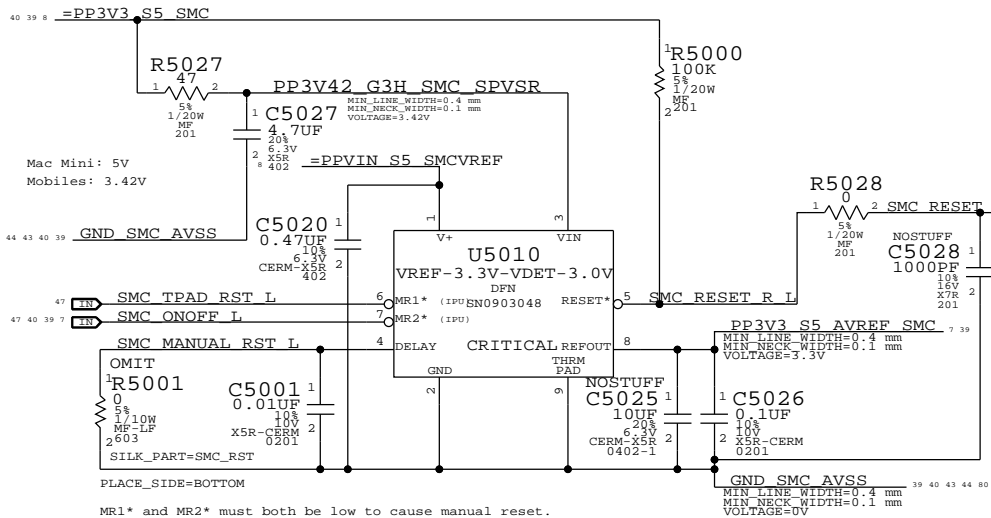
SATA GUMSTICK2 CONNECTOR

SYNC MASTER=MASTER		SYNC DATE=MASTER	
PAGE TITLE			
SSD/HDD Connectors			
 Apple Inc.		DRAWING NUMBER	SIZE
		<SCH_NUM>	D
NOTICE OF PROPRIETARY PROPERTY: THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE INC. THE POSSESSOR AGREES TO THE FOLLOWING: I 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		REVISION	
		<E4LABEL>	
		BRANCH	
		<BRANCH>	
		PAGE	45 OF 132
		SHEET	37 OF 80





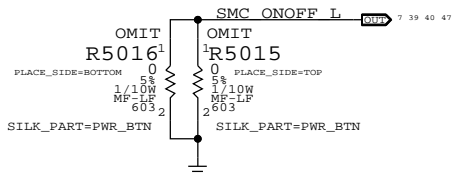
SMC Reset "Button", Supervisor & AVREF Supply



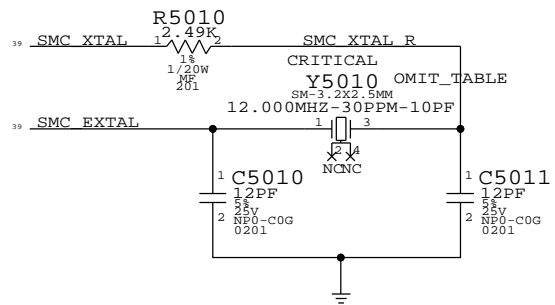
MR1* and MR2* must both be low to cause manual reset.
Used on mobiles to support SMC reset via keyboard.

NOTE: Internal pull-ups are to VIN, not V+.

Debug Power "Buttons"



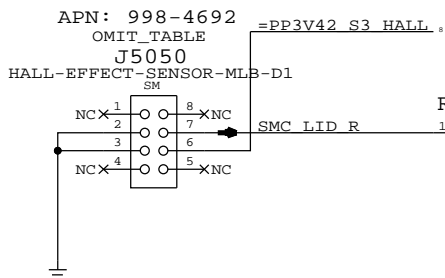
SMC Crystal Circuit



SMC USB CLOCK REQUIRE THESE CRYSTAL VALUES:5,6,8,10,12,16,18,20,24,25 MHZ

PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
197S0486	1	XTAL, 12MHZ, 30PPM, 10PF, 3.2X2.5X0.7MM, 90C	Y5010	CRITICAL	

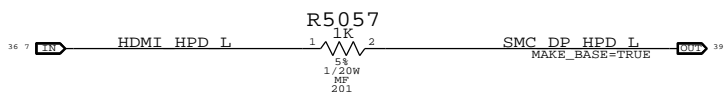
Hall Effect pads



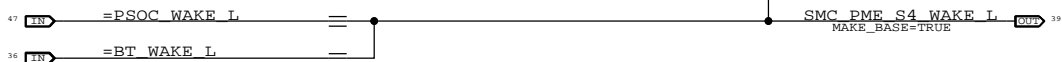
PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
607-9320	1	SUBASSY,PCBA HALL EFFECT,J4	J5050	CRITICAL	

639-3261 (J4 Hall effect board) reports to 607-9320

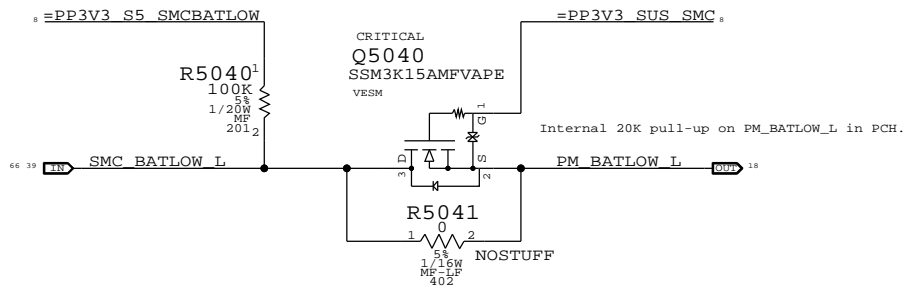
HDMI HPD ESD PROTECTION



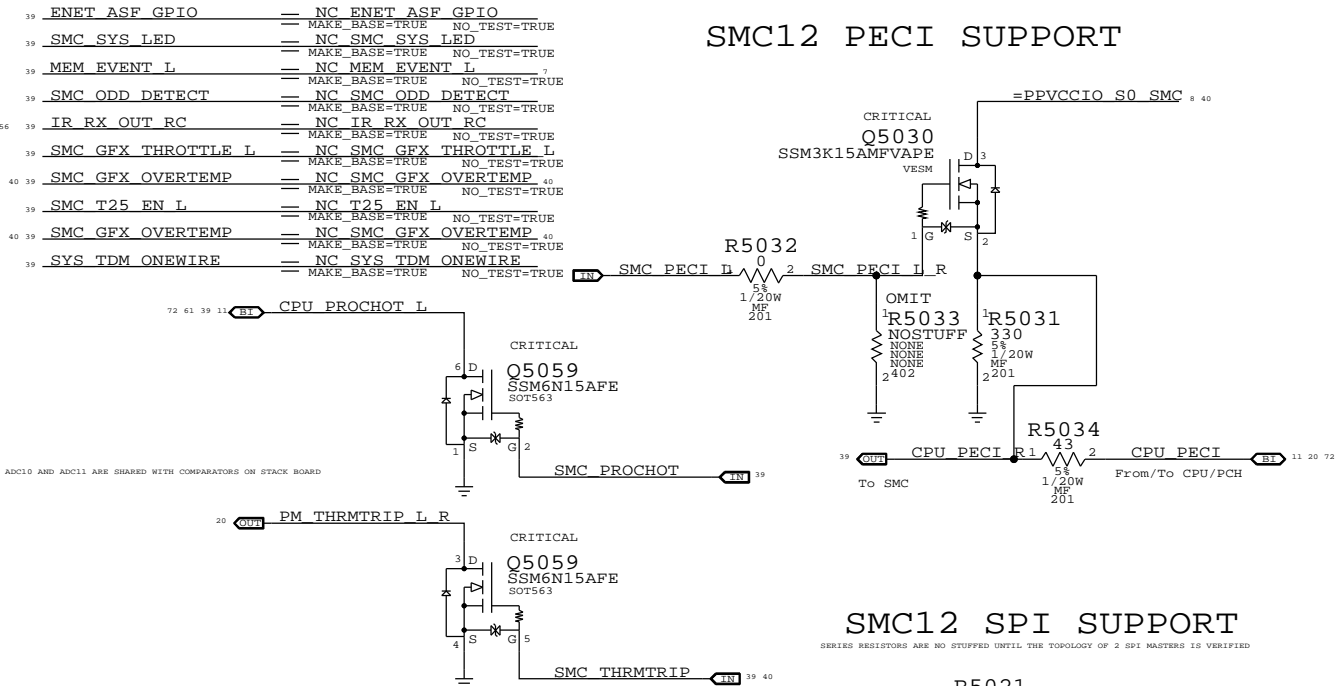
S4 SMC WAKE SOURCES



BATLOW# ISOLATION

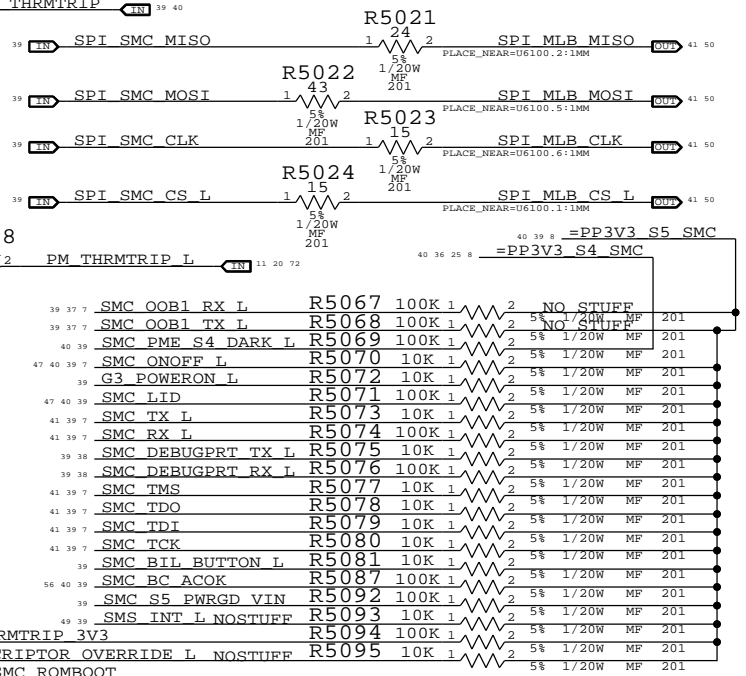



SMC12 PECE SUPPORT



SMC12 SPI SUPPORT

SERIES RESISTORS ARE NOT STUFFED UNTIL THE TOPOLOGY OF 2 SPI MASTERS IS VERIFIED



SYNC MASTER=D1 SENSORS		SYNC DATE=02/20/2012	
PAGE TITLE			
Apple Support			
	Apple Inc.	DRAWING NUMBER	SID
		<SCH_NUM>	D
NOTICE OF PROPRIETARY PROPERTY:		REVISION	
THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE INC. THE POSSESSOR AGREES TO THE FOLLOWING:		<E4LABEL>	
I TO MAINTAIN THIS DOCUMENT IN CONFIDENCE		BRANCH	
II NOT TO REPRODUCE OR COPY IT		PAGE	50 OF 132
III NOT TO REVEAL OR PUBLISH IT IN WHOLE OR PART		SHEET	40 OF 80
IV ALL RIGHTS RESERVED			

D

C

B

A

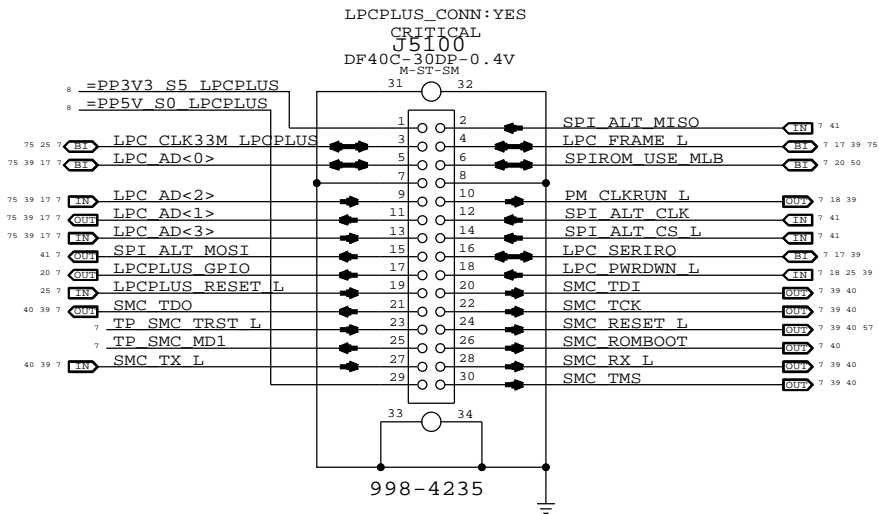
D

C

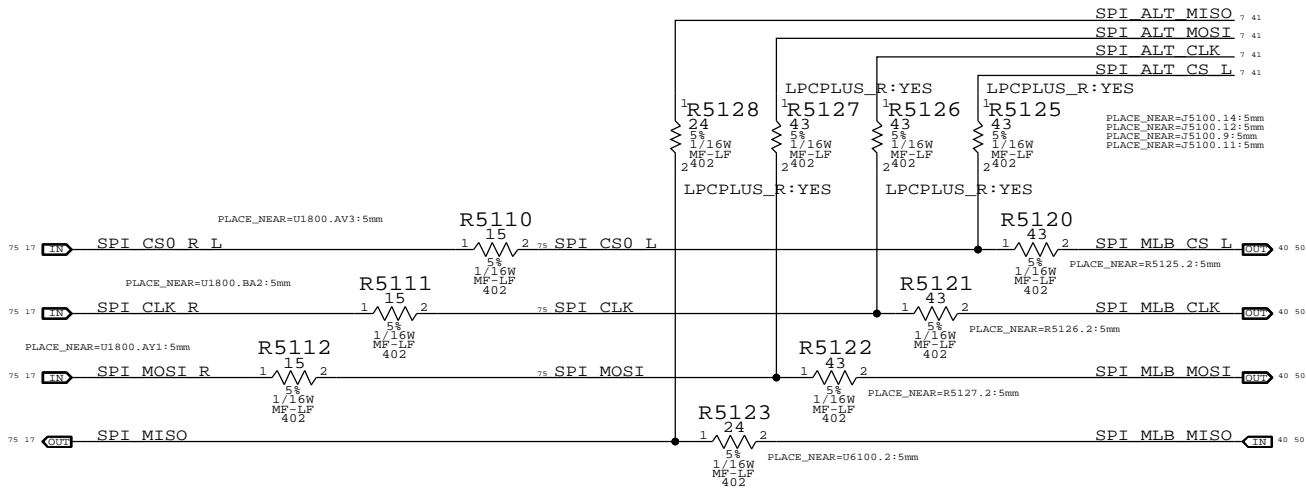
B


A

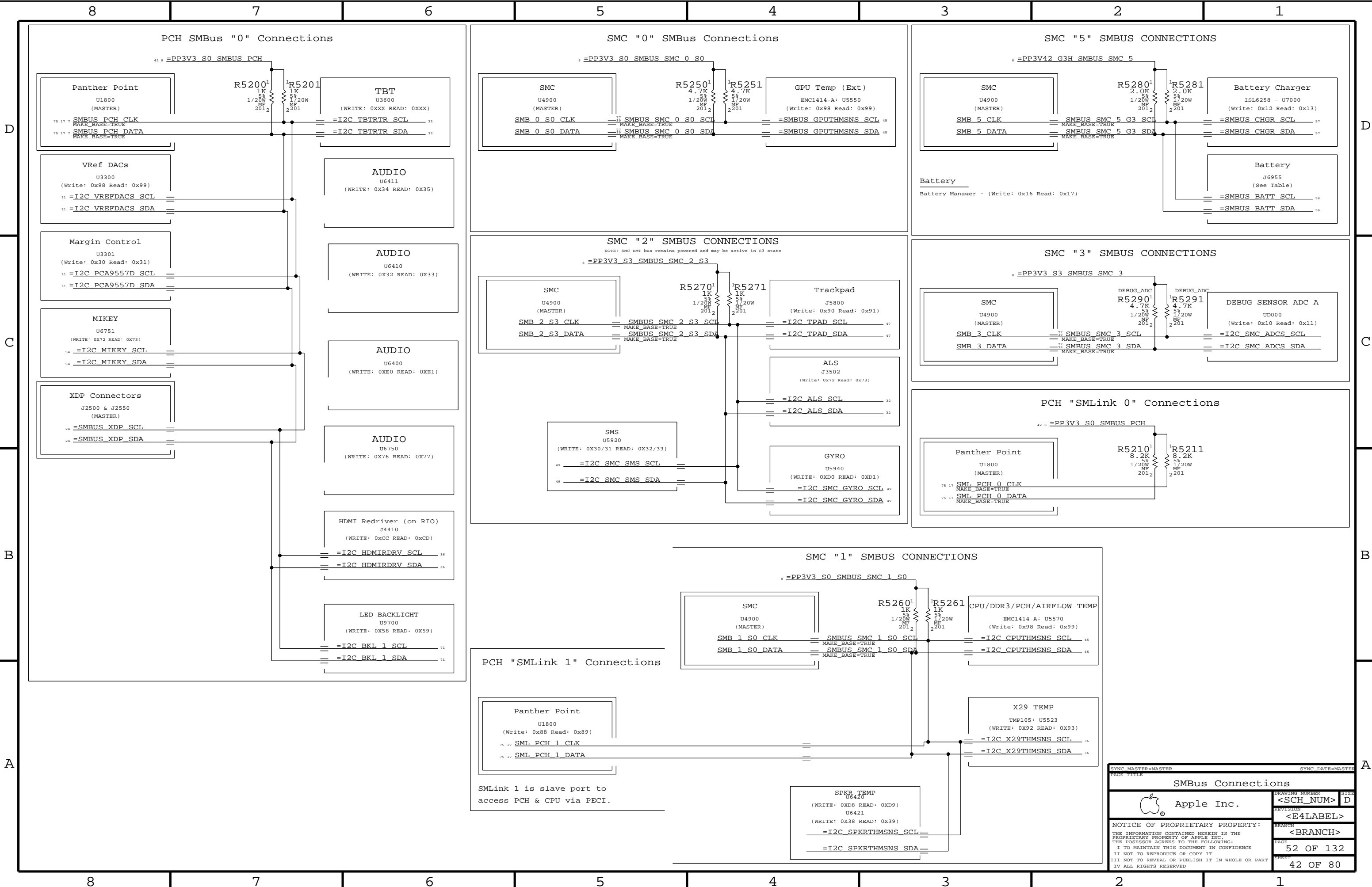
LPC+SPI Connector



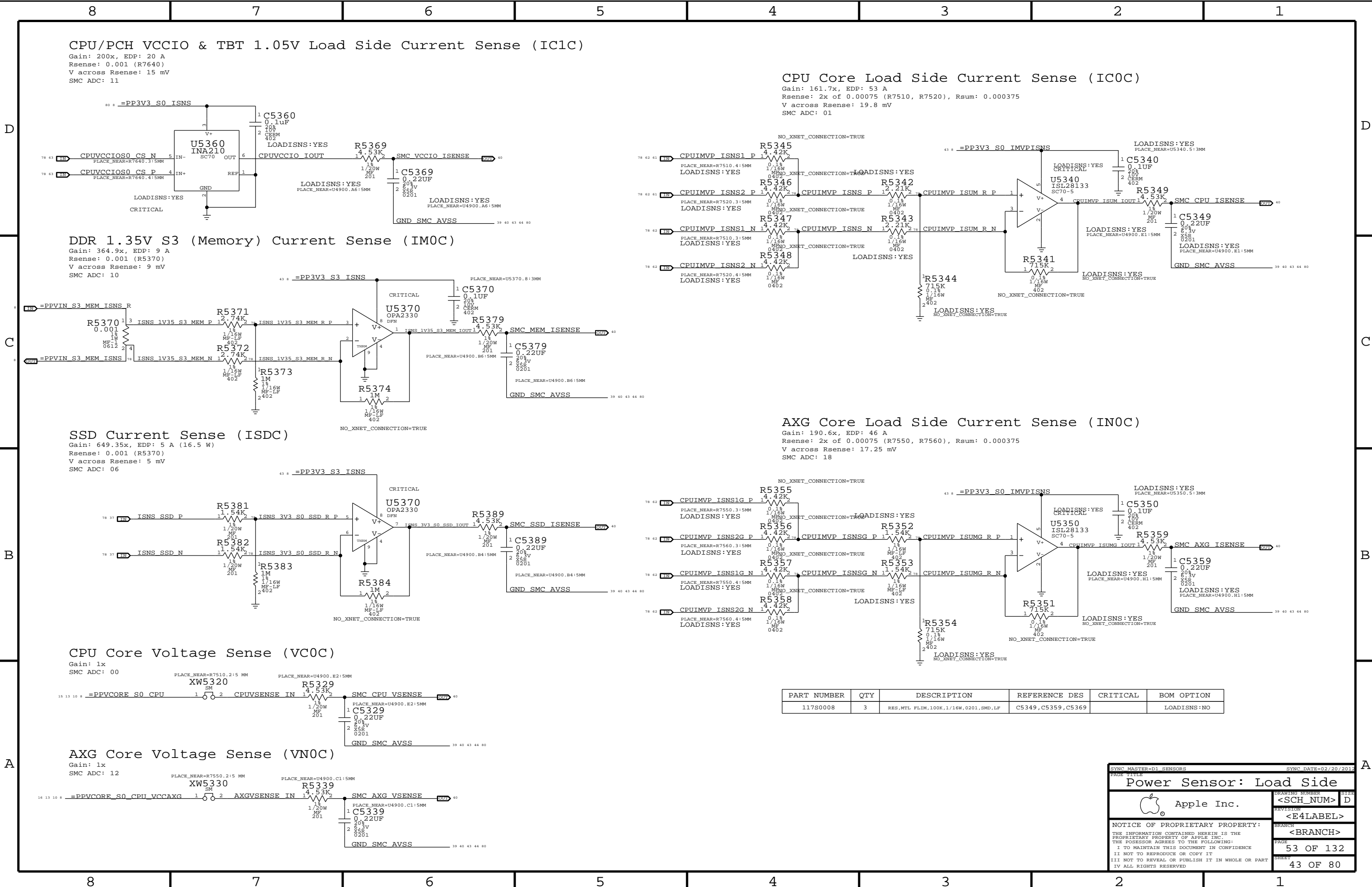
SPI Bus Series Termination



SYNC MASTER=D1 SENSORS		SYNC DATE=02/20/2012	
PAGE TITLE			
LPC+SPI Debug Connector			
 Apple Inc.	DRAWING NUMBER		SIZE
	<SCH_NUM>		D
	REVISION		
	<E4LABEL>		
NOTICE OF PROPRIETARY PROPERTY:			
THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE INC.			
THE POSSESSOR 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			
		BRANCH	
		<BRANCH>	
		PAGE	51 OF 132
		SHEET	41 OF 80




SYNC MASTER=MASTER		SYNC DATE=MASTER	
PAGE TITLE		PAGE	
SMBus Connections		DRAWING NUMBER	SIZE
Apple Inc.		<SCH_NUM>	D
		REVISION	
		<E4LABEL>	
NOTICE OF PROPRIETARY PROPERTY: THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE INC. THE POSSESSOR 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		BRANCH	<BRANCH>
		PAGE	52 OF 132
		SHEET	42 OF 80



SYNC MASTER=D1 SENSORS

SYNC DATE=02/20/2012

Power Sensor: Load Side

 Apple Inc.

THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE INC. THE POSSESSOR 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

<SCH_NUM>

REVISION

<E4LABEL>

BRANCH

<BRANCH>

PAGE

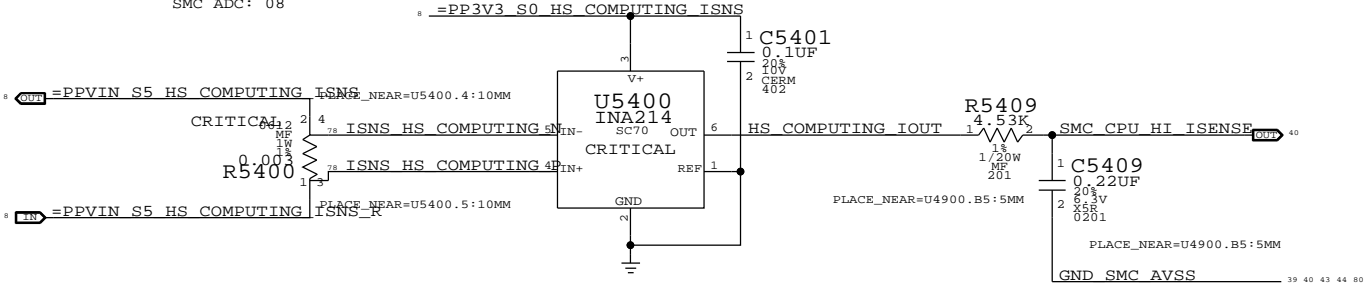
53 OF 132

SHEET

43 OF 80

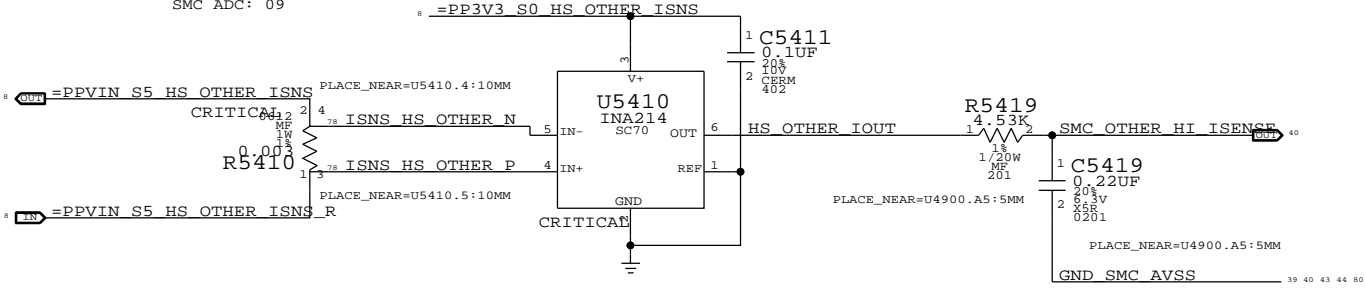
CPU High Side Current Sense (IC0R)

Gain: 50x, EDP: 17.4 A
Rsense: 0.003 (R5400)
V across Rsense: 52.2 mV
SMC ADC: 08



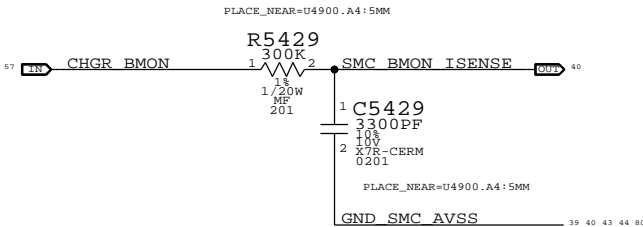
OTHER High Side Current Sense (IO0R)

Gain: 100x, EDP: 8.8 A
Rsense: 0.003 (R5410)
V across Rsense: 26.4 mV
SMC ADC: 09



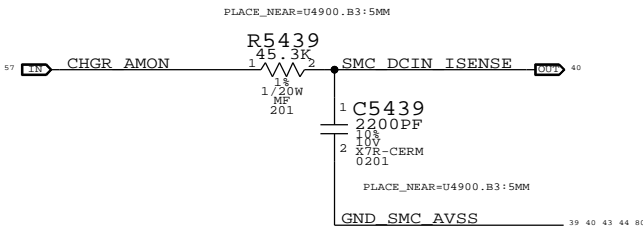
Charger (BMON Production) Current Sense (IPBR)

Charger Gain: 36x, EDP: 6.6 A
Rsense: 0.010 (R7050)
SMC ADC: 07



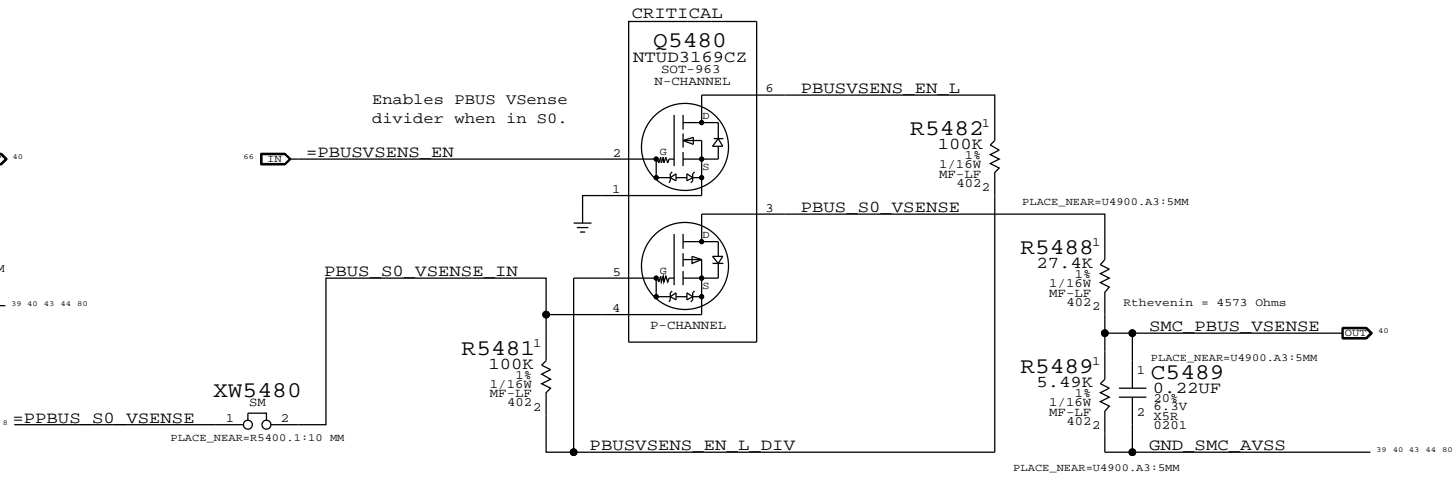
DC-In (AMON) Current Sense (ID0R)

Charger Gain: 20x, EDP: 4.6 A
Rsense: 0.020 (R7020)
SMC ADC: 04



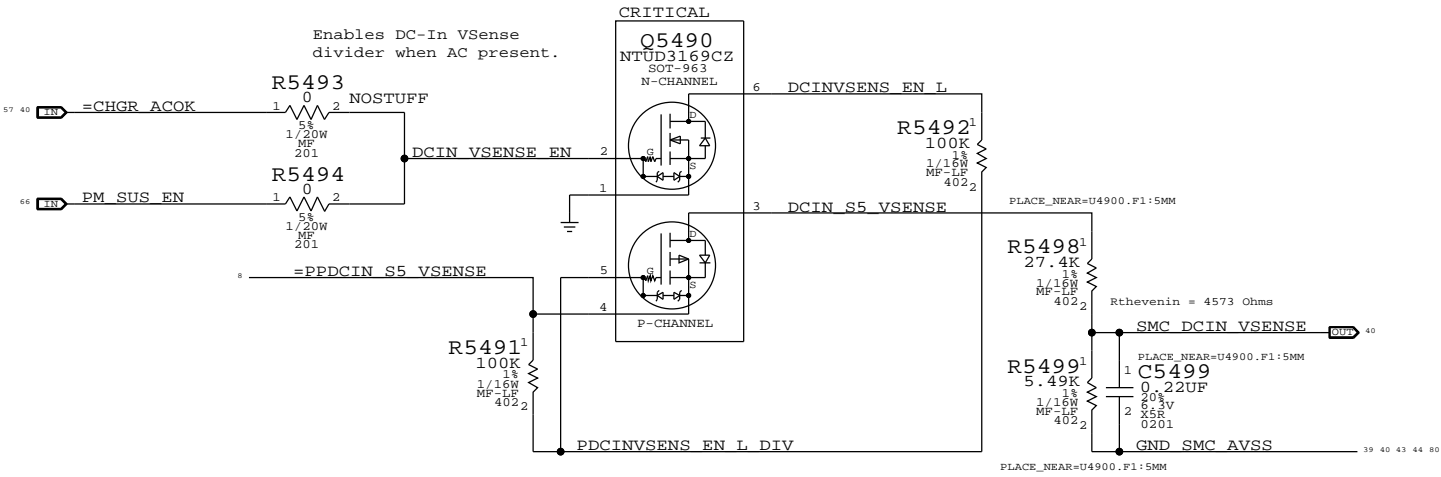
PBUS Voltage Sense & Enable (VP0R)


Gain: 0.167x
SMC ADC: 05



DC In Voltage Sense & Enable (VD0R)

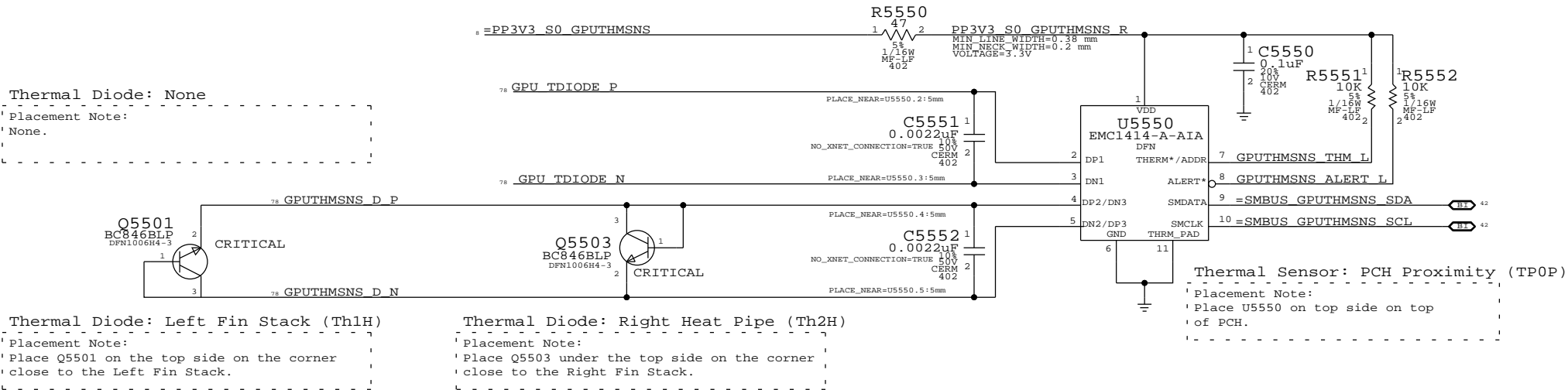
Gain: 0.167x
SMC ADC: 03



SYNC MASTER=D1 SENSORS		SYNC DATE=02/20/2012	
PAGE TITLE			
Power Sensor: High Side			
 Apple Inc.		DRAWING NUMBER	SIZE
		<SCH_NUM>	D
		REVISION	
		<E4LABEL>	
NOTICE OF PROPRIETARY PROPERTY:		BRANCH	
THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE INC. THE POSSESSOR AGREES TO THE FOLLOWING:		<BRANCH>	
I TO MAINTAIN THIS DOCUMENT IN CONFIDENCE		PAGE	54 OF 132
II NOT TO REPRODUCE OR COPY IT		SHEET	44 OF 80
III NOT TO REVEAL OR PUBLISH IT IN WHOLE OR PART			
IV ALL RIGHTS RESERVED			

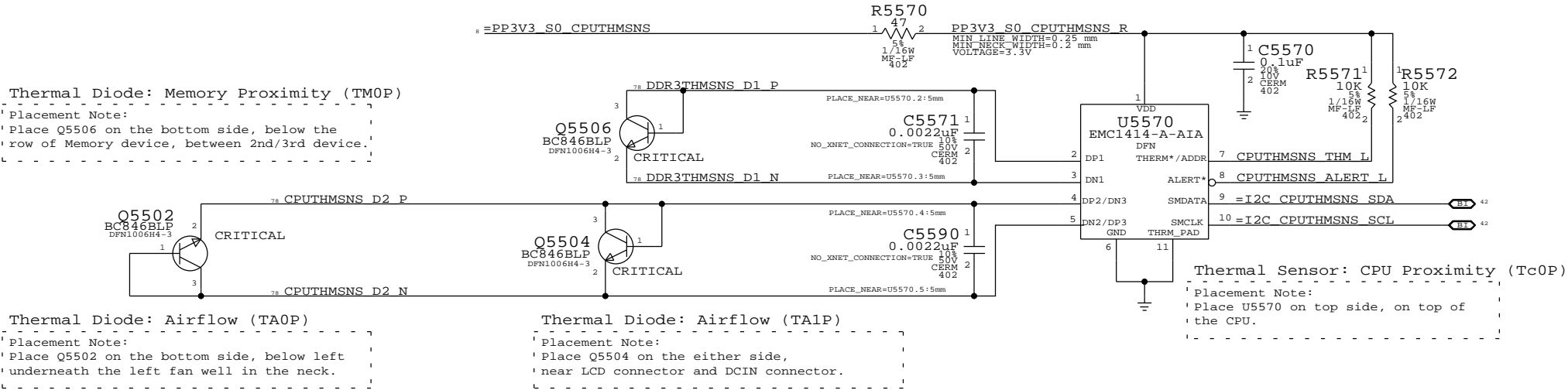
Thermal Sensor A:
PCH Proximity, Left Fin Pipe, Right Fin Stack

I2C Write: 0x98, I2C Read: 0x99

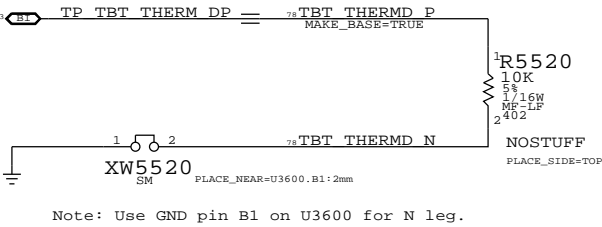



Thermal Sensor B:
CPU Proximity, Memory Proximity, Airflow

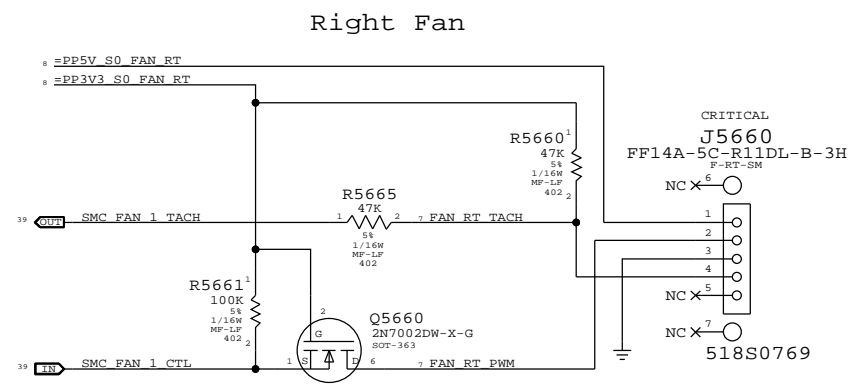
I2C Write: 0x98, I2C Read: 0x99



Thermal Sensor: T29 Die

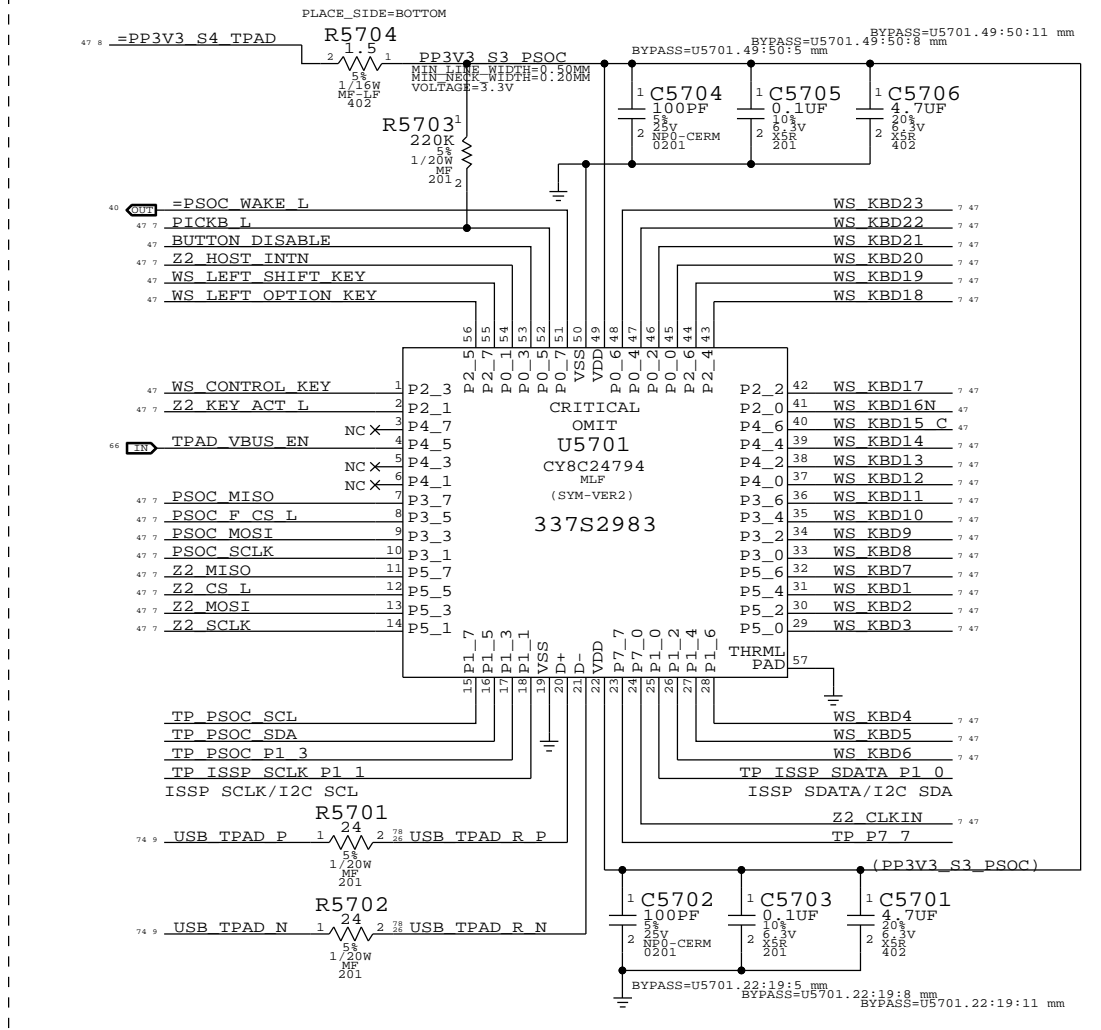


SYNC MASTER=D1 SENSORS		SYNC DATE=02/20/2012	
PAGE TITLE			
Thermal Sensors			
 Apple Inc.		DRAWING NUMBER	SIZE
		<SCH_NUM>	D
		REVISION	
		<E4LABEL>	
NOTICE OF PROPRIETARY PROPERTY:		BRANCH	
THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE INC. THE POSSESSOR AGREES TO THE FOLLOWING: I 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		<BRANCH>	
		PAGE	55 OF 132
		SHEET	45 OF 80



PSOC USB CONTROLLER

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

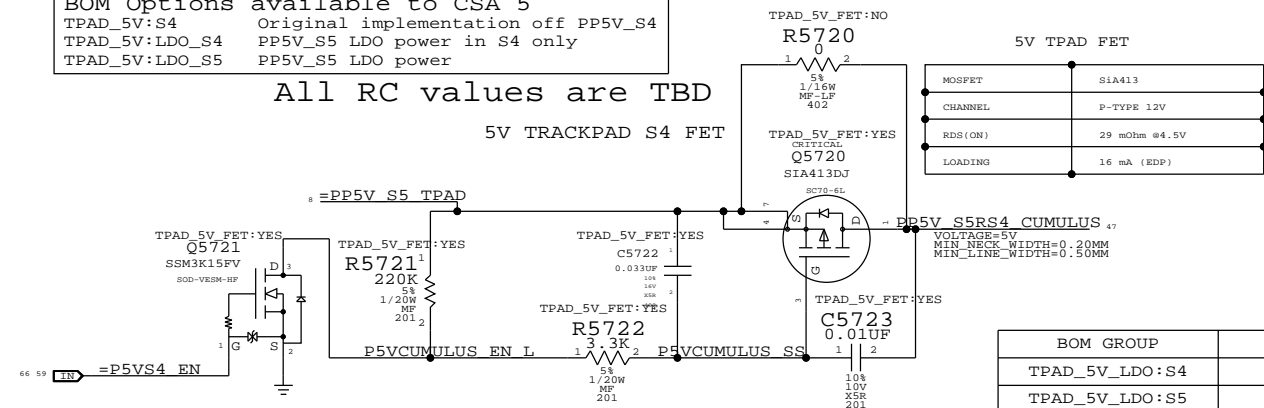


IC	PIN NAME	CURRENT	R_SNS	V_SNS	POWER
TMP102	V+	10UA	2.55 KOHM	0.0255 V	0.255E-6 W
	VOUT	80UA	0.204 V	16.32E-6 W	
3V3 LDO	VDD	60MA (MAX)	10 OHM	0.6 V	36E-3 W
	VOUT	60MA (MAX)	0.2 OHM	0.72E-3 W	
PSOC	VDD	8MA (TYP)	1.5 OHM	0.012 V	96E-6 W
	VDD	14MA (MAX)	0.021 V	294E-6 W	
18V BOOSTER	VIN	4MA (MAX)	4.7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

BOM Options available to CSA 5
TPAD_5V:S4 Original implementation off PP5V_S4
TPAD_5V:LDO_S4 PP5V_S5 LDO power in S4 only
TPAD_5V:LDO_S5 PP5V_S5 LDO power

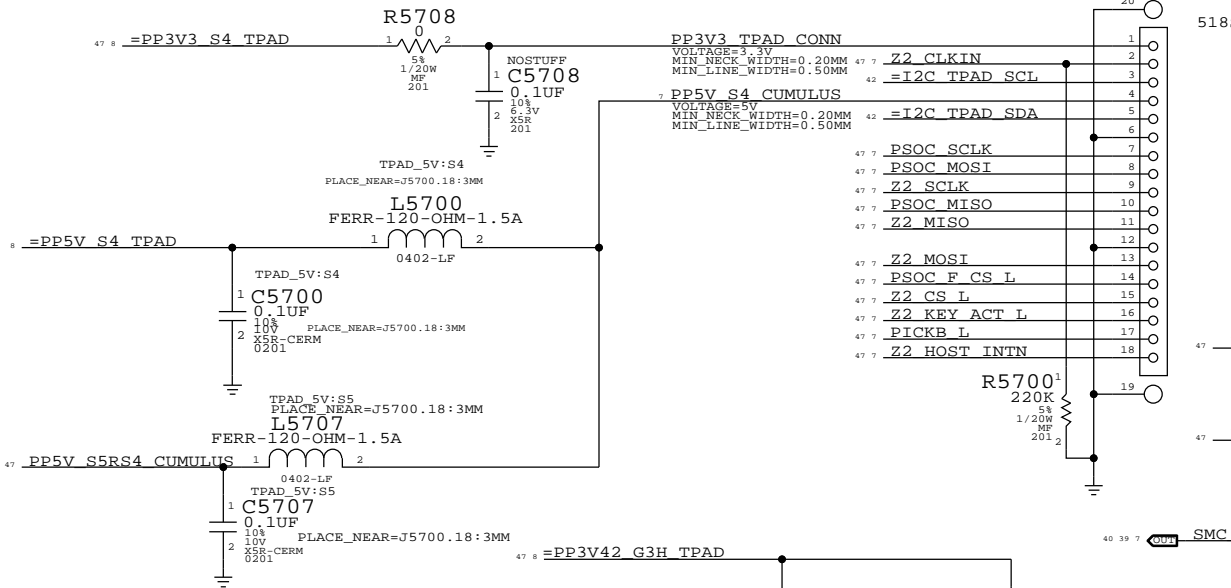
All RC values are TBD

5V TRACKPAD S4 FET



BOM GROUP	BOM OPTIONS
TPAD_5V_LDO:S4	TPAD_5V_FET:YES, TPAD_5V:S5
TPAD_5V_LDO:S5	TPAD_5V_FET:NO, TPAD_5V:S5

IPD Flex Connector

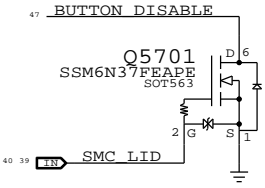


www.qdzbwx.com

TPAD Buttons Disable

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

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



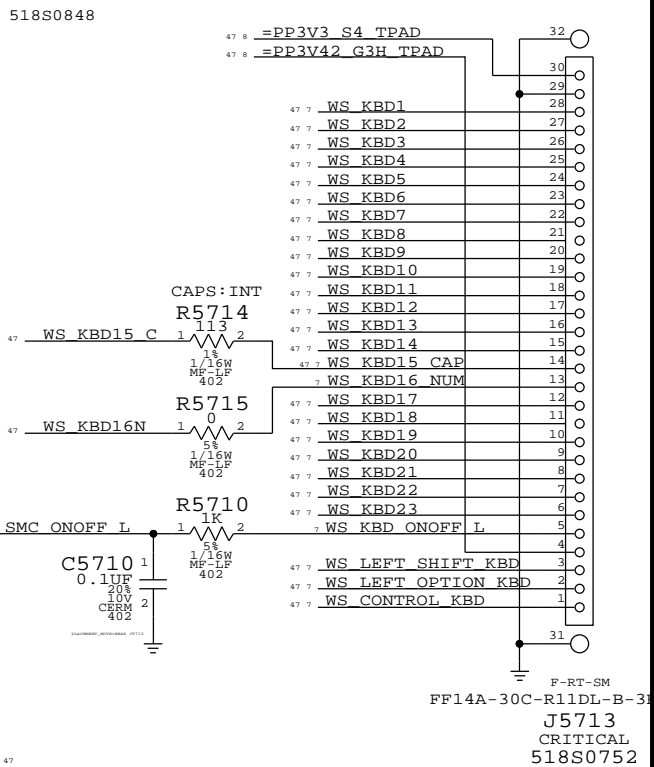
Caps Lock LED Drive

WS_KBD15_C	CAP_COMP_H	CAP_COMP_L	Q5736	Q5738	LED Current
Z	1	1	off	off	none
1	0	1	on	off	source
0	1	0	off	on	sink

CRITICAL

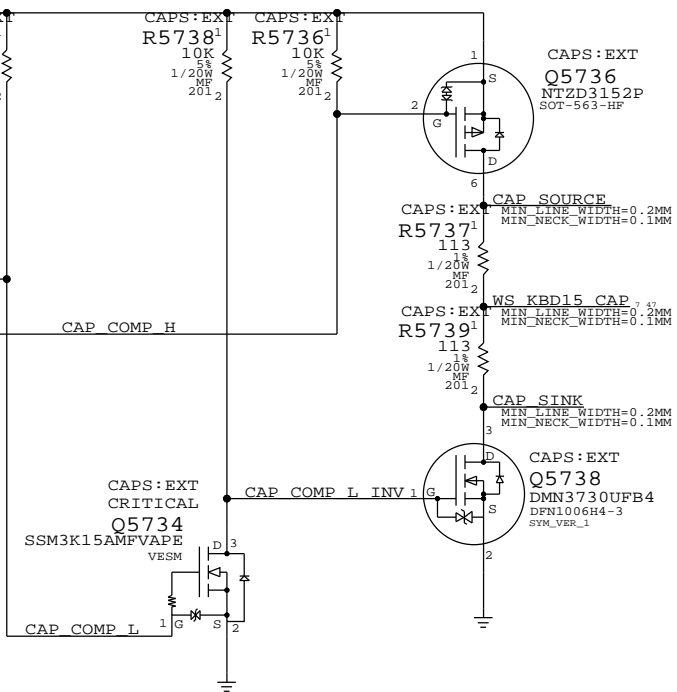
J5700
FF14-18C-R11DL

Keyboard Connector

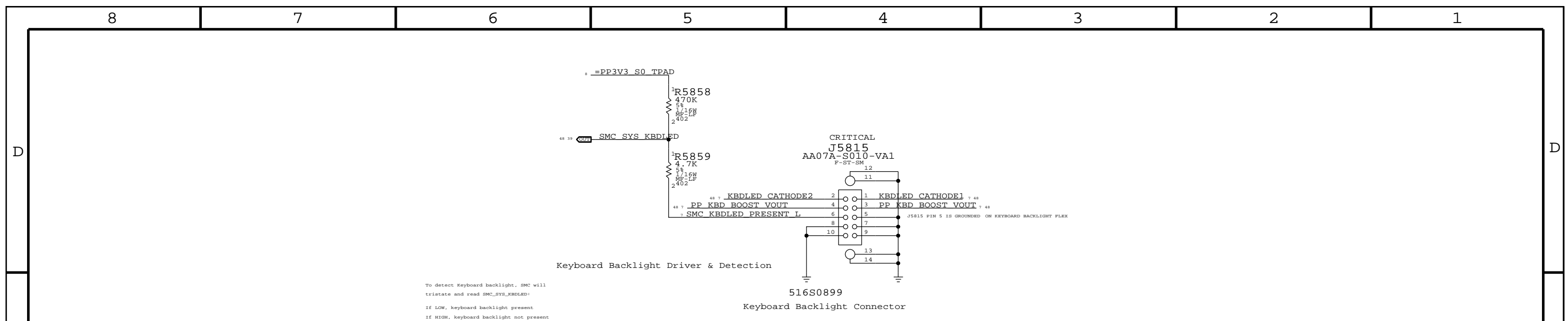


SMC Manual Reset & Isolation

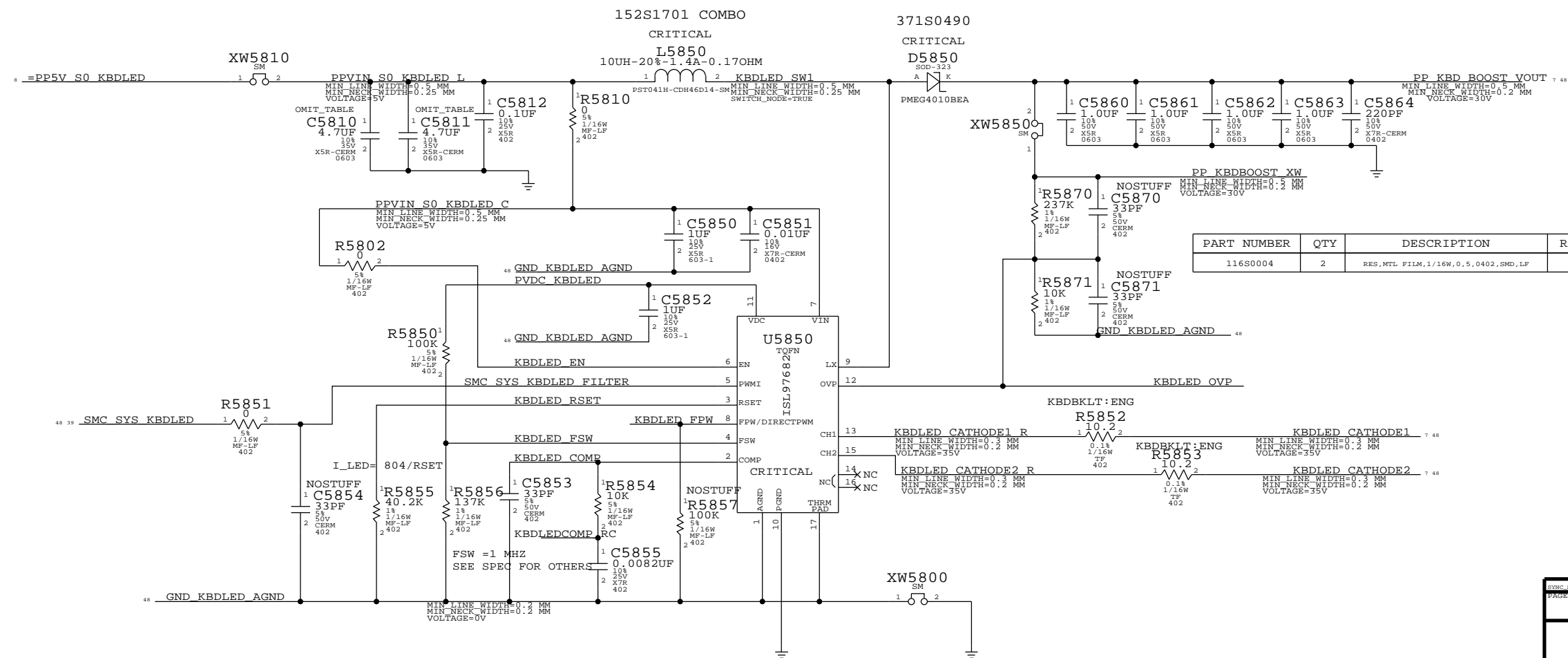
Left shift, option & control keys combined with power button cause SMC RESET# assertion.
Keys ANDED with MSP power to isolate when MSP is not powered.
No IPD on OE input pin PP3V3_S4 (symbol error).




KEYBOARD/TRACKPAD (1 OF 2)		
Apple Inc.	DRAWING NUMBER	SIZE
	<SCH_NUM>	D
	REVISION	
	<E4LABEL>	
	BRANCH	
	<BRANCH>	
	PAGE	57 OF 132
	SHEET	47 OF 80

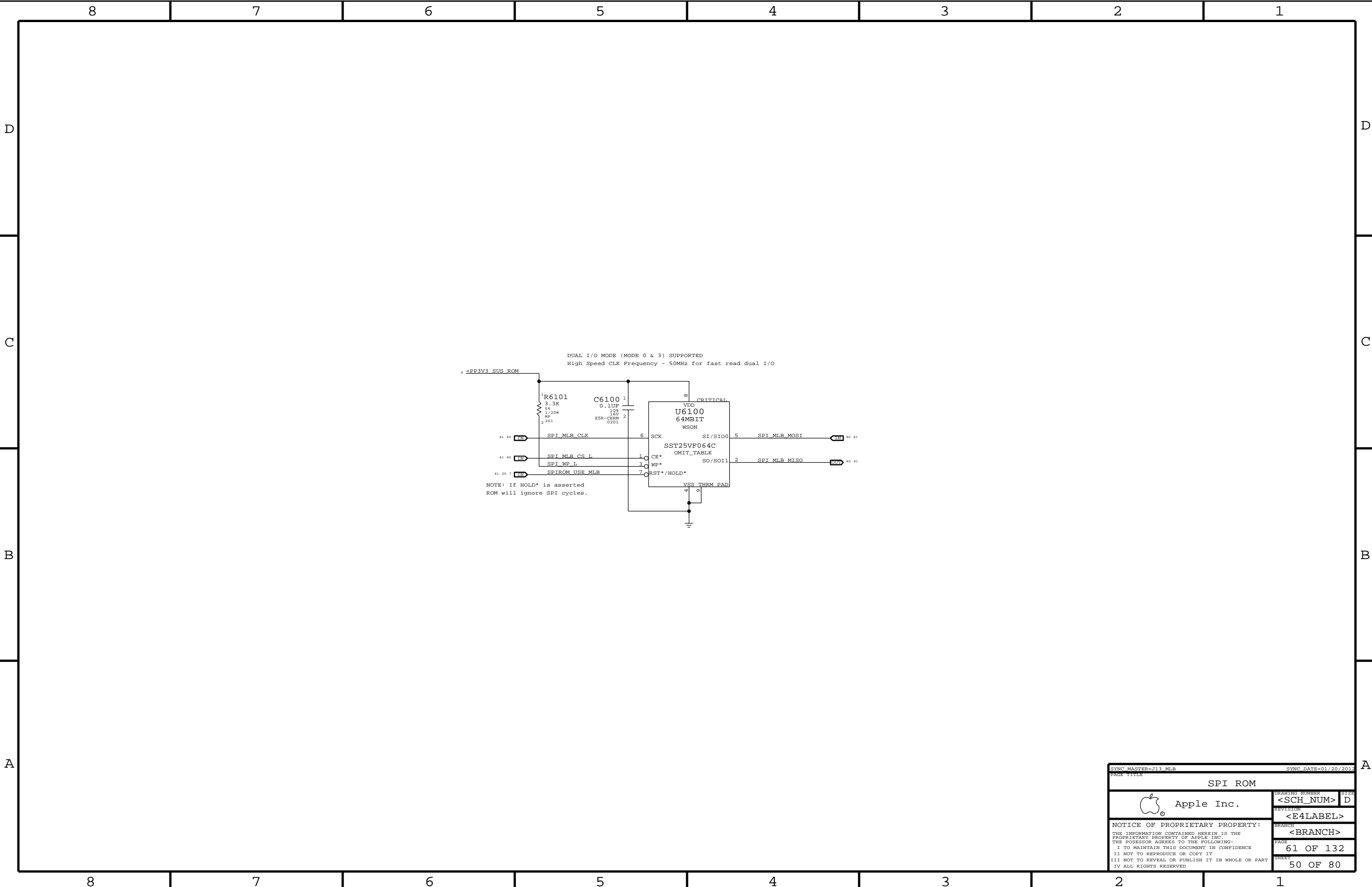



PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
138S0811	2	CAP,CER,4.7UF,10%,25V,X6S,0603	C5810,C5811	CRITICAL	



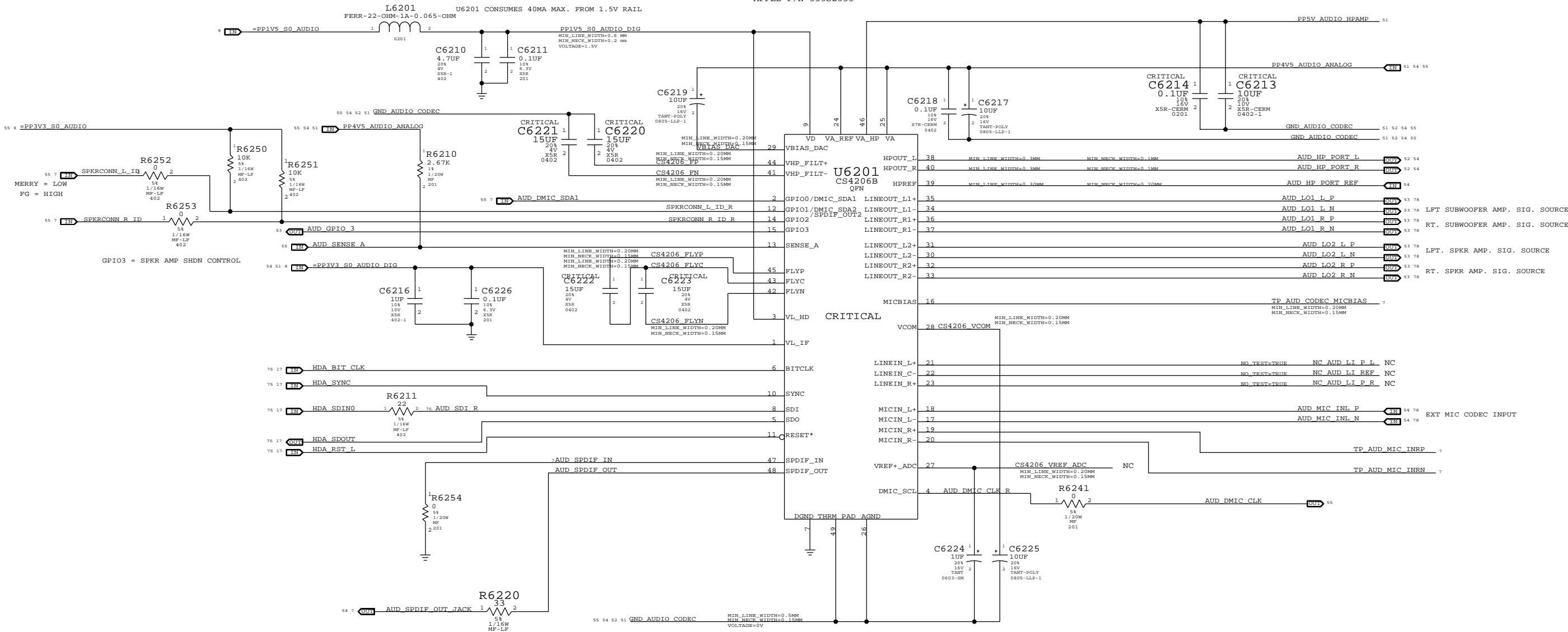
PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
116S0004	2	RES,MTL FILM,1/16W,0.5,0402,SMD,LF	R5852,R5853	CRITICAL	KBDBKLT:PROD

SYMC MASTER-D2 MLS EEDLES		SYMC DATE-12/08/2011	
PAGE TITLE			
KEYBOARD/TRACKPAD (2 OF 2)			
		DRAWING NUMBER <SCH_NUM>	
Apple Inc.		SIZE D	
NOTICE OF PROPRIETARY PROPERTY: THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE INC. THE POSSESSOR AGREES TO THE FOLLOWING: I TO MAINTAIN THIS DOCUMENT IN CONFIDENCE I NOT TO REPRODUCE OR COPY IT I NOT TO REVEAL OR PUBLISH IT IN WHOLE OR PART I ALL RIGHTS RESERVED		REVISION <E4LABEL>	
		BRANCH <BRANCH>	
		PAGE 58 OF 132	
		SHEET 48 OF 80	

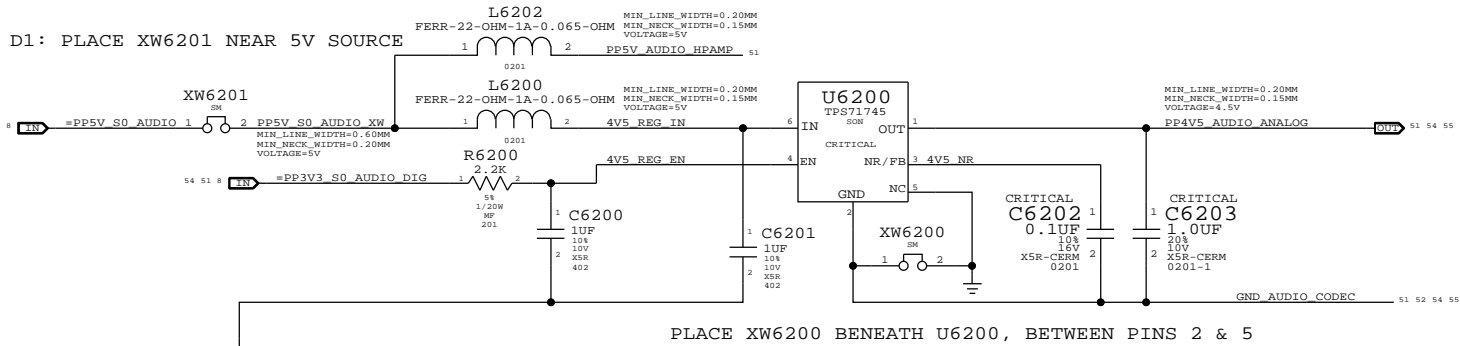


SYNC MASTER=J13_MLB		SYNC DATE=01/20/2012	
PAGE TITLE			
SPI ROM			
 Apple Inc.	DRAWING NUMBER		SIZE
	<SCH_NUM>		D
NOTICE OF PROPRIETARY PROPERTY: THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE INC. THE POSSESSOR AGREES TO THE FOLLOWING: I TO MAINTAIN THIS DOCUMENT IN CONFIDENCE II NOT TO REPRODUCE OR COPY IT III NOT TO REVEAL OR PUBLISH IT IN WHOLE OR PART IV ALL RIGHTS RESERVED	REVISION		
	<E4LABEL>		
	BRANCH		
	<BRANCH>		
	PAGE		
61 OF 132			
SHEET			
50 OF 80			

AUDIO CODEC
APPLE P/N 353S2355



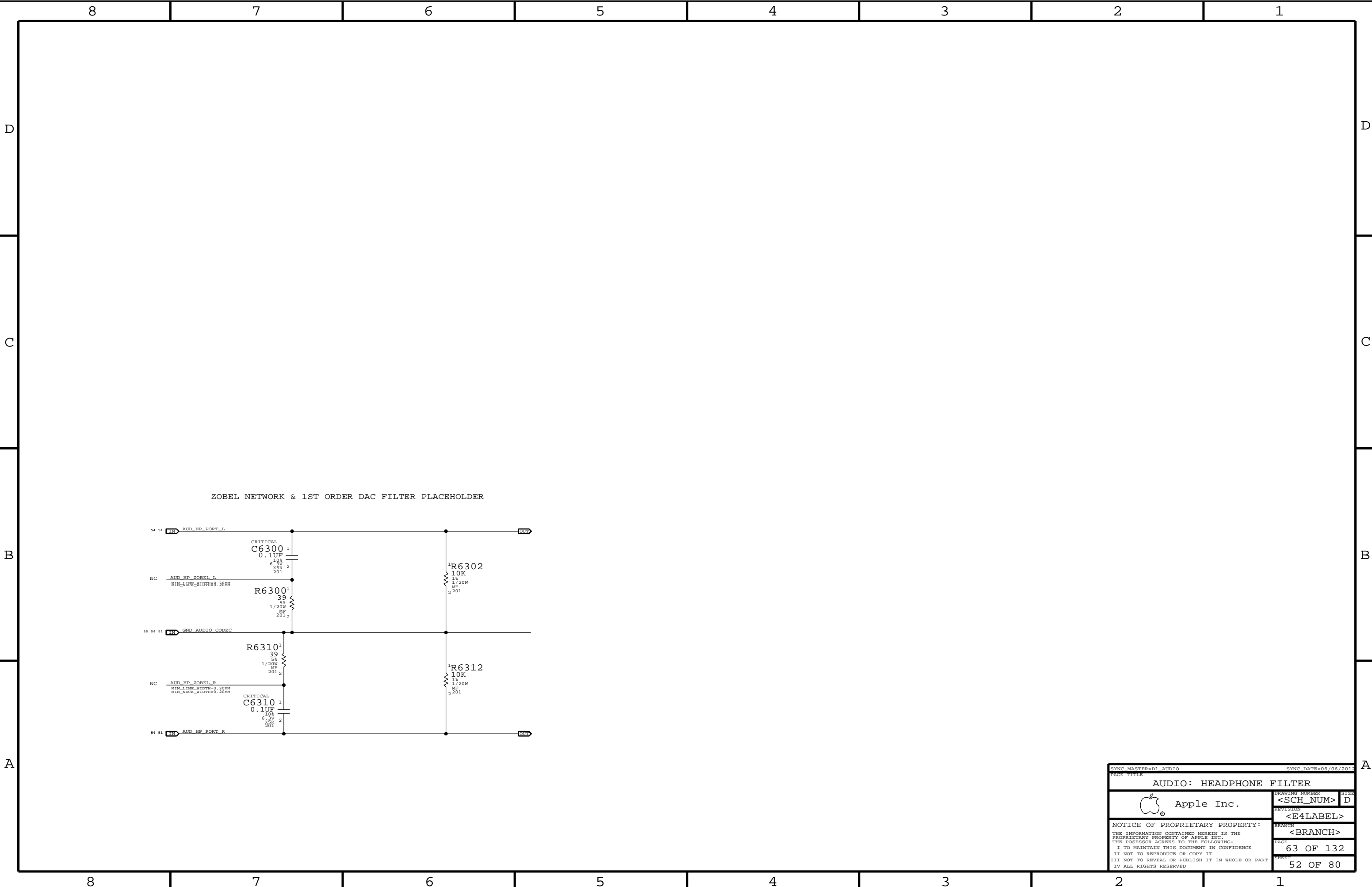
4.5V POWER SUPPLY FOR CODEC
APPLE P/N 353S2456




NOTES ON CODEC I/O

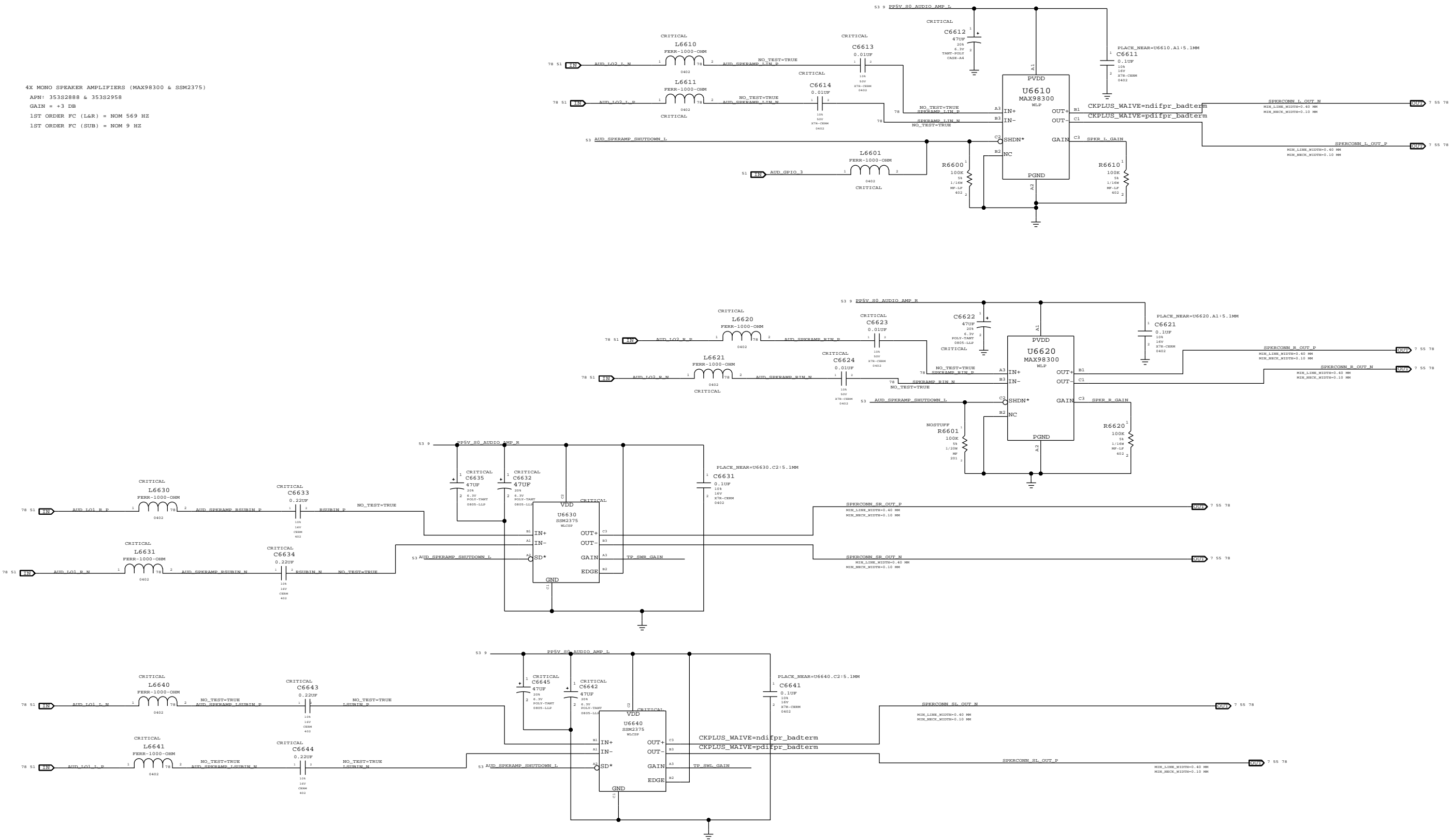
DIFF FSINPUT= 2.45VRMS
SE FSINPUT= 1.22VRMS
DAC1 FSOUTPUT= 1.34VRMS
DAC2/3 FSOUTPUTDIFF= 2.67VRMS
DAC2/3 FSOUTPUTSE= 1.34VRMS


PAGE TITLE		SYNC DATE=06/06/2012	
AUDIO: CODEC/REGULATOR		DRAWING NUMBER	
Apple Inc.		<SCH_NUM>	
NOTICE OF PROPRIETARY PROPERTY:		REVISION	
THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE INC. THE POSSESSOR AGREES TO THE FOLLOWING:		<E4LABEL>	
I TO MAINTAIN THIS DOCUMENT IN CONFIDENCE		BRANCH	
II NOT TO REPRODUCE OR COPY IT		<BRANCH>	
III NOT TO REVEAL OR PUBLISH IT IN WHOLE OR PART		PAGE	
IV ALL RIGHTS RESERVED		62 OF 132	
		SHEET	
		51 OF 80	

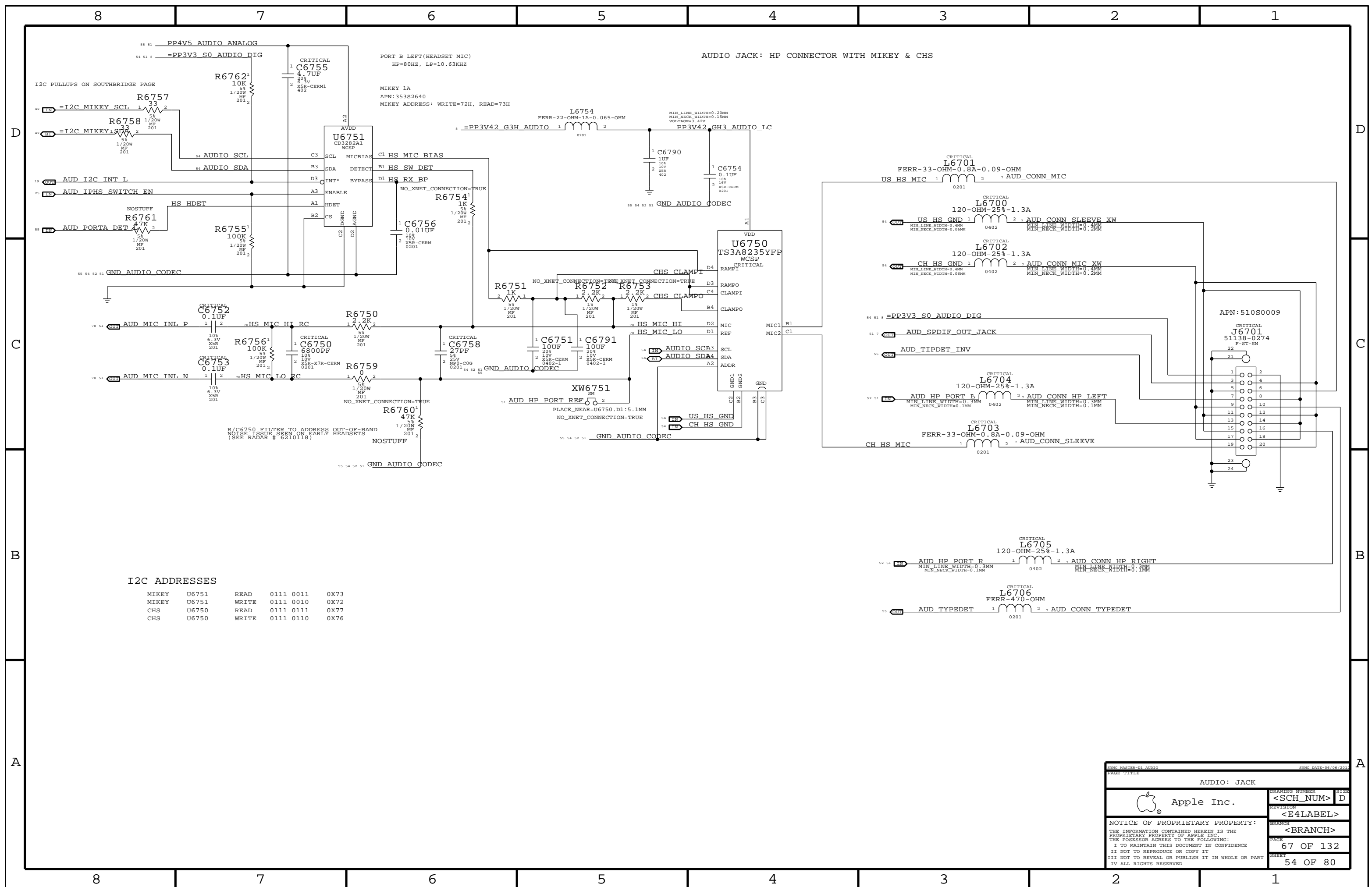


SYNC MASTER=D1 AUDIO		SYNC DATE=06/06/2012	
PAGE TITLE			
AUDIO: HEADPHONE FILTER			
 Apple Inc.		DRAWING NUMBER	SIZE
		<SCH_NUM>	D
NOTICE OF PROPRIETARY PROPERTY: THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE INC. THE POSSESSOR AGREES TO THE FOLLOWING: I TO MAINTAIN THIS DOCUMENT IN CONFIDENCE II NOT TO REPRODUCE OR COPY IT III NOT TO REVEAL OR PUBLISH IT IN WHOLE OR PART IV ALL RIGHTS RESERVED		REVISION	
		<E4LABEL>	
		BRANCH	
		<BRANCH>	
		PAGE	63 OF 132
		SHEET	52 OF 80

4X MONO SPEAKER AMPLIFIERS (MAX98300 & SSM2375)
APN: 35382888 & 35382958
GAIN = +3 DB
1ST ORDER FC (L&R) = NOM 569 HZ
1ST ORDER FC (SUB) = NOM 9 HZ

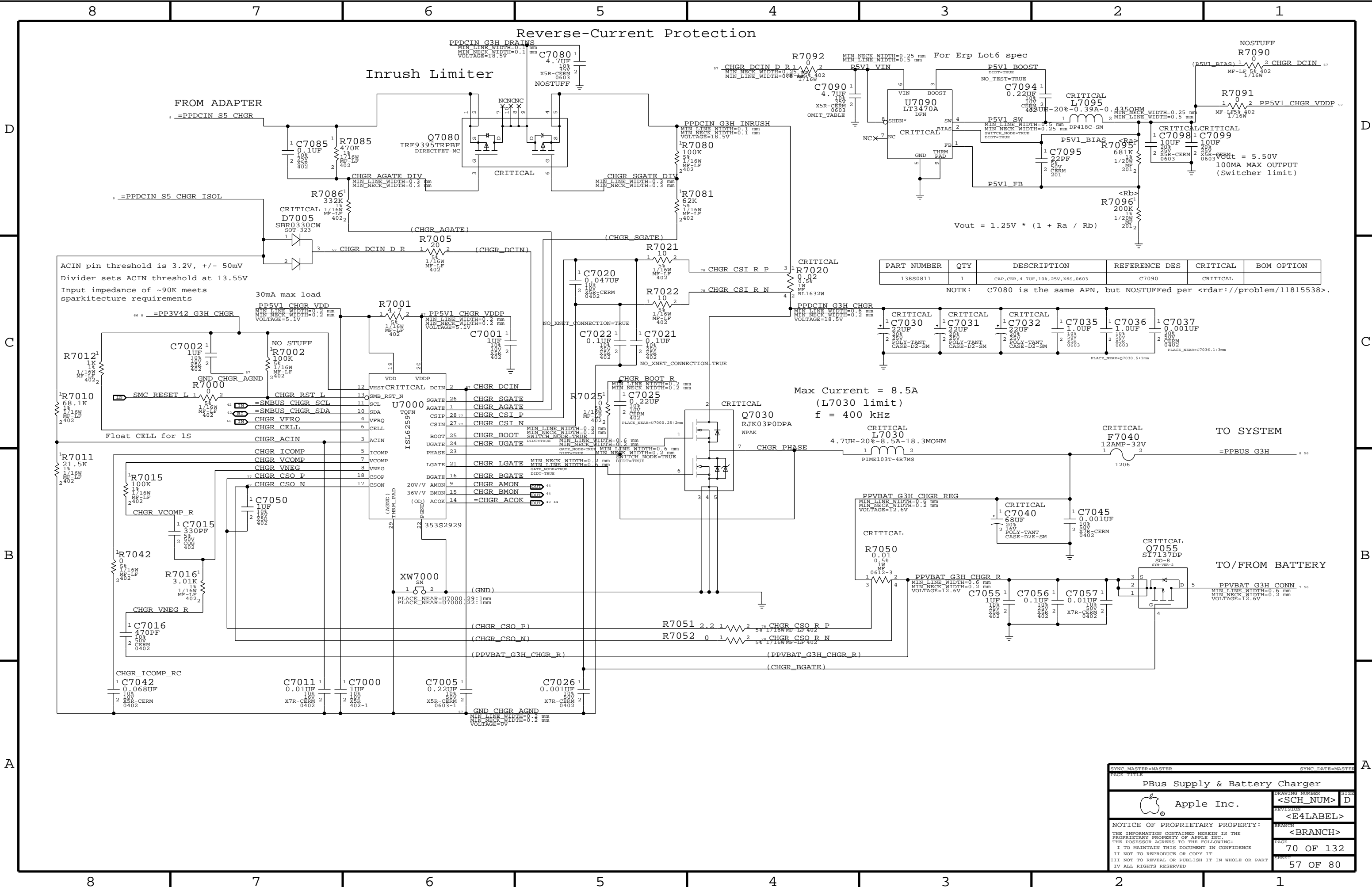


SYMC MASTER-01 AUDIO		SYMC DATE=06/06/2015	
PAGE TITLE			
AUDIO: SPEAKER AMP		DRAWING NUMBER	SIZE
 Apple Inc.		<SCH_NUM>	D
		REVISION	
		<E4LABEL>	
		BRANCH	
		<BRANCH>	
		PAGE	66 OF 132
NOTICE OF PROPRIETARY PROPERTY: THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE INC. THE POSSESSOR AGREES TO THE FOLLOWING: I 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		SHEET	53 OF 80










PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
138S0811	1	CAP, CER, 4.7UF, 10%, 25V, X6S, 0603	C7090	CRITICAL	

NOTE: C7080 is the same APN, but NOSTUFFed per <rdar://problem/11815538>.

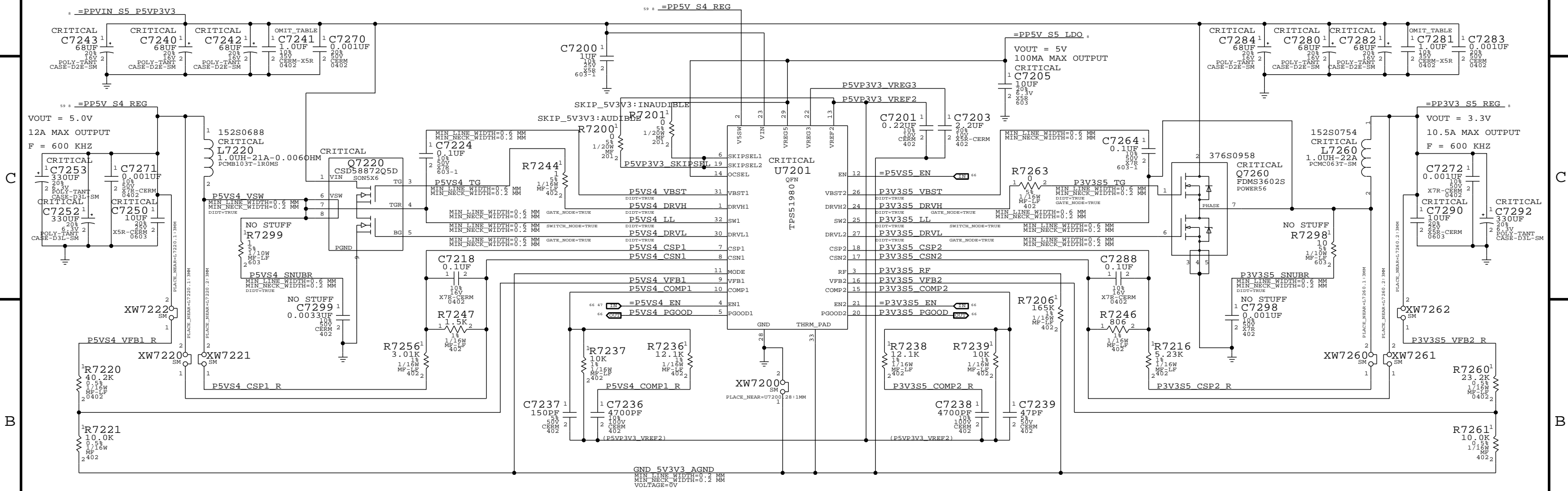
SYNC MASTER=MASTER		SYNC DATE=MASTER	
PAGE TITLE			
PBus Supply & Battery Charger			
 Apple Inc.		DRAWING NUMBER	SIZE
		<SCH_NUM>	D
		REVISION	
		<E4LABEL>	
		BRANCH	
		<BRANCH>	
		PAGE	70 OF 132
		SHEET	57 OF 80
NOTICE OF PROPRIETARY PROPERTY: THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE INC. THE POSSESSOR 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			


D

C Δ

8	7	6	5	4	3	2	1
---	---	---	---	---	---	---	---

PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
138S0812	2	CAP,CER,1UF,10%,35V,X6S,0402,MURATA	C7241,C7281	CRITICAL	



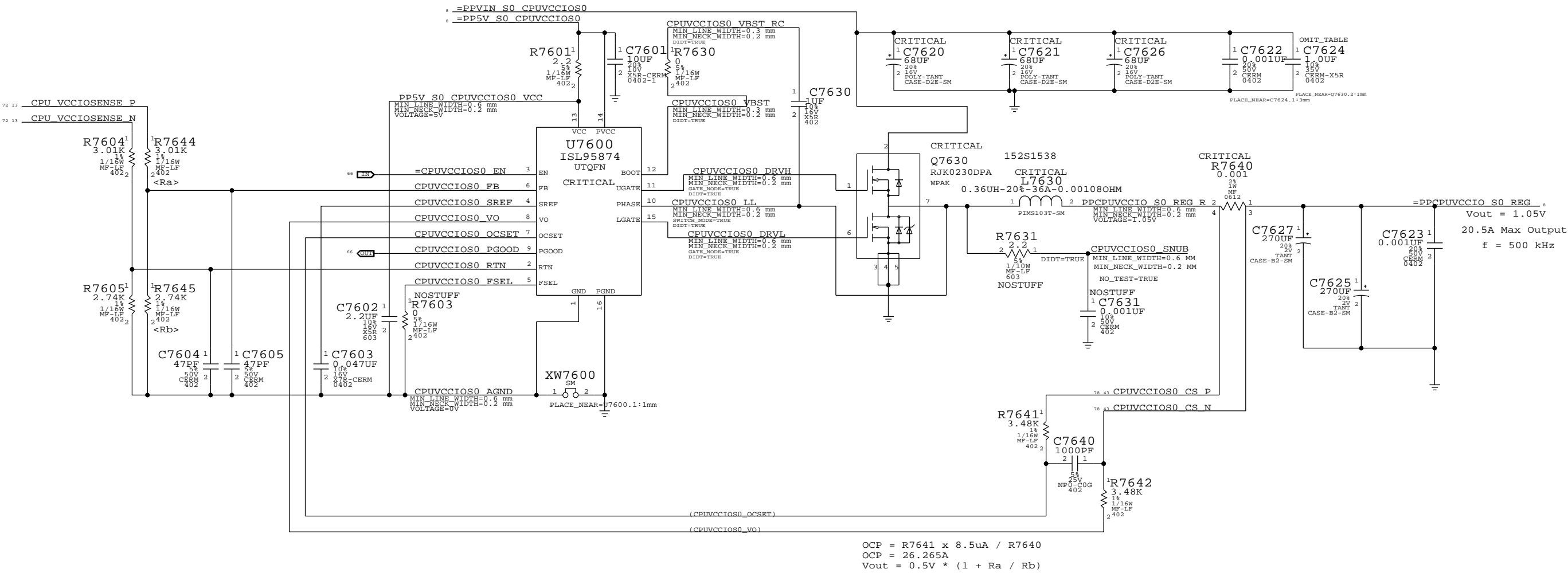
SYNC MASTER=MASTER		SYNC DATE=MASTER	
PAGE TITLE			
5V / 3.3V Power Supply			
 Apple Inc.		DRAWING NUMBER	SIZE
		<SCH_NUM>	D
		REVISION	
		<E4LABEL>	
NOTICE OF PROPRIETARY PROPERTY: THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE INC. THE POSSESSOR AGREES TO THE FOLLOWING: I TO 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		BRANCH	
		<BRANCH>	
		PAGE	72 OF 132
		SHEET	59 OF 80





CPU VCCIO (1.05V S0) Regulator

PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
138S0812	1	CAP,CER,1UF,10%,35V,X6S,0402,MURATA	C7624	CRITICAL	

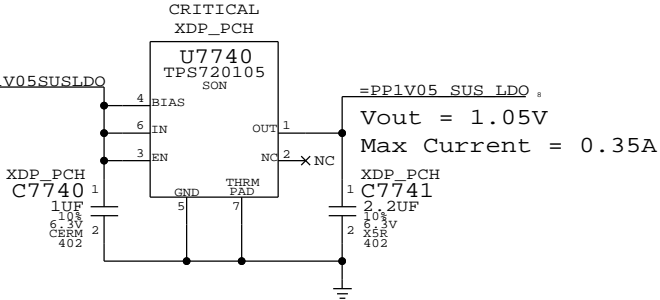
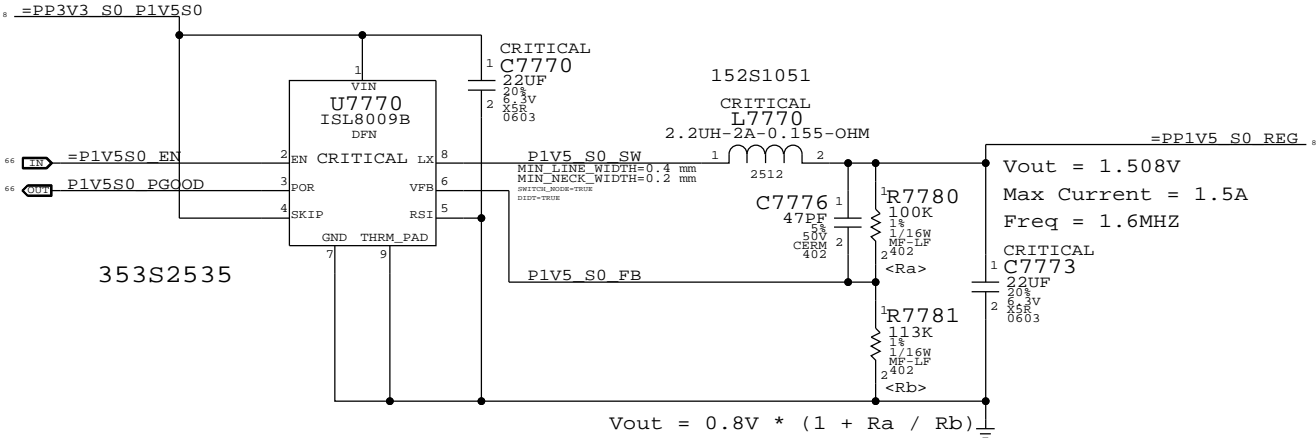


CPUVCCIO (1.05V) Power Supply	
Apple Inc.	
NOTICE OF PROPRIETARY PROPERTY: THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE INC. THE POSSESSOR AGREES TO THE FOLLOWING: I TO MAINTAIN THIS DOCUMENT IN CONFIDENCE II NOT TO REPRODUCE OR COPY IT III NOT TO REVEAL OR PUBLISH IT IN WHOLE OR PART IV ALL RIGHTS RESERVED	DRAWING NUMBER <SCH_NUM> REVISION <E4LABEL> BRANCH <BRANCH> PAGE 76 OF 132 SHEET 63 OF 80

1.5V S0 Switcher

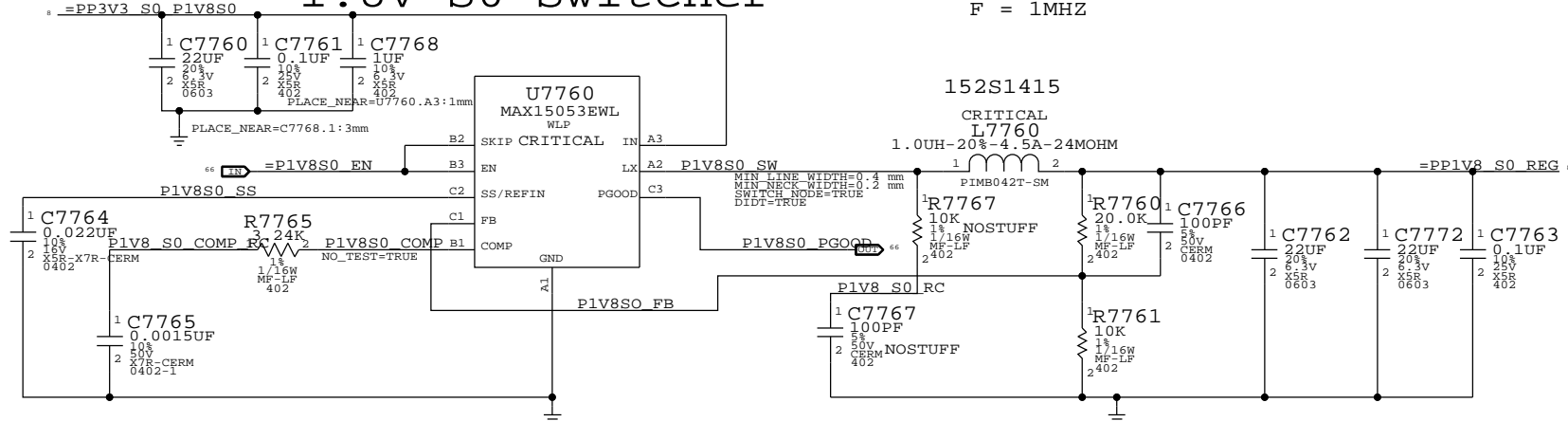
1.05V SUS LDO

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



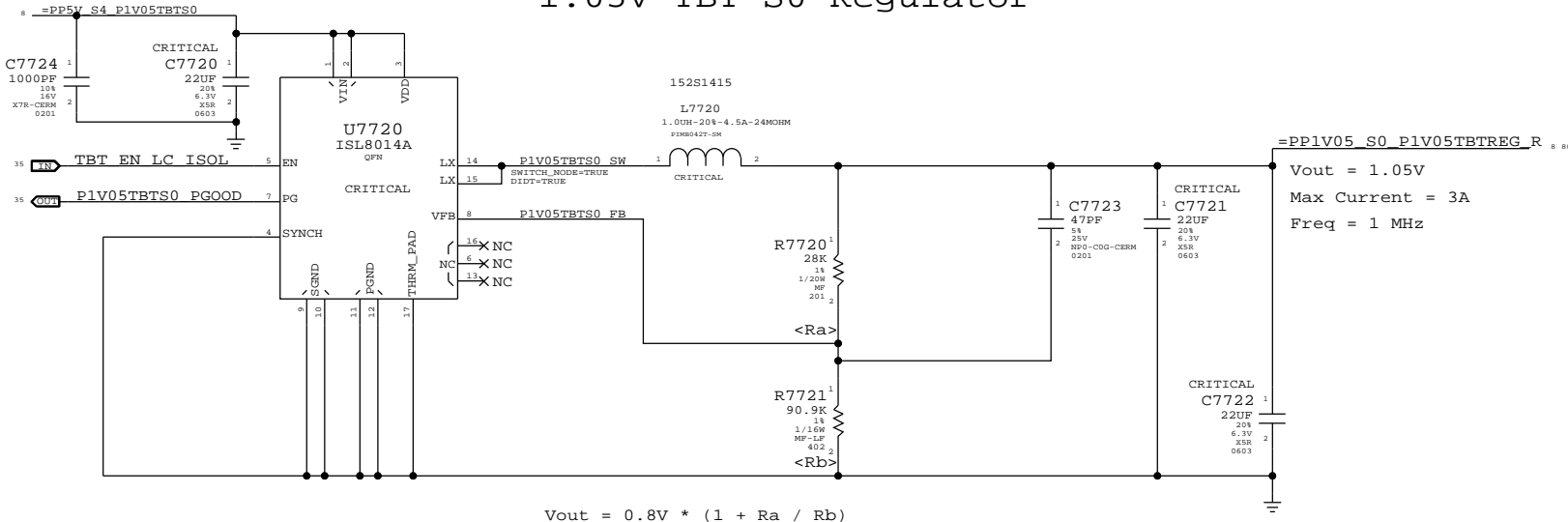
1.8V S0 Switcher

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



1.05V TBT S0 Regulator

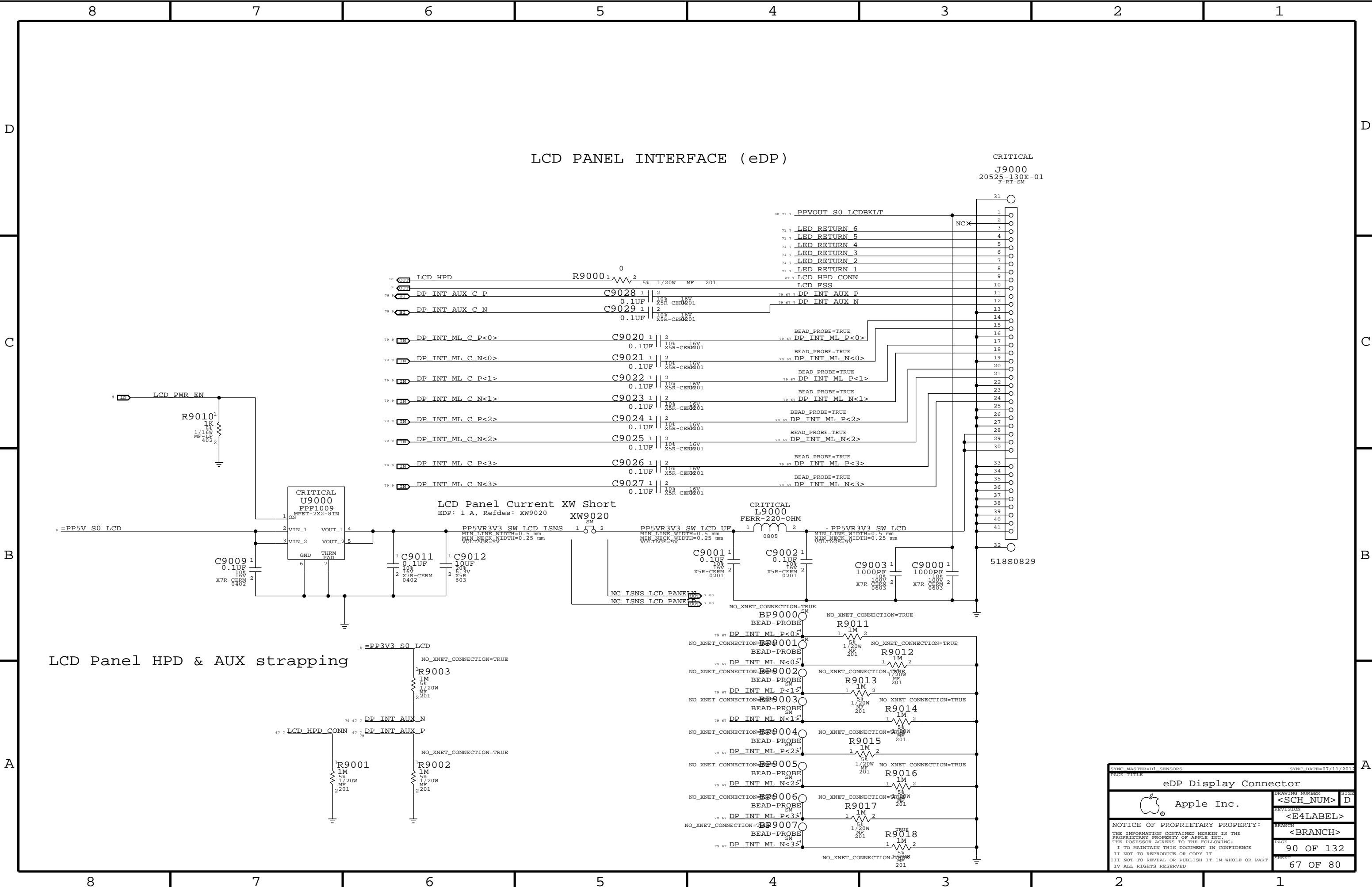
Vout = 1.05V
Max Current = 3A
Freq = 1 MHz



SYNC MASTER=MASTER		SYNC DATE=MASTER	
PAGE TITLE		DRAWING NUMBER	
Misc Power Supplies		<SCH_NUM> D	
Apple Inc.		REVISION	
		<E4LABEL>	
NOTICE OF PROPRIETARY PROPERTY:		BRANCH	
THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE INC. THE POSSESSOR AGREES TO THE FOLLOWING:		<BRANCH>	
I TO MAINTAIN THIS DOCUMENT IN CONFIDENCE		PAGE	
II NOT TO REPRODUCE OR COPY IT		77 OF 132	
III NOT TO REVEAL OR PUBLISH IT IN WHOLE OR PART		SHEET	
IV ALL RIGHTS RESERVED		64 OF 80	

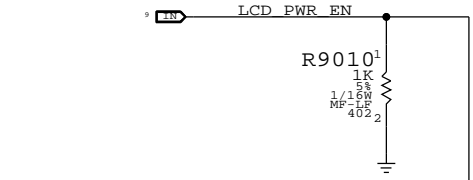






LCD PANEL INTERFACE (eDP)

CRITICAL
J9000
20525-130E-01
F-RT-SM



CRITICAL
U9000
FPF1009
MFET-2X2-8IN

LCD Panel Current XW Short
EDP: 1 A, Refdes: XW9020
XW9020
SM

CRITICAL
L9000
FERR-220-OHM

LCD Panel HPD & AUX strapping

SYNC MASTER=DL SENSORS		SYNC DATE=07/11/2013	
PAGE TITLE		eDP Display Connector	
Apple Inc.		DRAWING NUMBER	SIZE
		<SCH_NUM>	D
		REVISION	
		<E4LABEL>	
		BRANCH	
		<BRANCH>	
		PAGE	90 OF 132
		SHEET	67 OF 80

3.3V/HV Power MUX

V3P3 must be 84 to support wake from Thunderbolt devices.

PP3V3 SW TBTAPWRSW

PPHV SW TBTAPWRSW

CRITICAL C9487 100UF

CRITICAL C9480 22UF

CRITICAL C9481 0.1UF

CRITICAL U9410 CD3210A0RGPD

CRITICAL C9415 4.7UF

CRITICAL C9410 0.1UF

CRITICAL C9485 0.1UF

CRITICAL C9486 10UF

CRITICAL C9411 0.1UF

CRITICAL U9460 74AUP1T97

CRITICAL C9430 0.1UF

CRITICAL C9431 0.1UF

CRITICAL C9432 0.22UF

CRITICAL C9433 0.22UF

CRITICAL C9460 0.1UF

CRITICAL U9400 J9400

CRITICAL C9400 0.01UF

CRITICAL C9401 0.01UF

CRITICAL C9474 0.47UF

CRITICAL C9475 0.47UF

CRITICAL C9478 0.22UF

CRITICAL C9479 0.22UF

CRITICAL C9476 0.47UF

CRITICAL C9477 0.47UF

CRITICAL C9498 30PF

CRITICAL C9499 30PF

CRITICAL C9402 0.01UF

CRITICAL C9494 330PF

CRITICAL C9495 330PF

CRITICAL L9498 650NH-5%-0.430MA-0.520HM

CRITICAL L9499 650NH-5%-0.430MA-0.520HM

CRITICAL C9420 0.1UF

CRITICAL C9421 0.1UF

CRITICAL R9427 10K

CRITICAL R9429 100K

CRITICAL U9420 CBT05023

CRITICAL C9425 0.1UF

CRITICAL R9410 22.6K

CRITICAL R9411 22.6K

CRITICAL R9412 36.5K

CRITICAL R9413 22.6K

CRITICAL R9414 22.6K

CRITICAL R9415 22.6K

CRITICAL R9416 22.6K

CRITICAL R9417 22.6K

CRITICAL R9418 22.6K

CRITICAL R9419 22.6K

CRITICAL R9420 22.6K

CRITICAL R9421 22.6K

CRITICAL R9422 22.6K

CRITICAL R9423 22.6K

CRITICAL R9424 22.6K

CRITICAL R9425 22.6K

CRITICAL R9426 22.6K

CRITICAL R9427 22.6K

CRITICAL R9428 22.6K

CRITICAL R9429 22.6K

CRITICAL R9430 22.6K

CRITICAL R9431 22.6K

CRITICAL R9432 22.6K

CRITICAL R9433 22.6K

CRITICAL R9434 22.6K

CRITICAL R9435 22.6K

CRITICAL R9436 22.6K

CRITICAL R9437 22.6K

CRITICAL R9438 22.6K

CRITICAL R9439 22.6K

CRITICAL R9440 22.6K

CRITICAL R9441 22.6K

CRITICAL R9442 22.6K

CRITICAL R9443 22.6K

CRITICAL R9444 22.6K

CRITICAL R9445 22.6K

CRITICAL R9446 22.6K

CRITICAL R9447 22.6K

CRITICAL R9448 22.6K

CRITICAL R9449 22.6K

CRITICAL R9450 22.6K

CRITICAL R9451 22.6K

CRITICAL R9452 22.6K

CRITICAL R9453 22.6K

CRITICAL R9454 22.6K

CRITICAL R9455 22.6K

CRITICAL R9456 22.6K

CRITICAL R9457 22.6K

CRITICAL R9458 22.6K

CRITICAL R9459 22.6K

CRITICAL R9460 22.6K

CRITICAL R9461 22.6K

CRITICAL R9462 22.6K

CRITICAL R9463 22.6K

CRITICAL R9464 22.6K

CRITICAL R9465 22.6K

CRITICAL R9466 22.6K

CRITICAL R9467 22.6K

CRITICAL R9468 22.6K

CRITICAL R9469 22.6K

CRITICAL R9470 22.6K

CRITICAL R9471 22.6K

CRITICAL R9472 22.6K

CRITICAL R9473 22.6K

CRITICAL R9474 22.6K

CRITICAL R9475 22.6K

CRITICAL R9476 22.6K

CRITICAL R9477 22.6K

CRITICAL R9478 22.6K

CRITICAL R9479 22.6K

CRITICAL R9480 22.6K

CRITICAL R9481 22.6K

CRITICAL R9482 22.6K

CRITICAL R9483 22.6K

CRITICAL R9484 22.6K

CRITICAL R9485 22.6K

CRITICAL R9486 22.6K

CRITICAL R9487 22.6K

CRITICAL R9488 22.6K

CRITICAL R9489 22.6K

CRITICAL R9490 22.6K

CRITICAL R9491 22.6K

CRITICAL R9492 22.6K

CRITICAL R9493 22.6K

CRITICAL R9494 22.6K

CRITICAL R9495 22.6K

CRITICAL R9496 22.6K

CRITICAL R9497 22.6K

CRITICAL R9498 22.6K

CRITICAL R9499 22.6K

CRITICAL R9500 22.6K

CRITICAL R9501 22.6K

CRITICAL R9502 22.6K

CRITICAL R9503 22.6K

CRITICAL R9504 22.6K

CRITICAL R9505 22.6K

CRITICAL R9506 22.6K

CRITICAL R9507 22.6K

CRITICAL R9508 22.6K

CRITICAL R9509 22.6K

CRITICAL R9510 22.6K

CRITICAL R9511 22.6K

CRITICAL R9512 22.6K

CRITICAL R9513 22.6K

CRITICAL R9514 22.6K

CRITICAL R9515 22.6K

CRITICAL R9516 22.6K

CRITICAL R9517 22.6K

CRITICAL R9518 22.6K

CRITICAL R9519 22.6K

CRITICAL R9520 22.6K

CRITICAL R9521 22.6K

CRITICAL R9522 22.6K

CRITICAL R9523 22.6K

CRITICAL R9524 22.6K

CRITICAL R9525 22.6K

CRITICAL R9526 22.6K

CRITICAL R9527 22.6K

CRITICAL R9528 22.6K

CRITICAL R9529 22.6K

CRITICAL R9530 22.6K

CRITICAL R9531 22.6K

CRITICAL R9532 22.6K

CRITICAL R9533 22.6K

CRITICAL R9534 22.6K

CRITICAL R9535 22.6K

CRITICAL R9536 22.6K

CRITICAL R9537 22.6K

CRITICAL R9538 22.6K

CRITICAL R9539 22.6K

CRITICAL R9540 22.6K

CRITICAL R9541 22.6K

CRITICAL R9542 22.6K

CRITICAL R9543 22.6K

CRITICAL R9544 22.6K

CRITICAL R9545 22.6K

CRITICAL R9546 22.6K

CRITICAL R9547 22.6K

CRITICAL R9548 22.6K

CRITICAL R9549 22.6K

CRITICAL R9550 22.6K

CRITICAL R9551 22.6K

CRITICAL R9552 22.6K

CRITICAL R9553 22.6K

CRITICAL R9554 22.6K

CRITICAL R9555 22.6K

CRITICAL R9556 22.6K

CRITICAL R9557 22.6K

CRITICAL R9558 22.6K

CRITICAL R9559 22.6K

CRITICAL R9560 22.6K

CRITICAL R9561 22.6K

CRITICAL R9562 22.6K

CRITICAL R9563 22.6K

CRITICAL R9564 22.6K

CRITICAL R9565 22.6K

CRITICAL R9566 22.6K

CRITICAL R9567 22.6K

CRITICAL R9568 22.6K

CRITICAL R9569 22.6K

CRITICAL R9570 22.6K

CRITICAL R9571 22.6K

CRITICAL R9572 22.6K

CRITICAL R9573 22.6K

CRITICAL R9574 22.6K

CRITICAL R9575 22.6K

CRITICAL R9576 22.6K

CRITICAL R9577 22.6K

CRITICAL R9578 22.6K

CRITICAL R9579 22.6K

CRITICAL R9580 22.6K

CRITICAL R9581 22.6K

CRITICAL R9582 22.6K

CRITICAL R9583 22.6K

CRITICAL R9584 22.6K

CRITICAL R9585 22.6K

CRITICAL R9586 22.6K

CRITICAL R9587 22.6K

CRITICAL R9588 22.6K

CRITICAL R9589 22.6K

CRITICAL R9590 22.6K


CRITICAL R9591 22.6K

CRITICAL R9592 22.6K

CRITICAL R9593 22.6K

CRITICAL R9594 22.6K

<

FORM MASTER-JS MCB EDP/LES		SYNC DATE=11/14/2013	
PAGE TITLE			
Thunderbolt Connector A			
	Apple Inc.		DRAWING NUMBER <SCH_NUM>
			REVISION <E4LABEL>
NOTICE OF PROPRIETARY PROPERTY:		BRANCH	<BRANCH>
THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE INC. THE POSSESSOR AGREES TO THE FOLLOWING: I I TO MAINTAIN THIS DOCUMENT IN CONFIDENCE I I NOT TO REPRODUCE OR COPY IT I I I NOT TO REVEAL OR PUBLISH IT IN WHOLE OR PART IV ALL RIGHTS RESERVED		PAGE	94 OF 132
		SHEET	69 OF 80

8	7	6	5	4	3	2	1
---	---	---	---	---	---	---	---

D

C

A

C

B

A

WWW.AliSaler.Com



8

7

6

5

4

3

2

1

Memory Bus Constraints

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
MEM_37S	*	=37_OHM_SE	=37_OHM_SE	=37_OHM_SE	=37_OHM_SE	=STANDARD	=STANDARD
MEM_40S	*	=40_OHM_SE	=40_OHM_SE	=40_OHM_SE	=40_OHM_SE	=STANDARD	=STANDARD
MEM_72D	*	=72_OHM_DIFF	=72_OHM_DIFF	=72_OHM_DIFF	=72_OHM_DIFF	=72_OHM_DIFF	=72_OHM_DIFF
MEM_50S	*	=50_OHM_SE	=50_OHM_SE	=50_OHM_SE	=50_OHM_SE	=STANDARD	=STANDARD
MEM_85D	*	=85_OHM_DIFF	=85_OHM_DIFF	=85_OHM_DIFF	=85_OHM_DIFF	=85_OHM_DIFF	=85_OHM_DIFF

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
MEM_CLK2MEM	*	=4X_DIELECTRIC	?
MEM_CTRL2CTRL	*	=3X_DIELECTRIC	?
MEM_CTRL2MEM	*	=3X_DIELECTRIC	?
MEM_CMD2CMD	*	=2X_DIELECTRIC	?
MEM_CMD2MEM	*	=3X_DIELECTRIC	?
MEM_DATA2DATA	*	=2X_DIELECTRIC	?
MEM_DATA2MEM	*	=3X_DIELECTRIC	?
MEM_DQS2MEM	*	=4X_DIELECTRIC	?
MEM_2OTHER	*	=6X_DIELECTRIC	?
MEM_DQBL2BL	*	=4X_DIELECTRIC	?
MEM_DQCH2CH	*	=6X_DIELECTRIC	?

Memory Bus Spacing Group Assignments

NET_SPACING_TYPE1	NET_SPACING_TYPE2	AREA_TYPE	SPACING_RULE_SET
MEM_CLK	MEM_*	*	MEM_CLK2MEM

NET_SPACING_TYPE1	NET_SPACING_TYPE2	AREA_TYPE	SPACING_RULE_SET
MEM_CMD	MEM_*	*	MEM_CMD2MEM
MEM_CMD	MEM_CMD	*	MEM_CMD2CMD

NET_SPACING_TYPE1	NET_SPACING_TYPE2	AREA_TYPE	SPACING_RULE_SET
MEM_CTRL	MEM_*	*	MEM_CTRL2MEM
MEM_CTRL	MEM_CTRL	*	MEM_CTRL2CTRL

NET_SPACING_TYPE1	NET_SPACING_TYPE2	AREA_TYPE	SPACING_RULE_SET
MEM_DQS	MEM_*	*	MEM_DQS2MEM

NET_SPACING_TYPE1	NET_SPACING_TYPE2	AREA_TYPE	SPACING_RULE_SET
MEM_*	*	*	MEM_2OTHER

Memory Net Properties

ELECTRICAL_CONSTRAINT_SET	NET_TYPE			
	PHYSICAL	SPACING		
MEM_A_CLK	MEM_72D	MEM_CLK	MEM A CLK P<0>	12 28 30
MEM_A_CLK	MEM_72D	MEM_CLK	MEM A CLK N<0>	12 28 30
MEM_A_CNTRL	MEM_37S	MEM_CTRL	MEM A CKE<1..0>	12 28 30
MEM_A_CNTRL	MEM_37S	MEM_CTRL	MEM A CS L<1>	12 28 30
MEM_A_CNTRL	MEM_37S	MEM_CTRL	MEM A CS L<0>	12 28 30
MEM_A_CNTRL	MEM_37S	MEM_CTRL	MEM A ODT<1>	12 28 30
MEM_A_CNTRL	MEM_37S	MEM_CTRL	MEM A ODT<0>	12 28 30
MEM_A_CMD	MEM_40S	MEM_CMD	MEM A A<15..0>	12 28 30
MEM_A_CMD	MEM_40S	MEM_CMD	MEM A BA<2..0>	12 28 30
MEM_A_CMD	MEM_40S	MEM_CMD	MEM A RAS L	12 28 30
MEM_A_CMD	MEM_40S	MEM_CMD	MEM A CAS L	12 28 30
MEM_A_CMD	MEM_40S	MEM_CMD	MEM A WE L	12 28 30
MEM_A_DQ_BYTE0	MEM_50S	MEM_A_DQ_BYTE0	MEM A DQ<7..0>	7 12 28
MEM_A_DQ_BYTE1	MEM_50S	MEM_A_DQ_BYTE1	MEM A DQ<15..8>	7 12 28
MEM_A_DQ_BYTE2	MEM_50S	MEM_A_DQ_BYTE2	MEM A DQ<23..16>	7 12 28
MEM_A_DQ_BYTE3	MEM_50S	MEM_A_DQ_BYTE3	MEM A DQ<31..24>	7 12 28
MEM_A_DQ_BYTE4	MEM_50S	MEM_A_DQ_BYTE4	MEM A DQ<39..32>	7 12 28
MEM_A_DQ_BYTE5	MEM_50S	MEM_A_DQ_BYTE5	MEM A DQ<47..40>	7 12 28
MEM_A_DQ_BYTE6	MEM_50S	MEM_A_DQ_BYTE6	MEM A DQ<55..48>	7 12 28
MEM_A_DQ_BYTE7	MEM_50S	MEM_A_DQ_BYTE7	MEM A DQ<63..56>	7 12 28
MEM_A_DQS0	MEM_85D	MEM_DQS	MEM A DQS P<0>	12 28
MEM_A_DQS0	MEM_85D	MEM_DQS	MEM A DQS N<0>	12 28
MEM_A_DQS1	MEM_85D	MEM_DQS	MEM A DQS P<1>	12 28
MEM_A_DQS1	MEM_85D	MEM_DQS	MEM A DQS N<1>	12 28
MEM_A_DQS2	MEM_85D	MEM_DQS	MEM A DQS P<2>	12 28
MEM_A_DQS2	MEM_85D	MEM_DQS	MEM A DQS N<2>	12 28
MEM_A_DQS3	MEM_85D	MEM_DQS	MEM A DQS P<3>	12 28
MEM_A_DQS3	MEM_85D	MEM_DQS	MEM A DQS N<3>	12 28
MEM_A_DQS4	MEM_85D	MEM_DQS	MEM A DQS P<4>	12 28
MEM_A_DQS4	MEM_85D	MEM_DQS	MEM A DQS N<4>	12 28
MEM_A_DQS5	MEM_85D	MEM_DQS	MEM A DQS P<5>	12 28
MEM_A_DQS5	MEM_85D	MEM_DQS	MEM A DQS N<5>	12 28
MEM_A_DQS6	MEM_85D	MEM_DQS	MEM A DQS P<6>	12 28
MEM_A_DQS6	MEM_85D	MEM_DQS	MEM A DQS N<6>	12 28
MEM_A_DQS7	MEM_85D	MEM_DQS	MEM A DQS P<7>	12 28
MEM_A_DQS7	MEM_85D	MEM_DQS	MEM A DQS N<7>	12 28
MEM_B_CLK	MEM_72D	MEM_CLK	MEM B CLK P<0>	12 29 30
MEM_B_CLK	MEM_72D	MEM_CLK	MEM B CLK N<0>	12 29 30
MEM_B_CNTRL	MEM_37S	MEM_CTRL	MEM B CKE<1>	12 29 30
MEM_B_CNTRL	MEM_37S	MEM_CTRL	MEM B CKE<0>	12 29 30
MEM_B_CNTRL	MEM_37S	MEM_CTRL	MEM B CS L<3..0>	12 29 30
MEM_B_CNTRL	MEM_37S	MEM_CTRL	MEM B ODT<1..0>	12 29 30
MEM_B_CMD	MEM_40S	MEM_CMD	MEM B A<15..0>	12 29 30
MEM_B_CMD	MEM_40S	MEM_CMD	MEM B BA<2..0>	12 29 30
MEM_B_CMD	MEM_40S	MEM_CMD	MEM B RAS L	12 29 30
MEM_B_CMD	MEM_40S	MEM_CMD	MEM B CAS L	12 29 30
MEM_B_CMD	MEM_40S	MEM_CMD	MEM B WE L	12 29 30
MEM_B_DQ_BYTE0	MEM_50S	MEM_B_DQ_BYTE0	MEM B DQ<7..0>	7 12 29
MEM_B_DQ_BYTE1	MEM_50S	MEM_B_DQ_BYTE1	MEM B DQ<15..8>	7 12 29
MEM_B_DQ_BYTE2	MEM_50S	MEM_B_DQ_BYTE2	MEM B DQ<23..16>	7 12 29
MEM_B_DQ_BYTE3	MEM_50S	MEM_B_DQ_BYTE3	MEM B DQ<31..24>	7 12 29
MEM_B_DQ_BYTE4	MEM_50S	MEM_B_DQ_BYTE4	MEM B DQ<39..32>	7 12 29
MEM_B_DQ_BYTE5	MEM_50S	MEM_B_DQ_BYTE5	MEM B DQ<47..40>	7 12 29
MEM_B_DQ_BYTE6	MEM_50S	MEM_B_DQ_BYTE6	MEM B DQ<55..48>	7 12 29
MEM_B_DQ_BYTE7	MEM_50S	MEM_B_DQ_BYTE7	MEM B DQ<63..56>	7 12 29
MEM_B_DQS0	MEM_85D	MEM_DQS	MEM B DQS P<0>	12 29
MEM_B_DQS0	MEM_85D	MEM_DQS	MEM B DQS N<0>	12 29
MEM_B_DQS1	MEM_85D	MEM_DQS	MEM B DQS P<1>	12 29
MEM_B_DQS1	MEM_85D	MEM_DQS	MEM B DQS N<1>	12 29
MEM_B_DQS2	MEM_85D	MEM_DQS	MEM B DQS P<2>	12 29
MEM_B_DQS2	MEM_85D	MEM_DQS	MEM B DQS N<2>	12 29
MEM_B_DQS3	MEM_85D	MEM_DQS	MEM B DQS P<3>	12 29
MEM_B_DQS3	MEM_85D	MEM_DQS	MEM B DQS N<3>	12 29
MEM_B_DQS4	MEM_85D	MEM_DQS	MEM B DQS P<4>	12 29
MEM_B_DQS4	MEM_85D	MEM_DQS	MEM B DQS N<4>	12 29
MEM_B_DQS5	MEM_85D	MEM_DQS	MEM B DQS P<5>	12 29
MEM_B_DQS5	MEM_85D	MEM_DQS	MEM B DQS N<5>	12 29
MEM_B_DQS6	MEM_85D	MEM_DQS	MEM B DQS P<6>	12 29
MEM_B_DQS6	MEM_85D	MEM_DQS	MEM B DQS N<6>	12 29
MEM_B_DQS7	MEM_85D	MEM_DQS	MEM B DQS P<7>	12 29
MEM_B_DQS7	MEM_85D	MEM_DQS	MEM B DQS N<7>	12 29

DDR3 (Memory Down):

DQ signals should be matched within 0.508mm of associated DQS pair

DQS intra-pair matching should be within 0.127mm, no inter-pair matching requirement.

DQS to clock matching should be within [CLK-139.73mm] and [CLK-30.48mm].

CLK intra-pair matching should be within 0.127mm, inter-pair matching should be within 0.508mm.

CONTROL signals should be matched within [CLK-2.54mm] to [CLK+0mm] of CLK pairs.

A/BA/CMD signals should be matched within [CLK-2.54mm] to [CLK+2.54mm] of CLK pairs.

DQ/DQS/A/BA/cmd signal spacing is 4x dielectric, CLK is 5x dielectric.

Maximum length of any signal from die pad to first DRAM device is 139.7mm max, to last DRAM device is 194.31mm max.

SOURCE: Chief River SFF Platform DG, Rev 0.7 (#460452), Section 2.6.3

Memory Constraints

Apple Inc.

NOTICE OF PROPRIETARY PROPERTY:
THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE INC. THE POSSESSOR 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	SIZE
<SCH_NUM>	D

REVISION	BRANCH
<E4LABEL>	<BRANCH>

PAGE	SHEET
101 OF 132	73 OF 80

8

7

6

5

4

3

2

1

WWW.AliSaler.Com

D

D

C

C

B

B

A

A

Digital Video Signal Constraints

SATA Interface Constraints

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
SATA_90D	*	=90_OHM_DIFF	=90_OHM_DIFF	=90_OHM_DIFF	=90_OHM_DIFF	=90_OHM_DIFF	=90_OHM_DIFF
SATA_37SE	*	=37_OHM_SE	=37_OHM_SE	=37_OHM_SE	=37_OHM_SE	=37_OHM_SE	=37_OHM_SE
SATA_50SE	*	=50_OHM_SE	=50_OHM_SE	=50_OHM_SE	=50_OHM_SE	=50_OHM_SE	=50_OHM_SE

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
SATA	*	=5:1_SPACING	?
SATA_ICOMP	*	15 MIL	?

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
SATA	TOP,BOTTOM	=5:1_SPACING	?

SOURCE: HR PLATFORM DESIGN GUIDE, TABLES 191,193

USB 2.0 Interface Constraints

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

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
USB	*	=4:1_SPACING	?
USB_RBIAS	*	15 MIL	?

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
USB	TOP,BOTTOM	=4:1_SPACING	?

SOURCE: HR PLATFORM DESIGN GUIDE, TABLES 191,193

USB 3.0 INTERFACE CONSTRAINTS

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
USB3_85D	*	=85_OHM_DIFF	=85_OHM_DIFF	=85_OHM_DIFF	=85_OHM_DIFF	=85_OHM_DIFF	=85_OHM_DIFF

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
USB3	*	=5:1_SPACING	?

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
USB3	TOP,BOTTOM	=5:1_SPACING	?

SOURCE: CR SFF PLATFORM DESIGN GUIDE V0.7, TABLE 4-211, 1X1+

System Clock Signal Constraints

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

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

NOTE: 25MHz system clocks very sensitive to noise.

PCH Net Properties

ELECTRICAL_CONSTRAINT_SET				NET_TYPE	
				PHYSICAL	SPACING
E97D	SATA_HDD_R2D	SATA_90D	SATA	SATA HDD R2D RDRIN P	7
E98D	SATA_HDD_R2D	SATA_90D	SATA	SATA HDD R2D RDRIN N	7
E99D	SATA_HDD_D2R	SATA_90D	SATA	SATA HDD D2R RDROUT P	7
E20D	SATA_HDD_D2R	SATA_90D	SATA	SATA HDD D2R RDROUT N	7
E98D	SATA_HDD_D2R	SATA_90D	SATA	SATA HDD D2R RDRIN P	7
E99D	SATA_HDD_D2R	SATA_90D	SATA	SATA HDD D2R RDRIN N	7
E98D	SATA_HDD_R2D	SATA_90D	SATA	SATA HDD R2D RDROUT N	7
E99D	SATA_HDD_R2D	SATA_90D	SATA	SATA HDD R2D RDROUT P	7
E20D	SATA_HDD_D2R	SATA_90D	SATA	SATA HDD D2R RC P	7 37
E98D	SATA_HDD_D2R	SATA_90D	SATA	SATA HDD D2R RC N	7 37
E99D	SATA_HDD_R2D	SATA_90D	SATA	SATA HDD R2D RC N	7 37
E97D	SATA_HDD_R2D	SATA_90D	SATA	SATA HDD R2D RC P	7 37
E97D	SATA_HDD_R2D	SATA_90D	SATA	SATA HDD R2D C P	7 17 37
E97D	SATA_HDD_R2D	SATA_90D	SATA	SATA HDD R2D C N	7 17 37
E97D	SATA_HDD_D2R	SATA_90D	SATA	SATA HDD D2R P	7 17 37
E97D	SATA_HDD_D2R	SATA_90D	SATA	SATA HDD D2R N	7 17 37

E97D	SATA_HDD_D2R	SATA_90D	SATA	SATA SSDRHDD D2R P	7 37
E97D	SATA_HDD_D2R	SATA_90D	SATA	SATA SSDRHDD D2R N	7 37
E97D	SATA_HDD_R2D	SATA_90D	SATA	SATA SSDRHDD R2D P	7 37
E97D	SATA_HDD_R2D	SATA_90D	SATA	SATA SSDRHDD R2D N	7 37

E98D	PCH_SATA3_ICOMP	SATA_50SE	SATA_ICOMP	PCH SATA3COMP	17
E98D	PCH_SATA_ICOMP	SATA_37SE	SATA_ICOMP	PCH SATAICOMP	17
E98D	USB_EXTB	USB_85D	USB	USB EXTB XHCI P	19 26
E98D	USB_EXTB	USB_85D	USB	USB EXTB XHCI N	19 26
E98D	USB_EXTB	USB_85D	USB	USB EXTB EHCI P	19 26
E98D	USB_EXTB	USB_85D	USB	USB EXTB EHCI N	19 26
E98D	USB_HUB2_UP	USB_85D	USB	USB HUB UP P	19 26
E98D	USB_HUB2_UP	USB_85D	USB	USB HUB UP N	19 26
E98D	USB_EXTB	USB_85D	USB	USB EXTB P	19 38
E98D	USB_EXTB	USB_85D	USB	USB EXTB N	19 38
E98D	USB_EXTB	USB_85D	USB	USB EXTB P	7 26 36
E98D	USB_EXTB	USB_85D	USB	USB EXTB N	7 26 36
E98D	USB_EXTD	USB_85D	USB	USB EXT D P	
E98D	USB_EXTD	USB_85D	USB	USB EXT D N	
E98D	USB_CAMERA	USB_85D	USB	USB CAMERA CONN P	7 32
E98D	USB_CAMERA	USB_85D	USB	USB CAMERA CONN N	7 32
E98D	USB_BT	USB_85D	USB	USB BT P	7 9 36
E98D	USB_BT	USB_85D	USB	USB BT N	7 9 36
E98D	USB_TPAD	USB_85D	USB	USB TPAD P	9 47
E98D	USB_TPAD	USB_85D	USB	USB TPAD N	9 47
E98D	USB_SMC	USB_85D	USB	USB SMC P	9 39
E98D	USB_SMC	USB_85D	USB	USB SMC N	9 39
E98D	PCH_USB_RBIAS	PCH_USB_RBIAS	USB_RBIAS	PCH USB RBIAS	19
E98D	USB_EXTD	USB_85D	USB	USB EXT D XHCI P	19 26
E98D	USB_EXTD	USB_85D	USB	USB EXT D XHCI N	19 26
E98D	USB_EXTB	USB_85D	USB	USB EXTB MUXED P	38
E98D	USB_EXTB	USB_85D	USB	USB EXTB MUXED N	38
E98D	USB_CAMERA	USB_85D	USB	USB CAMERA P	19 32
E98D	USB_CAMERA	USB_85D	USB	USB CAMERA N	19 32
E98D	USB_EXTB	USB_85D	USB	USB LT1 P	7 38
E98D	USB_EXTB	USB_85D	USB	USB LT1 N	7 38
E98D	USB3_EXTB_TX	USB3_85D	USB3	USB3 EXT B TX P	19 36
E98D	USB3_EXTB_TX	USB3_85D	USB3	USB3 EXT B TX N	19 36
E98D	USB3_EXTB_RX	USB3_85D	USB3	USB3 EXT B RX P	7 19 36
E98D	USB3_EXTB_RX	USB3_85D	USB3	USB3 EXT B RX N	7 19 36

E98D	USB3_EXTB_TX	USB3_85D	USB3	USB3 EXT B TX P	19 38
E98D	USB3_EXTB_TX	USB3_85D	USB3	USB3 EXT B TX N	7 19 38
E98D	USB3_EXTB_RX	USB3_85D	USB3	USB3 EXT B RX P	7 19 38
E98D	USB3_EXTB_RX	USB3_85D	USB3	USB3 EXT B RX N	7 19 38

Clock Net Properties


ELECTRICAL_CONSTRAINT_SET			NET_TYPE		
			PHYSICAL	SPACING	
REQ	SYSCLK_CLK32K_RTC	CLK_SLOW_55S	CLK_SLOW	SYSCLK_CLK32K_RTC	17 25
REQ	SYSCLK_CLK25M_SB	CLK_25M_55S	CLK_25M	SYSCLK_CLK25M_SB	17 25
REQ		CLK_25M_55S	CLK_25M	SYSCLK_CLK25M_SB_R	17
REQ	SYSCLK_CLK25M_ENET	CLK_25M_55S	CLK_25M	SYSCLK_CLK25M_ENET	
REQ		CLK_25M_55S	CLK_25M	SYSCLK_CLK25M_ENET_R	
REQ	SYSCLK_CLK25M_TBT	CLK_25M_55S	CLK_25M	SYSCLK_CLK25M_TBT	25 33
REQ		CLK_25M_55S	CLK_25M	SYSCLK_CLK25M_TBT_R	33

SYDC: MATTER-CTL_MBO_EXPLORE

SYDC: DATE=09/21/2015

PAGE TITLE

PCH Constraints 1

 Apple Inc.

THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE INC. THE POSSESSOR 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

REVISION

BRANCH

PAGE

SHEET

<SCH_NUM>

<E4LABEL>

<BRANCH>

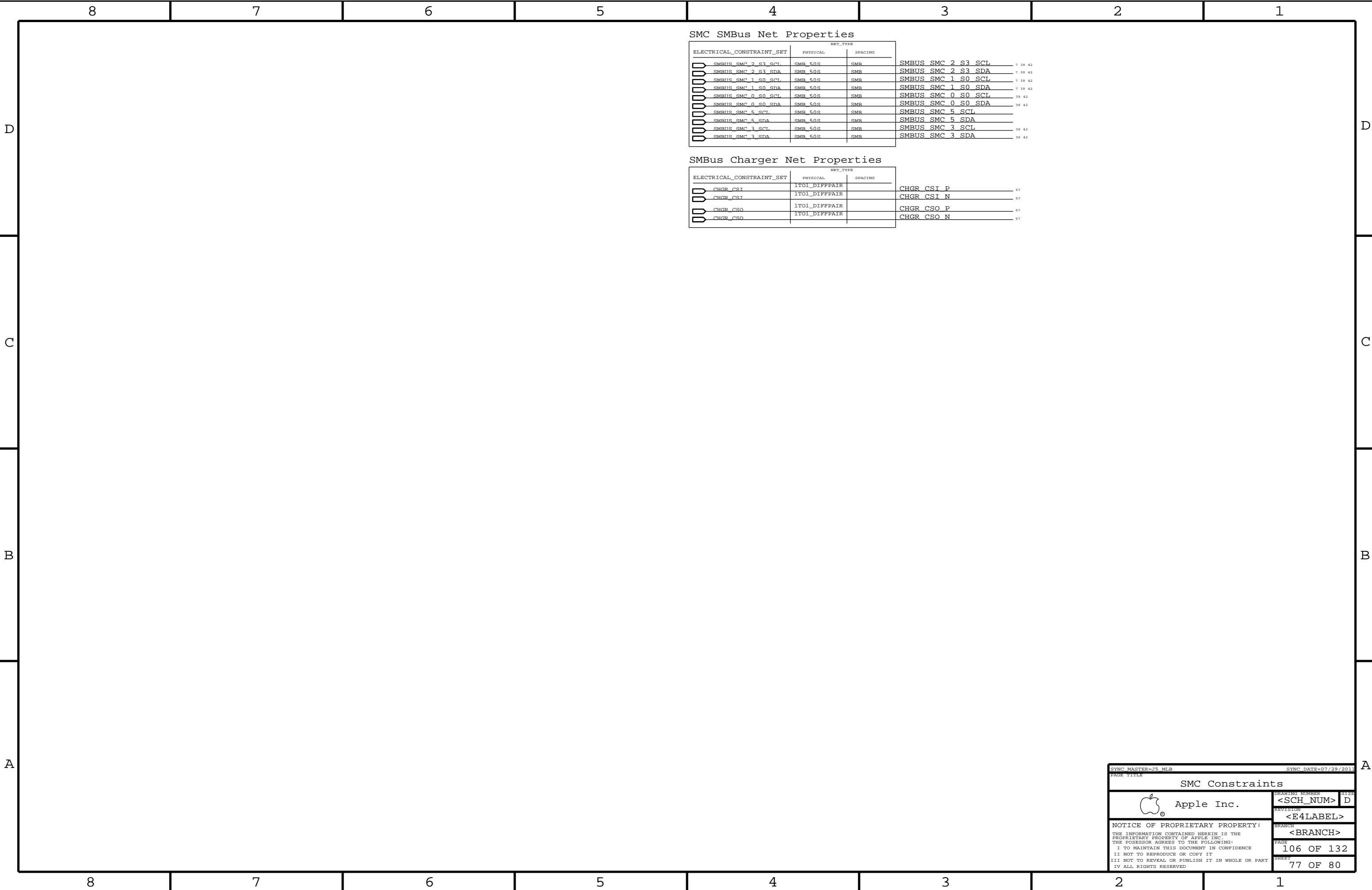
102 OF 132

74 OF 80











SIZE

D





WWW.AliSaler.Com



SMC SMBus Net Properties

ELECTRICAL_CONSTRAINT_SET	NET_TYPE			
	PHYSICAL	SPACING		
 SMBUS_SMC_2_S3_SCL	SMB_50S	SMB	SMBUS_SMC_2_S3_SCL	7 39 42
 SMBUS_SMC_2_S3_SDA	SMB_50S	SMB	SMBUS_SMC_2_S3_SDA	7 39 42
 SMBUS_SMC_1_S0_SCL	SMB_50S	SMB	SMBUS_SMC_1_S0_SCL	7 39 42
 SMBUS_SMC_1_S0_SDA	SMB_50S	SMB	SMBUS_SMC_1_S0_SDA	7 39 42
 SMBUS_SMC_0_S0_SCL	SMB_50S	SMB	SMBUS_SMC_0_S0_SCL	39 42
 SMBUS_SMC_0_S0_SDA	SMB_50S	SMB	SMBUS_SMC_0_S0_SDA	39 42
 SMBUS_SMC_5_SCL	SMB_50S	SMB	SMBUS_SMC_5_SCL	
 SMBUS_SMC_5_SDA	SMB_50S	SMB	SMBUS_SMC_5_SDA	
 SMBUS_SMC_3_SCL	SMB_50S	SMB	SMBUS_SMC_3_SCL	39 42
 SMBUS_SMC_3_SDA	SMB_50S	SMB	SMBUS_SMC_3_SDA	39 42

SMBus Charger Net Properties


ELECTRICAL_CONSTRAINT_SET	NET_TYPE			
	PHYSICAL	SPACING		
 CHGR_CSI	1T01_DIFFPAIR		CHGR_CSI_P	57
 CHGR_CSI	1T01_DIFFPAIR		CHGR_CSI_N	57
 CHGR_CSO	1T01_DIFFPAIR		CHGR_CSO_P	57
 CHGR_CSO	1T01_DIFFPAIR		CHGR_CSO_N	57

SYNC MASTER=J5_MLB

SYNC DATE=07/29/2013

PAGE TITLE

SMC Constraints

 Apple Inc.

DRAWING NUMBER

SIZE

REVISION

<SCH_NUM> D

BRANCH

<E4LABEL>

NOTICE OF PROPRIETARY PROPERTY:

THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE INC. THE POSSESSOR 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

106 OF 132

SHEET

77 OF 80

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
SENSE_1T01_55S	*	=1:1_DIFFPAIR	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=1:1_DIFFPAIR	=1:1_DIFFPAIR
THERM_1T01_55S	*	=1:1_DIFFPAIR	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=1:1_DIFFPAIR	=1:1_DIFFPAIR
DIFFPAIR	*	=1:1_DIFFPAIR			=1:1_DIFFPAIR	=1:1_DIFFPAIR	=1:1_DIFFPAIR
AUDIODIFF	*	=1:1_DIFFPAIR	0.1 MM	0.1 MM	10 MM	0.1 MM	0.1 MM

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

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

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

NET_SPACING_TYPE1	NET_SPACING_TYPE2	AREA_TYPE	SPACING_RULE_SET
GND	MEM_CLK	*	GND_P2MM
GND	MEM_CMD	*	GND_P2MM
GND	MEM_CTRL	*	GND_P2MM
GND	MEM_*_DQ_BYTE*	*	GND_P2MM
GND	MEM_DQS	*	GND_P2MM

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

NET_SPACING_TYP#1	NET_SPACING_TYP#2	AREA_TYPE	SPACING_RULE_SET
CLK_PCIE	GND	*	GND_P2MM
PCIE	GND	*	GND_P2MM
SATA	GND	*	GND_P2MM
USB3	GND	*	GND_P2MM
USB	GND	*	GND_P2MM
CLK_PCIE	SB_POWER	*	PWR_P2MM
SATA	SB_POWER	*	PWR_P2MM
USB3	SB_POWER	*	PWR_P2MM
USB	SB_POWER	*	PWR_P2MM

PHYSICAL_RULE_SET	LAYER	ALLOW_ROUTE_ON_LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
MEM_40S_OVERRIDE	* OVERRIDE	OVERRIDE	OVERRIDE	0.09 MM OVERRIDE	100 MIL OVERRIDE	OVERRIDE	OVERRIDE
MEM_72D_OVERRIDE	* OVERRIDE	OVERRIDE	OVERRIDE	0.09 MM OVERRIDE	100 MIL OVERRIDE	OVERRIDE	OVERRIDE
MEM_37S_OVERRIDE	* OVERRIDE	OVERRIDE	OVERRIDE	0.09 MM OVERRIDE	100 MIL OVERRIDE	OVERRIDE	OVERRIDE
MEM_85D_OVERRIDE	* OVERRIDE	OVERRIDE	OVERRIDE	0.09 MM OVERRIDE	100 MIL OVERRIDE	OVERRIDE	OVERRIDE
PCIE_85D_OVERRIDE	* OVERRIDE	OVERRIDE	OVERRIDE	0.09 MM OVERRIDE	10 mm OVERRIDE	OVERRIDE	OVERRIDE
USB_85D	TOP			0.1 MM	500 MIL		
CPU_27P4S	BOTTOM			0.23 MM	100 MIL		
USB3_85D	TOP			0.1 MM	500 MIL		
USB3_85D	ISL10			0.075 MM			0.090 MM
DP_85D	ISL9			0.075 MM			0.090 MM
PCIE_85D	ISL10			0.075 MM			0.090 MM

NET_PHYSICAL_TYPE	AREA_TYPE	PHYSICAL_RULE_SET
MEM_37S	BGA_MEM	MEM_50S
MEM_40S	BGA_MEM	MEM_50S
MEM_72D	BGA_MEM	MEM_85D

NET_PHYSICAL_TYPE	AREA_TYPE	PHYSICAL_RULE_SET
AUDIODIFF	*	AUDIODIFF
1TO1_DIFFPAIR	*	1:1_DIFFPAIR
SENSE_1TO1_55S	*	SENSE_1TO1_55S
THERM_1TO1_55S	*	THERM_1TO1_55S
DIFFPAIR	*	DIFFPAIR

NET_PHYSICAL_TYPE	AREA_TYPE	PHYSICAL_RULE_SET
DP_85D	BGA	100_DIFF_BGA
SATA_90D	BGA	100_DIFF_BGA
CLK_PCIE_90D	BGA	100_DIFF_BGA

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

D1 Specific Net Properties

ELECTRICAL_CONSTRAINT_SET		NET_TYPE		SPACING	
		PHYSICAL			
	SENSE_DIFFPAIR	THERM_1T01_55S	THERM	CPUTHMSNS D2 P	45
	SENSE_DIFFPAIR	THERM_1T01_55S	THERM	CPUTHMSNS D2 N	45
	SENSE_DIFFPAIR	THERM_1T01_55S	THERM	CPU_THERMD P	9 10
	SENSE_DIFFPAIR	THERM_1T01_55S	THERM	CPU_THERMD N	9 10
	SENSE_DIFFPAIR	THERM_1T01_55S	THERM	GPUTHMSNS D P	45
	SENSE_DIFFPAIR	THERM_1T01_55S	THERM	GPUTHMSNS D N	45
	SENSE_DIFFPAIR	THERM_1T01_55S	THERM	GPU_TDIODE P	45
	SENSE_DIFFPAIR	THERM_1T01_55S	THERM	GPU_TDIODE N	45
4400	SENSE_DIFFPAIR	THERM_1T01_55S	THERM	TBT_THERMD P	45
4400	SENSE_DIFFPAIR	THERM_1T01_55S	THERM	TBT_THERMD N	45
	SENSE_DIFFPAIR	THERM_1T01_55S	THERM	DDR3THMSNS D1 P	45
	SENSE_DIFFPAIR	THERM_1T01_55S	THERM	DDR3THMSNS D1 N	45
	SENSE_DIFFPAIR	SENSE_1T01_55S	SENSE	CPUVCCIOS0 CS P	43 63
	SENSE_DIFFPAIR	SENSE_1T01_55S	SENSE	CPUVCCIOS0 CS N	43 63
	SENSE_DIFFPAIR	SENSE_1T01_55S	SENSE	CPU_VDDQ SENSE P	13
	SENSE_DIFFPAIR	SENSE_1T01_55S	SENSE	CPU_VDDQ SENSE N	13
4400	SENSE_DIFFPAIR	SENSE_1T01_55S	SENSE	ISNS_LCD_PANEL P	
4400	SENSE_DIFFPAIR	SENSE_1T01_55S	SENSE	ISNS_LCD_PANEL N	
	SENSE_DIFFPAIR	SENSE_1T01_55S	SENSE	ISNS_1V35_S3_MEM P	43
	SENSE_DIFFPAIR	SENSE_1T01_55S	SENSE	ISNS_1V35_S3_MEM N	
	SENSE_DIFFPAIR	SENSE_1T01_55S	SENSE	ISNS_SSD P	37 43
	SENSE_DIFFPAIR	SENSE_1T01_55S	SENSE	ISNS_SSD N	37 43
	SENSE_DIFFPAIR	SENSE_1T01_55S	SENSE	ISNS_3V3_S0_SSD_R P	
	SENSE_DIFFPAIR	SENSE_1T01_55S	SENSE	ISNS_3V3_S0_SSD_R N	43
	SENSE_DIFFPAIR	SENSE_1T01_55S	SENSE	ISNS_WLAN P	
	SENSE_DIFFPAIR	SENSE_1T01_55S	SENSE	ISNS_WLAN N	
	SENSE_DIFFPAIR	SENSE_1T01_55S	SENSE	ISNS_LCDBKIT P	
	SENSE_DIFFPAIR	SENSE_1T01_55S	SENSE	ISNS_LCDBKIT N	
4400	SENSE_DIFFPAIR	SENSE_1T01_55S	SENSE	ISNS_TBT P	80
4400	SENSE_DIFFPAIR	SENSE_1T01_55S	SENSE	ISNS_TBT N	80
	SENSE_DIFFPAIR	SENSE_1T01_55S	SENSE	ISNS_1V35_S3_MEM_R P	43
	SENSE_DIFFPAIR	SENSE_1T01_55S	SENSE	ISNS_1V35_S3_MEM_R N	43
	SENSE_DIFFPAIR	SENSE_1T01_55S	SENSE	VCCSA50 CS P	58 80
	SENSE_DIFFPAIR	SENSE_1T01_55S	SENSE	VCCSA50 CS N	58 80
4435	HDMI_CLK	HDMI_90D	HDMI	HDMI_IG_CLK_C P	7 9 36
4435	HDMI_CLK	HDMI_90D	HDMI	HDMI_IG_CLK_C N	7 9 36
4435	HDMI_DATA	HDMI_90D	HDMI	HDMI_IG_DATA_C P<2..0>	7 9 36
4435	HDMI_DATA	HDMI_90D	HDMI	HDMI_IG_DATA_C N<2..0>	7 9 36

D1 Specific Net Properties


ELECTRICAL_CONSTRAINT_SET		SET_TYPE			
		PHYSICAL	SPACING		
	PCIE_CLK100M_AP	CLK_PCIE_90D	CLK_PCIE	PCIE_CLK100M_AP_CONN_P	7 36
	PCIE_CLK100M_AP	CLK_PCIE_90D	CLK_PCIE	PCIE_CLK100M_AP_CONN_N	7 36
		1T01_DIFFEPAIR		CHGR_CSI_R_P	57
		1T01_DIFFEPAIR		CHGR_CSI_R_N	57
		1T01_DIFFEPAIR		CHGR_CSO_R_P	57
		1T01_DIFFEPAIR		CHGR_CSO_R_N	57
	USB_BT	USB_85D	1USB	USB_BT_CONN_P	36
	USB_BT	USB_85D	1USB	USB_BT_CONN_N	36
	USB_BT	USB_85D	1USB	USB_BT_WAKE_P	36
	USB_BT	USB_85D	1USB	USB_BT_WAKE_N	36
	AUDIO_DIFFEPAIR	DIFFEPAIR	AUDIO	SPKRCONN_SL_OUT_P	7 53 55
	AUDIO_DIFFEPAIR	DIFFEPAIR	AUDIO	SPKRCONN_SL_OUT_N	7 53 55
	AUDIO_DIFFEPAIR	DIFFEPAIR	AUDIO	SPKRCONN_SR_OUT_P	7 53 55
	AUDIO_DIFFEPAIR	DIFFEPAIR	AUDIO	SPKRCONN_SR_OUT_N	7 53 55
	AUDIO_DIFFEPAIR	AUDIODIFF	AUDIO	SPKRCONN_L_OUT_P	7 53 55 78
	AUDIO_DIFFEPAIR	AUDIODIFF	AUDIO	SPKRCONN_L_OUT_N	7 53 55 78
	AUDIO_DIFFEPAIR	AUDIODIFF	AUDIO	SPKRCONN_R_OUT_P	7 53 55 78
	AUDIO_DIFFEPAIR	AUDIODIFF	AUDIO	SPKRCONN_R_OUT_N	7 53 55 78
	SENSE_DIFFEPAIR	SENSE_1T01_55S_SENSE		CPUIMVP_ISNSG_P	43
	SENSE_DIFFEPAIR	SENSE_1T01_55S_SENSE		CPUIMVP_ISNSG_N	43
	SENSE_DIFFEPAIR	SENSE_1T01_55S_SENSE		CPUIMVP_ISNS1G_P	43 62
	SENSE_DIFFEPAIR	SENSE_1T01_55S_SENSE		CPUIMVP_ISNS1G_N	43 62
	SENSE_DIFFEPAIR	SENSE_1T01_55S_SENSE		CPUIMVP_ISNS2G_P	43 62
	SENSE_DIFFEPAIR	SENSE_1T01_55S_SENSE		CPUIMVP_ISNS2G_N	43 62
	SENSE_DIFFEPAIR	SENSE_1T01_55S_SENSE		CPUIMVP_ISUMG_R_P	43
	SENSE_DIFFEPAIR	SENSE_1T01_55S_SENSE		CPUIMVP_ISUMG_R_N	43
	SENSE_DIFFEPAIR	SENSE_1T01_55S_SENSE		ISNS_HS_OTHER_P	44
	SENSE_DIFFEPAIR	SENSE_1T01_55S_SENSE		ISNS_HS_OTHER_N	44
	SENSE_DIFFEPAIR	SENSE_1T01_55S_SENSE		ISNS_HS_COMPUTING_P	44
	SENSE_DIFFEPAIR	SENSE_1T01_55S_SENSE		ISNS_HS_COMPUTING_N	44
	SENSE_DIFFEPAIR	SENSE_1T01_55S_SENSE		CPUIMVP_ISNS_P	43
	SENSE_DIFFEPAIR	SENSE_1T01_55S_SENSE		CPUIMVP_ISNS_N	43
	SENSE_DIFFEPAIR	SENSE_1T01_55S_SENSE		CPUIMVP_ISNS1_P	43 62
	SENSE_DIFFEPAIR	SENSE_1T01_55S_SENSE		CPUIMVP_ISNS1_N	43 62
	SENSE_DIFFEPAIR	SENSE_1T01_55S_SENSE		CPUIMVP_ISNS2_P	43 62
	SENSE_DIFFEPAIR	SENSE_1T01_55S_SENSE		CPUIMVP_ISNS2_N	43 62
	SENSE_DIFFEPAIR	SENSE_1T01_55S_SENSE		CPUIMVP_ISUM_R_P	43
	SENSE_DIFFEPAIR	SENSE_1T01_55S_SENSE		CPUIMVP_ISUM_R_N	43
	AUDIO_DIFFEPAIR	AUDIODIFF	AUDIO	AUD_L01_L_P	51 53
	AUDIO_DIFFEPAIR	AUDIODIFF	AUDIO	AUD_L01_L_N	51 53
	AUDIO_DIFFEPAIR	AUDIODIFF	AUDIO	AUD_L01_R_P	51 53
	AUDIO_DIFFEPAIR	AUDIODIFF	AUDIO	AUD_L01_R_N	51 53
	AUDIO_DIFFEPAIR	AUDIODIFF	AUDIO	AUD_L02_L_P	51 53
	AUDIO_DIFFEPAIR	AUDIODIFF	AUDIO	AUD_L02_L_N	51 53
	AUDIO_DIFFEPAIR	AUDIODIFF	AUDIO	AUD_L02_R_P	51 53
	AUDIO_DIFFEPAIR	AUDIODIFF	AUDIO	AUD_L02_R_N	51 53
	AUDIO_DIFFEPAIR	AUDIODIFF	AUDIO	AUD_MIC_INL_P	51 54
	AUDIO_DIFFEPAIR	AUDIODIFF	AUDIO	AUD_MIC_INL_N	51 54
	AUDIO_DIFFEPAIR	AUDIODIFF	AUDIO	AUD_SPKRAMP_LIN_P	53
	AUDIO_DIFFEPAIR	AUDIODIFF	AUDIO	AUD_SPKRAMP_LIN_N	53
	AUDIO_DIFFEPAIR	AUDIODIFF	AUDIO	AUD_SPKRAMP_RIN_P	53
	AUDIO_DIFFEPAIR	AUDIODIFF	AUDIO	AUD_SPKRAMP_RIN_N	53
	AUDIO_DIFFEPAIR	AUDIODIFF	AUDIO	AUD_SPKRAMP_LSUBIN_P	53
	AUDIO_DIFFEPAIR	AUDIODIFF	AUDIO	AUD_SPKRAMP_LSUBIN_N	53
	AUDIO_DIFFEPAIR	AUDIODIFF	AUDIO	AUD_SPKRAMP_RSUBIN_P	53
	AUDIO_DIFFEPAIR	AUDIODIFF	AUDIO	AUD_SPKRAMP_RSUBIN_N	53
	AUDIO_DIFFEPAIR	AUDIODIFF	AUDIO	RSUBIN_P	53
	AUDIO_DIFFEPAIR	AUDIODIFF	AUDIO	RSUBIN_N	53
	AUDIO_DIFFEPAIR	AUDIODIFF	AUDIO	LSUBIN_P	53
	AUDIO_DIFFEPAIR	AUDIODIFF	AUDIO	LSUBIN_N	53
	AUDIO_DIFFEPAIR	AUDIODIFF	AUDIO	SPKRAMP_LIN_P	53
	AUDIO_DIFFEPAIR	AUDIODIFF	AUDIO	SPKRAMP_LIN_N	53
	AUDIO_DIFFEPAIR	AUDIODIFF	AUDIO	SPKRAMP_RIN_P	53
	AUDIO_DIFFEPAIR	AUDIODIFF	AUDIO	SPKRAMP_RIN_N	53
	AUDIO_DIFFEPAIR	AUDIODIFF	AUDIO	HS_MIC_HI_RC	54
	AUDIO_DIFFEPAIR	AUDIODIFF	AUDIO	HS_MIC_LO_RC	54
	AUDIO_DIFFEPAIR	AUDIODIFF	AUDIO	HS_MIC_HI	54
	AUDIO_DIFFEPAIR	AUDIODIFF	AUDIO	HS_MIC_LO	54

DDR3 Loaded Segment Constraint Relaxations
Alternate single ended and differential impedances between devices.

Graphics ,SATA Constraint Relaxations
Alternate diffpair width/gap through BGA fanout areas (95-ohm diff)

Memory Constraint Relaxations

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

SYNC MASTER=J5 MLB		SYNC DATE=07/29/2011	
PAGE TITLE			
Project Specific Constraints			
 Apple Inc.		DRAWING NUMBER <SCH_NUM>	SIZE D
		REVISION <E4LABEL>	
NOTICE OF PROPRIETARY PROPERTY:		BRANCH	
THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE INC. THE POSSESSOR AGREES TO THE FOLLOWING: I I TO MAINTAIN THIS DOCUMENT IN CONFIDENCE I I NOT TO REPRODUCE OR COPY IT I I NOT TO REVEAL OR PUBLISH IT IN WHOLE OR PART I I ALL RIGHTS RESERVED		<BRANCH> PAGE 108 OF 132 SHEET 78 OF 80	

D1 BOARD-SPECIFIC SPACING & PHYSICAL CONSTRAINTS

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

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

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
55_OHM_SE	TOP, BOTTOM	Y	0.090 MM	0.090 MM			
55_OHM_SE	*	Y	0.076 MM	0.076 MM	=STANDARD	=STANDARD	=STANDARD

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
50_OHM_SE	TOP, BOTTOM	Y	0.090 MM	0.090 MM			
50_OHM_SE	*	Y	0.070 MM	0.070 MM	=STANDARD	=STANDARD	=STANDARD

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
40_OHM_SE	TOP, BOTTOM	Y	0.145 MM	0.095 MM			
40_OHM_SE	*	Y	0.105 MM	0.090 MM	=STANDARD	=STANDARD	=STANDARD

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
37_OHM_SE	TOP, BOTTOM	Y	0.165 MM	0.095 MM			
37_OHM_SE	*	Y	0.120 MM	0.090 MM	=STANDARD	=STANDARD	=STANDARD

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
27P4_OHM_SE	TOP, BOTTOM	Y	0.265 MM	0.095 MM			
27P4_OHM_SE	*	Y	0.190 MM	0.1 MM	=STANDARD	=STANDARD	=STANDARD

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
72_OHM_DIFF	*	N	=STANDARD	=STANDARD	=STANDARD	=STANDARD	=STANDARD
72_OHM_DIFF	ISL3, ISL4, ISL9, ISL10	Y	0.124 MM	0.124 MM		0.200 MM	0.200 MM
72_OHM_DIFF	ISL2, ISL11	Y	0.124 MM	0.124 MM		0.200 MM	0.200 MM
72_OHM_DIFF	TOP, BOTTOM	Y	0.140 MM	0.140 MM		0.120 MM	0.120 MM

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
85_OHM_DIFF	*	N	=STANDARD	=STANDARD	=STANDARD	=STANDARD	=STANDARD
85_OHM_DIFF	ISL3, ISL4, ISL9, ISL10	Y	0.089 MM	0.089 MM		0.180 MM	0.180 MM
85_OHM_DIFF	ISL2, ISL11	Y	0.089 MM	0.089 MM		0.180 MM	0.180 MM
85_OHM_DIFF	TOP, BOTTOM	Y	0.110 MM	0.110 MM		0.180 MM	0.180 MM

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
90_OHM_DIFF	*	N	=STANDARD	=STANDARD	=STANDARD	=STANDARD	=STANDARD
90_OHM_DIFF	ISL3, ISL4, ISL9, ISL10	Y	0.081 MM	0.081 MM		0.200 MM	0.200 MM
90_OHM_DIFF	ISL2, ISL11	Y	0.081 MM	0.081 MM		0.200 MM	0.200 MM
90_OHM_DIFF	TOP, BOTTOM	Y	0.099 MM	0.090 MM		0.200 MM	0.200 MM

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
100_OHM_DIFF	*	N	=STANDARD	=STANDARD	=STANDARD	=STANDARD	=STANDARD
100_OHM_DIFF	ISL3, ISL4, ISL9, ISL10	Y	0.065 MM	0.065 MM		0.200 MM	0.200 MM
100_OHM_DIFF	ISL2, ISL11	Y	0.065 MM	0.065 MM		0.200 MM	0.200 MM
100_OHM_DIFF	TOP, BOTTOM	Y	0.079 MM	0.079 MM		0.200 MM	0.200 MM

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

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

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
DEFAULT	*	0.1 MM	?
STANDARD	*	=DEFAULT	?
P072_SPACE	*	0.071 MM	?

NET_SPACING_TYPE1	NET_SPACING_TYPE2	AREA_TYPE	SPACING_RULE_SET
*	*	BGA	P072_SPACE

Stackup-Defined Spacing Rules

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
1:1_SPACING	TOP, BOTTOM	0.1 MM	?
1:1_SPACING	ISL3, ISL4, ISL9, ISL10	0.1 MM	?
1:1_SPACING	ISL2, ISL5, ISL6, ISL7, ISL8, ISL11	0.101 MM	?

Note: Outer dielectric is 0.058 mm nominal,
Inner dielectric is 0.053 mm nominal.

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
1x_DIELECTRIC	TOP, BOTTOM	0.058 MM	?
1x_DIELECTRIC	ISL3, ISL4, ISL9, ISL10	0.053 MM	?
1x_DIELECTRIC	ISL2, ISL5, ISL6, ISL7, ISL8, ISL11	0.101 MM	?

J4 Specific Net Properties

ELECTRICAL_CONSTRAINT_SET			NET_TYPE	
	PHYSICAL	SPACING		
DP_TBT_AUXCH	DP_85D	DISPLAYPORT	DP_TBTSNK0_AUXCH_C_P	
DP_TBT_AUXCH	DP_85D	DISPLAYPORT	DP_TBTSNK0_AUXCH_C_N	
DP_TBT_AUXCH	DP_85D	DISPLAYPORT	DP_TBTSNK1_AUXCH_C_P	
DP_TBT_AUXCH	DP_85D	DISPLAYPORT	DP_TBTSNK1_AUXCH_C_N	
DP_TBT_ML	DP_85D	DISPLAYPORT	DP_TBTSNK0_ML_C_P<3..0>	
DP_TBT_ML	DP_85D	DISPLAYPORT	DP_TBTSNK0_ML_C_N<3..0>	
DP_TBT_ML	DP_85D	DISPLAYPORT	DP_TBTSNK1_ML_C_P<3..0>	
DP_TBT_ML	DP_85D	DISPLAYPORT	DP_TBTSNK1_ML_C_N<3..0>	
DP_TBT_AUXCH	DP_85D	DISPLAYPORT	DP_TBTSNK0_AUXCH_P	
DP_TBT_AUXCH	DP_85D	DISPLAYPORT	DP_TBTSNK0_AUXCH_N	
DP_TBT_AUXCH	DP_85D	DISPLAYPORT	DP_TBTSNK1_AUXCH_P	
DP_TBT_AUXCH	DP_85D	DISPLAYPORT	DP_TBTSNK1_AUXCH_N	
DP_TBT_ML	DP_85D	DISPLAYPORT	DP_TBTSNK0_ML_P<3..0>	
DP_TBT_ML	DP_85D	DISPLAYPORT	DP_TBTSNK0_ML_N<3..0>	
DP_TBT_ML	DP_85D	DISPLAYPORT	DP_TBTSNK1_ML_P<3..0>	
DP_TBT_ML	DP_85D	DISPLAYPORT	DP_TBTSNK1_ML_N<3..0>	
DP_INT_ML	DP_85D	DISPLAYPORT	DP_INT_ML_C_P<3..0>	
DP_INT_ML	DP_85D	DISPLAYPORT	DP_INT_ML_C_N<3..0>	
DP_INT_AUX	DP_85D	DISPLAYPORT	DP_INT_AUX_C_P	
DP_INT_AUX	DP_85D	DISPLAYPORT	DP_INT_AUX_C_N	
DP_INT_AUX	DP_85D	DISPLAYPORT	DP_INT_AUX_P	
DP_INT_AUX	DP_85D	DISPLAYPORT	DP_INT_AUX_N	
DP_INT_ML	DP_85D	DISPLAYPORT	DP_INT_ML_P<3..0>	
DP_INT_ML	DP_85D	DISPLAYPORT	DP_INT_ML_N<3..0>	
DP_INT_ML	DP_85D	DISPLAYPORT	DP_INT_ML_F_P<3..0>	
DP_INT_ML	DP_85D	DISPLAYPORT	DP_INT_ML_F_N<3..0>	
USB3_EXTB_RX	USB3_85D	USB3	USB3_EXTB_RX_RC_P	
USB3_EXTB_RX	USB3_85D	USB3	USB3_EXTB_RX_RC_N	
USB3_EXTB_RX	USB3_85D	USB3	USB3_EXTB_RX_F_P	
USB3_EXTB_RX	USB3_85D	USB3	USB3_EXTB_RX_F_N	
USB3_EXTB_TX	USB3_85D	USB3	USB3_EXTB_TX_C_P	
USB3_EXTB_TX	USB3_85D	USB3	USB3_EXTB_TX_C_N	
USB3_EXTB_TX	USB3_85D	USB3	USB3_EXTB_TX_C_P	
USB3_EXTB_TX	USB3_85D	USB3	USB3_EXTB_TX_C_N	

PCB Rule Definitions

Apple Inc.

NOTICE OF PROPRIETARY PROPERTY:
THE INFORMATION CONTAINED HEREIN IS THE
PROPRIETARY PROPERTY OF APPLE INC.
THE POSSESSOR 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
<SCH_NUM>

REVISION
<E4LABEL>

BRANCH
<BRANCH>

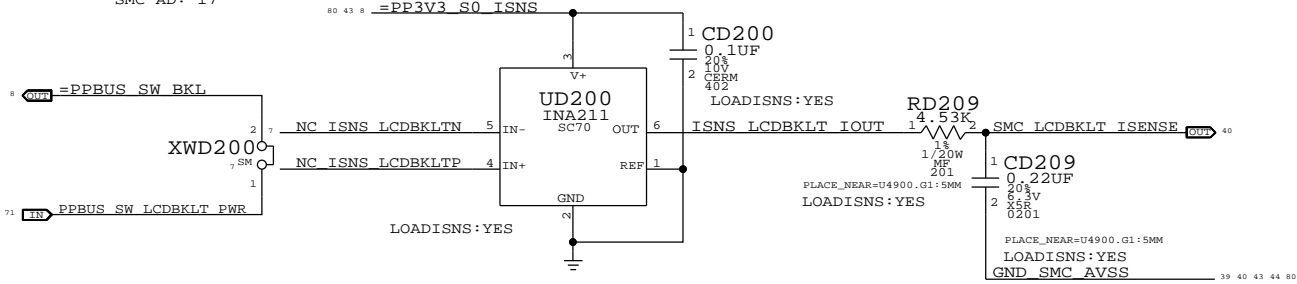
PAGE
109 OF 132

SHEET
79 OF 80

WWW.AliSaler.Com

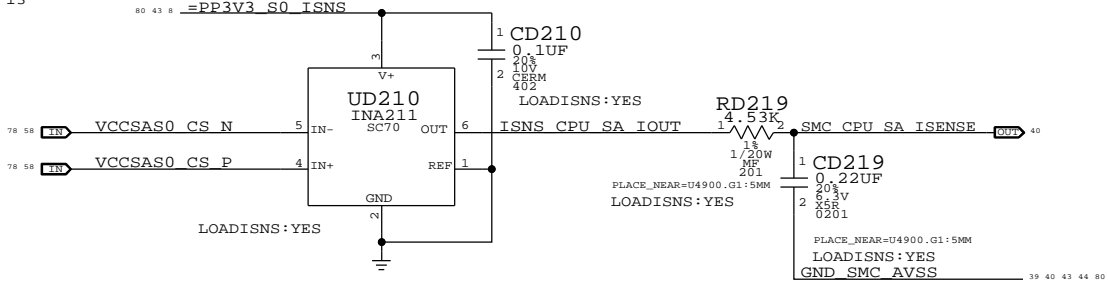
LCD Backlight Current Sense (IBLC)

Gain: 500x. EDP: 0.9 A
Rsense: 0.005 (RD200 / XWD200)
V across Rsense: 4.5 mV
SMC AD: 17



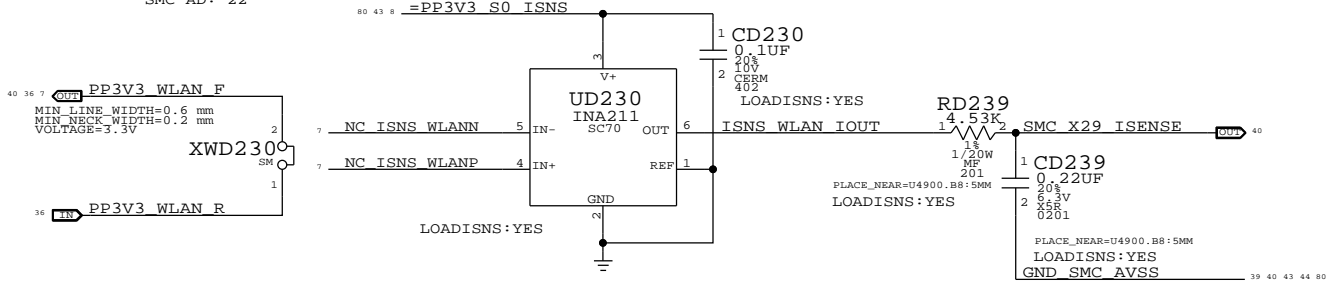
CPU SA Current Sense (IC2C)

Gain: 500x. EDP: 6 A
Rsense: 0.001 (R7140)
V across Rsense: 6 mV
SMC AD: 13



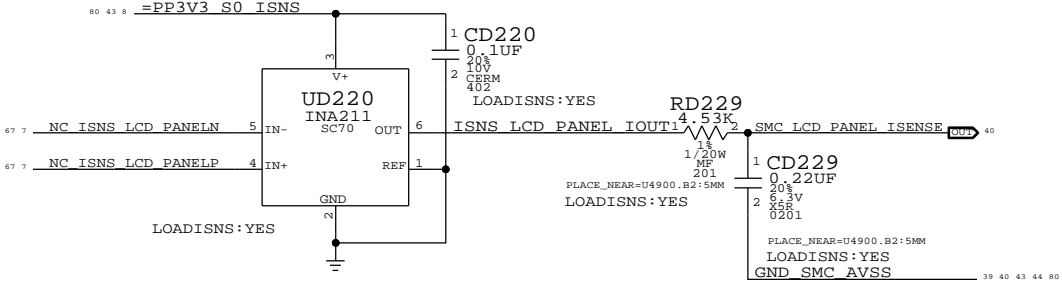
Airport X29 Current Sense (IAPC)

Gain: 500x. EDP: 1.06 A
Rsense: 0.005 (RD230 / XWD230)
V across Rsense: 5.3 mV
SMC AD: 22



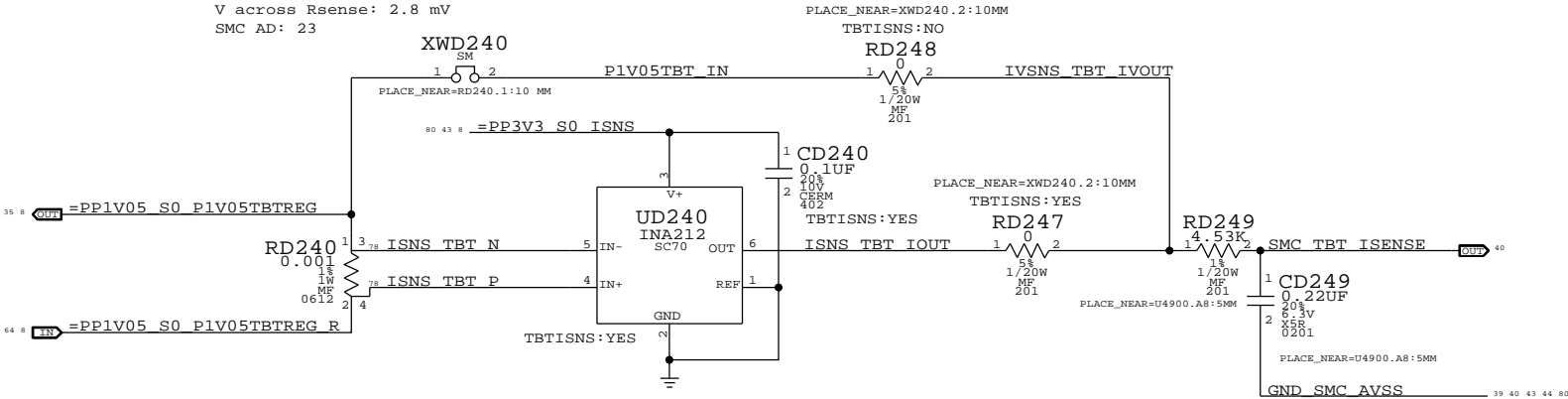
LCD Panel Current Sense (ILDC)

Gain: 500x. EDP: 1 A
Rsense: 0.005 (R9020, XW9020)
V across Rsense: 5 mV
SMC AD: 15



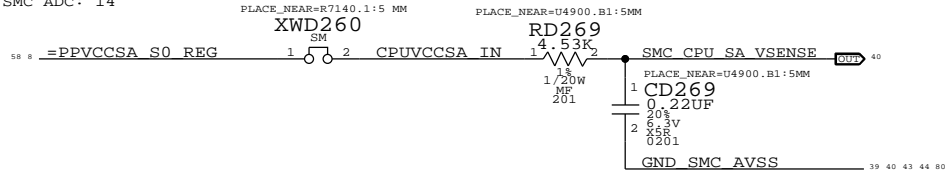
Thunderbolt TBT Current/Voltage Sense (IHSP/VHSP)

Gain: 1000x. EDP: 2.8 A
Rsense: 0.001 (RD240)
V across Rsense: 2.8 mV
SMC AD: 23



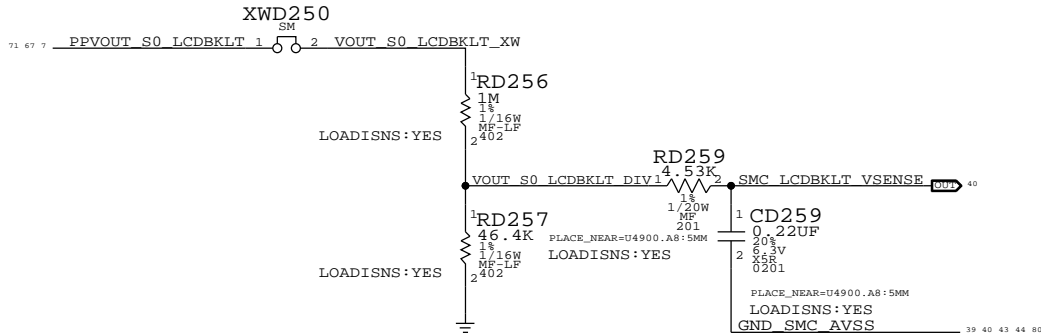
CPU SA Voltage Sense (VC2C)

Gain: 1x
SMC ADC: 14



LCD Backlight Voltage Sense (VBLC)

Gain: 0.04434



PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
117S0008	3	RES,MTL FILM,100K,1/16W,0201,SMD,LF	CD209,CD219,CD229		LOADISNS:NO
117S0008	3	RES,MTL FILM,100K,1/16W,0201,SMD,LF	CD239,CD259		LOADISNS:NO

Power Sensors: Extended	
Apple Inc.	DRAWING NUMBER <SCH_NUM>
NOTICE OF PROPRIETARY PROPERTY: THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE INC. THE POSSESSOR 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	REVISION <E4LABEL> BRANCH <BRANCH> PAGE 132 OF 132 SHEET 80 OF 80