

- 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
				2012-02-23

SCHEM, MLB, J13

2/23/12

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31	33	FSB/DDR3/FRAMBUF Vref Margining	J11_MLB	08/04/2011
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34	36	Thunderbolt Host (1 of 2)	J11_MLB	09/30/2011
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40	47	Left I/O (LIO) Connector	J13_MLB_NON_POR	11/10/2011
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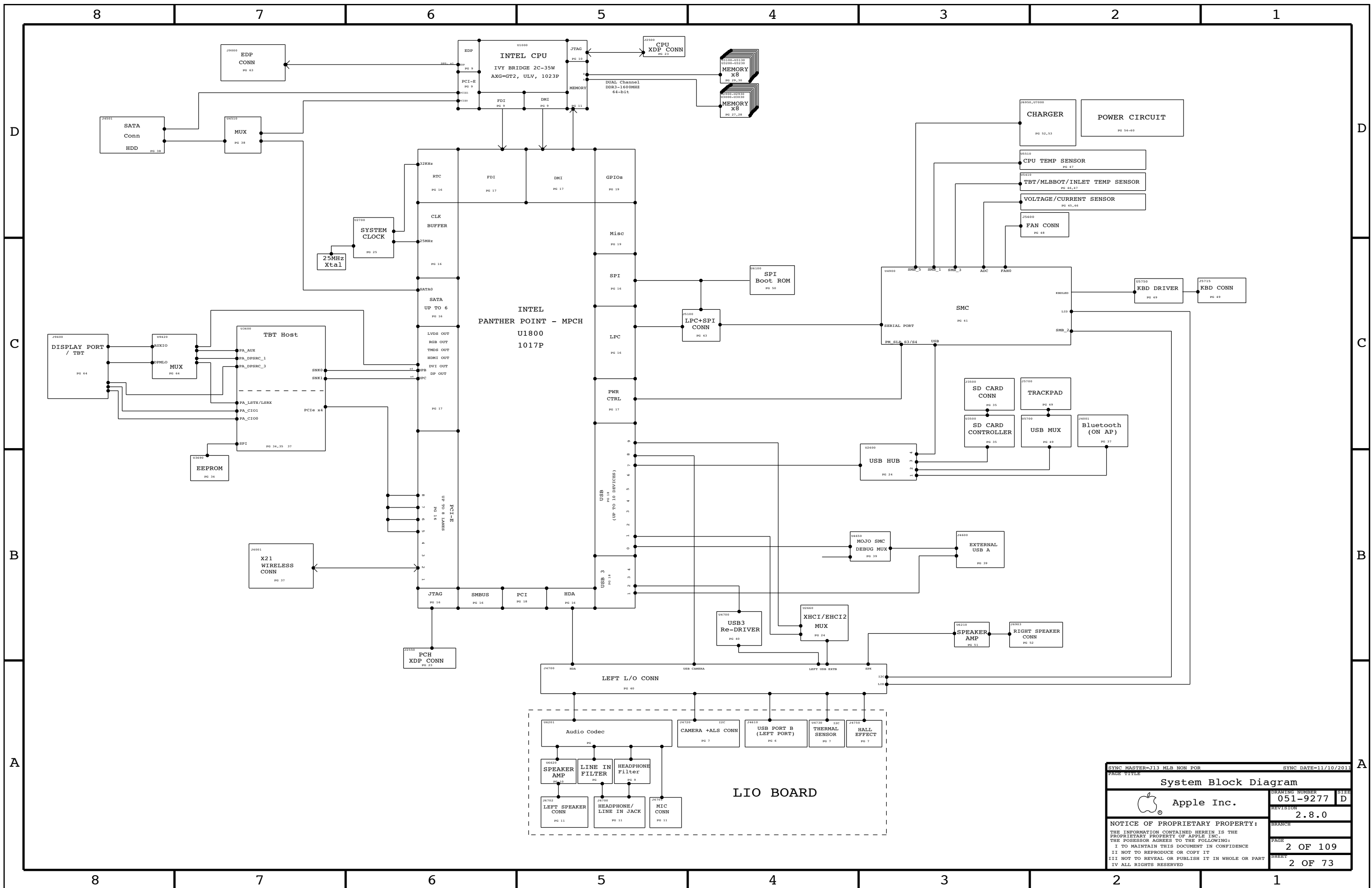
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Schematic / PCB #'s

PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
051-9277	1	SCHEM, MLB, J13	SCH	CRITICAL	
820-3209	1	PCBF, MLB, J13	PCB	CRITICAL	

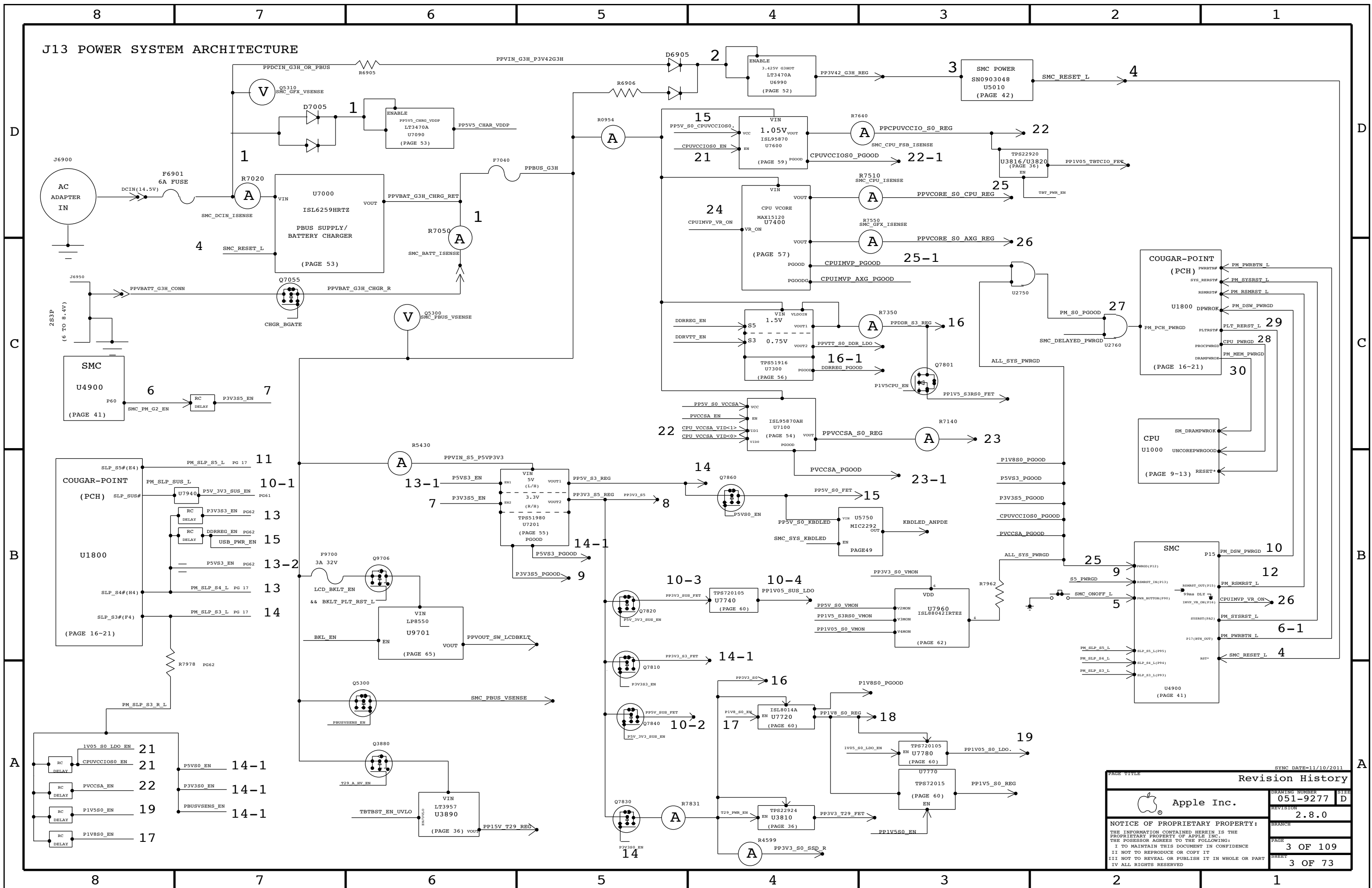
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DRAWING TITLE		SCHEM, MLB, J13	
DRAWING NUMBER		051-9277	SIZE D
REVISION		2.8.0	
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SYNC MASTER=J13 MLB NON POR		SYNC DATE=11/10/2011	
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Apple Inc.		DRAWING NUMBER	051-9277
		REVISION	2.8.0
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J13 POWER SYSTEM ARCHITECTURE



Revision History	
Apple Inc.	Drawing Number: 051-9277
Revision: 2.8.0	Branch:
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BOM Variants

BOM NUMBER	BOM NAME	BOM OPTIONS
085-3939	J13 MLB DEVELOPMENT BOM	J13_DEVEL_BOM
607-9090	CMN PTS,PCBA,MLB,J13	J13_CMNPTS
639-3552	PCBA,MLB,1.7GHZ,SA 4GB,J13	J13_CMNPTS,EEEE:DYRK,CPU:1.7GHZ,DDR3:SAMSUNG_4GB
639-3553	PCBA,MLB,1.5GHZ,SA 4GB,J13	J13_CMNPTS,EEEE:DYRN,CPU:1.5GHZ,DDR3:SAMSUNG_4GB
639-3554	PCBA,MLB,1.5GHZ,HY 4GB,J13	J13_CMNPTS,EEEE:DYRN,CPU:1.5GHZ,DDR3:HYNIX_4GB
639-3555	PCBA,MLB,1.5GHZ,HY 8GB,J13	J13_CMNPTS,EEEE:DYRN,CPU:1.5GHZ,DDR3:HYNIX_8GB
639-3556	PCBA,MLB,1.7GHZ,HY 8GB,J13	J13_CMNPTS,EEEE:DYRK,CPU:1.7GHZ,DDR3:HYNIX_8GB
639-3557	PCBA,MLB,1.7GHZ,HY 4GB,J13	J13_CMNPTS,EEEE:DYRN,CPU:1.7GHZ,DDR3:HYNIX_4GB
639-3645	PCBA,MLB,1.5GHZ,EL 8GB,J13	J13_CMNPTS,EEEE:F0TC,CPU:1.5GHZ,DDR3:ELPIDA_8GB
639-3644	PCBA,MLB,1.7GHZ,EL 8GB,J13	J13_CMNPTS,EEEE:F0TD,CPU:1.7GHZ,DDR3:ELPIDA_8GB
639-3760	PCBA,MLB,1.8GHZ,SA 4GB,J13	J13_CMNPTS,EEEE:F25Q,CPU:1.8GHZ,DDR3:SAMSUNG_4GB
639-3761	PCBA,MLB,1.8GHZ,HY 8GB,J13	J13_CMNPTS,EEEE:F25T,CPU:1.8GHZ,DDR3:HYNIX_8GB
639-3762	PCBA,MLB,1.8GHZ,HY 4GB,J13	J13_CMNPTS,EEEE:F25T,CPU:1.8GHZ,DDR3:HYNIX_4GB
639-3763	PCBA,MLB,1.8GHZ,EL 8GB,J13	J13_CMNPTS,EEEE:F25P,CPU:1.8GHZ,DDR3:ELPIDA_8GB
639-3764	PCBA,MLB,2.0GHZ,SA 4GB,J13	J13_CMNPTS,EEEE:F25N,CPU:2.0GHZ,DDR3:SAMSUNG_4GB
639-3765	PCBA,MLB,2.0GHZ,HY 8GB,J13	J13_CMNPTS,EEEE:F25N,CPU:2.0GHZ,DDR3:HYNIX_8GB
639-3766	PCBA,MLB,2.0GHZ,HY 4GB,J13	J13_CMNPTS,EEEE:F25N,CPU:2.0GHZ,DDR3:HYNIX_4GB
639-3767	PCBA,MLB,2.0GHZ,EL 8GB,J13	J13_CMNPTS,EEEE:F25V,CPU:2.0GHZ,DDR3:ELPIDA_8GB
639-3790	PCBA,MLB,1.7GHZ,SA 8GB,J13	J13_CMNPTS,EEEE:F27V,CPU:1.7GHZ,DDR3:SAMSUNG_8GB
639-3791	PCBA,MLB,1.8GHZ,SA 8GB,J13	J13_CMNPTS,EEEE:F27Q,CPU:1.8GHZ,DDR3:SAMSUNG_8GB
639-3792	PCBA,MLB,2.0GHZ,SA 8GB,J13	J13_CMNPTS,EEEE:F27R,CPU:2.0GHZ,DDR3:SAMSUNG_8GB
639-3793	PCBA,MLB,1.7GHZ,EL 4GB,J13	J13_CMNPTS,EEEE:F27W,CPU:1.7GHZ,DDR3:ELPIDA_4GB
639-3794	PCBA,MLB,1.8GHZ,EL 4GB,J13	J13_CMNPTS,EEEE:F27Y,CPU:1.8GHZ,DDR3:ELPIDA_4GB
639-3795	PCBA,MLB,2.0GHZ,EL 4GB,J13	J13_CMNPTS,EEEE:F27Y,CPU:2.0GHZ,DDR3:ELPIDA_4GB

Bar Code Labels / EEEE #'s

PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
825-7670	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE_DYRK]	CRITICAL	EEEE:DYRK
825-7670	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE_DYRL]	CRITICAL	EEEE:DYRL
825-7670	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE_DYRM]	CRITICAL	EEEE:DYRM
825-7670	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE_DYRN]	CRITICAL	EEEE:DYRN
825-7670	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE_DYRP]	CRITICAL	EEEE:DYRP
825-7670	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE_DYRQ]	CRITICAL	EEEE:DYRQ
825-7670	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE_F0TC]	CRITICAL	EEEE:F0TC
825-7670	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE_F0TD]	CRITICAL	EEEE:F0TD
825-7670	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE_F25N]	CRITICAL	EEEE:F25N
825-7670	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE_F25P]	CRITICAL	EEEE:F25P
825-7670	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE_F25Q]	CRITICAL	EEEE:F25Q
825-7670	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE_F25R]	CRITICAL	EEEE:F25R
825-7670	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE_F25T]	CRITICAL	EEEE:F25T
825-7670	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE_F25V]	CRITICAL	EEEE:F25V
825-7670	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE_F25W]	CRITICAL	EEEE:F25W
825-7670	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE_F25Y]	CRITICAL	EEEE:F25Y
825-7670	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE_F27Q]	CRITICAL	EEEE:F27Q
825-7670	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE_F27R]	CRITICAL	EEEE:F27R
825-7670	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE_F27T]	CRITICAL	EEEE:F27T
825-7670	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE_F27V]	CRITICAL	EEEE:F27V
825-7670	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE_F27W]	CRITICAL	EEEE:F27W
825-7670	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEEE_F27Y]	CRITICAL	EEEE:F27Y

D

D

C

C

B

B

A

A

Sub BOM

PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
085-3939	1	J13 MLB DEVELOPMENT	DEVEL	CRITICAL	DEVEL_BOM
607-9090	1	CMN PTS,PCBA,MLB,J13	CMNPTS	CRITICAL	J13_CMNPTS

SYNC MASTER=J13 MLB SYNC DATE=07/27/2011

Revision History

DRAWING NUMBER	051-9277	SIZE	D
REVISION	2.8.0	BRANCH	
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J13 BOM GROUPS

BOM GROUP	BOM OPTIONS
J13_COMMON	ALTERNATE, COMMON, J13_MISC, J13_DEBUG:ENG, J13_PROGPARTS, USBHUB2514B, EDP:YES, PCH_C1
J13_MISC	CPOMER_BLD:NO, BUR_NONREM,TWT, HNS:YES, PPSV2_DCN:NO, TPAD_PCH:NO, SKIP_SV3V1:INADISRE, RFWP:1:4, TRHY:P15V, LVDR3_BH:YES, ARG_ACOUSTIC:NO
J13_PROGPARTS	BOOTROM_PROG, SMC_PROG, TBTROM:PROG
J13_DEVEL:ENG	ALTERNATE, BLT:ENG, XDP_CONN, XDP_CPU:RPM, XDP_PCH, LPCPLUS, DORVREF_DAC, VREFQ:LDO, VREFCA:LDO, VCCIOISNS_PROD, A1RPORTISNS_PROD, HODIENS_PROD, LDCBLKTIENS_PROD
J13_DEVEL:PVT	LPCPLUS, XDP_CONN
J13_DEBUG:ENG	DEVEL_BOM, HODI: YES, XDP
J13_DEBUG:PVT	DEVEL_BOM, BLT:PROG, HODI: YES, XDP, XDP_CPU:RPM, VREFQ:LDO, VREFCA:LDO, VCCIOISNS_PROD, A1RPORTISNS_PROD, HODIENS_PROD, LDCBLKTIENS_PROD
J13_DEBUG:PROG	BLT:PROG, HODI: YES, XDP, XDP_CPU:RPM, VREFQ:LDO, VREFCA:LDO, LPCPLUS, VCCIOISNS_PROD, A1RPORTISNS_PROD, HODIENS_PROD, LDCBLKTIENS_PROD
DDR3:HYNIX_4GB	RAMCFG0:L, RAMCFG1:L, RAMCFG2:L, RAMCFG3:L, DRAM_TYPE:HYNIX_4GB
DDR3:HYNIX_8GB	RAMCFG0:L, RAMCFG1:L, RAMCFG2:H, RAMCFG3:L, DRAM_TYPE:HYNIX_8GB
DDR3:SAMSUNG_4GB	RAMCFG0:L, RAMCFG1:H, RAMCFG2:L, RAMCFG3:L, DRAM_TYPE:SAMSUNG_4GB
DDR3:SAMSUNG_8GB	RAMCFG0:L, RAMCFG1:H, RAMCFG2:H, RAMCFG3:L, DRAM_TYPE:SAMSUNG_8GB
DDR3:ELPIDA_8GB	RAMCFG0:H, RAMCFG1:H, RAMCFG2:H, RAMCFG3:L, DRAM_TYPE:ELPIDA_8GB
DDR3:ELPIDA_4GB	RAMCFG0:H, RAMCFG1:H, RAMCFG2:L, RAMCFG3:L, DRAM_TYPE:ELPIDA_4GB

Programmable Parts

PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
3358065	1	IC, SERIAL SPI EEPROM, 256KBIT, 20MHZ, MLPS	U3690	CRITICAL	TBTROM:BLANK
34183475	1	IC, EEPROM, CR, V24-1, J11/J13	U3690	CRITICAL	TBTROM:PROG
33881098	1	IC, SMC12-A3, 40MHZ/50MIPS MCU, 9X9, 1578GA	U4900	CRITICAL	SMC_BLANK
33881065	1	IC, SMC12-49MHZ/50MIPS MCU, 9X9, 1578GA	U4900	CRITICAL	SMC_BLANK
34183433	1	IC, SMC_V2-1A43, Proto18, J13	U4900	CRITICAL	SMC_PROG
33580809	1	64 MBIT SPI SERIAL SERIAL 1/0 FLASH, Macintosh	U6100	CRITICAL	BOOTROM_BLANK
33580803	1	64 MBIT SPI SERIAL SERIAL 1/0 FLASH, Macosys	U6100	CRITICAL	BOOTROM_BLANK
34183482	1	IC, EFI ROM, PROTO18, J13 J11	U6100	CRITICAL	BOOTROM_PROG

Alternate Parts

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
37680855	37680613		ALL	Diodes alt to Toshiba
37680977	37680859		ALL	Diodes alt to Toshiba
37680972	37680612		ALL	Diodes alt to Toshiba
13880676	13880691		ALL	Murata alt to Samsung
37180709	37180652		ALL	ESP alt to NXP
13880671	13880673		ALL	Taiyo alt to Murata
37680790	37680928		ALL	TI alt to Fairchild
15281462	15281295		ALL	Toko alt for NEC inductor
15281085	15281307		ALL	Toko alt for Cystec
13880703	13880648		ALL	Murata alt to Taiyo Yuden
13880684	13880660		ALL	Murata alt to Taiyo Yuden
15281493	15281300		ALL	Colicraft alt to Murata

35383238	35381428		ALL	Intersil alt to OPAL333
37280186	37280185		ALL	ESP alt to Diodes
37681053	37680604		ALL	Diodes alt to Fairchild
37680855	37680613		ALL	Diodes alt to Toshiba
37680903	37680796		ALL	Fairchild alt to Siliconix
19780431	19780432		ALL	Epson alt to NDK
33784198	33784197		ALL	TDP 1.5GHZ alt to Nominal
33784236	33784196		ALL	TDP 1.7GHZ alt to Nominal
37180713	37180958		ALL	Diodes alt to ST Micro
12880333	998-4435		ALL	Sanyo alt to Kemet
12880357	998-4435		ALL	Sanyo alt to POS caps
998-4715	998-4435		ALL	Kemet_Rect alt to POS caps
998-4716	998-4435		ALL	Kemet_0045 Plate alt to POS caps

DRAM CFG CHART

VENDOR	CFG 1	CFG 0
HYNIX	0	0
SAMSUNG	1	0
MICRON	0	1
ELPIDA	1	1

SIZE	CFG 2	DIE REV	CFG 3
4GB	0	A	0
8GB	1	B	1

Module Parts

PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
33784197	1	IVB, QRP8, ES2, K0, 1.5, 17W, 2+2, 0.95, 4M, ULVB	U1000	CRITICAL	CPU:1.5GHZ
33784299	1	IVB, QCS5, Q8, L0, 1.7, 17W, 2+2, 1.0, 3M, ULVBGA	U1000	CRITICAL	CPU:1.7GHZ
33784298	1	IVB, QCS4, Q8, L0, 1.8, 17W, 2+2, 1.1, 3M, ULVBGA	U1000	CRITICAL	CPU:1.8GHZ
33784296	1	IVB, QCS2, Q8, L0, 2.0, 17W, 2+2, 1.1, 4M, ULVBGA	U1000	CRITICAL	CPU:2.0GHZ
33784198	1	IVB, QRP8, ES2, K0, 1.5, 17W, 2+2, 0.95, 4M, ULVB	U1000	CRITICAL	CPU:1.5GHZTDP
33784236	1	IVB, QROP, R82, K0, 1.7, 17W, 2+2, 1.0, 4M, ULV, TDP	U1000	CRITICAL	CPU:1.7GHZTDP
33784165	1	IC, PCH, PPT-MB, SFF, ES1	U1800	CRITICAL	PCH_ES1
33784180	1	IC, PCH, PPT-MB, SFF, ES2, B0	U1800	CRITICAL	PCH_ES2
33784235	1	IC, PCH, PPT-MB, SFF, P-QS, C0	U1800	CRITICAL	PCH_CO
33784275	1	IC, PCH, PPT-MB, QS77, C1, QS	U1800	CRITICAL	PCH_C1
33881047	1	IC, TBT, CR-4C, ES1, 288 FCBGA, 12X12MM	U3600	CRITICAL	TWT

33380622	4	IC, SDRAM, 2GBIT, 256MX8, DDR3-1600, 78P FBGA	U2900, U2910, U2920, U2930	CRITICAL	DRAM_TYPE:HYNIX_4GB
33380622	4	IC, SDRAM, 2GBIT, 256MX8, DDR3-1600, 78P FBGA	U3000, U3010, U3020, U3030	CRITICAL	DRAM_TYPE:HYNIX_4GB
33380622	4	IC, SDRAM, 2GBIT, 256MX8, DDR3-1600, 78P FBGA	U3100, U3110, U3120, U3130	CRITICAL	DRAM_TYPE:HYNIX_4GB
33380622	4	IC, SDRAM, 2GBIT, 256MX8, DDR3-1600, 78P FBGA	U3200, U3210, U3220, U3230	CRITICAL	DRAM_TYPE:HYNIX_4GB
33380625	4	IC, SDRAM, 4GBIT, 512MX8, DDR3-1600, 82 FBGA	U2900, U2910, U2920, U2930	CRITICAL	DRAM_TYPE:HYNIX_8GB
33380625	4	IC, SDRAM, 4GBIT, 512MX8, DDR3-1600, 82 FBGA	U3000, U3010, U3020, U3030	CRITICAL	DRAM_TYPE:HYNIX_8GB
33380625	4	IC, SDRAM, 4GBIT, 512MX8, DDR3-1600, 82 FBGA	U3100, U3110, U3120, U3130	CRITICAL	DRAM_TYPE:HYNIX_8GB
33380625	4	IC, SDRAM, 4GBIT, 512MX8, DDR3-1600, 82 FBGA	U3200, U3210, U3220, U3230	CRITICAL	DRAM_TYPE:HYNIX_8GB
33380623	4	IC, SDRAM, 2GBIT, DDR3-1600, 78P FBGA, D-DIE	U2900, U2910, U2920, U2930	CRITICAL	DRAM_TYPE:SAMSUNG_4GB
33380623	4	IC, SDRAM, 2GBIT, DDR3-1600, 78P FBGA, D-DIE	U3000, U3010, U3020, U3030	CRITICAL	DRAM_TYPE:SAMSUNG_4GB
33380623	4	IC, SDRAM, 2GBIT, DDR3-1600, 78P FBGA, D-DIE	U3100, U3110, U3120, U3130	CRITICAL	DRAM_TYPE:SAMSUNG_4GB
33380623	4	IC, SDRAM, 2GBIT, DDR3-1600, 78P FBGA, D-DIE	U3200, U3210, U3220, U3230	CRITICAL	DRAM_TYPE:SAMSUNG_4GB
33380642	4	IC, SDRAM, 4GBIT, DDR3-1600, 78P FBGA, C-DIE	U2900, U2910, U2920, U2930	CRITICAL	DRAM_TYPE:SAMSUNG_8GB
33380642	4	IC, SDRAM, 4GBIT, DDR3-1600, 78P FBGA, C-DIE	U3000, U3010, U3020, U3030	CRITICAL	DRAM_TYPE:SAMSUNG_8GB
33380642	4	IC, SDRAM, 4GBIT, DDR3-1600, 78P FBGA, C-DIE	U3100, U3110, U3120, U3130	CRITICAL	DRAM_TYPE:SAMSUNG_8GB
33380642	4	IC, SDRAM, 4GBIT, DDR3-1600, 78P FBGA, C-DIE	U3200, U3210, U3220, U3230	CRITICAL	DRAM_TYPE:SAMSUNG_8GB
33380629	4	IC, SDRAM, 4GBIT, DDR3L-1600, REV B, 78P FBGA	U2900, U2910, U2920, U2930	CRITICAL	DRAM_TYPE:ELPIDA_8GB
33380629	4	IC, SDRAM, 4GBIT, DDR3L-1600, REV B, 78P FBGA	U3000, U3010, U3020, U3030	CRITICAL	DRAM_TYPE:ELPIDA_8GB
33380629	4	IC, SDRAM, 4GBIT, DDR3L-1600, REV B, 78P FBGA	U3100, U3110, U3120, U3130	CRITICAL	DRAM_TYPE:ELPIDA_8GB
33380629	4	IC, SDRAM, 4GBIT, DDR3L-1600, REV B, 78P FBGA	U3200, U3210, U3220, U3230	CRITICAL	DRAM_TYPE:ELPIDA_8GB
33380628	4	IC, SDRAM, 2GBIT, DDR3L-1600, REV D, 78P FBGA	U2900, U2910, U2920, U2930	CRITICAL	DRAM_TYPE:ELPIDA_4GB
33380628	4	IC, SDRAM, 2GBIT, DDR3L-1600, REV D, 78P FBGA	U3000, U3010, U3020, U3030	CRITICAL	DRAM_TYPE:ELPIDA_4GB
33380628	4	IC, SDRAM, 2GBIT, DDR3L-1600, REV D, 78P FBGA	U3100, U3110, U3120, U3130	CRITICAL	DRAM_TYPE:ELPIDA_4GB
33380628	4	IC, SDRAM, 2GBIT, DDR3L-1600, REV D, 78P FBGA	U3200, U3210, U3220, U3230	CRITICAL	DRAM_TYPE:ELPIDA_4GB

35382929	1	IC, 16L6239, BANCHEMGE, 38, 48XMM, QFN28	U7000	CRITICAL	
946-3115	1	MLB, DYNAX UV EB 0.22GRAM, R21	GLUE	CRITICAL	

PD Module Parts

806-3142	1	CAN, T29, J11/J13	TBTFFENCE	CRITICAL	
806-3215	1	CAN_COVER, T29, J11/J13	TBTTCOVER	CRITICAL	
806-3214	1	CAN, TOPSIDE, J11/J13	TBTTOPSIDE_IP	CRITICAL	
806-3706	1	CAN, TOPSIDE_2piece_Cover, J11/J13	TBTTOPSIDE_2P_COVER	CRITICAL	
806-3705	1	CAN, TOPSIDE_2piece_Fence, J11/J13	TBTTOPSIDE_2P_FENCE	CRITICAL	
806-3216	1	CAN, MDP, J11/J13	MDPCAN	CRITICAL	
806-3083	1	SHLD, USB, MLB, J11/J13	USBCAN	CRITICAL	
806-2377	1	K78, mDP Spring	MDPSPRING	CRITICAL	NOSTUFF

SYNC MASTER=J30 MLB SYNC DATE=07/27/2011

BOM Configuration

Apple Inc.

DRAWING NUMBER: 051-9277 SIZE: D

REVISION: 2.8.0

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