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.

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SCHEM, MLB, PB17"  
12/21/2004

PRODUCTION RELEASED 12/21/04

Apple Computer Inc.

12/21/2004

www.vinafix.vn
PCB SPECS

THICKNESS: 1.2 MM / 0.047 IN
1/2 OZ CU THICKNESS: 0.7 MILS
1.0 OZ CU THICKNESS: 1.4 MILS

IMPEDANCE: 50 OHMS +/- 10%
DIELECTRIC: FR-4
LAYER COUNT: 12
SIGNAL TRACE WIDTH: 4 MILS
SIGNAL TRACE SPACING: 4 MILS
PREPREG THICKNESS: 2-3 MILS

SEE PCB CAD FILES FOR MORE SPECIFIC INFO.

BOARD STACK-UP AND CONSTRUCTION

1. SIGNAL (1/3 OZ + COPPER PLATING)
2. PREPREG (3MIL)
3. LAMINATE (4MIL)
4. PREPREG (3MIL)
5. LAMINATE (4MIL)
6. PREPREG (2MIL)
7. LAMINATE (3MIL)
8. PREPREG (2MIL)
9. LAMINATE (4MIL)
10. PREPREG (3MIL)
11. LAMINATE (4MIL)
12. PREPREG (3MIL)

SEL = LOW; HOST = B PORT; A PORT = 1000OHM TO GND
SEL = HIGH; HOST = A PORT; B PORT = 1000OHM TO GND
MEM_MUXSEL_H<0> AND MEM_MUXSEL_L<0> ARE ACTIVE LOW
MEM_MUXSEL_H<1> AND MEM_MUXSEL_L<1> ARE ACTIVE HIGH

ADDED 0 OHM RESISTORS IN CASE POLARITY IS WRONG
PORT POWER SWITCH

<table>
<thead>
<tr>
<th>STATE</th>
<th>PMU_POWER_UP_L</th>
<th>POWER_UP</th>
<th>DCDC_EN</th>
<th>AC_IN</th>
<th>STUFF R867</th>
<th>NO STUFF R867</th>
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<tbody>
<tr>
<td>SHUTDOWN</td>
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<td>0</td>
<td>0</td>
<td>1</td>
<td>OFF</td>
<td>ON</td>
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<tr>
<td>SHUTDOWN</td>
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<td>1</td>
<td>ON</td>
<td>ON</td>
</tr>
<tr>
<td>READY</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>READY</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>OFF</td>
<td>OFF</td>
</tr>
</tbody>
</table>

ENABLES PORT POWER WHEN MACHINE IS RUNNING, SHUTDOWN OR WHEN ASLEEP ON AC

- 2.99V +3V_PMU +4.6V_BU +3V_PMU

R894
+3V_PMU +PMUS
1.224V

CRITICAL R751
1/10W

CRITICAL Q67
MOSFET

CRITICAL R743
1/10W

CRITICAL R752
1/10W

SM-1

FERR-250-OHM

400-OHM-EMI

90-OHM-300MA

0.1UF 10V 20%

0.01UF 16V 20%

805

50V 20%

C803

16V 20%

C805

16V 20%

CERM

CRITICAL 10V 330K 1/16W 5%

2N7002DW SOT-363

BAV99DW SOT-363

BAV99DW SOT-363

AND CONNECTION DETECTION CURRENTS

LOGIC GROUND FOR SPEED SIGNALING

THERE'S NO DC PATH BETWEEN

IS PLUGGED TO BETA-ONLY DEVICE,

SO WHEN A BILINGUAL DEVICE

ALL LOCAL GROUNDS PER 1394B SPEC

TO AVOID GROUND OFFSET ISSUE

BREF SHOULD BE HARD CONNECTED TO LOCAL GROUND FOR SPEED SIGNALING

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**VCORE POWER SEQUENCING**

- For output order and voltage limits, see table.
- 5V_MAIN
- MAX1717 VID can take 3.7V to 5.7V.

### OUTPUT VOLTAGE

<table>
<thead>
<tr>
<th>D4=0</th>
<th>D4=1</th>
<th>D3=0</th>
<th>D3=1</th>
<th>D2=0</th>
<th>D2=1</th>
<th>D1=0</th>
<th>D1=1</th>
<th>V_DAC</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.300V</td>
<td>1.300V</td>
<td>1.300V</td>
<td>1.300V</td>
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<td>0.990V</td>
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</tr>
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</table>

### TABLE 5 HEAD

- VCORE_VID<4>
- VCORE_VID<2>
- VCORE_VID<1>
- VCORE_VID<0>

### FMAX_CONNECTOR

- MAX1717 GND pin 13
- Leave trace fat and short!!

### GROUND SENSE VOLTAGE DIVIDER

- This allows for an offset to the ground sense to adjust the output voltage.
- VOFF = 2.2V with a 0.5 scale factor, hence VOFFSET = 1.7V * (R1/(R1+R2)) and VCORE = VDAC + VOFFSET.

### FOR V-STEP:

- When A/B is high (fast): D4-D0 read as-is
- When A/B is low (slow): <=1k-ohm = 0
- >=100k-ohm = 1

If all pull-ups are >=100K and all pull-downs are <=1k, \( V = V' \).
### Differential Signals

<table>
<thead>
<tr>
<th>Layer</th>
<th>Signal Name</th>
<th>Differential Pair</th>
<th>Min. Spacing</th>
<th>Min. Width</th>
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<tbody>
<tr>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>C</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>D</td>
<td></td>
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</tbody>
</table>

### Internal Layer

- **ER**: 4.3 (Dielectric Constant)
- **W**: 4.0MIL (Trace Width)
- **B**: 12.2MIL (Dist Btw 2 Gnd Planes)
- **T**: 0.7MIL (Trace Thickness)
- **S**: 10.0MIL (Separation of Diff Traces)
- **ZSINGLE**: 51.50ohm
- **ZDIFF**: 99.80ohm

### Internal Layer (USB1.1/USB 2.0)

- **ER**: 4.3 (Dielectric Constant)
- **W**: 3.4MIL (Trace Width)
- **B**: 12.2MIL (Dist Btw 2 Gnd Planes)
- **T**: 0.7MIL (Trace Thickness)
- **S**: 10.0MIL (Separation of Diff Traces)
- **ZSINGLE**: 53.37ohm
- **ZDIFF**: 107.17ohm

### Signal Constraints - Page 2

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**APPLE COMPUTER INC.**

**D 051-6694 B**

**A 38 45**
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<th>C</th>
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