# BTS88 LA-1541 REV0.3 Schematics Document

**Intel Pentium 4 Processor in the 478-pin Package**

**with 845PE / ICH4 / NVIDIA SQ17 chipset**

**2002-10-26-A** **For B2-Test**

| | | |
|---|---|---|
| **Compal Electronics, Ltd.** | | |
| Title: **BTS88 Cover Sheet** | | |
| Size: B | Document Number: **LA1541** | Rev: 0.3 |
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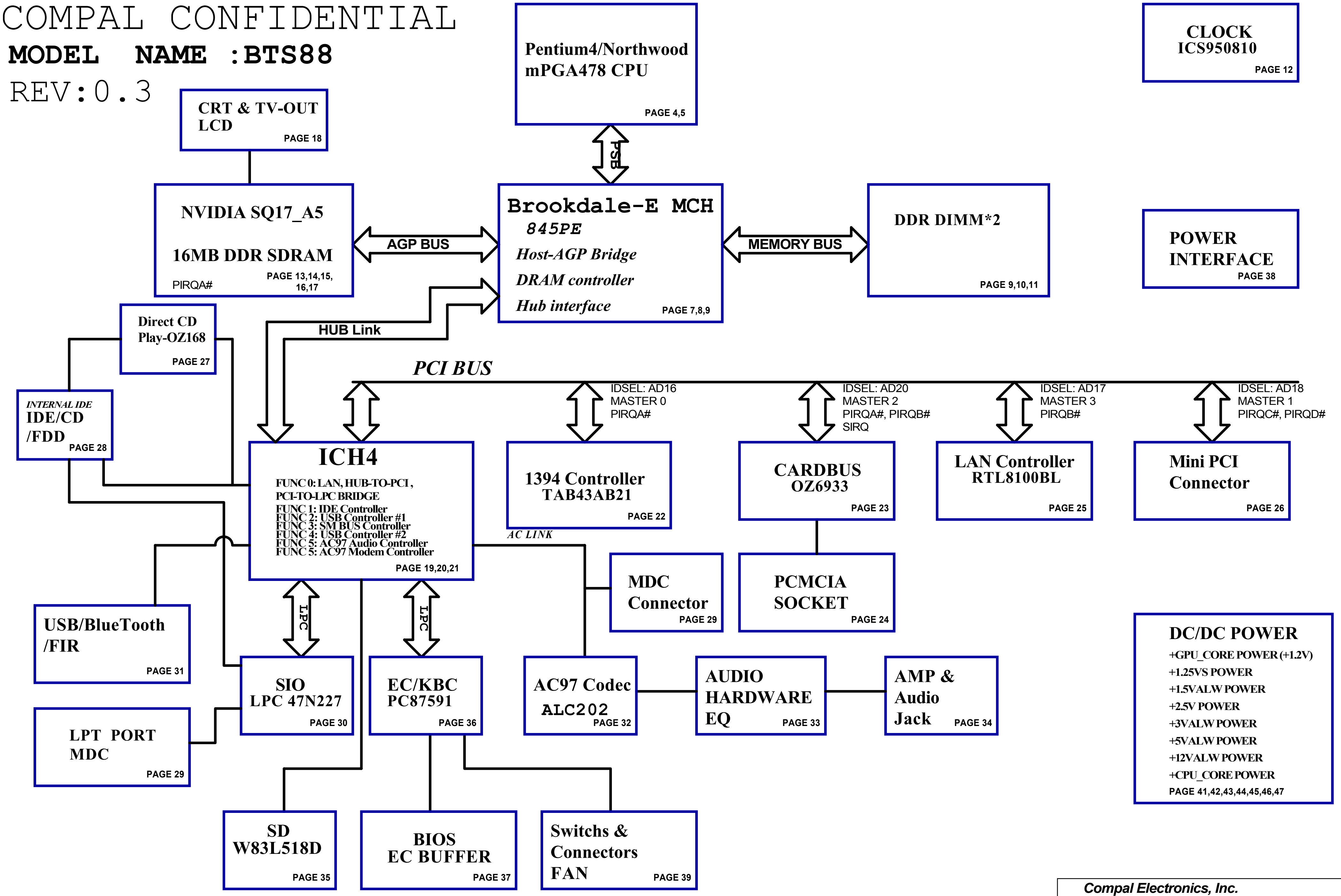
COMPAL CONFIDENTIAL

**MODEL NAME :BTS88**

REV:0.3

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## Voltage Rails

| Power Plane | Description | S1 | S3 | S5 |
|---|---|---|---|---|
| VIN | Adapter power supply (19V) | N/A | N/A | N/A |
| B+ | AC or battery power rail for power circuit. | N/A | N/A | N/A |
| +CPU_CORE | Core voltage for CPU | ON | OFF | OFF |
| +1.2VP | 1.2V switched power rail for CPU AGTL Bus | ON | OFF | OFF |
| +1.25VS | 1.25V switched power rail | ON | OFF | OFF |
| +1.5VS | AGP 4X | ON | OFF | OFF |
| +1.5VALW | 1.5V always on power rail | ON | ON | ON* |
| +2.5V | 2.5V power rail | ON | ON | OFF |
| +2.5VS | 2.5V switched power rail | ON | OFF | OFF |
| +3VALW | 3.3V always on power rail | ON | ON | ON* |
| +3V | 3.3V power rail | ON | ON | OFF |
| +3VS | 3.3V switched power rail | ON | OFF | OFF |
| +5VALW | 5V always on power rail | ON | ON | ON* |
| +5V | 5V power rail | ON | ON | OFF |
| +5VS | 5V switched power rail | ON | OFF | OFF |
| +12VALW | 12V always on power rail | ON | ON | ON* |
| RTCVCC | RTC power | ON | ON | ON |

Note : ON* means that this power plane is ON only with AC power available, otherwise it is OFF.

## External PCI Devices

| Device | IDSEL# | REQ#/GNT# | Interrupts |
|---|---|---|---|
| VGA | | | PIRQA |
| CardBus | AD20 | 2 | PIRQA/PIRQB |
| LAN | AD17 | 3 | PIRQB |
| Mini-PCI | AD18 | 1/4 | PIRQC/PIRQD |
| 1394 | AD16 | 0 | PIRQA |

## EC SM Bus1 address

| Device | Address |
|---|---|
| Smart Battery | 0001 011X b |
| EEPROM(24C16/02) | 1010 000X b |
| (24C04) | 1011 000Xb |

## EC SM Bus2 address

| Device | Address |
|---|---|
| MAX1617MEE | 1001 110X b |
| OZ168 | 0011 0100 b |
| Smart Battery | 0001 011X b |
| Docking | 0011 011X b |
| DOT Board | XXXX XXXXb |

## ICH4 SM Bus address

| Device | Address |
|---|---|
| Clock Generator ( ICS950810) | 1101 001Xb |
| DDR DIMM0 | 1001 000Xb |
| DDR DIMM1 | 1001 001Xb |

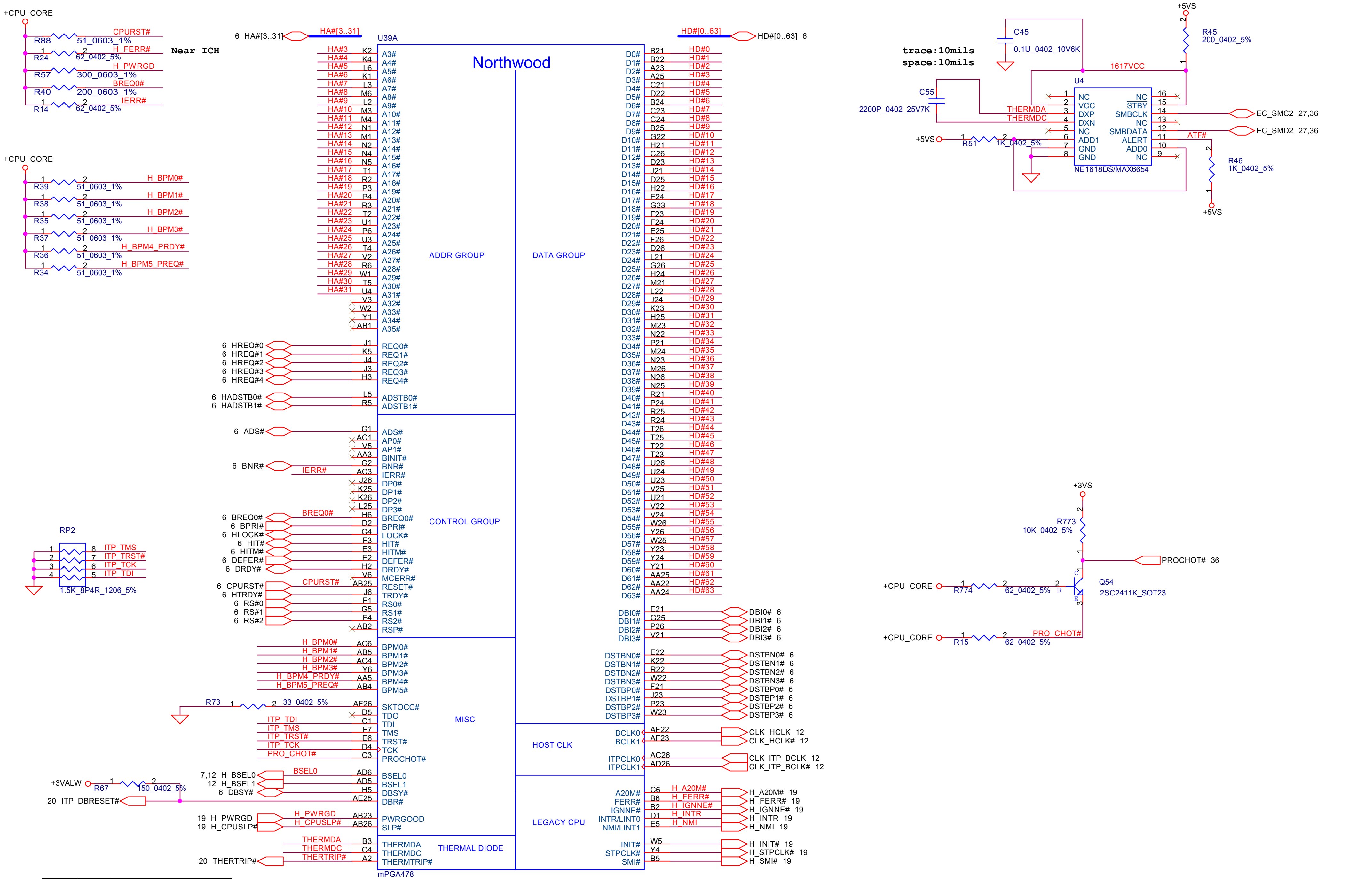
| STATE \ SIGNAL | SLP_S1# | SLP_S3# | SLP_S4# | SLP_S5# | +VALW | +V | +VS | Clock |
|---|---|---|---|---|---|---|---|---|
| Full ON | HIGH | HIGH | HIGH | HIGH | ON | ON | ON | ON |
| S1(Power On Suspend) | LOW | HIGH | HIGH | HIGH | ON | ON | ON | LOW |
| S3 (Suspend to RAM) | LOW | LOW | HIGH | HIGH | ON | ON | OFF | OFF |
| S4 (Suspend to Disk) | LOW | LOW | LOW | HIGH | ON | OFF | OFF | OFF |
| S5 (Soft OFF) | LOW | LOW | LOW | LOW | ON | OFF | OFF | OFF |

## Board ID Table for AD channel

| | |
|---|---|
| Vcc | 3.3V +/- 5% |
| Ra | 100K +/- 5% |

| Board ID | Rb | $V_{AD\_BID}$ min | $V_{AD\_BID}$ typ | $V_{AD\_BID}$ max |
|---|---|---|---|---|
| 0 | 0 | 0 V | 0 V | 0 V |
| 1 | 8.2K +/- 5% | 0.216 V | 0.250 V | 0.289 V |
| 2 | 18K +/- 5% | 0.436 V | 0.503 V | 0.538 V |
| 3 | 33K +/- 5% | 0.712 V | 0.819 V | 0.875 V |
| 4 | 56K +/- 5% | 1.036 V | 1.185 V | 1.264 V |
| 5 | 100K +/- 5% | 1.453 V | 1.650 V | 1.759 V |
| 6 | 200K +/- 5% | 1.935 V | 2.200 V | 2.341 V |
| 7 | NC | 2.500 V | 3.300 V | 3.300 V |

| Board ID | PCB Revision |
|---|---|
| 0 | 0.1 |
| 1 | 0.2 |
| 2 | 0.3 |
| 3 | |
| 4 | |
| 5 | |
| 6 | |
| 7 | |




| BSEL1 | BSEL0 | SYSTEM BUS FREQUENCY |
|---|---|---|
| L | L | 100MHz |
| **L** | **H** | **133MHz** |
| H | L | RESERVED |
| H | H | RESERVED |

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Title: Pentium 4/Northwood Processor in mPGA478

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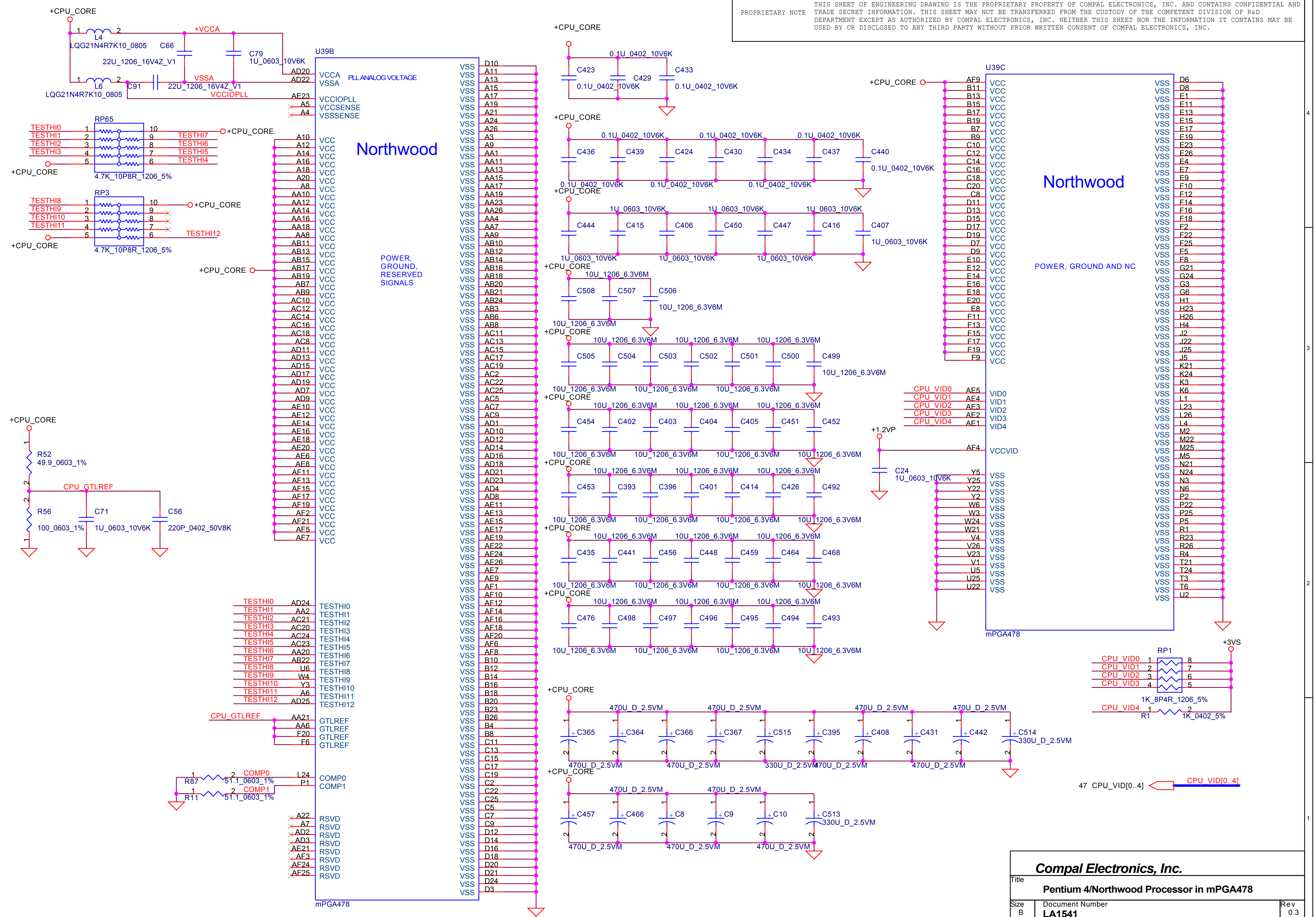


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| | |
|---|---|
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| Document Number | LA1541 |
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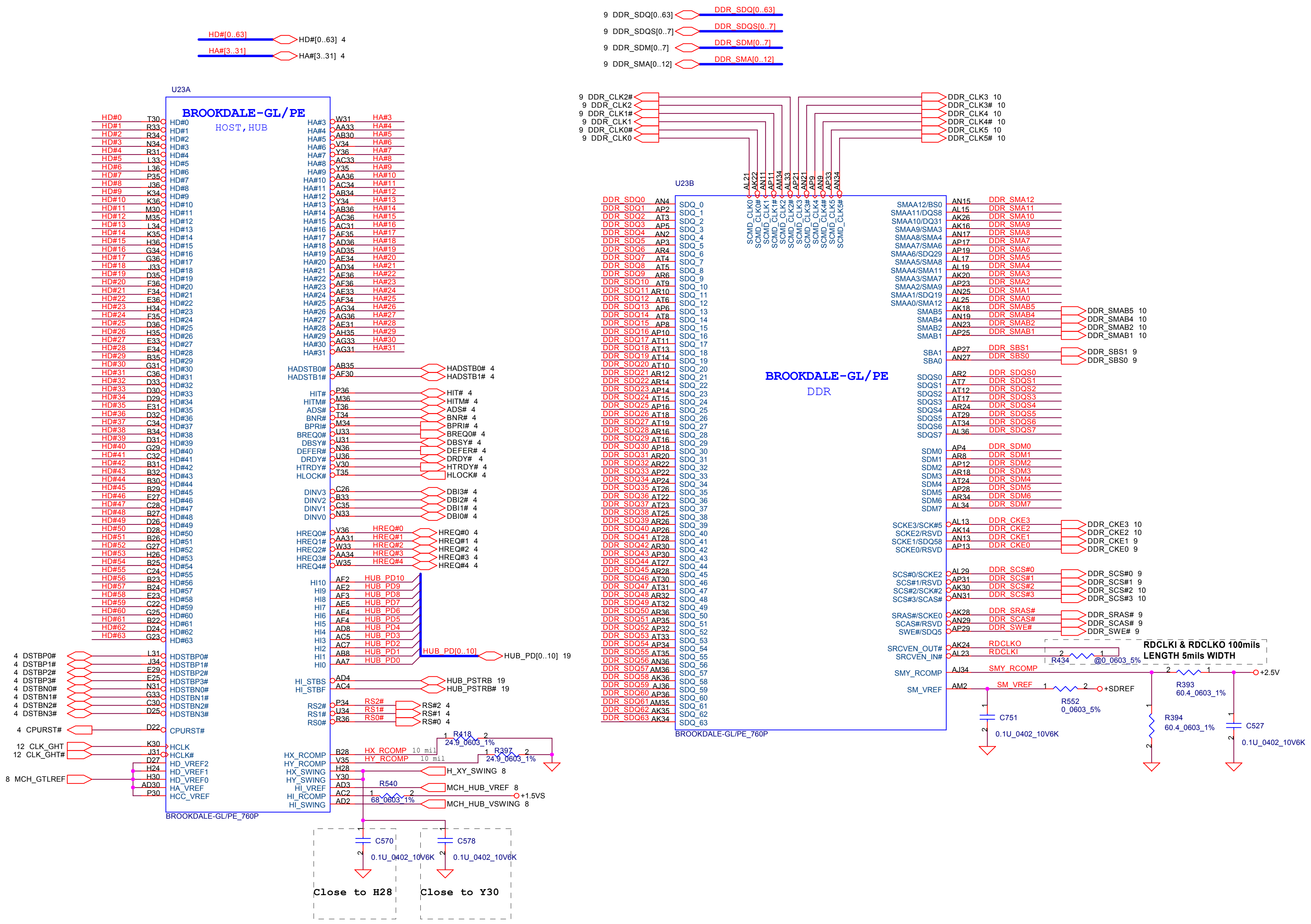


**Layout note :**
1. HX_RCOMP, HY_RCOMP Trace width 10 mil.
2. Terminator Max 500 mil.

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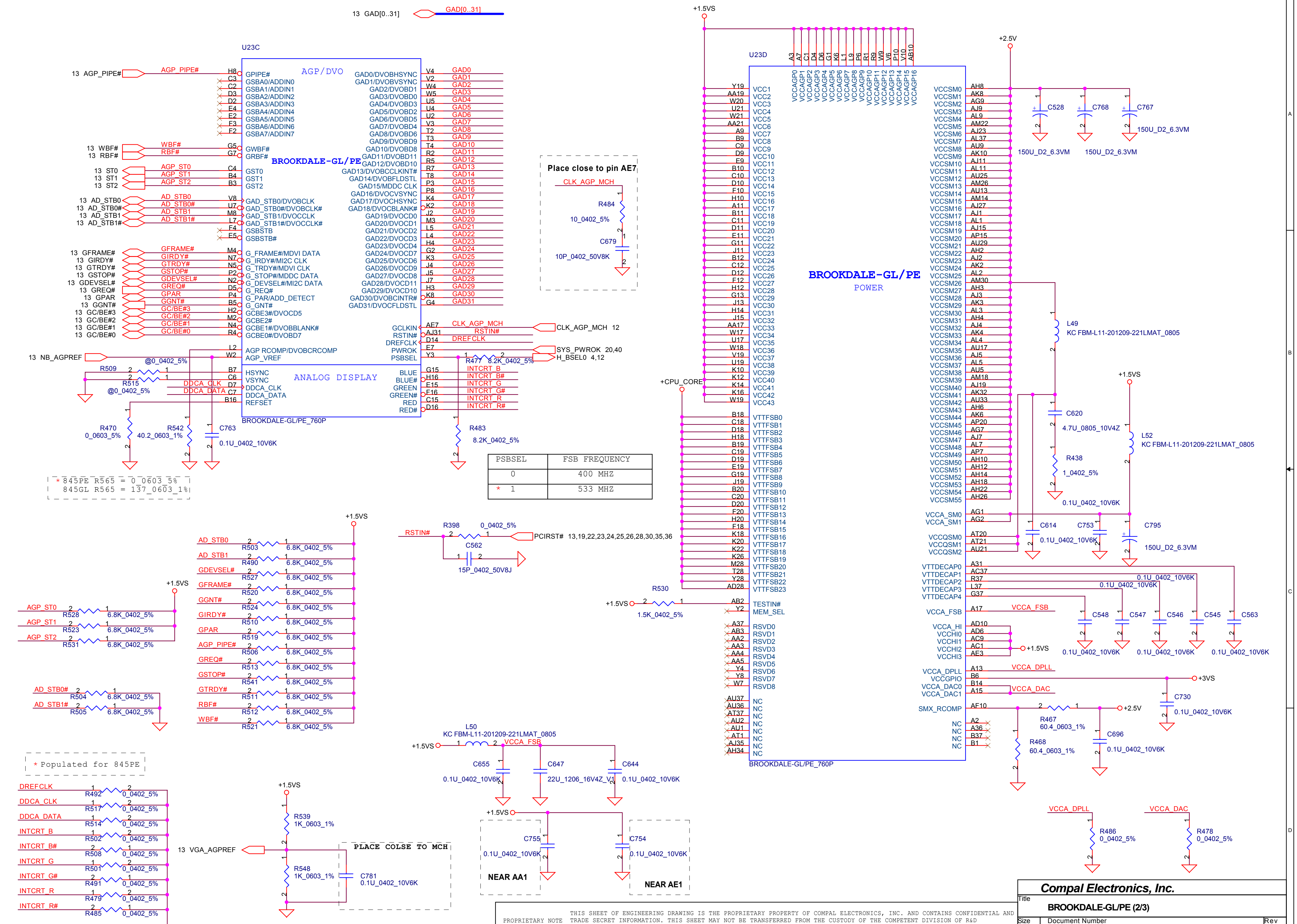


| PSBSEL | FSB FREQUENCY |
|---|---|
| 0 | 400 MHZ |
| * 1 | 533 MHZ |

* 845PE R565 = 0_0603_5%
845GL R565 = 137_0603_1%

* Populated for 845PE

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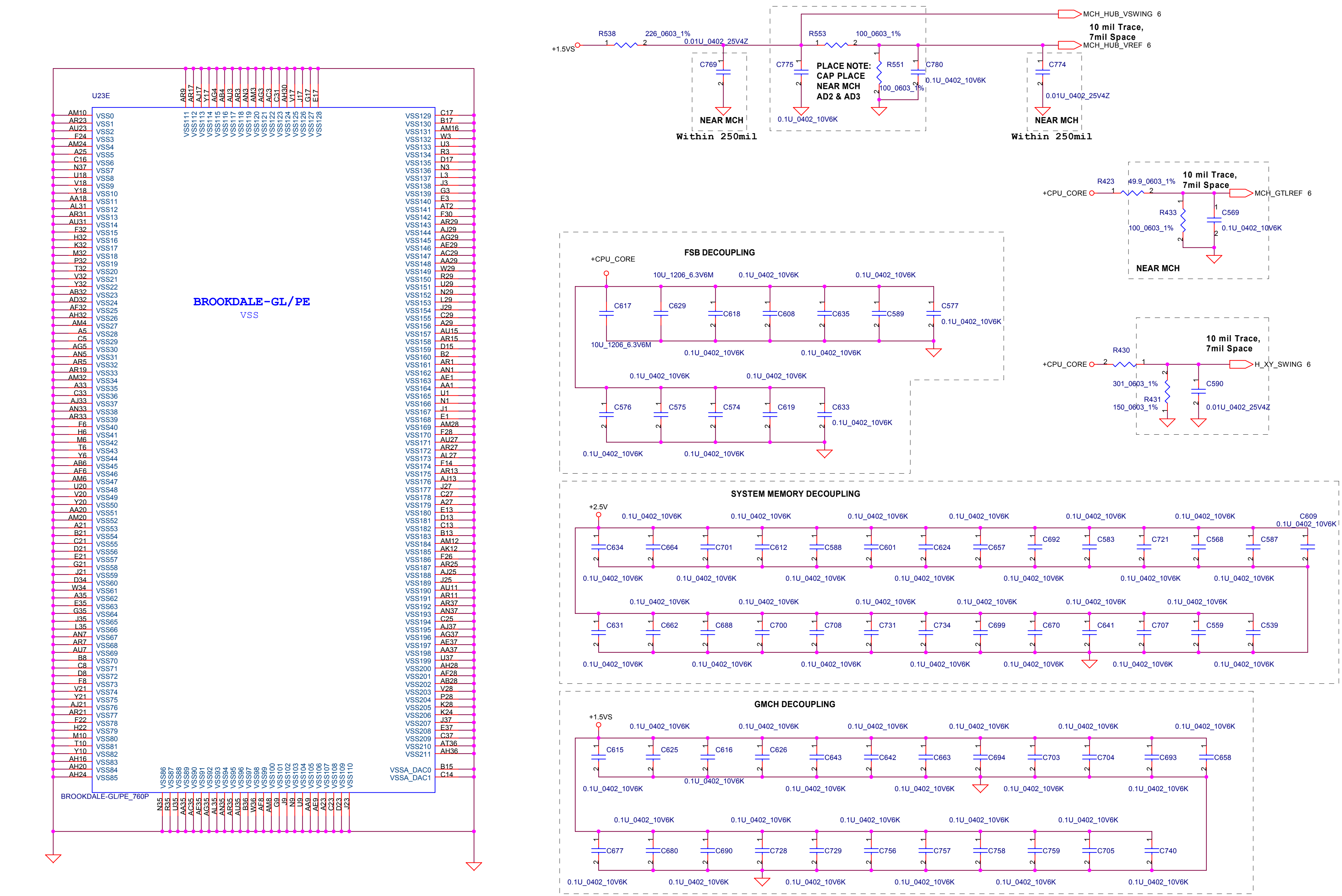


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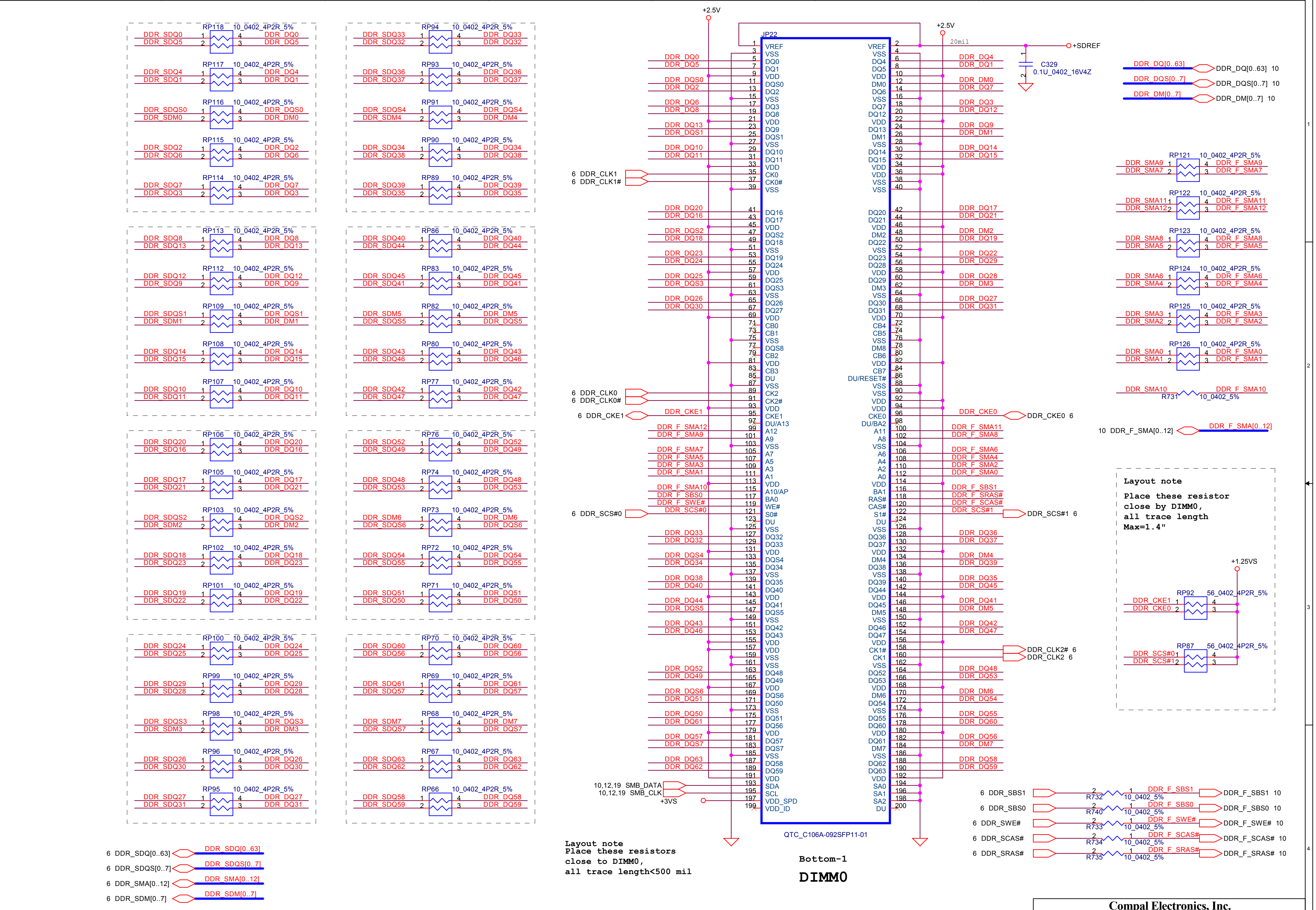


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| Title: DDR-SODIMM SLOT0 | | |
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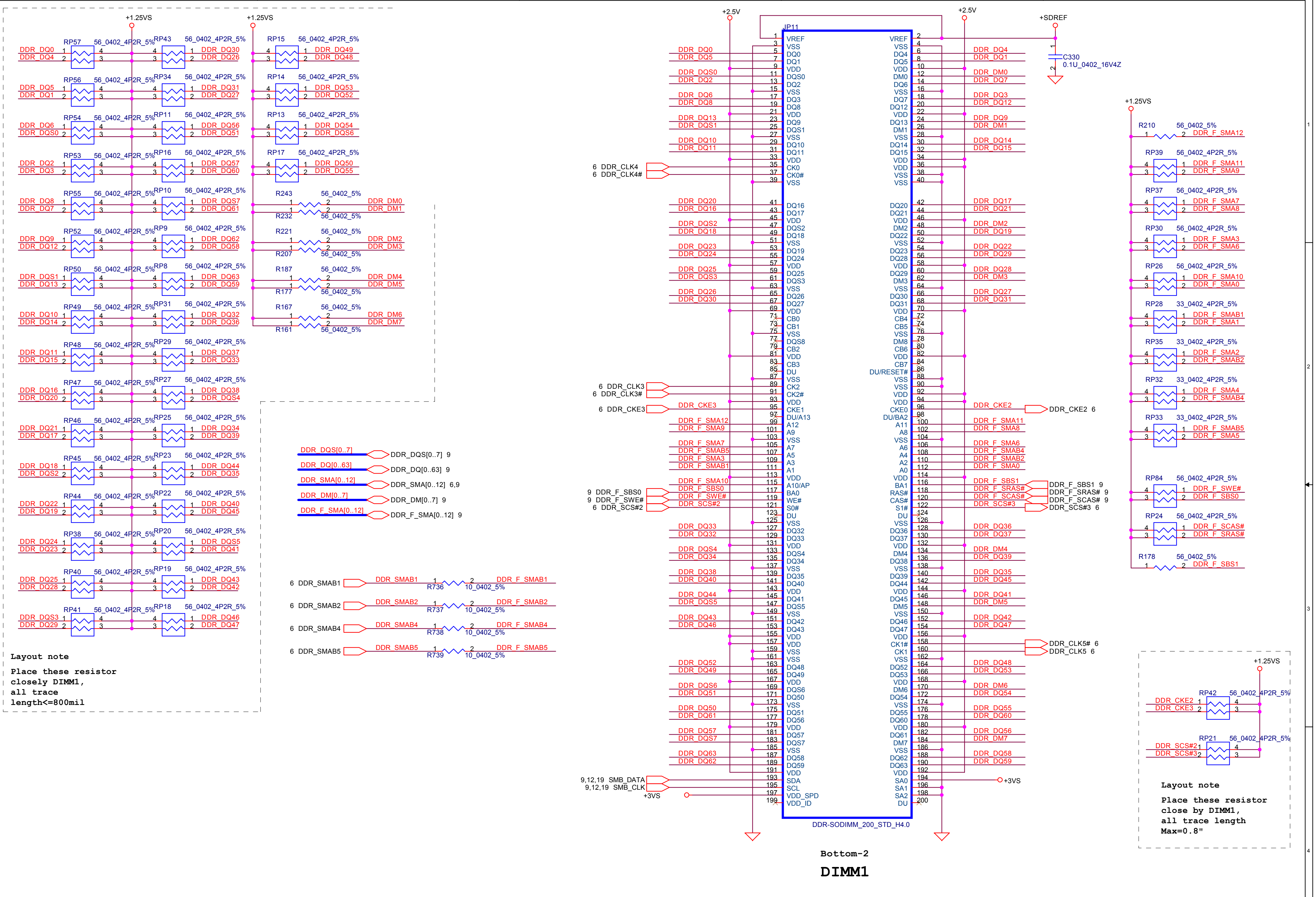


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Title: DDR-SODIMM SLOT1

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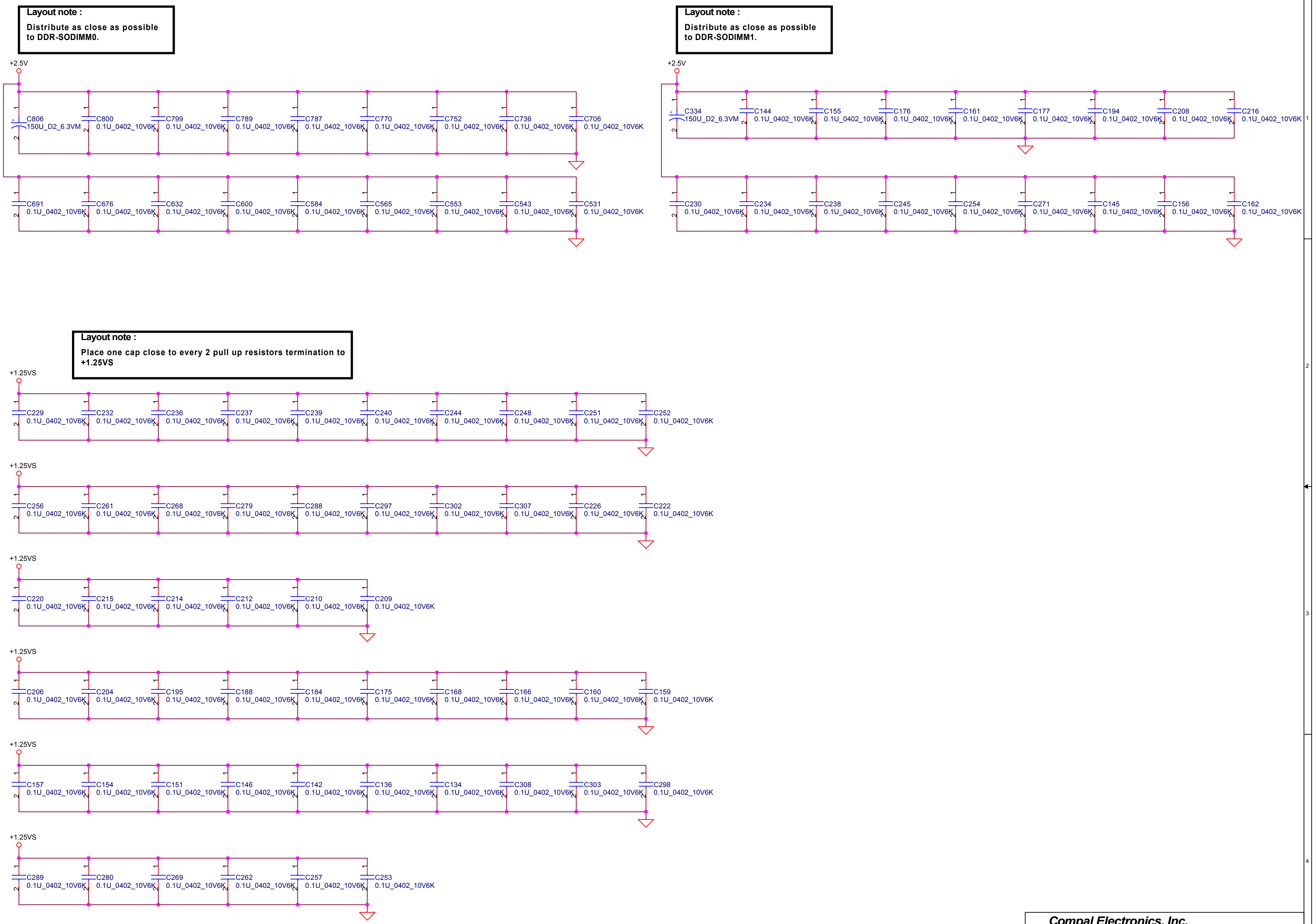


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Title: **DDR SODIMM Decoupling**

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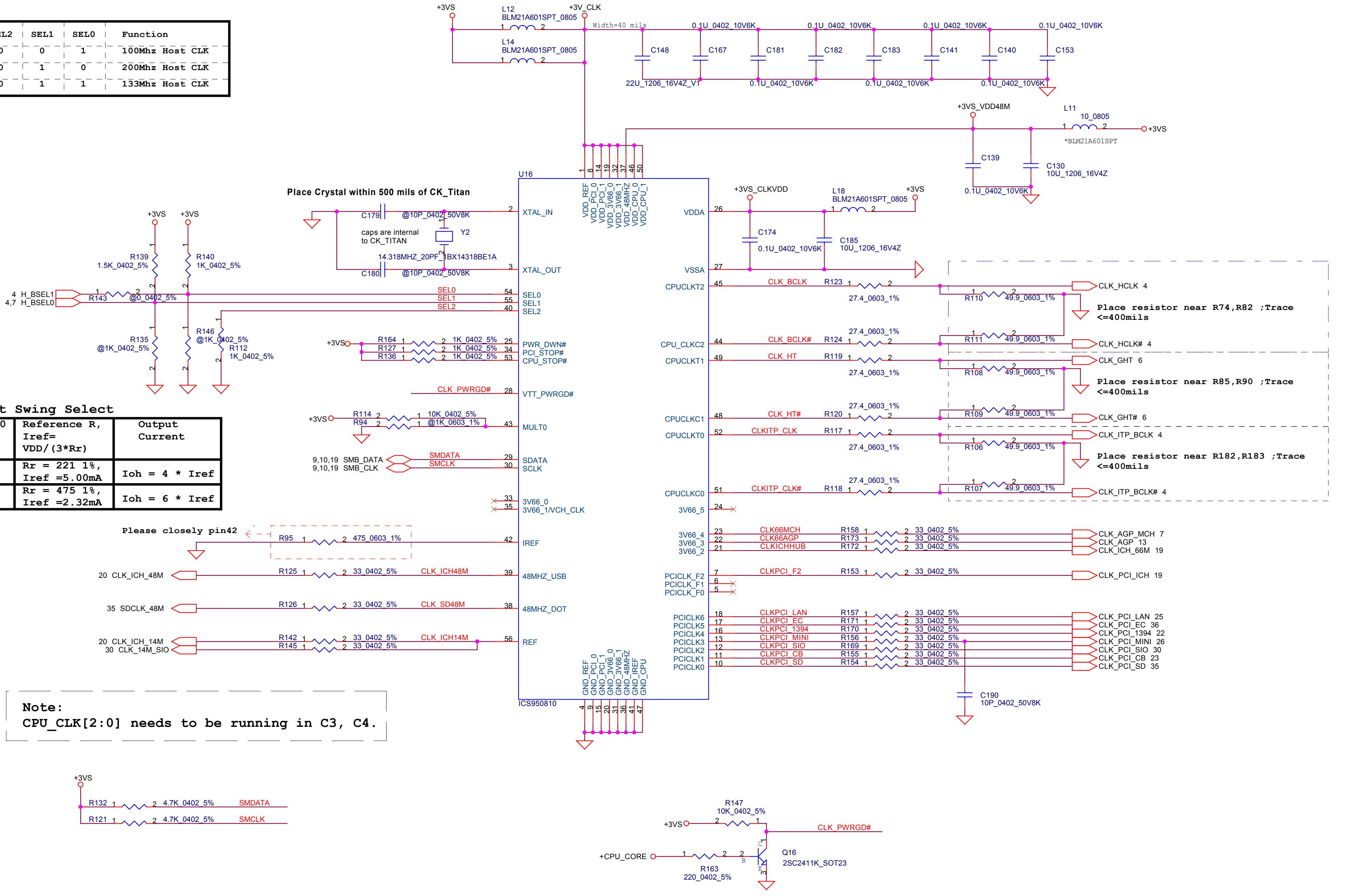
| SEL2 | SEL1 | SEL0 | Function |
|---|---|---|---|
| 0 | 0 | 1 | 100Mhz Host CLK |
| 0 | 1 | 0 | 200Mhz Host CLK |
| 0 | 1 | 1 | 133Mhz Host CLK |




## Host Swing Select

| MULT0 | Reference R, Iref= VDD/(3*Rr) | Output Current |
|---|---|---|
| 0 | Rr = 221 1%, Iref =5.00mA | Ioh = 4 * Iref |
| 1 | Rr = 475 1%, Iref =2.32mA | Ioh = 6 * Iref |

Note:
CPU_CLK[2:0] needs to be running in C3, C4.

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Title: Clock Generator
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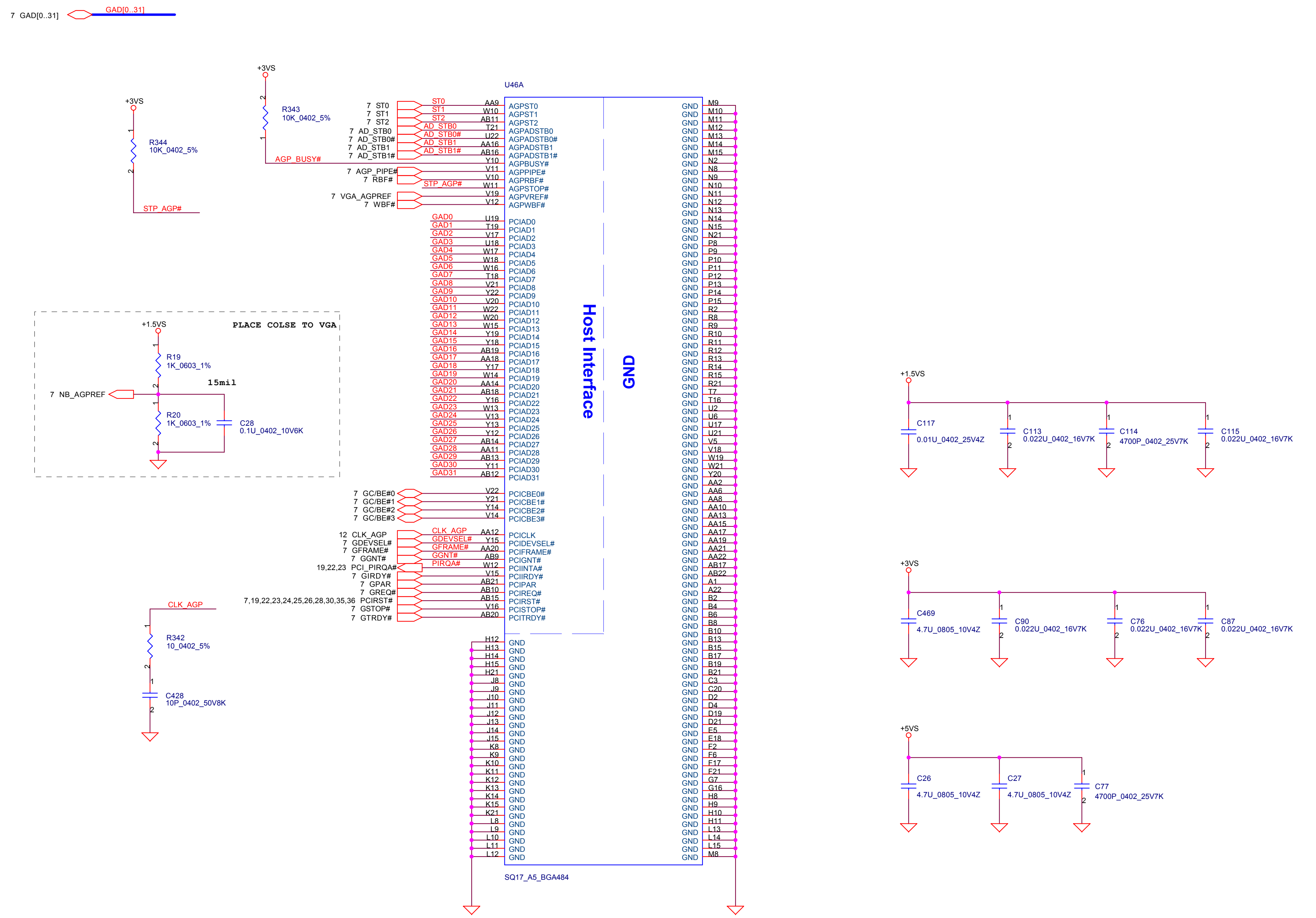


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| Title: **SQ17-AGP I/F** | | |
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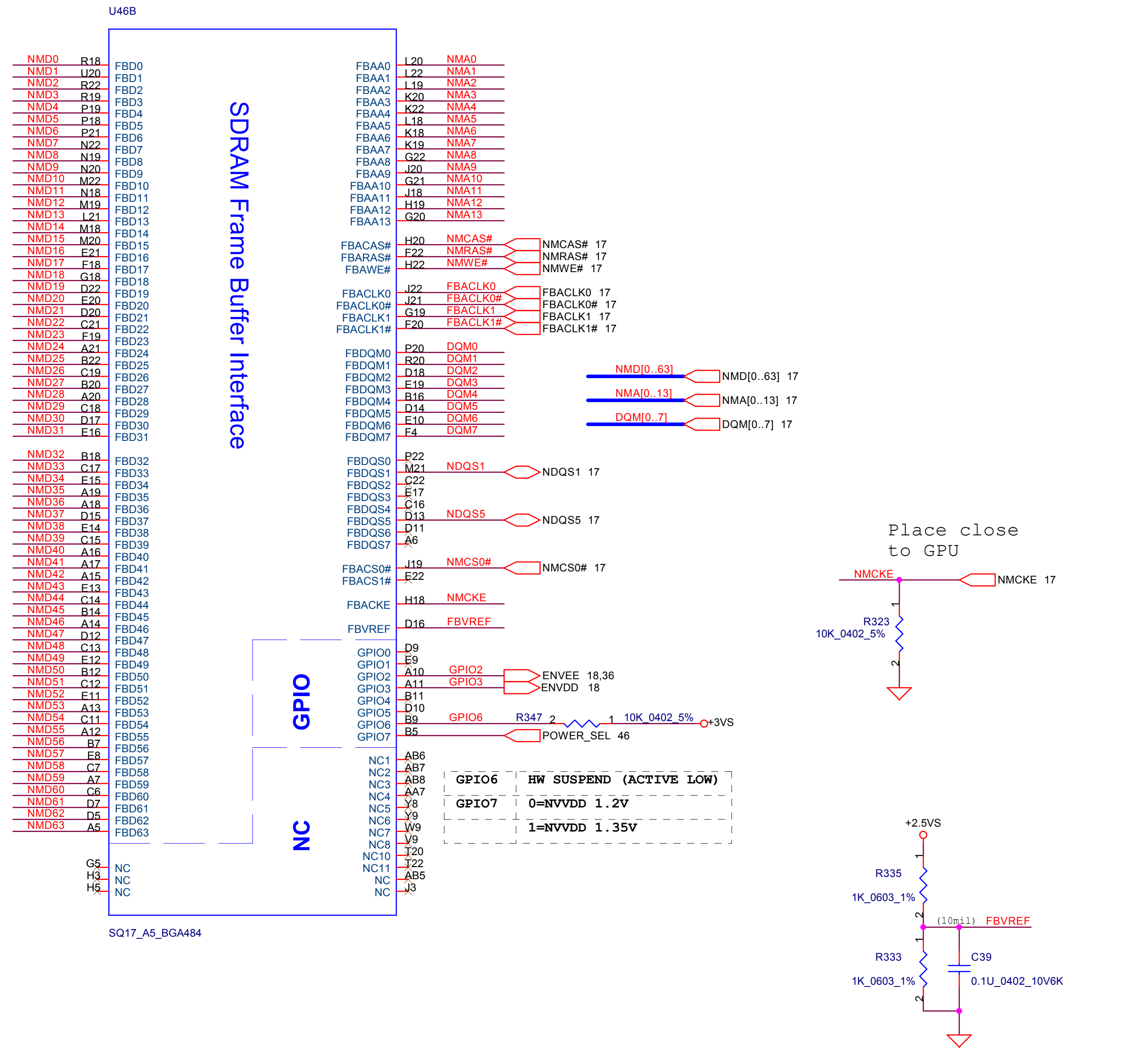


| GPIO6 | HW SUSPEND (ACTIVE LOW) |
|---|---|
| GPIO7 | 0=NVVDD 1.2V |
| | 1=NVVDD 1.35V |

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| | |
|---|---|
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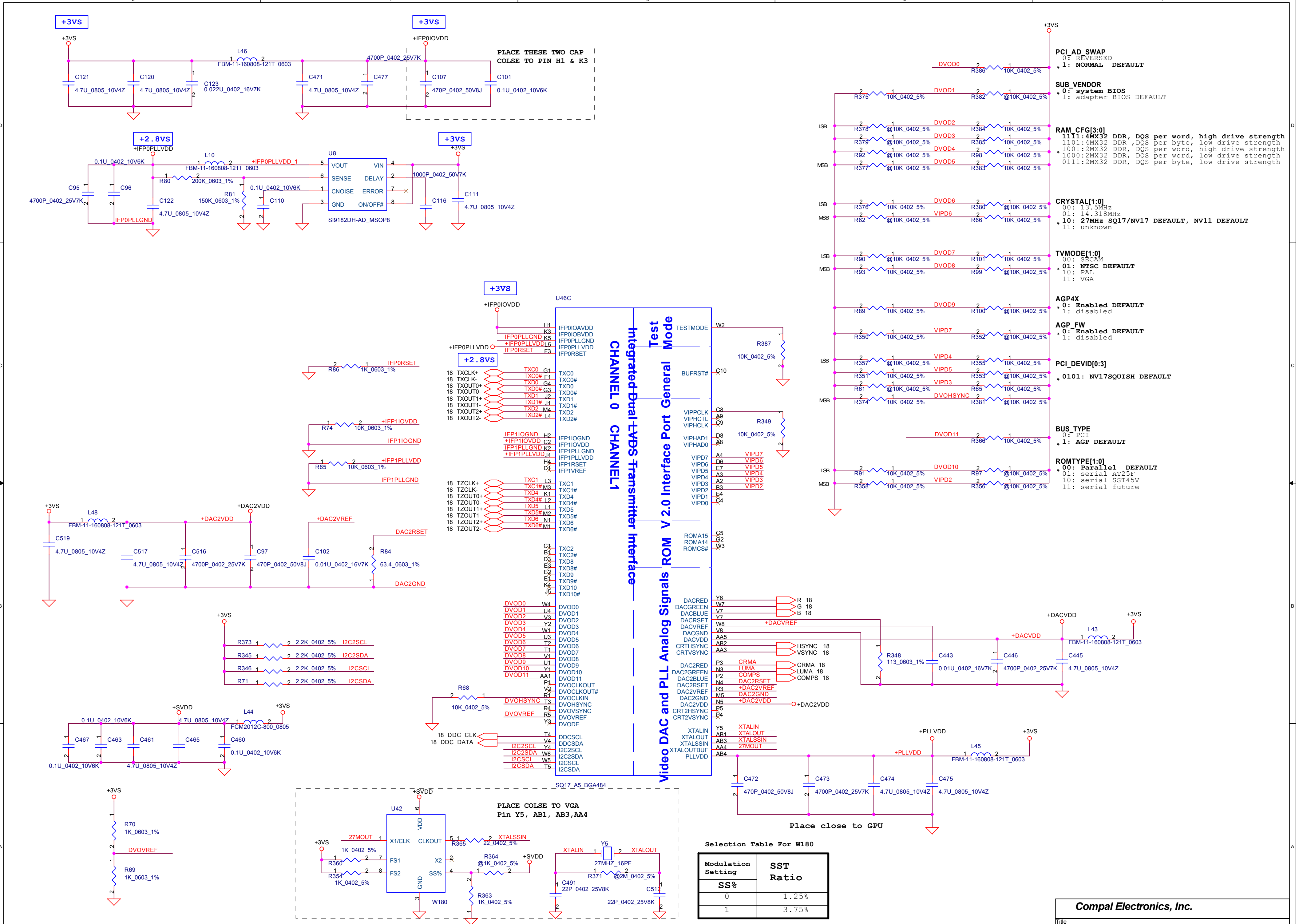


**Selection Table For W180**

| Modulation Setting SS% | SST Ratio |
| --- | --- |
| 0 | 1.25% |
| 1 | 3.75% |

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Title: SQ17-TVOUT/PANEL/CRT

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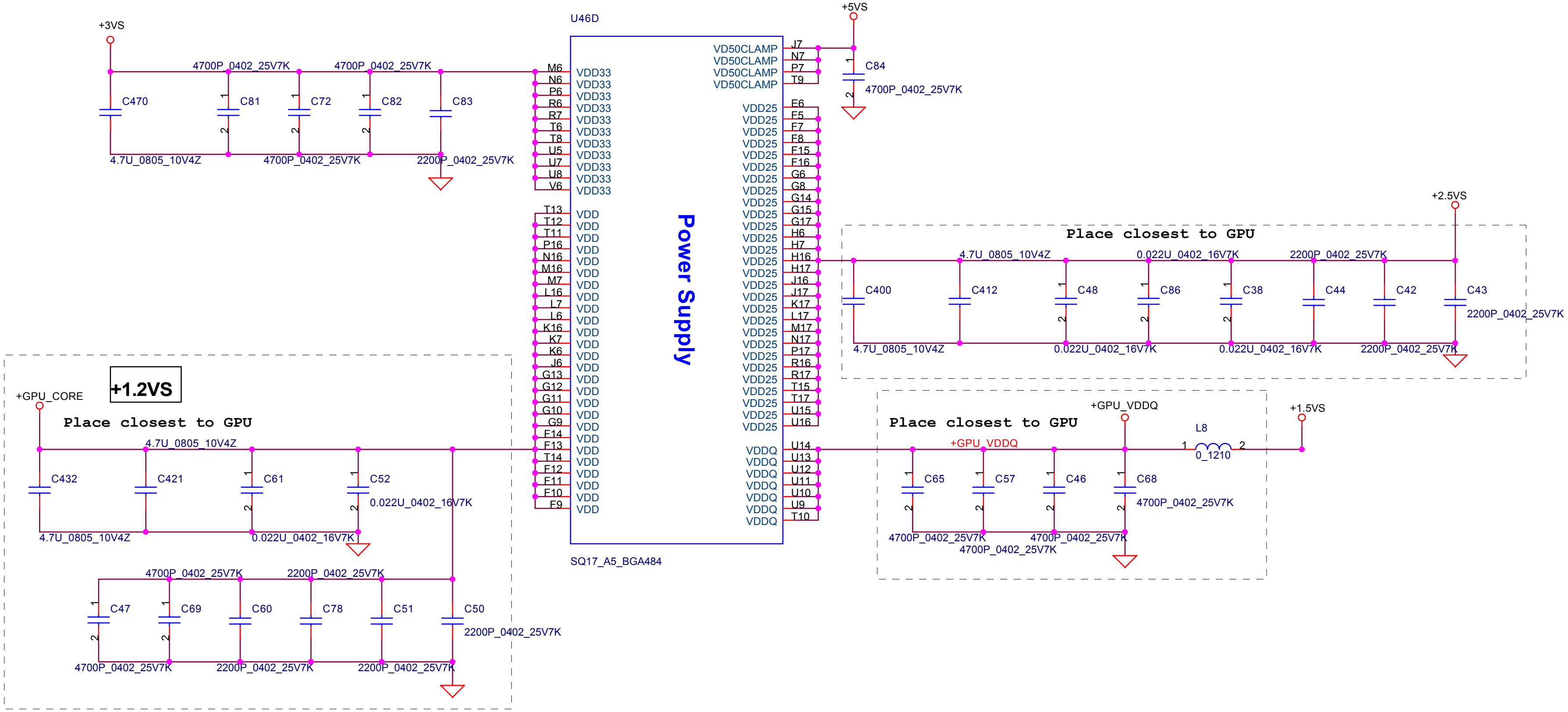


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| Title: SQ17-GPUPOWER | | |
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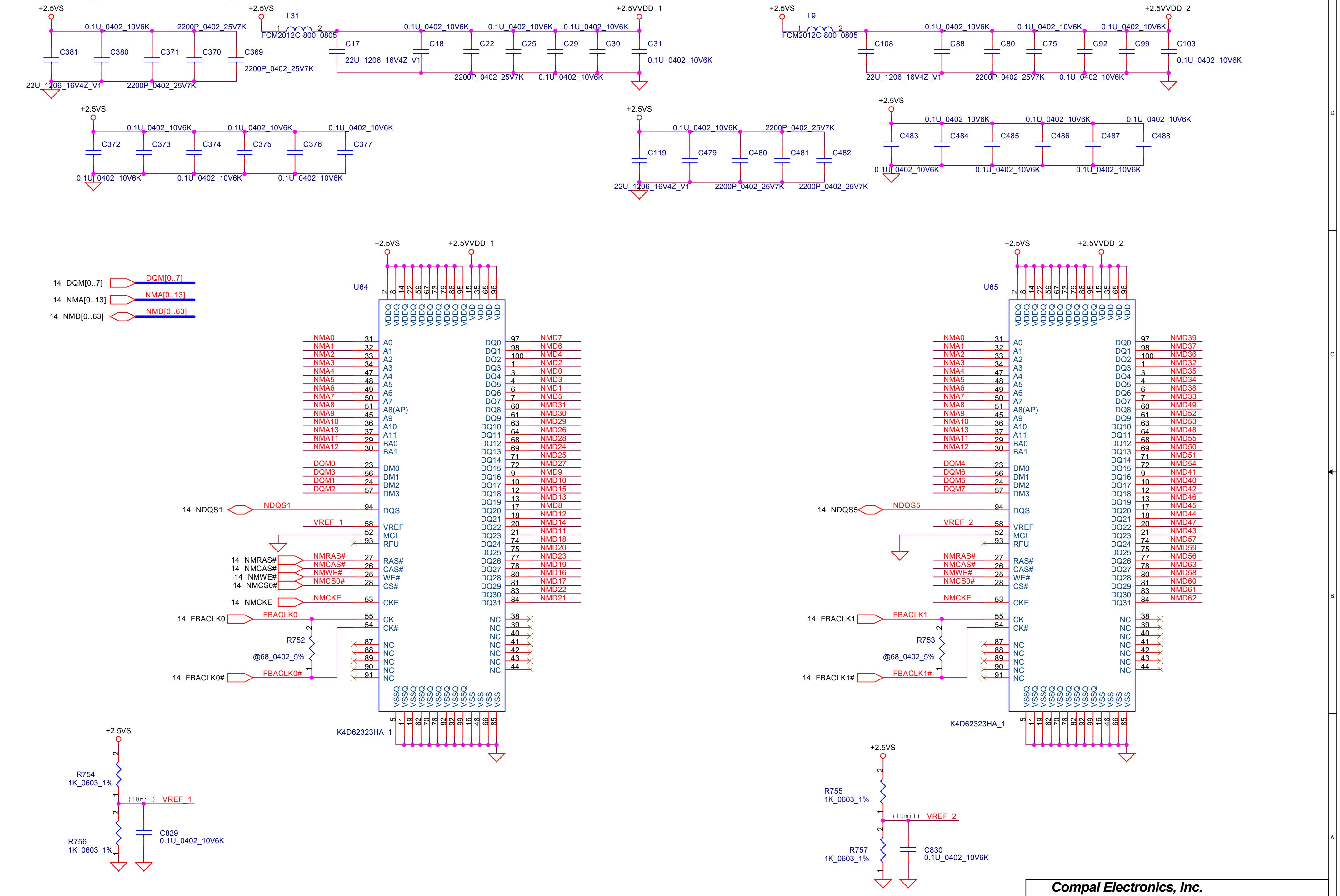


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| Title | NVIDIA SQ17 A CHANNEL DDR | |
| Size B | Document Number LA1541 | Rev 0.3 |
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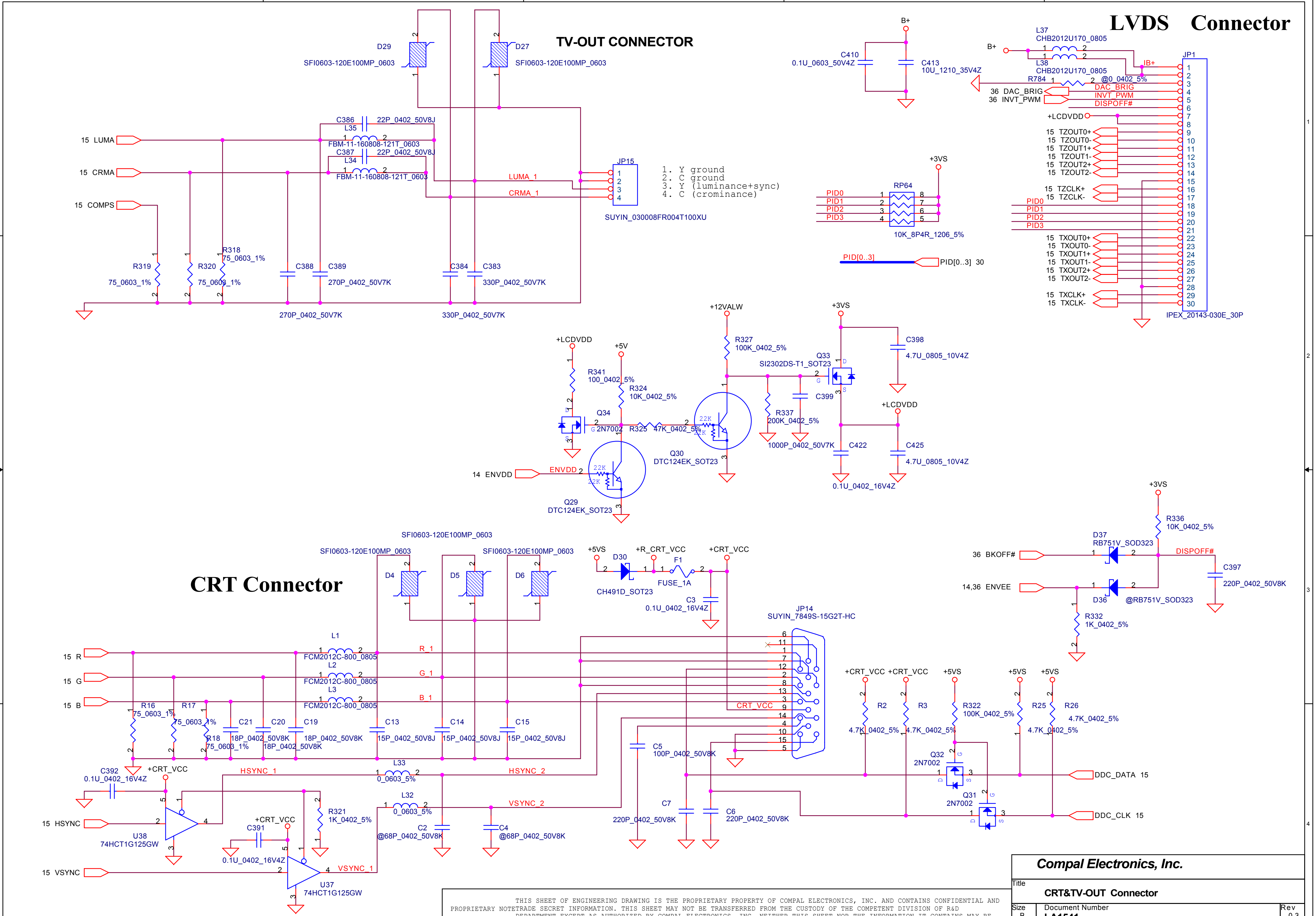


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| | | |
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| Title | CRT&TV-OUT Connector | |
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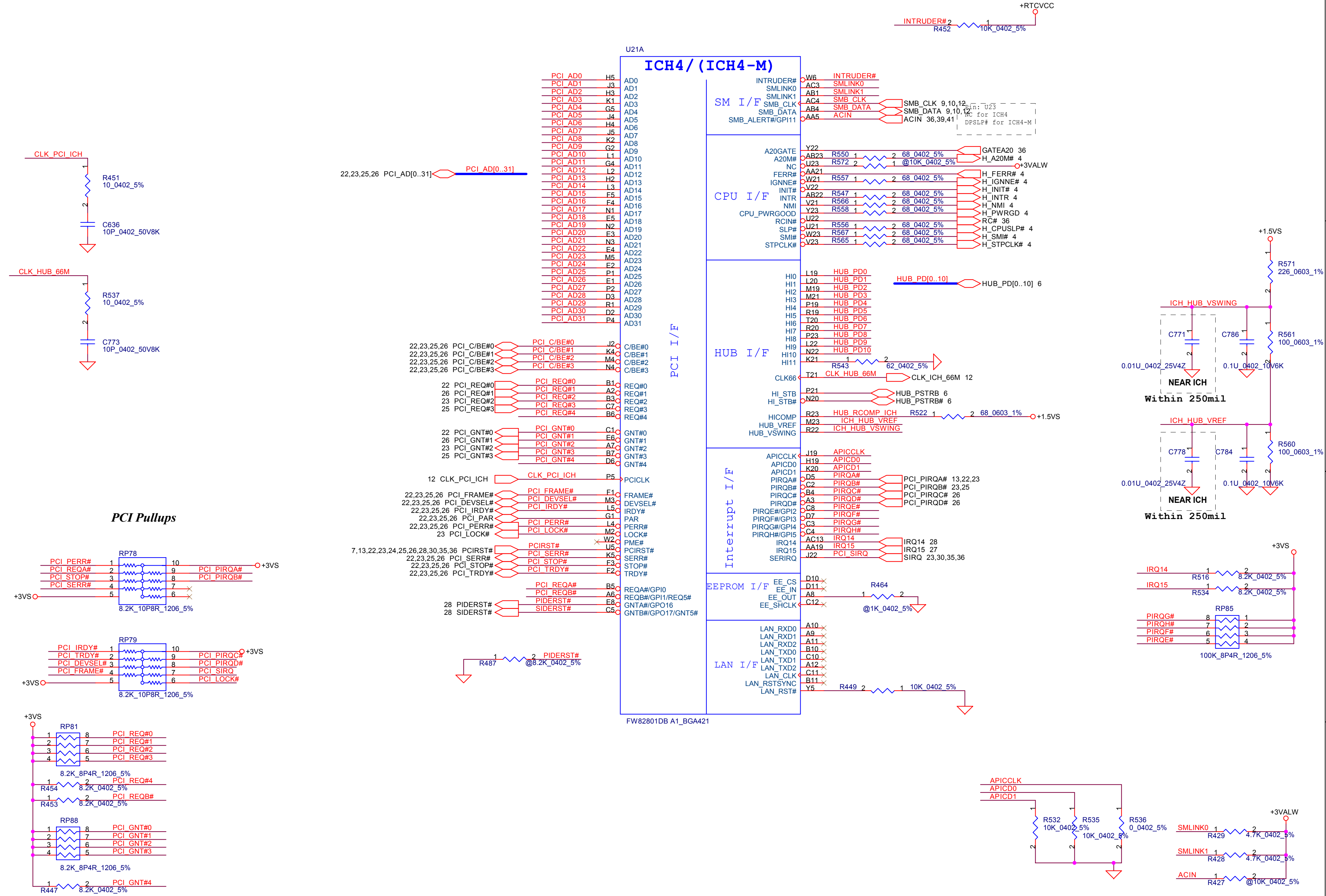


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| Title | ICH4 - PCI/CPU/HUB | | |
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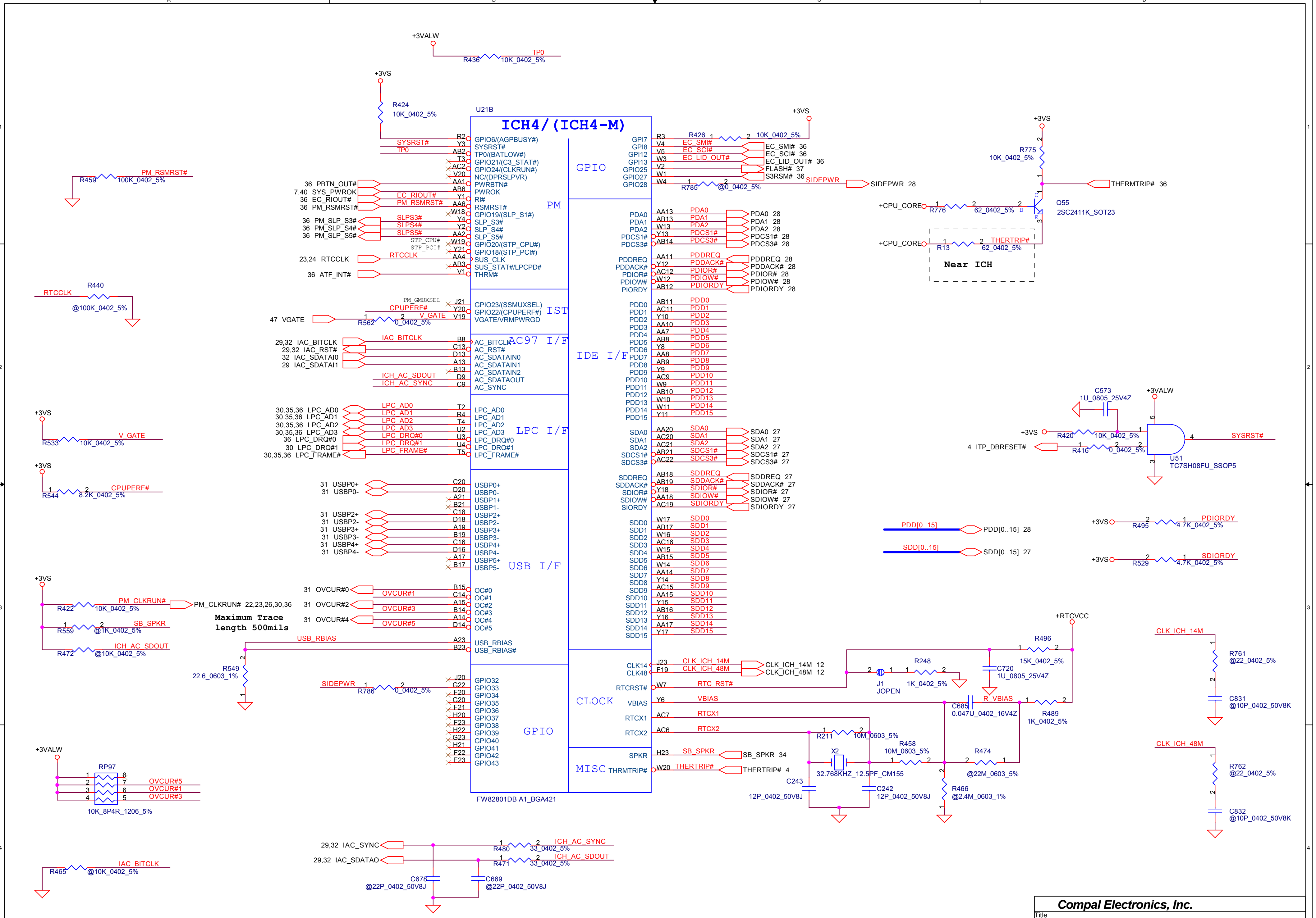


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| Title | ICH4 - IDE/USB/AC'97 | |
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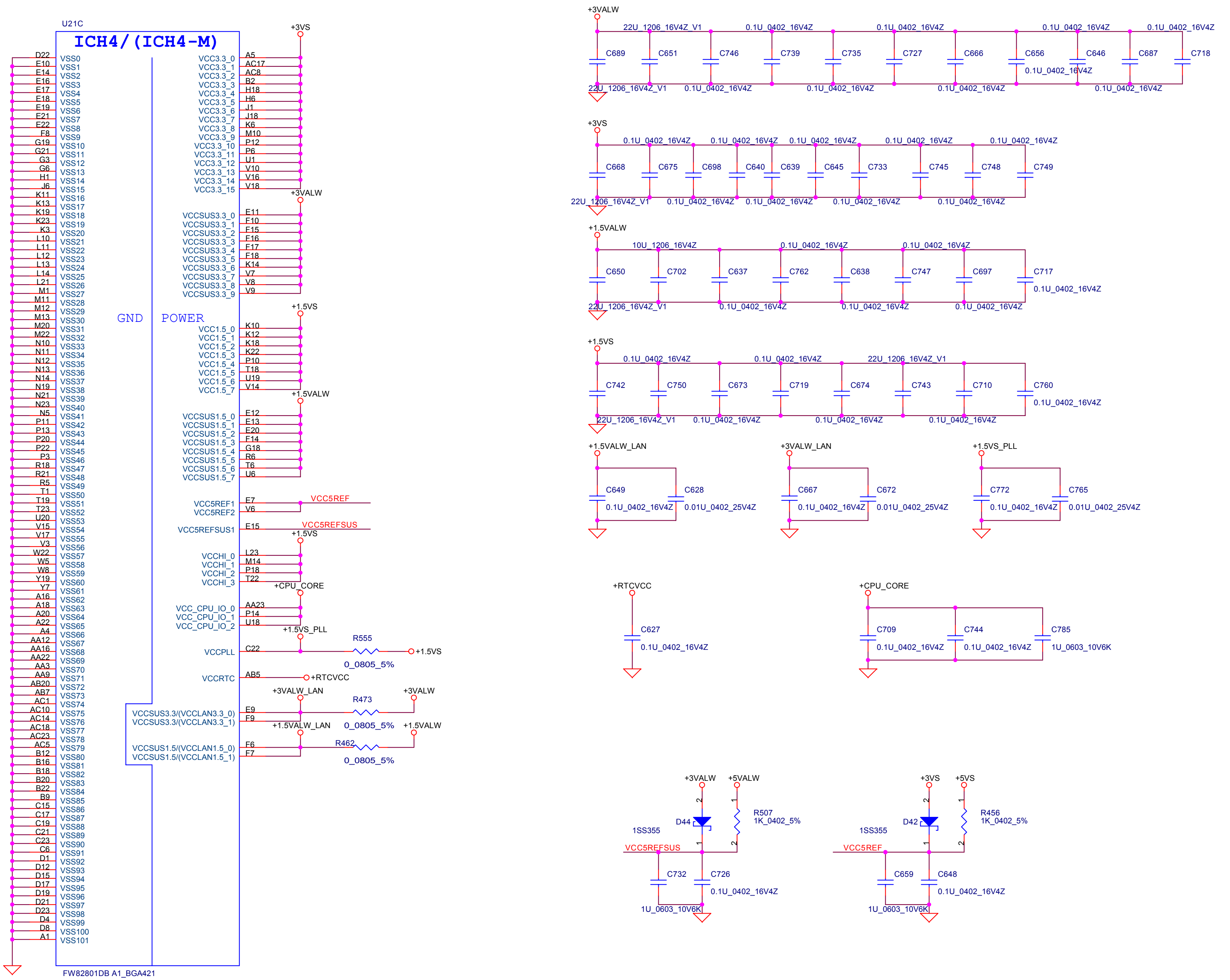


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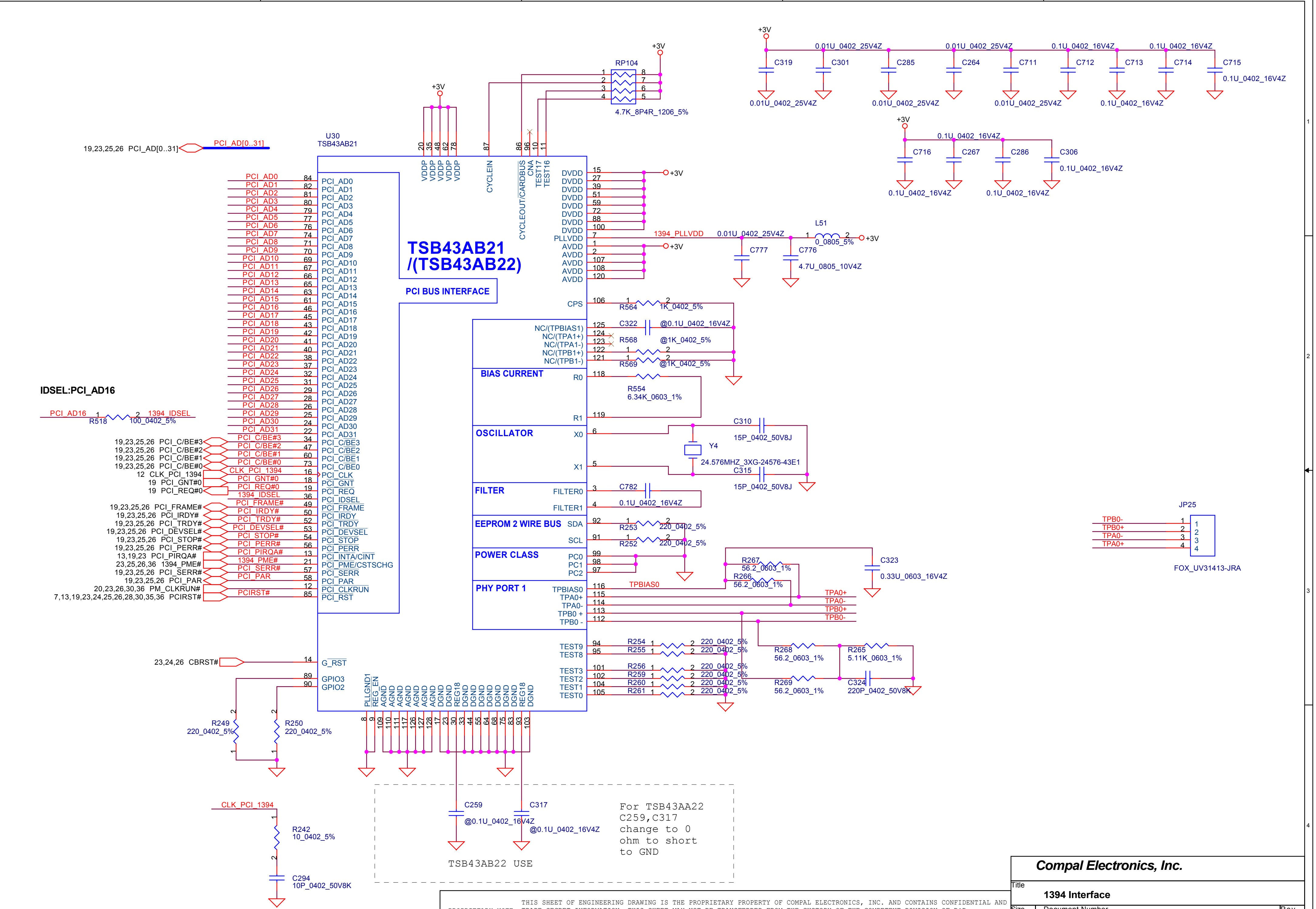
| | |
|---|---|
| Compal Electronics, Inc. | |
| Title | ICH4 - POWER/GND |
| Size | Document Number: LA1541 — Rev 0.3 |
| Date: 星期二, 十月 29, 2002 | Sheet 21 of 48 |

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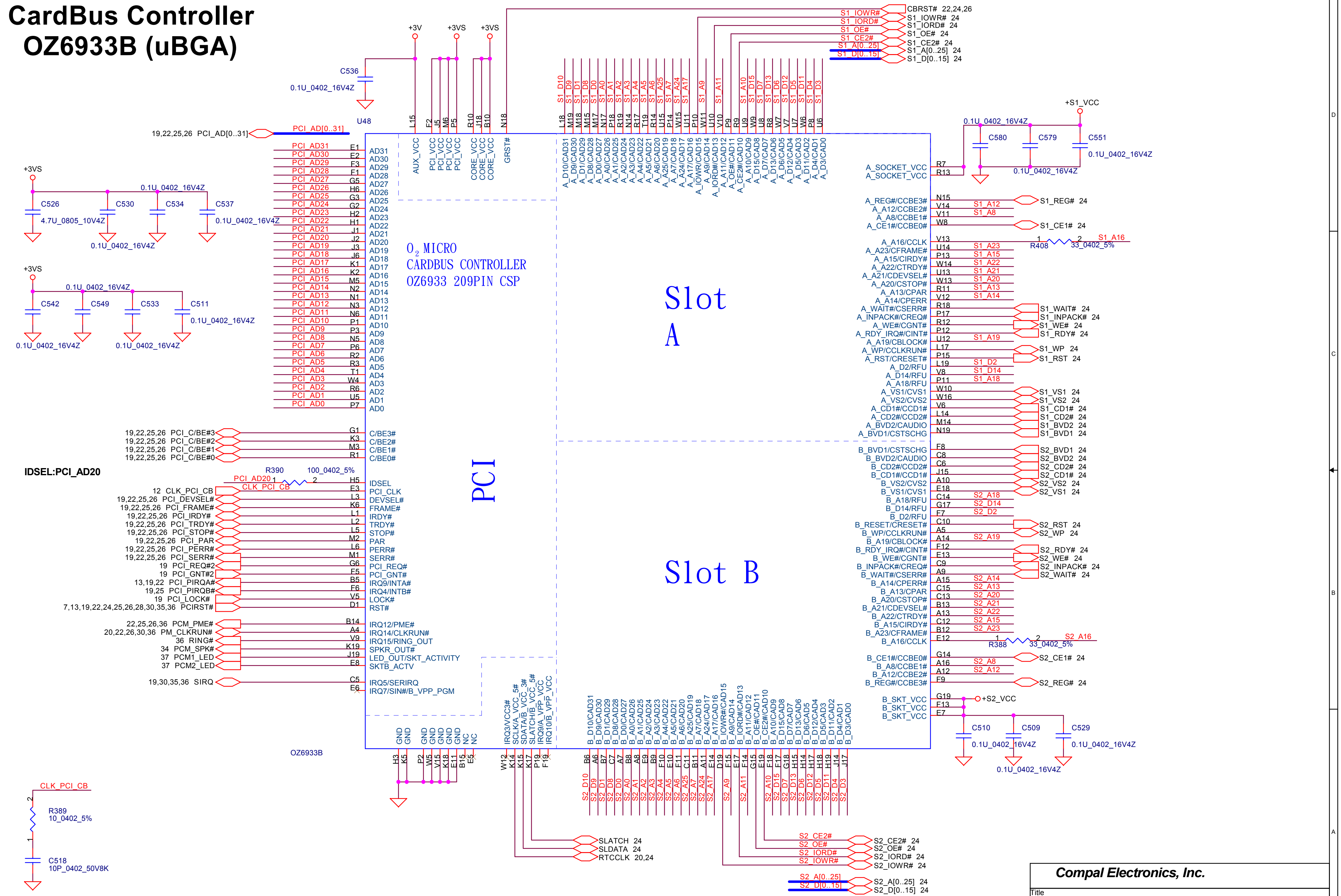
| | |
|---|---|
| **Compal Electronics, Inc.** | |
| Title | 1394 Interface |
| Size B | Document Number LA1541 / Rev 0.3 |
| Date: 星期二, 十月 29, 2002 | Sheet 22 of 48 |

# CardBus Controller OZ6933B (uBGA)

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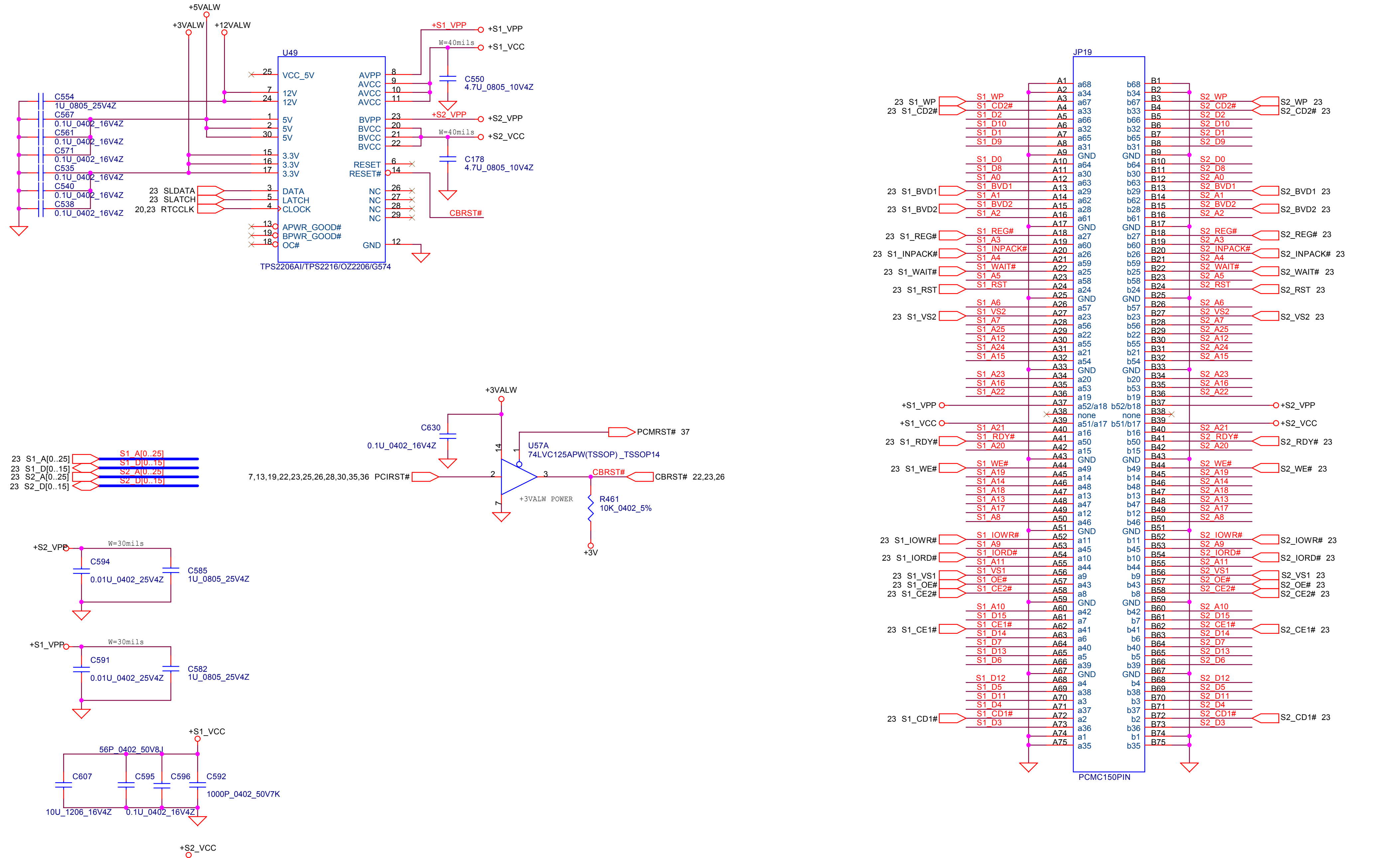
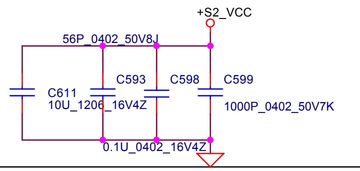
**Compal Electronics, Inc.**

| | | |
|---|---|---|
| Title | CardBus Controller ( OZ6933T ) | |
| Size B | Document Number LA1541 | Rev 0.3 |
| Date: 星期二, 十月 29, 2002 | Sheet 23 of 48 | |

# PCMCIA POWER CTRL.

# CARDBUS SOCKET

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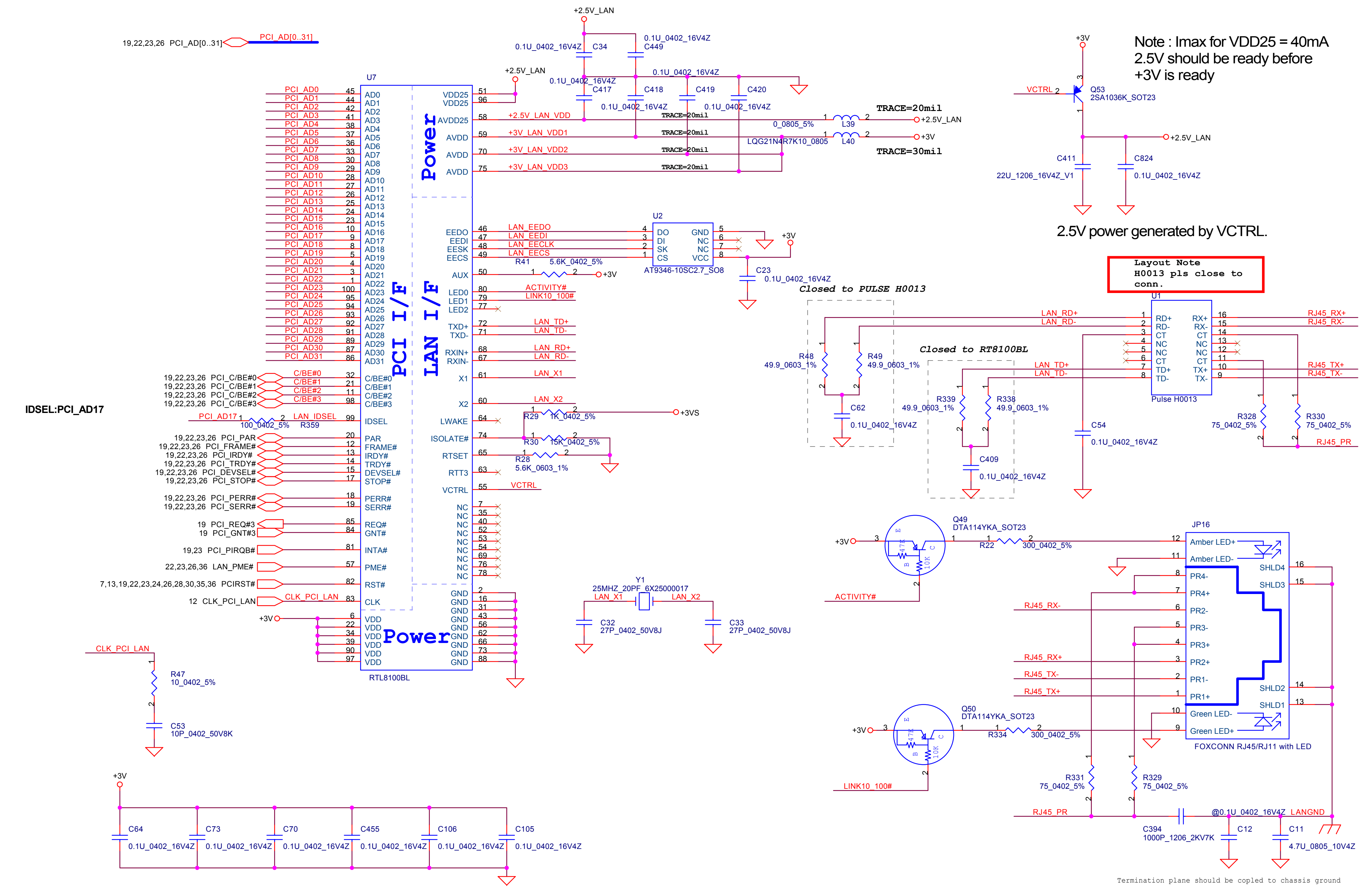
**Compal Electronics, Inc.**

| | | |
|---|---|---|
| Title | Foxconn PCMCIA SOCKET | |
| Size B | Document Number LA1541 | Rev 0.3 |
| Date: 星期二, 十月 29, 2002 | Sheet 24 of 48 | |

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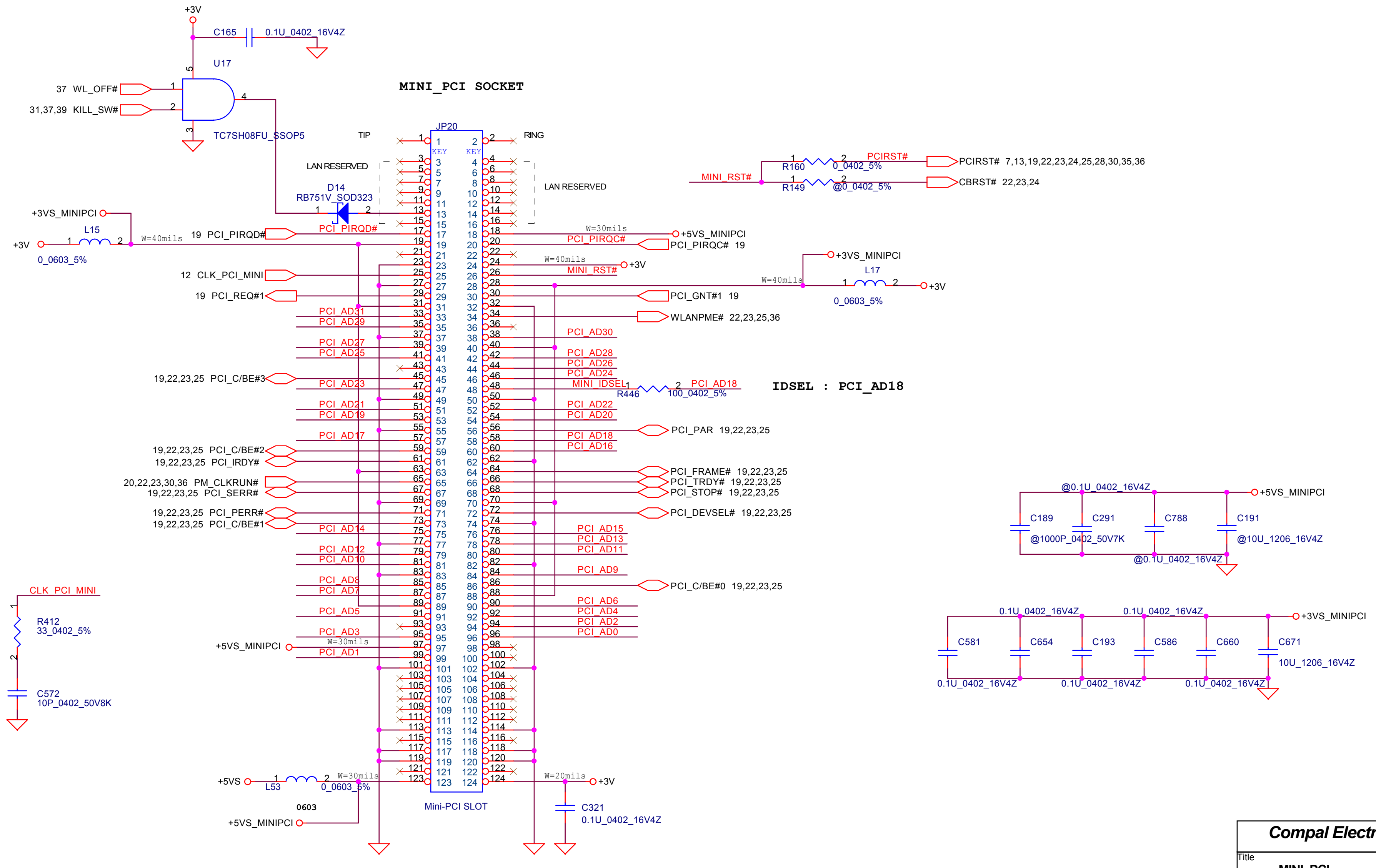
| | | |
|---|---|---|
| Compal Electronics, Inc. | | |
| Title | LAN REALTEK RTL8100BL | |
| Size B | Document Number | Rev 0.3 |
| Date: 星期二, 十月 29, 2002 | Sheet 25 of 48 | |




PCI_AD[0..31]    PCI_AD[0..31] 19,22,23,25

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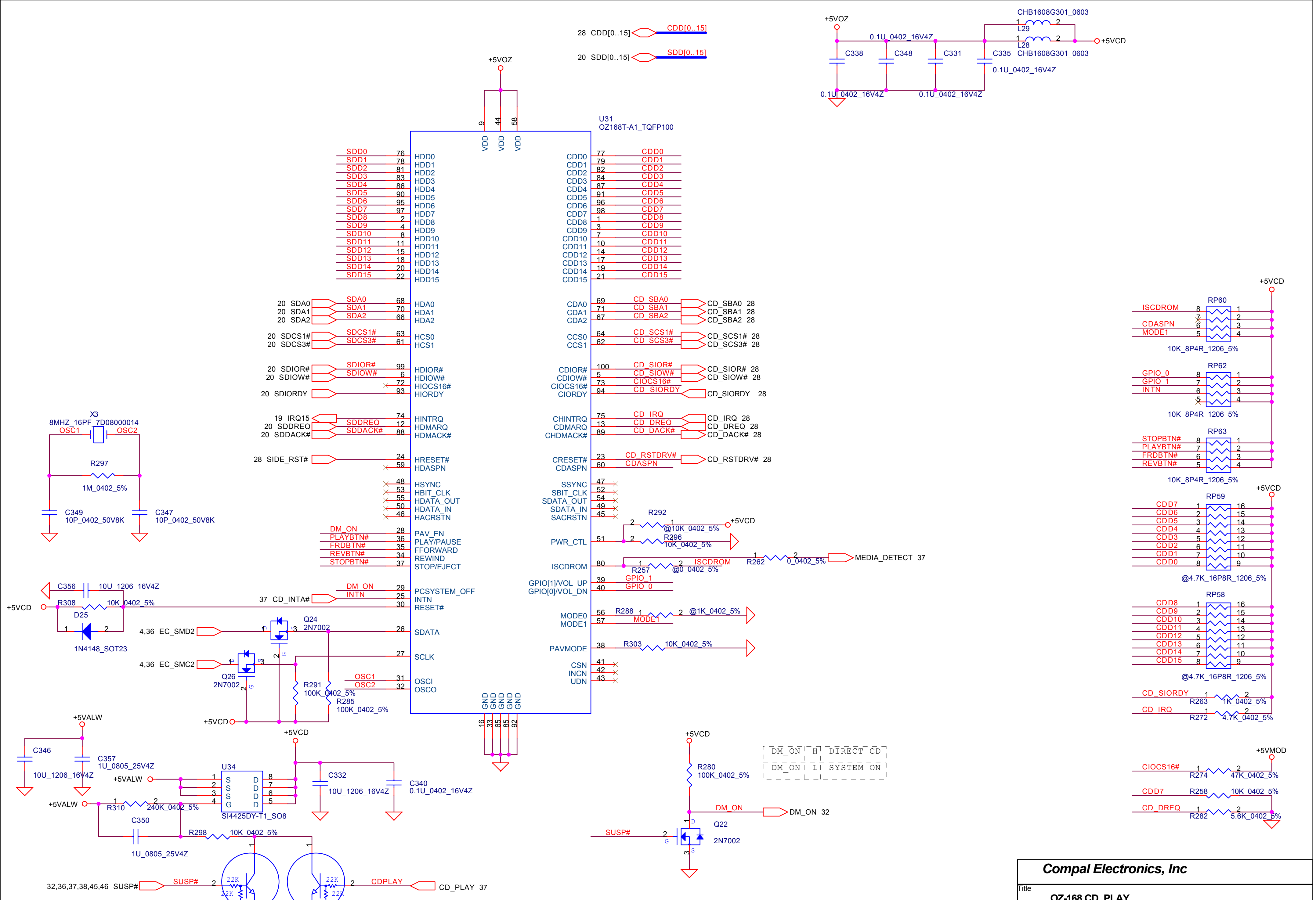
| Compal Electronics, Inc | | |
|---|---|---|
| Title | MINI_PCI | |
| Size B | Document Number LA1541 | Rev 0.3 |
| Date: 星期二, 十月 29, 2002 | Sheet 26 of 48 | |

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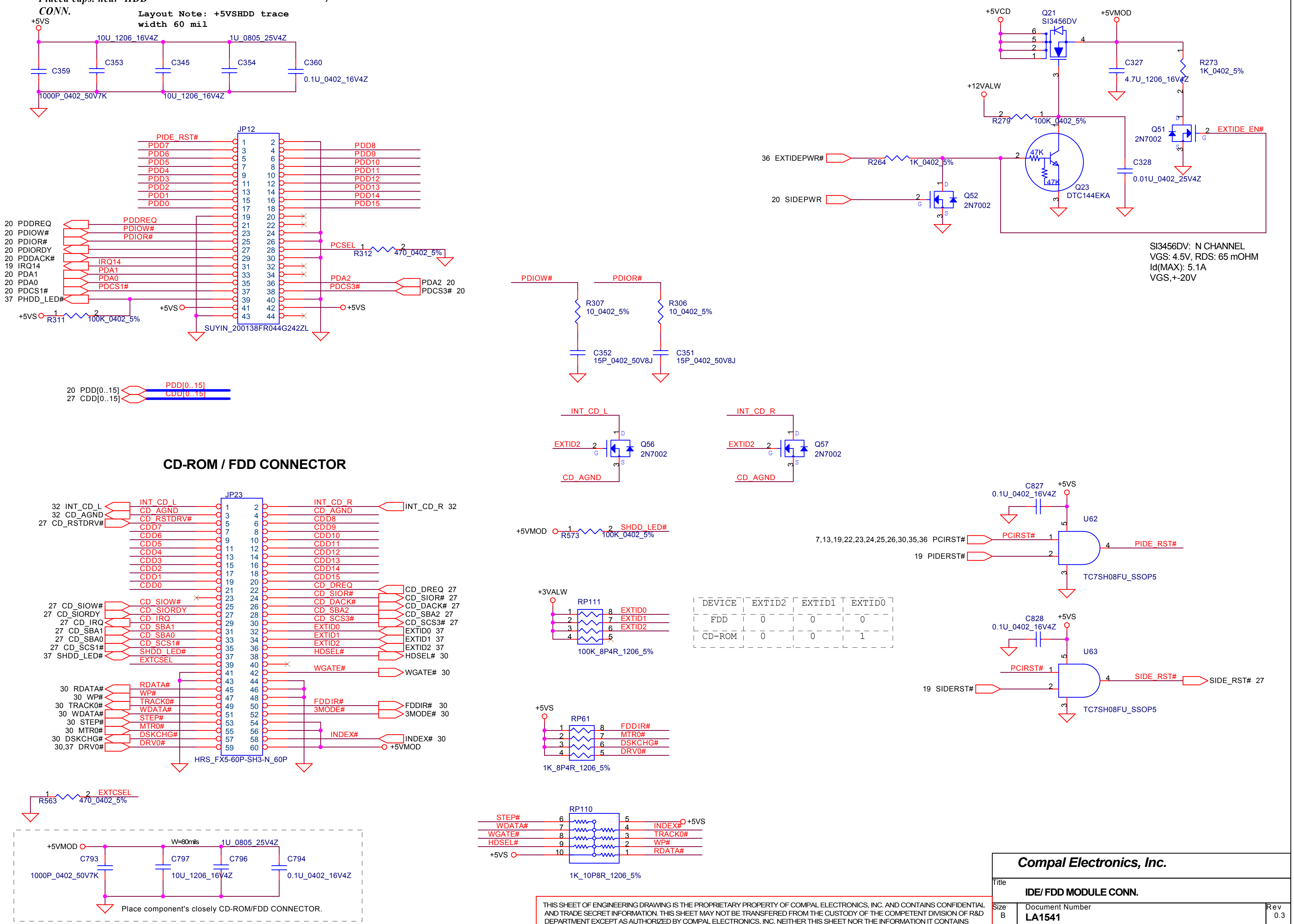
**Compal Electronics, Inc**

| | | |
|---|---|---|
| Title | OZ-168 CD_PLAY | |
| Size: B | Document Number: LA1541 | Rev: 0.3 |
| Date: 星期二, 十月 29, 2002 | Sheet 27 of 48 | |

# IDE,CD-ROM Module CONN.




| DEVICE | EXTID2 | EXTID1 | EXTID0 |
|---|---|---|---|
| FDD | 0 | 0 | 0 |
| CD-ROM | 0 | 0 | 1 |

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**Compal Electronics, Inc.**

| | | |
|---|---|---|
| Title | IDE/ FDD MODULE CONN. | |
| Size B | Document Number LA1541 | Rev 0.3 |
| Date: 星期二, 十月 29, 2002 | Sheet 28 of 48 | |


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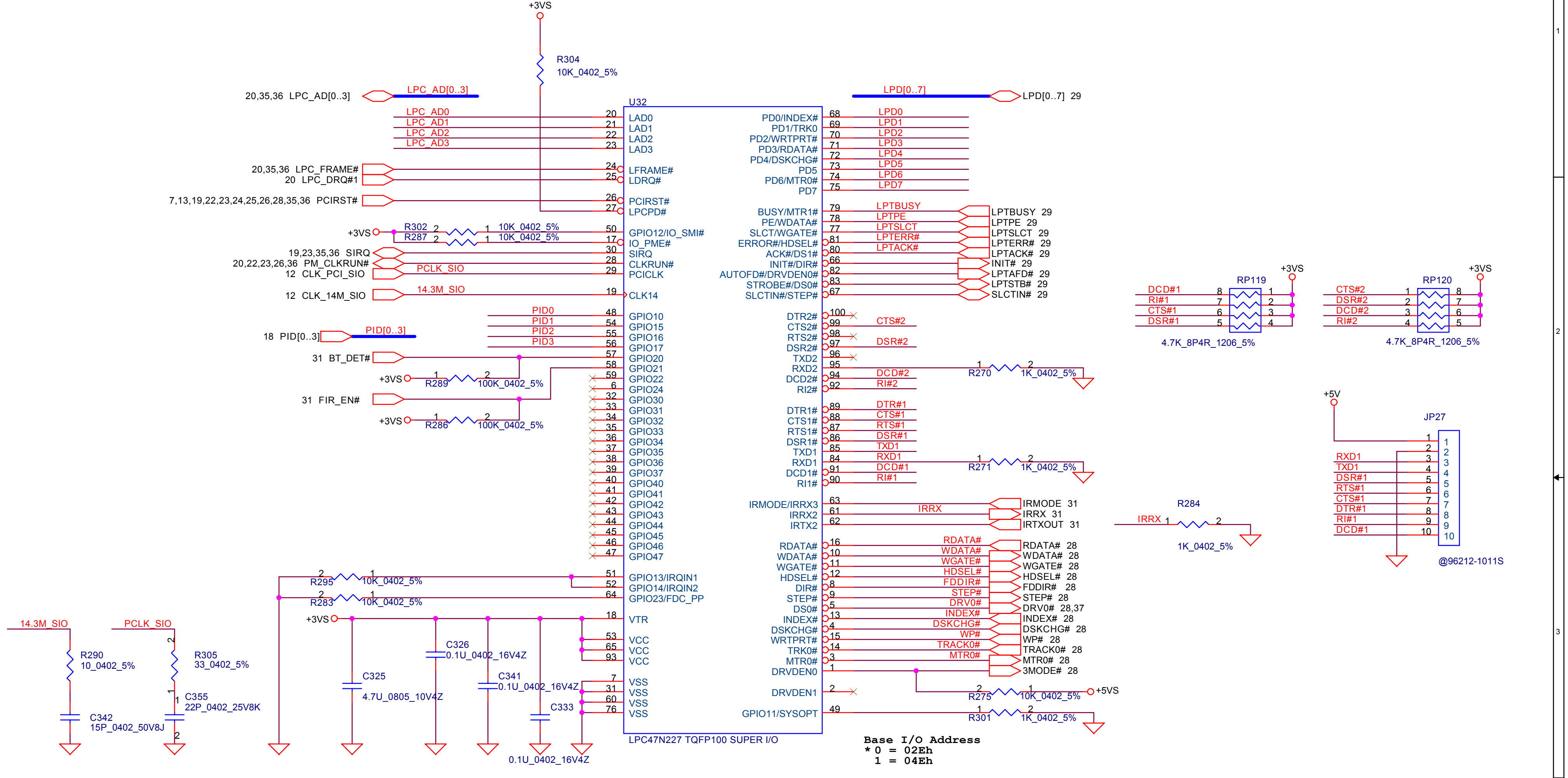
| | | |
|---|---|---|
| ***Compal Electronics, Inc.*** | | |
| Title | **PARALLEL/MDC PORT** | |
| Size | Document Number **LA1541** | Rev 0.3 |
| Date: 星期二, 十月 29, 2002 | Sheet 29 of 48 | |

# SUPER I/O SMsC FDC47N227





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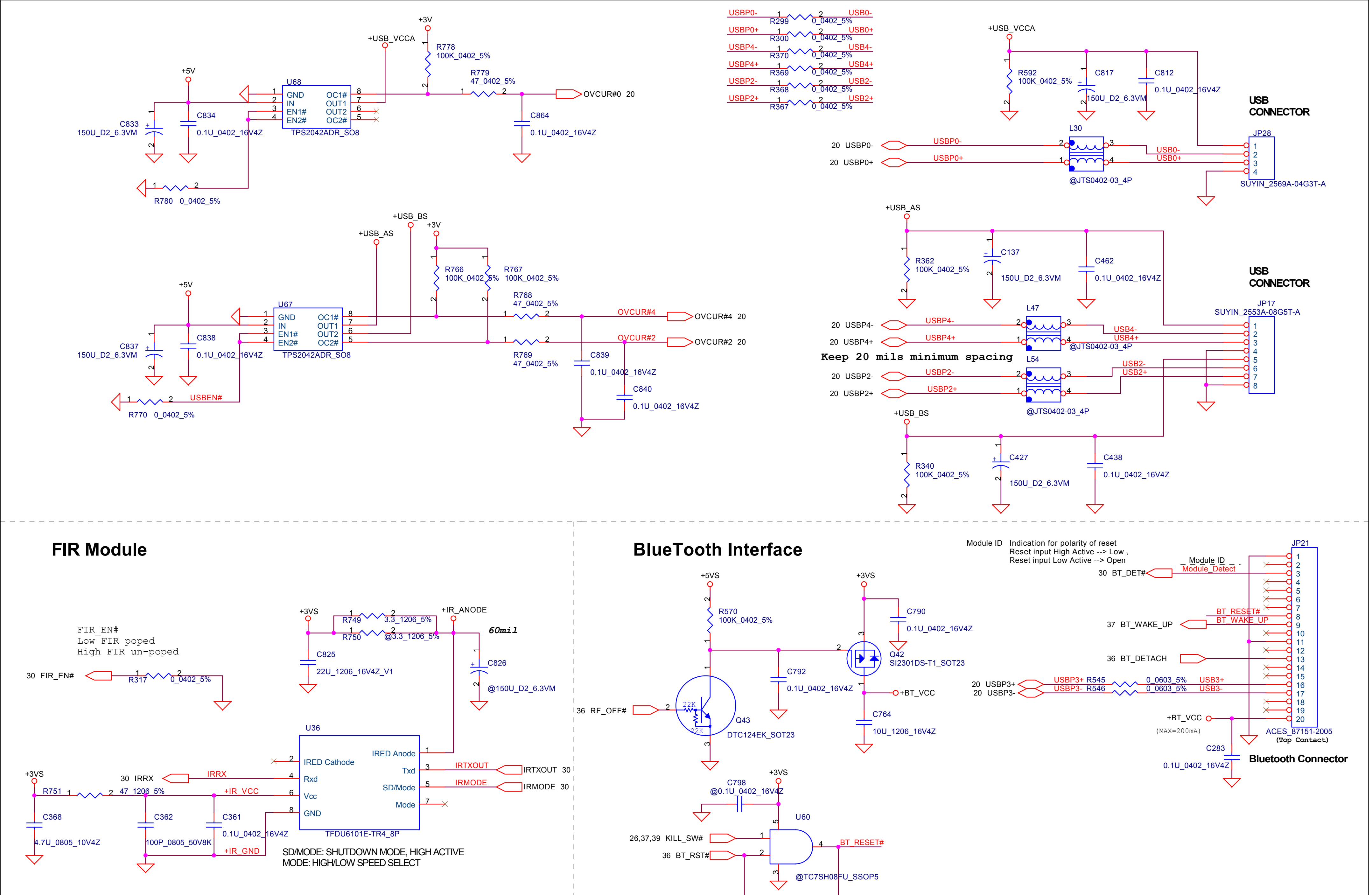
| | | |
|---|---|---|
| Compal Electronics, Inc. | | |
| Title: SUPER I/O | | |
| Size: B | Document Number: LA1541 | Rev: 0.3 |
| Date: 星期二, 十月 29, 2002 | Sheet 30 of 48 | |

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| Compal Electronics, Inc. | | | |
|---|---|---|---|
| Title | USB/Bluetooth/FIR | | |
| Size B | Document Number LA1541 | | Rev 0.3 |
| Date: 星期二, 十月 29, 2002 | | Sheet 31 of 48 | |

# AC97 Codec

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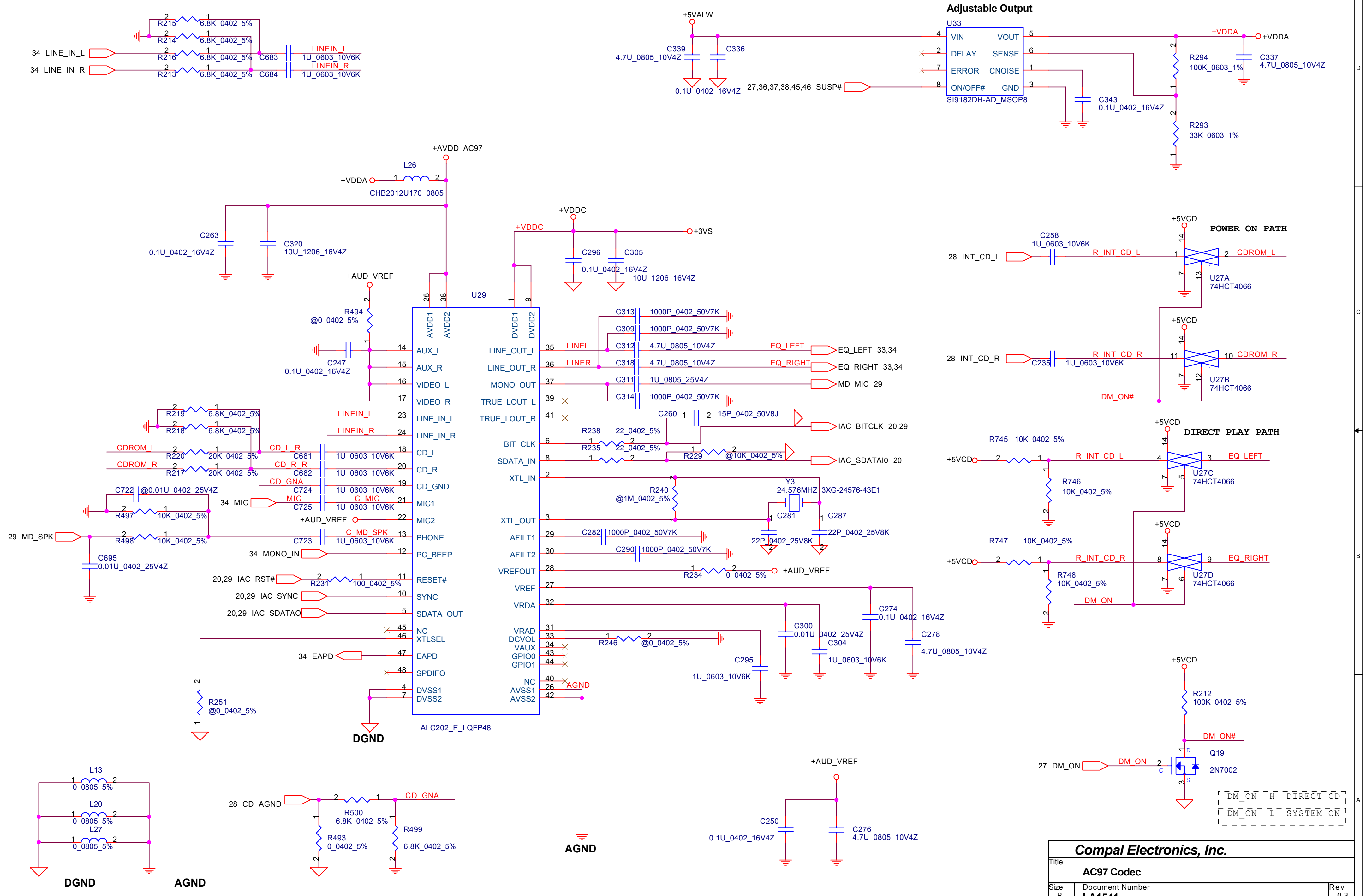
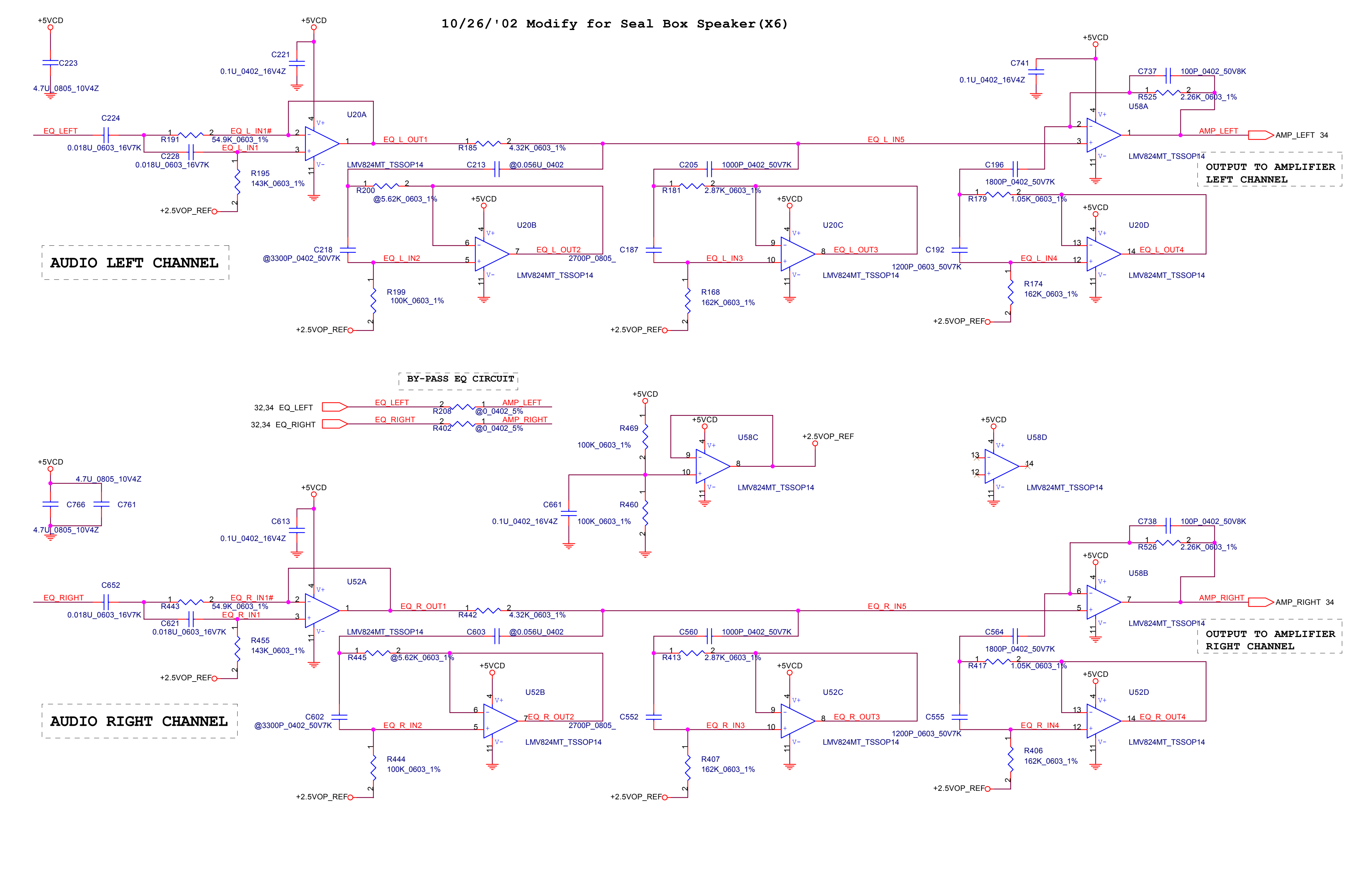



**Compal Electronics, Inc.**

| | |
|---|---|
| Title | AC97 Codec |
| Size | B |
| Document Number | LA1541 |
| Rev | 0.3 |
| Date: | 星期二, 十月 29, 2002 |
| Sheet | 32 of 48 |

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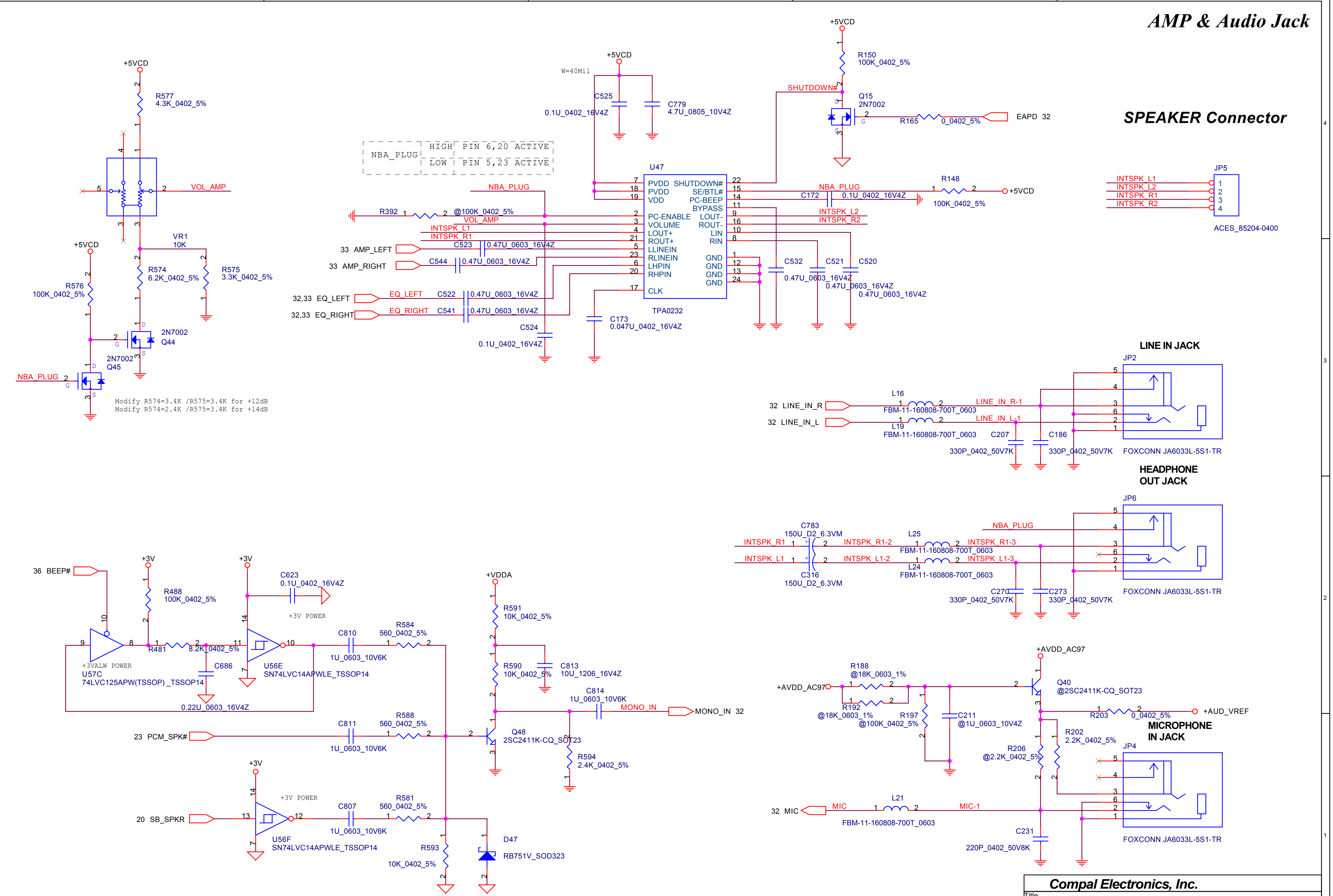
| | |
|---|---|
| Compal Electronics, Inc. | |
| Title | HAREWARE EQ |
| Size B | Document Number LA1541 — Rev 0.3 |
| Date: 星期二, 十月 29, 2002 | Sheet 33 of 48 |





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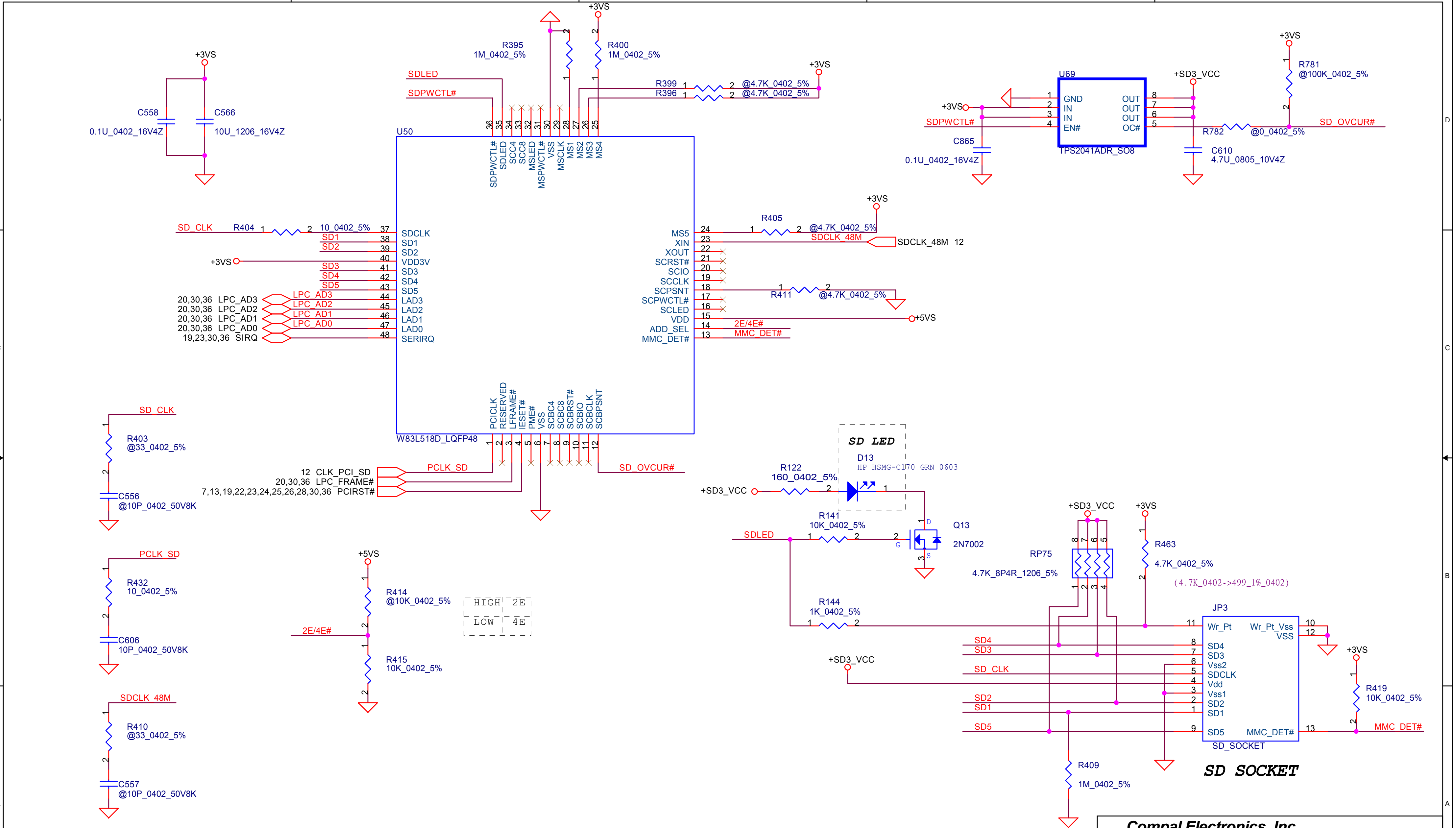
**Compal Electronics, Inc.**

| | | |
|---|---|---|
| Title | AMP & Audio Jack | |
| Size: B | Document Number: LA1541 | Rev: 0.3 |
| Date: 星期二, 十月 29, 2002 | Sheet 34 of 48 | |




Compal Electronics, Inc.

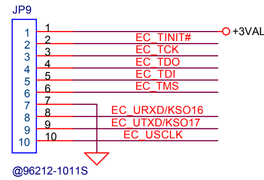
Title

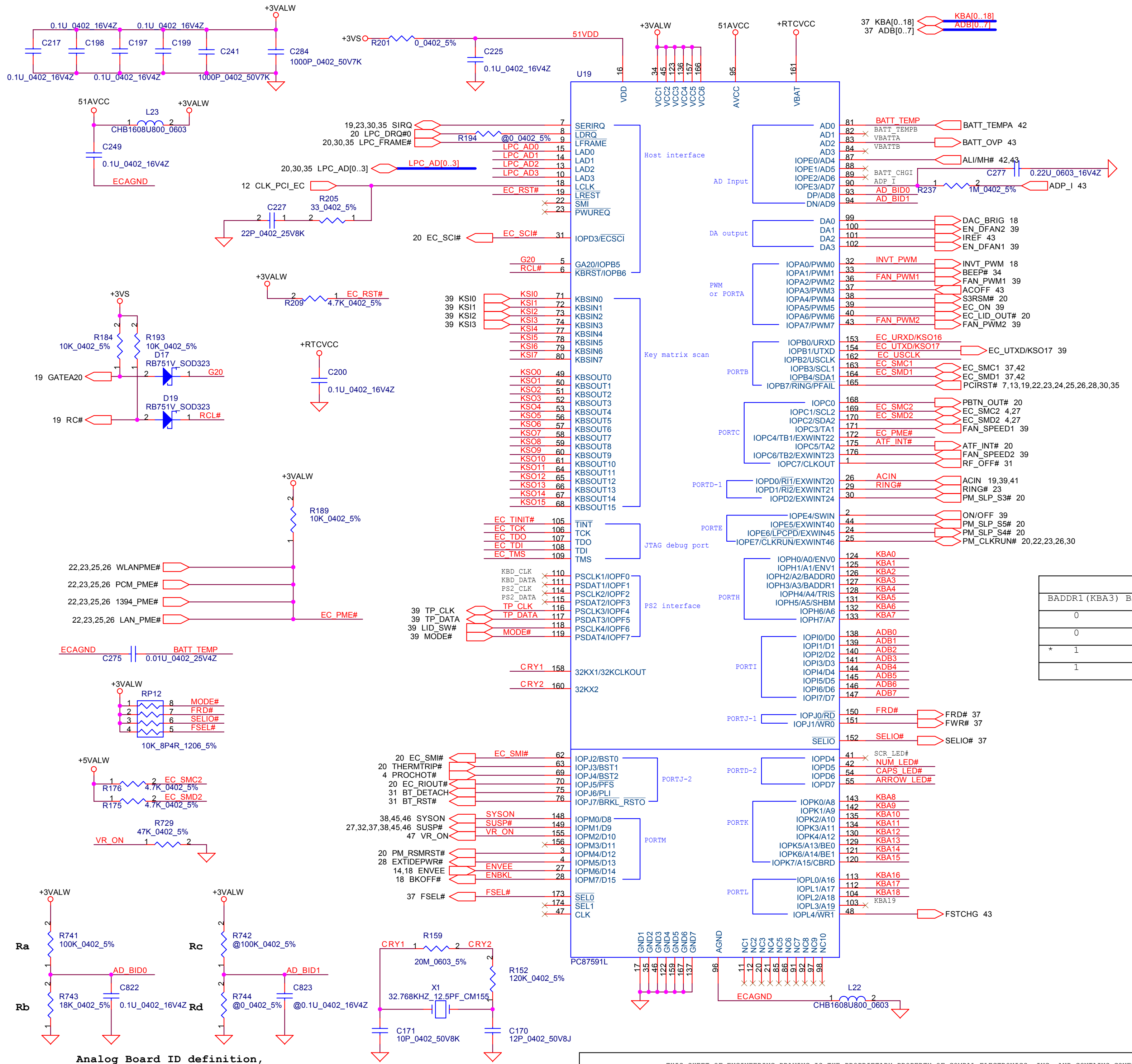
**SD CARD Controller/Socket**

| Size | Document Number | Rev |
|---|---|---|
| B | LA1541 | 0.3 |

Date: 星期二, 十月 29, 2002 Sheet 35 of 48

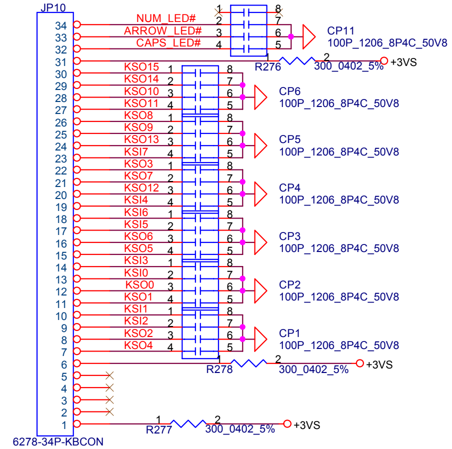
*For EC Tools*




**Analog Board ID definition,**
**Please see page 3.**

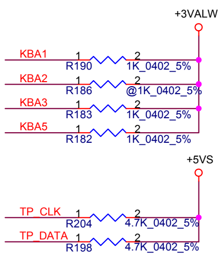
KEYBOARD CONN.




| | | I/O Address | |
|---|---|---|---|
| BADDR1(KBA3) | BADDR0(KBA2) | Index | Data |
| 0 | 0 | 2E | 2F |
| 0 | 1 | 4E | 4F |
| * 1 | 0 | (HCFGBAH, HCFGBAL) | (HCFGBAH, HCFGBAL)+1 |
| 1 | 1 | Reserved | |

| | ENV0 (KBA0) | ENV1 (KBA1) | TRIS (KBA4) |
|---|---|---|---|
| IRE | 0 | 0 | 0 |
| * OBD | 0 | 1 | 0 |
| DEV | 1 | 0 | 0 |
| PROG | 1 | 1 | 0 |

SHBM(KBA5)=1: Enable shared memory with host BIOS
TRIS(KBA4)=1: While in IRE and OBD, float all the signals for clip-on ISE use

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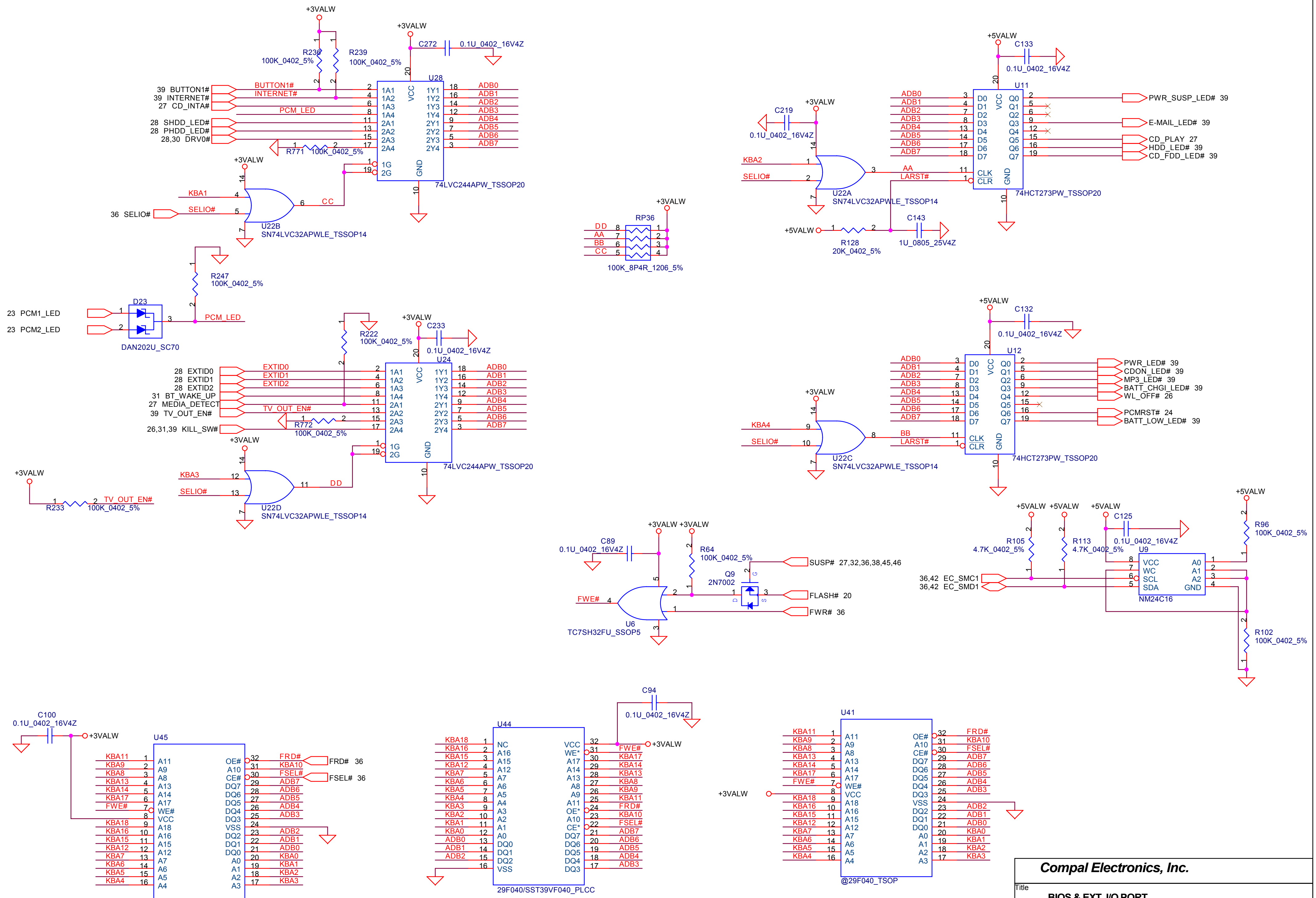
**Compal Electronics, Inc.**

Title: EC PC87591

Size: Custom | Document Number: LA1541 | Rev: 0.3

Date: 星期二, 十月 29, 2002 | 




36 KBA[0..18] KBA[0..18]
36 ADB[0..7] ADB[0..7]

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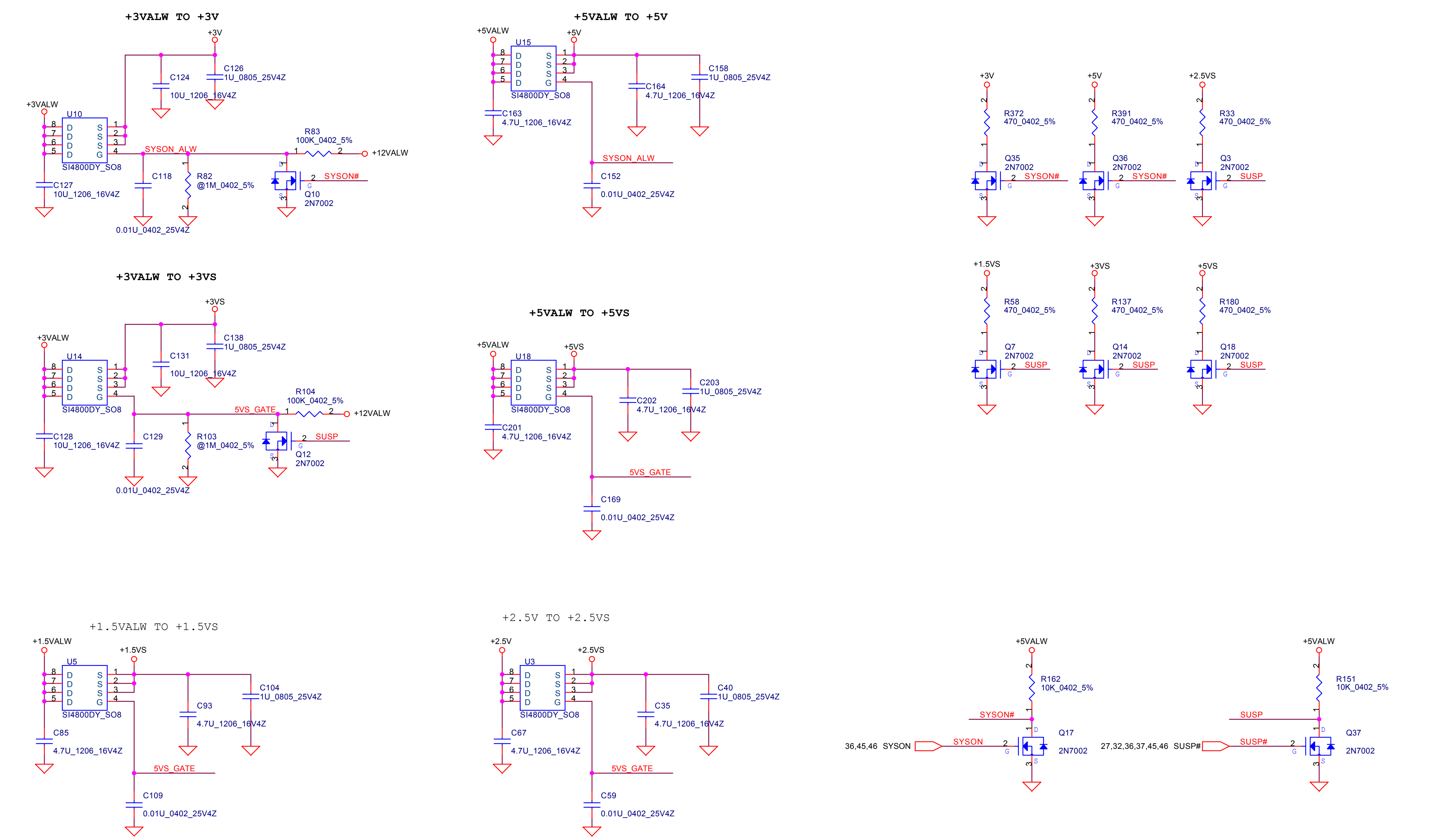
| | |
|---|---|
| **Compal Electronics, Inc.** | |
| Title | BIOS & EXT. I/O PORT |
| Size B | Document Number LA1541 / Rev 0.3 |
| Date: 星期二, 十月 29, 2002 | Sheet 37 of 48 |

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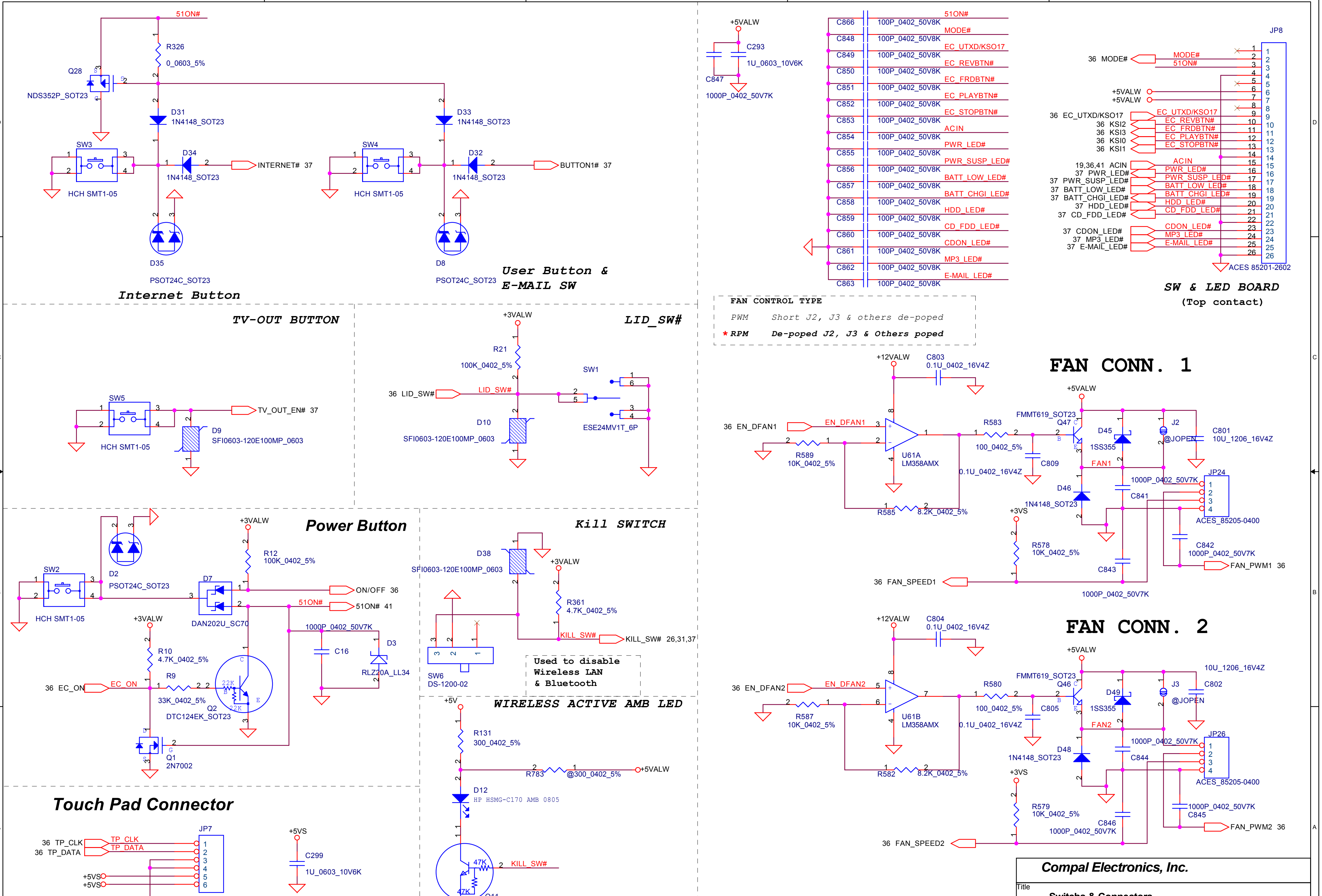
| | | |
|---|---|---|
| **Compal Electronics, Inc.** | | |
| Title: POWER CONTROL CKT | | |
| Size: B | Document Number: LA1541 | Rev: 0.3 |
| Date: 星期二, 十月 29, 2002 | Sheet 38 of 48 | |

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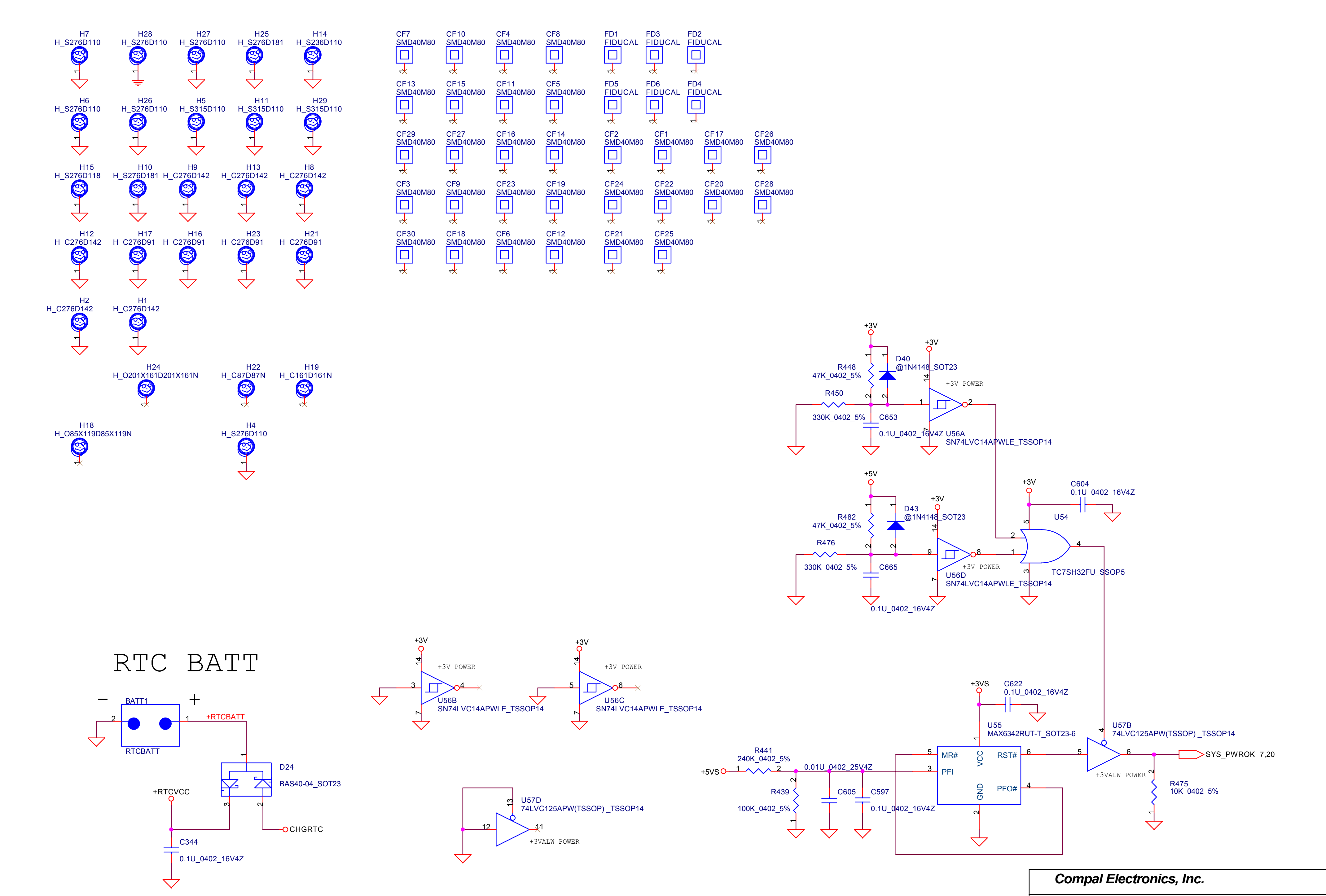
**Compal Electronics, Inc.**

Title: Switchs & Connectors

| Size | Document Number | Rev |
|---|---|---|
| B | LA1541 | 0.3 |

Date: 星期二, 十月 29, 2002 Sheet 39 of 48

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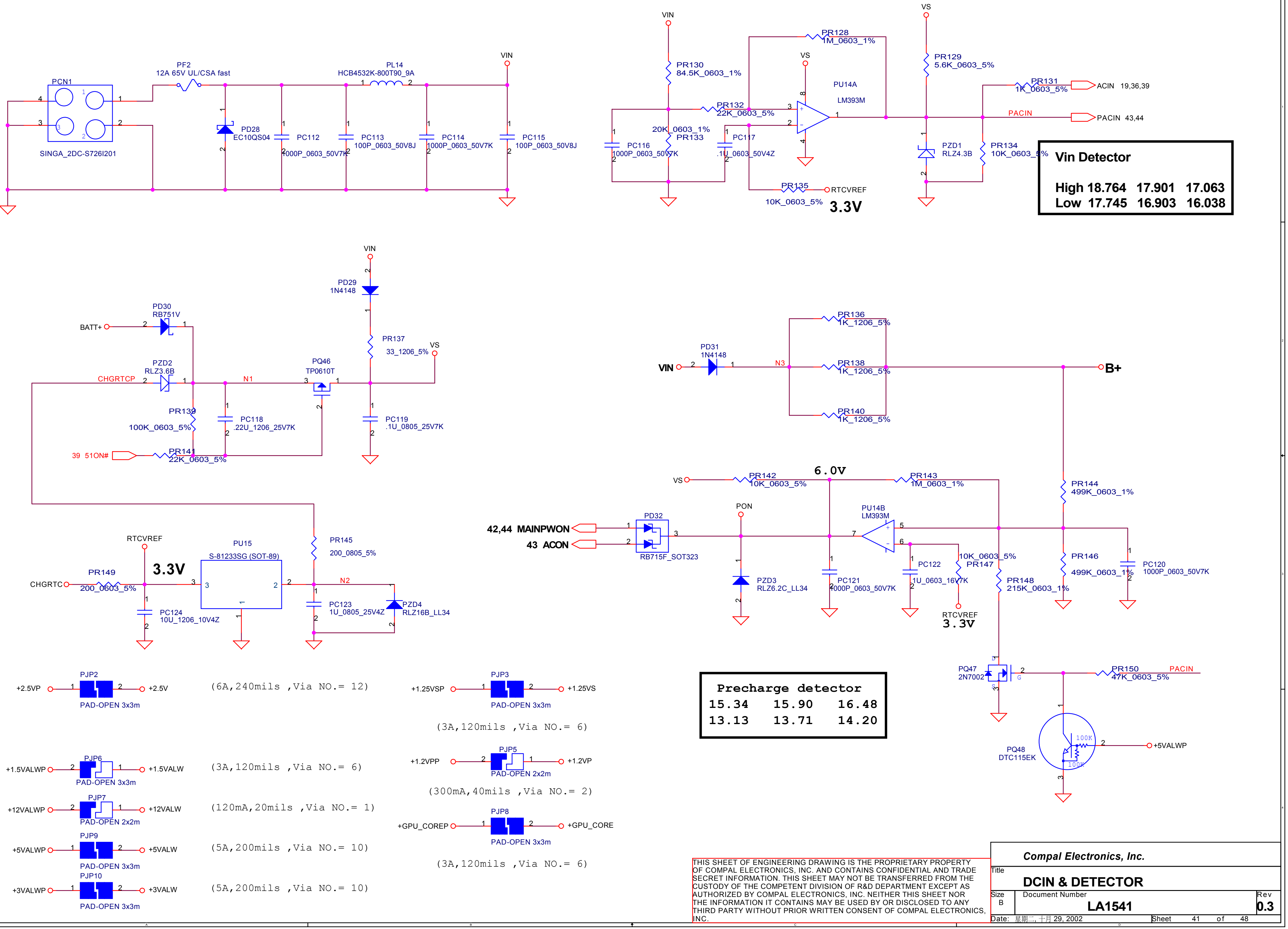
**Compal Electronics, Inc.**

| | | |
|---|---|---|
| Title | RESET | |
| Size B | Document Number LA1541 | Rev 0.3 |
| Date: 星期二, 十月 29, 2002 | Sheet 40 of 48 | |




**Vin Detector**

| | | | |
|---|---|---|---|
| High | 18.764 | 17.901 | 17.063 |
| Low | 17.745 | 16.903 | 16.038 |

**Precharge detector**

| | | |
|---|---|---|
| 15.34 | 15.90 | 16.48 |
| 13.13 | 13.71 | 14.20 |

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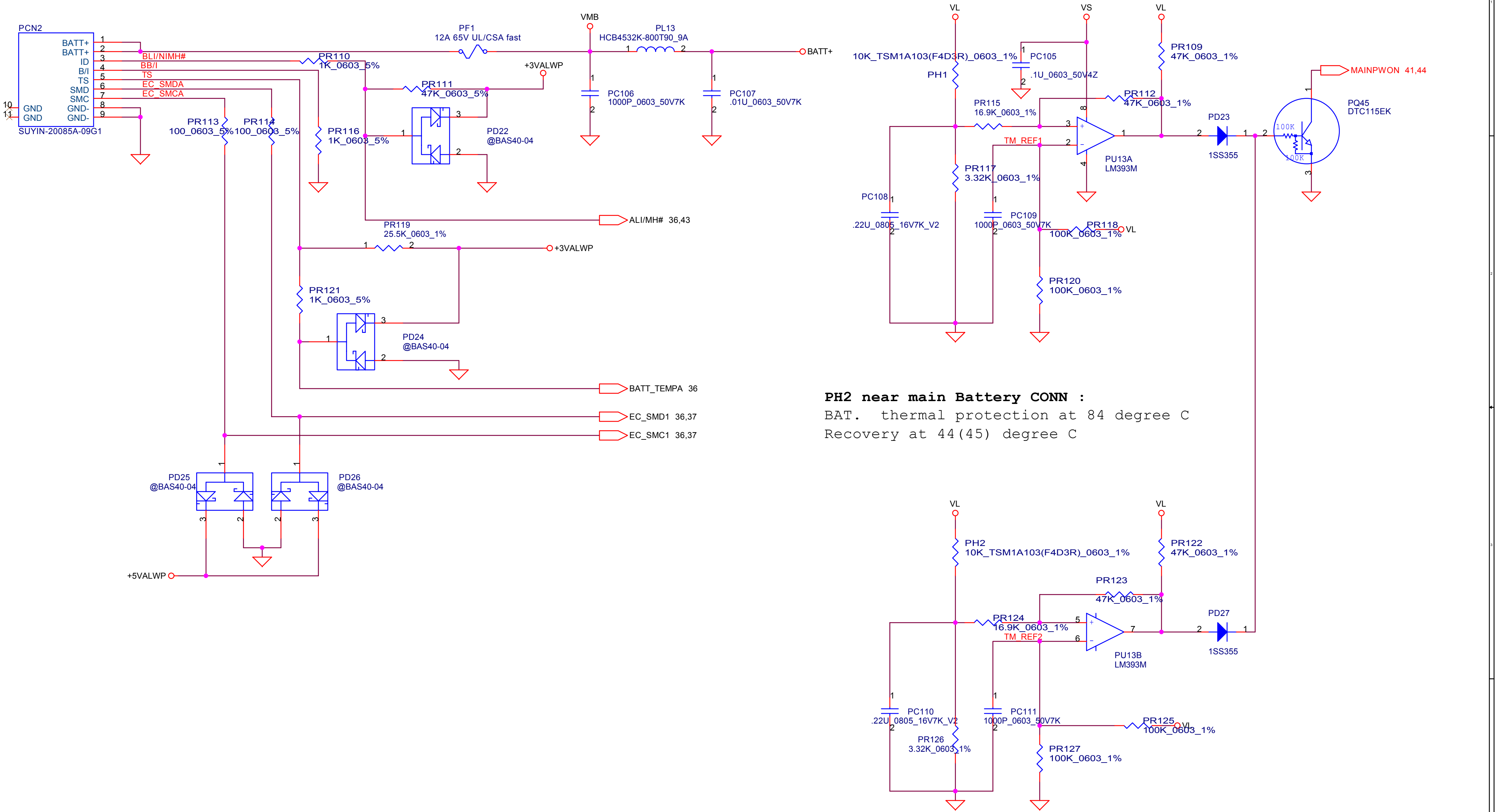
*Compal Electronics, Inc.*

Title: **DCIN & DETECTOR**

Size: B | Document Number: LA1541 | Rev: 0.3

**PH1 under CPU botten side :**
CPU thermal protection at 84 degree C
Recovery at 44(45) degree C

**PH2 near main Battery CONN :**
BAT. thermal protection at 84 degree C
Recovery at 44(45) degree C

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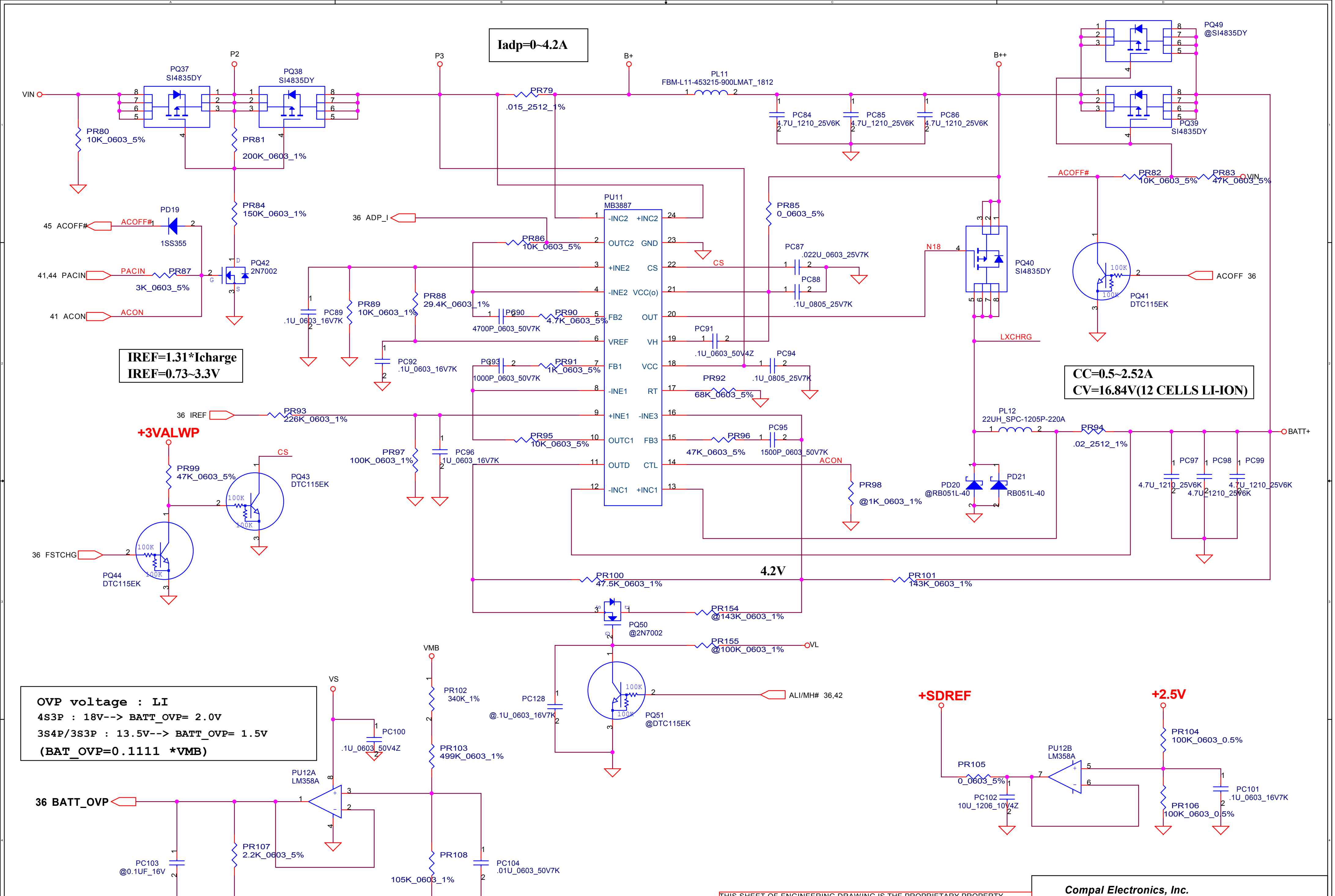
| | | |
|---|---|---|
| *Compal Electronics, Inc.* | | |
| Title: **BATTERY CONN / OTP** | | |
| Size: B | Document Number: **LA1541** | Rev: **0.3** |
| Date: 星期二, 十月 29, 2002 | Sheet 42 of 48 | |

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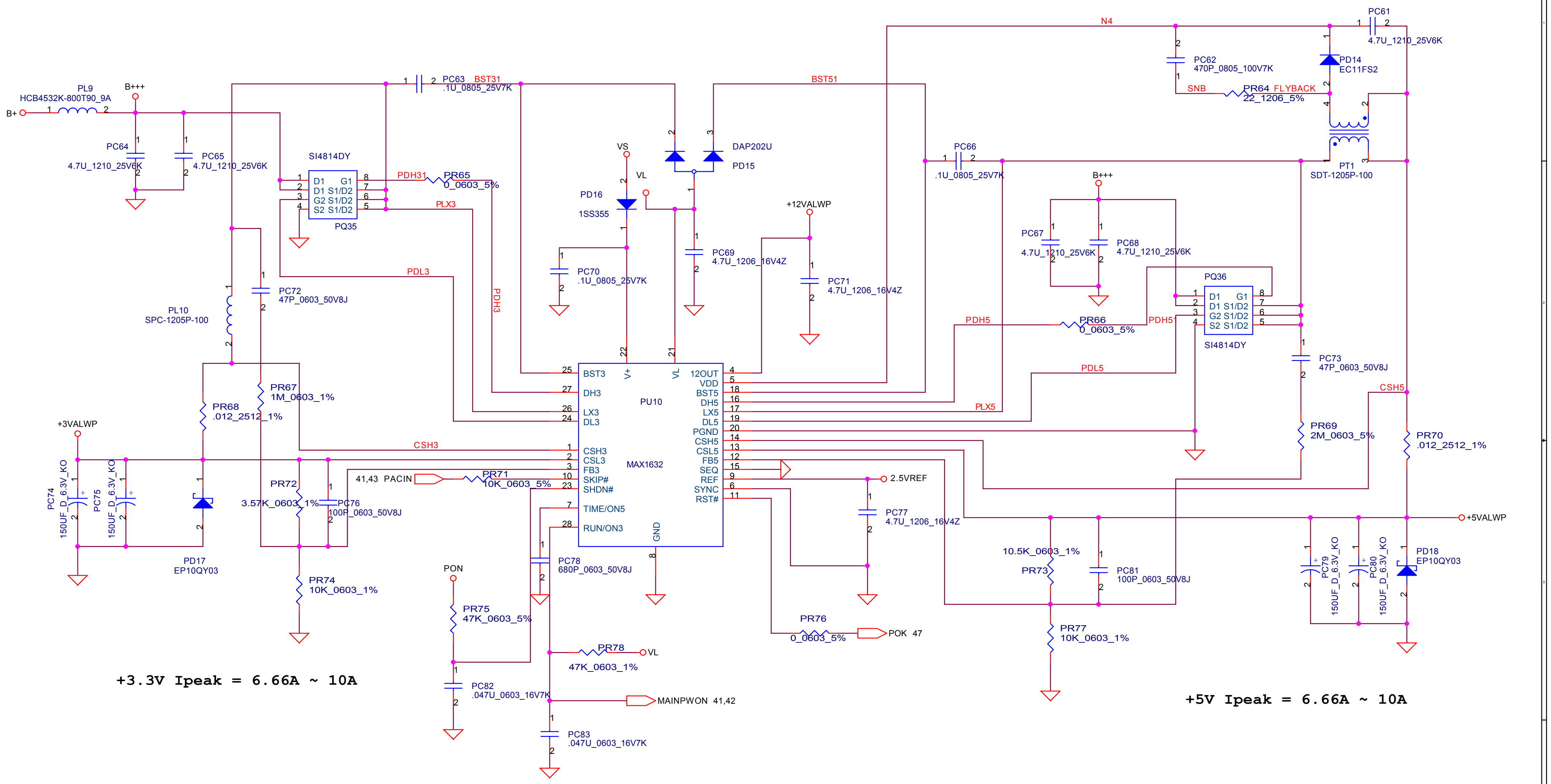
| | | |
|---|---|---|
| Compal Electronics, Inc. | | |
| Title: CHARGER | | |
| Size: B | Document Number: LA1541 | Rev: 0.3 |
| Date: 星期二, 十月 29, 2002 | Sheet 43 of 48 | |

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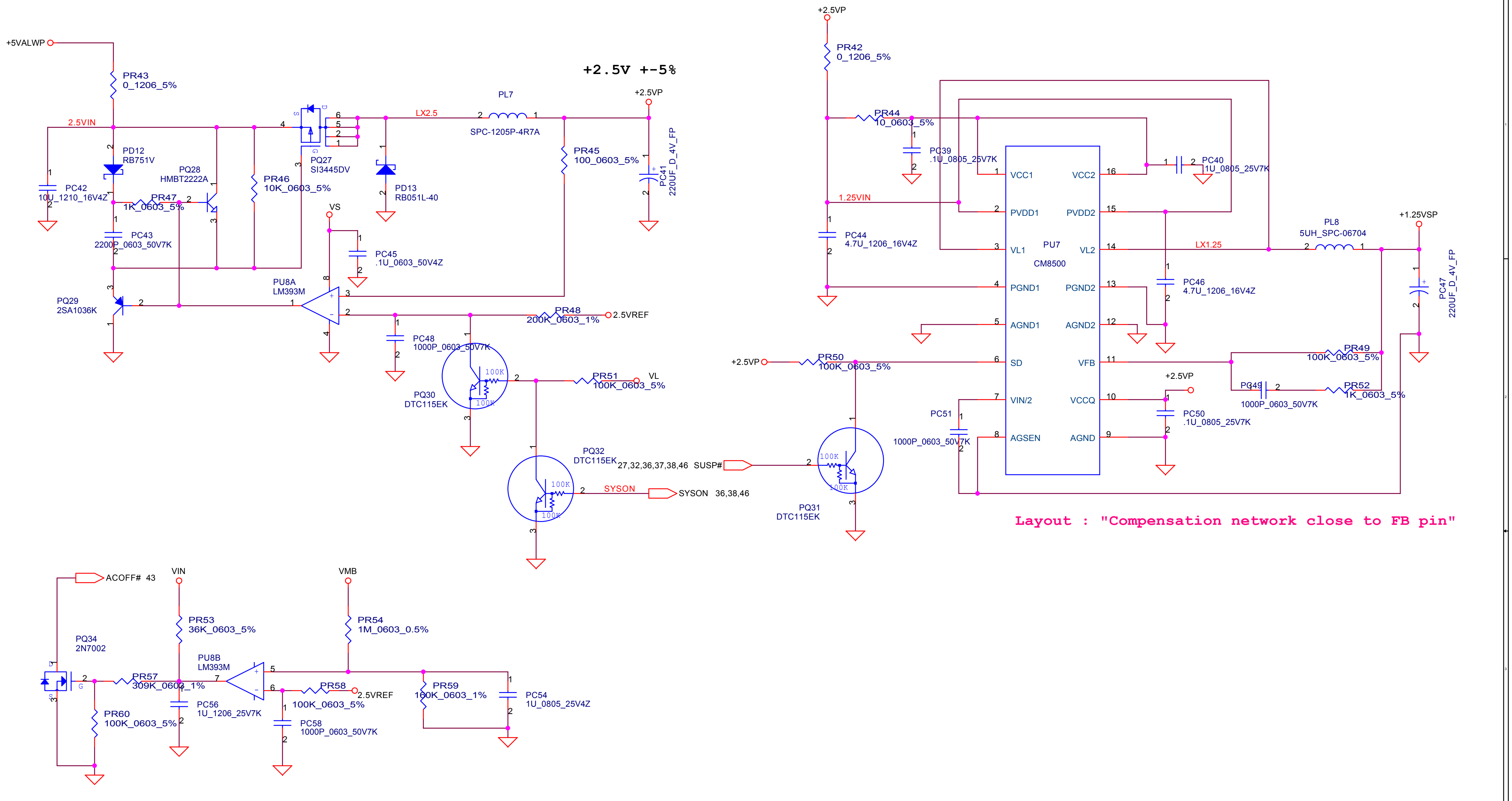
**Compal Electronics, Inc.**

| | | |
|---|---|---|
| Title | 5V/3.3V/12V | |
| Size B | Document Number LA1541 | Rev 0.3 |
| Date: 星期二, 十月 29, 2002 | Sheet 44 of 48 | |

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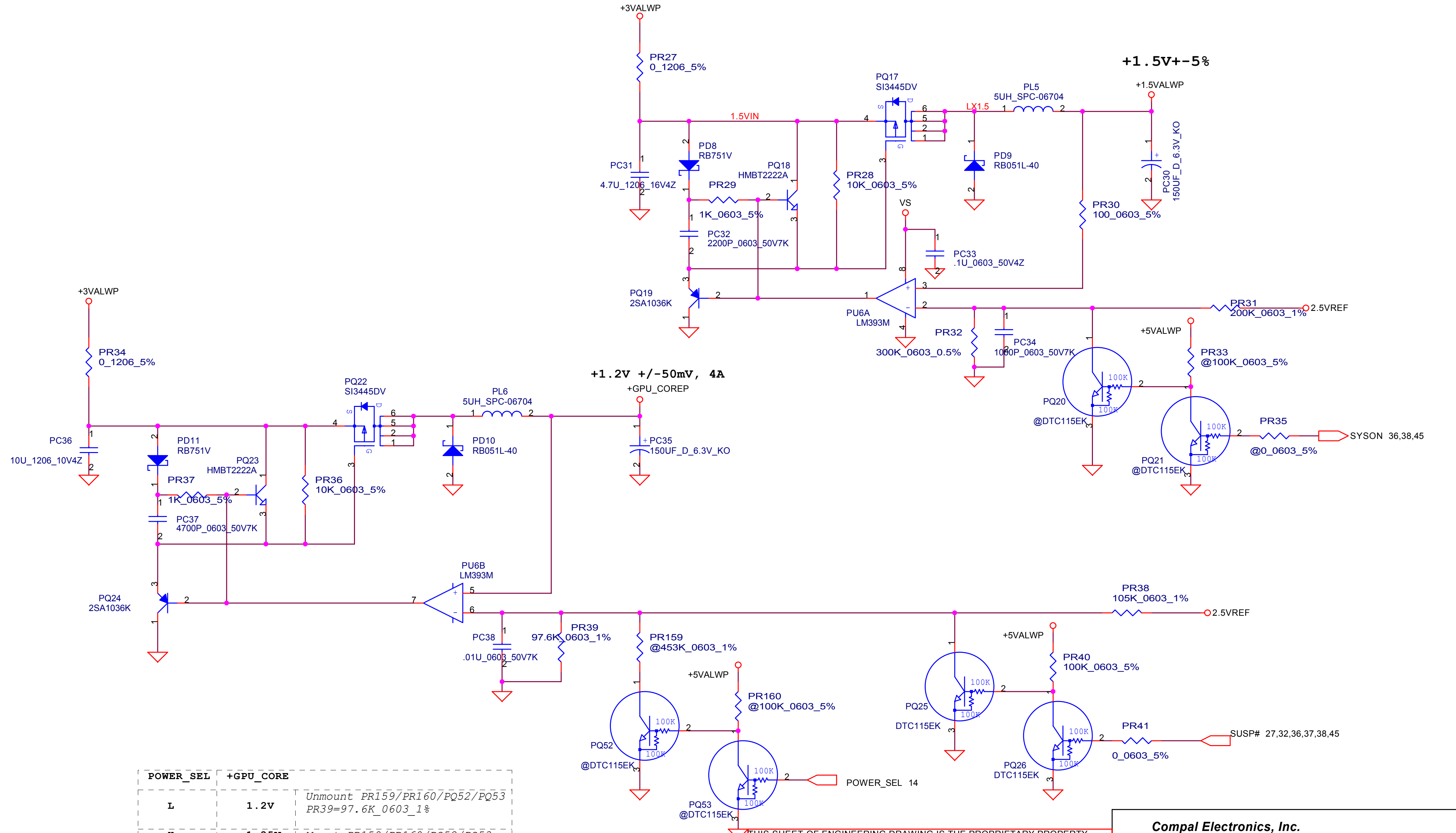
| | | |
|---|---|---|
| Compal Electronics, Inc. | | |
| Title: DDR / 2.5V / 1.25V | | |
| Size: B | Document Number: LA1541 | Rev: 0.3 |
| Date: 星期二, 十月 29, 2002 | Sheet 45 of 48 | |




| POWER_SEL | +GPU_CORE | |
|---|---|---|
| L | 1.2V | Unmount PR159/PR160/PQ52/PQ53<br>PR39=97.6K_0603_1% |
| H | 1.35V | Mount PR159/PR160/PQ52/PQ53<br>PR39=124K_0603_1% |

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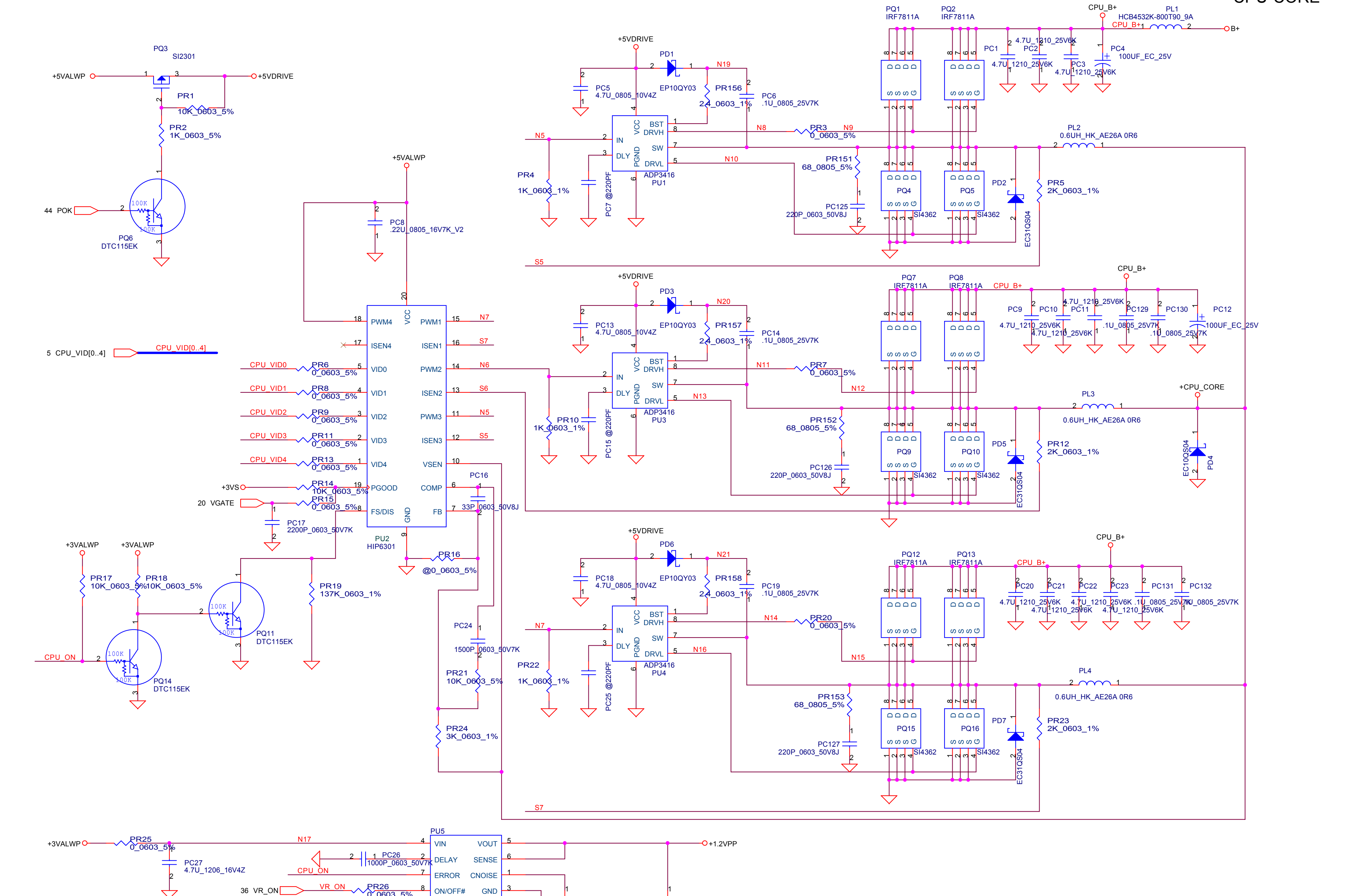
**Compal Electronics, Inc.**

Title: VGA_CORE / 1.5V

Size: B | Document Number: LA1541 | Rev: 0.3

Date: 星期□G, 十月 29, 2002 | Sheet 46 of 48

# CPU-CORE

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| | | |
|---|---|---|
| **Compal Electronics, Inc.** | | |
| Title | +VCC_H_CORE | |
| Size B | Document Number LA1541 | Rev 0.3 |
| Date: 星期二, 十月 29, 2002 | Sheet 47 of 48 | |

# BTS88 PIR LIST

## HW PIR LIST

10/29 Modified R577 to 4.3K_0402_5%
R575 to 3.3K_0402_5%
R574 to 6.2K_0402_5% for +10dB audio gain

10/29 Modified ESD diode symbol

## PWR PIR LIST

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Compal Electronics, Inc.
Title: BTS88 PIR LIST
Size: Custom Document Number: LA1541 Rev: 0.3
Date: 星期二, 十月 29, 2002