

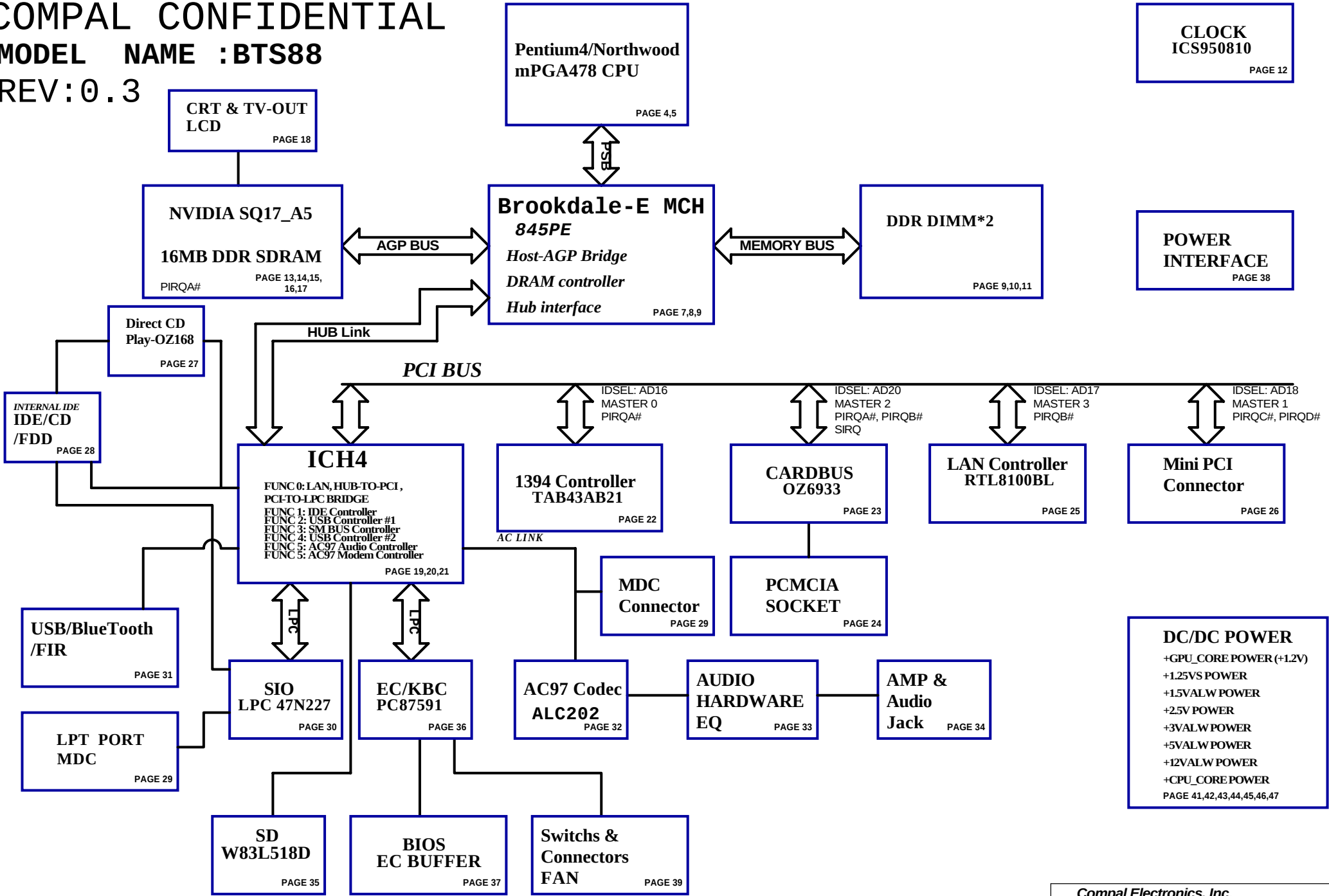
# ***BTS88 LA-1541 REV0.3 Schematics Document***

**Intel Pentium 4 Processor in the 478-pin Package  
with 845PE / ICH4 / NVIDIA SQ17 chipset**

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

|                                 |                                  |               |            |
|---------------------------------|----------------------------------|---------------|------------|
| <b>Compal Electronics, Ltd.</b> |                                  |               |            |
| Title                           |                                  |               |            |
| <b>BTS88 Cover Sheet</b>        |                                  |               |            |
| Size<br>B                       | Document Number<br><b>LA1541</b> |               | Rev<br>0.3 |
| Date:                           | 星期二, 十月 29, 2002                 | Sheet 1 of 48 |            |

COMPAL CONFIDENTIAL  
MODEL NAME :BTS88  
REV:0.3



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| Title                    |                  |       |         |
| BTS88 BLOCK DIAGRAM      |                  |       |         |
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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     | Device        | Address     |
|------------------|-------------|---------------|-------------|
| Smart Battery    | 0001 011X b | MAX1617MEE    | 1001 110X b |
| EEPROM(24C16/02) | 1010 000X b | OZ168         | 0011 0100 b |
| (24C04)          | 1011 000Xb  | Smart Battery | 0001 011X b |
|                  |             | Docking       | 0011 011X b |
|                  |             | DOT Board     | XXXX XXXXb  |

ICH4 SM Bus address

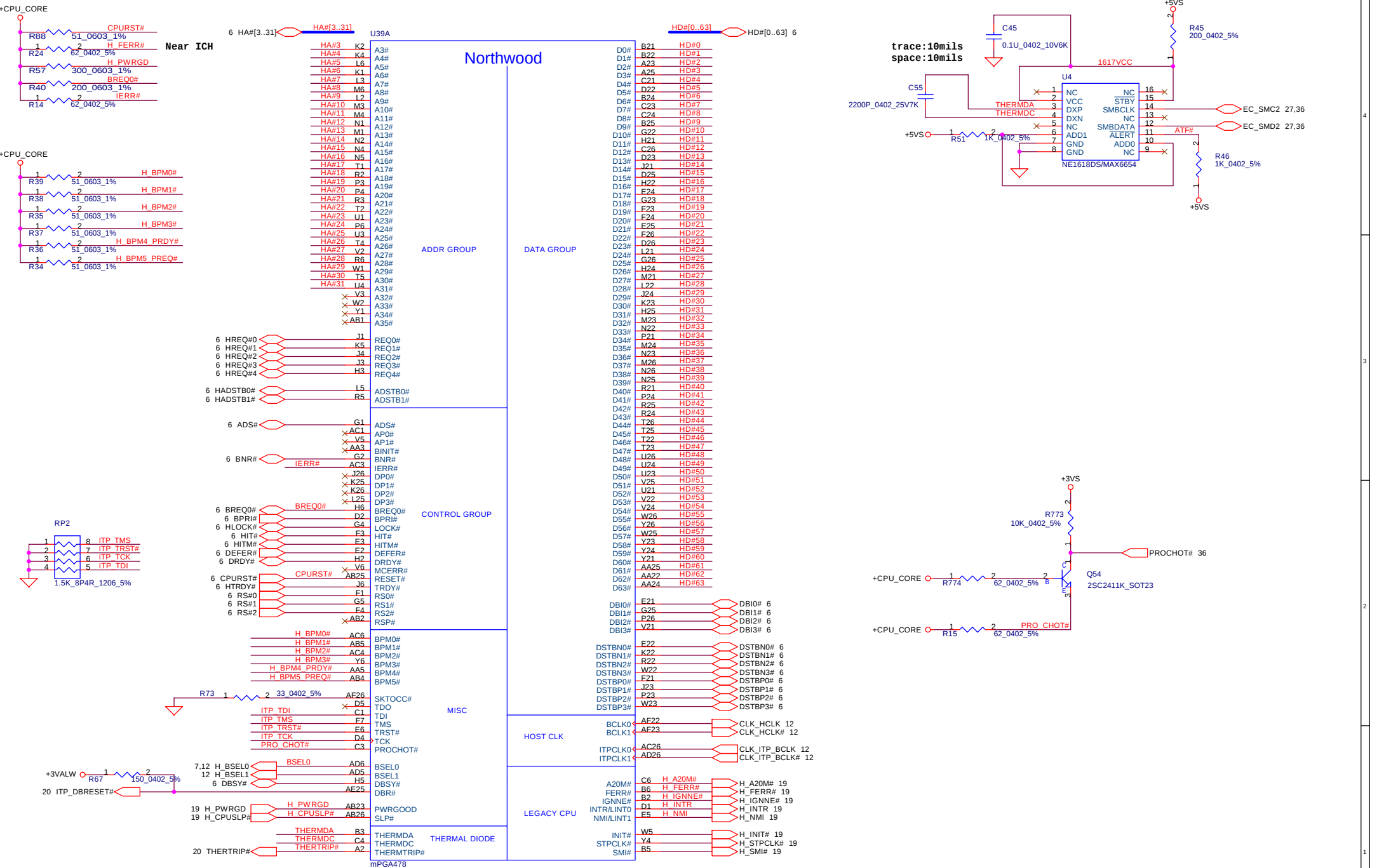
| Device                       | Address    |
|------------------------------|------------|
| Clock Generator ( ICS950810) | 1101 001Xb |
| DDR DIMM0                    | 1001 000Xb |
| DDR DIMM1                    | 1001 001Xb |

| 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          | VAD_BID min | VAD_BID typ | VAD_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

Size B

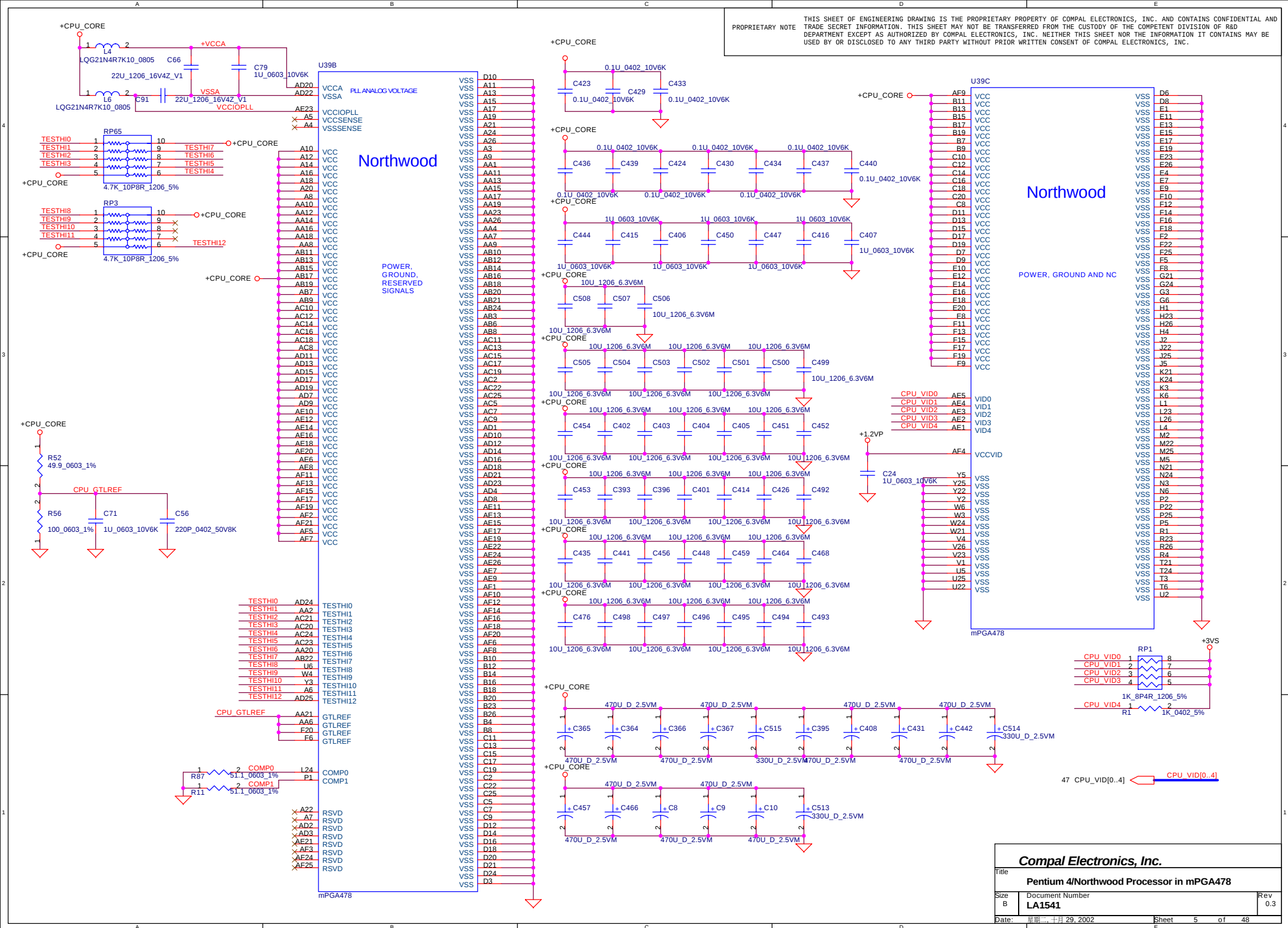
Document Number

LA1541

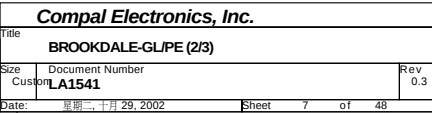
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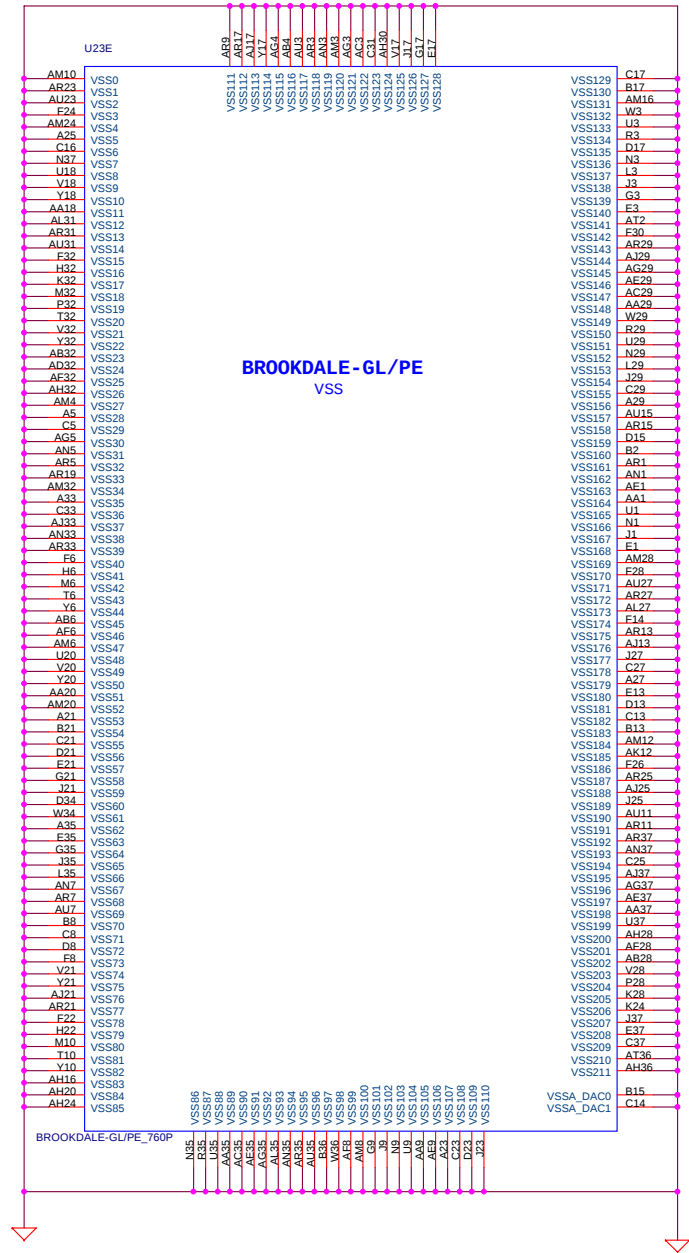
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Rev 0.3

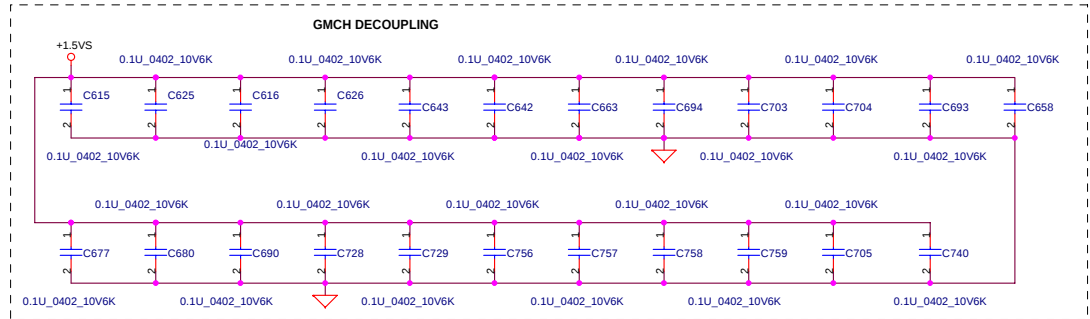
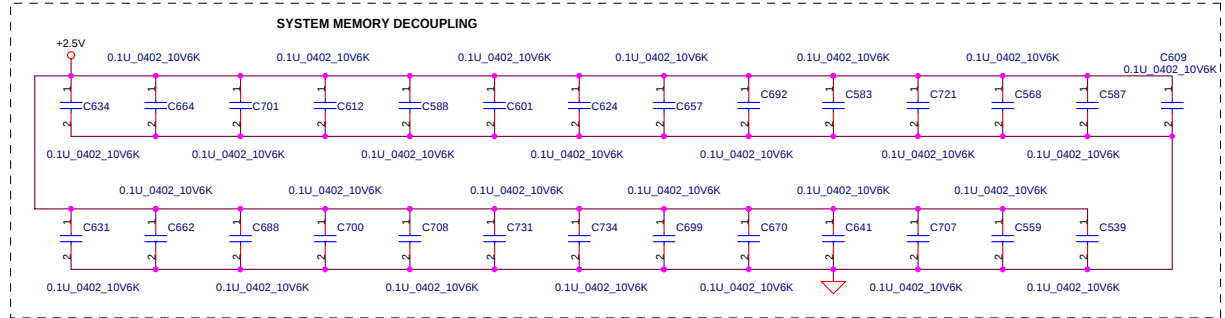
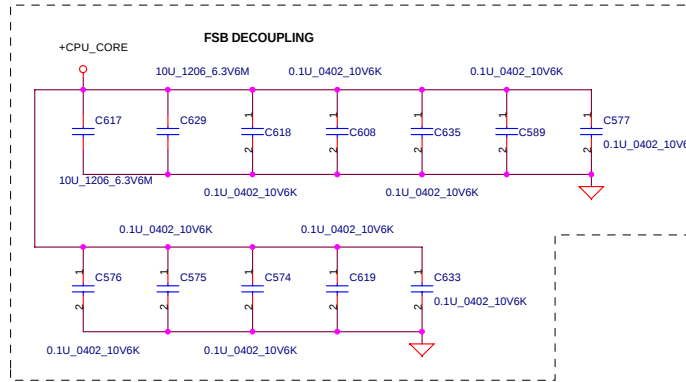
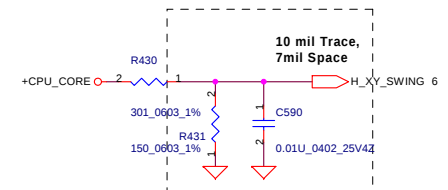
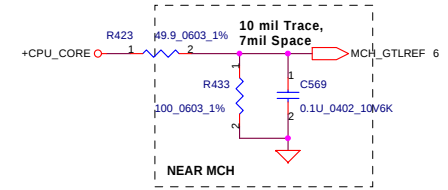
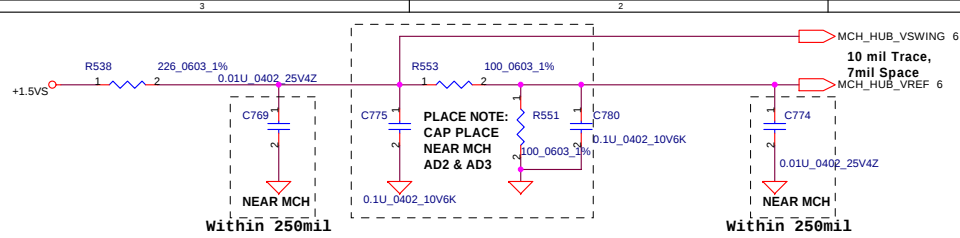








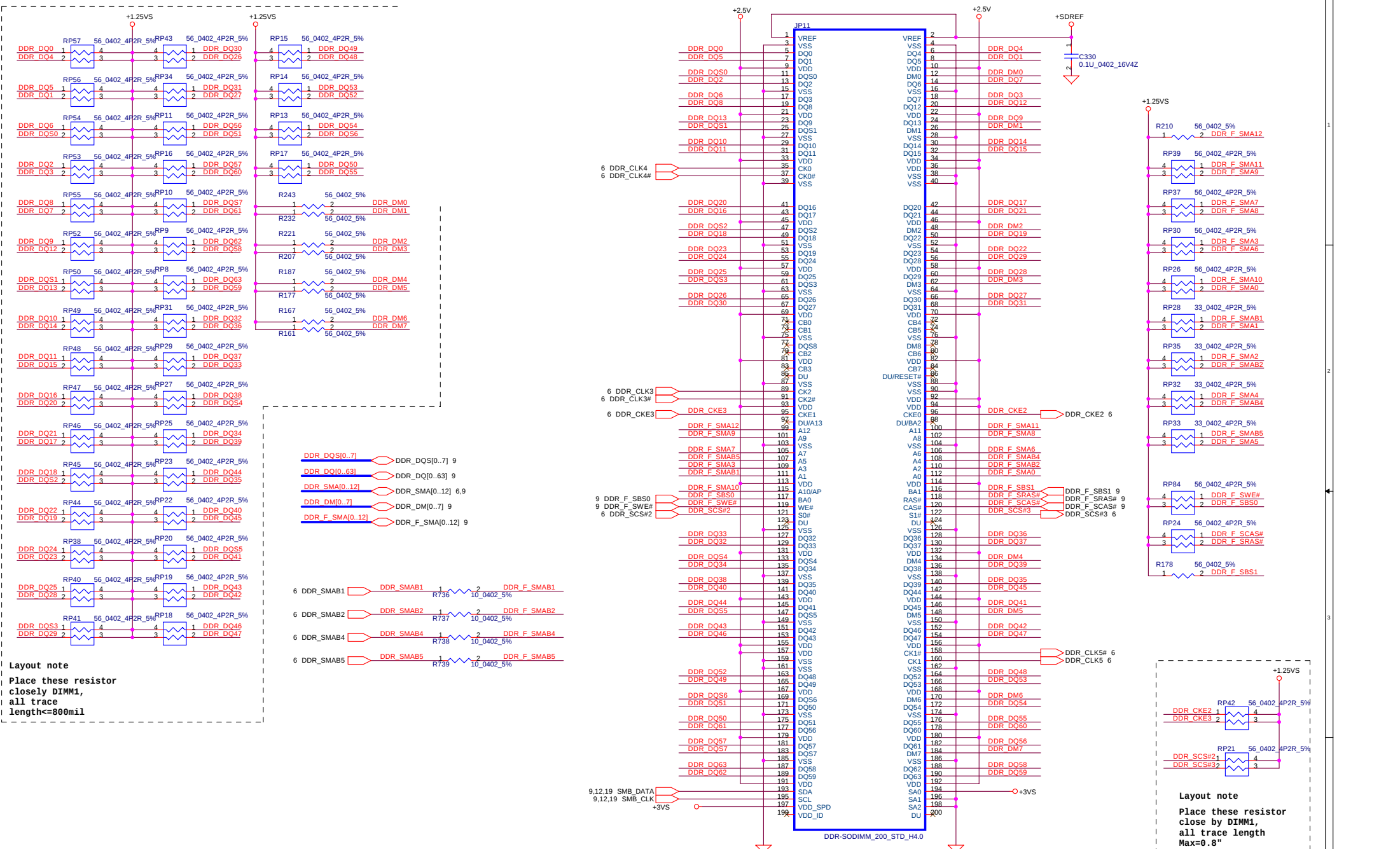
BROOKDALE-GL/PE  
VSS



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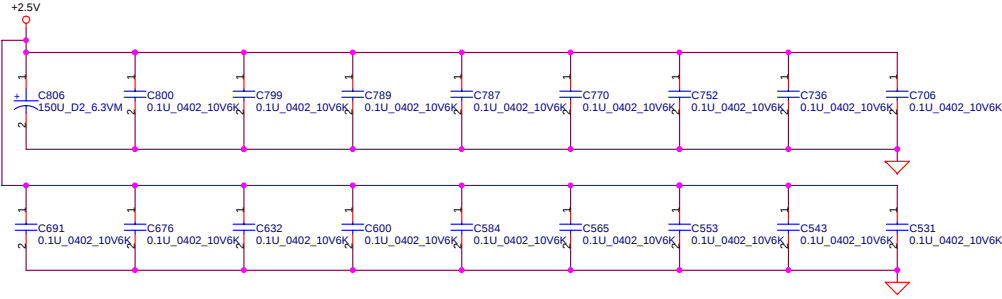


Bottom-2  
DIMM1

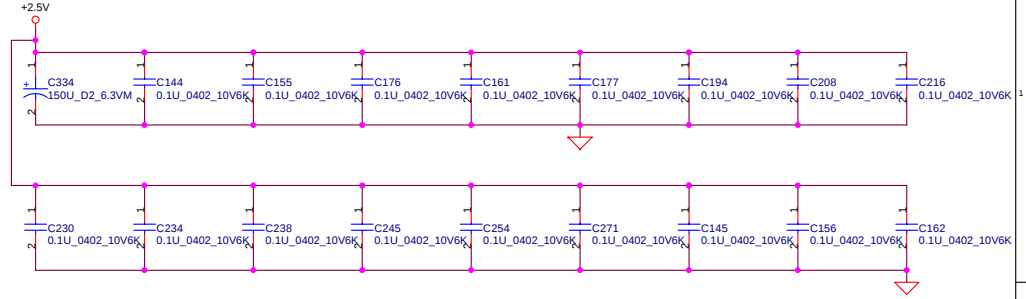
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|--------------------------|------------------|-------|----------|
| Title                    |                  |       |          |
| DDR-SODIMM SLOT1         |                  |       |          |
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Layout note :  
Distribute as close as possible  
to DDR-SODIMM0.



Layout note :  
Distribute as close as possible  
to DDR-SODIMM1.



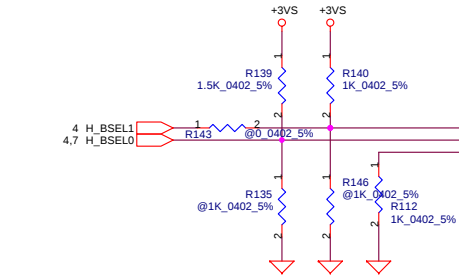
Layout note :  
Place one cap close to every 2 pull up resistors termination to  
+1.25VS



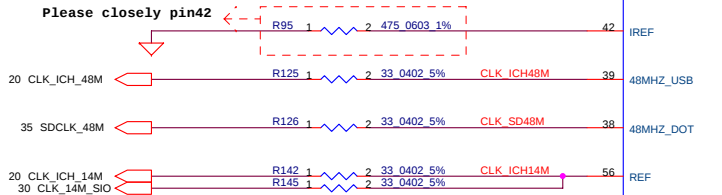
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|--------------------------|------------------|----------------|
| Title                    |                  |                |
| DDR SODIMM Decoupling    |                  |                |
| Size                     | Document Number  | Rev            |
| B                        | LA1541           | 0.3            |
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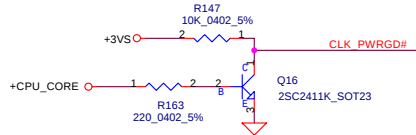
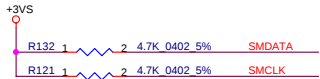
| SEL2 | SEL1 | SEL0 | Function        |
|------|------|------|-----------------|
| 0    | 0    | 1    | 100MHz Host CLK |
| 0    | 1    | 0    | 200MHz Host CLK |
| 0    | 1    | 1    | 133MHz Host CLK |



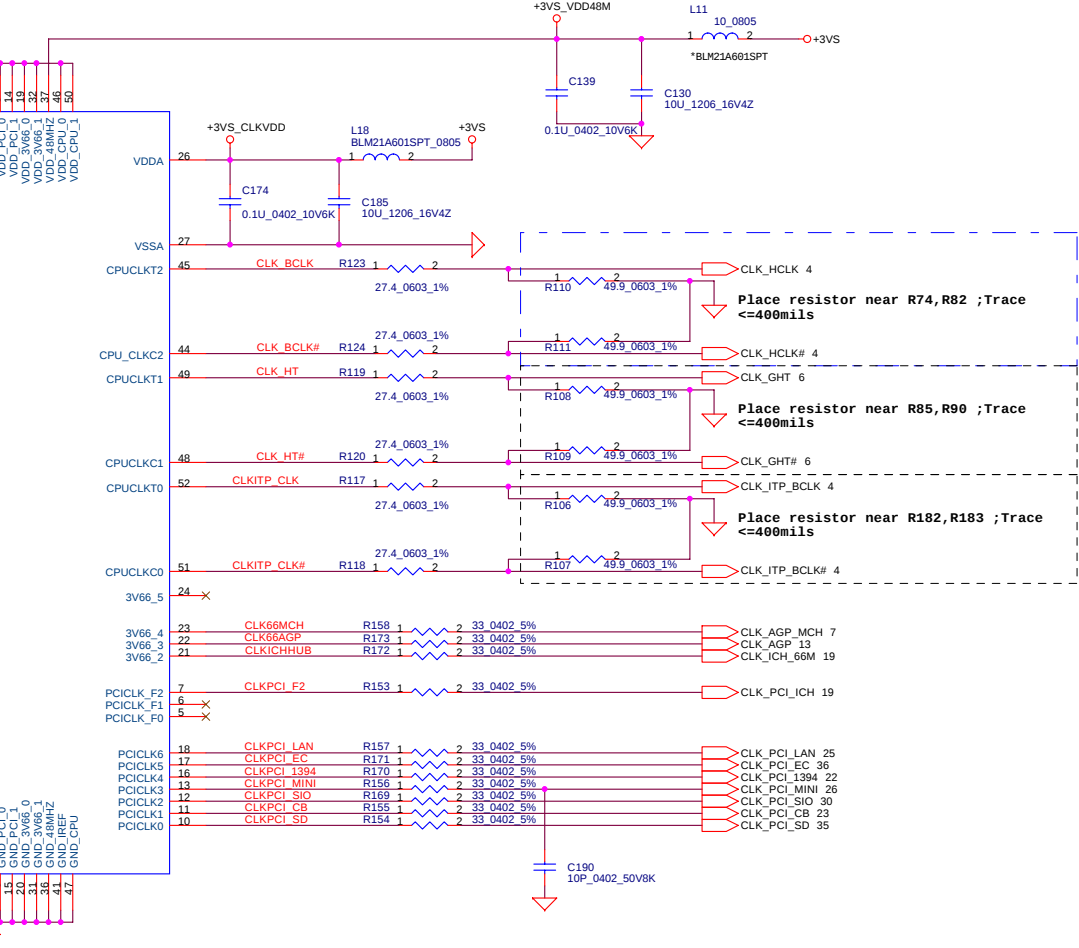
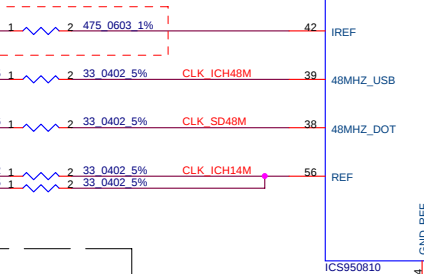
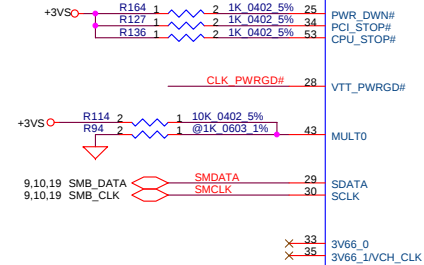
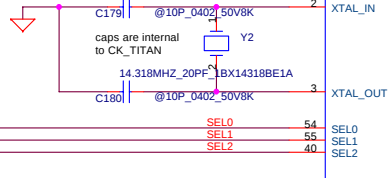
| MULT0 | Reference R, Iref= VDD/(3*Rr) | Output Current |
|-------|-------------------------------|----------------|
| 0     | Rr = 221 1%, Iref = 5.00mA    | Ioh = 4 * Iref |
| 1     | Rr = 475 1%, Iref = 2.32mA    | Ioh = 6 * Iref |



Note:  
CPU\_CLK[2:0] needs to be running in C3, C4.



Place Crystal within 500 mils of CK\_Titan



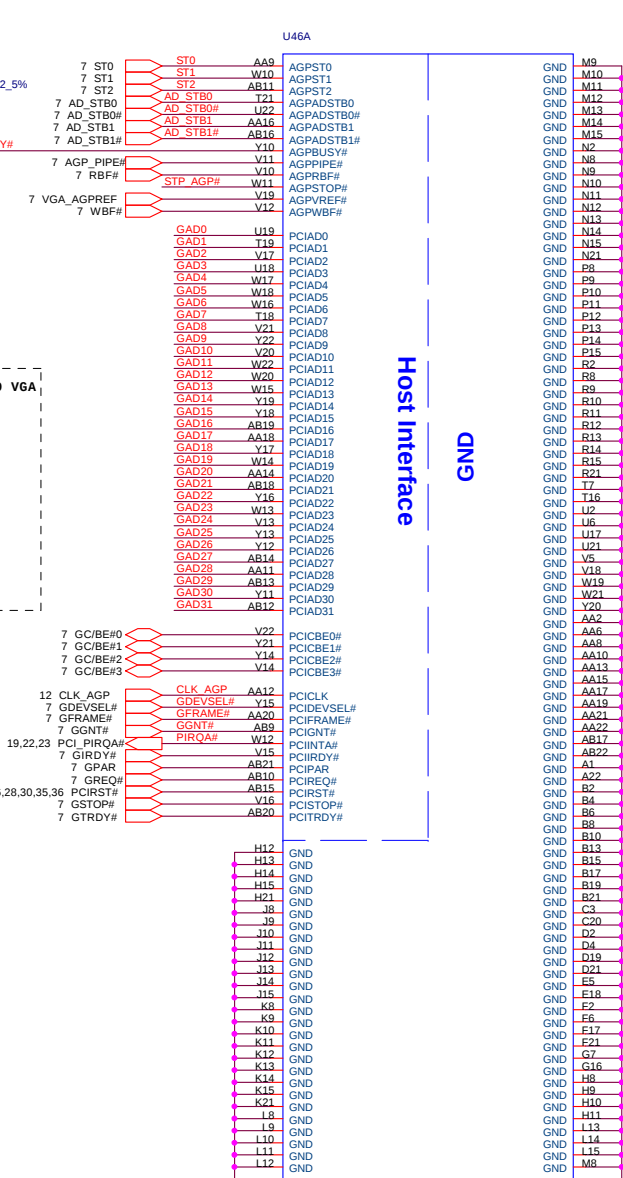
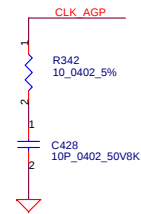
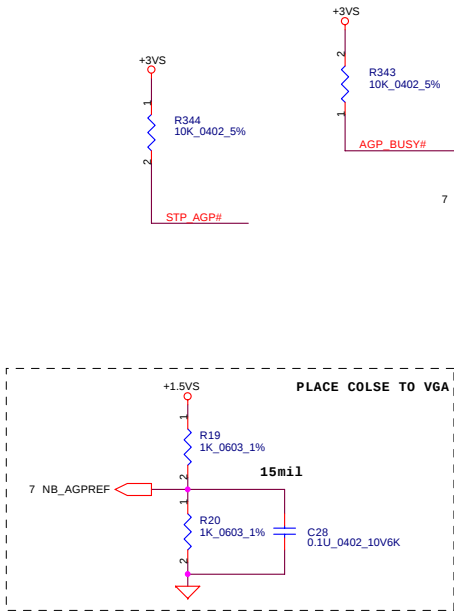
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Clock Generator

| Size  | Document Number  | Rev            |
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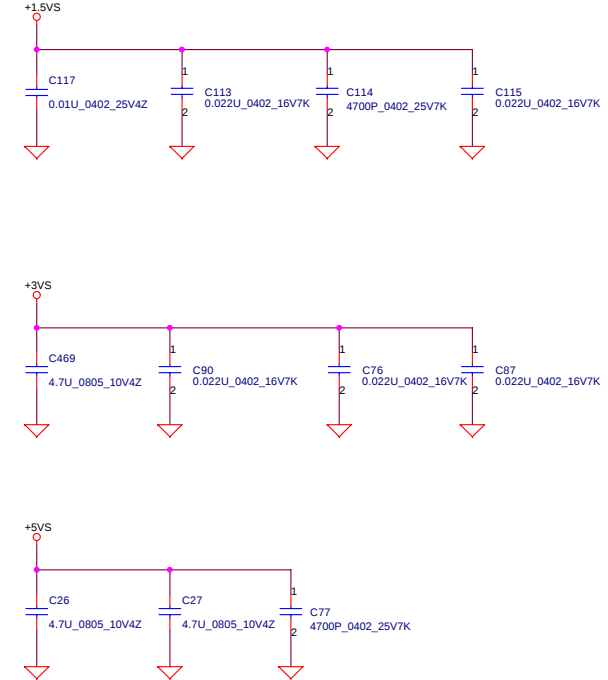
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7 GAD[0..31]  GAD[0..31]



Host Interface

GND

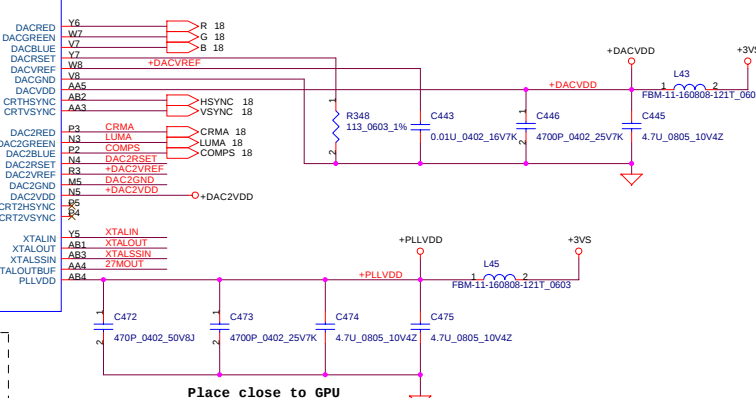
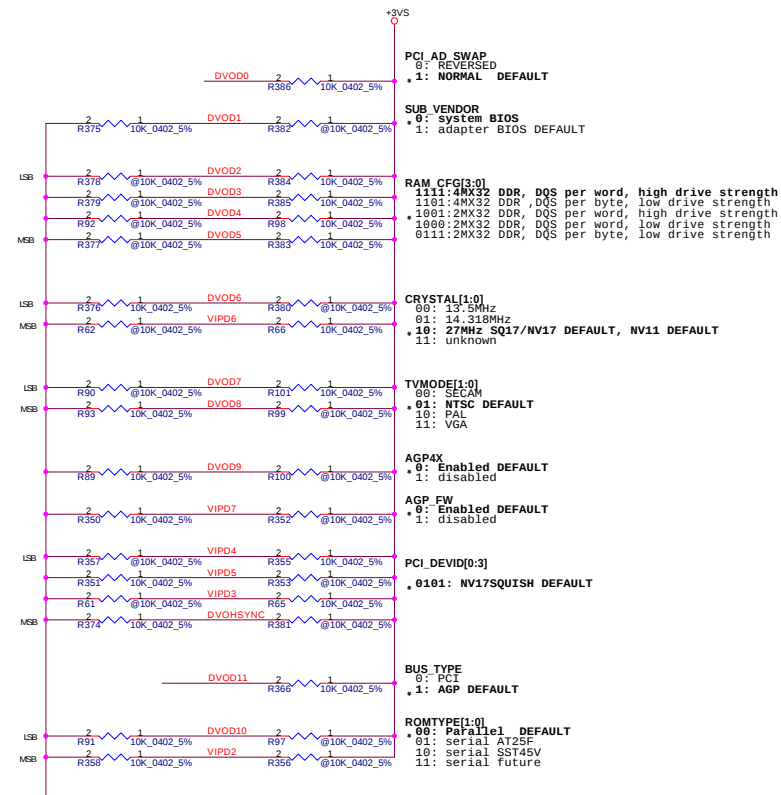
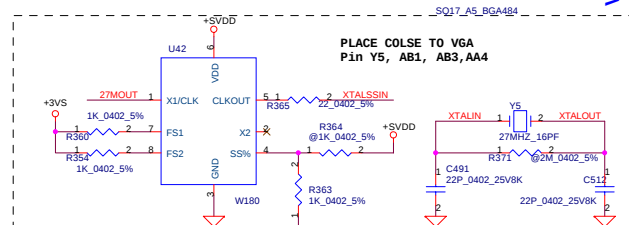
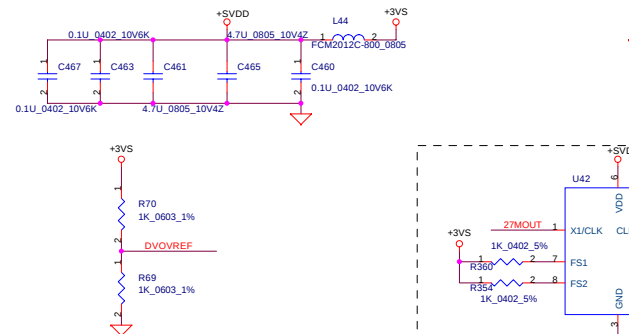
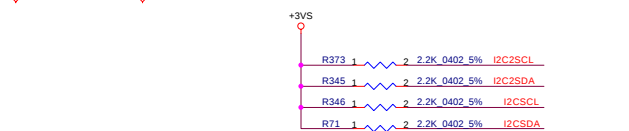
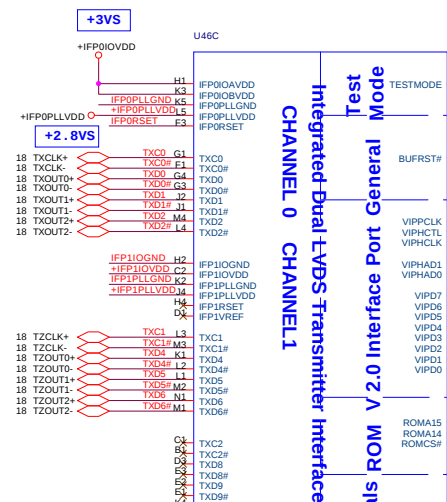
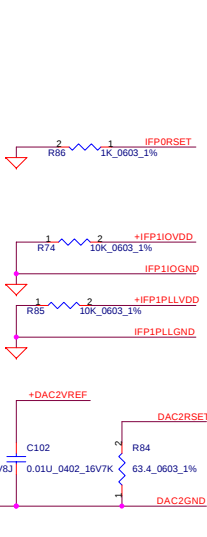
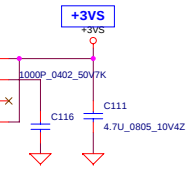
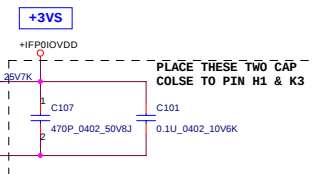


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|        |                  |       |              |
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|  |  |
|--|--|
|  |  |
|--|--|

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

**Compal Electronics, Inc.**

|       |                      |
|-------|----------------------|
| Title | SQ17-TVOUT/PANEL/CRT |
|-------|----------------------|

| Size | Document Number |
|------|-----------------|
|------|-----------------|

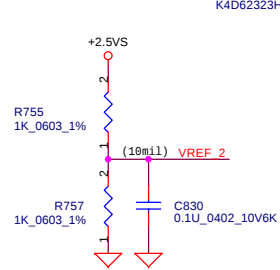
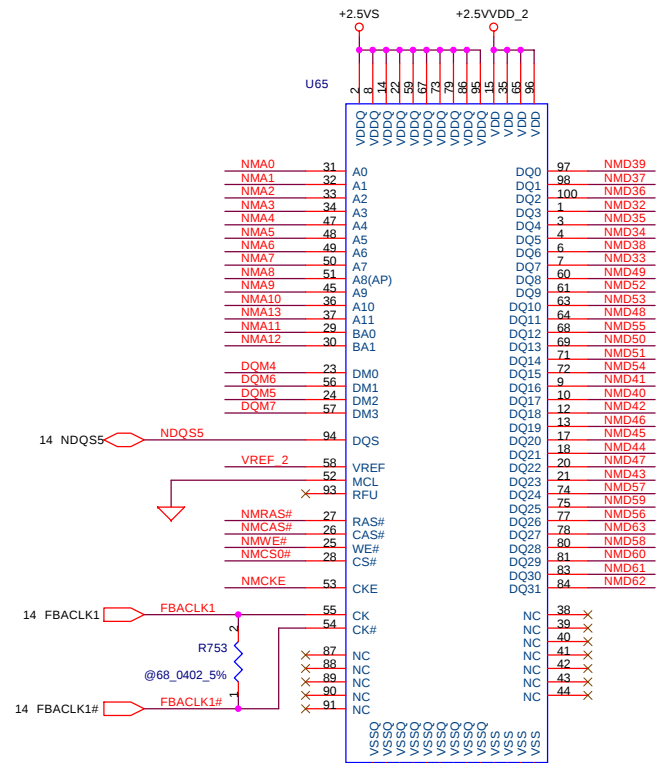
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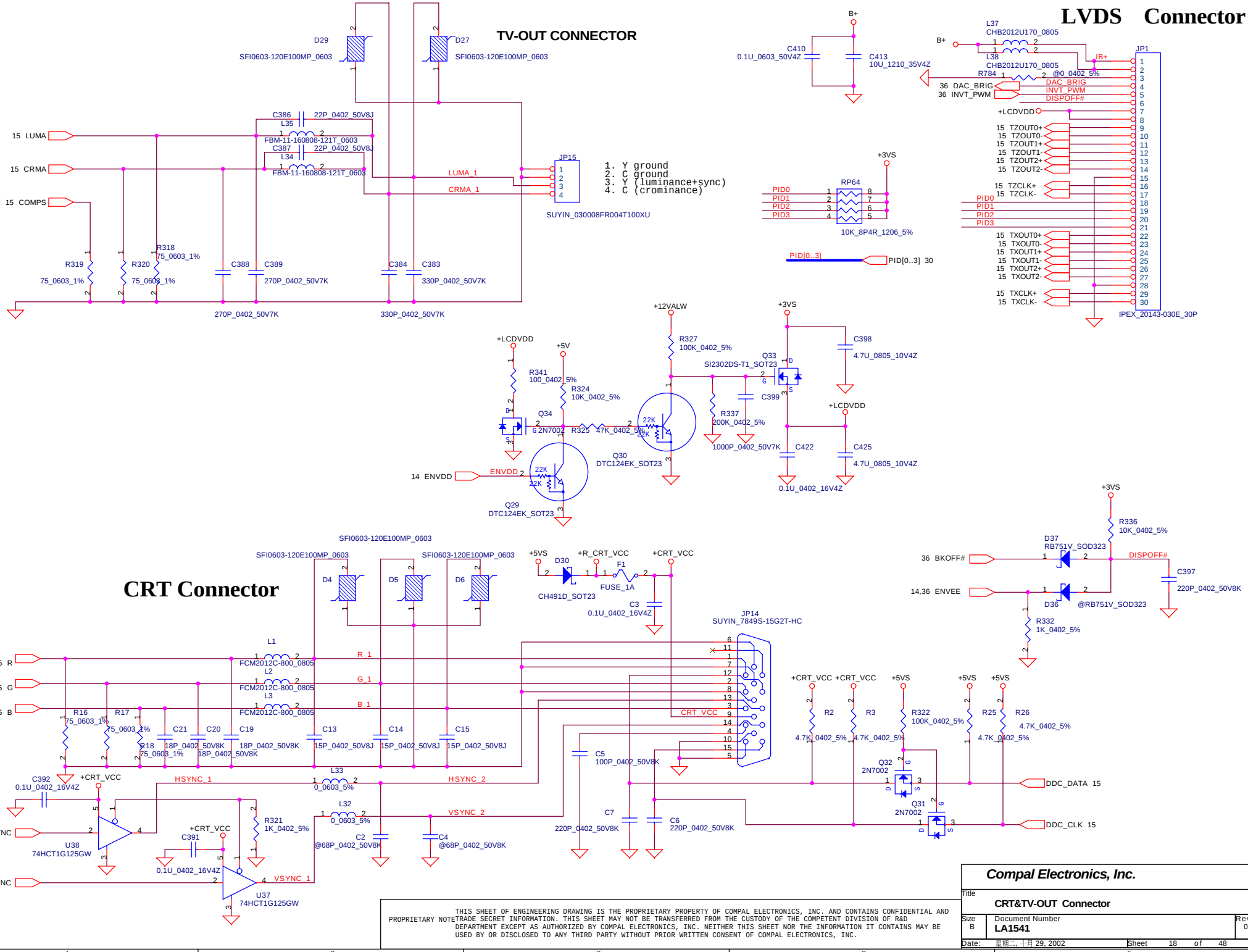
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| Rev |
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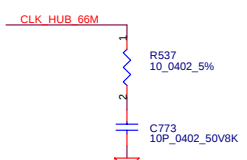
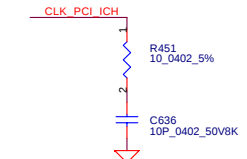




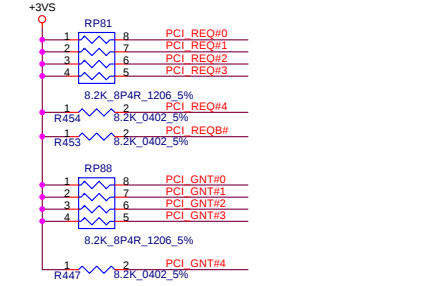
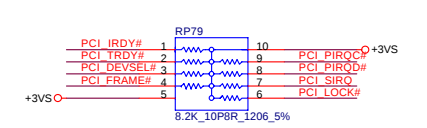
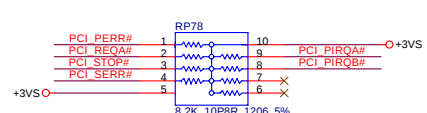


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|                          |                 |         |
|--------------------------|-----------------|---------|
| Compal Electronics, Inc. |                 |         |
| Title                    |                 |         |
| CRT&TV-OUT Connector     |                 |         |
| Size                     | Document Number |         |
|                          | LA1541          |         |
| Date: 星期二, 十月 29, 2002   |                 | Rev 0.3 |
| Sheet 18                 |                 | of 48   |



PCI Pullups



22,23,25,26 PCI\_AD[0..31] PCI\_AD[0..31]

22,23,25,26 PCI\_C/BE#0 PCI\_C/BE#0  
22,23,25,26 PCI\_C/BE#1 PCI\_C/BE#1  
22,23,25,26 PCI\_C/BE#2 PCI\_C/BE#2  
22,23,25,26 PCI\_C/BE#3 PCI\_C/BE#3

22 PCI\_REQ#0 PCI\_REQ#0  
26 PCI\_REQ#1 PCI\_REQ#1  
23 PCI\_REQ#2 PCI\_REQ#2  
25 PCI\_REQ#3 PCI\_REQ#3

22 PCI\_GNT#0 PCI\_GNT#0  
26 PCI\_GNT#1 PCI\_GNT#1  
23 PCI\_GNT#2 PCI\_GNT#2  
25 PCI\_GNT#3 PCI\_GNT#3

12 CLK\_PCI\_ICH CLK\_PCI\_ICH

22,23,25,26 PCI\_FRAME# PCI\_FRAME#  
22,23,25,26 PCI\_DEVSEL# PCI\_DEVSEL#  
22,23,25,26 PCI\_IRDY# PCI\_IRDY#  
22,23,25,26 PCI\_PERR# PCI\_PERR#  
23 PCI\_LOCK# PCI\_LOCK#

7,13,22,23,24,25,26,28,30,35,36 PCI\_RST# PCI\_RST#  
22,23,25,26 PCI\_SERR# PCI\_SERR#  
22,23,25,26 PCI\_STOP# PCI\_STOP#  
22,23,25,26 PCI\_TRDY# PCI\_TRDY#

28 PIDERST# PIDERST#  
28 SIDERST# SIDERST#

1 PIDERST# @8.2K\_0402\_5%

ICH4/(ICH4-M)

INTRUDER#  
SMB\_ALERT#/GPI11

CPU I/F

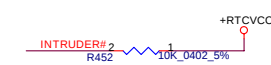
HUB I/F

Interrupt I/F

EEPROM I/F

LAN I/F

FW82801DB A1\_BGA421



INTRUDER#  
AC3 SMLINK0  
AB1 SMLINK1  
AC4 SMB\_CLK  
AB4 SMB\_DATA  
AA5 ACIN

A20GATE  
A20M#  
FERR#  
IGNNE#  
INTR#  
NMI  
CPU\_PWRGOOD  
RCIN#  
SLP#  
SMI#  
STPCLK#

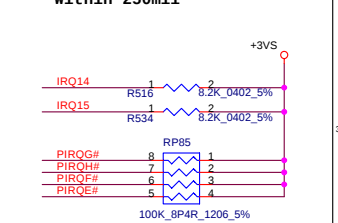
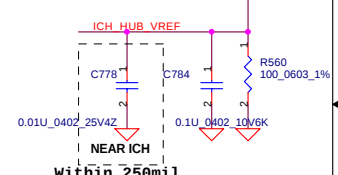
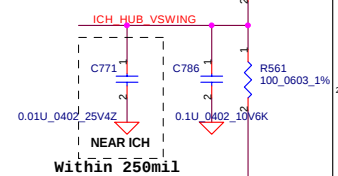
HUB PD[0..10] HUB\_PD[0..10] 6

CLK66  
HI\_STB  
HI\_STB#  
HICOMP  
HUB\_VSWING

APICCLK  
APICD0  
APICD1  
PIRQA#  
PIRQB#  
PIRQC#  
PIRQD#  
PIRQE#  
PIRQF#  
PIRQG#  
PIRQH#  
PIRQI#  
PIRQJ#  
PIRQK#  
PIRQL#  
PIRQM#  
PIRQN#  
PIRQO#  
PIRQP#  
PIRQR#  
PIRQS#  
PIRQT#  
PIRQU#  
PIRQV#  
PIRQW#  
PIRQX#  
PIRQY#  
PIRQZ#

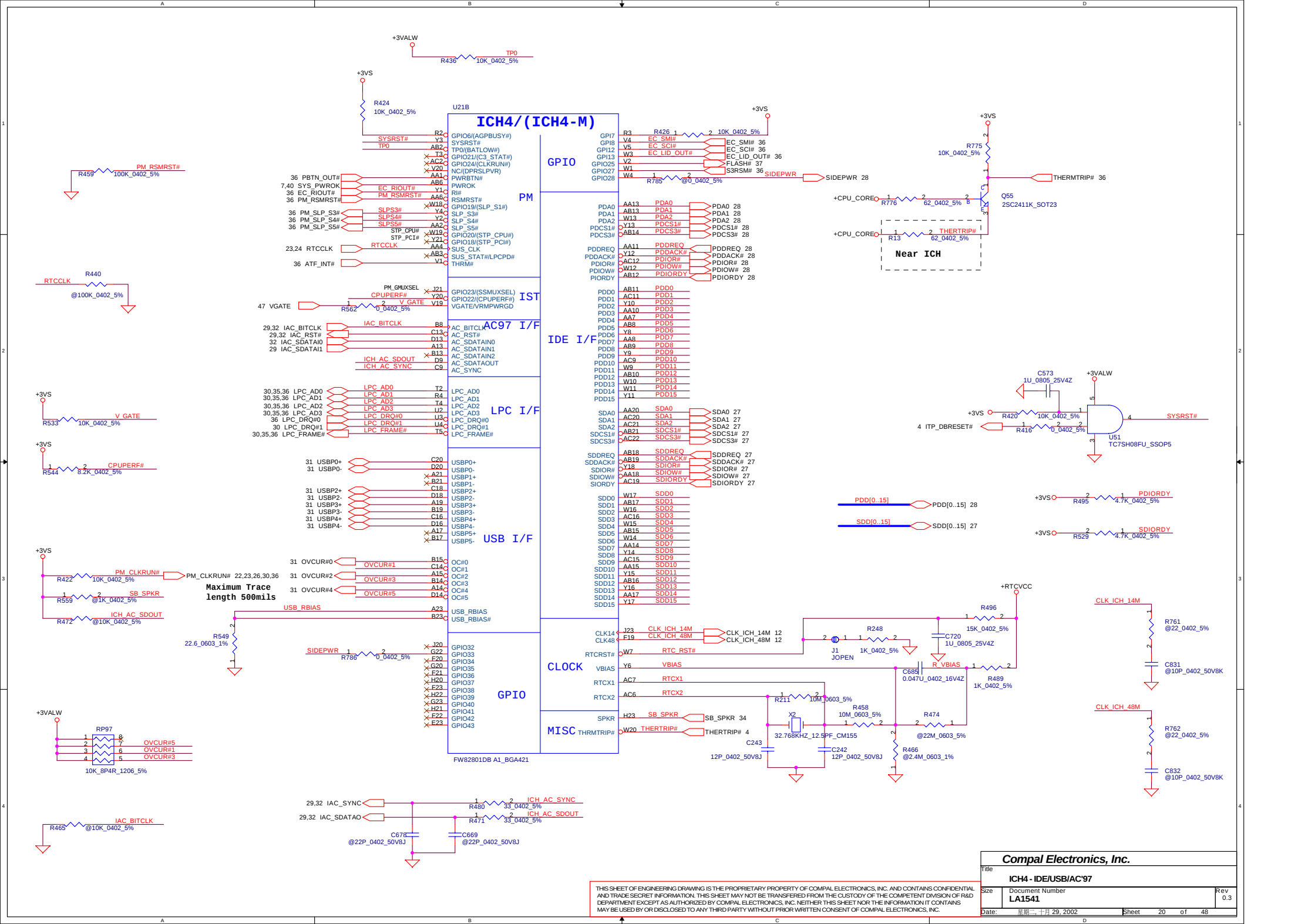
EE\_CS  
EE\_IN  
EE\_OUT  
EE\_SHCLK

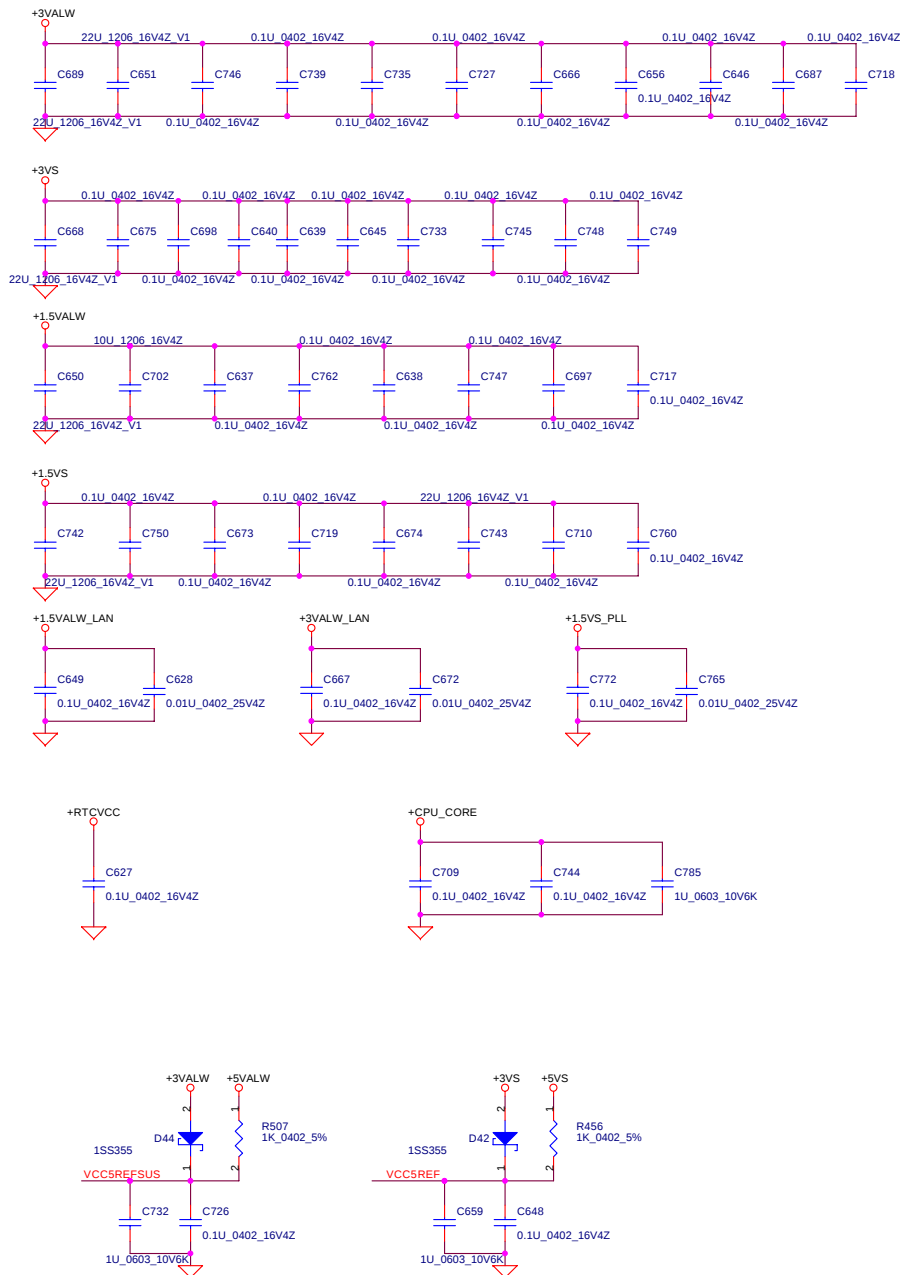
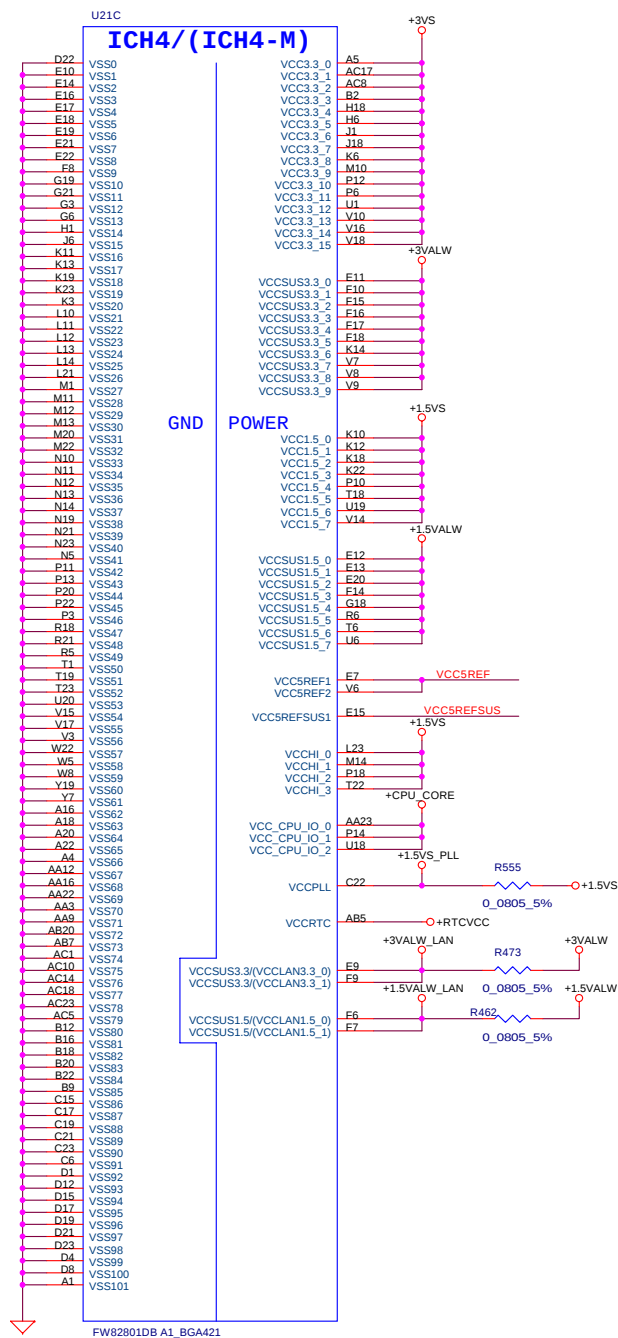
LAN\_RXD0  
LAN\_RXD1  
LAN\_RXD2  
LAN\_TXD0  
LAN\_TXD1  
LAN\_TXD2  
LAN\_CLK  
LAN\_RSTSYNC  
LAN\_RST#



|                          |                  |       |          |
|--------------------------|------------------|-------|----------|
| Compal Electronics, Inc. |                  |       |          |
| Title                    |                  |       |          |
| ICH4 - PCI/PCU/HUB       |                  |       |          |
| Size                     | Document Number  | Rev   |          |
|                          | LA1541           | 0.3   |          |
| Date:                    | 星期二, 十月 29, 2002 | Sheet | 19 of 48 |

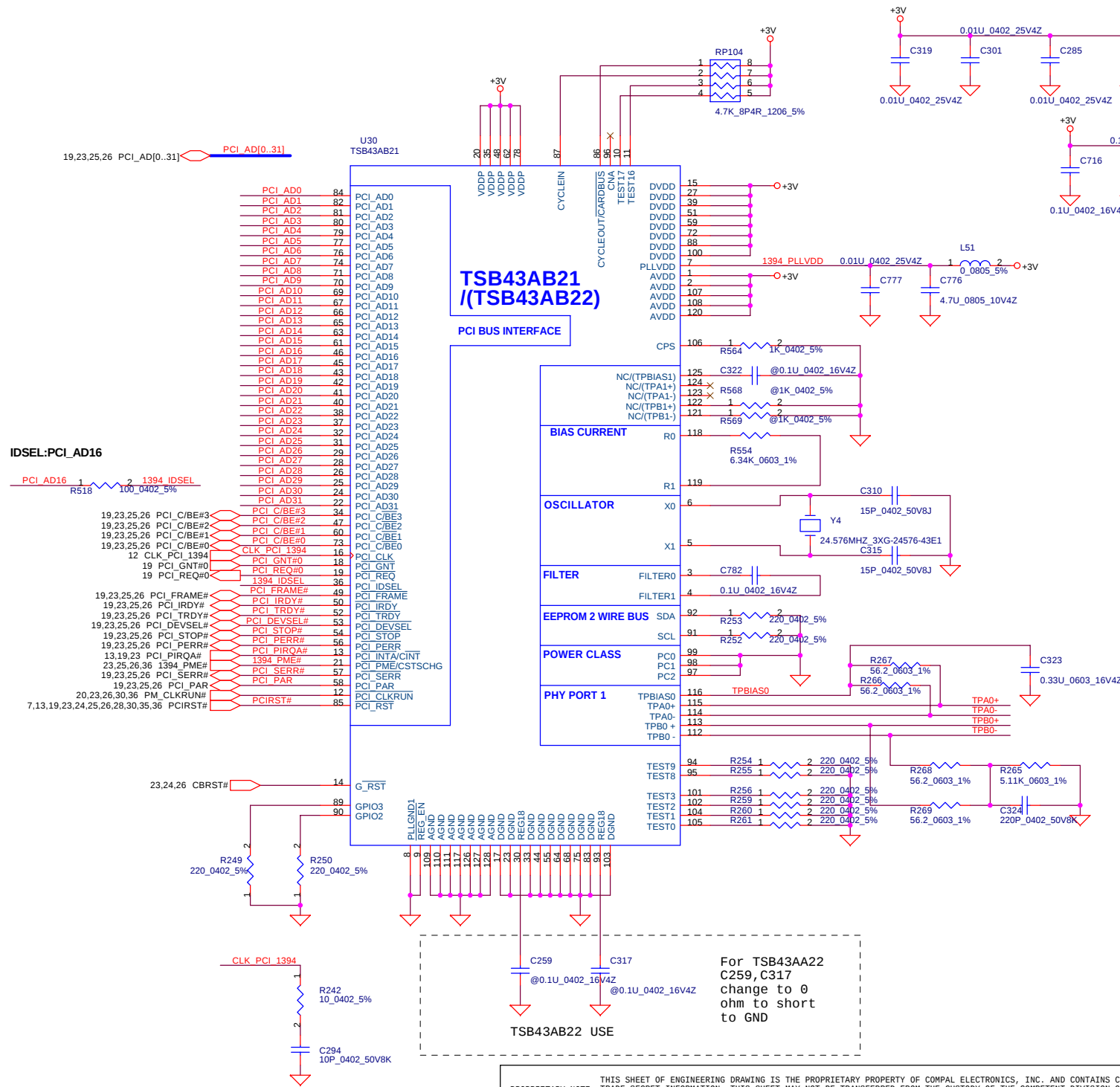
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# TSB43AB21 (TSB43AB22)

## PCI BUS INTERFACE

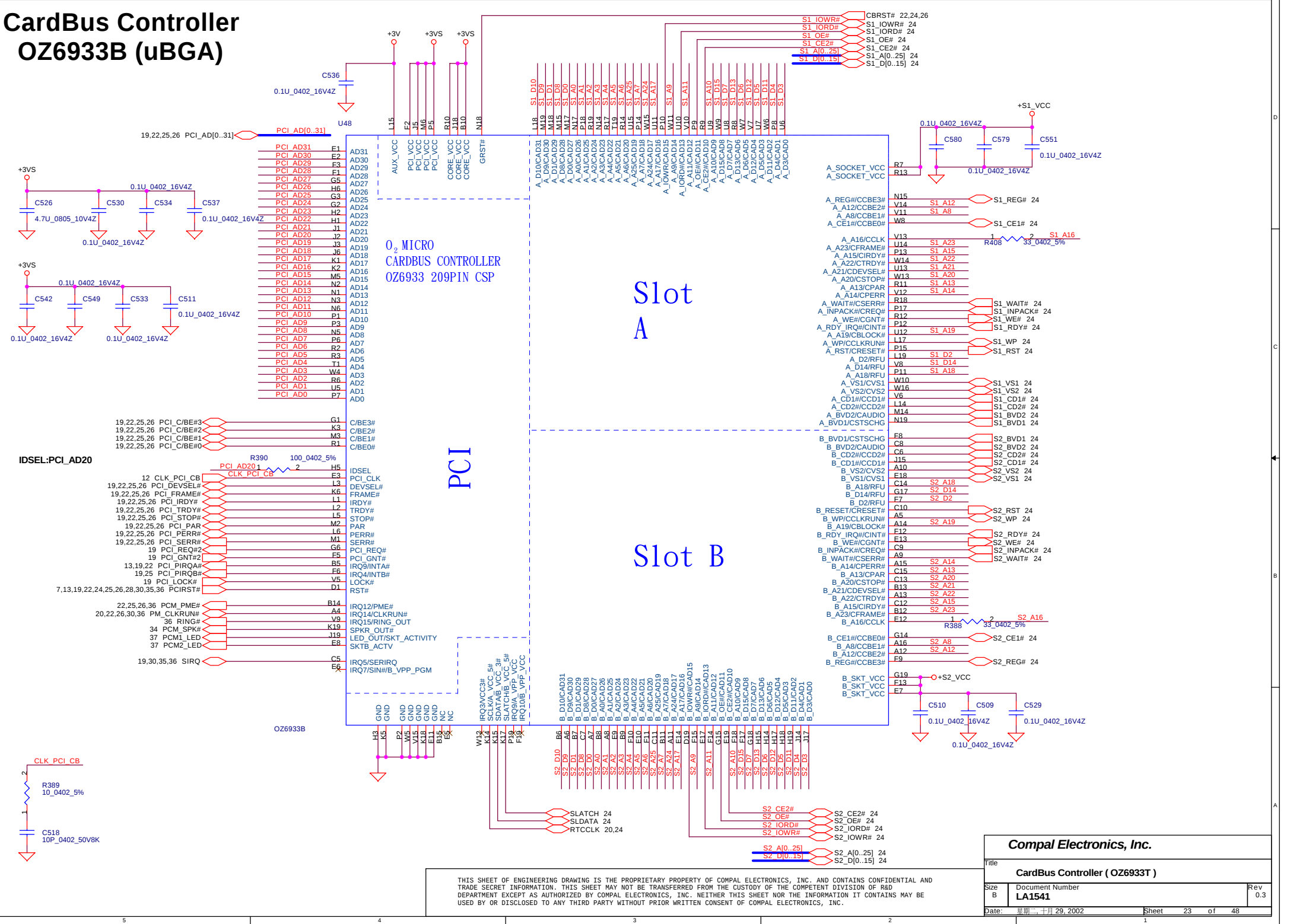


|                          |                  |       |          |
|--------------------------|------------------|-------|----------|
| Compal Electronics, Inc. |                  |       |          |
| Title                    |                  |       |          |
| 1394 Interface           |    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

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# CardBus Controller

## OZ6933B (uBGA)

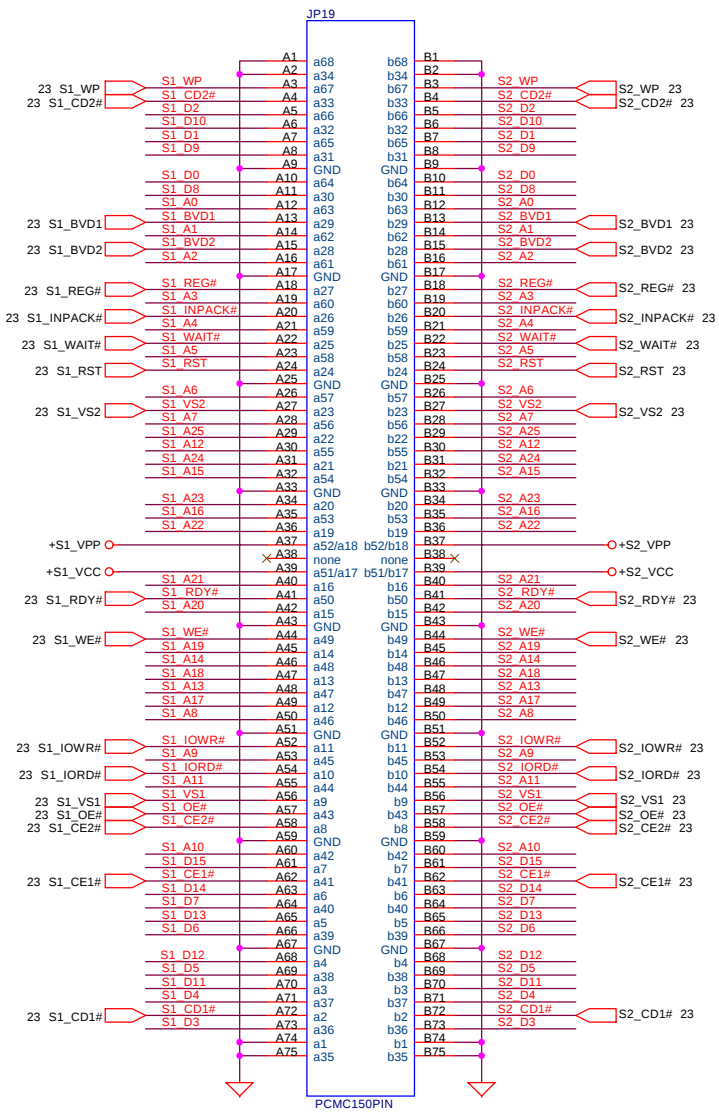
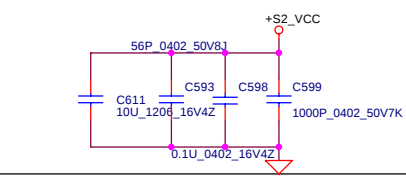
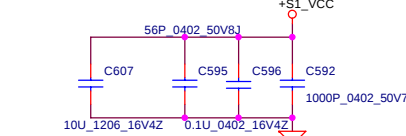
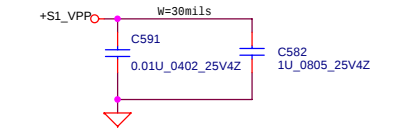
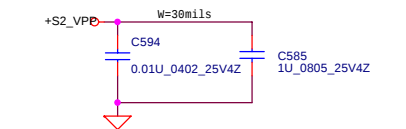
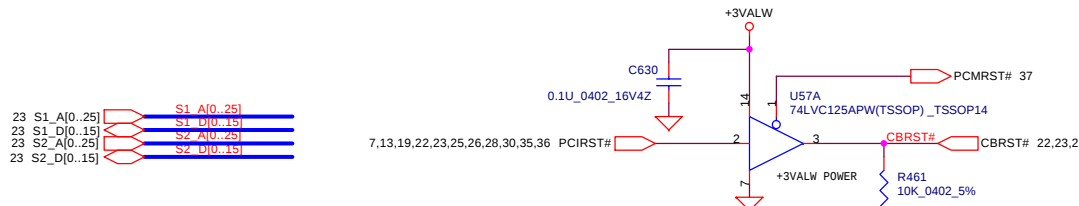
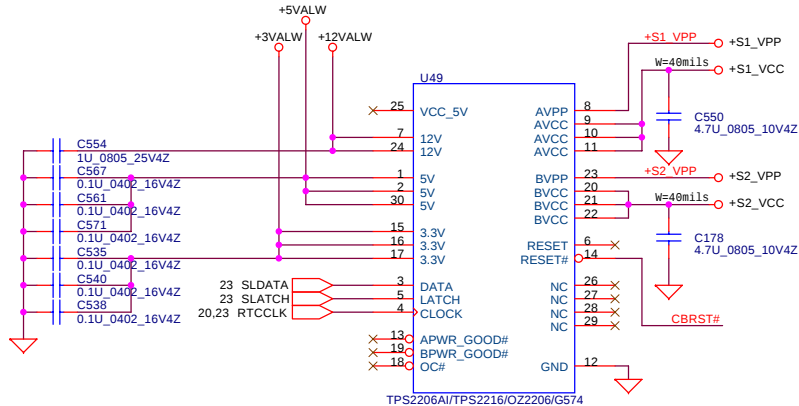


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|--------------------------------|------------------|----------------|
| Title                          |                  |                |
| CardBus Controller ( OZ6933T ) |                  |                |
| Size<br>B                      |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

PCMCIA POWER CTRL.

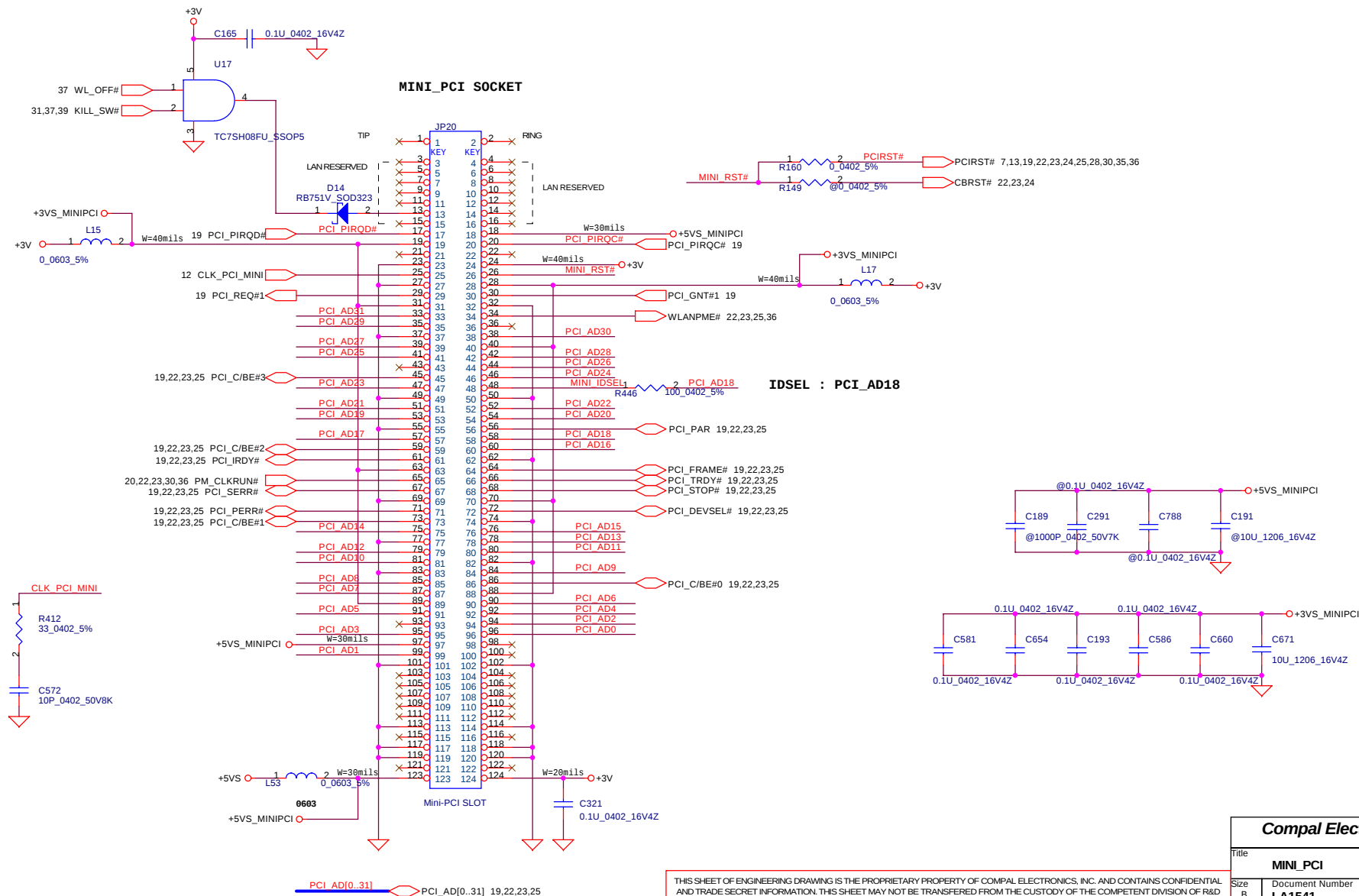
CARDBUS  
SOCKET



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



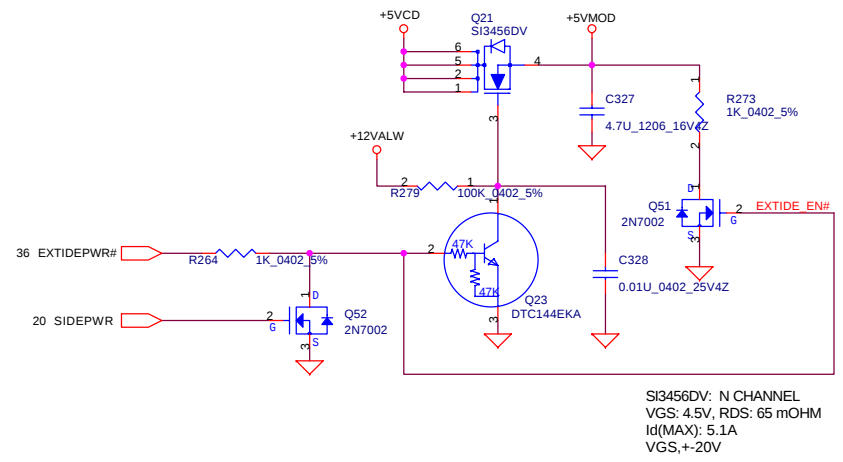
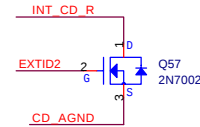


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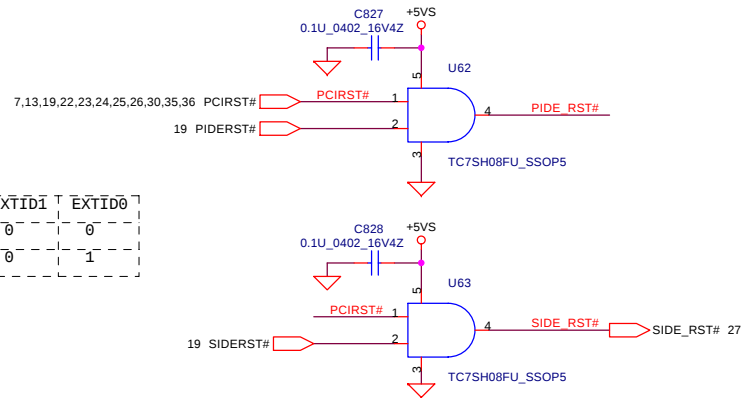
| Compal Electronics, Inc |                  |       |          |
|-------------------------|------------------|-------|----------|
| Title                   |                  |       |          |
| MINI_PCI                |                  |       |          |
| Size                    | Document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



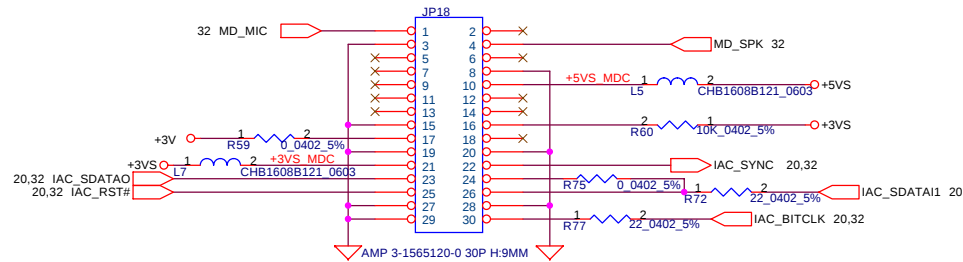
## Placea caps. near HDD



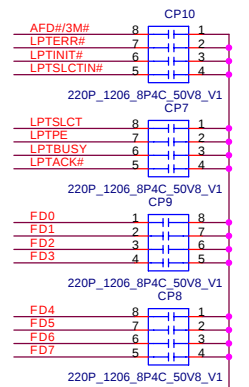
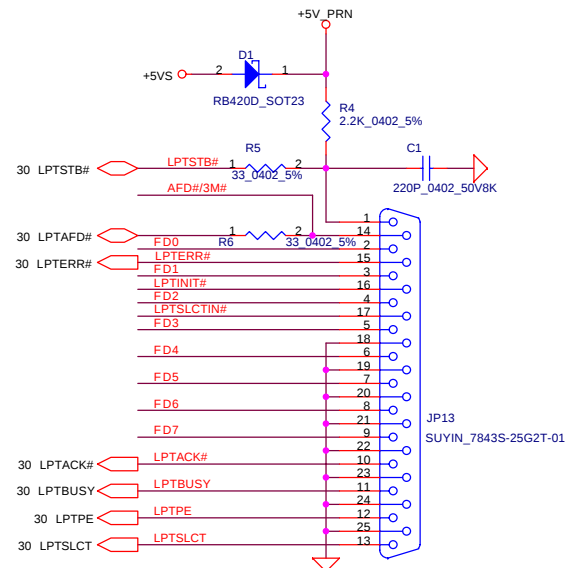
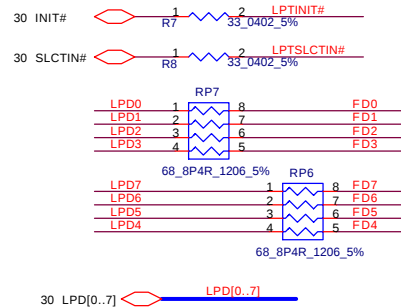
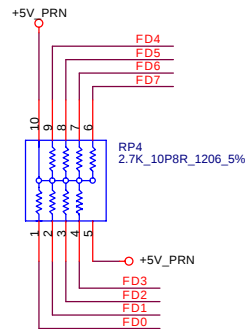
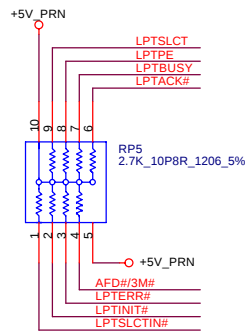
SI3456DV: N CHANNEL  
VGS: 4.5V, RDS: 65 mOHM  
Id(MAX): 5.1A  
VGS,+20V



## MDC MODEM CONNECTOR



## PARALLEL PORT

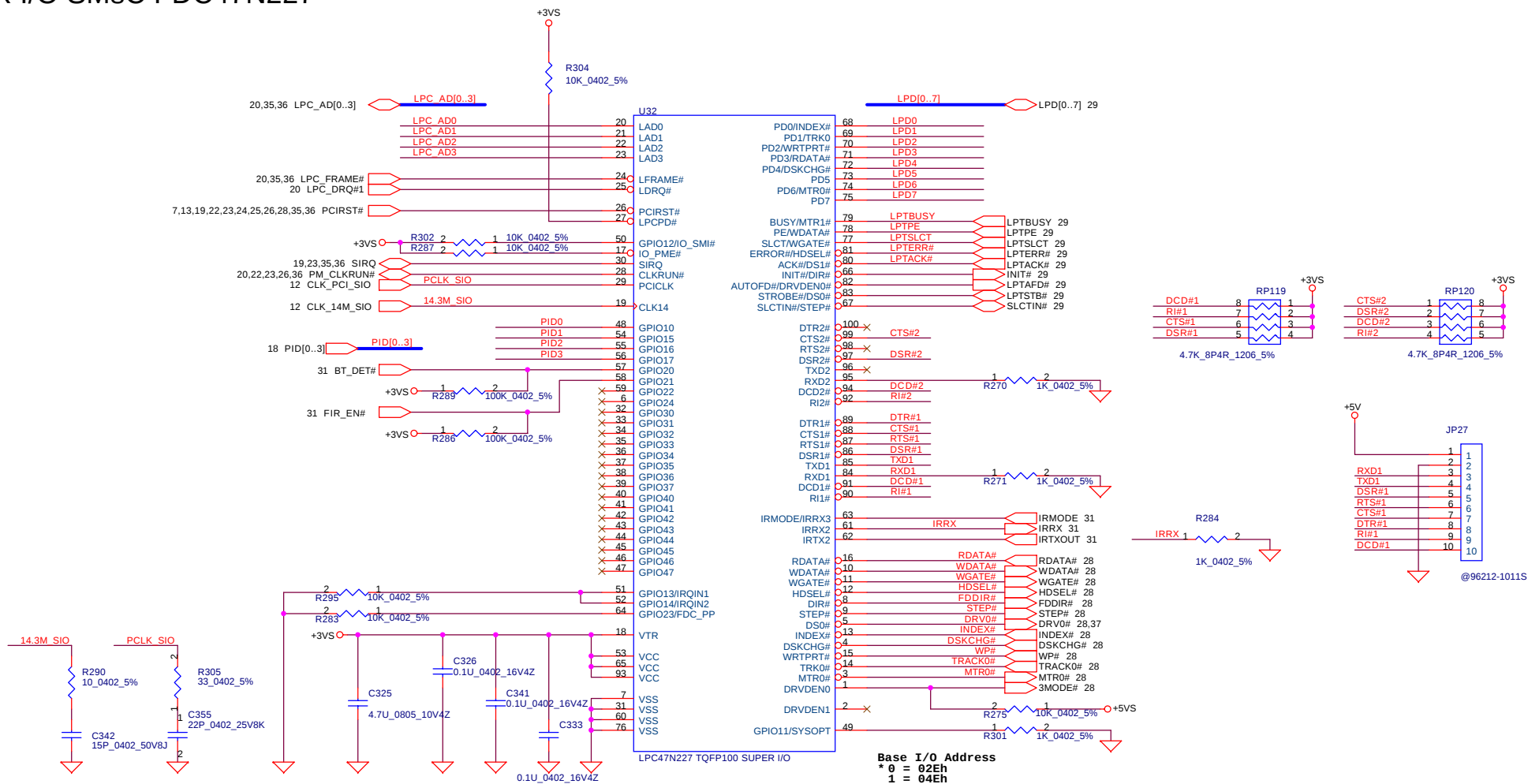


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**Compal Electronics, Inc.**

| Title             |                  |       |          |
|-------------------|------------------|-------|----------|
| PARALLEL/MDC PORT |                  |       |          |
| Size              | Document Number  | Rev   |          |
|                   | LA1541           | 0.3   |          |
| Date:             | 星期三, 十月 29, 2002 | Sheet | 29 of 48 |

## SUPER I/O SMsC FDC47N227



**Compal Electronics, Inc.**

| Title |
|-------|
|-------|

## SUPER I/O

|     |      |
|-----|------|
| AND | Size |
|-----|------|

Document Number  
**LA1541**

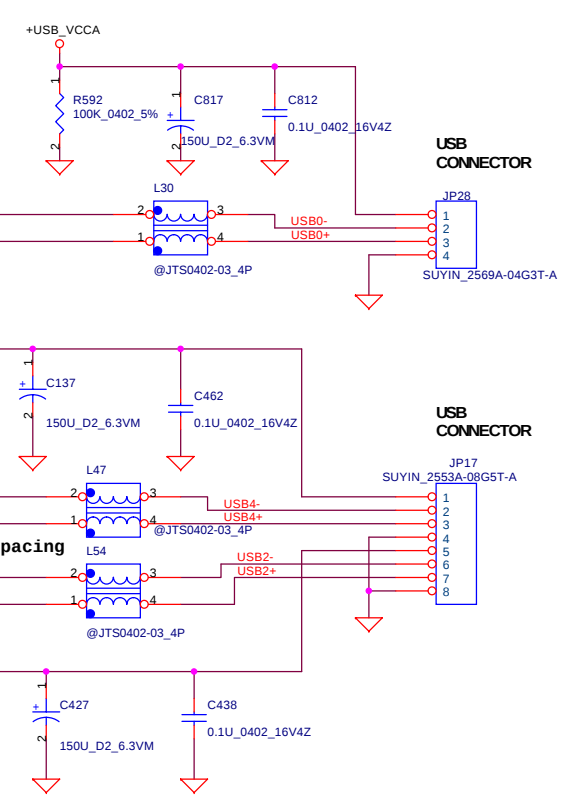
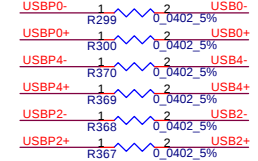
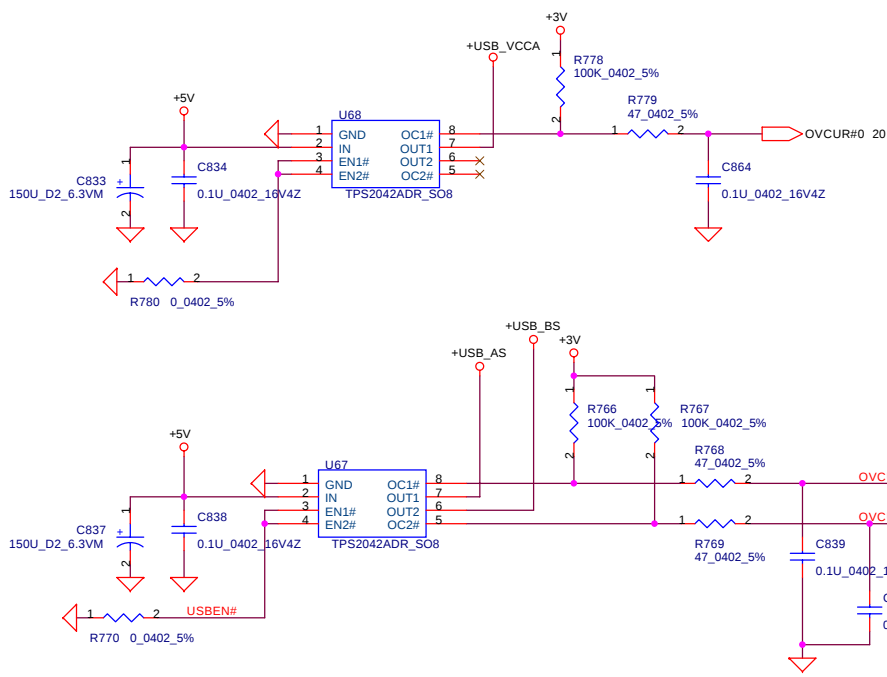
|     |     |
|-----|-----|
| Rev | 0.3 |
|-----|-----|

Date \_\_\_\_\_

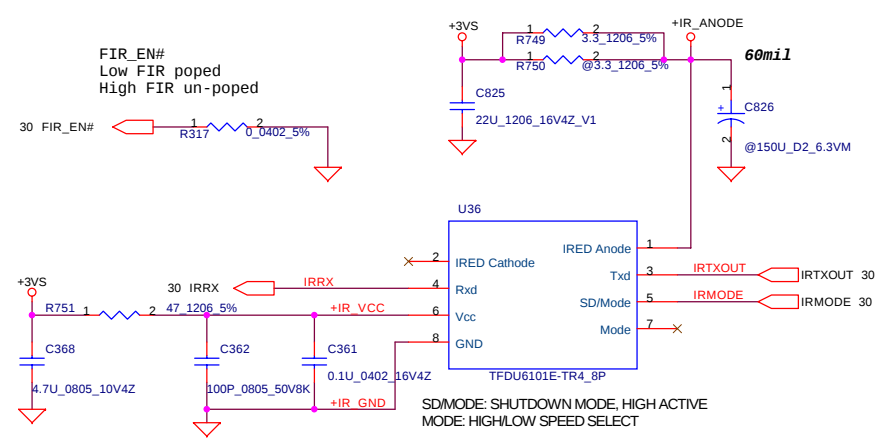
星期二, 十月 29, 2002      Sheet    30    of    48

E

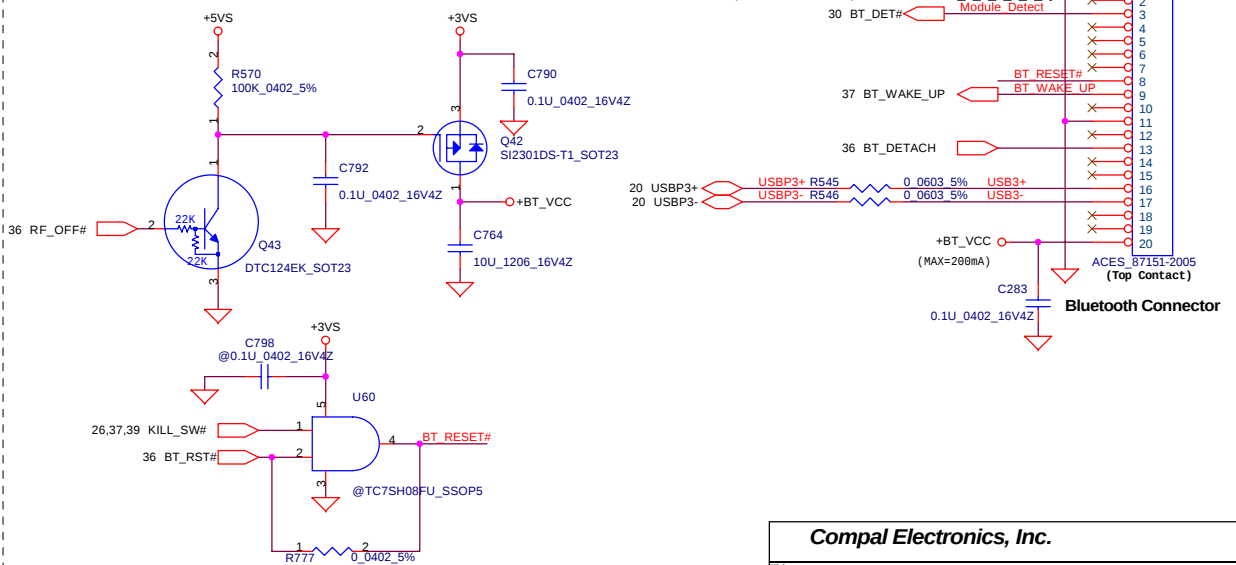
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## FIR Module



## BlueTooth Interface

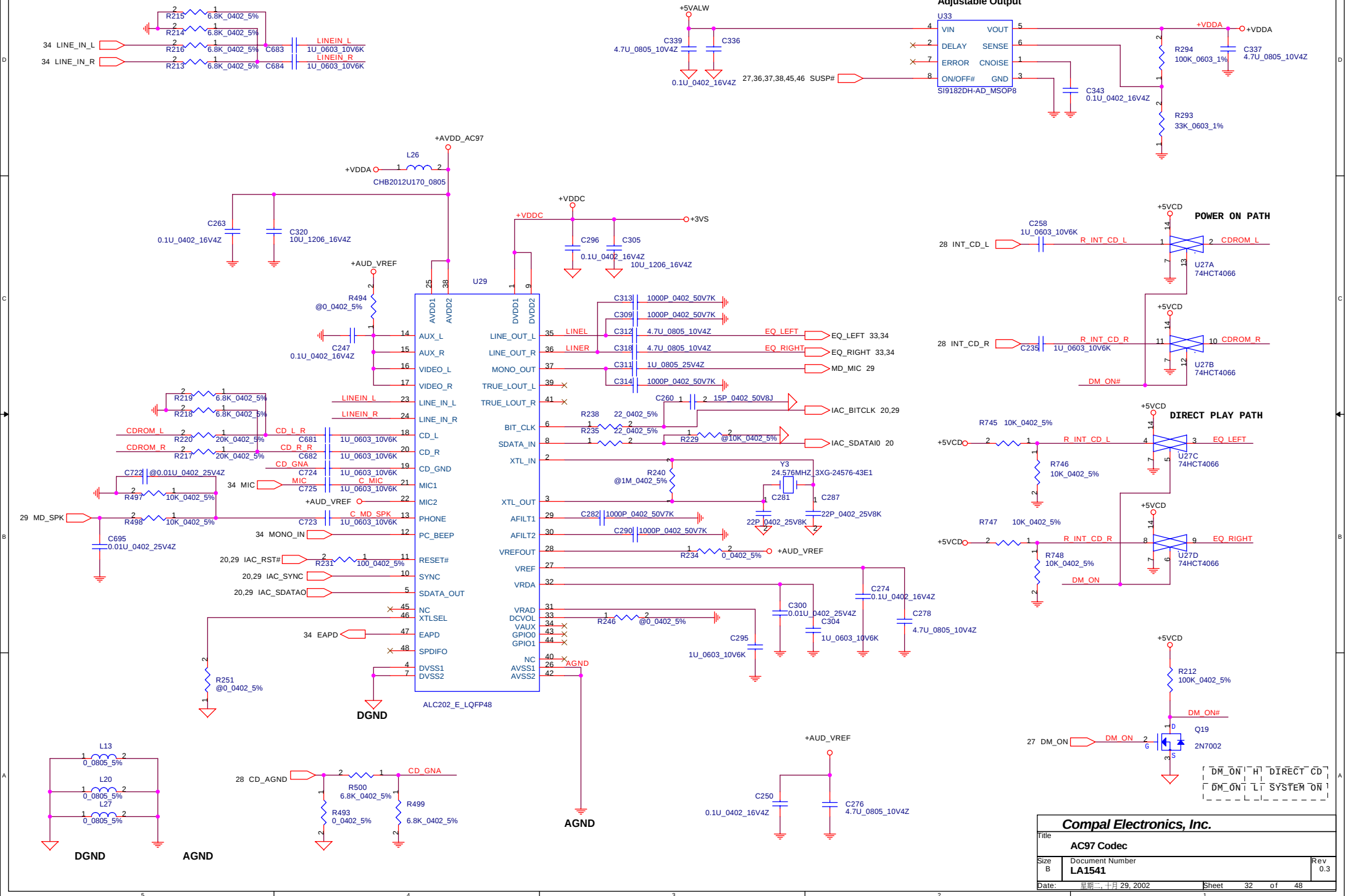


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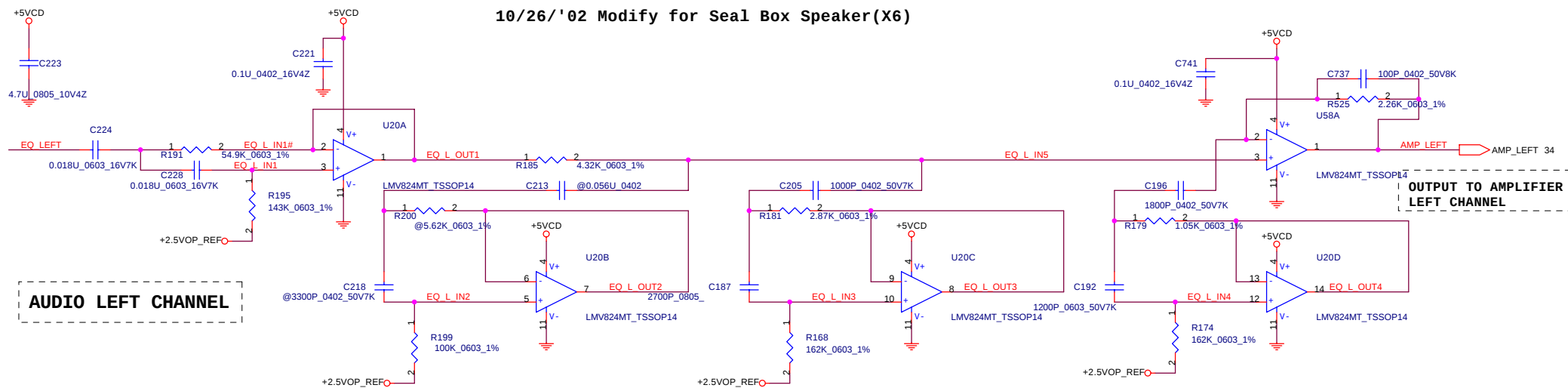
| Compal Electronics, Inc. |                  |       |          |
|--------------------------|------------------|-------|----------|
| Title                    |                  |       |          |
| USB/Bluetooth/FIR        |                  |       |          |
| Size                     | Document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

## AC97 Codec

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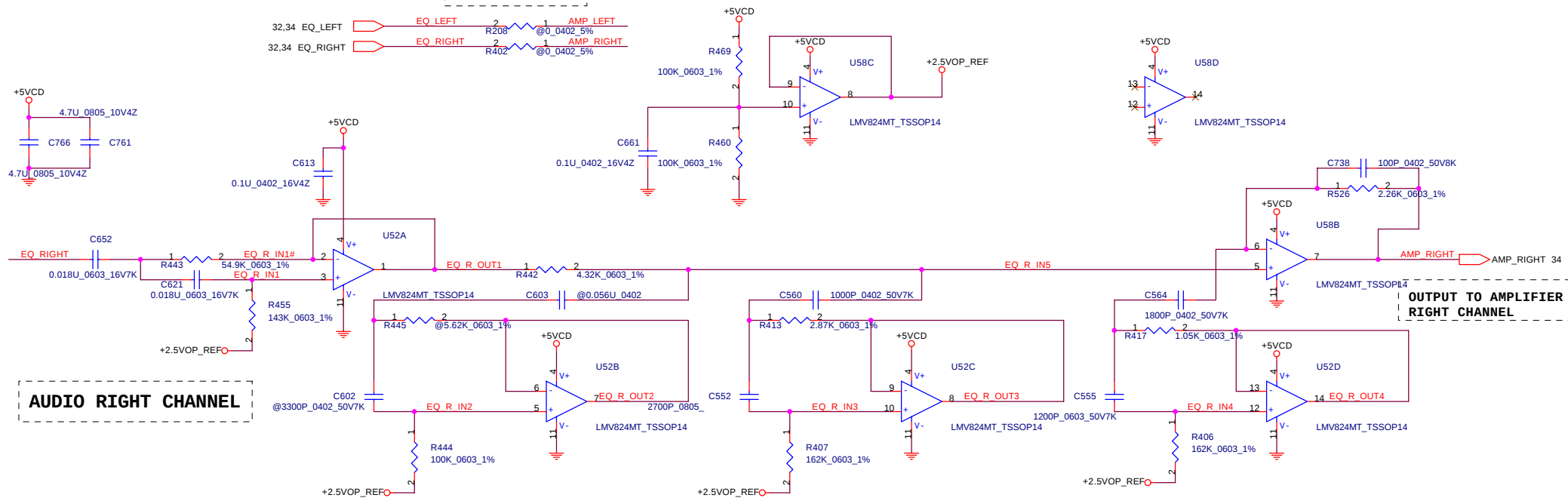


# 10/26/'02 Modify for Seal Box Speaker(X6)



OUTPUT TO AMPLIFIER  
LEFT CHANNEL

## BY-PASS EQ CIRCUIT



OUTPUT TO AMPLIFIER  
RIGHT CHANNEL

Compal Electronics, Inc.

HAREWARE EQ

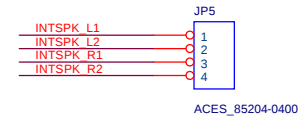
Document Number  
LA1541

Date: 星期二, 十月 29, 2002

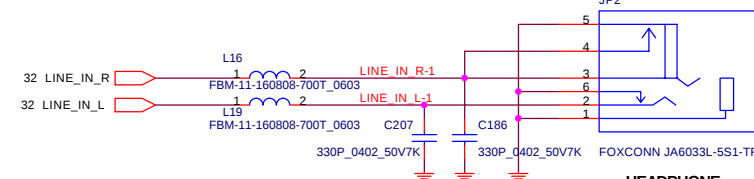
Sheet 33 of 48

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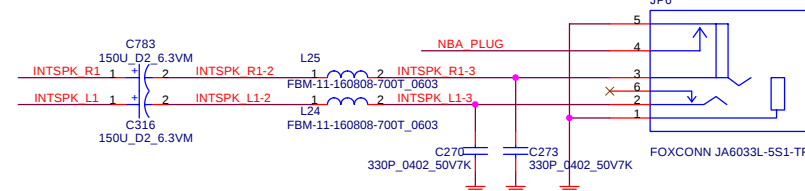
## SPEAKER Connector



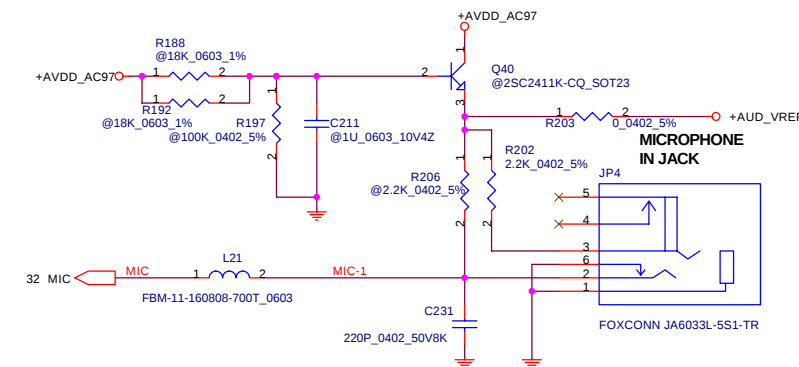
## LINE IN JACK



## HEADPHONE OUT JACK



## MICROPHONE IN JACK

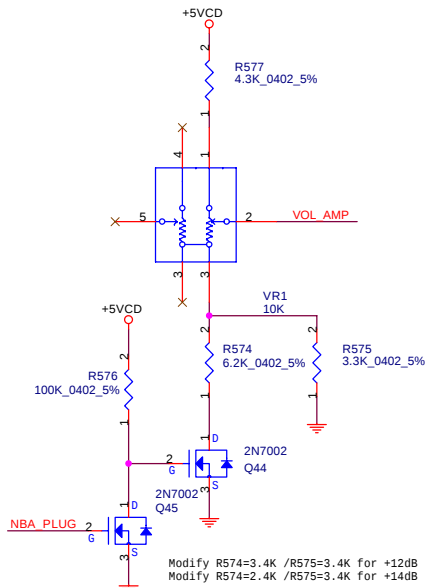


Compal Electronics, Inc.

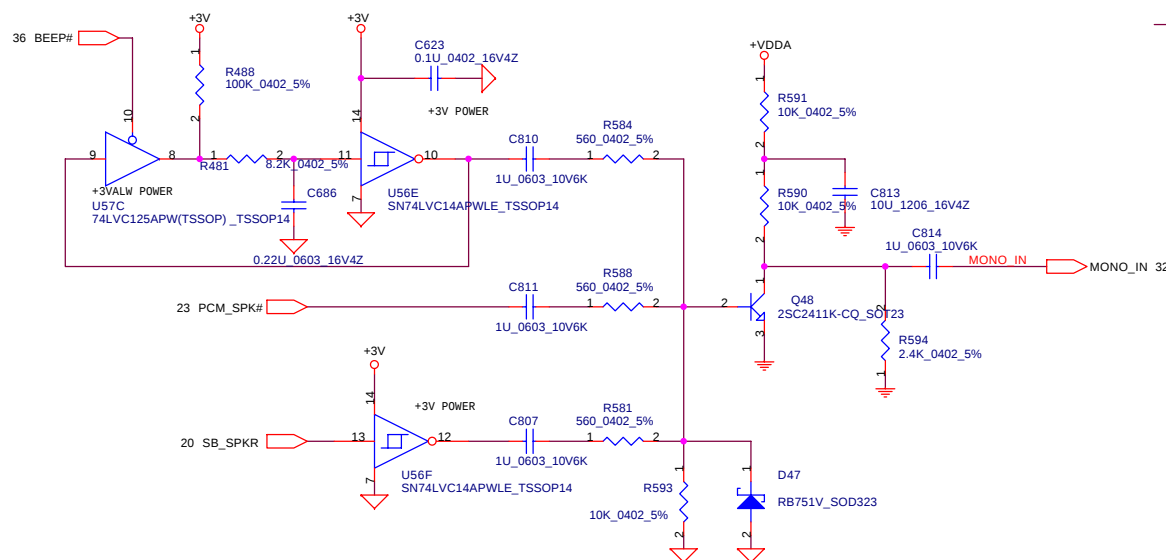
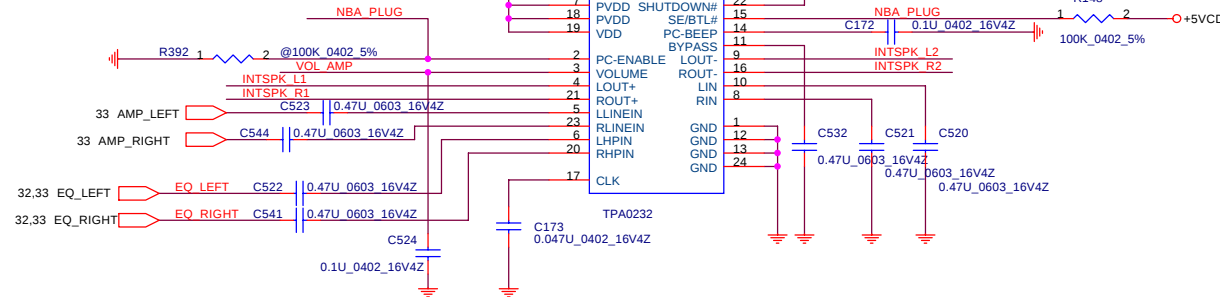
AMP &amp; Audio Jack

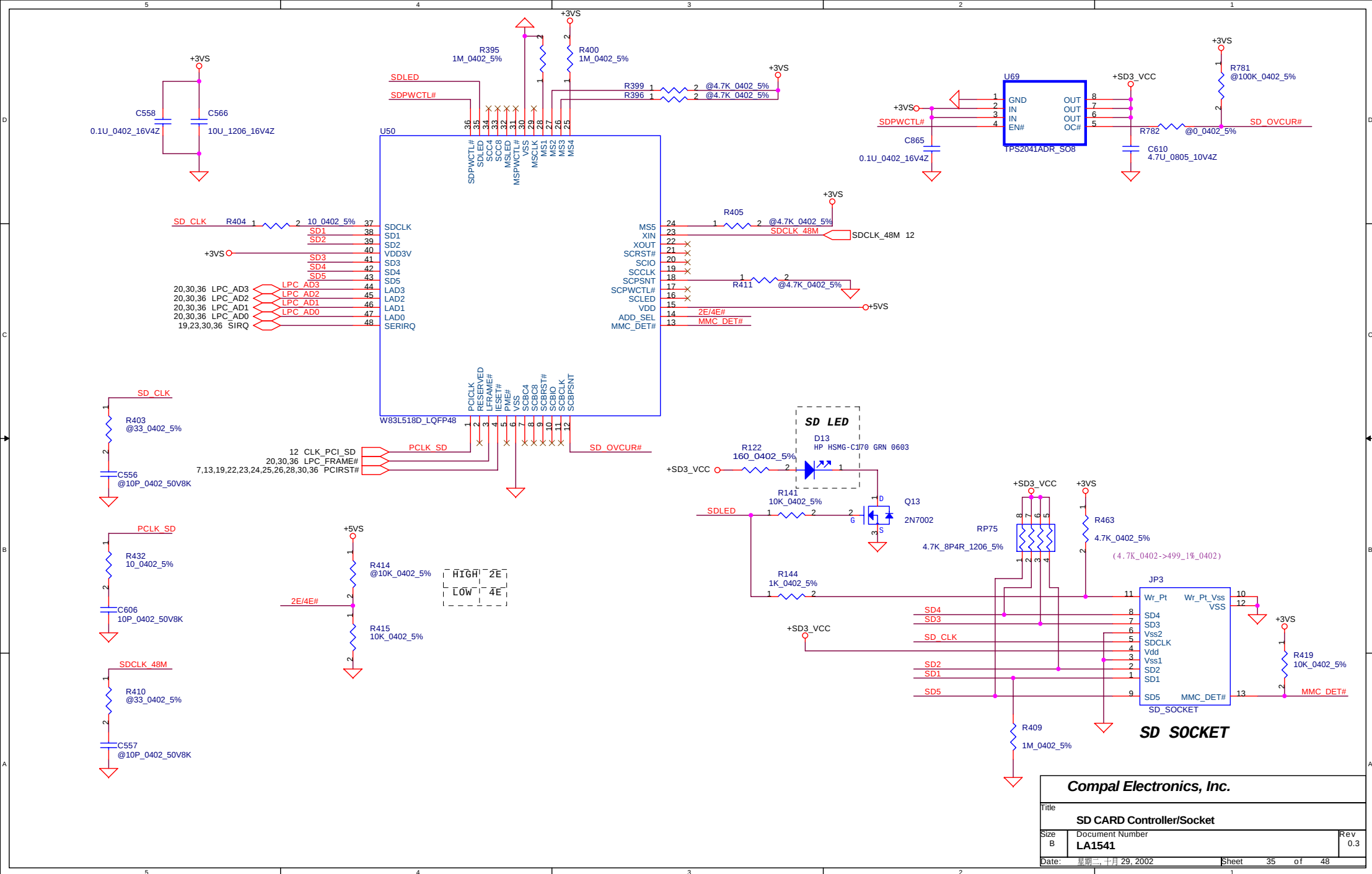
|        |                                  |                |
|--------|----------------------------------|----------------|
| Size B | Document Number<br><b>LA1541</b> | Rev<br>0.3     |
| Date:  | 星期二, 十月 29, 2002                 | Sheet 34 of 48 |

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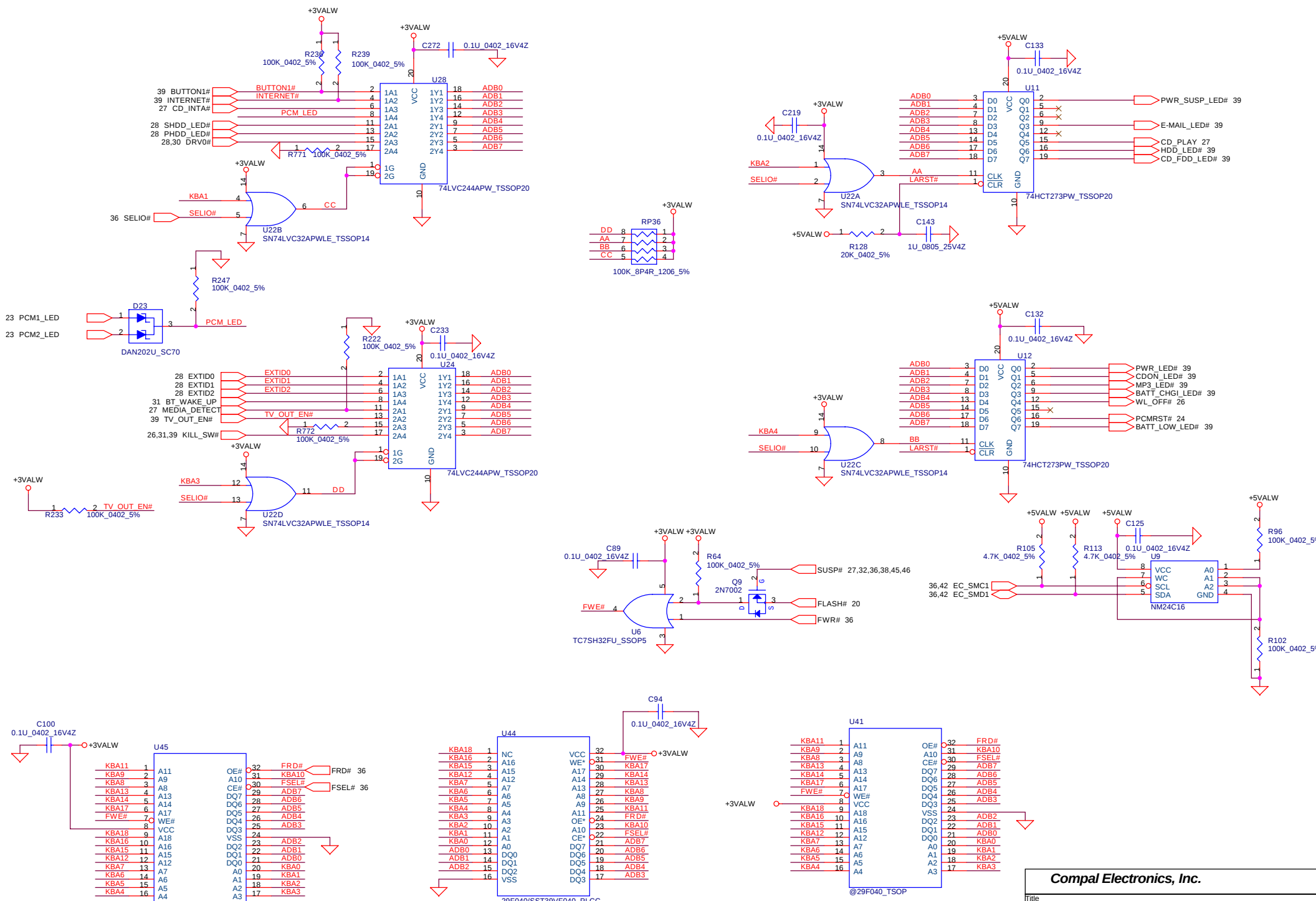


HIGH PIN 6, 20 ACTIVE  
NBA PLUG  
LOW PIN 5, 23 ACTIVE



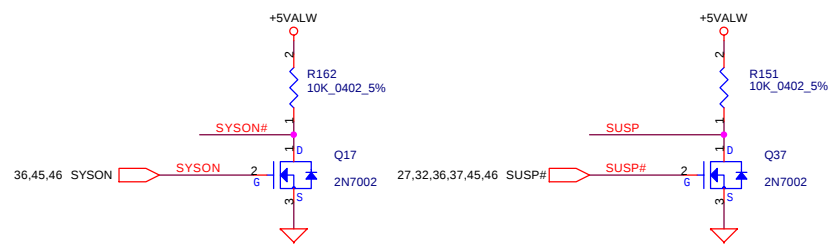
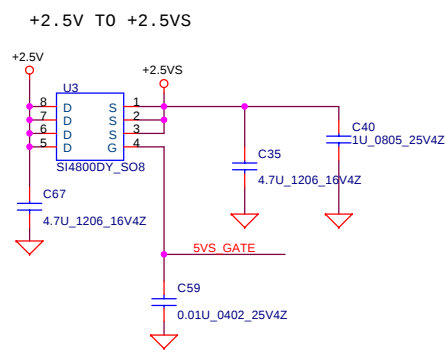
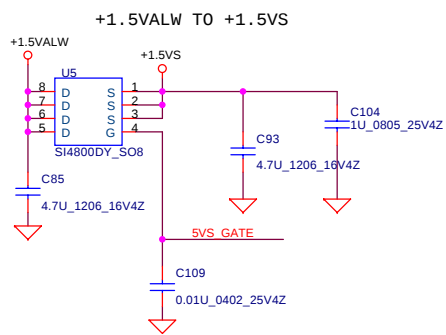
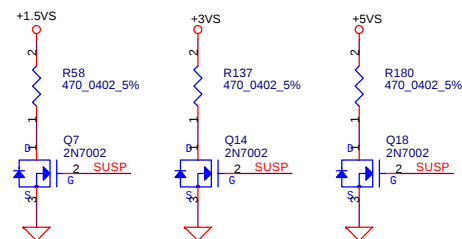
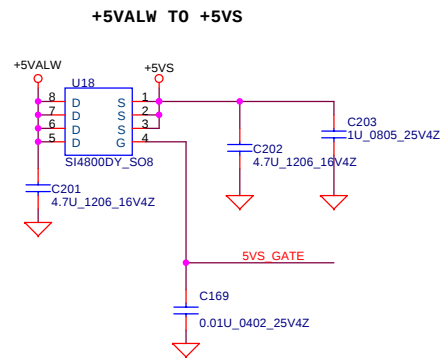
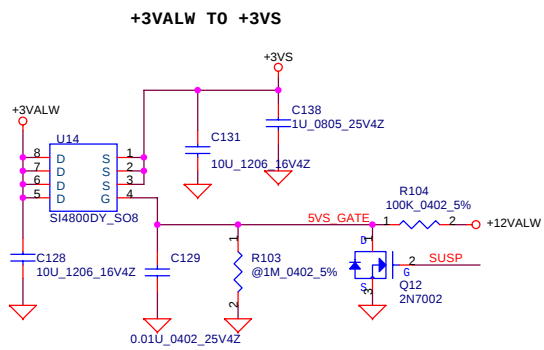
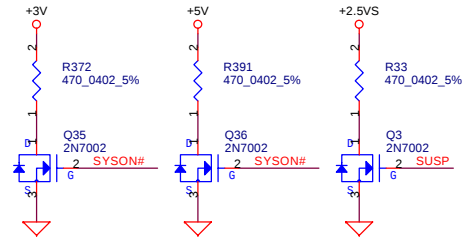
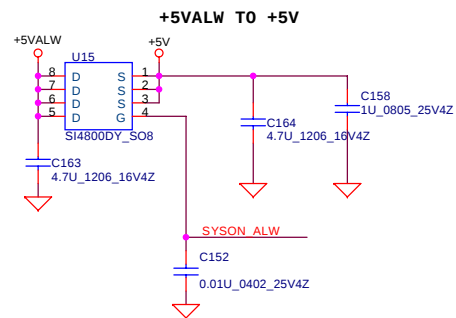
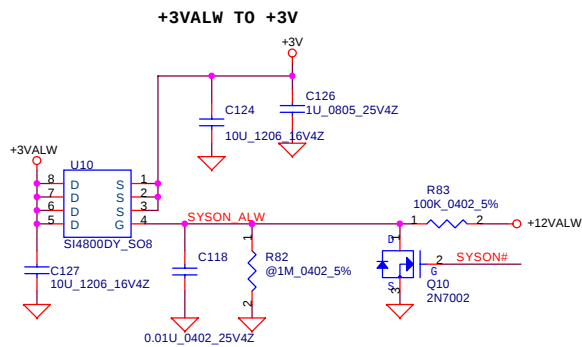






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| Compal Electronics, Inc. |                  |       |          |
|--------------------------|------------------|-------|----------|
| Title                    |                  |       |          |
| BIOS & EXT. I/O PORT     |                  |       |          |
| Size                     | Document Number  | Rev   |          |
| B                        | LA1541           | 0.3   |          |
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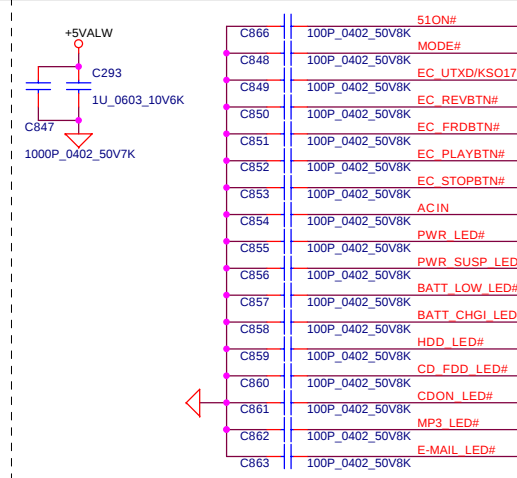
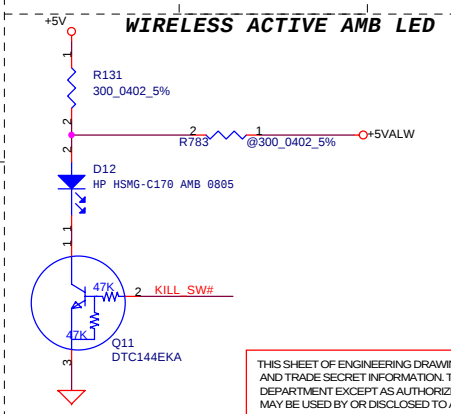
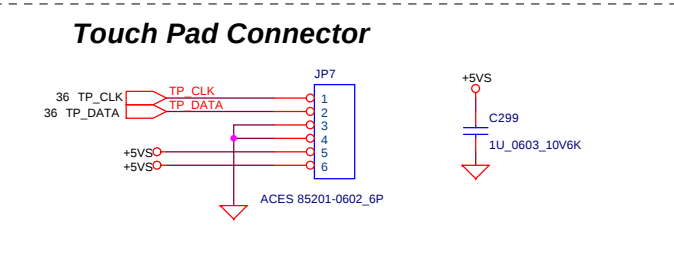
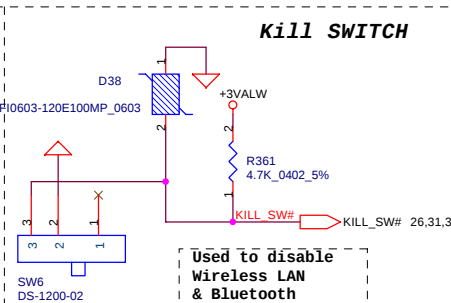
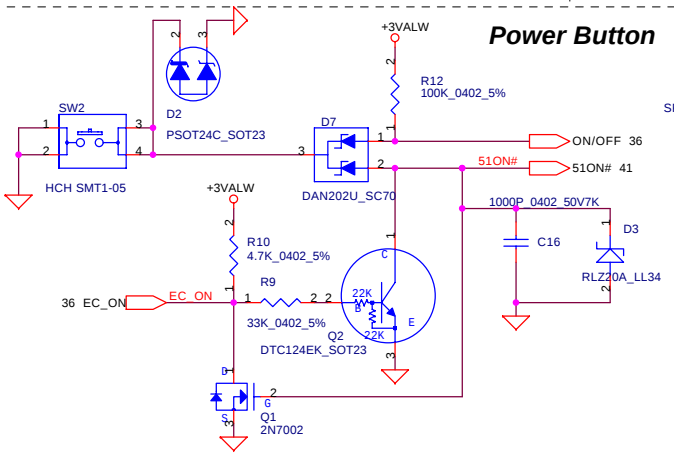
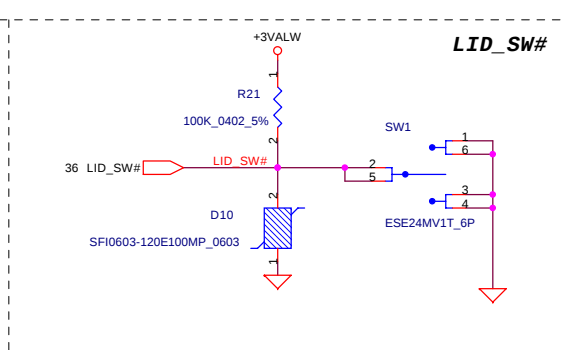
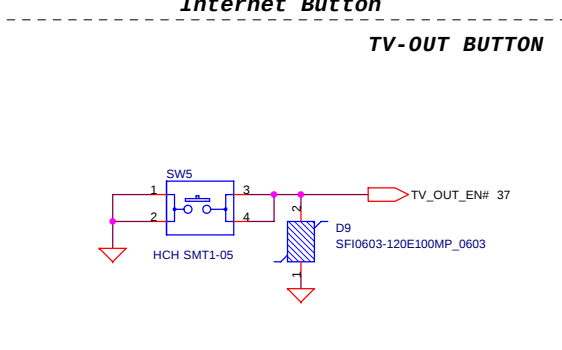
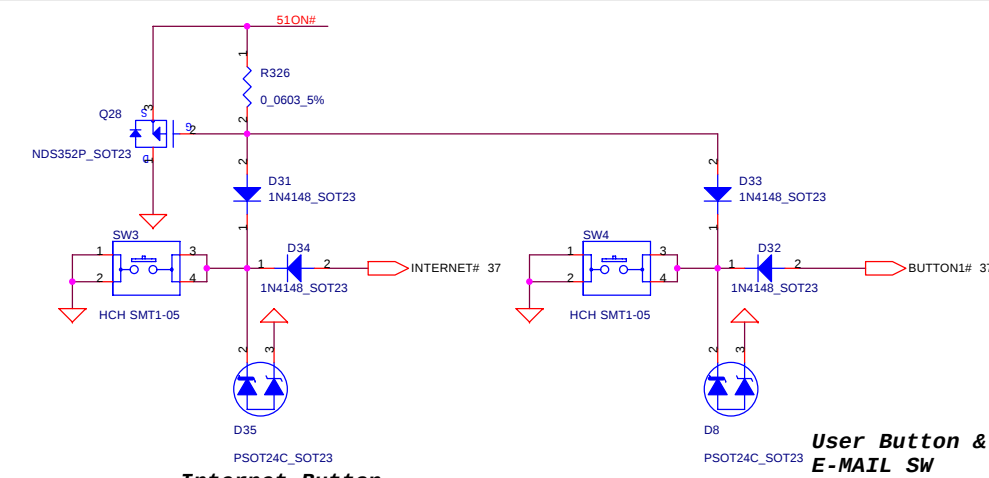
**Compal Electronics, Inc.**

Title  
**POWER CONTROL CKT**

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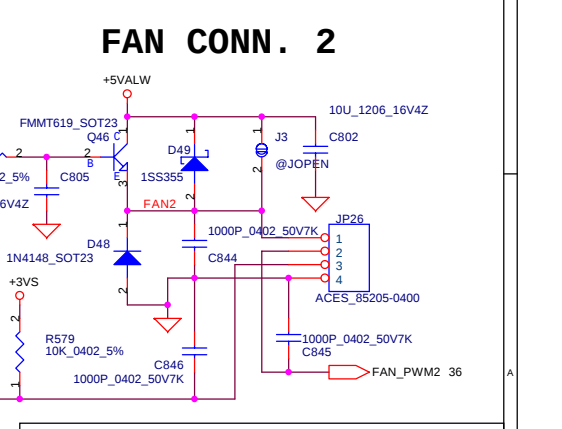
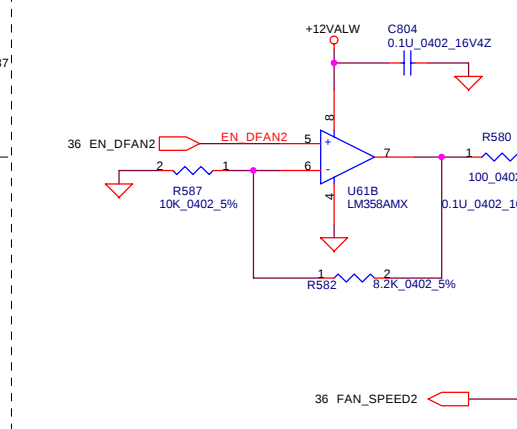
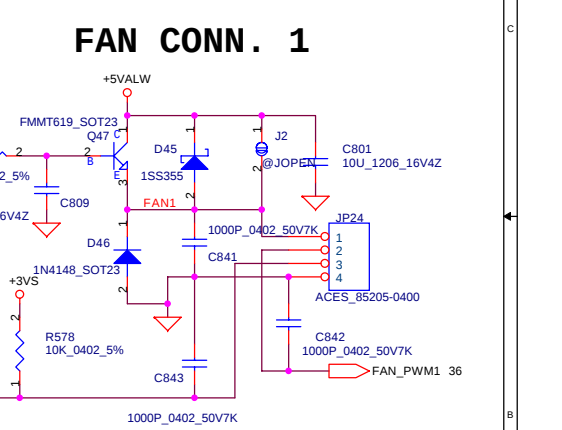
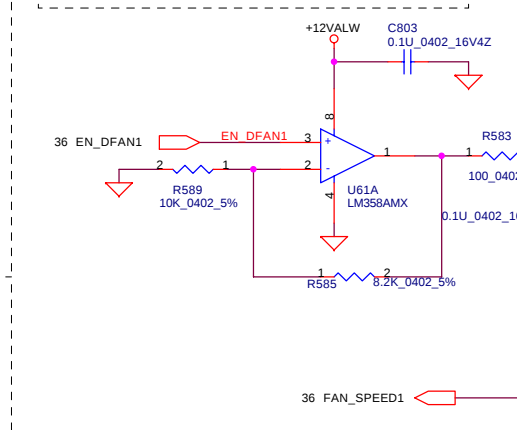
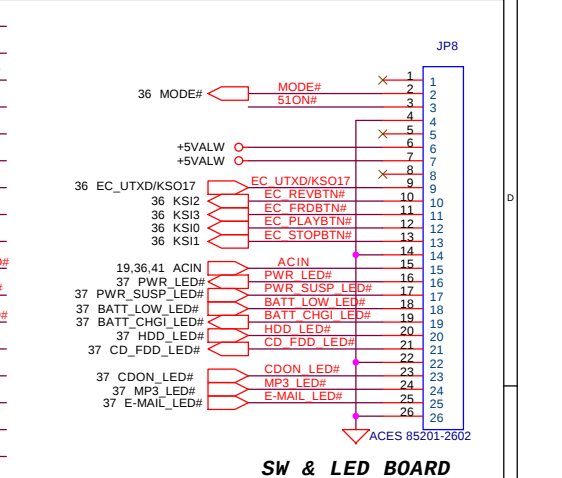
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**FAN CONTROL TYPE**

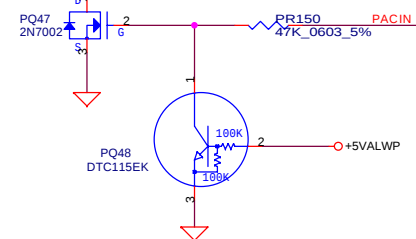
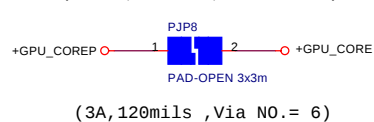
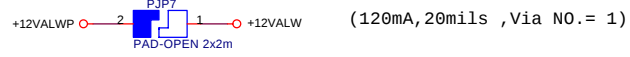
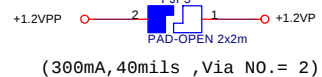
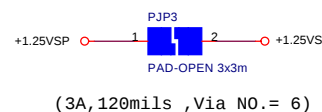
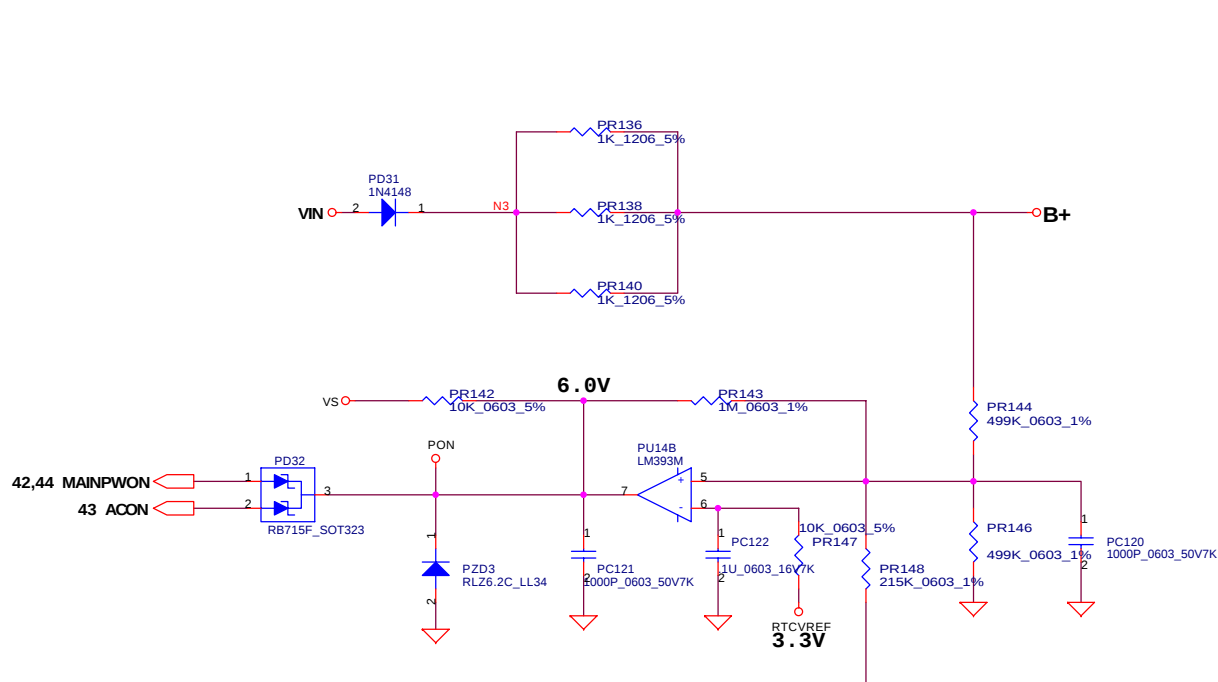
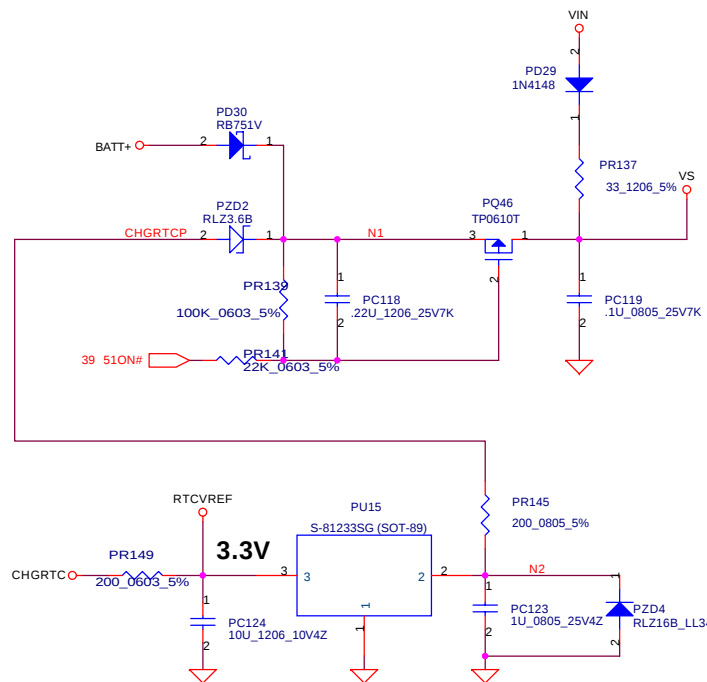
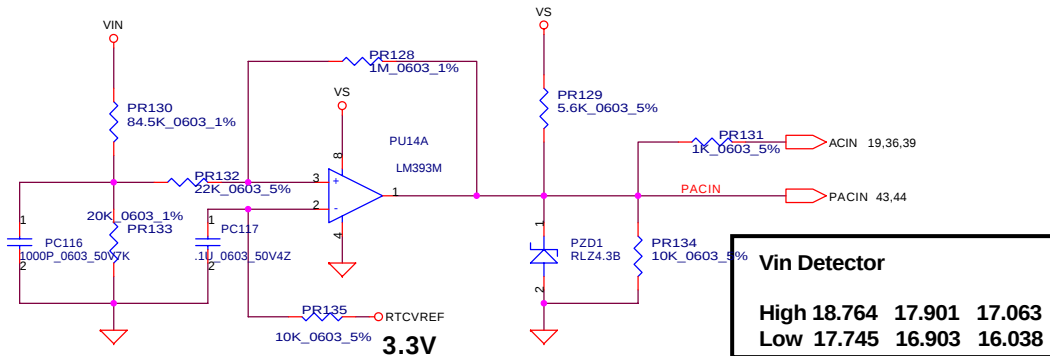
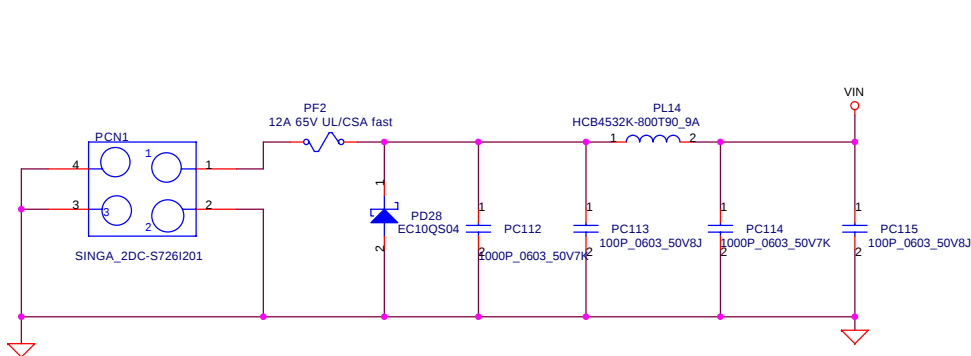
PWM Short J2, J3 & others de-poped

\* RPM De-poped J2, J3 & Others popped

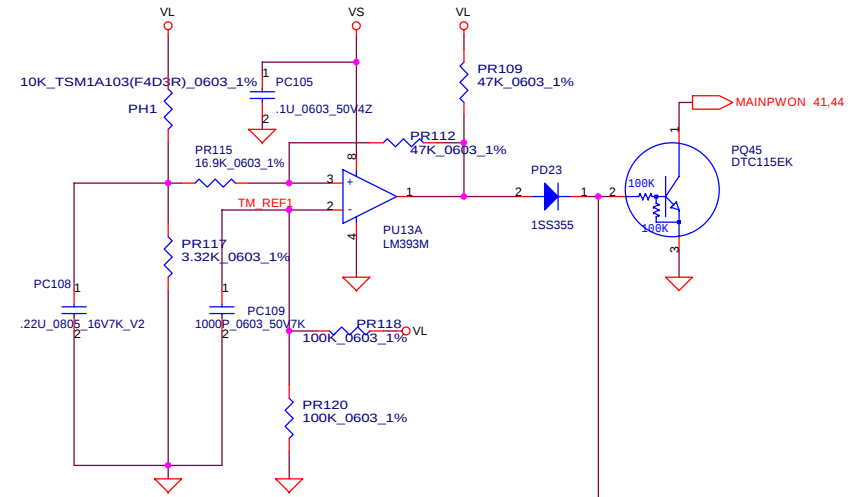
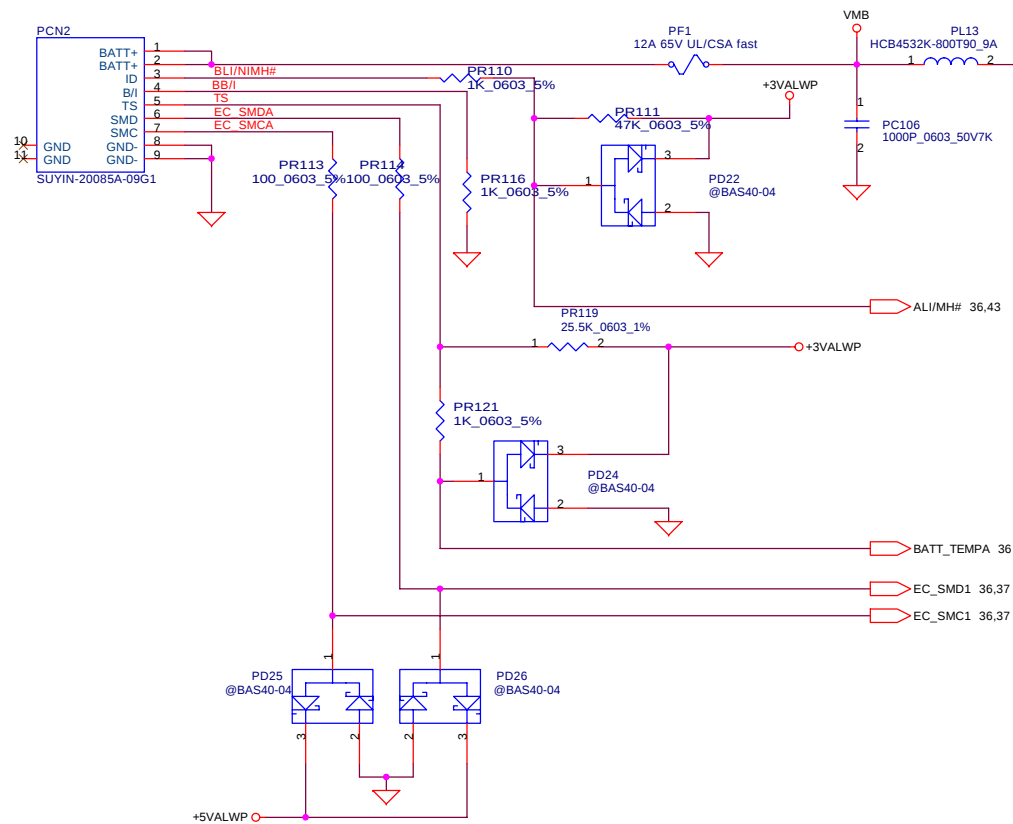


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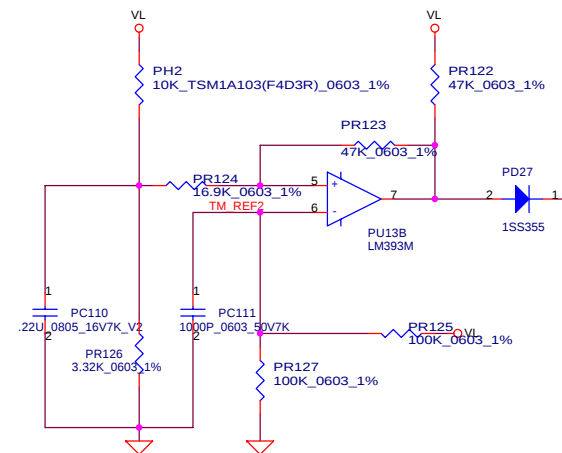




**PH1 under CPU botten side :**  
CPU thermal protection at 84 degree C  
Recovery at 44(45) degree C



**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**

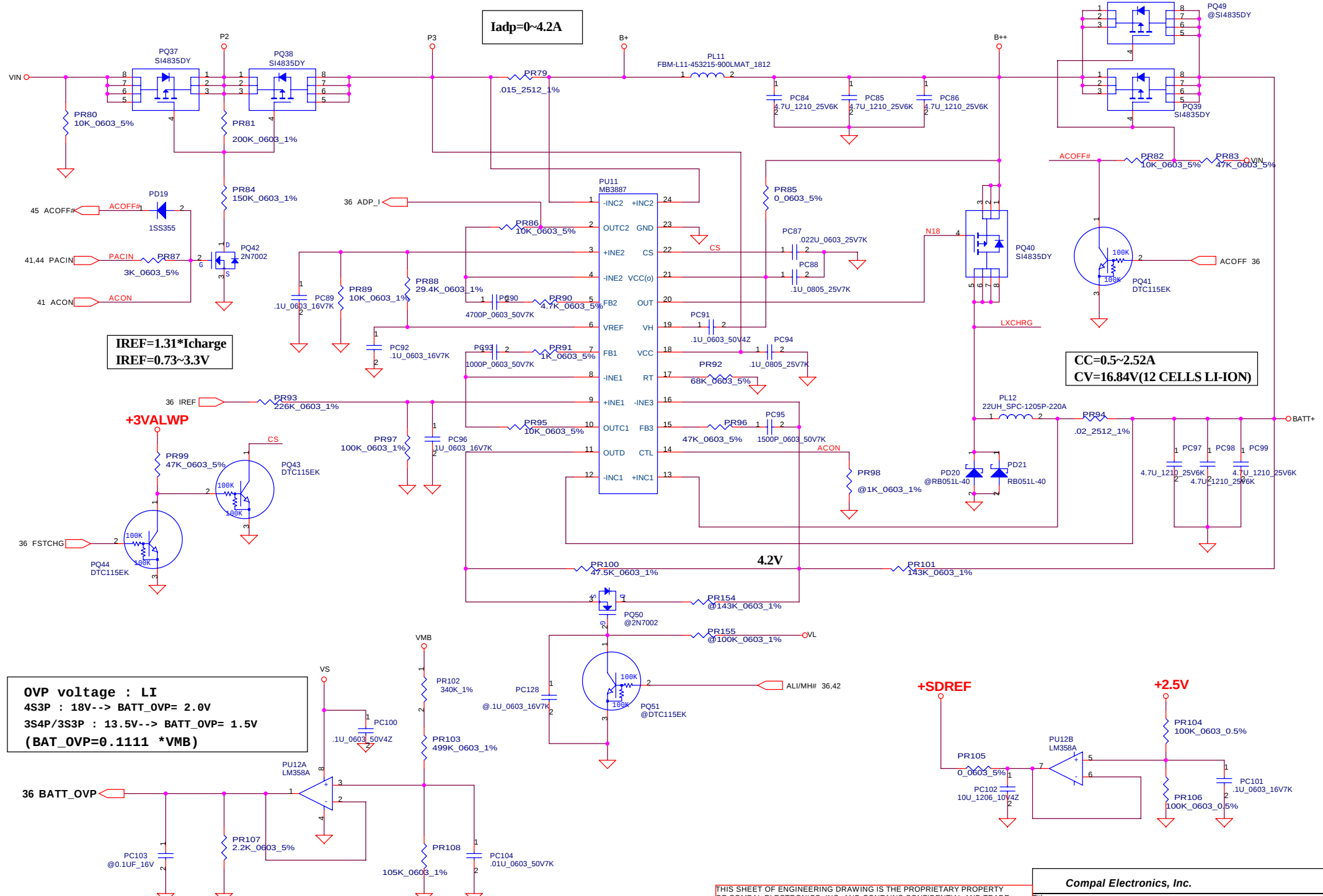
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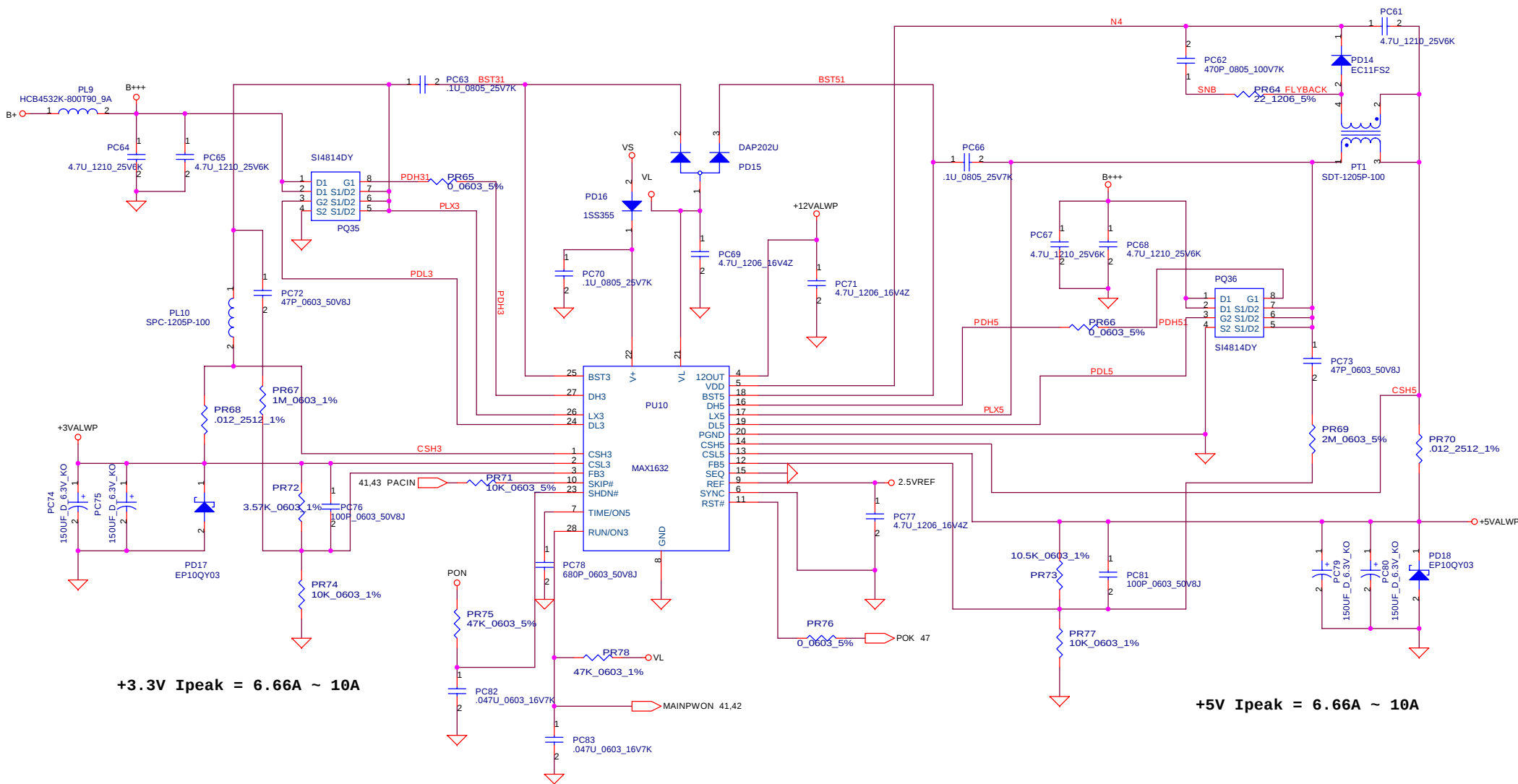
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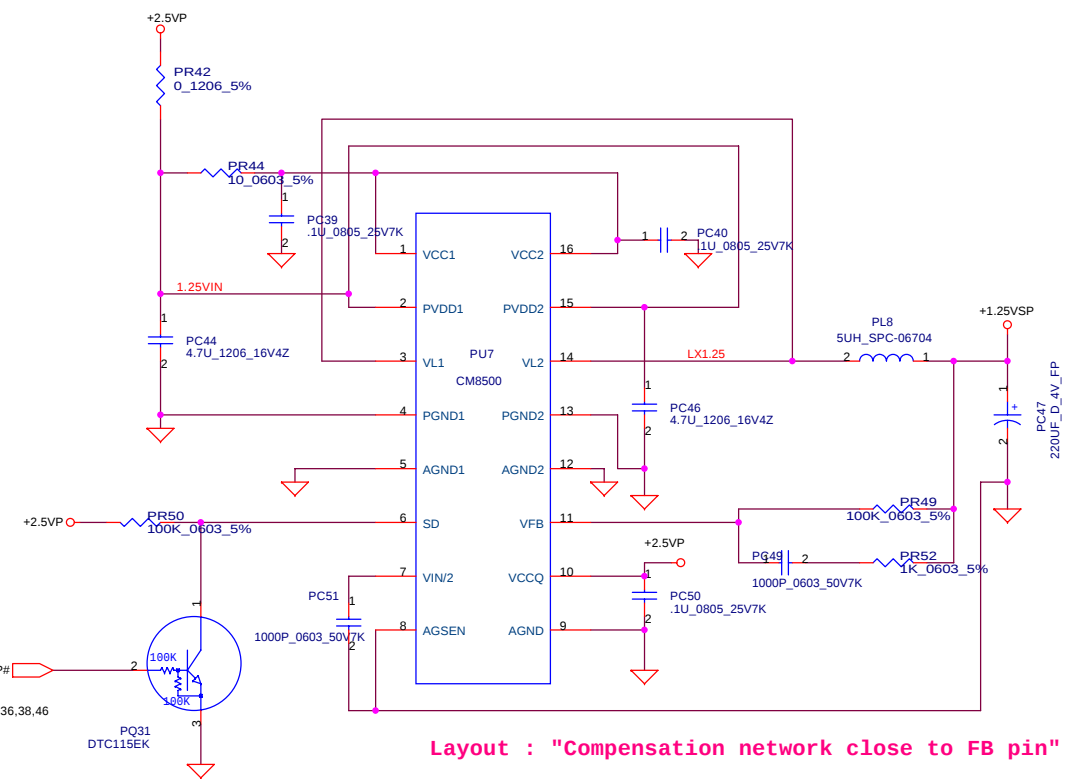
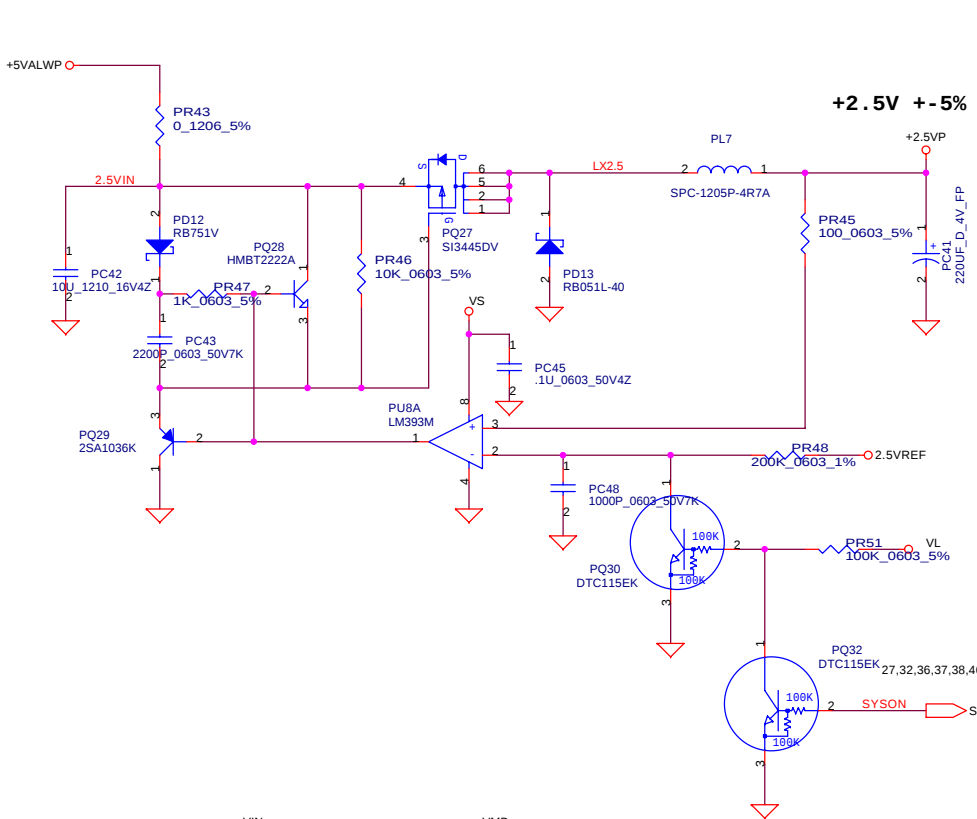
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| Compal Electronics, Inc. |                  |       |          |
| Title                    | CHARGER          |       |          |
| Size                     | Document Number  | Rev   |          |
| B                        | LA1541           | 0.3   |          |
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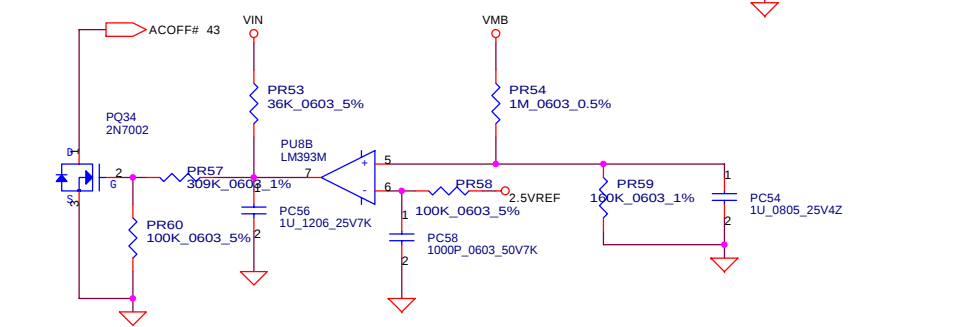
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Compal Electronics, Inc.

|       |                  |                 |          |
|-------|------------------|-----------------|----------|
| Title |                  | 5V/3.3V/12V     |          |
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Layout : "Compensation network close to FB pin"



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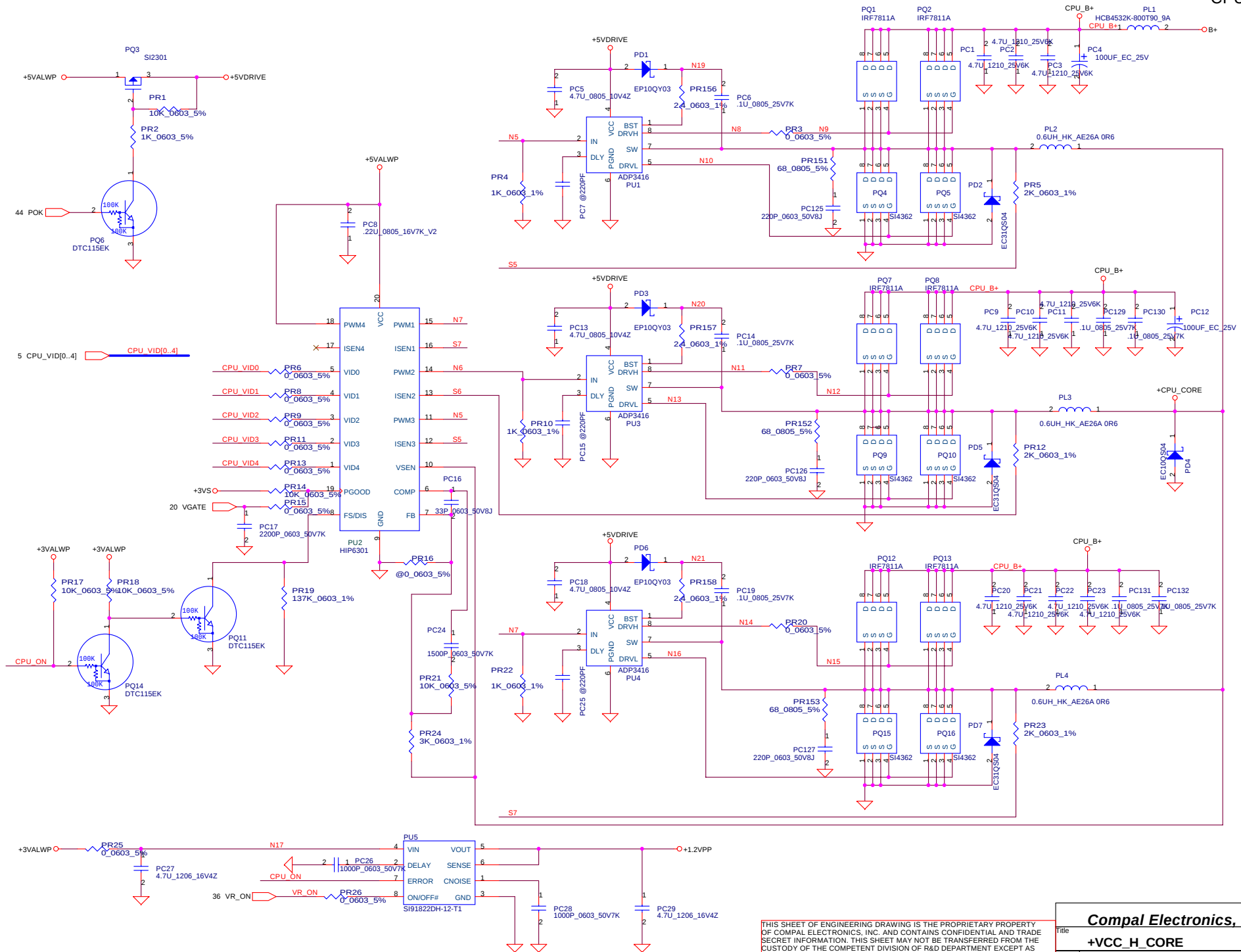
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| Compal Electronics, Inc. |                 |                    |          |
| Title                    |                 | DDR / 2.5V / 1.25V |          |
| Size                     | Document Number | Rev                |          |
| B                        | LA1541          | 0.3                |          |
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| 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<br><b>VGA_CORE / 1.5V</b> |                                  |                   |
| Size<br>B                       | Document Number<br><b>LA1541</b> | Rev<br><b>0.3</b> |
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## CPU-CORE



Compal Electronics, Inc.

|       |                  |       |             |
|-------|------------------|-------|-------------|
| Title |                  |       | +VCC_H CORE |
| Size  | Document Number  | Rev   |             |
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# 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                     | Document Number |                | Rev |
| Custom                   | LA1541          |                | 0.3 |
| Date: 星期二, 十月 29, 2002   |                 | Sheet 48 of 48 |     |