

JET WAY INFORMATION

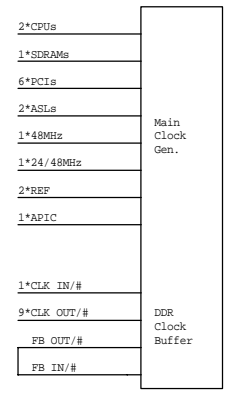
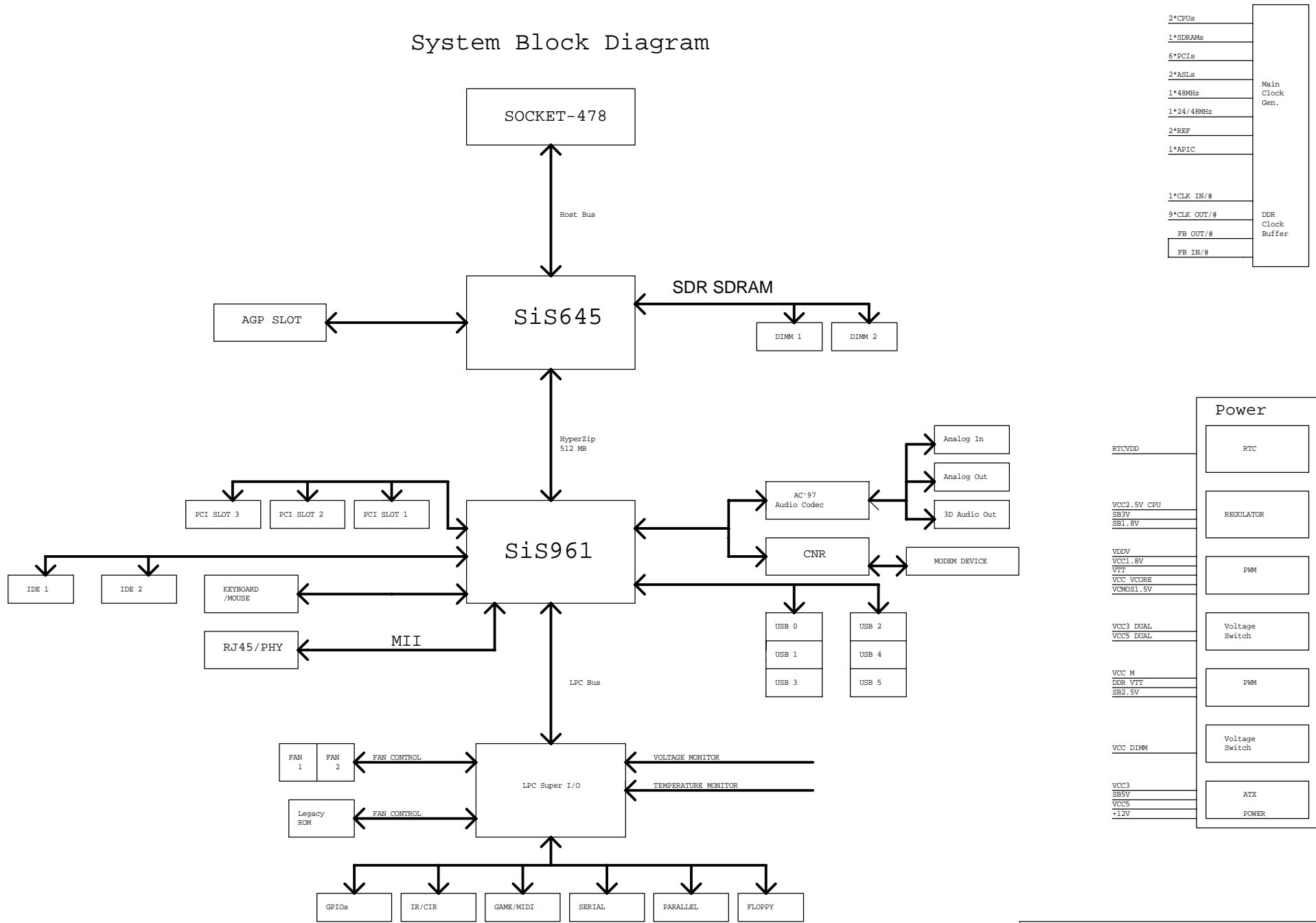
645EM

SiS-645/650 for Pentium 4 (Desktop PC)
Uniprocessor Reference Design Schematics

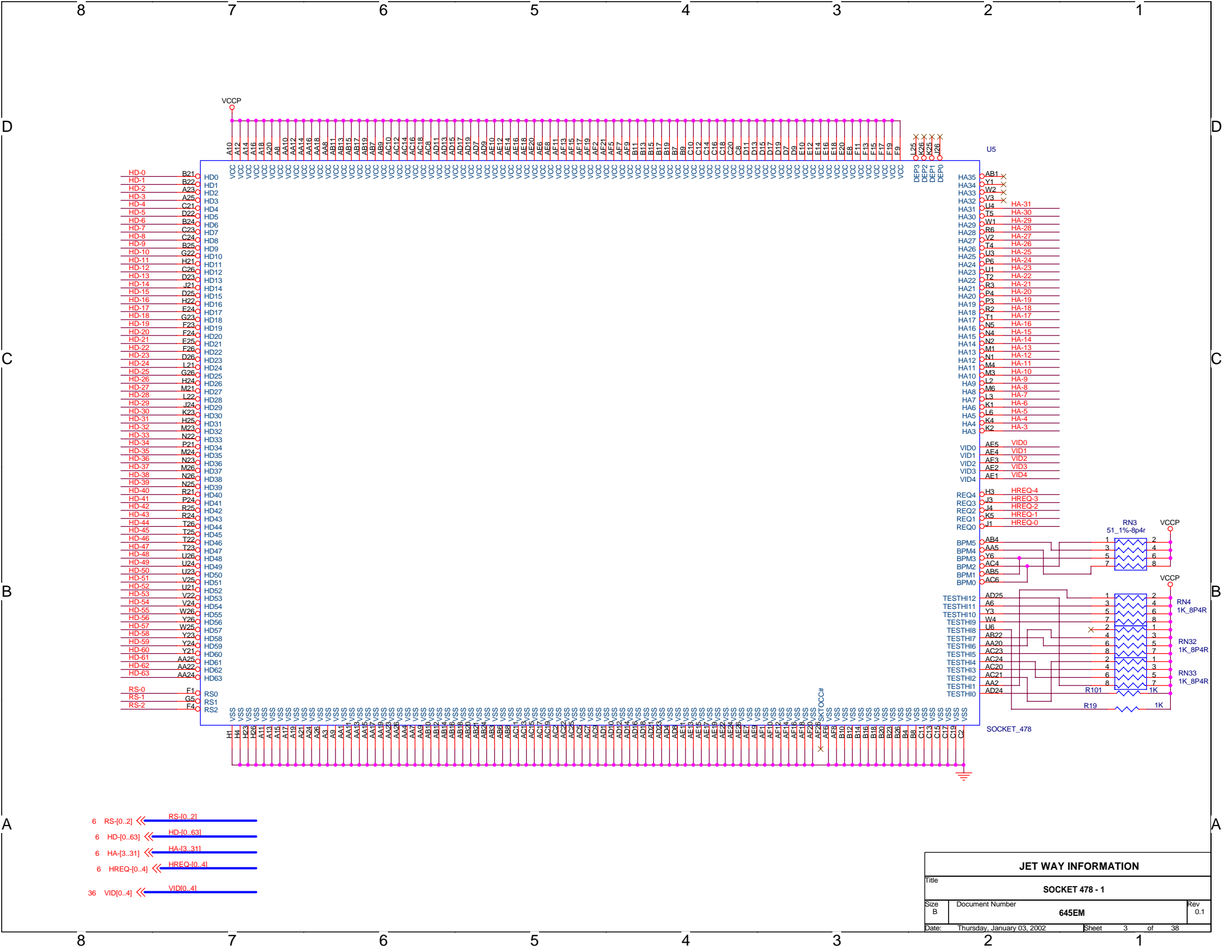
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System Block Diagram

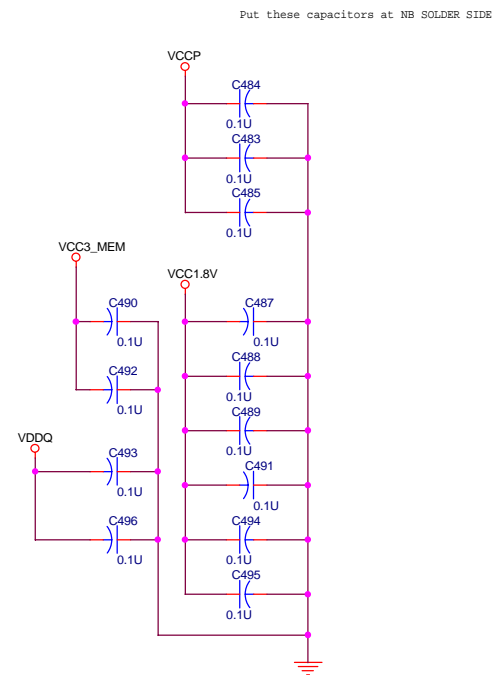
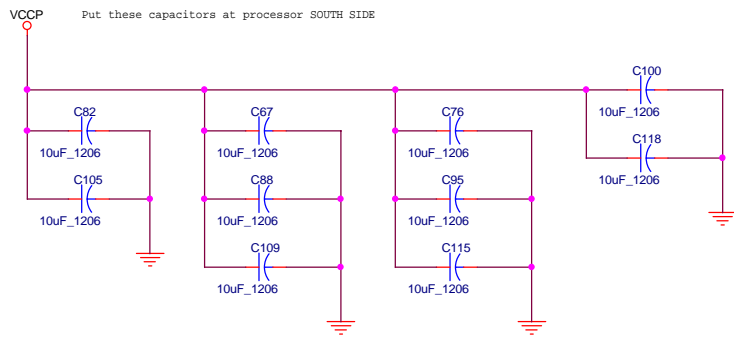
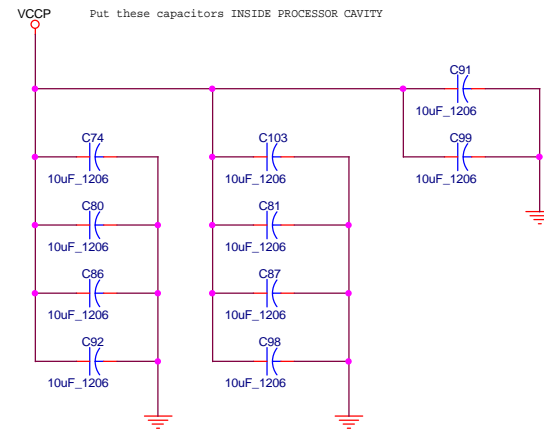
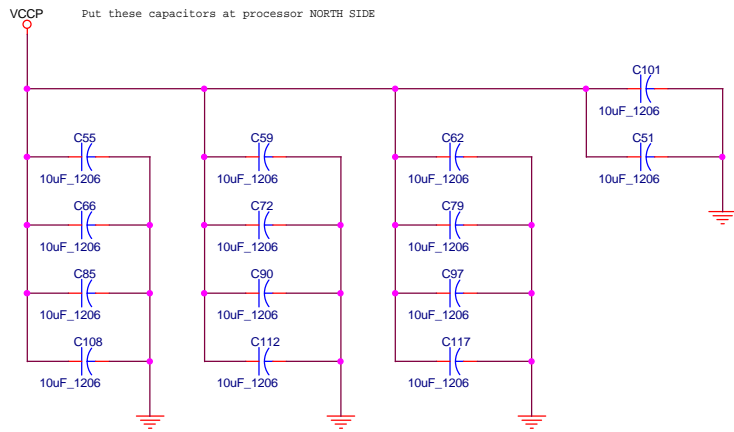


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| System Block Diagram | | | |
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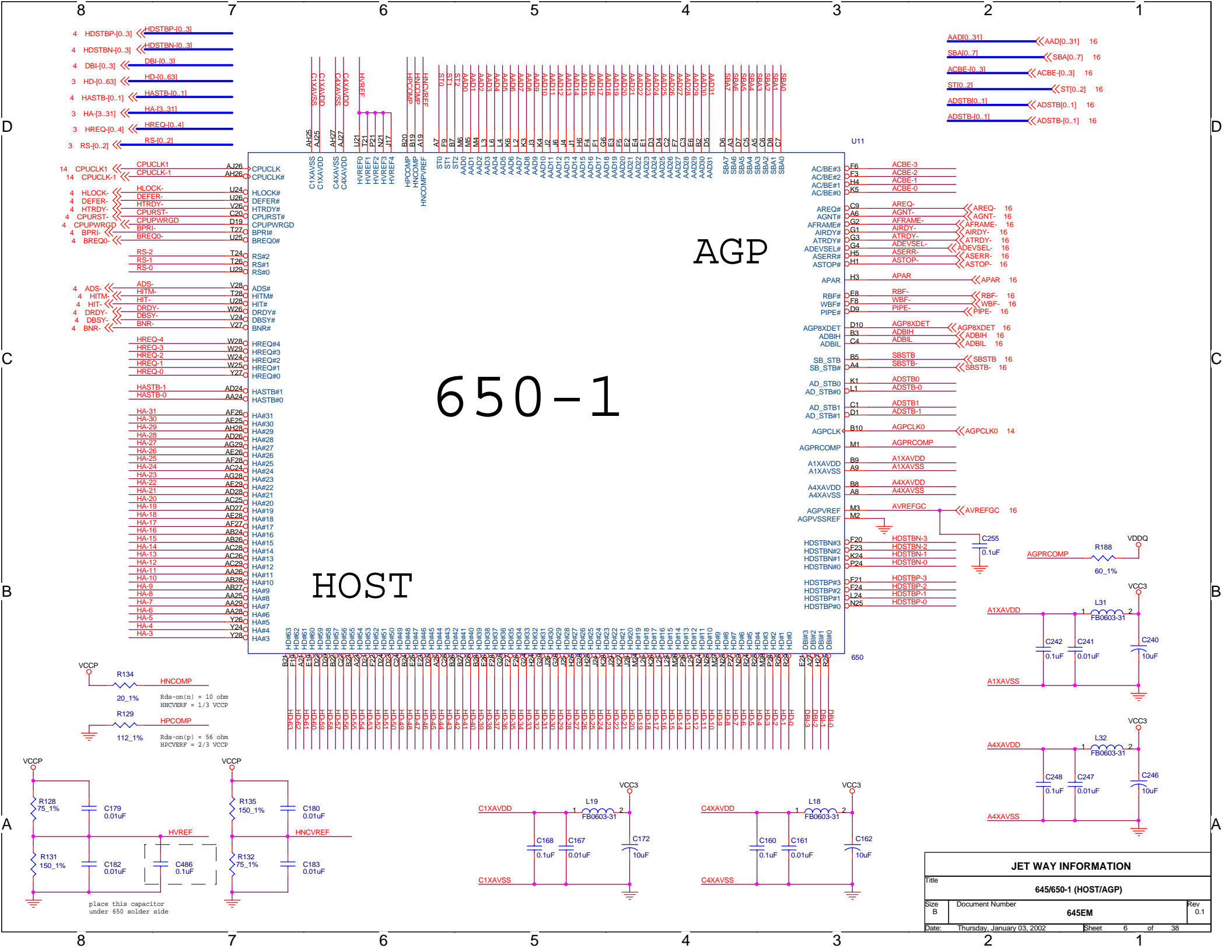


- 6 RS-[0..2] << RS-[0..2]
- 6 HD-[0..63] << HD-[0..63]
- 6 HA-[3..31] << HA-[3..31]
- 6 HREQ-[0..4] << HREQ-[0..4]
- 36 VID-[0..4] << VID-[0..4]

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- 4 HDSTBP[0..3] << HDSTBP[0..3]
- 4 HDSTBN[0..3] << HDSTBN[0..3]
- 4 DBI[0..3] << DBI[0..3]
- 3 HD[0..63] << HD[0..63]
- 4 HASTB[0..1] << HASTB[0..1]
- 3 HA[3..31] << HA[3..31]
- 3 HREQ[0..4] << HREQ[0..4]
- 3 RS[0..2] << RS[0..2]

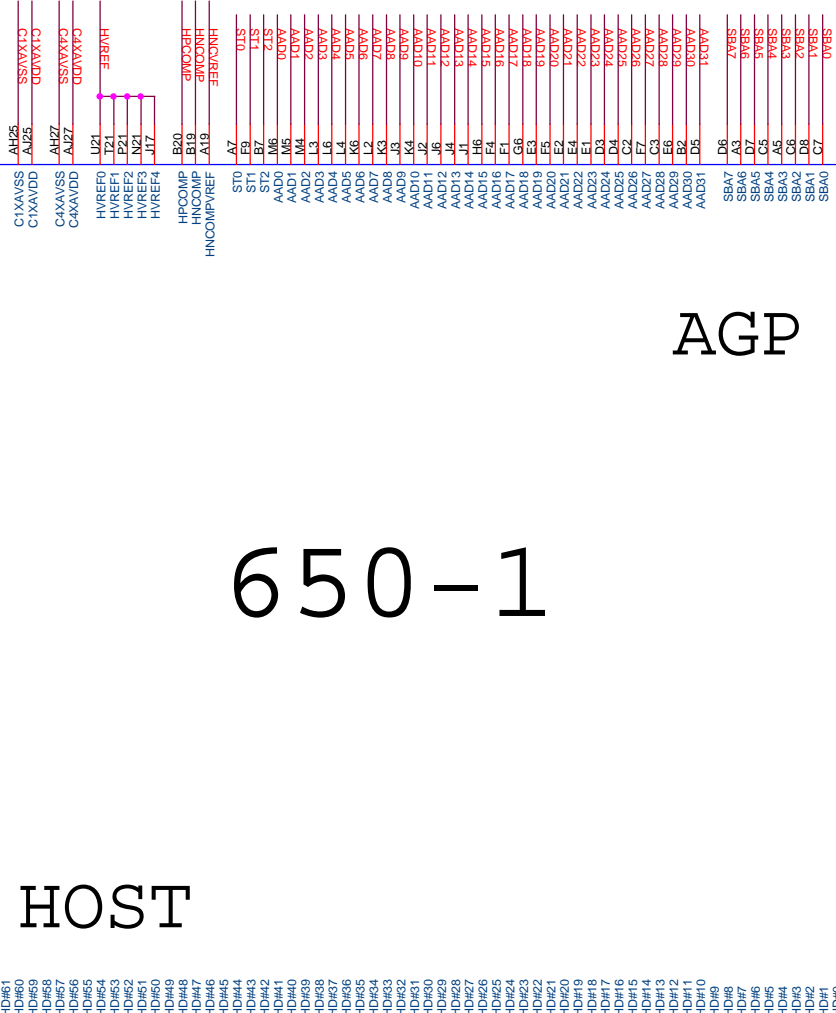
- AAD[0..31] << AAD[0..31] 16
- SBA[0..7] << SBA[0..7] 16
- ACBE[0..3] << ACBE[0..3] 16
- ST[0..2] << ST[0..2] 16
- ADSTB[0..1] << ADSTB[0..1] 16
- ADSTB[0..1] << ADSTB[0..1] 16

- 14 CPULCK1 << CPULCK1
- 14 CPULCK-1 << CPULCK-1
- 4 HLOCK- << HLOCK-
- 4 DEFER- << DEFER-
- 4 HTRDY- << HTRDY-
- 4 CPURST- << CPURST-
- 4 CPUWRGD << CPUWRGD
- 4 BPR# << BPR#
- 4 BREQ0- << BREQ0-

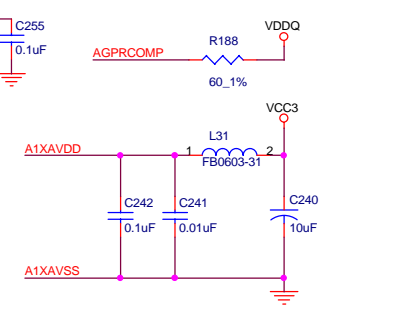
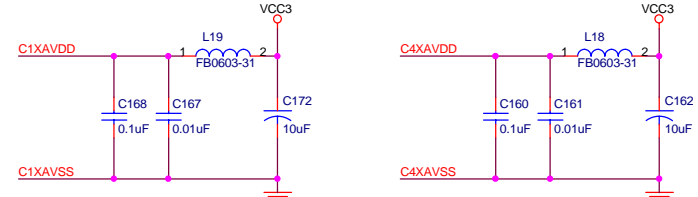
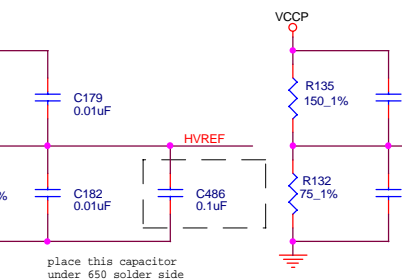
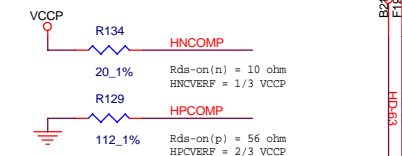
- 4 ADS- << ADS-
- 4 HITM- << HITM-
- 4 HIT- << HIT-
- 4 DRDY- << DRDY-
- 4 DBSY- << DBSY-
- 4 BNR- << BNR-

- HREQ-4 << HREQ#4
- HREQ-3 << HREQ#3
- HREQ-2 << HREQ#2
- HREQ-1 << HREQ#1
- HREQ-0 << HREQ#0

- HASTB-1 << HASTB#1
- HASTB-0 << HASTB#0
- HA-31 << HA#31
- HA-30 << HA#30
- HA-29 << HA#29
- HA-28 << HA#28
- HA-27 << HA#27
- HA-26 << HA#26
- HA-25 << HA#25
- HA-24 << HA#24
- HA-23 << HA#23
- HA-22 << HA#22
- HA-21 << HA#21
- HA-20 << HA#20
- HA-19 << HA#19
- HA-18 << HA#18
- HA-17 << HA#17
- HA-16 << HA#16
- HA-15 << HA#15
- HA-14 << HA#14
- HA-13 << HA#13
- HA-12 << HA#12
- HA-11 << HA#11
- HA-10 << HA#10
- HA-9 << HA#9
- HA-8 << HA#8
- HA-7 << HA#7
- HA-6 << HA#6
- HA-5 << HA#5
- HA-4 << HA#4
- HA-3 << HA#3



- ACBE#3 << ACBE-3
- ACBE#2 << ACBE-2
- ACBE#1 << ACBE-1
- ACBE#0 << ACBE-0
- AREQ# << AREQ- 16
- AGNT# << AGNT- 16
- AFRAME# << AFRAME- 16
- AIRDY# << AIRDY- 16
- ATRDY# << ATRDY- 16
- ADEVSEL# << ADEVSEL- 16
- ASERR# << ASERR- 16
- ASTOP# << ASTOP- 16
- APAR << APAR 16
- RBF# << RBF- 16
- WBF# << WBF- 16
- PIPE# << PIPE- 16
- AGP8XDET << AGP8XDET 16
- ADBIH << ADBIH 16
- ADBIL << ADBIL 16
- SB_STB << SBSTB 16
- SB_STB# << SBSTB- 16
- AD_STB0 << ADSTB0
- AD_STB#0 << ADSTB-0
- AD_STB1 << ADSTB1
- AD_STB#1 << ADSTB-1
- AGPCLK << AGPCLK0 14
- AGPRCOMP << AGPRCOMP
- A1XAVDD << A1XAVDD
- A1XAVSS << A1XAVSS
- A4XAVDD << A4XAVDD
- A4XAVSS << A4XAVSS
- AGPVREF << AVREFGC 16
- AGPVSSREF << AVREFGC 16
- HDSTBN#3 << HDSTBN-3
- HDSTBN#2 << HDSTBN-2
- HDSTBN#1 << HDSTBN-1
- HDSTBN#0 << HDSTBN-0
- HDSTBP#3 << HDSTBP-3
- HDSTBP#2 << HDSTBP-2
- HDSTBP#1 << HDSTBP-1
- HDSTBP#0 << HDSTBP-0



| JET WAY INFORMATION | | | |
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| 645/650-1 (HOST/AGP) | | | |
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18 MA[0..14] << MA[0..14]
 18 MD[0..63] << MD[0..63]
 18 DQM[0..7] << DQM[0..7]

Rs place close to DIMM1

CKE[0..3] << CKE[0..3] 18,19

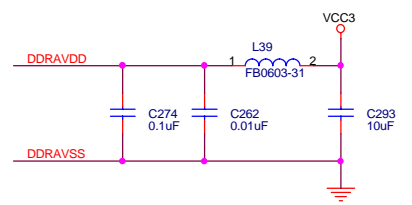
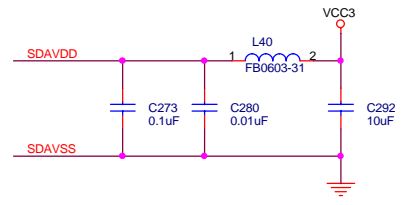
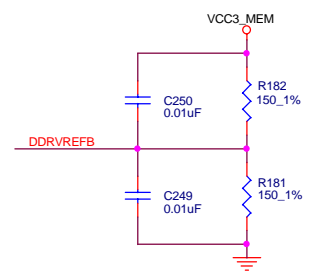
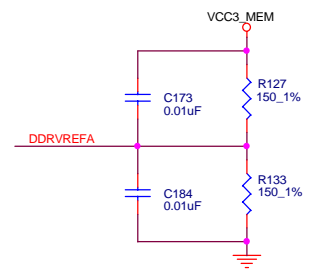
U11-1

| | | |
|---------|------|------------|
| MD0 | AJ23 | MD0 |
| MD1 | AG22 | MD1 |
| MD2 | AH21 | MD2 |
| MD3 | AJ21 | MD3 |
| MD4 | AD23 | MD4 |
| MD5 | AE23 | MD5 |
| MD6 | AF22 | MD6 |
| MD7 | AF21 | MD7 |
| DQM0 | AD22 | DQM0 |
| 18 DQS0 | DQS0 | DQS0/CSB#0 |
| MD8 | AG20 | MD8 |
| MD9 | AE19 | MD9 |
| MD10 | AE19 | MD10 |
| MD11 | AE19 | MD11 |
| MD12 | AE21 | MD12 |
| MD13 | AD20 | MD13 |
| MD14 | AD19 | MD14 |
| MD15 | AH19 | MD15 |
| DQM1 | AE20 | DQM1 |
| 18 DQS1 | DQS1 | DQS1/CSB#1 |
| MD16 | AF18 | MD16 |
| MD17 | AG18 | MD17 |
| MD18 | AH17 | MD18 |
| MD19 | AD16 | MD19 |
| MD20 | AD16 | MD20 |
| MD21 | AD17 | MD21 |
| MD22 | AE17 | MD22 |
| MD23 | AJ17 | MD23 |
| DQM2 | AE17 | DQM2 |
| 18 DQS2 | DQS2 | DQS2/CSB#2 |
| MD24 | AH18 | MD24 |
| MD25 | AD14 | MD25 |
| MD26 | AG14 | MD26 |
| MD27 | AJ13 | MD27 |
| MD28 | AE13 | MD28 |
| MD29 | AJ15 | MD29 |
| MD30 | AF14 | MD30 |
| MD31 | AD13 | MD31 |
| DQM3 | AE13 | DQM3 |
| 18 DQS3 | DQS3 | DQS3/CSB#3 |
| MD32 | AH14 | MD32 |
| MD33 | AD10 | MD33 |
| MD34 | AH10 | MD34 |
| MD35 | AE9 | MD35 |
| MD36 | AD8 | MD36 |
| MD37 | AG10 | MD37 |
| MD38 | AE10 | MD38 |
| MD39 | AH9 | MD39 |
| DQM4 | AF9 | DQM4 |
| MD40 | AJ9 | DQS4/CSB#4 |
| MD41 | AH5 | MD41 |
| MD42 | AG4 | MD42 |
| MD43 | AH3 | MD43 |
| MD44 | AG6 | MD44 |
| MD45 | AF6 | MD45 |
| MD46 | AE5 | MD46 |
| MD47 | AF4 | MD47 |
| DQM5 | AH4 | DQM5 |
| MD48 | AJ3 | DQS5/CSB#5 |
| MD49 | AE4 | MD49 |
| MD50 | AD6 | MD50 |
| MD51 | AE2 | MD51 |
| MD52 | AC5 | MD52 |
| MD53 | AG2 | MD53 |
| MD54 | AG1 | MD54 |
| MD55 | AE3 | MD55 |
| DQM6 | AC6 | DQM6 |
| MD56 | AD4 | DQS6/CSB#6 |
| MD57 | AB6 | MD57 |
| MD58 | AD3 | MD58 |
| MD59 | AA6 | MD59 |
| MD60 | AB3 | MD60 |
| MD61 | AC4 | MD61 |
| MD62 | AE1 | MD62 |
| MD63 | AD2 | MD63 |
| DQM7 | AC1 | DQM7 |
| | AB4 | DQS7/CSB#7 |
| | AC2 | |

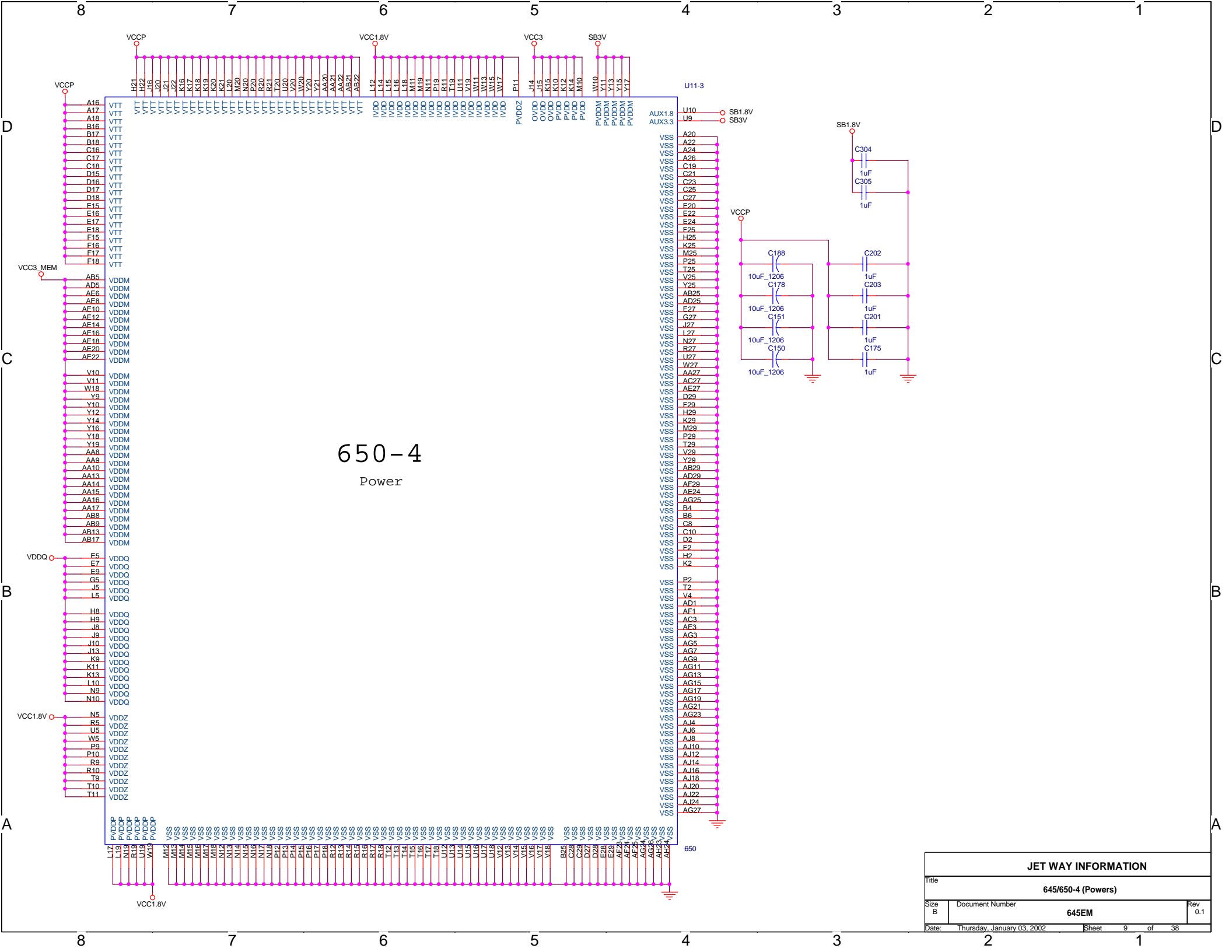
650-2

Rs place close to DIMM1

| | | |
|----------|------|----------|
| MA0 | AH11 | MA0 |
| MA1 | AH12 | MA1 |
| MA2 | AG12 | MA2 |
| MA3 | AD12 | MA3 |
| MA4 | AH15 | MA4 |
| MA5 | AF15 | MA5 |
| MA6 | AF15 | MA6 |
| MA7 | AH16 | MA7 |
| MA8 | AF15 | MA8 |
| MA9 | AD15 | MA9 |
| MA10 | AF11 | MA10 |
| MA11 | AG8 | MA11 |
| MA12 | AJ11 | MA12 |
| MA13 | AG16 | MA13 |
| MA14 | AF16 | MA14 |
| SRAS# | AH8 | SRAS- |
| SCAS# | AJ7 | SCAS- |
| SWE# | AH7 | SWE- |
| CS#0 | AE7 | CS-0 |
| CS#1 | AF7 | CS-1 |
| CS#2 | AH6 | CS-2 |
| CS#3 | AJ5 | CS-3 |
| CS#4 | AF8 | CS-3 |
| CS#5 | AD7 | CS-3 |
| CKE0 | AB2 | CKE0 |
| CKE1 | AA4 | CKE1 |
| CKE2 | AB1 | CKE2 |
| CKE3 | Y6 | CKE3 |
| CKE4 | AA5 | CKE3 |
| CKE5 | Y5 | CKE3 |
| S3AUXSW# | Y4 | S3AUXSW- |
| SDCLK | AA3 | SDCLK |
| FWSDCLKO | AD11 | FWSDCLKO |
| SDRCLKI | AE11 | SDCLKI |
| SDAVDD | Y1 | SDAVDD |
| SDAVSS | Y2 | SDAVSS |
| DDRAVDD | AA1 | DDRAVDD |
| DDRAVSS | AA2 | DDRAVSS |
| DDRVREFA | AJ19 | DDRVREFA |
| DDRVREFB | AH2 | DDRVREFB |
| DRAM_SEL | W3 | DRAM_SEL |

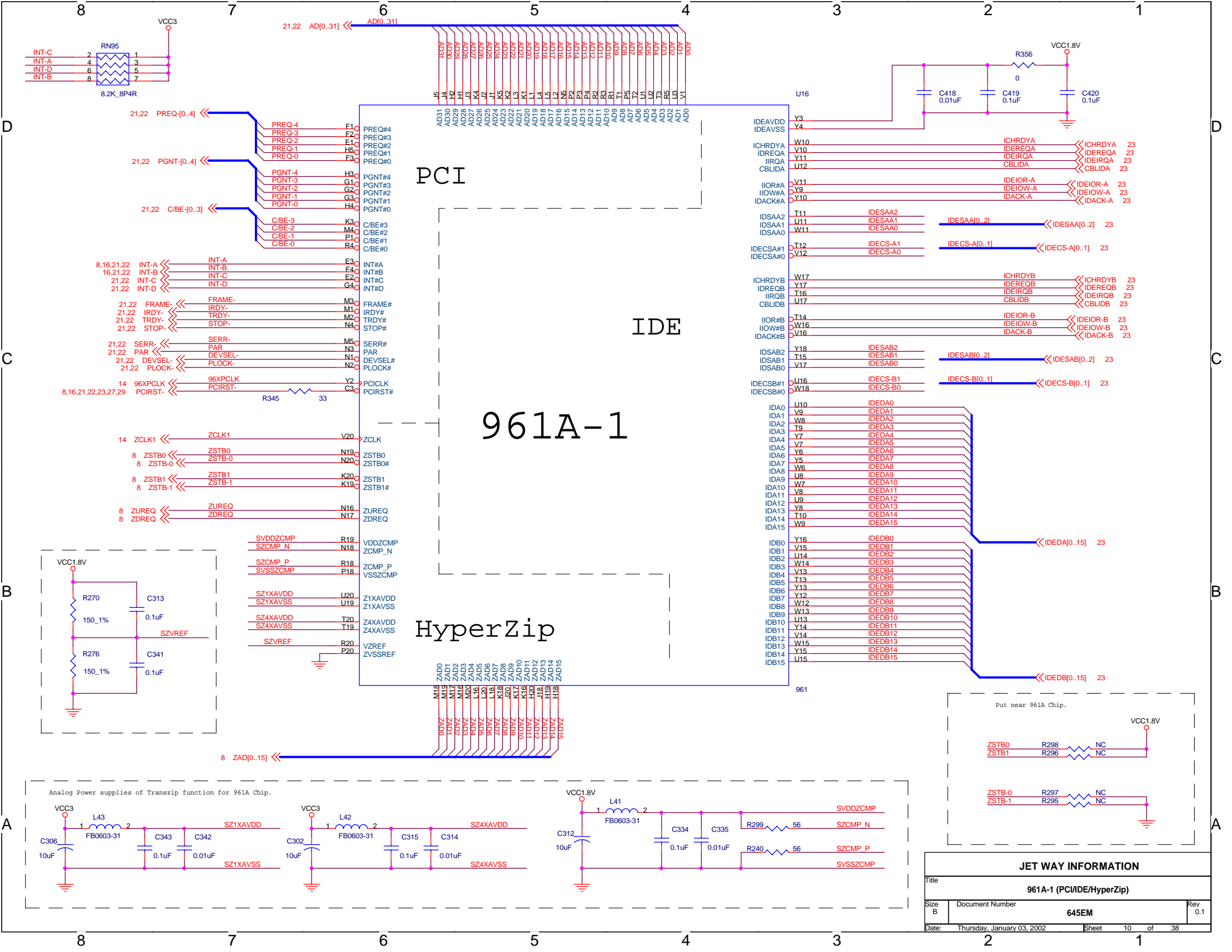


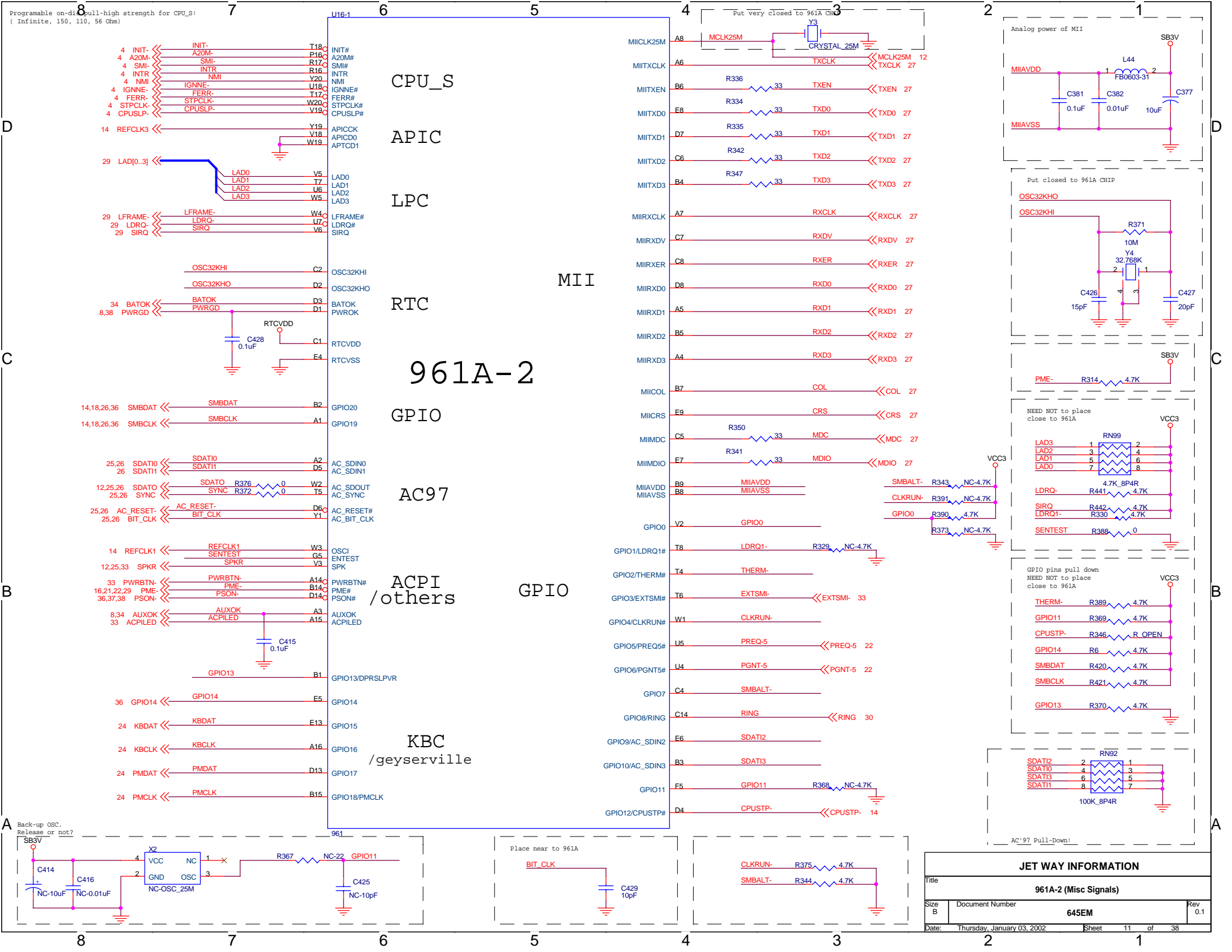
| JET WAY INFORMATION | | | |
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| Title | 645/650-2 (MEMORY for SDR) | | |
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650-4
Power

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Programmable on-die pull-high strength for CPU_S:
(Infinite, 150, 110, 56 Ohm)

D

C

B

A

CPU_S

APIC

LPC

RTC

961A-2

GPIO

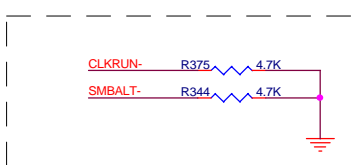
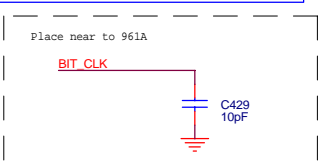
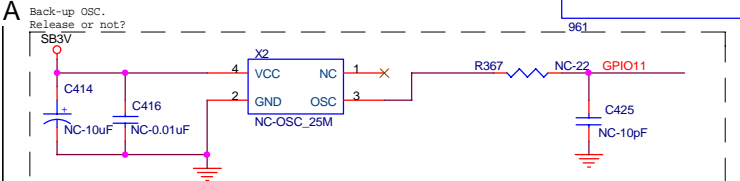
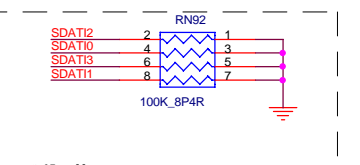
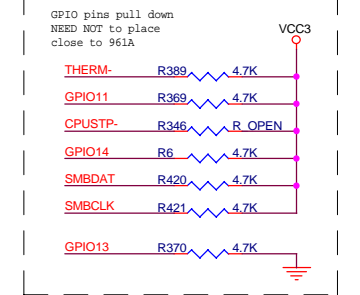
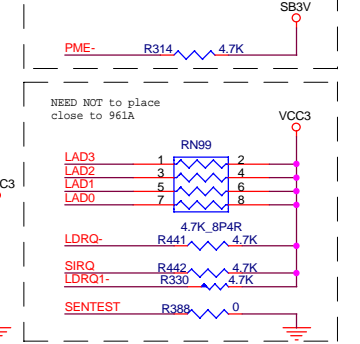
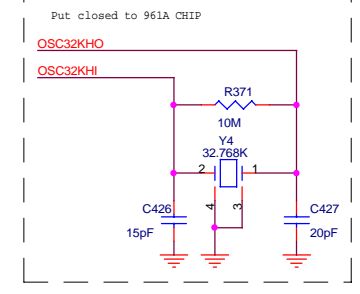
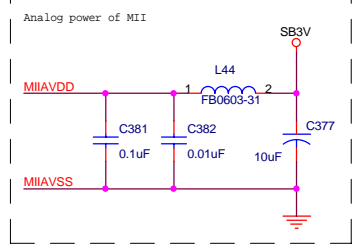
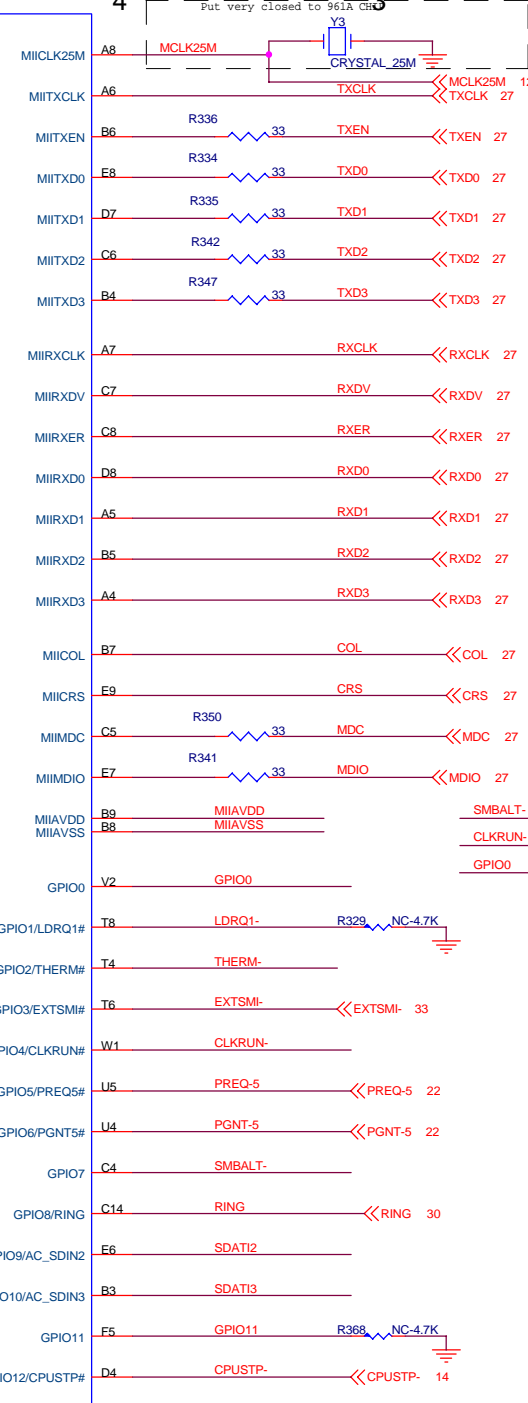
AC97

ACPI /others

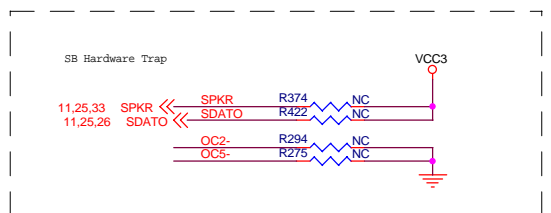
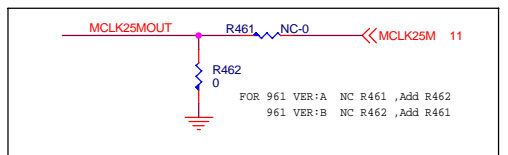
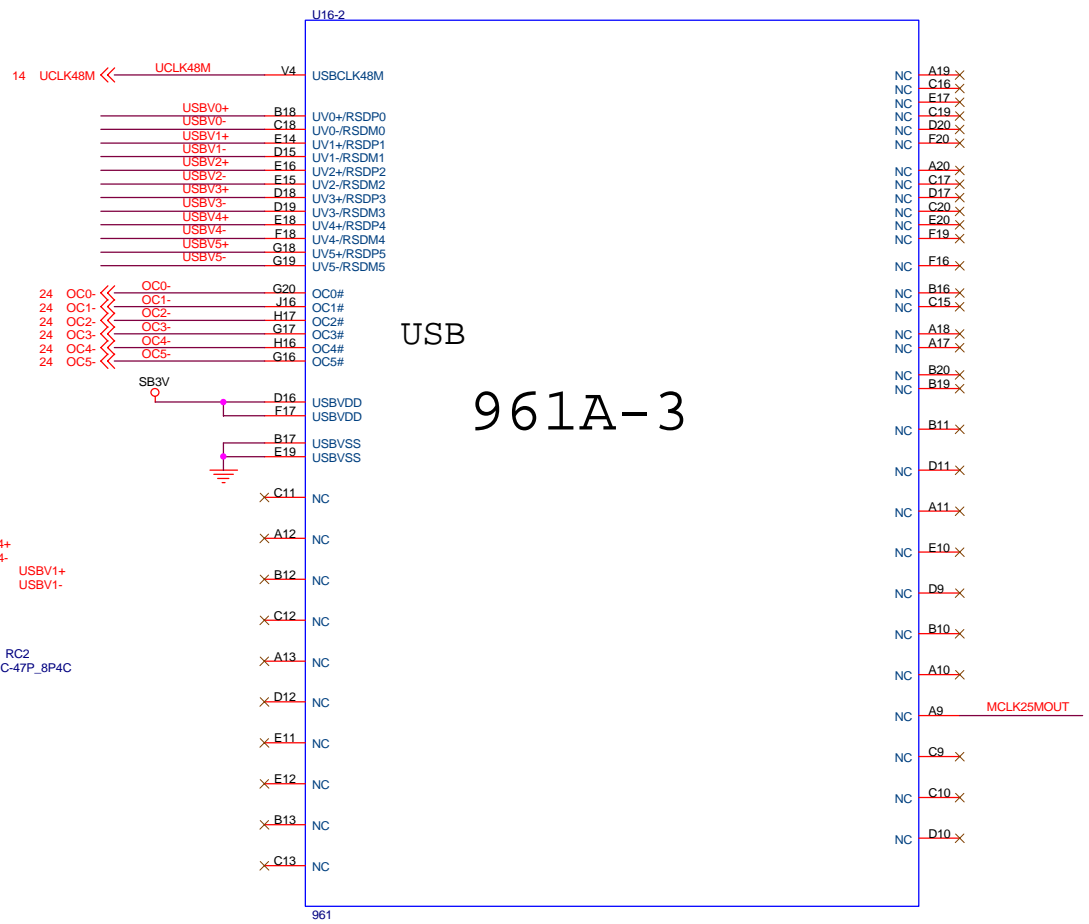
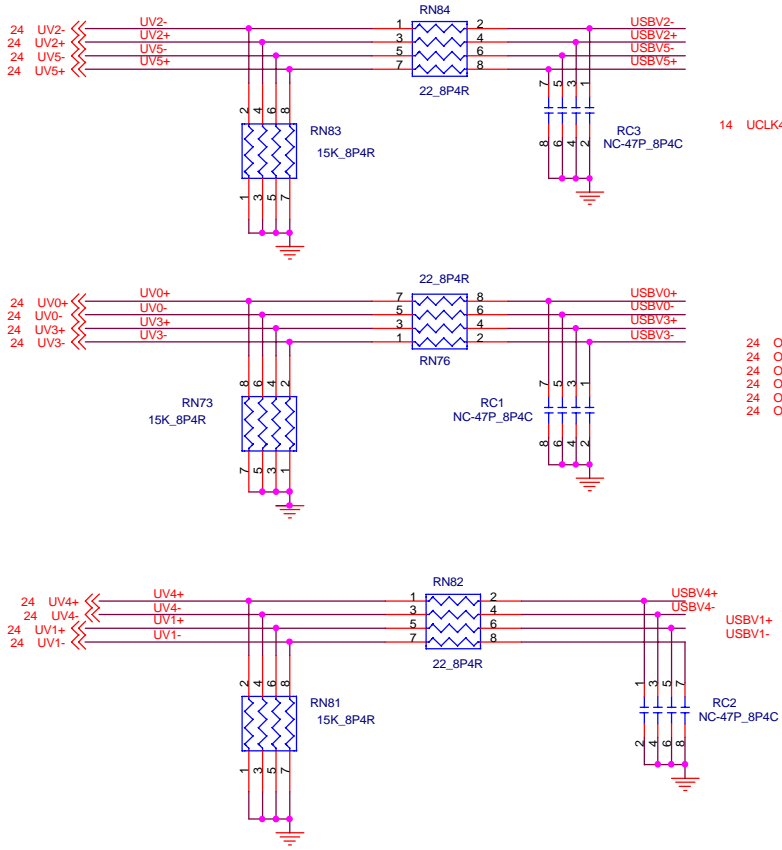
KBC /geyserville

MII

GPIO

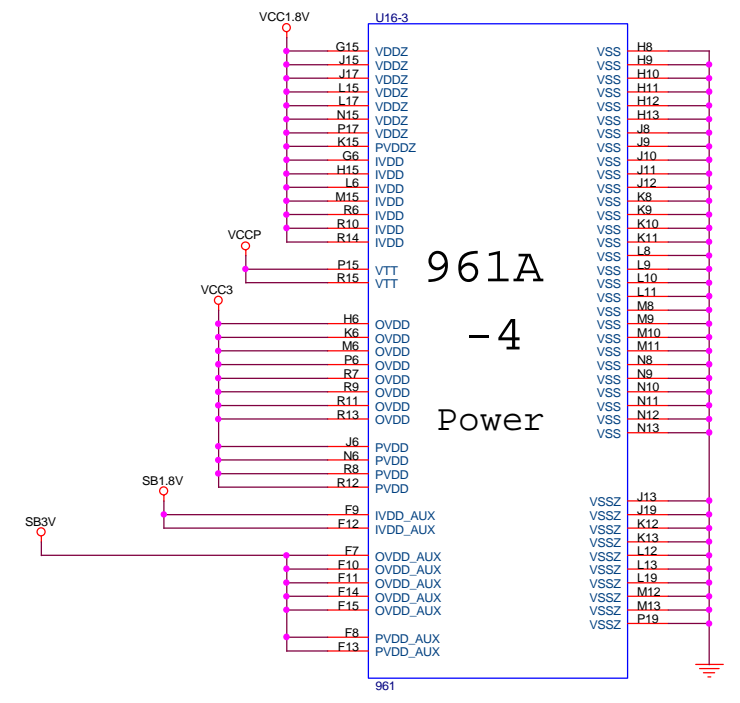
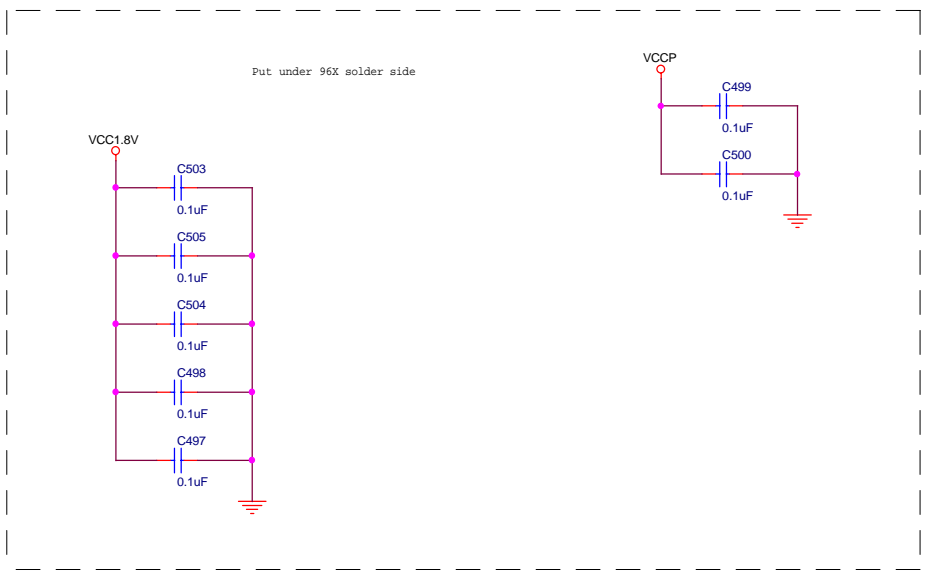
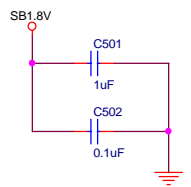


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| Title | 961A-2 (Misc Signals) | | |
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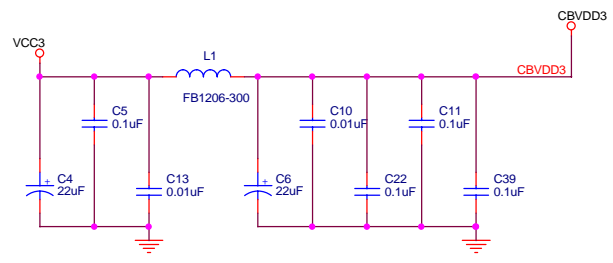
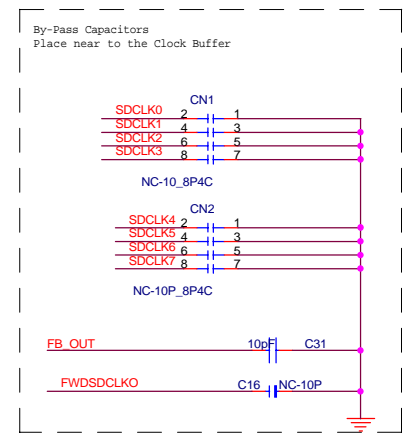
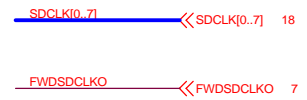
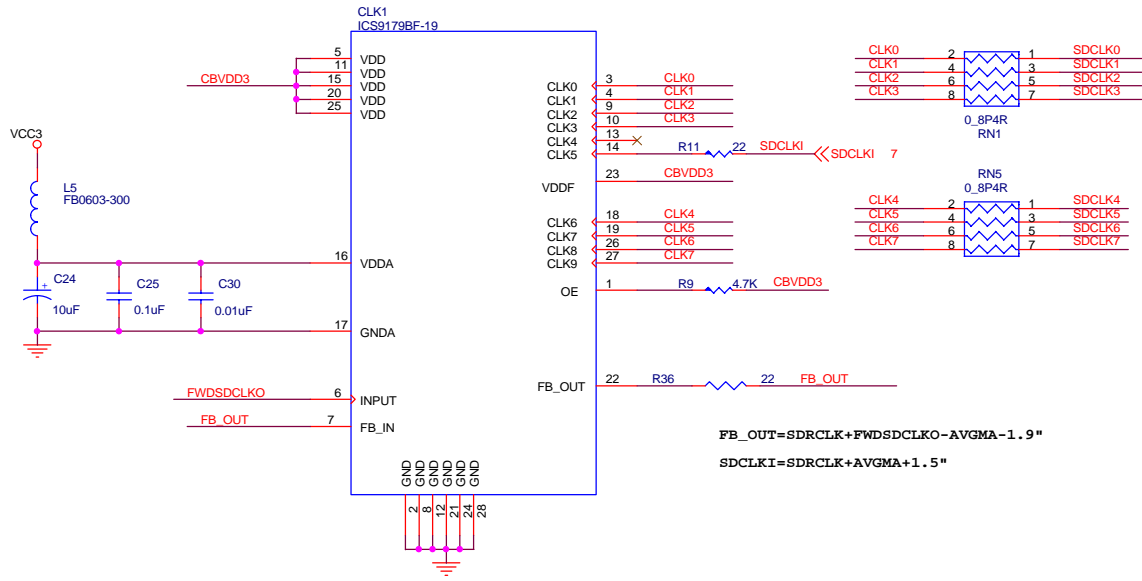
| | 0 | 1 | Default | embedded pull-low (30-50K Ohm) |
|-------------------------|---------|---------|---------|--------------------------------|
| SPKR(LPC_addr mapping) | disable | enable | 0 | yes |
| SDATO(PCICLK_PLL) | enable | disable | 0 | yes |
| OC2-(SB debug mode) | enable | disable | 1 | yes |
| OC5-(Trap mode) | PCI AD | ROM | 1 | yes |

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Clock Buffer (SDR)

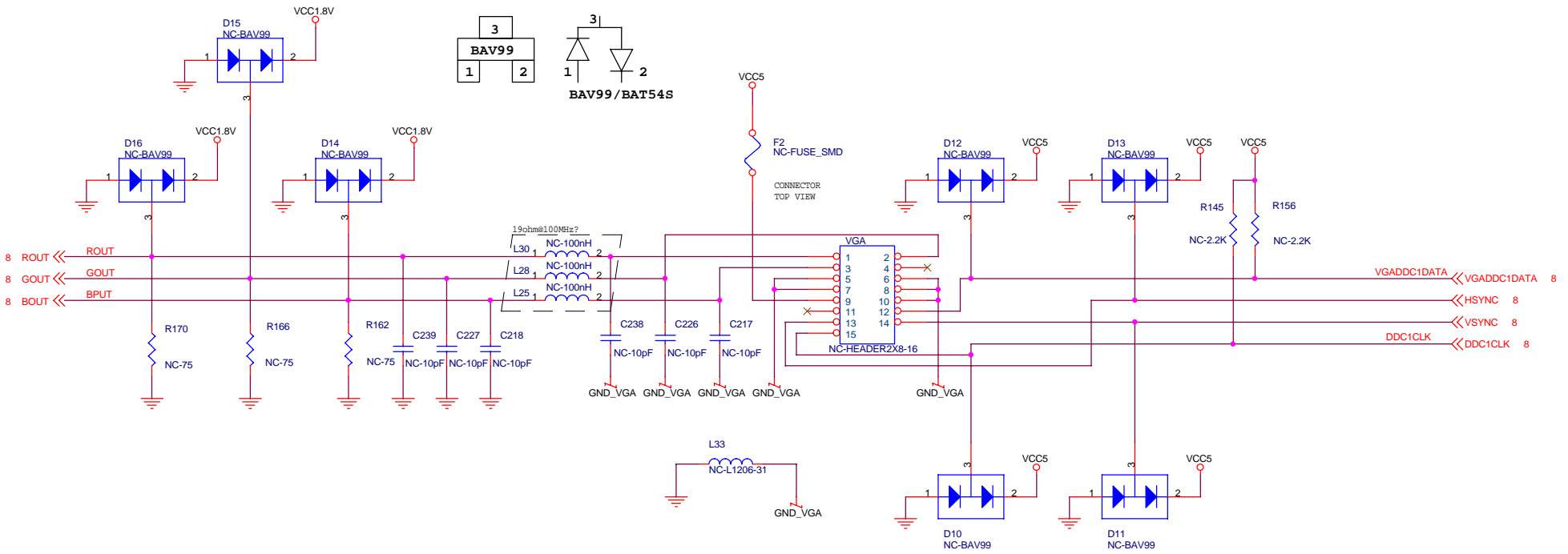


$FB_OUT = SDRCLK + FWDSDCLKO - AVGMA - 1.9"$
 $SDCLKI = SDRCLK + AVGMA + 1.5"$

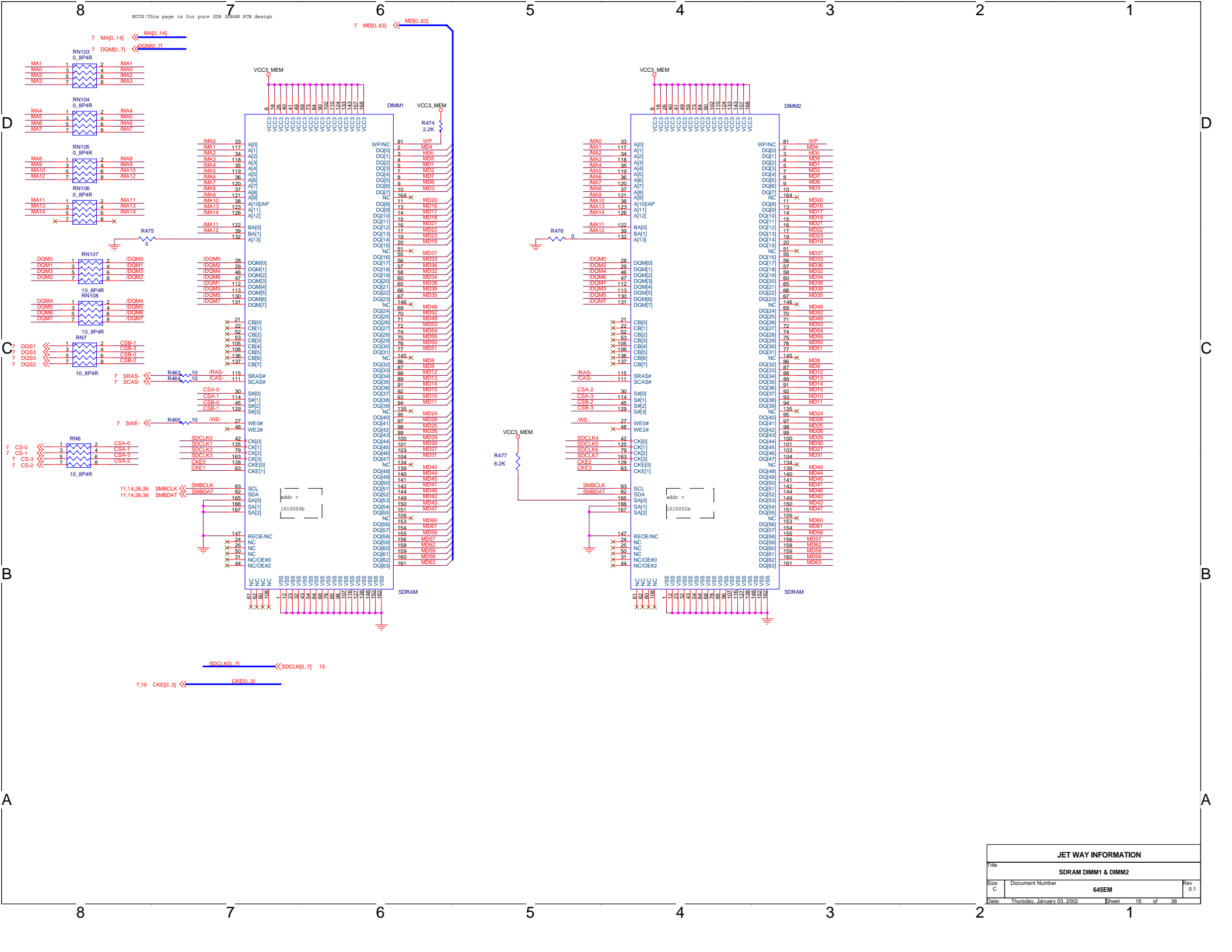
| JET WAY INFORMATION | | | |
|---------------------|----------------------------|----------|---------|
| Title | CLOCK BUFFER (SDR) | | |
| Size B | Document Number | 645EM | Rev 0.1 |
| Date: | Thursday, January 03, 2002 | Sheet 15 | of 38 |

VGA CONNECTOR

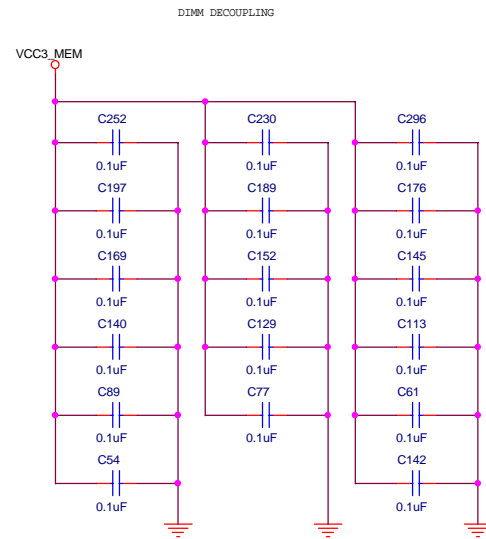
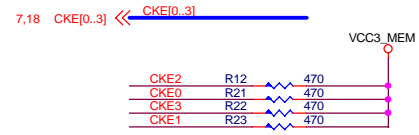
NOTE: This page is for universal PCB design(suitable for both 645 or 650)



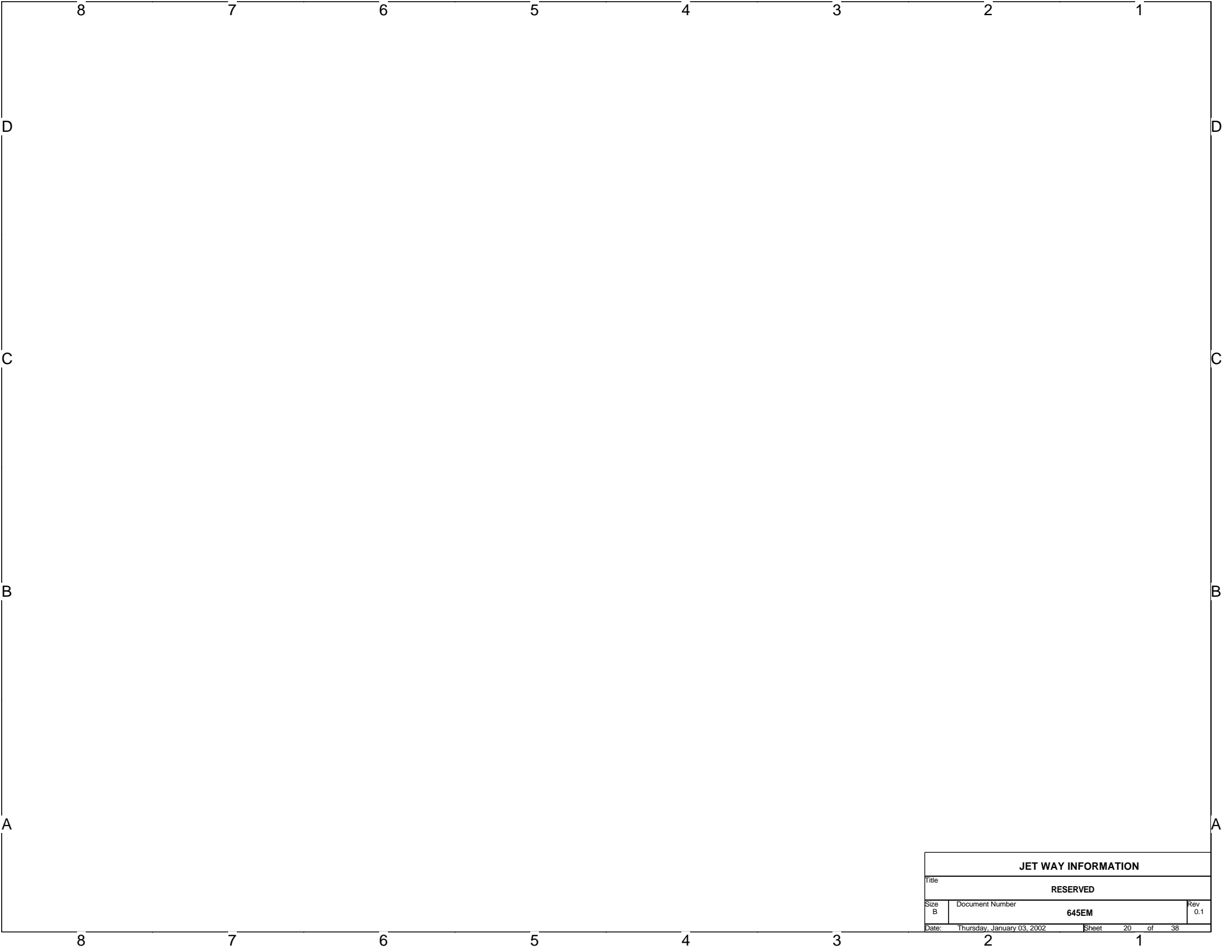
| JET WAY INFORMATION | | | |
|---------------------|----------------------------|---------------|----------|
| Title | | VGA Connector | |
| Size | Document Number | 645EM | Rev 0.1 |
| B | | | |
| Date: | Thursday, January 03, 2002 | Sheet | 17 of 38 |



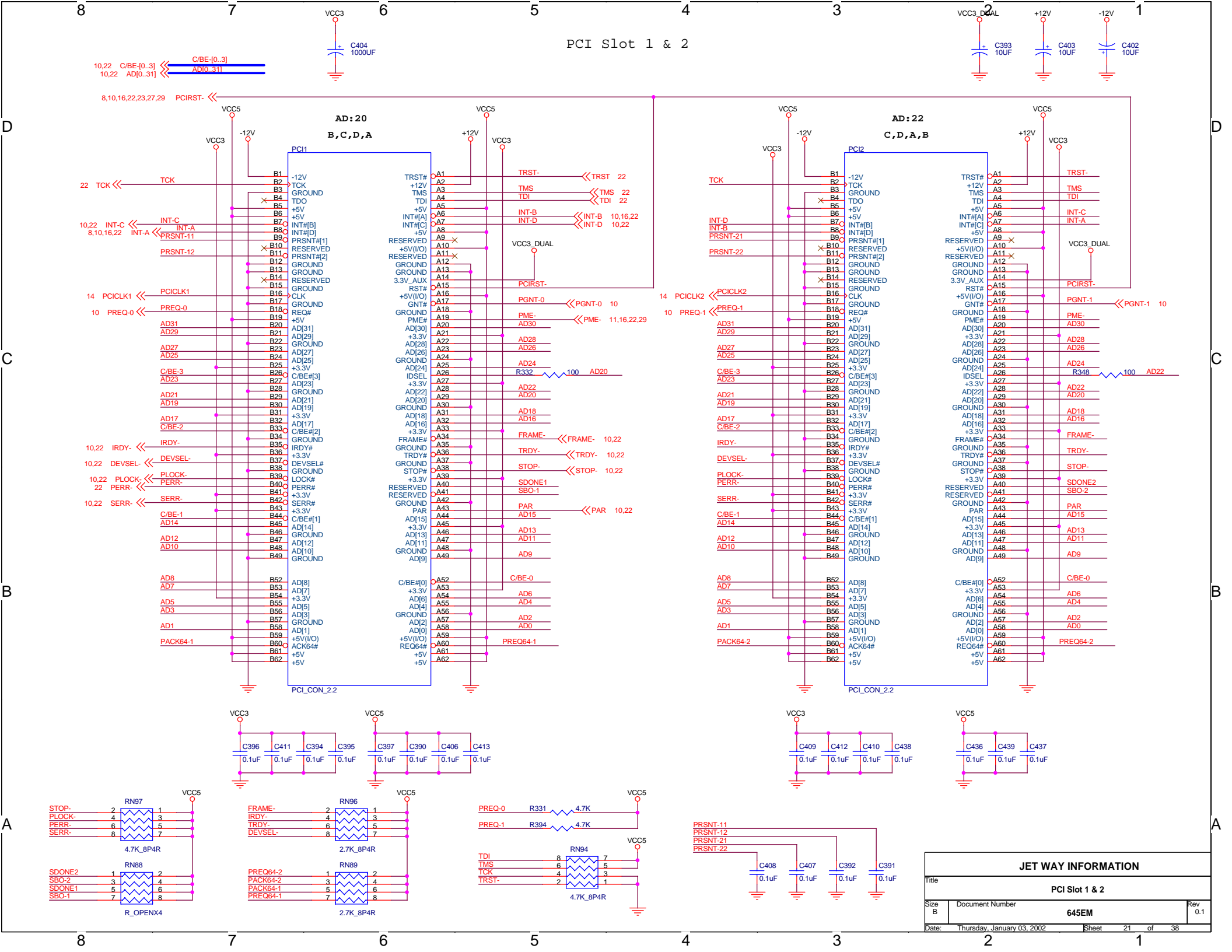
| JET WAY INFORMATION | | |
|---------------------|----------------------------|----------------|
| File | SDRAM DIMM1 & DIMM2 | |
| Size | Document Number | Rev |
| C | 645EM | 0.1 |
| Date: | Thursday, January 03, 2002 | Sheet 18 of 38 |



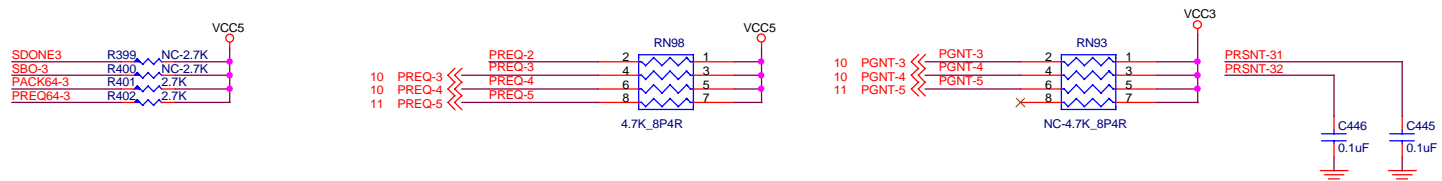
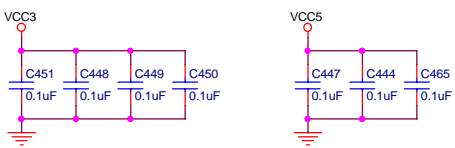
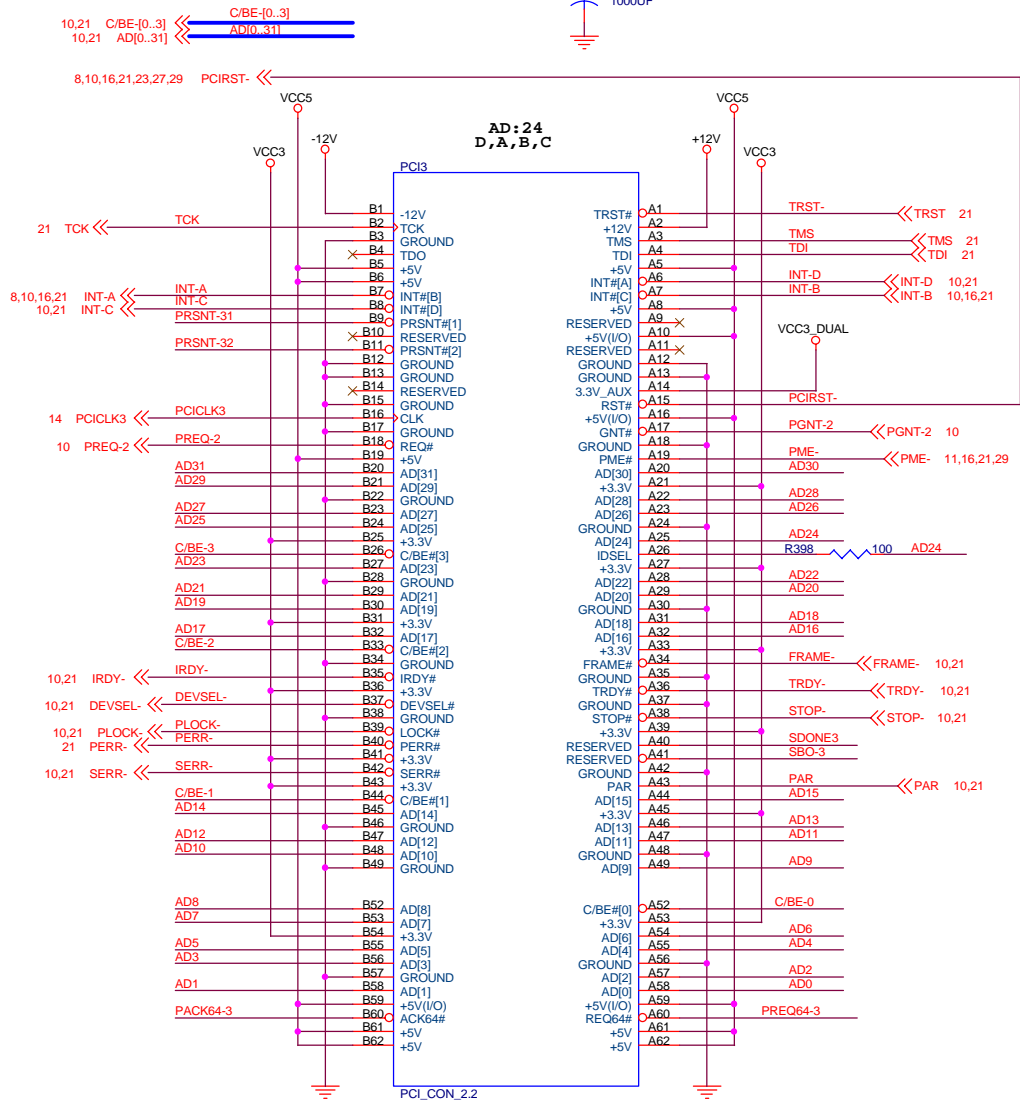
| JET WAY INFORMATION | | |
|---------------------|----------------------------|----------------|
| Title | | |
| SDR -BY-PASS CAP. | | |
| Size | Document Number | Rev |
| B | 645EM | 0.1 |
| Date: | Thursday, January 03, 2002 | Sheet 19 of 38 |



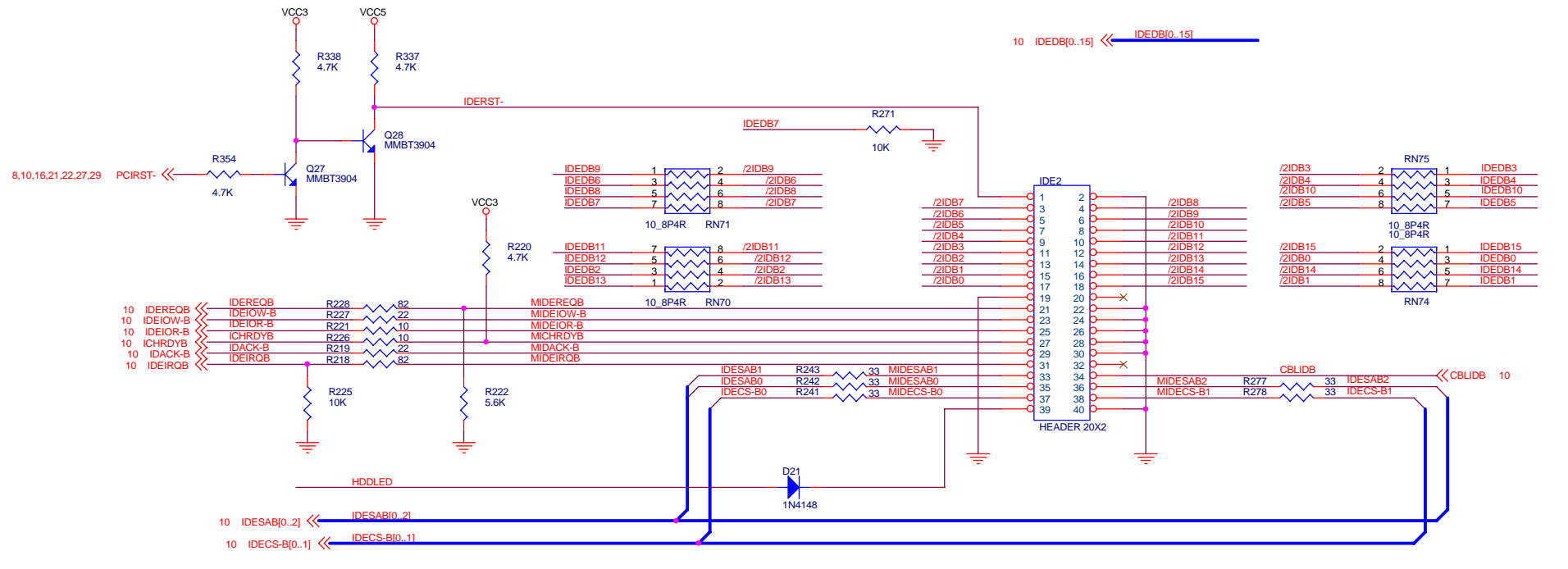
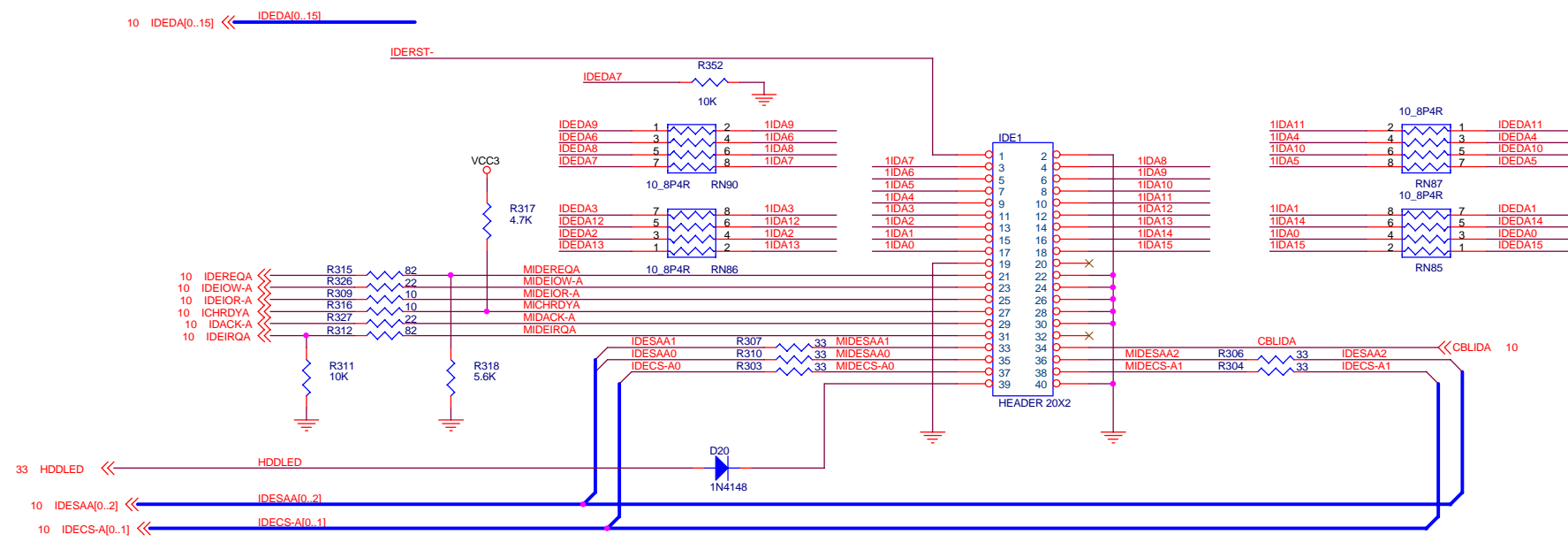
| | | |
|----------------------------|----------------------------|----------------|
| JET WAY INFORMATION | | |
| Title | | |
| RESERVED | | |
| Size | Document Number | Rev |
| B | 645EM | 0.1 |
| Date: | Thursday, January 03, 2002 | Sheet 20 of 38 |



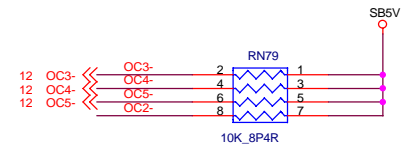
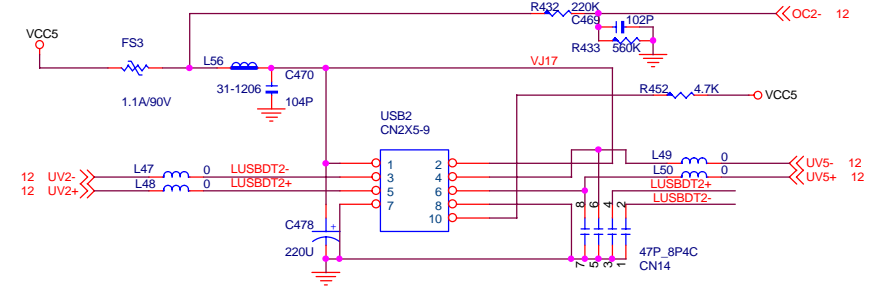
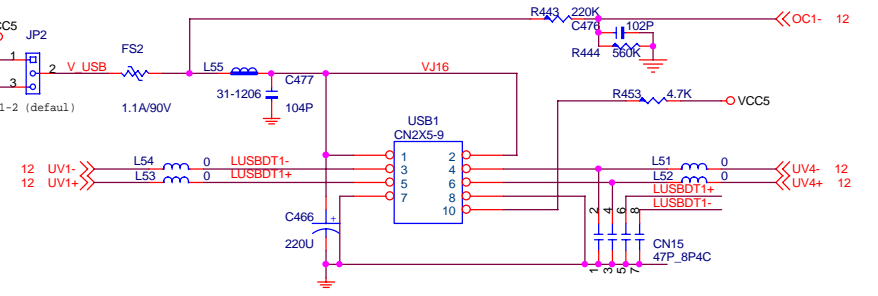
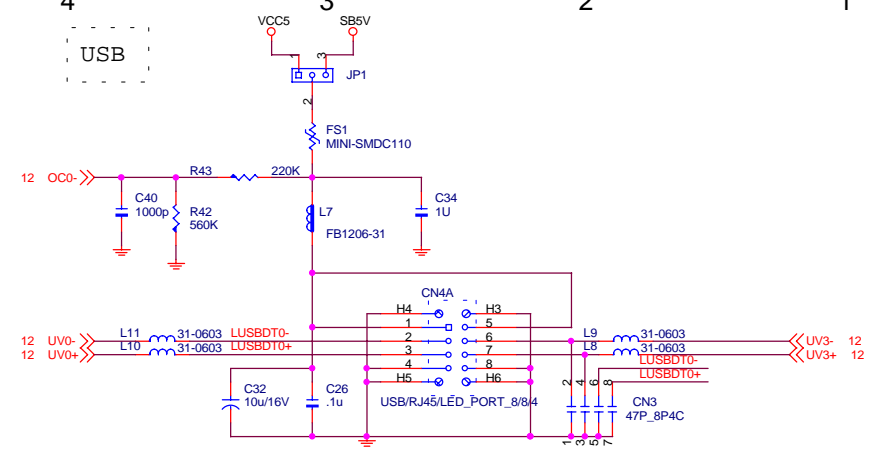
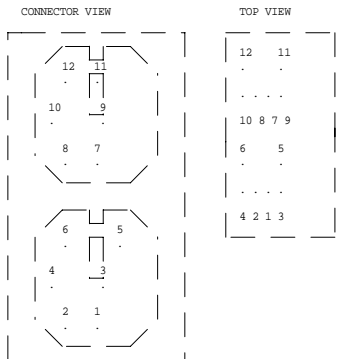
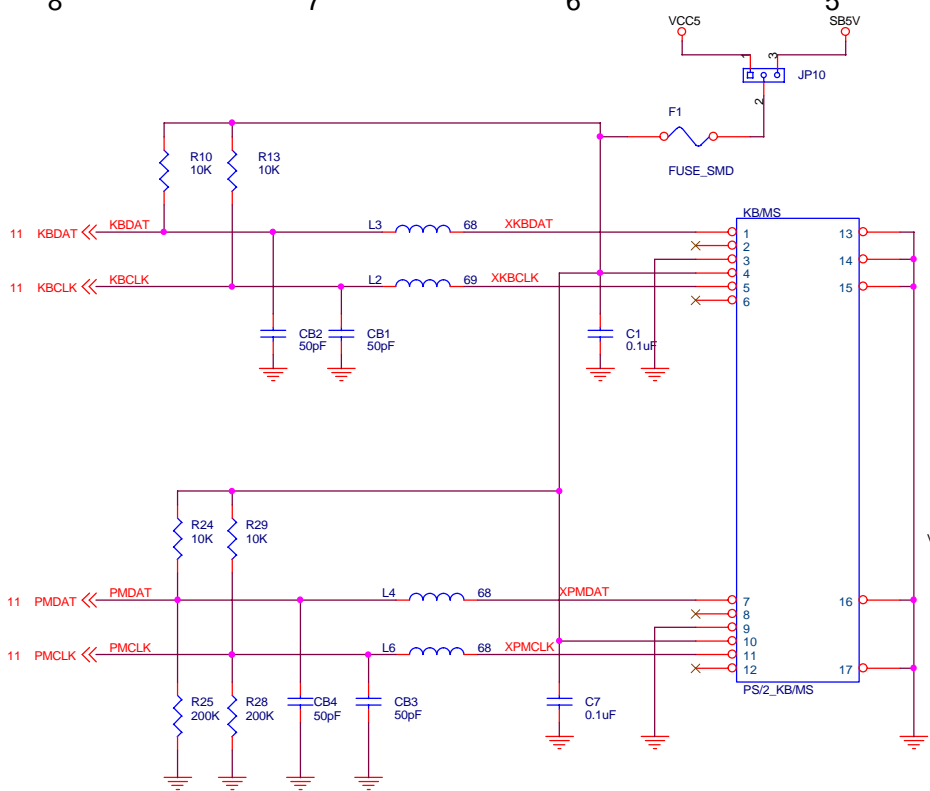
PCI Slot 3



| JET WAY INFORMATION | | | |
|---------------------|----------------------------|----------------|---------|
| Title | PCI Slot 3 | | |
| Size B | Document Number | 645EM | Rev 0.1 |
| Date: | Thursday, January 03, 2002 | Sheet 22 of 38 | |



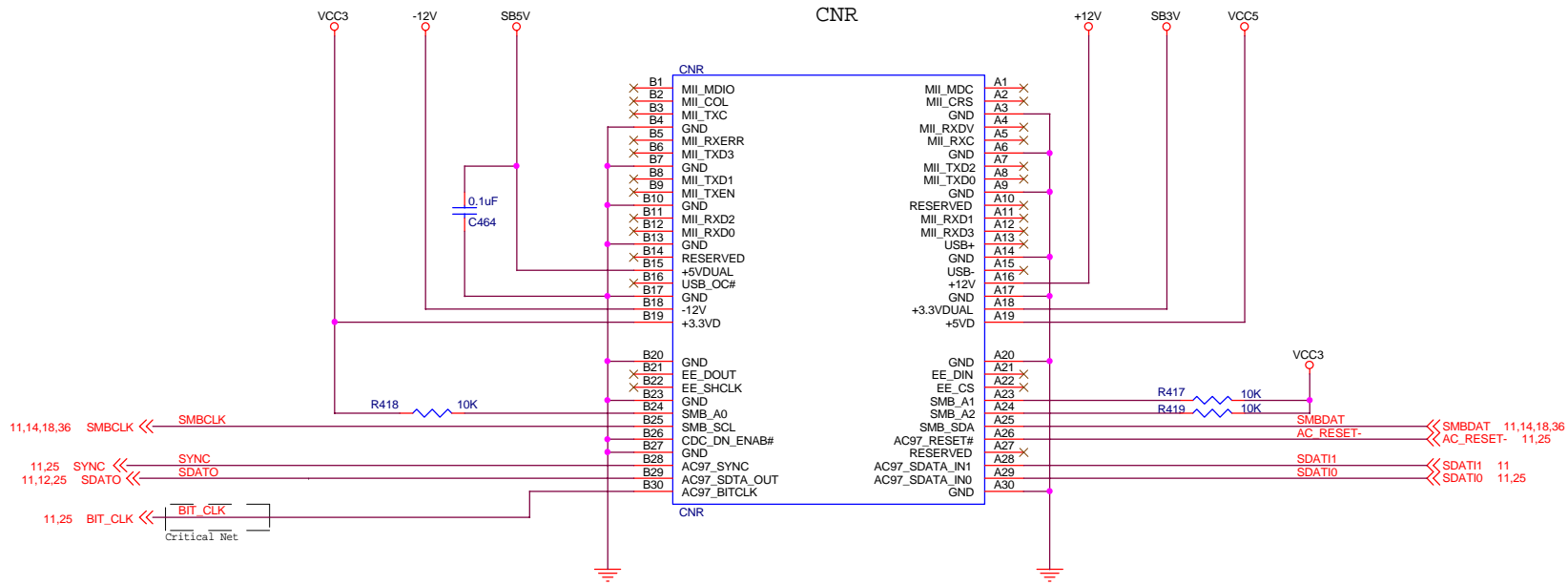
| JET WAY INFORMATION | | | |
|---------------------|----------------------------|-------|----------|
| Title | IDE CONNECTORS | | |
| Size B | Document Number | 645EM | Rev 0.1 |
| Date: | Thursday, January 03, 2002 | Sheet | 23 of 38 |



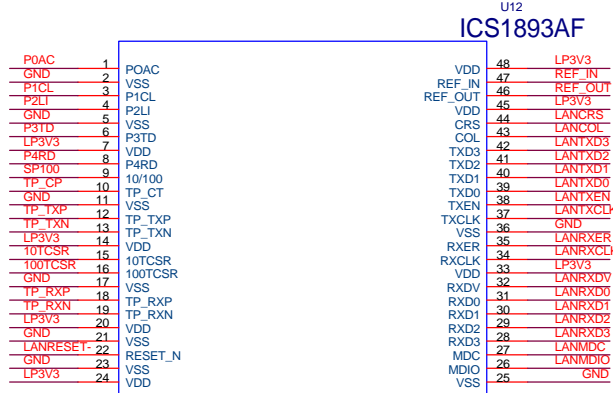
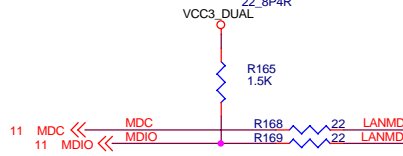
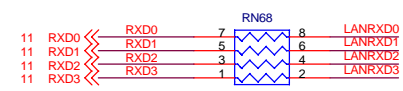
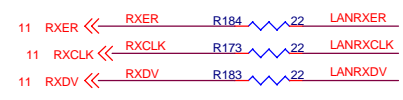
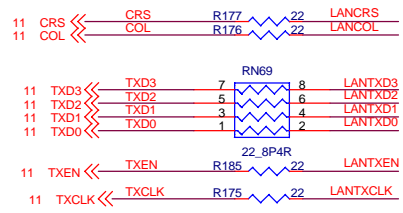
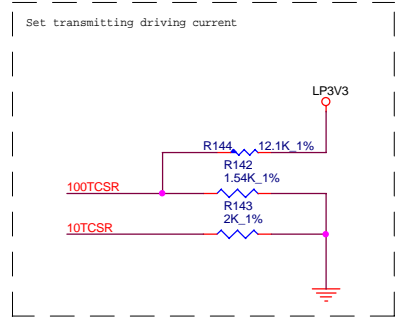
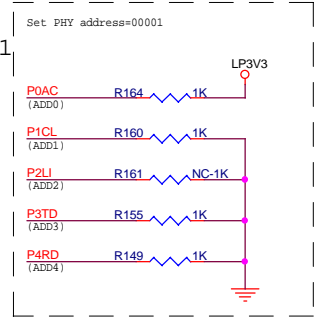
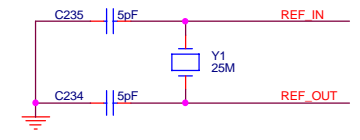
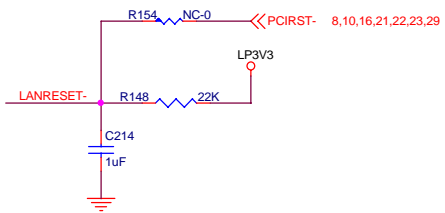
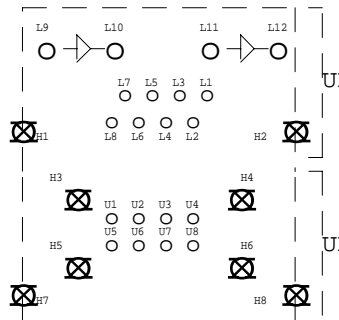
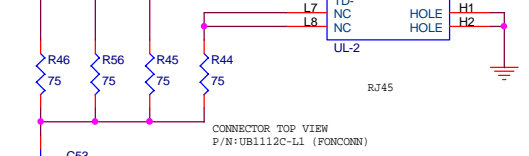
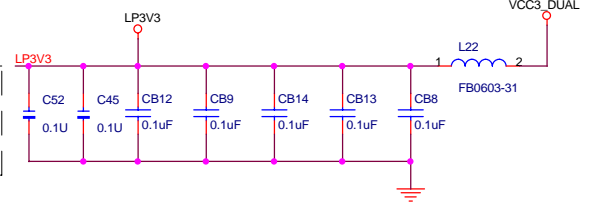
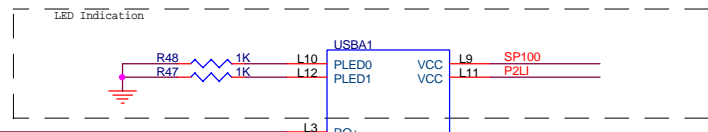
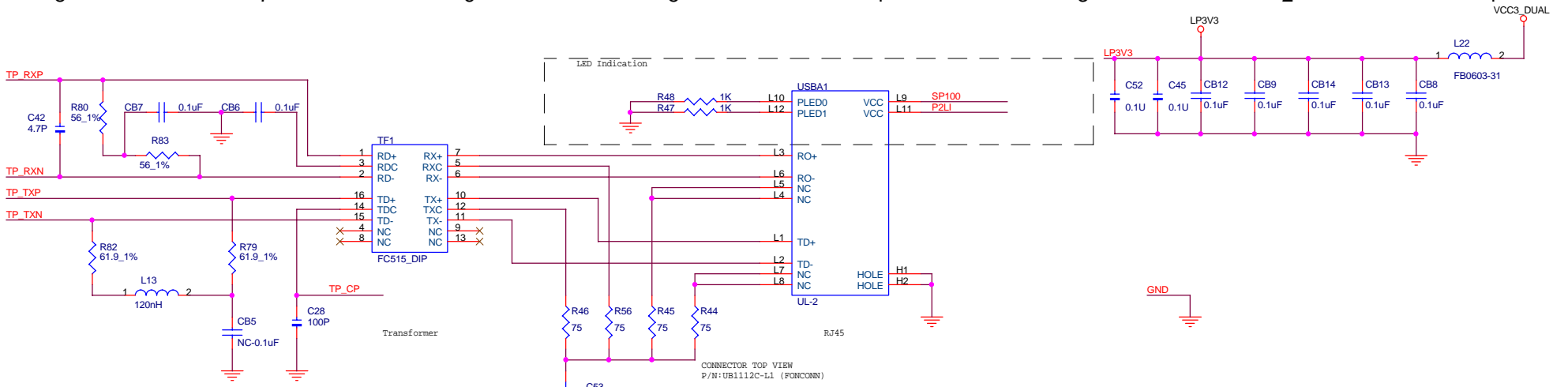
NOTE:
 The SiS961A integrates two USB controllers. One controls USB ports 0,1,2, and the other controls ports 3,4,5.

- To avoid one of the internal controllers is too busy and the other one is idle. SiS recommends you to arrange the signals to I/O connector properly.
- If you do not want to use some of the USB ports, you must to pull them down with 15K ohms.

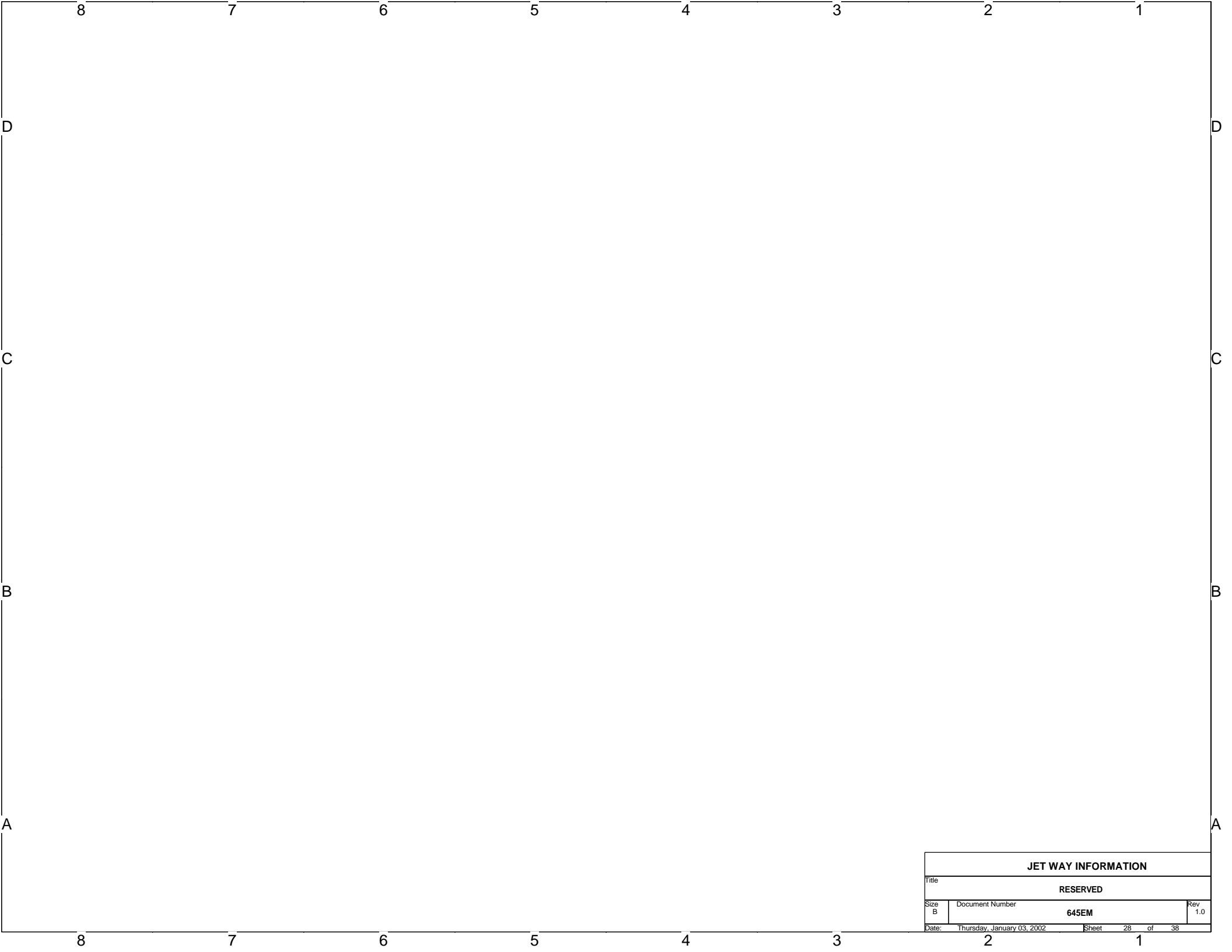
| JET WAY INFORMATION | | | |
|---------------------|----------------------------|-------|----------|
| Title | | | |
| USB CONNECTORS | | | |
| Size | Document Number | 645EM | Rev |
| B | | | 0.1 |
| Date: | Thursday, January 03, 2002 | Sheet | 24 of 38 |



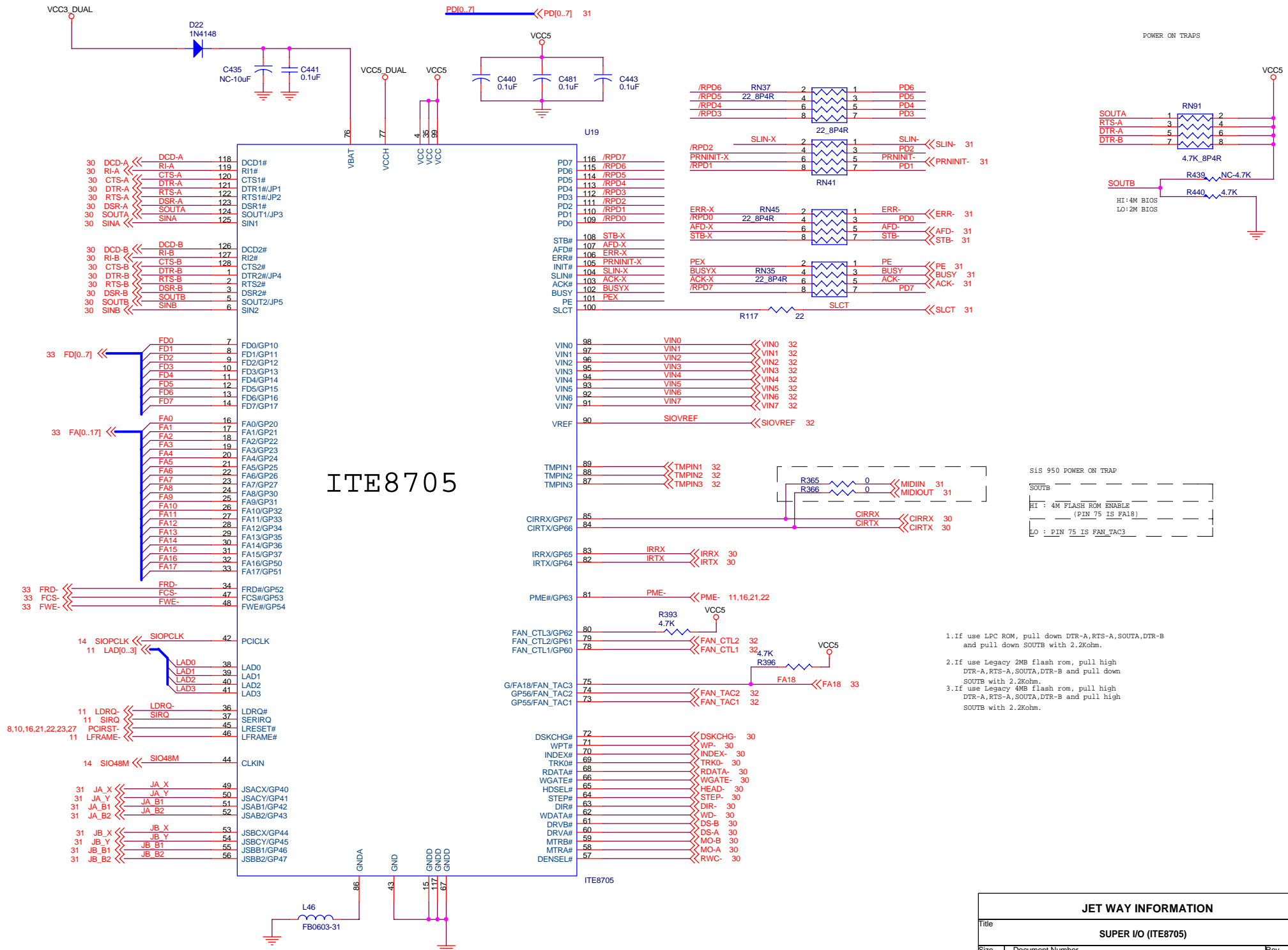
| JET WAY INFORMATION | | | |
|---------------------|----------------------------|----------|----------|
| Title | | CNR SLOT | |
| Size | Document Number | 645EM | Rev 0.1 |
| Date: | Thursday, January 03, 2002 | Sheet | 26 of 38 |



| JET WAY INFORMATION | | | |
|---------------------|----------------------------|-------|----------|
| Title | | | |
| ICS1893AF PHY | | | |
| Size | Document Number | 645EM | Rev |
| B | | | 0.1 |
| Date: | Thursday, January 03, 2002 | Sheet | 27 of 38 |



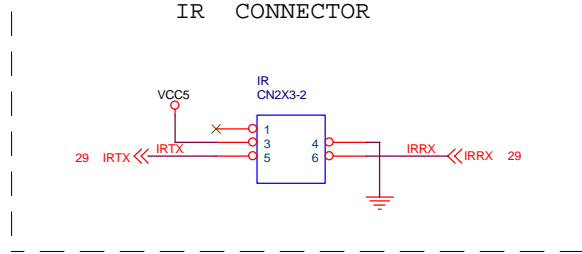
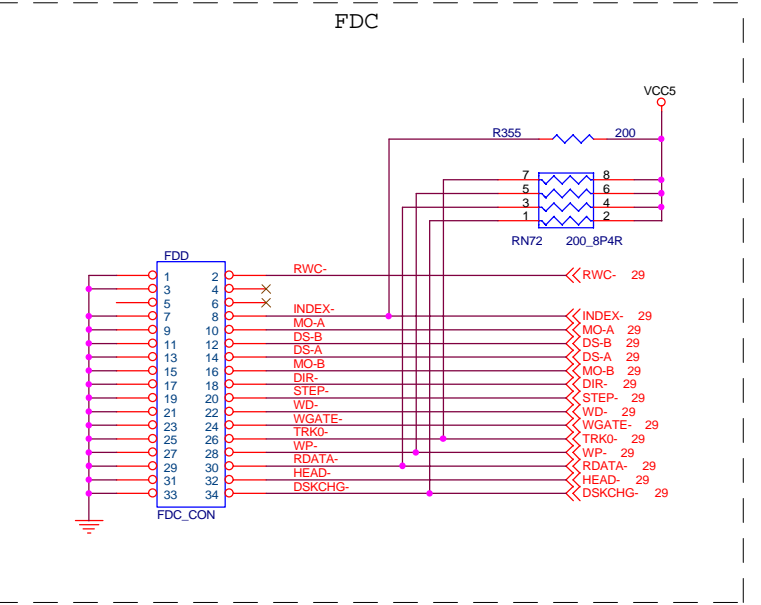
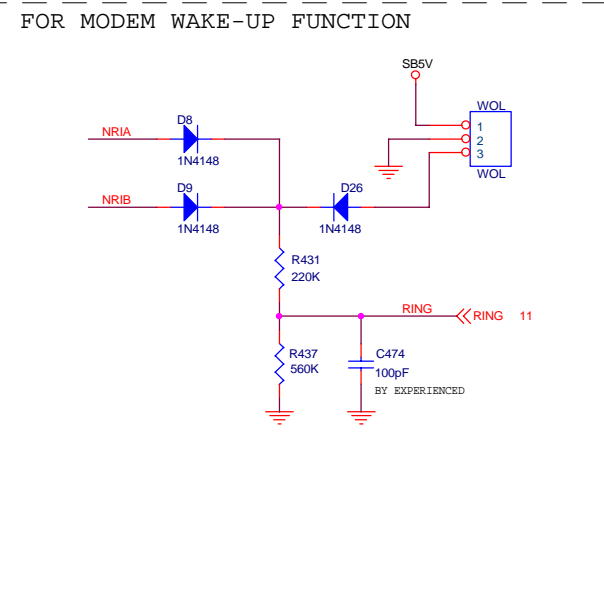
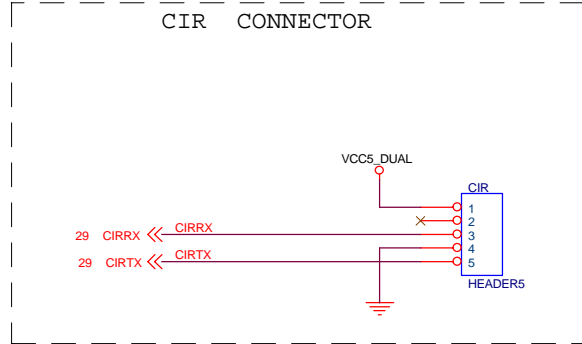
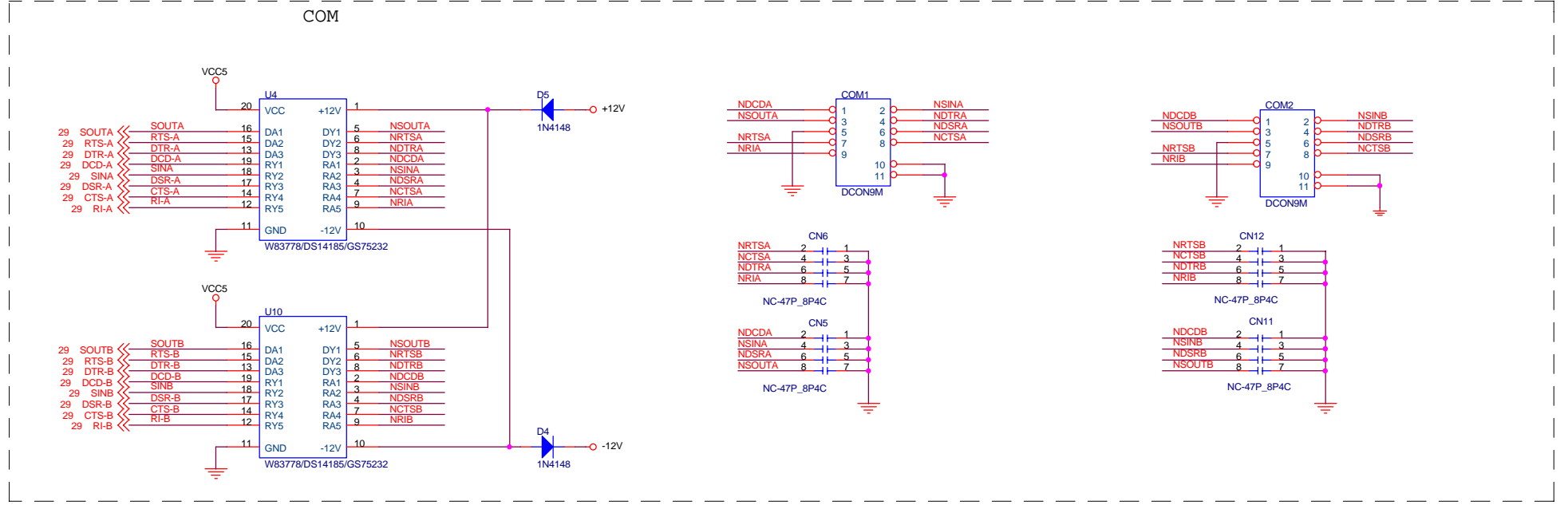
| | | |
|----------------------------|----------------------------|----------------|
| JET WAY INFORMATION | | |
| Title | | |
| RESERVED | | |
| Size | Document Number | Rev |
| B | 645EM | 1.0 |
| Date: | Thursday, January 03, 2002 | Sheet 28 of 38 |



ITE8705

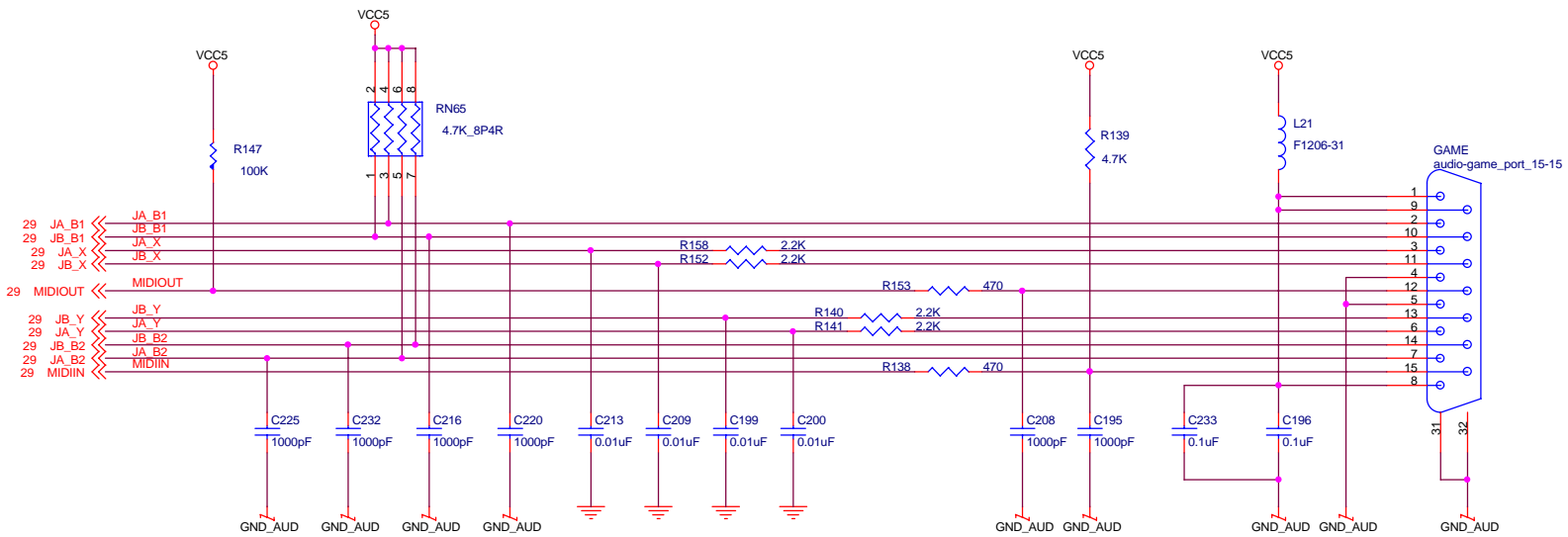
- 1.If use LPC ROM, pull down DTR-A,RTS-A,SOUTA,DTR-B and pull down SOUTB with 2.2kohm.
- 2.If use Legacy 2MB flash rom, pull high DTR-A,RTS-A,SOUTA,DTR-B and pull down SOUTB with 2.2kohm.
- 3.If use Legacy 4MB flash rom, pull high DTR-A,RTS-A,SOUTA,DTR-B and pull high SOUTB with 2.2kohm.

| JET WAY INFORMATION | | | |
|---------------------|----------------------------|-------|----------|
| Title | | | |
| SUPER I/O (ITE8705) | | | |
| Size | Document Number | | Rev |
| Custom | 645EM | | 0.1 |
| Date: | Thursday, January 03, 2002 | Sheet | 29 of 38 |

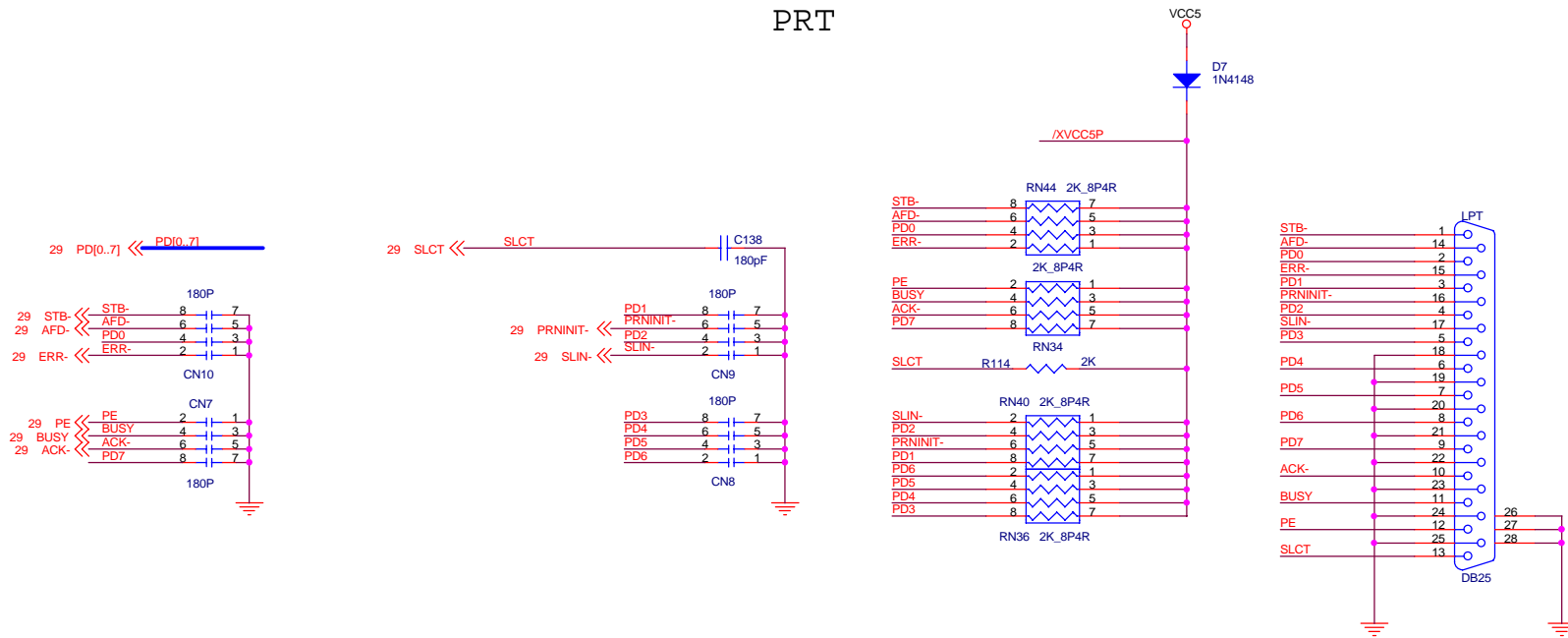


| JET WAY INFORMATION | | | |
|---------------------|----------------------------|-------|----------|
| Title | | | |
| FDC/COM1&2/IR CONN. | | | |
| Size | Document Number | Rev | |
| Custom | 645EM | 0.1 | |
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GAME PORT & MIDI



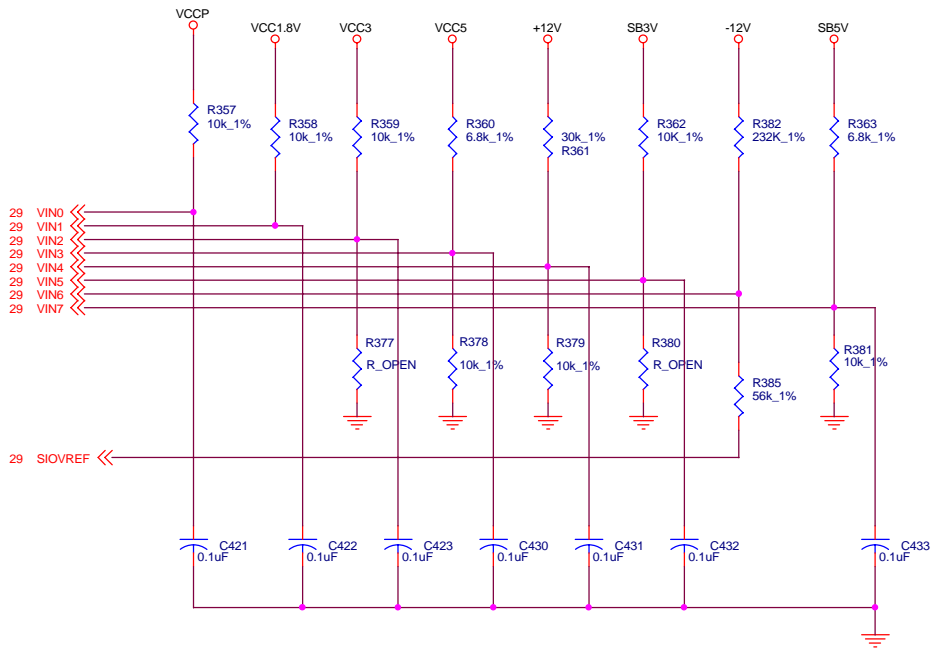
PRT



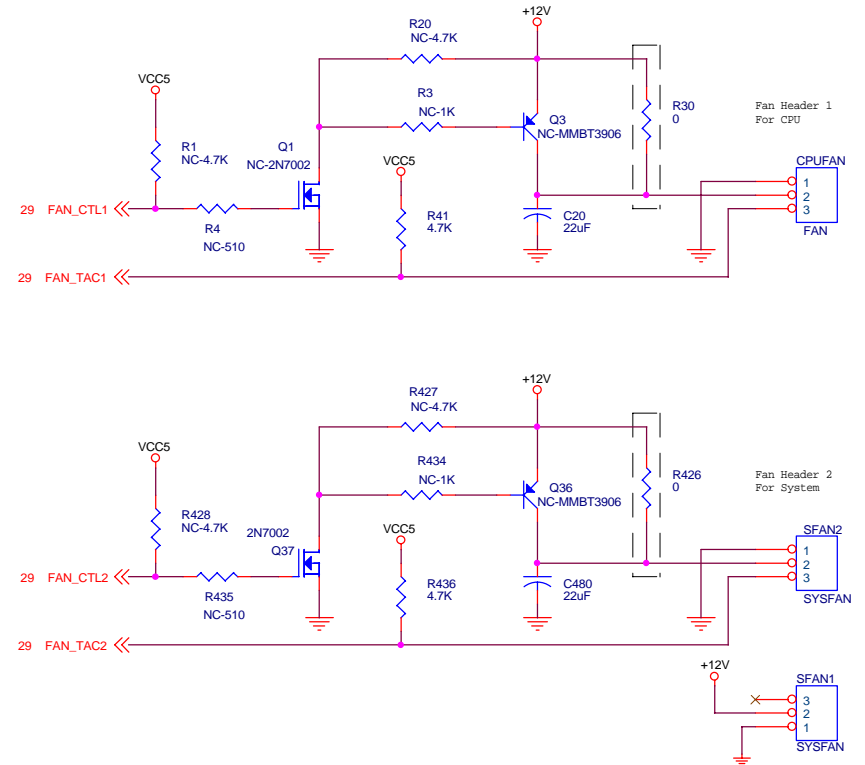
JET WAY INFORMATION

| | | | |
|---------------------|----------------------------|-------|----------|
| Title | | | |
| GAME/PARALLEL CONN. | | | |
| Size | Document Number | 645EM | Rev |
| B | | | 0.1 |
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Voltage Monitor

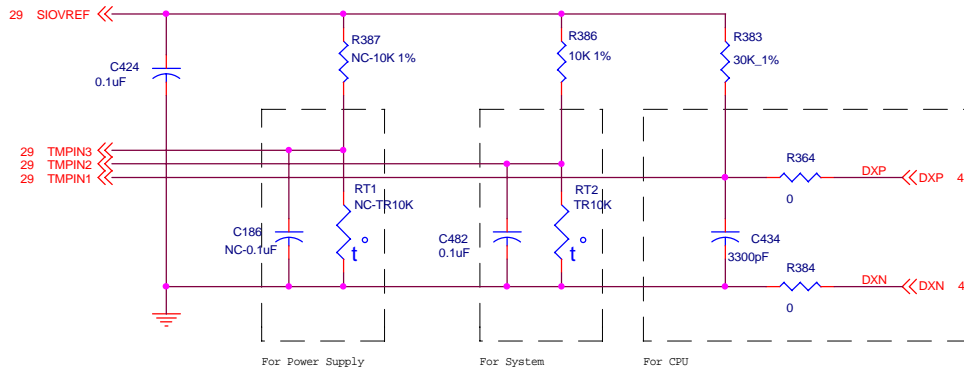


FAN Input and Output



Temperature Monitor

Choosing method of measuring temperature by either thermistor or diode

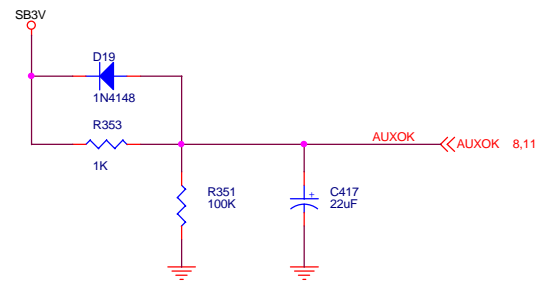
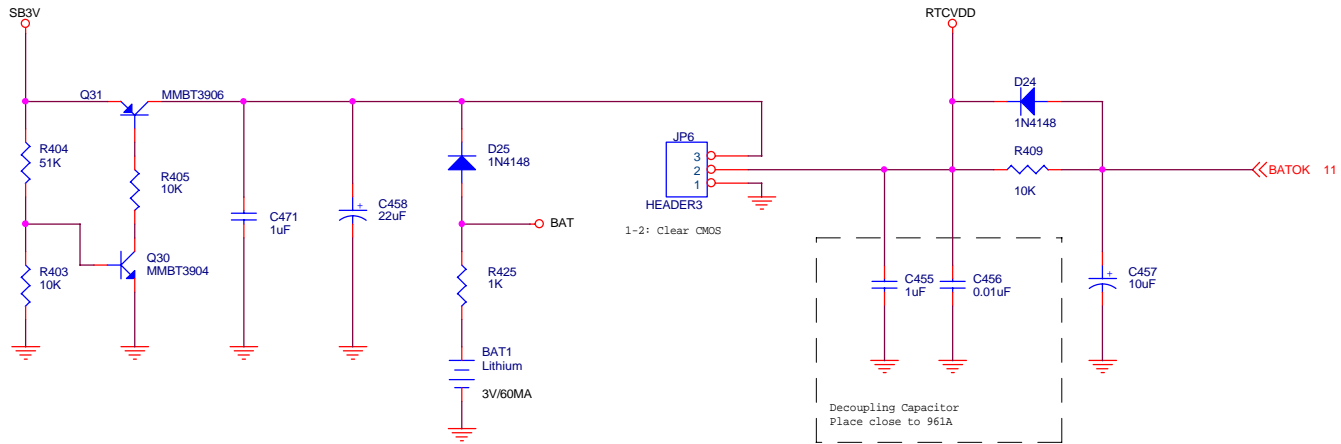


| JET WAY INFORMATION | | | |
|----------------------------|----------------------------|-------|----------|
| Title: FAN1&2/VOLTAGE/TEMP | | | |
| Size B | Document Number | 645EM | Rev 0.1 |
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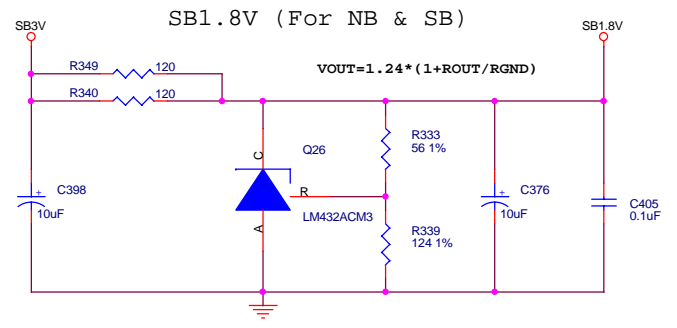
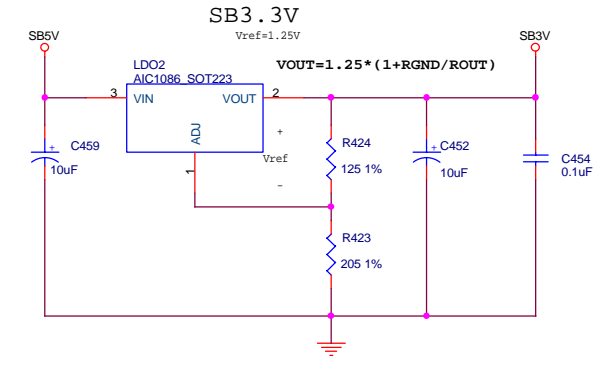
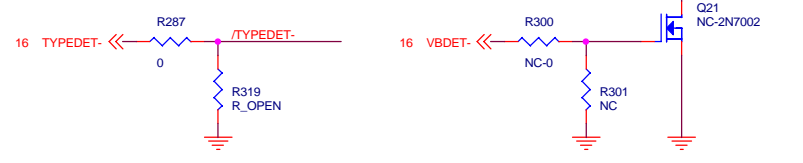
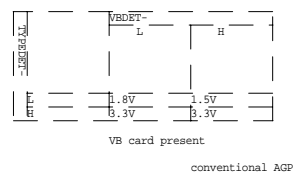
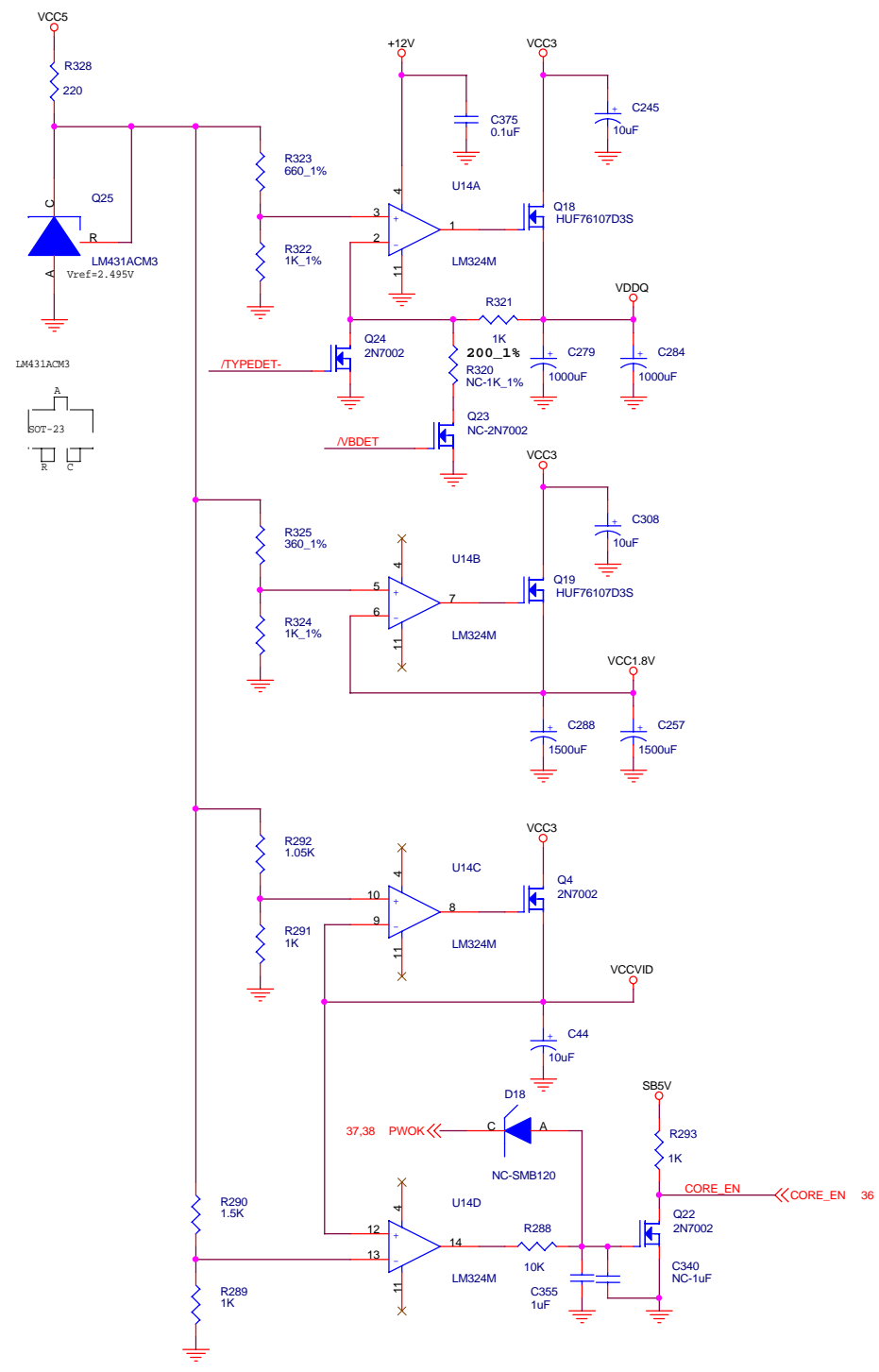
RTC

NOTE!

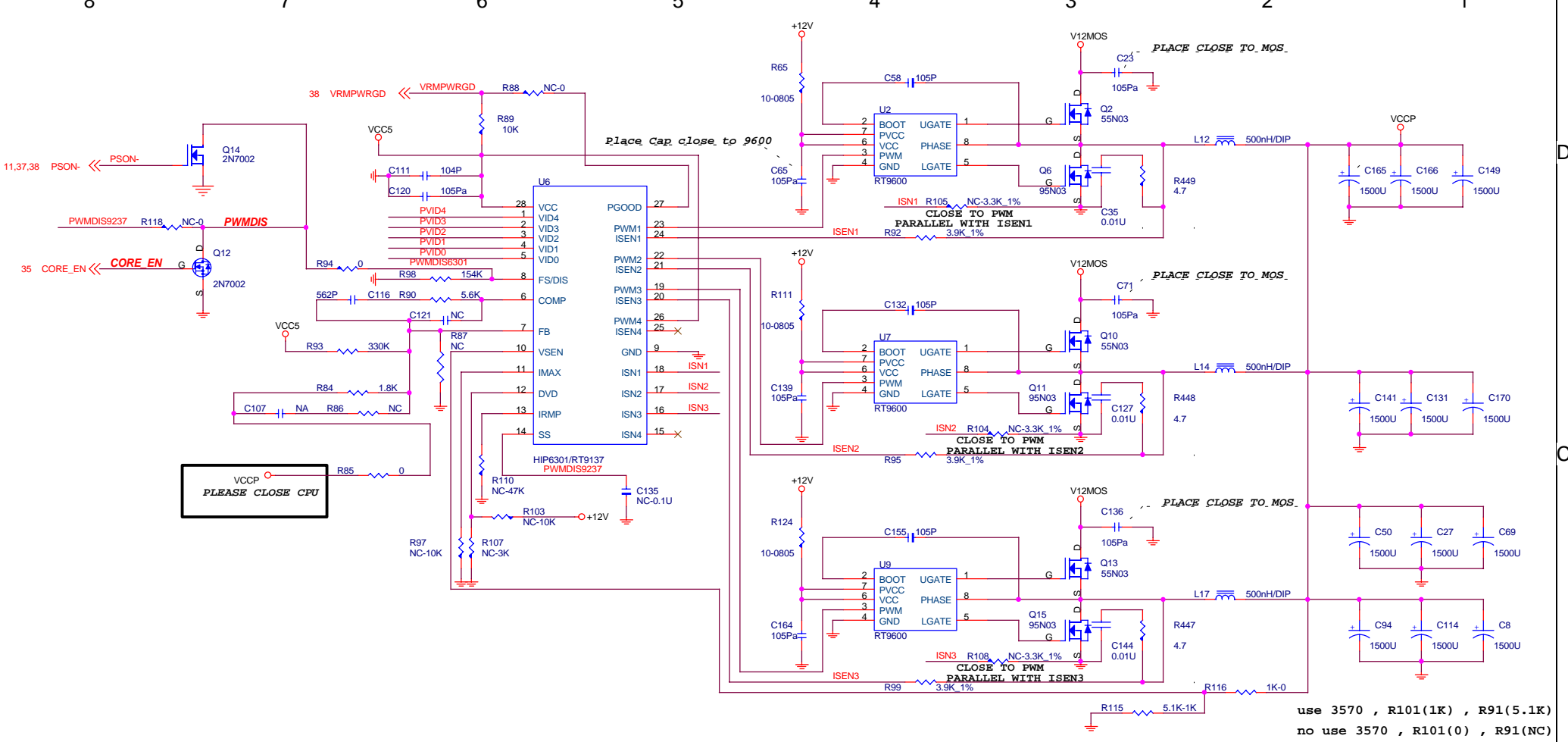
- 1.The RTCVDD is 3V
- 2.Decoupling capacitor must be close to 650 RTCVDD pin.
- 3.RTC circuit must strictly follow SiS's recommended design
SiS is not responsible for RTC problems from foreign designs.



| JET WAY INFORMATION | | | |
|---------------------|----------------------------|-------|----------|
| Title | RTC | | |
| Size | Document Number | 645EM | Rev |
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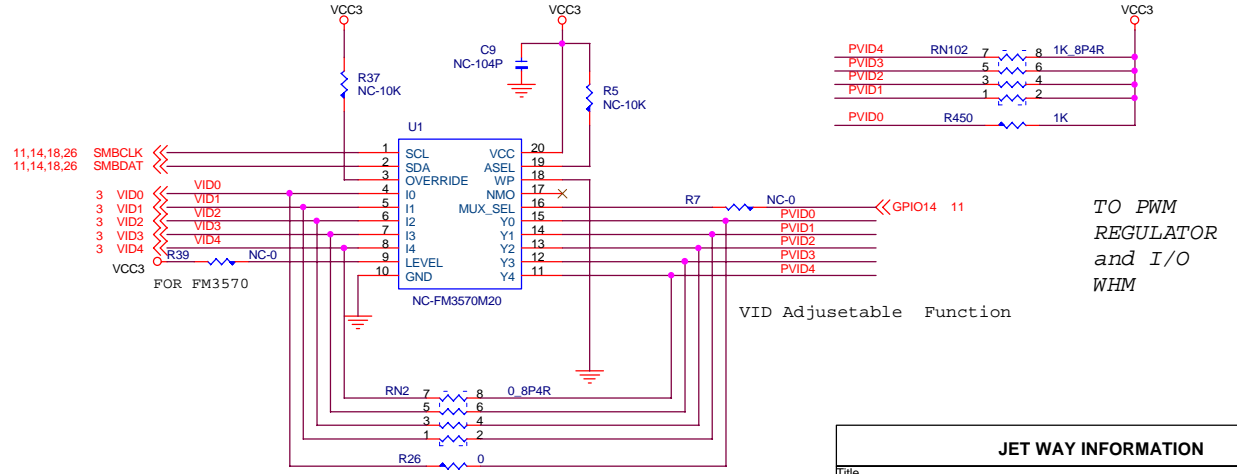


| JET WAY INFORMATION | | | |
|---------------------|----------------------------|-------|----------|
| Title | | | |
| LINEAR REGULATOR | | | |
| Size | Document Number | 645EM | Rev |
| B | | | 0.1 |
| Date: | Thursday, January 03, 2002 | Sheet | 35 of 38 |

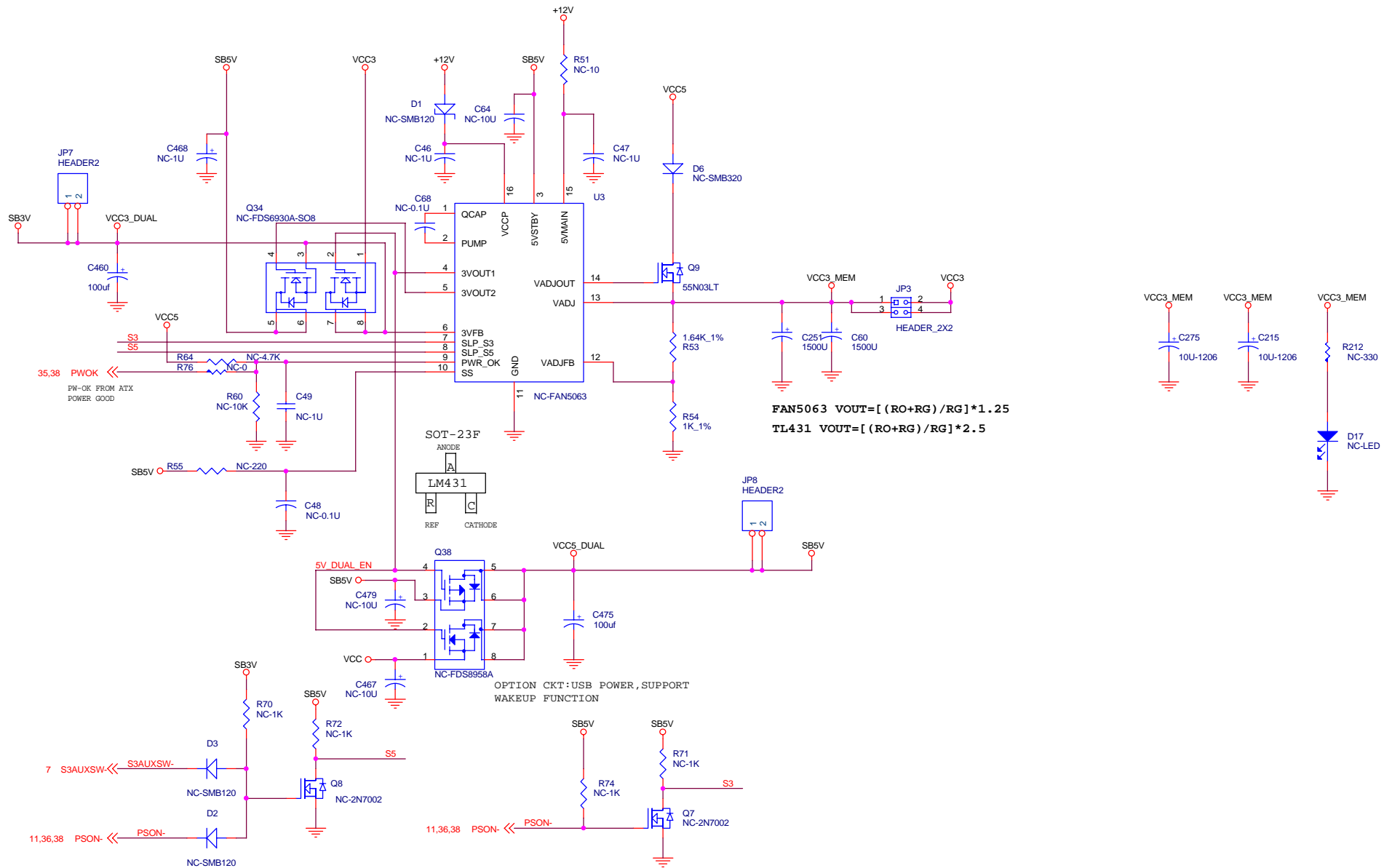


use 3570 , R101(1K) , R91(5.1K)
no use 3570 , R101(0) , R91(NC)

| VID4 | VID3 | VID2 | VID1 | VID0 | VCORE |
|------|------|------|------|------|-------|
| 1 | 1 | 1 | 1 | 1 | OFF |
| 1 | 1 | 1 | 1 | 0 | 1.100 |
| 1 | 1 | 1 | 0 | 1 | 1.125 |
| 1 | 1 | 1 | 0 | 0 | 1.150 |
| 1 | 1 | 0 | 1 | 1 | 1.175 |
| 1 | 1 | 0 | 1 | 0 | 1.200 |
| 1 | 1 | 0 | 0 | 1 | 1.225 |
| 1 | 1 | 0 | 0 | 0 | 1.250 |
| 1 | 0 | 1 | 1 | 1 | 1.275 |
| 1 | 0 | 1 | 1 | 0 | 1.300 |
| 1 | 0 | 1 | 0 | 1 | 1.325 |
| 1 | 0 | 1 | 0 | 0 | 1.350 |
| 1 | 0 | 0 | 1 | 1 | 1.375 |
| 1 | 0 | 0 | 1 | 0 | 1.400 |
| 1 | 0 | 0 | 0 | 1 | 1.425 |
| 1 | 0 | 0 | 0 | 0 | 1.450 |
| 0 | 1 | 1 | 1 | 1 | 1.475 |
| 0 | 1 | 1 | 1 | 0 | 1.500 |
| 0 | 1 | 1 | 0 | 1 | 1.525 |
| 0 | 1 | 1 | 0 | 0 | 1.550 |
| 0 | 1 | 0 | 1 | 1 | 1.575 |
| 0 | 1 | 0 | 1 | 0 | 1.600 |
| 0 | 1 | 0 | 0 | 1 | 1.625 |
| 0 | 1 | 0 | 0 | 0 | 1.650 |
| 0 | 0 | 1 | 1 | 1 | 1.675 |
| 0 | 0 | 1 | 1 | 0 | 1.700 |
| 0 | 0 | 1 | 0 | 1 | 1.725 |
| 0 | 0 | 1 | 0 | 0 | 1.750 |
| 0 | 0 | 0 | 1 | 1 | 1.775 |
| 0 | 0 | 0 | 1 | 0 | 1.800 |
| 0 | 0 | 0 | 0 | 1 | 1.825 |
| 0 | 0 | 0 | 0 | 0 | 1.850 |

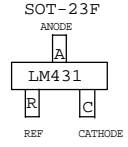


| JET WAY INFORMATION | | | |
|---------------------|----------------------------|----------|---------|
| Title | CPU POWER | | |
| Size | Document Number | 645EM | Rev 0.1 |
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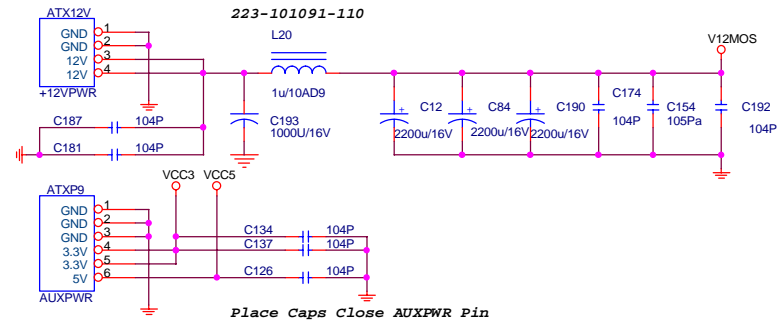
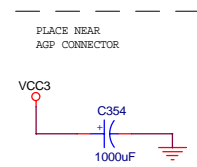
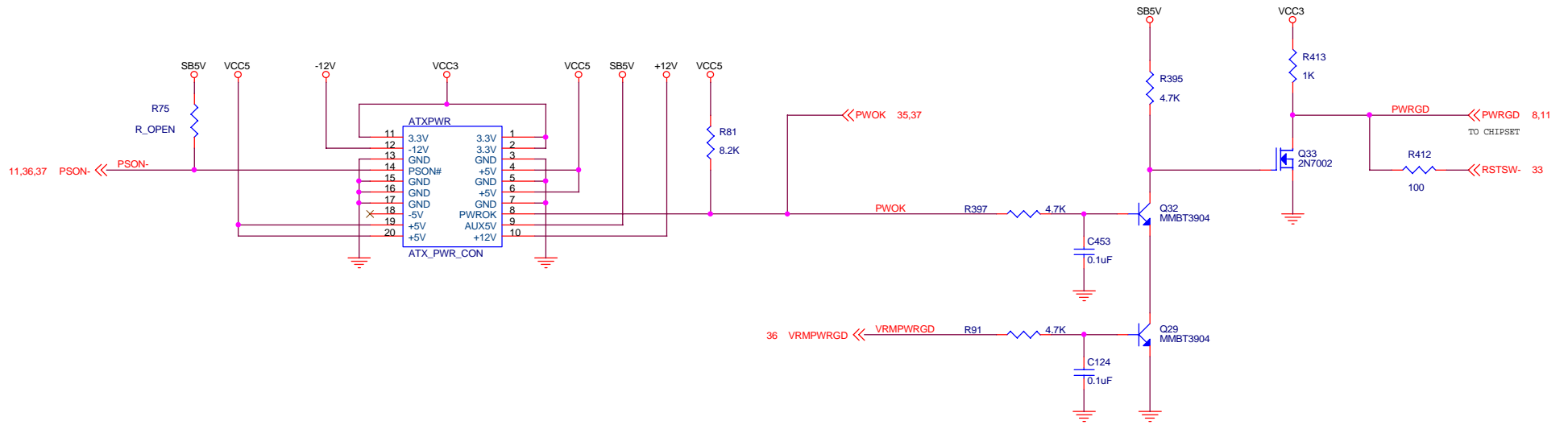
$$\text{FAN5063 VOUT} = \left[\frac{RO+RG}{RG} \right] * 1.25$$

$$\text{TL431 VOUT} = \left[\frac{RO+RG}{RG} \right] * 2.5$$

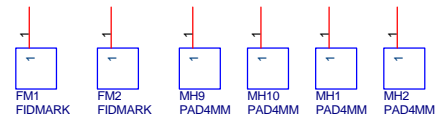
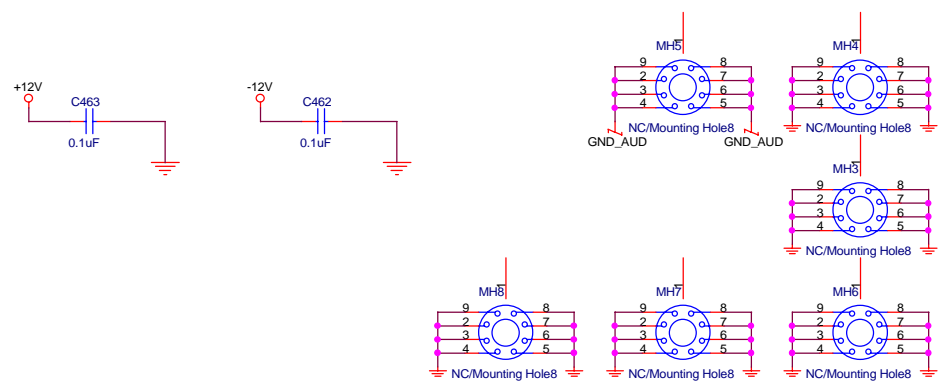


| MODE | CONTROL SIGNAL | | | | |
|-------|----------------|----------|-----|----|---|
| | PSON# | S3AUXSW- | S3 | S5 | |
| S0→S3 | 0 | 0 | ==> | 1 | 1 |
| S0 | 0 | 1 | ==> | 1 | 1 |
| S3 | 1 | 0 | ==> | 0 | 1 |
| S5 | 1 | 1 | ==> | 0 | 0 |

| JET WAY INFORMATION | | | |
|---------------------|----------------------------|------------|----------|
| Title | | ACPI POWER | |
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12VATXPOWER SPEC. Ver. 1.0



| JET WAY INFORMATION | | | |
|---------------------|----------------------------|------------------|----------|
| Title | | POWER CONNECTORS | |
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