

P654 - GT200/NVIO2

P654, GT200-100, 896MB/1792MB - GDDR3 BGA136 16M/32Mx32

DVI-I + DVI-I/DP + HD/SD/TVout, SPDIF, Dual SLI

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| NO | VARIANT     | NVPM               | ASSEMBLY  |
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PAGE 21:VGS SLIM

PAGE 22:remove DACB HDTV Circuit

PAGE 24:DVI change HDMI

PAGE 25:DP modify DSDA/DSCL circuit

PAGE 28:ADD I2C0\_SCL/SDA and GPIO 3 circuit,remove GPIO 12

PAGE 29:remove R112,R113 and GPIO8\_FAN\_TACH link to U21

PAGE 33:remove R671,R572


PAGE 35:remove RT8805CQVA change UPI6205 and UPI6262 circuit

PAGE 36:remove NCP5388MNR2G change UPI6208 circuit

PAGE 37/38 :remove NCP3418B change UPI6281 circuit

PAGE 39 :Add WL83L786G circuit

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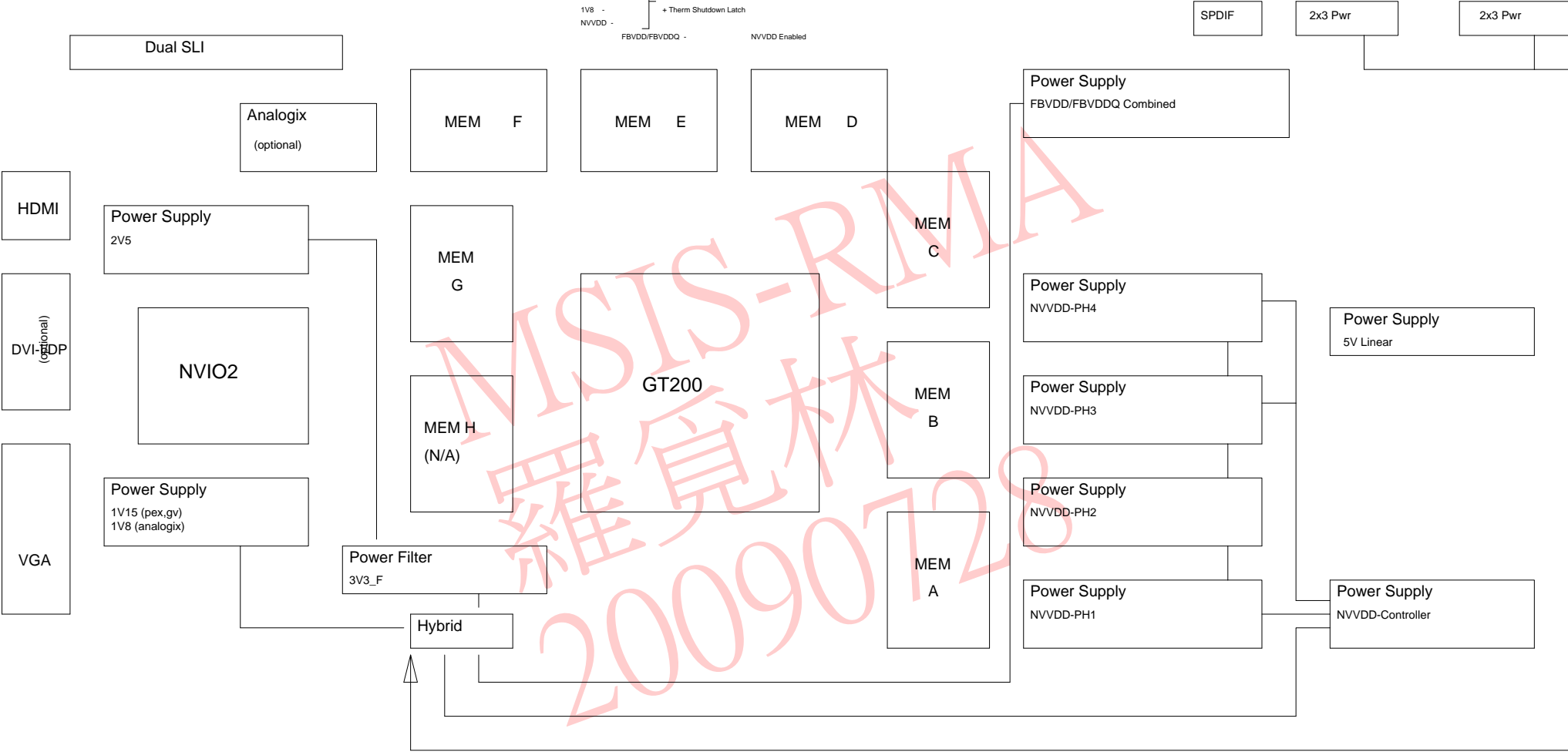
1 of 41

Block Diagram

Power Sequence


- 5V - Always On
- 3V3 - Always On
- 12V\_F - Always On
- 12V\_PEX6\_F1 - Always On
- 12V\_PEX6\_F2 - Always On
- 3V3\_DP - Always On

- 3V3\_F - Hybrid Enable
- 2V5 - + Input\_PEX\_Enable
- 1V15 - + Therm Shutdown Latch
- 1V8 -
- NVVDD -
- FBVDD/FBVDDQ - NVVDD Enabled



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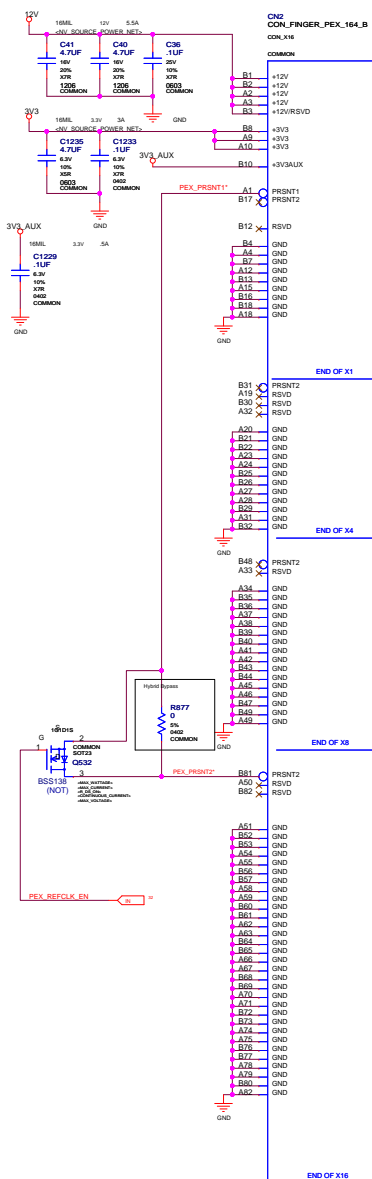
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|                         | Block Diagram   |



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## PCI Express / JTAG

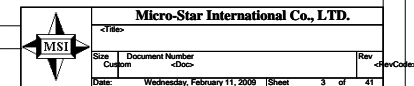


## JTAG

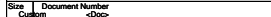
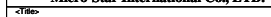
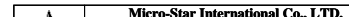


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## Framebuffer A,B: GPU Section + Calibration

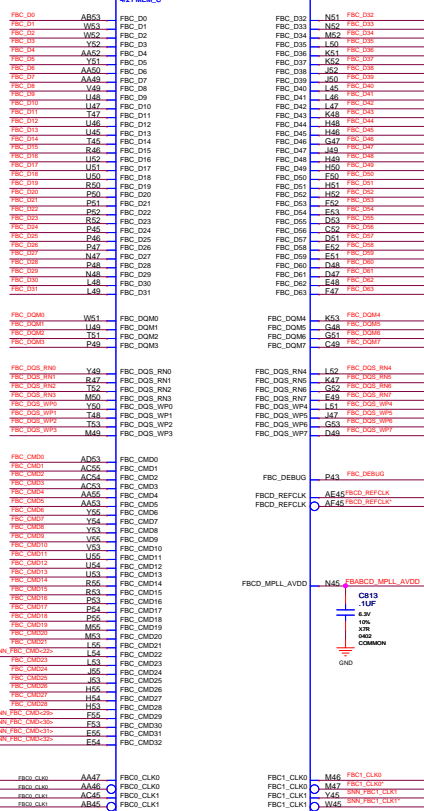


# Framebuffer C,D: GPU Section

G1F

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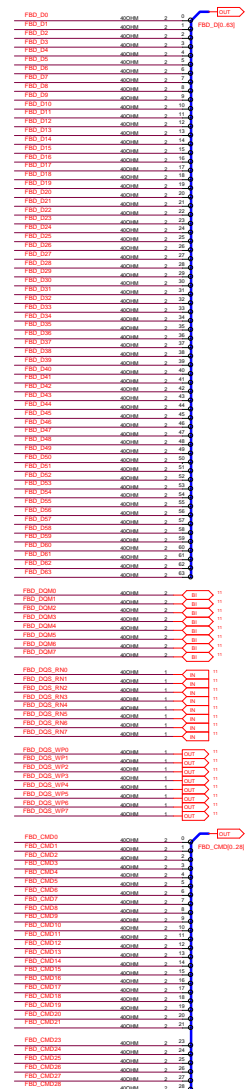
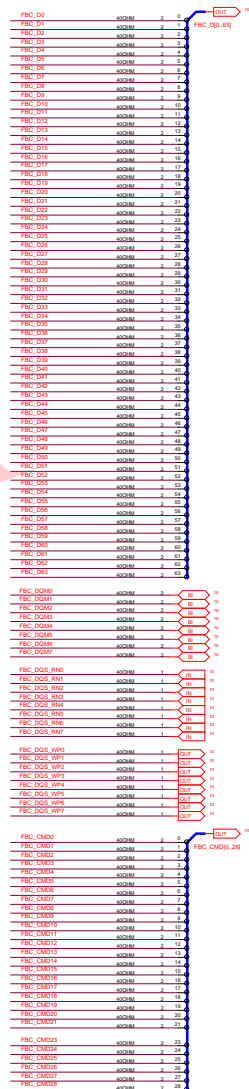
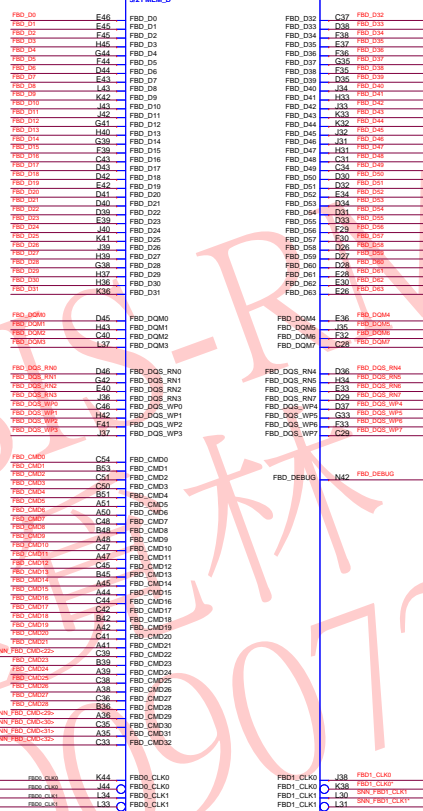
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G1G

IGA\_32M\_FBD\_0100\_400400

4021 MEM\_D



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Framebuffer C,D: GPU Section

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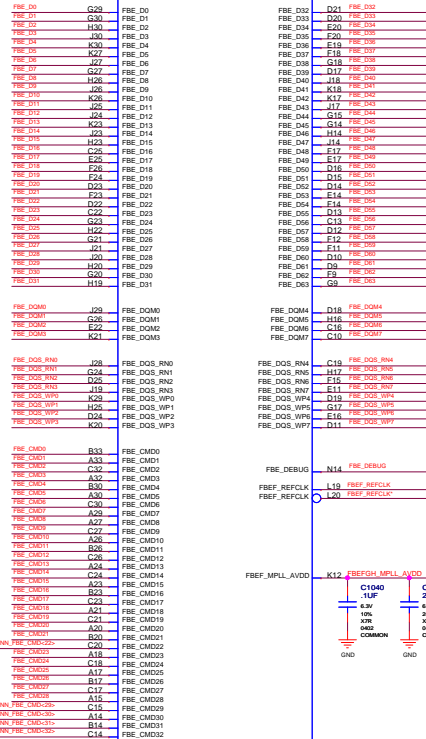
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# Framebuffer E,F: GPU Section

G1H

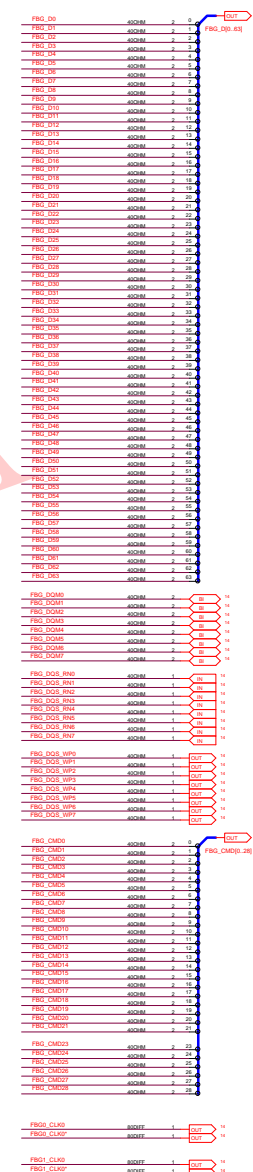
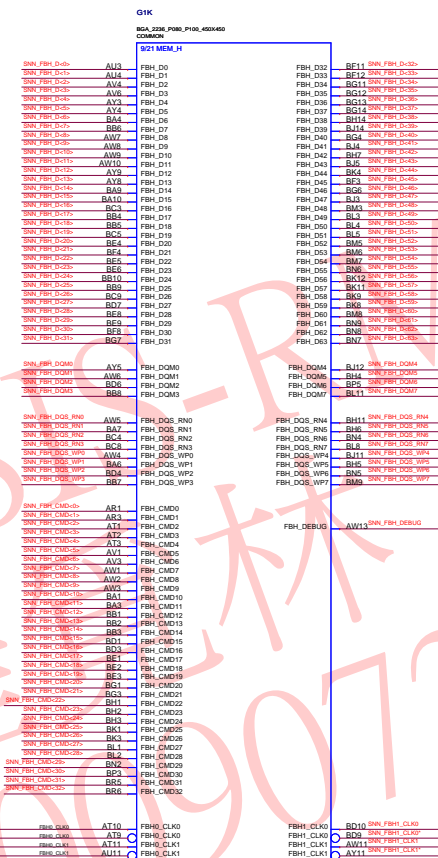
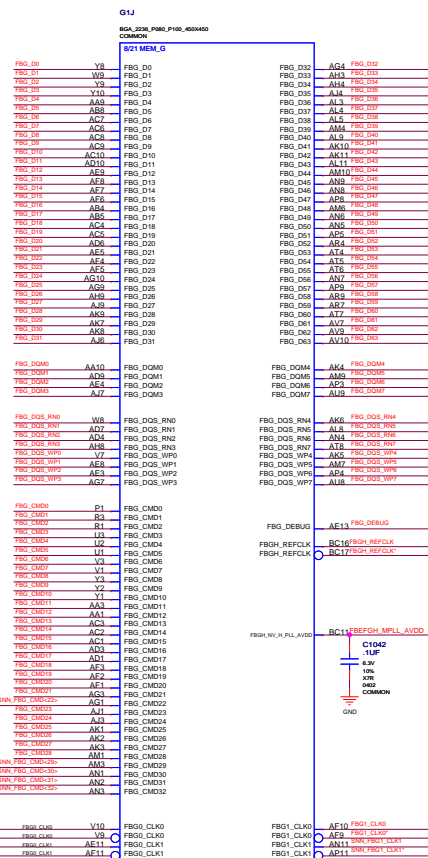
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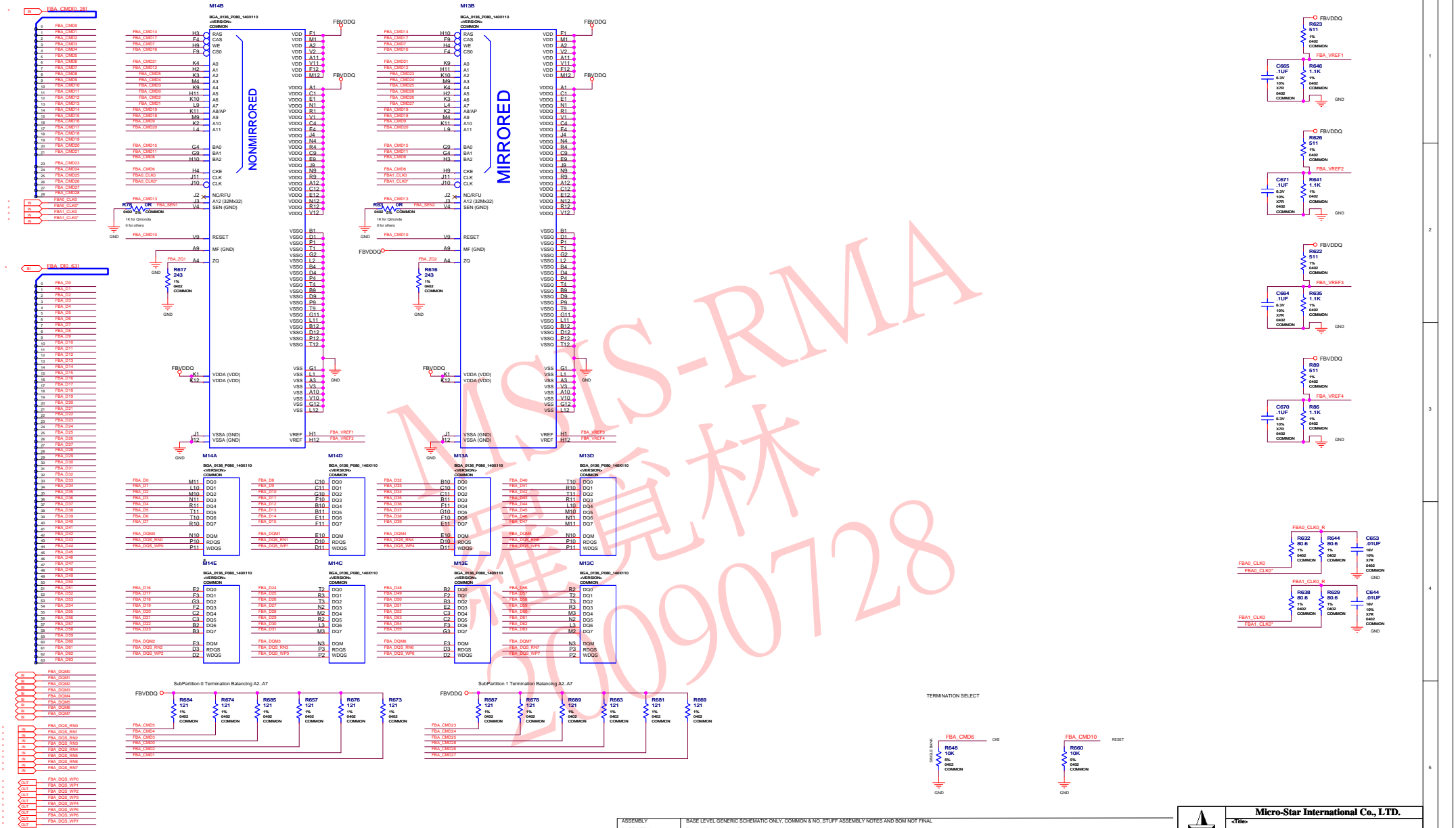




### Framebuffer G,H: GPU Section

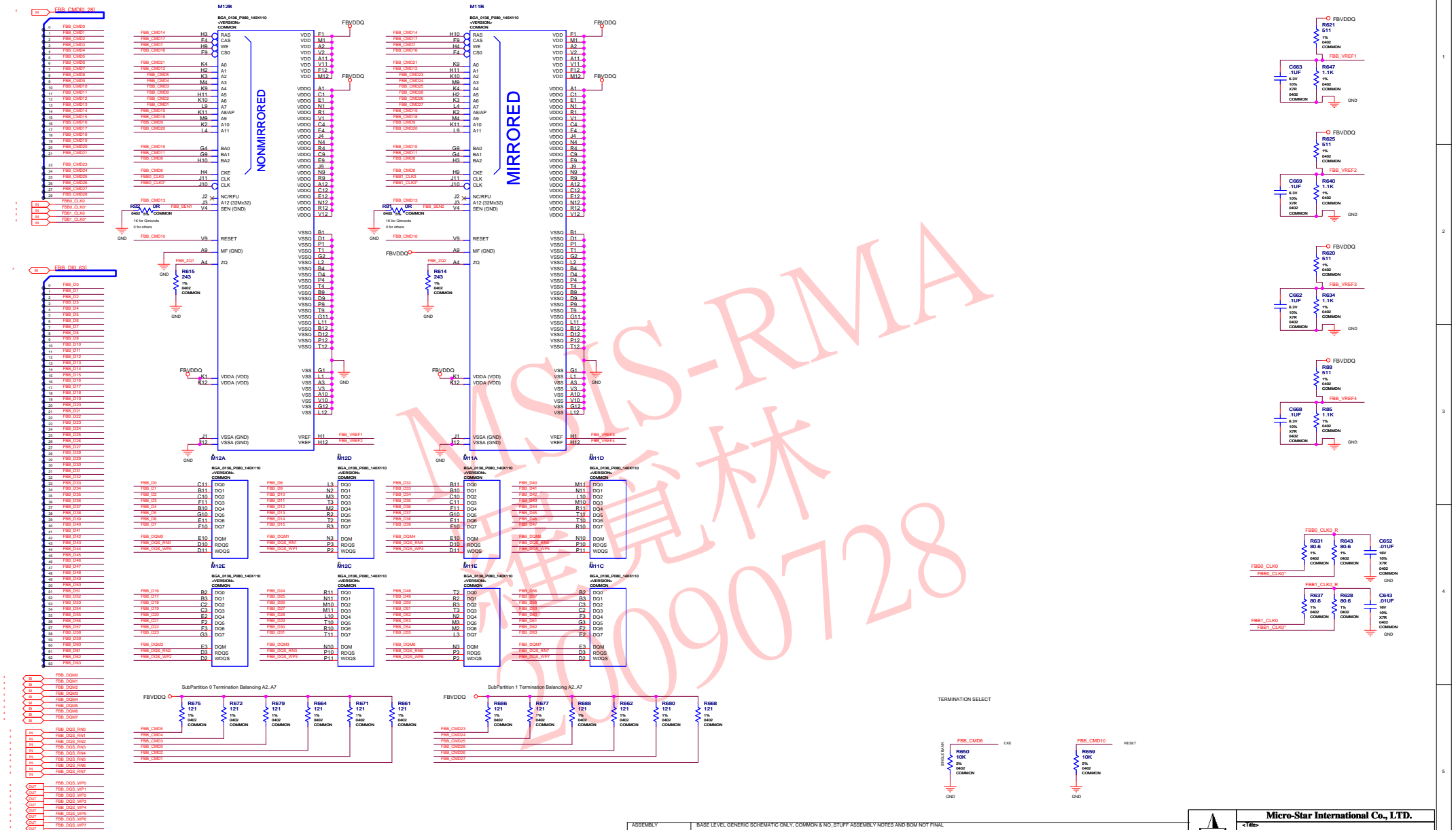


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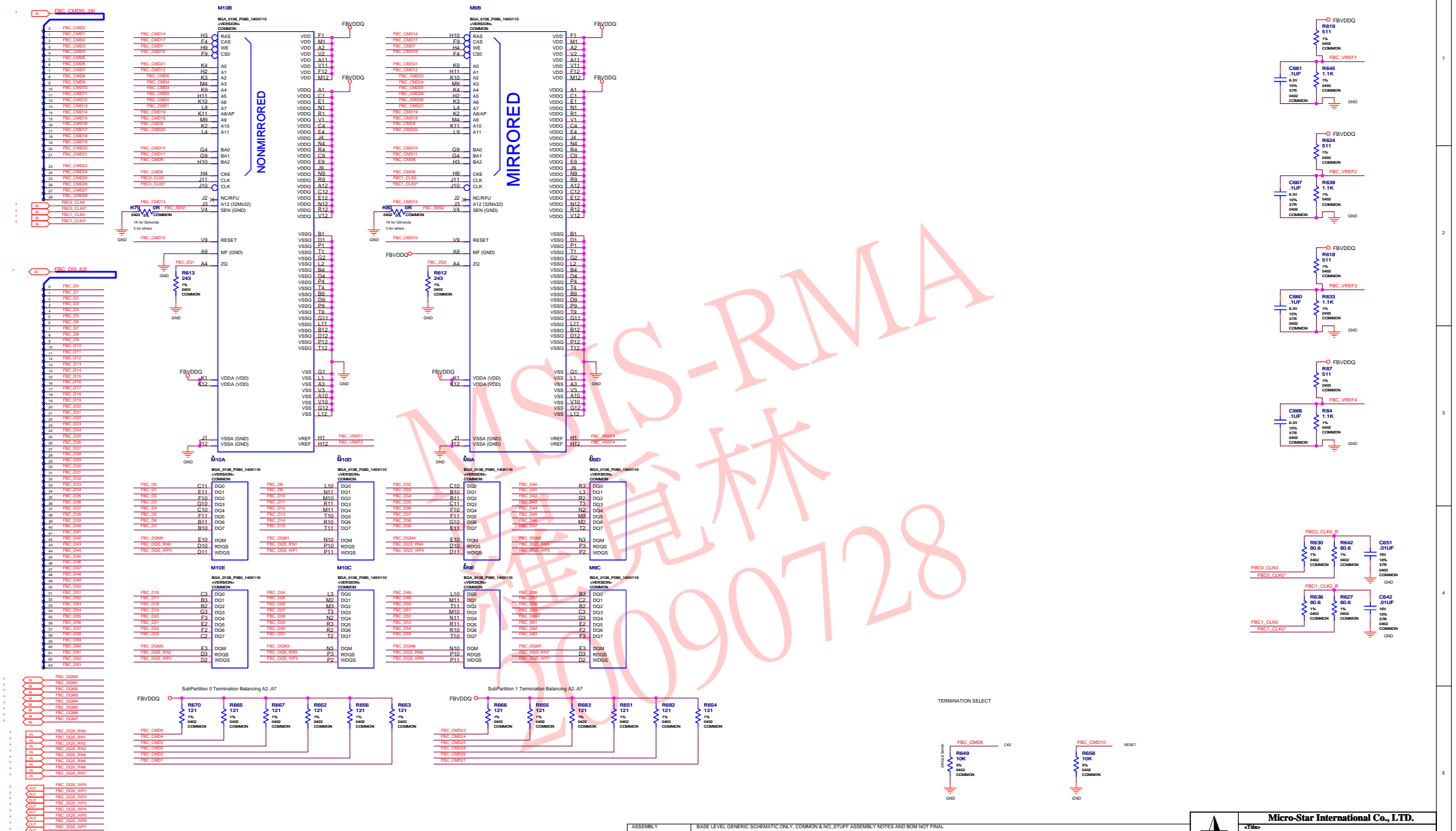


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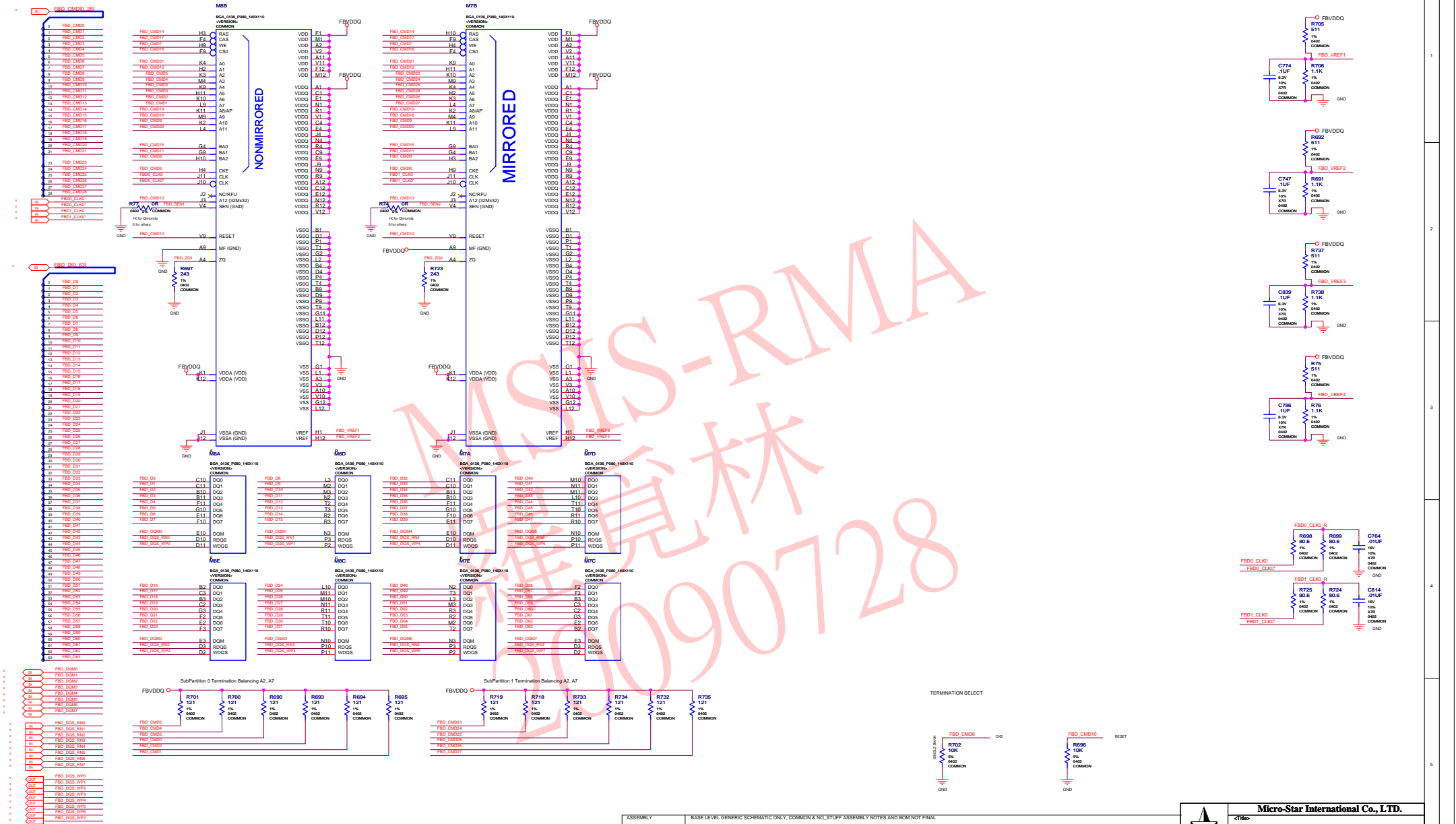
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## Framebuffer C: Memory Section



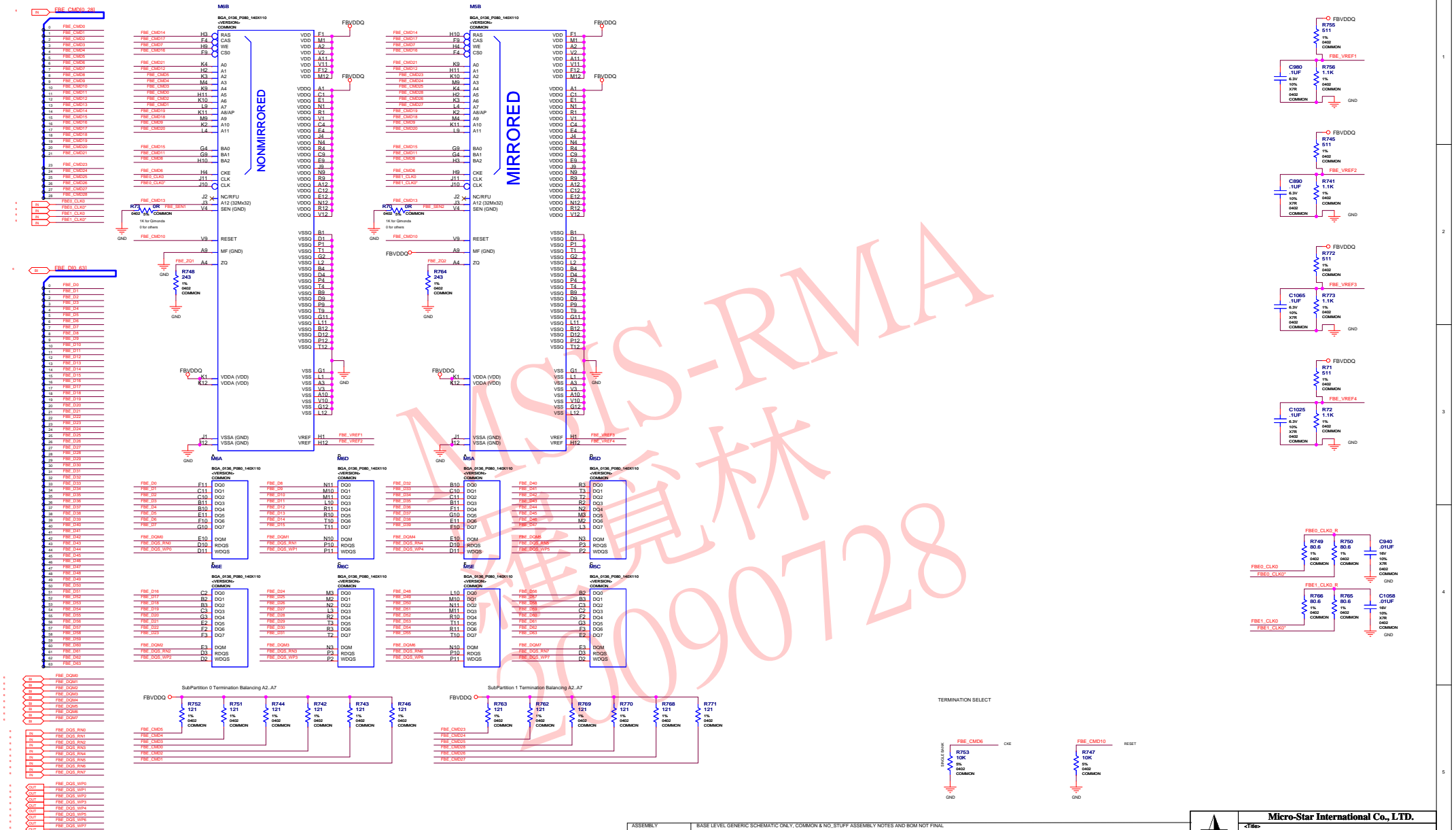
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### Framebuffer D: Memory Section



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## Framebuffer E: Memory Section



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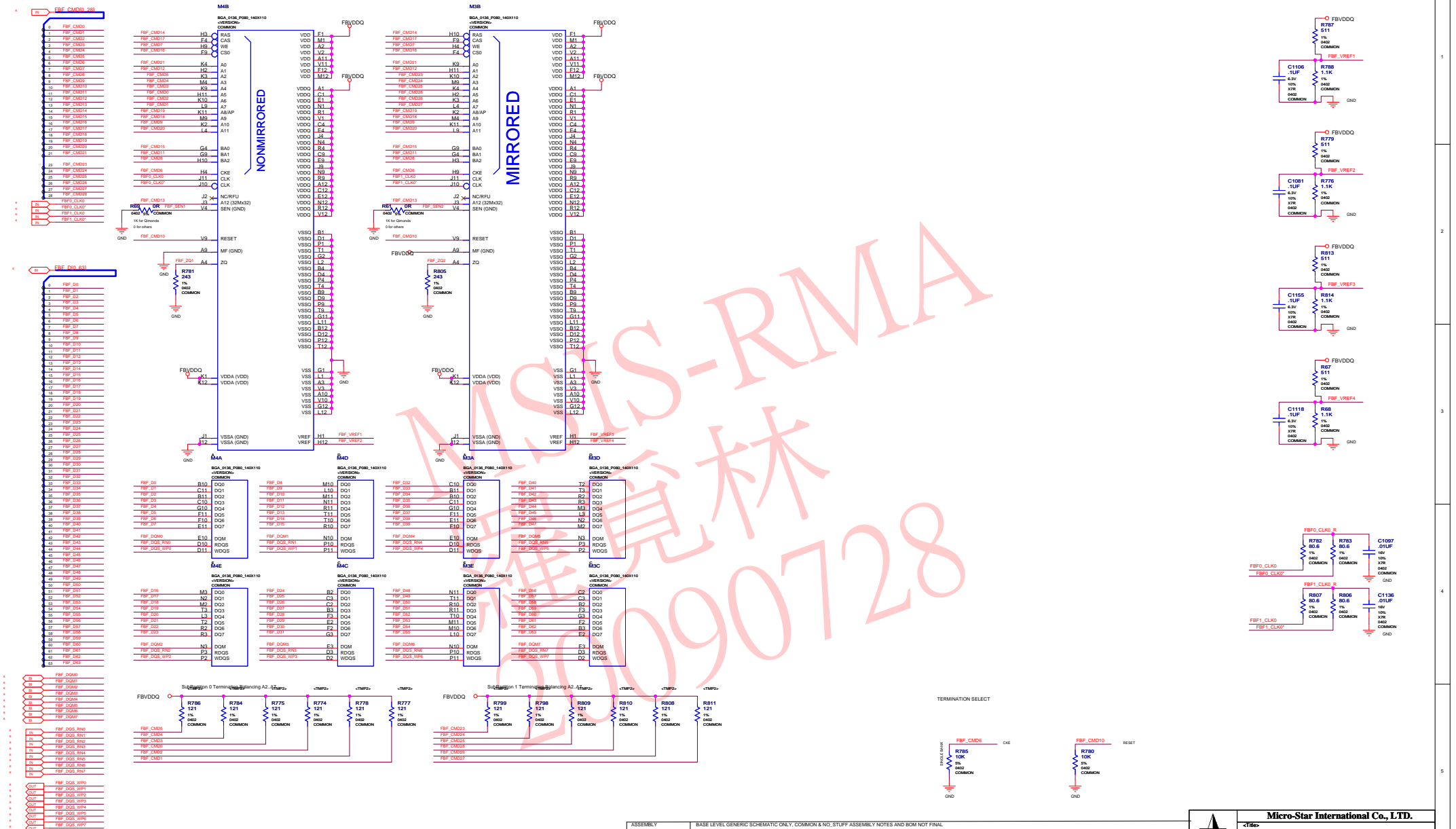


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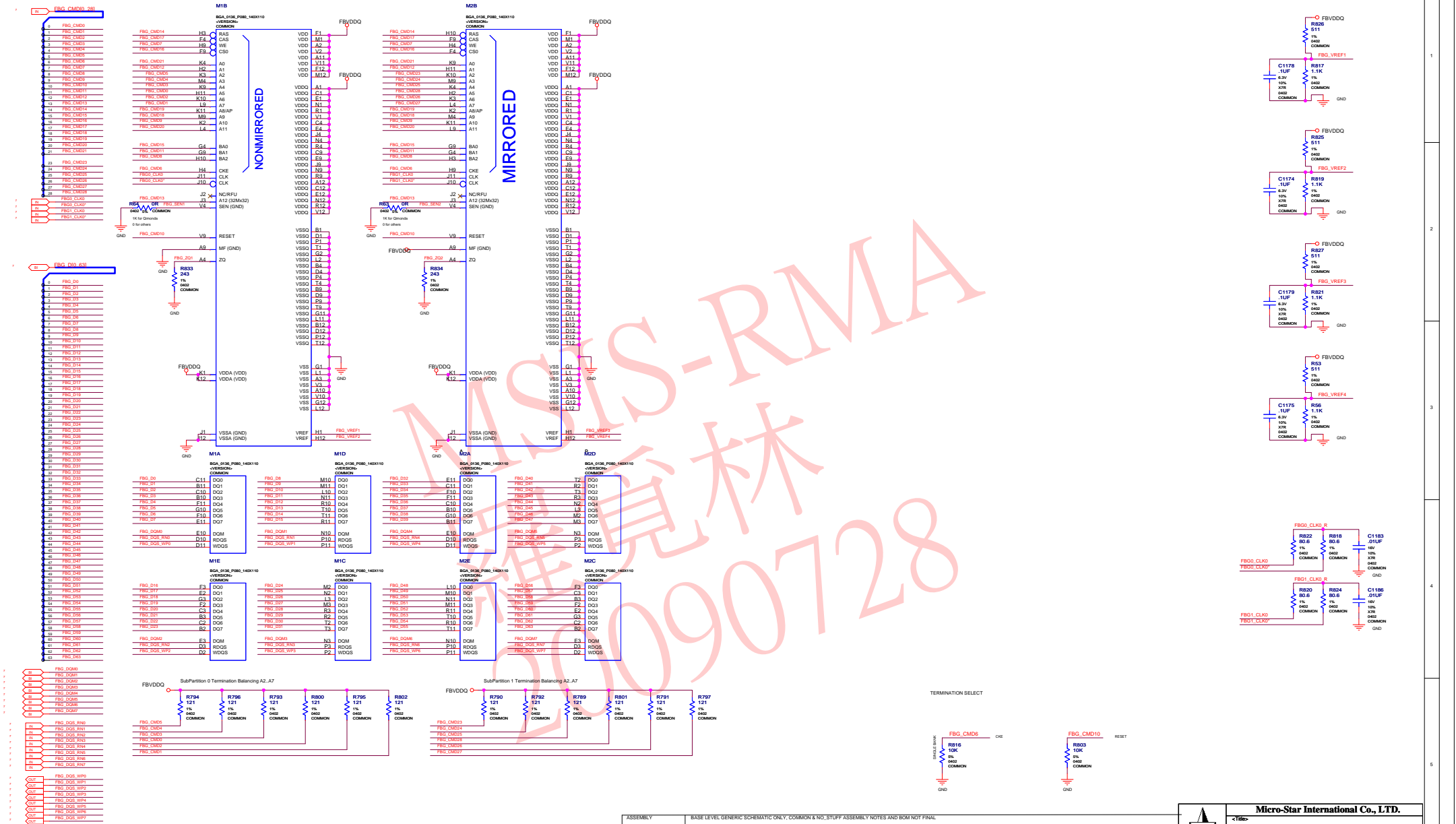
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## Framebuffer G: Memory Section



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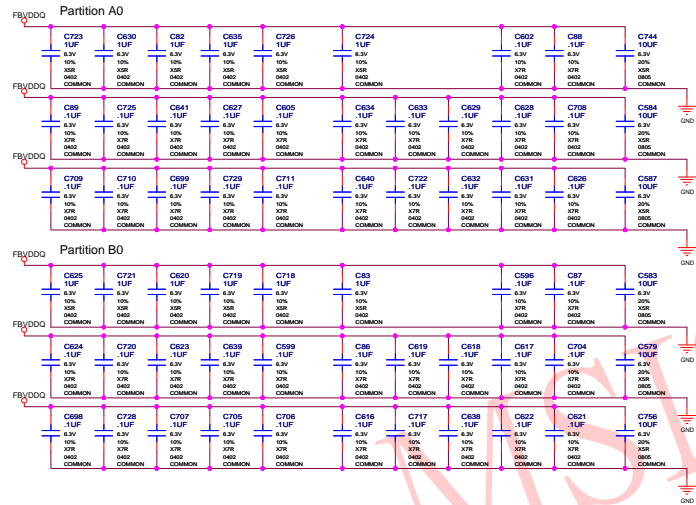
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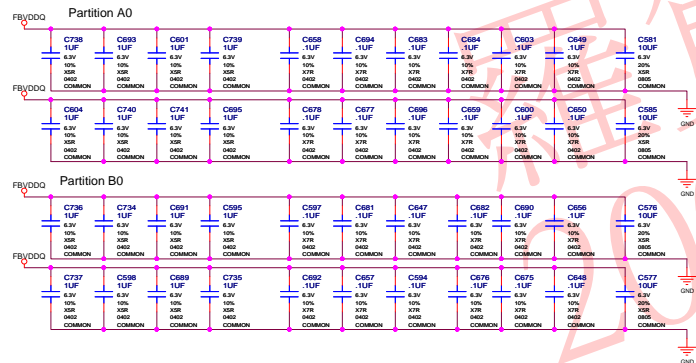
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# Decoupling: Memory Section A-D

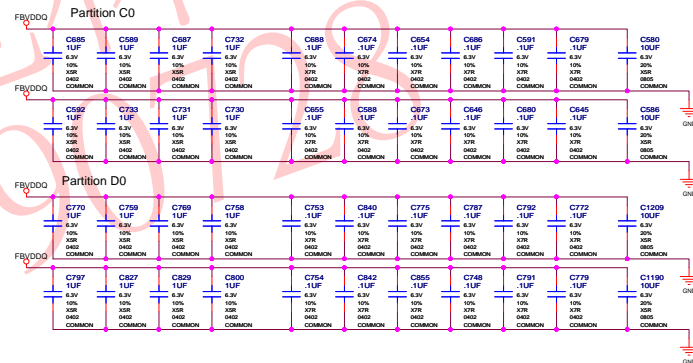
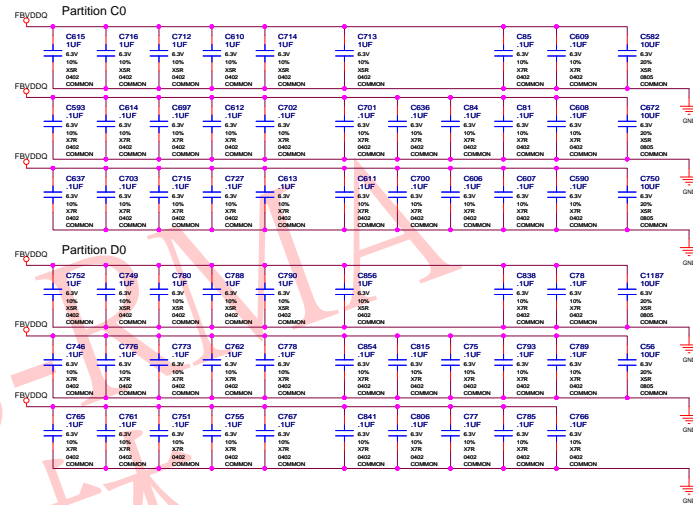
## Decoupling for FBVDDQ



## Decoupling for FBVDDQ



Banks A-D FBVDDQ  
Combined Distributed Capacitance  
280 uF



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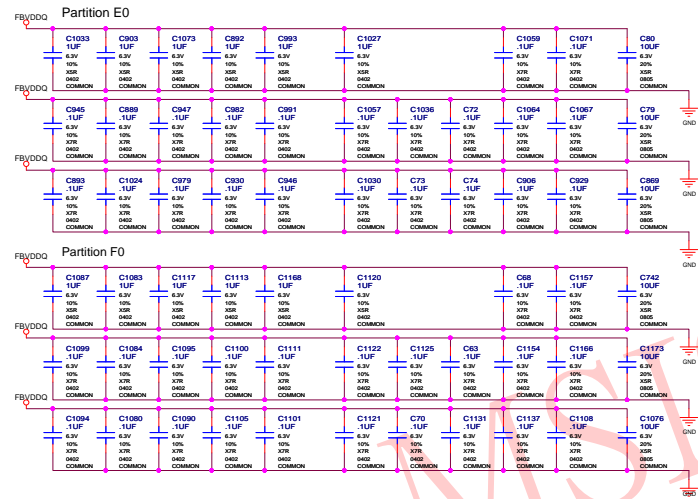
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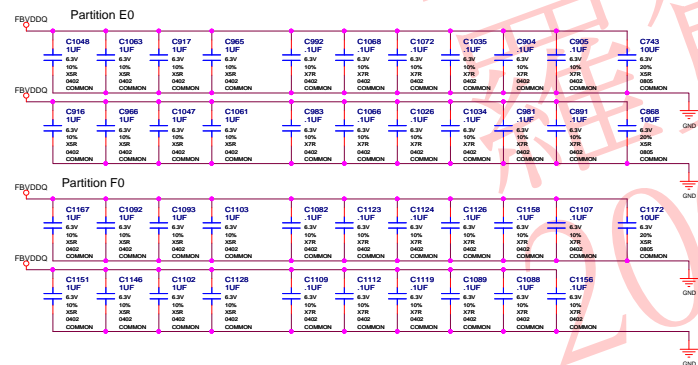
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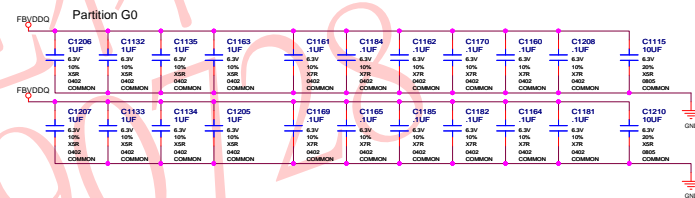
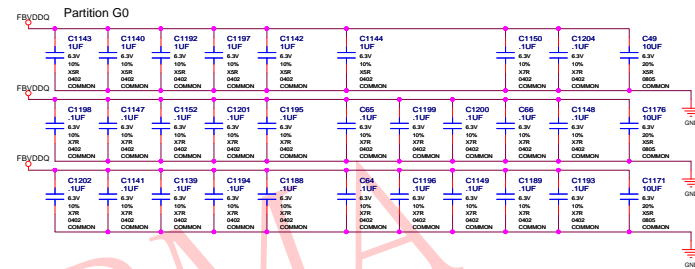
## Decoupling for FBVDDQ



## Decoupling for FBVDDQ

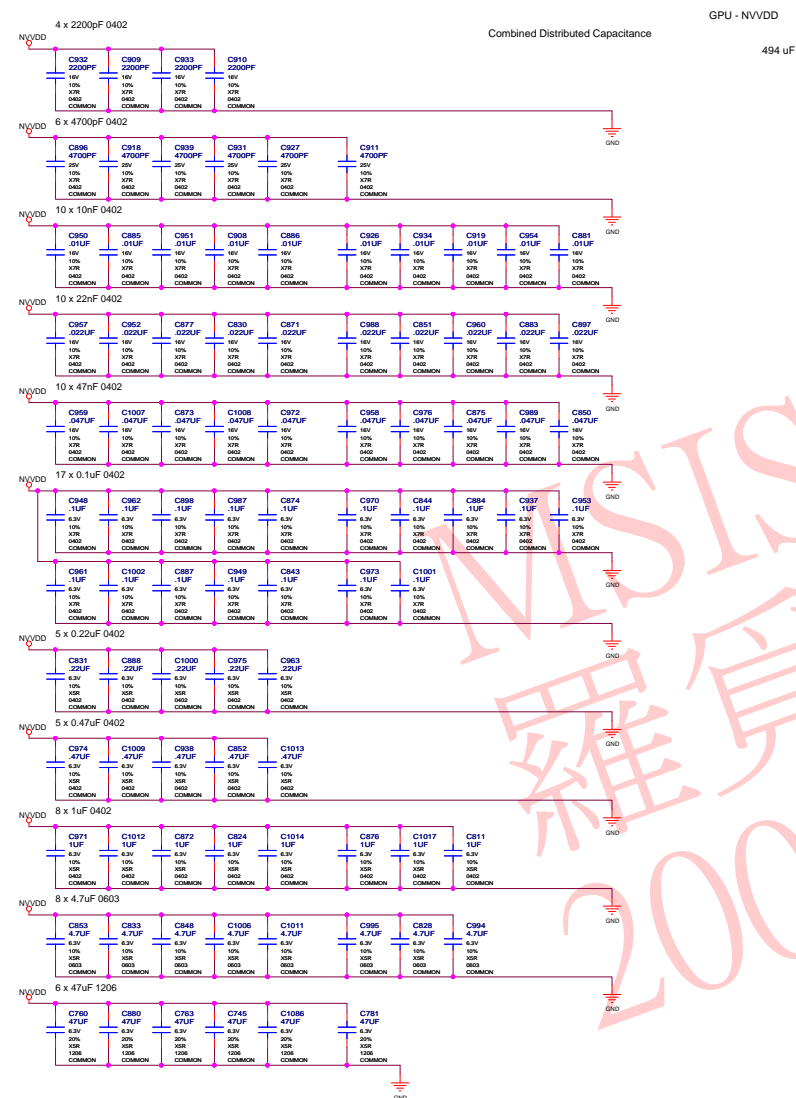


Banks E-G FBVDDQ  
Combined Distributed Capacitance  
210 uF

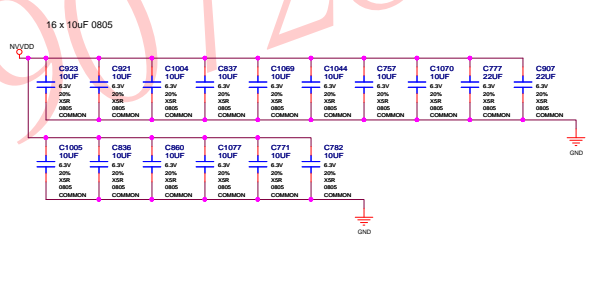
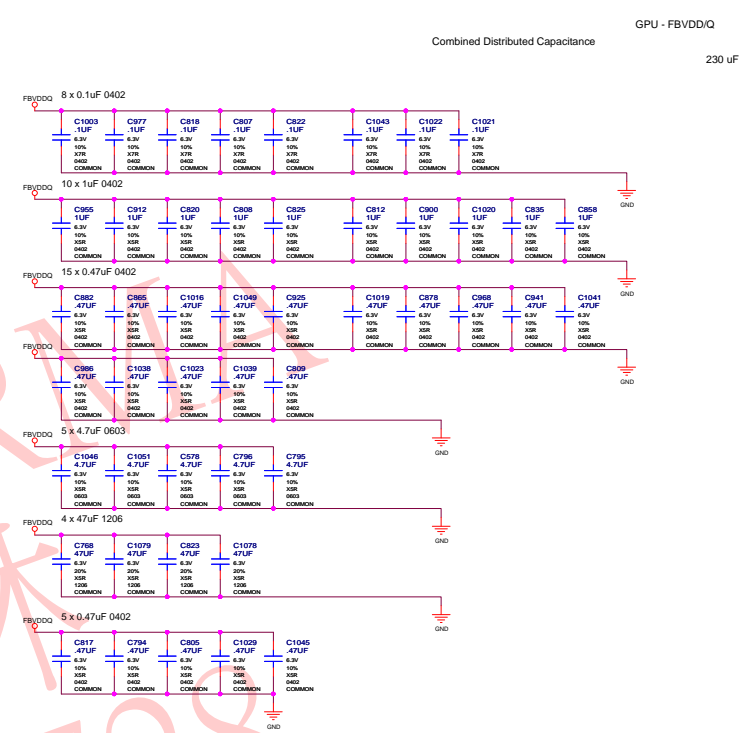


# Decoupling: GPU (NVVDD, FBVDDQ)

## Decoupling for NVVDD (under GPU)



## Decoupling for FBVDDQ (under GPU)



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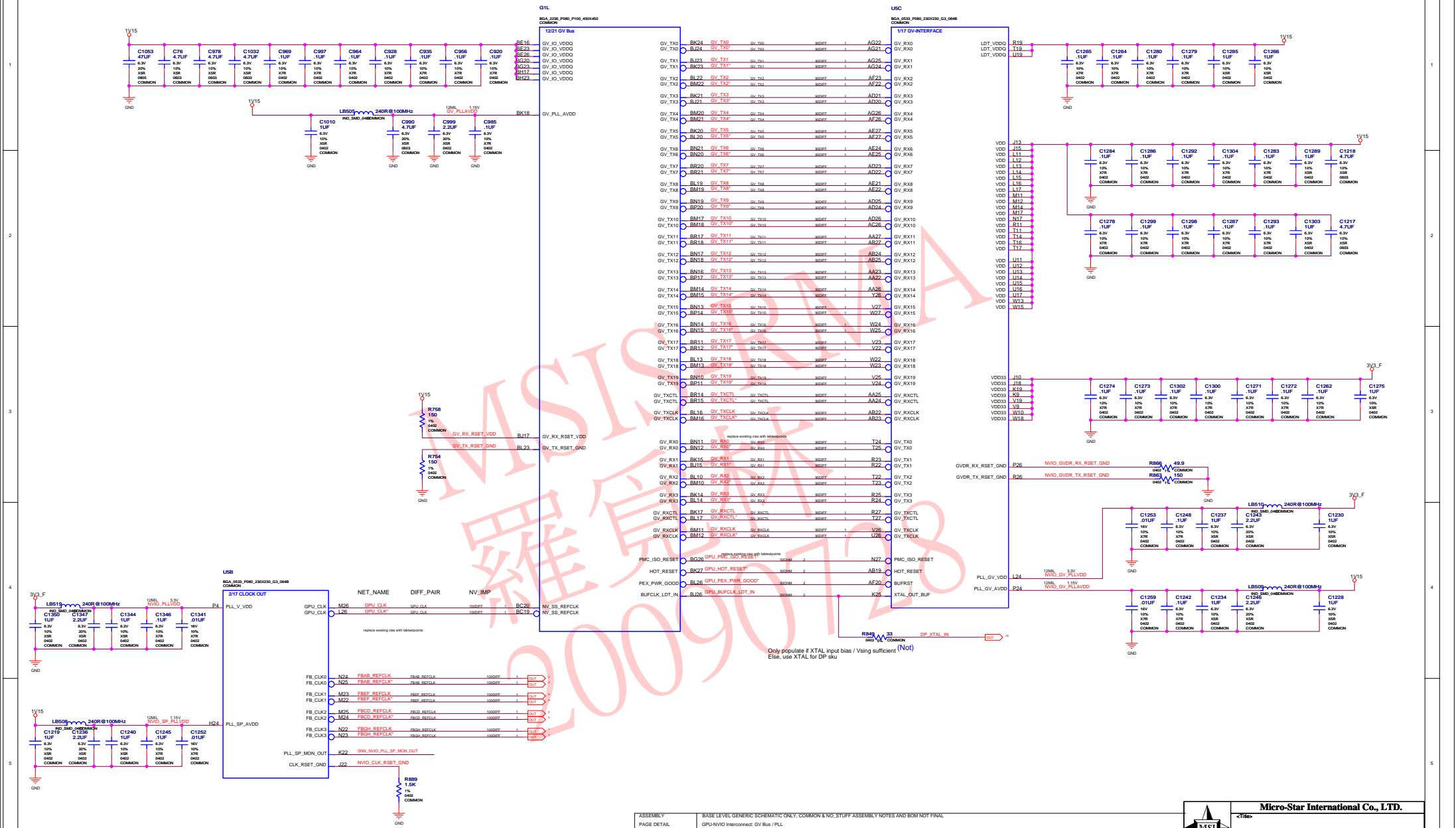
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## GPU-NVIO Interconnect: GV Bus / PLL



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| PAGE DETAIL | GPU-NVIO Interconnect: GV Bus / PLL   |



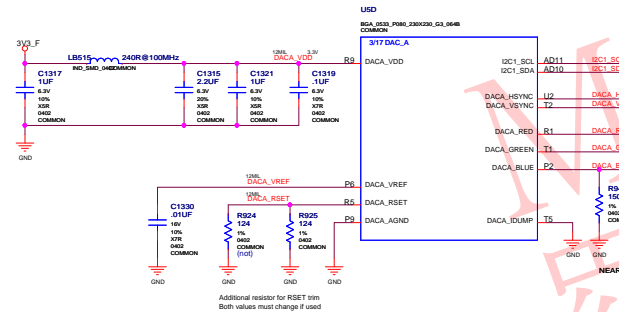
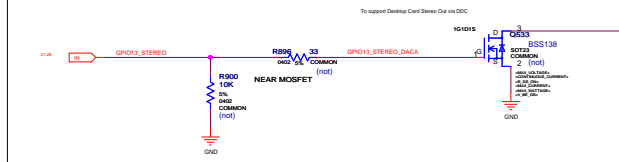
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# Display: DACA (Middle DVI-I)

## Desktop STEREO (option)



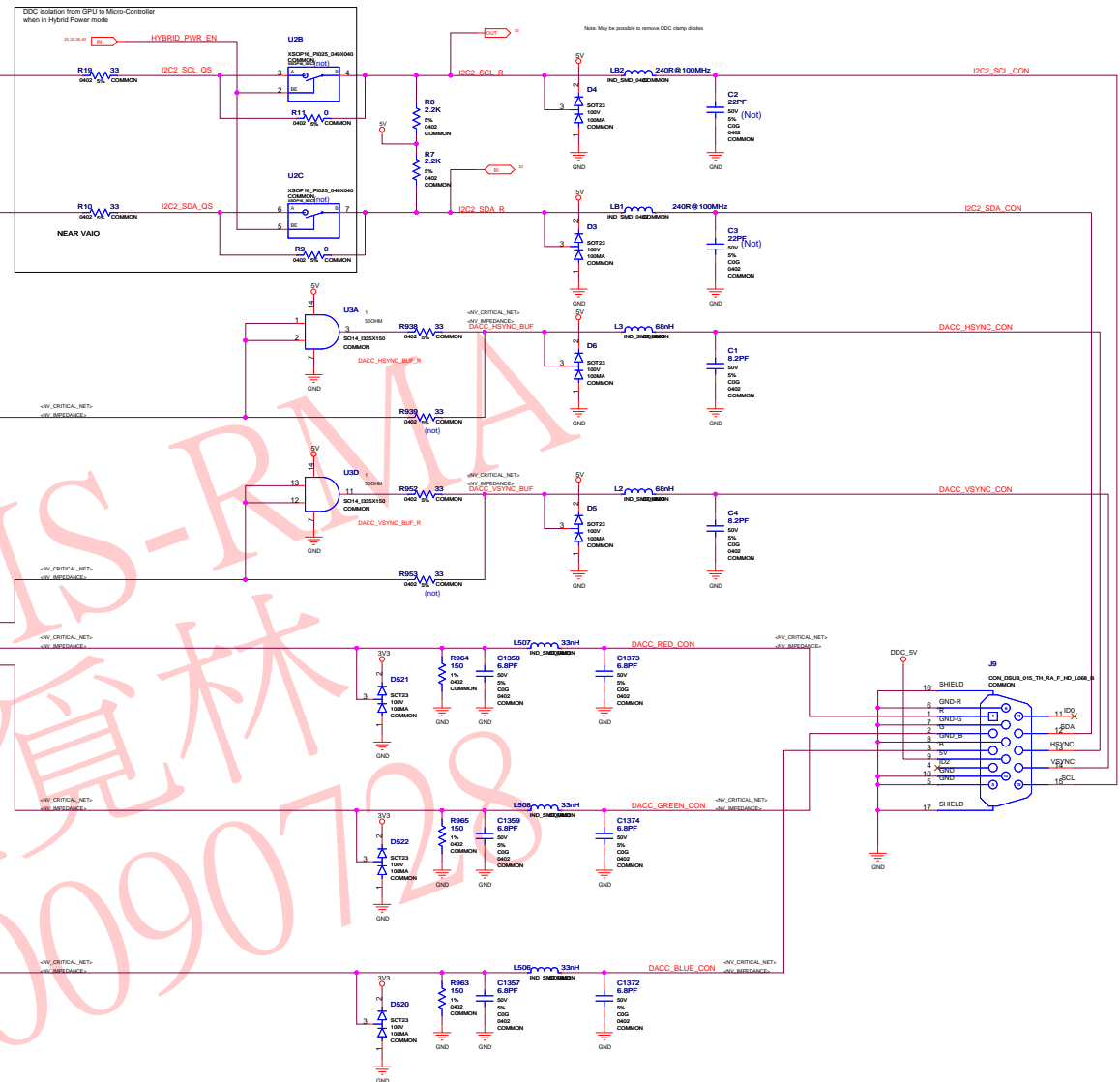
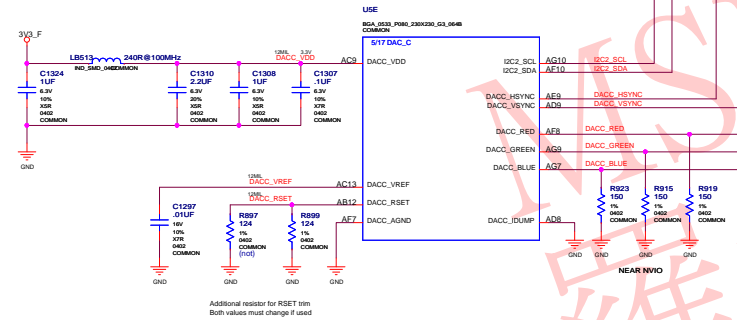
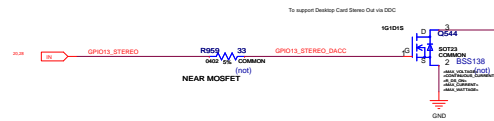
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Display: DACA (Middle DVI-I)

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| Sheet                              | 20 of 41        |



Display: DACC (South DVI-I)



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| PAGE DETAIL | Display: DACC (South DVI-I)   |



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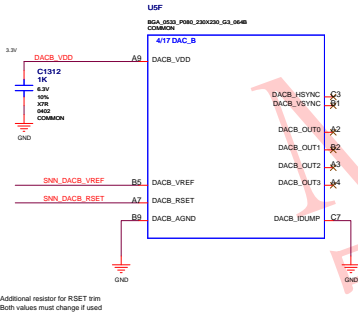
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| Date:   | Wednesday, February 11, 2009 | Sheet | 21 of 41 |

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Display: DACB (North MiniDIN) SD/HDTV out

11/21 remove TV

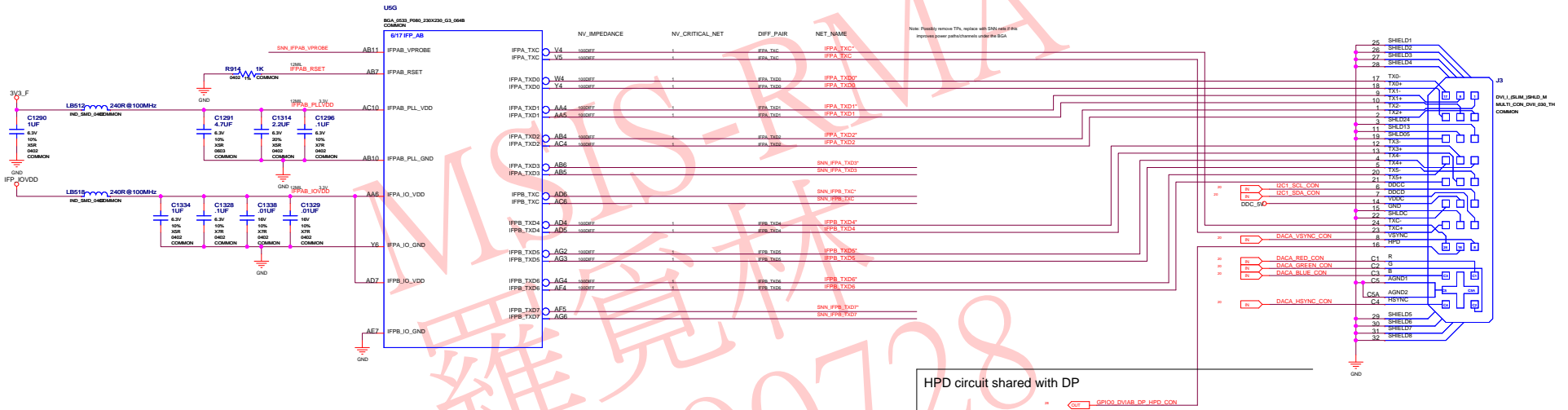


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ASSEMBLY  
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STATE LEVEL GENERIC SCHEMATIC ONLY, COMMON & NO STUFF ASSEMBLY NOTES AND BOM NOT FINAL  
Display: DACB (North MiniDIN) SD/HDTV out

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## Display: IFPAB for South DVI-I (with DACC)



HPD circuit shared with DP

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| ASSEMBLY    | BASE LEVEL GENERIC SCHEMATIC ONLY, COMMON & NO_STUFF ASSEMBLY NOTES AND BOM NOT FINAL |
| PAGE DETAIL | Display: IFPAB for south DVI-I (with DAC)   |

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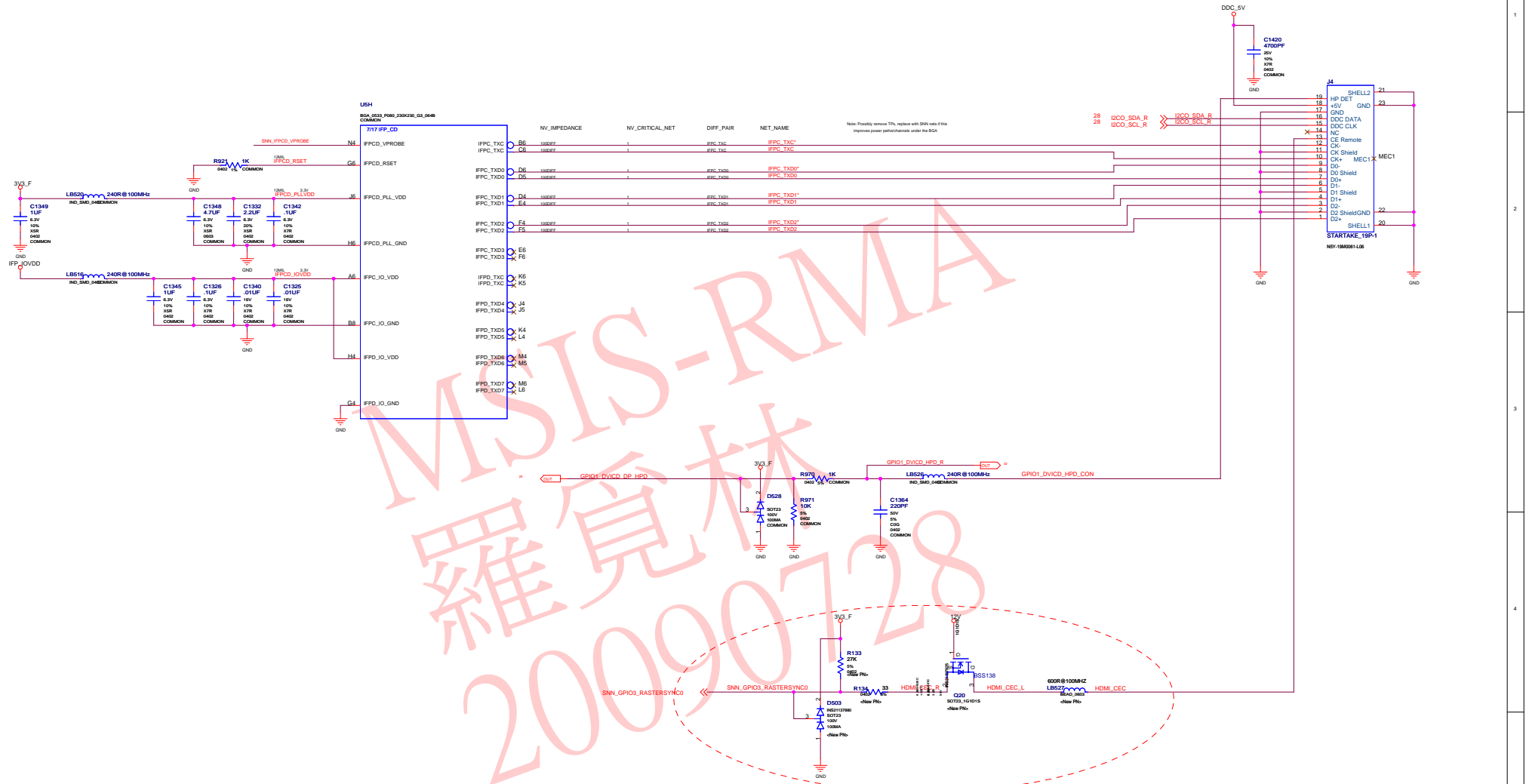
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Date: Wednesday, Feb

Rev. 1/2004

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Display: IFPCD for middle DVI-I (with DACA)



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| PAGE DETAIL | Display: IFPCD for middle DVI-I (with DACA)  |



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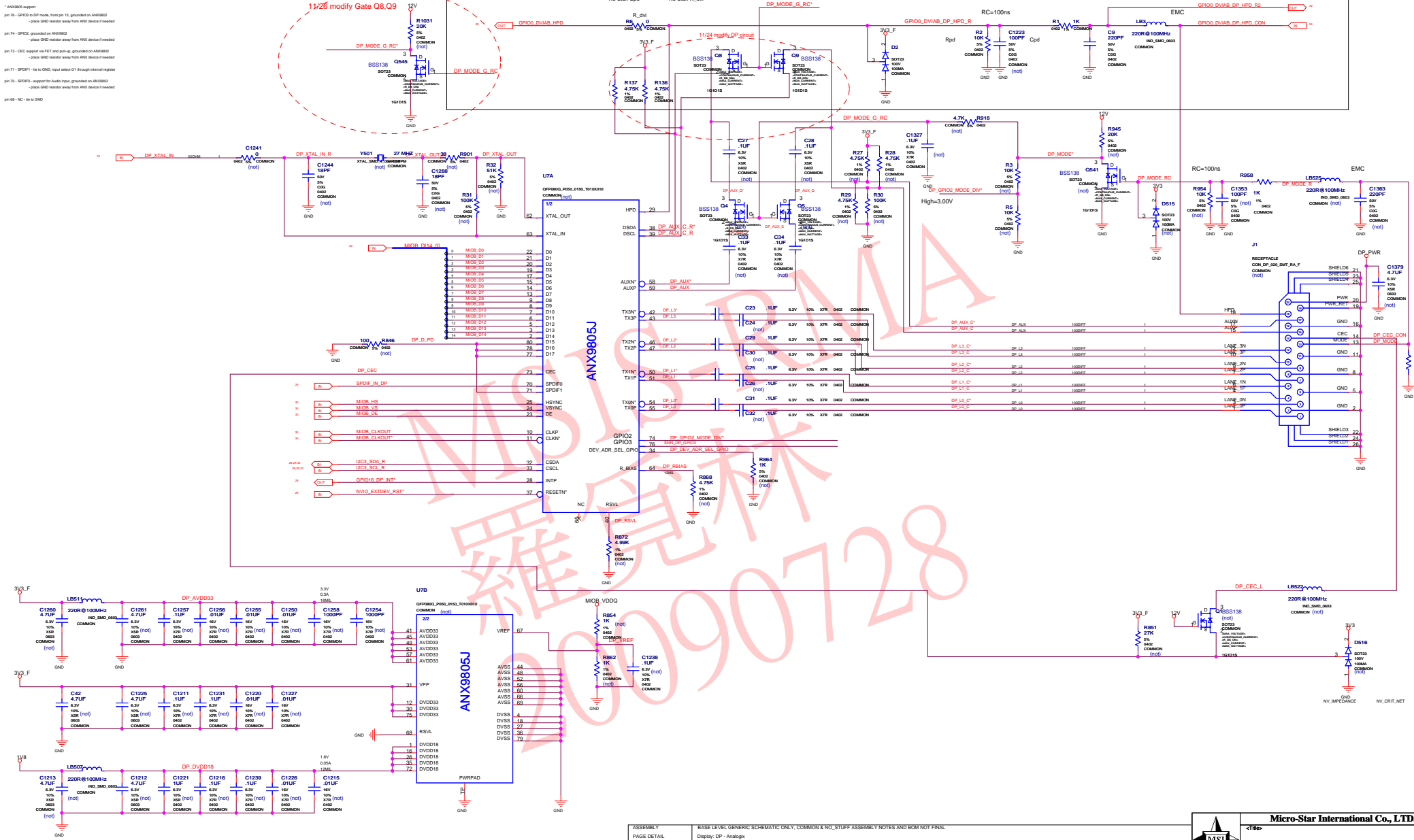
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Display: DP - Analogix

- \* AN3865 to DIP mode, from pin 13, grounded on AN3862
  - place GND resistor away from ANX device if needed
- pin 74 - GPQ02, grounded on AN3862
  - place GND resistor away from ANX device if needed
- pin 73 - CEC support via FET and pull-up, grounded on AN3862
  - place GND resistor away from ANX device if needed
- pin 71 - SPDF01 - Ix to GND, input select 01 through internal register
- pin 70 - SPDF01 - support for Audio Input, grounded on AN3862
  - place GND resistor away from ANX device if needed
- pin 68 - NC - Ix to GND



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| ASSEMBLY    | BASE LEVEL GENERIC SCHEMATIC ONLY, COMMON & NO_STUFF ASSEMBLY NOTES AND BOM NOT FINAL |
| PAGE DETAIL | Display: DP - Analogix  |



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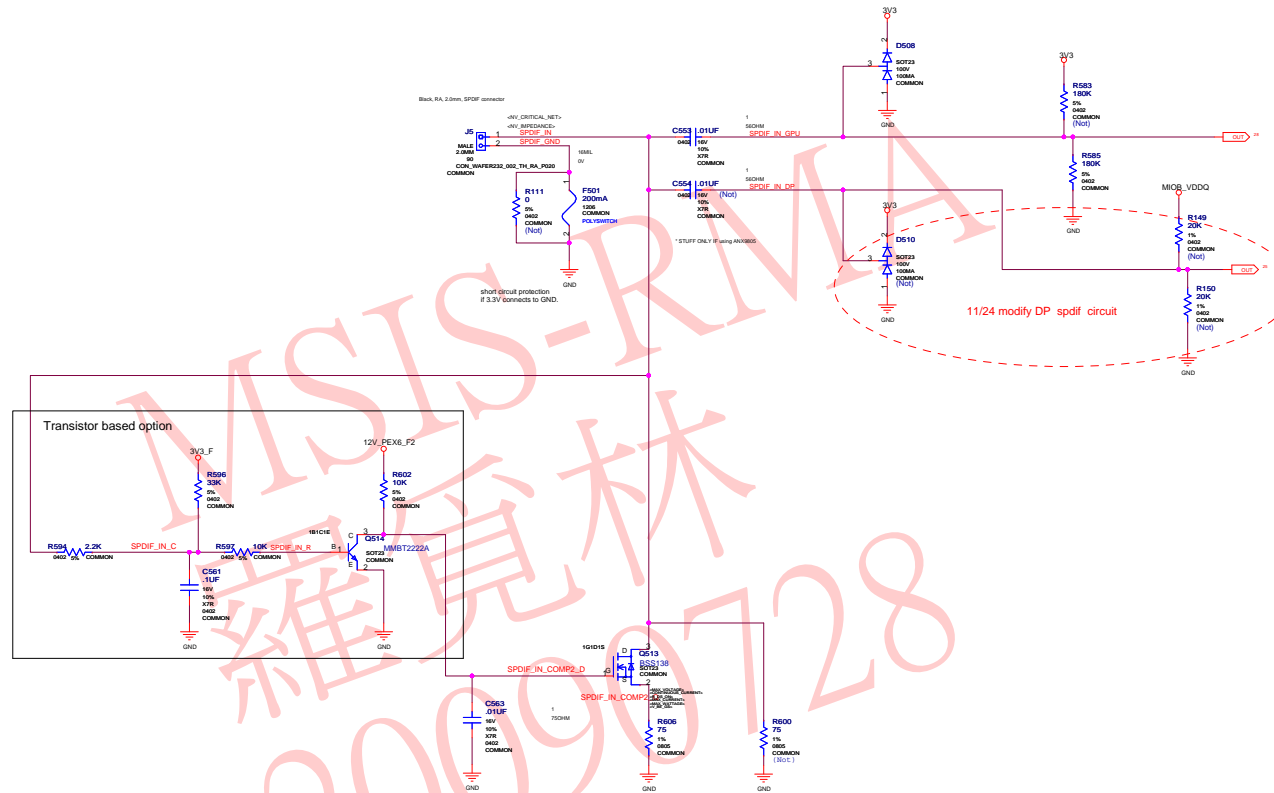
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| TV | RefCode |
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Connectors: SPDIF

SPDIF INPUT / Level Detection



Transistor based option

11/24 modify DP spdif circuit

ASSEMBLY  
PAGE DATA

BASE LEVEL GENERIC SCHEMATIC ONLY, COMMON & NO\_STUFF ASSEMBLY NOTES AND BOM NOT FINAL  
Connectors: SPDIF



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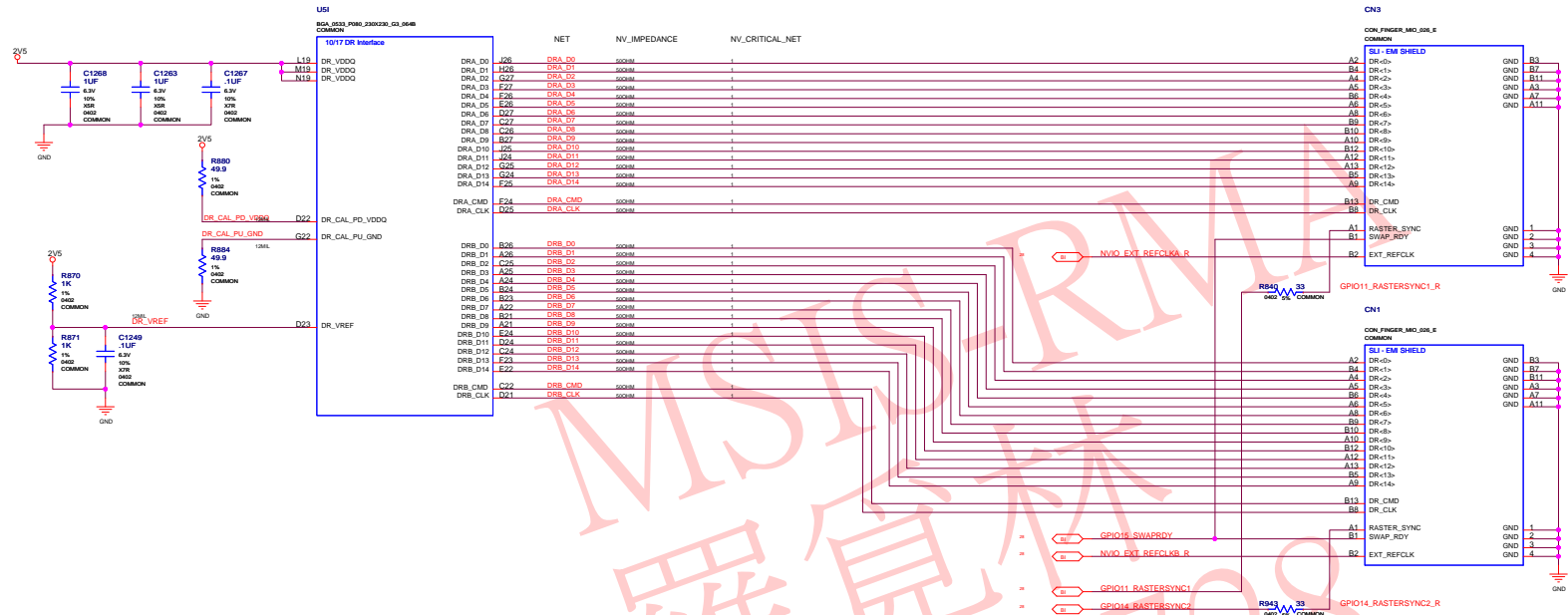
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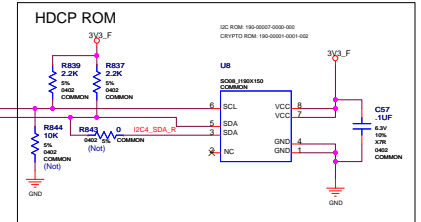
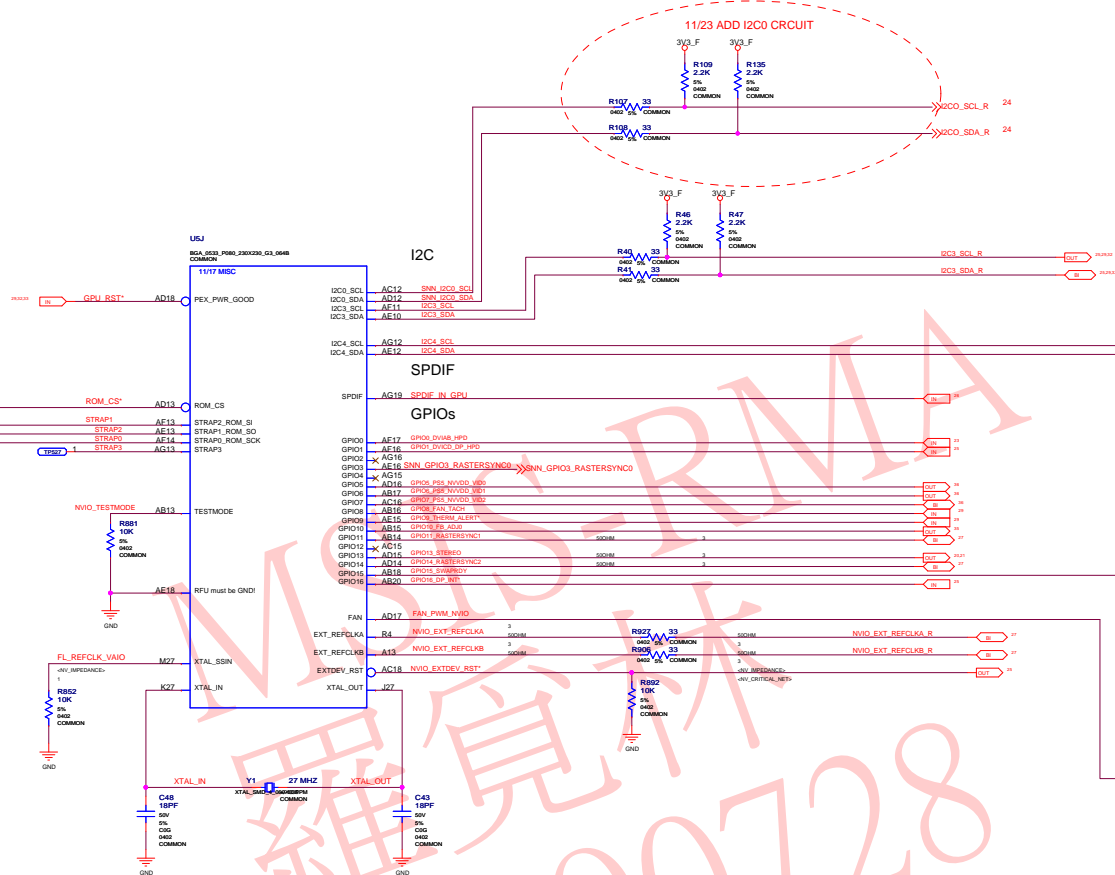
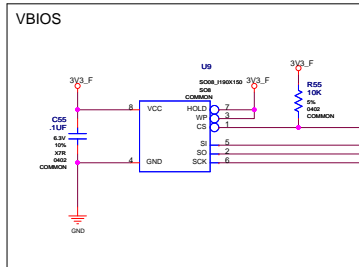
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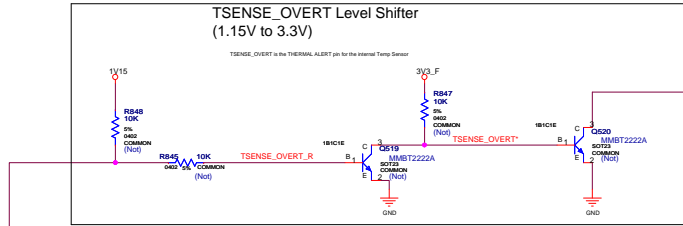
Connectors: DR Interface (Dual SLI)



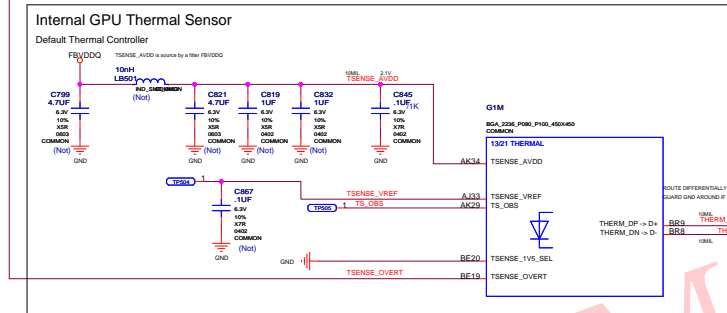
## VBIOS



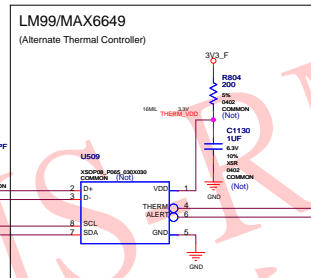
## MISC: FAN / THERM



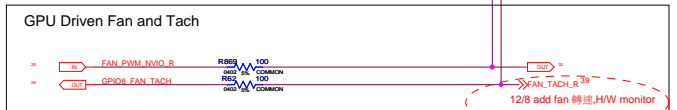
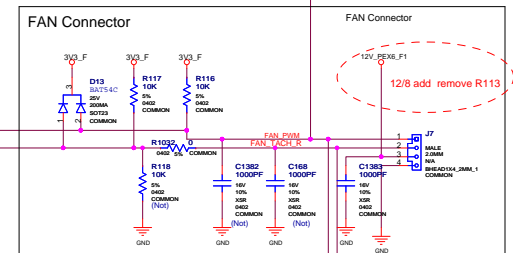
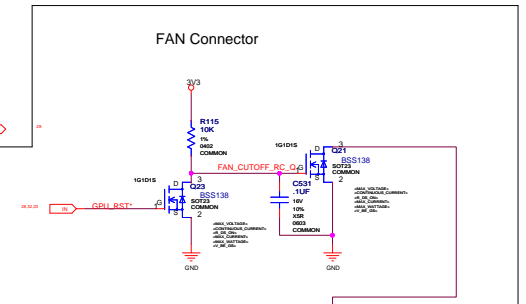
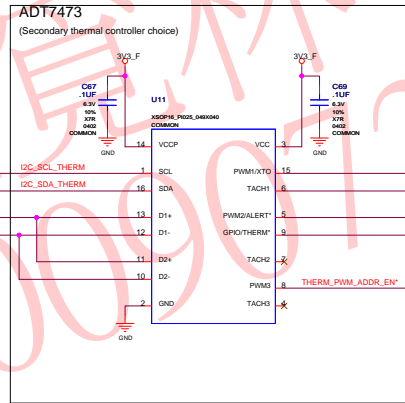
## Default Thermal Controller



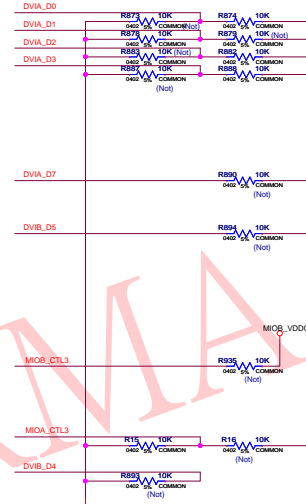
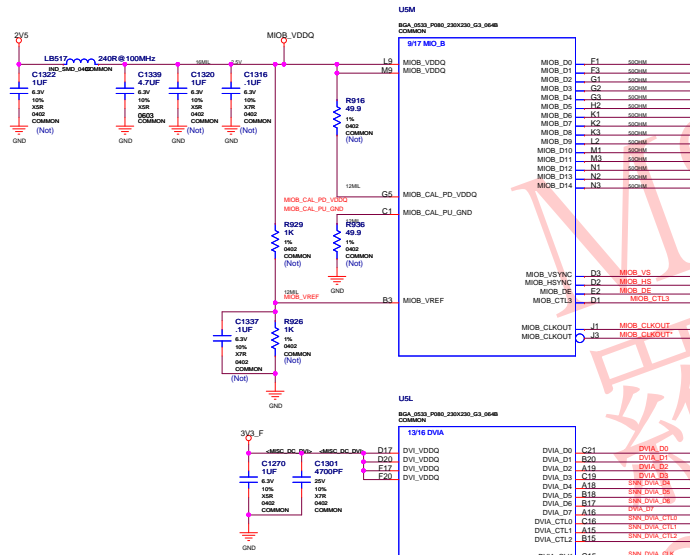
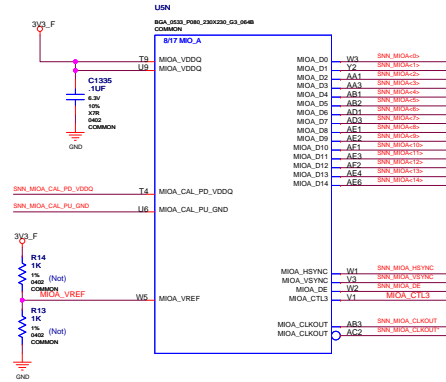
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| tsense_1v5_sel = 0: | TS_AVDD = 1.7v - 2.1v (default) (wired to gnd) |
| tsense_1v5_sel = 1: | TS_AVDD = 1.45v - 1.7v (wired to NVVDD)        |



Note: POR internal thermal control  
external controls will be DN



MISC: MIO / DVI / STRAPS

STRAP BITS BOOT0 = 0x101000

| NR. | USAGE                   | COMMENT                        |
|-----|-------------------------|--------------------------------|
| 00  | GV_WIDTH                | DEFAULT=0x00 (WIDE)            |
| 01  | SUB_VENDOR              | DEFAULT=0x01 (FROM BIOS)       |
| 02  | RAM_CFGQ1               |                                |
| 03  | RAM_CFGQ1               |                                |
| 04  | RAM_CFGQ2               |                                |
| 05  | RAM_CFGQ3               |                                |
| 06  | CRYSTAL                 | DEFAULT=0x00 (27MHz)           |
| 07  | TV_MODEQ0               | DEFAULT=0x01 (NTSC_J)          |
| 08  | TV_MODEQ1               |                                |
| 09  | TV_MODEQ2               |                                |
| 10  | PCI_DEVQ0               | SET BY BIOS                    |
| 11  | PCI_DEVQ1               |                                |
| 12  | PCI_DEVQ2               |                                |
| 13  | PCI_DEVQ3               | DEFAULT=0x00                   |
| 14  | FB_SIZEQ0               | DEFAULT=0x02 (256MB 77)        |
| 15  | FB_SIZEQ1               |                                |
| 16  | FB_SIZEQ2               |                                |
| 17  | PEX_PL_LN_TERM00        | DEFAULT=0x00 (ENABLED)         |
| 18  | 3G0G_PAD_CFG_LUT_ADDRQ0 | DEFAULT=0x03 (DESKTOP_DEFAULT) |
| 19  | 3G0G_PAD_CFG_LUT_ADDRQ1 |                                |
| 20  | 3G0G_PAD_CFG_LUT_ADDRQ2 |                                |
| 21  | 3G0G_PAD_CFG_LUT_ADDRQ3 |                                |
| 22  | ROMTYPEQ0               | DEFAULT=0x01 (AT25S)           |
| 23  | ROMTYPEQ1               |                                |
| 24  | USERQ0                  | SET BY BIOS                    |
| 25  | USERQ1                  |                                |
| 26  | USERQ2                  |                                |
| 27  | USERQ3                  |                                |
| 28  | PCI_DEVQ_EXT            | DEFAULT=0x00                   |

STRAP BITS BOOT3 = 0x10100C

| NR. | USAGE     | COMMENT                            |
|-----|-----------|------------------------------------|
| 06  | XCLK_555  | DEFAULT=0x0                        |
| 16  | PCI_JOBAR | DEFAULT=0x1<br>0=DISABLE, 1=ENABLE |

| CFG  | Config Width            | Vendor |
|------|-------------------------|--------|
| 0000 | Reserved                |        |
| 0001 | 16Mx32 512-bit Cimaxda  |        |
| 0010 | 16Mx32 512-bit Hynix*   |        |
| 0011 | 16Mx32 512-bit Samsung* |        |
| 0100 | Reserved                |        |
| 0101 | 32Mx32 512-bit Cimaxda  |        |
| 0110 | 32Mx32 512-bit Hynix    |        |
| 0111 | 32Mx32 512-bit Samsung  |        |
| 1000 | Reserved                |        |
| 1001 | 16Mx32 448-bit Cimaxda  |        |
| 1010 | 16Mx32 448-bit Hynix    |        |
| 1011 | 16Mx32 448-bit Samsung  |        |
| 1100 | Reserved                |        |
| 1101 | 32Mx32 448-bit Cimaxda  |        |
| 1110 | 32Mx32 448-bit Hynix    |        |
| 1111 | 32Mx32 448-bit Samsung  |        |



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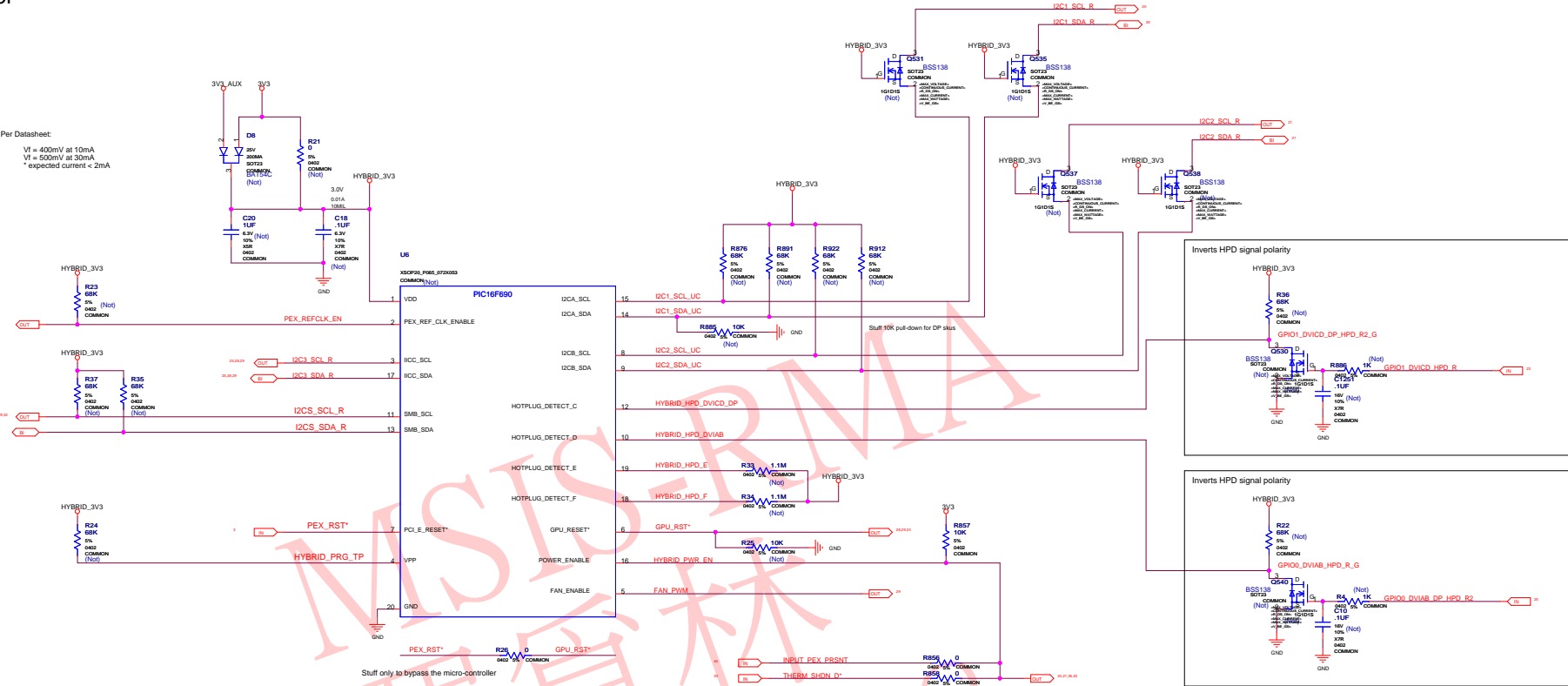
Date: Wednesday, February 11, 2009 Sheet 30 of 41

Power and GND (GPU and NVIOx)

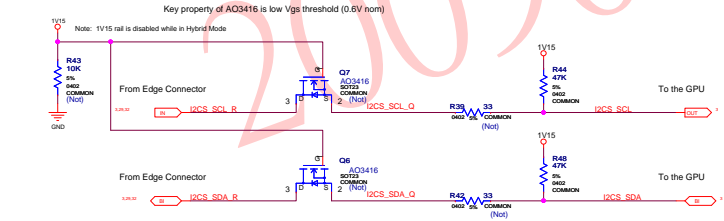
GPU SECTION GND

| G1N                        |     | G1O                        |       | G1P                        |      |       |     |     |
|----------------------------|-----|----------------------------|-------|----------------------------|------|-------|-----|-----|
| RCA_2236_P080_P100_450x450 |     | RCA_2236_P080_P100_450x450 |       | RCA_2236_P080_P100_450x450 |      |       |     |     |
| 1921 GND1                  |     | 2021 GND2                  |       | 2121 GND3                  |      |       |     |     |
| 1                          | GND | AG17                       | AM54  | GND                        | B47  | BP18  | GND | R16 |
| 2                          | GND | AG18                       | AM6   | GND                        | B50  | BP21  | GND | R18 |
| 3                          | GND | AG19                       | AM10  | GND                        | B53  | BP24  | GND | R20 |
| 4                          | GND | AG2                        | AN16  | GND                        | B59  | BP27  | GND | R20 |
| 5                          | GND | AG21                       | AN17  | GND                        | B61  | BP29  | GND | R22 |
| 6                          | GND | AG21                       | AN18  | GND                        | B63  | BP31  | GND | R22 |
| 7                          | GND | AG22                       | AN19  | GND                        | B64  | BP32  | GND | R27 |
| 8                          | GND | AG23                       | AN20  | GND                        | B65  | BP33  | GND | R22 |
| 9                          | GND | AG24                       | AN21  | GND                        | B66  | BP34  | GND | R31 |
| 10                         | GND | AG25                       | AN22  | GND                        | B67  | BP35  | GND | R33 |
| 11                         | GND | AG26                       | AN23  | GND                        | B68  | BP36  | GND | R35 |
| 12                         | GND | AG27                       | AN24  | GND                        | B69  | BP37  | GND | R43 |
| 13                         | GND | AG28                       | AN25  | GND                        | B70  | BP38  | GND | R45 |
| 14                         | GND | AG29                       | AN26  | GND                        | B71  | BP39  | GND | R45 |
| 15                         | GND | AG30                       | AN27  | GND                        | B72  | BP40  | GND | R5  |
| 16                         | GND | AG31                       | AN28  | GND                        | B73  | BP41  | GND | R51 |
| 17                         | GND | AG32                       | AN29  | GND                        | B74  | BP42  | GND | R54 |
| 18                         | GND | AG33                       | AN30  | GND                        | B75  | BP43  | GND | R52 |
| 19                         | GND | AG34                       | AN31  | GND                        | B76  | BP44  | GND | R16 |
| 20                         | GND | AG35                       | AN32  | GND                        | B77  | BP45  | GND | R16 |
| 21                         | GND | AG36                       | AN33  | GND                        | B78  | BP46  | GND | R17 |
| 22                         | GND | AG37                       | AN34  | GND                        | B79  | BP47  | GND | R18 |
| 23                         | GND | AG38                       | AN35  | GND                        | B80  | BP48  | GND | R18 |
| 24                         | GND | AG39                       | AN36  | GND                        | B81  | BP49  | GND | R19 |
| 25                         | GND | AG40                       | AN37  | GND                        | B82  | BP50  | GND | R19 |
| 26                         | GND | AG41                       | AN38  | GND                        | B83  | BP51  | GND | R20 |
| 27                         | GND | AG42                       | AN39  | GND                        | B84  | BP52  | GND | R20 |
| 28                         | GND | AG43                       | AN40  | GND                        | B85  | BP53  | GND | R21 |
| 29                         | GND | AG44                       | AN41  | GND                        | B86  | BP54  | GND | R21 |
| 30                         | GND | AG45                       | AN42  | GND                        | B87  | BP55  | GND | R21 |
| 31                         | GND | AG46                       | AN43  | GND                        | B88  | BP56  | GND | R21 |
| 32                         | GND | AG47                       | AN44  | GND                        | B89  | BP57  | GND | R21 |
| 33                         | GND | AG48                       | AN45  | GND                        | B90  | BP58  | GND | R21 |
| 34                         | GND | AG49                       | AN46  | GND                        | B91  | BP59  | GND | R21 |
| 35                         | GND | AG50                       | AN47  | GND                        | B92  | BP60  | GND | R21 |
| 36                         | GND | AG51                       | AN48  | GND                        | B93  | BP61  | GND | R21 |
| 37                         | GND | AG52                       | AN49  | GND                        | B94  | BP62  | GND | R21 |
| 38                         | GND | AG53                       | AN50  | GND                        | B95  | BP63  | GND | R21 |
| 39                         | GND | AG54                       | AN51  | GND                        | B96  | BP64  | GND | R21 |
| 40                         | GND | AG55                       | AN52  | GND                        | B97  | BP65  | GND | R21 |
| 41                         | GND | AG56                       | AN53  | GND                        | B98  | BP66  | GND | R21 |
| 42                         | GND | AG57                       | AN54  | GND                        | B99  | BP67  | GND | R21 |
| 43                         | GND | AG58                       | AN55  | GND                        | B100 | BP68  | GND | R21 |
| 44                         | GND | AG59                       | AN56  | GND                        | B101 | BP69  | GND | R21 |
| 45                         | GND | AG60                       | AN57  | GND                        | B102 | BP70  | GND | R21 |
| 46                         | GND | AG61                       | AN58  | GND                        | B103 | BP71  | GND | R21 |
| 47                         | GND | AG62                       | AN59  | GND                        | B104 | BP72  | GND | R21 |
| 48                         | GND | AG63                       | AN60  | GND                        | B105 | BP73  | GND | R21 |
| 49                         | GND | AG64                       | AN61  | GND                        | B106 | BP74  | GND | R21 |
| 50                         | GND | AG65                       | AN62  | GND                        | B107 | BP75  | GND | R21 |
| 51                         | GND | AG66                       | AN63  | GND                        | B108 | BP76  | GND | R21 |
| 52                         | GND | AG67                       | AN64  | GND                        | B109 | BP77  | GND | R21 |
| 53                         | GND | AG68                       | AN65  | GND                        | B110 | BP78  | GND | R21 |
| 54                         | GND | AG69                       | AN66  | GND                        | B111 | BP79  | GND | R21 |
| 55                         | GND | AG70                       | AN67  | GND                        | B112 | BP80  | GND | R21 |
| 56                         | GND | AG71                       | AN68  | GND                        | B113 | BP81  | GND | R21 |
| 57                         | GND | AG72                       | AN69  | GND                        | B114 | BP82  | GND | R21 |
| 58                         | GND | AG73                       | AN70  | GND                        | B115 | BP83  | GND | R21 |
| 59                         | GND | AG74                       | AN71  | GND                        | B116 | BP84  | GND | R21 |
| 60                         | GND | AG75                       | AN72  | GND                        | B117 | BP85  | GND | R21 |
| 61                         | GND | AG76                       | AN73  | GND                        | B118 | BP86  | GND | R21 |
| 62                         | GND | AG77                       | AN74  | GND                        | B119 | BP87  | GND | R21 |
| 63                         | GND | AG78                       | AN75  | GND                        | B120 | BP88  | GND | R21 |
| 64                         | GND | AG79                       | AN76  | GND                        | B121 | BP89  | GND | R21 |
| 65                         | GND | AG80                       | AN77  | GND                        | B122 | BP90  | GND | R21 |
| 66                         | GND | AG81                       | AN78  | GND                        | B123 | BP91  | GND | R21 |
| 67                         | GND | AG82                       | AN79  | GND                        | B124 | BP92  | GND | R21 |
| 68                         | GND | AG83                       | AN80  | GND                        | B125 | BP93  | GND | R21 |
| 69                         | GND | AG84                       | AN81  | GND                        | B126 | BP94  | GND | R21 |
| 70                         | GND | AG85                       | AN82  | GND                        | B127 | BP95  | GND | R21 |
| 71                         | GND | AG86                       | AN83  | GND                        | B128 | BP96  | GND | R21 |
| 72                         | GND | AG87                       | AN84  | GND                        | B129 | BP97  | GND | R21 |
| 73                         | GND | AG88                       | AN85  | GND                        | B130 | BP98  | GND | R21 |
| 74                         | GND | AG89                       | AN86  | GND                        | B131 | BP99  | GND | R21 |
| 75                         | GND | AG90                       | AN87  | GND                        | B132 | BP100 | GND | R21 |
| 76                         | GND | AG91                       | AN88  | GND                        | B133 | BP101 | GND | R21 |
| 77                         | GND | AG92                       | AN89  | GND                        | B134 | BP102 | GND | R21 |
| 78                         | GND | AG93                       | AN90  | GND                        | B135 | BP103 | GND | R21 |
| 79                         | GND | AG94                       | AN91  | GND                        | B136 | BP104 | GND | R21 |
| 80                         | GND | AG95                       | AN92  | GND                        | B137 | BP105 | GND | R21 |
| 81                         | GND | AG96                       | AN93  | GND                        | B138 | BP106 | GND | R21 |
| 82                         | GND | AG97                       | AN94  | GND                        | B139 | BP107 | GND | R21 |
| 83                         | GND | AG98                       | AN95  | GND                        | B140 | BP108 | GND | R21 |
| 84                         | GND | AG99                       | AN96  | GND                        | B141 | BP109 | GND | R21 |
| 85                         | GND | AG100                      | AN97  | GND                        | B142 | BP110 | GND | R21 |
| 86                         | GND | AG101                      | AN98  | GND                        | B143 | BP111 | GND | R21 |
| 87                         | GND | AG102                      | AN99  | GND                        | B144 | BP112 | GND | R21 |
| 88                         | GND | AG103                      | AN100 | GND                        | B145 | BP113 | GND | R21 |
| 89                         | GND | AG104                      | AN101 | GND                        | B146 | BP114 | GND | R21 |
| 90                         | GND | AG105                      | AN102 | GND                        | B147 | BP115 | GND | R21 |
| 91                         | GND | AG106                      | AN103 | GND                        | B148 | BP116 | GND | R21 |
| 92                         | GND | AG107                      | AN104 | GND                        | B149 | BP117 | GND | R21 |
| 93                         | GND | AG108                      | AN105 | GND                        | B150 | BP118 | GND | R21 |
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| 95                         | GND | AG110                      | AN107 | GND                        | B152 | BP120 | GND | R21 |
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| 100                        | GND | AG115                      | AN112 | GND                        | B157 | BP125 | GND | R21 |
| 101                        | GND | AG116                      | AN113 | GND                        | B158 | BP126 | GND | R21 |
| 102                        | GND | AG117                      | AN114 | GND                        | B159 | BP127 | GND | R21 |
| 103                        | GND | AG118                      | AN115 | GND                        | B160 | BP128 | GND | R21 |
| 104                        | GND | AG119                      | AN116 | GND                        | B161 | BP129 | GND | R21 |
| 105                        | GND | AG120                      | AN117 | GND                        | B162 | BP130 | GND | R21 |
| 106                        | GND | AG121                      | AN118 | GND                        | B163 | BP131 | GND | R21 |
| 107                        | GND | AG122                      | AN119 | GND                        | B164 | BP132 | GND | R21 |
| 108                        | GND | AG123                      | AN120 | GND                        | B165 | BP133 | GND | R21 |
| 109                        | GND | AG124                      | AN121 | GND                        | B166 | BP134 | GND | R21 |
| 110                        | GND | AG125                      | AN122 | GND                        | B167 | BP135 | GND | R21 |
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| 126                        | GND | AG141                      | AN138 | GND                        | B183 | BP151 | GND | R21 |
| 127                        | GND | AG142                      | AN139 | GND                        | B184 | BP152 | GND | R21 |
| 128                        | GND | AG143                      | AN140 | GND                        | B185 | BP153 | GND | R21 |
| 129                        | GND | AG144                      | AN141 | GND                        | B186 | BP154 | GND | R21 |
| 130                        | GND | AG145                      | AN142 | GND                        | B187 | BP155 | GND | R21 |
| 131                        | GND | AG146                      | AN143 | GND                        | B188 | BP156 | GND | R21 |
| 132                        | GND | AG147                      | AN144 | GND                        | B189 | BP157 | GND | R21 |
| 133                        | GND | AG148                      | AN145 | GND                        | B190 | BP158 | GND | R21 |
| 134                        | GND | AG149                      | AN146 | GND                        | B191 | BP159 | GND | R21 |
| 135                        | GND | AG150                      | AN147 | GND                        | B192 | BP160 | GND | R21 |
| 136                        | GND | AG151                      | AN148 | GND                        | B193 | BP161 | GND | R21 |
| 137                        | GND | AG152                      | AN149 | GND                        | B194 | BP162 | GND | R21 |
| 138                        | GND | AG153                      | AN150 | GND                        | B195 | BP163 | GND | R21 |
| 139                        | GND | AG154                      | AN151 | GND                        | B196 | BP164 | GND | R21 |
| 140                        | GND | AG155                      | AN152 | GND                        | B197 | BP165 | GND | R21 |
| 141                        | GND | AG156                      | AN153 | GND                        | B198 | BP166 | GND | R21 |
| 142                        | GND | AG157                      | AN154 | GND                        | B199 | BP167 | GND | R21 |
| 143                        | GND | AG158                      | AN155 | GND                        | B200 | BP168 | GND | R21 |
| 144                        | GND | AG159                      | AN156 | GND                        | B201 | BP169 | GND | R21 |
| 145                        | GND | AG160                      | AN157 | GND                        | B202 | BP170 | GND | R21 |
| 146                        | GND | AG161                      | AN158 | GND                        | B203 | BP171 | GND | R21 |
| 147                        | GND | AG162                      | AN159 | GND                        | B204 | BP172 | GND | R21 |
| 148                        | GND | AG163                      | AN160 | GND                        | B205 | BP173 | GND | R21 |
| 149                        | GND | AG164                      | AN161 | GND                        | B206 | BP174 | GND | R21 |
| 150                        | GND | AG165                      | AN162 | GND                        | B207 | BP175 | GND | R21 |
| 151                        | GND | AG166                      | AN163 | GND                        | B208 | BP176 | GND | R21 |
| 152                        | GND | AG167                      | AN164 | GND                        | B209 | BP177 | GND | R21 |
| 153                        | GND | AG168                      | AN165 | GND                        | B210 | BP178 | GND | R21 |
| 154                        | GND | AG169                      | AN166 | GND                        | B211 | BP179 | GND | R21 |
| 155                        | GND | AG170                      | AN167 | GND                        | B212 | BP180 | GND | R21 |
| 156                        | GND | AG171                      | AN168 | GND                        | B213 | BP181 | GND | R21 |
| 157                        | GND | AG172                      | AN169 | GND                        | B214 | BP182 | GND | R21 |
| 158                        | GND | AG173                      | AN170 | GND                        | B215 | BP183 | GND | R21 |
| 159                        | GND | AG174                      | AN171 | GND                        | B216 | BP184 | GND | R21 |
| 160                        | GND | AG175                      | AN172 | GND                        | B217 | BP185 | GND | R21 |
| 161                        | GND | AG176                      | AN173 | GND                        | B218 | BP186 | GND | R21 |
| 162                        | GND | AG177                      | AN174 | GND                        | B219 | BP187 | GND | R21 |
| 163                        | GND | AG178                      | AN175 | GND                        | B220 | BP188 | GND | R21 |
| 164                        | GND | AG179                      | AN176 | GND                        | B221 | BP189 | GND | R21 |
| 165                        | GND | AG180                      | AN177 | GND                        | B222 | BP190 | GND | R21 |
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| 168                        | GND | AG183                      | AN180 | GND                        | B225 | BP193 | GND | R21 |
| 169                        | GND | AG184                      | AN181 | GND                        | B226 | BP194 | GND | R21 |
| 170                        | GND | AG185                      | AN182 | GND                        | B227 | BP195 | GND | R21 |
| 171                        | GND |                            |       |                            |      |       |     |     |

Power: Hybrid Power



I2CS Isolation for Hybrid Power and Level Shifting (3.3V to 1.5V)  
Isolates SMBus to the GPU when in Hybrid mode  
GT200 I2CS lanes are 1.2V tolerant signals



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PAGE DETAIL  
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Power: Hybrid Power

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Rev <RevCode>  
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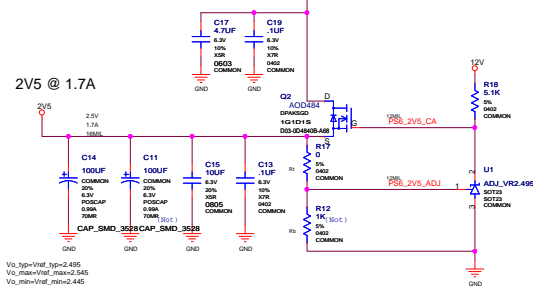




Power Supply: 2V5, DP\_PWR, 8V5 1V15 (PEX\_VDD, GV\_VDD)



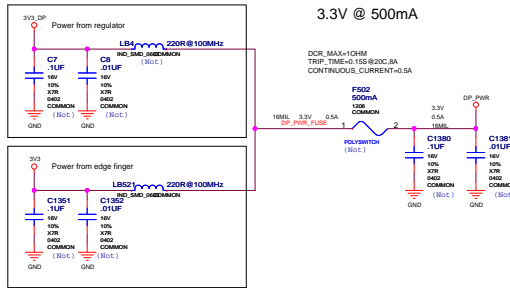
2V5 @ 1.7A



Vo\_typ=Vref\_typ=2.495  
Vo\_max=Vref\_max=2.545  
Vo\_min=Vref\_min=2.445

## DP Dongle Supply

3.3V @ 500mA

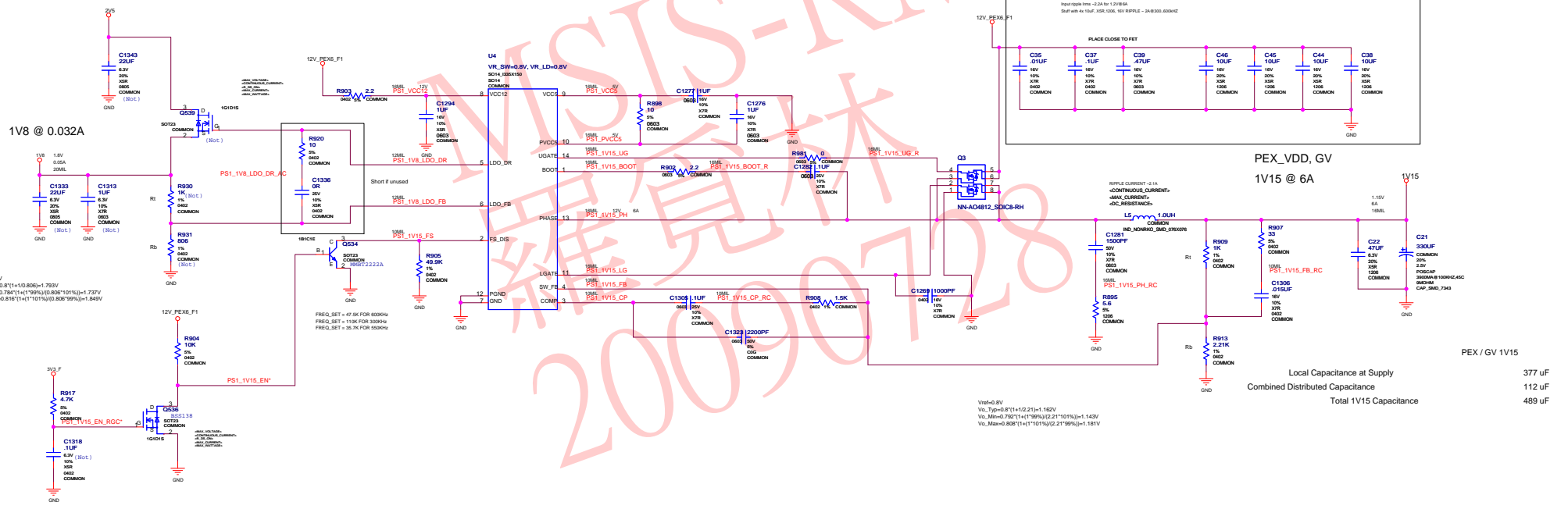


8V5

11/21:remove 8V5 circuit

## 1V15 (PEX\_VDD AND GV\_VDD/Q) and 1V8(For Analogix)

1V8 @ 0.032A



PEX\_VDD, GV  
1V15 @ 6A

PEX / GV 1V15

377 uF

112 uF

489 uF

$V_{ref}=0.8V$   
 $V_{o\_Typ}=0.8*(1+1/2.21)=1.162V$   
 $V_{o\_Min}=0.792*(1+(1*99\%)/(2.21*101\%))=1.147V$

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| ASSEMBLY    | BASE LEVEL GENERIC SCHEMATIC ONLY, COMMON & NO_STUFF ASSEMBLY NOTES AND BOM NOT FINAL |
| PAGE DETAIL | Power Supply: 2V5, DP_PWR, 1V15 (PEX_VDD, GV_VDD)                                     |



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# Power Supply: Combined FBVDD/Q

## FVBDDQ ENABLE

NVDD\_PG000 >> NVDD\_PG000

12V Driver -> R7301:0 ohm, R7300:NC ohm  
9V Driver -> R7301:NC, R7301:0 ohm

11/19 modify 12V to 12V\_Pex6\_F1

2/9 remove R7304 and R7315  
N-NTMFS4841NHT1G\_S08-RH

FBVDDQ = 1.9-2.0V @ 31A~35A

## FBVDDQ Power Supply


FBVDDQ = 1.9~20V @ 31A~35A

FB VOLTAGE SENSE

$0.6 V \times (1 + R_{top} / R_{bot})$   
 $2.057V = 0.6 V \times (1 + 2.55K / 1.05K)$   
 $1.833V = 0.6 V \times (1 + 2.55K / 1.24K)$   
 $1.93V = 0.6 V \times (1 + 2.55K / 1.15K)$

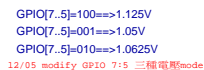
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Power Supply: Combined FBVDDQ

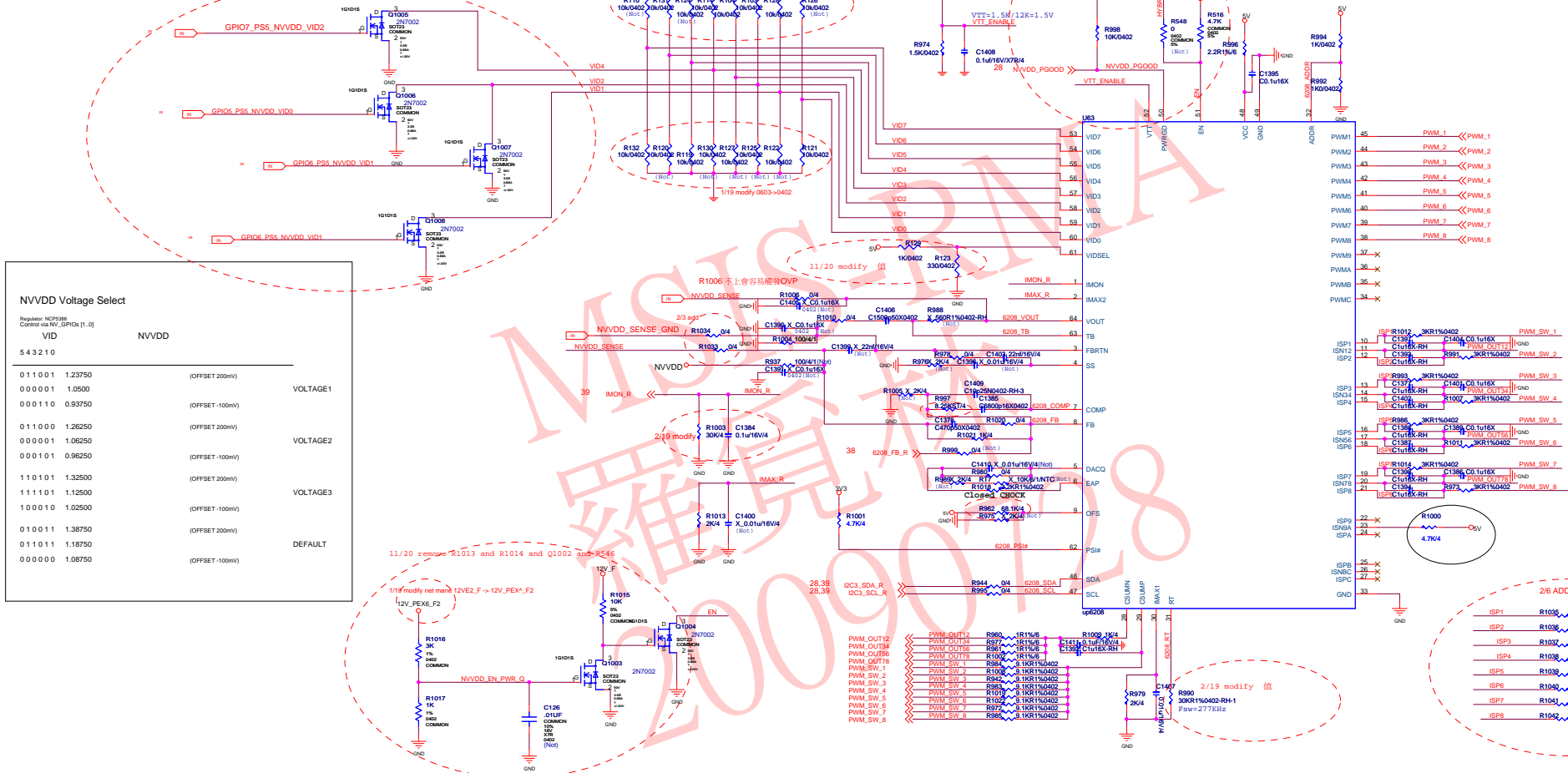


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Power Supply: NVVDD Regulator



1/19 modify net mane ~~12VE2\_F~~ -> 12V\_PEX6\_F2

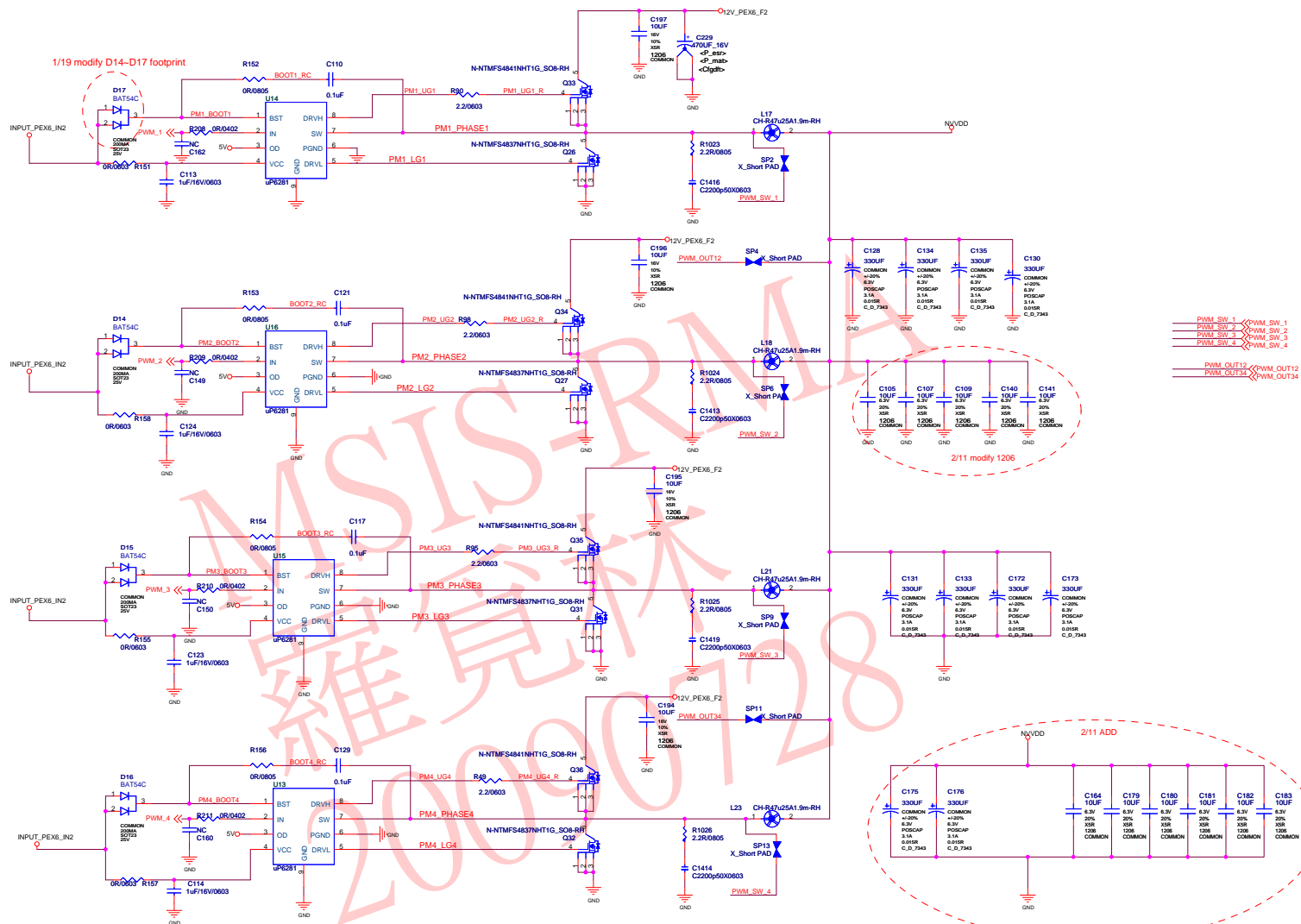


| NVVDD Voltage Select                            |         |                 |
|---|---------|-----------------|
| Register: MC2006<br>Control via NV_GPIOs [1..0] |         |                 |
| VID   | NVVDD   |                 |
| 5 4 3 2 1 0                                     |         |                 |
| 0 1 1 0 0 1                                     | 1.23750 | (OFFSET 200mV)  |
| 0 0 0 0 0 1                                     | 1.0500  | VOLTAGE1        |
| 0 0 0 1 1 0                                     | 0.93750 | (OFFSET -100mV) |
| 0 1 1 0 0 0                                     | 1.26250 | (OFFSET 200mV)  |
| 0 0 0 0 0 1                                     | 1.06250 | VOLTAGE2        |
| 0 0 0 1 0 1                                     | 0.96250 | (OFFSET -100mV) |
| 1 1 0 1 0 1                                     | 1.32500 | (OFFSET 200mV)  |
| 1 1 1 1 0 1                                     | 1.12500 | VOLTAGE3        |
| 1 0 0 0 1 0                                     | 1.02500 | (OFFSET -100mV) |
| 0 1 0 0 1 1                                     | 1.38750 | (OFFSET 200mV)  |
| 0 1 1 0 1 1                                     | 1.18750 | DEFAULT         |
| 0 0 0 0 0 0                                     | 1.08750 | (OFFSET -100mV) |

2/8 ADD

|      | (Not) |                       |           |
|------|-------|-----------------------|-----------|
| ISP1 | R1036 | <del>NR114/0402</del> | PWM_OUT12 |
| ISP2 | R1036 | <del>NR114/0402</del> | PWM_OUT12 |
|      | (Not) |                       |           |
| ISP3 | R1037 | <del>NR114/0402</del> | PWM_OUT34 |
| ISP4 | R1038 | <del>NR114/0402</del> | PWM_OUT34 |
|      | (Not) |                       |           |
| ISP5 | R1039 | <del>NR114/0402</del> | PWM_OUT56 |
| ISP6 | R1040 | <del>NR114/0402</del> | PWM_OUT56 |
|      | (Not) |                       |           |
| ISP7 | R1041 | <del>NR114/0402</del> | PWM_OUT78 |
|      | (Not) |                       |           |
| ISP8 | R1042 | <del>NR114/0402</del> | PWM_OUT78 |

# Power Supply: NVVDD Phase 1,2 powered from external PEX 6PIN




ASSEMBLY PAGE DETAIL

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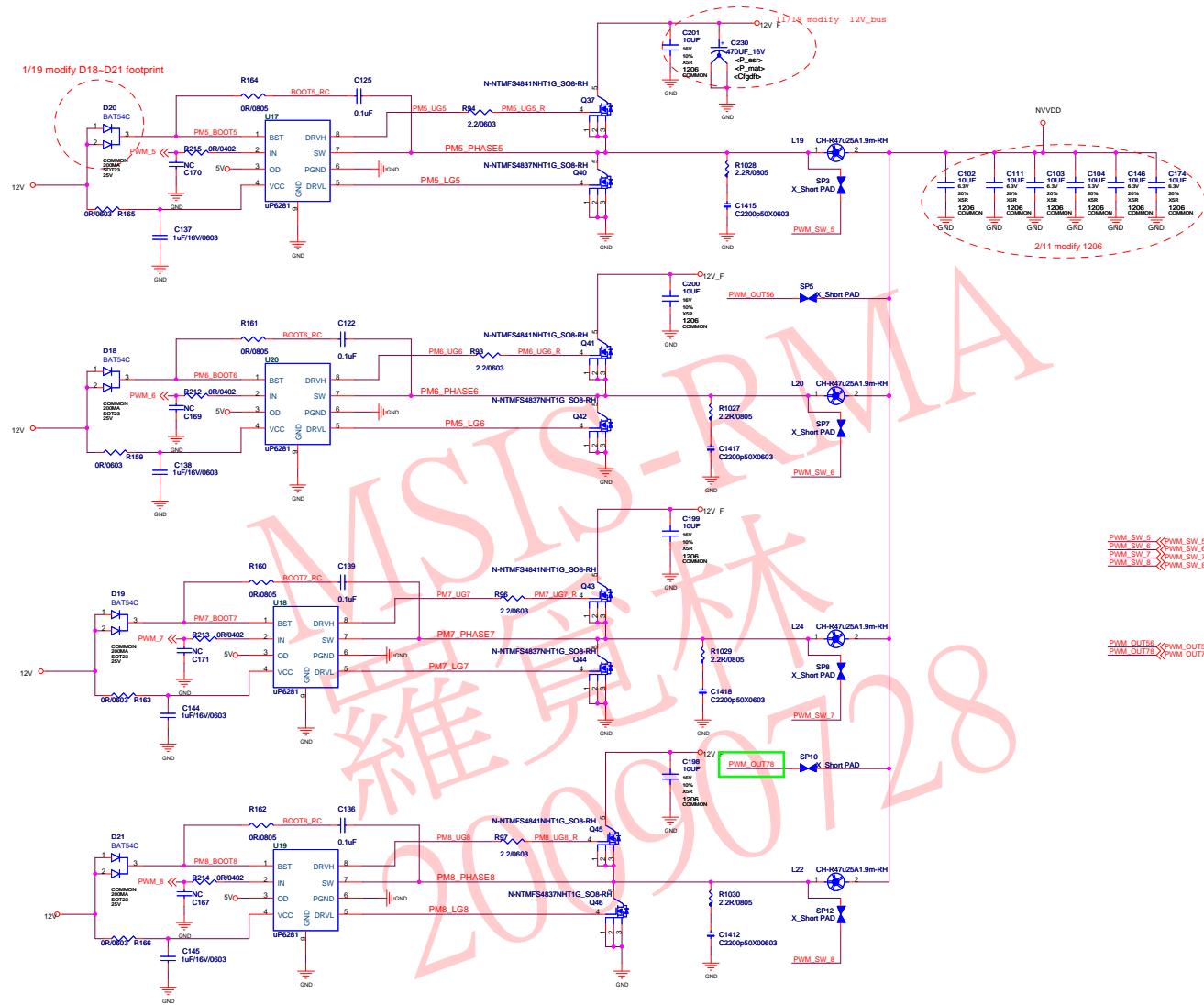
Power Supply: NVVDD Phase 1-2 of 4

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Power Supply: NVVDD Phase 5~8 powered from internal PEX edge connector



|          |            |
|----------|------------|
| PWM SW_5 | ◀ PWM_SW_5 |
| PWM SW_6 | ◀ PWM_SW_6 |
| PWM SW_7 | ◀ PWM_SW_7 |
| PWM SW_8 | ◀ PWM_SW_8 |

PWM\_OUT56 >> PWM\_OUT5  
PWM\_OUT78 >> PWM\_OUT7

|             |   |
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| ASSEMBLY    | BASE LEVEL GENERIC SCHEMATIC ONLY, COMMON & NO_STUFF ASSEMBLY NOTES AND BOM NOT FINAL |
| PAGE DETAIL | Power Supply: NVDD Phase 3-4 of 4   |



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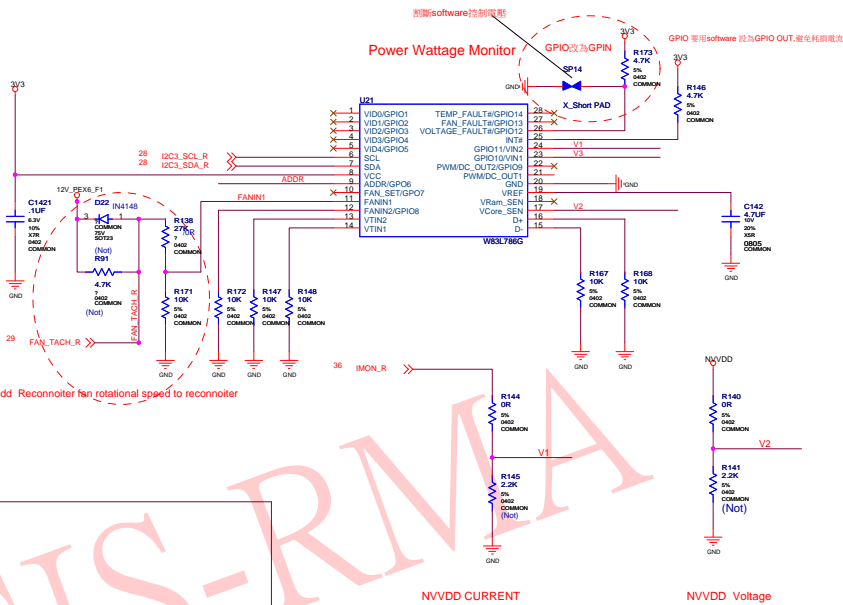
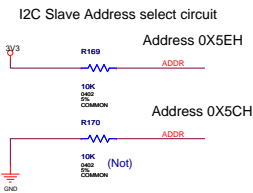
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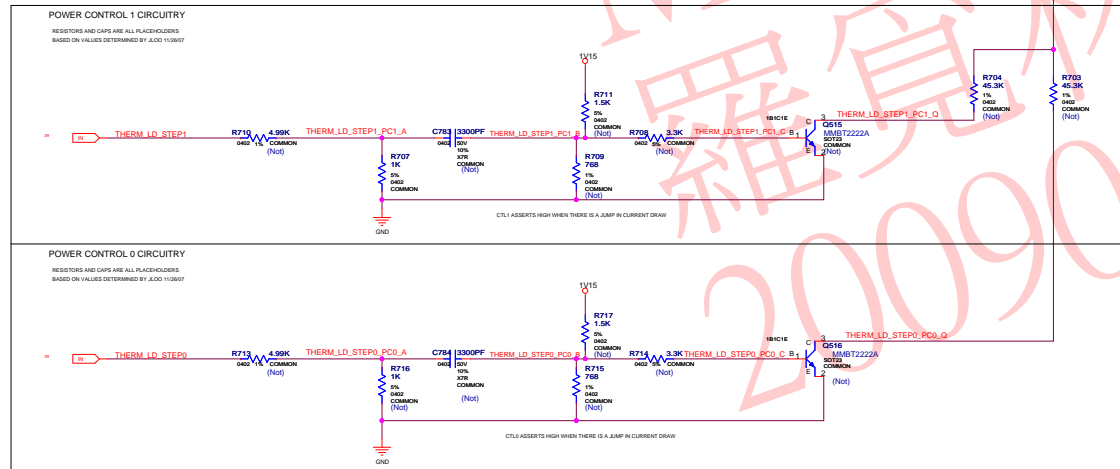
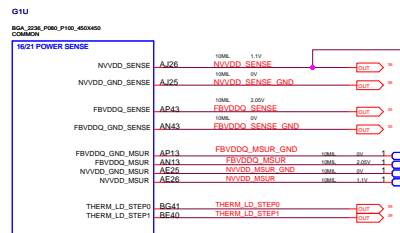
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Power Supply: NVVDD power control

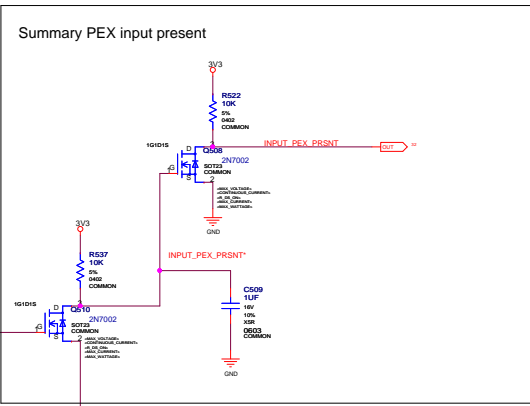
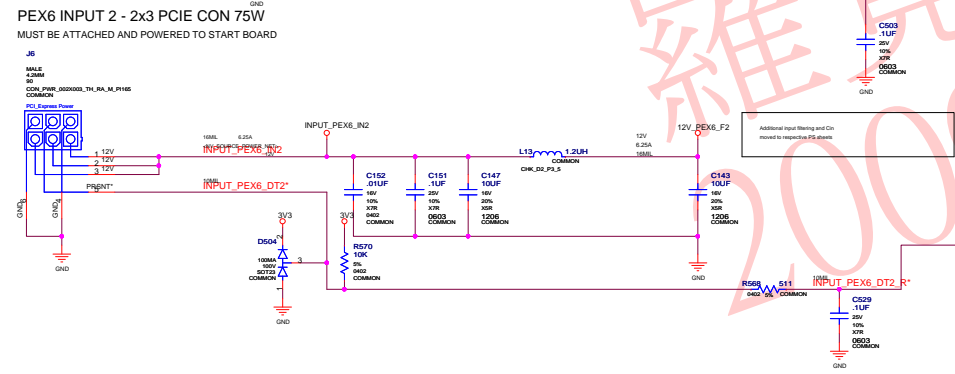
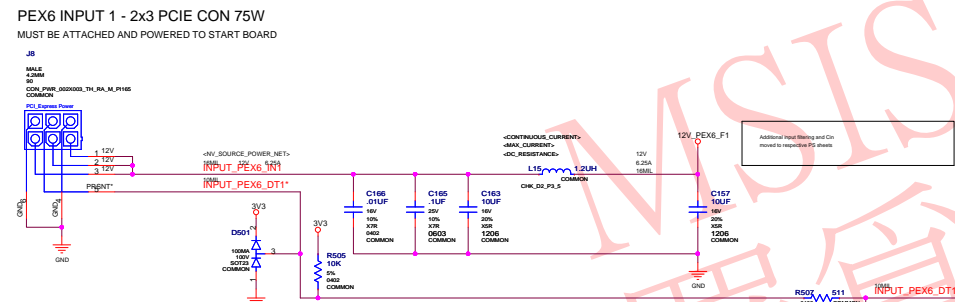
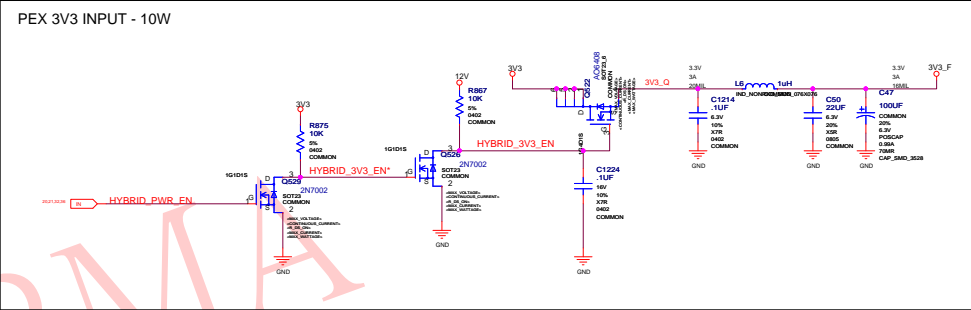
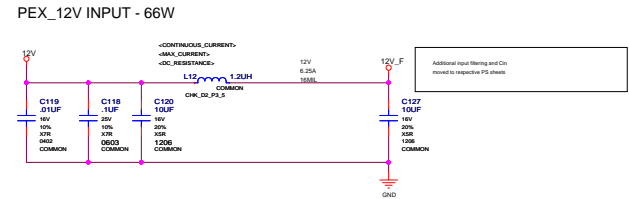


## NVVDD &amp; FBVDDQ SENSE/MSUR



Power: Input Rail Filter and Detection Logic

| Connector Power State Table |               |       |           |
|-----------------------------|---------------|-------|-----------|
| J61 Connector               | J62 Connector | Power | STATE     |
| Connected                   | Connected     | 225W  | Full Post |
| Connected                   | Not Connected | 105W  | Board Off |
| Not Connected               | Connected     | 105W  | Board Off |
| Not Connected               | Not Connected | 75W   | Board Off |



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ASSEMBLY  
PAGE DETAIL  
BASE LEVEL GENERIC SCHEMATIC ONLY; COMMON & NO\_310FF ASSEMBLY NOTES AND BOM NOT FINAL  
Power: Input Rail Filter and Detection Logic

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Document Number: <Doc>  
Date: Wednesday, February 11, 2009  
Sheet: 40 of 41



# Thermal/Mechanical/ID

## Bracket and Assembly



## GPU Socket



## GPU Stiffener



## NVIOx Socket

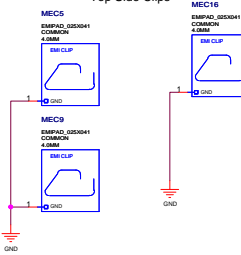


## Hockey Stick Retention Mechanism

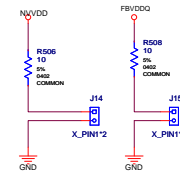


## EMI Gnd Clips

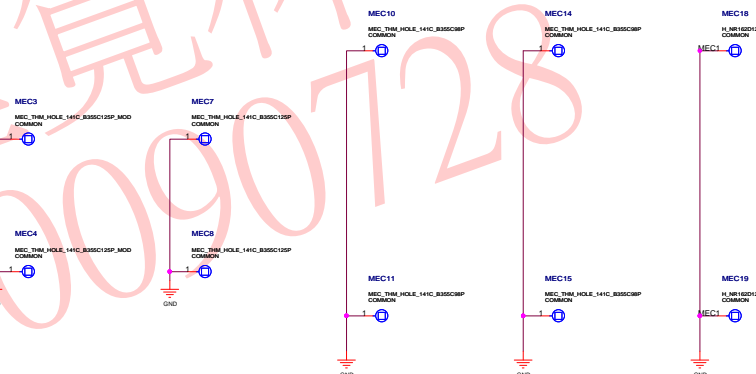
### Top Side Clips



## 電源量測點



## THERMAL/MECHANICAL HOLES



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ASSEMBLY  
PAGE DETAIL  
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Thermal/Mechanical

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Date: Wednesday, February 11, 2009  
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