

Model Name: GA-Z87-HD3

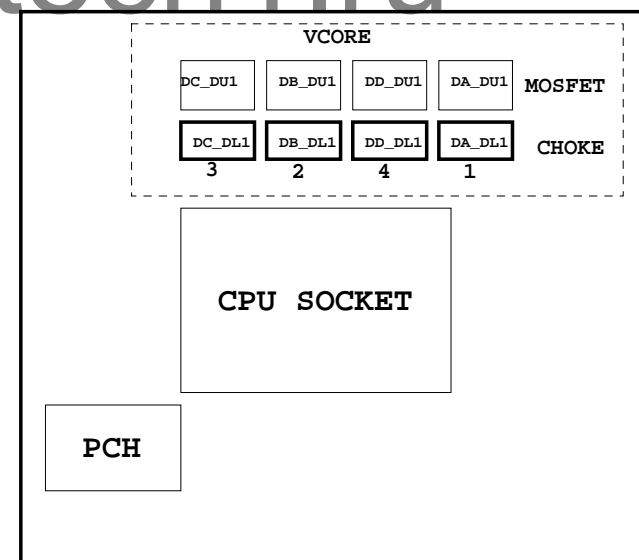
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SHEET TITLE

| | |
|----|--------------------------|
| 01 | COVER SHEET |
| 02 | BOM & PCB MODIFY HISTORY |
| 03 | BLOCK DIAGRAM |
| 04 | CPU_LGA1150-A |
| 05 | CPU_LGA1150-B |
| 06 | CPU_LGA1150-C |
| 07 | DDR III CHANNEL A |
| 08 | DDR III CHANNEL B |
| 09 | PCH_FDI,DMI,USB,PCIE |
| 10 | PCH_RGB,CLK BUFFER |
| 11 | PCH_HOST,SATA,PCI |
| 12 | PCH_GPIO,CTRL,AUDIO |
| 13 | PCH_PWR,GND |
| 14 | PCI EXPRESS*16 SLOT |
| 15 | PCIEX1*2 , PCIEX4 SLOT |
| 16 | ITE8892 PCI BRIDGE |
| 17 | PCI SLOT 1&2 |
| 18 | I/O ITE8728 |
| 19 | COM, -PROHOT, R_USB |
| 20 | Dual BIOS / LPT |
| 21 | ALC892 CODEC |
| 22 | REAR AUDIO JACK |
| 23 | VCORE_ ISL95820_1 |
| 24 | VCORE_ ISL95820_2 |
| 25 | DDR15V / M3 POWER |
| 26 | NCP3933 OVER VOLTAGE |
| 27 | DISCRETE POWER |

SHEET TITLE

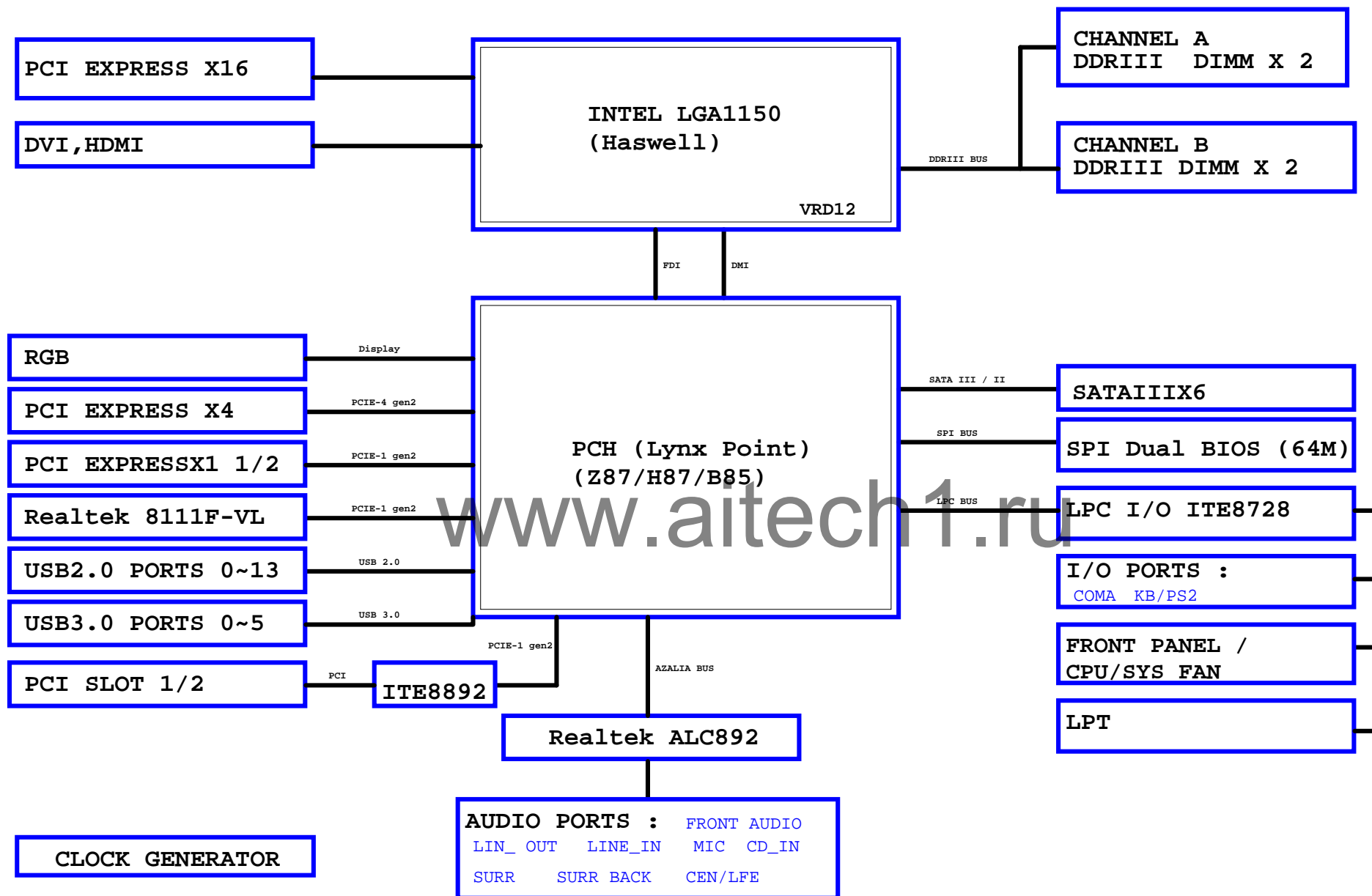
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|----|------------------------|
| 28 | F_PANEL , F_USB2.0/3.0 |
| 29 | ATX POWER, CLOCK GEN |
| 30 | HWM , KB/MS , FAN CTRL |
| 31 | Realtek 8111F-VL |
| 32 | DVI |
| 33 | HDMI |
| 34 | TABLE LIST |
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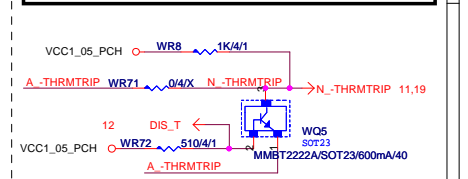
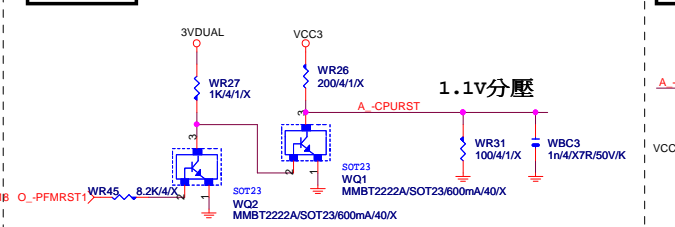
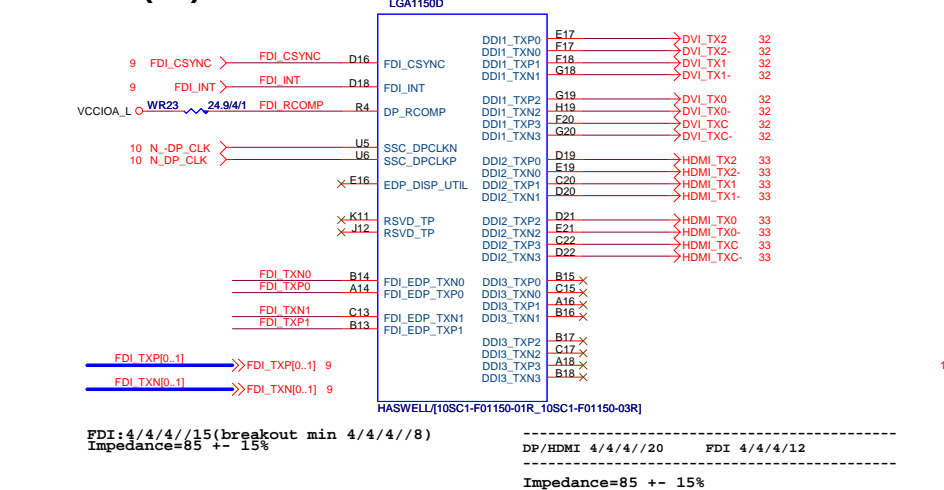
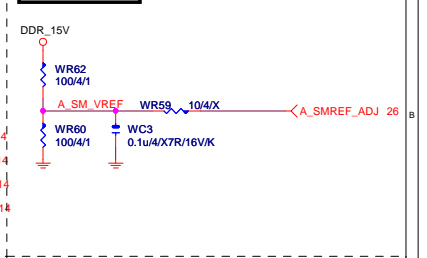
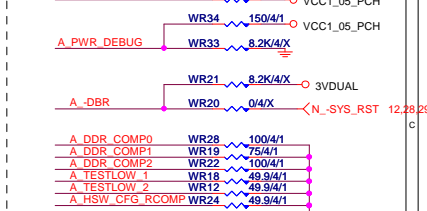
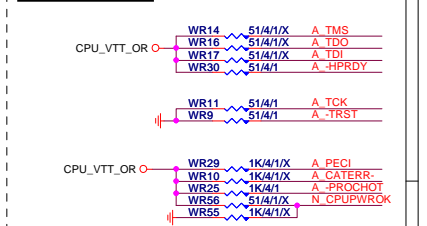
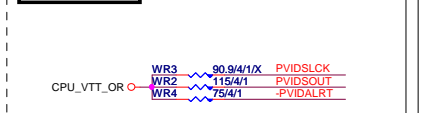
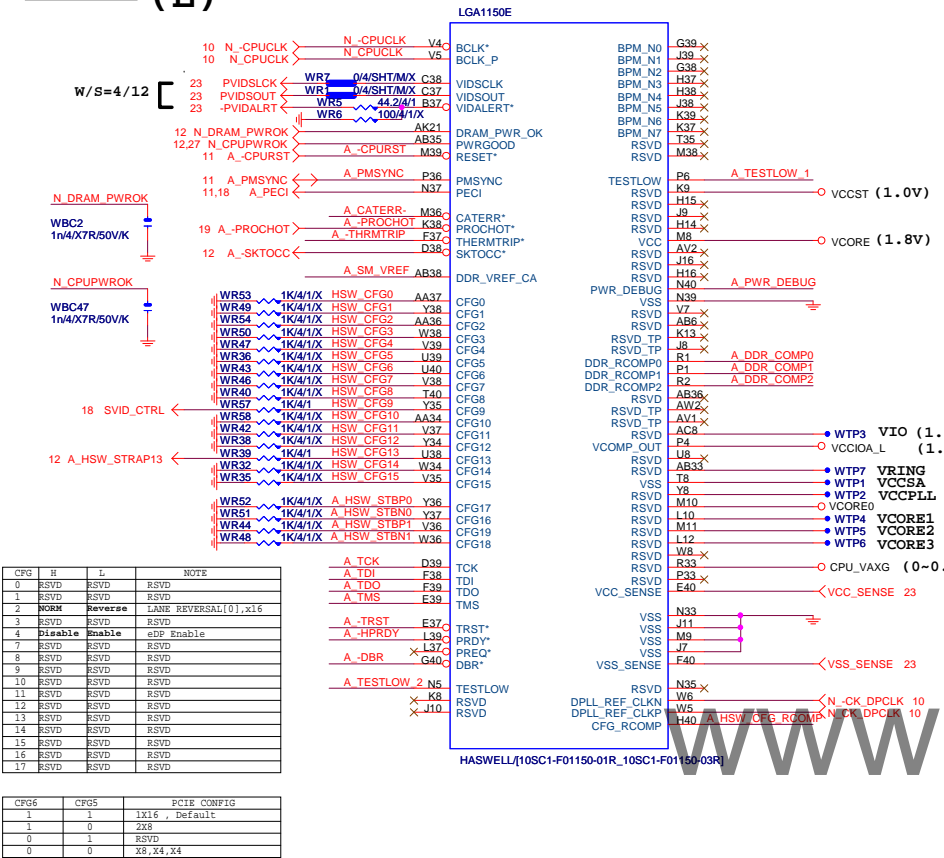


Component value change history

[illegible][illegible]

BLOCK DIAGRAM





| LGA1150A | | | | | |
|----------|------|-----------|-----------|------|-------|
| MAAA0 | AU13 | DDR0_M0 | DDR0_D00 | AD38 | MDA0 |
| MAAA1 | AV16 | DDR0_M1 | DDR0_D01 | AD39 | MDA1 |
| MAAA2 | AU17 | DDR0_M2 | DDR0_D02 | AD38 | MDA2 |
| MAAA3 | AW17 | DDR0_M3 | DDR0_D03 | AF39 | MDA3 |
| MAAA4 | AU18 | DDR0_M4 | DDR0_D04 | AD37 | MDA4 |
| MAAA5 | AW18 | DDR0_M5 | DDR0_D05 | AD40 | MDA5 |
| MAAA6 | AV17 | DDR0_M6 | DDR0_D06 | AF37 | MDA6 |
| MAAA7 | AT18 | DDR0_M7 | DDR0_D07 | AE40 | MDA7 |
| MAAA8 | AU18 | DDR0_M8 | DDR0_D08 | AH40 | MDA8 |
| MAAA9 | AT19 | DDR0_M9 | DDR0_D09 | AH39 | MDA13 |
| MAAA10 | AW11 | DDR0_M10 | DDR0_D10 | AH38 | MDA10 |
| MAAA11 | AV19 | DDR0_M11 | DDR0_D11 | AH37 | MDA11 |
| MAAA12 | AU19 | DDR0_M12 | DDR0_D12 | AH39 | MDA12 |
| MAAA13 | Y10 | DDR0_M13 | DDR0_D13 | AH38 | MDA8 |
| MAAA14 | AT20 | DDR0_M14 | DDR0_D14 | AH37 | MDA14 |
| MAAA15 | AU21 | DDR0_M15 | DDR0_D15 | AH40 | MDA9 |
| | | DDR0_M16 | DDR0_D16 | AP39 | MDA21 |
| MODT_A0 | AW10 | DDR0_OTD0 | DDR0_D17 | AP38 | MDA18 |
| MODT_A1 | AY8 | DDR0_OTD1 | DDR0_D18 | AP39 | MDA19 |
| MODT_A2 | AW9 | DDR0_OTD2 | DDR0_D19 | AP39 | MDA17 |
| MODT_A3 | AU8 | DDR0_OTD3 | DDR0_D20 | AP38 | MDA16 |
| | | DDR0_OTD1 | DDR0_D21 | AP37 | MDA22 |
| | | DDR0_OTD2 | DDR0_D22 | AP40 | MDA25 |
| | AW33 | DDR0_ECC0 | DDR0_D23 | AP40 | MDA23 |
| | AV33 | DDR0_ECC1 | DDR0_D24 | AV37 | MDA24 |
| | AU31 | DDR0_ECC2 | DDR0_D25 | AW37 | MDA29 |
| | AV31 | DDR0_ECC3 | DDR0_D26 | AU35 | MDA26 |
| | AT33 | DDR0_ECC4 | DDR0_D27 | AT35 | MDA27 |
| | AW33 | DDR0_ECC5 | DDR0_D28 | AV37 | MDA24 |
| | AT31 | DDR0_ECC6 | DDR0_D29 | AT35 | MDA30 |
| | AW31 | DDR0_ECC7 | DDR0_D30 | AW35 | MDA31 |
| | | DDR0_D31 | DDR0_D31 | AY6 | MDA37 |
| | | DDR0_D32 | DDR0_D32 | AU6 | MDA34 |
| | | DDR0_D33 | DDR0_D33 | AY6 | MDA37 |
| | | DDR0_D34 | DDR0_D34 | AY6 | MDA37 |
| | | DDR0_D35 | DDR0_D35 | AW4 | MDA35 |
| | | DDR0_D36 | DDR0_D36 | AW6 | MDA36 |
| | | DDR0_D37 | DDR0_D37 | AW6 | MDA32 |
| | | DDR0_D38 | DDR0_D38 | AW4 | MDA38 |
| | | DDR0_D39 | DDR0_D39 | AY4 | MDA39 |
| | | DDR0_D40 | DDR0_D40 | AR1 | MDA41 |
| | | DDR0_D41 | DDR0_D41 | AR4 | MDA42 |
| | | DDR0_D42 | DDR0_D42 | AR4 | MDA43 |
| | | DDR0_D43 | DDR0_D43 | AR2 | MDA44 |
| | | DDR0_D44 | DDR0_D44 | AR2 | MDA44 |
| | | DDR0_D45 | DDR0_D45 | AN2 | MDA46 |
| | | DDR0_D46 | DDR0_D46 | AN1 | MDA47 |
| | | DDR0_D47 | DDR0_D47 | AL1 | MDA49 |
| | | DDR0_D48 | DDR0_D48 | AL4 | MDA50 |
| | | DDR0_D49 | DDR0_D49 | AJ3 | MDA50 |
| | | DDR0_D50 | DDR0_D50 | AJ4 | MDA51 |
| | | DDR0_D51 | DDR0_D51 | AJ2 | MDA52 |
| | | DDR0_D52 | DDR0_D52 | AL3 | MDA44 |
| | | DDR0_D53 | DDR0_D53 | AJ2 | MDA54 |
| | | DDR0_D54 | DDR0_D54 | AJ1 | MDA55 |
| | AW12 | RSVD | DDR0_D55 | AG1 | MDA57 |
| | | | DDR0_D56 | AG4 | MDA6 |
| | | | DDR0_D57 | AE3 | MDA58 |
| | | | DDR0_D58 | AE4 | MDA59 |
| | | | DDR0_D59 | AE3 | MDA58 |
| | | | DDR0_D60 | AE4 | MDA60 |
| | | | DDR0_D61 | AE3 | MDA62 |
| | | | DDR0_D62 | AE1 | MDA63 |
| | | | DDR0_D63 | AE39 | DSQA0 |
| | | | DDR0_D64 | AJ39 | DSQA2 |
| | | | DDR0_D65 | AN39 | DSQA2 |
| | | | DDR0_D66 | AV36 | DSQA3 |
| | | | DDR0_D67 | AV35 | DSQA4 |
| | | | DDR0_D68 | AP3 | DSQA5 |
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LGA1150

LGA1150B

MAA80

MAA81

MAA82

MAA83

MAA84

MAA85

MAA86

MAA87

MAA88

MAA89

MAA90

MAA91

MAA92

MAA93

MAA94

MAA95

MODT_B0

MODT_B1

MODT_B2

MODT_B3

CKE80

CKE81

CKE82

CKE83

CS80

CS81

CS82

CS83

CLK80

CLK81

CLK82

CLK83

CLK84

CLK85

CLK86

SCASB

SRASB

SWEB

AB39

AB40

AL19

AK23

AM22

AM23

AP23

AY24

AV25

AU26

AP18

AW25

AY15

AV26

AR25

AV27

AY28

AM17

AM16

AM16

AK15

AK17

AL18

AW28

AW29

AN17

AP17

AM17

AL15

AM20

AM21

AN17

AP20

AP21

AP23

AP16

AM18

AK16

AB39

AB40

DDR1_MA0

DDR1_MA1

DDR1_MA2

DDR1_MA3

DDR1_MA4

DDR1_MA5

DDR1_MA6

DDR1_MA7

DDR1_MA8

DDR1_MA9

DDR1_MA10

DDR1_MA11

DDR1_MA12

DDR1_MA13

DDR1_MA14

DDR1_MA15

DDR1_ODT0

DDR1_ODT1

DDR1_ODT2

DDR1_ODT3

DDR1_ECC0

DDR1_ECC1

DDR1_ECC2

DDR1_ECC3

DDR1_ECC4

DDR1_ECC5

DDR1_ECC6

DDR1_ECC7

DDR1_BA0

DDR1_BA1

DDR1_BA2

DDR1_CKE0

DDR1_CKE1

DDR1_CKE2

DDR1_CKE3

DDR1_CS_N0

DDR1_CS_N1

DDR1_CS_N2

DDR1_CS_N3

DDR1_CLK_P0

DDR1_CLK_N0

DDR1_CLK_P1

DDR1_CLK_N1

DDR1_CLK_P2

DDR1_CLK_N2

DDR1_CLK_P3

DDR1_CLK_N3

DDR1_CAS*

RSVD

DDR1_RAS*

DDR1_WE*

DDR_VREF_DQ0

DDR_VREF_DQ1

DDR1_D00

DDR1_D01

DDR1_D02

DDR1_D03

DDR1_D04

DDR1_D05

DDR1_D06

DDR1_D07

DDR1_D08

DDR1_D09

DDR1_D10

DDR1_D11

DDR1_D12

DDR1_D13

DDR1_D14

DDR1_D15

DDR1_D16

DDR1_D17

DDR1_D18

DDR1_D19

DDR1_D20

DDR1_D21

DDR1_D22

DDR1_D23

DDR1_D24

DDR1_D25

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|---|--------------|---|--------------|
| 7 | MODT_A[0..3] | ↔ | MODT_A[0..3] |
| 8 | MODT_B[0..3] | ↔ | MODT_B[0..3] |
| 7 | MDA[0..63] | ↔ | MDA[0..63] |
| 8 | MDB[0..63] | ↔ | MDB[0..63] |
| 7 | DQSA[0..7] | ↔ | DQSA[0..7] |
| 7 | -DQSA[0..7] | ↔ | -DQSA[0..7] |
| 7 | MAAA[0..15] | ↔ | MAAA[0..15] |
| 8 | MAAB[0..15] | ↔ | MAAB[0..15] |
| 8 | DQSB[0..7] | ↔ | DQSB[0..7] |
| 8 | -DQSB[0..7] | ↔ | -DQSB[0..7] |

(F, J)



(G,H,I)



(X30)

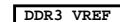
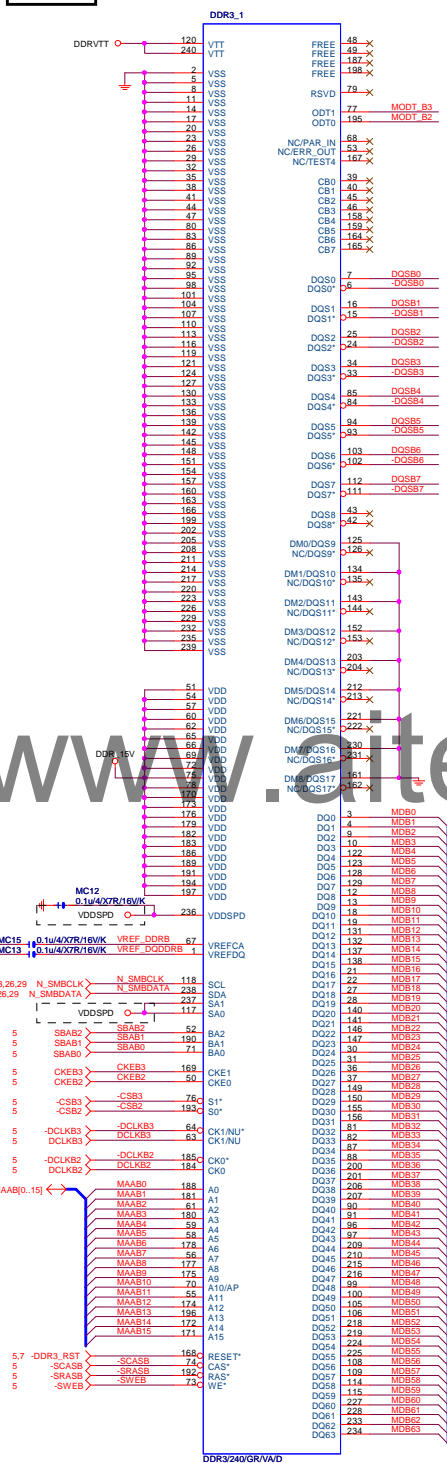
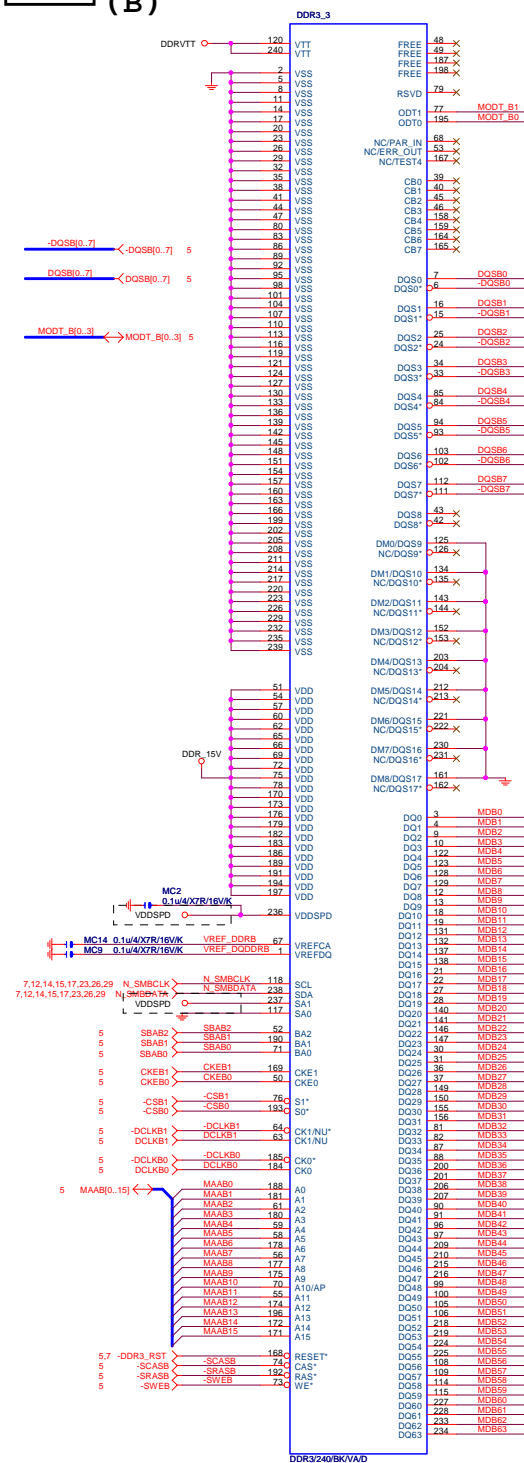


(X15)





(B)



DDR3 1066,1333,1600MHZ BANDWIDTH

DDR3 1066MHZ

DDR3 single channel bandwidth=533x2x8Byte=8.5GB/s

DDR3 dual channel bandwidth=533x2x2x8Byte=17GB/s

```
| DDR3 1333MHZ
```

```
DDR3 clock=667MHZ
```

```
DDR3 single channel bandwidth=10.6GB/s
```

DDR3 dual channel bandwidth=21GB/s

DDR3 1600MHZ

```
DDR3 clock=800MHZ
```

```
DDR3 single channel bandwidth=12.8GB/s
```

```
DDR3 dual channel bandwidth=25.6GB/s
```

COUPON



CPU

DIMM

DIMM

DIMM

DIMM

CHA

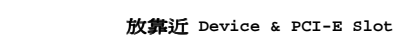
CHB

Gigabyte Technology

| | | | |
|------------------|-----------------|---|-------|
| Title | | | |
| DDRIII CHANNEL B | | | |
| Size | Document Number | | Rev |
| Custom | GA-Z87-HD3 | | 1.1 |
| Date: | Sheet | 8 | of 34 |

DMI:12/4/4/4/12(breakout min 8/4/4/4/8)
Impedance=85 +- 17.5%

DMI:12/4/4/4/12(breakout min 8/4/4/4/8)
Impedance=85 +- 17.5%



28 PCH_USB3_RXN0



|
 |
 |

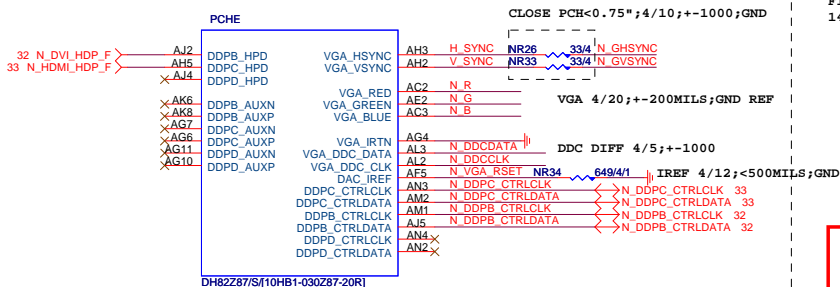
USB OC# Configure

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

PCH FDI,DMI,USB ,PCIE

| | |
|--|---|
| | 1 |
|--|---|

PCH (E)



VGA DISABLE

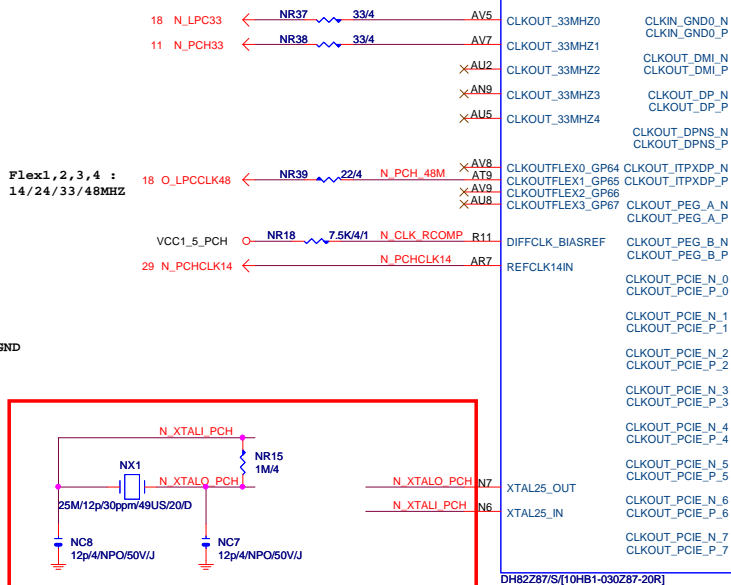
R,G,B NC OR GND

IRTN / IREF GND

VGA_HSYNC, VGA_VSYNC, DDC_CLK, DDC_DATA NC

POWER VCCADAC(AF2), VCCADACBG(AE1) GND

PCH (G)

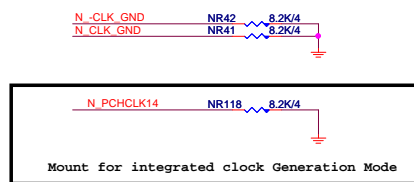


CRYSTAL/TRACE 週邊不要有訊號,VIA靠近

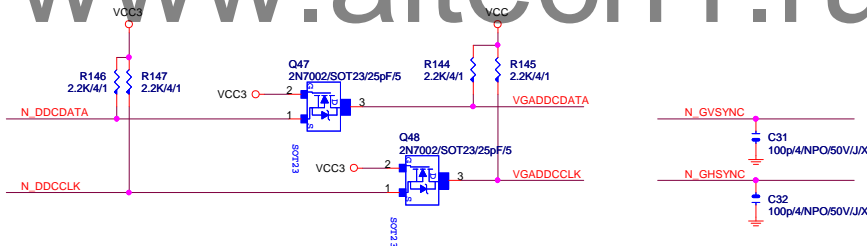
PCIEX4
CLOCK (PE_SRRCLK_3GIO1) 由PIN
R6,R7 換成PIN W7,W6
避免跟CRYSTAL 25MHZ干擾

Differential Clock:18/4/6/4/18
Impedance=90 +- 15%

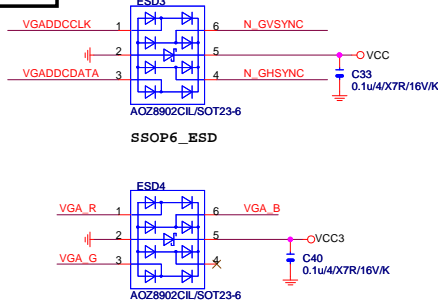
PCH CLK PD



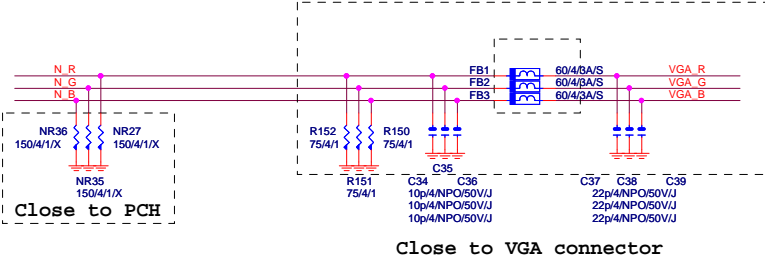
VGA DDC



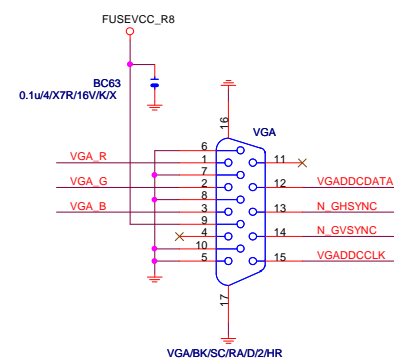
VGA ESD



VGA DDC

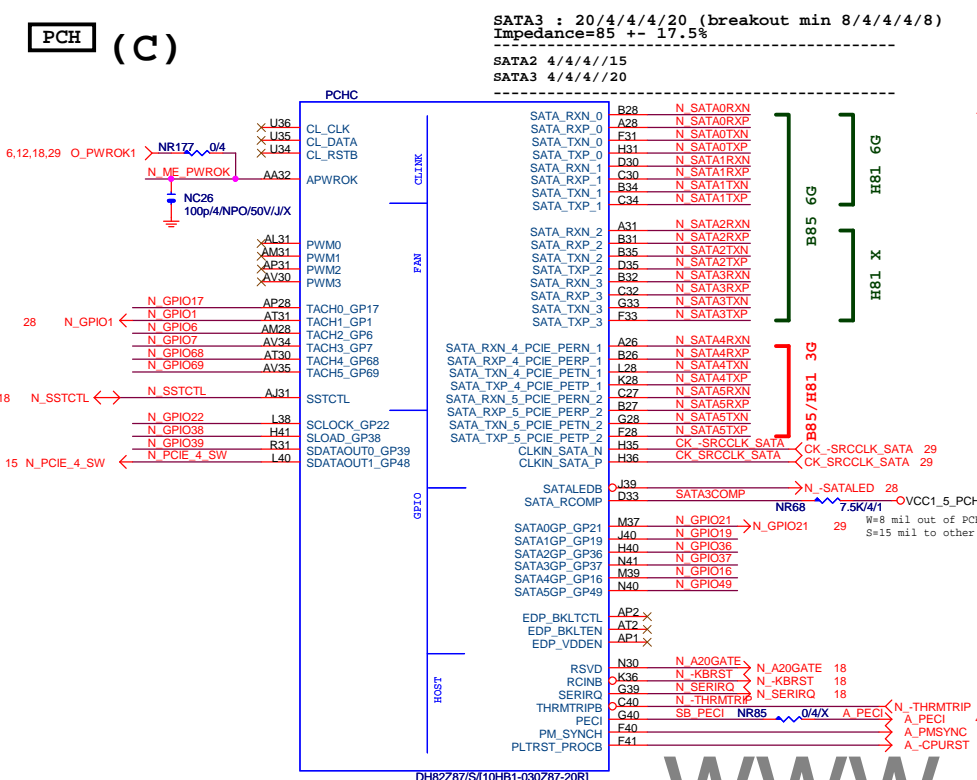


VGA CONNECTOR

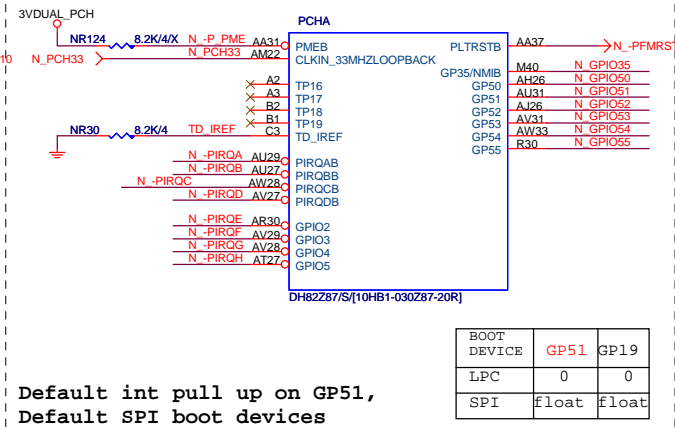


| | | | |
|---|--------------------------------------|-------------|--|
| Gigabyte Technology | | | |
| Title PCH DISPLAY ,CLK BUFFER | | | |
| Size Custom | Document Number GA-Z87-HD3 | Rev 1.12 | |
| Date: Friday, October 25, 2013 | Sheet 10 | of 34 | |

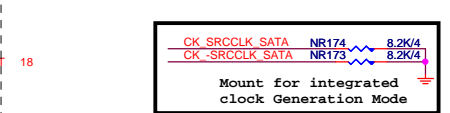
PCH (C)



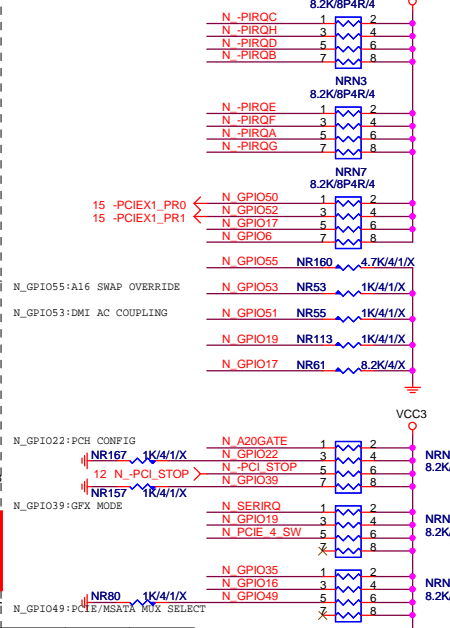
PCH (A)



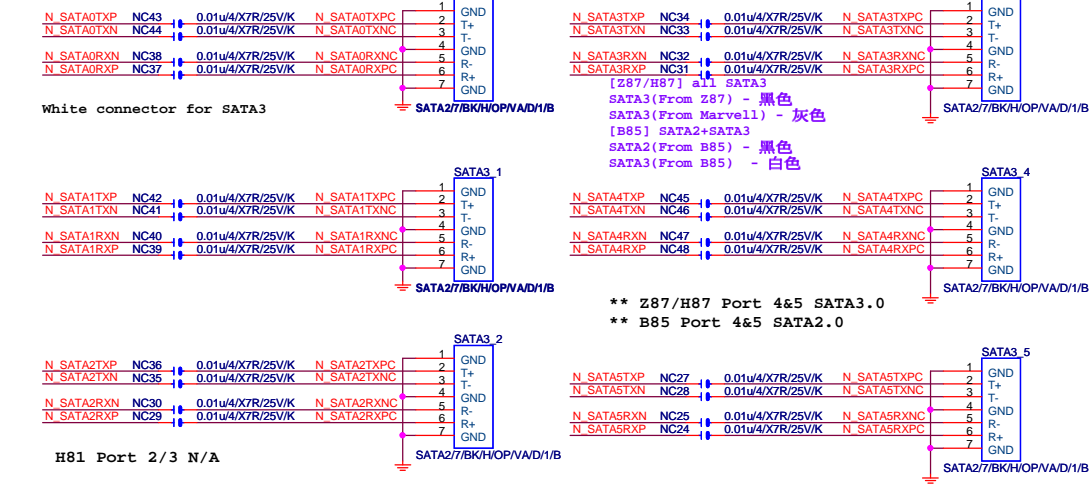
PCH CLK PD



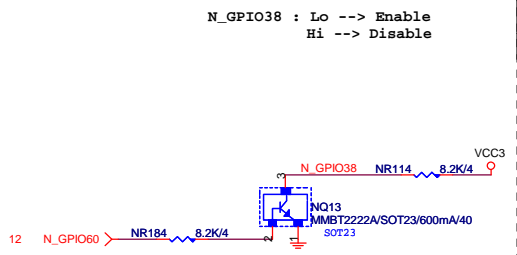
PCH PU/PD



SATA CONNECTOR



GPIO38 Ctrl



```
MFG Mode
N_GPIO38 : Lo --> Enable
           Hi --> Disable
```

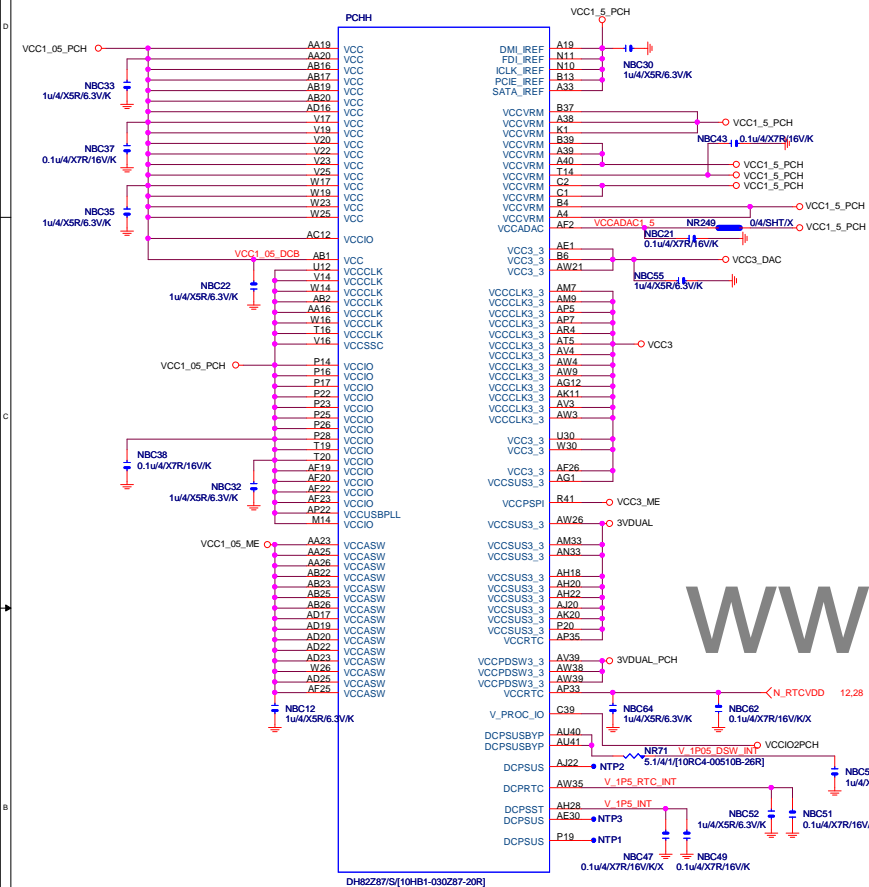
| | | |
|------------|-------|-------|
| soft strap | GP16 | GP49 |
| 0 | pcie1 | pcie2 |
| 1 | sata4 | sata5 |

Pinout diagram for the Raspberry Pi 4 Model B. The diagram shows two rows of pins. The top row includes N_GPIO21 (NR252, 1K/4/1), N_KBRST (NR161, 1K/4/1), N_GPIO36 (NR148, 8.2K/4/X), N_GPIO69 (NR65, 8.2K/4/X), and N_GPIO55 (NR244, 8.2K/4). The bottom row includes N_GPIO7 (NRN4, 8.2K/8P4/4), N_GPIO54 (pins 8 and 7), N_GPIO1 (pins 6 and 5), N_GPIO68 (pins 4 and 3), and N_GPIO68 (pins 2 and 1).

Gigabyte Technology

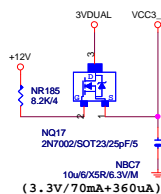
| | | | |
|----------------------|--------------------------|-------|----------|
| Title | | | |
| PCH HOST , SATA, PCI | | | |
| Size | Document Number | Rev | |
| Custom | GA-Z87-HD3 | 1.12 | |
| Date: | Friday, October 25, 2013 | Sheet | 11 of 34 |

PCH (H)

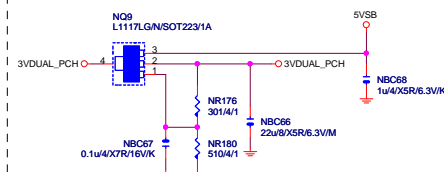


VCC3_DAC

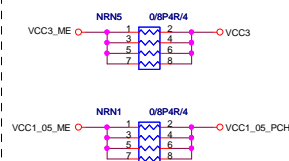
CLOSE北橋(注意震盪水波紋)



3VDUAL_PCH

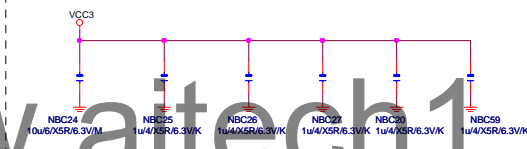


SHT_PWR

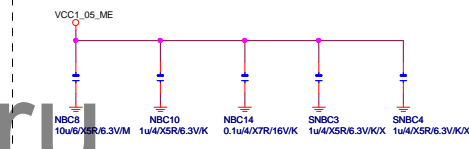


CAP

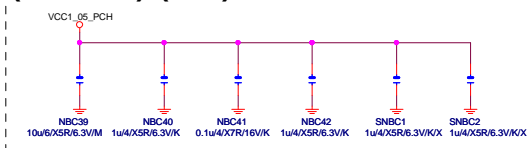
(3.3V) (X6)



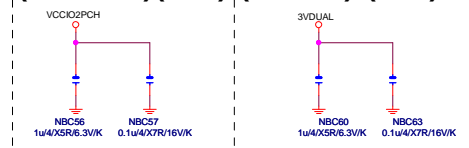
(1.05V) (X5)



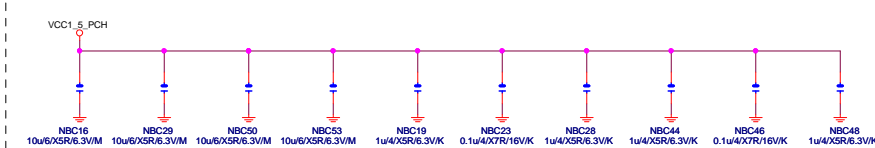
(1.05V) (X6)



(1.05V)(X2) (3.3V) (X2)



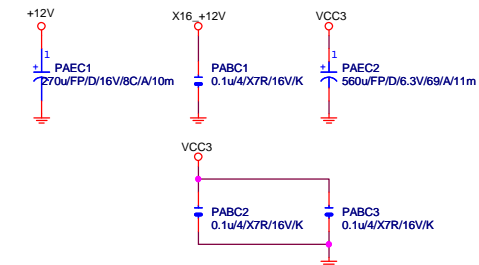
(1.5V) (X10)



PCH (I)

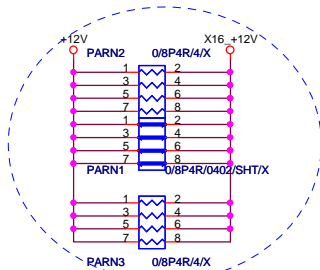


PCIEX16 CAP



PCIEX16 PROTECT SHT

```
+12 protect
short-wire test
```



PCIEX16 AC CAP

| | | | |
|--------------|-------|------------------|----------------|
| PA EXP TXP0 | PAC5 | 0.22u4/XSR/6.3VK | PA EXP TXP0 C |
| PA EXP TXN0 | PAC4 | 0.22u4/XSR/6.3VK | PA EXP TXN0 C |
| PA EXP TXP1 | PAC6 | 0.22u4/XSR/6.3VK | PA EXP TXP1 C |
| PA EXP TXN1 | PAC7 | 0.22u4/XSR/6.3VK | PA EXP TXN1 C |
| PA EXP TXP2 | PAC8 | 0.22u4/XSR/6.3VK | PA EXP TXP2 C |
| PA EXP TXN2 | PAC9 | 0.22u4/XSR/6.3VK | PA EXP TXN2 C |
| PA EXP TXP3 | PAC10 | 0.22u4/XSR/6.3VK | PA EXP TXP3 C |
| PA EXP TXN3 | PAC11 | 0.22u4/XSR/6.3VK | PA EXP TXN3 C |
| PA EXP TXP4 | PAC12 | 0.22u4/XSR/6.3VK | PA EXP TXP4 C |
| PA EXP TXN4 | PAC13 | 0.22u4/XSR/6.3VK | PA EXP TXN4 C |
| PA EXP TXP5 | PAC14 | 0.22u4/XSR/6.3VK | PA EXP TXP5 C |
| PA EXP TXN5 | PAC15 | 0.22u4/XSR/6.3VK | PA EXP TXN5 C |
| PA EXP TXP6 | PAC16 | 0.22u4/XSR/6.3VK | PA EXP TXP6 C |
| PA EXP TXN6 | PAC17 | 0.22u4/XSR/6.3VK | PA EXP TXN6 C |
| PA EXP TXP7 | PAC18 | 0.22u4/XSR/6.3VK | PA EXP TXP7 C |
| PA EXP TXN7 | PAC18 | 0.22u4/XSR/6.3VK | PA EXP TXN7 C |
| PA EXP TXP8 | PAC20 | 0.22u4/XSR/6.3VK | PA EXP TXP8 C |
| PA EXP TXN8 | PAC21 | 0.22u4/XSR/6.3VK | PA EXP TXN8 C |
| PA EXP TXP9 | PAC22 | 0.22u4/XSR/6.3VK | PA EXP TXP9 C |
| PA EXP TXN9 | PAC23 | 0.22u4/XSR/6.3VK | PA EXP TXN9 C |
| PA EXP TXP10 | PAC24 | 0.22u4/XSR/6.3VK | PA EXP TXP10 C |
| PA EXP TXN10 | PAC25 | 0.22u4/XSR/6.3VK | PA EXP TXN10 C |
| PA EXP TXP11 | PAC26 | 0.22u4/XSR/6.3VK | PA EXP TXP11 C |
| PA EXP TXN11 | PAC27 | 0.22u4/XSR/6.3VK | PA EXP TXN11 C |
| PA EXP TXP12 | PAC28 | 0.22u4/XSR/6.3VK | PA EXP TXP12 C |
| PA EXP TXN12 | PAC29 | 0.22u4/XSR/6.3VK | PA EXP TXN12 C |
| PA EXP TXP13 | PAC30 | 0.22u4/XSR/6.3VK | PA EXP TXP13 C |
| PA EXP TXN13 | PAC31 | 0.22u4/XSR/6.3VK | PA EXP TXN13 C |
| PA EXP TXP14 | PAC32 | 0.22u4/XSR/6.3VK | PA EXP TXP14 C |
| PA EXP TXN14 | PAC33 | 0.22u4/XSR/6.3VK | PA EXP TXN14 C |
| PA EXP TXP15 | PAC34 | 0.22u4/XSR/6.3VK | PA EXP TXP15 C |
| PA EXP TXN15 | PAC35 | 0.22u4/XSR/6.3VK | PA EXP TXN15 C |

PCI-E REV:1.1--> 2.5GHZ

PCE-E X1(單向) BANDWIDTH=2.5GHz*(8b/10b)=2Gb/s=250MB/s

PCE-E X1(雙向) BANDWIDTH=2.5GHz*(8b/10b)X2=4Gb/s=500MB/s

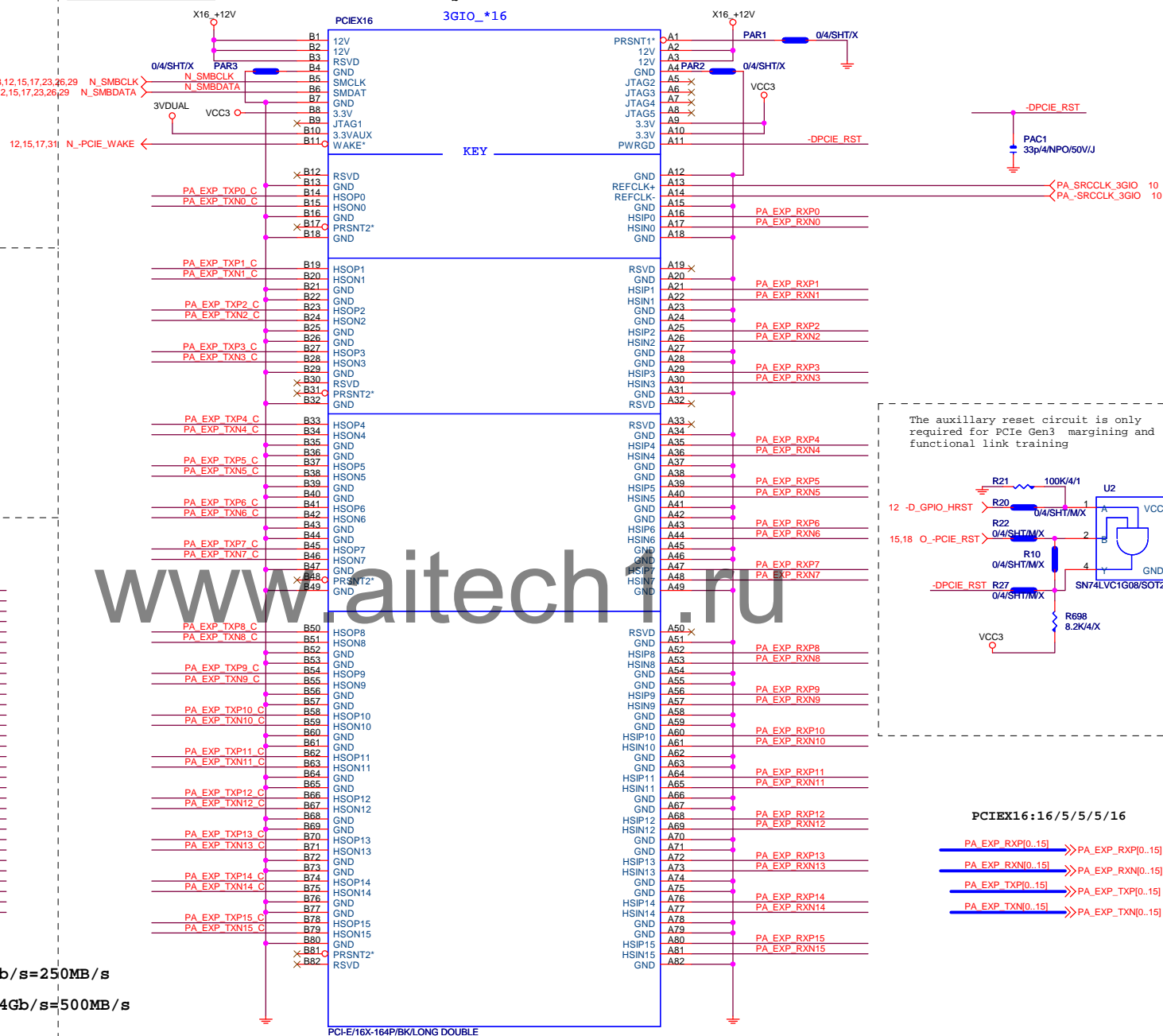
PCE-E X16(單向) BANDWITH=2.5GHz*(8b/10b)X16=32Gb/s=4GB/s

PCE-E X16(雙向) BANDWIDTH=2.5GHz*(8b/10b)X16X2=64Gb/s=8GB/s

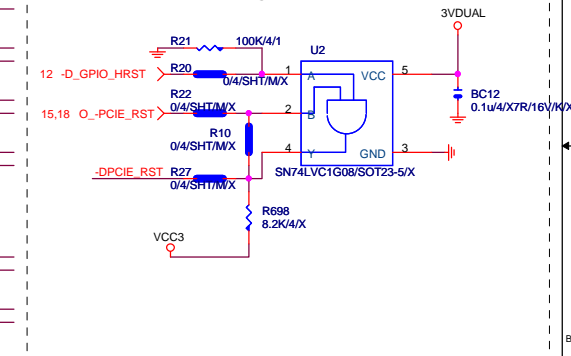
PCI-E REV:2.0--> 5GHZ

PCIEX16 SLOT

PCIESLOT-164DN-Q



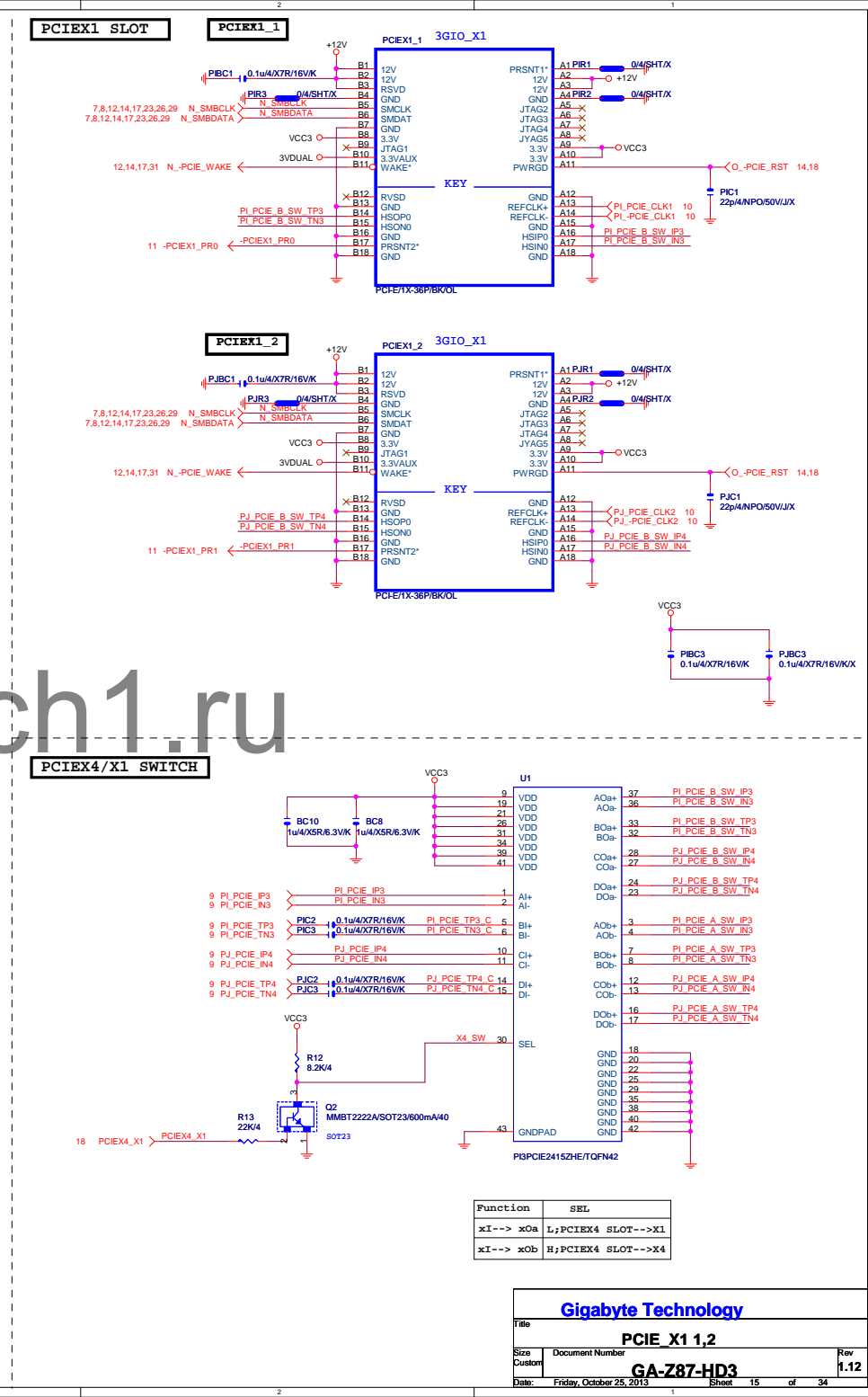
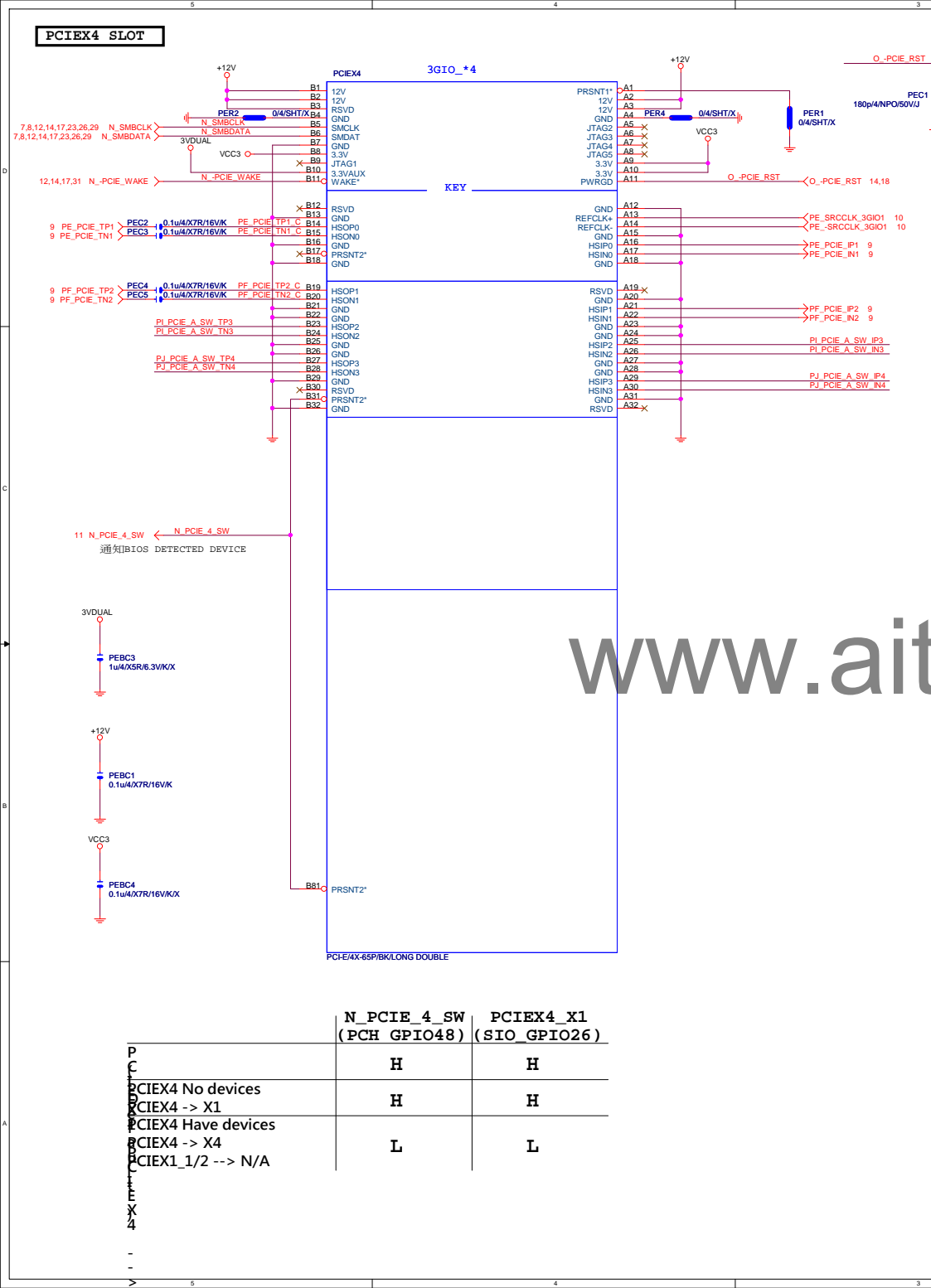
The auxillary reset circuit is only required for PCIe Gen3 margining and functional link training



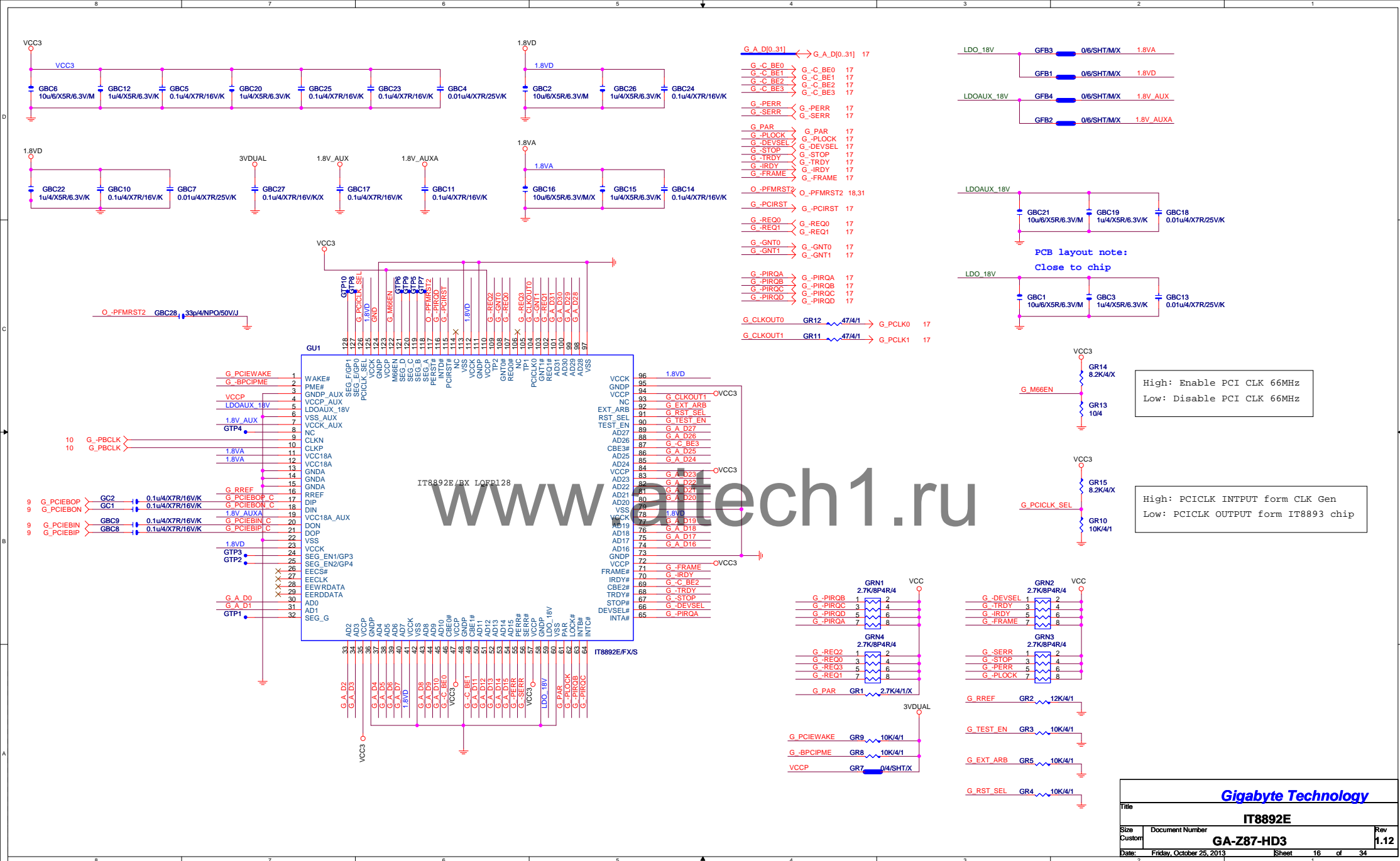
PCIEX16:16/5/5/5/16

```
PA_EXP_RXP[0..15] >> PA_EXP_RXP[0..15] 4
PA_EXP_RXN[0..15] >> PA_EXP_RXN[0..15] 4
PA_EXP_TXP[0..15] >> PA_EXP_TXP[0..15] 4
PA_EXP_TXN[0..15] >> PA_EXP_TXN[0..15] 4
```

| | | | |
|-------------------------------|--------------------------|-------------------|-----------------|
| Gigabyte Technology | | | |
| Title PCI EXPRESS * 16 | | | |
| Size | Document Number | GA-Z87-HD3 | Rev 1.12 |
| Custom | | | |
| Date: | Friday, October 25, 2013 | Sheet | 14 of 34 |



www.aitech1.ru



SIO IT8728F

SYS_FAN3

CPU_OPT

CPU_FAN

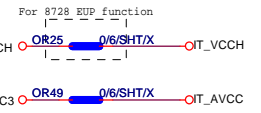
SYS_FAN1

SYS_FAN2

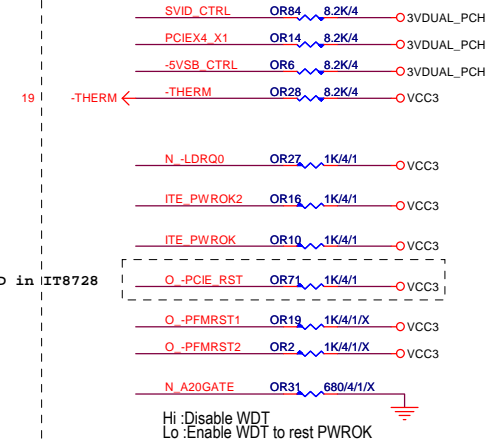
IT8728F (GB)

【技術通報R&D技術通報151】
有使用PRINT PORT的 MODEL
需使用新料號:10HP2-118728-72R

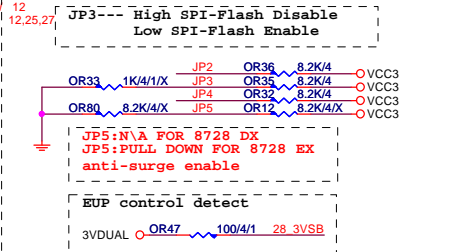
PWR SHT



SIO PU



SIO STRAP



| | | |
|-----|-----|---|
| JP4 | 1 | k8 power sequency function is Disable |
| | 0 | k8 power sequency function is Enable |
| JP3 | 1 1 | The default value of EC Index 63h/6Bh/73h is 80h. |
| | 0 1 | The default value of EC Index 63h/6Bh/73h is FFh |
| JP5 | 1 0 | The default value of EC Index 63h/6Bh/73h is 00h. |
| | 0 0 | The default value of EC Index 63h/6Bh/73h is 40h. |

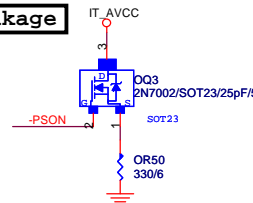
IT8728F NOTE

| | IT8728 |
|--------|---------------------------|
| PIN121 | VCORE_EN/PCH_C0 |
| PIN120 | VLDT_EN/PCH_D0 |
| PIN19 | ATXPG |
| PIN31 | PCH_C1 |
| PIN53 | SST/AMDTSL_D/MTRB#/PCH_D1 |
| PIN55 | PECI/AMDTSL_C/DRV# |
| PIN66 | SYS_3VSB |
| PIN70 | GP47 |
| PIN95 | VIN2(VCC5) |
| PIN96 | VIN1(VCC12) |
| PIN97 | VIN1/VDIMM_STR(1.5V) |
| PIN98 | VIN0/VCORE(1.1V)/NC |

DUAL BIOS OPT STRAP



Power leakage

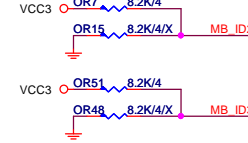


SIO_18V

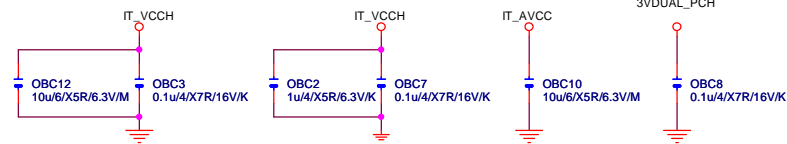
internal power pin, max 22nF cap



MB ID



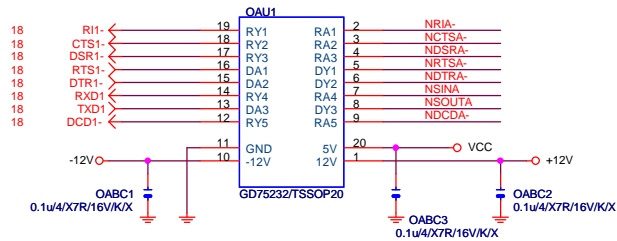
SIO CAP



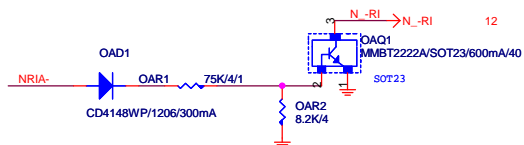
Gigabyte Technology

| | | | |
|--------|--------------------------|------------|-----------------|
| Title | | | ITE 8728 LPC IO |
| Size B | Document Number | GA-Z87-HD3 | |
| Date: | Friday, October 25, 2013 | Sheet | 18 of 34 |
| | | | Rev 1.12 |

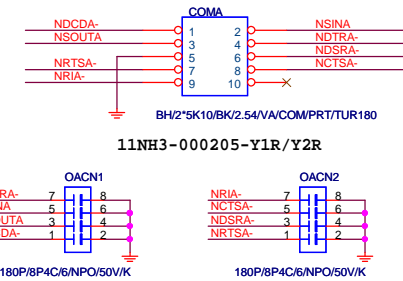
COMA



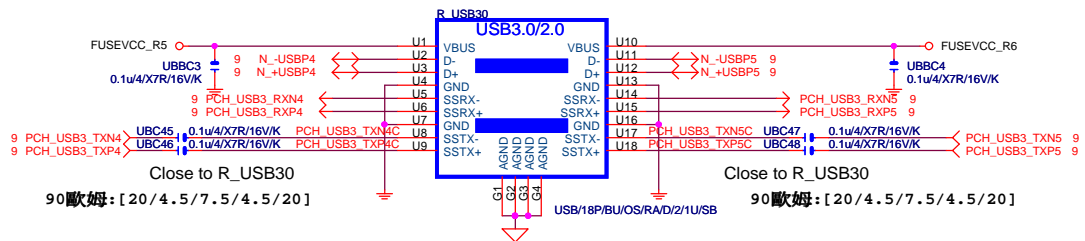
COM RI



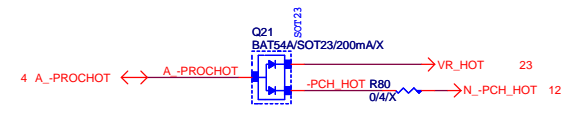
COM BUFFER



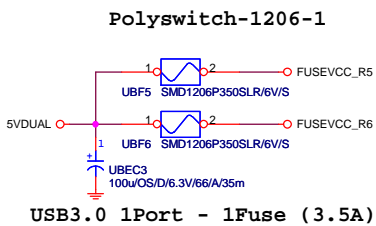
USB30_20 CONNECT



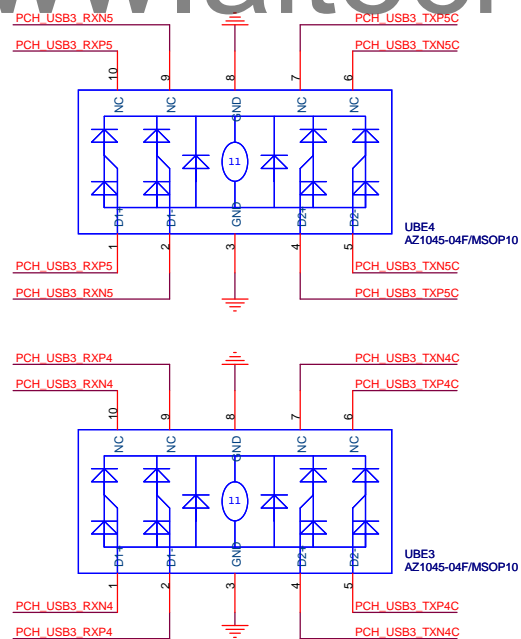
-PROHOT



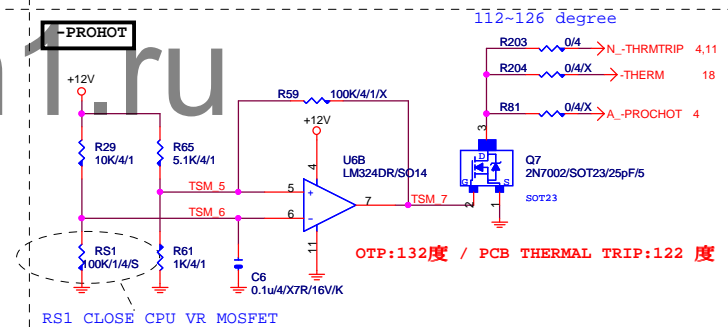
USB30 PWR



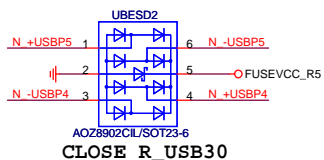
USB30 ESD PROTECT



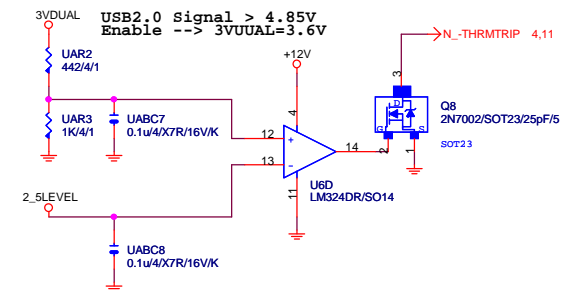
-PROHOT



USB20 ESD PROTECT



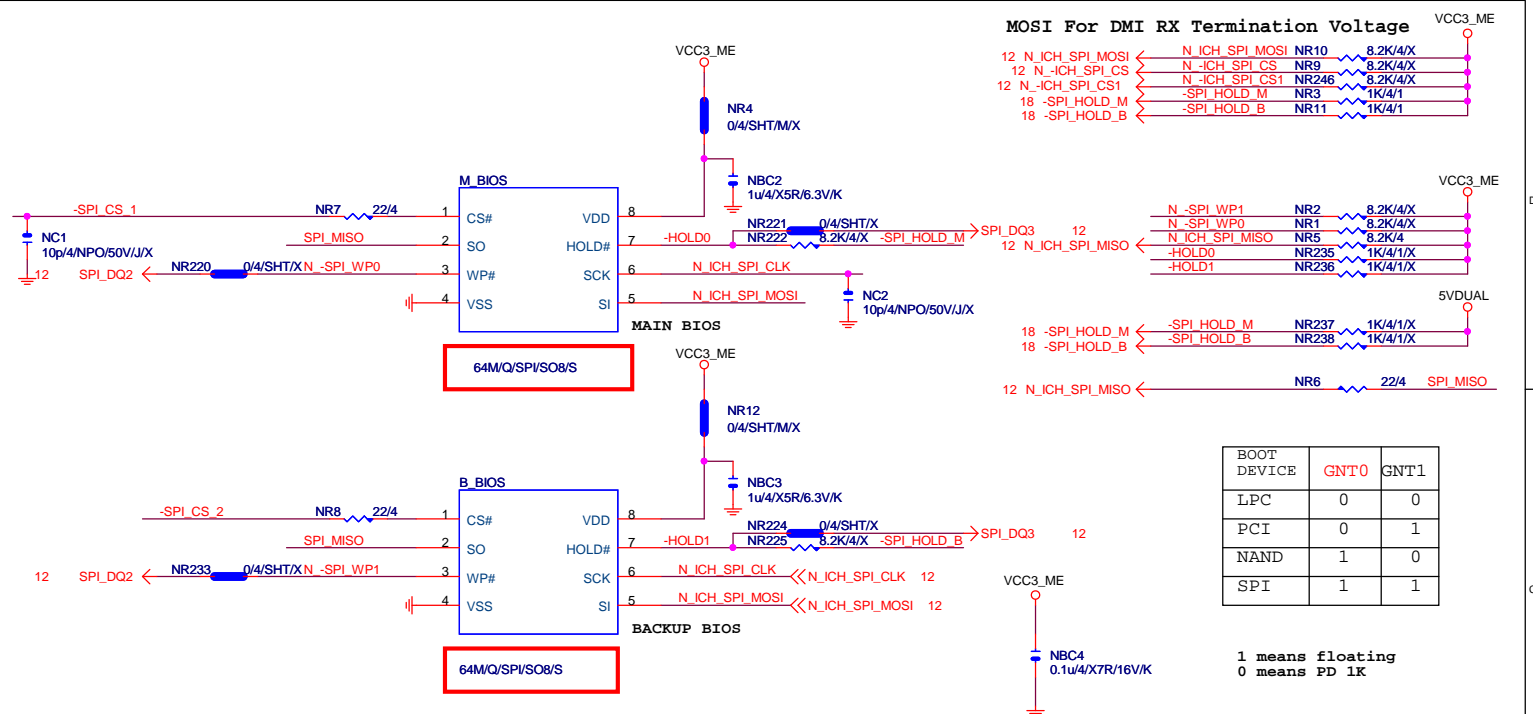
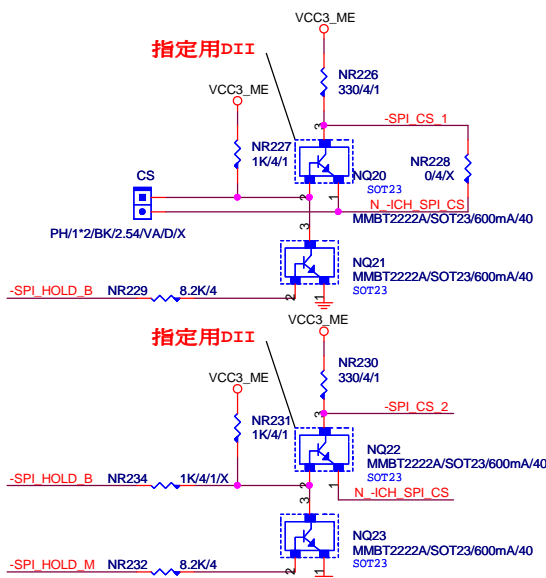
USB2.0 Signal & power short protection



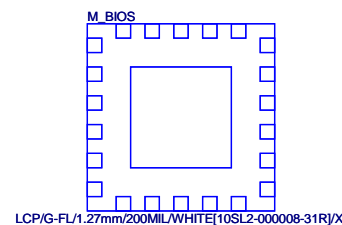
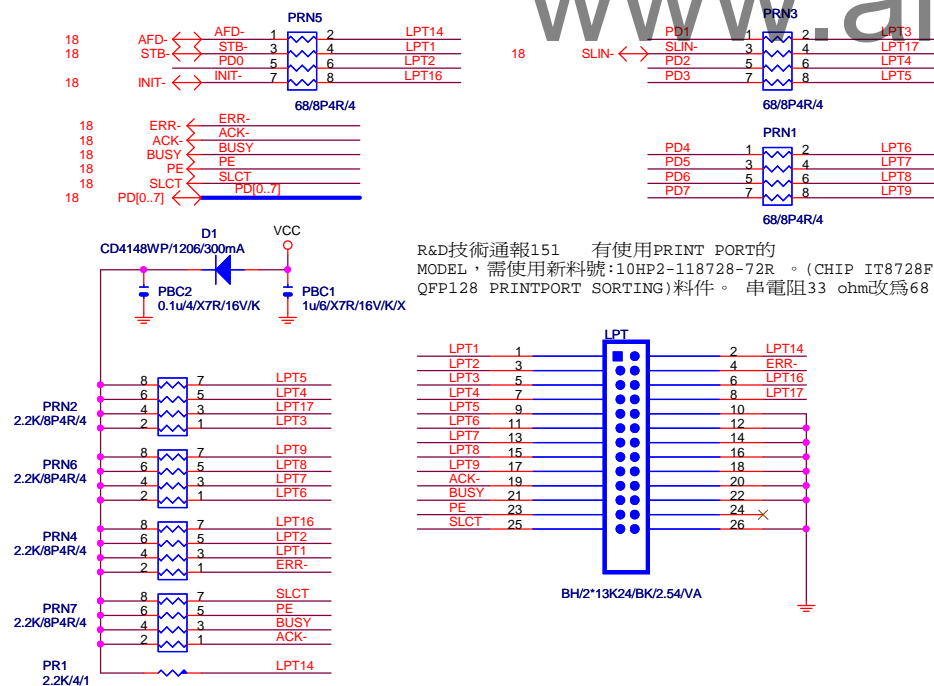
Gigabyte Technology

| | | | |
|--------------------|--------------------------|------------|----------|
| Title | | | |
| COM/ PROHOT/ R_USB | | | |
| Size | Document Number | Rev | |
| Custom | | GA-Z87-HD3 | |
| Date: | Friday, October 25, 2013 | Sheet | 19 of 34 |

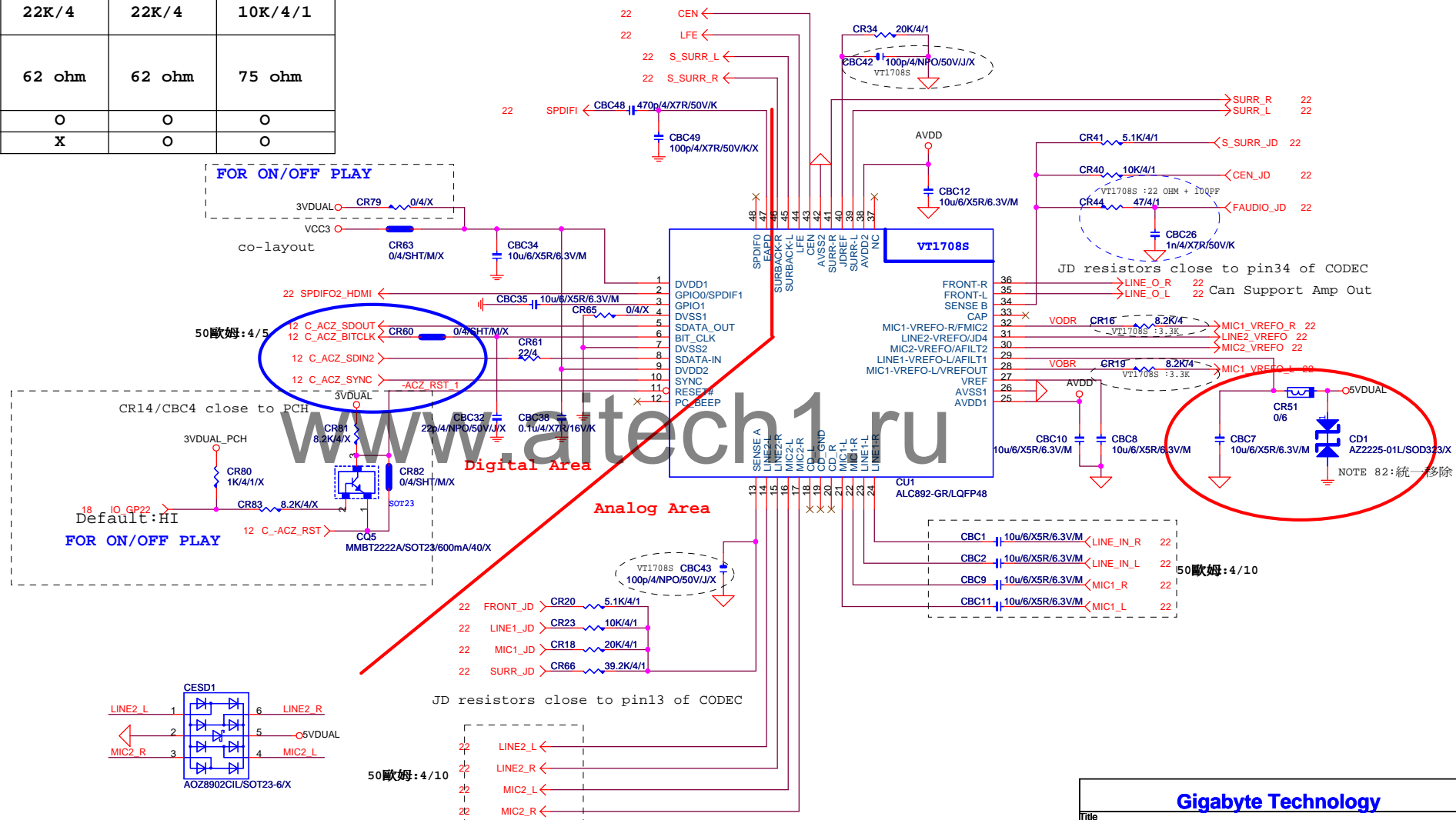
DUAL BIOS



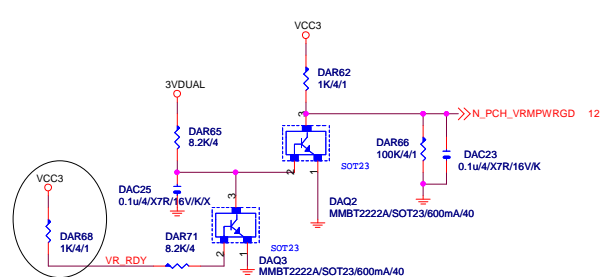
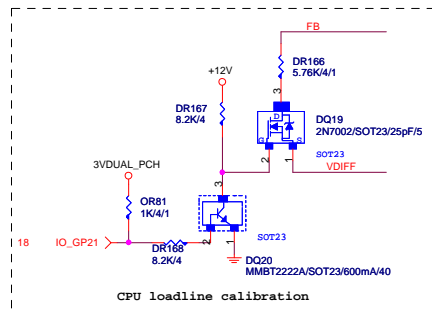
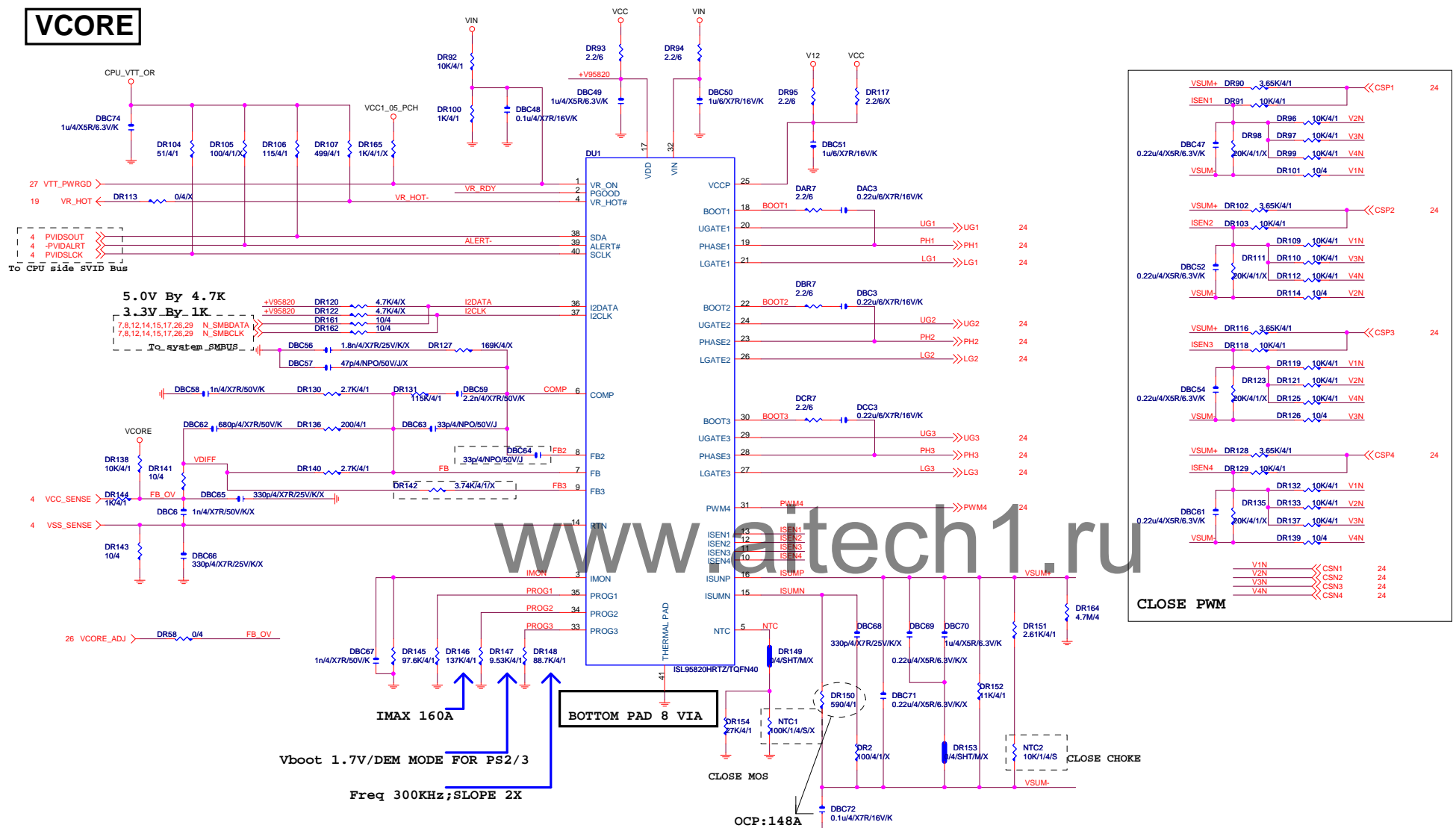
LPT PORT



| | | | |
|--|-----------|------------|------------|
| | ALC892 | ALC887-VD2 | VT1708S-CE |
| CR44/CBC26 | 47ohm+1nF | 47ohm+1nF | 22ohm+100P |
| CBC42/CBC43 | X | X | 100P/4 |
| CR16/CR19 CR52/CR56/CR10/CR9 | 8.2K/4 | 8.2K/4 | 3.3K/4/1 |
| CR6/CR7/CR58/CR54/ CR67/CR68/CR69/CR70 | 22K/4 | 22K/4 | 10K/4/1 |
| CR5/CR8/CR1/CR14/ CR17/CR22/CR73/CR74/ CR13/CR11/CR57/CR53/ CR75/CR76 | 62 ohm | 62 ohm | 75 ohm |
| CR51/CD1/CBC7 | O | O | O |
| CESD1 | X | O | O |



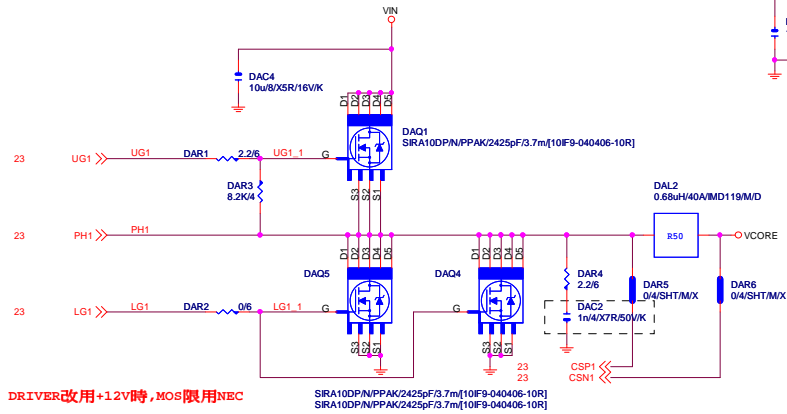
VCORE



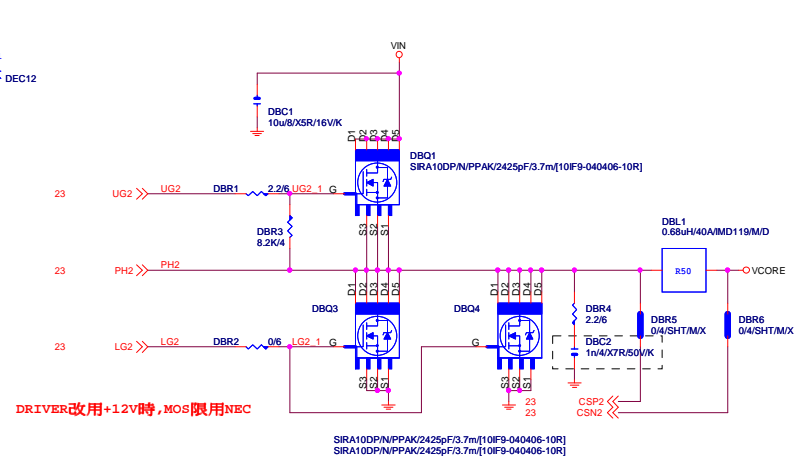
| | | | |
|-----------------------------|--------------------------|-------|----------|
| Gigabyte Technology | | | |
| Title VCORE_ISL95820 | | | |
| Size | Document Number | Rev | |
| Custom | GA-Z87-HD3 | 1.12 | |
| Date: | Friday, October 25, 2013 | Sheet | 23 of 34 |

VCORE

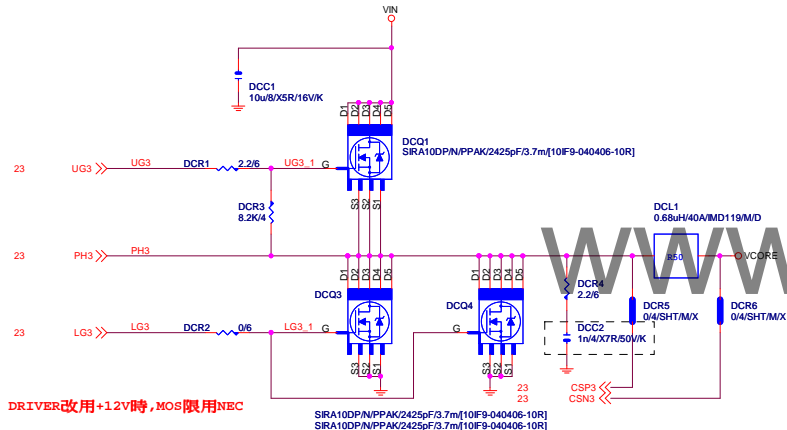
[1]



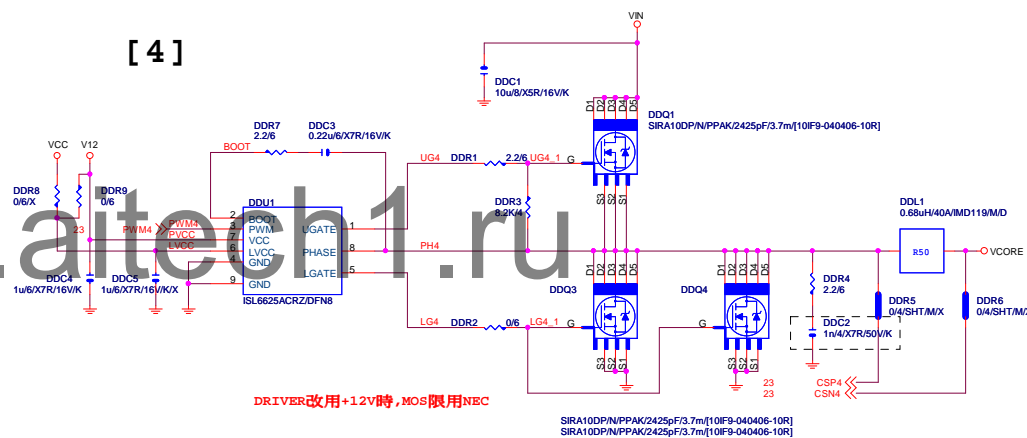
[2]



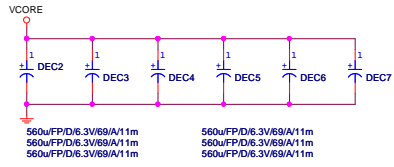
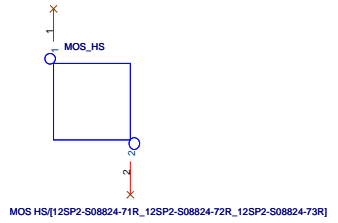
[3]



[4]

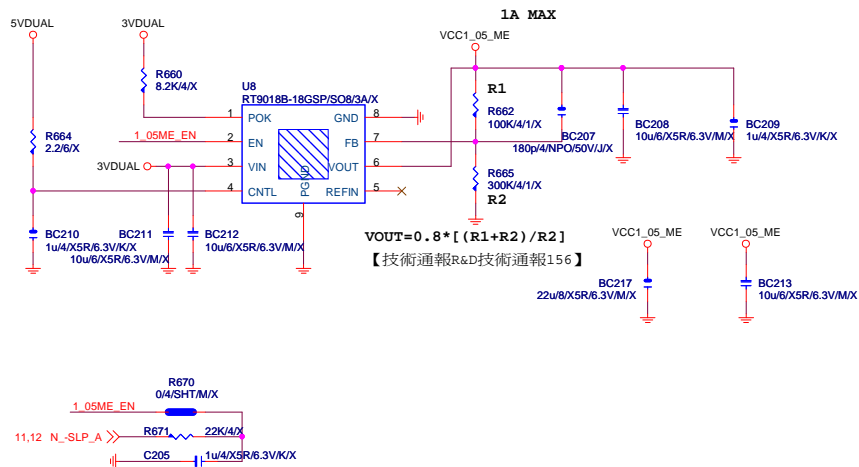


MOSFET HEATSINK

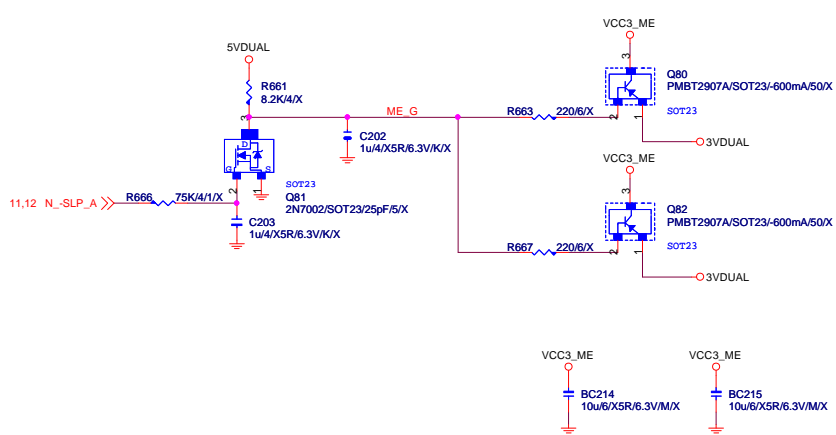


| Gigabyte Technology | | | |
|---------------------|--------------------------|------------|----------|
| Title | ISL95820_2 | | |
| Size | Document Number | GA-Z87-HD3 | |
| Custom | | | Rev 1.12 |
| Date | Friday, October 25, 2013 | Sheet 24 | of 34 |

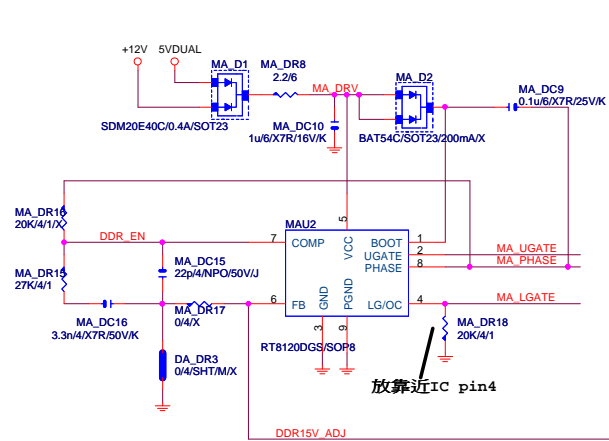
VCC1_05_ME



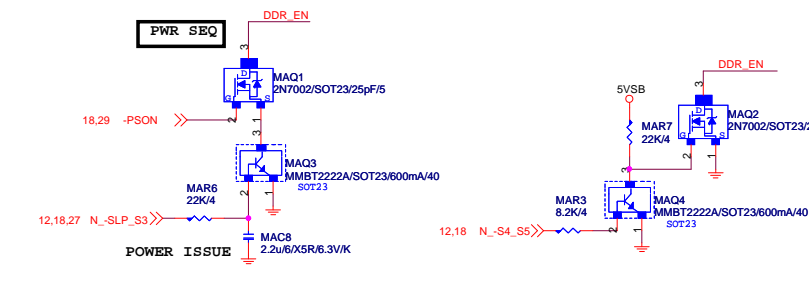
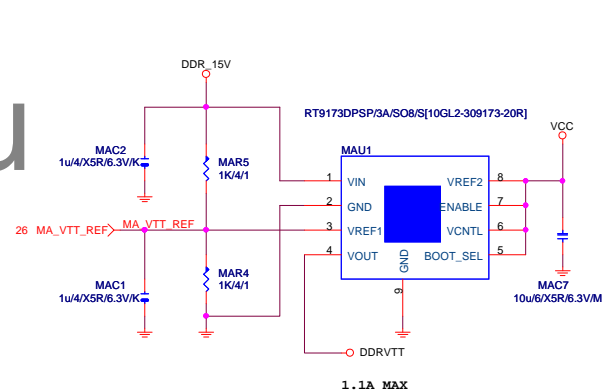
VCC3_ME



DDR_15V



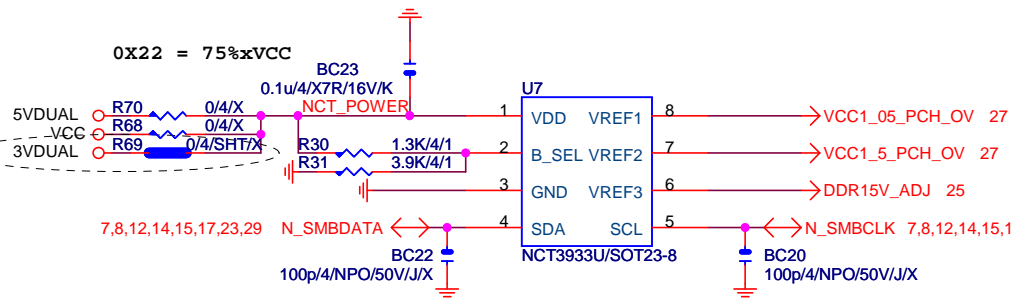
DDRVTT



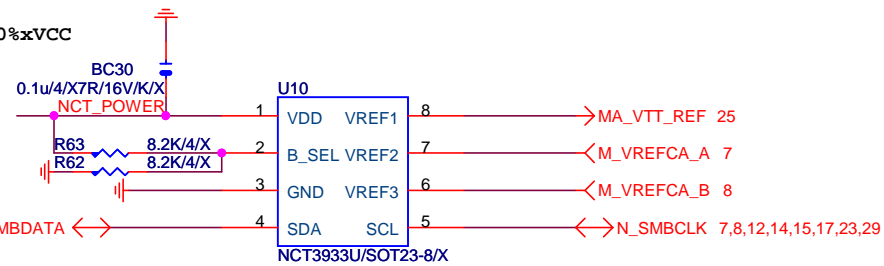
VIN=5V, VOUT=1.5V, IOUT=25A, PHASE=1
 IRMS=11.45A
 560u/FP/D/6.3V/68/8m RIPPLE CURRENT=4.7A
 Coefficient=1.7(85℃), 1(105℃)
 VIN Ripple current=4.7X1.7=7.99A(85℃)
 -->故固態電容須2X7.99=15.98>11.45A
 OCP:35.82A for Rds=6.7m for vishay@4.5V
 OCP:72.727A for Rds=3.3m for renesas@10V
 OCP:48A=RoSet*Iocset / Rds(on)
 =12K*10uA / [5//5]

| GIGABYTE™ | | | |
|-------------------|--------------------------|-------|----------|
| Title | | | |
| DDR15V / M3 POWER | | | |
| Size | Document Number | Rev | |
| Custom | GA-Z87-HD3 | 1.12 | |
| Date: | Friday, October 25, 2013 | Sheet | 25 of 34 |

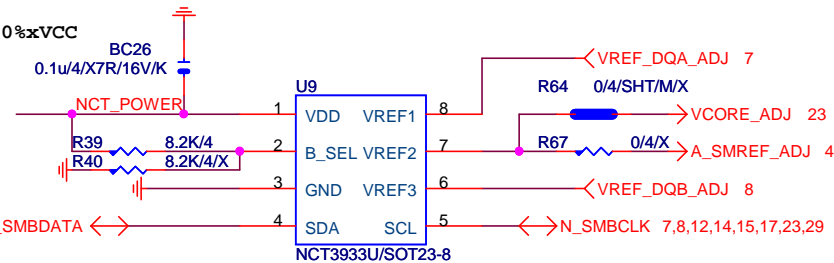
OVER VOLTAGE



0X2A = 0%xVCC



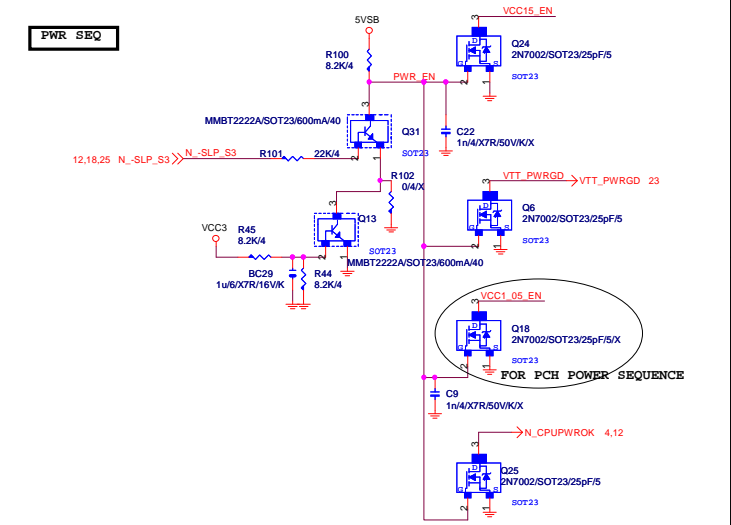
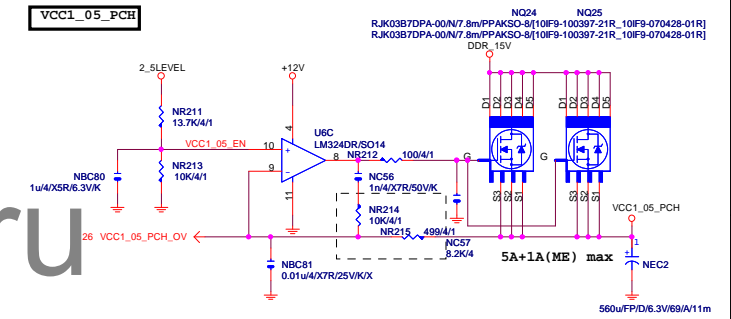
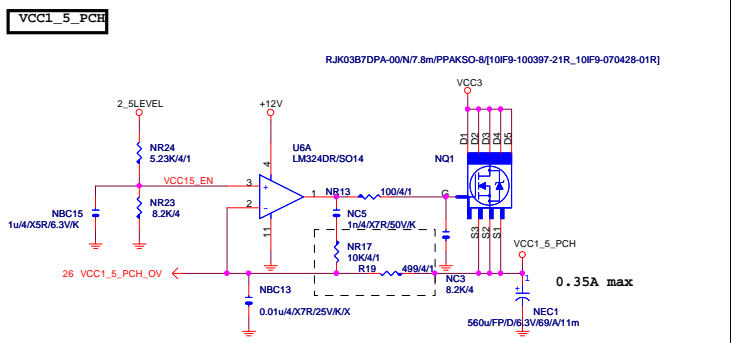
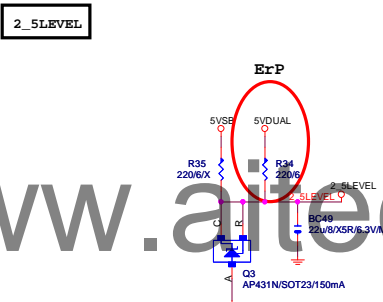
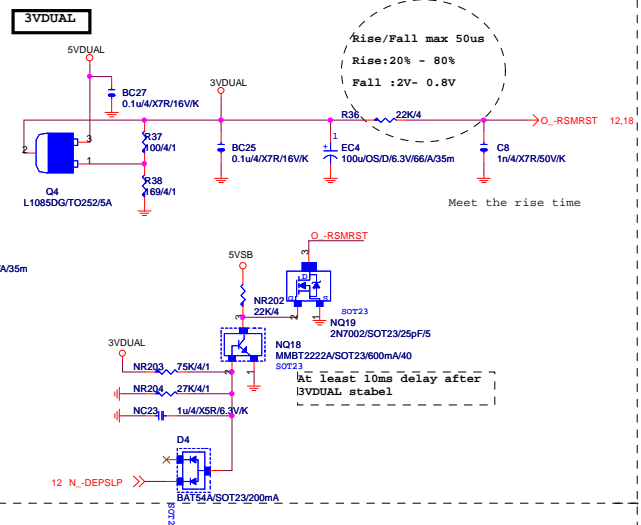
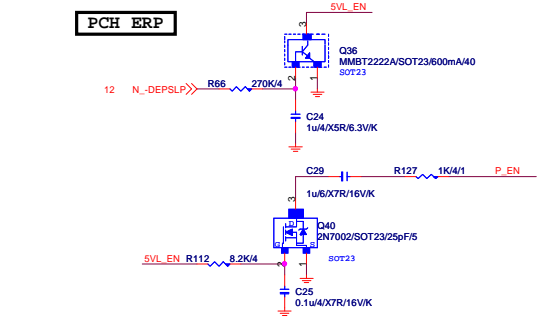
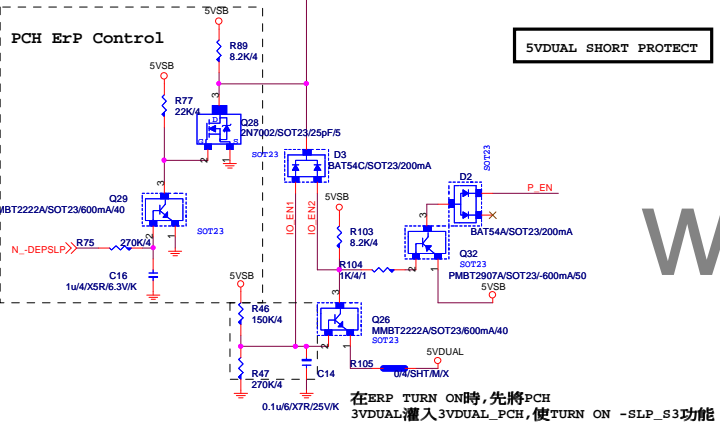
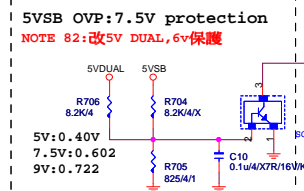
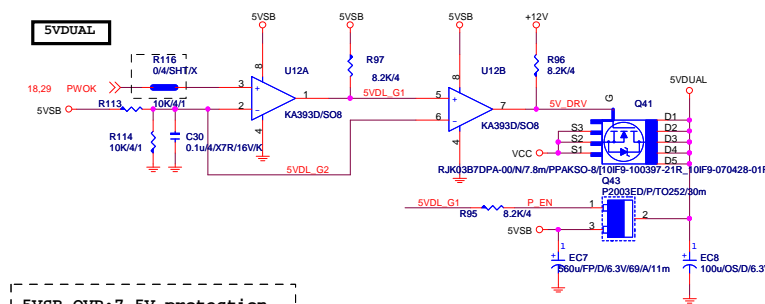
0X20 = 100%xVCC



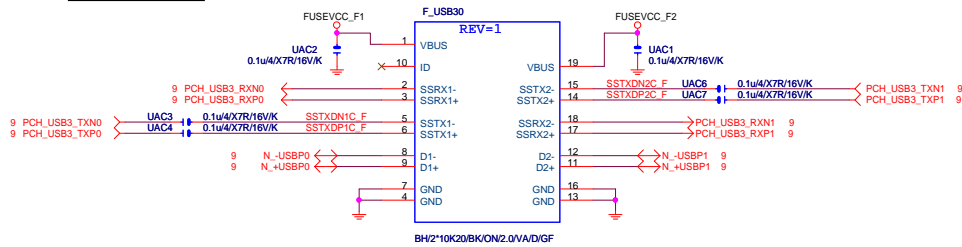
| NCT3933 | 0X2A | 0X20 | 0X22 |
|---------|--------------|--------------|------------|
| VREF1 | DDRVTT | VREF_DDRA_DQ | PCH Core |
| VREF2 | VREF_DDRA_CA | N/A | VCC1_5_PCH |
| VREF3 | VREF_DDRA_CA | VREF_DDRB_DQ | SMREF |

Gigabyte Technology

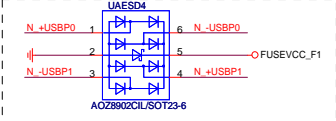
| | | |
|---------------|--------------------------|----------------|
| Title | | |
| CPU CORE VR-2 | | |
| Size | Document Number | Rev |
| Custom | GA-Z87-HD3 | 1.12 |
| Date: | Friday, October 25, 2013 | Sheet 26 of 34 |



Front USB3.0

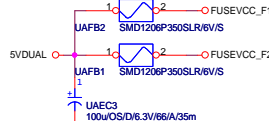


BLUE

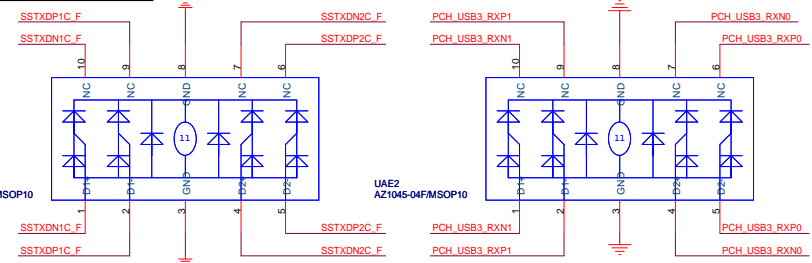


Close to connector

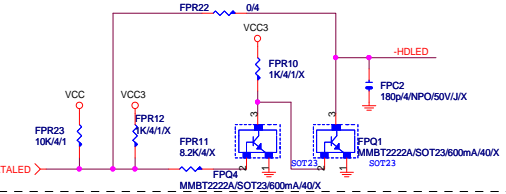
F_USB30 PWR



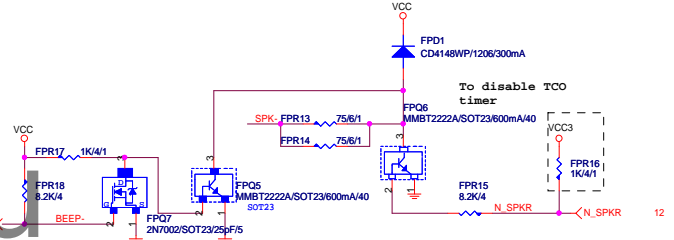
F_USB30 ESD PROTECT



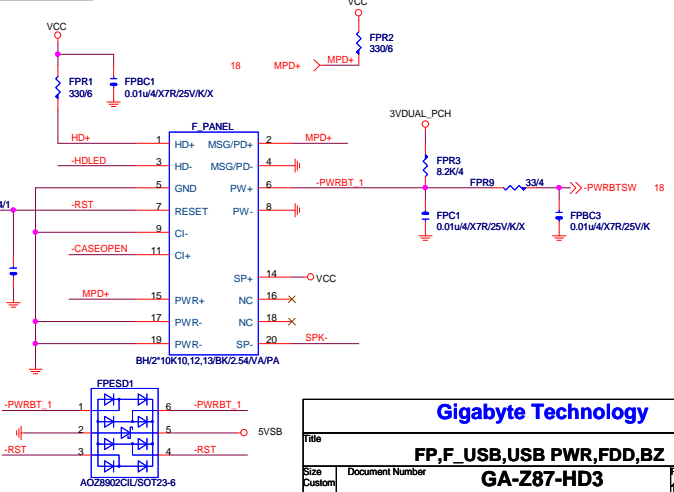
SATA LED



SPKR



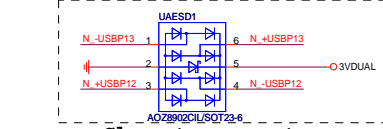
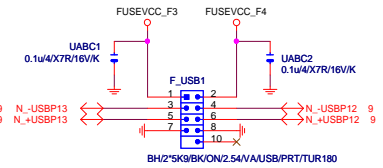
INTEL FRONT PANEL



Gigabyte Technology

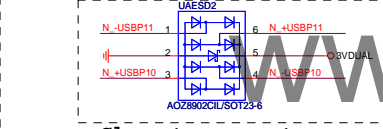
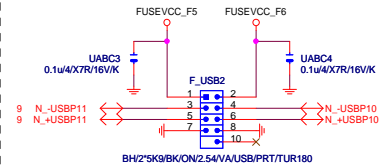
| | | | |
|--------|--------------------------|-------------------------|----------|
| Title | | FP,F_USB,USB PWR,FDD,BZ | |
| Size | | Document Number | |
| Custom | | GA-Z87-HD3 | |
| Date: | Friday, October 25, 2013 | Sheet | 28 of 34 |

FRONT USB1



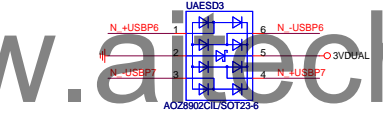
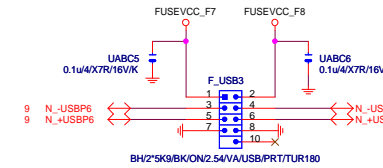
Close to connector

FRONT USB2

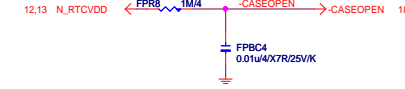


Close to connector

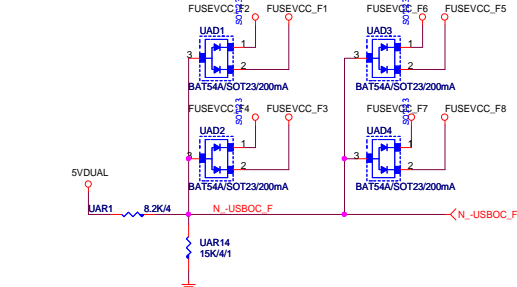
FRONT USB3



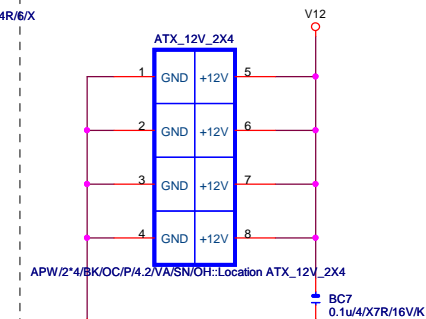
CASE OPEN



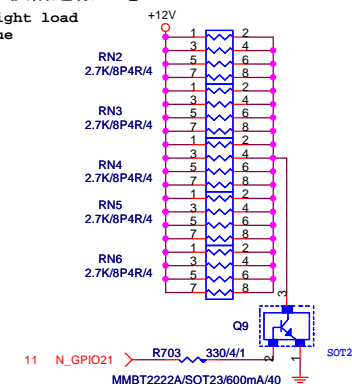
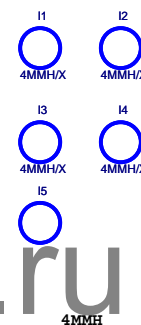
-USBOC_F



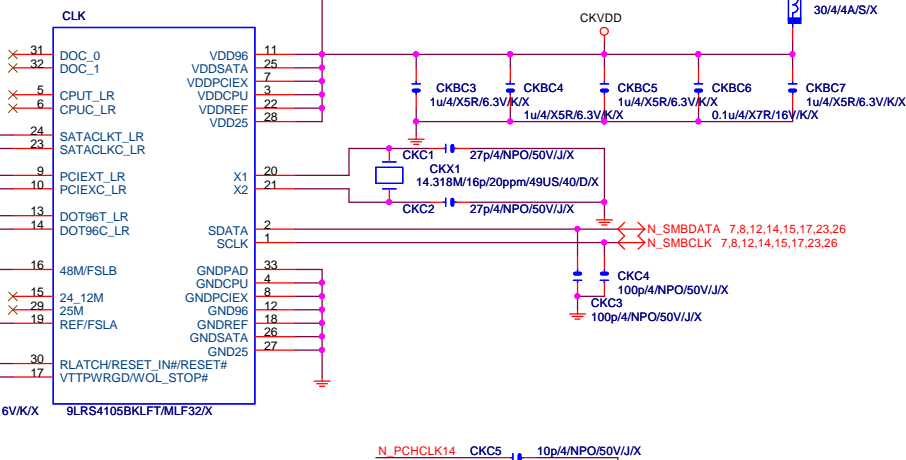
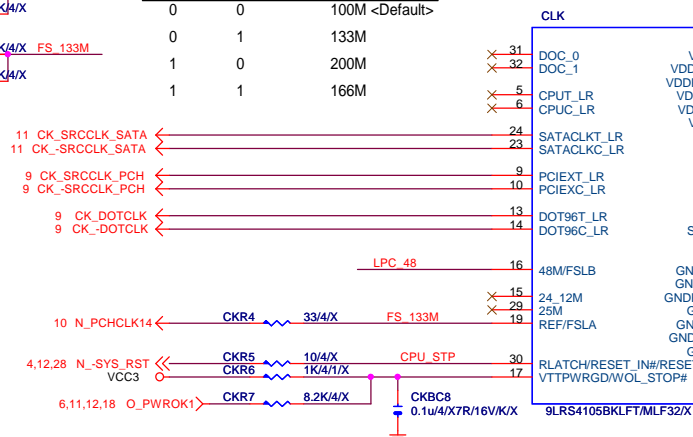
ATXX4 POWER CONNECTOR



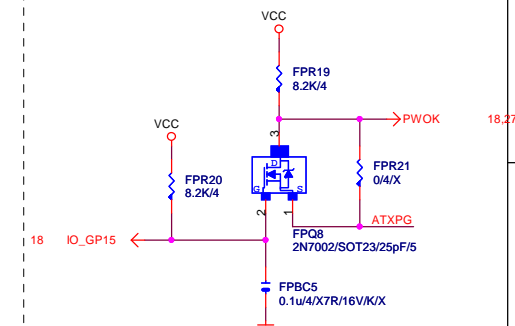
【技術通報R&D技術通報153】



CPU Frequency Selection



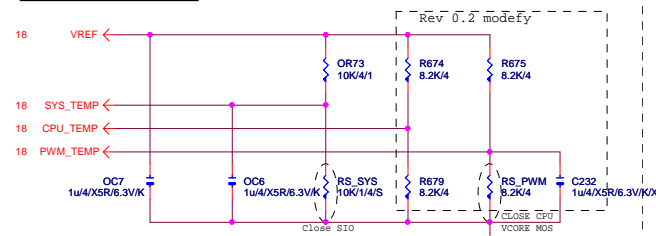
【技術通報R&D技術通報154】



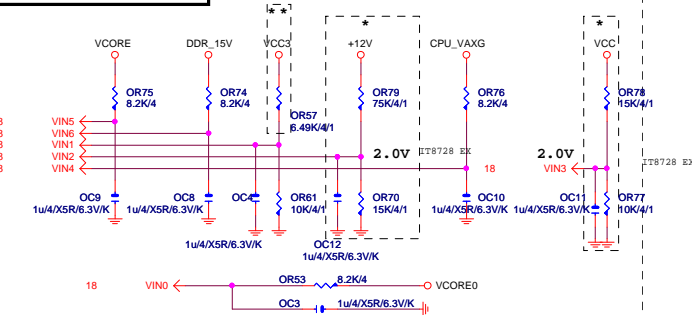
Gigabyte Technology

| | | | |
|----------------------------|--------------------------|-------|-------------|
| Title | | | |
| ATX POWER CONNECTOR | | | |
| Size Custom | Document Number | | Rev |
| | GA-Z87-HD3 | | 1.12 |
| Date: | Friday, October 25, 2013 | Sheet | 29 of 34 |

TEMP H/W MONITOR

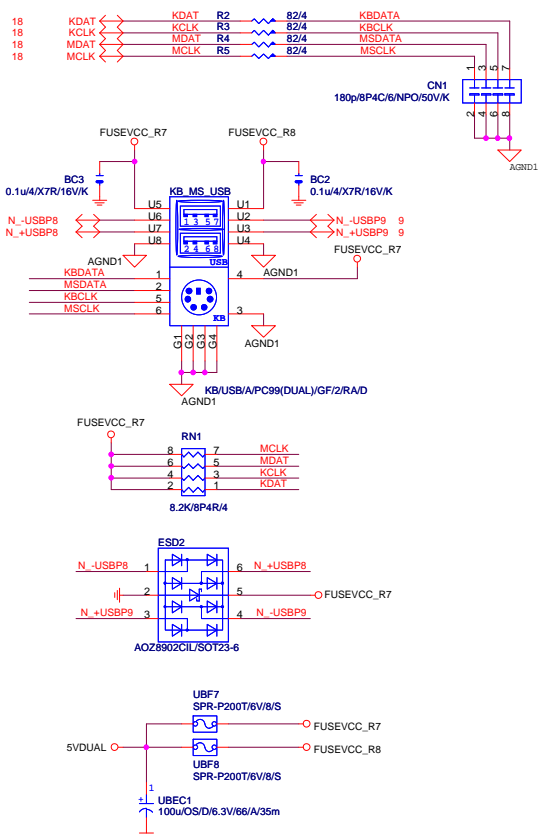


VOLTAGE-- H/W MONITOR

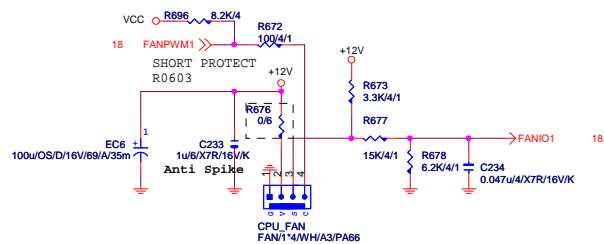


The division voltage of VIN2 & VIN3 must be around 2.9V

KB/USB

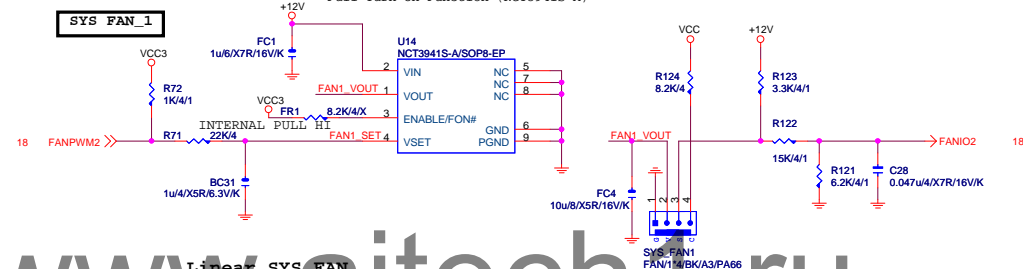


CPU SMART FAN

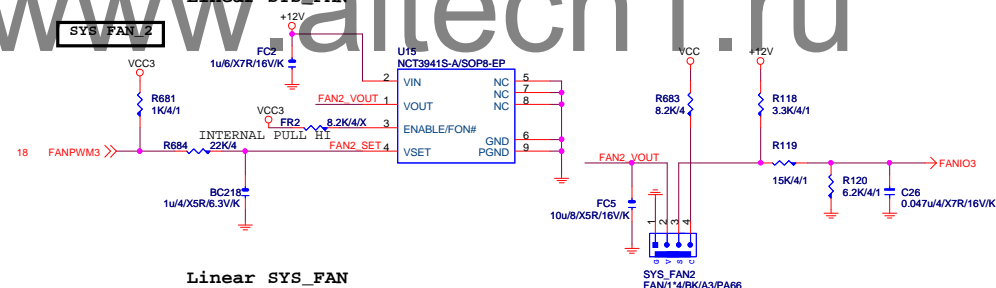


Linear SYS_FAN

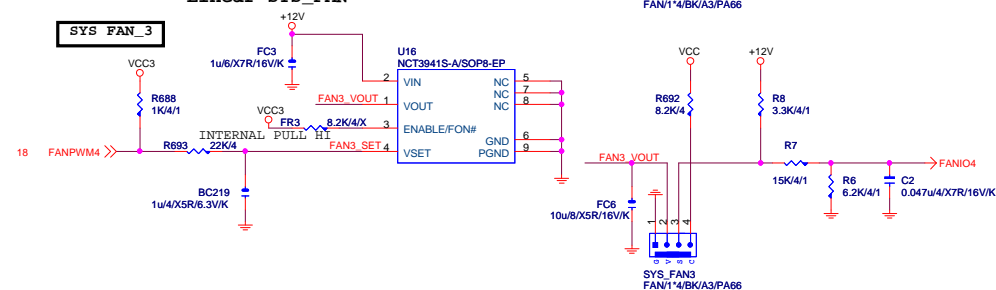
Enable Function (NCT3941S)
Full Turn On Function (NCT3941S-A)



Linear SYS FAN



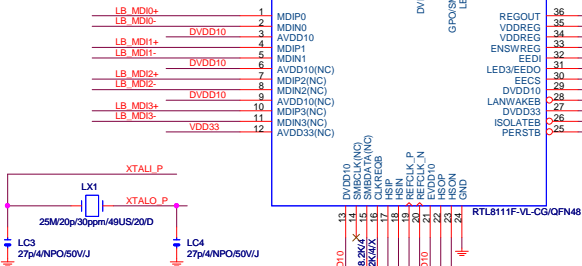
Linear SYS_FAN



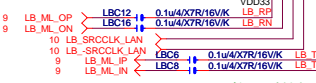
Gigabyte Technology

| | | | | | | | | | |
|--------|---------------------------|--|--|-------|---------------------|----|----|--|--|
| Title | | | | | HWM,KB/MS, FAN CTRL | | | | |
| Size | Document Number | | | | Rev | | | | |
| Custom | GA-Z87-HD3 | | | | 1.12 | | | | |
| Date: | Monday, November 25, 2013 | | | Sheet | 30 | of | 34 | | |

100歐姆:[20/4/8/4/20]

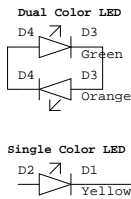
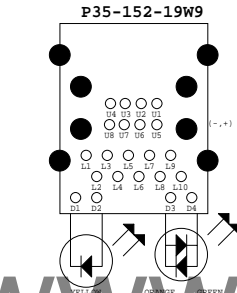


80歐姆:[15/5/5/5/15]



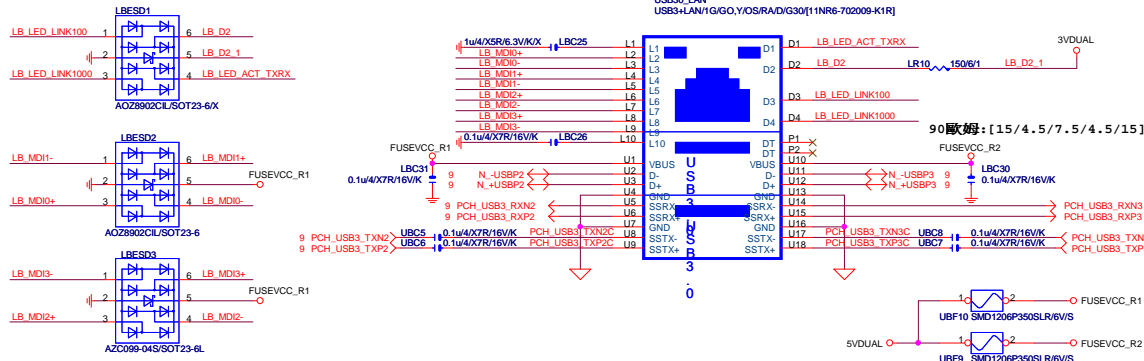
SRCCLK 50歐姆:[18/4/10/4/18]

離IC近越好

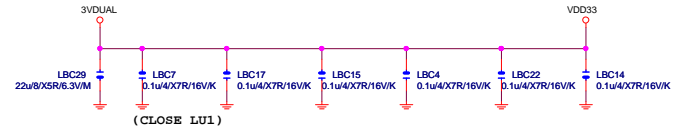
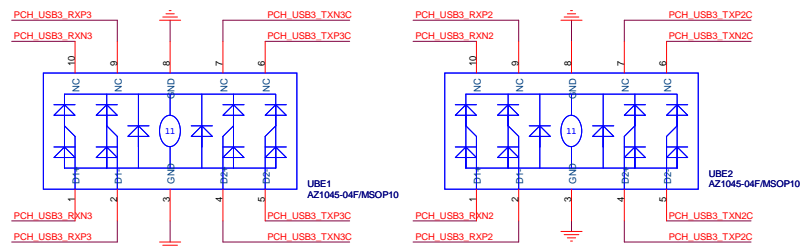
FOR DSM MODE
(DEEP SLEEP MODE)

USB30_LAN CONNECTOR

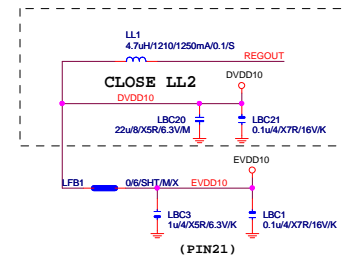
100歐姆:[20/4/8/4/20]

USB30_LAN
USB3-LAN1GGO,YOSRADI3011NR6-702009-K1R

CLOSE USB30_LAN



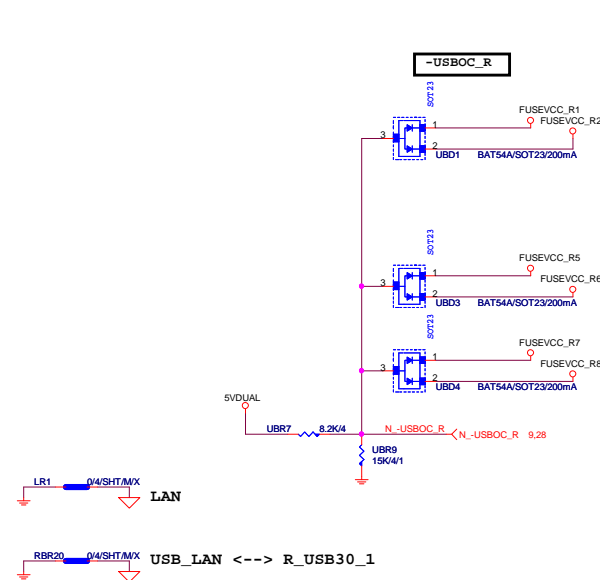
(PIN3,6,9,13,29,41,45)



(PIN21)

www.aitech1.ru

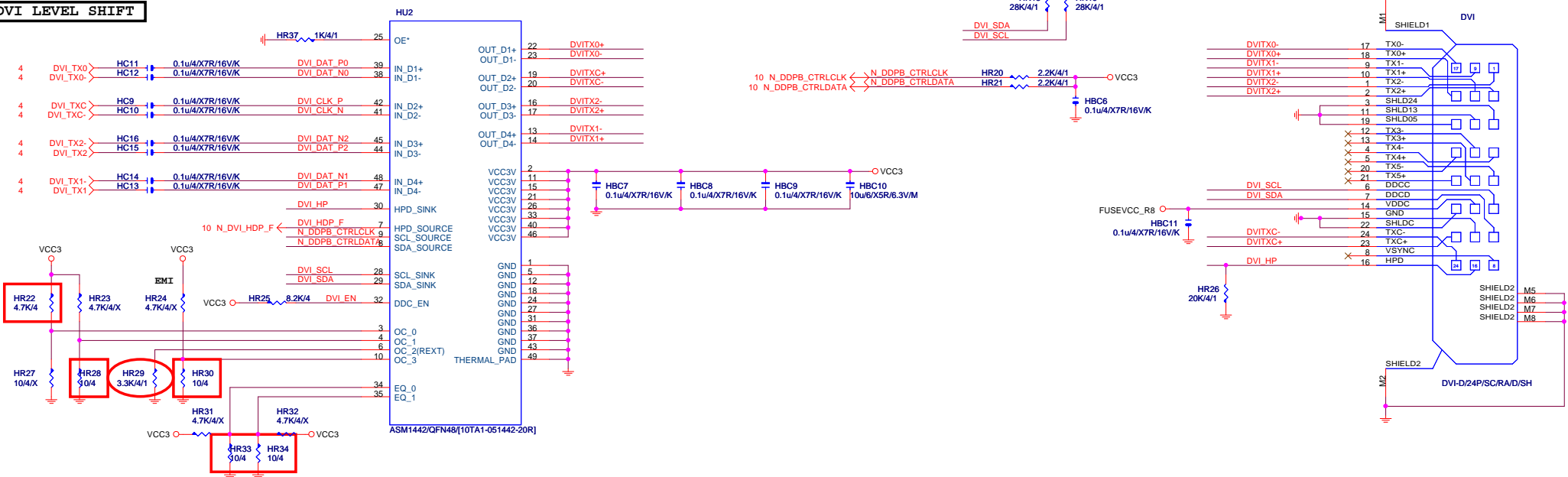
-USB0C_R



DVI LEVEL SHIFT

DVI:20/4/6/4/20

Impedance=85 +- 17.5%



PTN3360:PIN 4/10/34/35 NC PIN,都不上值;只上HR29:10K

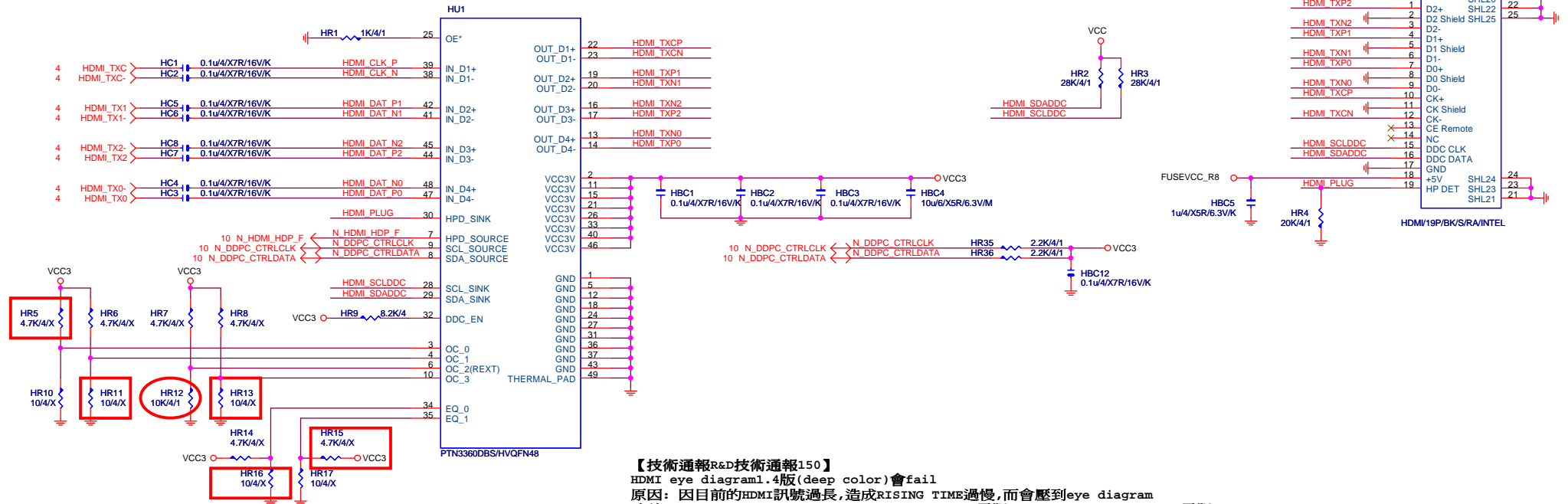
ASM1442:紅色框要上,HR29:3.3K

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| Gigabyte Technology | | | |
|---------------------|--------------------------|-------|----------|
| DVI | | | |
| Size | Document Number | Rev | |
| Custom | GA-Z87-HD3 | 1.12 | |
| Date: | Friday, October 25, 2013 | Sheet | 32 of 34 |

HDMI LEVEL SHIFT

HDMI:20/4/6/4/20
Impedance=85 +- 17.5%



PTN3360:PIN 4/10/34/35 NC PIN,都不上值;只上HR12:10K
ASM1442:紅色框要上,HR12:3.16K

【技術通報R&D技術通報150】
HDMI eye diagram.4版(deep color)會fail
原因: 因目前的HDMI訊號過長,造成RISING TIME過慢,而會壓到eye diagram
改善: ASMDIA ASM1442 : 3.16K(PIN6 PULL DOWN電阻) 10ohm(PIN4 PULL DOWN電阻)

GIGABYTE™

| | | | |
|-------------|--------------------------|-------------|----------|
| Title | | | |
| HDMI | | | |
| Size | Document Number | Rev | |
| Custom | GA-Z87-HD3 | 1.12 | |
| Date: | Friday, October 25, 2013 | Sheet | 33 of 34 |

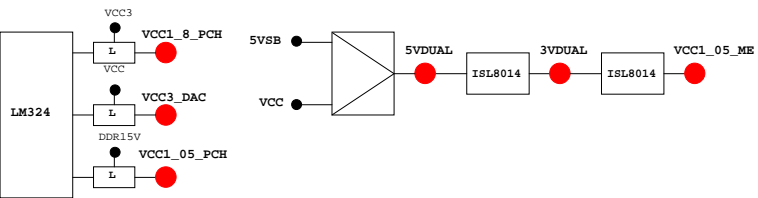
PCB GPIO LIST TABLE

| PIN NAME | PWR | Default | USAGE | NOTE |
|----------------|------|---------|-----------------|--------------------|
| GP0 | MAIN | H-Z | GPIO0 | N/A |
| GP1/TACH1 | MAIN | GPI | GPIO1 | N/A |
| GP2/PIRQE# | MAIN | GPI | ~PIRQE | P/U 8.2K VCC3 |
| GP3/PIRQF# | MAIN | GPI | ~PIRQF | P/U 8.2K VCC3 |
| GP4/PIRQG# | MAIN | GPI | ~PIRQG | P/U 8.2K VCC3 |
| GP5/PIRQH# | MAIN | GPI | ~PIRQH | P/U 8.2K VCC3 |
| GP6/TACH2 | MAIN | GPI | PCIE1 Detect | P/U 8.2K VCC3 |
| GP7/TACH3 | MAIN | MAIN | GPIO7 | P/U 8.2K VCC3 |
| GP8 | STBY | H | GPIO8 | N/A |
| GP9/OC5# | STBY | NATIVE | USB OC5# | N/A |
| GP10/OC6# | STBY | NATIVE | USB OC6# | N/A |
| GP11/SMBALERT# | STBY | NATIVE | USB PWR protect | P/U 8.2K 3VDUAL |
| GP12 | STBY | L | GPI | GPIO12 |
| GP13 | STBY | L | GPI | LPCPME# |
| GP14/OC7# | STBY | NATIVE | USB OC7# | N/A |
| GP15 | STBY | L | GPI | GPIO15(TLS Enable) |
| GP16 | MAIN | GPI | GPIO16 | P/U 8.2K VCC3 |
| GP17/TACH0 | MAIN | GPI | GPIO17 | P/U 8.2K VCC3 |
| GP18 | MAIN | GPI | Mobile Only | N/A |
| GP19 | MAIN | GPI | GPIO19 | P/U 8.2K VCC3 |
| GP20 | MAIN | GPI | GPIO20 | P/U 8.2K VCC3 |
| GP21 | MAIN | GPI | GPIO21 | P/U 8.2K VCC3 |
| GP22 | MAIN | H-Z | GPI | GPIO22 |
| GP23 | MAIN | GPI | GPIO23 | N/A |
| GP24 | STBY | L | GPI | SKTOCC# |
| GP25 | STBY | | Mobile Only | N/A |
| GP26 | STBY | | Mobile Only | N/A |
| GP27 | STBY | H | GPO | GPIO27 |
| GP28 | STBY | H | GPO | PWR LED |
| GP29 | STBY | L | GPI | GPIO29 |
| GP30 | STBY | H-Z | GPI | Mobile Only |
| GP31 | STBY | H-Z | GPI | Mobile Only |
| GP32 | MAIN | H | GPO | N/A |
| GP33 | MAIN | H | GPO | N/A |
| GP34 | MAIN | H-Z | GPI | -PCI_STOP |
| GP35 | MAIN | L | GPO | -ACZ_DET |
| GP36 | MAIN | GPI | N/A | N/A |
| GP37 | MAIN | GPI | N/A | N/A |
| GP38 | MAIN | H-Z | GPI | PCIEX4 Detect |
| GP39 | MAIN | H-Z | GPI | GPIO39 |
| GP40 | STBY | NATIVE | USB OC1# | N/A |
| GP41 | STBY | NATIVE | USB OC2# | N/A |
| GP42 | STBY | NATIVE | USB OC3# | N/A |
| GP43 | STBY | NATIVE | USB OC4# | N/A |
| GP44 | STBY | L | NATIVE | GPIO44 |
| GP45 | STBY | NATIVE | GPIO45 | P/U 8.2K 3VDUAL |
| GP46 | STBY | L | NATIVE | GPIO46 |
| GP47 | STBY | | Mobile Only | N/A |
| GP48 | MAIN | H-Z | IN | GPIO48 |
| GP49 | MAIN | H-Z | IN | GPIO49 |
| GP50 | MAIN | NATIVE | -REQ1 | P/U 2.2K VCC |
| GP51 | MAIN | H | NATIVE | -GNT1 |
| GP52 | MAIN | NATIVE | -REQ2 | P/U 2.2K VCC |
| GP53 | MAIN | H | NATIVE | -GNT2 |
| GP54 | MAIN | NATIVE | -REQ3 | P/U 2.2K VCC |
| GP55 | MAIN | H | NATIVE | -GNT3 |
| GP56 | STBY | NATIVE | Mobile Only | N/A |
| GP57 | STBY | H-Z | IN | VCORE_OV1 |
| GP58 | STBY | H-Z | NATIVE | F_USB_OC |
| GP59 | STBY | NATIVE | USB_OC0# | N/A |
| GP60 | STBY | H-Z | NATIVE | N/A(Reverse) |
| GP61 | STBY | L | NATIVE | -SUSTAT |
| GP62 | STBY | L | NATIVE | SUSCLK |
| GP63 | STBY | L | NATIVE | GPIO63 |
| GP64 | MAIN | L | NATIVE | CLKOUTFLEX0 |
| GP65 | MAIN | L | NATIVE | CLKOUTFLEX1 |
| GP66 | MAIN | L | NATIVE | CLKOUTFLEX2 |
| GP67 | MAIN | L | NATIVE | CLKOUTFLEX3 |
| GP72 | STBY | H-Z | NATIVE | VCORE_OV4 |
| GP73 | STBY | | Mobile Only | N/A |
| GP74 | STBY | H-Z | NATIVE | 1_05V_OV2 |
| GP75 | STBY | H-Z | NATIVE | N/A(Reverse) |

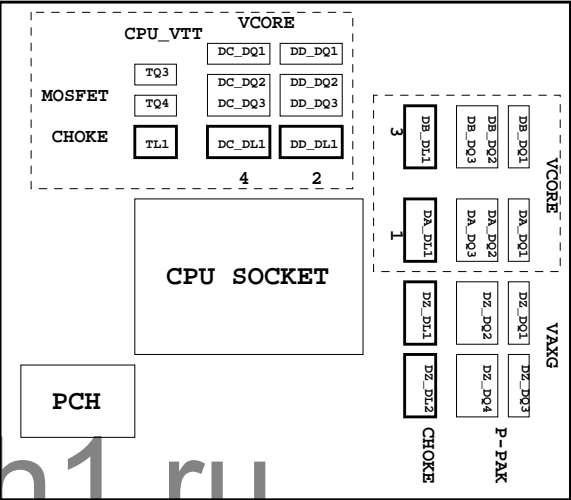
Super I/O ITE8720 GPIO Table

| PIN NAME | USAGE | NOTE |
|----------------------------|------------------|------|
| SVC/PECI_RQT/GP14 | -PECI_REQ | |
| PWROK1/GP13 | PWROK1/ITE_PWROK | |
| KRST#/GP62 | -KBRST | |
| SO/GP50 | -ICH_SPI_CS | |
| IRTX/GP47/CE2_N/JP7 | CEB_N | |
| GP46/IRRX | -LAN2_DSM | |
| PSION#/GP42 | -PSON | |
| PWROK2#/GP41 | PECI_CTL | |
| PCIRST3#/GP10/VDIMM_STR_EN | -PCIE_RST | |
| RSMRST#CIRRX1/GP55 | -RSMRST | |
| PME#/GP54 | -LPCPME | |
| PD5/GP75/BUSS00 | N/A | |

| PIN NAME | USAGE | NOTE |
|----------------------------|-------------------|------------------|
| FAN_TAC2/GP52 | FANIO2 | |
| FAN_TAC3/GP37 | FANIO3 | |
| VIDO3/FAN_TAC4/GP25/DSR2# | FANIO4 | |
| FAN_CTL2/GP51 | FANPWM2 | |
| FAN_CTL3/GP36 | FANPWM3 | |
| VID4/GP34 | BEEP- | |
| VID3/GP33 | TURBO1 | |
| VID2/GP32 | TURBO0 | |
| VCORE_GOOD/VID6/GP63 | CPUT_LED1_C | |
| VID5/GP35 | CPUT_LED2_C | |
| VID1/GP31 | CPUT_LED3_C | |
| VID0/GP30 | -LAN1_DSM | NBT_LED1_C |
| SLCT/GP80 | CPU_LED1_C | |
| PE/GP81 | CPU_LED2_C | |
| BUSY/GP82 | CPU_LED3_C | |
| PD3/GP73/BUSS11 | SB_LED1_C | |
| PD4/GP74/BUSS12 | SB_LED2_C | |
| VCORE_EN/VID7/GP64 | IT_GP64 | SB_LED3_C |
| PD0/GP70 | NB_LED1_C | |
| PD1/GP71 | NB_LED2_C | |
| PD2/GP72/BUSS10 | NB_LED3_C | |
| GP22/SEN | LOW_PWR_1 | |
| VID05/GP27/SEN2 | LOW_PWR_2 | |
| PCIRST2#/GP11 | -PFMRST1 | |
| PCIRST1#/GP12 | -PFMRST2 | |
| 3VSB5W#/GP40 | CSI_F0 | BSEL166_1 |
| SUSCH#/GP53 | CSI_F1 | BSEL166_2 |
| GP23/SI | BSEL166_3/CSISBSL | |
| VID00/GP20/CTS2# | CPUT_LED1_C | BSEL166_4 |
| GP65/VDDA_EN/GB_01 | MB_ID2 | |
| PD6/GP76/BUSS01 | MB_ID3 | |
| PD7/GP77/BUSS02 | MB_ID4 | |
| AFD#/GP86/SMBC_R | PIN | FST_2X8 |
| INIT#/GP85/SMBD_M | SEC_2x8 | GTLREF_AD2 |
| ACK#/GP83 | DDR_LED1_C | |
| VID01/GP21/DCD2# | DDR_LED2_C | |
| STB#/GP87/SMBC_M | DDR_LED3_C | |
| PWRON#/GP44 | VCORE_OV1 | |
| PANSWH#/GP43 | PWRBTSW | |
| KDAT/GP61 | -PWRBTSW | |
| KCLK/GP60 | KDAT | |
| MDAT/GP57 | KCLK | |
| MACL/GP56 | MDAT | |
| GP66/VLDT_EN/GB_02 | NBT_LED1_C | MCLK |
| SVD/PCIRSTIN#/CIRTX/GP15 | PWM2_CR | |
| KDAT/GP61 | PWM2_CR | |
| GP67/CPU_PG/GB_03 | EN_LOADLINE | IT_GP67/-EN_PWM2 |
| SLIN#/GP84/SMBD_R | -EN_PWM2 | |
| PSI_L/FAN_CLT5/CIRRX2/GP16 | -THERM | |
| VID04/GP26/SOUT2 | DDR18V_PH2_EN | |
| VID02/FAN_TAC5/GP24/DSR2# | DDR18V_LED | |
| VID06/GP17/RI2# | 1_1V_PH_EN | |
| VID07/JP6/DTR2# | JP6 | |
| PD5/GP75/BUSS00 | SB_LED3_C | |



PWM各相位的擺法如下：



BIOS超電壓對應表：

| 線路圖名稱 | BIOS選項 |
|---------------------|------------------|
| Vcore | CPU Vcore |
| CPU_VTT | CPU Termination |
| CPU_VAXG | CPU Graphic Core |
| VCC1_8_PCH | CPU PLL |
| VCC1_05_PCH | PCH core |
| 3VDUAL | 3VDUAL |
| DDR15V | DRAM voltage |
| DDRVTT | DRAM Termination |
| VREF_CA_A/VREF_CA_B | DRAM Address Ref |
| VREF_DQ_A/VREF_DQ_B | DRAM Data Ref |

| | 3 pin FAN control | 4 pin FAN control | FAN speed | Controller |
|---------|-------------------|-------------------|---------------|------------|
| CPU FAN | FANPWM1 | FANPWM3 | FANIO1 | IT8720 |
| | ICH_FAN_PWM2 | ICH_FAN_PWM0 | ICH_FAN_TACH0 | PCH |
| SYS FAN | FANPWM2 | N/A | FANIO2 | IT8720 |
| | ICH_FAN_PWM1 | N/A | ICH_FAN_TACH1 | PCH |
| PWR FAN | N/A | N/A | FANIO3 | IT8720 |
| | | | ICH_FAN_TACH2 | PCH |

| Gigabyte Technology | | | |
|---------------------|--------------------------|-------|----------|
| TABLE LIST | | | |
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