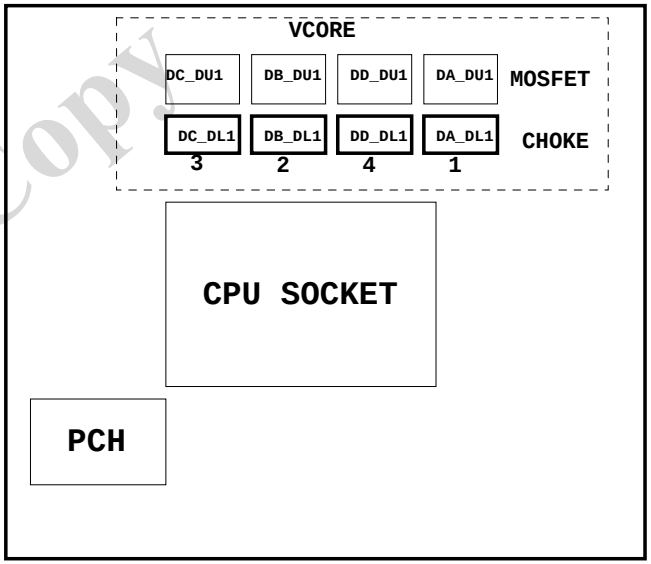
# Model Name: GA-H87-HD3

1.1

| 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 |
|---|---|
| 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 |
| 35 | |
| 36 | |
| 37 | |
| 38 | |
| 39 | |
| 40 | |



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Title: Cover Sheet

Size: Custom | Document Number: GA-H87-HD3 | Rev: 1.1

Date: Wednesday, July 10, 2013 | Sheet 1 of 34

# GA-H87-HD3

## Component value change history

| Data | Change Item | Reason |
|---|---|---|
| 2012/12/11 EBOM:01 | E-BOM | |
| 2013/01/18 EBOM:02 | 1.修改HDMI阻值 | |
| | 2.修改cpu vcore load line /DVID 阻值 | |
| | 3.修改PROCHOT 阻值 | |
| | 4.修改DDR DIMM 顏色順序 | |
| | 5.DR166 1K--->5.76K FOR CPU loadline calibration | |
| 2013/03/22 PBOM:10A | 1.LEVEL SHIFT限用NXP | |
| | 2.不用PROCHOT改用Thermtrip線路 | |
| 2013/03/29 PBOM:10B | 1.DVI LEVEL SHIFT NXP------>ASM1442 | |
| 2013/05/13 PBOM:10C | 1.change MOS-HS | |
| 2013/06/28 PBOM:11A | 1.H87 C1 CHIP change TO C2 | |
| | 2.OR80 移除,dissable ITE OVP PROTECT | |
| 2013/07/11 PBOM:11B | 1.DEL CD1,R704,ADD R706,R705 715 ---->825 | |

## Circuit or PCB layout change

| DATE | Change Item | Reason |
|---|---|---|
| 2012/12/07 PCB:0.1 | 1.由Z87-D3H 修改成Z87-HD3-0.1 | |
| 2013/01/16 PCB:0.2 | 1.CS 1*1 PIN ---->1*2 PIN 2.front panel update footprint | |
| | 3.NC59跟NR132 位置互換 4.N_CLK_RCOMP SPACE 調整 | |
| | 5.ADD DISABLE ME SCH 6. WR59 SHORT----->499/4/1 7.ADD VCORE OVER VOLTAGE CIRCUIT | |
| | 8.MAU2 REF GND,ML1轉向 9.SATA/PCIEX16 WIDTH/SPACE修正. | |
| | 10.PI_-PCIE_CLK1 / PE_-SRCCLK_3GIO1 換位置FOR PCIE 2.0 CLCOK | |
| | 11.ALL SYS FAN換成3941S-A | |
| 2013/03/01 PCB:1.0 | 1.SYS_FAN short protection | 4.部分0 ohm改short pad |
| | 2.PWR_LED change to IO_GP65 | 5.Add +12V dummy load control |
| | 3.Add N_GPIO37 pull up VCC3 | 6.Add 5VSB/5VDUAL OVP protection |
| | 7.WBC35~46;MBC48~51;SBC1/2 背板電容改MASK | 8.預留N_PCH_DPWROK 控制線路 |
| | 9.修正usb2.0 對應到usb3.0 名稱及位置 | |
| 2013/03/21 PCB:1.01 | 1.CPU_FAN ADD 100UF CAP FOR 12V DROOP ISSUE | |
| 2013/03/22 PCB:1.02 | 1.NR177 SHORT WIRE -----> 0402 SIZE | |
| 2013/06/27 PCB:1.1 | 1.修改HDMI footprint -2 ----------->-3 固定孔加大 | |



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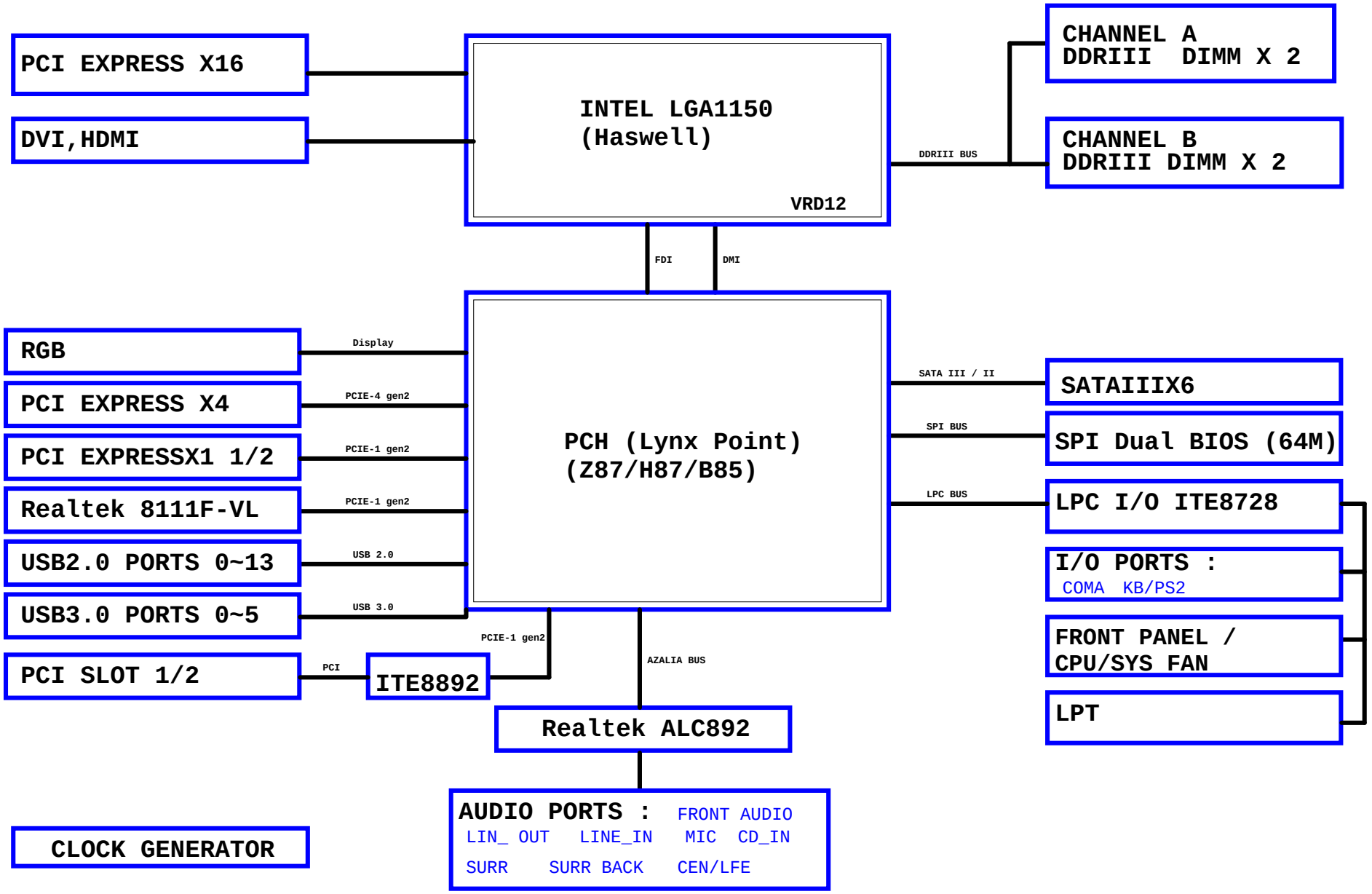
Title: BOM & PCB MODIFY HISTORY

Size: Custom | Document Number: GA-H87-HD3 | Rev: 1.1

Date: Wednesday, July 10, 2013 | Sheet 2 of 34

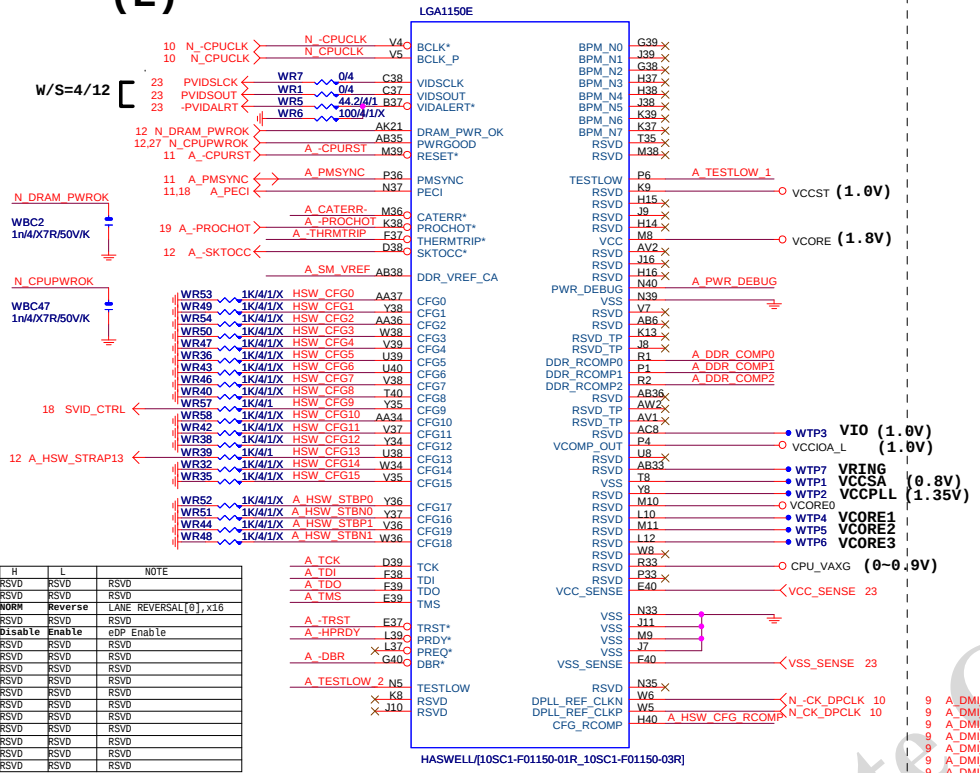
# BLOCK DIAGRAM






| | | | |
|---|---|---|---|
| Gigabyte Technology | | | |
| Title: BLOCK DIAGRAM | | | |
| Size: C | Document Number: GA-H87-HD3 | | Rev: 1.1 |
| Date: Wednesday, July 10, 2013 | Sheet 3 of 34 | | |

## LGA1150 (E)

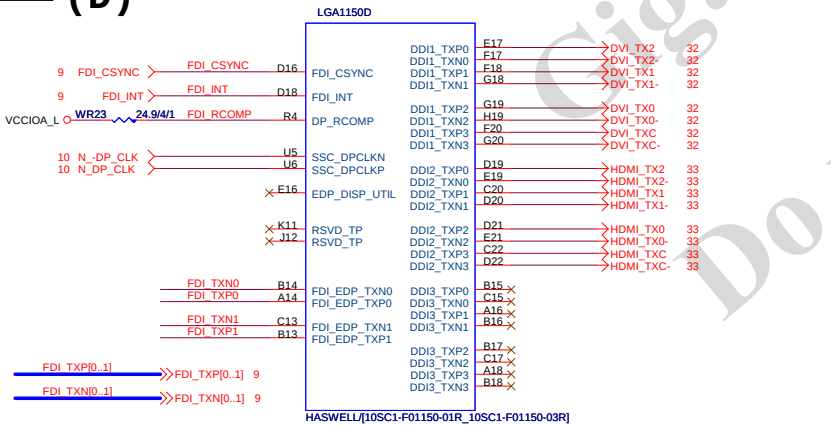



| CFG | H | L | NOTE |
|---|---|---|---|
| 0 | RSVD | RSVD | RSVD |
| 1 | RSVD | RSVD | RSVD |
| 2 | **NORM** | **Reverse** | LANE REVERSAL[0],x16 |
| 3 | RSVD | RSVD | RSVD |
| 4 | **Disable** | **Enable** | eDP Enable |
| 7 | RSVD | RSVD | RSVD |
| 8 | RSVD | RSVD | RSVD |
| 9 | RSVD | RSVD | RSVD |
| 10 | RSVD | RSVD | RSVD |
| 11 | RSVD | RSVD | RSVD |
| 12 | RSVD | RSVD | RSVD |
| 13 | RSVD | RSVD | RSVD |
| 14 | RSVD | RSVD | RSVD |
| 15 | RSVD | RSVD | RSVD |
| 16 | RSVD | RSVD | RSVD |
| 17 | RSVD | RSVD | RSVD |

| CFG6 | CFG5 | PCIE CONFIG |
|---|---|---|
| 1 | 1 | 1X16 , Default |
| 1 | 0 | 2X8 |
| 0 | 1 | RSVD |
| 0 | 0 | X8,X4,X4 |

**CFG 0-17 all internal PULL-UP**

## LGA1150 (D)

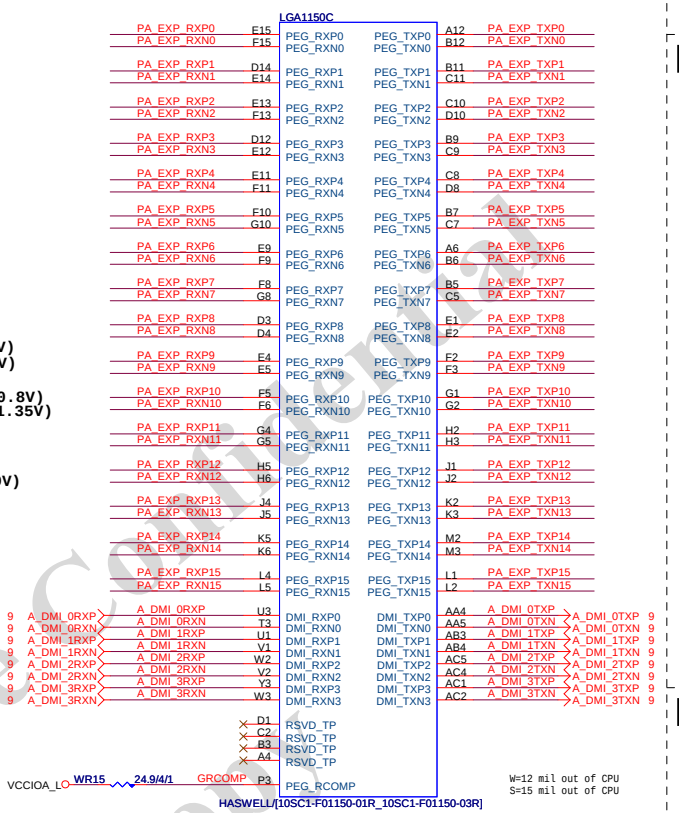



**FDI:4/4/4//15(breakout min 4/4/4//8)**
**Impedance=85 +- 15%**

**DP/HDMI 4/4/4//20 FDI 4/4/4/12**

**Impedance=85 +- 15%**

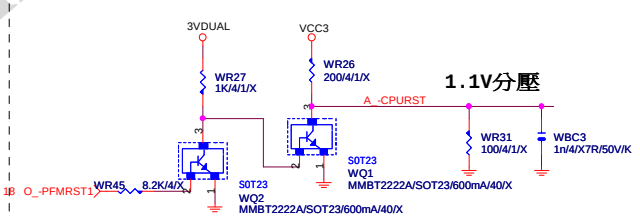
## LGA1155 (C)



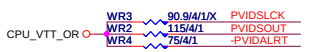

**CPU PEG 5/5/5//20 Impedance=80 +- 15%**

**DMI 4/4/4//15 Impedance=85 +- 15%**

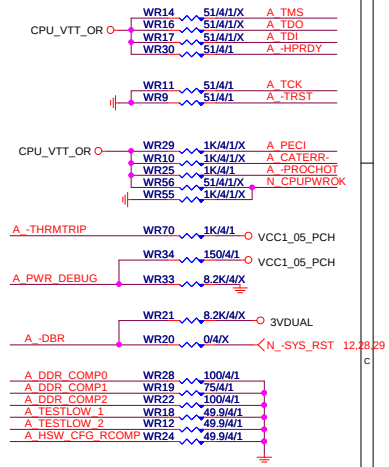
## -CPURST



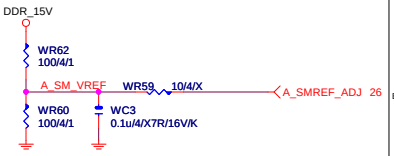

## CPU SVID



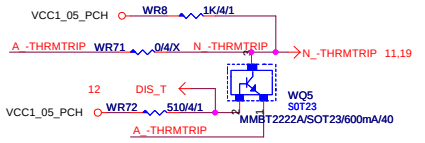

## CPU PU/PD




## SM REF




## THRMTRIP DISABLE FOR Z87 OVERCLOCK



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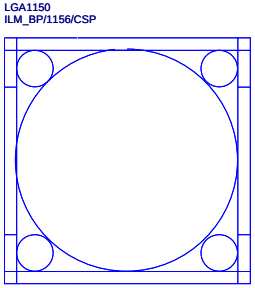
|---|---|---|---|
| Gigabyte Technology | | | |
| Title: CPU LGA1150-A | | | |
| Size: Custom | Document Number: GA-H87-HD3 | | Rev: 1.1 |
| Date: Wednesday, July 10, 2013 | Sheet 4 of 34 | | |

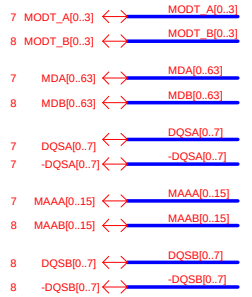
## LGA1150 (A)


## LGA1150 (B)


## LGA1150 (CR)




## DDR BUS




| | | | |
|---|---|---|---|
| Gigabyte Technology | | | |
| Title: CPU LGA1150-B | | | |
| Size: Custom | Document Number: GA-H87-HD3 | | Rev: 1.1 |
| Date: Wednesday, July 10, 2013 | Sheet 5 of 34 | | |

## LGA1150 (F,J)

(1.0V)
CPU_VTT_OR
VCORE
VCORE
WBC1 22u/8/X5R/6.3V/M
WR65 0/4/X
VCCST
WBC23 1u/4/X5R/6.3V/K
WBC13 0.1u/4/X7R/16V/K
WR63 0/4
VCCIO2PCH
(1.07V)
WR64 0/4
VCC1_05_PCH
VCORE
LGA1150F
P8 L40 AB8
VCC VCCIO_OUT VCCIO2PCH
L31 L18 L17 J33 A24 A25 A26 A27 A28 A29 A30 G33 B25 B27 B29 B31 J31 B33 G31 B35 C24 C25 C26 C27 C28 C29 C30 C32 C34 C35 D25 D27 D29 D31 E33 D33 E31 D35 E24 E25 E26 E27 E28 E29 E30 E32 E34 F23 F25 F27 F29 F31 E35 F33 F35 G22 G23 G24 G25 G26 G27 G28 G29 G30 G32 G34 G35 H23 H25 H27 H29 H31 L34
C31 C33 L16 L15 J35 H33 H35 J21 J22 J23 J24 J25 J26 J27 J28 J29 J30 J32 J34 K19 K21 K23 K25 K27 K29 K31 M13 K33 K35 L19 L20 L21 L22 L23 L24 L25 L26 L27 L28 L29 L30 L32 L33 M17 M15 M19 M21 M23 M25 M27 M29 M33
VDDQ A12 A13 A15 A17 A20 A21 A24 A25 A28 A9 AT17 AT22 AU15 AU20 AU24 AV10 AV11 AV13 AV18 AV23 AW16 AY12 AY14 AY9
DDR_15V
HASWELL/[10SC1-F01150-01R_10SC1-F01150-03R]

LGA1150J
RSVD_TP K12 J13 P37 N38 R36 C39 U35 P40 R38 T37 V34 R39 T38 U36 P39 T36 R37 J14 N36
RAVD_TP
VSS
AY18 AW24 AW23 AV29 AV24 AU39 AU27 AU1 AT40 AK20 Y7 T34 R34 J40 J17 J15 H12
RSVD
WR67 6.04K/4/1
11,12,18,29 O_PWROK1
VCCST_PWRGD
WR66 3.16K/4/1
HASWELL/[10SC1-F01150-01R_10SC1-F01150-03R]

## LGA1150 (G,H,I)

LGA1150G
A13 A15 A17 A23 A11 AA3 AA33 AA35 AA38 AA6 AA7 AA8 A5 AB34 AB37 AB5 AB7 AC3 AC33 AC34 AC35 AC36 AC37 AC38 AC39 AC40 AC6 AC7 A7 AD1 AD2 AD3 AD33 AD36 AD4 AD5 AD6 AD7 AD8 AE33 AE36 AE37 AE40 AE5 AE8 AF1 AF33 AF36 AF4 AF5 AF8 AG33 AG36 AG37 AG38 AG39 AG40 AG5 AG8 AH1 AH2 AH3 AH33 AH36 AH4 AH5 AH8 AJ11 AJ14 AJ16 AJ18 AJ19 AJ22 AJ23 AJ26 AJ27 AJ30 AJ31 AJ32 AJ33
VSS
AJ34 AJ35 AJ36 AJ37 AJ40 AJ5 AJ8 AK1 AK10 AK11 AK12 AK13 AK14 AK18 AK19 AK24 AK25 AK26 AK27 AK28 AK29 AK30 AK36 AK4 AK5 AK6 AK7 AK8 AK9 AL11 AL14 AL17 AL21 AL22 AL24 AL27 AL30 AL36 AL37 AL38 AL39 AL40 AL5 AM1 AM11 AM14 AM15 AM19 AM2 AM24 AM27 AM3 AM30 AM31 AM32 AM33 AM34 AM35 AM36 AM4 AM5 AN10 AN11 AN14 AN16 AN18 AN19 AN22 AN23 AN24 AN27 AN30 AN36 AN37 AN40 AN5 AN6 AN7 AN8 AN9 AP1
HASWELL/[10SC1-F01150-01R_10SC1-F01150-03R]

LGA1150I
G12 G13 G14 G16 H11 G17 G21 G3 H13 H22 H32 G36 G37 G6 G7 G15 H1 H10 H17 H18 H20 H21 H24 H26 H28 H30 H34 H36 H39 H4 H7 H8 H9 J19 J20 J3 J18 K10 K14 J36 J37 J6 K1 K18 K20 K22 K24 K26 K28 K30 K34 K36 K4 K40 K7 L7 L8 L9 L11 L3 L13 L14 L35 L38 L6 M1 K17 M12 M14 M18 M16 M20 M22 M24 M26 M28 M30 M32 M34 M37
VSS
M4 M40 M5 M6 M7 K15 K16 N1 N2 N3 N7 N34 N4 N6 K32 P2 P34 P38 P5 P7 N8 R3 L36 R35 R40 R5 R6 R7 T1 T2 T33 M35 T39 T4 T5 T6 T7 R8 U2 U33 U34 U37 U4 U7 P35 V3 V33 V40 V6 V8 W1 W33 W35 W37 W4 W7 Y33 Y4 Y5 Y6
VSS_NCTF
AU40 AV39 AW38 AY3 B38 B39 C40 D40
HASWELL/[10SC1-F01150-01R_10SC1-F01150-03R]

LGA1150H
AP11 AP14 AP15 AP24 AP27 AP30 AP36 AP4 AP5 AR11 AR14 AR16 AR17 AR18 AR19 AR20 AR21 AR22 AR23 AR24 AR27 AR30 AR31 AR32 AR33 AR34 AR35 AR36 AR37 AR38 AR39 AR40 AR5 AT1 AT10 AT11 AT12 AT13 AT14 AT15 AT16 AT2 AT24 AT25 AT26 AT27 AT28 AT29 AT3 AT30 AT32 AT36 AT38 AT39 AT4 AT5 AT6 AT7 AT8 AT9 AU2 AU25 AU3 AU30 AU34 AU38 AU5 AU7 AV21 AV28 AV3 AV30 AV34 AV38 AV7 AW26 AW3 AW30
VSS
AW32 AW34 AW36 AW7 AY17 AY23 AY26 AY27 AY30 AY5 AY7 B24 B26 B28 B30 B34 B36 B4 B8 C4 C6 C12 C14 C16 C18 C19 C21 C23 C36 B10 B23 C3 D9 D11 D13 D15 D17 D2 D23 D24 D26 D28 D30 D34 D36 D37 D5 D6 D7 E7 E8 E10 E18 E3 E20 E22 E23 E36 E38 B32 E6 F1 F32 F12 F14 F16 F19 F21 F22 F24 F26 F28 F30 F34 F36 F4 D32 F7 G9 G11
HASWELL/[10SC1-F01150-01R_10SC1-F01150-03R]

## VCore CAP (X30)

VCORE
WBC35 22u/8/X5R/6.3V/M/X
WBC42 22u/8/X5R/6.3V/M/X
WBC36 22u/8/X5R/6.3V/M/X
WBC43 22u/8/X5R/6.3V/M/X
WBC44 22u/8/X5R/6.3V/M/X
WBC38 22u/8/X5R/6.3V/M/X
WBC37 22u/8/X5R/6.3V/M/X
WBC46 22u/8/X5R/6.3V/M/X
WBC39 22u/8/X5R/6.3V/M/X
WBC41 22u/8/X5R/6.3V/M/X

VCORE
WBC40 22u/8/X5R/6.3V/M/X
WBC19 22u/8/X5R/6.3V/M
WBC21 22u/8/X5R/6.3V/M
WBC6 22u/8/X5R/6.3V/M
WBC9 22u/8/X5R/6.3V/M
WBC20 22u/8/X5R/6.3V/M
WBC7 22u/8/X5R/6.3V/M
WBC11 22u/8/X5R/6.3V/M
WBC8 22u/8/X5R/6.3V/M
WBC4 22u/8/X5R/6.3V/M

VCORE
WBC5 22u/8/X5R/6.3V/M
WBC10 22u/8/X5R/6.3V/M
WBC12 22u/8/X5R/6.3V/M
WBC22 22u/8/X5R/6.3V/M
WBC45 22u/8/X5R/6.3V/M/X
WBC14 22u/8/X5R/6.3V/M
WBC15 22u/8/X5R/6.3V/M
WBC16 22u/8/X5R/6.3V/M
WBC17 22u/8/X5R/6.3V/M
WBC18 22u/8/X5R/6.3V/M

## DDR CAP (X15)

DDR_15V
WBC24 22u/8/X5R/6.3V/M
WBC25 22u/8/X5R/6.3V/M
WBC26 22u/8/X5R/6.3V/M
WBC27 22u/8/X5R/6.3V/M
WBC28 22u/8/X5R/6.3V/M

DDR_15V
WBC29 22u/8/X5R/6.3V/M
WBC30 22u/8/X5R/6.3V/M
WBC31 22u/8/X5R/6.3V/M
WBC32 22u/8/X5R/6.3V/M
SBC1 22u/8/X5R/6.3V/M/X
SBC2 22u/8/X5R/6.3V/M/X

DDR_15V
MBC50 22u/8/X5R/6.3V/M/X
MBC51 22u/8/X5R/6.3V/M/X
MBC48 1u/4/X5R/6.3V/K/X
MBC49 1u/4/X5R/6.3V/K/X

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| | | |
|---|---|---|
| Title | CPU LGA1150-C | |
| Size: Custom | Document Number: GA-H87-HD3 | Rev: 1.1 |
| Date: Wednesday, July 10, 2013 | Sheet 6 of 34 | |

DDR3 (A)

DDR3_4

DDR3/240/BK/VA/D

DDR3_2

DDR3/240/GR/VA/D

DDR3_VREF

DDR TERMINATION CHANNEL A/B

DDR15V Decouple

DDRVTT Decouple

VDDSPD SHORT PROTECT R0402-2



Gigabyte Technology

Title: DDRIII CHANNEL A

Size: Custom | Document Number: GA-H87-HD3 | Rev: 1.1

Date: | Sheet 7 of 34

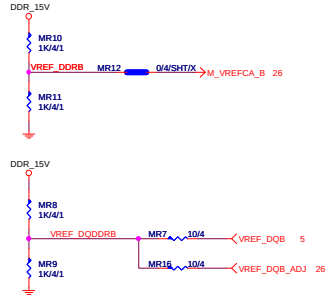
DDR3 (B)

DDR3_3

DDR3 (A)

DDR3_1

DDR3 VREF



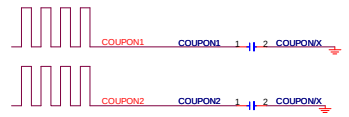

**DDR3 1066,1333,1600MHZ BANDWIDTH**

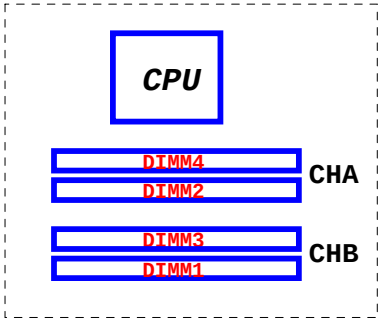
**DDR3 1066MHZ**
**DDR3 clock=533MHZ**
**DDR3 single channel bandwidth=533x2x8Byte=8.5GB/s**
**DDR3 dual channel bandwidth=533x2x2x8Byte=17GB/s**

**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




| | | | |
|---|---|---|---|
| Gigabyte Technology | | | |
| Title: DDRIII CHANNEL B | | | |
| Size: Custom | Document Number: GA-H87-HD3 | | Rev: 1.1 |
| Date: | Sheet 8 of 34 | | |

## PCH (B)

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

USB2.0 : 12/5/7/5/12 (breakout min 8/4/4/4/8)
Impedance=85 +- 15%

PCHB

DMI_RXN_0 DMI_RXP_0 DMI_TXN_0 DMI_TXP_0
DMI_RXN_1 DMI_RXP_1 DMI_TXN_1 DMI_TXP_1
DMI_RXN_2 DMI_RXP_2 DMI_TXN_2 DMI_TXP_2
DMI_RXN_3 DMI_RXP_3 DMI_TXN_3 DMI_TXP_3

A_DMI_0TXN L24 A_DMI_0TXP K24
A_DMI_0RXN C20 A_DMI_0RXP B20
A_DMI_1TXN G24 A_DMI_1TXP H24
A_DMI_1RXN D21 A_DMI_1RXP B21
A_DMI_2TXN F26 A_DMI_2TXP G26
A_DMI_2RXN B22 A_DMI_2RXP C22
A_DMI_3TXN K26 A_DMI_3TXP L26
A_DMI_3RXN A24 A_DMI_3RXP B24

VCC1_5_PCH — NR50 7.5K/4/1 — DMI_COMP B19
PCIE_COMP C13
NR40 7.5K/4/1
W=8 mil out of PCH
S=15 mil to other signals

29 CK_SRCCLK_PCH — CK_SRCCLK_PCH G22
29 CK_SRCCLK_PCH — CK_SRCCLK_PCH F22

DMI_RCOMP
PCIE_RCOMP
CLKIN_DMI_N
CLKIN_DMI_P

USBN_0 AV10 N_-USBP0 — N_-USBP0 28
USBP_0 AU10 N_+USBP0 — N_+USBP0 28
USBN_1 AV11 N_-USBP1 — N_-USBP1 28
USBP_1 AW11 N_+USBP1 — N_+USBP1 28
USBN_2 AN14 N_-USBP2 — N_-USBP2 31
USBP_2 AP14 N_+USBP2 — N_+USBP2 31
USBN_3 AJ16 N_-USBP3 — N_-USBP3 31
USBP_3 AK16 N_+USBP3 — N_+USBP3 31
USBN_4 AU15 N_-USBP4 — N_-USBP4 19
USBP_4 AV15 N_+USBP4 — N_+USBP4 19
USBN_5 AU12 N_-USBP5 — N_-USBP5 19
USBP_5 AT12 N_+USBP5 — N_+USBP5 19
USBN_6 AV14 N_-USBP6 — N_-USBP6 28
USBP_6 AW14 N_+USBP6 — N_+USBP6 28
USBN_7 AU17 N_-USBP7 — N_-USBP7 28
USBP_7 AT17 N_+USBP7 — N_+USBP7 28
USBN_8 AW16 N_-USBP8 — N_-USBP8 30
USBP_8 AV16 N_+USBP8 — N_+USBP8 30
USBN_9 AN16 N_-USBP9 — N_-USBP9 30
USBP_9 AP16 N_+USBP9 — N_+USBP9 30
USBN_10 AJ18 N_-USBP10 — N_-USBP10 28
USBP_10 AK18 N_+USBP10 — N_+USBP10 28
USBN_11 AP18 N_-USBP11 — N_-USBP11 28
USBP_11 AN18 N_+USBP11 — N_+USBP11 28
USBN_12 AW18 N_-USBP12 — N_-USBP12 28
USBP_12 AV18 N_+USBP12 — N_+USBP12 28
USBN_13 AP20 N_-USBP13 — N_-USBP13 28
USBP_13 AN20 N_+USBP13 — N_+USBP13 28

DMI
USB
PCIE

Port要對應

B85/H81: 6/7 N\A
H81:USB3.0 N\A
H81:12/13 N\A

REAR USB3.0
B85/H81:USB N\A

31 PCH_USB3_RXN2 L14 — PCIE_PERN_1_USB3_RXN 2
31 PCH_USB3_RXP2 K14 — PCIE_PERP_1_USB3_RXP 2
31 PCH_USB3_TXN2 B12 — PCIE_PETN_1_USB3_TXN 2
31 PCH_USB3_TXP2 B11 — PCIE_PETP_1_USB3_TXP 2
31 PCH_USB3_RXN3 F14 — PCIE_PERN_2_USB3_RXN 3
31 PCH_USB3_RXP3 G14 — PCIE_PERP_2_USB3_RXP 3
31 PCH_USB3_TXN3 D11 — PCIE_PETN_2_USB3_TXN 3
31 PCH_USB3_TXP3 C11 — PCIE_PETP_2_USB3_TXP 3

LAN AR8161
31 LB_ML_IN L11 — PCIE_PERN_3
31 LB_ML_IP H11 — PCIE_PERP_3
31 LB_ML_ON B9 — PCIE_PETN_3
31 LB_ML_OP A9 — PCIE_PETP_3

ITE8892 PCI Bridge
16 G_PCIEBIN J11 — PCIE_PERN_4
16 G_PCIEBIP L11 — PCIE_PERP_4
16 G_PCIEBON B8 — PCIE_PETN_4
16 G_PCIEBOP C8 — PCIE_PETP_4

PCIEX4 port1
15 PE_PCIE_IN1 G9 — PCIE_PERN_5
15 PE_PCIE_IP1 F9 — PCIE_PERP_5
15 PE_PCIE_TN1 B7 — PCIE_PETN_5
15 PE_PCIE_TP1 A7 — PCIE_PETP_5

PCIEX4 port2
15 PF_PCIE_IN2 F7 — PCIE_PERN_6
15 PF_PCIE_IP2 H7 — PCIE_PERP_6
15 PF_PCIE_TN2 E1 — PCIE_PETN_6
15 PF_PCIE_TP2 D2 — PCIE_PETP_6

PCIEX4 port3
PCIEX1_1
15 PI_PCIE_IN3 K6 — PCIE_PERN_7
15 PI_PCIE_IP3 K8 — PCIE_PERP_7
15 PI_PCIE_TN3 G3 — PCIE_PETN_7
15 PI_PCIE_TP3 G5 — PCIE_PETP_7

H81:PCIE 7/8X
PCIEX4 port4
PCIEX1_2
15 PJ_PCIE_IN4 J2 — PCIE_PERN_8
15 PJ_PCIE_IP4 J3 — PCIE_PERP_8
15 PJ_PCIE_TN4 H2 — PCIE_PETN_8
15 PJ_PCIE_TP4 H1 — PCIE_PETP_8

放靠近 Device & PCI-E Slot

H87/S/[10HB1-030H87-20R]

OC0B_GP59 AE40 — N_-USBOC_F 28
OC1B_GP40 AE37
OC2B_GP41 AD39
OC3B_GP42 AD40 — N_-USBOC_R 28,31
OC4B_GP43 AF39
OC5B_GP9 AC41
OC6B_GP10 AF40
OC7B_GP14 AG40 — N_GPIO14

USBRBIASB AV20 — N_USBRBIAS — NR47 22.6/4/1
USBRBIAS AU20
W=8 mil out of PCH
S=15 mil to other signals

CLKIN_DOT96N AP11 — CK_-DOTCLK — CK_-DOTCLK 29
CLKIN_DOT96P AM11 — CK_DOTCLK — CK_DOTCLK 29

N_GPIO14 — NR130 8.2K/4 — 3VDUAL

N_-USBOC_F — NBC82 0.1u/4/X7R/16V/K
N_-USBOC_R — NBC83 0.1u/4/X7R/16V/K

PCH PCIE ,DMI 4/4/4/15 Impedance=85 +- 15%
usb2.0 5/7/5//12
usb3.0 5/7/5//20 Impedance=85 +- 15%

## PCH (F)

PCHF

USB3 / FDILINK

28 PCH_USB3_RXN0 — F20 USB3_RXN_0 — FDI_RXN_0 N1 — FDI_TXN0
28 PCH_USB3_RXP0 — G20 USB3_RXP_0 — FDI_RXP_0 N2 — FDI_TXP0
28 PCH_USB3_TXN0 — B18 USB3_TXN_0 — FDI_RXN_1 P2 — FDI_TXN1
28 PCH_USB3_TXP0 — C18 USB3_TXP_0 — FDI_RXP_1 P3 — FDI_TXP1

28 PCH_USB3_RXN1 — G18 USB3_RXN_1
28 PCH_USB3_RXP1 — H18 USB3_RXP_1 — FDI_CSYNC L2 — FDI_CSYNC 4
28 PCH_USB3_TXN1 — B15 USB3_TXN_1
28 PCH_USB3_TXP1 — B16 USB3_TXP_1 — FDI_INT L3 — FDI_INT 4

19 PCH_USB3_RXN4 — K20 USB3_RXN_4 — FDI_RCOMP K2 — NR29 7.5K/4/1 — VCC1_5_PCH
19 PCH_USB3_RXP4 — L20 USB3_RXP_4
19 PCH_USB3_TXN4 — D15 USB3_TXN_4
19 PCH_USB3_TXP4 — C15 USB3_TXP_4

19 PCH_USB3_RXN5 — L18 USB3_RXN_5
19 PCH_USB3_RXP5 — K18 USB3_RXP_5
19 PCH_USB3_TXN5 — B14 USB3_TXN_5
19 PCH_USB3_TXP5 — A14 USB3_TXP_5

VCC3
NR62 8.2K/4
NR63 8.2K/4
AK28 TACH6_GP70
AT34 TACH7_GP71

H87/S/[10HB1-030H87-20R]

FDI:12/4/5/4/12
Impedance=85 +- 17.5%

FDI_TXP[0..1] — FDI_TXP[0..1] 4
FDI_TXN[0..1] — FDI_TXN[0..1] 4

USB3.0:20/5/7/5/20 (breakout min 8/4/4/4/8) ; ONLY 3 VIAS
Impedance=85 +- 17.5%
Back Panel < 10000 MILS
Front Panel < 6000 MILS

CK_SRCCLK_PCH — NR89 8.2K/4
CK_-SRCCLK_PCH — NR88 8.2K/4
Mount for integrated clock Generation Mode

CK_DOTCLK — NR92 8.2K/4
CK_-DOTCLK — NR91 8.2K/4
NR92 short to GND in non graphic SKU

## PCH (J)

PCHJ

AT1 AT41 AU1 AV1 AV2 AV40 AV41 AW2 AW40 B40 B41 C41 D1 D41 — VSS_NCTF

TP22 TP23 TP21 TP20 TP14 TP15 TP12 TP10 TP11 TP9 TP3 TP4 TP1 TP2 TP5 TP6 TP7 TP8

U11 U10 AJ14 AK14 K34 K33 AH24 L16 K16 AM34 R12 N12 L22 K22 R4 K5 P5 L5

VSS AC31 AF3 AV21

H87/S/[10HB1-030H87-20R]

## PCH H/S

PCH_HS

1× ×2

PCH_HS/[12SP2-S06012-01R_12SP2-S06012-02R_12SP2-S06012-03R]

## USB TABLE

OC[3:0]# for Device 29 (ports 0-7)
OC[7:4]# for Device 26 (ports 8-13)

| USB OC# | Configure |
|---|---|
| OC0# | USB0,1 |
| OC1# | USB2,3 |
| OC2# | USB4,5 |
| OC3# | USB6,7 |
| OC4# | USB8,9 |
| OC5# | USB10,11 |
| OC6# | USB12,13 |
| OC7# | Not Use |

Gigabyte Technology

Title: PCH FDI,DMI,USB ,PCIE

Size: Custom | Document Number: GA-H87-HD3 | Rev: 1.1

Date: Wednesday, July 10, 2013 | Sheet 9 of 34

## PCH (E)

PCHE

CLOSE PCH<0.75";4/10;+-1000;GND

VGA 4/20;+-200MILS;GND REF

DDC DIFF 4/5;+-1000

IREF 4/12;<500MILS;GND

H87/S/[10HB1-030H87-20R]

| 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)

PCHG

Flex1,2,3,4 : 14/24/33/48MHZ

H87/S/[10HB1-030H87-20R]

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

PCIXx16

PCIXx1_2

lan 8111F-VL

ITE8892

PCIXx1_1

PCIXx4

## PCH CLK PD

Mount for integrated clock Generation Mode

## VGA DDC

## VGA CONNECTOR

VGA/BK/SC/RA/D/2/HR

## VGA ESD

SSOP6_ESD

AOZ8902CIL/SOT23-6

## VGA DDC

Close to PCH

Close to VGA connector



| Gigabyte Technology | | |
|---|---|---|
| Title: PCH DISPLAY ,CLK BUFFER | | |
| Size: Custom | Document Number: GA-H87-HD3 | Rev: 1.1 |
| Date: Wednesday, July 10, 2013 | Sheet 10 of 34 | |

## PCH (C)

SATA3 : 20/4/4/4/20 (breakout min 8/4/4/4/8)
Impedance=85 +- 17.5%

SATA2 4/4/4//15
SATA3 4/4/4//20

PCHC

CLINK: CL_CLK, CL_DATA, CL_RSTB, APWROK
FAN: PWM0, PWM1, PWM2, PWM3
GPIO: TACH0_GP17, TACH1_GP1, TACH2_GP6, TACH3_GP7, TACH4_GP68, TACH5_GP69, SSTCTL, SCLOCK_GP22, SLOAD_GP38, SDATAOUT0_GP39, SDATAOUT1_GP48
HOST: SATALEDB, SATA_RCOMP, EDP_BKLTCTL, EDP_BKLTEN, EDP_VDDEN, RSVD, RCINB, SERIRQ, THRMTRIPB, PECI, PM_SYNCH, PLTRST_PROCB

SATA_RXN_0 B28 N_SATA0RXN
SATA_RXP_0 A28 N_SATA0RXP
SATA_TXN_0 F31 N_SATA0TXN
SATA_TXP_0 H31 N_SATA0TXP
SATA_RXN_1 D30 N_SATA1RXN
SATA_RXP_1 C30 N_SATA1RXP
SATA_TXN_1 B34 N_SATA1TXN
SATA_TXP_1 C34 N_SATA1TXP
SATA_RXN_2 A31 N_SATA2RXN
SATA_RXP_2 B31 N_SATA2RXP
SATA_TXN_2 B35 N_SATA2TXN
SATA_TXP_2 D35 N_SATA2TXP
SATA_RXN_3 B32 N_SATA3RXN
SATA_RXP_3 C32 N_SATA3RXP
SATA_TXN_3 G33 N_SATA3TXN
SATA_TXP_3 F33 N_SATA3TXP

B85 6G
H81 6G
H81 X

SATA_RXN_4_PCIE_PERN_1 A26 N_SATA4RXN
SATA_RXP_4_PCIE_PERP_1 B26 N_SATA4RXP
SATA_TXN_4_PCIE_PETN_1 L28 N_SATA4TXN
SATA_TXP_4_PCIE_PETP_1 K28 N_SATA4TXP
SATA_RXN_5_PCIE_PERN_2 C27 N_SATA5RXN
SATA_RXP_5_PCIE_PERP_2 B27 N_SATA5RXP
SATA_TXN_5_PCIE_PETN_2 G28 N_SATA5TXN
SATA_TXP_5_PCIE_PETP_2 F28 N_SATA5TXP

B85/H81 3G

CLKIN_SATA_N H35 CK_-SRCCLK_SATA → CK_-SRCCLK_SATA 29
CLKIN_SATA_P H36 CK_SRCCLK_SATA → CK_SRCCLK_SATA 29

SATALEDB J39 → N_-SATALED 28
SATA_RCOMP D33 SATA3COMP → NR68 7.5K/4/1 → VCC1_5_PCH
W=8 mil out of PCH
S=15 mil to other signals

SATA0GP_GP21 M37 N_GPIO21 → N_GPIO21 29
SATA1GP_GP19 J40 N_GPIO19
SATA2GP_GP36 H40 N_GPIO36
SATA3GP_GP37 N41 N_GPIO37
SATA4GP_GP16 M39 N_GPIO16
SATA5GP_GP49 N40 N_GPIO49

EDP_BKLTCTL AP2
EDP_BKLTEN AT2
EDP_VDDEN AP1

RSVD N30 N_A20GATE → N_A20GATE 18
RCINB K36 N_-KBRST → N_-KBRST 18
SERIRQ G39 N_SERIRQ → N_SERIRQ 18
THRMTRIPB C40 N_-THRMTRIP → N_-THRMTRIP 4,19
PECI G40 SB_PECI NR85 0/4/X A_PECI → A_PECI 4,18
PM_SYNCH F40 → A_PMSYNC 4
PLTRST_PROCB F41 → A_-CPURST 4

H87/S/[10HB1-030H87-20R]

6,12,18,29 O_PWROK1 NR177 0/4/X → N_ME_PWROK AA32
NC26 100p/4/NPO/50V/J/X

28 N_GPIO1
18 N_SSTCTL
15 N_PCIE_4_SW

## PCH (A)

3VDUAL_PCH
NR124 8.2K/4/X N_-P_PME AA31
10 N_PCH33 → N_PCH33 AM22

PCHA
PMEB
CLKIN_33MHZLOOPBACK
TP16 A2
TP17 A3
TP18 B2
TP19 B1
TD_IREF C3
NR30 8.2K/4 TD_IREF
PIRQAB N_-PIRQA AU29
PIRQBB N_-PIRQB AU27
PIRQCB N_-PIRQC AW28
PIRQDB N_-PIRQD AV27
GPIO2 N_-PIRQE AR30
GPIO3 N_-PIRQF AV29
GPIO4 N_-PIRQG AV28
GPIO5 N_-PIRQH AT27
PLTRSTB AA37 → N_-PFMRST 18
GP35/NMIB M40 N_GPIO35
GP50 AH26 N_GPIO50
GP51 AU31 N_GPIO51
GP52 AJ26 N_GPIO52
GP53 AV31 N_GPIO53
GP54 AW33 N_GPIO54
GP55 R30 N_GPIO55

H87/S/[10HB1-030H87-20R]

| BOOT DEVICE | GP51 | GP19 |
|---|---|---|
| LPC | 0 | 0 |
| SPI | float | float |

Default int pull up on GP51,
Default SPI boot devices

## PCH CLK PD

18 CK_SRCCLK_SATA NR174 8.2K/4
CK_-SRCCLK_SATA NR173 8.2K/4

Mount for integrated clock Generation Mode

## PCH PU/PD

NRN2 8.2K/8P4R/4
N_-PIRQC
N_-PIRQH
N_-PIRQD
N_-PIRQB

NRN3 8.2K/8P4R/4
N_-PIRQE
N_-PIRQF
N_-PIRQA
N_-PIRQG

NRN7 8.2K/8P4R/4
15 -PCIEX1_PR0 N_GPIO50
15 -PCIEX1_PR1 N_GPIO52
N_GPIO17
N_GPIO6

N_GPIO55 NR160 4.7K/4/1/X
N_GPIO55:A16 SWAP OVERRIDE
N_GPIO53 NR53 1K/4/1/X
N_GPIO53:DMI AC COUPLING
N_GPIO51 NR55 1K/4/1/X
N_GPIO19 NR113 1K/4/1/X
N_GPIO17 NR61 8.2K/4/X

N_GPIO22:PCH CONFIG
N_A20GATE NR167 1K/4/1/X
N_GPIO22
12 N_-PCI_STOP N_PCI_STOP
N_GPIO39 NR157 1K/4/1/X
N_GPIO39:GFX MODE
N_SERIRQ
N_GPIO19
N_PCIE_4_SW

NRN11 8.2K/8P4R/4
NRN12 8.2K/8P4R/4
NRN13 8.2K/8P4R/4

N_GPIO35
N_GPIO16
N_GPIO49 NR80 1K/4/1/X
N_GPIO49:PCIE/MSATA MUX SELECT

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

N_GPIO21 NR252 1K/4/1
N_-KBRST NR161 1K/4/1
N_GPIO36:DMI RX TERMINATION
N_GPIO36 NR148 8.2K/4/X
N_GPIO69 NR65 8.2K/4/X
N_GPIO69:SV DETECT
N_GPIO55 NR244 8.2K/4

NRN4 8.2K/8P4R/4
N_GPIO7
N_GPIO54
N_GPIO1
N_GPIO68

## ME PWROK

VCC3_ME
NR186 8.2K/4
N_ME_PWROK
ND2 BAT54A/SOT23/200mA
3VDUAL
NR188 22K/4
NQ15 S0T23 MMBT2222A/SOT23/600mA/40
NC49 0.01u/4/X7R/25V/K
12,25 N_-SLP_A
VCC1_05_ME
NR187 0/4
S0T23
NQ16 MMBT2222A/SOT23/600mA/40 S0T23
NR119 1K/4/1
VCC3_ME NR189 8.2K/4
NR190 8.2K/4/X
NC50 1u/4/X5R/6.3V/K

TLS Setting enable for SBA
3VDUAL
NR146 1K/4/1/X N_GPIO37 NR110 1K/4/1/X

## SATA CONNECTOR

SATA3_0
N_SATA0TXP NC43 0.01u/4/X7R/25V/K N_SATA0TXPC
N_SATA0TXN NC44 0.01u/4/X7R/25V/K N_SATA0TXNC
N_SATA0RXN NC38 0.01u/4/X7R/25V/K N_SATA0RXNC
N_SATA0RXP NC37 0.01u/4/X7R/25V/K N_SATA0RXPC
GND T+ T- GND R- R+ GND
SATA2/7/BK/H/OP/VA/D/1/B

White connector for SATA3

SATA3_3
N_SATA3TXP NC34 0.01u/4/X7R/25V/K N_SATA3TXPC
N_SATA3TXN NC33 0.01u/4/X7R/25V/K N_SATA3TXNC
N_SATA3RXN NC32 0.01u/4/X7R/25V/K N_SATA3RXNC
N_SATA3RXP NC31 0.01u/4/X7R/25V/K N_SATA3RXPC
SATA2/7/BK/H/OP/VA/D/1/B

[Z87/H87] all SATA3
SATA3(From Z87) - 黑色
SATA3(From Marvell) - 灰色
[B85] SATA2+SATA3
SATA2(From B85) - 黑色
SATA3(From B85) - 白色

SATA3_1
N_SATA1TXP NC42 0.01u/4/X7R/25V/K N_SATA1TXPC
N_SATA1TXN NC41 0.01u/4/X7R/25V/K N_SATA1TXNC
N_SATA1RXN NC40 0.01u/4/X7R/25V/K N_SATA1RXNC
N_SATA1RXP NC39 0.01u/4/X7R/25V/K N_SATA1RXPC
SATA2/7/BK/H/OP/VA/D/1/B

SATA3_4
N_SATA4TXP NC45 0.01u/4/X7R/25V/K N_SATA4TXPC
N_SATA4TXN NC46 0.01u/4/X7R/25V/K N_SATA4TXNC
N_SATA4RXN NC47 0.01u/4/X7R/25V/K N_SATA4RXNC
N_SATA4RXP NC48 0.01u/4/X7R/25V/K N_SATA4RXPC
SATA2/7/BK/H/OP/VA/D/1/B

** Z87/H87 Port 4&5 SATA3.0
** B85 Port 4&5 SATA2.0

SATA3_2
N_SATA2TXP NC36 0.01u/4/X7R/25V/K N_SATA2TXPC
N_SATA2TXN NC35 0.01u/4/X7R/25V/K N_SATA2TXNC
N_SATA2RXN NC30 0.01u/4/X7R/25V/K N_SATA2RXNC
N_SATA2RXP NC29 0.01u/4/X7R/25V/K N_SATA2RXPC
SATA2/7/BK/H/OP/VA/D/1/B

H81 Port 2/3 N/A

SATA3_5
N_SATA5TXP NC27 0.01u/4/X7R/25V/K N_SATA5TXPC
N_SATA5TXN NC28 0.01u/4/X7R/25V/K N_SATA5TXNC
N_SATA5RXN NC25 0.01u/4/X7R/25V/K N_SATA5RXNC
N_SATA5RXP NC24 0.01u/4/X7R/25V/K N_SATA5RXPC
SATA2/7/BK/H/OP/VA/D/1/B

## GPIO38 Ctrl

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

VCC3
N_GPIO38 NR114 8.2K/4
NQ13 MMBT2222A/SOT23/600mA/40 S0T23
12 N_GPIO60
NR184 8.2K/4



Gigabyte Technology
Title: PCH HOST , SATA, PCI
Size: Custom
Document Number: GA-H87-HD3
Rev: 1.1
Date: Wednesday, July 10, 2013
Sheet 11 of 34

## PCH (D)

PCHD

H87/S/[10HB1-030H87-20R]

## ACZ_SDOUT

C_ACZ_SDOUT : HI --> ME Enable
Lo --> ME Disable
HI:disable ME and override SPI Flash Access Permissions

## PCH_DPWROK

At least 10ms delay after 3VDUAL_PCH stabel

At least 40ns lead fall to 0V before 3VDUAL_PCH fall to 2V

## PCH PU/PD

GP44:DFX test Mode

N_-IGC_EN:Low to over clock validation strap

SUSCLK: OD PLL VR Disable

## HSW_STRAP13

## 32.768KHZ

NX2-SHT
SHW/D0.64*5.08*6.74

32.768K/12.5p/20ppm/TF38/35K/D

## CLR_CMOS

BATTERY-DUAL-4

RB 必须放在BAT外

N_INTERMEN : Integrated 1.05V SUS VRM Enable



| | | | |
|---|---|---|---|
| Gigabyte Technology | | | |
| Title: PCH GPIO , CTRL , AUDIO | | | |
| Size: Custom | Document Number: GA-H87-HD3 | | Rev: 1.1 |
| Date: Wednesday, July 10, 2013 | Sheet 12 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)

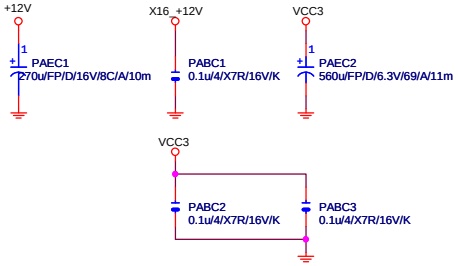
(1.05V)(X2)

(3.3V)(X2)

(1.5V) (X10)

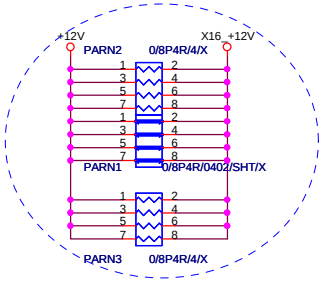
PCH (I)

## PCIEX16 CAP




## PCIEX16 PROTECT SHT

+12 protect short-wire test




## PCIEX16 AC CAP

| | | | |
|---|---|---|---|
| PA_EXP_TXP0 | PAC5 | 0.22u/4/X5R/6.3V/K | PA_EXP_TXP0_C |
| PA_EXP_TXN0 | PAC4 | 0.22u/4/X5R/6.3V/K | PA_EXP_TXN0_C |
| PA_EXP_TXP1 | PAC6 | 0.22u/4/X5R/6.3V/K | PA_EXP_TXP1_C |
| PA_EXP_TXN1 | PAC7 | 0.22u/4/X5R/6.3V/K | PA_EXP_TXN1_C |
| PA_EXP_TXP2 | PAC8 | 0.22u/4/X5R/6.3V/K | PA_EXP_TXP2_C |
| PA_EXP_TXN2 | PAC9 | 0.22u/4/X5R/6.3V/K | PA_EXP_TXN2_C |
| PA_EXP_TXP3 | PAC10 | 0.22u/4/X5R/6.3V/K | PA_EXP_TXP3_C |
| PA_EXP_TXN3 | PAC11 | 0.22u/4/X5R/6.3V/K | PA_EXP_TXN3_C |
| PA_EXP_TXP4 | PAC12 | 0.22u/4/X5R/6.3V/K | PA_EXP_TXP4_C |
| PA_EXP_TXN4 | PAC13 | 0.22u/4/X5R/6.3V/K | PA_EXP_TXN4_C |
| PA_EXP_TXP5 | PAC14 | 0.22u/4/X5R/6.3V/K | PA_EXP_TXP5_C |
| PA_EXP_TXN5 | PAC15 | 0.22u/4/X5R/6.3V/K | PA_EXP_TXN5_C |
| PA_EXP_TXP6 | PAC16 | 0.22u/4/X5R/6.3V/K | PA_EXP_TXP6_C |
| PA_EXP_TXN6 | PAC17 | 0.22u/4/X5R/6.3V/K | PA_EXP_TXN6_C |
| PA_EXP_TXP7 | PAC19 | 0.22u/4/X5R/6.3V/K | PA_EXP_TXP7_C |
| PA_EXP_TXN7 | PAC18 | 0.22u/4/X5R/6.3V/K | PA_EXP_TXN7_C |
| PA_EXP_TXP8 | PAC20 | 0.22u/4/X5R/6.3V/K | PA_EXP_TXP8_C |
| PA_EXP_TXN8 | PAC21 | 0.22u/4/X5R/6.3V/K | PA_EXP_TXN8_C |
| PA_EXP_TXP9 | PAC22 | 0.22u/4/X5R/6.3V/K | PA_EXP_TXP9_C |
| PA_EXP_TXN9 | PAC23 | 0.22u/4/X5R/6.3V/K | PA_EXP_TXN9_C |
| PA_EXP_TXP10 | PAC24 | 0.22u/4/X5R/6.3V/K | PA_EXP_TXP10_C |
| PA_EXP_TXN10 | PAC25 | 0.22u/4/X5R/6.3V/K | PA_EXP_TXN10_C |
| PA_EXP_TXP11 | PAC26 | 0.22u/4/X5R/6.3V/K | PA_EXP_TXP11_C |
| PA_EXP_TXN11 | PAC27 | 0.22u/4/X5R/6.3V/K | PA_EXP_TXN11_C |
| PA_EXP_TXP12 | PAC28 | 0.22u/4/X5R/6.3V/K | PA_EXP_TXP12_C |
| PA_EXP_TXN12 | PAC29 | 0.22u/4/X5R/6.3V/K | PA_EXP_TXN12_C |
| PA_EXP_TXP13 | PAC30 | 0.22u/4/X5R/6.3V/K | PA_EXP_TXP13_C |
| PA_EXP_TXN13 | PAC31 | 0.22u/4/X5R/6.3V/K | PA_EXP_TXN13_C |
| PA_EXP_TXP14 | PAC32 | 0.22u/4/X5R/6.3V/K | PA_EXP_TXP14_C |
| PA_EXP_TXN14 | PAC33 | 0.22u/4/X5R/6.3V/K | PA_EXP_TXN14_C |
| PA_EXP_TXP15 | PAC34 | 0.22u/4/X5R/6.3V/K | PA_EXP_TXP15_C |
| PA_EXP_TXN15 | PAC35 | 0.22u/4/X5R/6.3V/K | PA_EXP_TXN15_C |

**PCI-E REV:1.1--> 2.5GHZ**

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

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

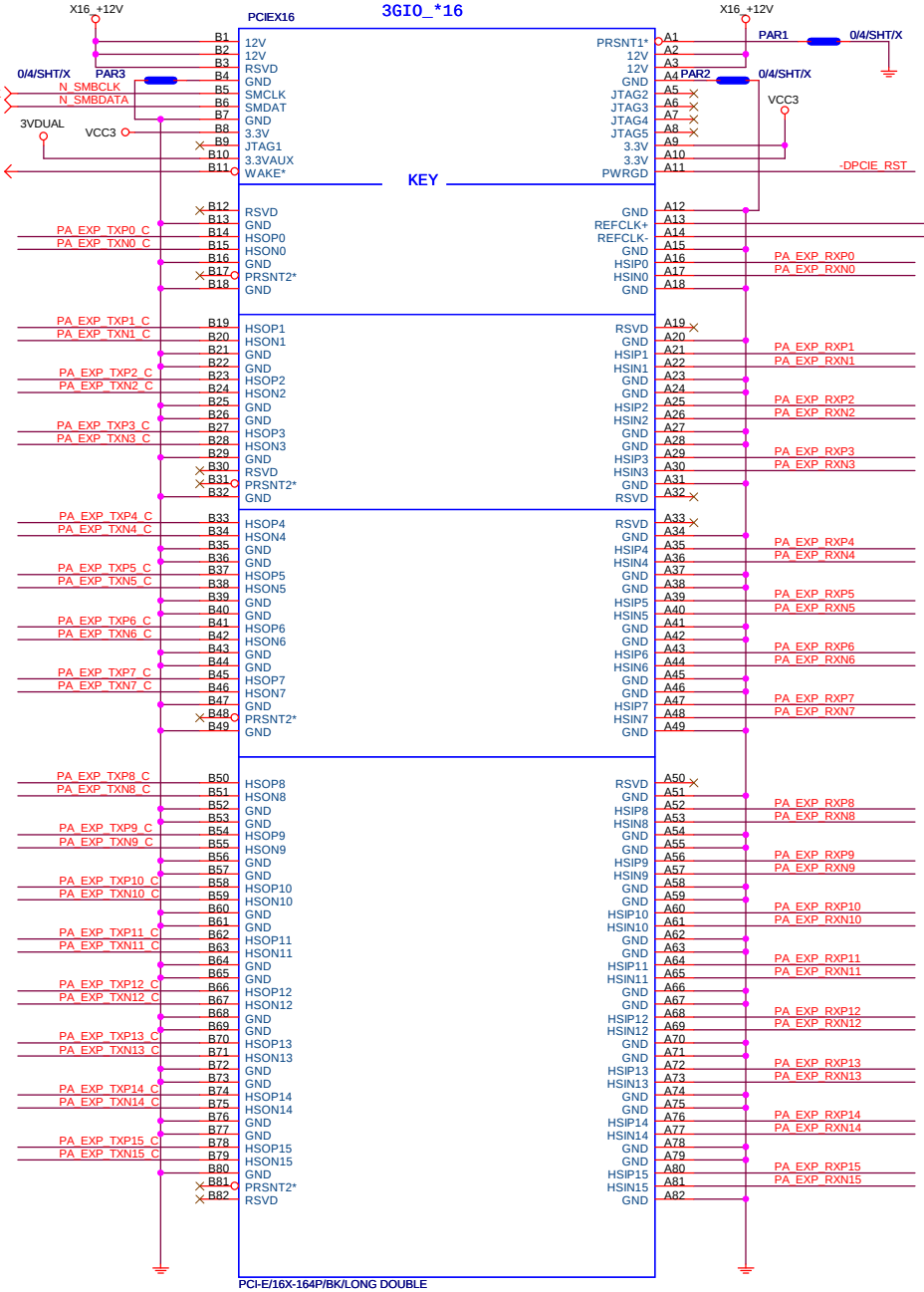
**PCE-E X16(單向) BANDWITH=2.5GHz*(8b/10b)X16=32Gb/s=4GB/s**

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

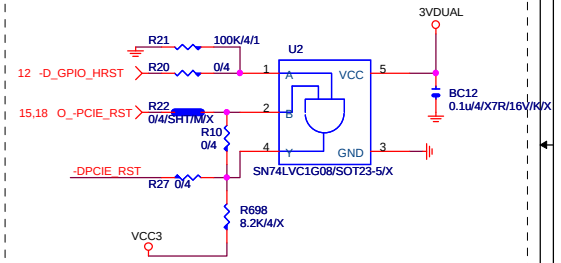
**PCI-E REV:2.0--> 5GHZ**

## PCIEX16 SLOT

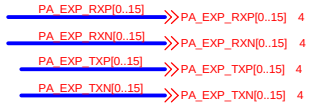
PCIESLOT-164DN-Q




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

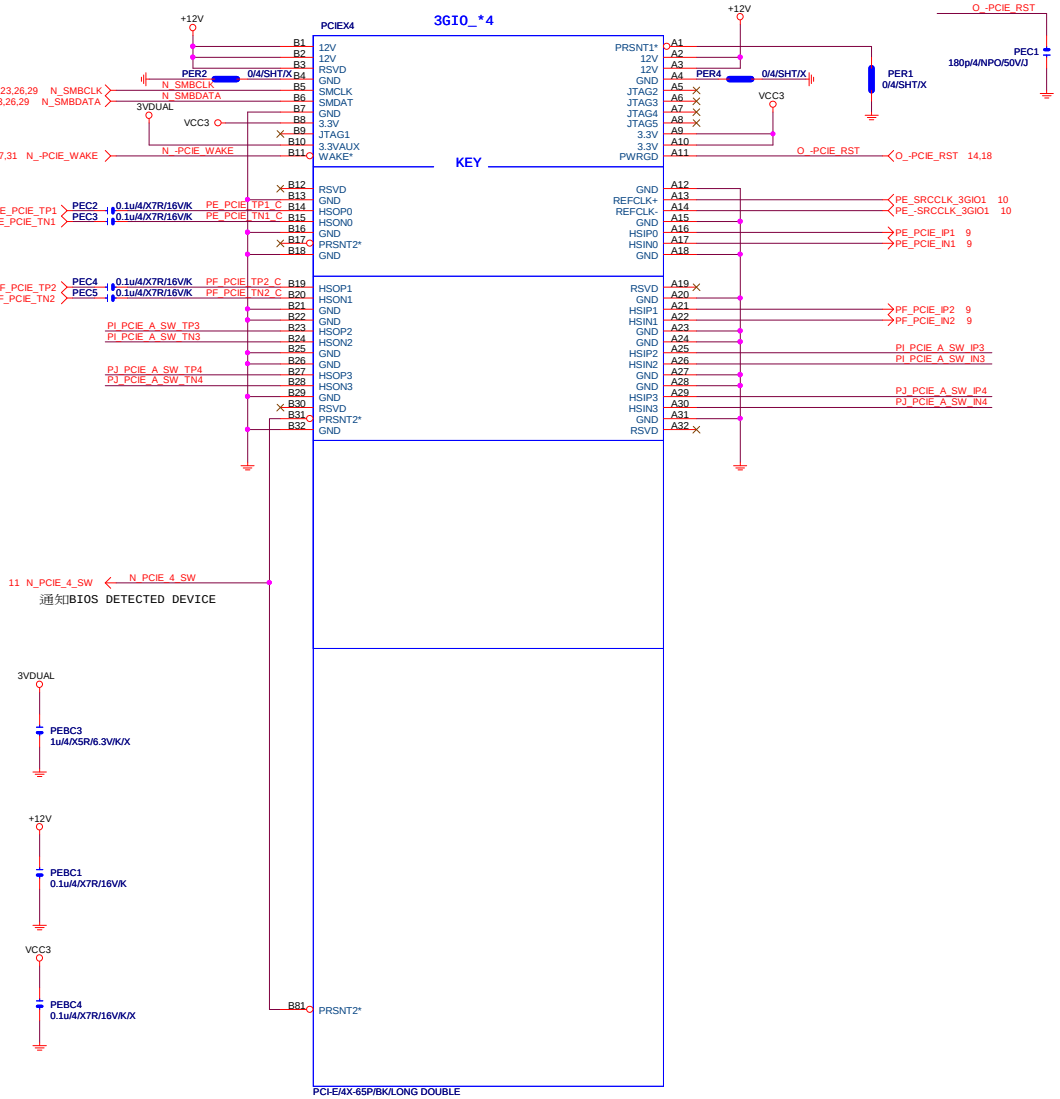



**PCIEX16:16/5/5/5/16**



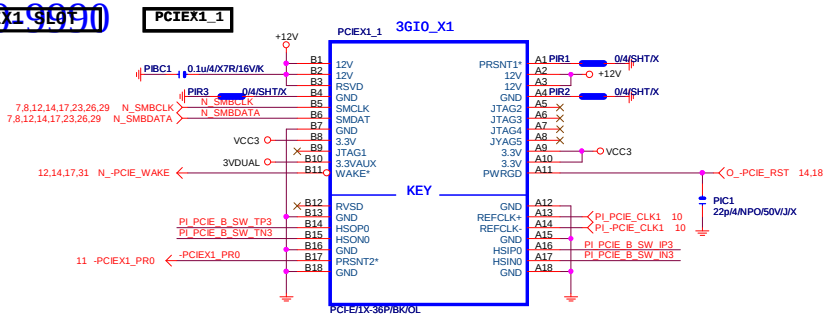

| | | | |
|---|---|---|---|
| Gigabyte Technology | | | |
| Title: PCI EXPRESS * 16 | | | |
| Size: Custom | Document Number: GA-H87-HD3 | | Rev: 1.1 |
| Date: Wednesday, July 10, 2013 | | Sheet 14 of 34 | |

## PCIEX4 SLOT

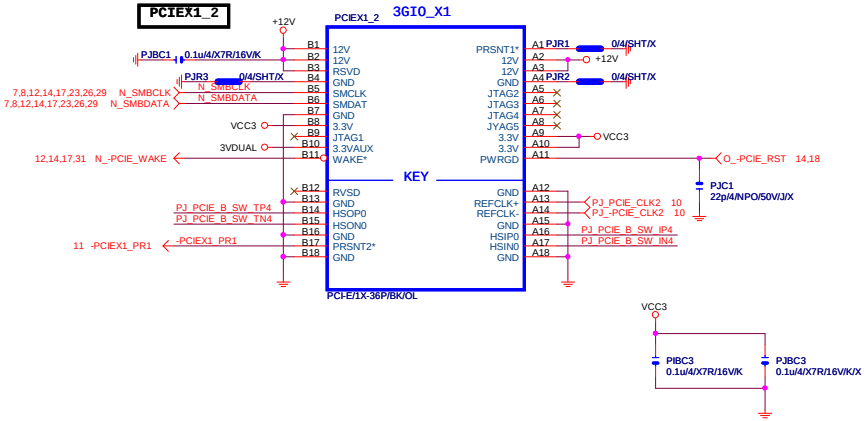



| PCIEX4_X1 (SIO_GPIO26) | N_PCIE_4_SW (PCH GPIO48) |
|---|---|
| PCIEX4 No devices | H |
| PCIEX4 -> X1 | H |
| PCIEX4 Have devices | L |
| PCIEX4 -> X4 | L |
| PCIEX1_1/2 --> N/A | |

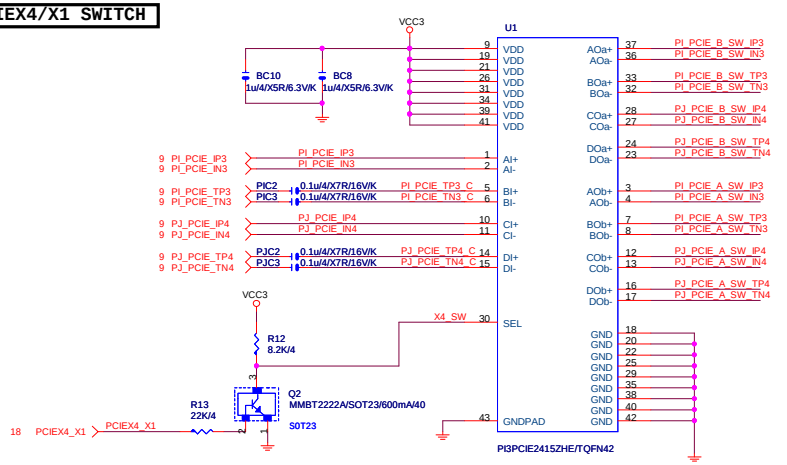
## PCIEX1_1




## PCIEX1_2




## PCIEX4/X1 SWITCH



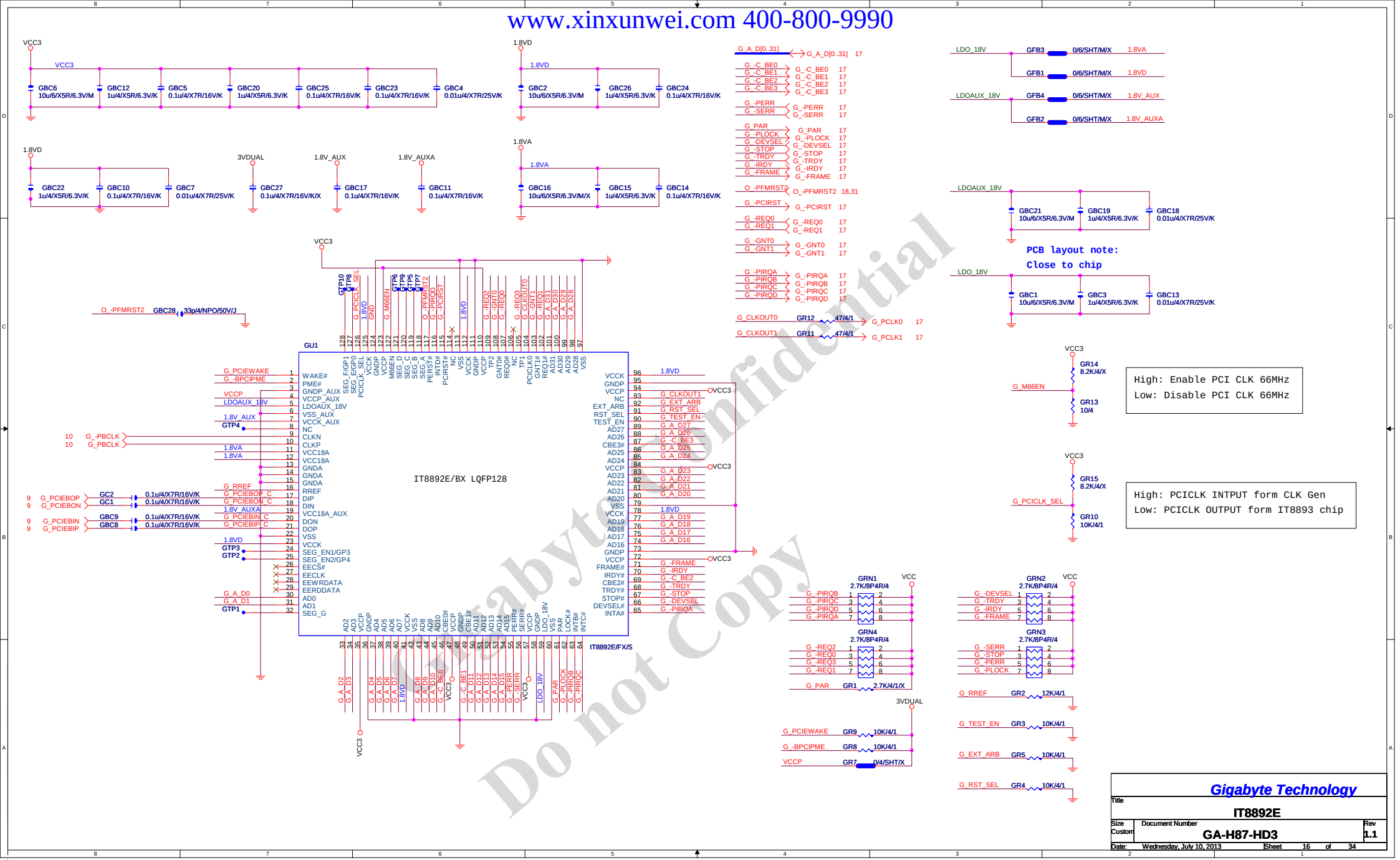

| Function | SEL |
|---|---|
| xI--> x0a | L;PCIEX4 SLOT-->X1 |
| xI--> x0b | H;PCIEX4 SLOT-->X4 |

Gigabyte Technology

Title: PCIE_X1 1,2

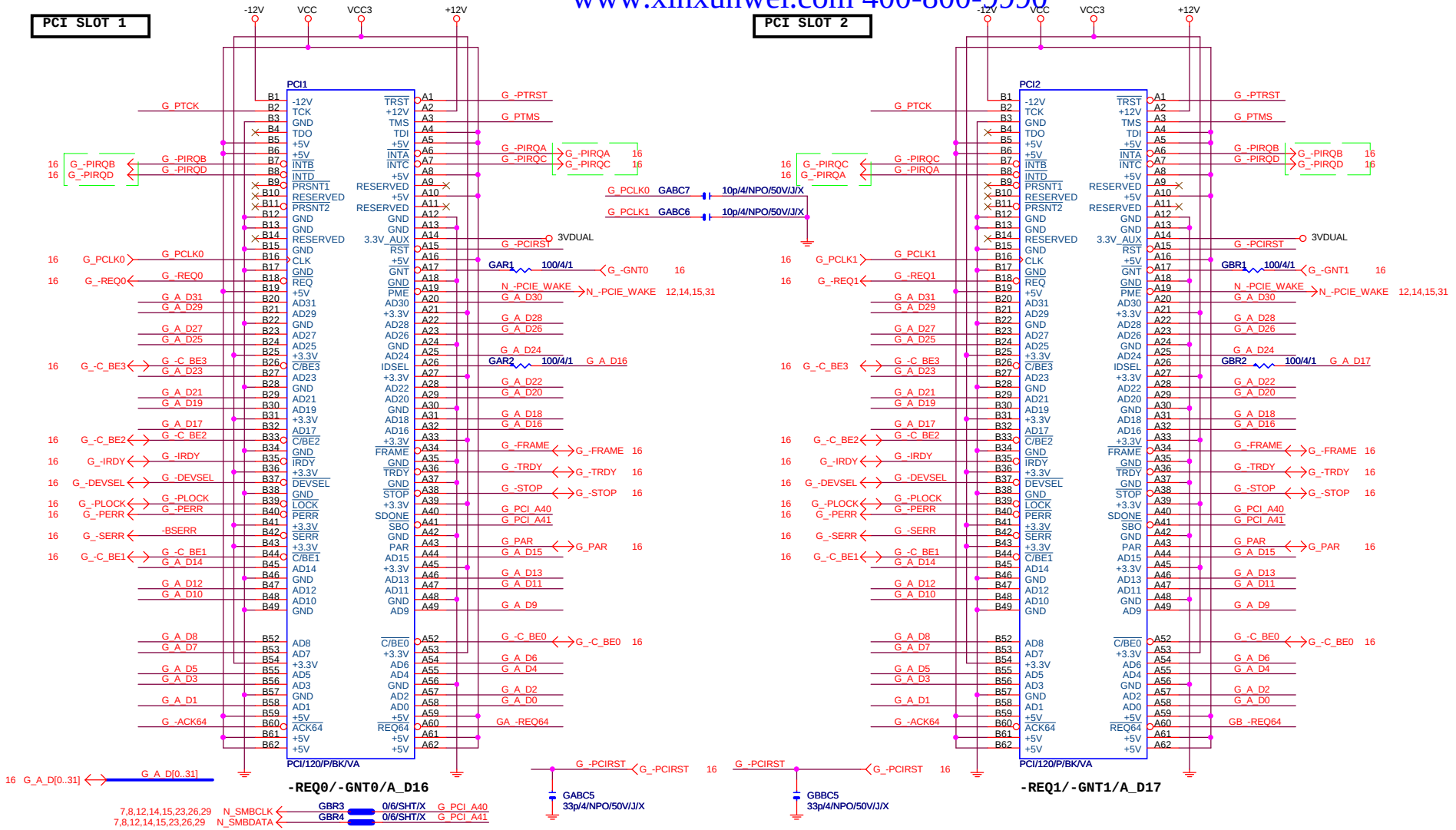
Size: Custom | Document Number: GA-H87-HD3 | Rev: 1.1

Date: Wednesday, July 10, 2013 | Sheet 15 of 34

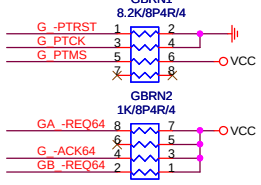




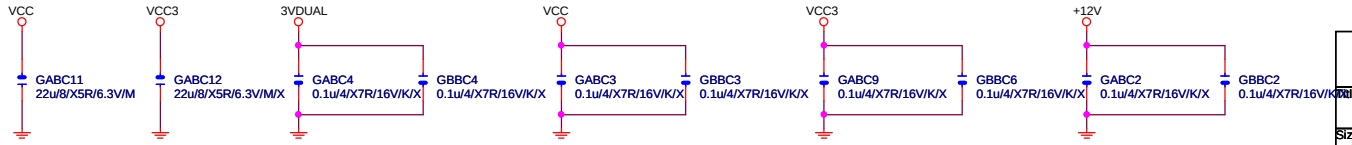

| | | |
|---|---|---|
| Gigabyte Technology | | |
| Title: IT8892E | | |
| Size: Custom | Document Number: GA-H87-HD3 | Rev: 1.1 |
| Date: Wednesday, July 10, 2013 | Sheet 16 of 34 | |




## PCI PU




## PCI CAP




GIGABYTE™

| | | |
|---|---|---|
| Title | PCI SLOT 1&2 | |
| Size: Custom | Document Number: GA-H87-HD3 | Rev: 1.1 |
| Date: Wednesday, July 10, 2013 | Sheet 17 of 34 | |

## SIO IT8728F

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

-PCIE_RST is OD in IT8728

IT8728F/EX (GB)/QFP128/[10HP2-118728-72R]

R&D技術通報151 有使用PRINT PORT的
MODEL，需使用新料號:10HP2-118728-72R 。(CHIP IT8728F/EX (GB) ITE/SMD
QFP128 PRINTPORT SORTING)料件。 串電阻33 ohm改爲68 ohm。

## PWR SHT

## SIO PU

Hi :Disable WDT
Lo :Enable WDT to rest PWROK

## SIO STRAP

JP3--- High SPI-Flash Disable
Low SPI-Flash Enable

JP5:N\A FOR 8728 DX
JP5:PULL DOWN FOR 8728 EX
anti-surge enable

EUP control detect

EUP from PCH

| | | |
|---|---|---|
| JP4 | 1 | k8 power sequency function is Disable |
| | 0 | k8 power sequency function is Enable |
| JP3<br>JP5 | 1 1 | The default value of EC Index 63h/6Bh/73h is 80h. |
| | 1 0 | The default value of EC Index 63h/6Bh/73h is FFh |
| | 0 1 | 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/AMDTSI_D/MTRB#/PCH_D1 |
| PIN55 | PECI/AMDTSI_C/DRVB# |
| 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

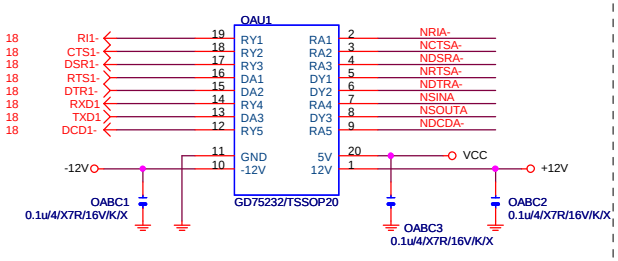
## MB ID

## SIO CAP

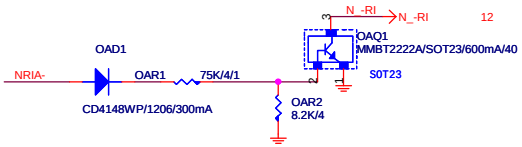
## Gigabyte Technology

| | | |
|---|---|---|
| Title | ITE 8728 LPC IO | |
| Size B | Document Number GA-H87-HD3 | Rev 1.1 |
| Date: Wednesday, July 10, 2013 | Sheet 18 of 34 | |

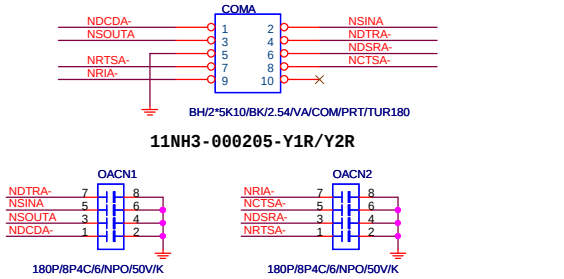
## COMA



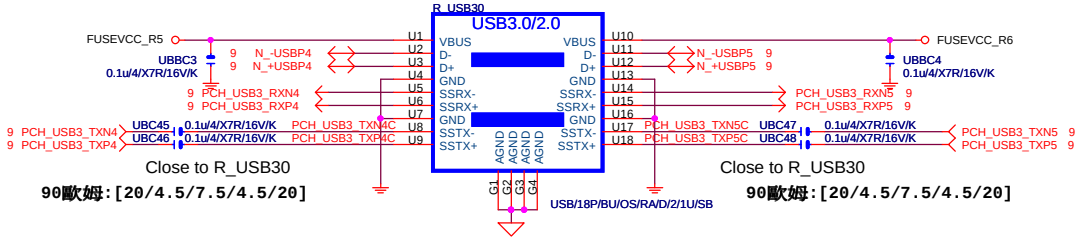

## COM RI



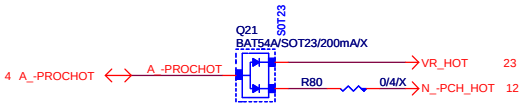

## COM BUFFER



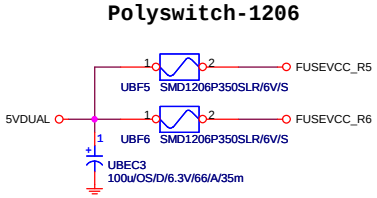

## USB30_20 CONNECT



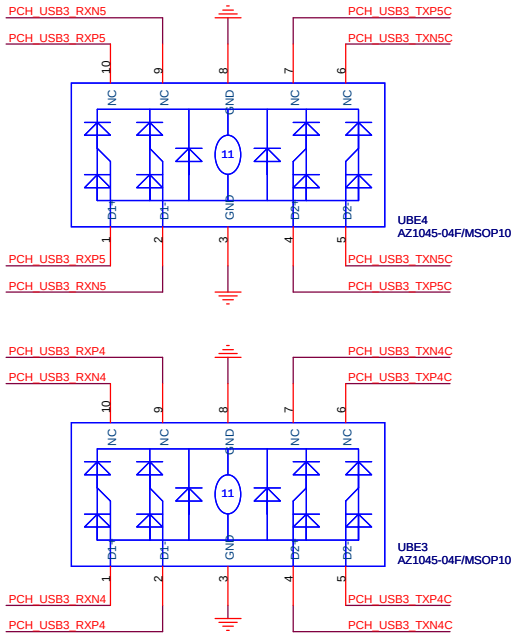

## -PROHOT



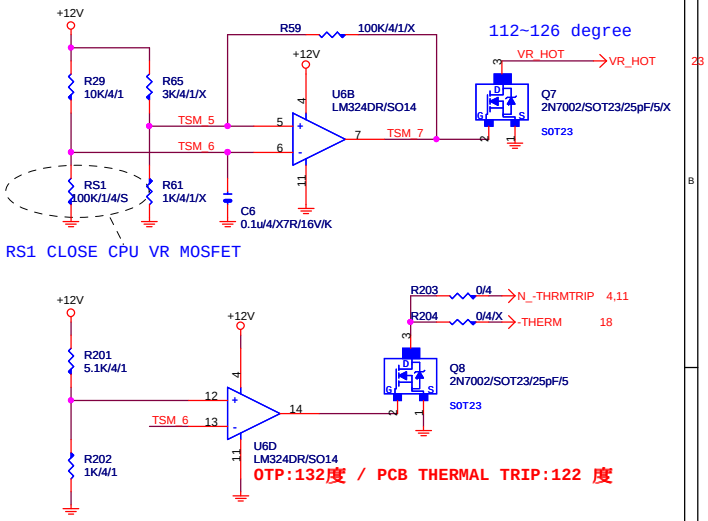

## USB30 PWR



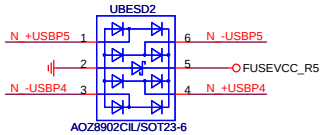

## USB30 ESD PROCTECT




## -PROHOT




## USB20 ESD PROCTECT




CLOSE R_USB30

**Gigabyte Technology**

| | |
|---|---|
| Title | COM/ PROHOT/ R_USB |
| Size: Custom | Document Number: GA-H87-HD3 |
| Rev | 1.1 |
| Date: Wednesday, July 10, 2013 | Sheet 19 of 34 |

## DUAL BIOS

指定用DII

VCC3_ME
NR226 330/4/1
NR227 1K/4/1
NQ20 S0T23
NR228 0/4/X
-SPI_CS_1
CS
N_-ICH_SPI_CS
MMBT2222A/SOT23/600mA/40
PH/1*2/BK/2.54/VA/D/X
NQ21 MMBT2222A/SOT23/600mA/40 S0T23
-SPI_HOLD_B NR229 8.2K/4

指定用DII

VCC3_ME
NR230 330/4/1
NR231 1K/4/1
NQ22 MMBT2222A/SOT23/600mA/40 S0T23
-SPI_CS_2
-SPI_HOLD_B NR234 1K/4/1/X
N_-ICH_SPI_CS
NQ23 MMBT2222A/SOT23/600mA/40 S0T23
-SPI_HOLD_M NR232 8.2K/4

M_BIOS
-SPI_CS_1 NR7 22/4
NC1 10p/4/NPO/50V/J/X
SPI_MISO
SPI_DQ2 NR220 0/4/SHT/X N_-SPI_WP0
CS# VDD SO HOLD# WP# SCK VSS SI
NR4 0/4/SHT/M/X
NBC2 1u/4/X5R/6.3V/K
NR221 0/4/SHT/X
NR222 8.2K/4/X -SPI_HOLD_M
-HOLD0
N_ICH_SPI_CLK
N_ICH_SPI_MOSI
NC2 10p/4/NPO/50V/J/X
MAIN BIOS
64M/Q/SPI/SO8/S

B_BIOS
-SPI_CS_2 NR8 22/4
SPI_MISO
SPI_DQ2 NR233 0/4/SHT/X N_-SPI_WP1
CS# VDD SO HOLD# WP# SCK VSS SI
NR12 0/4/SHT/M/X
NBC3 1u/4/X5R/6.3V/K
NR224 0/4/SHT/X
NR225 8.2K/4/X -SPI_HOLD_B
-HOLD1
N_ICH_SPI_CLK
N_ICH_SPI_MOSI
BACKUP BIOS
64M/Q/SPI/SO8/S
NBC4 0.1u/4/X7R/16V/K

MOSI For DMI RX Termination Voltage

| | | | |
|---|---|---|---|
| N_ICH_SPI_MOSI | NR10 | 8.2K/4/X | |
| N_-ICH_SPI_CS | NR9 | 8.2K/4/X | |
| N_-ICH_SPI_CS1 | NR246 | 8.2K/4/X | |
| -SPI_HOLD_M | NR3 | 1K/4/1 | |
| -SPI_HOLD_B | NR11 | 1K/4/1 | |
| N_-SPI_WP1 | NR2 | 8.2K/4/X | |
| N_-SPI_WP0 | NR1 | 8.2K/4/X | |
| N_ICH_SPI_MISO | NR5 | 8.2K/4 | |
| -HOLD0 | NR235 | 1K/4/1/X | |
| -HOLD1 | NR236 | 1K/4/1/X | |
| -SPI_HOLD_M | NR237 | 1K/4/1/X | |
| -SPI_HOLD_B | NR238 | 1K/4/1/X | |
| N_ICH_SPI_MISO | NR6 | 22/4 | SPI_MISO |

VCC3_ME, 5VDUAL

| BOOT DEVICE | GNT0 | GNT1 |
|---|---|---|
| LPC | 0 | 0 |
| PCI | 0 | 1 |
| NAND | 1 | 0 |
| SPI | 1 | 1 |

1 means floating
0 means PD 1K

## LPT PORT

PRN5 68/8P4R/4
AFD- STB- PD0 INIT- ERR- ACK- BUSY PE SLCT PD[0..7]
LPT14 LPT1 LPT2 LPT16 ERR- ACK- BUSY PE SLCT PD[0..7]

PRN3 68/8P4R/4
SLIN- PD1 PD2 PD3 LPT3 LPT17 LPT4 LPT5

PRN1 68/8P4R/4
PD4 PD5 PD6 PD7 LPT6 LPT7 LPT8 LPT9

D1 CD4148WP/1206/300mA
VCC
PBC2 0.1u/4/X7R/16V/K
PBC1 1u/6/X7R/16V/K/X

PRN2 2.2K/8P4R/4 LPT5 LPT4 LPT17 LPT3
PRN6 2.2K/8P4R/4 LPT9 LPT8 LPT7 LPT6
PRN4 2.2K/8P4R/4 LPT16 LPT2 LPT1 ERR-
PRN7 2.2K/8P4R/4 SLCT PE BUSY ACK-
PR1 2.2K/4/1 LPT14

R&D技術通報151 有使用PRINT PORT的
MODEL，需使用新料號:10HP2-118728-72R 。(CHIP IT8728F/EX (GB) ITE/SMD
QFP128 PRINTPORT SORTING)料件。 串電阻33 ohm改爲68 ohm。

LPT
LPT1 LPT2 LPT3 LPT4 LPT5 LPT6 LPT7 LPT8 LPT9 ACK- BUSY PE SLCT
LPT14 ERR- LPT16 LPT17
BH/2*13K24/BK/2.54/VA

M_BIOS
LCP/G-FL/1.27mm/200MIL/WHITE[10SL2-000008-31R]/X

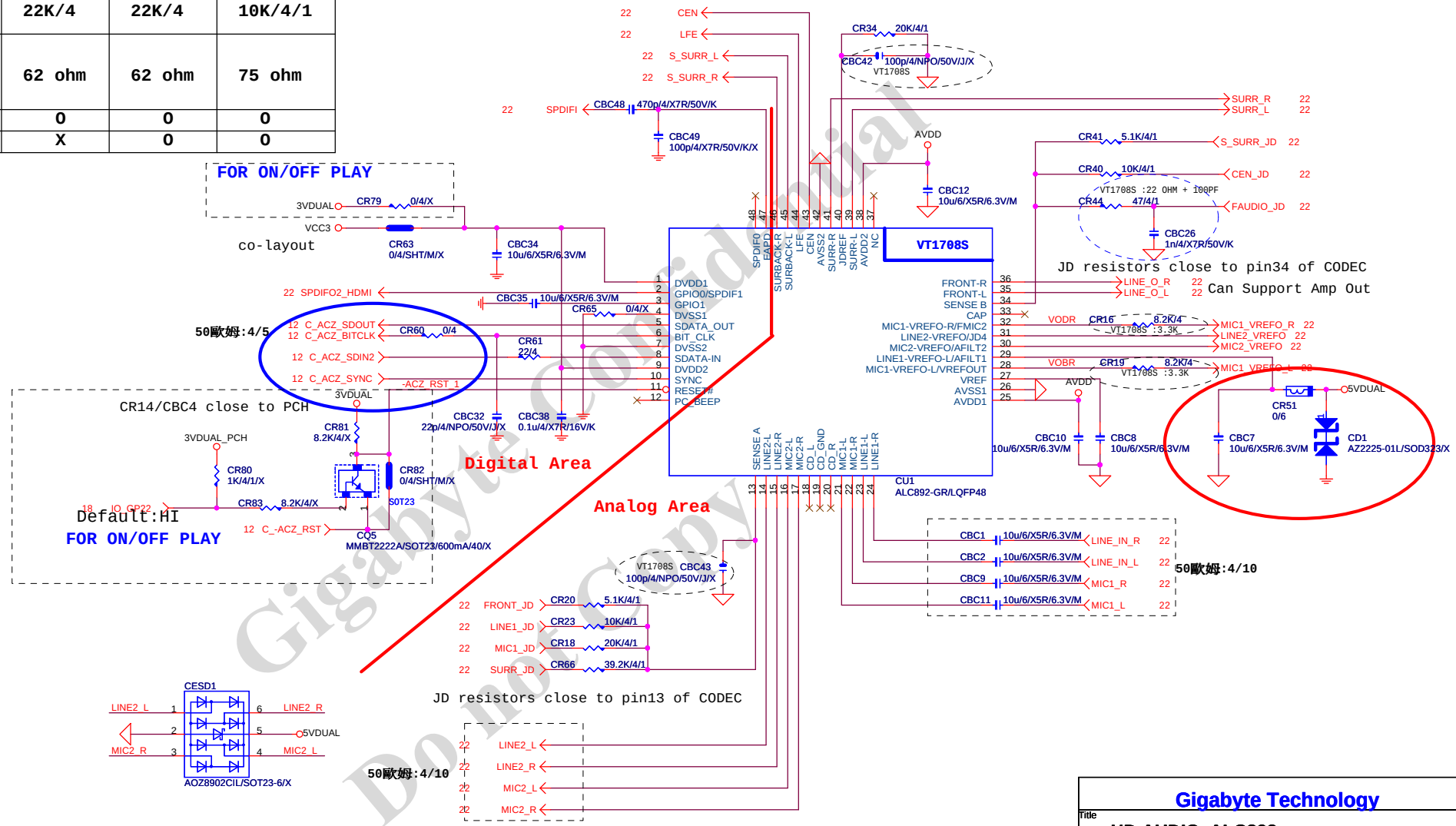
Gigabyte Technology

| | | |
|---|---|---|
| Title | BIOS | |
| Size: Custom | Document Number: GA-H87-HD3 | Rev: 1.1 |
| Date: Wednesday, July 10, 2013 | Sheet 20 of 34 | |

AZALIA CODEC **ALC892/ALC887-VD2/VT1708-CE Colay**



| | 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 | 0 | 0 | 0 |
| CESD1 | X | 0 | 0 |






| | | |
|---|---|---|
| Gigabyte Technology | | |
| Title: HD AUDIO ALC892 | | |
| Size: Custom | Document Number: GA-H87-HD3 | Rev: 1.1 |
| Date: Wednesday, July 10, 2013 | Sheet 21 of 34 | |

CR49 0/6/SHT/M/X → Close F_AUDIO

CR50 0/6/SHT/M/X → Close Codec

CR21 2.2/6 → Audio jack <--> USB_LAN

CR24 0/6/X → Under Audio jack

## LINE-OUT

21 LINE_O_R — CEC1 100u/OS/D/6.3V/66/A/35m — CR5 62/4

21 LINE_O_L — CEC2 100u/OS/D/6.3V/66/A/35m — CR8 62/4

CR7 22K/4 — CR6 22K/4 — AJ_B5 — AJ_B2

CBC19 180p/4/NPO/50V/J — CBC24 180p/4/NPO/50V/J

Only reserved for ALC888

## LINE-IN

21 LINE_IN_R — CR1 62/4 — AJ_A5

21 LINE_IN_L — CR14 62/4 — AJ_A2

CBC20 180p/4/NPO/50V/J — CBC23 180p/4/NPO/50V/J

Verify MIC function in LINE-in

For 889A/888

## MIC-IN

21 MIC1_R — CR17 62/4 — AJ_C5

21 MIC1_L — CR22 62/4 — AJ_C2

21 MIC1_VREFO_L

21 MIC1_VREFO_R

CBC3 180p/4/NPO/50V/J — CBC4 180p/4/NPO/50V/J

## SURROUND

21 SURR_R — CEC10 100u/OS/D/6.3V/66/A/35m — CR73 62/4

21 SURR_L — CEC11 100u/OS/D/6.3V/66/A/35m — CR74 62/4

CR67 22K/4 — CR68 22K/4 — BJ_C5 — BJ_C2

CBC44 180p/4/NPO/50V/J — CBC45 180p/4/NPO/50V/J

## CEN/LFE

21 LFE — CEC12 100u/OS/D/6.3V/66/A/35m — CR75 62/4

21 CEN — CEC13 100u/OS/D/6.3V/66/A/35m — CR76 62/4

CR69 22K/4 — CR70 22K/4 — BJ_B5 — BJ_B2

CBC46 180p/4/NPO/50V/J — CBC47 180p/4/NPO/50V/J

## SURR BACK

EMI

21 S_SURR_R — CEC8 100u/OS/D/6.3V/66/A/35m — CR25 62/4

21 S_SURR_L — CEC4 100u/OS/D/6.3V/66/A/35m — CR47 62/4

CR43 22K/4 — CR27 22K/4 — BJ_A5 — BJ_A2

CBC33 180p/4/NPO/50V/J — CBC31 180p/4/NPO/50V/J

## SPDIF_OUT

21 SPDIFO2_HDMI — CR26 0/4/SHT/M/X

CBC14 100p/4/NPO/50V/J

SPDIF_O — PH/1*2/BK/2.54/VA/D

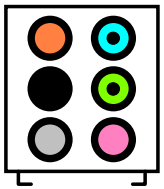
For HDMI SPDIF

## SPDIF_IN

21 SPDIFI 5VDUAL — CR77 0/4

SPDIF_IN — PH/1*3/BK/2.54/VA/D

## AZALIA JACK



AUDIOB

21 LINE1_JD — LINE1_JD — AJ_A5 — AJ_A2 — A3 A2 A4 A1 — GND — LINE-IN

21 FRONT_JD — FRONT_JD — AJ_B5 — AJ_B2 — B3 B2 B4 B1 — GND — LINE-OUT

21 MIC1_JD — MIC1_JD — AJ_C5 — AJ_C2 — C3 C2 C4 C1 C0 — GND — MIC-IN

2X3RP/26P/OR,BK,GY,BU,GE,PK/RA

BLUE LINE-IN

GREEN LINE-OUT

PINK MIC-IN

AUDIOA

21 CEN_JD — CEN_JD — BJ_B5 — BJ_B2 — D3 D2 D4 D1 — GND — REAR

21 SURR_JD — SURR_JD — BJ_C5 — BJ_C2 — F3 E2 E4 E1 — GND — CEN

21 S_SURR_JD — S_SURR_JD — BJ_A5 — BJ_A2 — F3 F2 F4 F1 F0 — GND — SIDE

G4 — G1 G2 G3

2X3RP/26P/OR,BK,GY,BU,GE,PK/RA

Orange CEN/LFE

Black SURROUND

Gray SURROUND SIDE

## AZALIA FRONT PANEL

CQ4 BAT54A/SOT23/200mA — 21 LINE2_VREFO

CQ2 BAT54A/SOT23/200mA — 21 MIC2_VREFO

SOT23 — VT1708S :3.3K

CR52 8.2K/4 — CR56 8.2K/4 — CR10 8.2K/4 — CR9 8.2K/4

VCC3 — CR78 8.2K/4/X

CR58 22K/4 — CR54 22K/4

F_AUDIO

21 MIC2_L — CBC6 10u/6/X5R/6.3V/M — CR13 62/4 — M2_L

21 MIC2_R — CBC5 10u/6/X5R/6.3V/M — CR11 62/4 — M2_R

L2_R — CR57 62/4 — L2-R

21 FAUDIO_JD

L2_L — CR53 62/4 — L2-L

CR55 20K/4/1 — CR59 39.2K/4/1

BH/2*5K8/BK/2.54/VA/AUDIO/PRT/TUR180

CR12 0/4/X

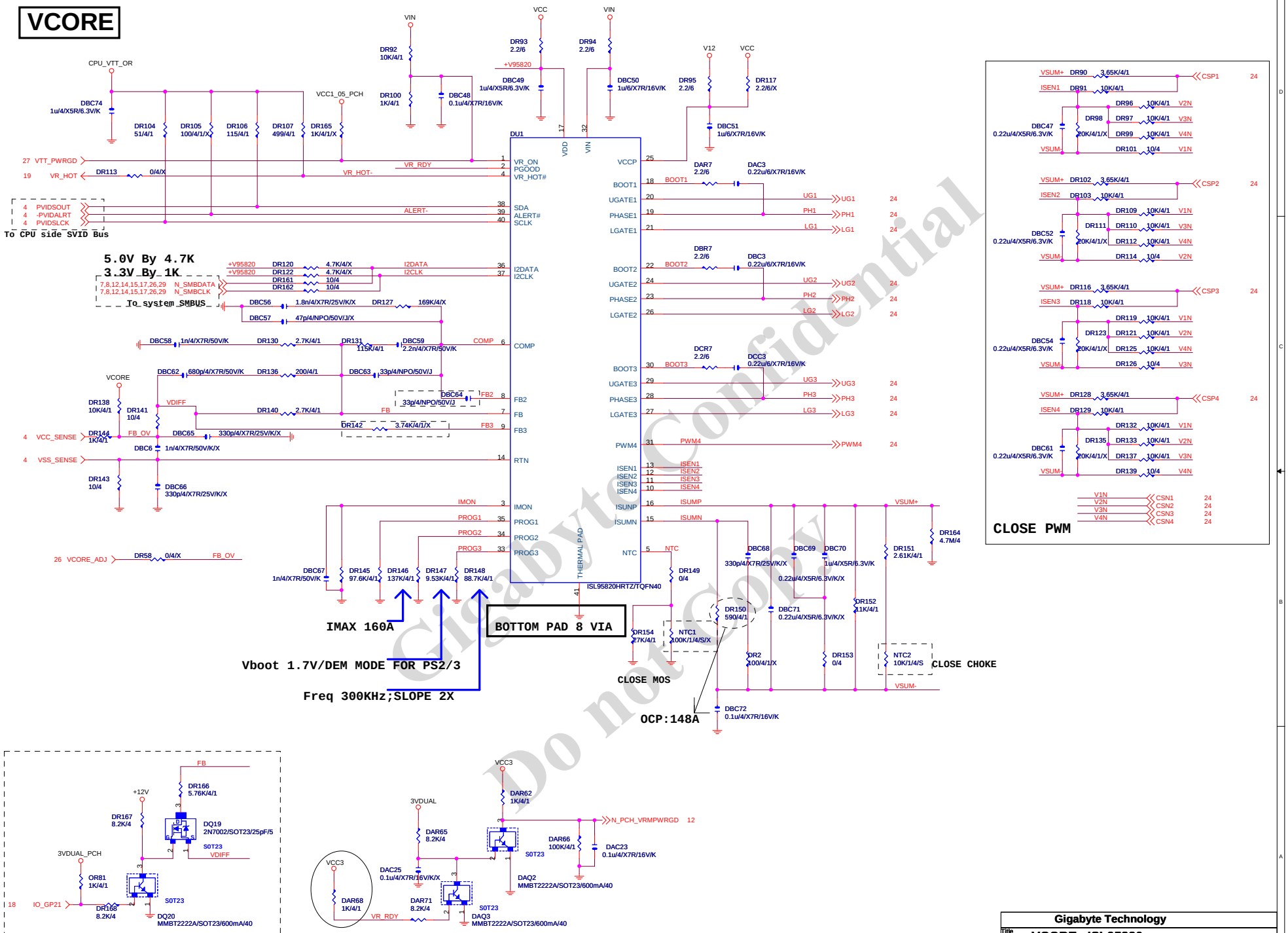
21 LINE2_R — 100u/OS/D/6.3V/66/A/35m — CEC9 — L2_R

21 LINE2_L — CEC6 — 100u/OS/D/6.3V/66/A/35m — L2_L

CBC30 180p/4/NPO/50V/J — CBC29 180p/4/NPO/50V/J — CBC37 180p/4/NPO/50V/J — CBC36 180p/4/NPO/50V/J

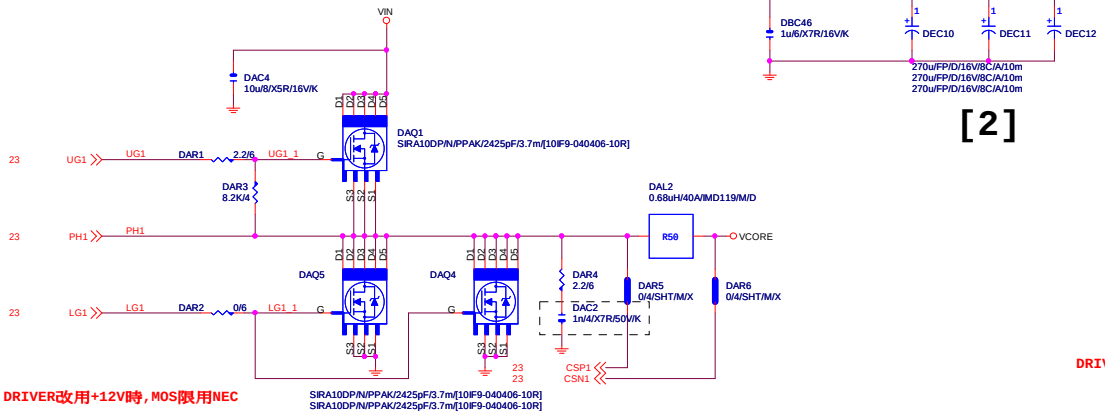
| | | |
|---|---|---|
| Gigabyte Technology | | |
| Title: AUDIO JACK | | |
| Size: Custom | Document Number: GA-H87-HD3 | Rev: 1.1 |
| Date: Wednesday, July 10, 2013 | Sheet 22 of 34 | |

# VCORE



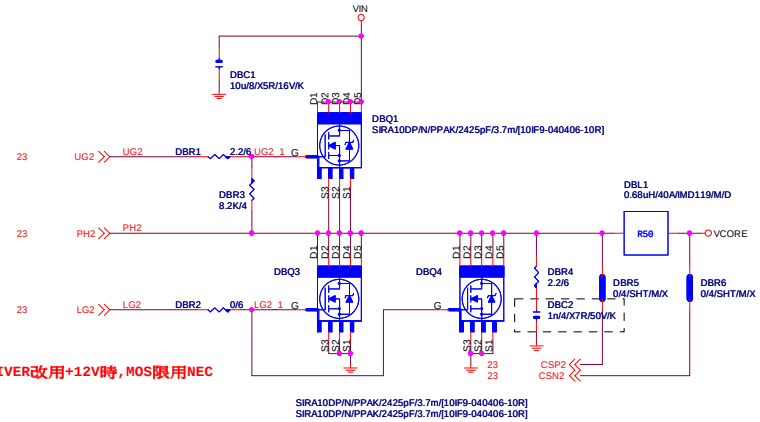

| | |
|---|---|
| Gigabyte Technology | |
| Title | VCORE_ ISL95820 |
| Size: Custom | Document Number: GA-H87-HD3 |
| Rev | 1.1 |
| Date: Wednesday, July 10, 2013 | Sheet 23 of 34 |

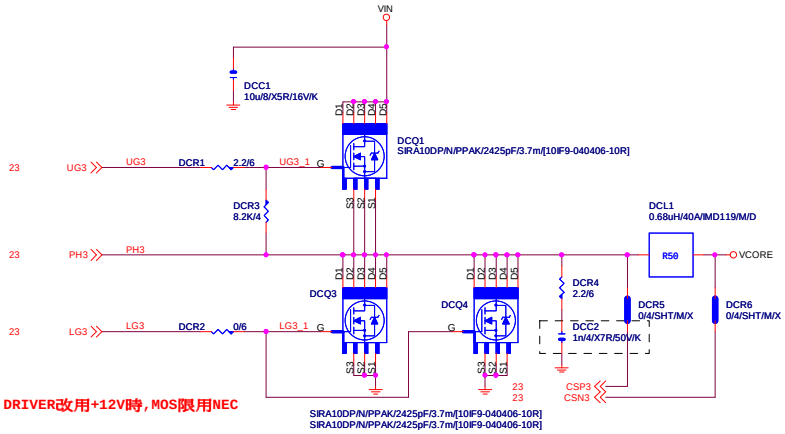
# VCORE

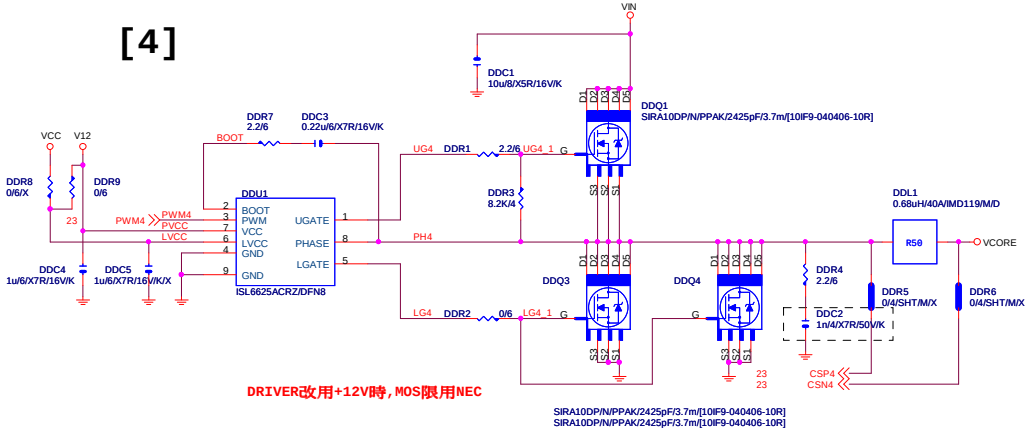




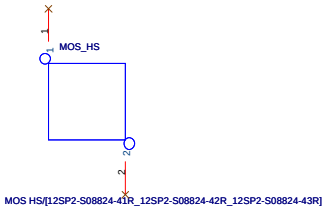


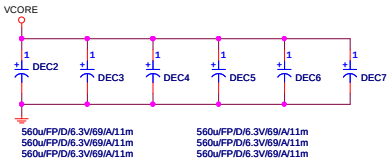



# MOSFET HEATSINK




| | | |
|---|---|---|
| Gigabyte Technology | | |
| Title | ISL95820_2 | |
| Size: Custom | Document Number: GA-H87-HD3 | Rev: 1.1 |
| Date: Wednesday, July 10, 2013 | Sheet 24 of 34 | |

## VCC1_05_ME

1A MAX

5VDUAL 3VDUAL

R660 8.2K/4

U8 RT9018B-18GSP/SO8/3A

POK GND EN FB VIN VOUT CNTL REFIN PGOOD

1_05ME_EN

R664 2.2/6

BC210 1u/4/X5R/6.3V/K 10u/6/X5R/6.3V/M

BC211

BC212 10u/6/X5R/6.3V/M

VCC1_05_ME

R1

R662 100K/4/1

R665 300K/4/1

R2

BC207 180p/4/NPO/50V/J

BC208 10u/6/X5R/6.3V/M

BC209 1u/4/X5R/6.3V/K

VOUT=0.8*[(R1+R2)/R2]

【技術通報R&D技術通報156】

VCC1_05_ME BC217 22u/8/X5R/6.3V/M

VCC1_05_ME BC213 10u/6/X5R/6.3V/M

1_05ME_EN R670 0/4

11,12 N_-SLP_A R671 22K/4

C205 1u/4/X5R/6.3V/K

## VCC3_ME

5VDUAL

R661 8.2K/4

ME_G

R663 220/6

C202 1u/4/X5R/6.3V/K

Q80 PMBT2907A/SOT23/-600mA/50 SOT23

3VDUAL

VCC3_ME

11,12 N_-SLP_A R666 75K/4/1

C203 1u/4/X5R/6.3V/K

S0T23 Q81 2N7002/SOT23/25pF/5

R667 220/6

Q82 PMBT2907A/SOT23/-600mA/50 SOT23

3VDUAL

VCC3_ME BC214 10u/6/X5R/6.3V/M

VCC3_ME BC215 10u/6/X5R/6.3V/M

## DDR_15V

+12V 5VDUAL

MA_D1 SDM20E40C/0.4A/SOT23

MA_DR8 2.2/6

MA_DRV

MA_D2 BAT54C/SOT23/200mA/X

MA_DC9 0.1u/6/X7R/25V/K

MA_DC10 1u/6/X7R/16V/K

MA_DR16 20K/4/1/X

DDR_EN

MA_DR15 27K/4/1

MA_DC15 22p/4/NPO/50V/J

MA_DC16 3.3n/4/X7R/50V/K

MA_DR17 0/4/X

DA_DR3 0/4/SHT/M/X

MAU2 RT8120DGS/SOP8 COMP FB GND VCC PGND BOOT UGATE PHASE LG/OC

MA_UGATE MA_PHASE MA_LGATE

MA_DR18 20K/4/1

放靠近IC pin4

5VDUAL ML2 1uH/36A/IMD109/M/D

MA_VIN

MA_DC6 0.1u/4/X7R/16V/K Close Choke

MA_DC7 1u/6/X7R/16V/K Close MOS

MAEC1 560u/FP/D/6.3V/69/A/11m

MAEC2 560u/FP/D/6.3V/69/A/11m

MA_DQ1 RJK03B7DPA-00/N/7.8m/PPAKSO-8/[10IF9-100397-21R_10IF9-070428-01R]

MA_UGATE MA_DR1 2.2/6

MA_DR2 8.2K/4

MA_PHASE

MA_LGATE

MA_DQ2 MA_DQ3

ML1 1uH/36A/IMD109/M/D

DDR_15V

25A MAX

MA_DR5 2.2/6

MA_DC5 1n/4/X7R/50V/K

MA_DR14 487/4/1

MA_DR13 2K/4/1

MA_DC14 3.3n/4/X7R/50V/K RS

RJK0393DPA-0G/N/4.3m/PPAKSO-8/[10IF9-040393-21R_10IF9-050840-01R]

RJK0393DPA-0G/N/4.3m/PPAKSO-8/[10IF9-040393-21R_10IF9-050840-01R]

DDR15V_ADJ

26 DDR15V_ADJ

RO MA_DR12 2.2K/4/1

Remote sense請從最重的負載端點拉回

0.8*(1+RS/RO) = Vout

0.8*[1+2K/2.2K)] =

1.527V

## PWR SEQ

DDR_EN

MAQ1 2N7002/SOT23/25pF/5

18,29 -PSON

MAQ3 MMBT2222A/SOT23/600mA/40 S0T23

MAR6 22K/4

12,18,27 N_-SLP_S3

MAC8 2.2u/6/X5R/6.3V/K

POWER ISSUE

5VSB

MAR7 22K/4

MAQ2 2N7002/SOT23/25pF/5

MAR3 8.2K/4

MAQ4 MMBT2222A/SOT23/600mA/40 S0T23

12,18 N_-S4_S5

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]

## DDRVTT

DDR_15V

RT9173DPSP/3A/SO8/S[10GL2-309173-20R]

MAC2 1u/4/X5R/6.3V/K

MAR5 1K/4/1

MAU1 VIN GND VREF1 VOUT VREF2 ENABLE VCNTL BOOT_SEL

VCC

26 MA_VTT_REF

MAC1 1u/4/X5R/6.3V/K

MAR4 1K/4/1

MAC7 10u/6/X5R/6.3V/M

DDRVTT

1.1A MAX



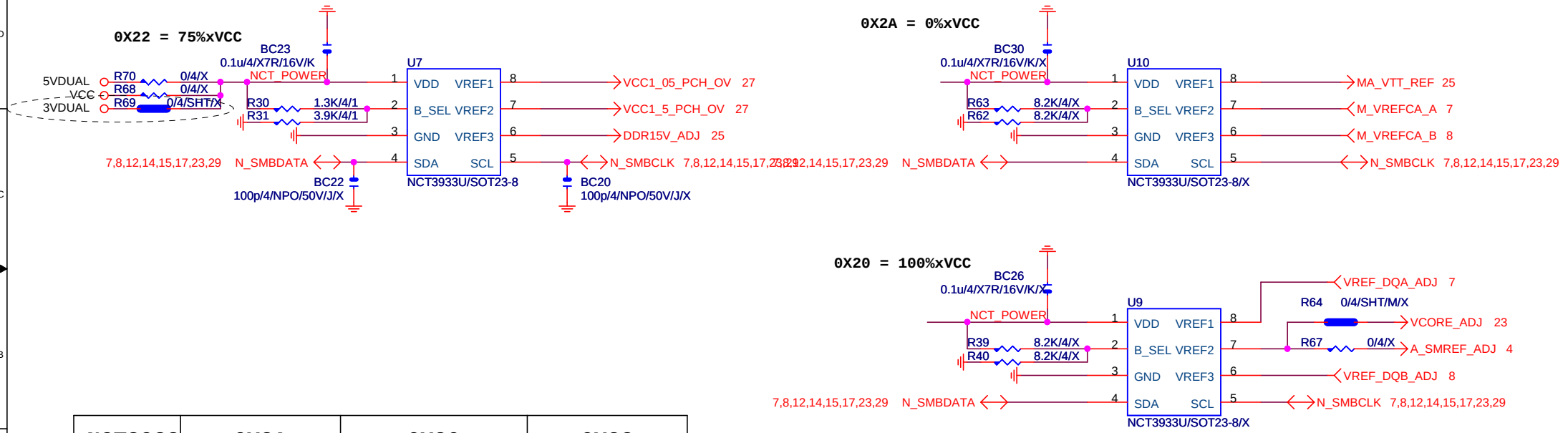
GIGABYTE™

Title: DDR15V / M3 POWER

Size: Custom | Document Number: GA-H87-HD3 | Rev: 1.1

Date: Wednesday, July 10, 2013 | Sheet 25 of 34

**OVER VOLTAGE**




| 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 |

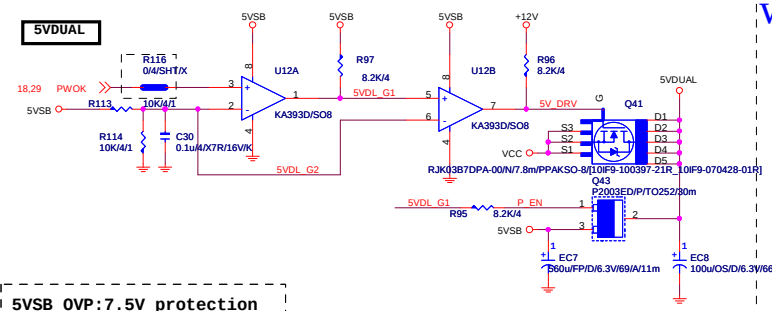
**Gigabyte Technology**

Title: CPU CORE VR-2

Size: Custom | Document Number: GA-H87-HD3 | Rev: 1.1

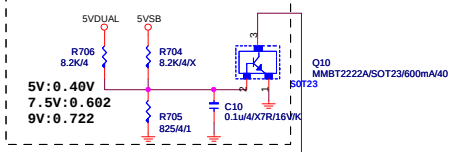
Date: Wednesday, July 10, 2013 | Sheet 26 of 34

## 5VDUAL

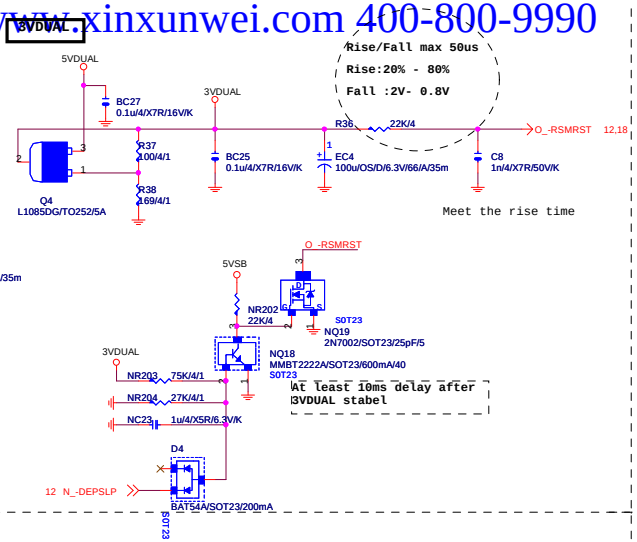



**5VSB OVP:7.5V protection**

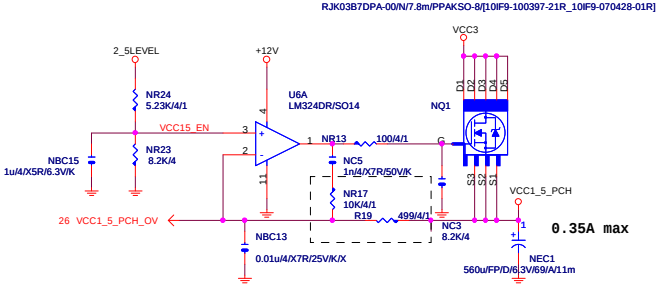
NOTE 82:改5V DUAL,6v保護



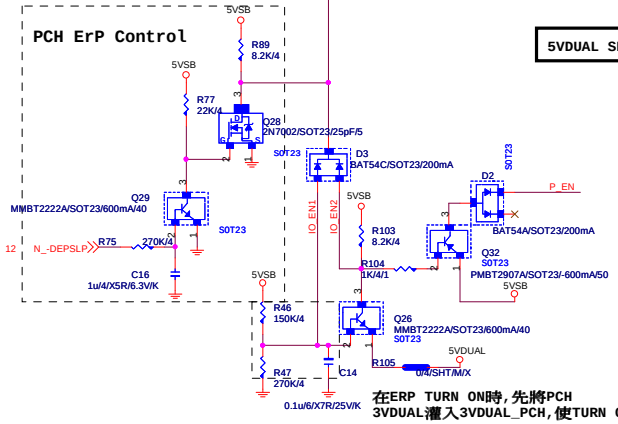

## 3VDUAL




## VCC1_5_PCH



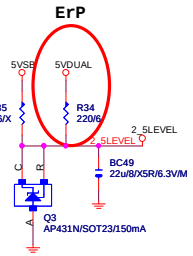

## PCH ErP Control



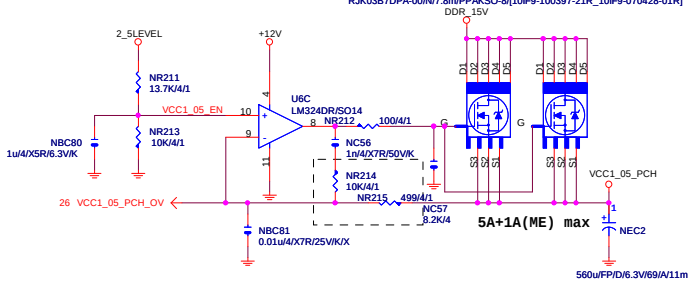

## 5VDUAL SHORT PROTECT

在ERP TURN ON時,先將PCH 3VDUAL灌入3VDUAL_PCH,使TURN ON -SLP_S3功能

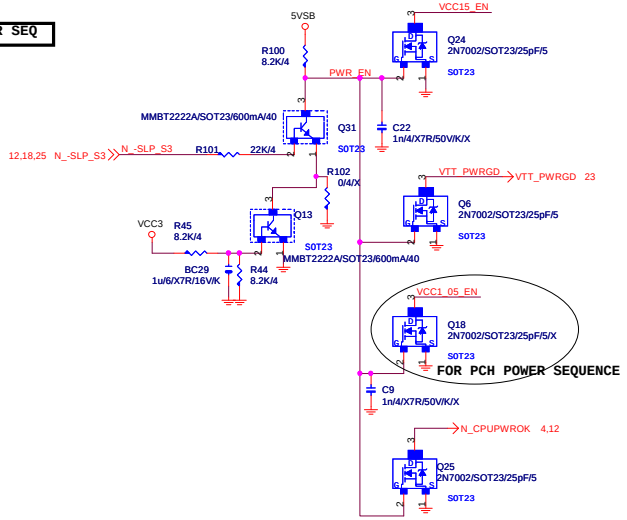
## 2_5LEVEL



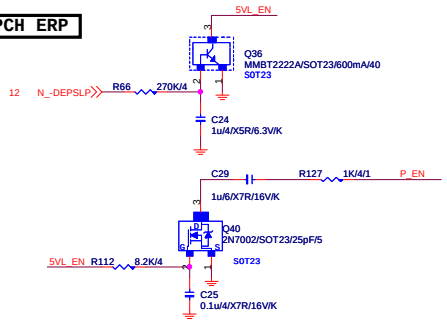

## VCC1_05_PCH

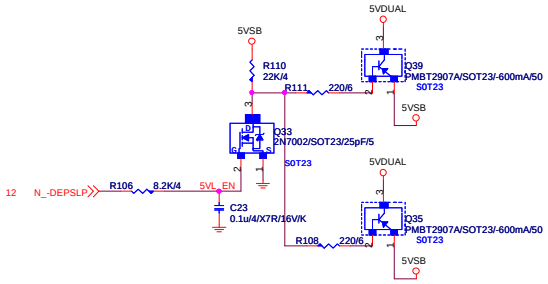



## PWR SEQ



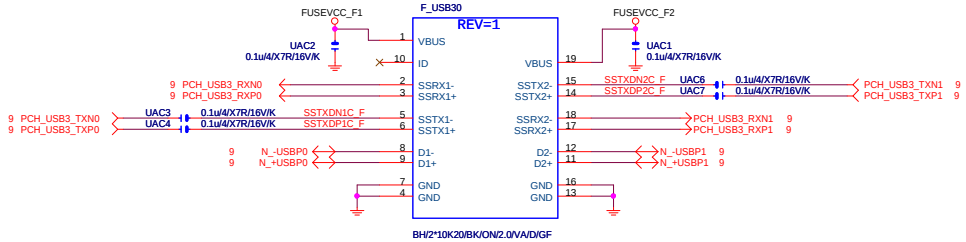

## PCH ERP



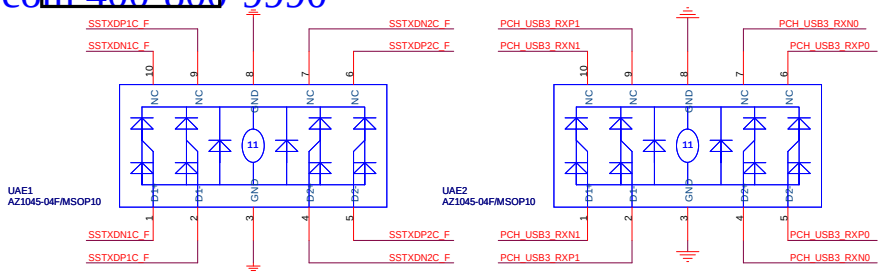




| | | |
|---|---|---|
| Gigabyte Technology | | |
| Title: DISCRETE POWER | | |
| Size: Custom | Document Number: GA-H87-HD3 | Rev: 1.1 |
| Date: Wednesday, July 10, 2013 | Sheet 27 of 34 | |

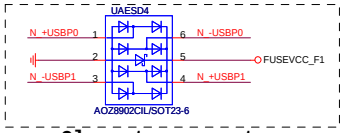
## Front USB3.0




## F_USB3.0 ESD PROTECT

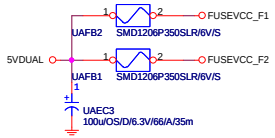



## BLUE

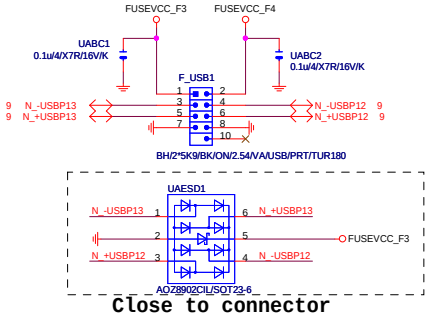



Close to connector

## F_USB30 PWR

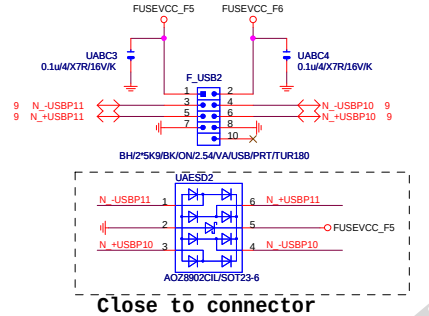



## FRONT USB1



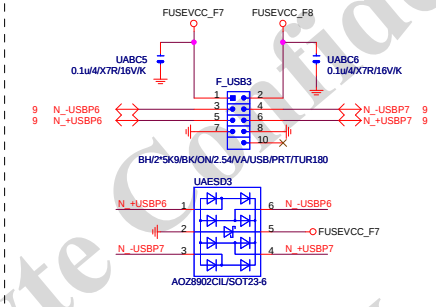

Close to connector

## FRONT USB2

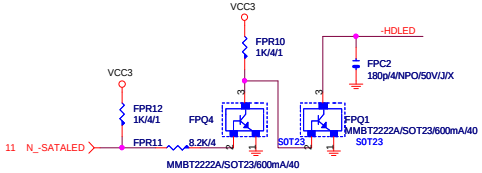



Close to connector

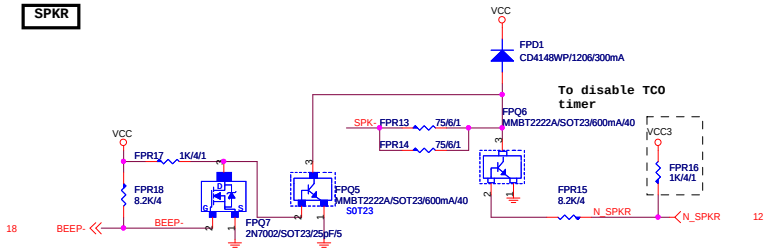
## FRONT USB3



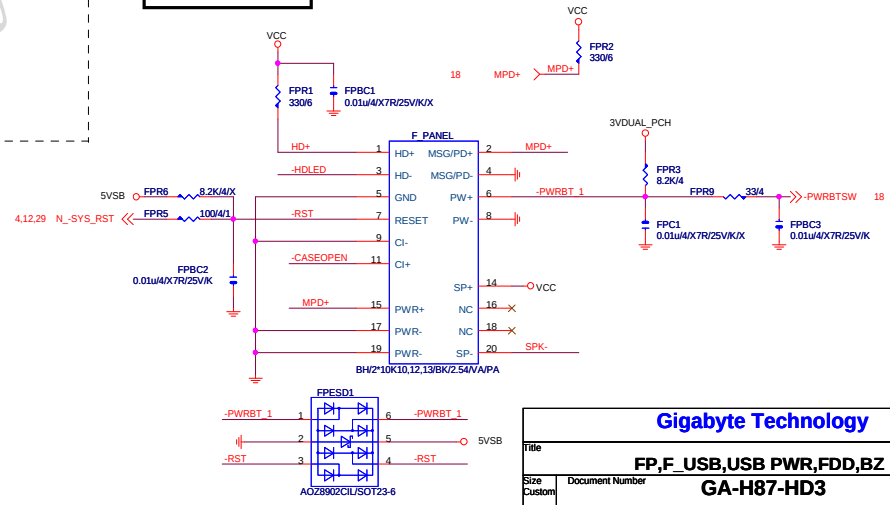

## SATA LED



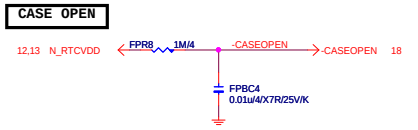

## SPKR



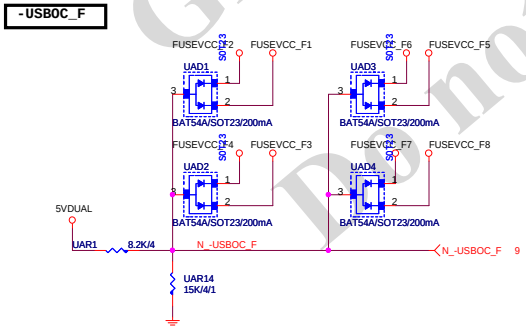

## INTEL FRONT PANEL



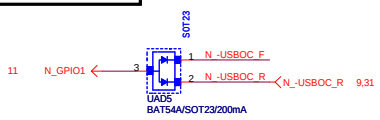

## CASE OPEN




## -USBOC_F




## F_USB POWER PROTECT






| | | |
|---|---|---|
| Gigabyte Technology | | |
| Title: FP,F_USB,USB PWR,FDD,BZ | | |
| Size: Custom | Document Number: GA-H87-HD3 | Rev: 1.1 |
| Date: Wednesday, July 10, 2013 | Sheet 28 of 34 | |

Patch some PSU no internal pull up resistor

## ATXX24 POWER CONNECTOR

APW/2*12/BK/VA/SN/2SHK/PA66

To prevent the 5VSB under loading when boot

## ATXX4 POWER CONNECTOR

APW/2*4/BK/OC/P/4.2/VA/SN/OH::Location ATX_12V_2X4

## HOLE_4-RH-1

## K1-ICT

## 4MMH

【技術通報R&D技術通報153】

To fix 12V light load abnromal issue

MMBT2222A/SOT23/600mA/40

## CLK GEN

CPU Frequency Selection

| FSLB | FSLA | CPU |
|---|---|---|
| 0 | 0 | 100M <Default> |
| 0 | 1 | 133M |
| 1 | 0 | 200M |
| 1 | 1 | 166M |

9LRS4105BKLFT/MLF32/X

## PWOK PATCH

【技術通報R&D技術通報154】



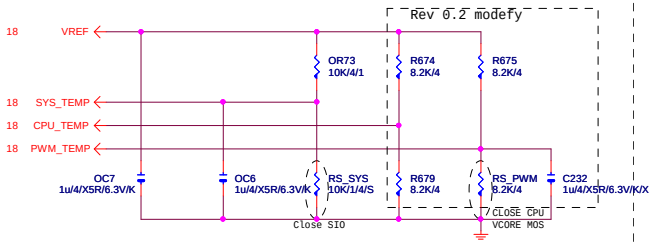
Gigabyte Technology

Title: ATX POWER CONNECTOR

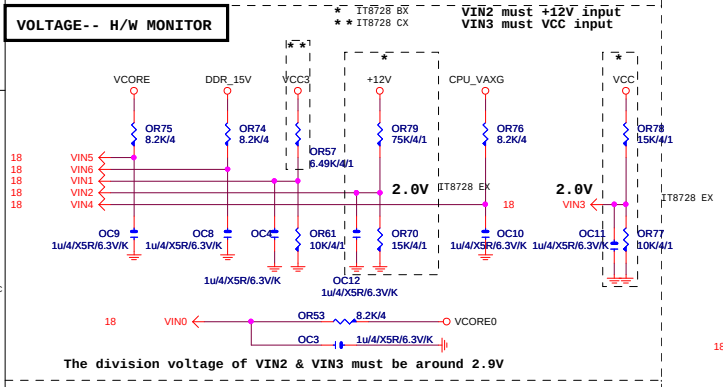
Size: Custom | Document Number: GA-H87-HD3 | Rev: 1.1

Date: Wednesday, July 10, 2013 | Sheet 29 of 34

## TEMP H/W MONITOR

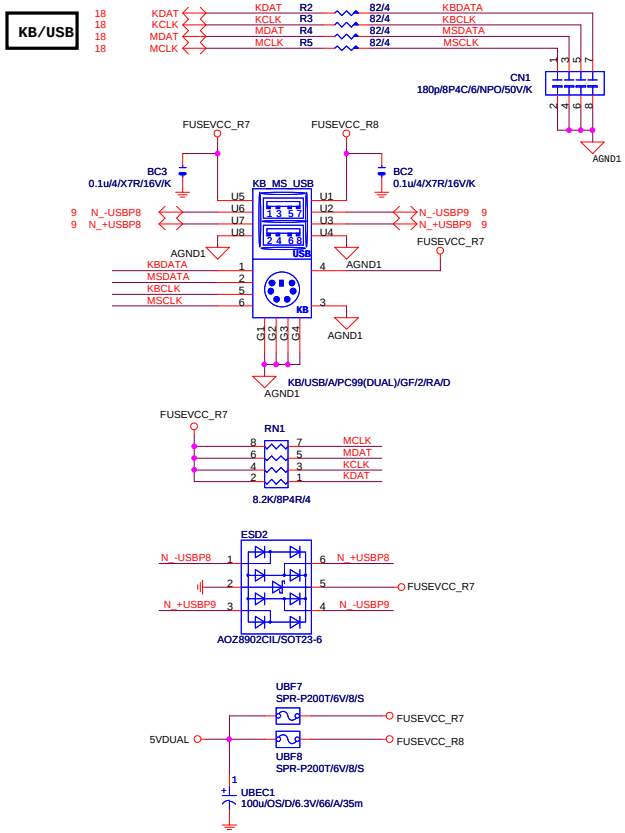



## VOLTAGE-- H/W MONITOR

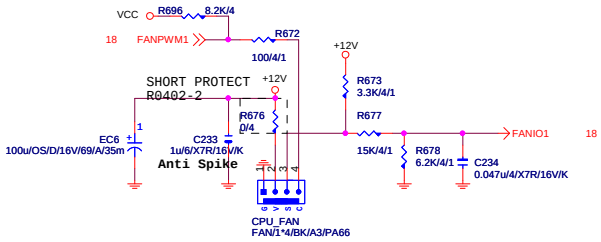



The division voltage of VIN2 & VIN3 must be around 2.9V

## KB/USB



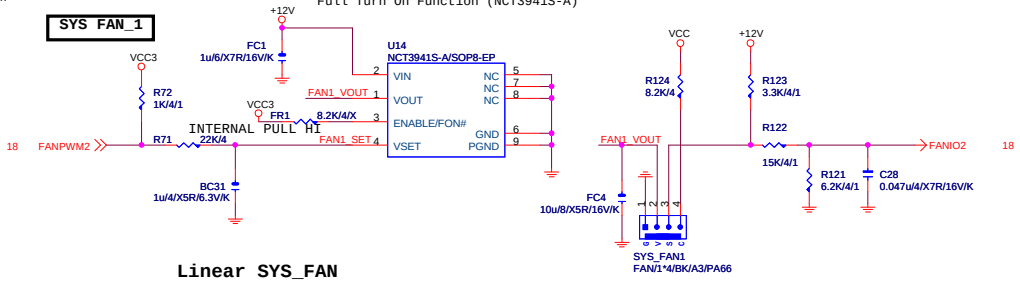

## CPU SMART FAN



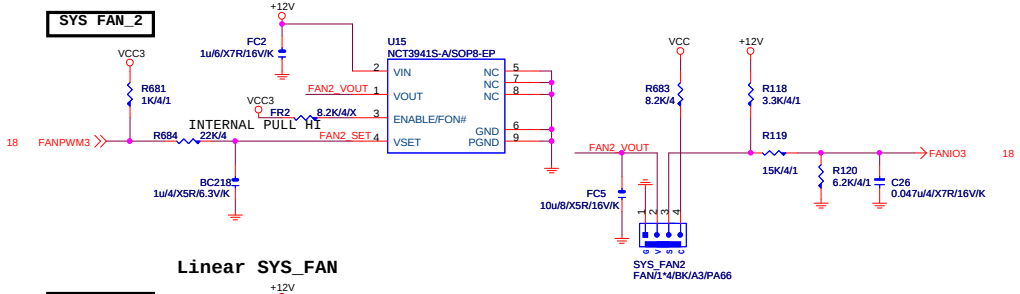

## Linear SYS_FAN

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

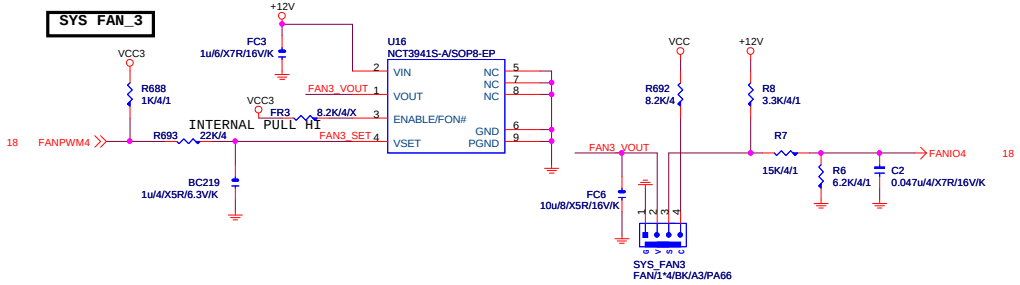
### SYS FAN_1

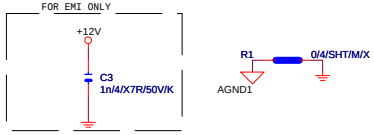



### SYS FAN_2




### SYS FAN_3




| | | |
|---|---|---|
| Gigabyte Technology | | |
| Title: HWM,KB/MS, FAN CTRL | | |
| Size: Custom | Document Number: GA-H87-HD3 | Rev: 1.1 |
| Date: Wednesday, July 10, 2013 | Sheet 30 of 34 | |

## LAN:INTEL I217

VDD33
LR12 1K/4/1
LR18 2.49K/4/1
FOR DSM MODE
(DEEP SLUMBER MODE)
LU1
GND
100歐姆:[20/4/8/4/20]
MDIP0 MDIN0 AVDD10 MDIP1 MDIN1 AVDD10(NC) MDIP2(NC) MDIN2(NC) AVDD10(NC) MDIP3(NC) MDIN3(NC) AVDD33(NC)
LB_MDI0+ LB_MDI0- LB_MDI1+ LB_MDI1- LB_MDI2+ LB_MDI2- LB_MDI3+ LB_MDI3-
DVDD10
VDD33
REGOUT VDDREG VDDREG ENSWREG EEDI LED3/EEDO EECS DVDD10 LANWAKEB DVDD33 ISOLATEB PERSTB
AVDD33_REG
ENSWREG
LR13 8.2K/4 LB_LED_LINK1000
LR6 8.2K/4
N_-PCIE_WAKE 12,14,15,17
O_-PFMRST2 16,18
ISOLATEB 18
LR15 1/6
LBC23 0.1u/4/X7R/16V/K
LBC24 22u/8/X5R/6.3V/M
LR4 1K/4/1
LR5 15K/4/1
LBC2 100p/4/NPO/50V/J
RTL8111F-VL-CG/QFN48
XTALI_P XTALO_P
LX1 25M/20p/30ppm/49US/20/D
LC3 27p/4/NPO/50V/J
LC4 27p/4/NPO/50V/J
80歐姆:[15/5/5/5/15]
LB_ML_OP LB_ML_ON LB_SRCCLK_LAN LB_-SRCCLK_LAN LB_ML_IP LB_ML_IN
LBC12 LBC16 LBC6 LBC8 0.1u/4/X7R/16V/K
LB_RP LB_RN LB_TP LB_TN
離IC近越好
SRCCLK 50歐姆:[18/4/10/4/18]

Dual Color LED
D4 D3 Green
D4 D3 Orange
Single Color LED
D2 D1 Yellow
LR16 0/6/SHT/M/X
ENABLE SW
ENSWREG

P35-152-19W9
U4 U3 U2 U1 U8 U7 U6 U5 (-,+)
L1 L3 L5 L7 L9 L2 L4 L6 L8 L10
D1 D2 D3 D4
YELLOW ORANGE GREEN

3VDUAL VDD33
LBC29 22u/8/X5R/6.3V/M
LBC7 LBC17 LBC15 LBC4 LBC22 LBC14 0.1u/4/X7R/16V/K
(CLOSE LU1)
DVDD10
LBC11 LBC10 LBC13 LBC5 LBC19 LBC18 LBC9 0.1u/4/X7R/16V/K
(PIN3,6,9,13,29,41,45)

LL1 4.7uH/1210/1250mA/0.1/S
CLOSE LL2
REGOUT DVDD10
LBC20 22u/8/X5R/6.3V/M
LBC21 0.1u/4/X7R/16V/K
EVDD10
LFB1 0/6/SHT/M/X
LBC3 1u/4/X5R/6.3V/K
LBC1 0.1u/4/X7R/16V/K
(PIN21)

## USB30_LAN CONNECTOR

LBESD1 AOZ8902CIL/SOT23-6/X
LBESD2 AOZ8902CIL/SOT23-6
LBESD3 AZC099-04S/SOT23-6L
UBESD1 AZC099-04S/SOT23-6L
CLOSE USB30_LAN

100歐姆:[20/4/8/4/20]
USB30_LAN
USB3+LAN/1G/GO,Y/OS/RA/D/G30/[11NR6-702009-K1R]
LBC25 1u/4/X5R/6.3V/K/X
LBC26 0.1u/4/X7R/16V/K
LBC31 0.1u/4/X7R/16V/K
LBC30 0.1u/4/X7R/16V/K
LR10 150/6/1
90歐姆:[15/4.5/7.5/4.5/15]
UBC5 UBC6 UBC8 UBC7 0.1u/4/X7R/16V/K
UBF10 UBF9 SMD1206P350SLR/6V/S
CLOSE USB30_LAN
UBE1 UBE2 AZ1045-04F/MSOP10

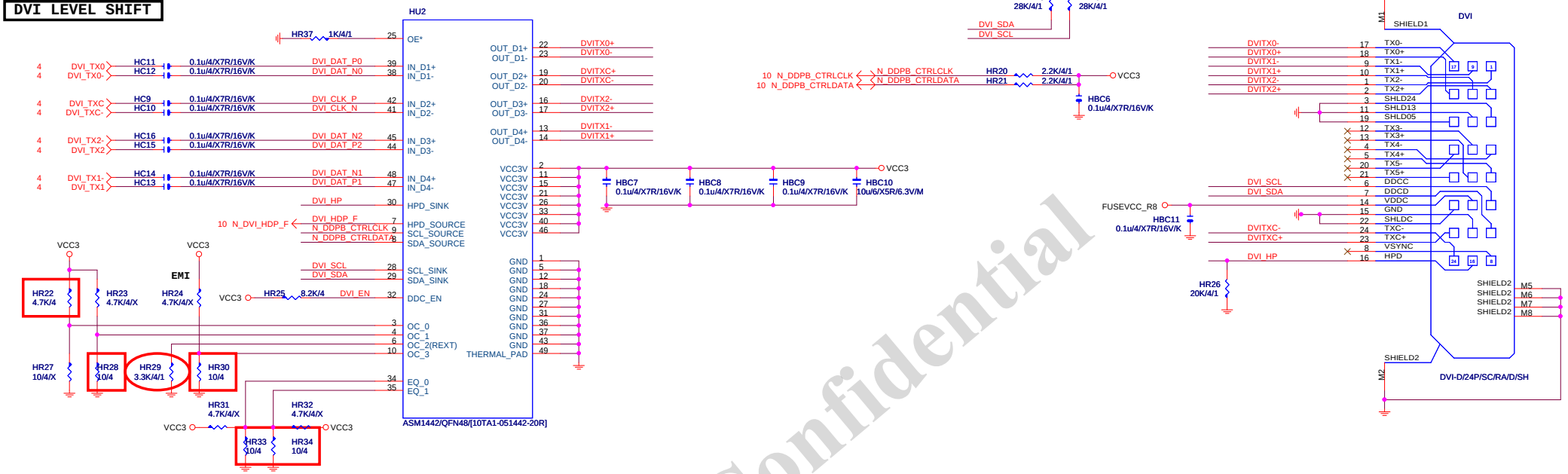
-USBOC_R
SOT23
UBD1 UBD3 UBD4 BAT54A/SOT23/200mA
UBR7 8.2K/4
UBR9 15K/4/1
LR1 0/4/SHT/M/X
LAN
RBR20 0/4/SHT/M/X
USB_LAN <--> R_USB30_1



| | |
|---|---|
| Title | Gigabyte Technology |
| | INTEL LAN I217 |
| Size / Custom | Document Number: GA-H87-HD3 |
| Rev | 1.1 |
| Date: | Wednesday, July 10, 2013 |
| Sheet | 31 of 34 |

## DVI LEVEL SHIFT

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

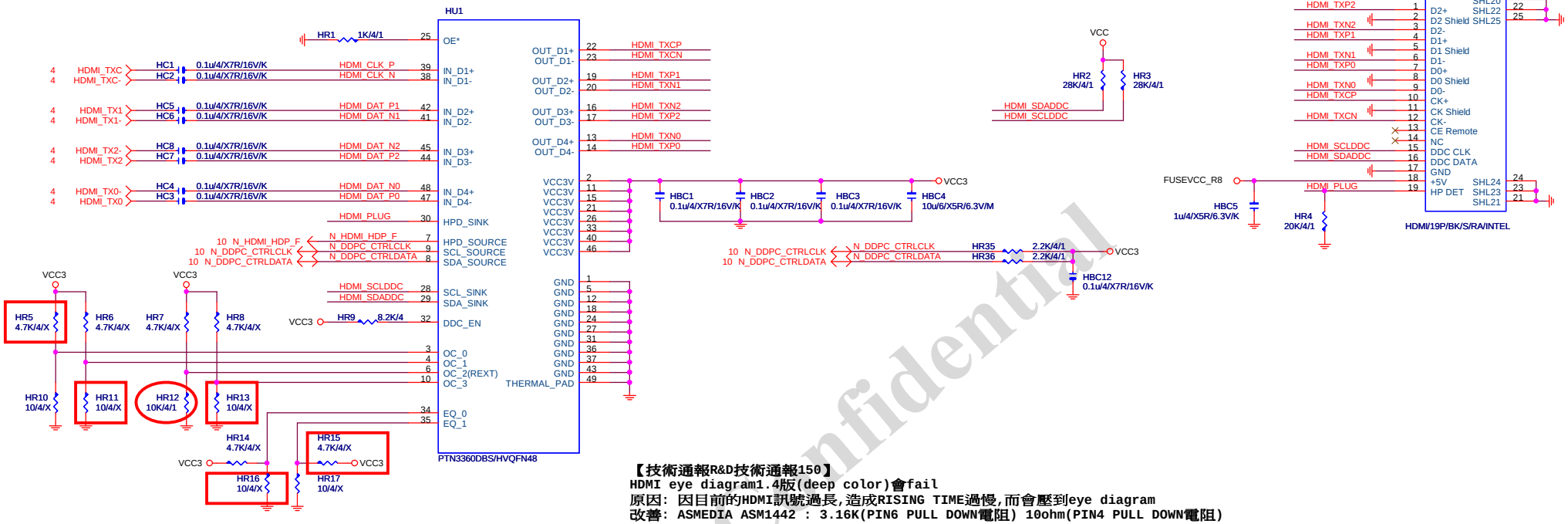



**PTN3360:PIN 4/10/34/35 NC PIN,都不上值;只上HR29:10K**
**ASM1442:紅色框要上,HR29:3.3K**

| | | | |
|---|---|---|---|
| Gigabyte Technology | | | |
| Title: TI TSB43AB23 1394 | | | |
| Size: Custom | Document Number: GA-H87-HD3 | | Rev: 1.1 |
| Date: Wednesday, July 10, 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 diagram1.4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: ASMEDIA ASM1442 : 3.16K(PIN6 PULL DOWN電阻) 10ohm(PIN4 PULL DOWN電阻)**



GIGABYTE™

| | | |
|---|---|---|
| Title: HDMI | | |
| Size: Custom | Document Number: GA-H87-HD3 | Rev: 1.1 |
| Date: Wednesday, July 10, 2013 | Sheet 33 of 34 | |

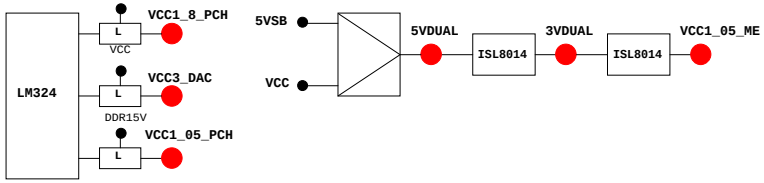
## PCH GPIO LIST TABLE

| PIN NAME | PWR | AFTER/PLTRST | Default | USAGE | NOTE |
|---|---|---|---|---|---|
| GP0 | MAIN | H-Z | GPI | 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 | PCIEX1 Detect | P/U 8.2K VCC3 |
| GP7/TACH3 | MAIN | | GPI | GPIO7 | P/U 8.2K VCC3 |
| GP8 | STBY | H | GPI | 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 | N/A |
| GP13 | STBY | L | GPI | LPCPME# | P/U 8.2K 3VDUAL |
| GP14/OC7# | STBY | | NATIVE | USB OC7# | N/A |
| GP15 | STBY | L | GPI | GPIO15(TLS Enable) | P/U 8.2K 3VDUAL |
| 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 | P/U 8.2K VCC3 |
| GP23 | MAIN | | GPI | GPIO23 | N/A |
| GP24 | STBY | L | GPI | SKTOCC# | N/A |
| GP25 | STBY | | | Mobile Only | N/A |
| GP26 | STBY | | | Mobile Only | N/A |
| GP27 | STBY | H | GPO | GPIO27 | P/U 8.2K 3VDUAL |
| GP28 | STBY | H | GPO | PWR LED | P/U 8.2K 3VDUAL |
| GP29 | STBY | L | GPI | GPIO29 | N/A |
| GP30 | STBY | H-Z | GPI | Mobile Only | N/A |
| GP31 | STBY | H-Z | GPI | Mobile Only | N/A |
| GP32 | MAIN | H | GPO | N/A | N/A |
| GP33 | MAIN | H | GPO | N/A | N/A |
| GP34 | MAIN | H-Z | GPI | -PCI_STOP | P/U 8.2K VCC3 |
| GP35 | MAIN | L | GPO | -ACZ_DET | P/U 8.2K VCC3 |
| GP36 | MAIN | | GPI | N/A | N/A |
| GP37 | MAIN | | GPI | N/A | N/A |
| GP38 | MAIN | H-Z | GPI | PCIEX4 Detect | P/U 8.2K VCC3 |
| GP39 | MAIN | H-Z | GPI | GPIO39 | P/U 8.2K VCC3 |
| 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 | P/U 8.2K 3VDUAL |
| GP45 | STBY | | NATIVE | GPIO45 | P/U 8.2K 3VDUAL |
| GP46 | STBY | L | NATIVE | GPIO46 | P/U 8.2K 3VDUAL |
| GP47 | STBY | | | Mobile Only | N/A |
| GP48 | MAIN | H-Z | IN | GPIO48 | P/U 8.2K 3VDUAL |
| GP49 | MAIN | H-Z | IN | GPIO49 | P/U 8.2K 3VDUAL |
| GP50 | MAIN | | NATIVE | -REQ1 | P/U 2.2K VCC |
| GP51 | MAIN | H | NATIVE | -GNT1 | N/A |
| GP52 | MAIN | | NATIVE | -REQ2 | P/U 2.2K VCC |
| GP53 | MAIN | H | NATIVE | -GNT2 | N/A |
| GP54 | MAIN | | NATIVE | -REQ3 | P/U 2.2K VCC |
| GP55 | MAIN | H | NATIVE | -GNT3 | N/A |
| GP56 | STBY | | NATIVE | Mobile Only | N/A |
| GP57 | STBY | H-Z | IN | VCORE_OV1 | P/U 8.2K 3VDUAL |
| GP58 | STBY | H-Z | NATIVE | F_USB_OC | P/U 8.2K 3VDUAL |
| GP59 | STBY | | NATIVE | USB_OC0# | N/A |
| GP60 | STBY | H-Z | NATIVE | N/A(Reverse) | P/U 8.2K 3VDUAL |
| GP61 | STBY | L | NATIVE | -SUSTAT | N/A |
| GP62 | STBY | L | NATIVE | SUSCLK | N/A |
| GP63 | STBY | L | NATIVE | GPIO63 | N/A |
| GP64 | MAIN | L | NATIVE | CLKOUTFLEX0 | N/A |
| GP65 | MAIN | L | NATIVE | CLKOUTFLEX1 | N/A |
| GP66 | MAIN | L | NATIVE | CLKOUTFLEX2 | N/A |
| GP67 | MAIN | L | NATIVE | CLKOUTFLEX3 | N/A |
| GP72 | STBY | H-Z | NATIVE | VCORE_OV4 | P/U 8.2K 3VDUAL |
| GP73 | STBY | | | Mobile Only | N/A |
| GP74 | STBY | H-Z | NATIVE | 1_05V_OV2 | P/U 8.2K 3VDUAL |
| GP75 | STBY | H-Z | NATIVE | N/A(Reverse) | P/U 8.2K 3VDUAL |

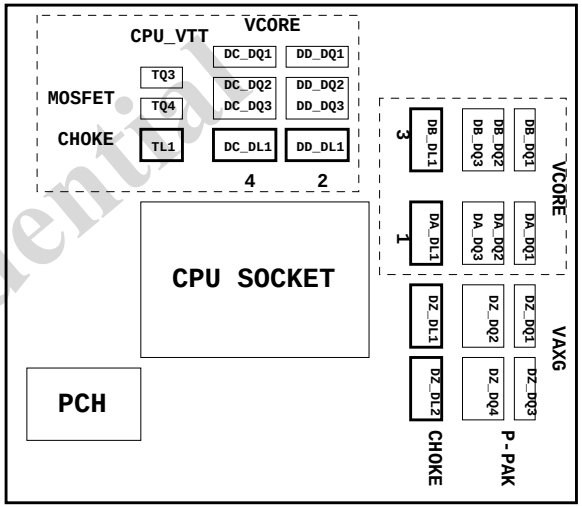
## Super I/O ITE8720 GPIO Table

| 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/BUSSO0 | 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/BUSSI1 | SB_LED1_C | |
| PD4/GP74/BUSSI2 | SB_LED2_C | |
| VCORE_EN/VID7/GP64 | IT_GP64 | SB_LED3_C |
| PD0/GP70 | NB_LED1_C | |
| PD1/GP71 | NB_LED2_C | |
| PD2/GP72/BUSSI0 | NB_LED3_C | |
| GP22/SCK | LOW_PWR_1 | |
| VIDO5/GP27/SIN2 | LOW_PWR_2 | |
| PCIRST2#/GP11 | -PFMRST1 | |
| PCIRST1#/GP12 | -PFMRST2 | |
| 3VSBSW#/GP40 | CSI_F0 | BSEL166_1 |
| SUSC#/GP53 | CSI_F1 | BSEL166_2 |
| GP23/SI | BSEL166_3/CSISBSL | |
| VIDO0/GP20/CTS2# | CPUT_LED1_C | BSEL166_4 |
| GP65/VDDA_EN/GB_01 | MB_ID2 | |
| PD6/GP76/BUSSO1 | MB_ID3 | |
| PD7/GP77/BUSSO2 | MB_ID4 | |
| AFD#/GP86/SMBC_R | 空 PIN | FST_2X8 |
| INIT#/GP85/SMBD_M | SEC_2x8 | GTLREF_AD2 |
| ACK#/GP83 | DDR_LED1_C | |
| VIDO1/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 | |
| VIDO4/GP26/SOUT2 | DDR18V_PH2_EN | |
| VIDO2/FAN_TAC5/GP24/DSR2# | DDR18V_LED | |
| VIDO6/GP17/RI2# | 1_1V_PH_EN | |
| VIDO7/JP6/DTR2# | JP6 | |
| PD5/GP75/BUSSO0 | 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 Terminatio |
| VREF_CA_A/VREF_CA_B | DRAM Address Ref |
| VREF_DQ_A/VREF_DQ_B | DRAM Data Ref |

## 散熱模組料號：

Z77-D3H :
PCH :
12SP2-S05511-01R/02R/03R
MOSFET :
12SP2-S08924-01R/02R/03R

| | 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 |



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Size: C | Document Number: GA-H87-HD3 | Rev: 1.1
Date: Wednesday, July 10, 2013 | Sheet 34 of 34