

Model Name: GA-Z87N-WIFI

Revision 2.01

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,NVRAM
10	PCH_DP,CLK BUFFER
11	PCH_HOST,SATA,PCI
12	PCH_GPIO,CTRL,AUDIO
13	PCH_PWR,GND
14	PCI EXPRESS*16 SLOT
15	ITE 8728 LPC IO
16	COM,KB_USB30
17	HWM,FAN CTRL,OV,-PROCHOT
18	DUAL BIOS
19	FP,FUSB,SPK,SATALED
20	Realtek ALC892
21	REAR AUDIO JACK
22	INTEL LAN I217 (A)
23	Artheros AR8161B (B)
24	DISCRETE POWER
25	ATX,CLK GEN
26	RT8120_DDR POWER,M3 POWER
27	VCORE ISL95820_1

SHEET

TITLE

28	VCORE ISL95820_2
29	DVI-I
30	HDMI * 2
31	mini PCI-E

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Gigabyte Technology

Title			Cover Sheet
Size	Document Number	GA-Z87N-WIFI	
Custom		Rev	2.01
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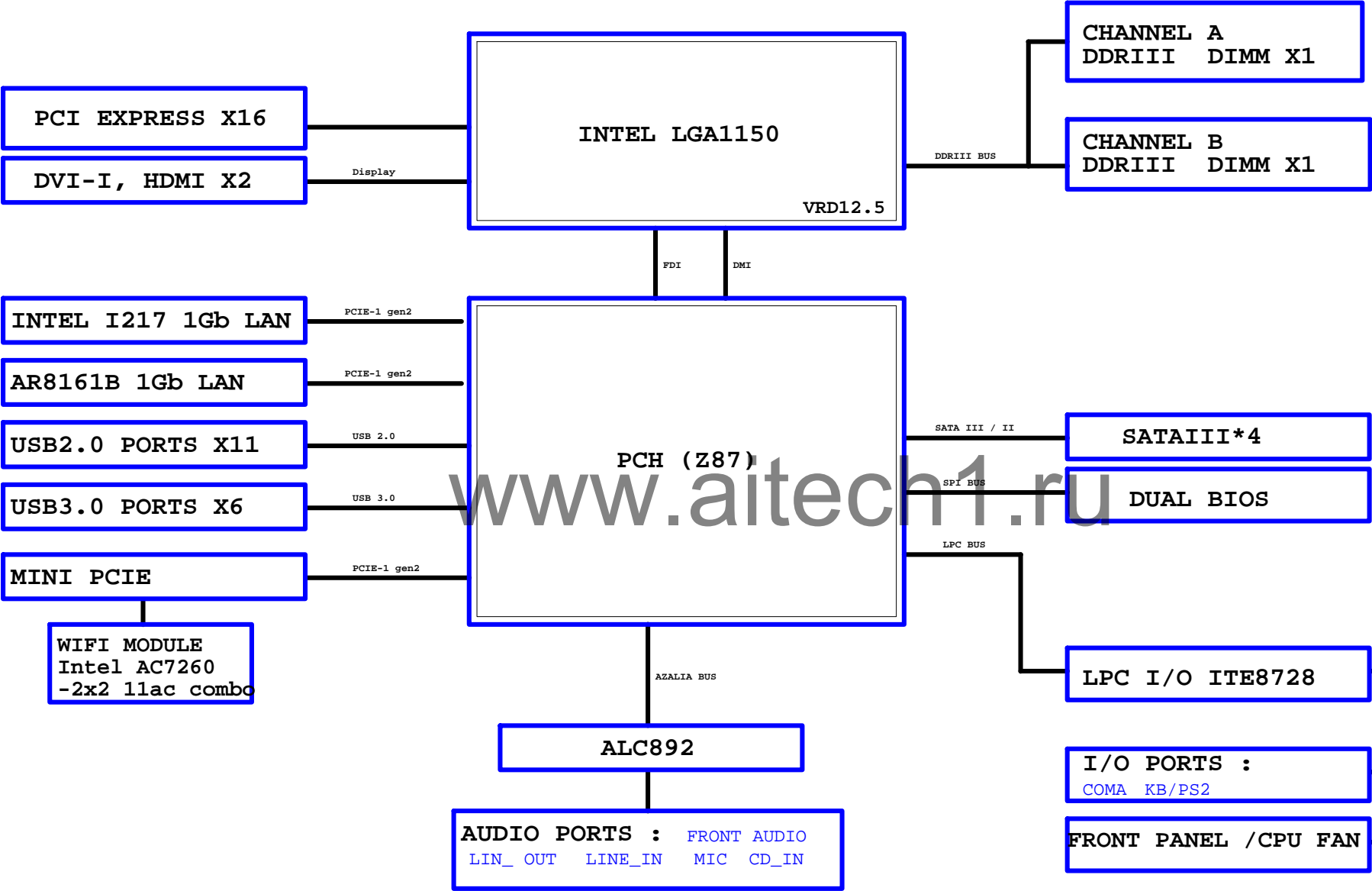
Revision 2.01

## 2013/08/15

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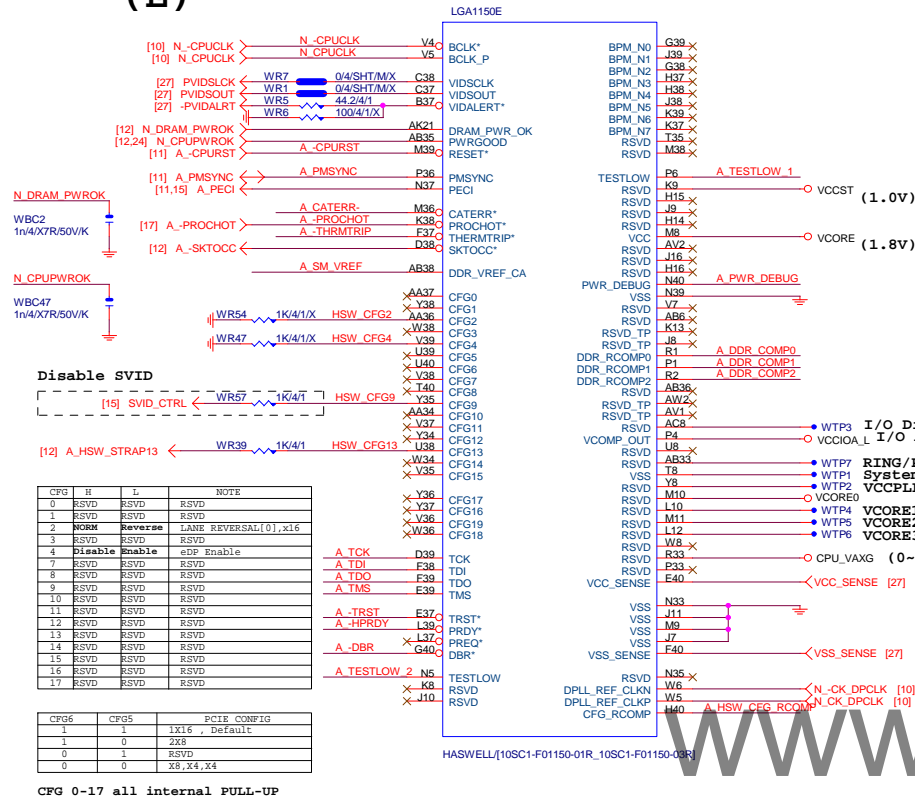
[illegible]

BLOCK DIAGRAM



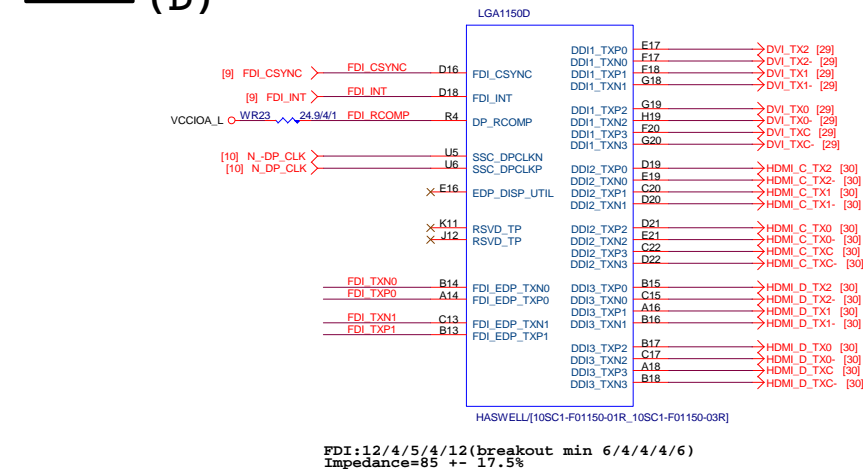
## LGA1150

(E)



## LGA1150

(D)



## LGA1155

(C)

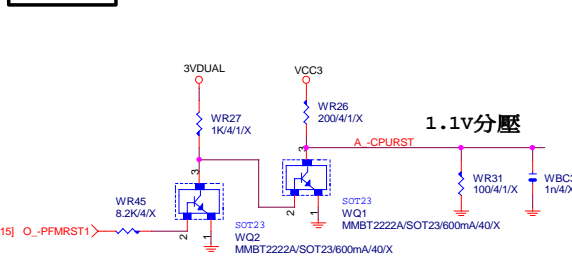
PCIEX16:16/5/5/5/16(breakout min 10/4/4/4/10)  
Impedance=80 +- 17.5%



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



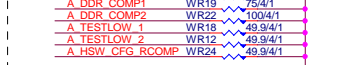
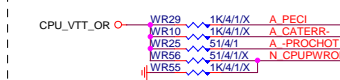
## -CPURST



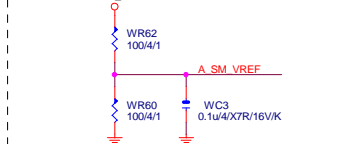
## CPU SVID



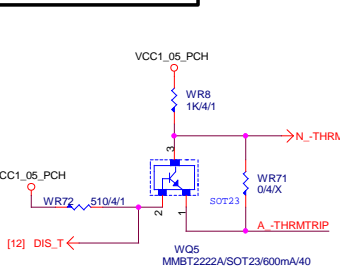
## CPU PU/PD



## SM REF



## THRMTRIP DISABLE



## Gigabyte Technology

CPU LGA1150-A

Size Custom Document Number GA-Z87N-WIFI

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HASWELL/10SC1-F01150-01R\_10SC1-F01150-03R

HASWELL/J10SC1-F01150-01R\_J10SC1-F01150-03R

WBC34 0.1u/4/X7R/16V/K WBC33 0.1u/4/X7R/16V/K

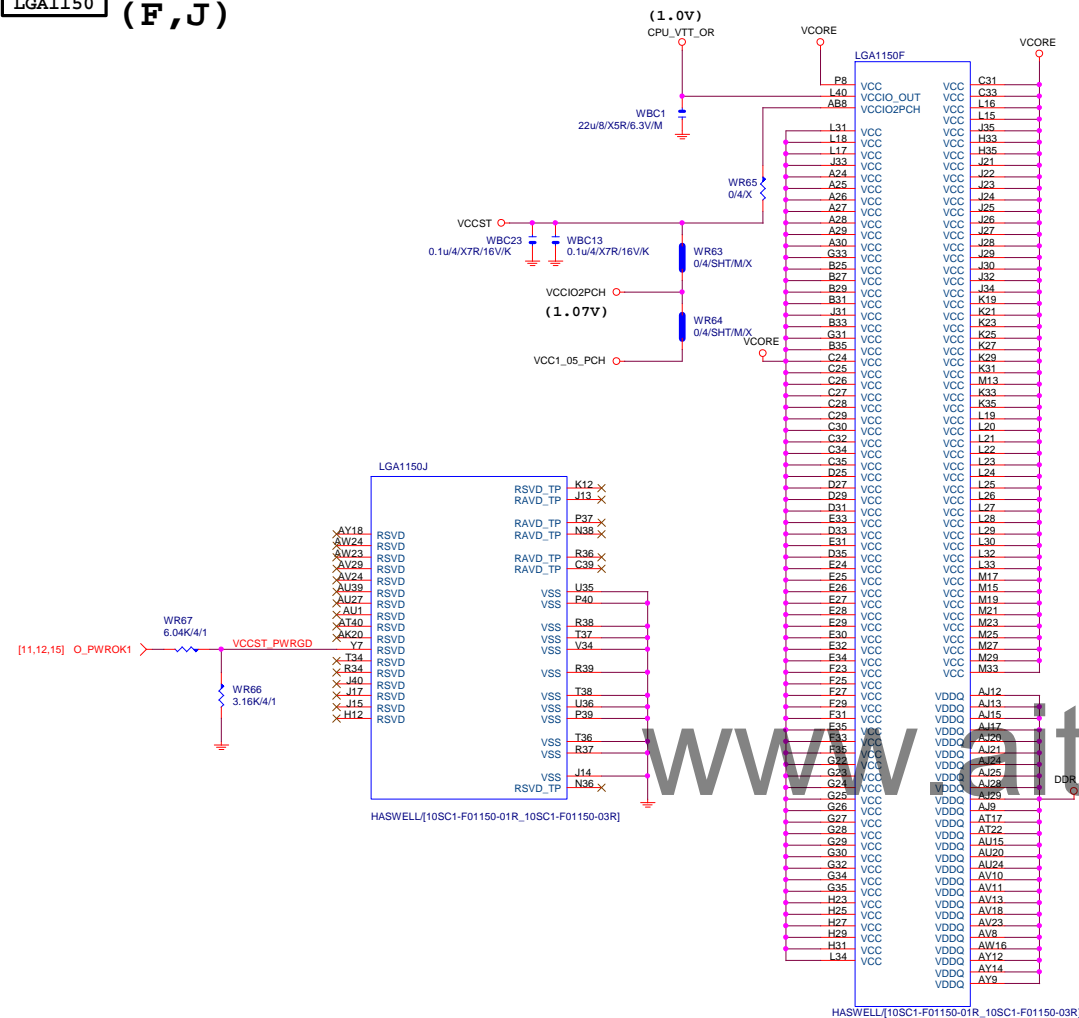
COVER+BLACK NI

ILM\_BP/1156/BKNI/[12KRC-0F0001-61R\_12KRC-0F0001-62R

DDR BUS

- [7] MODT\_A[0..1]  $\leftrightarrow$  MODT\_A[0..1]  
 [8] MODT\_B[0..1]  $\leftrightarrow$  MODT\_B[0..1]  
 [7] MDA[0..63]  $\leftrightarrow$  MDA[0..63]  
 [8] MDB[0..63]  $\leftrightarrow$  MDB[0..63]  
 [7] DQSA[0..7]  $\leftrightarrow$  DQSA[0..7]  
 [7] -DQSA[0..7]  $\leftrightarrow$  -DQSA[0..7]  
 [7] MAAA[0..15]  $\leftrightarrow$  MAAA[0..15]  
 [8] MAAB[0..15]  $\leftrightarrow$  MAAB[0..15]  
 [8] DQSB[0..7]  $\leftrightarrow$  DQSB[0..7]  
 [8] -DQSB[0..7]  $\leftrightarrow$  -DQSB[0..7]

# LGA1150 (F,J)

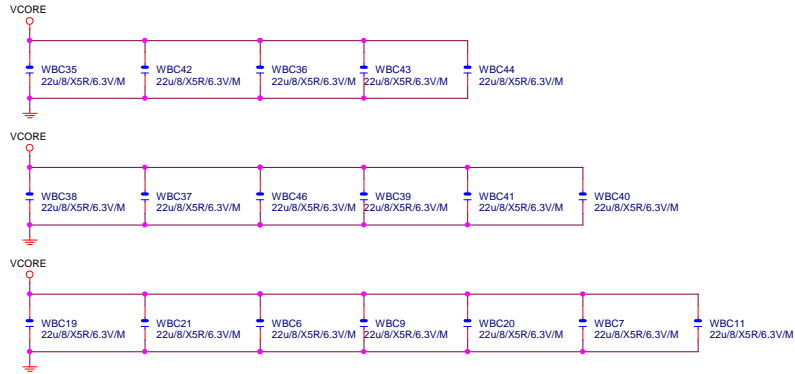


# LGA1155 (G,H,I)



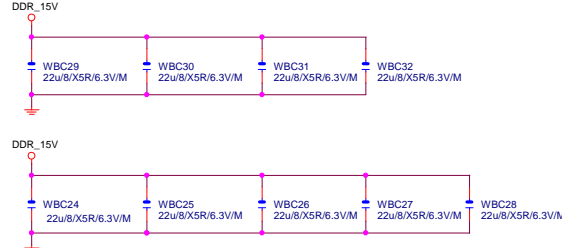
## VCore CAP

(X18)



## DDR CAP

(X9)



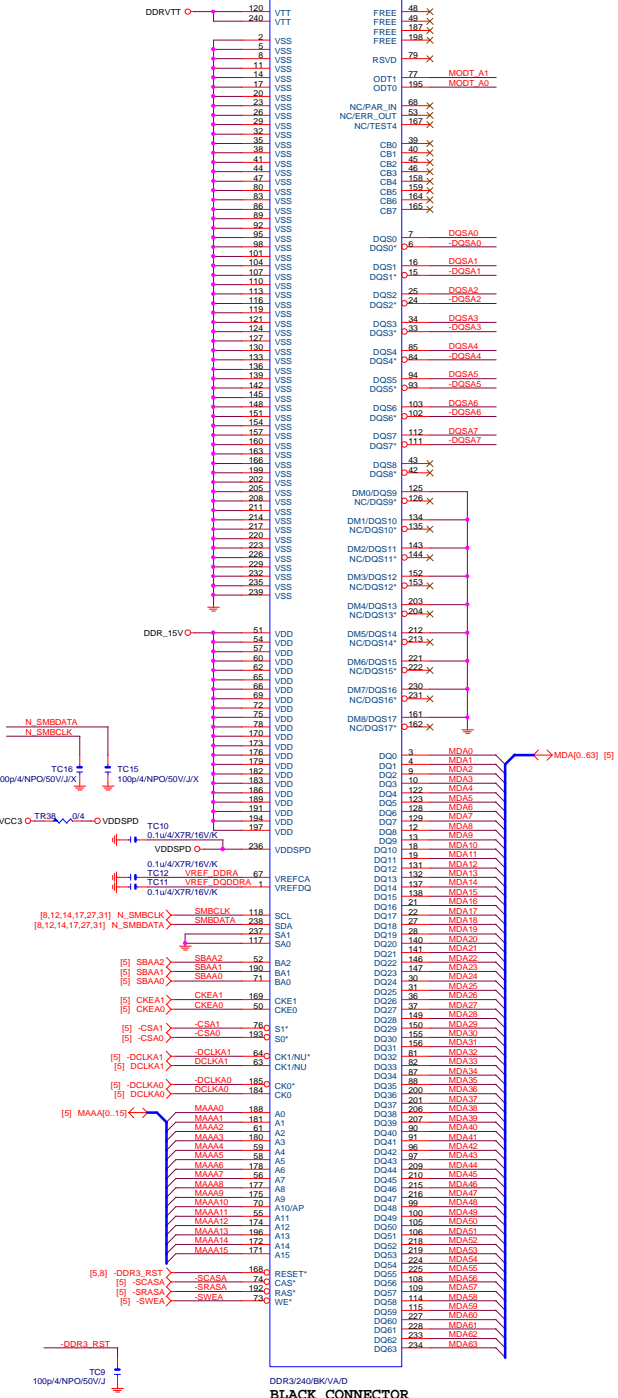
Gigabyte Technology

Title		CPU LGA1150-C	
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Rev 2.01

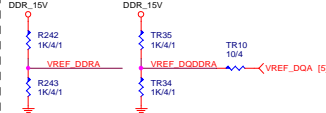
DDR3

(A)

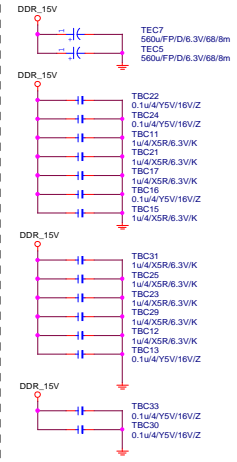


DDR3

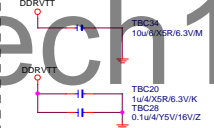
DDR3 VREF



DDR15V Decouple



DDRVTT Decouple



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Gigabyte Technology	
DDRIII CHANNEL A	
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DMI:12/4/4/4/12(breakout min 8/4/4/4/8)  
Impedance=85 +- 17.5%

VCC1\_5\_PCH

NR50 7.5K/4/1 DMI\_COMP B19

NR40 7.5K/4/1 PCIE\_COMP C13

CK -SRCLK\_PCH G22

CK SRCCLK\_PCH F22

	H7
	E1
	D2
	K6
	K8
	G3
	J2
	J3
	H2
	H1

PCIEX1:16/5/5/5/16 (breakout\_min\_8/4/4/4/8)



PCHB	B85: Port 6/7 N/A
	H81: Port 6/7/12/13 N/A

[illegible]

4/4/4/8)

PCHE  
USB3

VCC3

NR62 8.2K/4 AK28 TACH6\_G

NR63 8.2K/4 AT34 TACH7\_G

DH82Z287 O

FDI T1

FDI T2

## CK SRCCLK PCH NR8

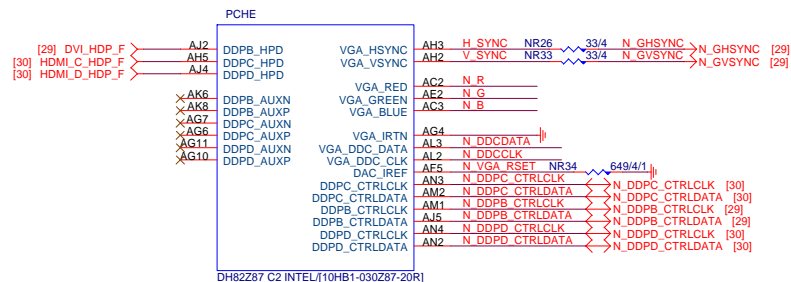


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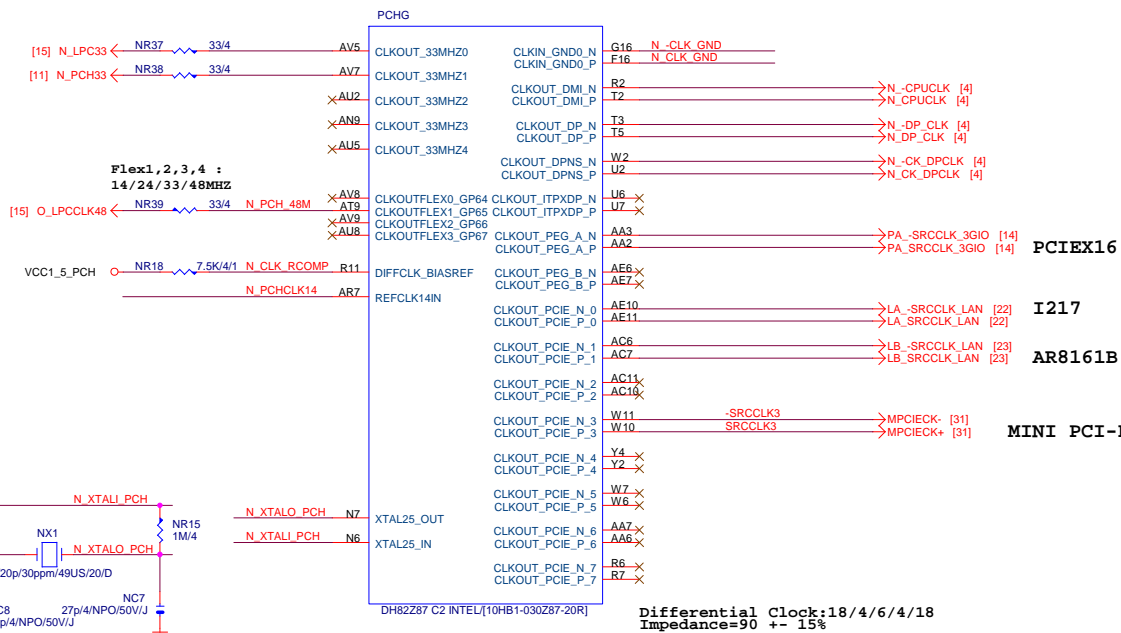
USB OC# Configure	
OC0#	F_USB30
OC1#	USB30__LAN2
OC2#	USB30__LAN1
OC3#	N/A
OC4#	F_USB20
OC5#	KB_MS_USB
OC6#	MINI_PCIE
OC7#	Not Use

<h1 style="text-align: center;">Gigabyte Technology</h1>				
<h2 style="text-align: center;">PCH FDI,DMI,USB ,PCIE,NVRAM</h2>				
Document Number	<h1 style="margin: 0;">GA-Z87N-WIFI</h1>			Rev 2.
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**PCH (E)**



**PCH (G)**



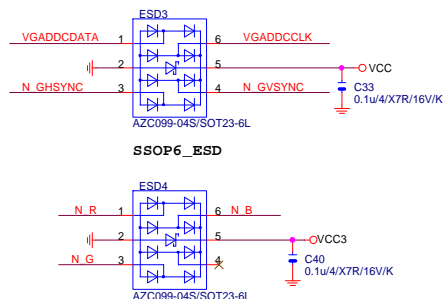
PCH CLK PD
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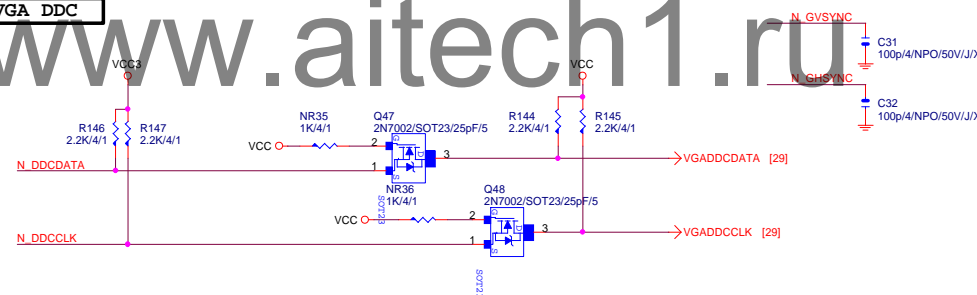
Mount for integrated clock Generation  
Mode



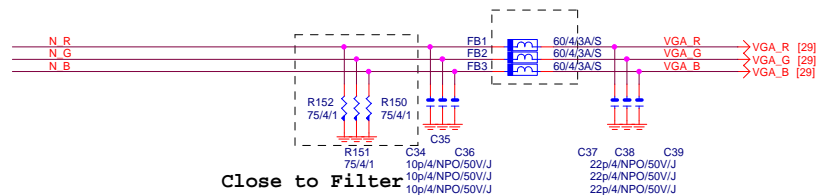
## VGA ESD



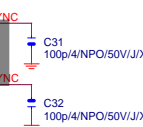
## VGA DDC



## VGA DDC

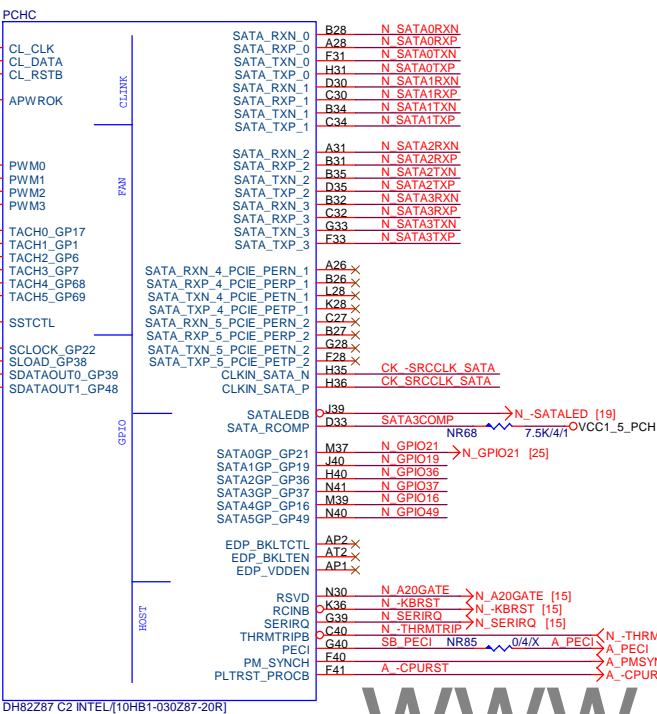


## VGA CONNECTOR

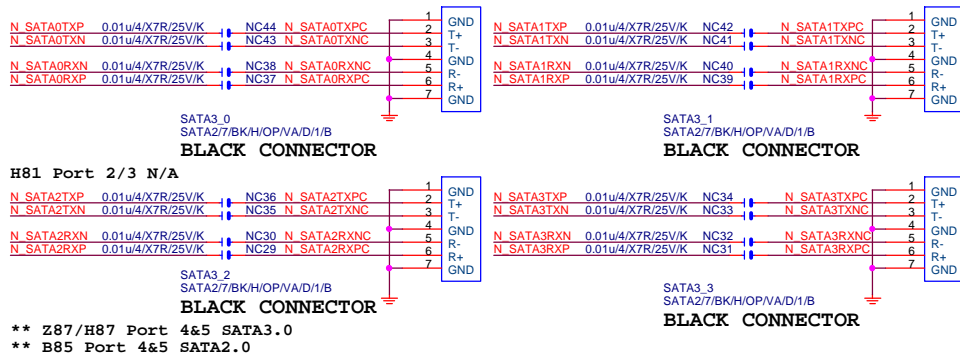


(C)

SATA3 : 20/7.5/4.5/7.5/20 (breakout min 8/4/4/4/8)  
Impedance=90 +- 17.5%  
SATA2 : 15/7.5/4.5/7.5/15 (breakout min 8/4/4/4/8)  
Impedance=90 +- 17.5%

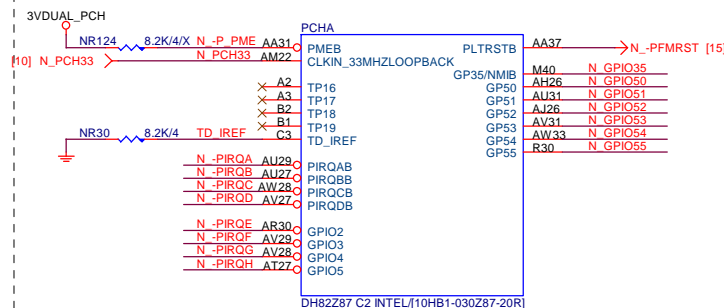


## SATA CONNECTOR

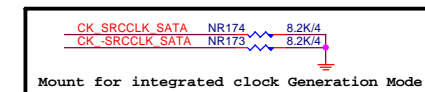


N/A

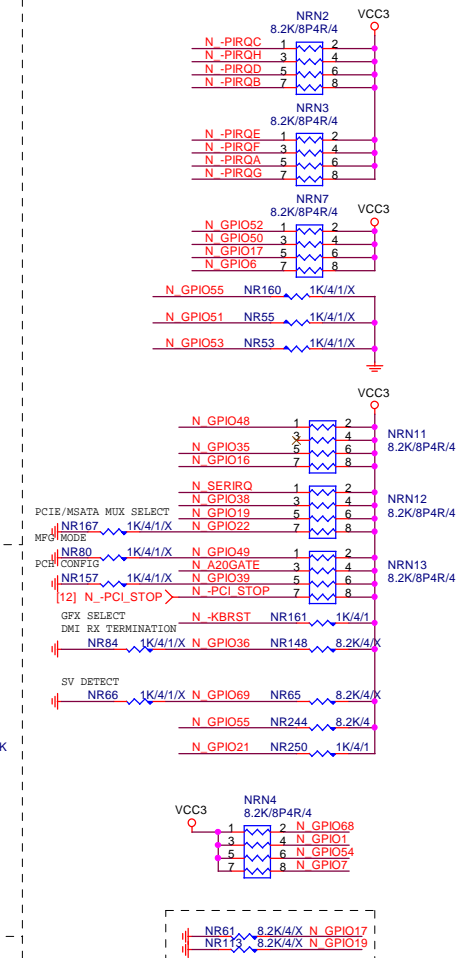
(A)



## PCH CLK PD



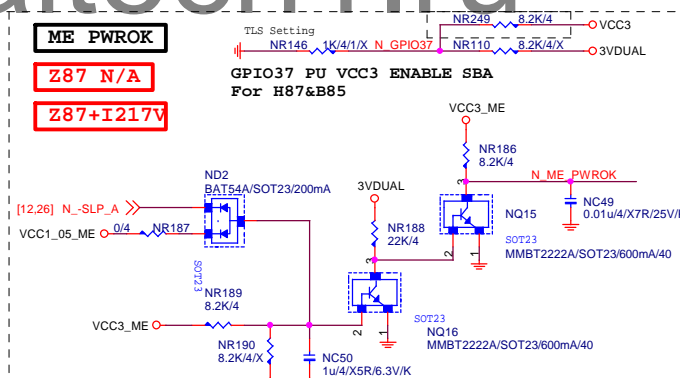
PCH	PU/PD
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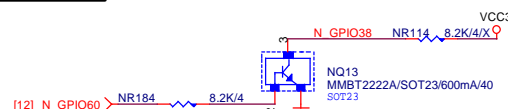
## ME PWROK

Z87 N/A

Z87+I217V



GPIO38 Ctrl

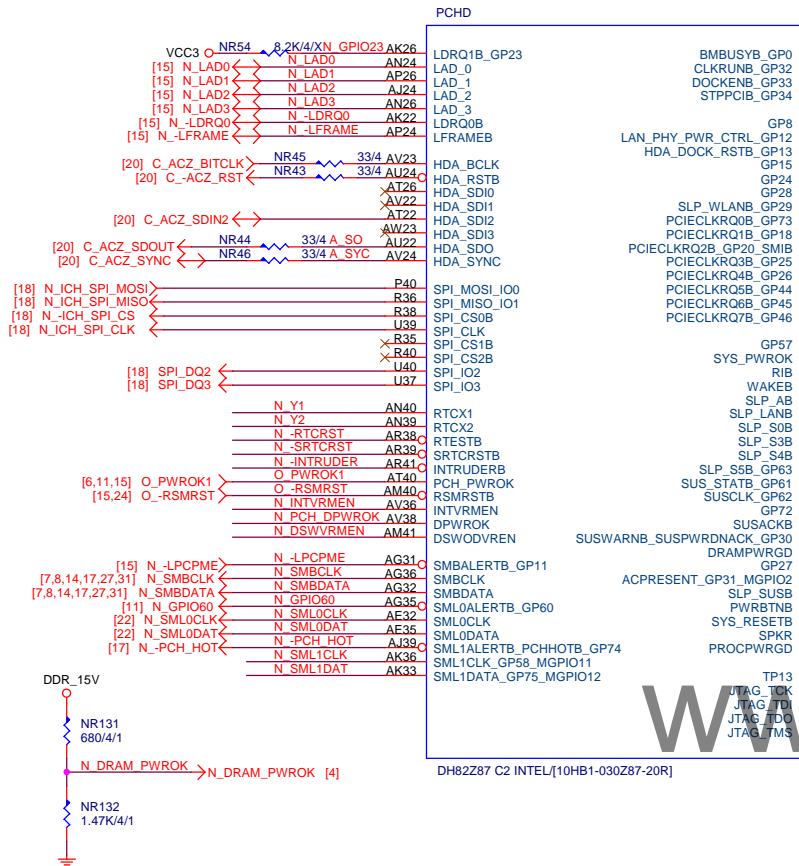


## Gigabyte Technology

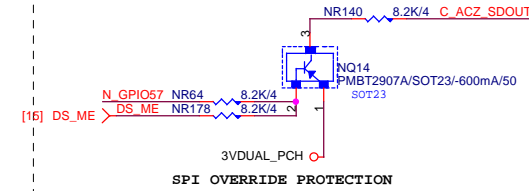
Title			
PCH HOST , SATA, PCI			
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# PCH (D)

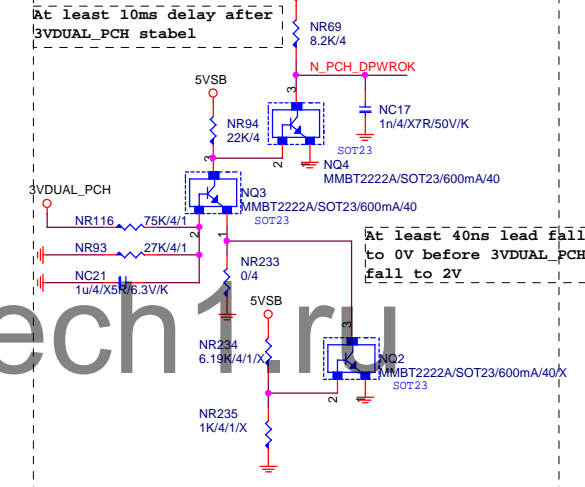
[15] N\_LAD[0..3] <-< N\_LAD[0..3]



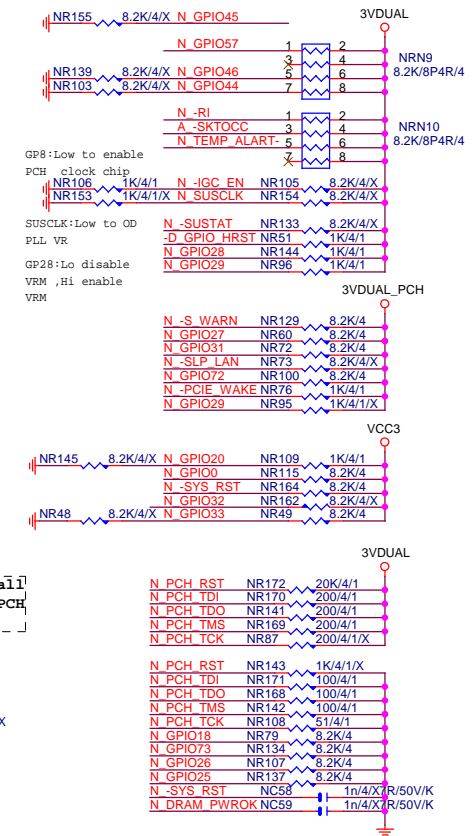
# ACZ\_SDOUT



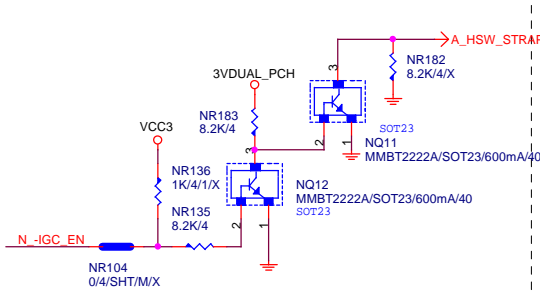
# PCH\_DPWROK



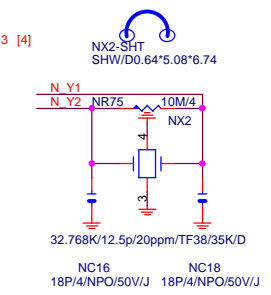
# PCH PU/PD



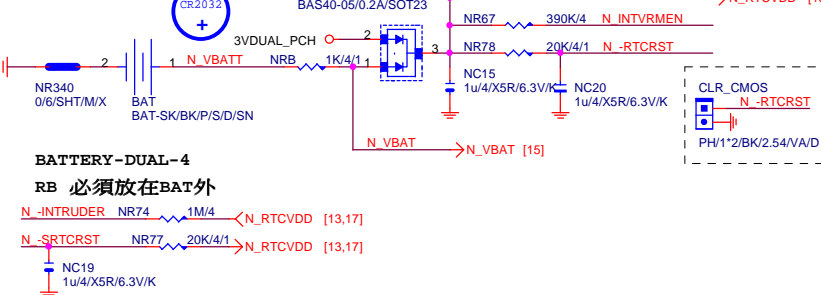
# HSW\_STRAP13



# 32.768KHZ



# CLR\_CMOS



**Gigabyte Technology**

Title: PCH GPIO , CTRL , AUDIO

Size: Custom

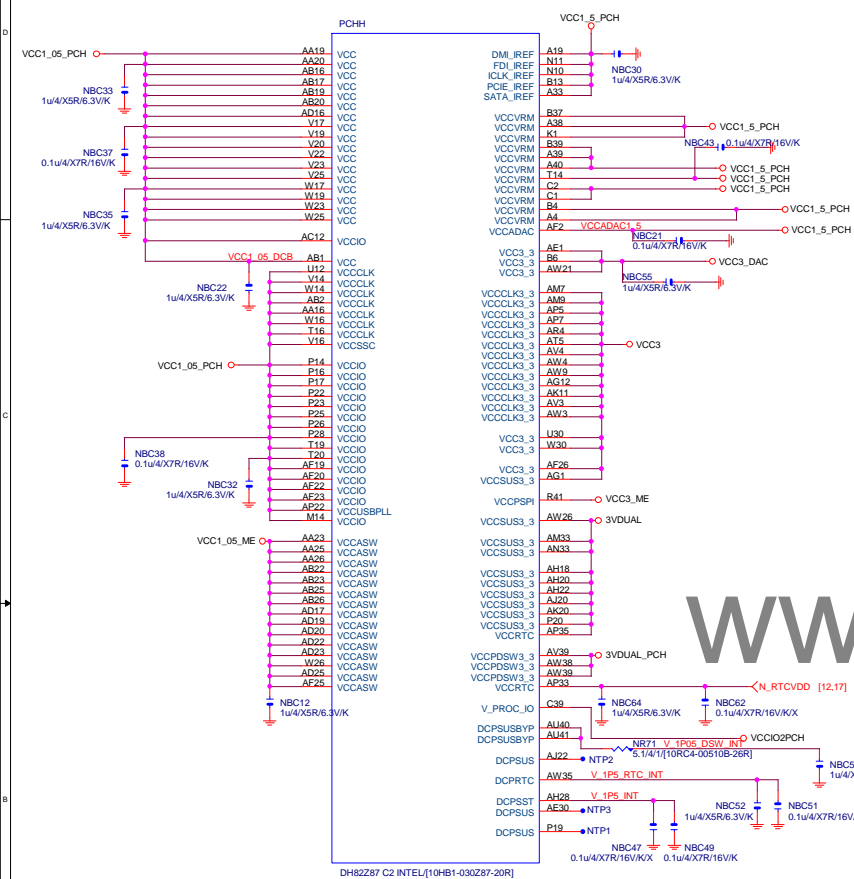
Document Number: GA-Z87N-WIFI

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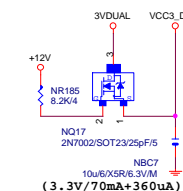
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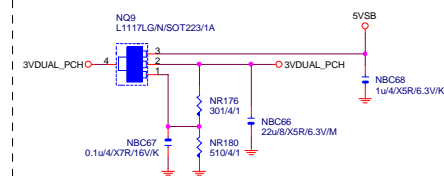
**PCH (H)**



## VCC3\_DAC

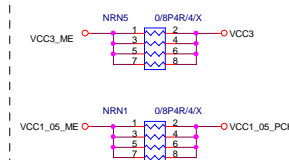


## 3VDUAL\_PCH



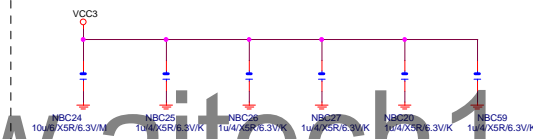
SHT PWR

M3 POWER

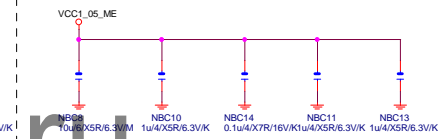


## CAP

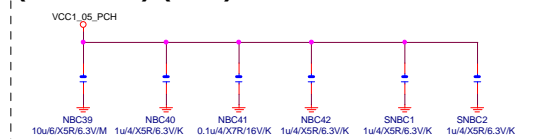
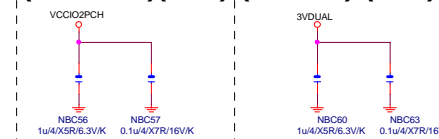
( 3.3V ) ( X6 )



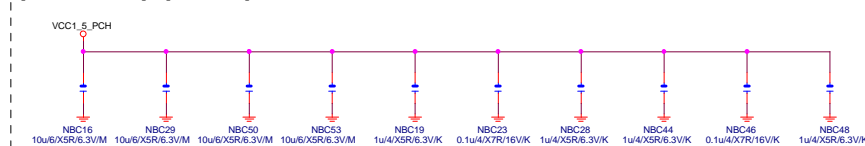
(1.05V) (x5)



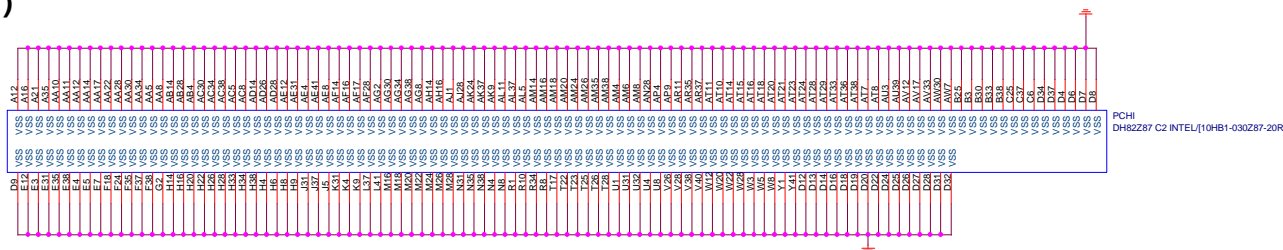
(1.05V)(x6)


$$(1.05V)(x2) + (3.3V)(x2)$$


**(1.05V) (x10)**

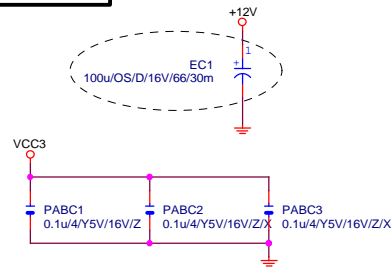


**PCH (I)**

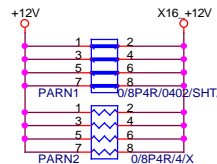




# PCIEX16 CAP



# PCIEX16 PROTECT SHT

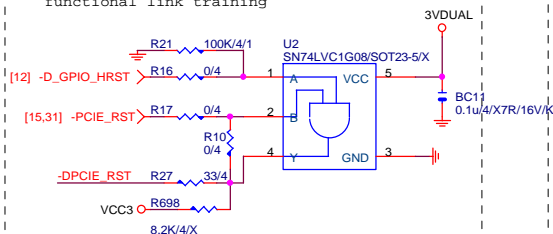


# PCIEX16 AC CAP

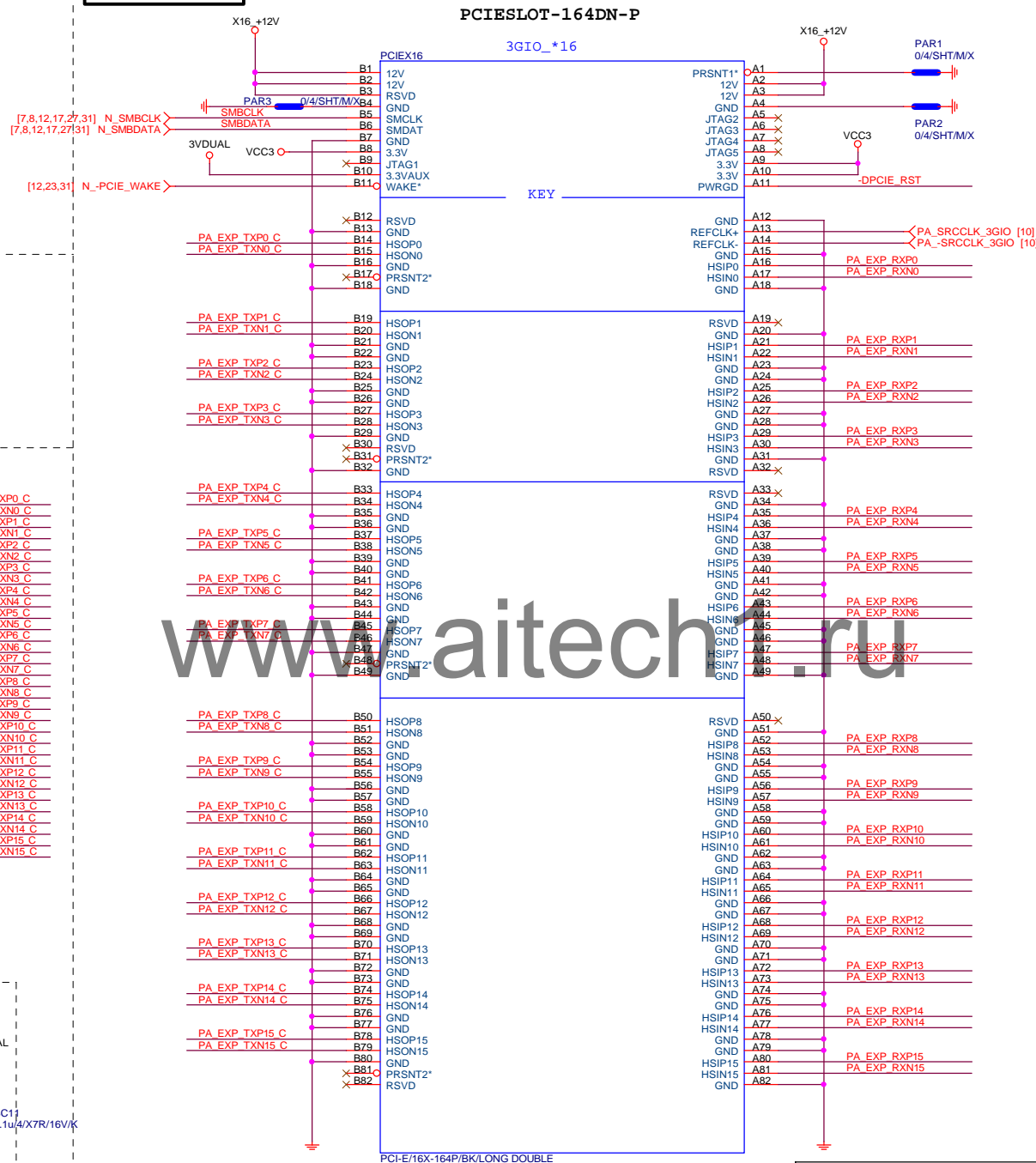
PA EXP TXP0	PAC5	0.22u/4/X5R/6.3V/K	PA EXP TXP0 C
PA EXP TXN0	PAC4	0.22u/4/X5R/6.3V/K	PA EXP TXN0 C
PA EXP TXP1	PAC6	0.22u/4/X5R/6.3V/K	PA EXP TXP1 C
PA EXP TXN1	PAC7	0.22u/4/X5R/6.3V/K	PA EXP TXN1 C
PA EXP TXP2	PAC8	0.22u/4/X5R/6.3V/K	PA EXP TXP2 C
PA EXP TXN2	PAC9	0.22u/4/X5R/6.3V/K	PA EXP TXN2 C
PA 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

PA EXP RXP0.15] >>> PA\_EXP\_RXP[0.15] [4]  
 PA EXP RXN0.15] >>> PA\_EXP\_RXN[0.15] [4]  
 PA EXP TXP0.15] >>> PA\_EXP\_TXP[0.15] [4]  
 PA EXP TXN0.15] >>> PA\_EXP\_TXN[0.15] [4]

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



# PCIEX16 SLOT



BLACK CONNECTOR

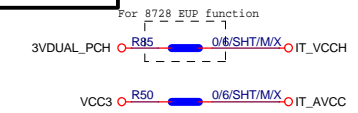
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Title			
PCI EXPRESS * 16			
Size	Document Number	Rev	
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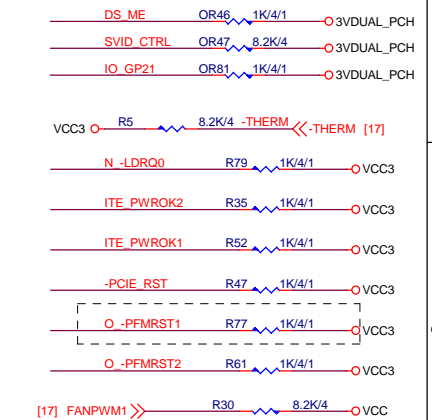
## SIO IT8728F

【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

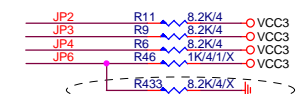
## PWR SHT



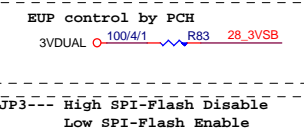
## SIO PU



## SIO STRAP



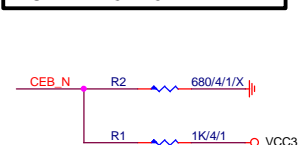
IT8728-EX  
PULL DOWN ENABLE OVP



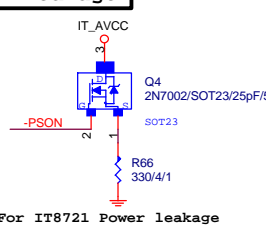
## IT8728F NOTE

	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

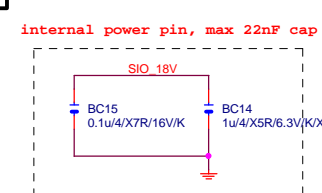
## DUAL BIOS OPT STRAP



## Power leakage

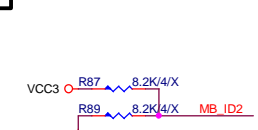


## SIO\_18V

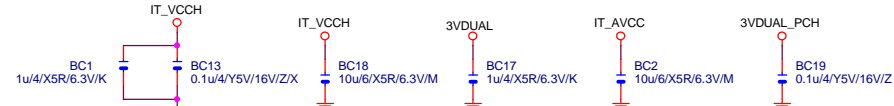


FOR LOW TEMP POWER ON INTO TEST MODE ISSUE

## MB ID



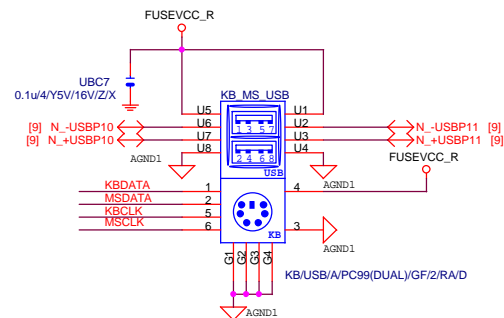
## SIO CAP



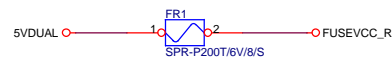
## Gigabyte Technology

Title			ITE 8728 LPC IO
Size	Document Number	GA-Z87N-WIFI	
Custom			Rev 2.01
Date:	Thursday, August 15, 2013	Sheet	15 of 31

## KB/MS

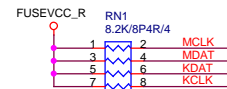


## USB2.0 PWR

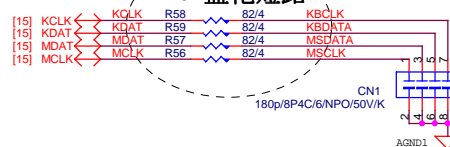


Close to connector  
KB\_MS\_USB 2-Port 2.0A

## KB\_MS



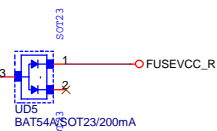
FOR 鹽化短路



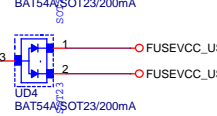
## -USBOC\_R

## USB POWER PROTECT

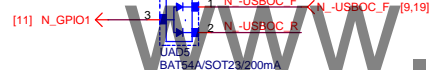
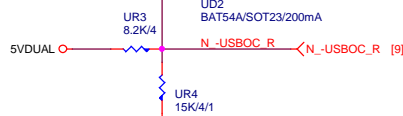
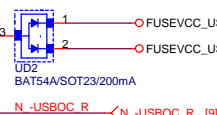
## KB\_USB



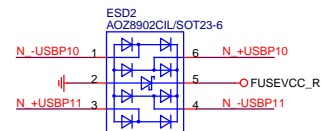
## USB\_LAN1



## USB\_LAN2

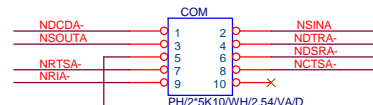
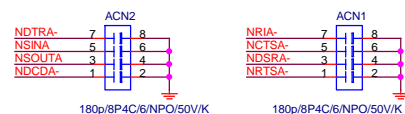
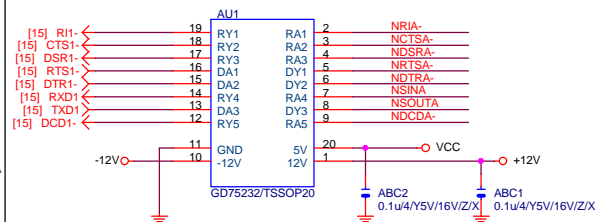


## USB2.0 ESD

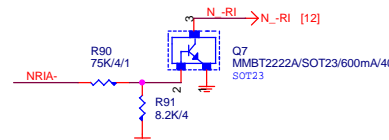


## COM

## COM RI



PIN2X5-CUT10-COM



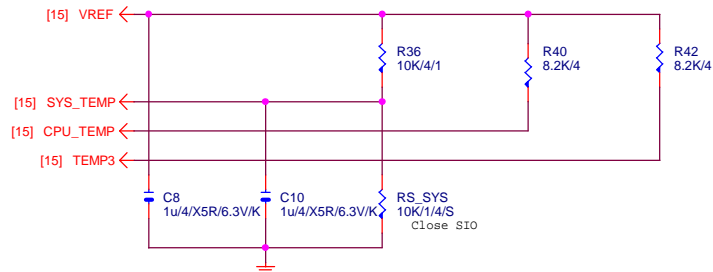
Gigabyte Technology

Title  
COM,-RI,KB\_USB,USB\_ESATA,-PROCHOTSize  
Custom Document Number  
GA-Z87N-WIFIRev  
2.01

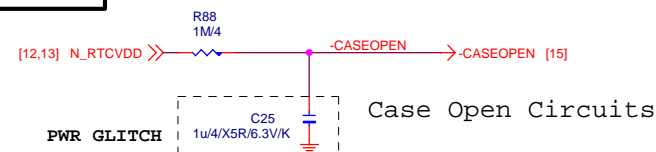
Date: Thursday, August 15, 2013 Sheet 16 of 31



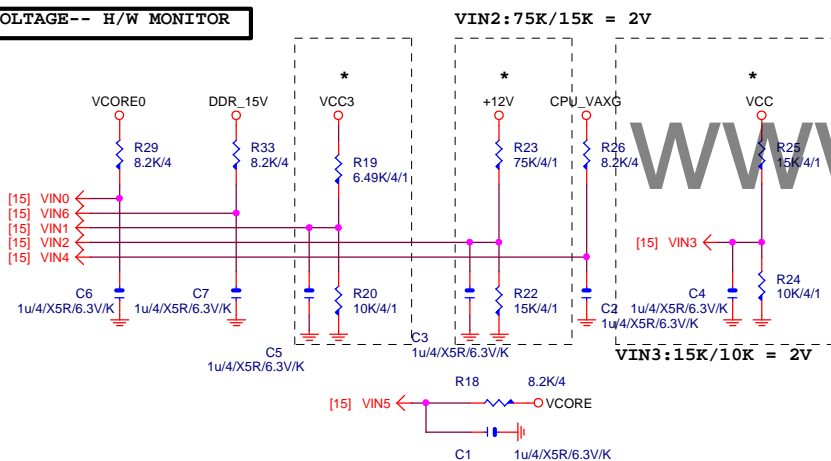
# TEMP H/W MONITOR



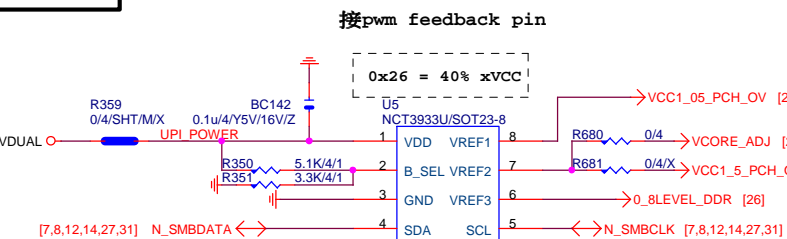
# CASE OPEN



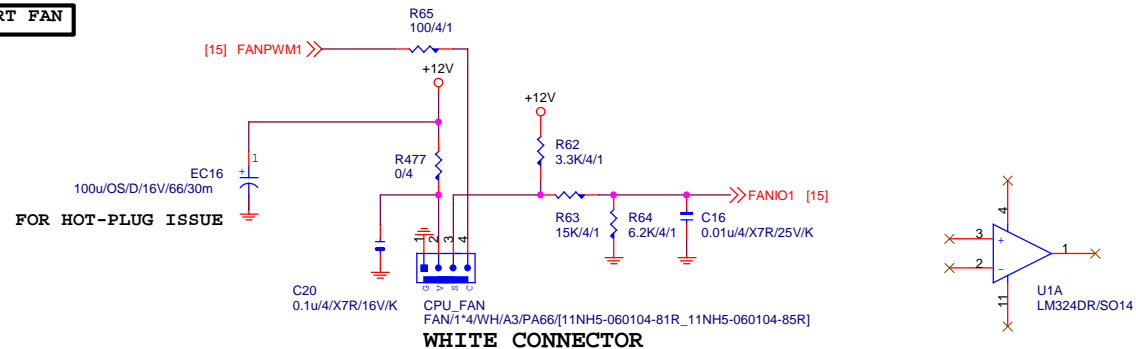
# VOLTAGE-- H/W MONITOR



# OV NCT3933

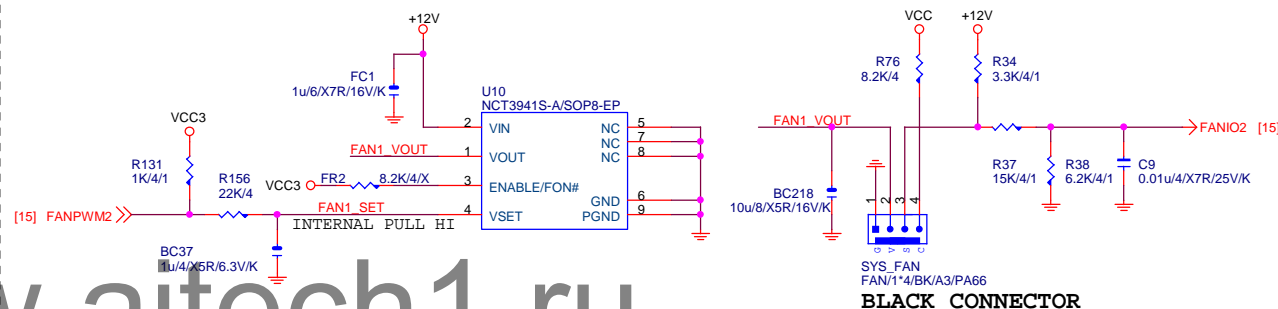


# CPU SMART FAN

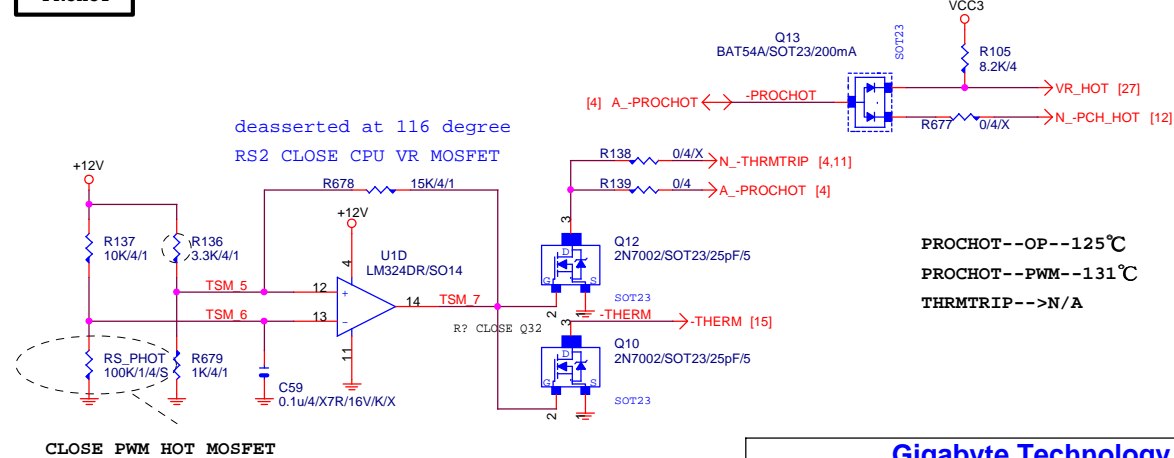


# SYS SMART FAN

Linear SYS\_FAN

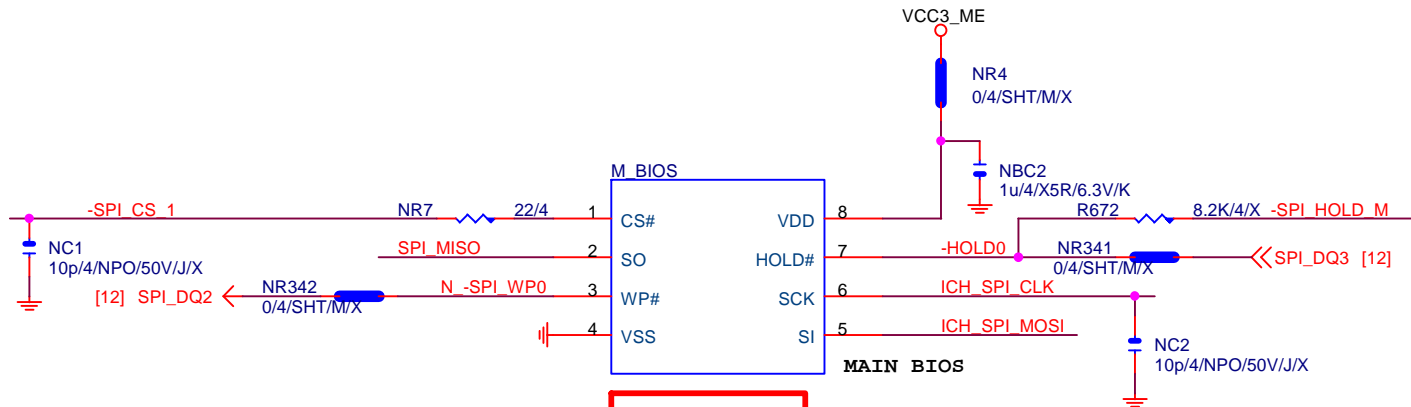


# -PROHOT



Gigabyte Technology

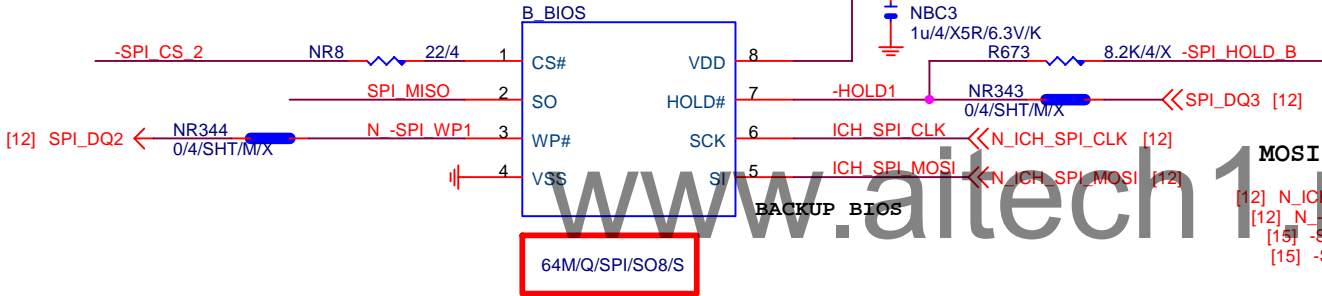
Gigabyte Technology		
Title		
HWM,FAN CTRL,OV		
Size	Document Number	Rev
Custom	GA-Z87N-WIFI	2.01
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64M/Q/SPI/SO8/S

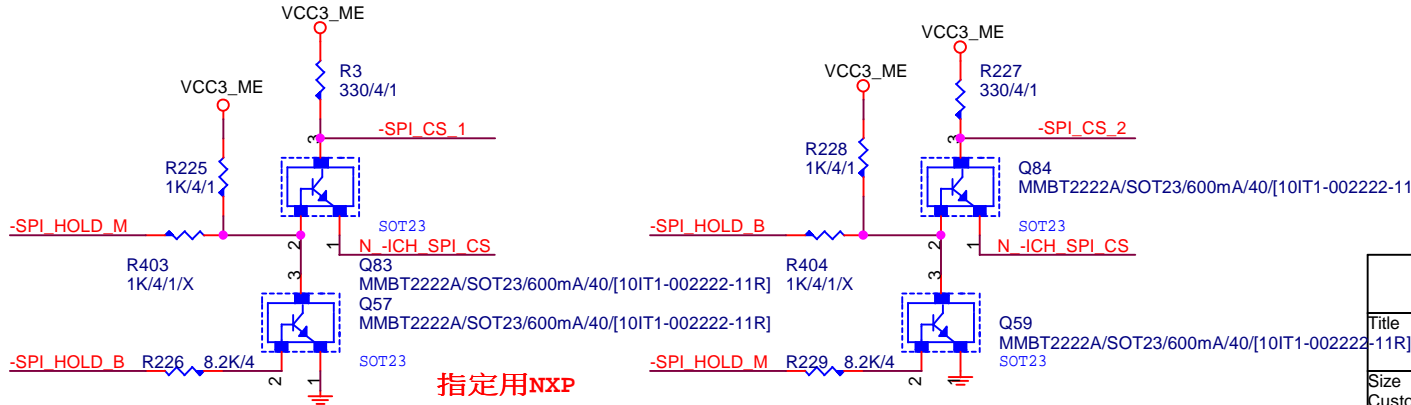
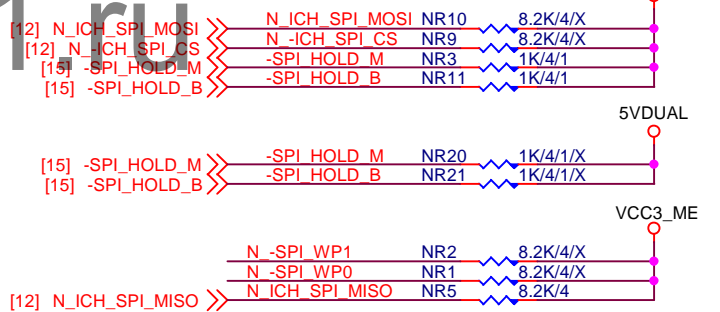
BOOT DEVICE	GNT0	GNT1
LPC	0	0
PCI	0	1
NAND	1	0
SPI	1	1

1 means floating  
0 means PD 1K



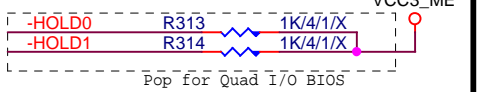
64M/Q/SPI/SO8/S

MOSI For DMI RX Termination Voltage



指定用NXP

CHECK



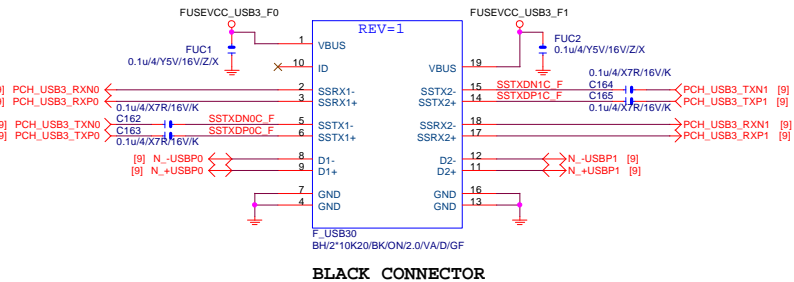
Gigabyte Technology

DUAL BIOS

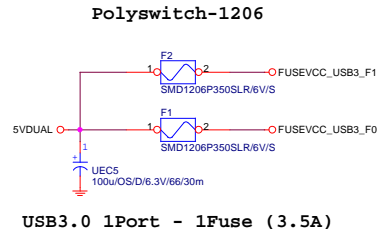
GA-Z87N-WIFI

Title	Document Number	Rev
Size Custom	GA-Z87N-WIFI	2.01
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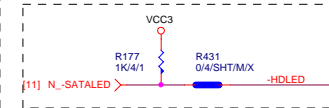
# F\_USB30



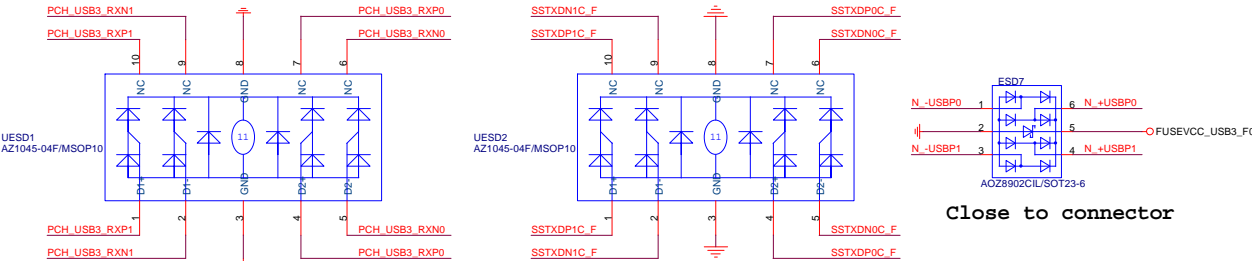
# F\_USB30 PWR



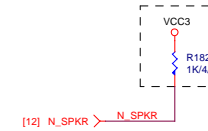
# SATA LED



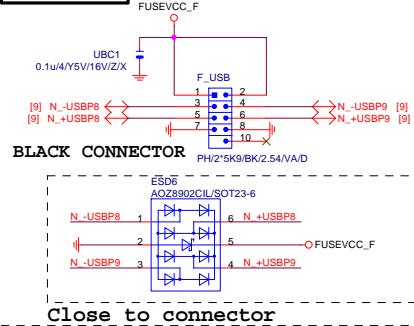
# F\_USB30 ESD PROTECT



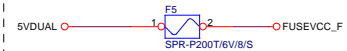
# SPKR



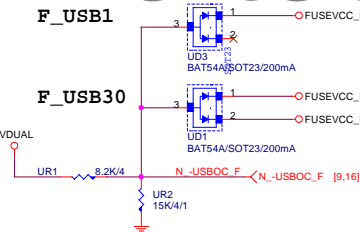
# FRONT USB1



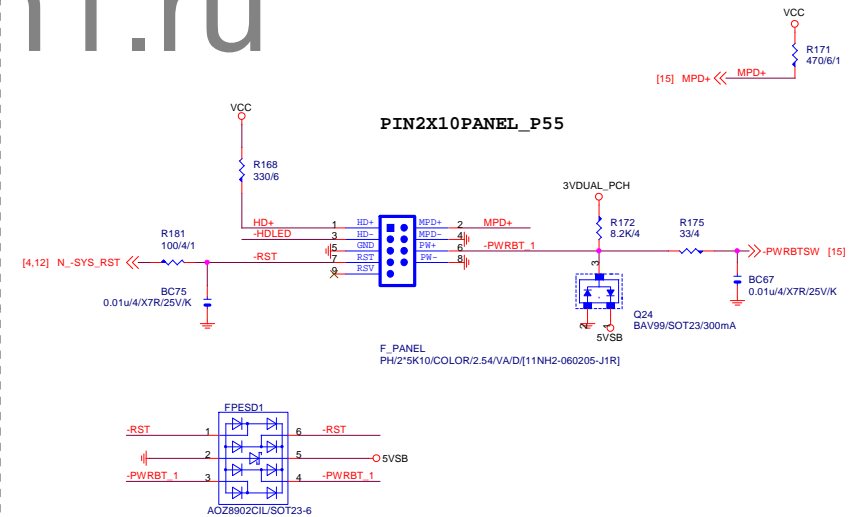
# FUSEVCC\_F



# -USBOC\_F

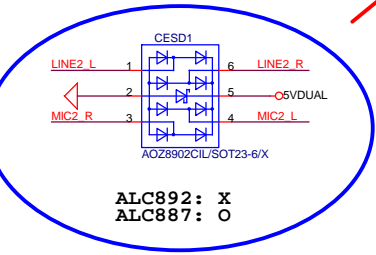


# INTEL FRONT PANEL



Gigabyte Technology			
Title	FP,F_USB,USB PWR,SPKR,SATA LED		
Size	Custom	Document Number	GA-Z87N-WIFI
Date	Thursday, August 15, 2013	Sheet	19 of 31
Rev	2.01		

CR5/CR8/CR11/CR4/ CR17/CR22/CR45/CR33/ CR47/CR40/CR26/CR37/ CR13/CR11/CR57/CR53	62 ohm	62 ohm	62 ohm	75 ohm	75 ohm
CR51/CD1/CBC7	O	O	X	X	O
CD2/CD3/CQ3/CQ5	X	X	O	O	X
CR1/CR14/CR17/CR22	62 ohm	62 ohm	62 ohm	75 ohm	1K ohm



CODEC POWER/EMI PAD

ADD CD2 For ESD PROTECT DIODE

**SPDIF\_OUT**

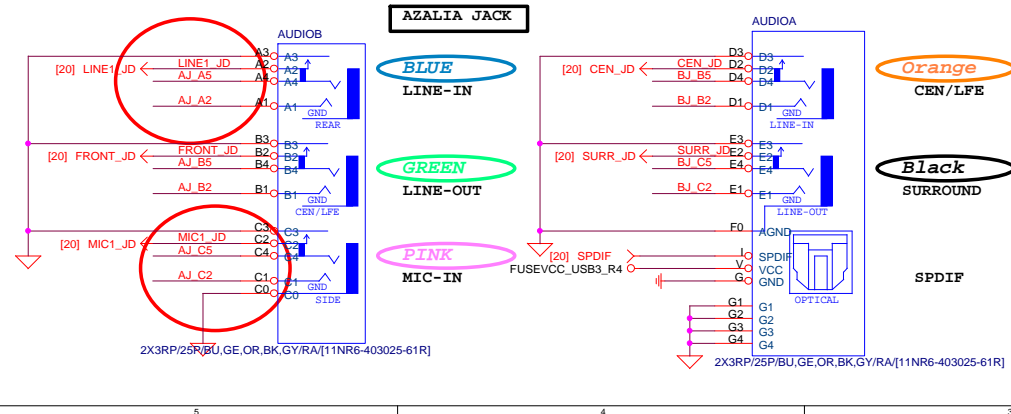
[20] SPDIFO2\_HDMI → CR26 → 0/4 SHT/MX → PIN

CBC14  
100pF/4NPO/50V/J

SPDIF\_O  
PH/1\*2/BK/2.54/V/A/D

**For HDMI SPDIF**

AZALIA JACK



**LINE-OUT**

[20] LINE\_O\_R  $\xrightarrow{+}$  CEC1 100uOS/D/I  $\xleftarrow{-}$  CF

CEC2 100uOS/D/I  $\xleftarrow{-}$  CF

[20] LINE\_O\_L  $\xrightarrow{+}$  CEC1 100uOS/D/I  $\xleftarrow{-}$  CF

CEC2 100uOS/D/I  $\xleftarrow{-}$  CF

Only reserved for ALC88

**LINE-IN**

[20] LINE\_IN\_R ← CR1

[20] LINE\_IN\_L ← CR14

Verify MIC function  
in LINE-in

For 889A/888

MIC-IN

[20] MIC1\_R ← CR17

[20] MIC1\_L ← CR22

[20] MIC1\_VI

[20] MIC1\_VI

**SURROUND**

[20] SURR\_R  $\xrightarrow{+}$  CEC10 100uOS/D/6.3  $\xrightarrow{+}$

[20] SURR\_L  $\xrightarrow{+}$  CEC11 100uOS/D/6.3  $\xrightarrow{+}$

**CEN/LFE**

itech 1.ru

CEC12 100uOS/D/6.3  
[20] LFE ←

CEC13 100uOS/D/6.3  
[20] CEN ←

**SURRBACK**

[illegible]

**Gigabyte Technology**

**AUDIO JACK**

**GA-Z87N-WIFI**

Rev 2.01

Thursday, August 15, 2013

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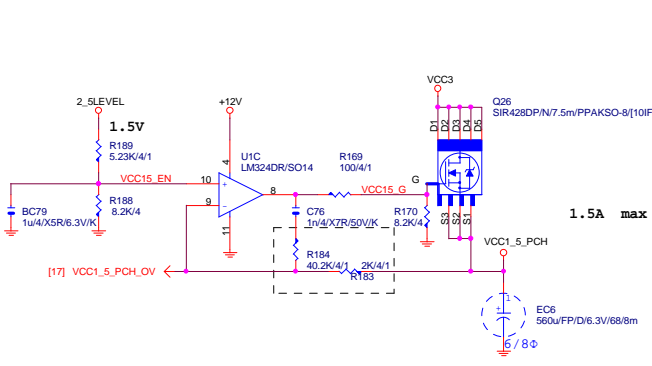
Rev	
0.01	

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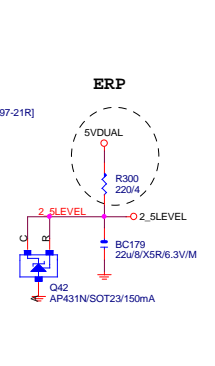




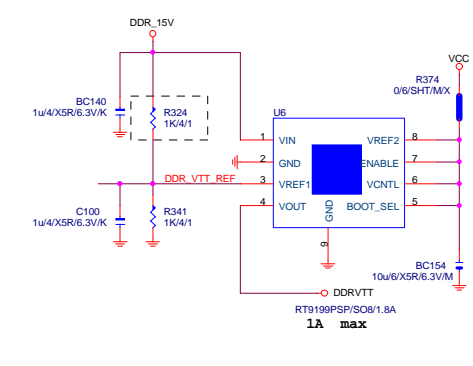
# VCC1\_5\_PCH



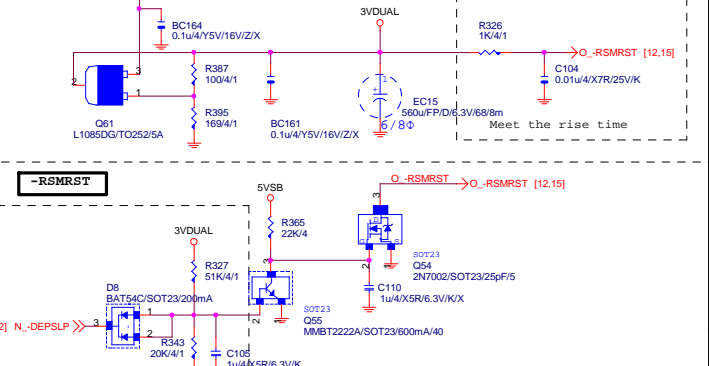
# 2\_5LEVEL



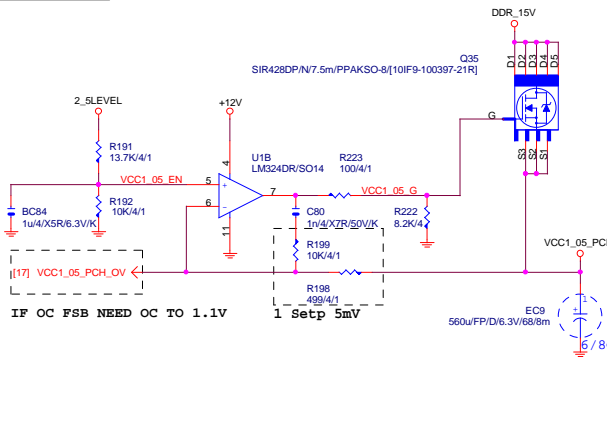
# DDRVTT



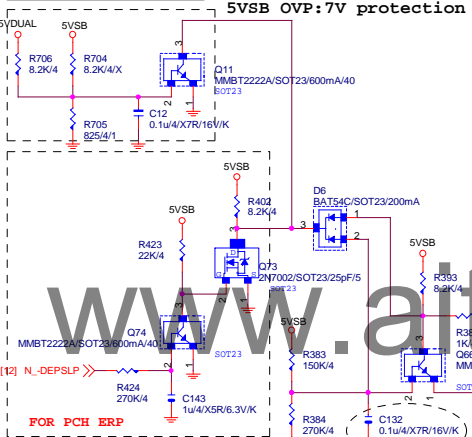
# 3VDUAL



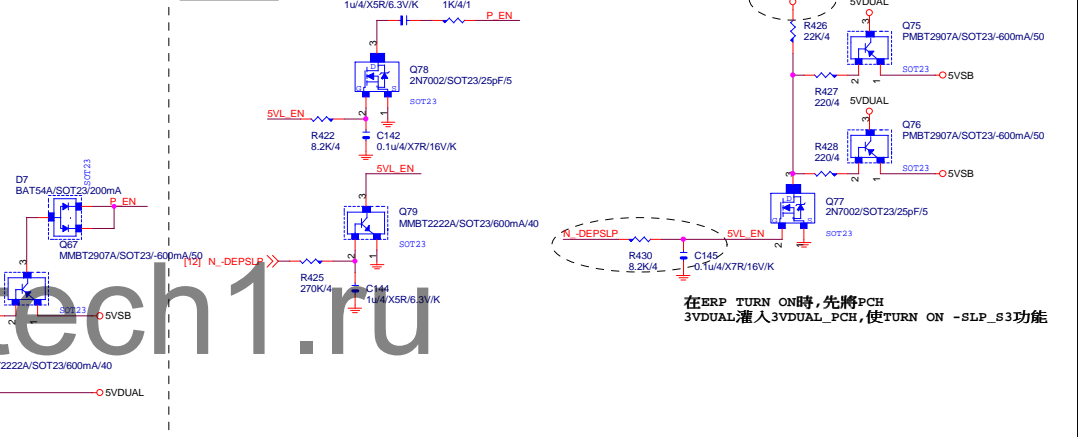
# VCC1\_05\_PCH



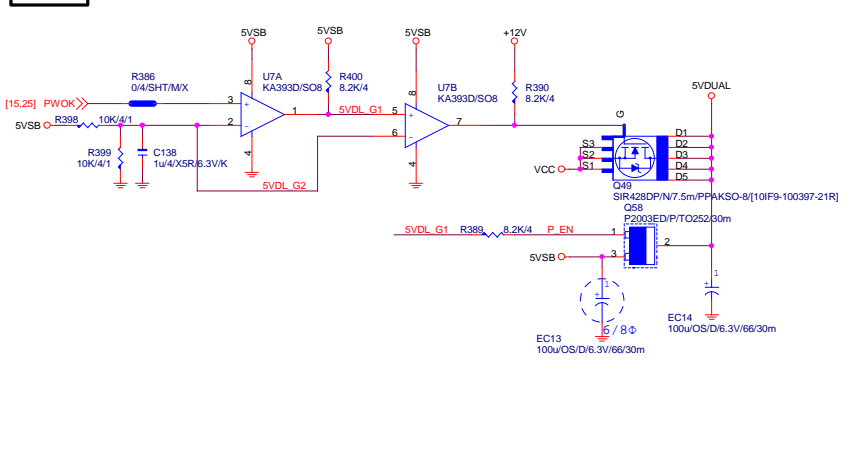
# 5VDUAL SHORT PROTECT



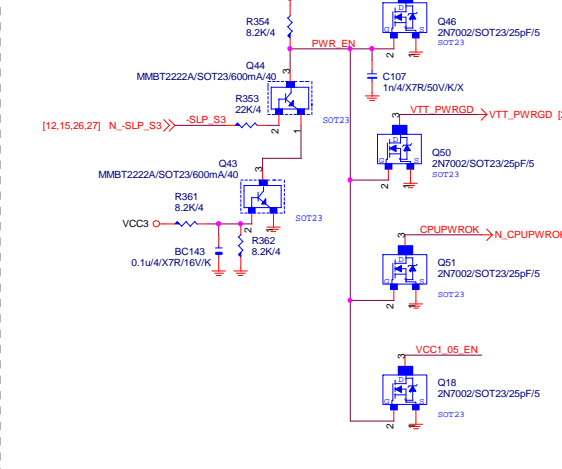
# PCH ERP



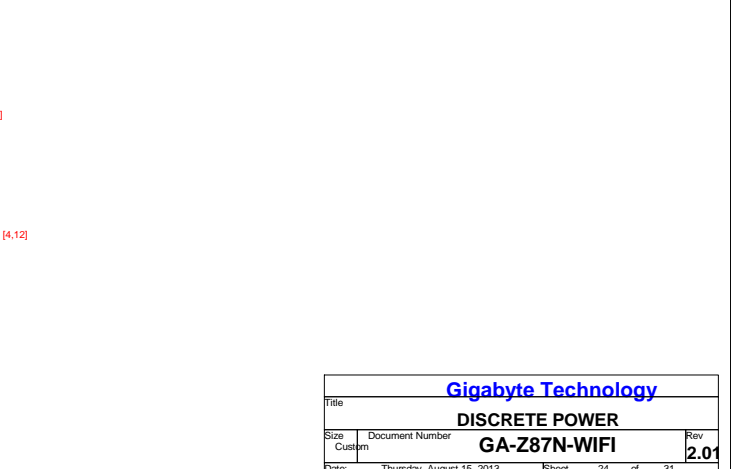
# 5VDUAL



# PWR SEQ

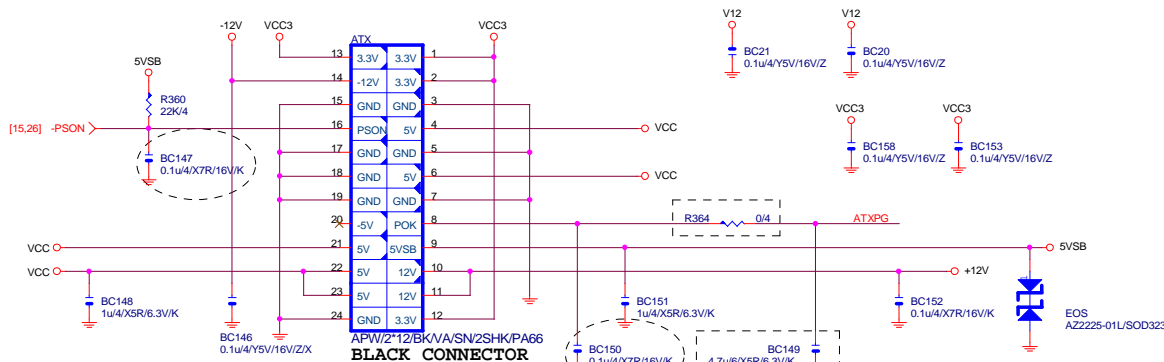


# VCC15\_EN

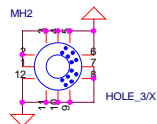




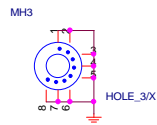
# ATXX24 POWER CONNECTOR



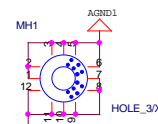
## MB LOCATION



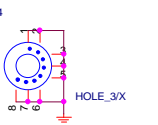
HOLE\_4-RH-5MM-1



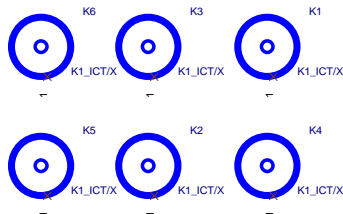
HOLE\_4-RH-5MM-5PIN-1



HOLE\_4-RH-5MM-1

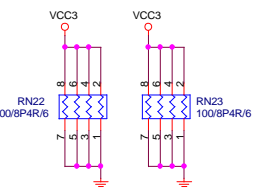


HOLE\_4-RH-5MM-5PIN-1

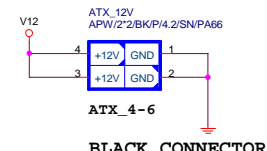


To prevent the 5VSB under loading when boot

## FIX PWR MINMUN LOAD



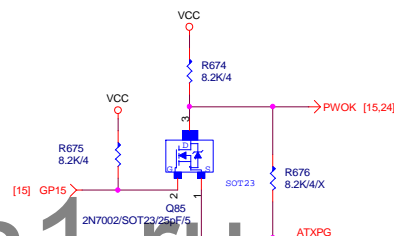
# ATXX4 POWER CONNECTOR



BLACK CONNECTOR

## PWOK PATCH

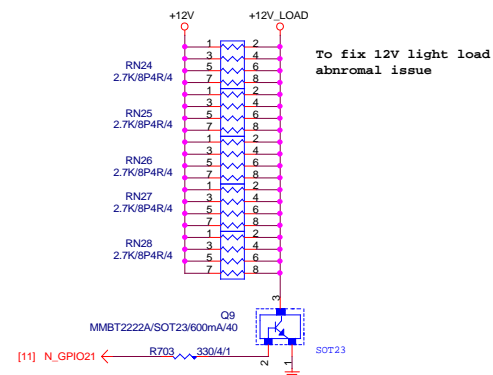
【技術通報R&D技術通報154】



## CLK GEN

N/A

【技術通報R&D技術通報153】

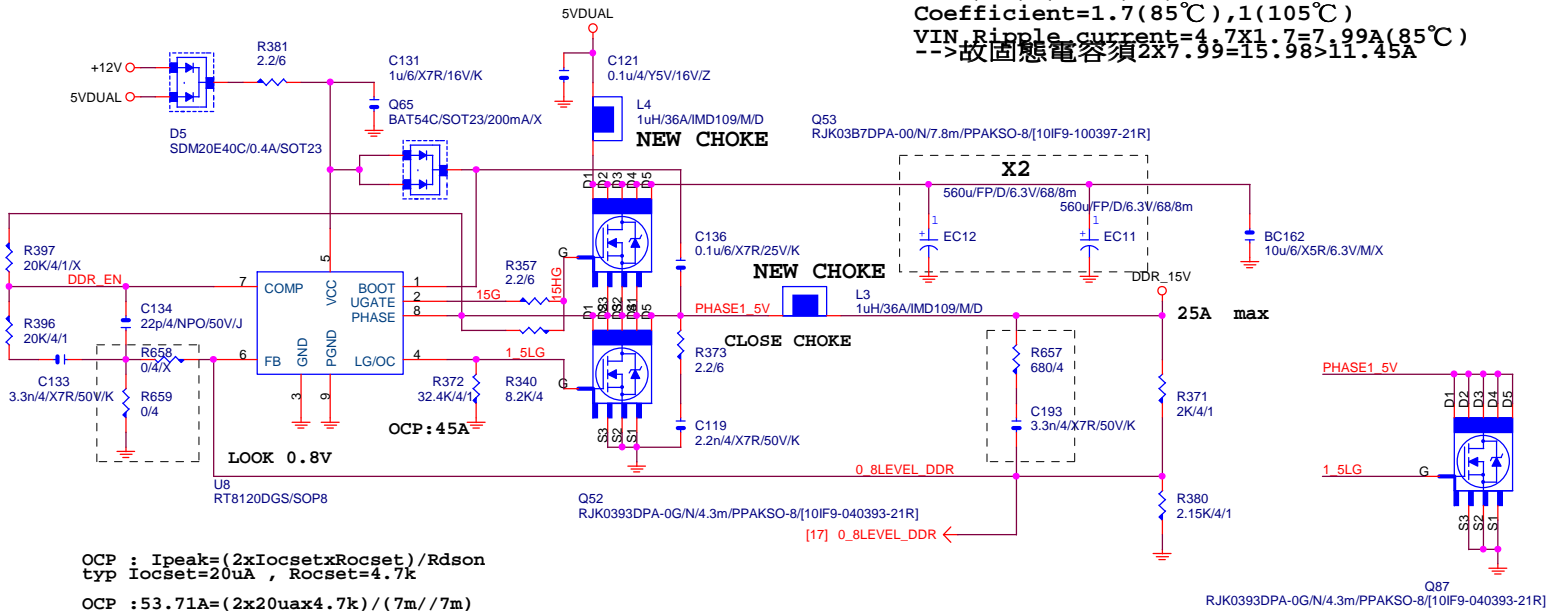


To fix 12V light load abnormal issue

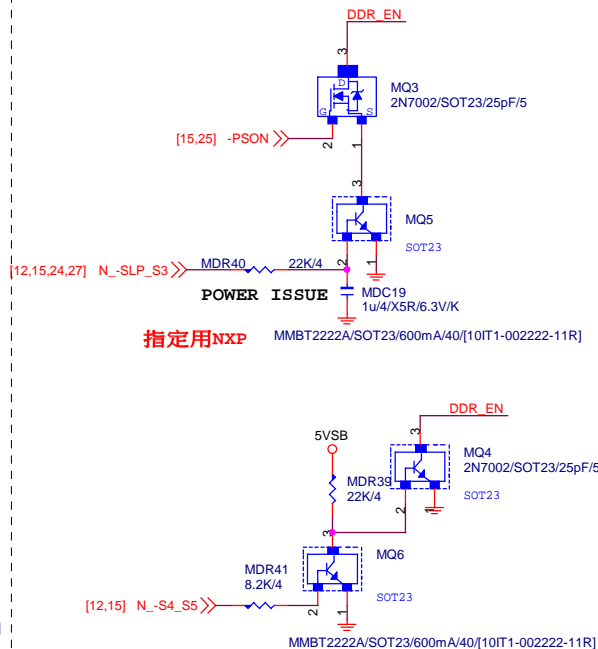
Gigabyte Technology

Title		
ATX CONNECTOR		
Size	Document Number	Rev
Custom	GA-Z87N-WIFI	2.01
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## DDR15V



PWR SEQ

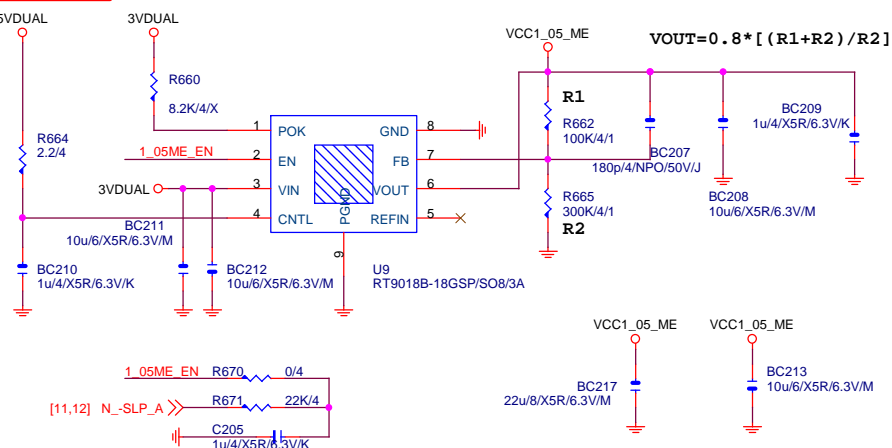


## VCC1\_05\_ME

Z87 N/A

Z87+I217V

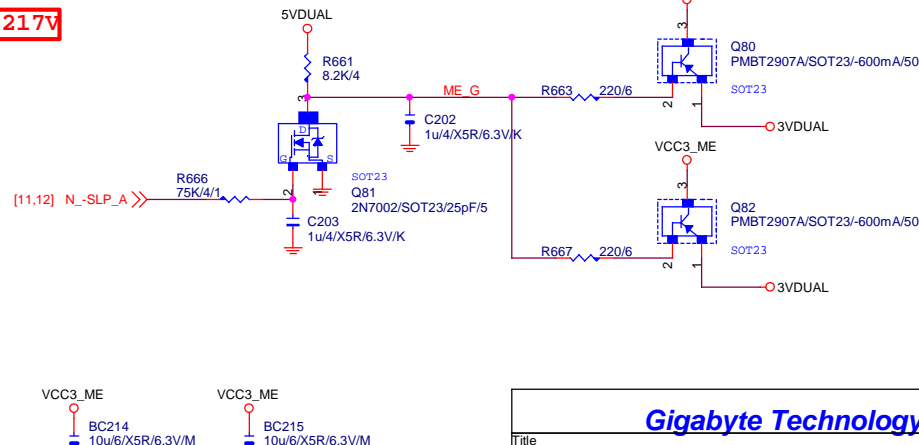
【技術通報R&D技術通報156】  
(RICHTER), (NUVOTON), (EMC)做共用  
PIN7分壓阻值須做修改為100K以上電阻值



VCC3\_ME

Z87 N/A

Z87+I217V



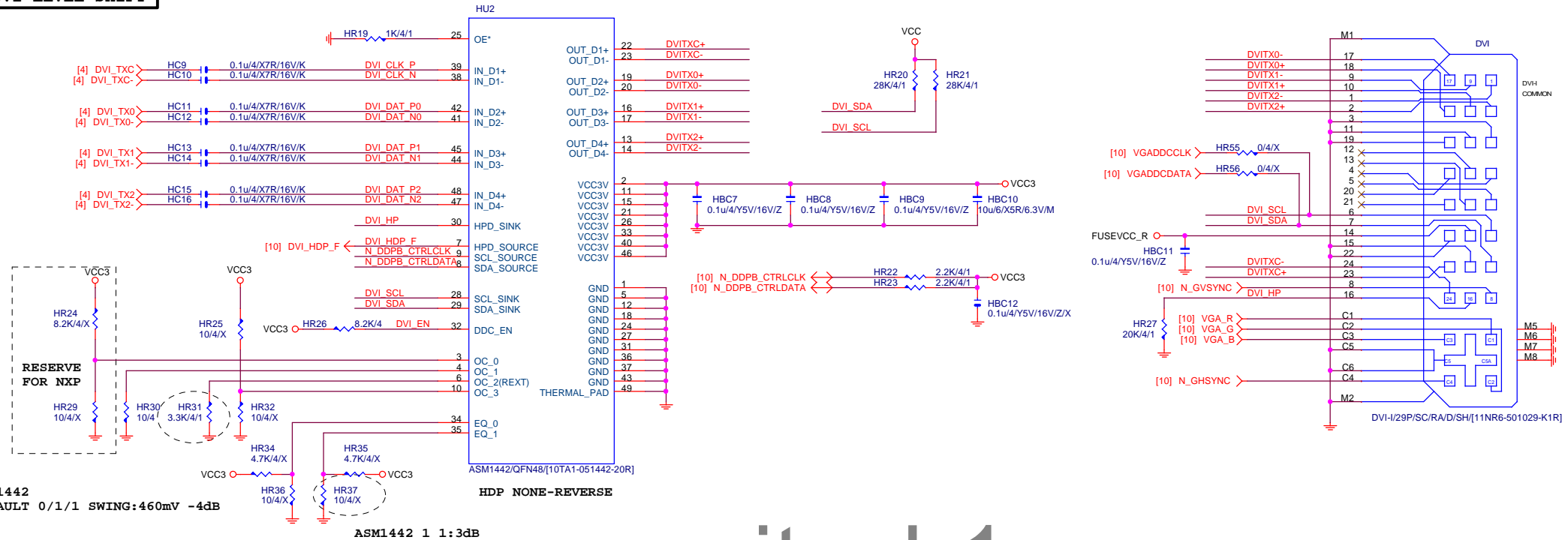
## Gigabyte Technology

Title			
DDR & M3 POWER			
Size B	Document Number	GA-Z87N-WIFI	Rev 2.01
Date:	Thursday, August 15, 2013	Sheet	26 of 31





# DVI LEVEL SHIFT



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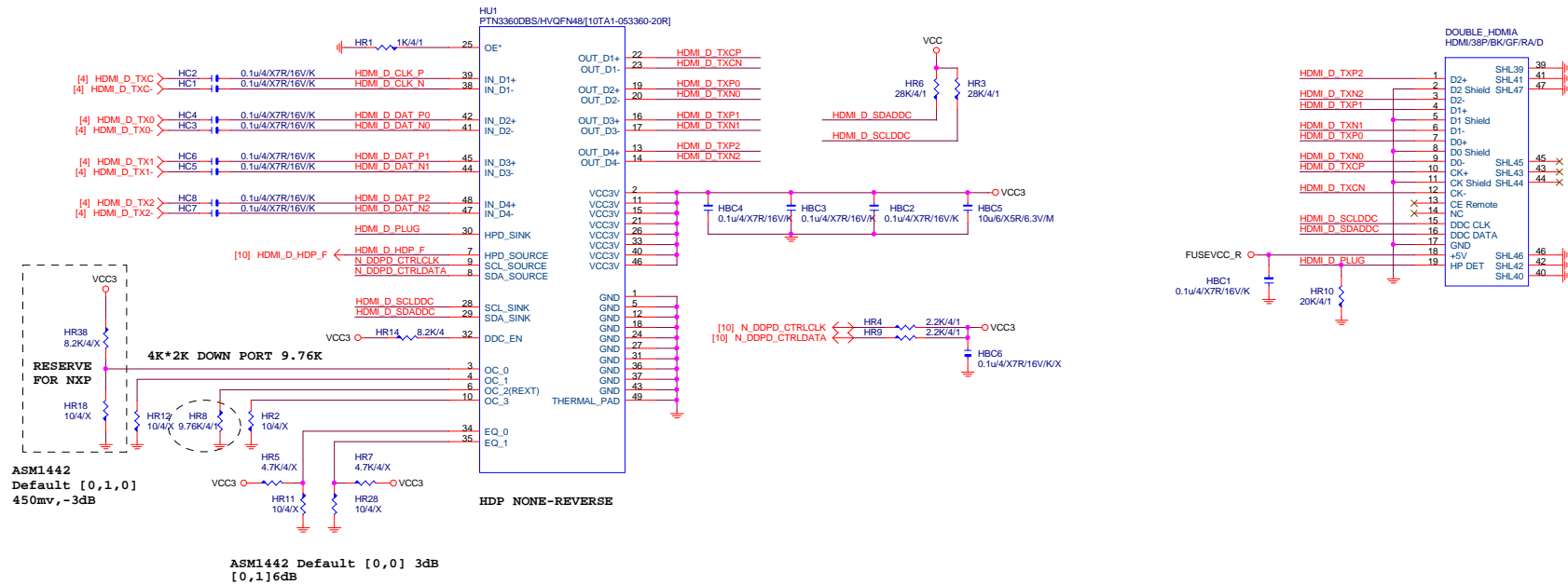
DVI

GA-Z87N-WIFI

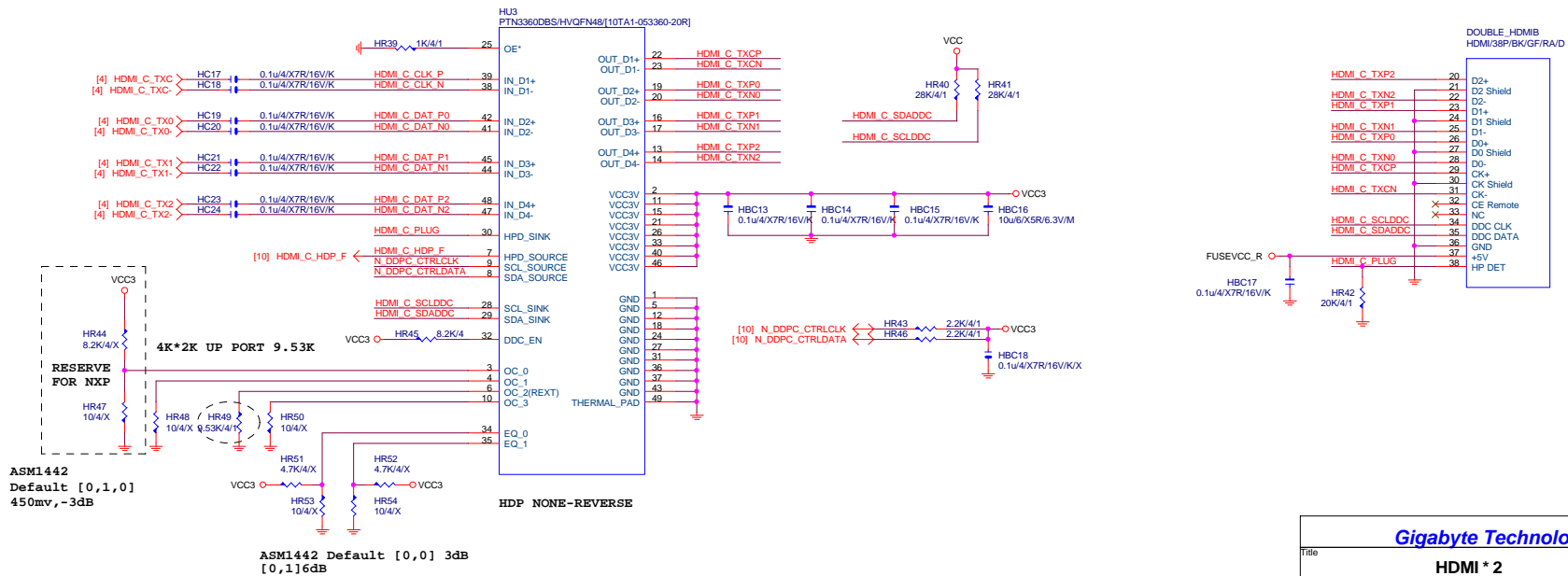
Rev  
2.01

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## HDMI LEVEL SHIFT

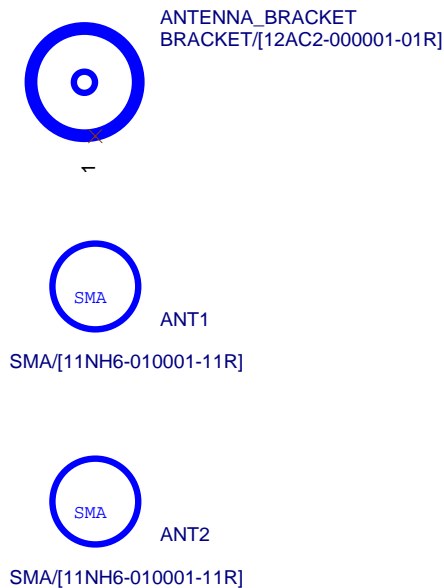
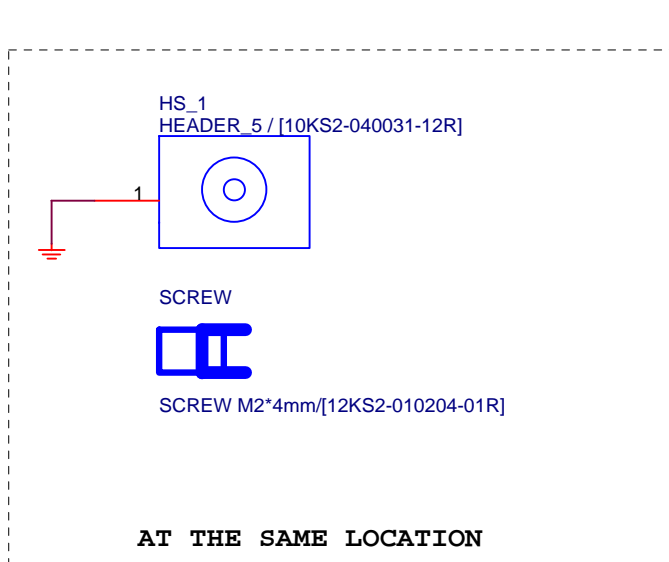
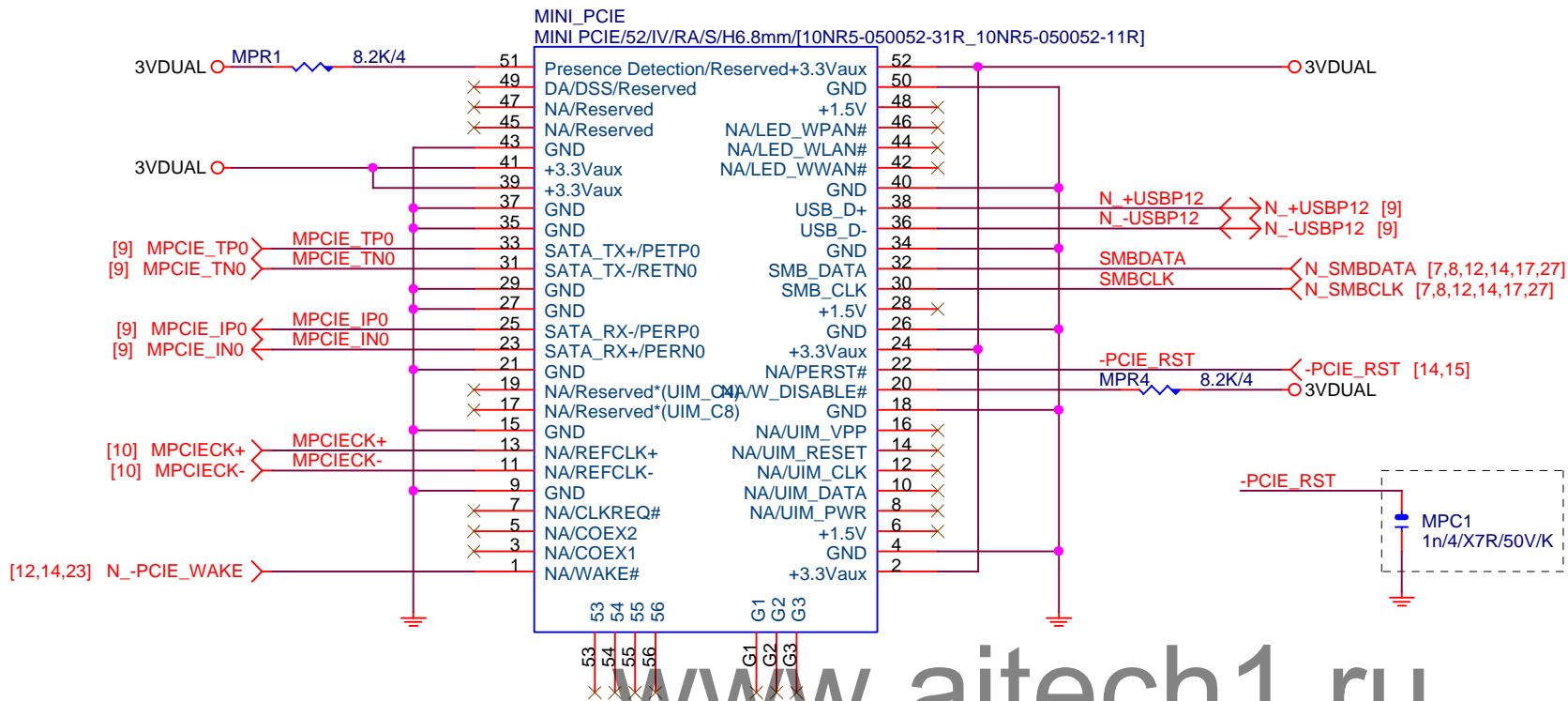


## HDMI LEVEL SHIFT

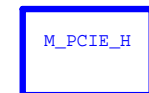


Gigabyte Technology

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**Intel 7260 - 2x2 11ac combo**



**WIFI\_MODULE**  
WI-FI WITH BT MINI CARD INTEL/[20CB1-027260-00R]

<b>Gigabyte Technology</b>			
Title			
mini PCI-E			
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			<b>2.01</b>
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