

Model Name: GA-H87N-WIFI

Revision 2.0

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

Cover Sheet

Size	Document Number	Rev
Custom	GA-H87N-WIFI	2.0
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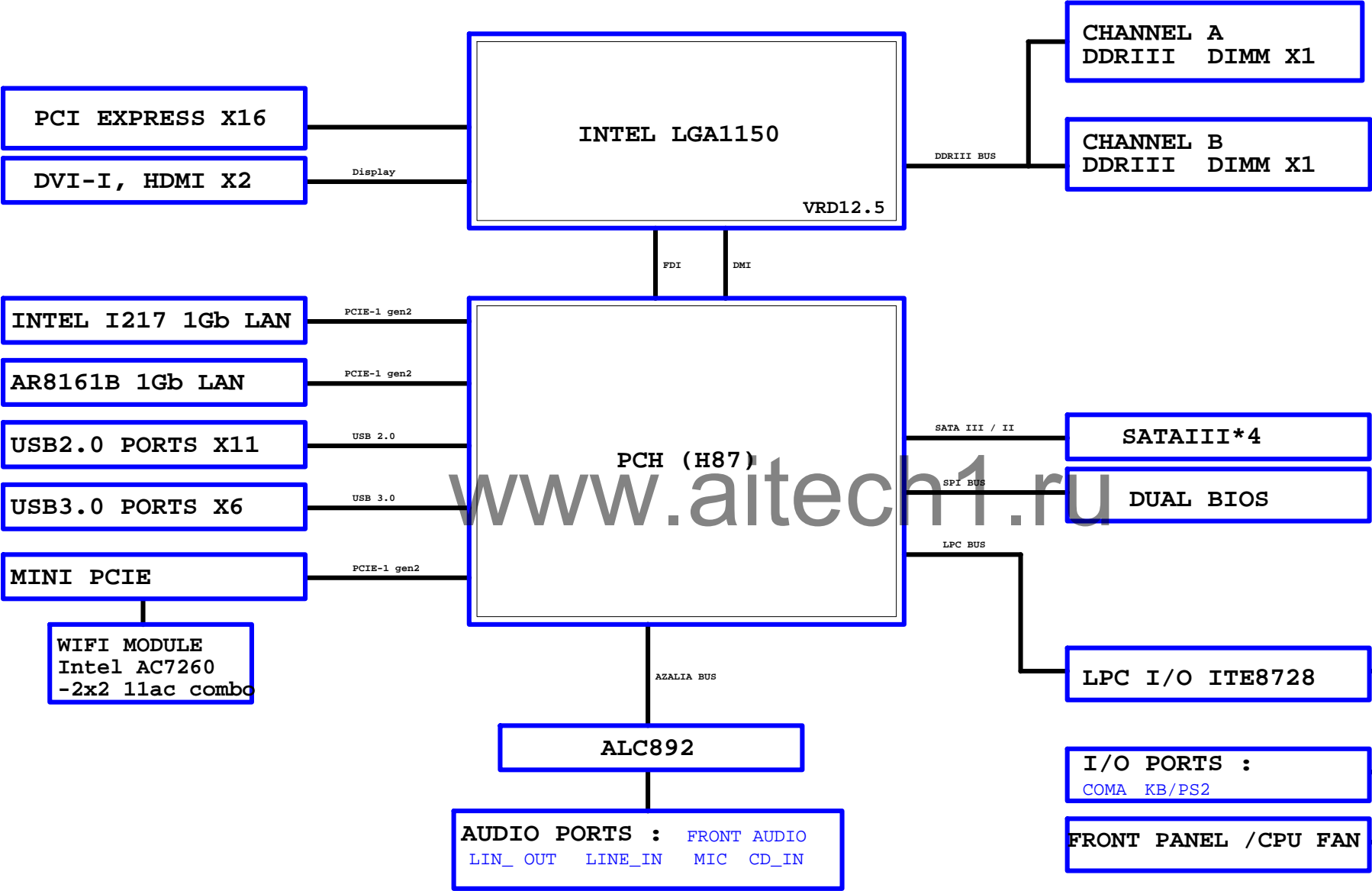
## Revision 2.0

## 2013/08/15

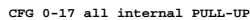
PBOM: 9MH87NWIF-00-20A  
 FPBOM: 9MH87NWIF-00-20B

[illegible]

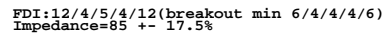
BLOCK DIAGRAM



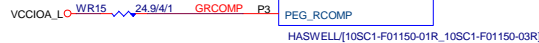
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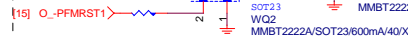
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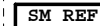
LGA11



100



CPU	PU/PD
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100	100



GA-H87N-WIFI

2.0

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

HASWELL/J10SC1-F01150-01R\_10SC1-F01150-03R

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

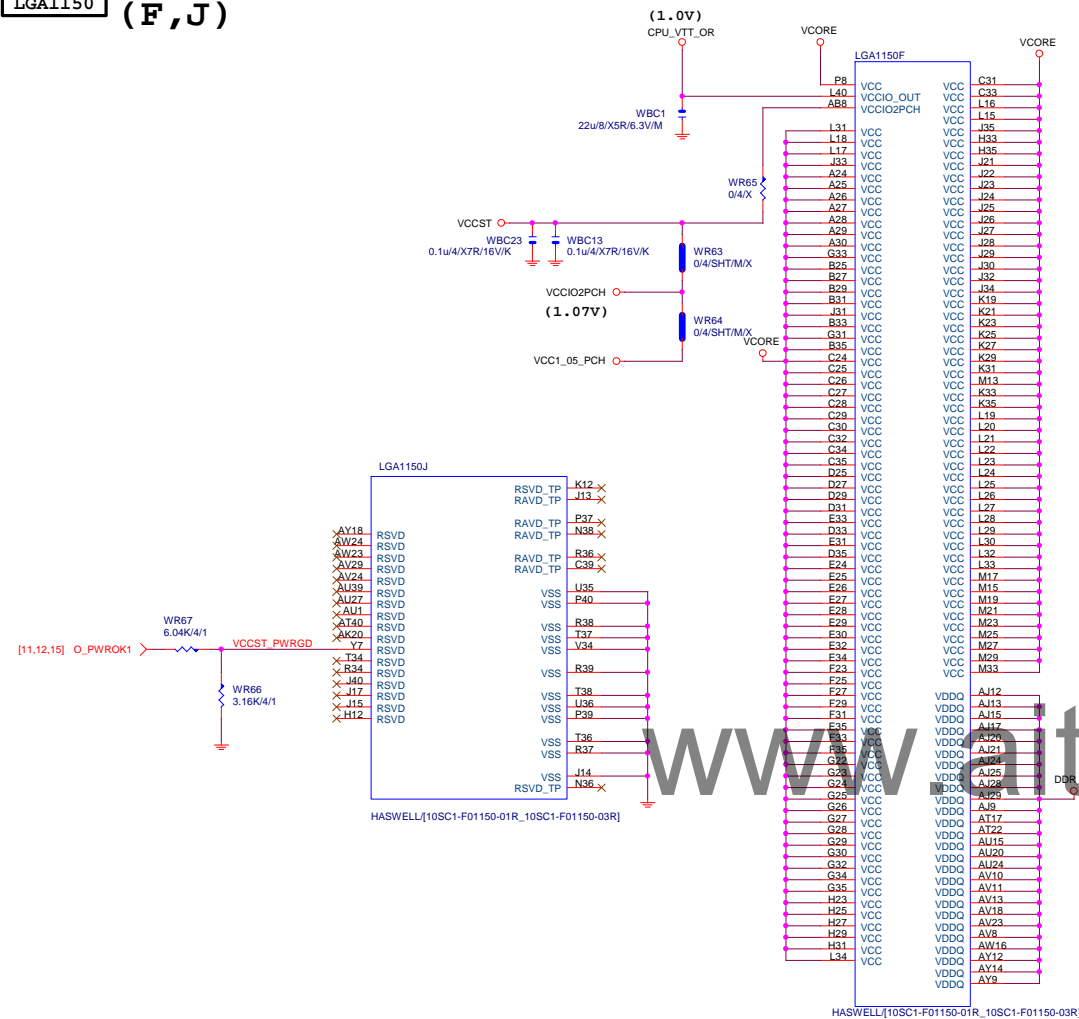
COVER+BLACK NI

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

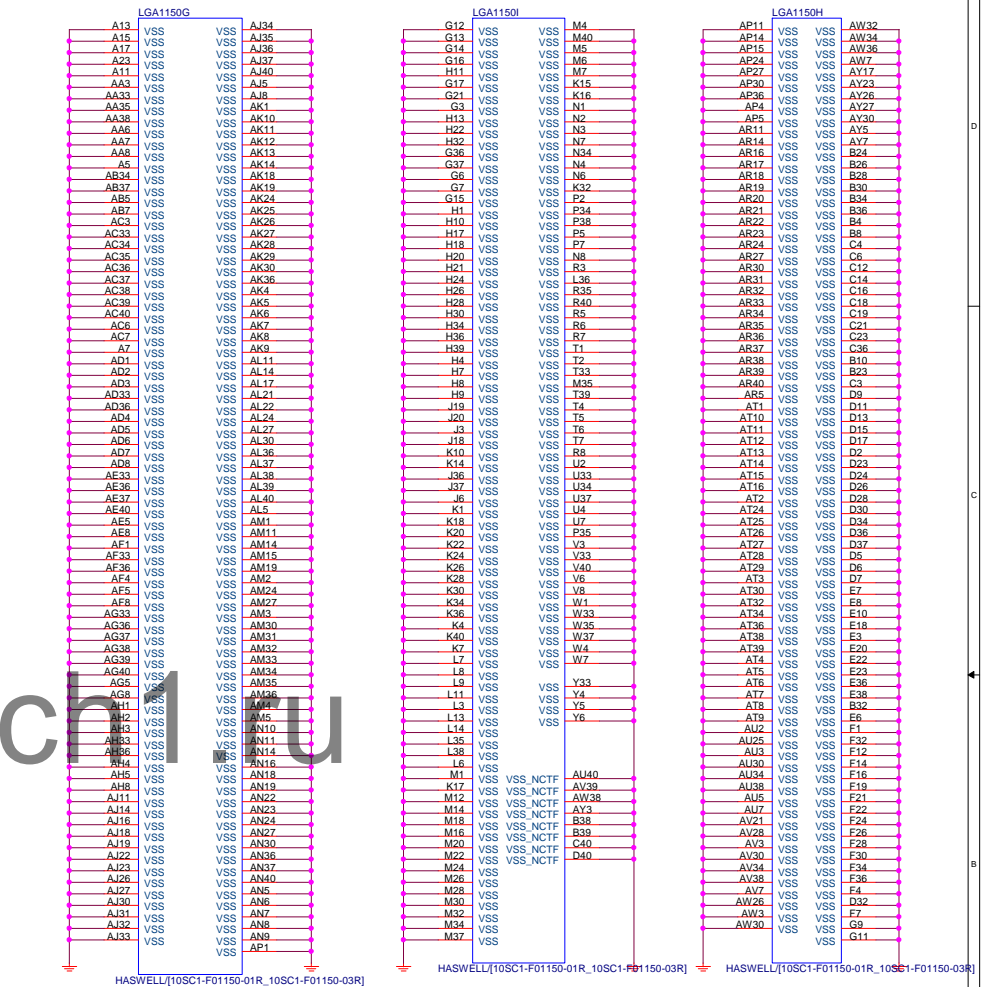
DDR BUS

[8] -DQSB[0..7]  $\longleftrightarrow$  -DQSB[0..7]

LGA1150 (F, J)

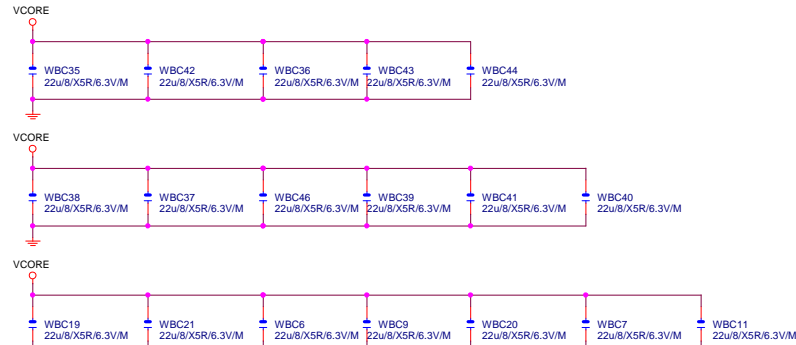


LGA1155 (G,H,I)



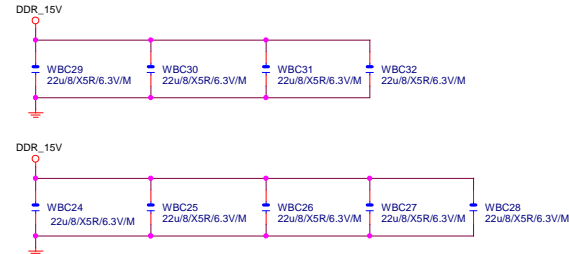
## VCore CAP

(X18)



DDR CAP

(x9)



## Gigabyte Technology

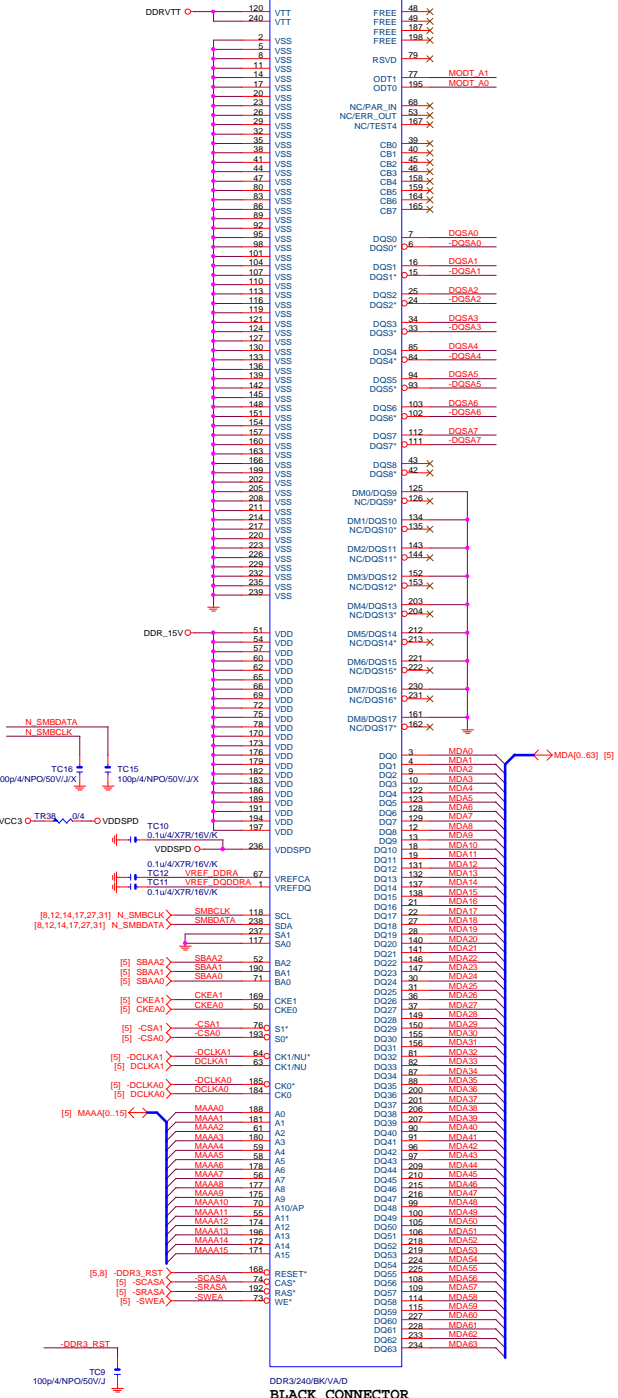
Title	CPU LGA1150-C
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Size Custom	Document Number <b>GA-H87N-WIFI</b>	Rev <b>2.0</b>
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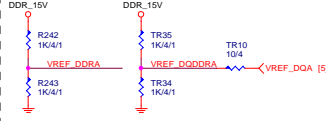
DDR3

(A)

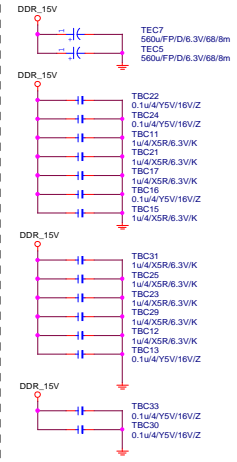


DDR3

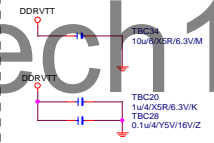
DDR3 VREF



DDR15V Decouple



DDRVTT Decouple



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Gigabyte Technology		
Title		
DDRIII CHANNEL A		
GA-H87N-WIFI		
Size	Document Number	Rev
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PCH

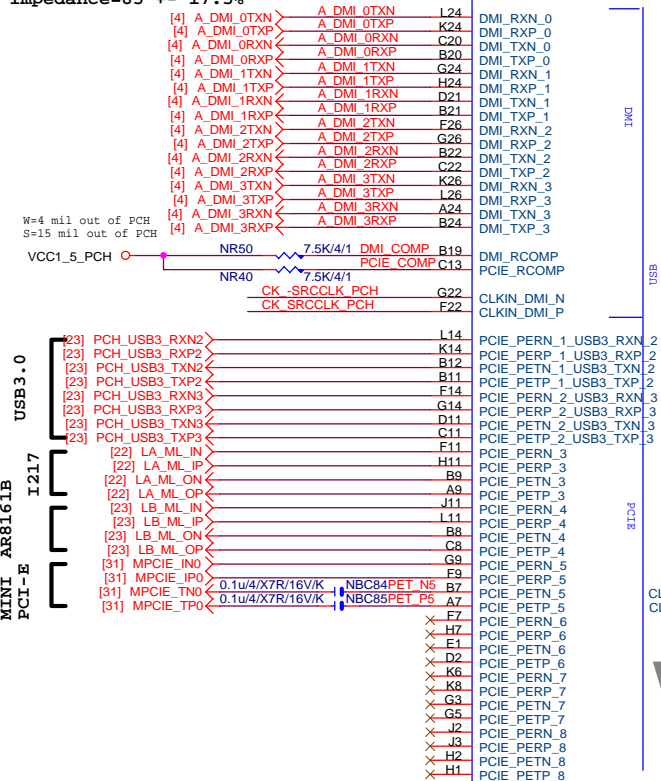
(B)

DMI:12/4/4/4/12(breakout min 8/4/4/4/8)  
Impedance=85 +- 17.5%USB2.0 : 12/4.5/7.5/4.5/12 (breakout min 8/4/4/4/8)  
Impedance=90 +- 17.5%

PCHB

B85: Port 6/7 N/A

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



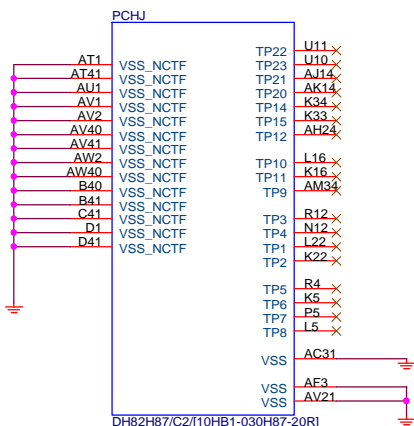
放靠近 Device &amp; PCI-E Slot

Impedance=80 +- 17.5%

PCIEX1:16/5/5/5/16 (breakout min 8/4/4/4/8)

PCH

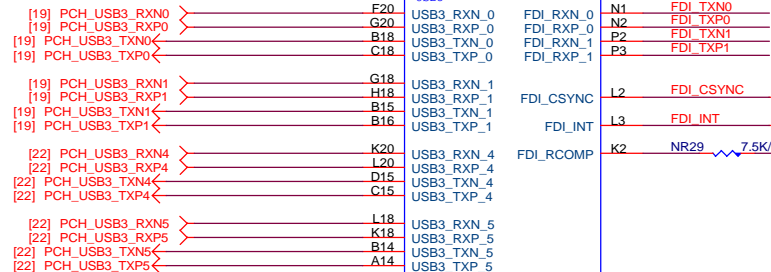
(J)



DH82H87/C2[10HB1-030H87-20R]

PCH

(F)



PCHF

USB3

FDILINK

N1

N2

N3

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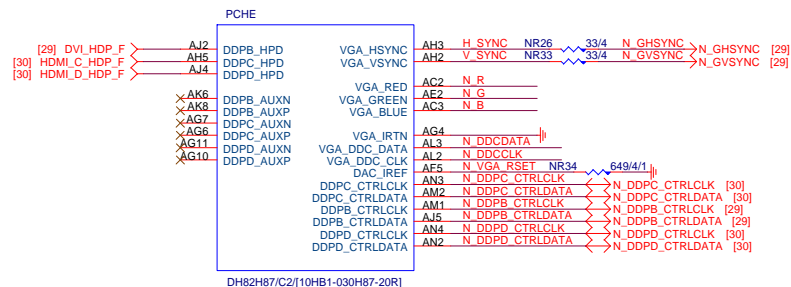
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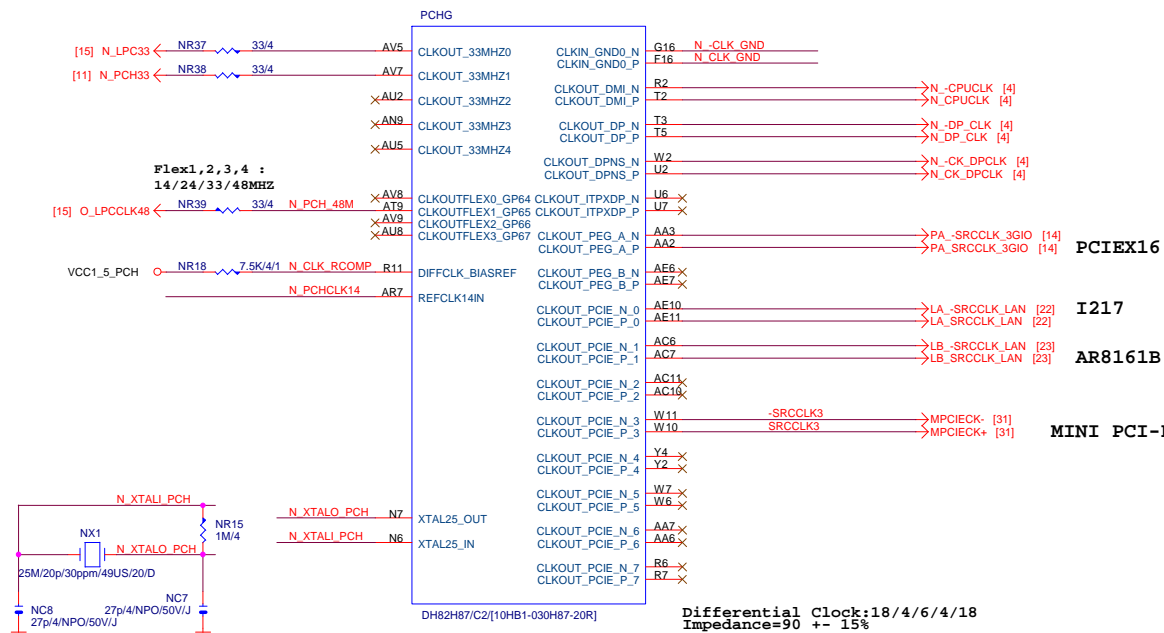
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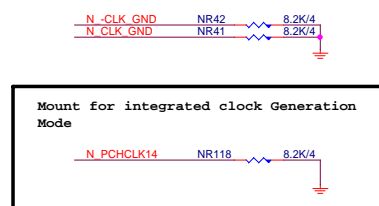
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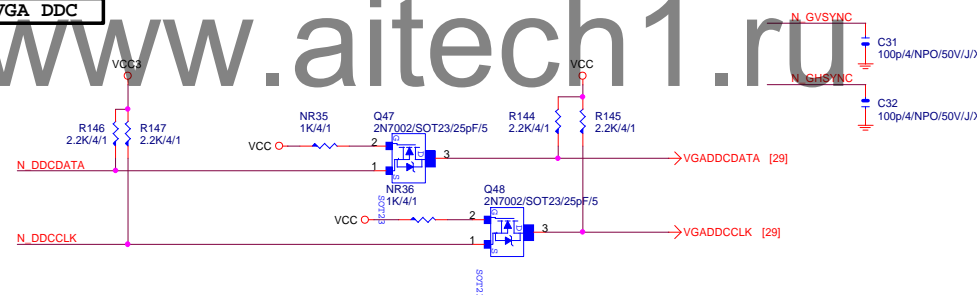
# PCH (G)



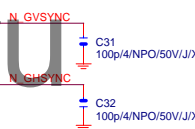
## PCH CLK PD



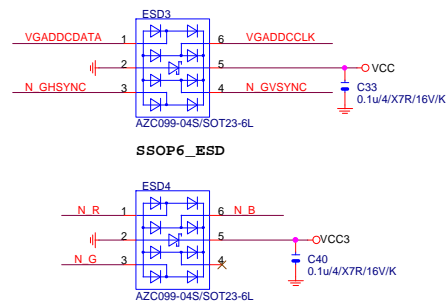
## VGA DDC



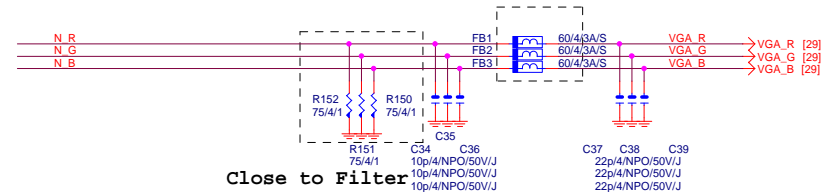
## VGA CONNECTOR



## VGA ESD



## VGA DDC



## Gigabyte Technology

Title			PCH DISPLAY_CLK BUFFER		
Size			GA-H87N-WIFI		
Date:			Rev 2.0		
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# PCH (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%

PCHC

CL\_CLK

CL\_DATA

CL\_RSTB

APWROK

PWM0

PWM1

PWM2

PWM3

TACH0\_GP17

TACH1\_GP1

TACH2\_GP6

TACH3\_GP7

TACH4\_GP8

TACH5\_GP9

SSTCTL

SCLOCK\_GP22

SLOAD\_GP38

SDATAOUT0\_GP39

SDATAOUT1\_GP48

SATALEDDB

SATA\_RCOMP

SATA0GP\_GP21

SATA1GP\_GP19

SATA2GP\_GP36

SATA3GP\_GP37

SATA4GP\_GP16

SATA5GP\_GP49

EDP\_BKLTCTL

EDP\_BKLTEN

EDP\_VDDEN

RSVD

RCINB

SERIRQ

THRMTRIPB

PECI

PM\_SYNCN

PLTRST\_PROCB

DH82H87/C2[10HB1-030H87-20R]

SATA\_RXN\_0

SATA\_RXP\_0

SATA\_TXN\_0

SATA\_TXP\_0

SATA\_RXN\_1

SATA\_RXP\_1

SATA\_TXN\_1

SATA\_TXP\_1

SATA\_RXN\_2

SATA\_RXP\_2

SATA\_TXN\_2

SATA\_TXP\_2

SATA\_RXN\_3

SATA\_RXP\_3

SATA\_TXN\_3

SATA\_TXP\_3

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SATA\_RXP\_4

SATA\_TXN\_4

SATA\_TXP\_4

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SATA\_TXP\_57

SATA\_RXN\_58

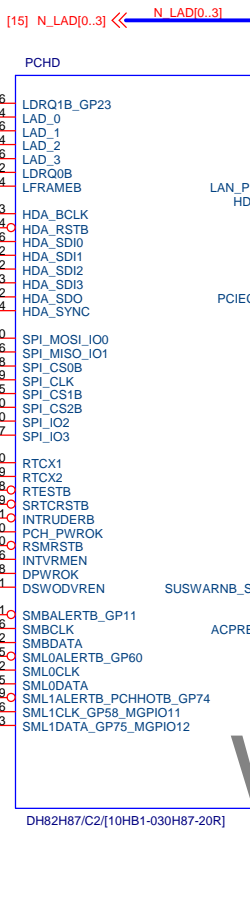
SATA\_RXP\_58

SATA\_TXN\_58

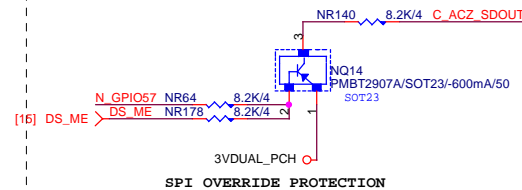
SATA\_TXP\_58

SATA\_RXN\_59

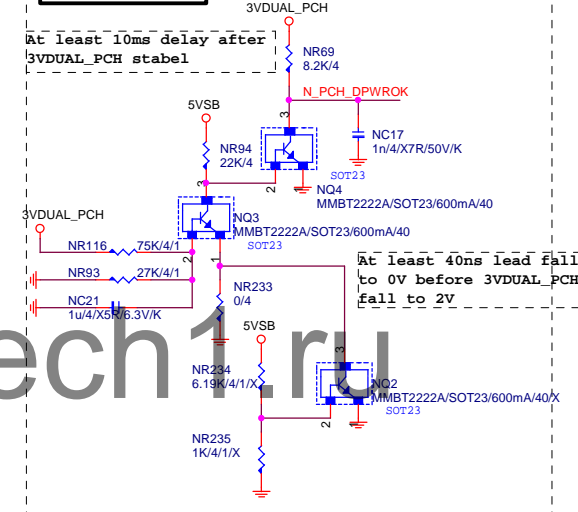
(D)



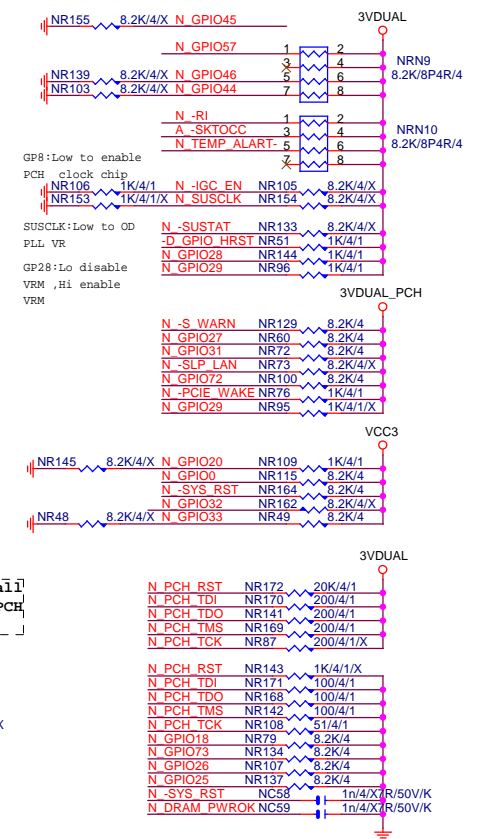
## ACZ\_SDOUT



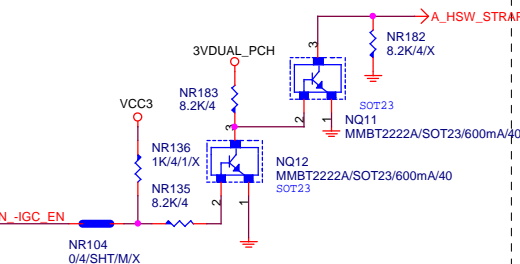
PCH\_DPWROK



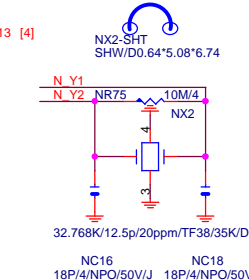
PCH	PU/PD
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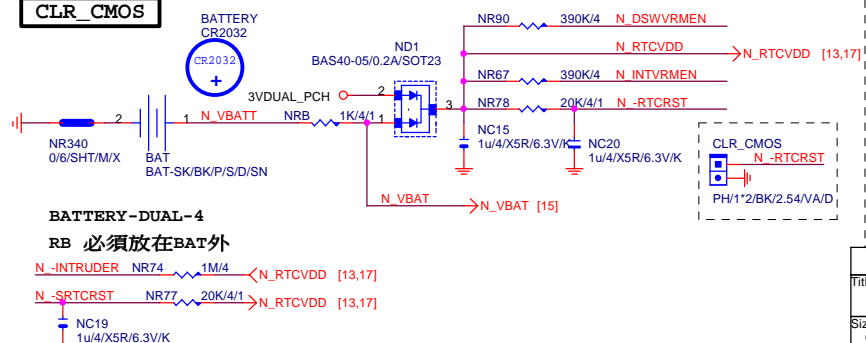
## HSW\_STRAP13



32.768KHZ



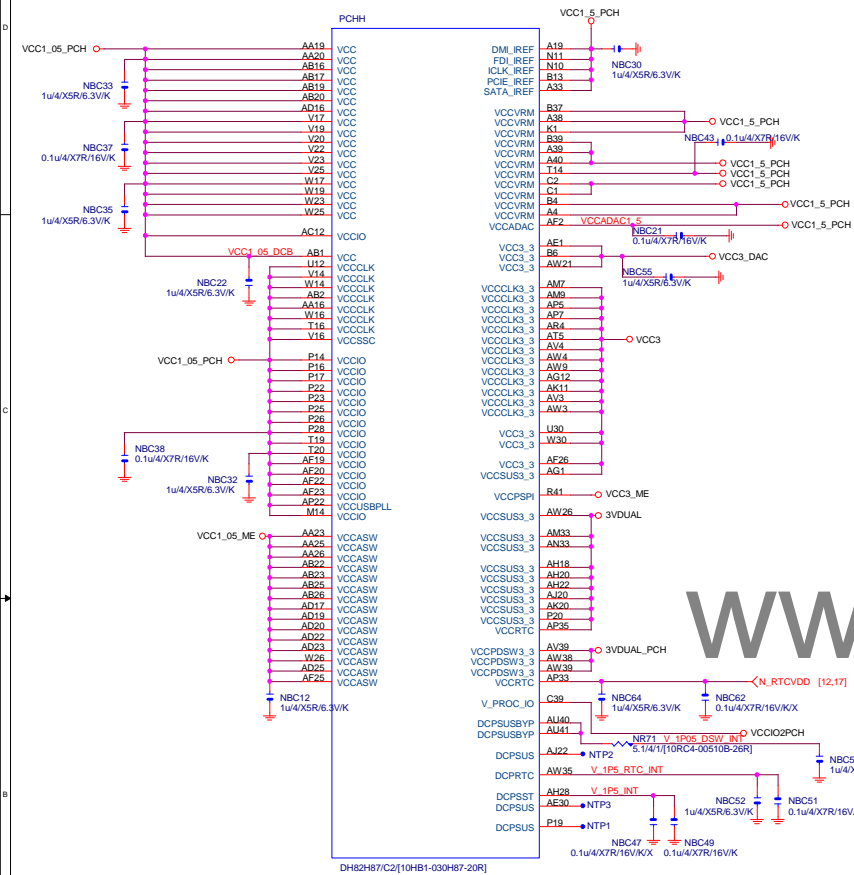
CLR_CMOS
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## Gigabyte Technology

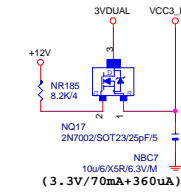
Title			
PCH GPIO, CTRL, AUDIO			
Size	Document Number	Rev	
Custom	GA-H87N-WIFI	2.0	
Date:	Friday, August 16, 2013	Sheet	12 of 31

PCH (H)

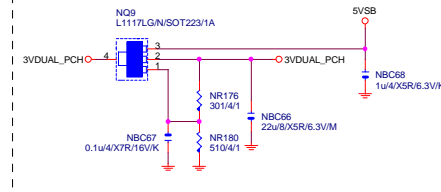


VCC3\_DAC

CLOSE北橋(注意震盪水波紋)

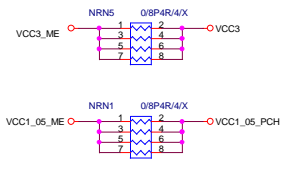


3VDUAL\_PCH



SHT\_PWR

M3\_POWER



CAP

(3.3V) (X6)

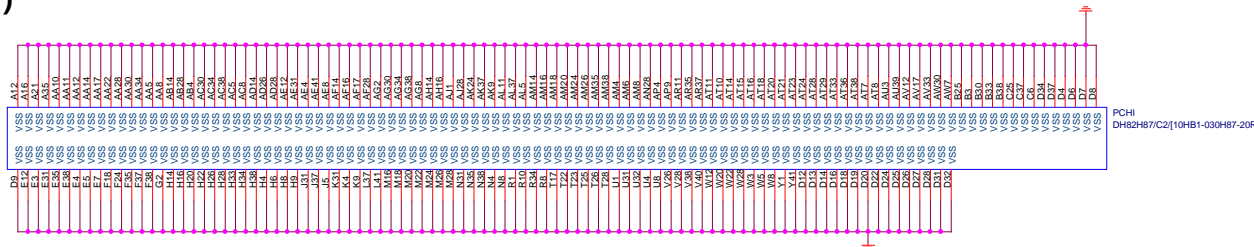
(1.05V) (X5)

(1.05V) (X6)

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

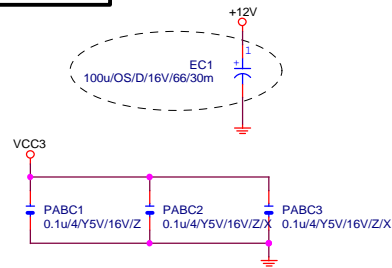
(1.05V) (X10)

PCH (I)

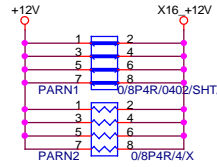




# PCIEX16 CAP



# PCIEX16 PROTECT SHT

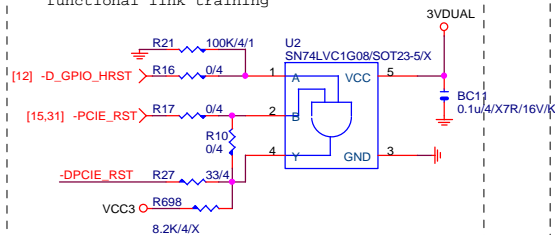


# PCIEX16 AC CAP

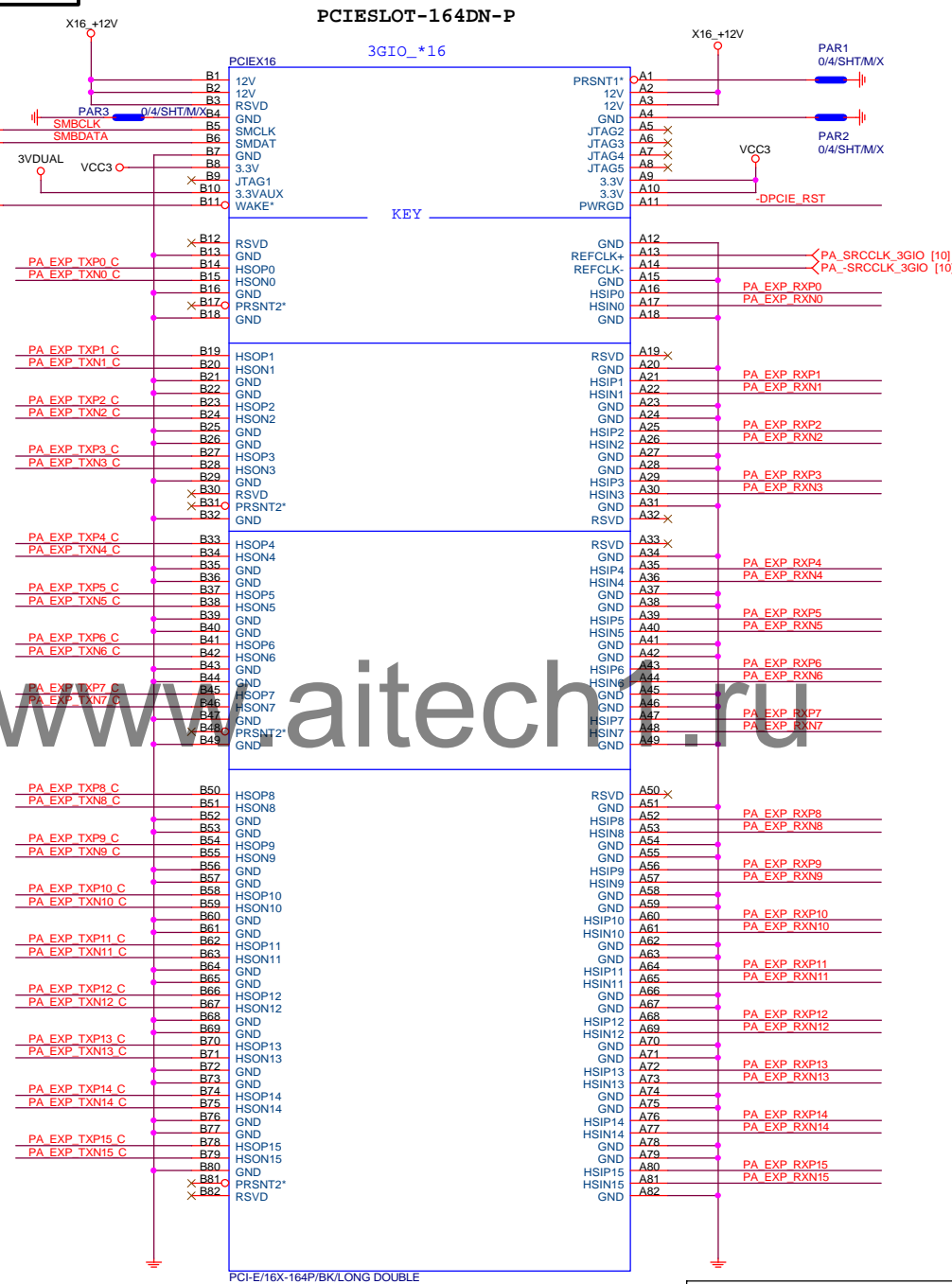
PA EXP TXP0	PAC5	0.22u4/X5R/6.3V/K	PA EXP TXP0 C
PA EXP TXN0	PAC4	0.22u4/X5R/6.3V/K	PA EXP TXN0 C
PA EXP TXP1	PAC6	0.22u4/X5R/6.3V/K	PA EXP TXP1 C
PA EXP TXN1	PAC7	0.22u4/X5R/6.3V/K	PA EXP TXN1 C
PA EXP TXP2	PAC8	0.22u4/X5R/6.3V/K	PA EXP TXP2 C
PA EXP TXN2	PAC9	0.22u4/X5R/6.3V/K	PA EXP TXN2 C
PA EXP TXP3	PAC10	0.22u4/X5R/6.3V/K	PA EXP TXP3 C
PA EXP TXN3	PAC11	0.22u4/X5R/6.3V/K	PA EXP TXN3 C
PA EXP TXP4	PAC12	0.22u4/X5R/6.3V/K	PA EXP TXP4 C
PA EXP TXN4	PAC13	0.22u4/X5R/6.3V/K	PA EXP TXN4 C
PA EXP TXP5	PAC14	0.22u4/X5R/6.3V/K	PA EXP TXP5 C
PA EXP TXN5	PAC15	0.22u4/X5R/6.3V/K	PA EXP TXN5 C
PA EXP TXP6	PAC16	0.22u4/X5R/6.3V/K	PA EXP TXP6 C
PA EXP TXN6	PAC17	0.22u4/X5R/6.3V/K	PA EXP TXN6 C
PA EXP TXP7	PAC19	0.22u4/X5R/6.3V/K	PA EXP TXP7 C
PA EXP TXN7	PAC18	0.22u4/X5R/6.3V/K	PA EXP TXN7 C
PA EXP TXP8	PAC20	0.22u4/X5R/6.3V/K	PA EXP TXP8 C
PA EXP TXN8	PAC21	0.22u4/X5R/6.3V/K	PA EXP TXN8 C
PA EXP TXP9	PAC22	0.22u4/X5R/6.3V/K	PA EXP TXP9 C
PA EXP TXN9	PAC23	0.22u4/X5R/6.3V/K	PA EXP TXN9 C
PA EXP TXP10	PAC24	0.22u4/X5R/6.3V/K	PA EXP TXP10 C
PA EXP TXN10	PAC25	0.22u4/X5R/6.3V/K	PA EXP TXN10 C
PA EXP TXP11	PAC26	0.22u4/X5R/6.3V/K	PA EXP TXP11 C
PA EXP TXN11	PAC27	0.22u4/X5R/6.3V/K	PA EXP TXN11 C
PA EXP TXP12	PAC28	0.22u4/X5R/6.3V/K	PA EXP TXP12 C
PA EXP TXN12	PAC29	0.22u4/X5R/6.3V/K	PA EXP TXN12 C
PA EXP TXP13	PAC30	0.22u4/X5R/6.3V/K	PA EXP TXP13 C
PA EXP TXN13	PAC31	0.22u4/X5R/6.3V/K	PA EXP TXN13 C
PA EXP TXP14	PAC32	0.22u4/X5R/6.3V/K	PA EXP TXP14 C
PA EXP TXN14	PAC33	0.22u4/X5R/6.3V/K	PA EXP TXN14 C
PA EXP TXP15	PAC34	0.22u4/X5R/6.3V/K	PA EXP TXP15 C
PA EXP TXN15	PAC35	0.22u4/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

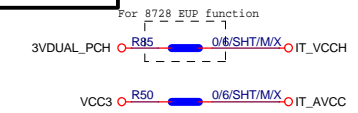
Gigabyte Technology

Title			PCI EXPRESS * 16		
Size			GA-H87N-WIFI		
Custom			Rev 2.0		
Date: Friday, August 16, 2013			Sheet 14 of 31		

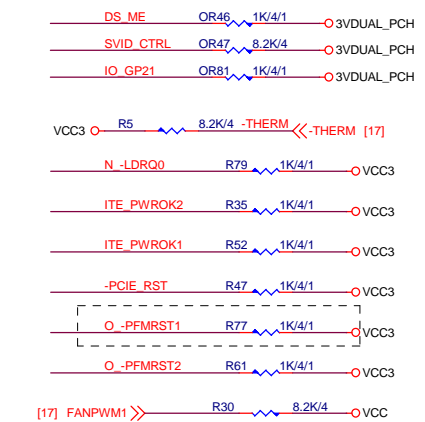
## SIO IT8728F

【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

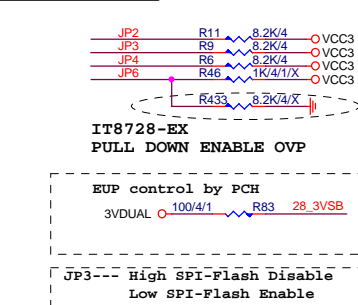
## PWR SHT



## SIO PU



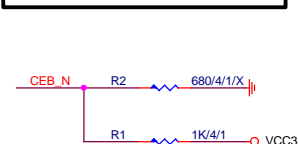
## SIO STRAP



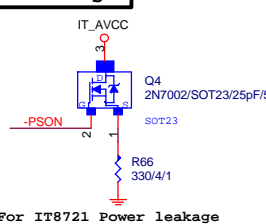
## IT8728F NOTE

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/DRV#
PIN66	SYS_3VSB
PIN70	GP47
PIN95	VIN2 (VCC5)
PIN96	VIN1 (VCC12)
PIN97	VIN1/VDIMM_STR(1.5V)
PIN98	VIN0/VCORE(1.1V)/NC

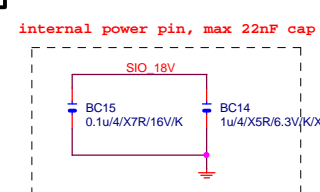
## DUAL BIOS OPT STRAP



## Power leakage

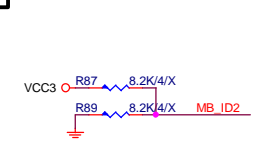


## SIO\_18V

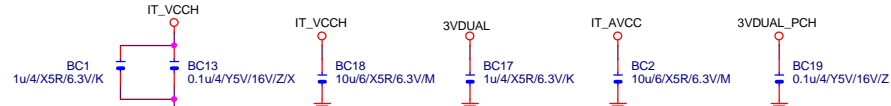


FOR LOW TEMP POWER ON INTO TEST MODE ISSUE

## MB ID



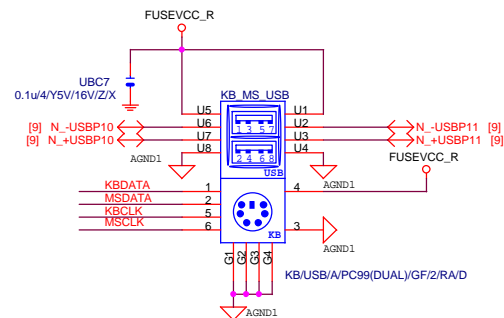
## SIO CAP



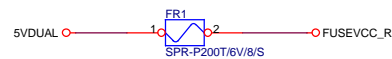
## Gigabyte Technology

Title		ITE 8728 LPC IO	
Size	Document Number	GA-H87N-WIFI	
Custom			Rev 2.0
Date:	Friday, August 16, 2013	Sheet	15 of 31

## KB/MS

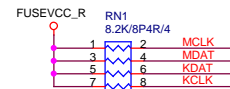


## USB2.0 PWR

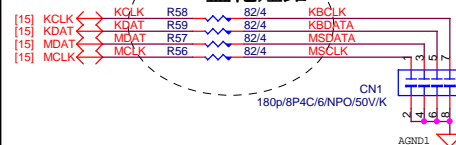


Close to connector  
KB\_MS\_USB 2-Port 2.0A

## KB\_MS



FOR 鹽化短路



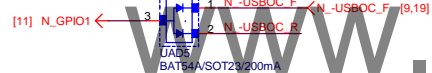
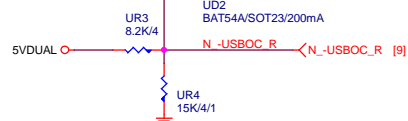
## -USBOC\_R

## USB POWER PROTECT

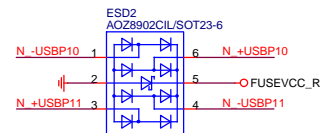
## KB\_USB

## USB\_LAN1

## USB\_LAN2

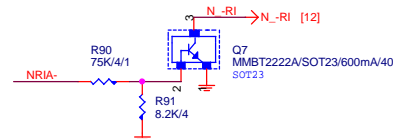
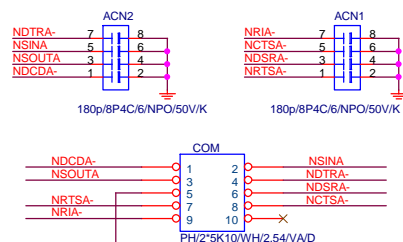
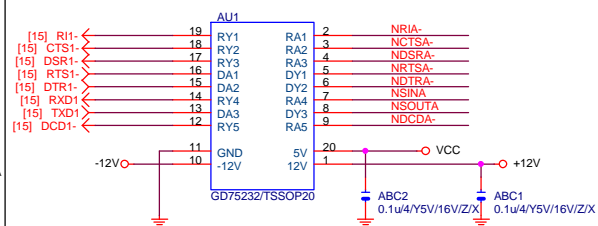


## USB2.0 ESD



## COM

## COM RI

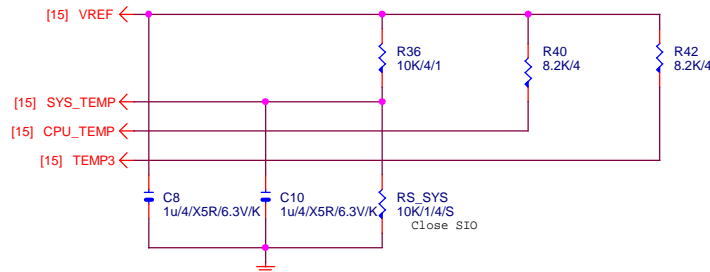


Gigabyte Technology

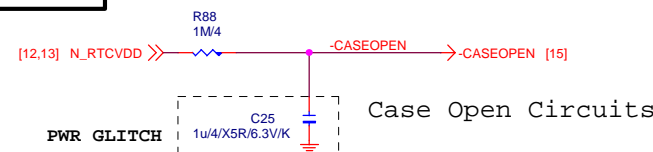
Title			COM,-RI,KB_USB,USB_ESATA,-PROCHOT		
Size	Document Number	GA-H87N-WIFI			Rev
Custom					2.0
Date:	Friday, August 16, 2013	Sheet	16	of	31



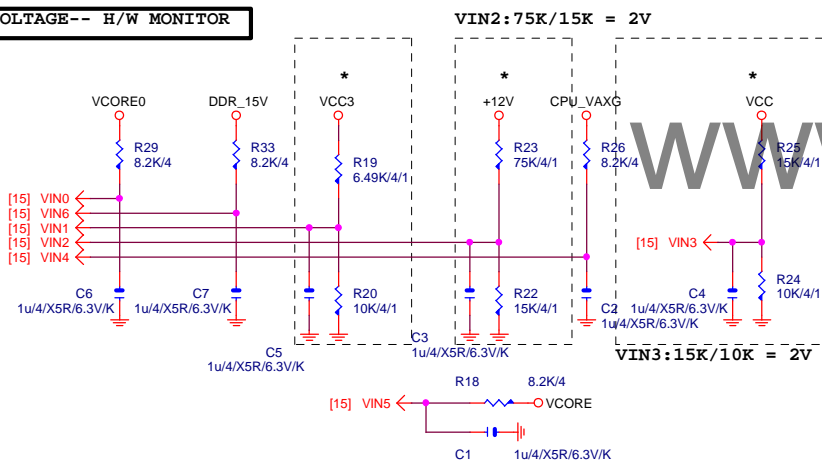
# TEMP H/W MONITOR



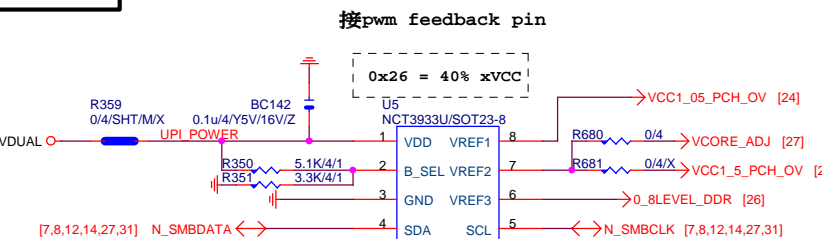
# CASE OPEN



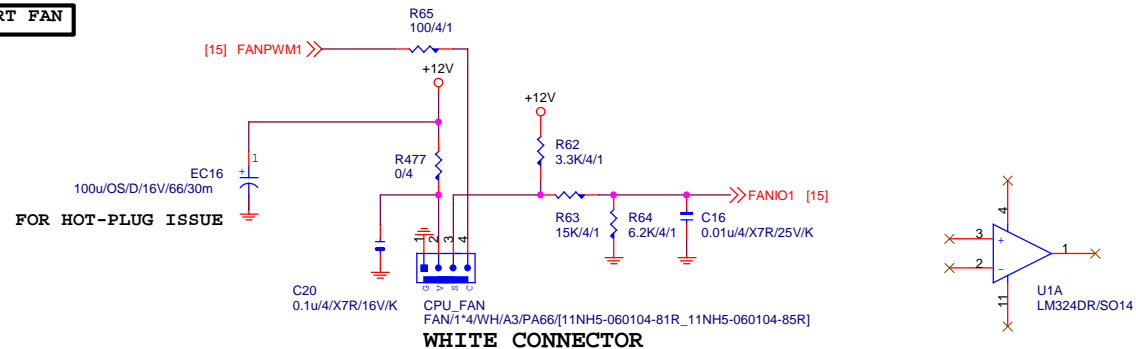
# VOLTAGE-- H/W MONITOR



# OV NCT3933

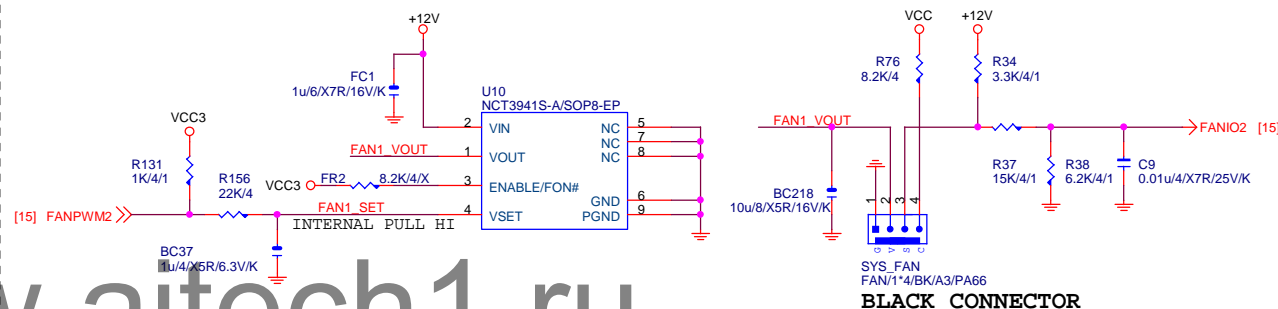


# CPU SMART FAN

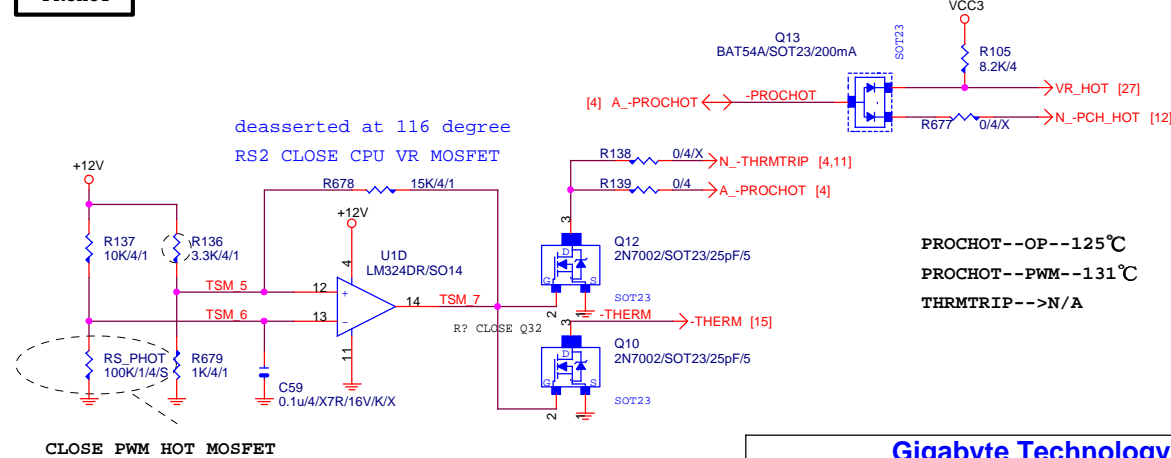


# SYS SMART FAN

Linear SYS\_FAN

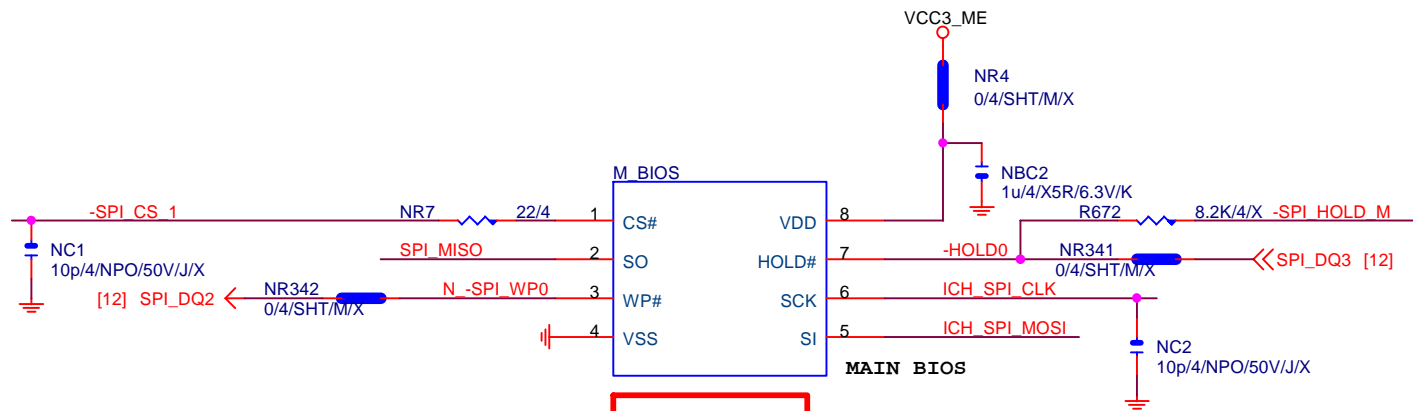


# -PROHOT



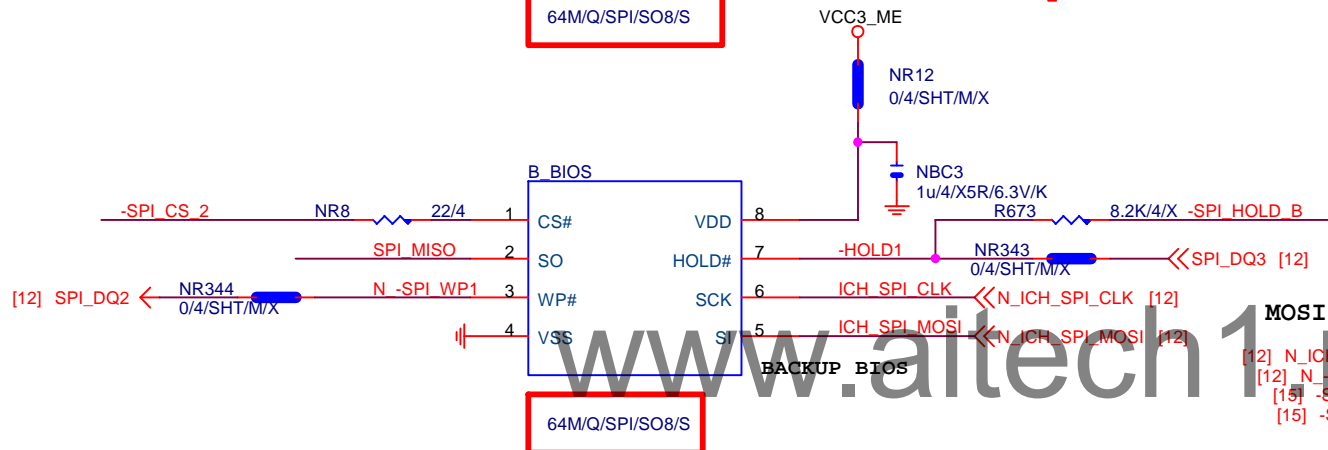
Gigabyte Technology

Title					HWM,FAN CTRL,OV						
Size	Custom	Document Number	GA-H87N-WIFI					Rev	2.0		
Date:	Friday, August 16, 2013				Sheet	17	of	31			

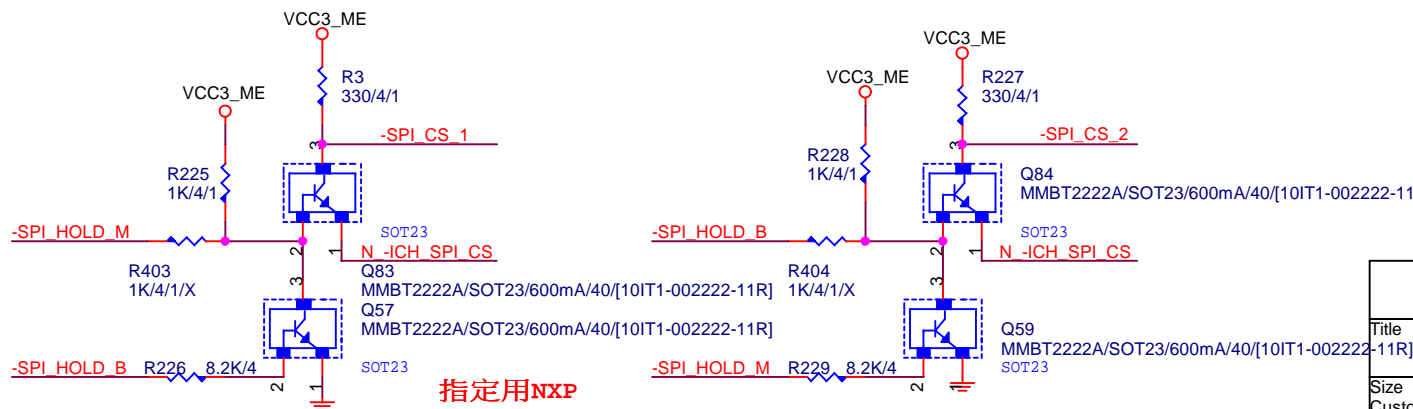
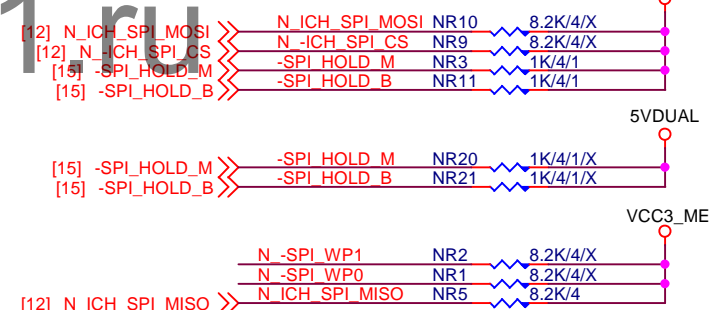


BOOT DEVICE	GNT0	GNT1
LPC	0	0
PCI	0	1
NAND	1	0
SPI	1	1

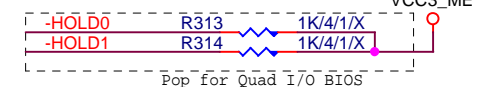
1 means floating  
0 means PD 1K



#### MOSI For DMI RX Termination Voltage



#### CHECK



**Gigabyte Technology**

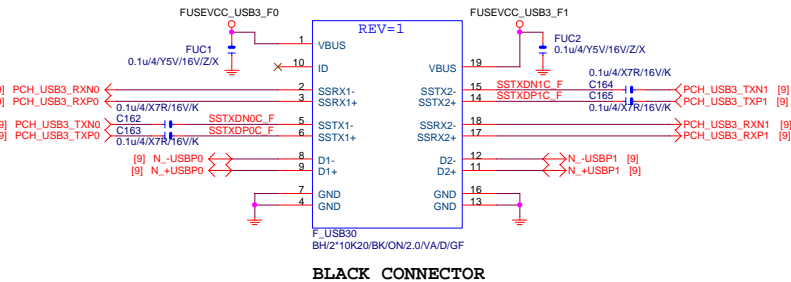
**DUAL BIOS**

**GA-H87N-WIFI**

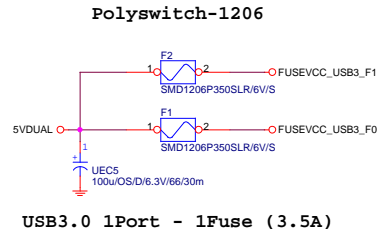
Rev  
2.0

Title	Document Number	Rev
Size Custom	GA-H87N-WIFI	2.0
Date: Friday, August 16, 2013	Sheet 18 of 31	

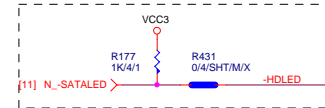
# F\_USB30



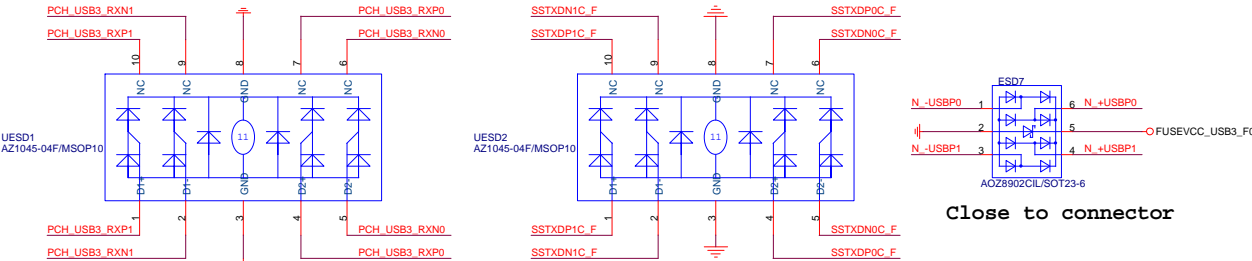
# F\_USB30 PWR



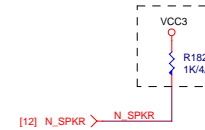
# SATA LED



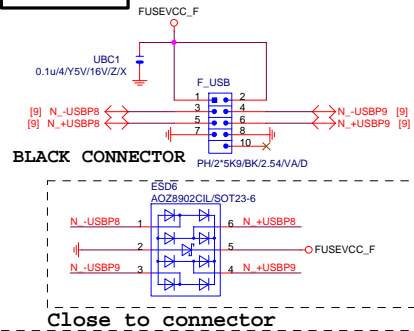
# F\_USB30 ESD PROTECT



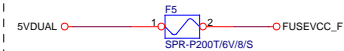
# SPKR



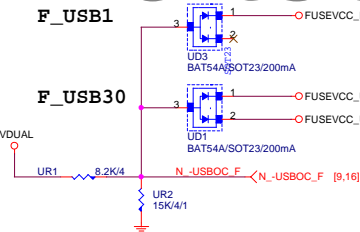
# FRONT USB1



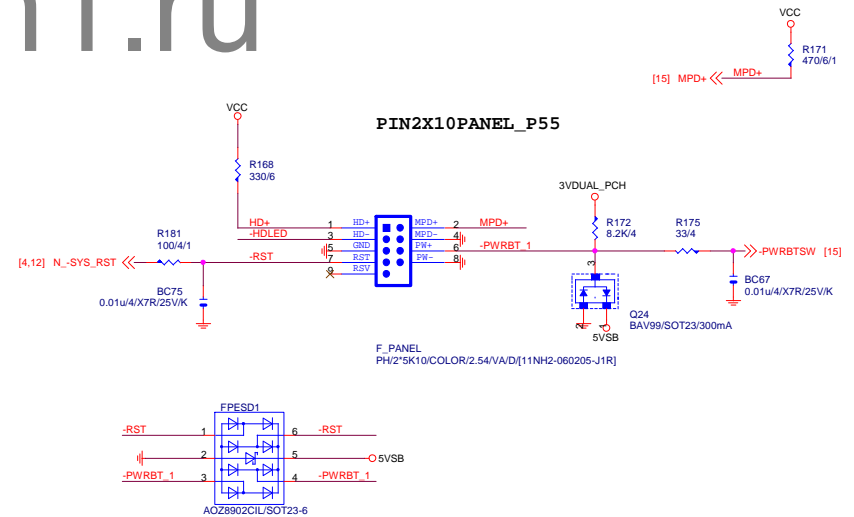
# FUSEVCC\_F



# -USBOC\_F

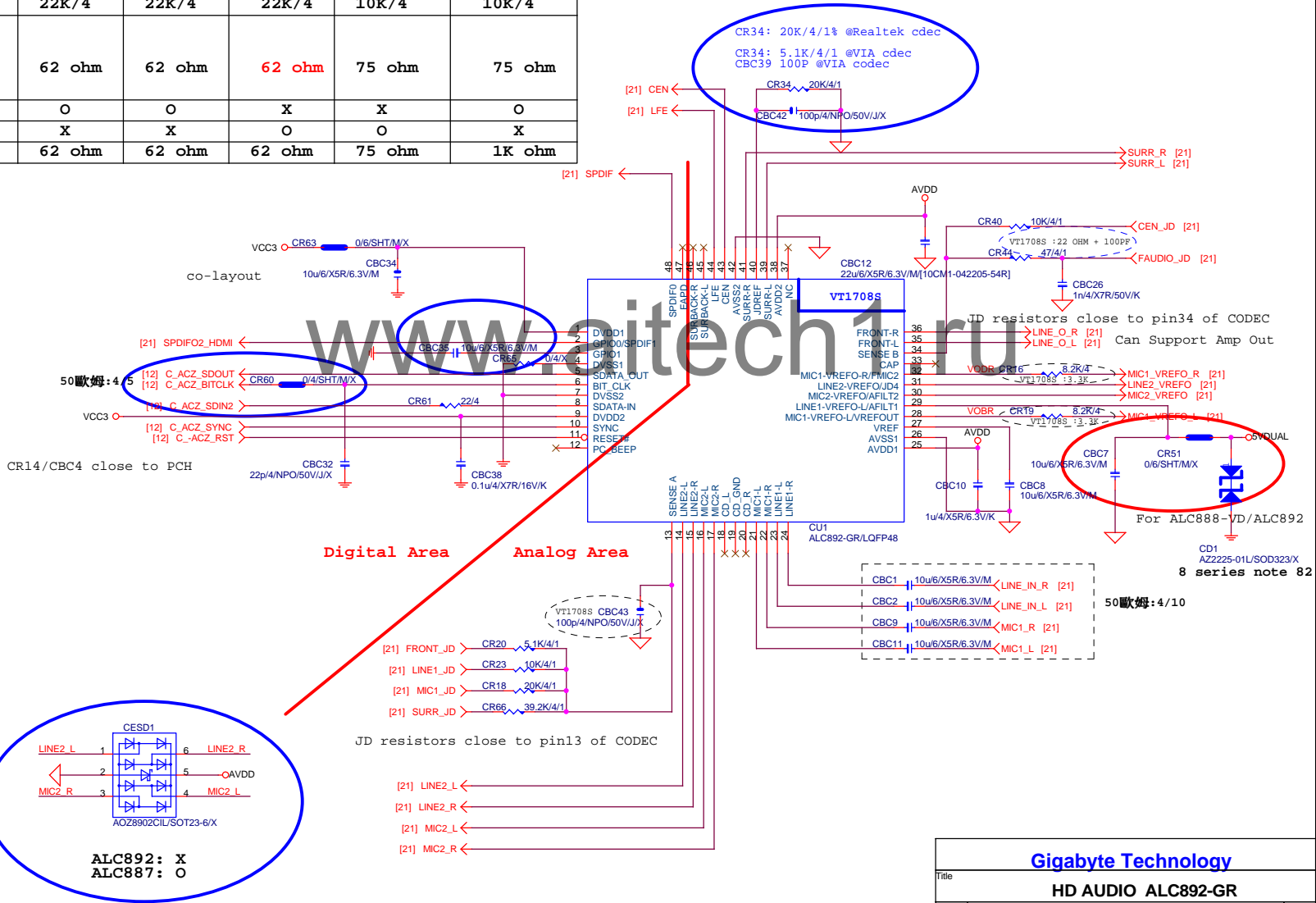


# INTEL FRONT PANEL

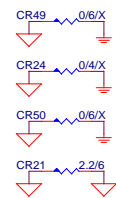


Gigabyte Technology			
Title	FP,F_USB,USB PWR,SPKR,SATA LED		
Size	Custom	Document Number	GA-H87N-WIFI
Date:	Friday, August 16, 2013	Sheet	19 of 31
Rev	2.0		

	ALC662	ALC887-VD2	ALC889	VT1708S	VT1708SCE
CR65	X	X	O	O	X
CR64	X	X	X	X	0.1u/4
CBC35	O	O	X	X	O
CR44/CBC6	47ohm+1nF	47ohm+1nF	47ohm+1nF	22ohm+100P	22ohm+100P
CR31	X	O	O	O	O
CR30	O	X	X	X	X
CBC1/CBC2	22uF/X5R	22uF/X5R	22uF/X5R	22uF/X5R	22uF/X5R
CR20	5.11K/4/1	5.11K/4/1	5.11K/4/1	5.1K/4/1	5.1K/4/1
CR34	20K/4/1	20K/4/1	20K/4/1	5.1K/4/1	20K/4/1
CBC39/CBC40	N/A	N/A	N/A	100P/4	100P/4
CR6/CR7/CR54/CR58	22K/4	22K/4	22K/4	10K/4	10K/4
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

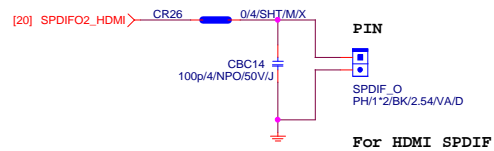


## CODEC POWER/EMI PAD

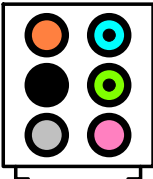


ADD CD2 For ESD PROTECT DIODE

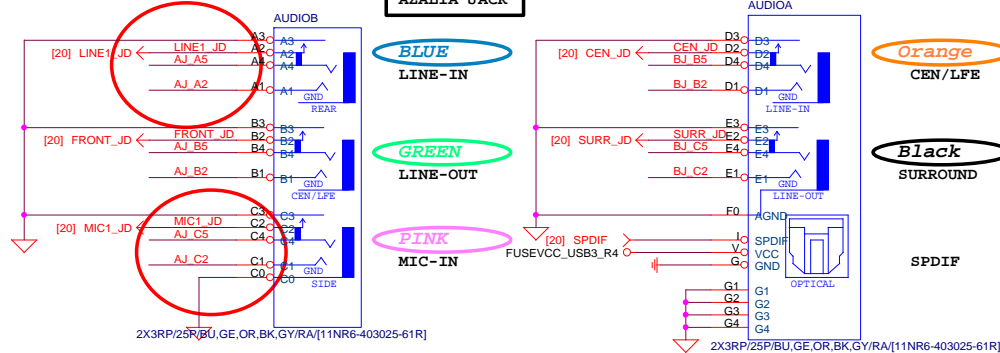
## SPDIF\_OUT



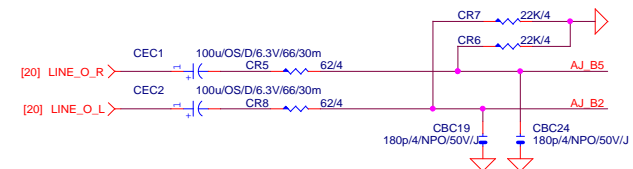
## AZALIA JACK



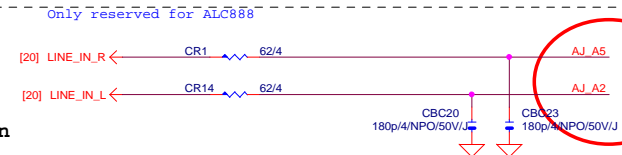
## AZALIA JACK

BLUE  
LINE-INGREEN  
LINE-OUTPINK  
MIC-IN

## LINE-OUT

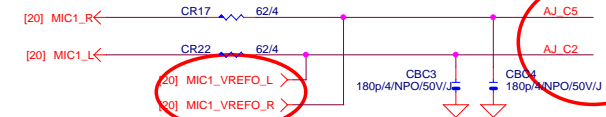


## LINE-IN

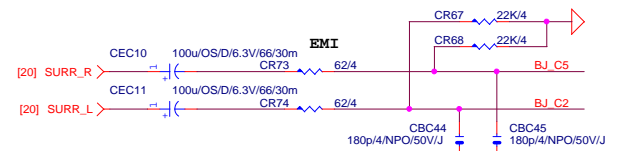
Verify MIC function  
in LINE-in

For 889A/888

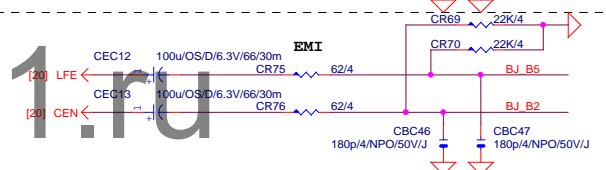
## MIC-IN



## SURROUND

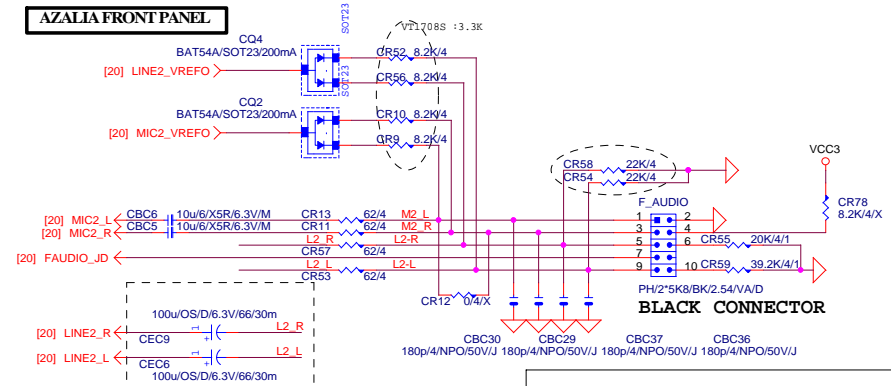


## CEN/LFE



## SURRBACK

## AZALIA FRONT PANEL



Gigabyte Technology

AUDIO JACK

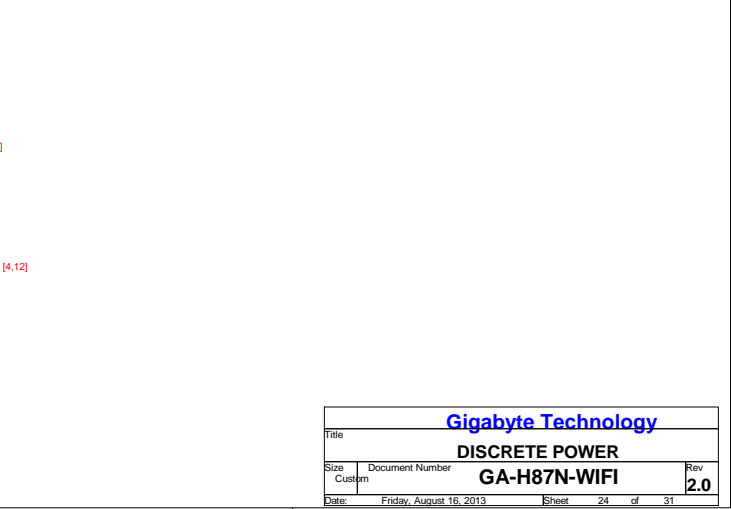
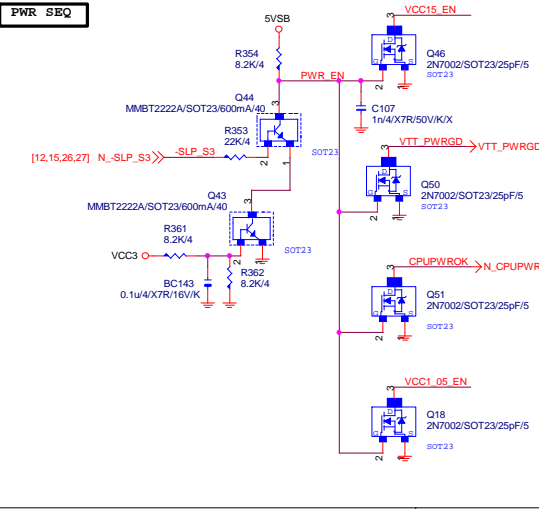
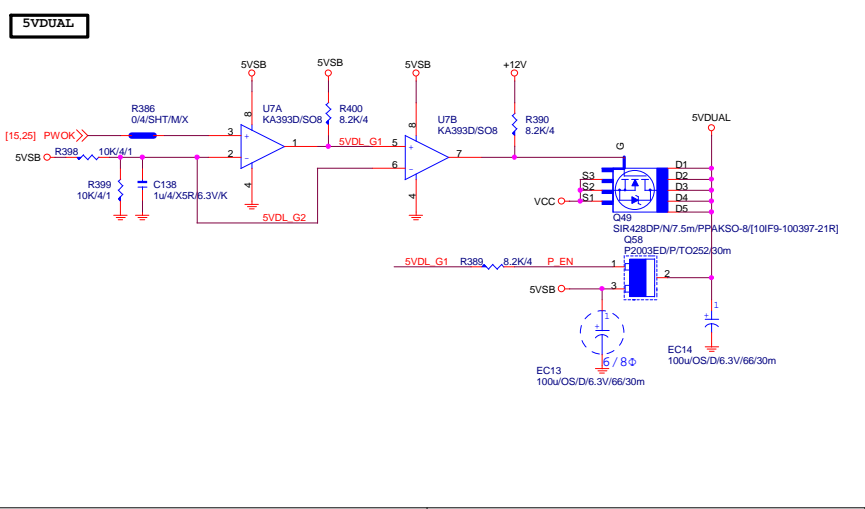
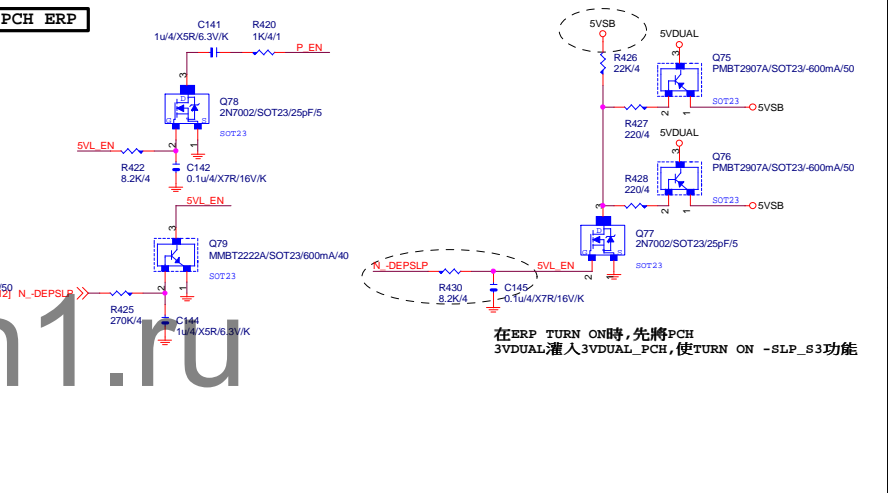
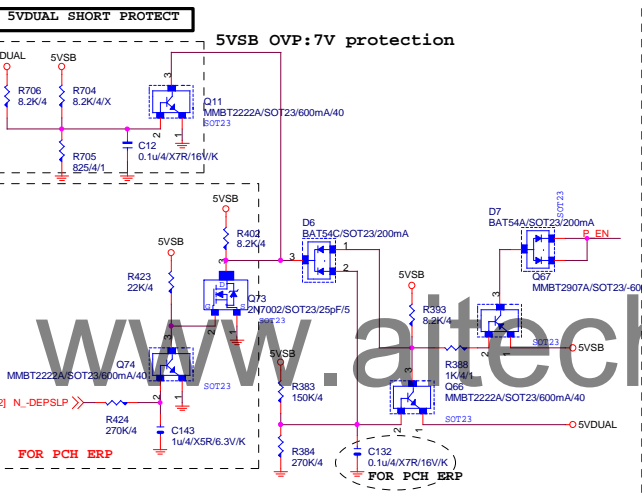
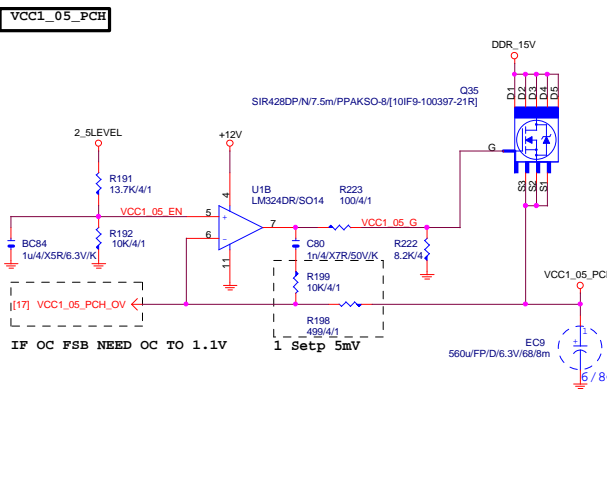
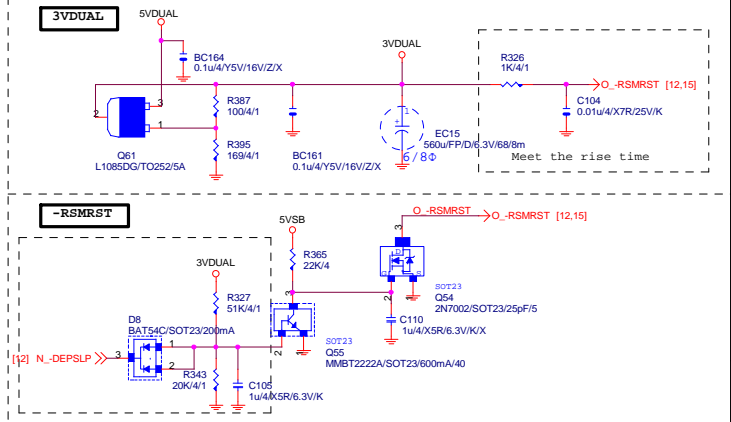
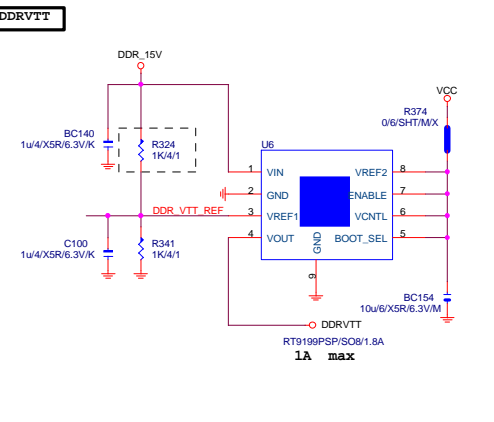
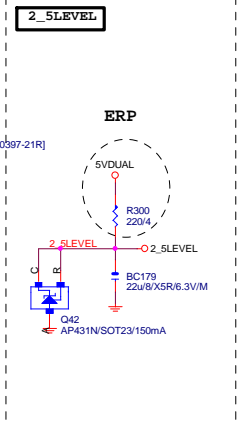
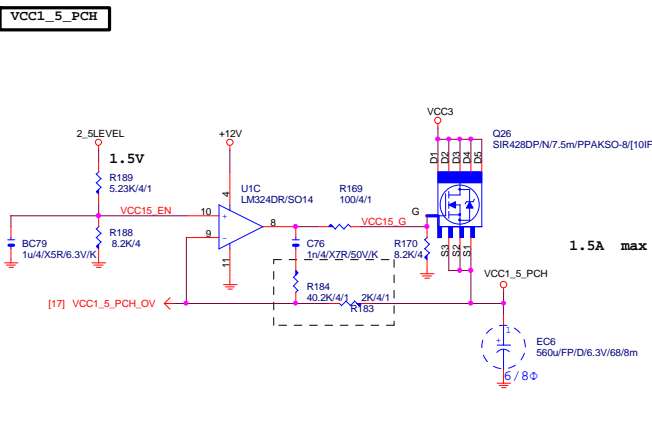
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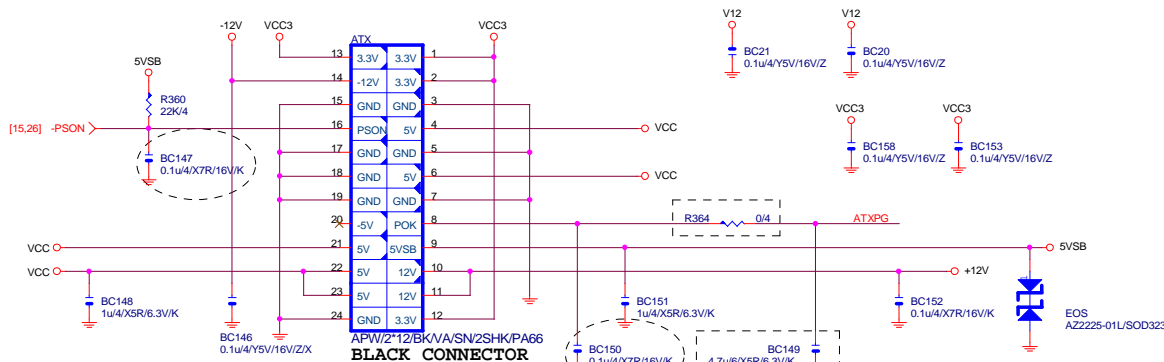




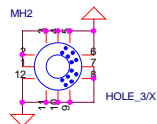




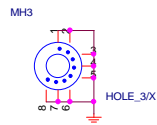
# ATXX24 POWER CONNECTOR



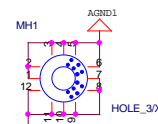
## MB LOCATION



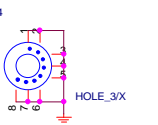
HOLE\_4-RH-5MM-1



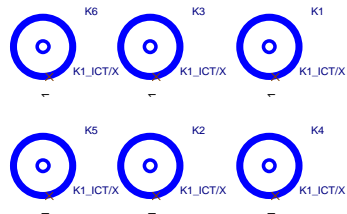
HOLE\_4-RH-5MM-5PIN-1



HOLE\_4-RH-5MM-1

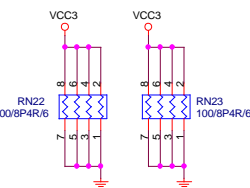


HOLE\_4-RH-5MM-5PIN-1

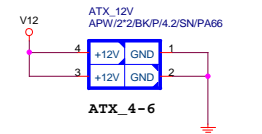


To prevent the 5VSB under loading when boot

## FIX PWR MINMUN LOAD



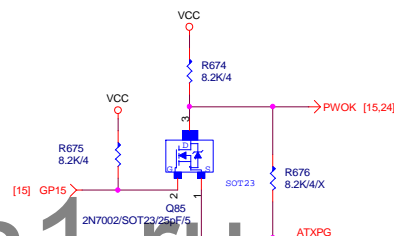
# ATXX4 POWER CONNECTOR



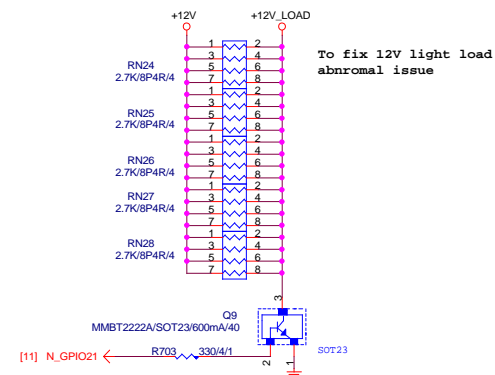
BLACK CONNECTOR

## PWOK PATCH

【技術通報R&D技術通報154】



【技術通報R&D技術通報153】



To fix 12V light load abnormal issue

## CLK GEN

N/A

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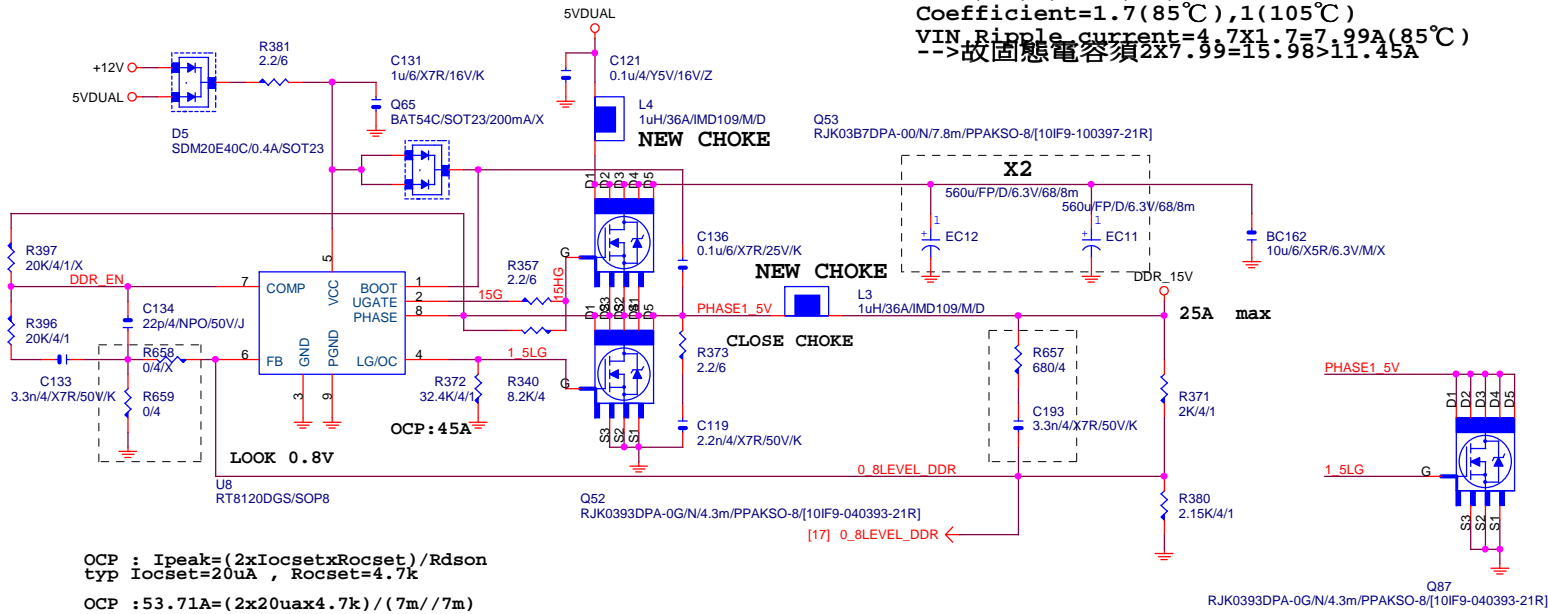
ATX CONNECTOR

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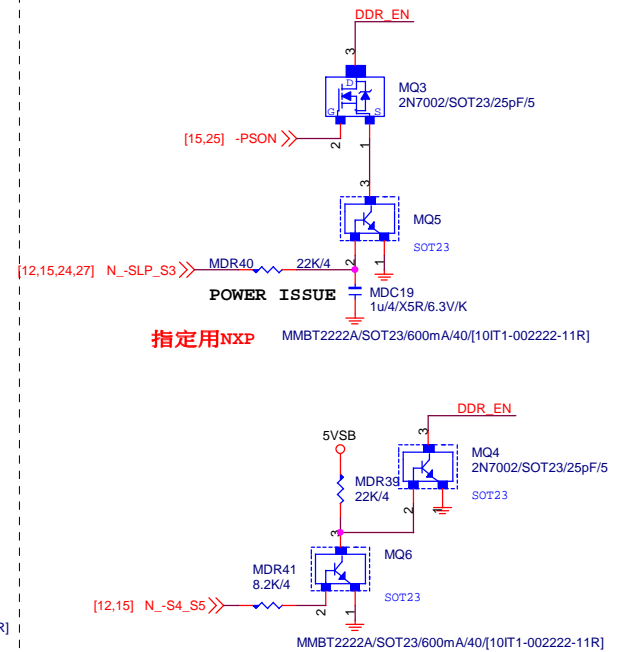
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# DDR15V



# PWR SEQ

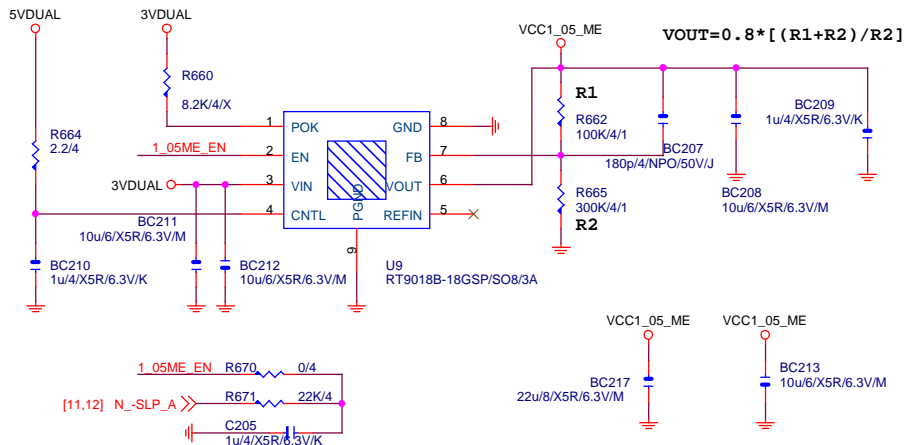


# VCC1\_05\_ME

Z87 N/A

Z87+I217V

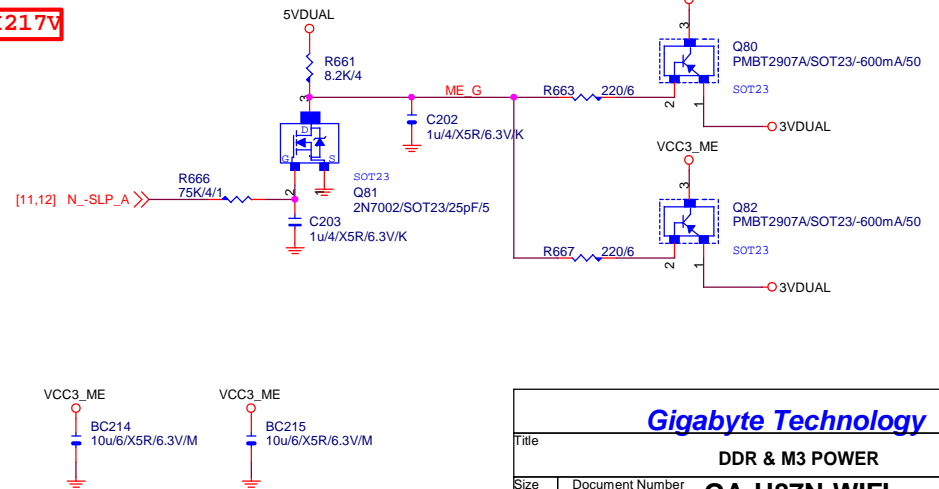
【技術通報R&D技術通報156】  
 (RICHTEK), (NUVOTON), (EMC)做共用  
 PIN7分壓阻值須做修改為100K以上電阻值



# VCC3\_ME

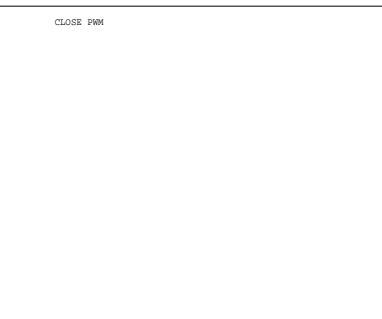
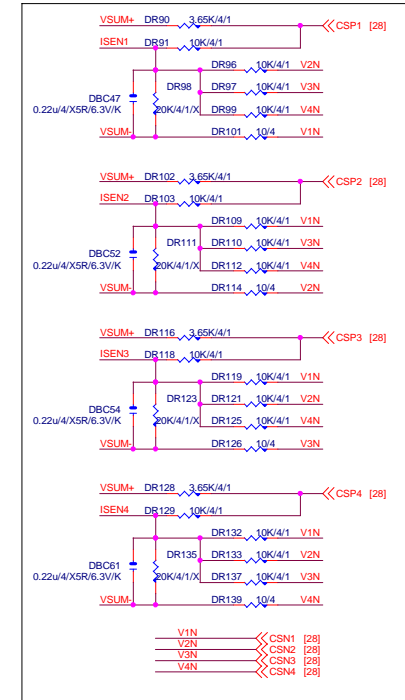
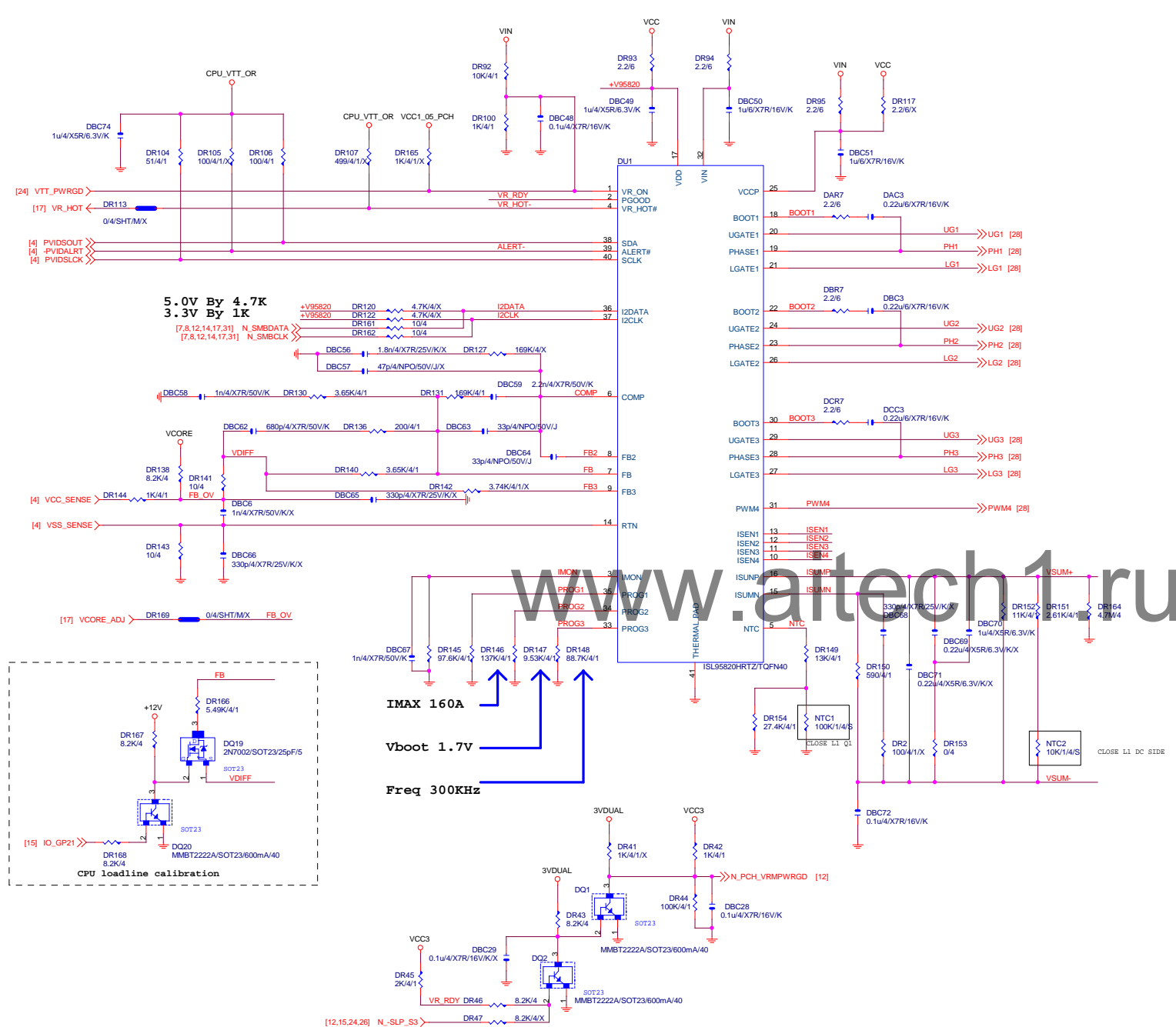
Z87 N/A

Z87+I217V

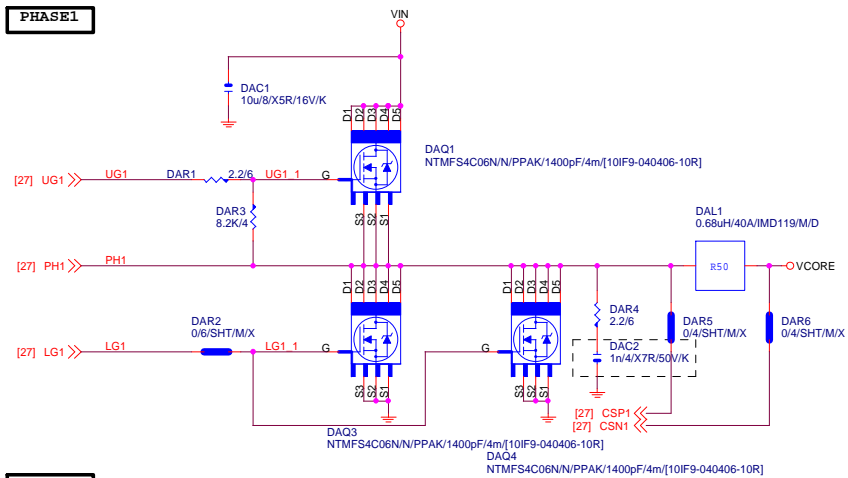


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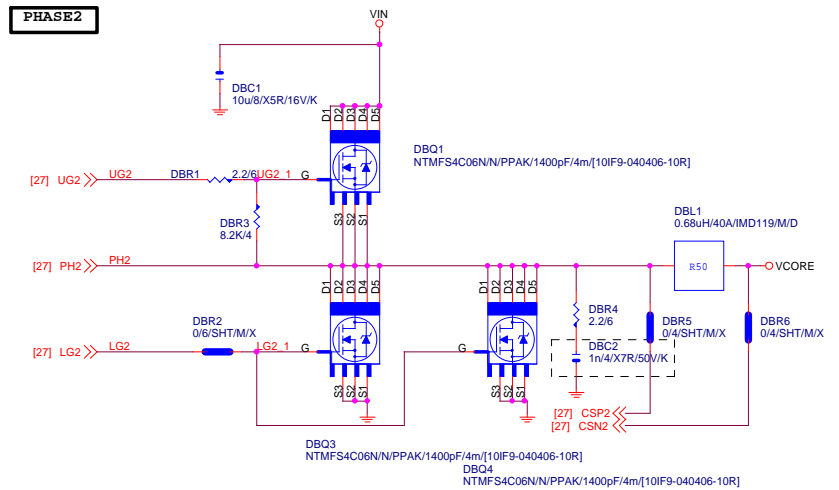
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DDR & M3 POWER			
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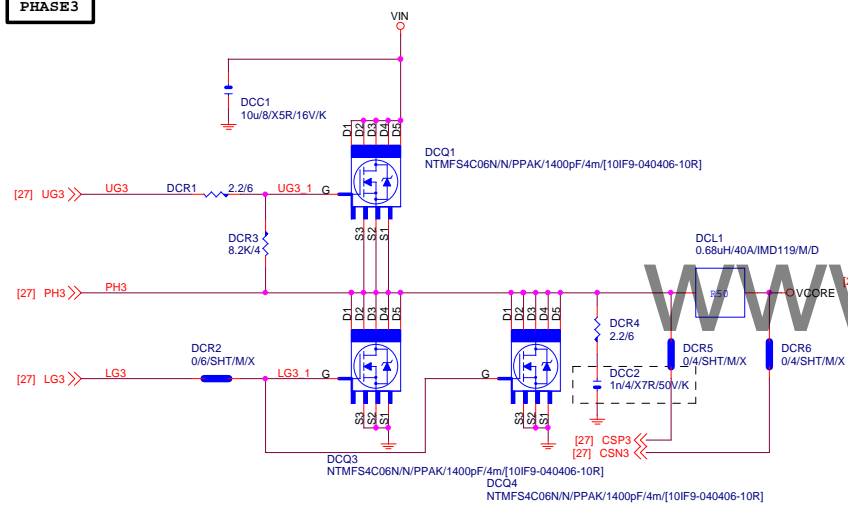
# PHASE1



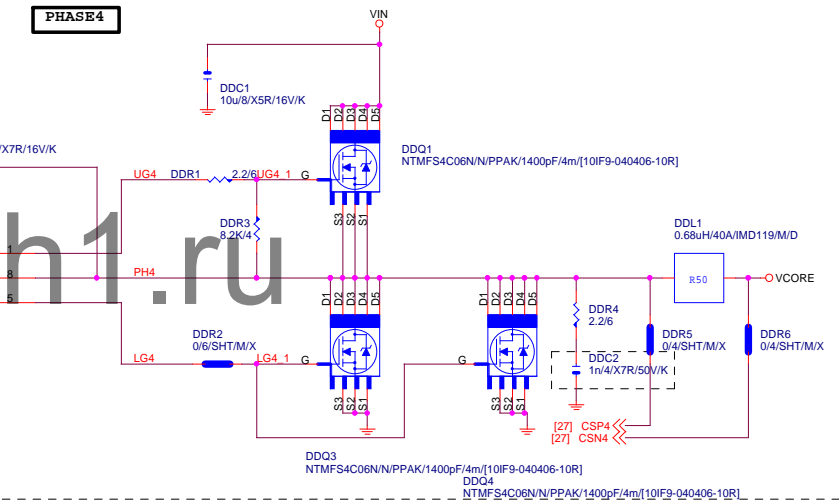
# PHASE2



# PHASE3

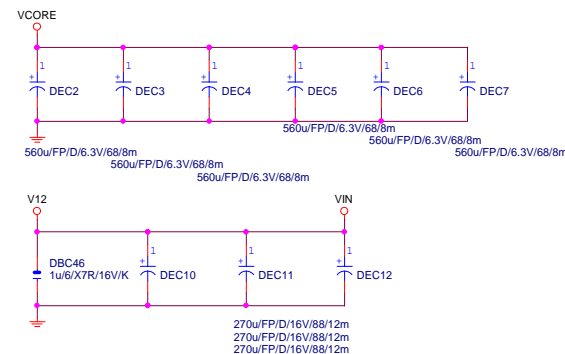


# PHASE4



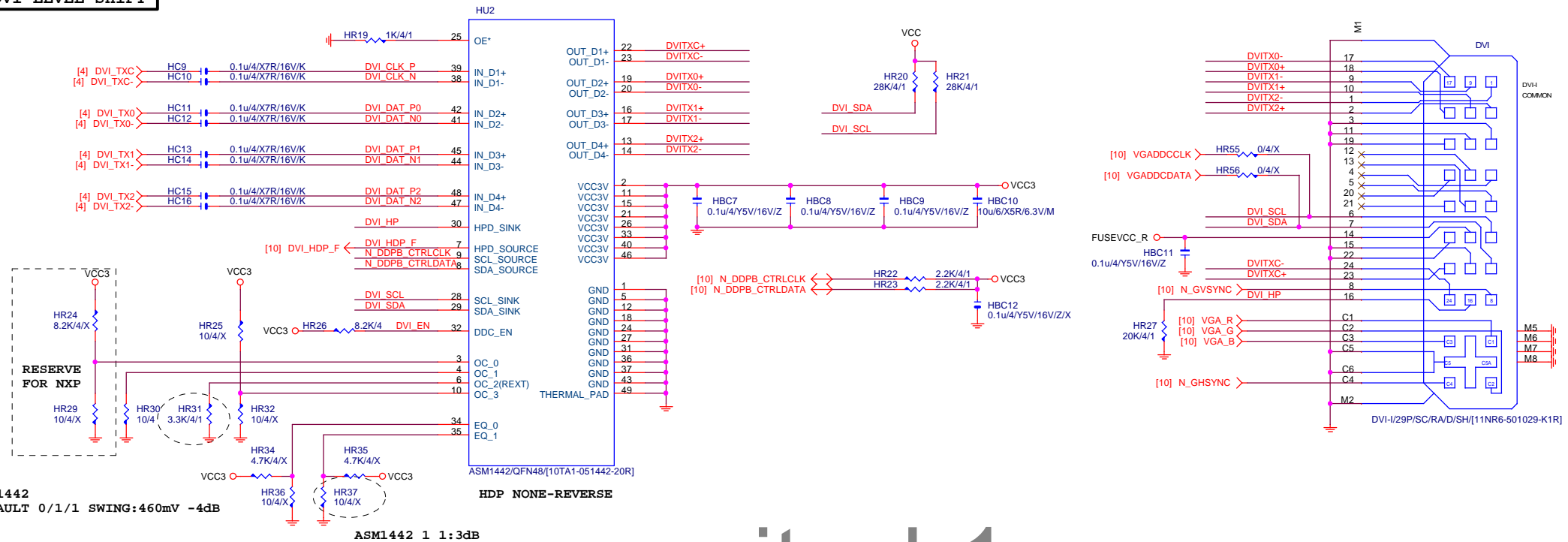
# MOS HEATSINK

N/A



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CPU CORE VR-2			
Size Custom			
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# DVI LEVEL SHIFT



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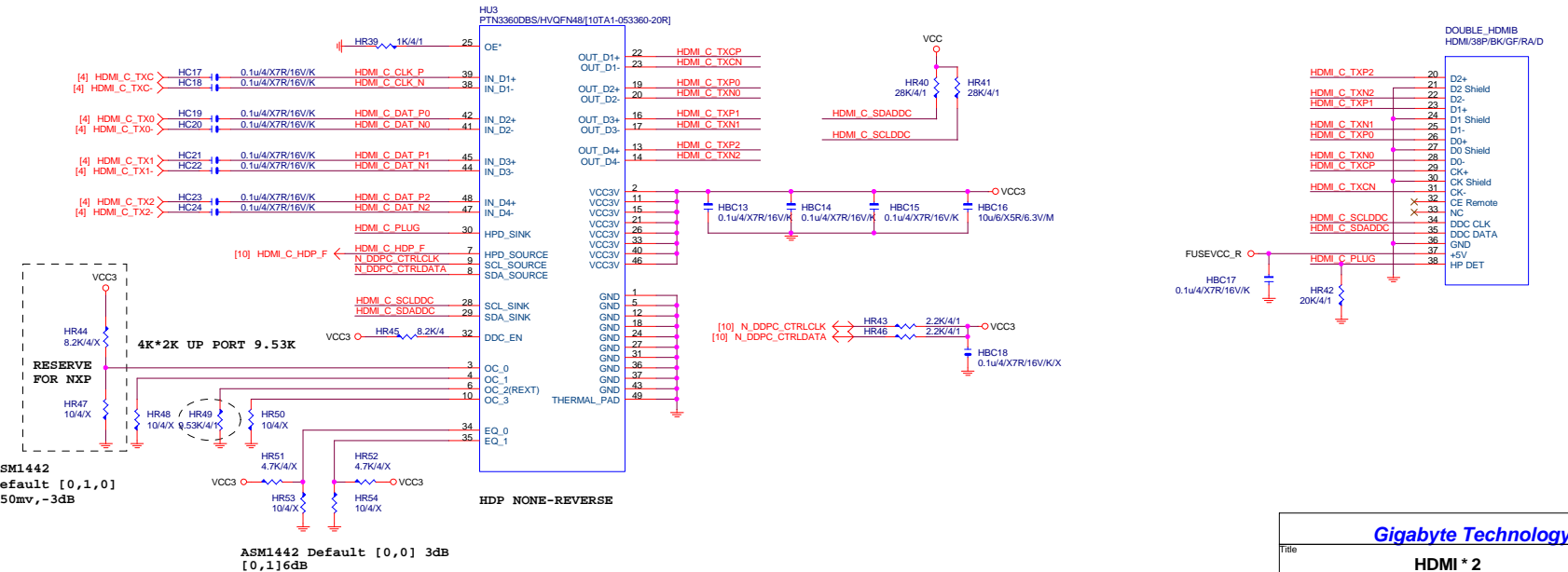
DVI

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## HDMI LEVEL SHIFT



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