

# Model Name: GA-Q87M-D3PH

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,Reserved
10	PCH_DP,CLK BUFFER
11	PCH_HOST,SATA,PCI
12	PCH_GPIO,CTRL,AUDIO
13	PCH_PWR,GND
14	PCI EXPRESS X16 SLOT
15	PCI EXPRESS X4 / X1 SLOT
16	PCI SLOT
17	ITE 8728 LPC IO
18	KB_MS_USB, R_USB3.0
19	HWM,FAN CTRL,-PROCHOT
20	BIOS,TPM
21	FP,FUSB,SPK,SATALED
22	REALTEK CODEC ALC887
23	REAR AUDIO JACK
24	Realtek LAN RTL8111EP/8111F-VL
25	DISCRETE POWER
26	ATX, M3 POWER
27	VCORE ISL95812_1

SHEET TITLE

28	VCORE ISL95812_2
29	RT8120_DDR POWER
30	COM A , LPT
31	DVI, HDMI ,DP
32	IT8892E PCI BRIDGE
33	INTEL i217LM PHY

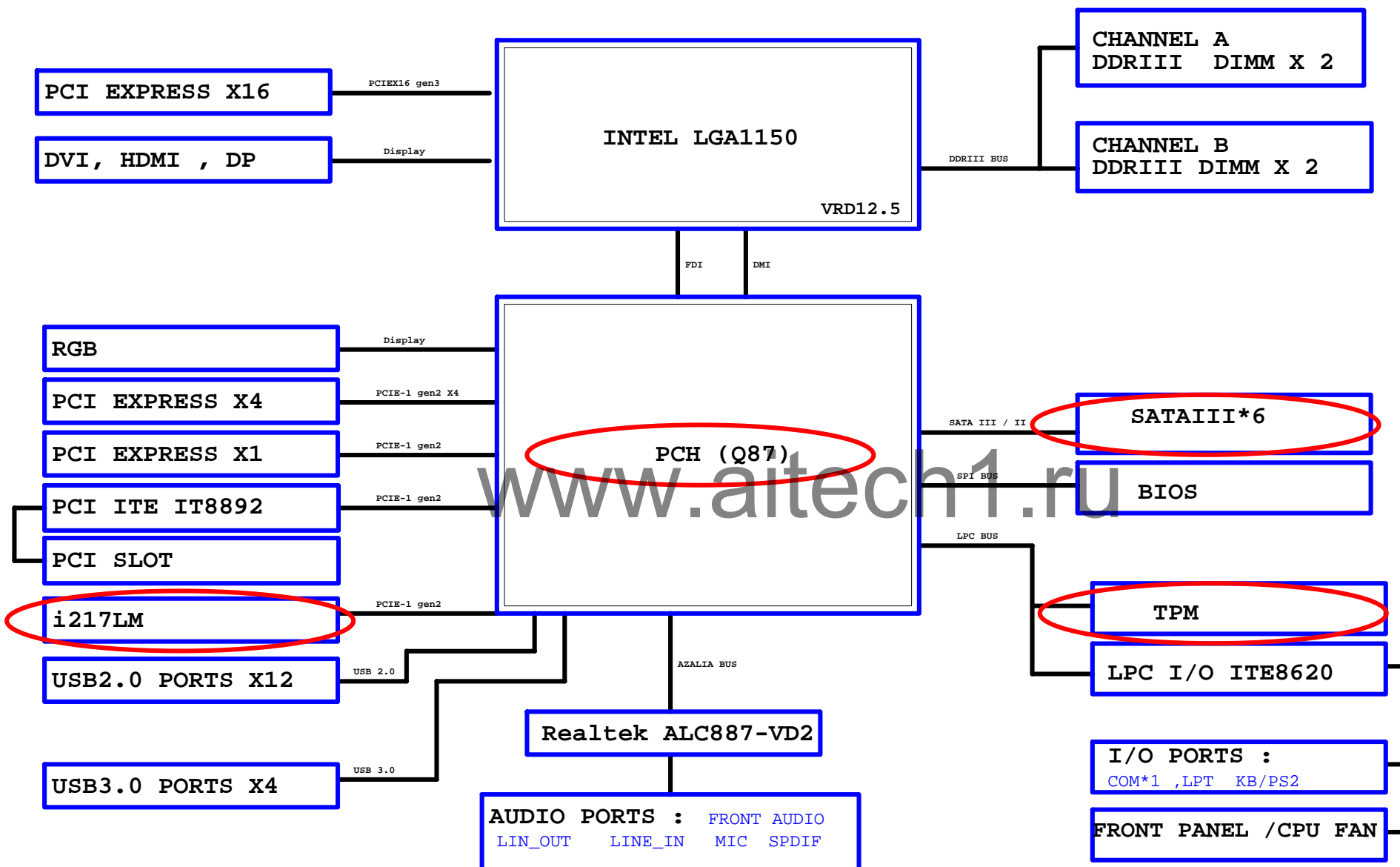
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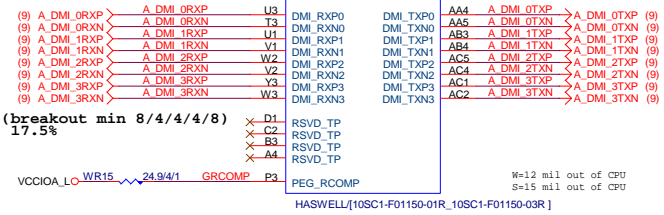
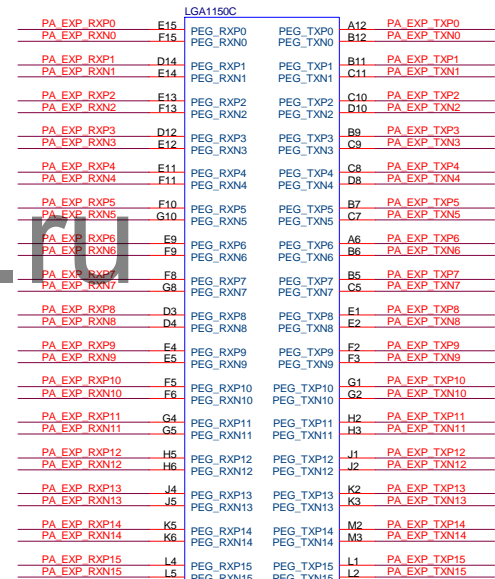
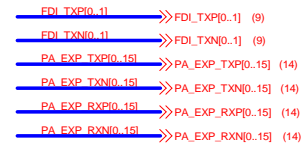
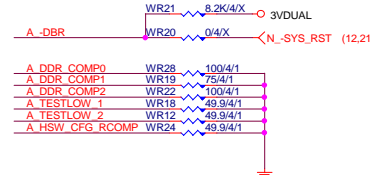
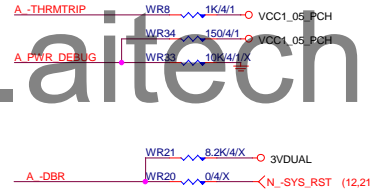
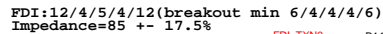
Gigabyte Technology			
Cover Sheet			
Title	Document Number		Rev
	GA-Q87M-D3PH		1.1
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## D

CA

# BLOCK DIAGRAM





CFG 0-17 all internal PULL-UP

## LGA1150A

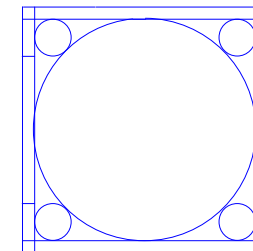
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MAAA5	AW18	DDR0_MA4	DDR0_DQ4	AD40	MDA5
MAAA6	AV17	DDR0_MA5	DDR0_DQ5	AF37	MDA6
MAAA7	AT18	DDR0_MA6	DDR0_DQ6	AF40	MDA7
MAAA8	AU18	DDR0_MA7	DDR0_DQ7	AF40	MDA9
MAAA9	AT19	DDR0_MA8	DDR0_DQ8	AH39	MDA13
MAAA10	AW11	DDR0_MA10	DDR0_DQ10	AK38	MDA10
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MAAA12	AU19	DDR0_MA12	DDR0_DQ12	AH37	MDA12
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MAAA14	AT20	DDR0_MA14	DDR0_DQ14	AK37	MDA14
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MODT_A2	AW9	DDR0_ODT2	DDR0_DQ18	AP39	MDA19
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			DDR0_DQ20	AM38	MDA16
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			DDR0_DQ27	AT37	MDA28
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			DDR0_DQ30	AW35	MDA31
			DDR0_DQ31	AY6	MDA33
			DDR0_DQ32	AU6	MDA37
			DDR0_DQ33	AY4	MDA34
			DDR0_DQ34	AU4	MDA35
			DDR0_DQ35	AW6	MDA36
			DDR0_DQ36	AV6	MDA32
			DDR0_DQ37	AV4	MDA38
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			DDR0_DQ57	AE4	MDA59
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			DDR0_DQ67	AP3	DQSA5
			DDR0_DQ68	AK3	DQSA6
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			DDR0_DQ74	AU36	DQSA4
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HASWELL[10SC1-F01150-01R\_10SC1-F01150-03R]

## LGA1150B

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MAAB4	AP23	DDR1_MA4	DDR1_DQ4	AD34	MDB4
MAAB5	AL23	DDR1_MA5	DDR1_DQ5	AD35	MDB5
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MAAB7	AV25	DDR1_MA7	DDR1_DQ7	AH34	MDB7
MAAB8	AU26	DDR1_MA8	DDR1_DQ8	AL34	MDB8
MAAB9	AW26	DDR1_MA9	DDR1_DQ9	AL35	MDB9
MAAB10	AP18	DDR1_MA10	DDR1_DQ10	AK31	MDB10
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			DDR1_DQ33	AP12	MDB33
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			DDR1_DQ35	AL12	MDB35
			DDR1_DQ36	AP13	MDB36
			DDR1_DQ37	AM13	MDB37
			DDR1_DQ38	AM13	MDB38
			DDR1_DQ39	AM12	MDB39
			DDR1_DQ40	AR9	MDB45
			DDR1_DQ41	AP9	MDB41
			DDR1_DQ42	AR6	MDB47
			DDR1_DQ43	AP6	MDB43
			DDR1_DQ44	AR10	MDB44
			DDR1_DQ45	AP10	MDB40
			DDR1_DQ46	AR7	MDB46
			DDR1_DQ47	AP7	MDB42
			DDR1_DQ48	AL9	MDB52
			DDR1_DQ49	AL6	MDB50
			DDR1_DQ50	AL7	MDB55
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			DDR1_DQ54	AM7	MDB51
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			DDR1_DQ60	AJ7	MDB57
			DDR1_DQ61	AF6	MDB59
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			DDR1_DQ66	AN28	DQSB3
			DDR1_DQ67	AN12	DQSB4
			DDR1_DQ68	AP8	DQSB5
			DDR1_DQ69	AL8	DQSB6
			DDR1_DQ70	AG7	DQSB7
			DDR1_DQ71	AN25	
			DDR1_DQ72	AF34	DQSB0
			DDR1_DQ73	AK33	DQSB1
			DDR1_DQ74	AN33	DQSB2
			DDR1_DQ75	AN29	DQSB3
			DDR1_DQ76	AN13	DQSB4
			DDR1_DQ77	AR8	DQSB5
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HASWELL[10SC1-F01150-01R\_10SC1-F01150-03R]

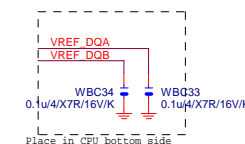
CR  
CPU RETAINTION/X

LGA1150



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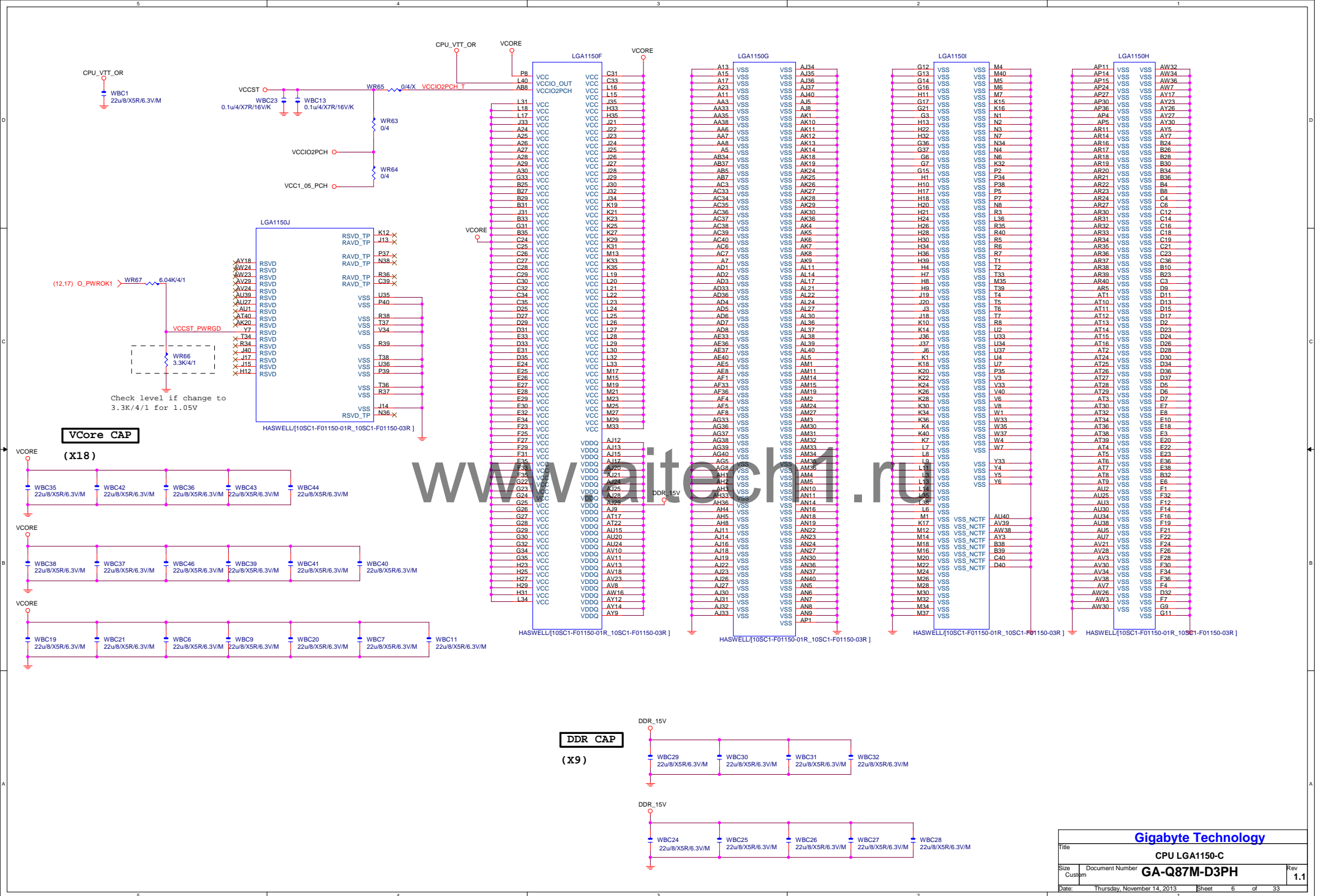


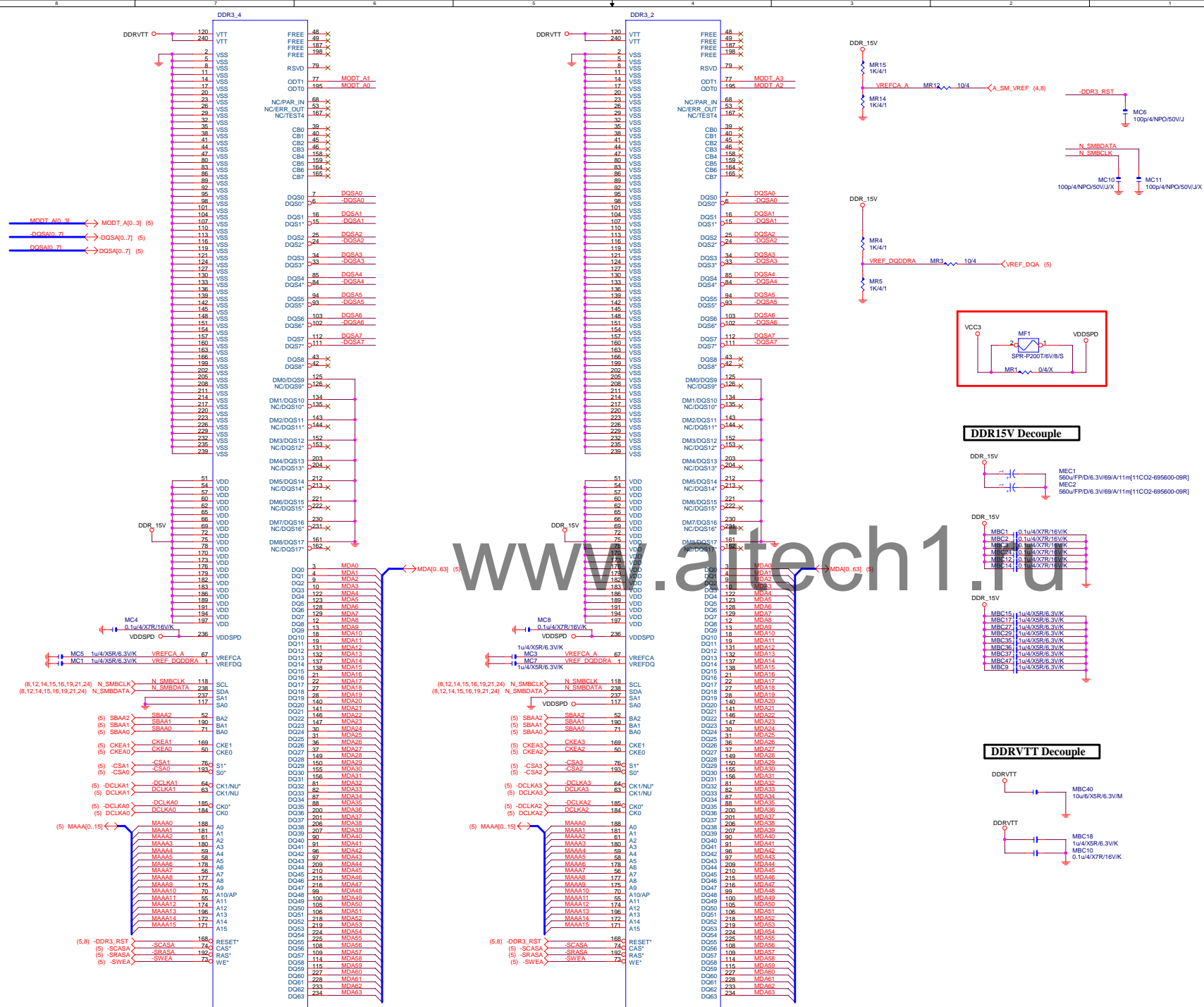
Gigabyte Technology

CPU LGA1150-B

Title	CPU LGA1150-B		Rev
Size	Document Number	GA-Q87M-D3PH	1.1
Custom			

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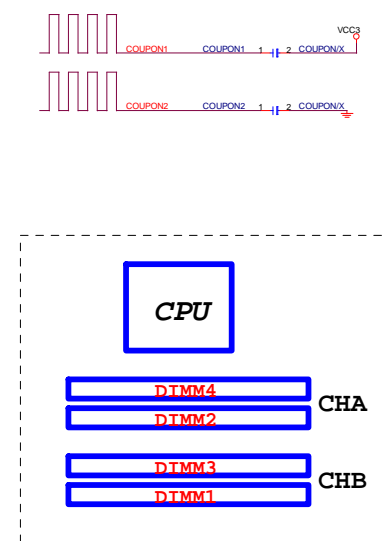
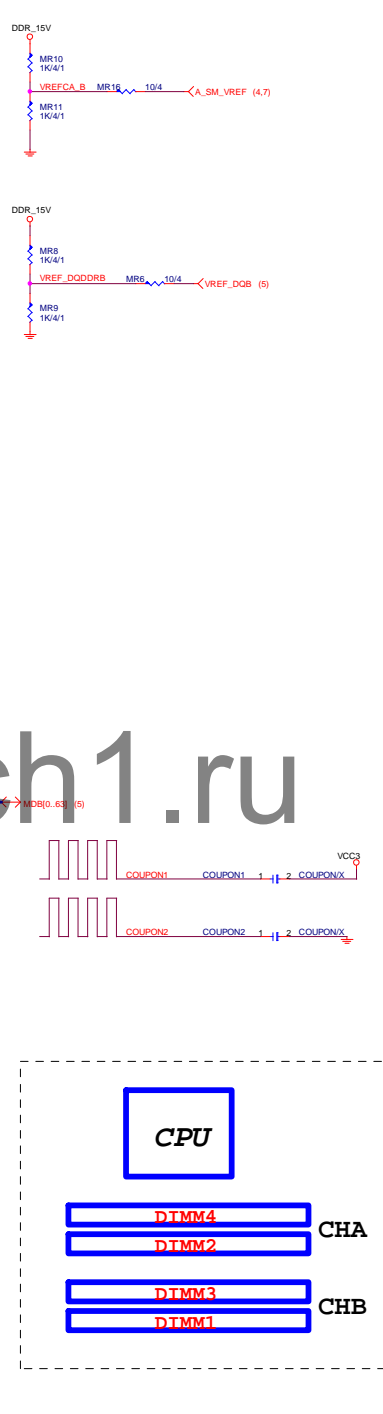
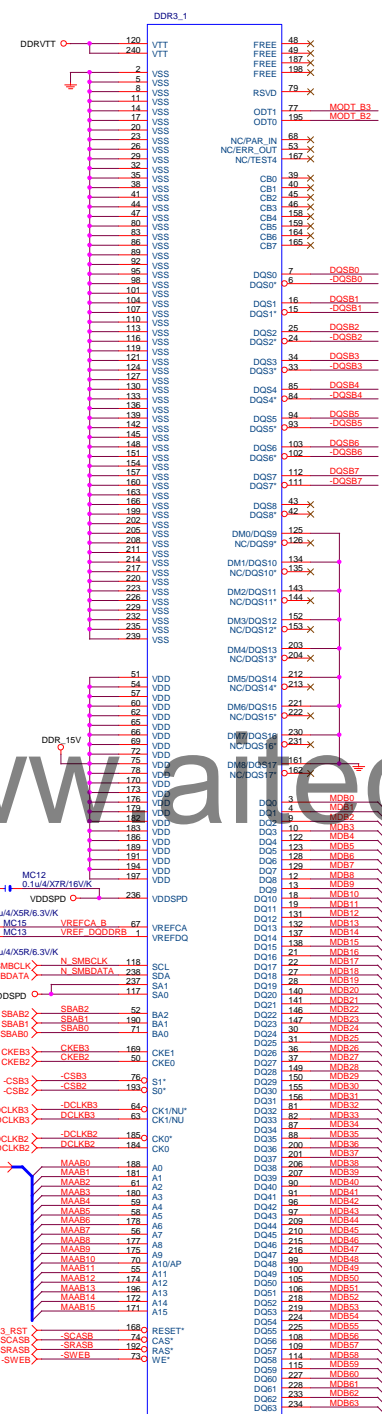
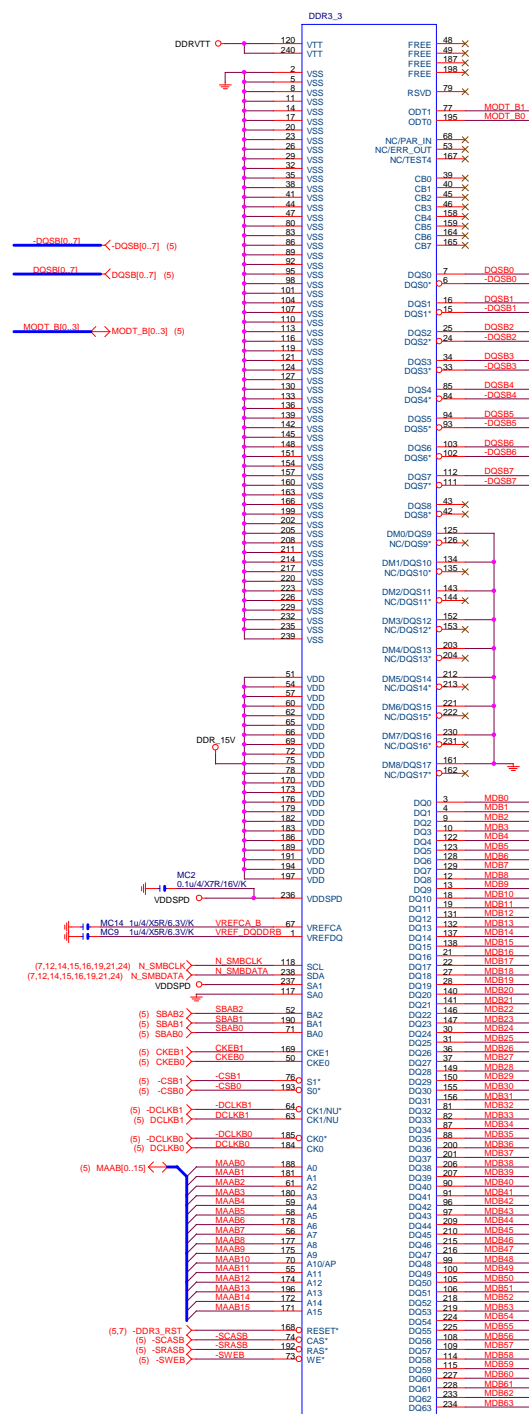




Gigabyte Technology

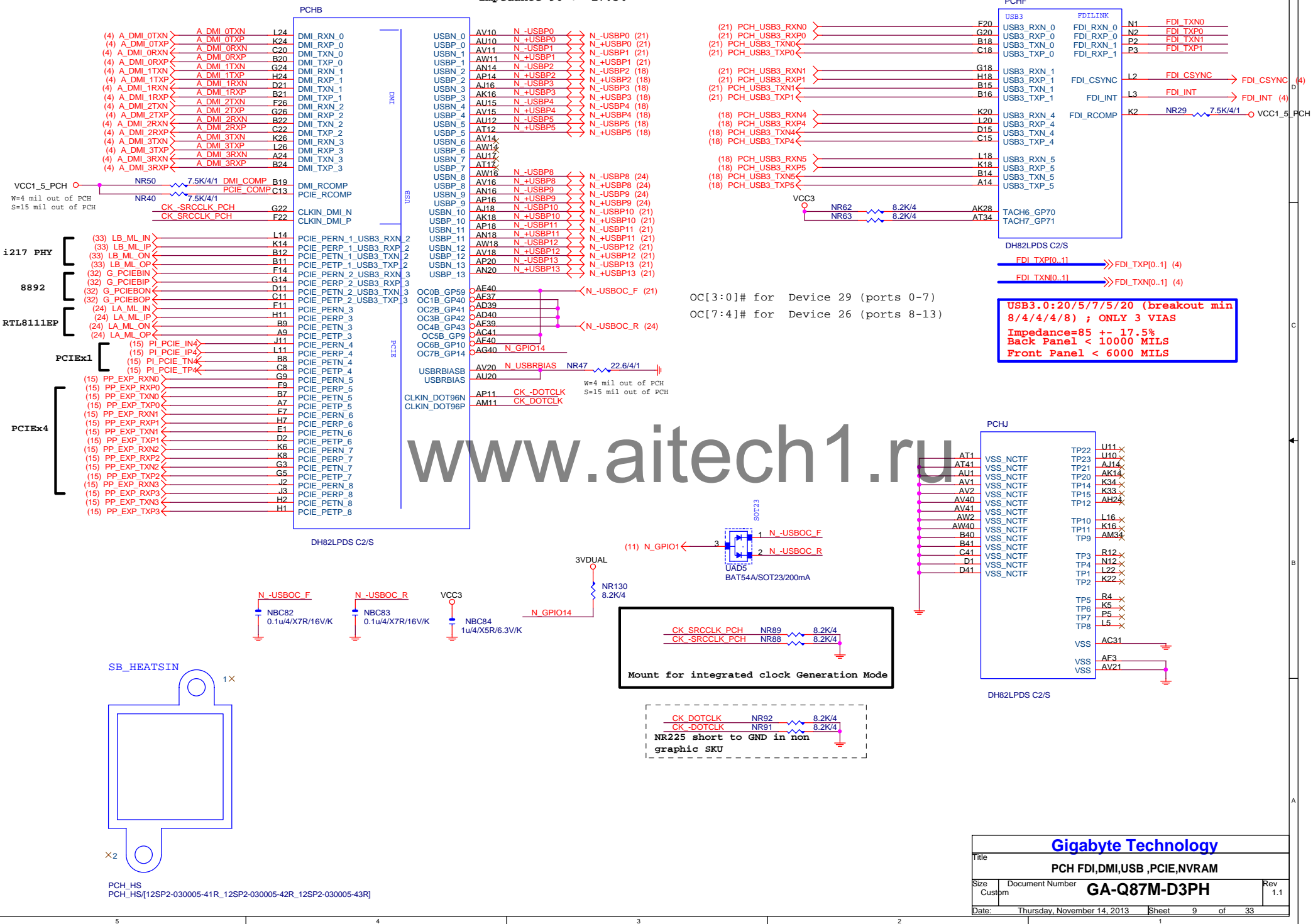
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Size	Document Number	GA-Q87M-D3PH	Rev
Custom			1.1
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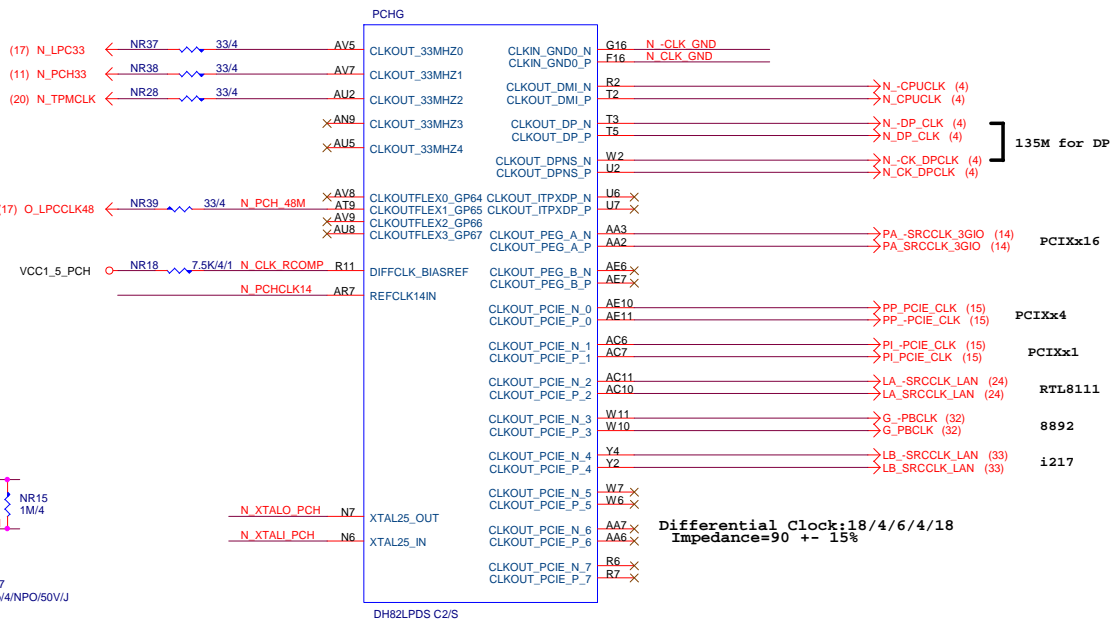
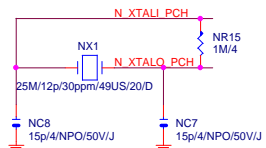
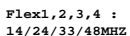




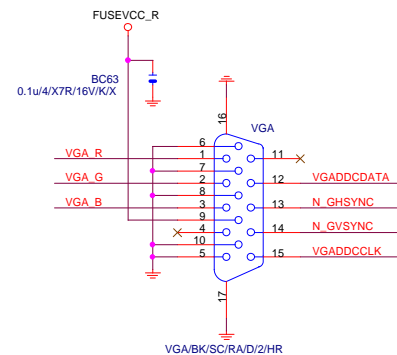


USB2.0 : 12/4.5/7.5/4.5/12 (breakout min 8/4/4/4/8)  
Impedance=90 +- 17.5%

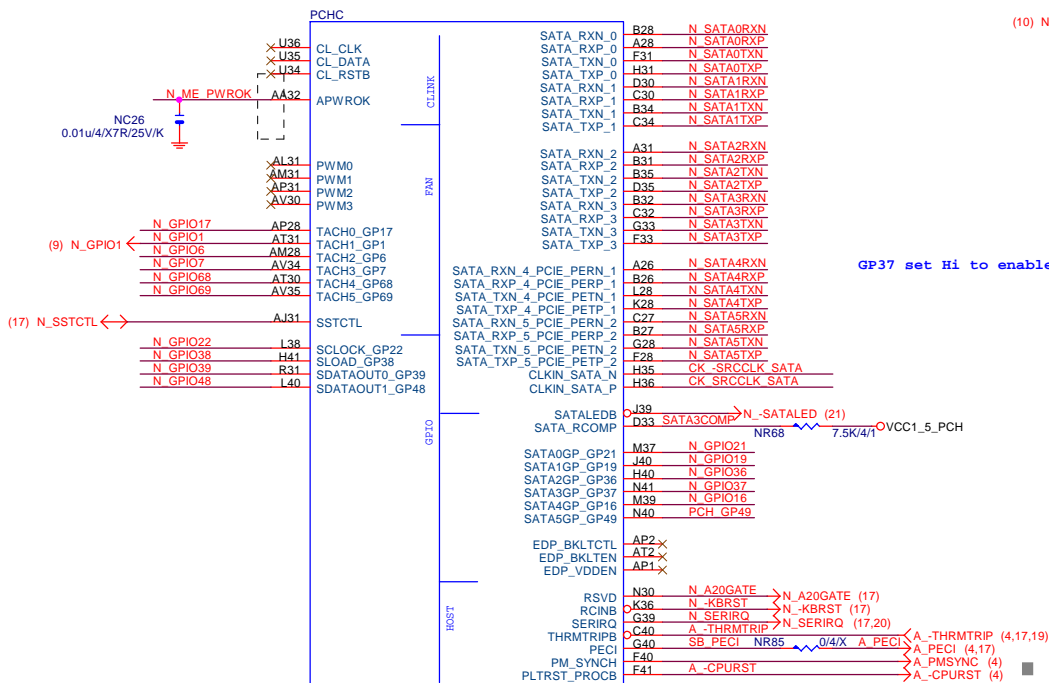




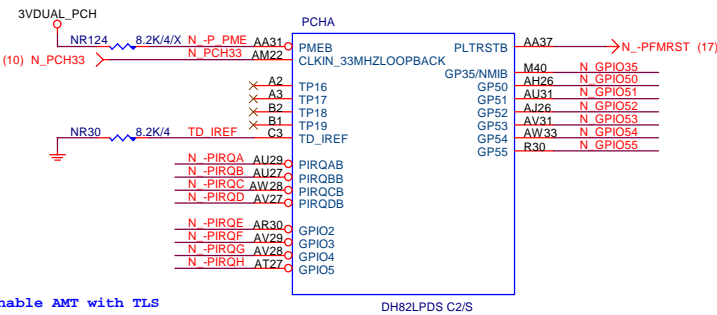
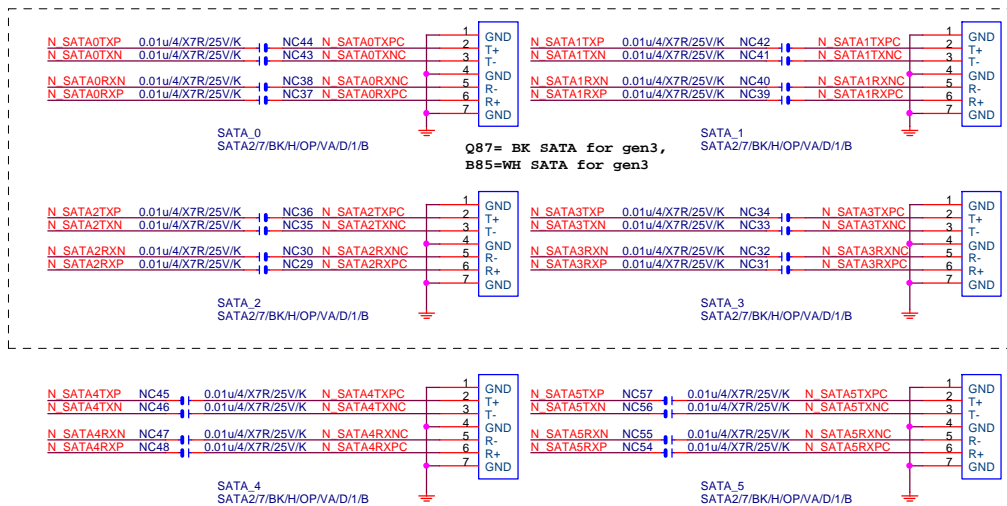
Mount for integrated clock Generation  
Mode



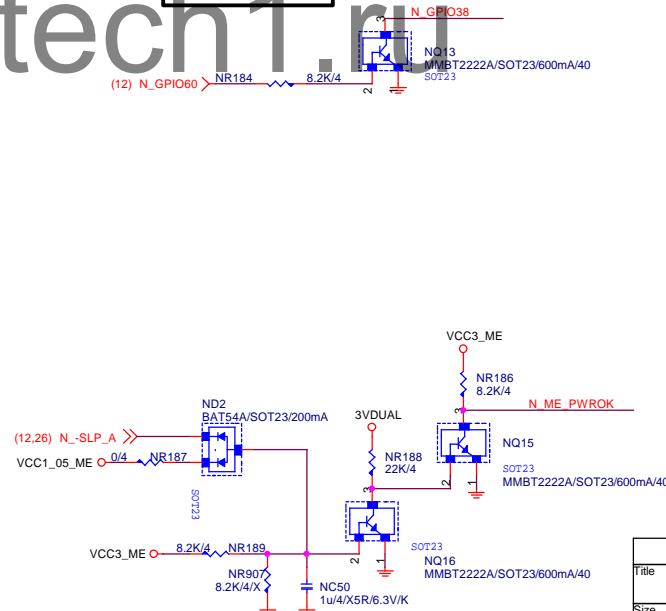
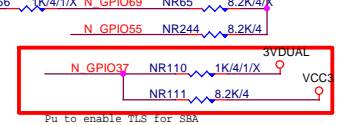
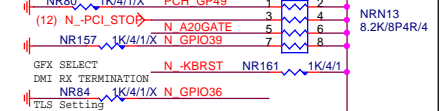
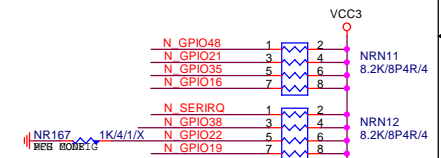
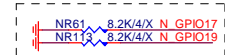
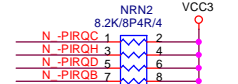
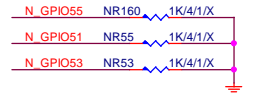
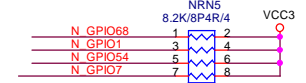
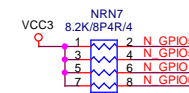
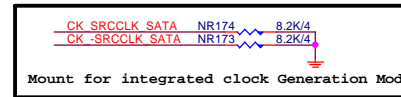
```
SATA3 : 20/7.5/4.5/7.5/20 (breakout min 8/4/4/4/8)
Impedance=90 +- 17.5%
SATA2 : 15/7.5/4.5/7.5/15 (breakout min 8/4/4/4/8)
Impedance=90 +- 17.5%
```



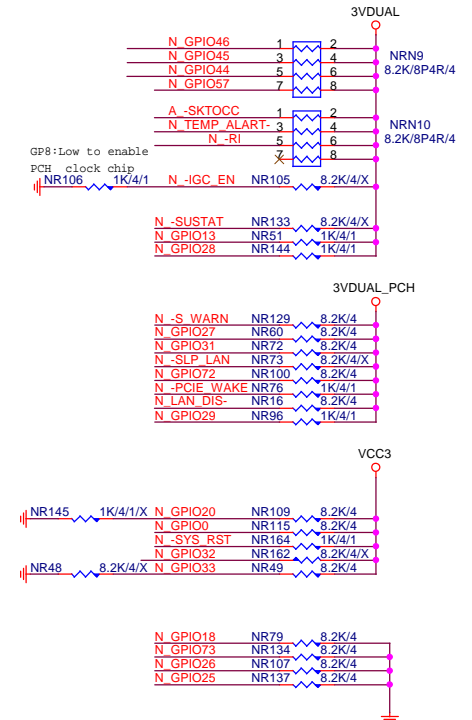
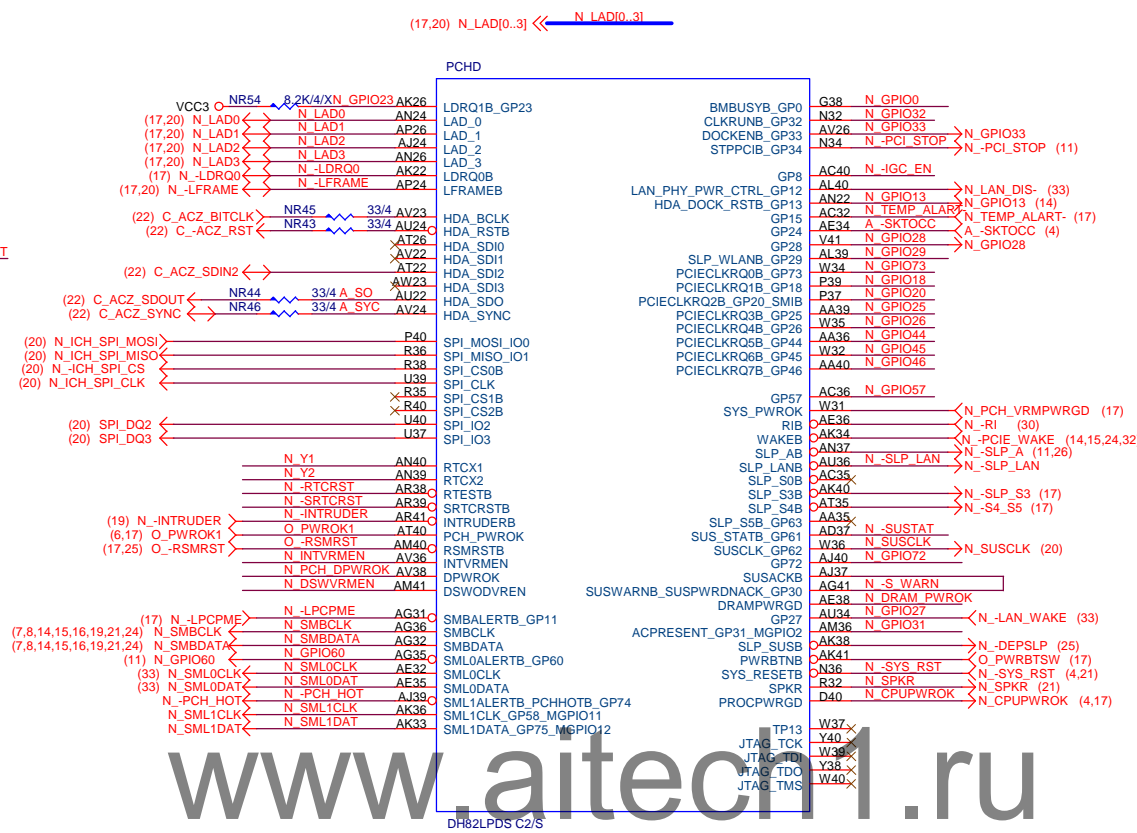
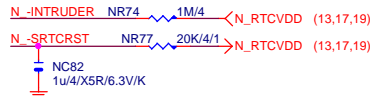
Final need change to  
B85 real P/N



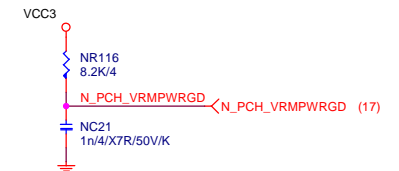
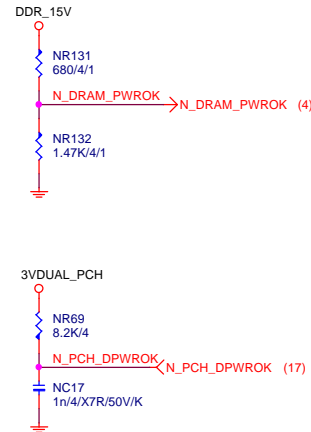
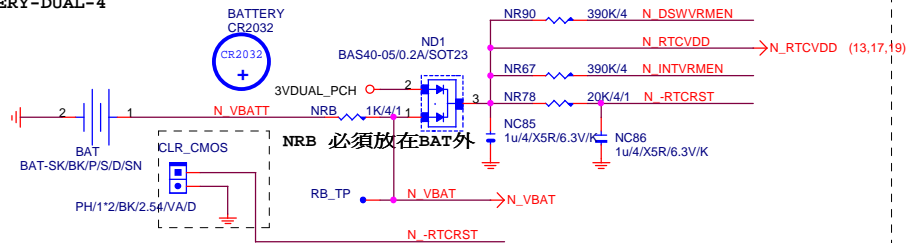
GP37 set Hi to enable AMT with TLS

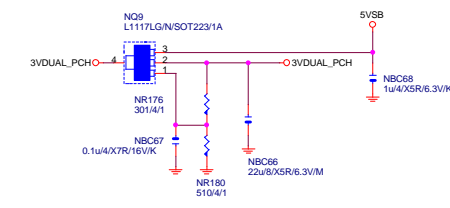
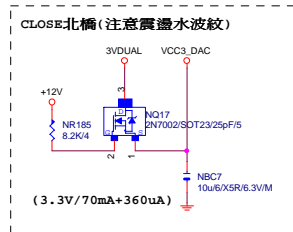
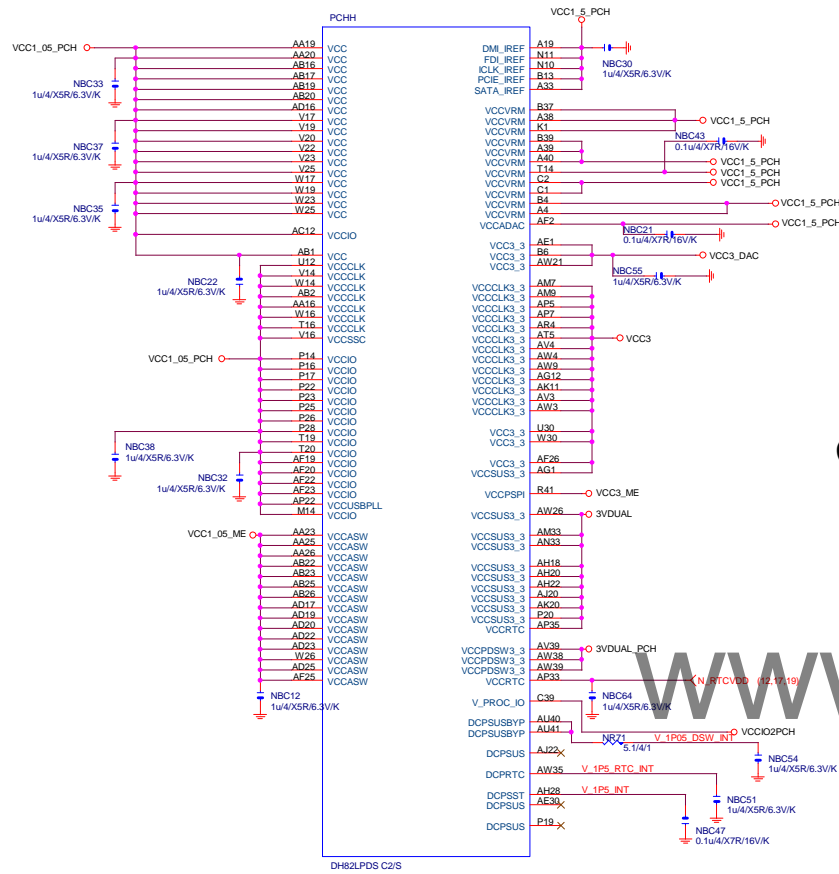


<b>Gigabyte Technology</b>			
Title			
<b>PCH HOST , SATA, PCI</b>			
Size	Document Number	Rev	
Custom	<b>GA-Q87M-D3PH</b>	<b>1.1</b>	
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## BATTERY-DUAL-4





(3.3V) (X6)

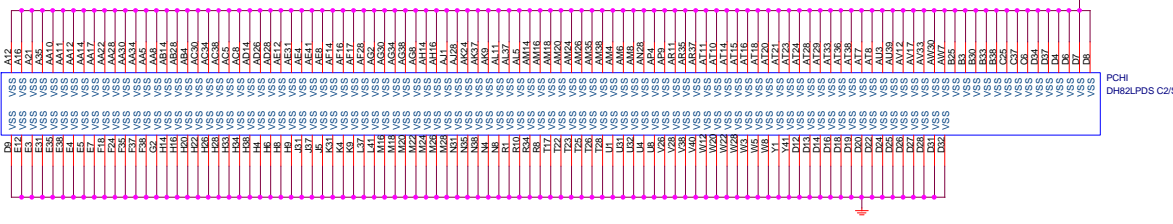
(1.05V) (X5)

(1.05V) (X6)

(1.5V) (X10)

(1.05V) (X2)

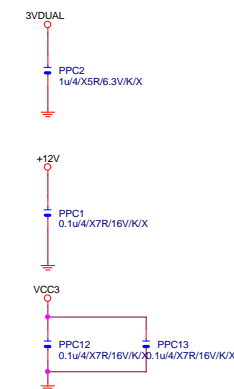
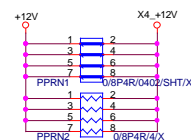
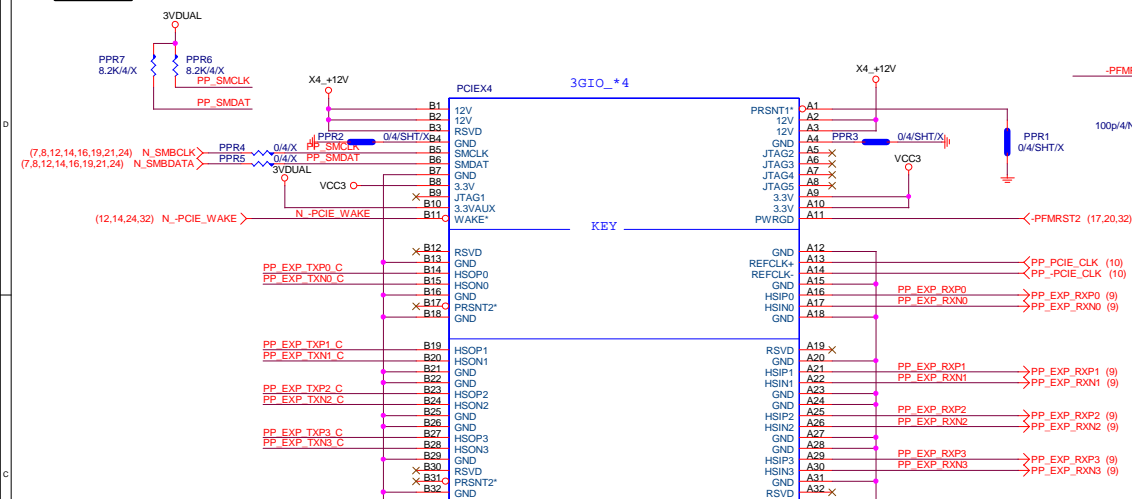
(3.3V) (X2)





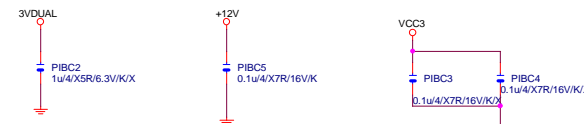
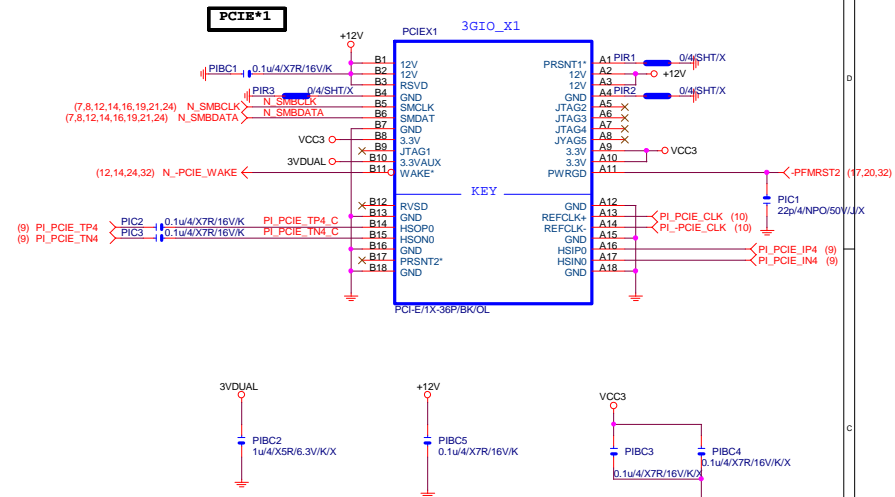


PCIE\*4



(9) PP\_EXP\_TXP0 PP\_EXP\_TXP0 PPC4 0.22u4/X5R/6.3V/K PP\_EXP\_TXP0 C  
(9) PP\_EXP\_TXN0 PP\_EXP\_TXN0 PPC5 0.22u4/X5R/6.3V/K PP\_EXP\_TXN0 C  
(9) PP\_EXP\_TXP1 PP\_EXP\_TXP1 PPC6 0.22u4/X5R/6.3V/K PP\_EXP\_TXP1 C  
(9) PP\_EXP\_TXN1 PP\_EXP\_TXN1 PPC7 0.22u4/X5R/6.3V/K PP\_EXP\_TXN1 C  
(9) PP\_EXP\_TXP2 PP\_EXP\_TXP2 PPC8 0.22u4/X5R/6.3V/K PP\_EXP\_TXP2 C  
(9) PP\_EXP\_TXN2 PP\_EXP\_TXN2 PPC9 0.22u4/X5R/6.3V/K PP\_EXP\_TXN2 C  
(9) PP\_EXP\_TXP3 PP\_EXP\_TXP3 PPC10 0.22u4/X5R/6.3V/K PP\_EXP\_TXP3 C  
(9) PP\_EXP\_TXN3 PP\_EXP\_TXN3 PPC11 0.22u4/X5R/6.3V/K PP\_EXP\_TXN3 C

PCIE\*1



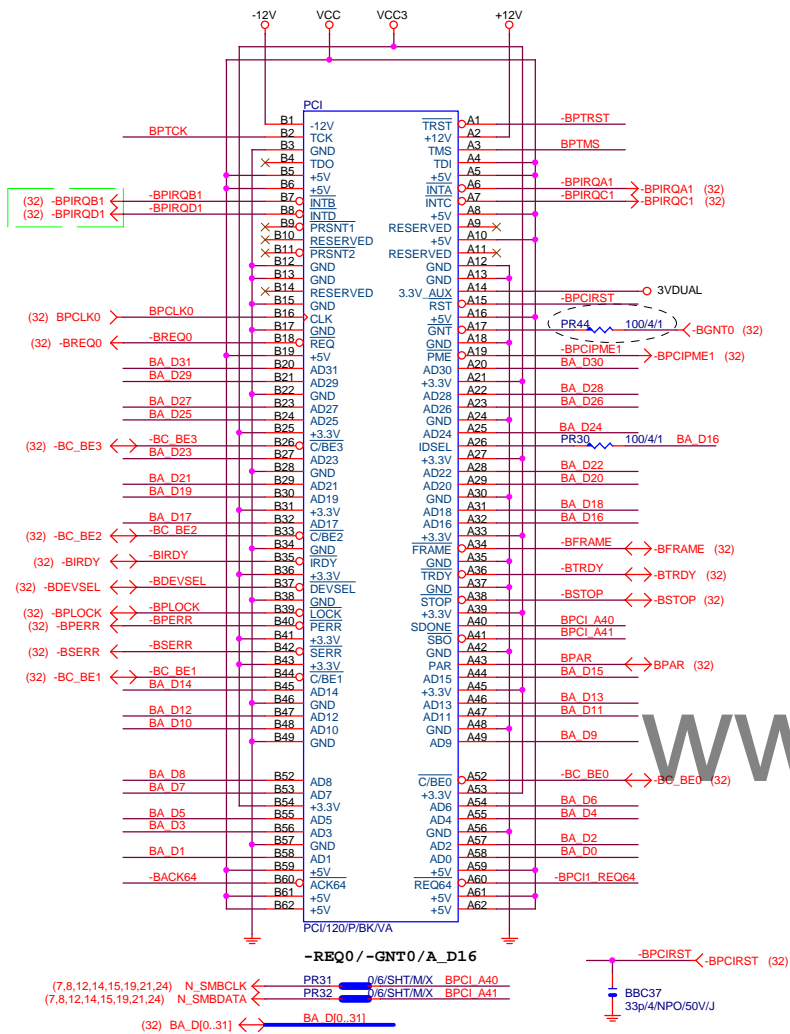
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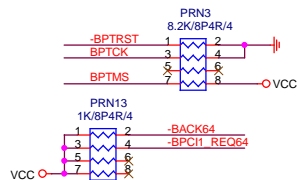
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Size	Document Number	Rev	
Custom	GA-Q87M-D3PH	1.1	
Date:	Thursday, November 14, 2013	Sheet	15 of 33



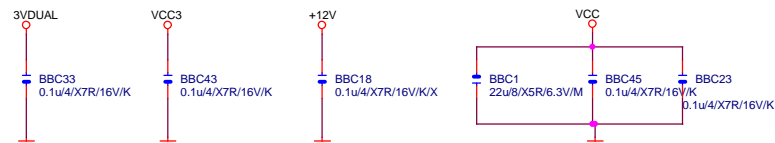
PCI SLOT



PCI	PU
-----	----



PCI CAP

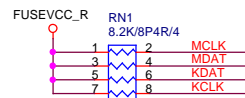
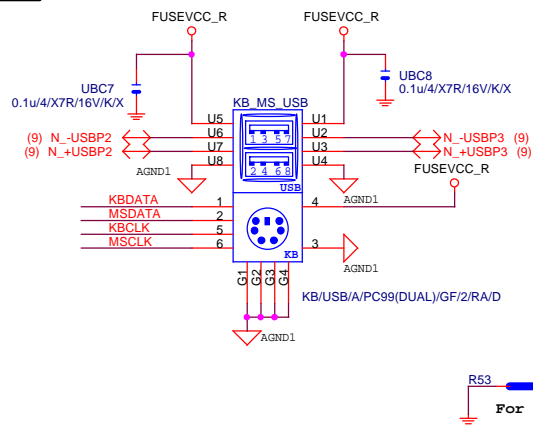


## Gigabyte Technology

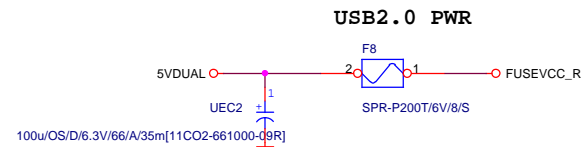
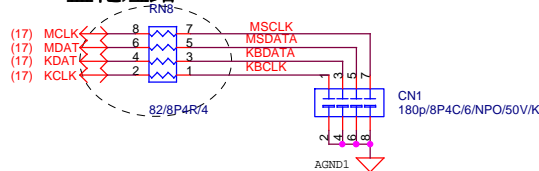
Title			
PCI SLOT 1&2			
Size Custom	Document Number	GA-Q87M-D3PH	Rev 1.1
Date:	Thursday, November 14, 2013	Sheet 16	of 33



# KB/MS



FOR 鹽化短路

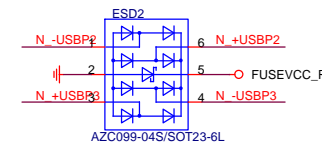


Close to USB connector

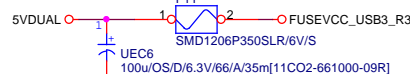
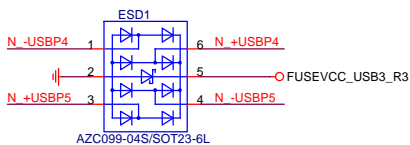
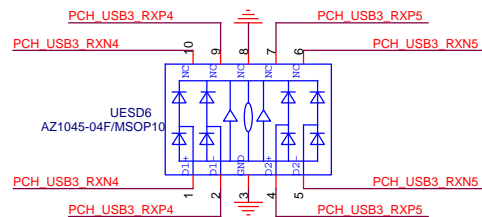
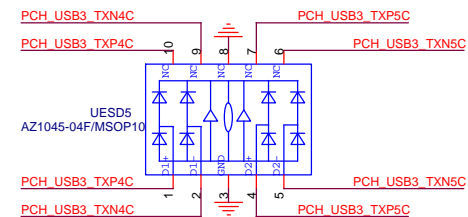
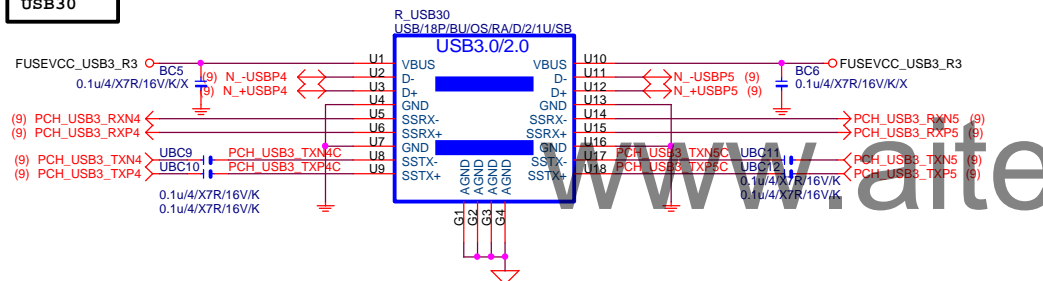
USB2.0 PWR

KB/MS PWR

USB2.0 ESD



# USB30

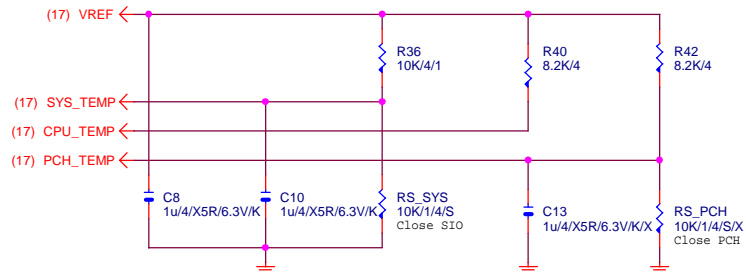


Polyswitch-1206 USB3.0 1Port - 1Fuse (3.5A)

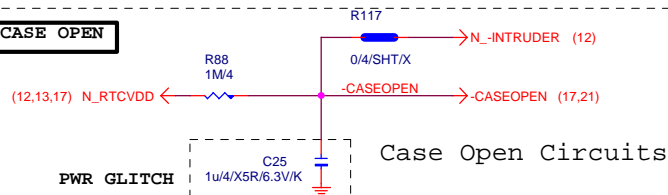
Gigabyte Technology

Title		
KB/MS,RUSB		
Size	Document Number	Rev
Custom	GA-Q87M-D3PH	1.1
Date:	Thursday, November 14, 2013	Sheet 18 of 33

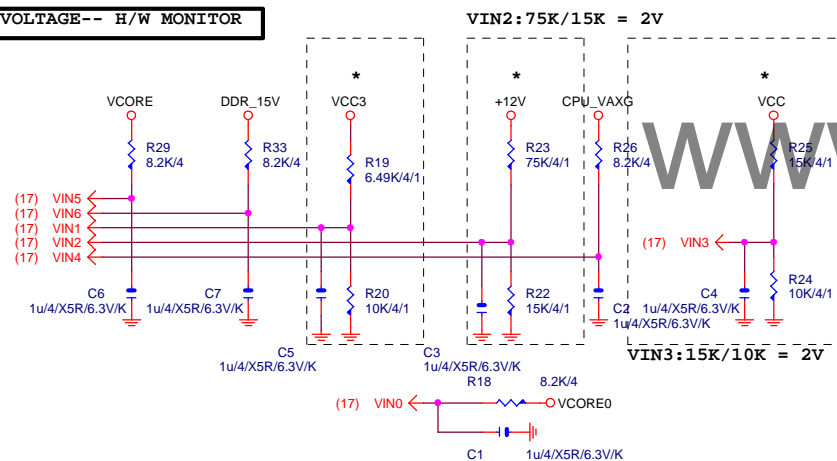
# TEMP H/W MONITOR



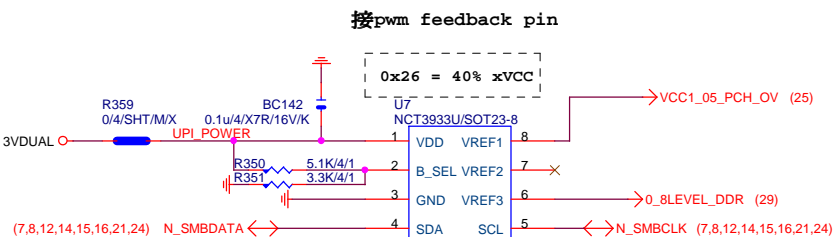
# CASE OPEN



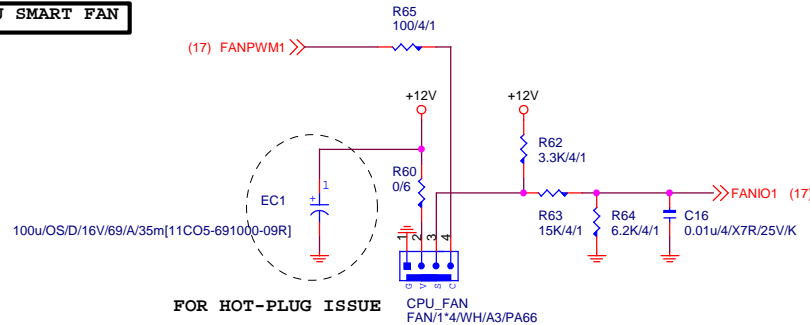
# VOLTAGE-- H/W MONITOR



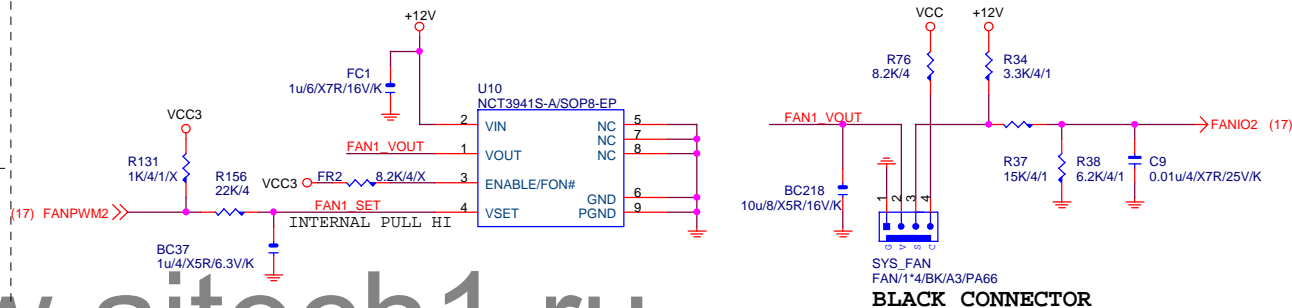
# OV NCT3933



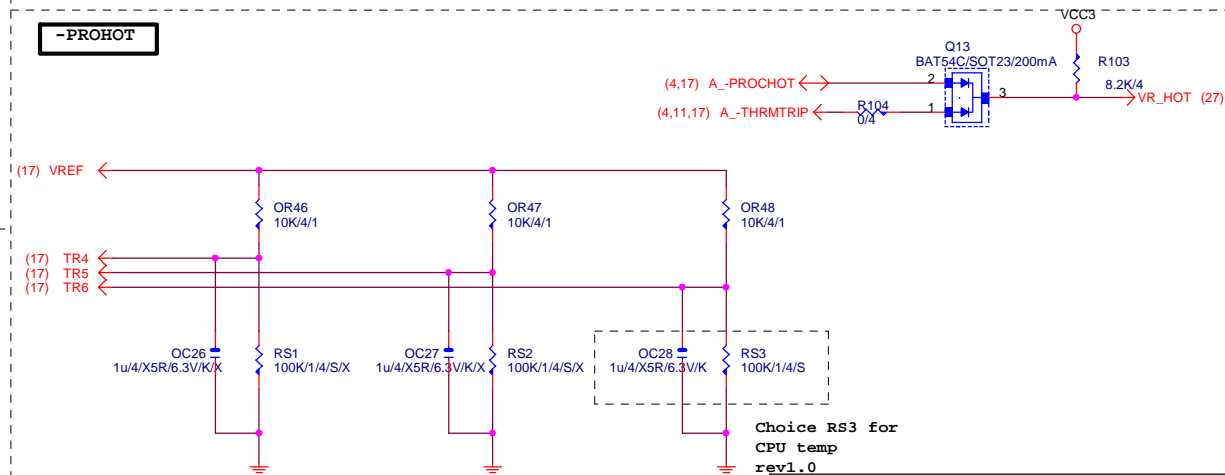
# CPU SMART FAN



# SYS SMART FAN



# -PROHOT

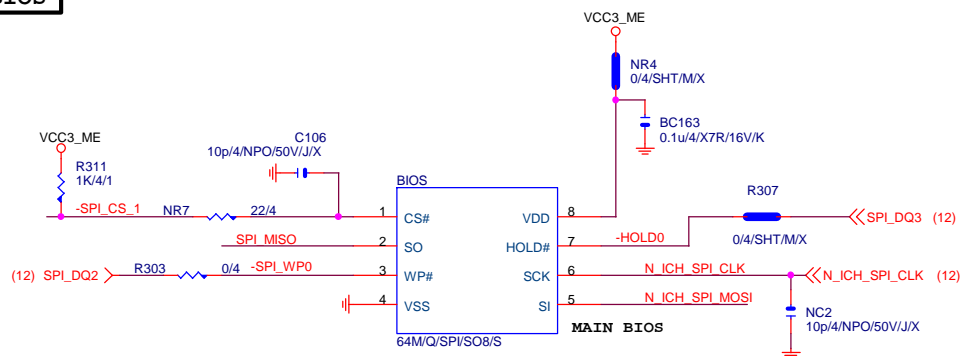


RS1、RS2、RS3 CLOSE CPU VR MOSFET  
Select the Hottest point to setup

Gigabyte Technology

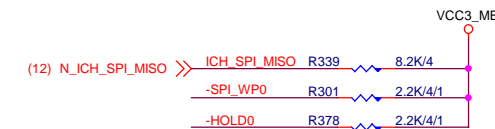
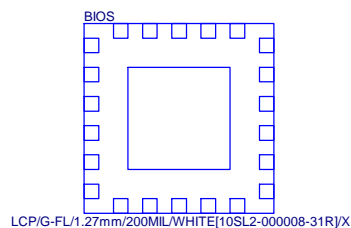
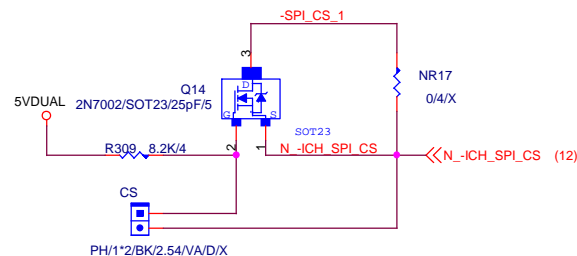
Title				
HWM,FAN CTRL,OV				
Size	Document Number			Rev
Custom	GA-Q87M-D3PH			1.1
Date:	Thursday, November 14, 2013		Sheet	19 of 33

# BIOS



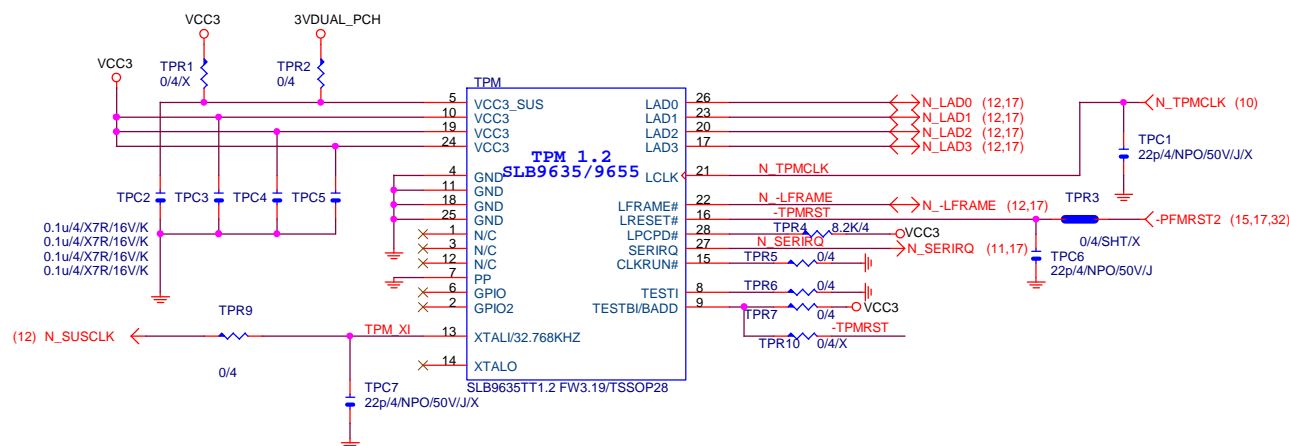
BOOT DEVICE	GP51	GP19
LPC	0	0
SPI	1	1

1 means internal PU  
0 means PD 1K



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# TPM

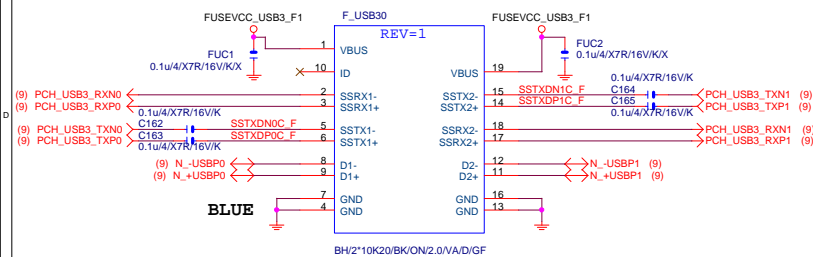


	SLB9635	SLB9655
TPR2, TPR4, TPR5, TPR6, TPR7, TPR9	MOUNT	N/A
TPR1, TPR10	N/A	MOUNT

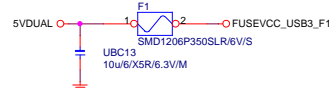
Gigabyte Technology

Title		
DUAL BIOS		
Size	Document Number	Rev
B	GA-Q87M-D3PH	1.1
Date:	Thursday, November 14, 2013	Sheet 20 of 33

## F\_USB30

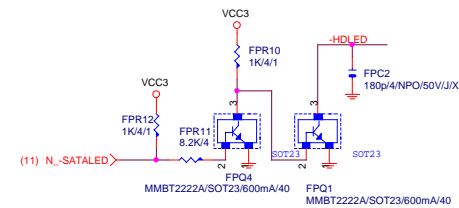


## F\_USB30 PWR

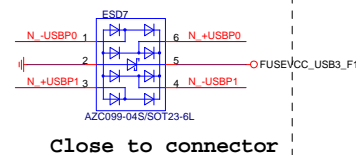
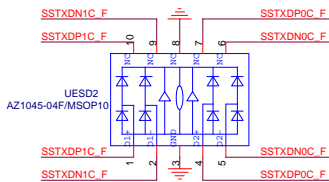
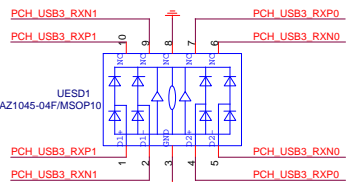


USB3.0 1Port - 1Fuse (3.5A)

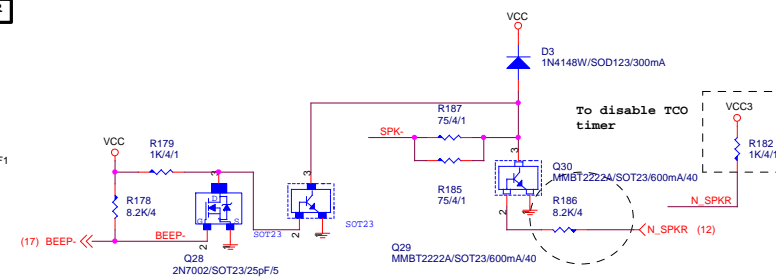
## SATA LED



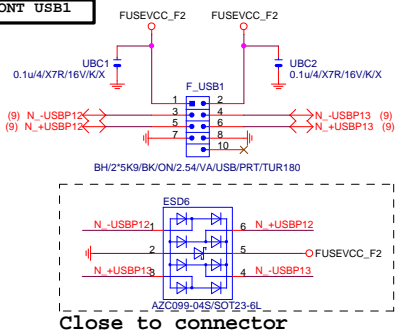
## F\_USB30 ESD PROTECT



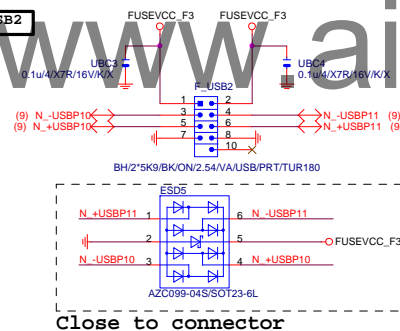
## SPKR



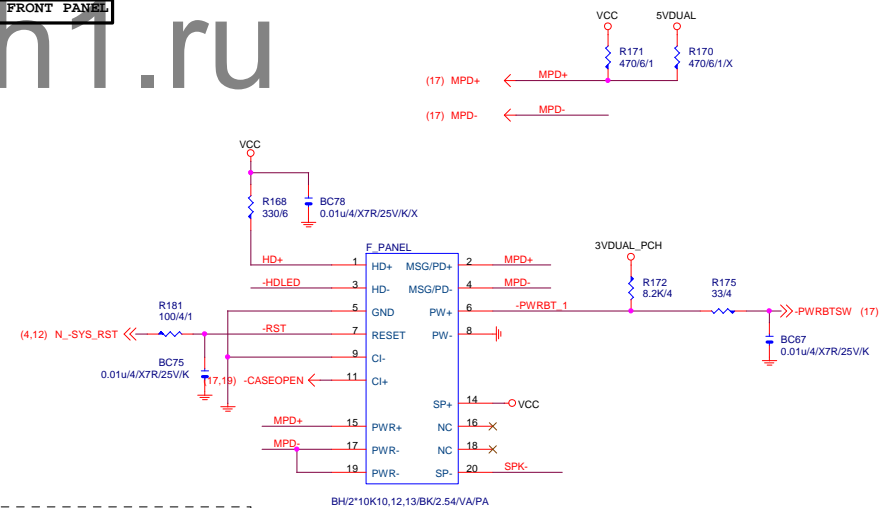
## FRONT USB1



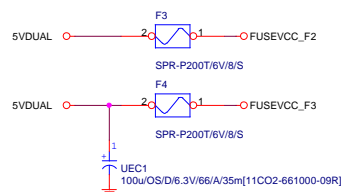
## FRONT USB2



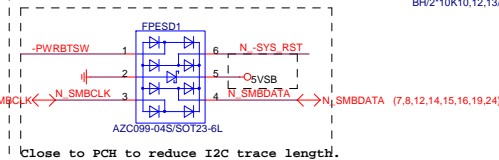
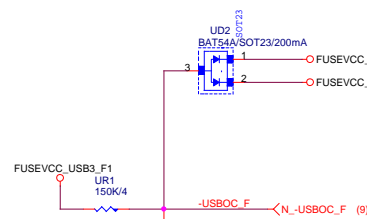
## INTEL FRONT PANEL



## FUSEVCC\_F



## -USB30\_F



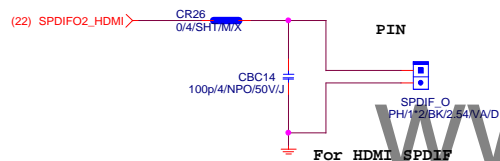
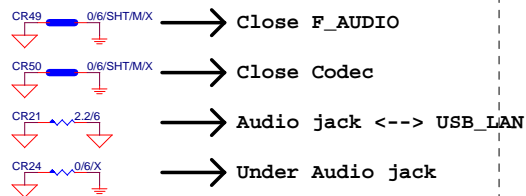
Gigabyte Technology			
Title	FP,F_USB,USB PWR,SPKR,SATA LED		
Size	Document Number	GA-Q87M-D3PH	
Custom			Rev 1.1
Date:	Thursday, November 14, 2013	Sheet 21	of 33

[illegible]

Rev
1.1

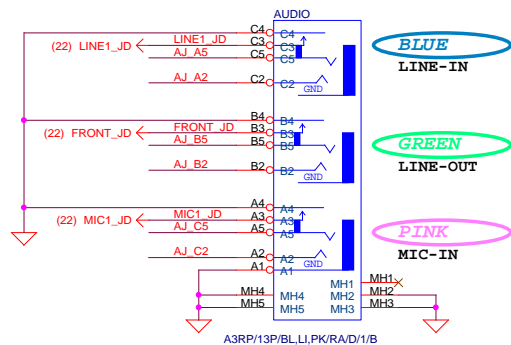


## CODEC POWER/EMI PAD

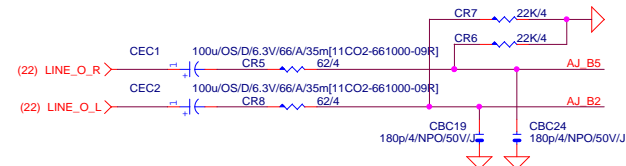


**AZALIA JACK**

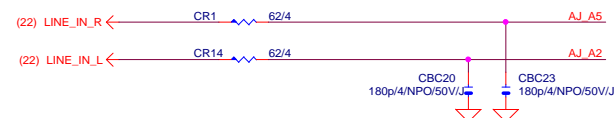
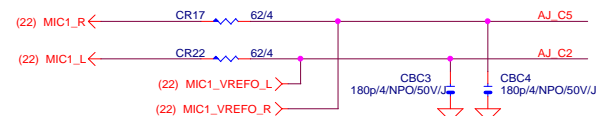
BTX AZALIA CONNECTOR



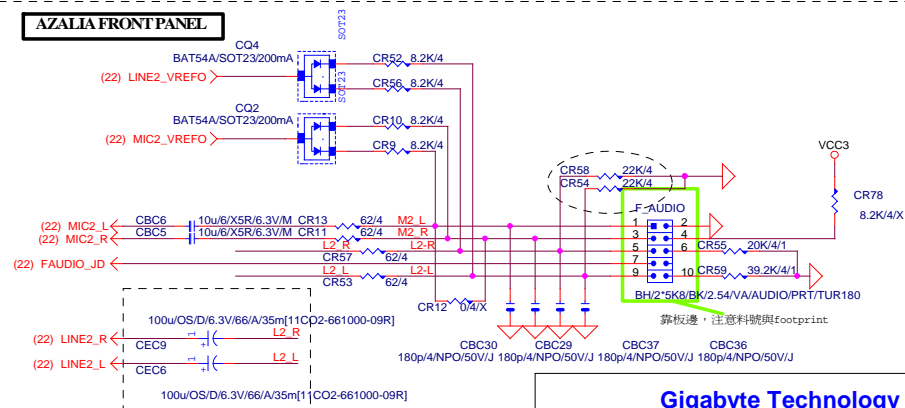
## LINE-OUT



## LINE-IN

**MIC-IN**

**SURROUND**

**CEN/LFE**

## Gigabyte Technology

## AUDIO JACK

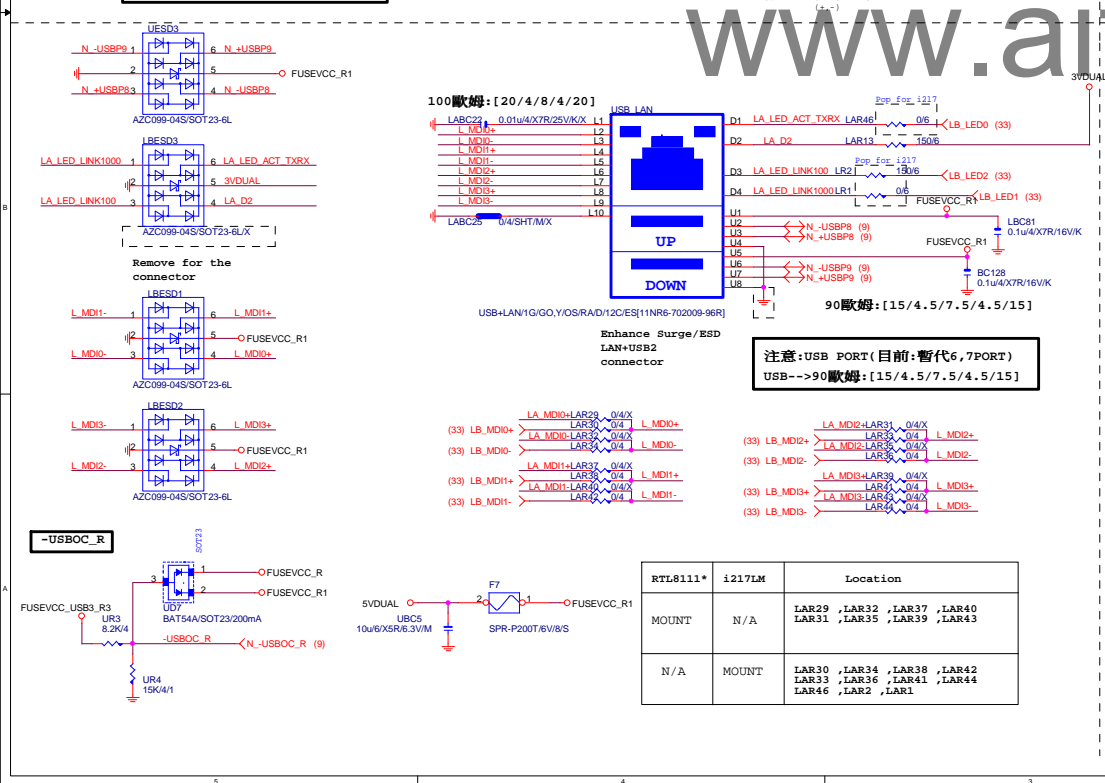
GA-Q87M-D3PH

Rev	1.1
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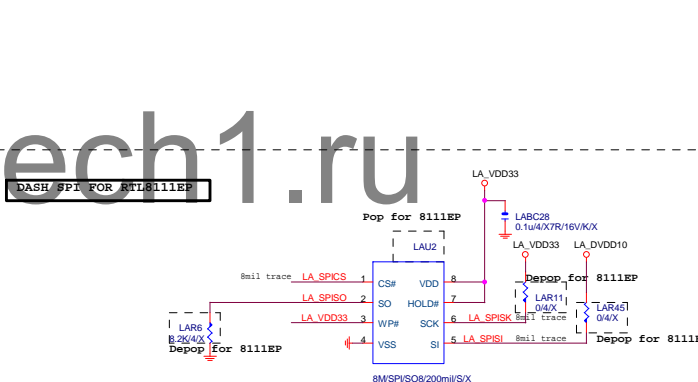
Date: Thursday, November 14, 2013 Sheet 23 of 33

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```
LAN:RTL8111F/VB/VL
```



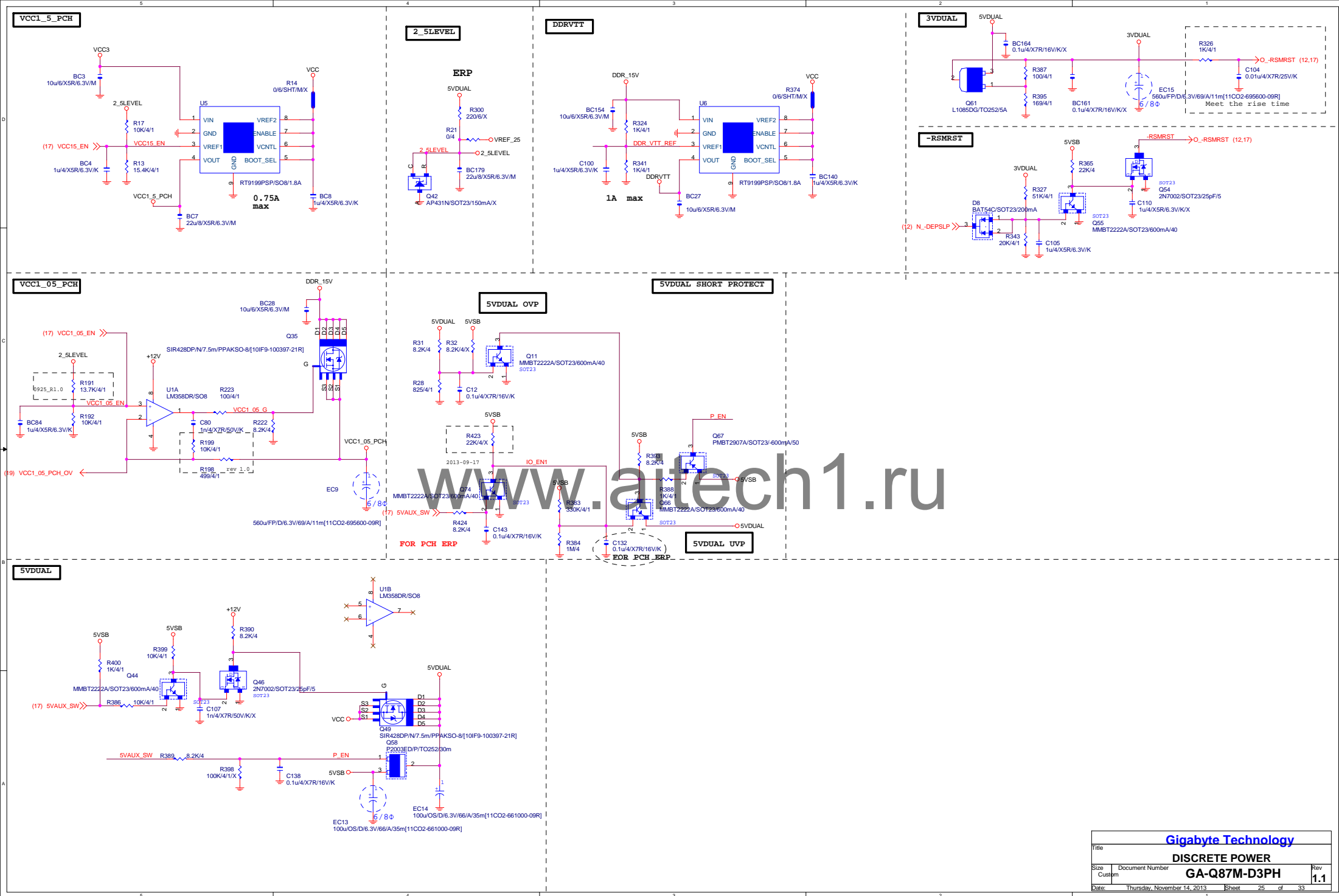
ASH SPI FOR RTL8111EP



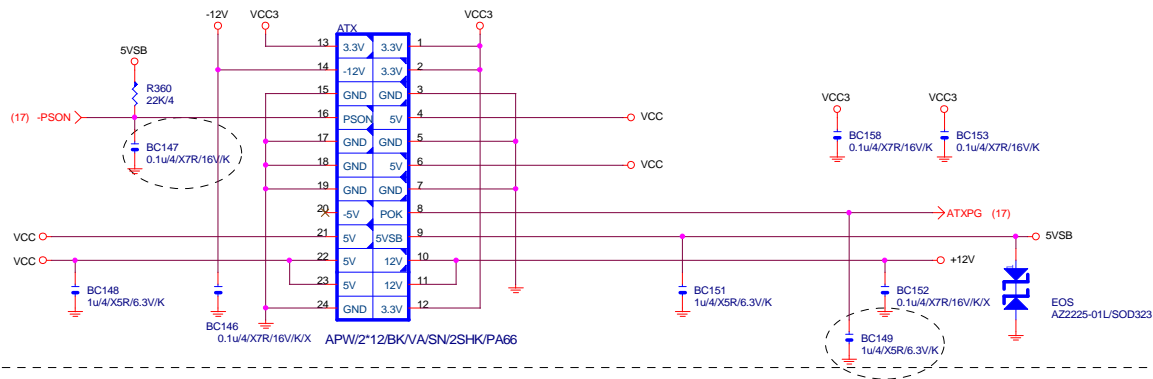
Power domain chart	
	RTL8111E
AVDD33	3.3V
DVDD33	3.3V
VDDREG	3.3V
DVDD10	1.05V

RTL8111EP	RTL8111F-VL	Location
MOUNT	N/A	LAR26 ,LAR27 ,LABC27 ,LAU2
N/A	MOUNT	LAR25 ,LAR6 ,LAR11 ,LAR45 ,LAR28

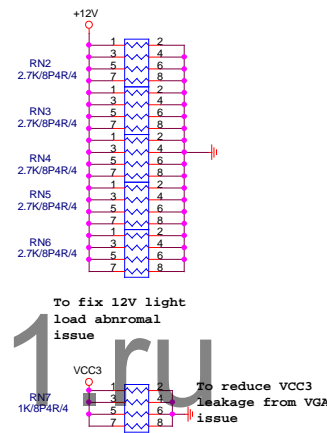
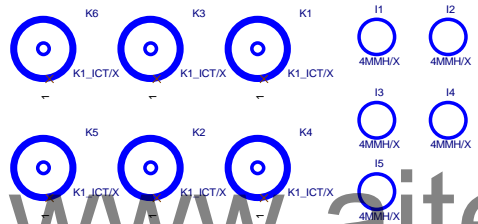
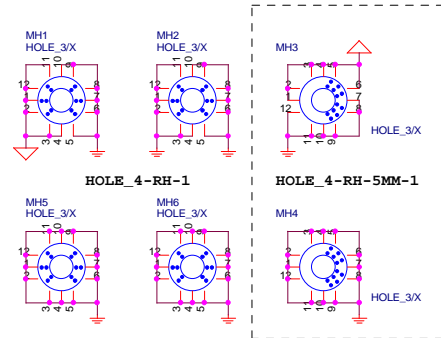
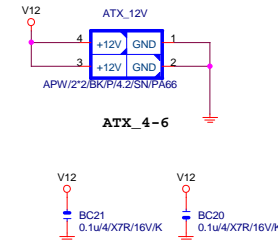
RTL8111*	i217LM	Location			
MOUNT	N/A	LAR29 LAR31	LAR32 LAR35	LAR37 LAR39	LAR40 LAR43
N/A	MOUNT	LAR30 LAR33 LAR46	LAR34 LAR36 LAR2	LAR38 LAR41 LAR1	LAR42 LAR44



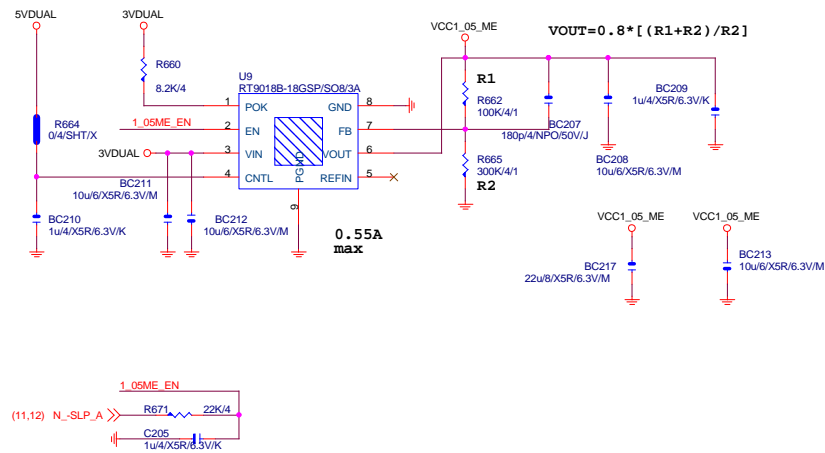
# ATXX24 POWER CONNECTOR



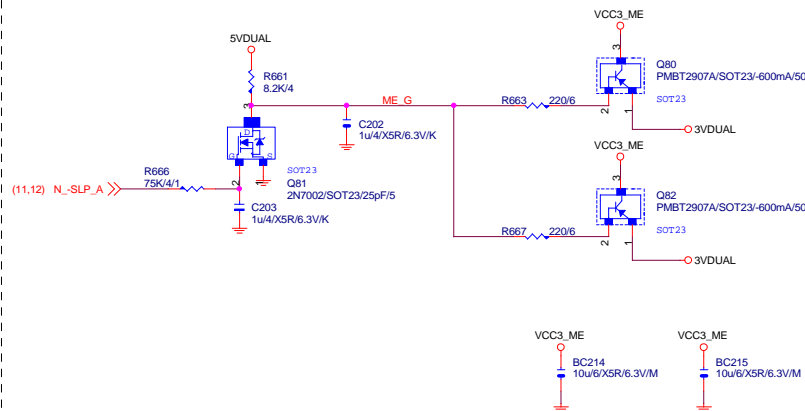
# ATXX4 POWER CONNECTOR



# VCC1\_05\_ME



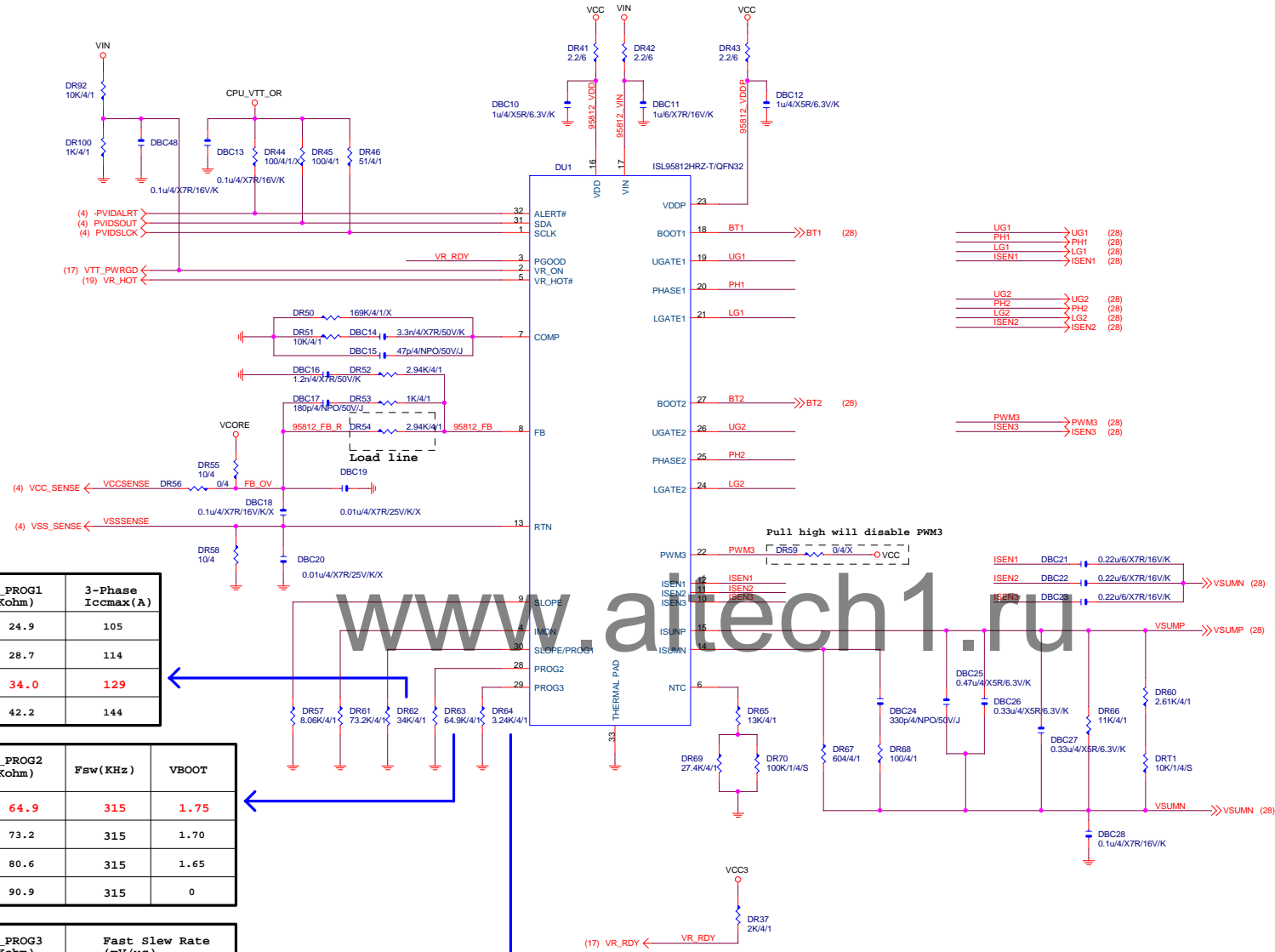
# VCC3\_ME



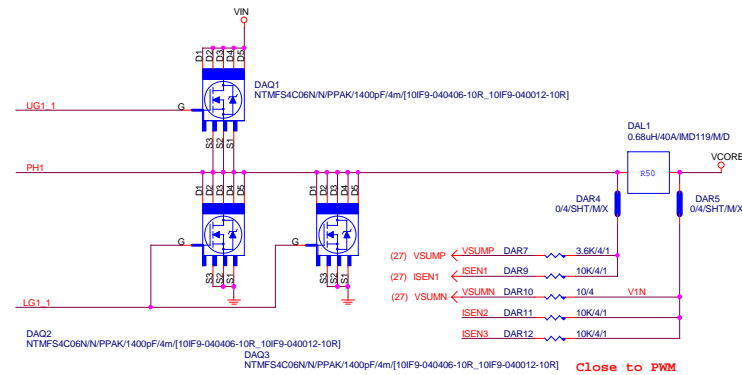
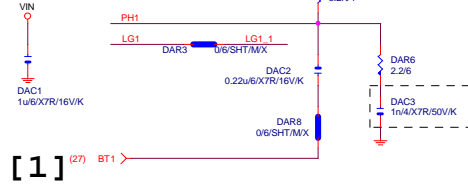
R_PROG1 (Kohm)	3-Phase Iccmax(A)
24.9	105
28.7	114
<b>34.0</b>	<b>129</b>
42.2	144

R_PROG2 (Kohm)	Fsw(KHz)	VBOOT
<b>64.9</b>	<b>315</b>	<b>1.75</b>
73.2	315	1.70
80.6	315	1.65
90.9	315	0

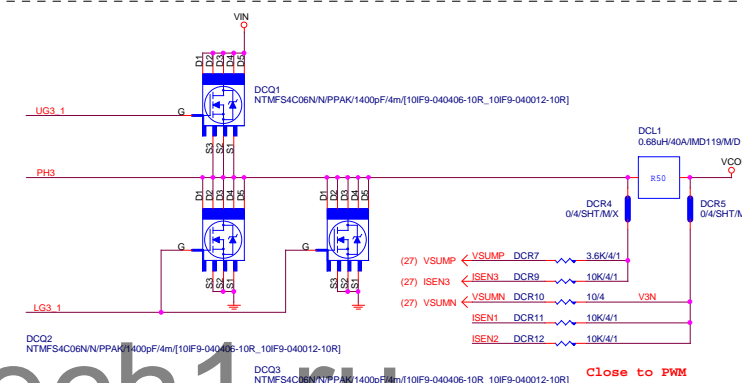
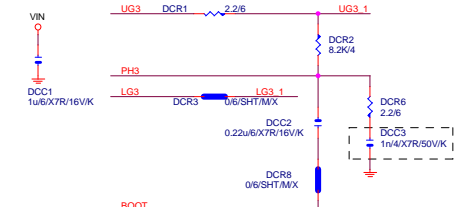
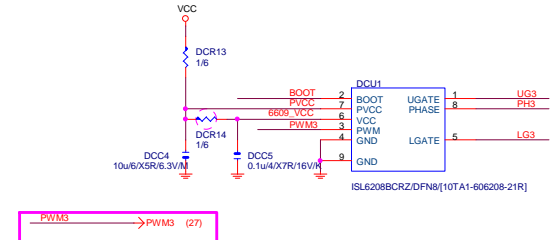
R_PROG3 (Kohm)	Fast Slew Rate (mV/us)
<b>3.24</b>	<b>12</b>
5.76	24
9.31	40
13.3	45



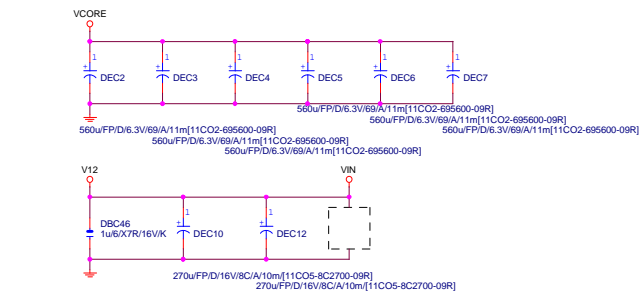
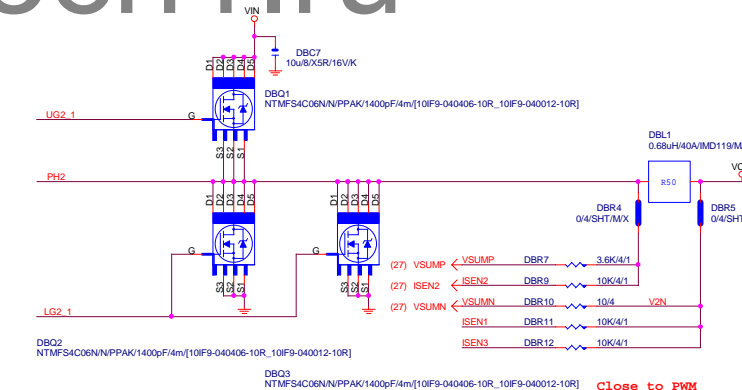
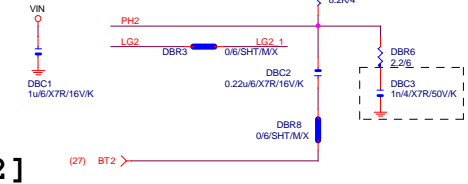
# PHASE 1



# PHASE 3



# PHASE 2



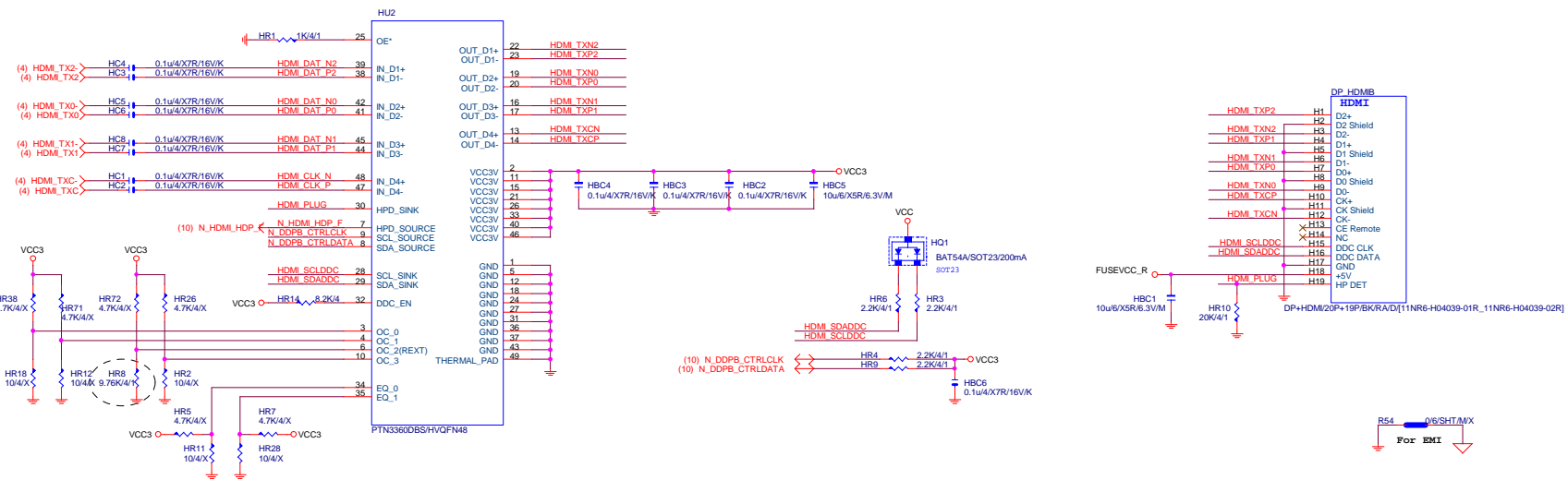
Gigabyte Technology			
Title		CPU CORE VR-2	
Size		GA-Q87M-D3PH	
Date		Thursday, November 14, 2013	
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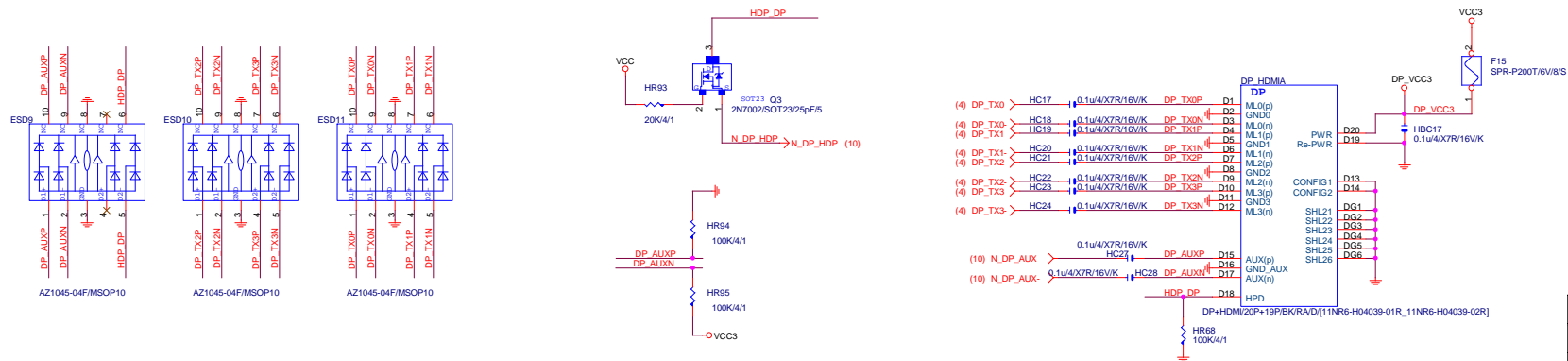
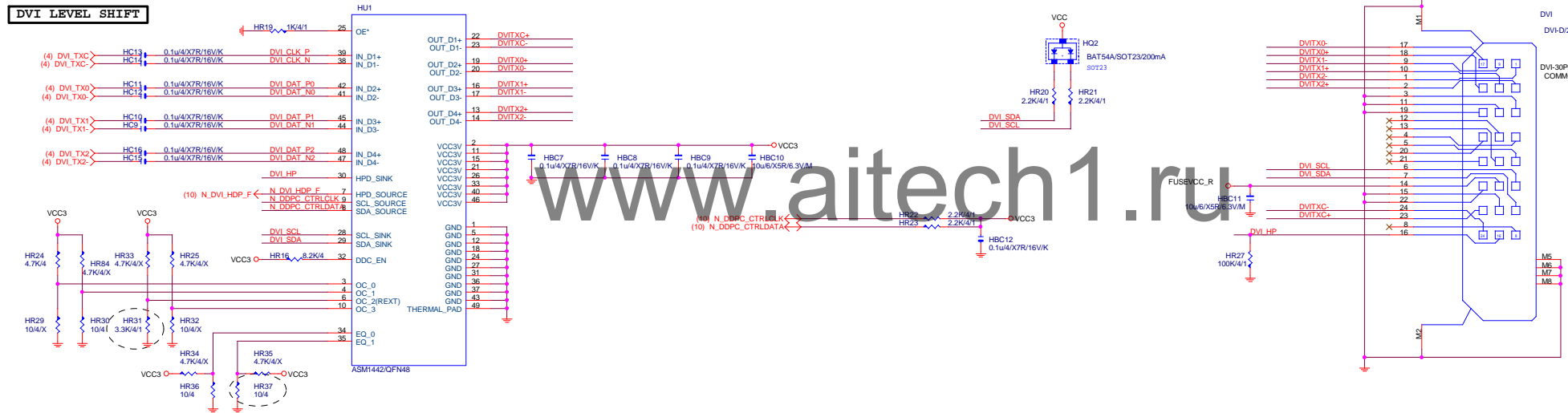




HDMI LEVEL SHIFT
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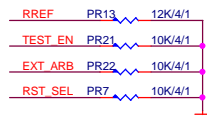
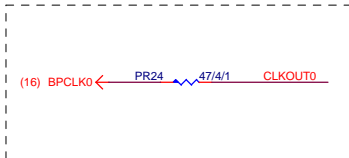
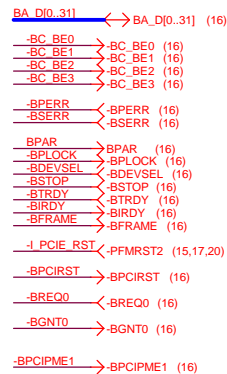


# DVI LEVEL SHIFT



# PCIE TO PCI

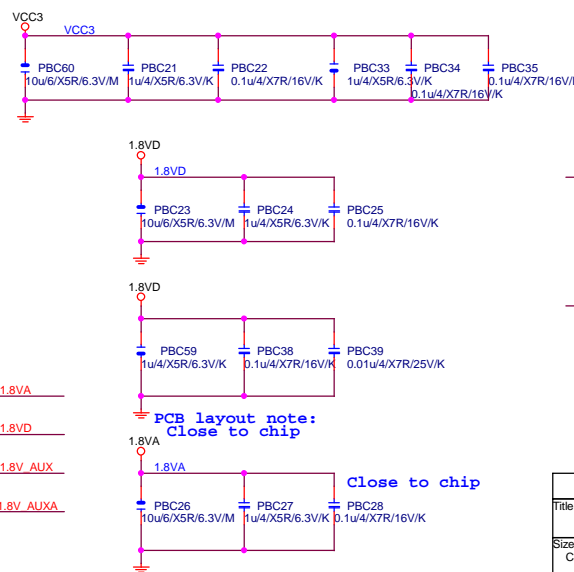
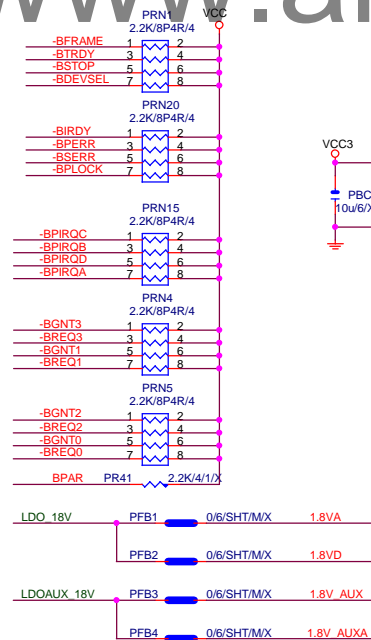
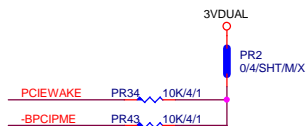
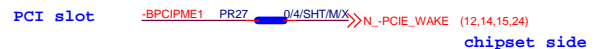
PCI:5/4/5 Impedance=50 +- 15%



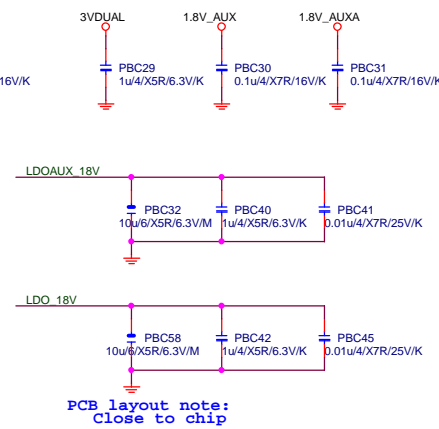
High: Enable PCI CLK 66MHz  
Low: Disable PCI CLK 66MHz



High: PCICLK INPUT form CLK Gen  
Low: PCICLK OUTPUT form IT8893 chip



PCB layout note:  
Close to chip

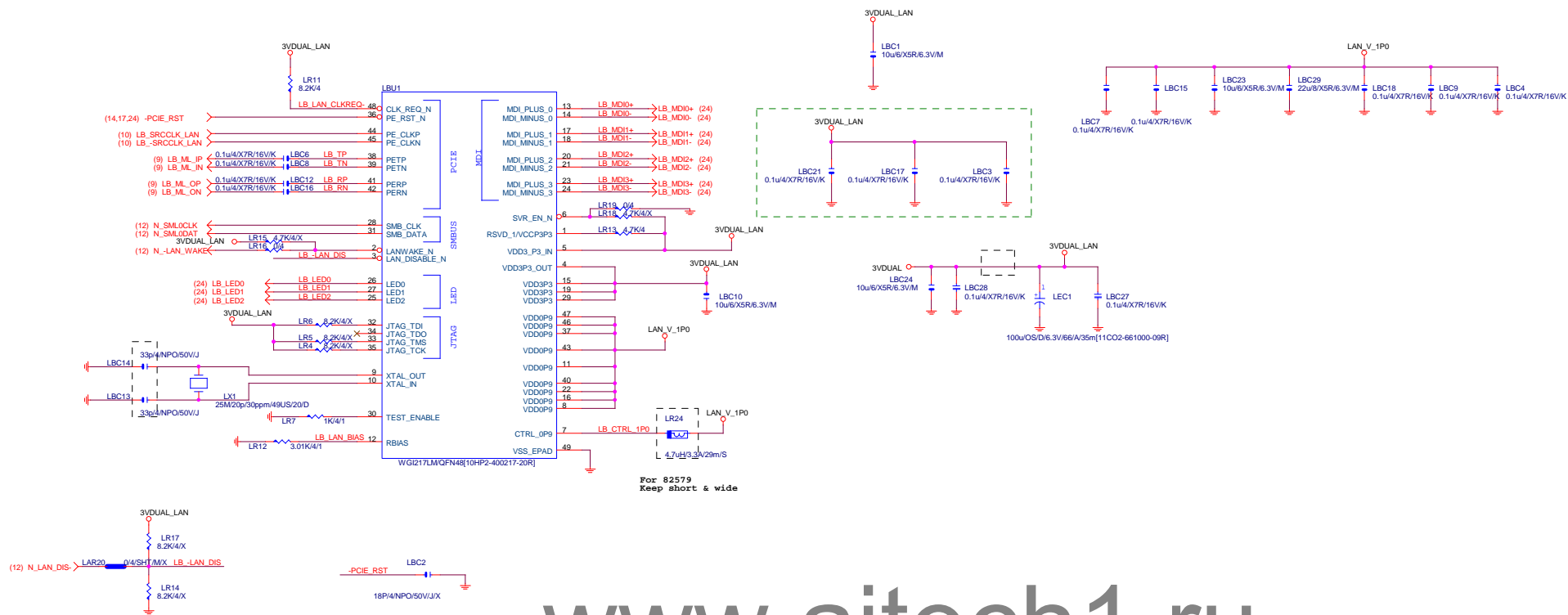


PCB layout note:  
Close to chip

Gigabyte Technology

ITE IT8892E  
GA-Q87M-D3PH

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