

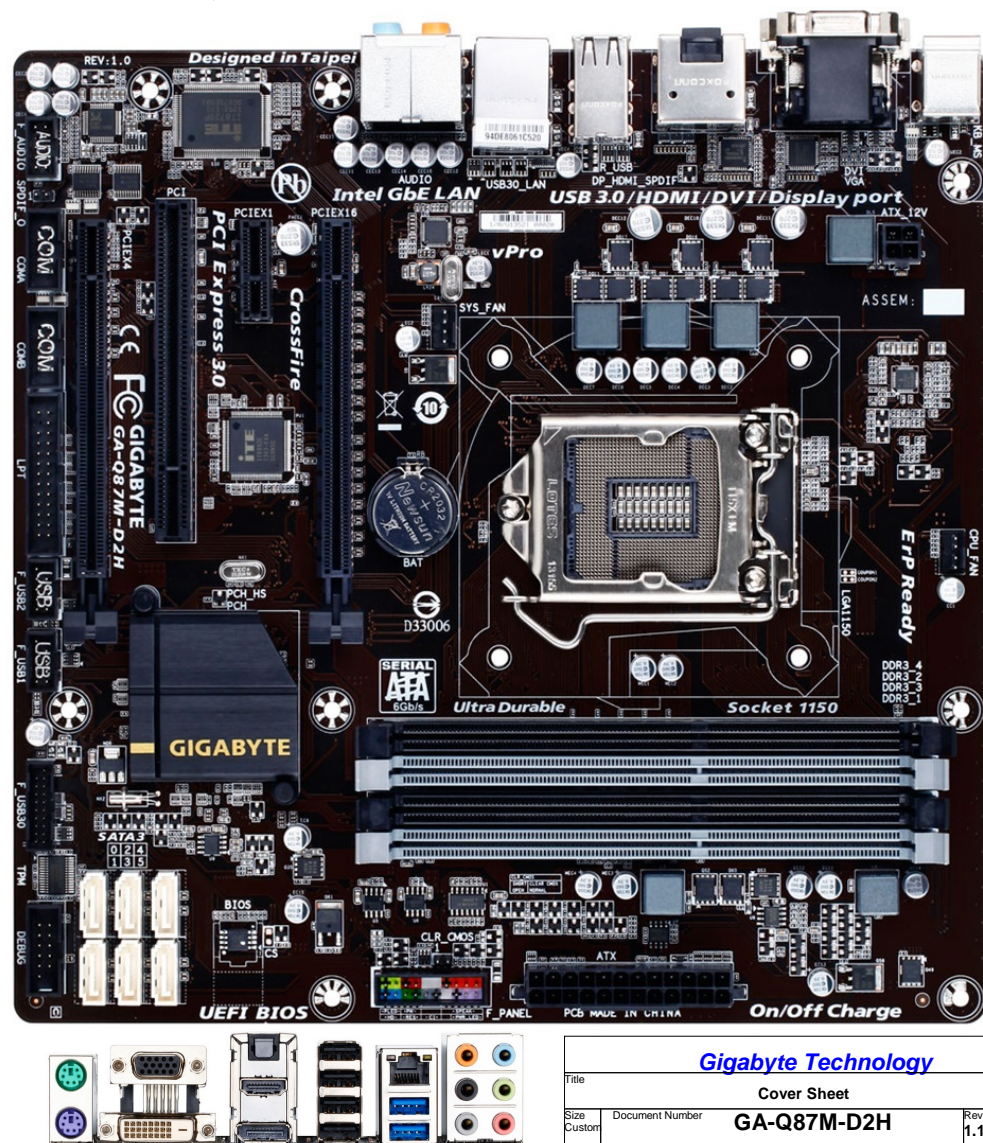
Model Name: GA-Q87M-D2H

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	PCI EXPRESSX4 / X1 SLOT
16	PCI SLOT
17	ITE 8728 LPC IO
18	KB_MS, R_USB
19	HWM,FAN CTRL,-PROCHOT
20	DUAL BIOS,TPM
21	FP,FUSB,SPK,SATALED
22	Realtek CODEC
23	REAR AUDIO JACK
24	INTEL i217 PHY
25	DISCRETE POWER
26	ATX, M3 POWER
27	VCORE ISL95820_1

SHEET TITLE

28	VCORE ISL95820_2
29	RT8120_DDR POWER
30	COM , LPT , 80PORT
31	DVI , HDMI ,DP
32	IT8892E PCI BRIDGE

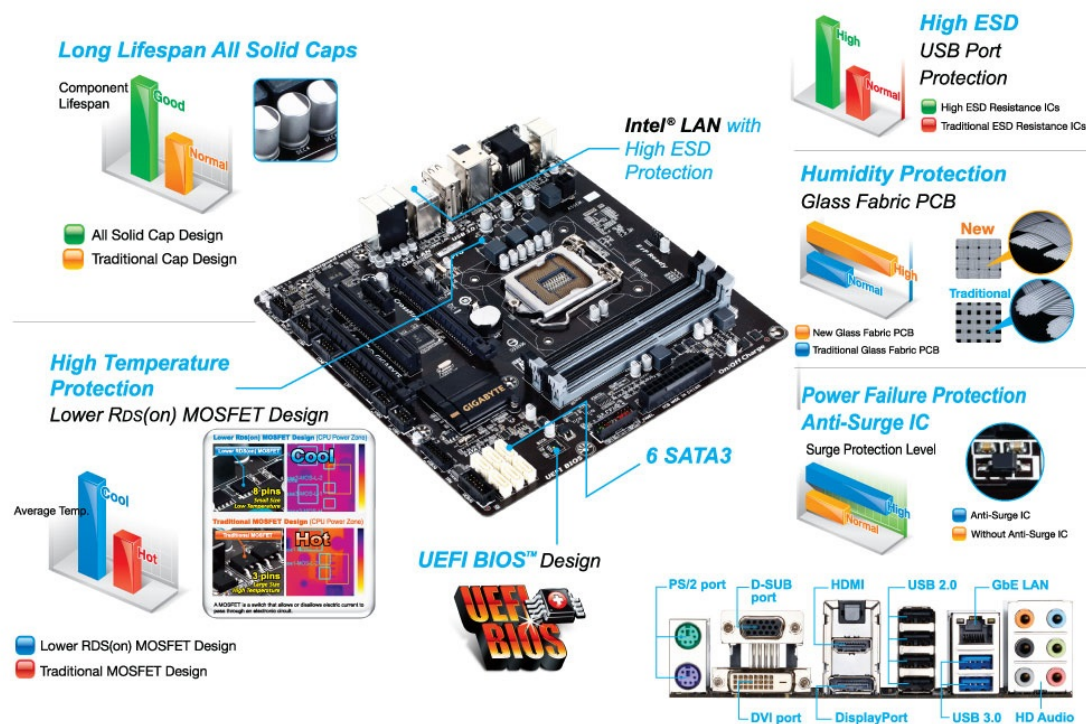


Gigabyte Technology

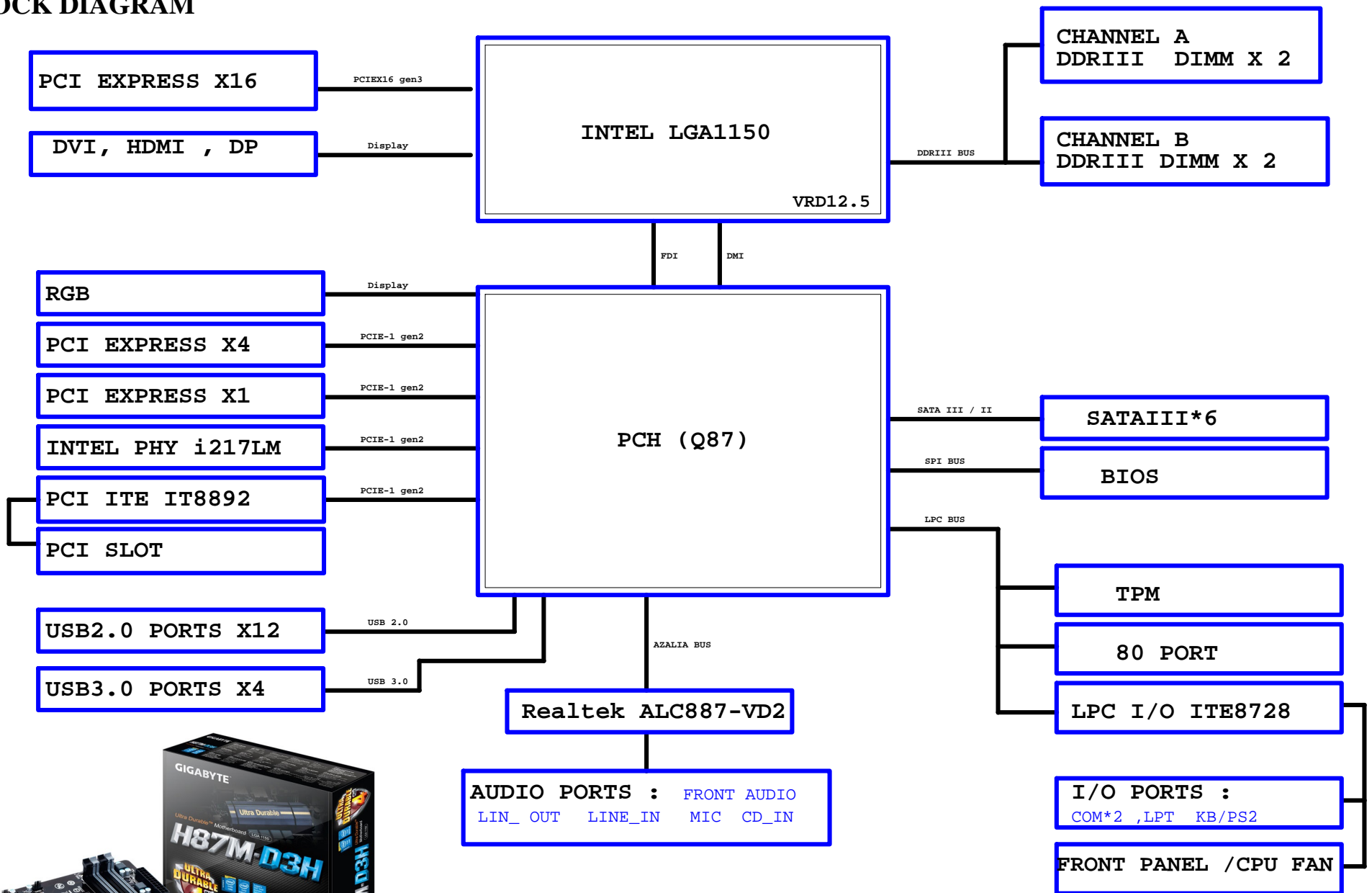
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Size	Document Number	GA-Q87M-D2H	
Custom			Rev 1.1
Date:	Tuesday, August 06, 2013	Sheet	1 of 32

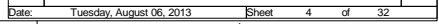
Model Name: GA-Q87M-D2H

Component value change history

[illegible]

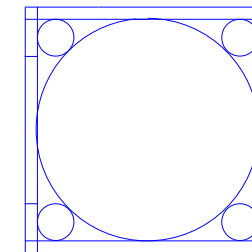
BLOCK DIAGRAM





LGA1155 (CR)

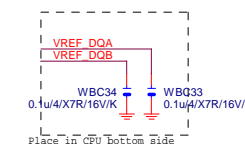
CR
CPU RETENTION/X



LGA1150

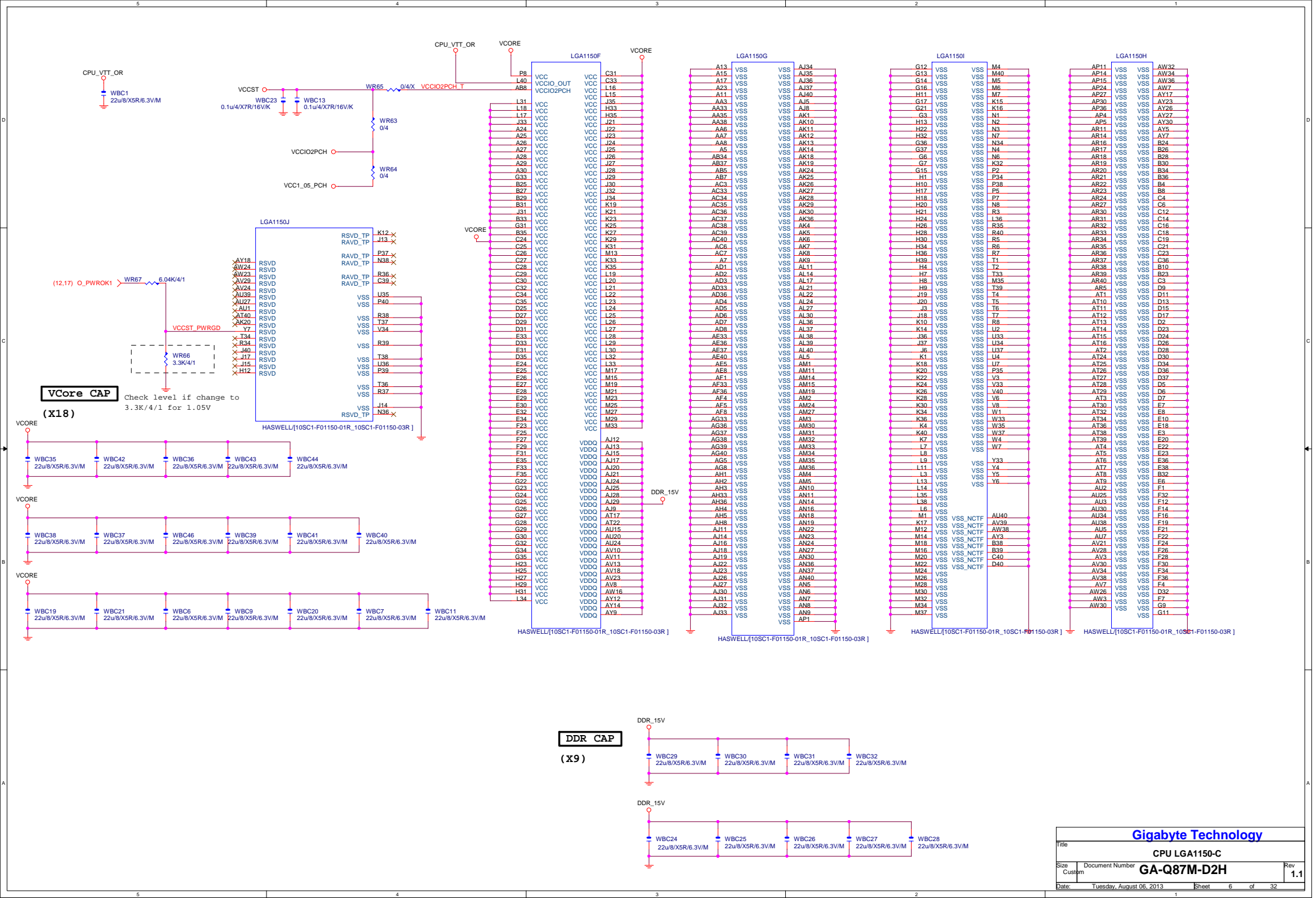


ILM_BP/1156/CSP/ILM_BP/1156/CSP/[12KRC-0F0001-52R_12KRC-0F0001-51R]

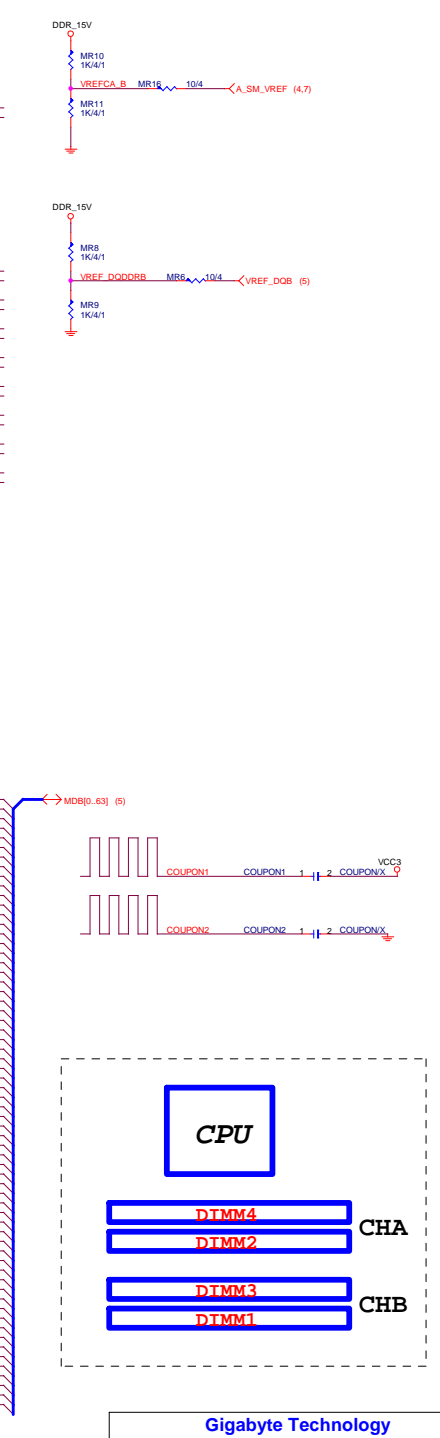
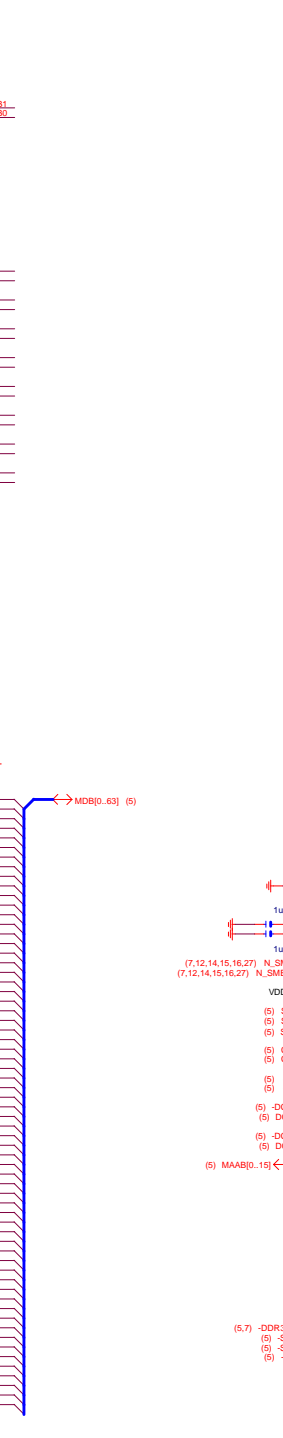


LGA1150A

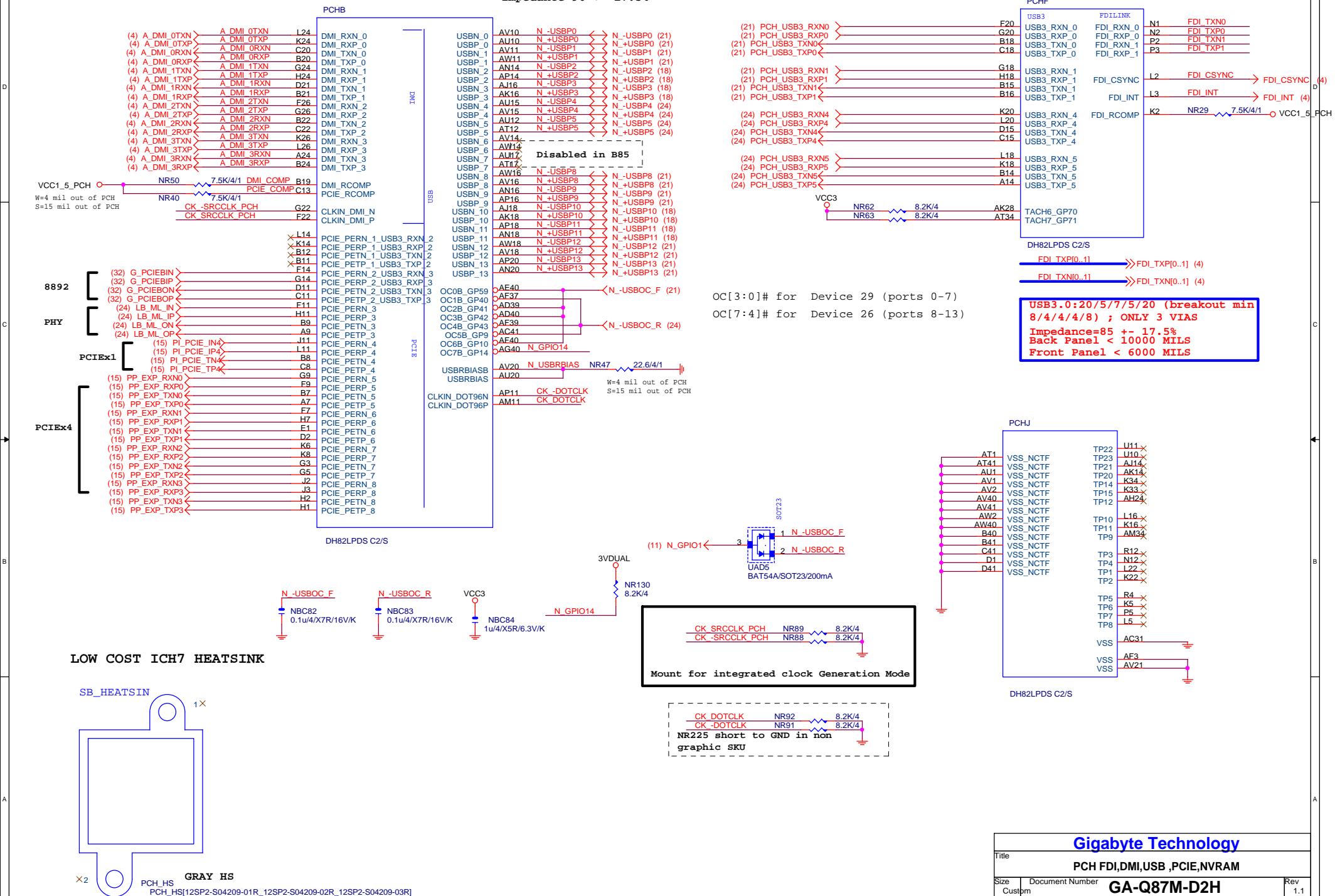
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MODT_A2	AW9	DDR0_ODT2	DDR0_DQ18	AP38	MDA18
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			DDR0_DQ29	AU37	MDA24
			DDR0_DQ30	AT35	MDA30
			DDR0_DQ31	AW35	MDA31
			DDR0_DQ32	AY6	MDA33
			DDR0_DQ33	AU6	MDA37
			DDR0_DQ34	AV4	MDA34
			DDR0_DQ35	AU4	MDA35
			DDR0_DQ36	AW6	MDA36
			DDR0_DQ37	AV6	MDA32
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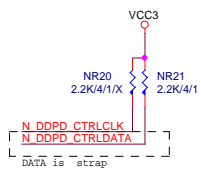
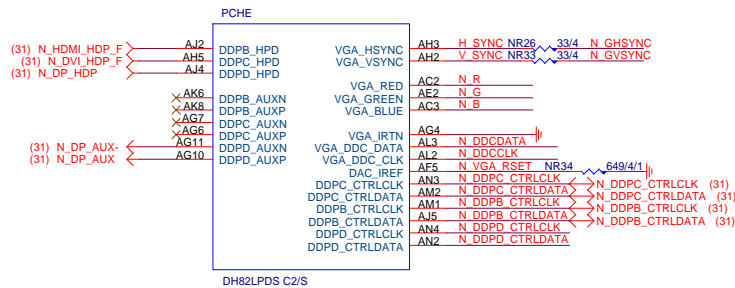




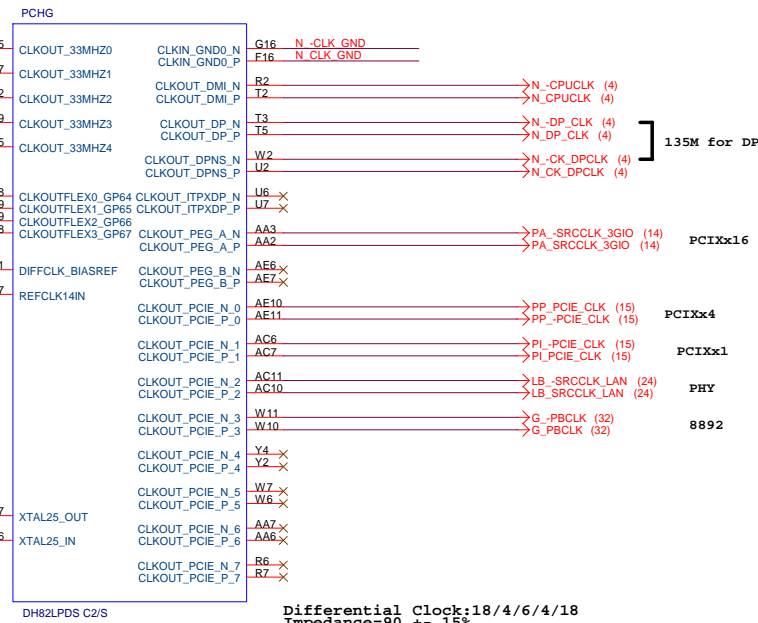
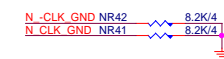
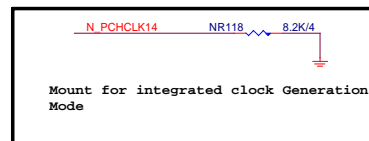
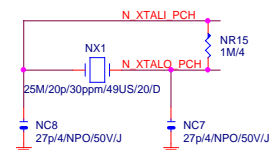


USB2.0 : 12/4.5/7.5/4.5/12 (breakout min 8/4/4/4/8)
Impedance=90 +- 17.5%

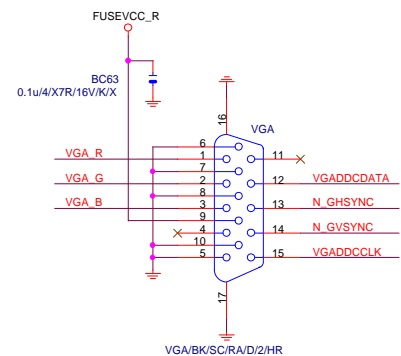
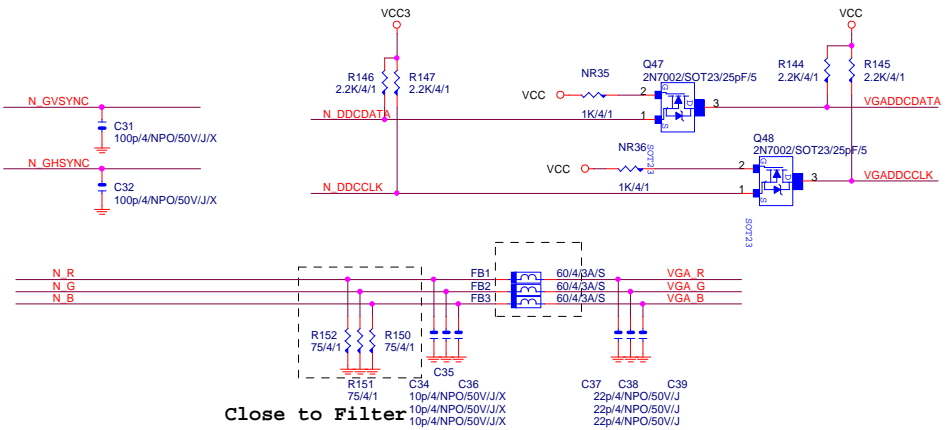
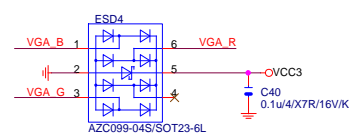
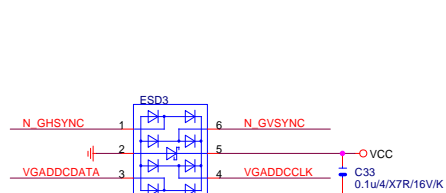




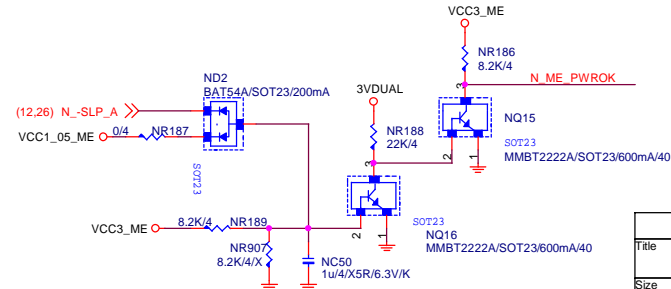
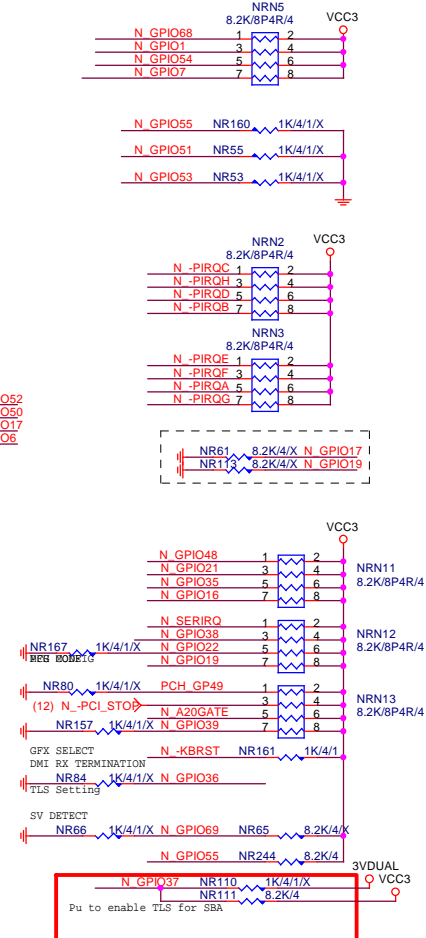
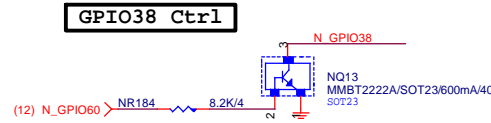
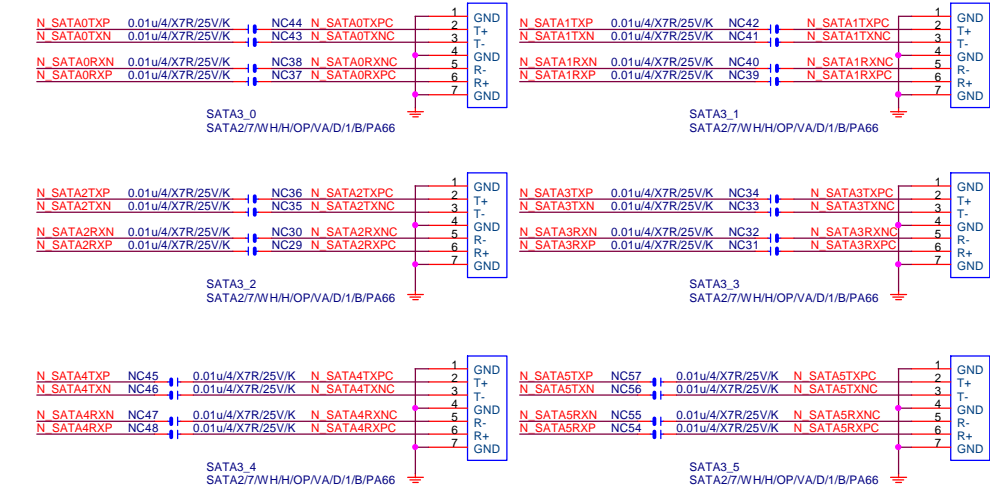
Flex1,2,3,4 : (17) O_LPCLK48
14/24/33/48MHz

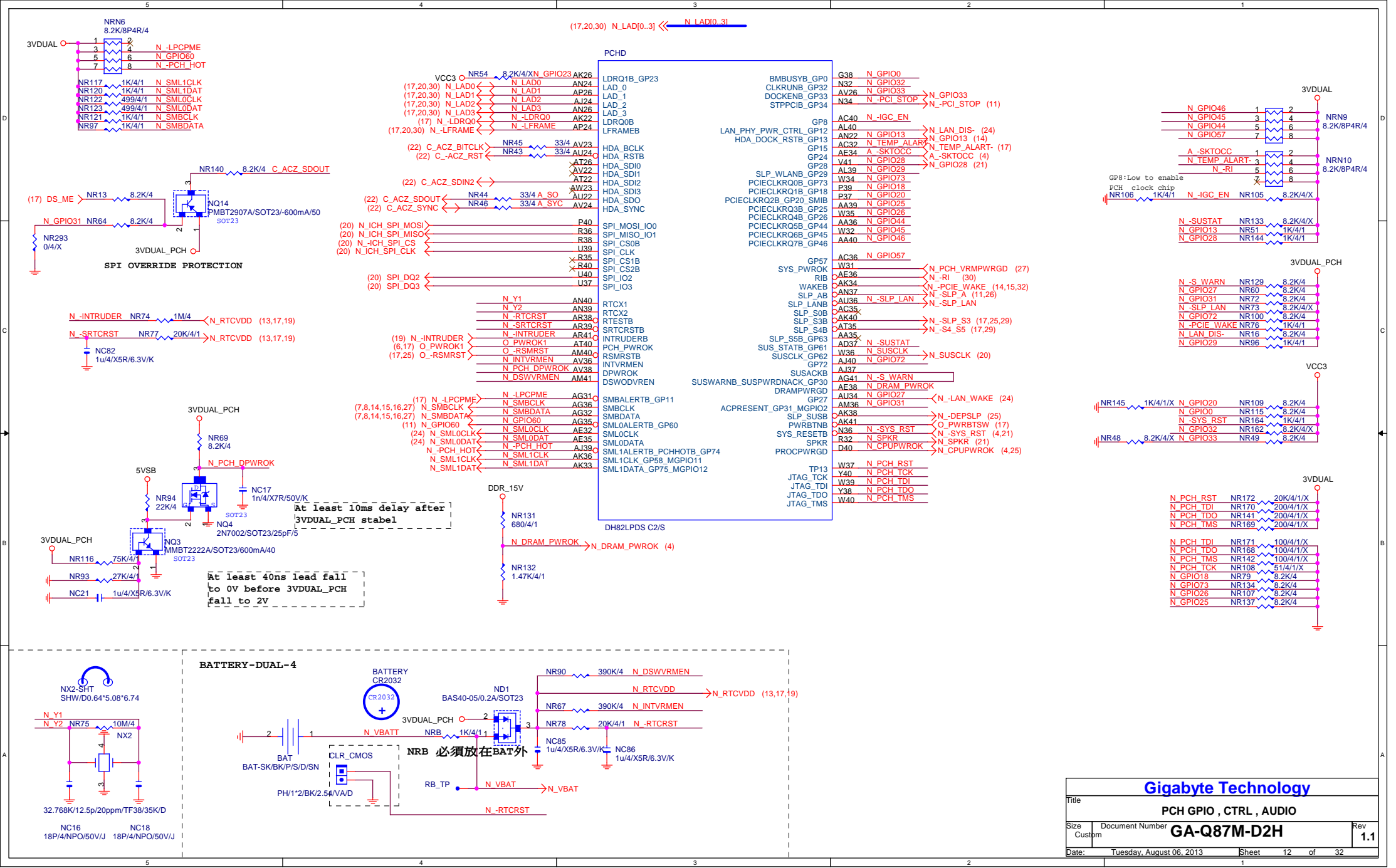


Differential Clock:18/4/6/4/18
Impedance=90 +- 15%



PCHC

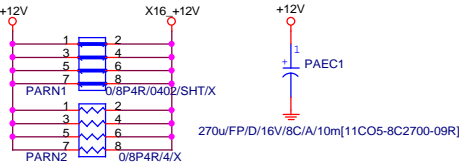




PCIEX16 CAP



PCIEX16 PROTECT SHT

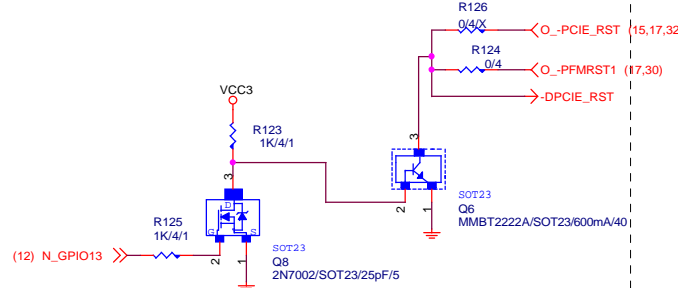


PCIEX16 AC CAP

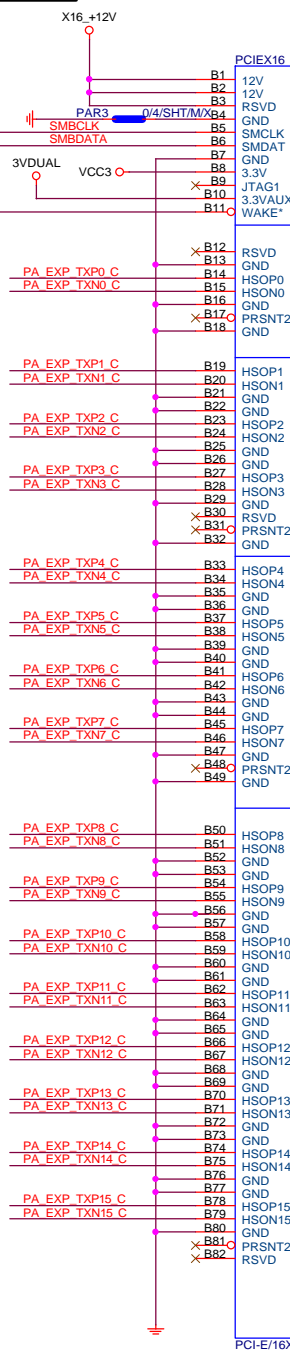
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PA EXP TXN0	PAC4	0.22uF/4X5R/6.3V/K	PA EXP TXN0 C
PA EXP TXP1	PAC6	0.22uF/4X5R/6.3V/K	PA EXP TXP1 C
PA EXP TXN1	PAC7	0.22uF/4X5R/6.3V/K	PA EXP TXN1 C
PA EXP TXP2	PAC8	0.22uF/4X5R/6.3V/K	PA EXP TXP2 C
PA EXP TXN2	PAC9	0.22uF/4X5R/6.3V/K	PA EXP TXN2 C
PA EXP TXP3	PAC10	0.22uF/4X5R/6.3V/K	PA EXP TXP3 C
PA EXP TXN3	PAC11	0.22uF/4X5R/6.3V/K	PA EXP TXN3 C
PA EXP TXP4	PAC12	0.22uF/4X5R/6.3V/K	PA EXP TXP4 C
PA EXP TXN4	PAC13	0.22uF/4X5R/6.3V/K	PA EXP TXN4 C
PA EXP TXP5	PAC14	0.22uF/4X5R/6.3V/K	PA EXP TXP5 C
PA EXP TXN5	PAC15	0.22uF/4X5R/6.3V/K	PA EXP TXN5 C
PA EXP TXP6	PAC16	0.22uF/4X5R/6.3V/K	PA EXP TXP6 C
PA EXP TXN6	PAC17	0.22uF/4X5R/6.3V/K	PA EXP TXN6 C
PA EXP TXP7	PAC18	0.22uF/4X5R/6.3V/K	PA EXP TXP7 C
PA EXP TXN7	PAC19	0.22uF/4X5R/6.3V/K	PA EXP TXN7 C
PA EXP TXP8	PAC20	0.22uF/4X5R/6.3V/K	PA EXP TXP8 C
PA EXP TXN8	PAC21	0.22uF/4X5R/6.3V/K	PA EXP TXN8 C
PA EXP TXP9	PAC22	0.22uF/4X5R/6.3V/K	PA EXP TXP9 C
PA EXP TXN9	PAC23	0.22uF/4X5R/6.3V/K	PA EXP TXN9 C
PA EXP TXP10	PAC24	0.22uF/4X5R/6.3V/K	PA EXP TXP10 C
PA EXP TXN10	PAC25	0.22uF/4X5R/6.3V/K	PA EXP TXN10 C
PA EXP TXP11	PAC26	0.22uF/4X5R/6.3V/K	PA EXP TXP11 C
PA EXP TXN11	PAC27	0.22uF/4X5R/6.3V/K	PA EXP TXN11 C
PA EXP TXP12	PAC28	0.22uF/4X5R/6.3V/K	PA EXP TXP12 C
PA EXP TXN12	PAC29	0.22uF/4X5R/6.3V/K	PA EXP TXN12 C
PA EXP TXP13	PAC30	0.22uF/4X5R/6.3V/K	PA EXP TXP13 C
PA EXP TXN13	PAC31	0.22uF/4X5R/6.3V/K	PA EXP TXN13 C
PA EXP TXP14	PAC32	0.22uF/4X5R/6.3V/K	PA EXP TXP14 C
PA EXP TXN14	PAC33	0.22uF/4X5R/6.3V/K	PA EXP TXN14 C
PA EXP TXP15	PAC34	0.22uF/4X5R/6.3V/K	PA EXP TXP15 C
PA EXP TXN15	PAC35	0.22uF/4X5R/6.3V/K	PA EXP TXN15 C

PA EXP RXP0_15I >>> PA_EXP_RXP[0..15] (4)
PA EXP RXN0_15I >>> PA_EXP_RXN[0..15] (4)
PA EXP TXP0_15I >>> PA_EXP_TXP[0..15] (4)
PA EXP TXN0_15I >>> PA_EXP_TXN[0..15] (4)

PCIEX16 SOFT RESET



PCIEX16 SLOT

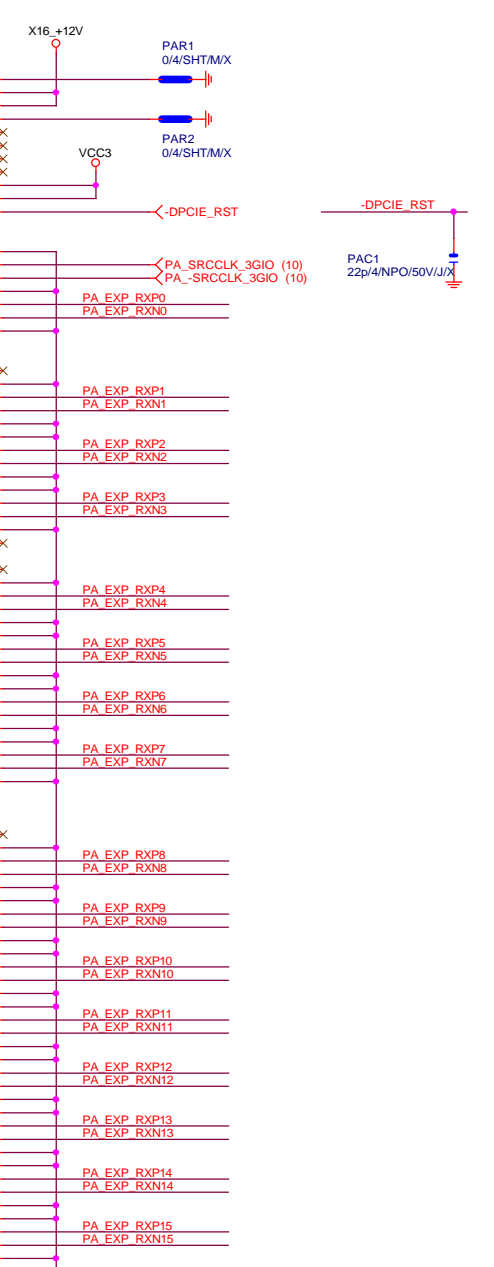


PCIESLOT-164DN-P

3GIO_*16

KEY

PCI-E/16X-164P/BK/LONG DOUBLE



Gigabyte Technology

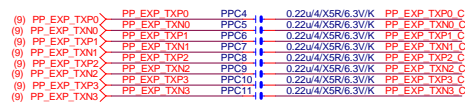
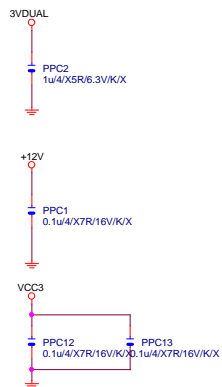
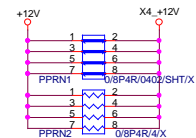
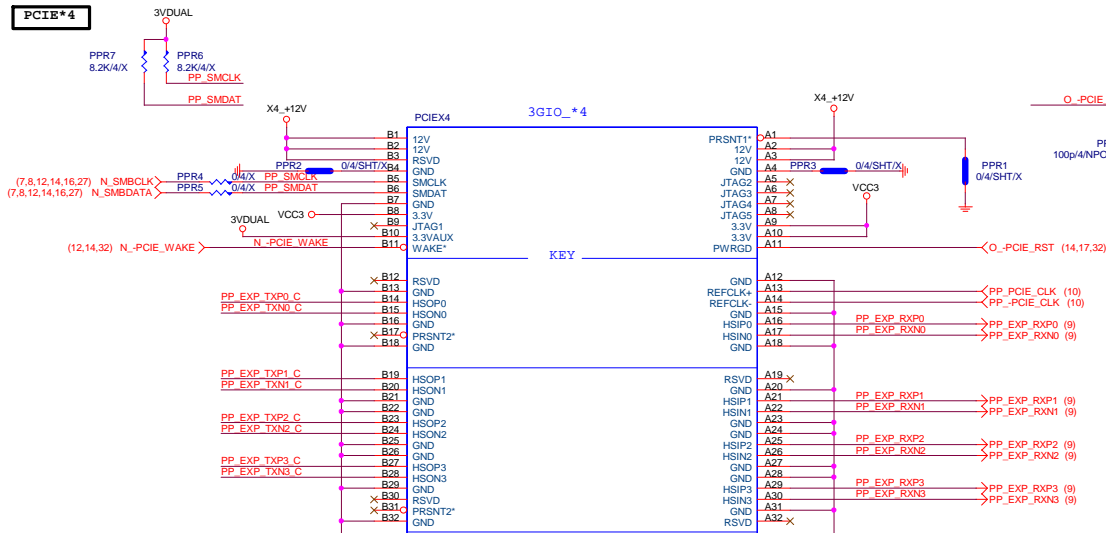
PCI EXPRESS * 16

GA-Q87M-D2H

Rev 1.1

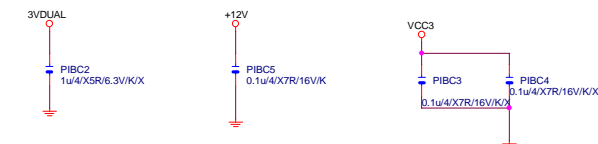
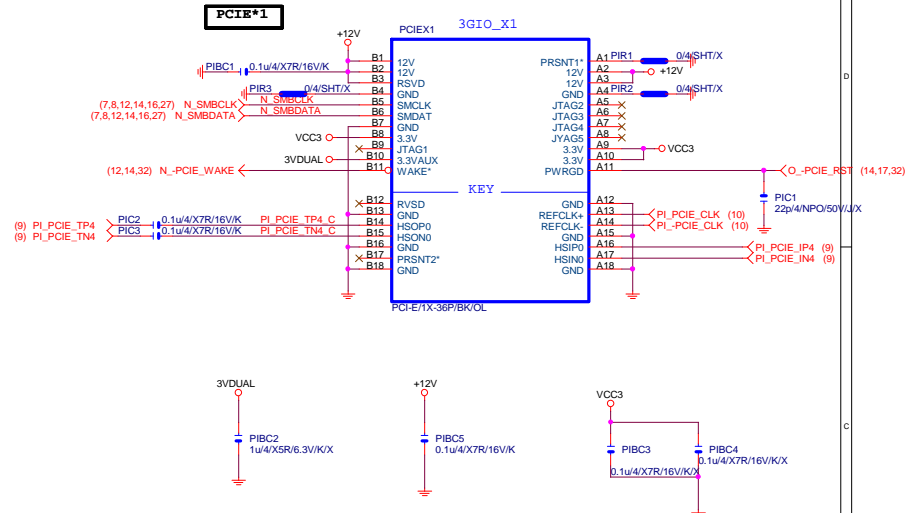
Title		Document Number		Rev
Size		Date:		1.1
Custom		Tuesday, August 06, 2013	Sheet 14 of 32	

PCIE*4

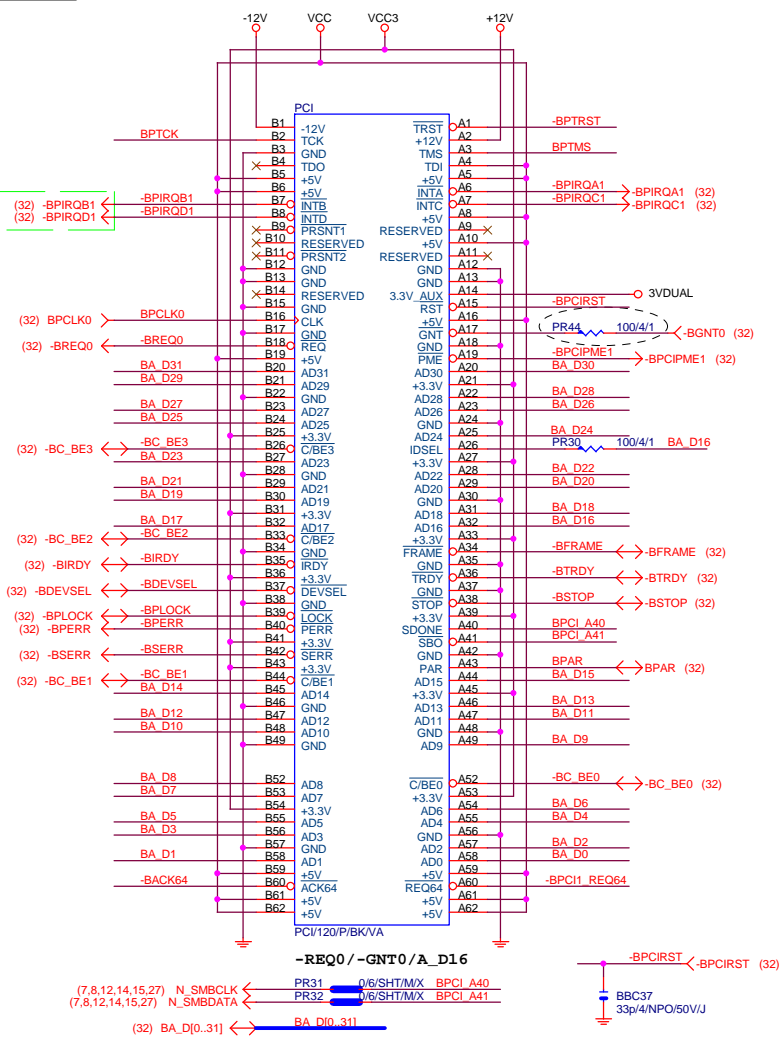


PCI-E/4X-65P/BK/LONG DOUBLE

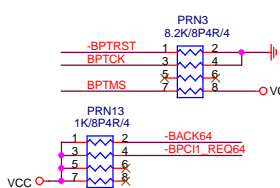
PCIE*1



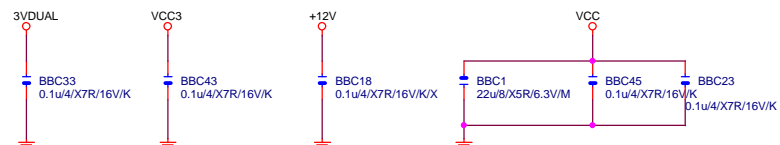
PCI SLOT



PCI PU



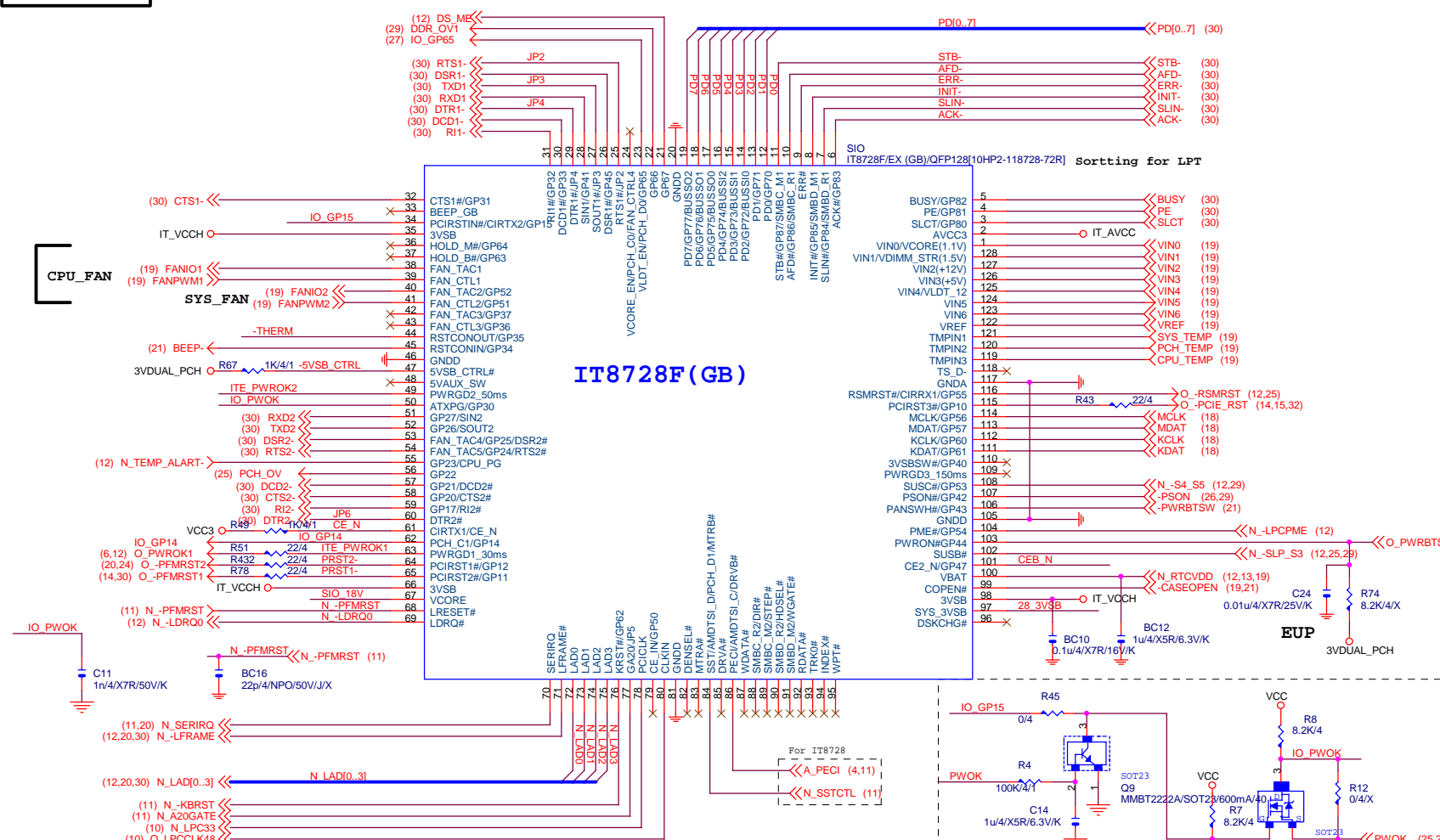
PCI CAP



<h1 style="text-align: center;">Gigabyte Technology</h1>			
Title			
<h2>PCI SLOT 1&2</h2>			
Size	Document Number		Rev
Customr	GA-Q87M-D2H		1.1
Date:	Tuesday, August 06, 2013	Sheet	16 of 32

Title			
PCI SLOT 1&2			
Size	Document Number	Rev	
Customr	GA-Q87M-D2H	1.1	
Date:	Tuesday, August 06, 2013	Sheet	16 of 32

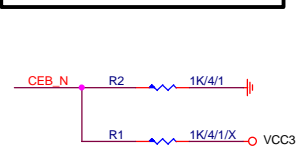
SIO IT8728F



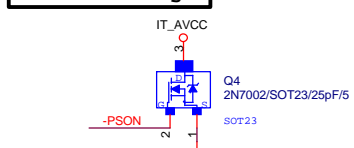
IT8728F NOTE

	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

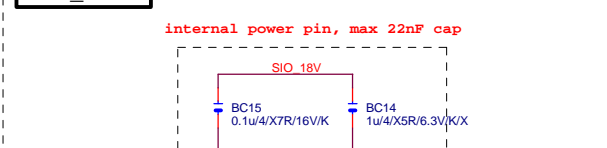
DUAL BIOS OPT STRAP



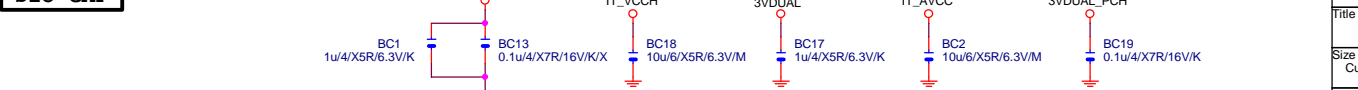
Power leakage



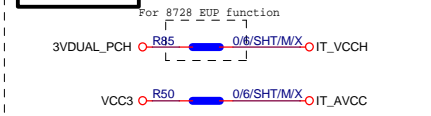
SIO 18V



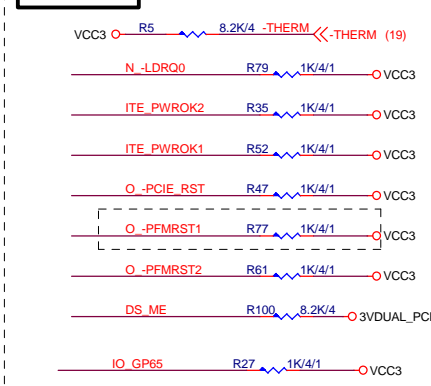
SIO CAP



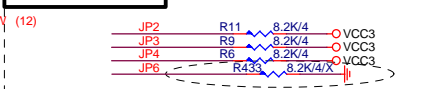
PWR SHT



SIO PU



SIO STRAP



IT8728-EX
PULL DOWN ENABLE FORCE OVP

EUP control by PCH

```

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

```

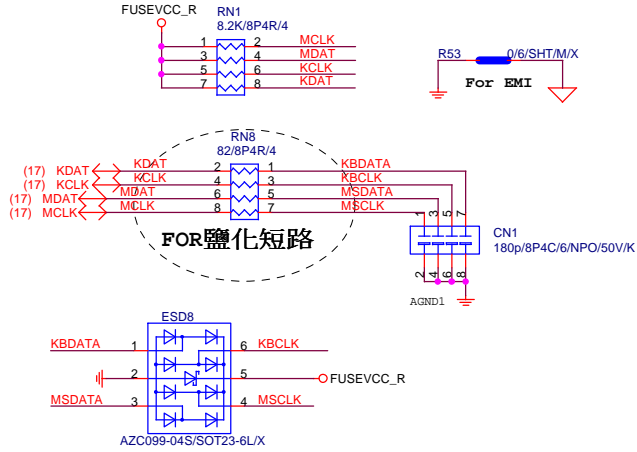
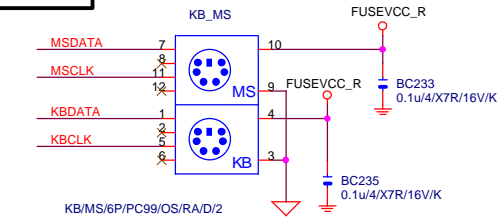
Gigabyte Technology

ITE 8728 LPC IO

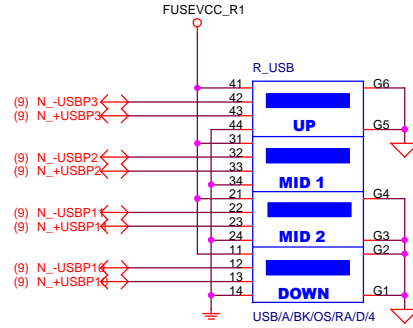
GA-Q87M-D2H

Rev
1.1

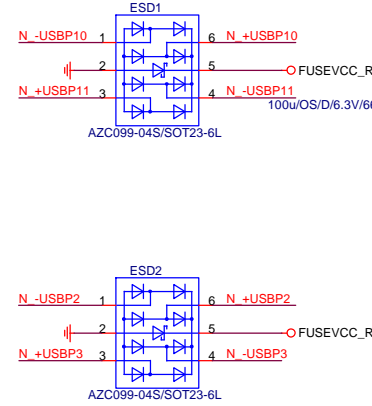
KB/MS



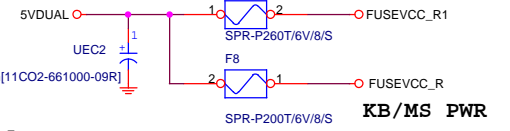
RUSB20



USB2.0 ESD



USB2.0 PWR

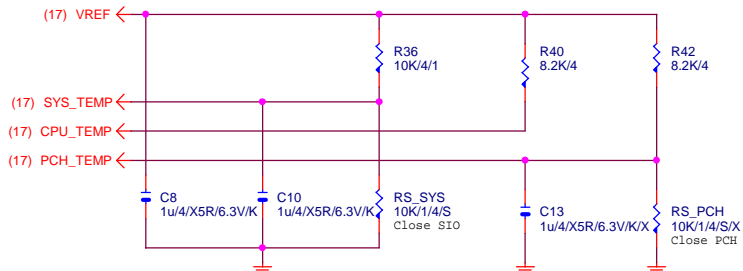


Close to USB connector

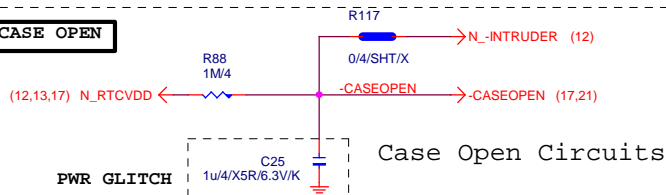
KB/MS PWR

Gigabyte Technology

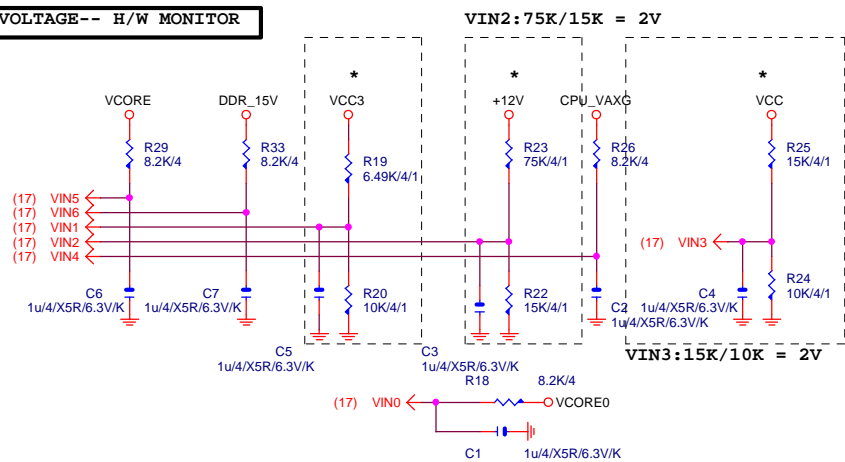
TEMP H/W MONITOR



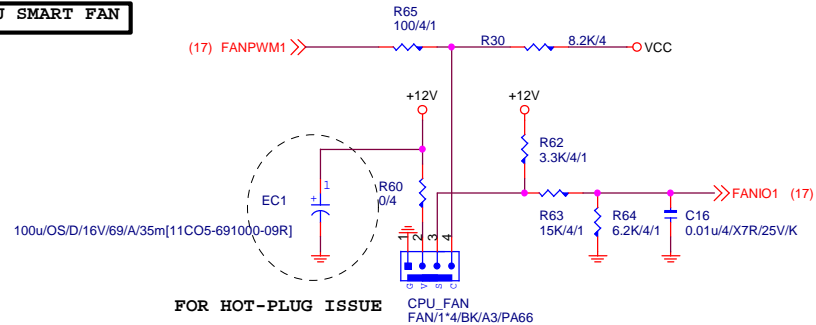
CASE OPEN



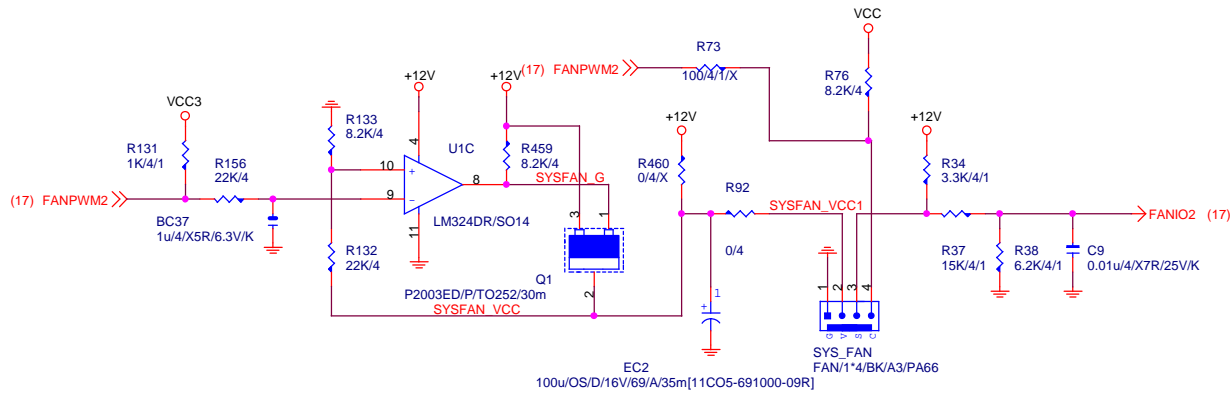
VOLTAGE-- H/W MONITOR



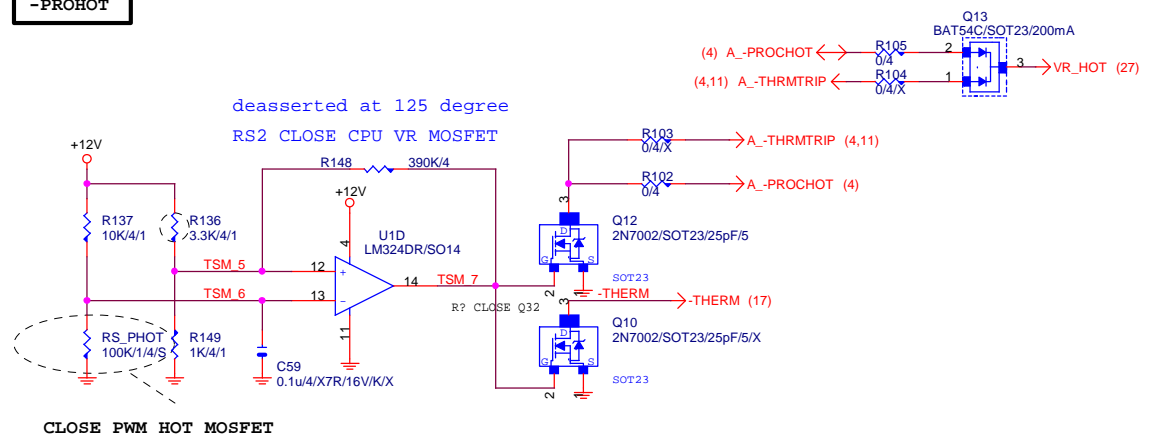
CPU SMART FAN



SYS SMART FAN



-PROHOT

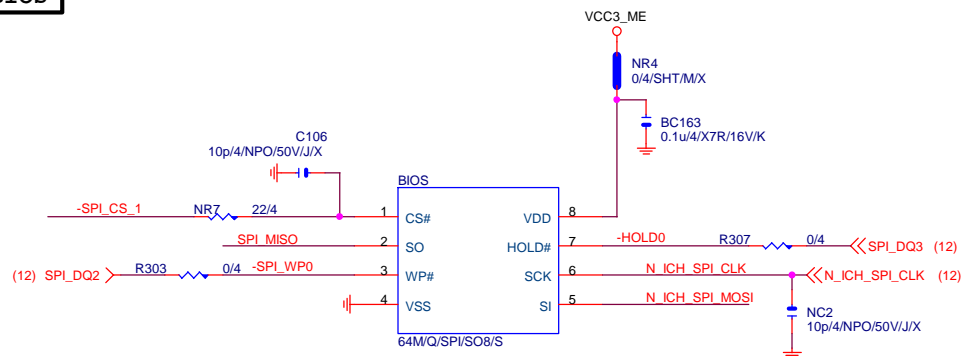


CLOSE PWM HOT MOSFET

Gigabyte Technology

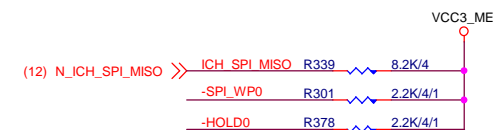
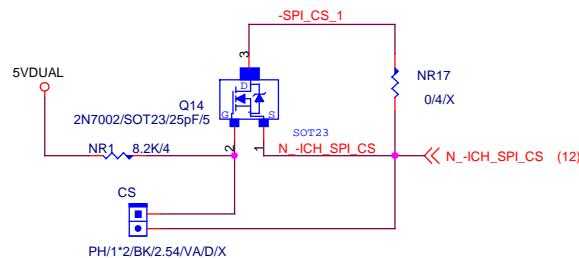
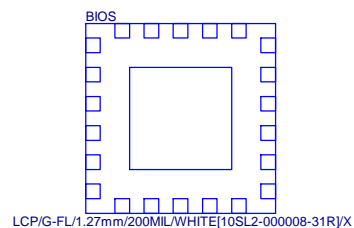
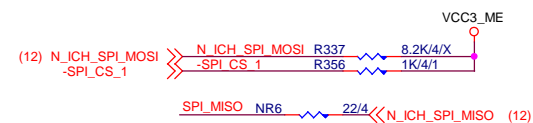
Title		HWM,FAN CTRL,OV	
Size	Document Number	GA-Q87M-D2H	
Custom		Rev 1.1	
Date:	Tuesday, August 06, 2013	Sheet	19 of 32

BIOS

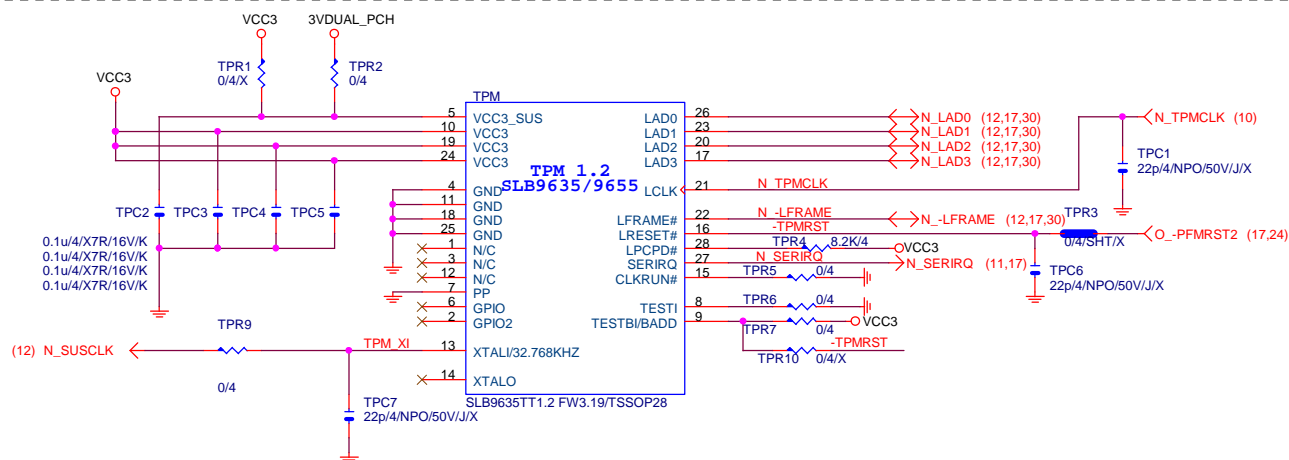


BOOT DEVICE	GP51	GP19
LPC	0	0
SPI	1	1

1 means internal P
0 means PD 1K



TPM

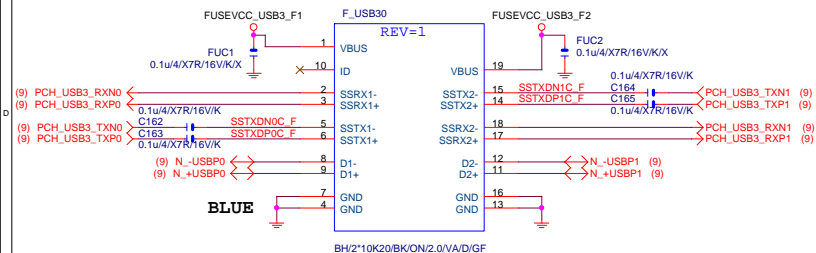


	SLB9635	SLB965
TPR2,TPR4,TPR5, TPR6,TPR7,TPR9	MOUNT	N/A
TPR1,TPR10	N/A	MOUNT

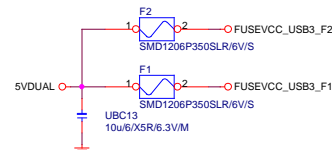
Gigabyte Technology

Title				BIOS ,TPM			
Size B	Document Number					Rev	
	GA-Q87M-D2H					1.1	
Date:	Tuesday, August 06, 2013			Sheet	20	of	32

F_USB30

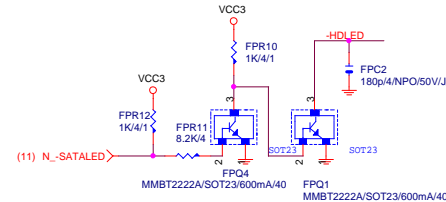


F_USB30 PWR

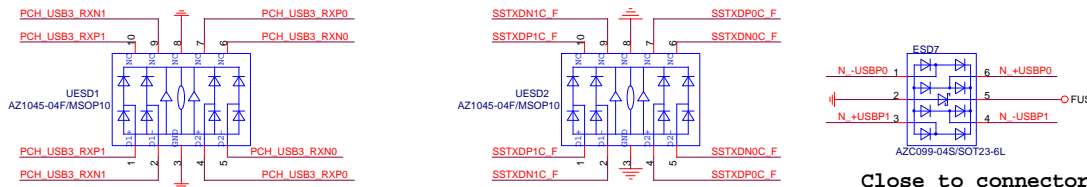


USB3.0 1Port - 1Fuse (3.5A)

SATA LED

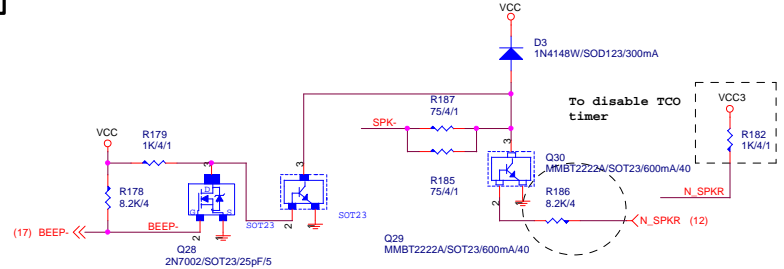


F_USB30 ESD PROTEC

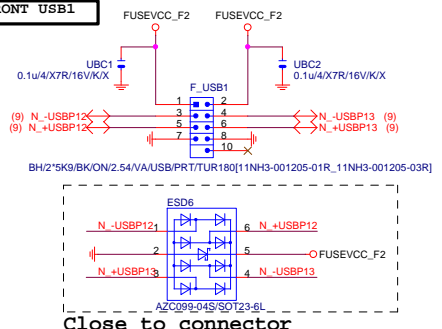


Close to connector

SPKR

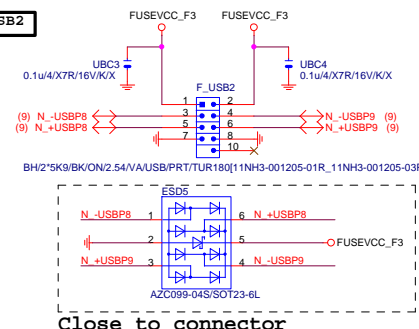


FRONT USB1



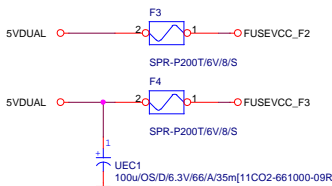
Close to connector

FRONT USB2

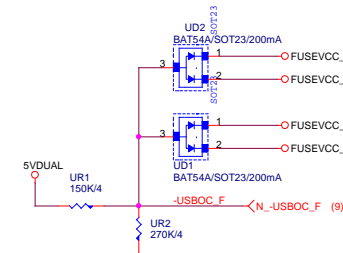


Close to connector

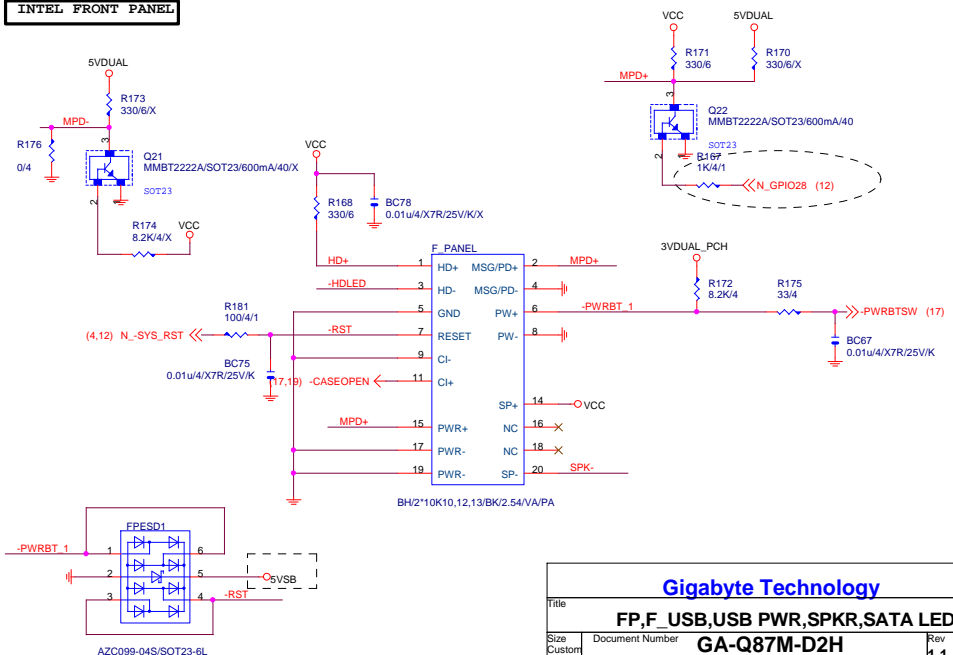
FUSEVCC_F



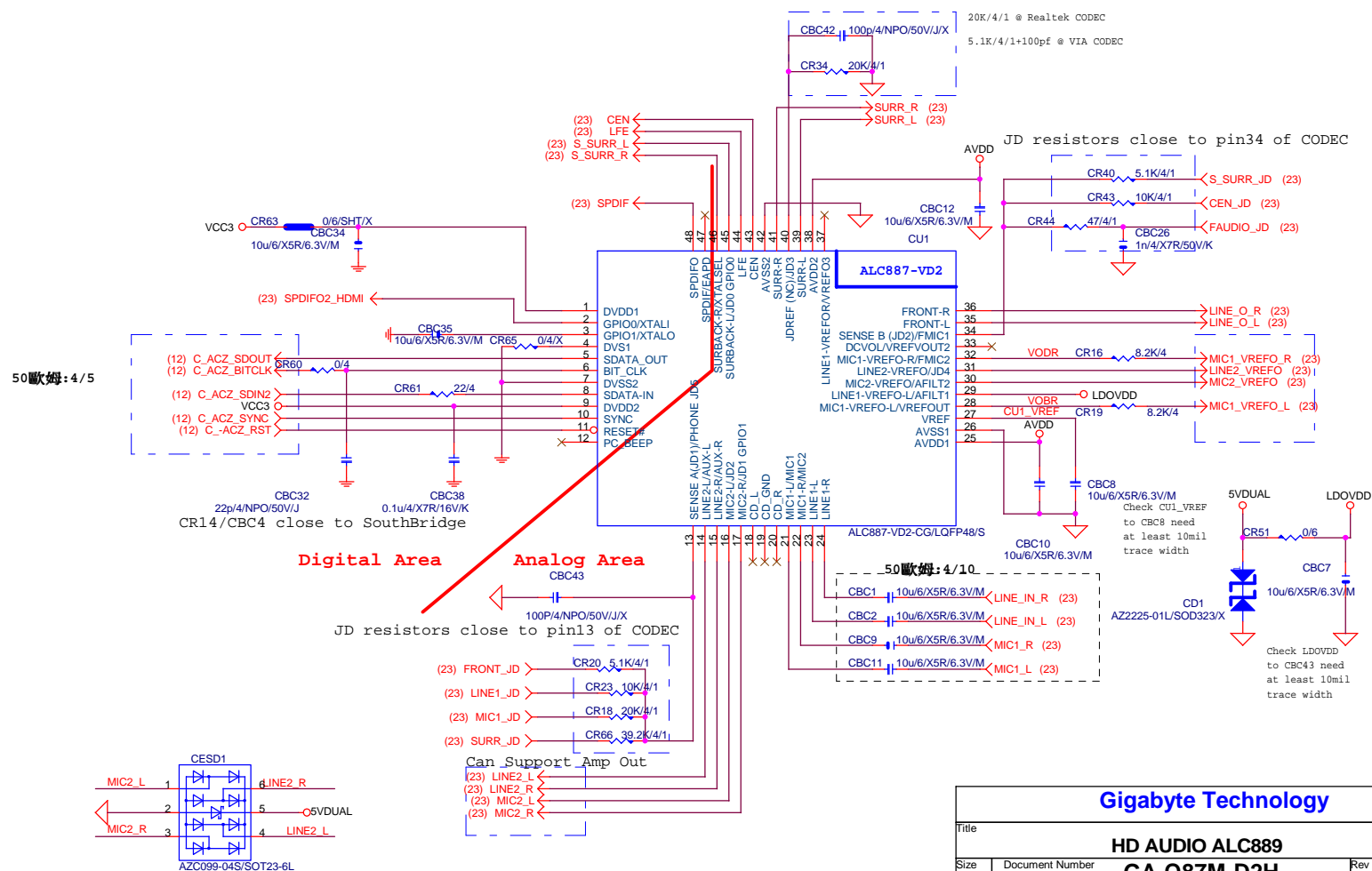
-USBOC_F

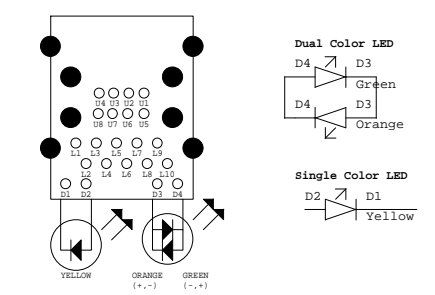
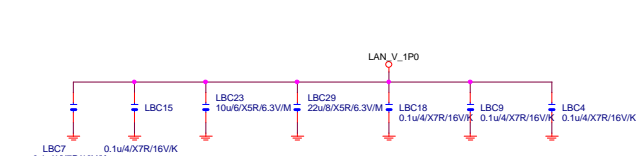
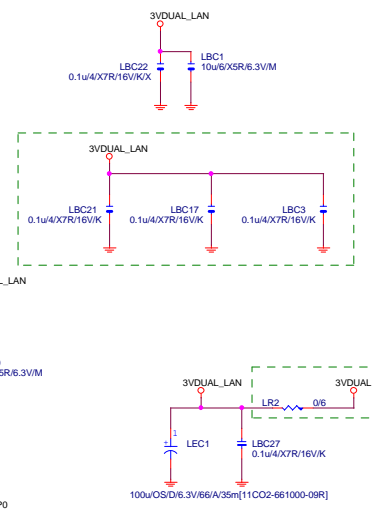
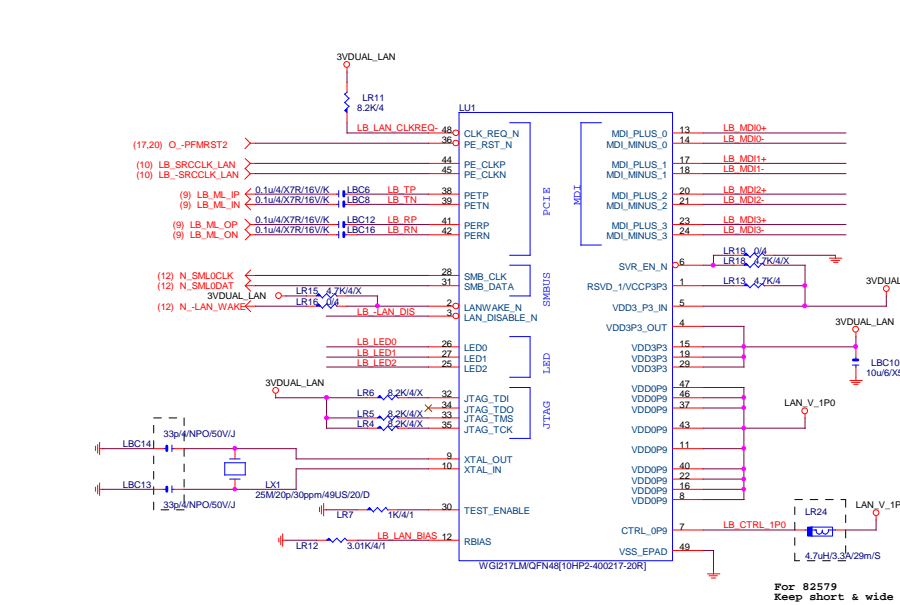


INTEL FRONT PANEL

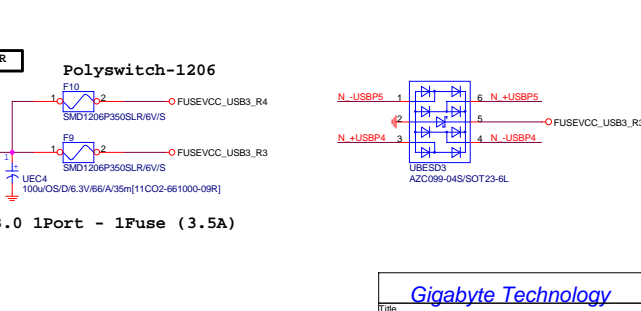
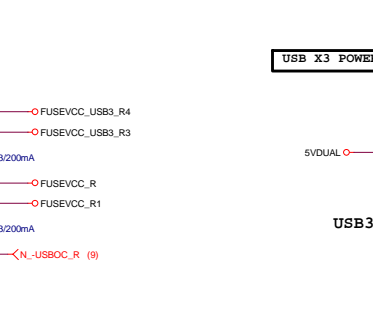
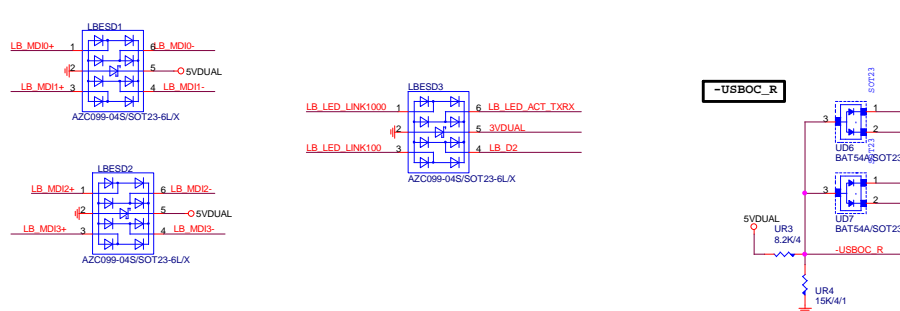
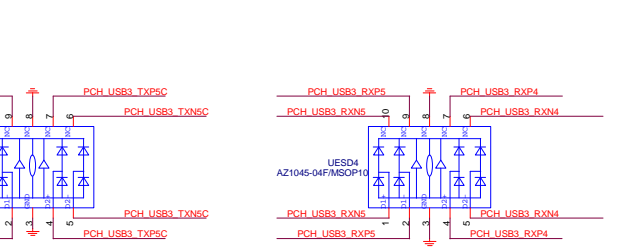
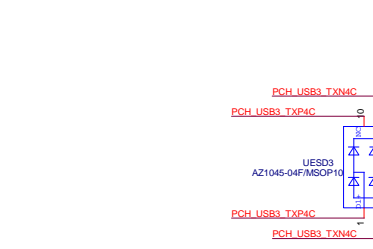
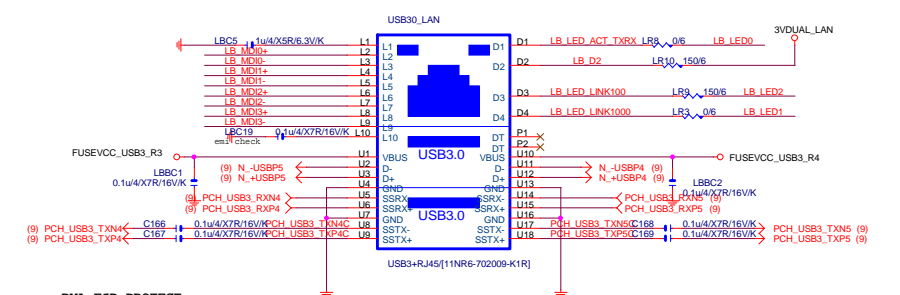


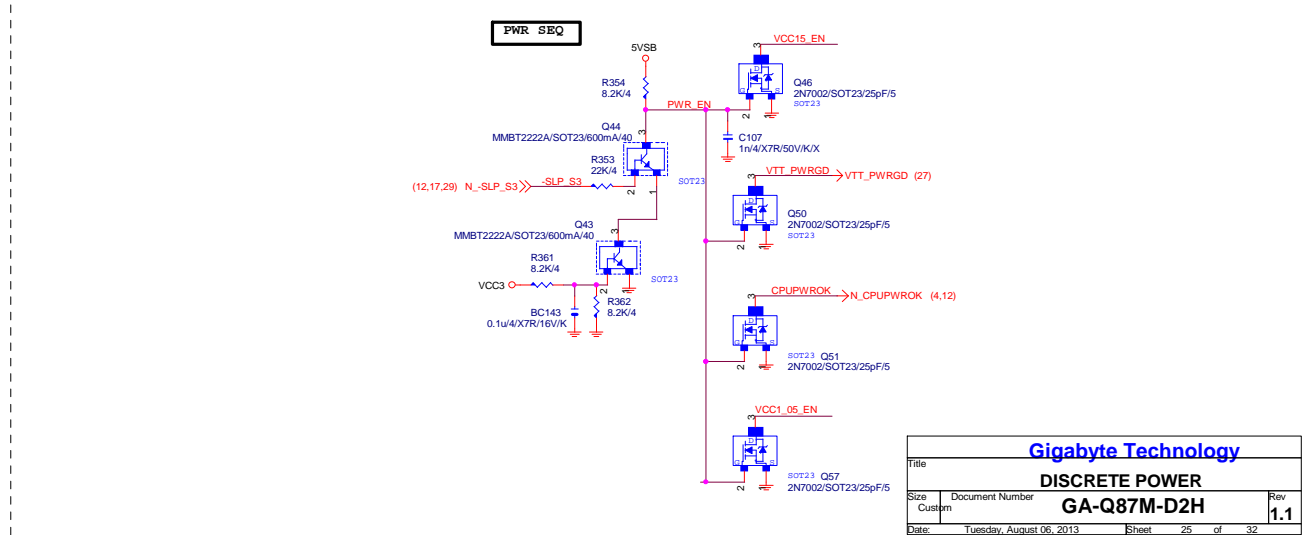
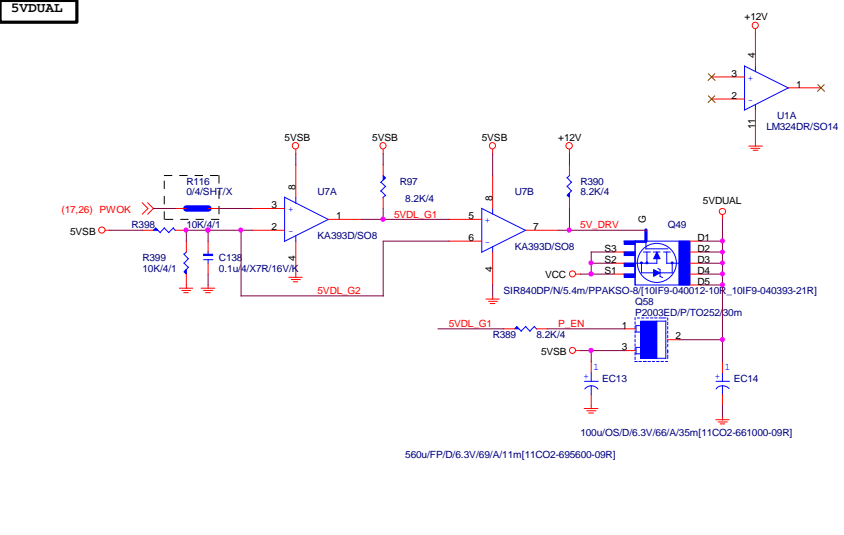
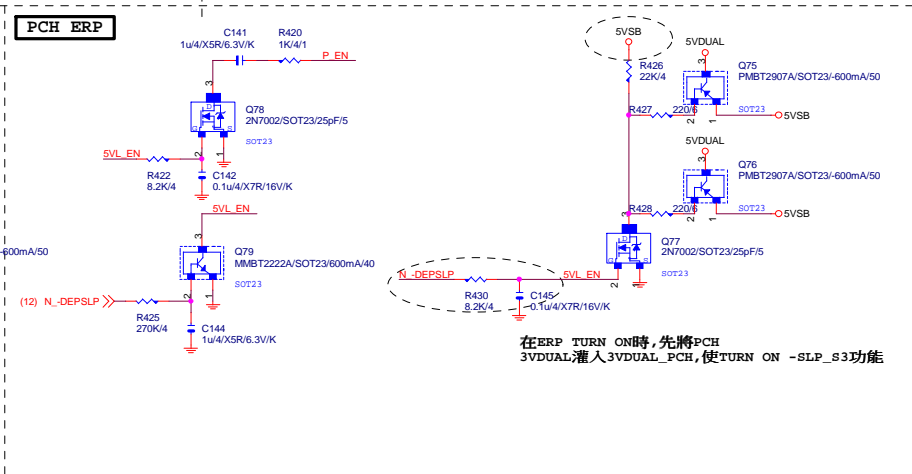
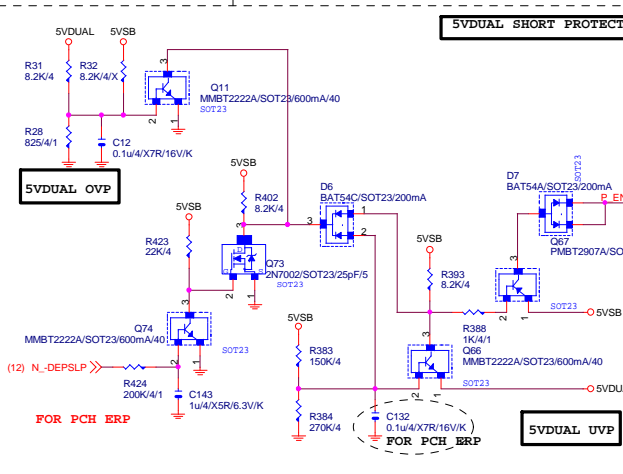
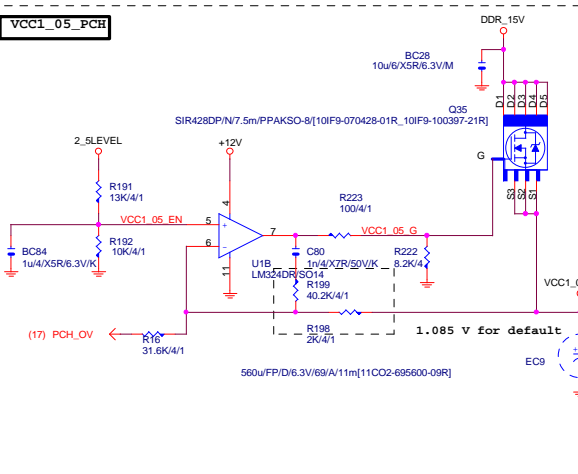
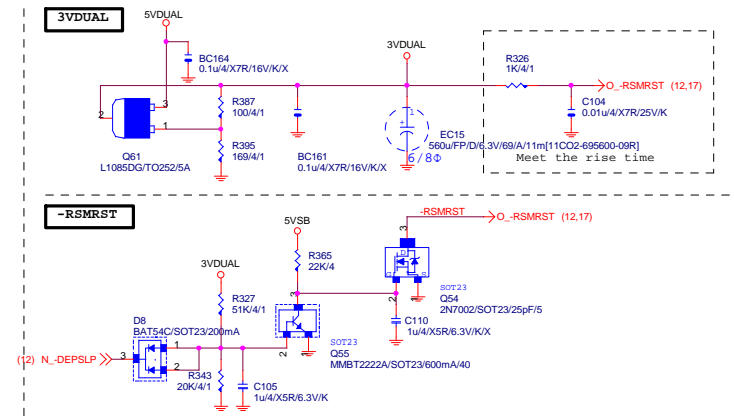
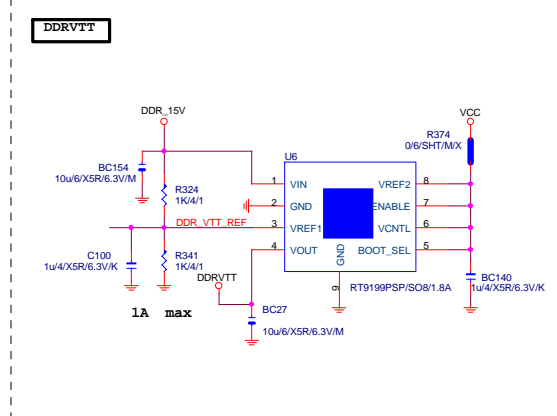
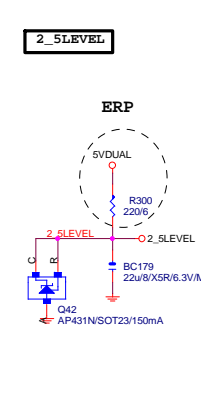
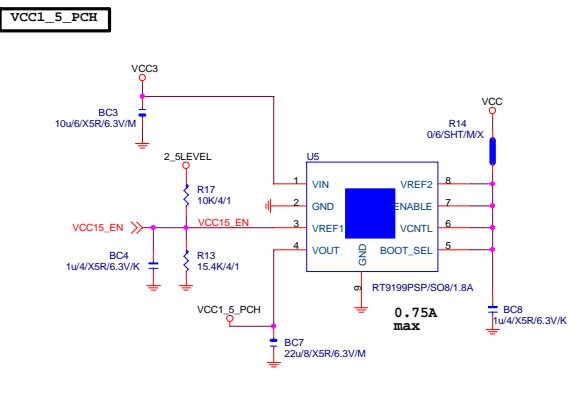
	ALC892	ALC887-VD2	VT1708S-CE
CR44/CBC26	47ohm+1nF	47ohm+1nF	22ohm+100P
CBC42/CBC43	X	X	100P/4
CR6/CR7/CR58/CR54/ CR67/CR68/CR69/CR70/ CR2/CR4	22K/4	22K/4	10K/4/1
CR5/CR8/CR1/CR14/ CR17/CR22/CR73/CR74/ CR13/CR11/CR57/CR53/ CR75/CR76/CR27/CR29	62 ohm	62 ohm	75 ohm
CR16/CR19	8.2K/4	8.2K/4	3.3K/4
CESD1	O	O	O



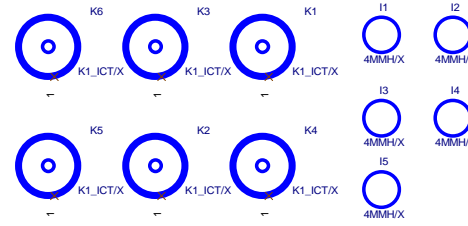
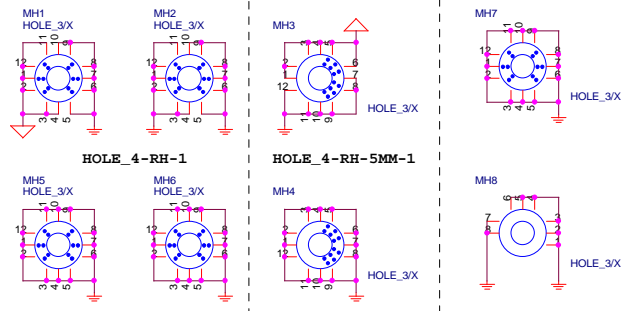
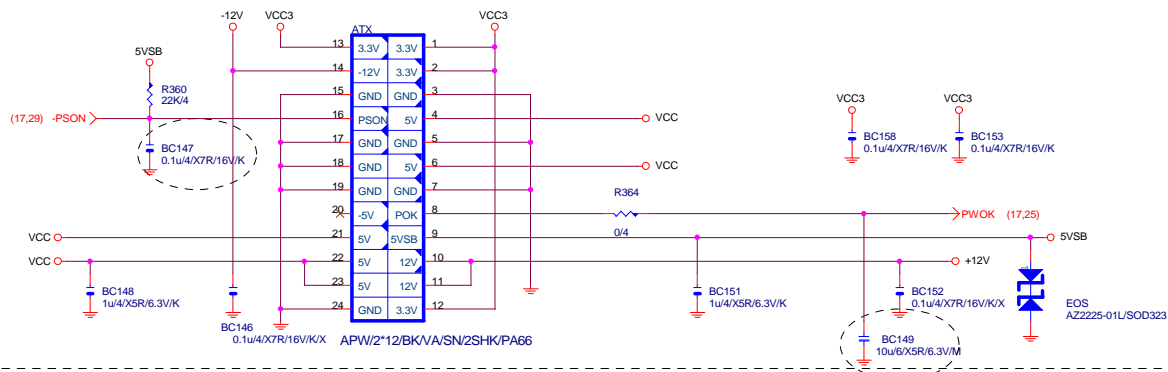


1Gb	Orange	Access	Blinking
100Mb	Green	Link	Yellow
10Mb	Off		

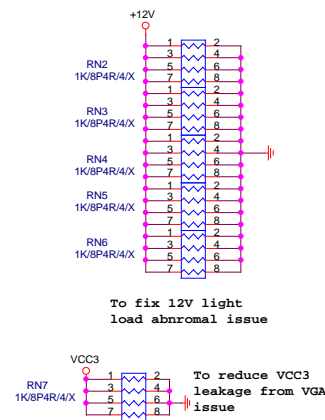
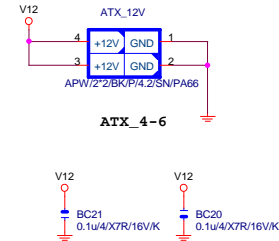




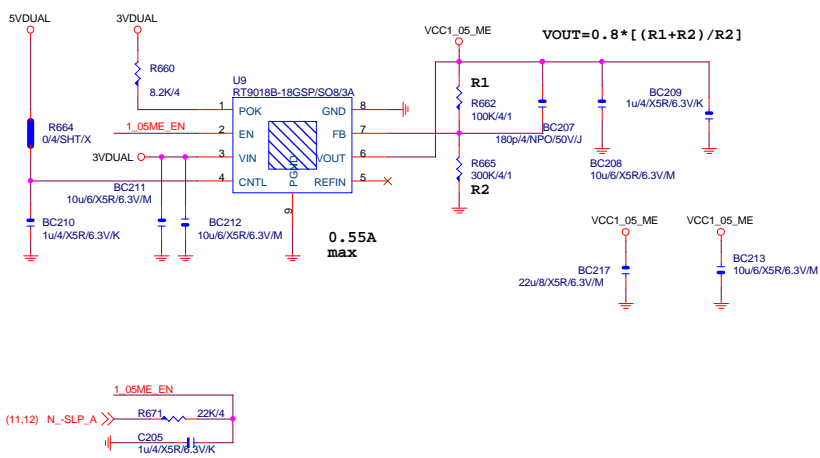
ATXX24 POWER CONNECTOR



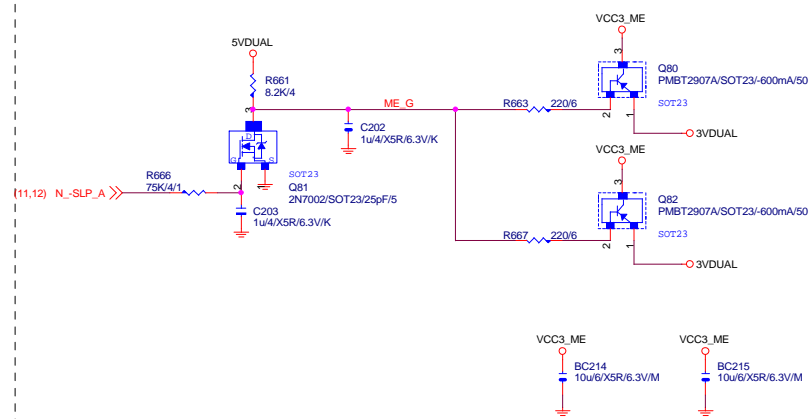
ATXX4 POWER CONNECTOR

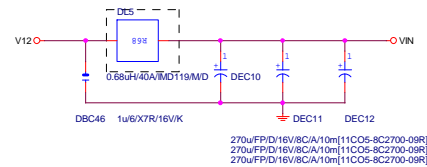
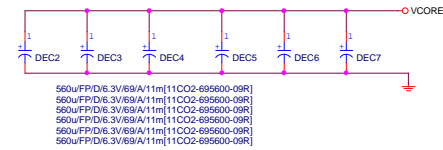
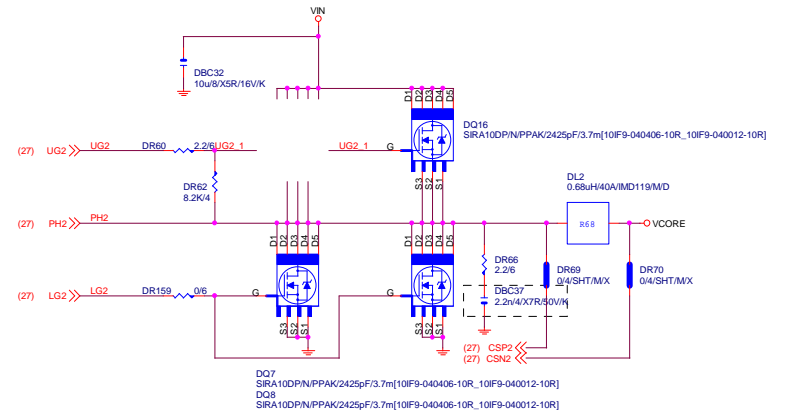
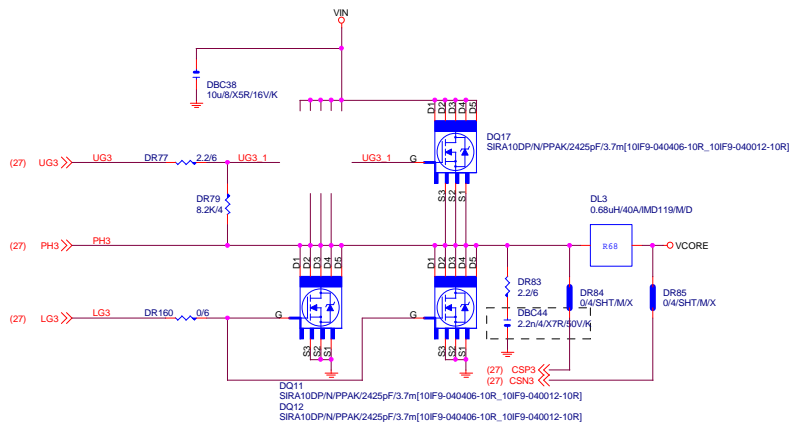
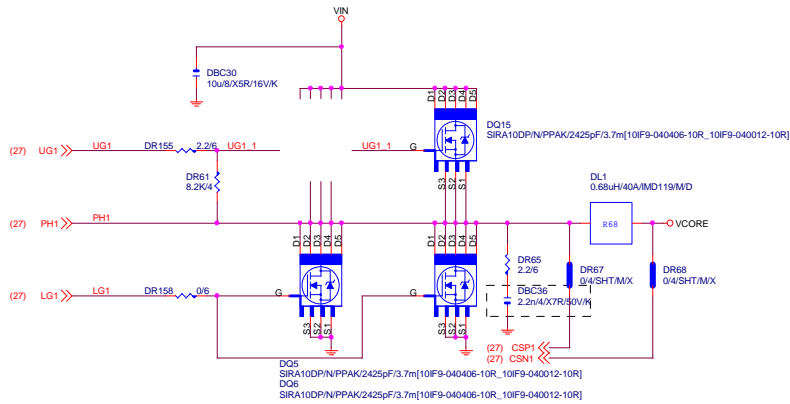


VCC1_05_ME

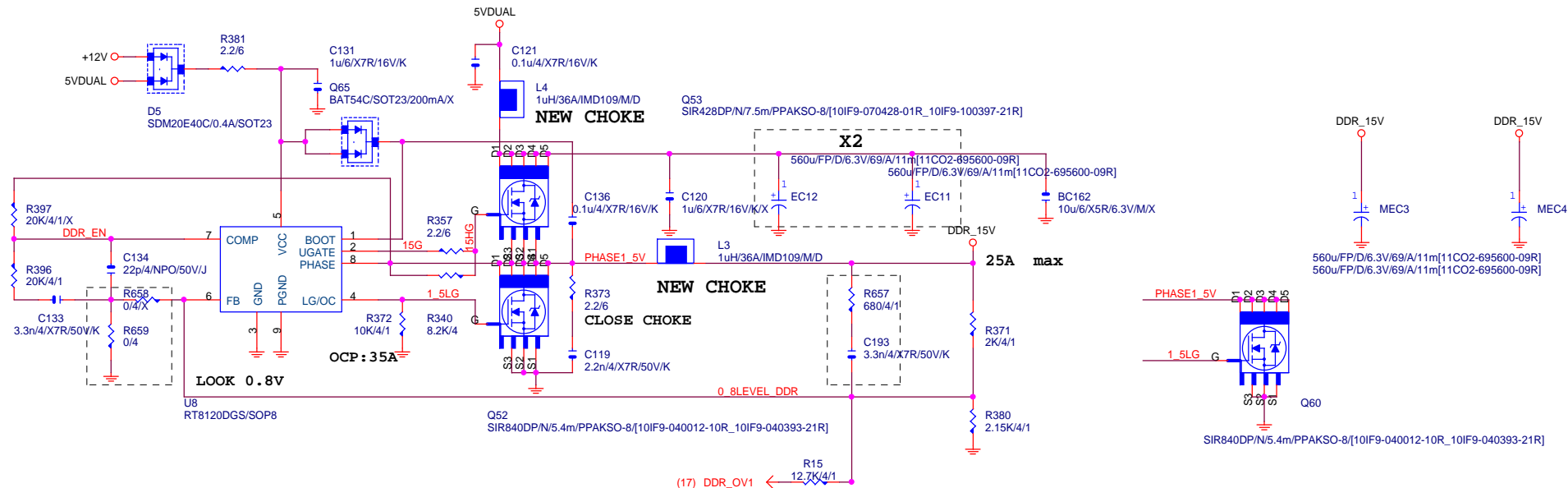


VCC3_ME

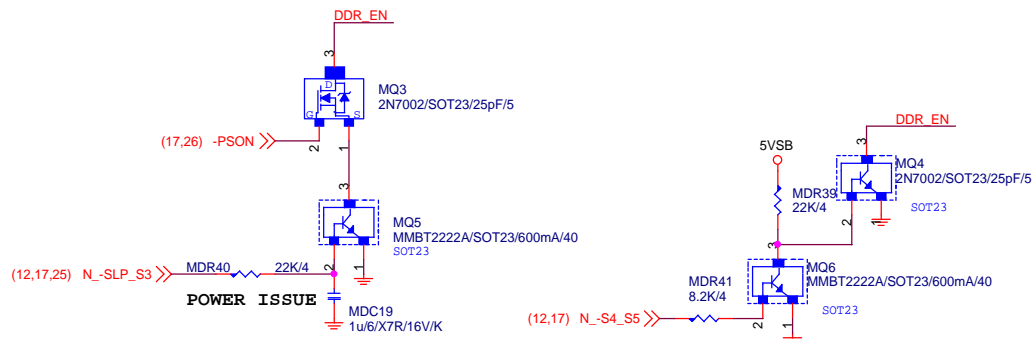




DDR15V



PWR SEQ



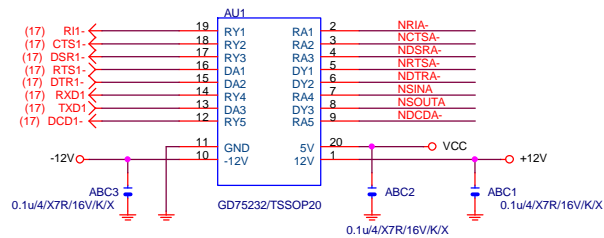
VIN=5V,VOUT=1.5V,IOUT=25A,PHASE=1
IRMS=11.45A

560u/FP/D/6.3V/68/8m RIPPLE CURRENT=4.7A
Coefficient=1.7(85°C),1(105°C)

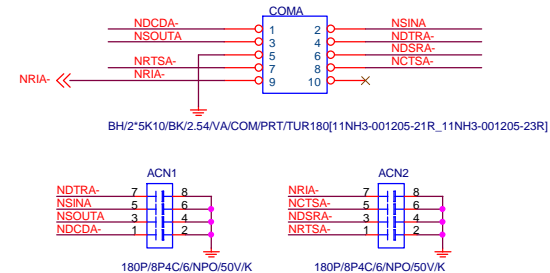
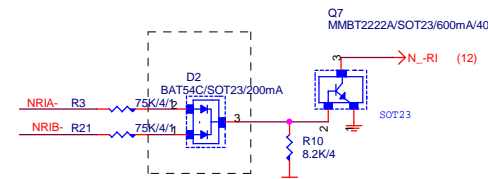
VIN Ripple current=4.7X1.7=7.99A(85°C)
-->故固態電容須2X7.99=15.98>11.45A

```
Rocset=(Iocp*Lgate,rdson)/Iocset
Rocset=(45A*6.7mOhm)/10uA = 30K
Iocset=10uA
```

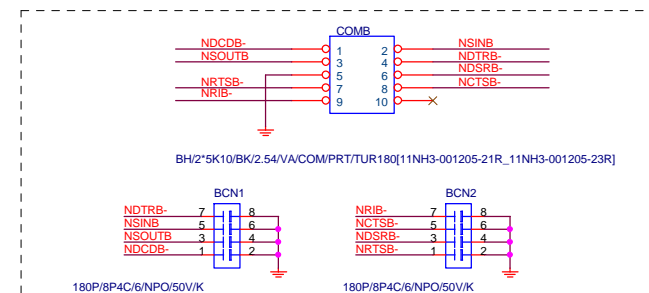
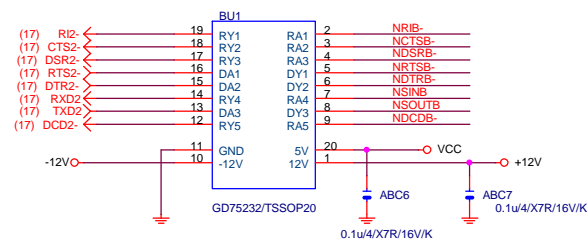
COMA



COM RI

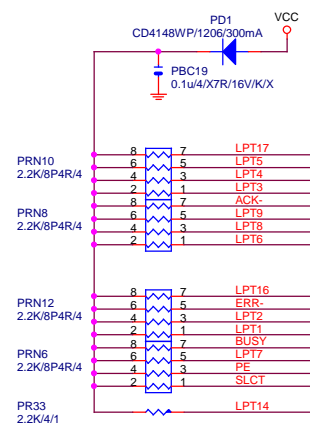
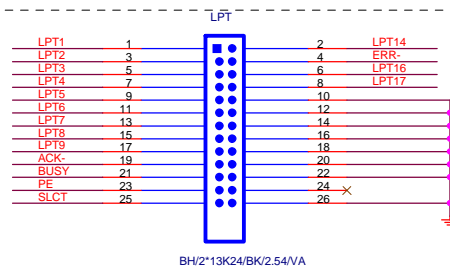
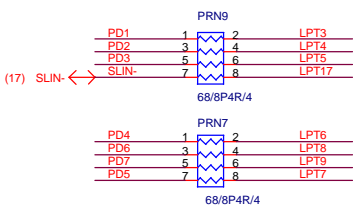
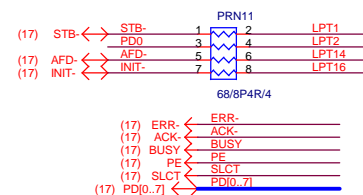


COMB

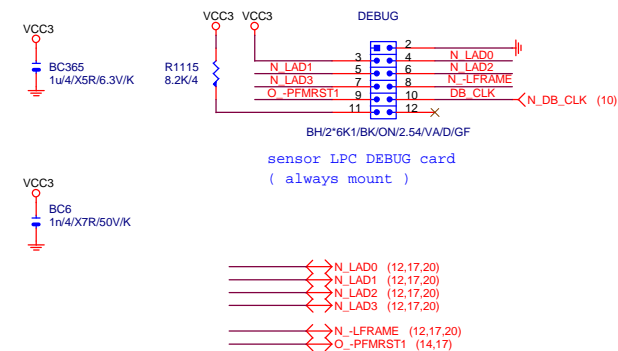


PLACE NEAR COM CONNECTOR

LPT PORT



80 PORT

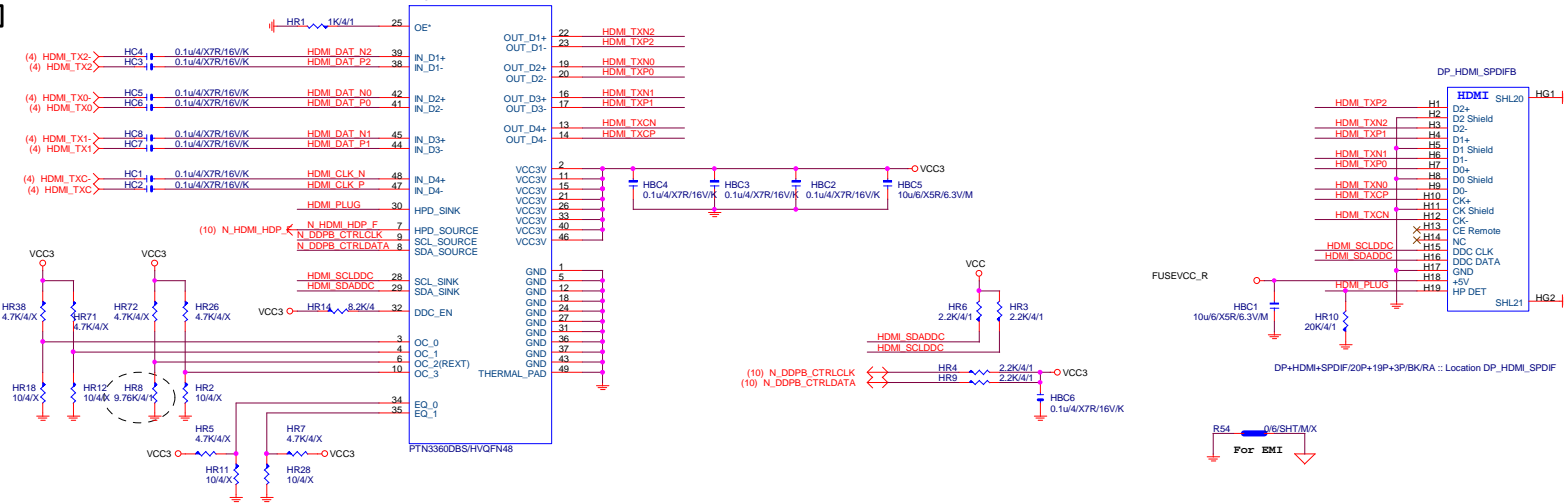


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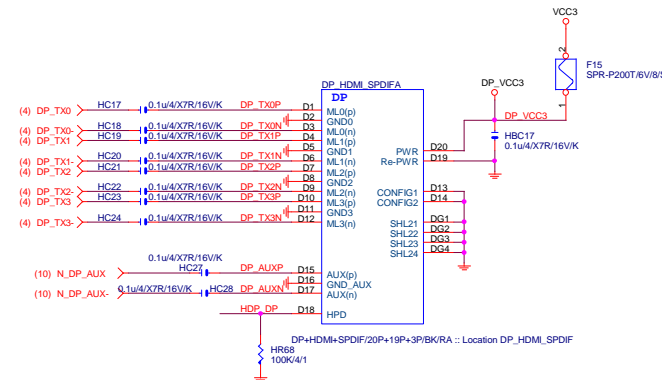
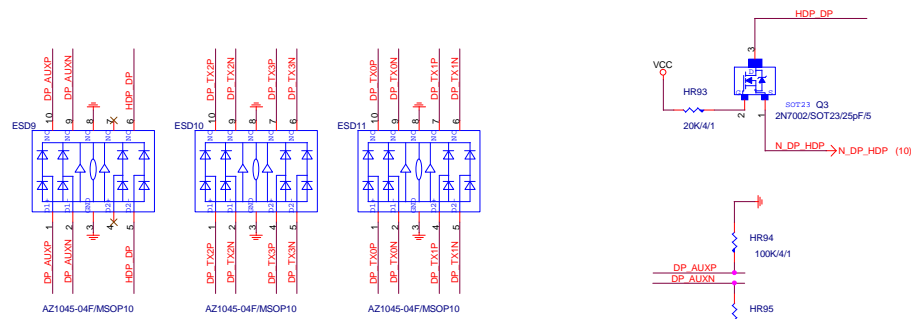
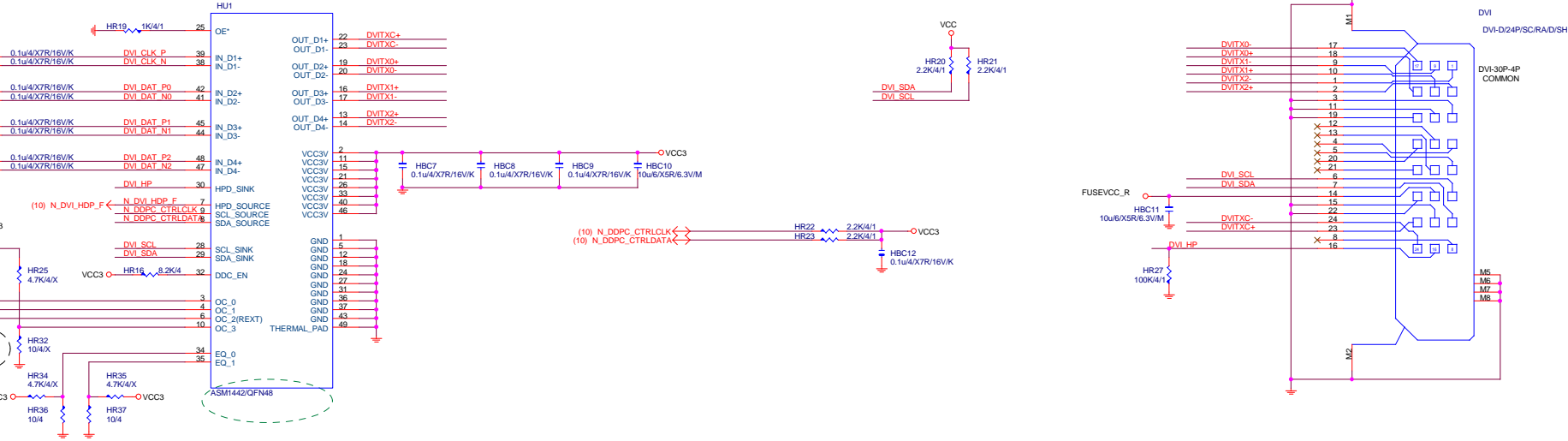
Title	COM A/B & LPT & 80 PORT
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Date: Tuesday, August 06, 2013	Sheet 30 of 32	

HDMI LEVEL SHIFT

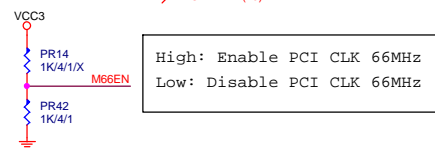
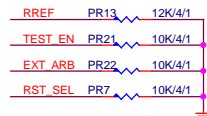
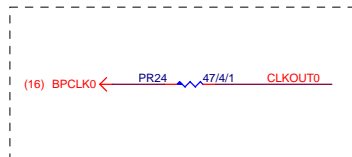
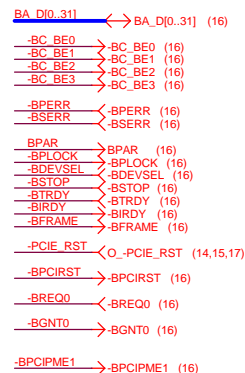


DVI LEVEL SHIFT

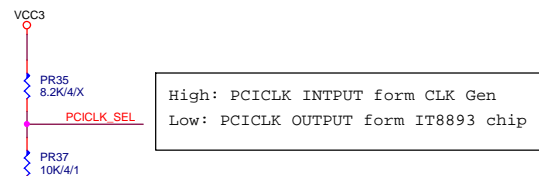


PCIE TO PCI

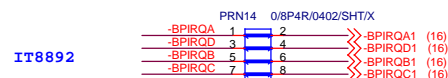
PCI:5/4/5 Impedance=50 +- 15%



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



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

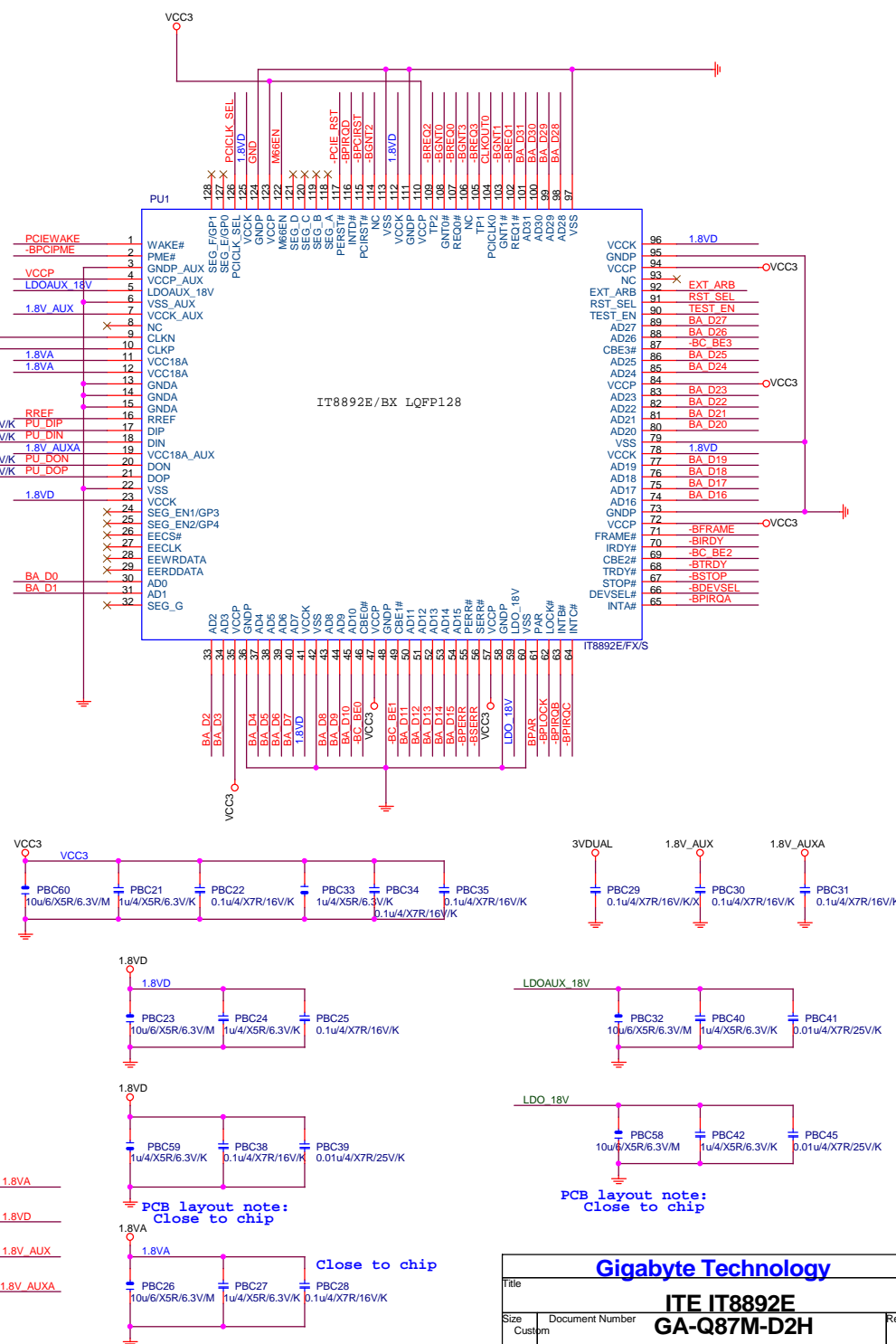
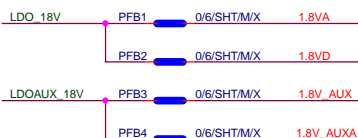
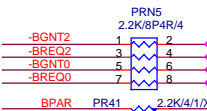
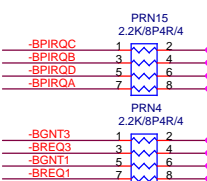
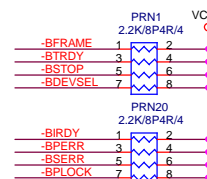
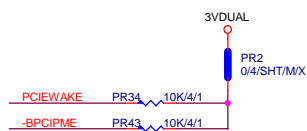


PCI slot



PCI slot -BPCIPME1 PR27 0/4/SHT/M/X>>N -PCIE WAKE (12 14 15)

chipset side



PCB layout note:
Close to chip

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ITE IT8892E
GA-Q87M-D2H

Rev
1 1