

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

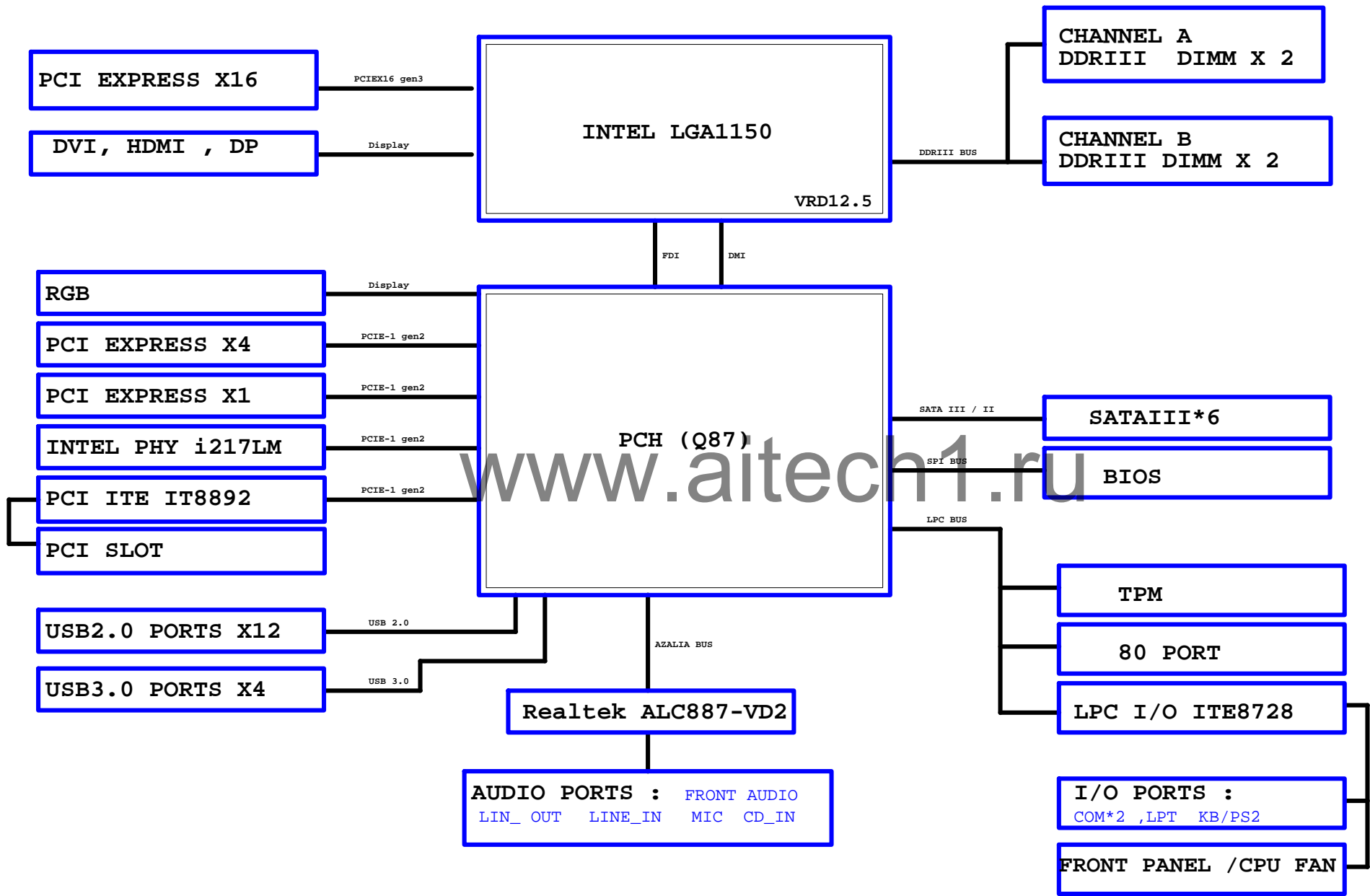
28	VCORE ISL95820_2
29	RT8120_DDR POWER
30	COM , LPT , 80PORT
31	DVI, HDMI ,DP
32	IT8892E PCI BRIDGE

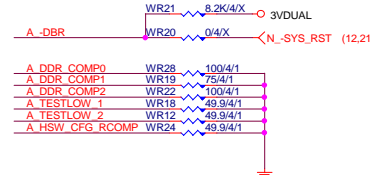
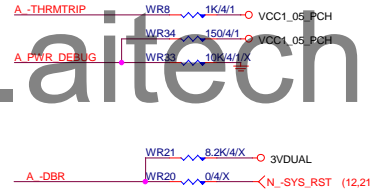
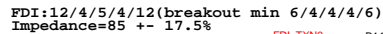
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Cover Sheet		
Size Custom	Document Number GA-Q87M-D2H	Rev 1.0
Date: Monday, May 20, 2013	Sheet 1 of 32	

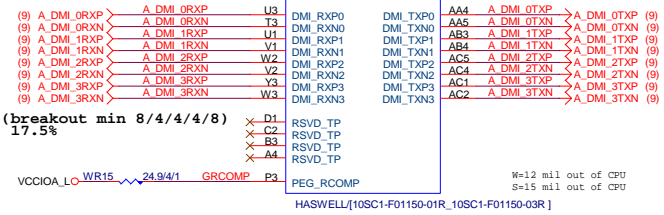
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BLOCK DIAGRAM





LGA1150C					
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PA EXP_RXN0	F15.	PEG_RXN0	PEG_TXN0	B12	PA EXP_TXN0
PA EXP_RXP1	D14.	PEG_RXP1	PEG_TXP1	B11	PA EXP_TXP1
PA EXP_RXN1	E14.	PEG_RXN1	PEG_TXN1	C11	PA EXP_TXN1
PA EXP_RXP2	E13.	PEG_RXP2	PEG_TXP2	D10.	PA EXP_TXP2
PA EXP_RXN2	F13.	PEG_RXN2	PEG_TXN2	D10.	PA EXP_TXN2
PA EXP_RXP3	D12.	PEG_RXP3	PEG_TXP3	B9.	PA EXP_TXP3
PA EXP_RXN3	E12.	PEG_RXN3	PEG_TXN3	C9.	PA EXP_TXN3
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PA EXP_RXN4	F11.	PEG_RXN4	PEG_TXN4	D8.	PA EXP_TXN4
PA EXP_RXP5	F10.	PEG_RXP5	PEG_TXP5	B7.	PA EXP_TXP5
PA EXP_RXN5	G10.	PEG_RXN5	PEG_TXN5	C7.	PA EXP_TXN5
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PA EXP_RXN6	G9.	PEG_RXN6	PEG_TXN6	B6.	PA EXP_TXN6
PA EXP_RXP7	F8.	PEG_RXP7	PEG_TXP7	B5.	PA EXP_TXP7
PA EXP_RXN7	G8.	PEG_RXN7	PEG_TXN7	C5.	PA EXP_TXN7
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PA EXP_RXN9	E5.	PEG_RXN9	PEG_TXN9	G1.	PA EXP_TXN9
PA EXP_RXP10	F5.	PEG_RXP10	PEG_TXP10	G2.	PA EXP_TXP10
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PA EXP_RXP12	H5.	PEG_RXP12	PEG_TXP12	J2.	PA EXP_TXN12
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PA EXP_RXP14	K5.	PEG_RXP14	PEG_TXP14	M3.	PA EXP_TXN14
PA EXP_RXN14	K6.	PEG_RXN14	PEG_TXN14	L1.	PA EXP_TXP15
PA EXP_RXP15	L4.	PEG_RXP15	PEG_TXP15	L2.	PA EXP_TXN15
PA EXP_RXN15	L5.	PEG_RXN15	PEG_TXN15		



CFG 0-17 all internal PULL-UP

LGA1150A

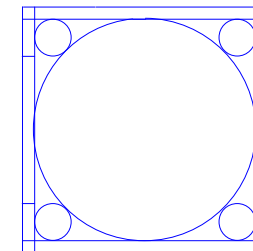
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MAAA8	AU18	DDR0_MA7	DDR0_DQ7	AD40	MDA9
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MAAA10	AW11	DDR0_MA10	DDR0_DQ10	AK38	MDA10
MAAA11	AV19	DDR0_MA11	DDR0_DQ11	AK39	MDA11
MAAA12	AU19	DDR0_MA12	DDR0_DQ12	AH37	MDA12
MAAA13	AY10	DDR0_MA13	DDR0_DQ13	AH38	MDA8
MAAA14	AT20	DDR0_MA14	DDR0_DQ14	AK37	MDA14
MAAA15	AU21	DDR0_MA15	DDR0_DQ15	AK40	MDA15
MODT_A0	AW10	DDR0_ODT0	DDR0_DQ16	AM39	MDA17
MODT_A1	AY8	DDR0_ODT1	DDR0_DQ17	AP38	MDA18
MODT_A2	AW9	DDR0_ODT2	DDR0_DQ18	AP39	MDA19
MODT_A3	AU8	DDR0_ODT3	DDR0_DQ19	AM37	MDA20
			DDR0_DQ20	AM38	MDA16
			DDR0_DQ21	AP37	MDA22
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			DDR0_DQ26	AV35	MDA27
			DDR0_DQ27	AT37	MDA28
			DDR0_DQ28	U37	MDA24
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			DDR0_DQ30	AW35	MDA31
			DDR0_DQ31	AY6	MDA33
			DDR0_DQ32	AU6	MDA37
			DDR0_DQ33	AY4	MDA34
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			DDR0_DQ35	AW6	MDA36
			DDR0_DQ36	AV6	MDA32
			DDR0_DQ37	AV4	MDA38
			DDR0_DQ38	AY4	MDA39
			DDR0_DQ39	AR1	MDA41
			DDR0_DQ40	AR4	MDA45
			DDR0_DQ41	AN3	MDA42
			DDR0_DQ42	AN4	MDA43
			DDR0_DQ43	AR2	MDA44
			DDR0_DQ44	AR3	MDA46
			DDR0_DQ45	AN2	MDA47
			DDR0_DQ46	AL1	MDA49
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			DDR0_DQ70	AV32	DQSA0
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			DDR0_DQ72	AJ38	DQSA2
			DDR0_DQ73	AN38	DQSA3
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			DDR0_DQ75	AW5	DQSA5
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			DDR0_DQ77	AK2	DQSA7
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LGA1150B

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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
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MAAB10	AP18	DDR1_MA10	DDR1_DQ10	AK31	MDB10
MAAB11	AY25	DDR1_MA11	DDR1_DQ11	AL31	MDB11
MAAB12	AV26	DDR1_MA12	DDR1_DQ12	AK34	MDB12
MAAB13	AR15	DDR1_MA13	DDR1_DQ13	AK35	MDB13
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			DDR1_DQ18	AN31	MDB19
			DDR1_DQ19	AP31	MDB23
			DDR1_DQ20	AN35	MDB20
			DDR1_DQ21	AP35	MDB18
			DDR1_DQ22	AN32	MDB16
			DDR1_DQ23	AP32	MDB22
			DDR1_DQ24	AM28	MDB25
			DDR1_DQ25	AM28	MDB26
			DDR1_DQ26	AR23	MDB27
			DDR1_DQ27	AP28	MDB30
			DDR1_DQ28	AL29	MDB24
			DDR1_DQ29	AL28	MDB29
			DDR1_DQ30	AP29	MDB28
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			DDR1_DQ68	AG7	DQSB7
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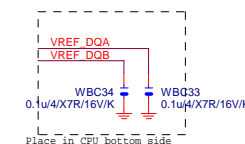
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CPU RETENTION/X

LGA1150



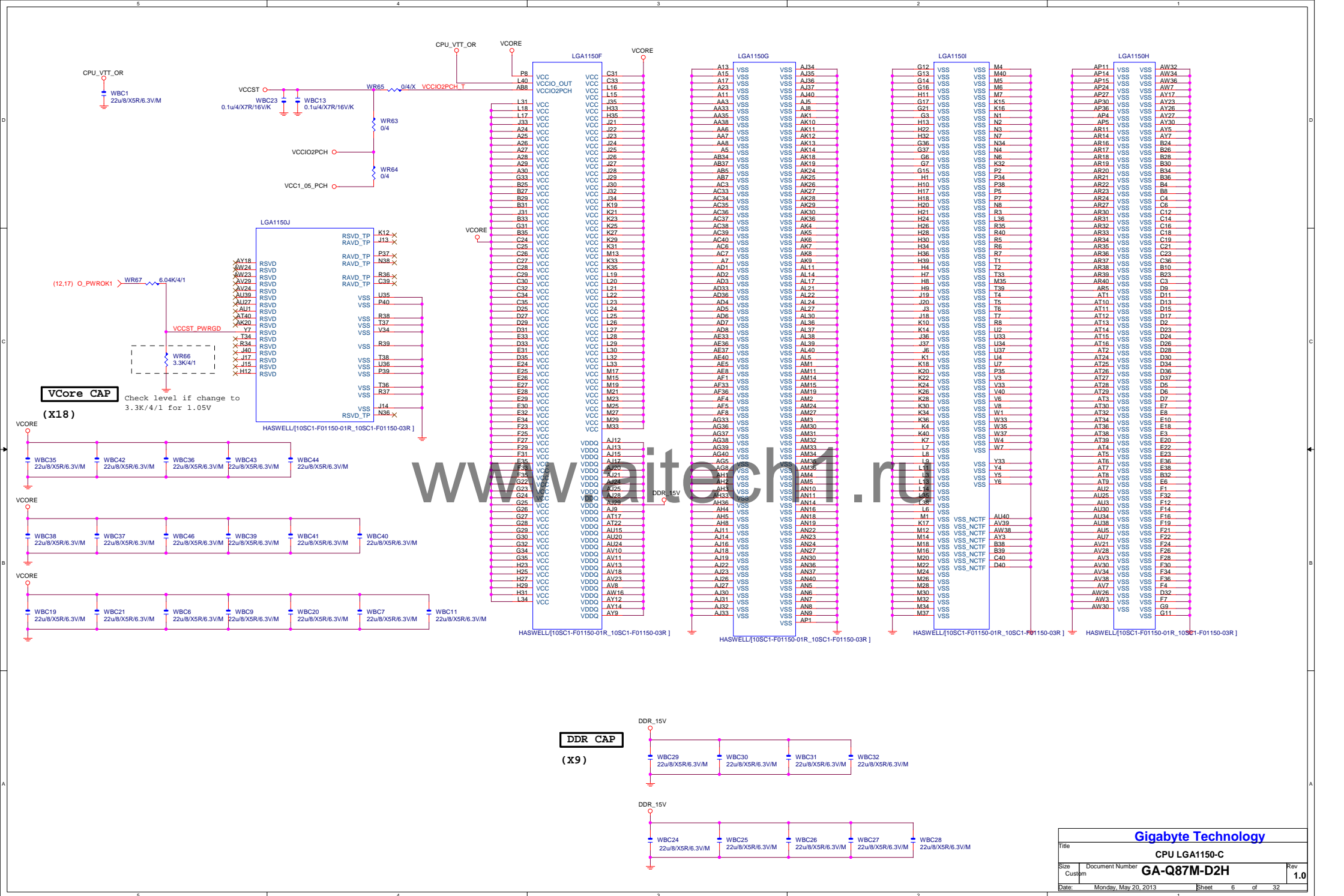
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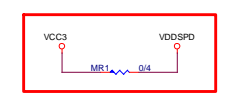
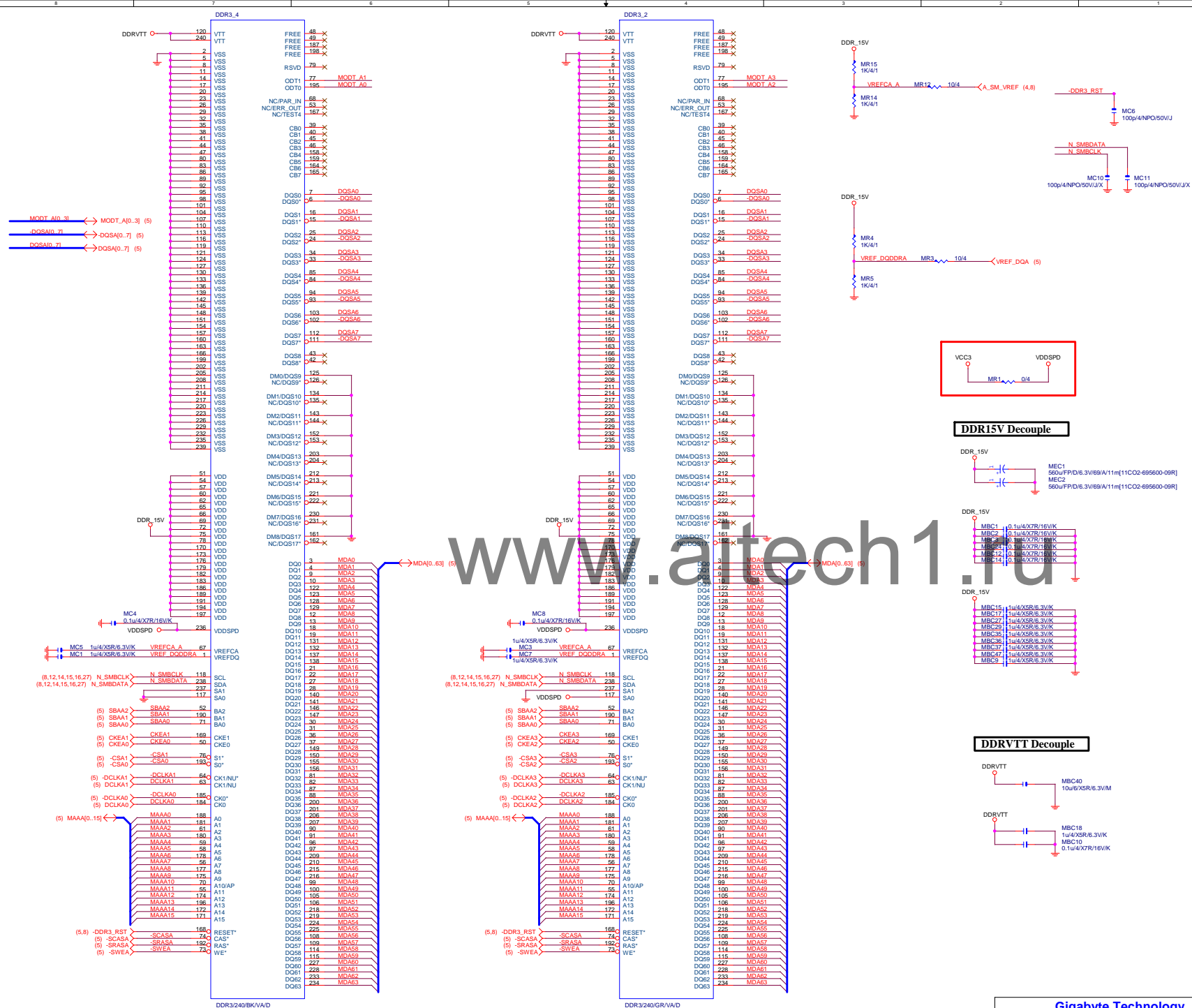
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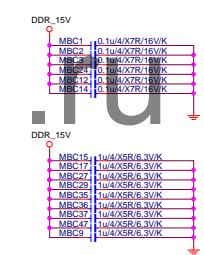
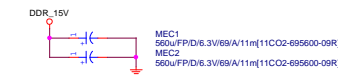
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Size			Document Number	
Custom			GA-Q87M-D2H	
Date:			Rev	
Monday, May 20, 2013			1.0	
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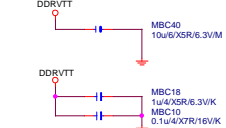




DDR15V Decouple

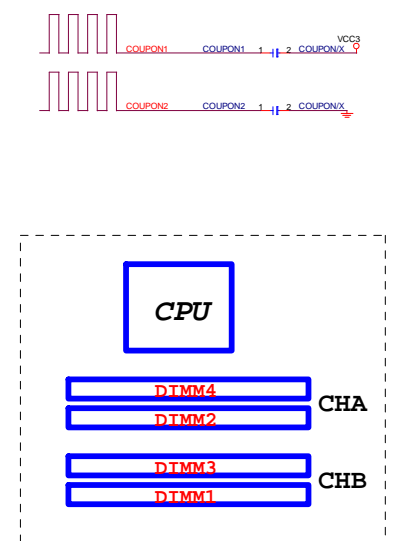
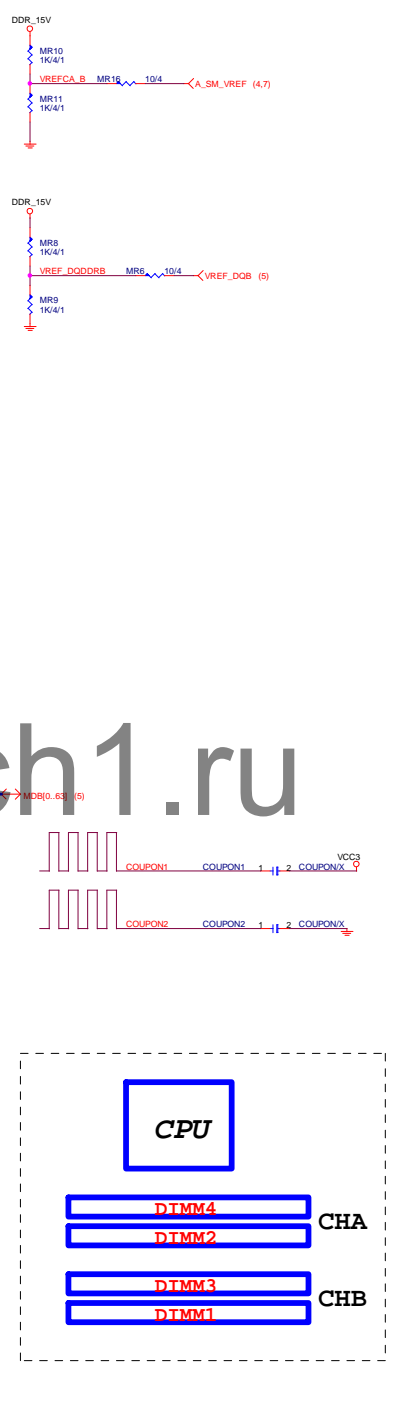
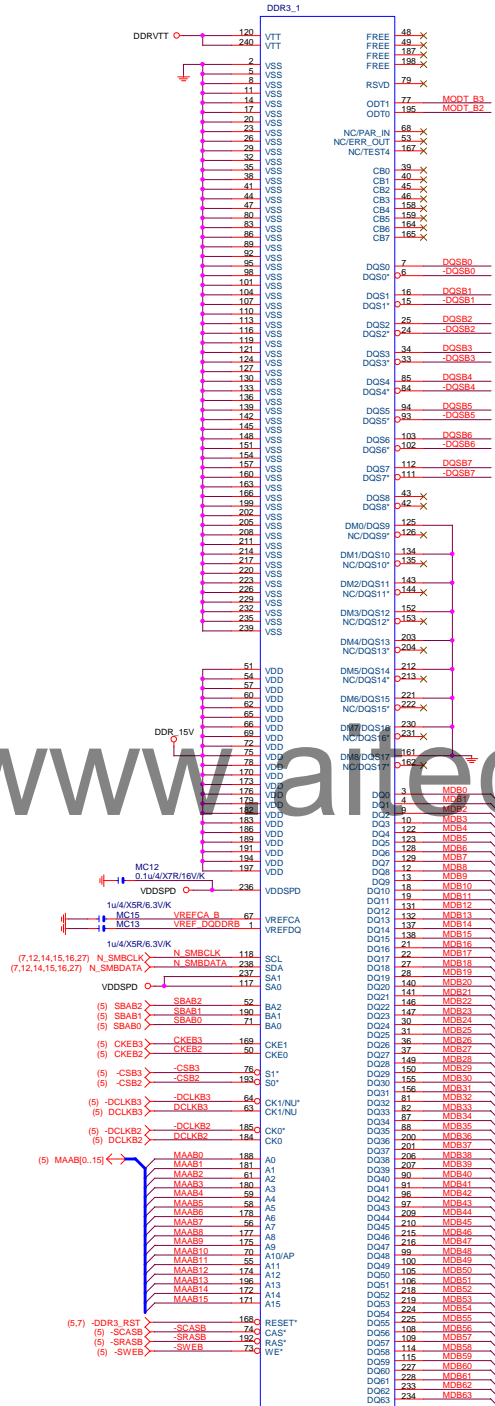
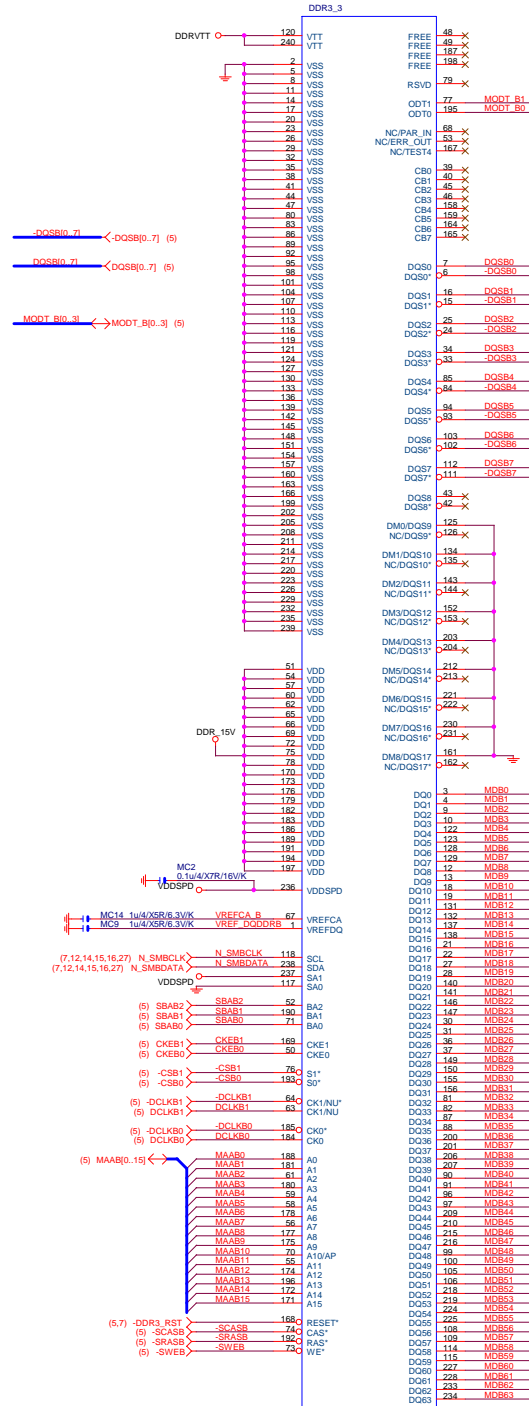


DDRVTT Decouple



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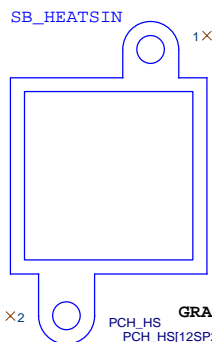
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Size	Custom	Document Number	GA-Q87M-D2H
Date:		Rev	1.0



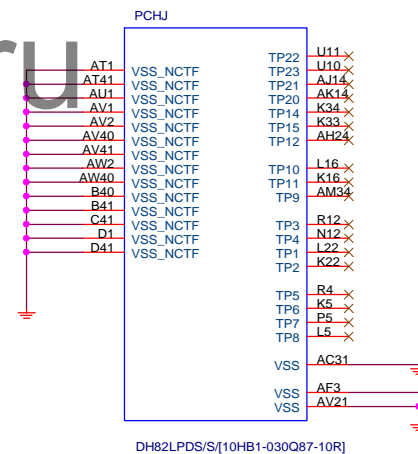
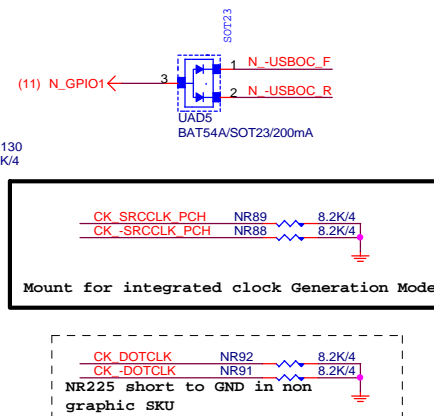
USB2.0 : 12/4.5/7.5/4.5/12 (breakout min 8/4/4/4/8)
Impedance=90 +- 17.5%



LOW COST ICH7 HEATSINK



GRAY HS
PCH_HS
PCH HS12SP2-S04209-01R 12SP2-S04209-02R 12SP2-S04209-03R

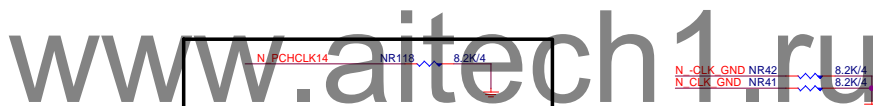
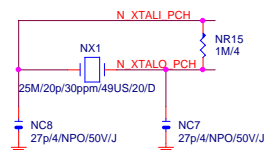
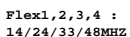


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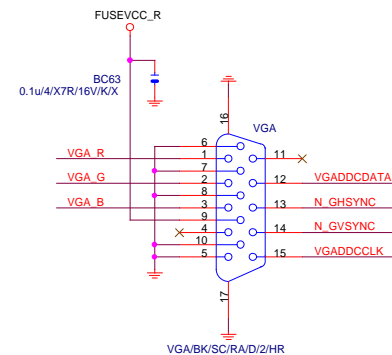
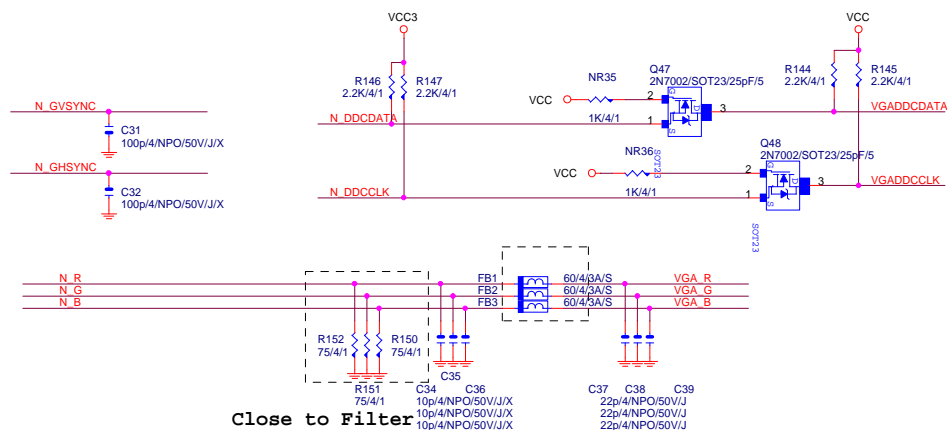
Title	PCH FDI,DMI,USB ,PCIE,NVRAM
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Size	Document Number	GA-Q87M-D2H
Custom		

Date: Monday, May 20, 2013 Sheet 9 of 32



Mount for integrated clock Generation
Mode



3VDDAL_PCH

NR124 8.2K/4X N_P PME AA31

(10) N_PCH33 N PCH33 AM22

NR30 8.2K/4 TD IREF

N_PIRQA AU29

N_PIROB AU27

N_PIROC AW28

N_PIRQD AV27

N_PIROE AR30

N_PIROF AV28

N_PIROG AV28

N_PIROH AT27

PCHB

PMEB PLTRSTB AA37 → N_PFMIRST (17)

CLKIN_33MHZLOOPBACK GP35/NMIB M40 N GPIO35

TP16 AH26 N GPIO50

GP50 AU31 N GPIO51

GP51 AJ26 N GPIO52

GP52 AV31 N GPIO53

GP53 AW33 N GPIO54

GP54 R30 N GPIO55

GP55

PIRQAB

PIRQBB

PIRQCB

PIRQDB

GPIO2

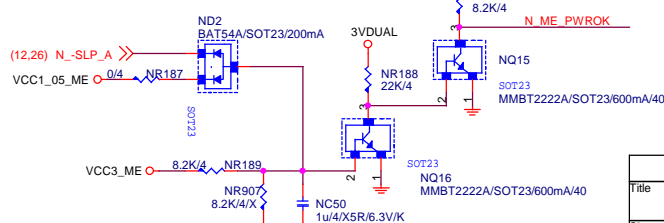
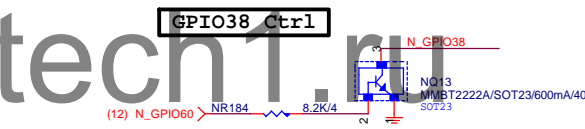
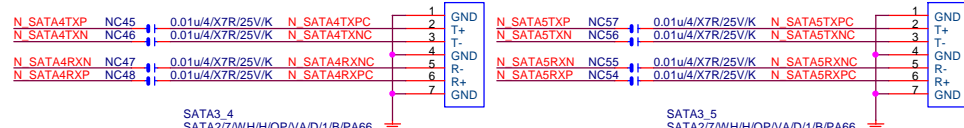
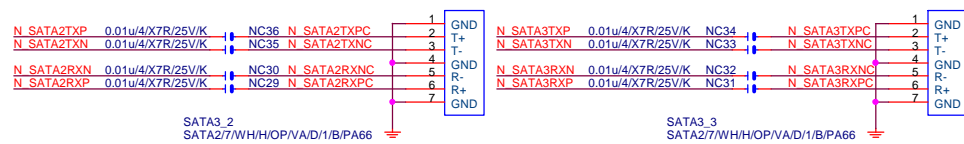
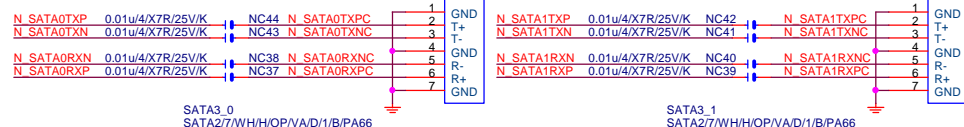
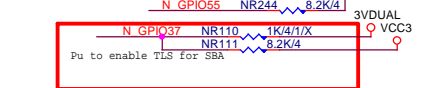
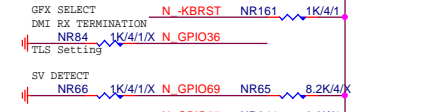
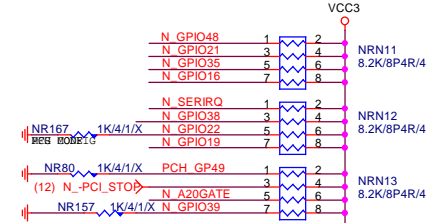
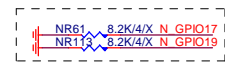
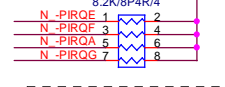
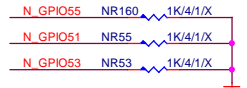
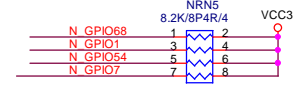
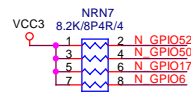
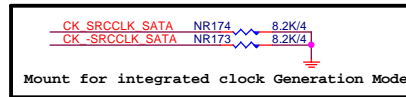
GPIO3

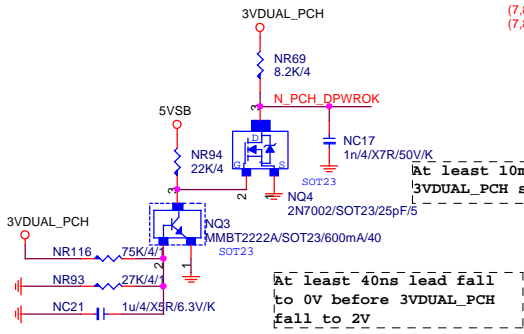
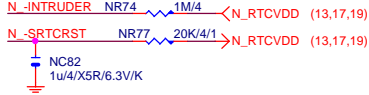
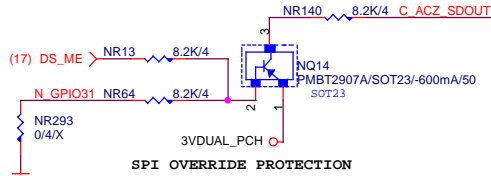
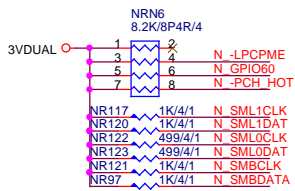
GPIO4

GPIO5

enable AMT with TLS

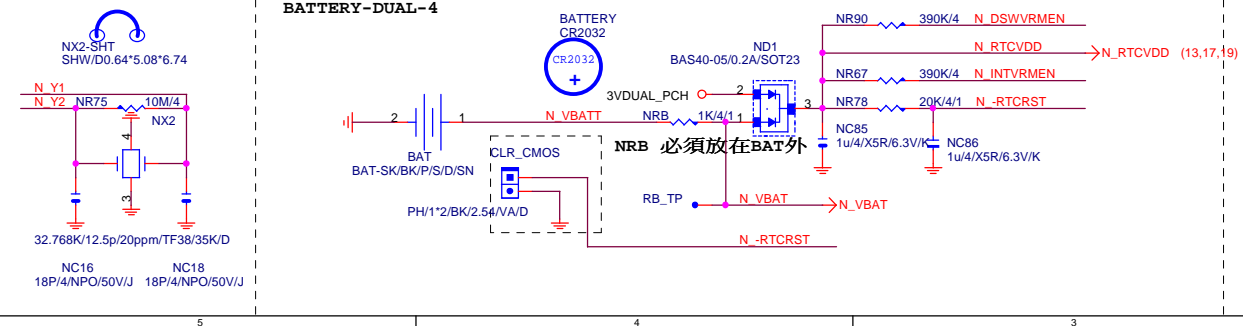
DH82LPDS/S[10HB1-030Q87-10R]





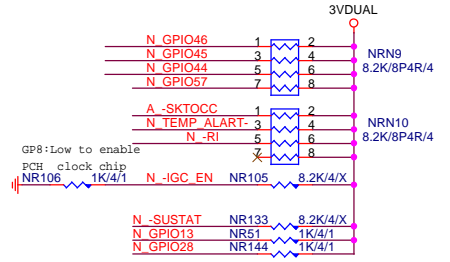
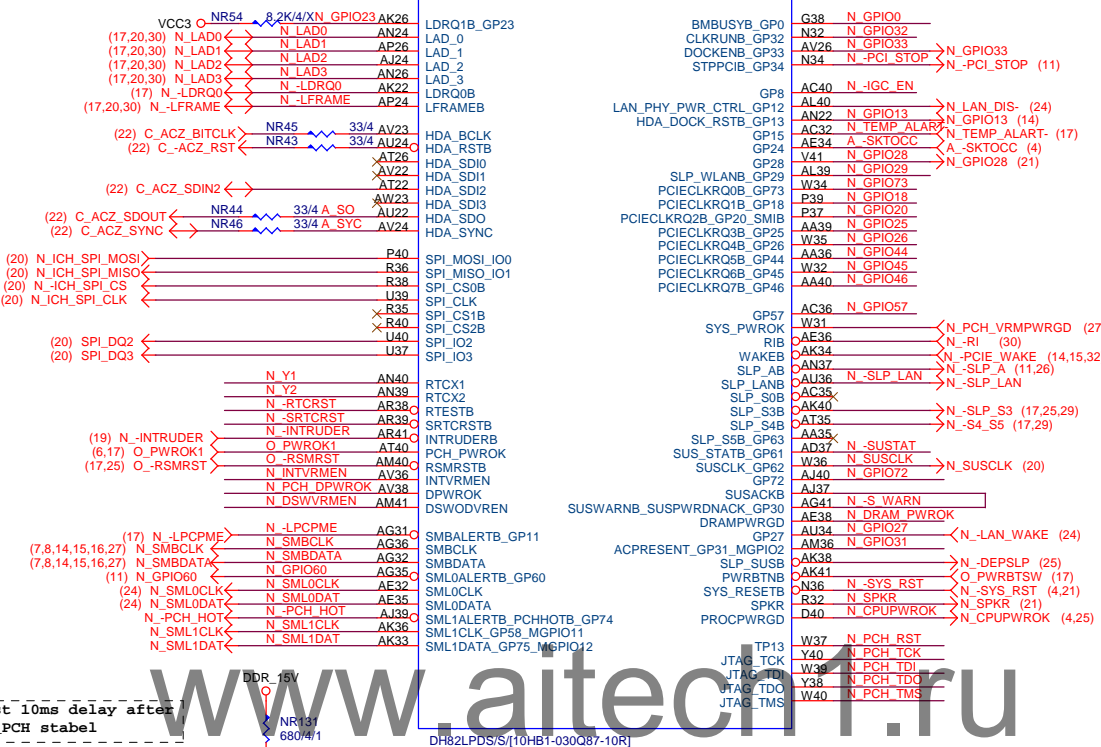
At least 10ms delay after 3VDUAL_PCH stabel

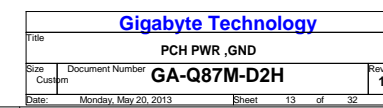
BATTERY-DUAL-4



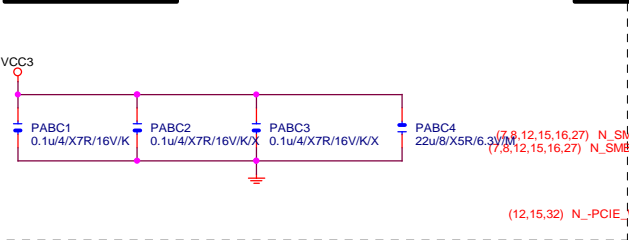
(17,20,30) N_LAD[0..3] << N_LAD[0..3]

PCHD

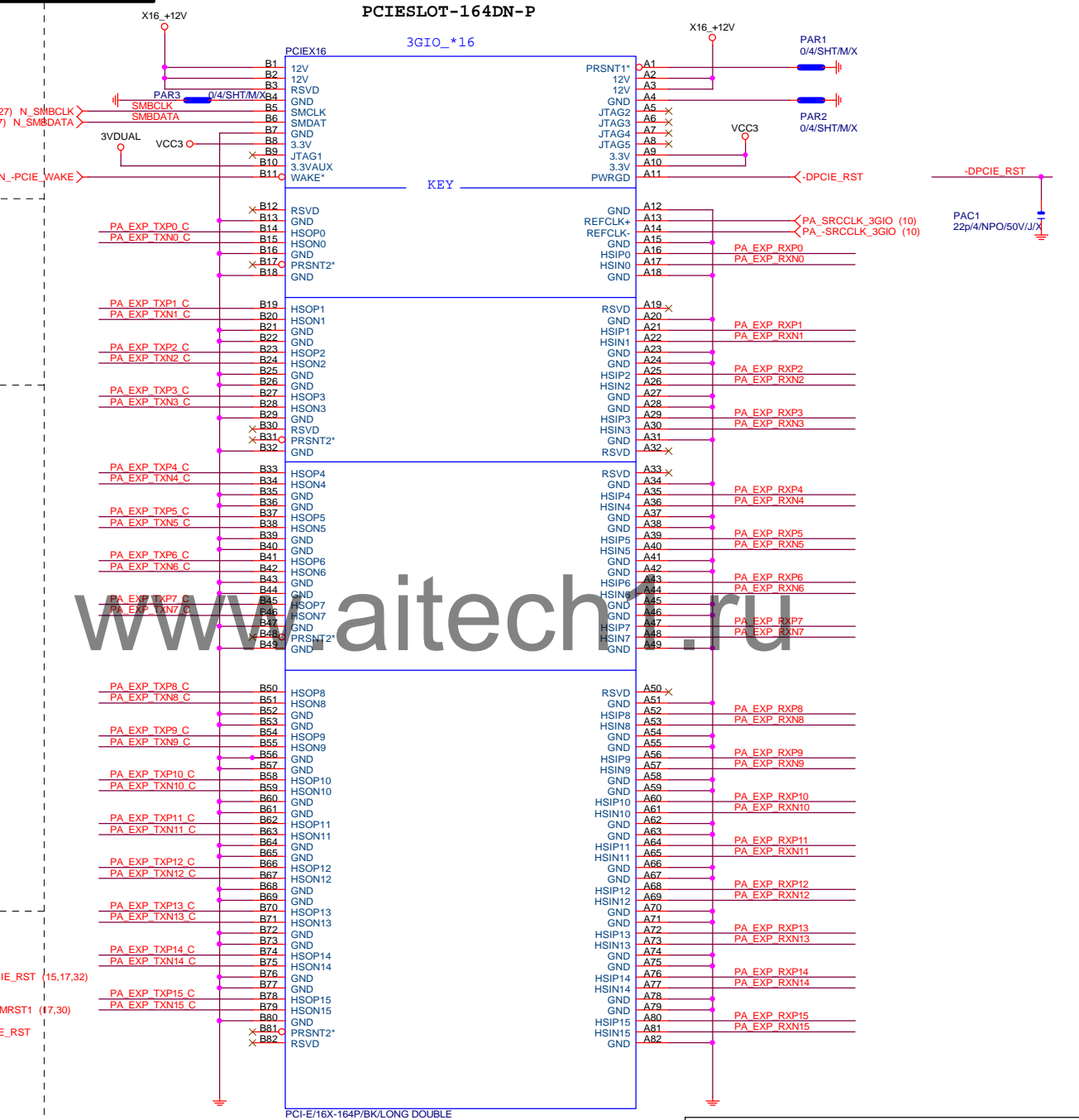




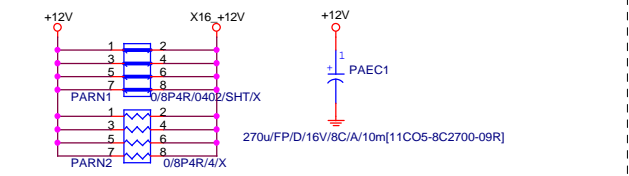
PCIEX16 CAP



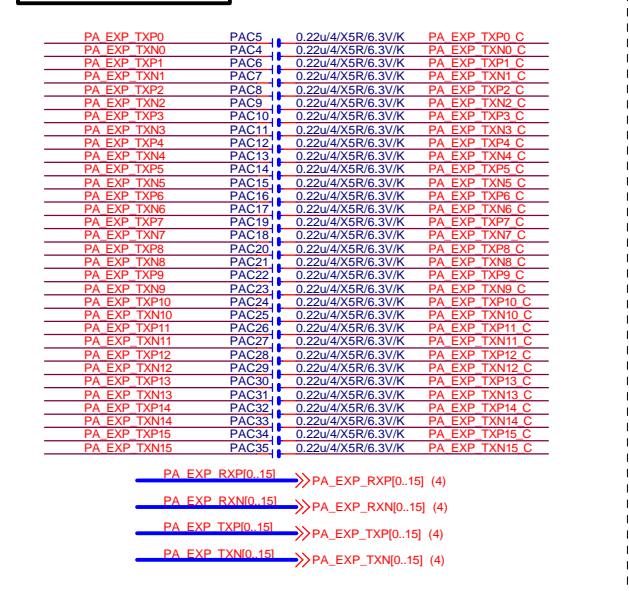
PCIEX16 SLOT



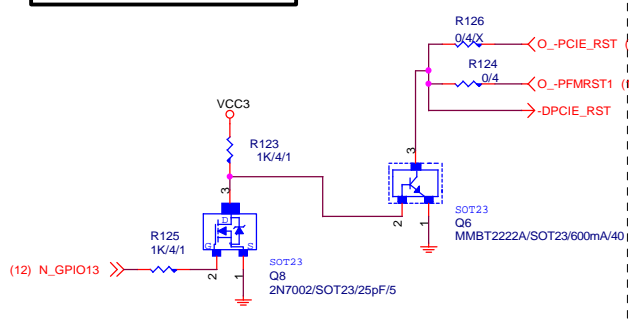
PCIEX16 PROTECT SHT



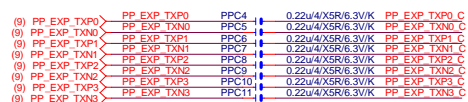
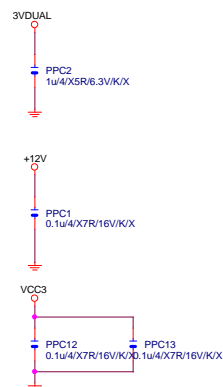
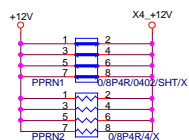
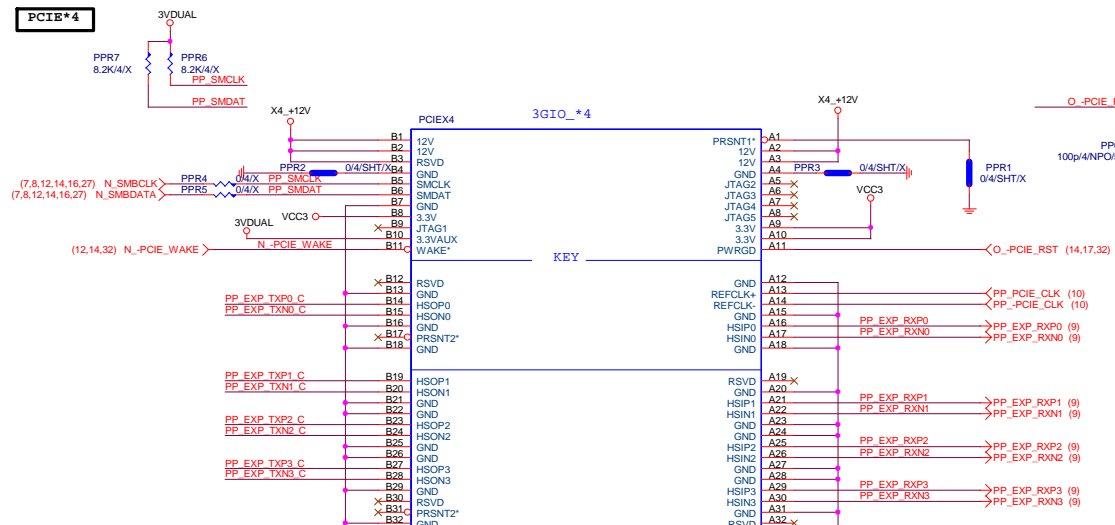
PCIEX16 AC CAP



PCIEX16 SOFT RESET

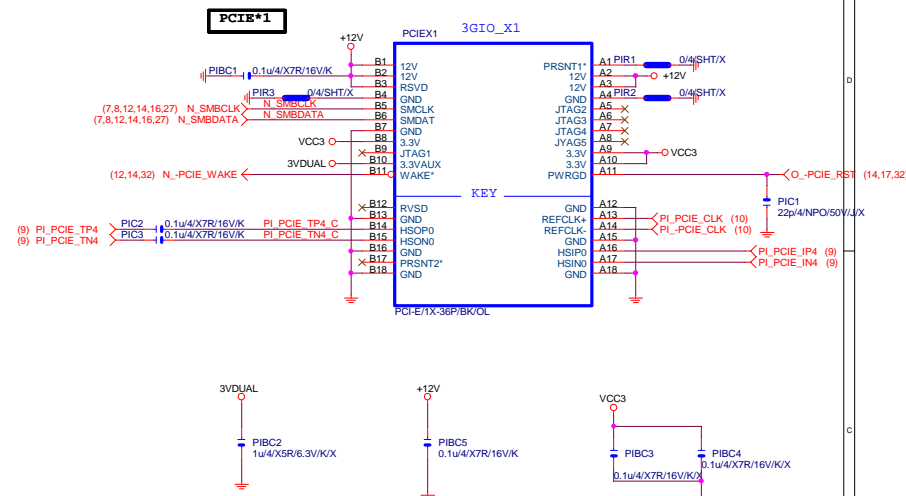


PCIE*4



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

PCIE*1



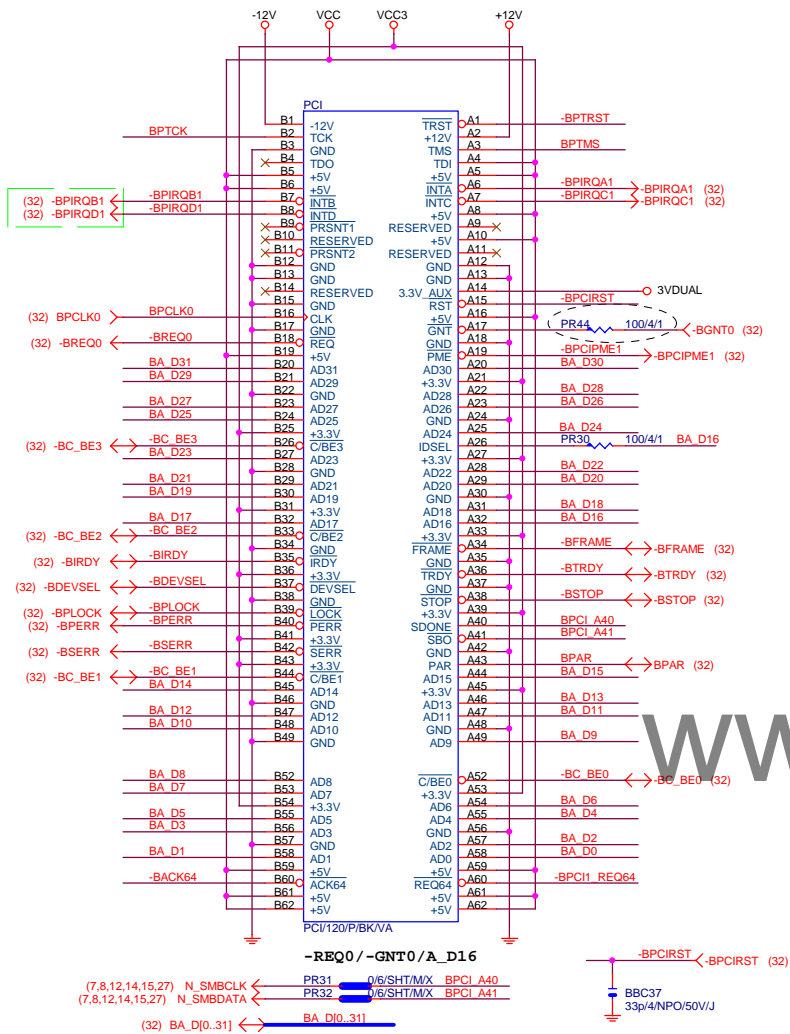
Gigabyte Technology

PCI EXPRESS X 1 PORT

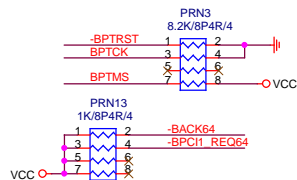
Size	Document Number	Rev
Custom	GA-Q87M-D2H	1.0

Date: Monday, May 20, 2013 Sheet 15 of 32

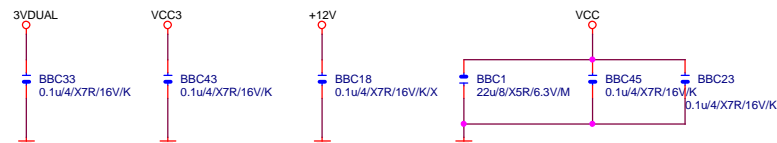
PCI SLOT



PCI	PU
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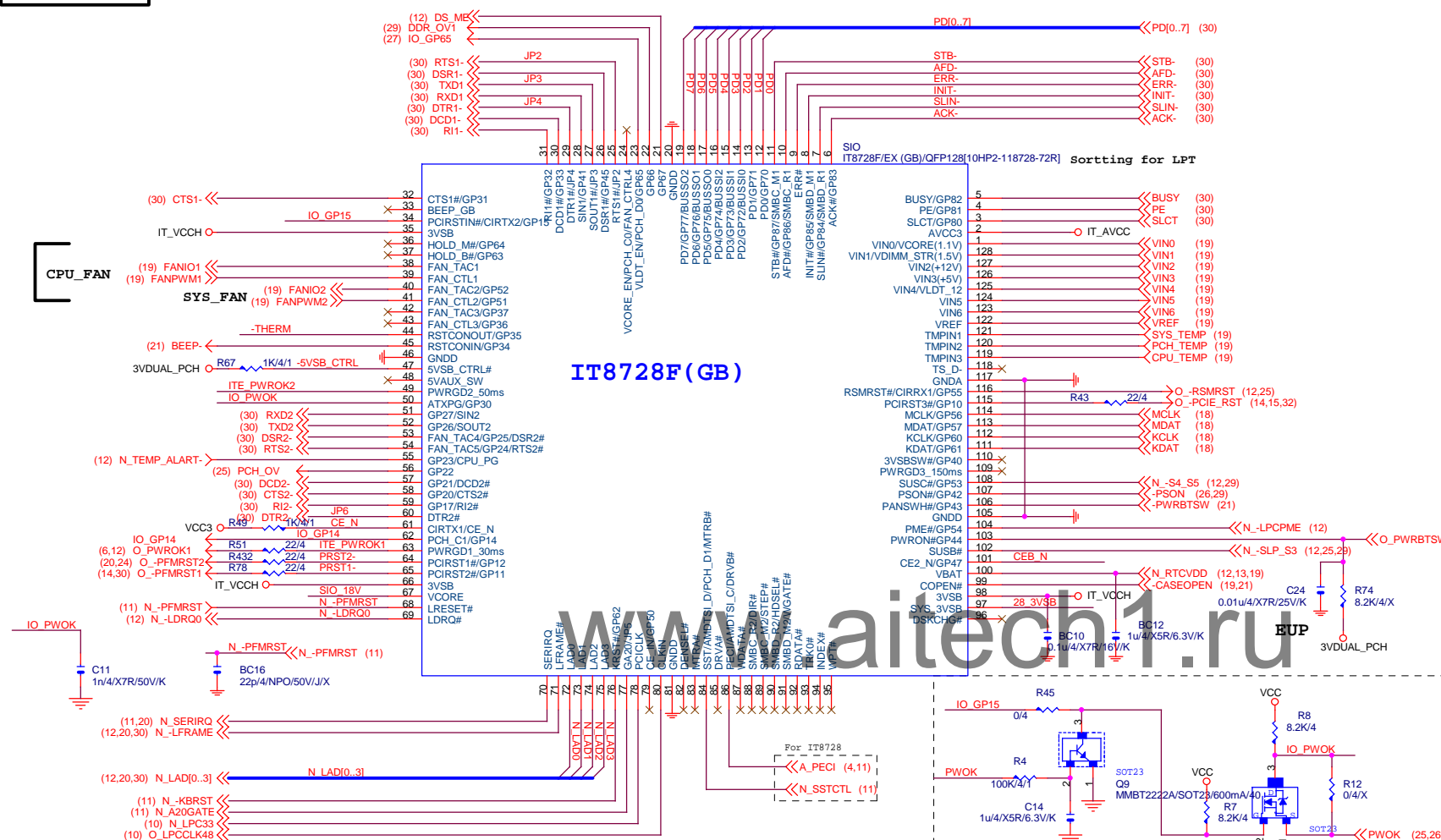
PCI CAP



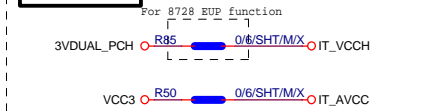
Gigabyte Technology

Title			
PCI SLOT 1&2			
Size Custom	Document Number	GA-Q87M-D2H	Rev 1.0
Date:	Monday, May 20, 2013	Sheet 16	of 32

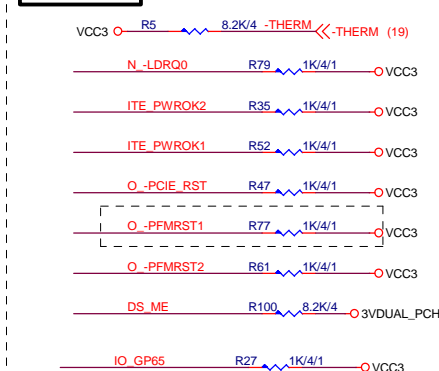
SIO IT8728F



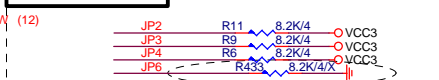
PWR	SHT
-----	-----



SIO	PU
-----	----



SIO STRAP



IT8728-EX
PULL DOWN ENABLE FORCE OVP

EUP control by PCH

```

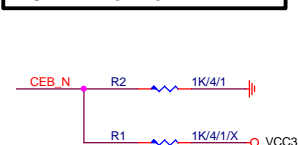
TP3--- High SPI-Flash Disable
      Low SPI-Flash Enable

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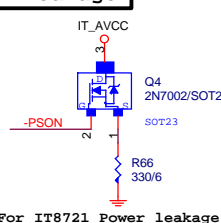
IT8728F NOTE

	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_3V5B
PIN70	GP47
PIN95	VIN2(VCC5)
PIN96	VIN1(VCC12)
PIN97	VIN1/VDIMM_STR(1.5V)
PIN98	VIN0/VCORE(1.1V)/NC

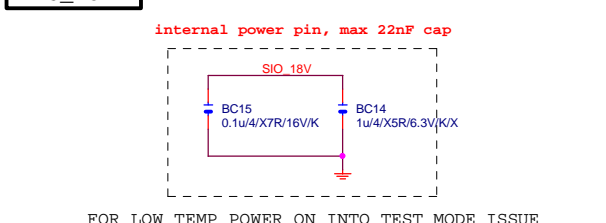
DUAL BIOS OPT STRAP



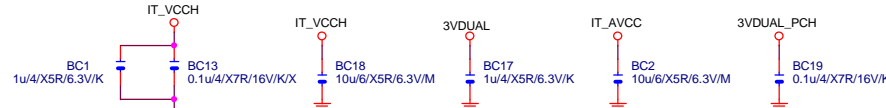
Power leakage



SIO 18V



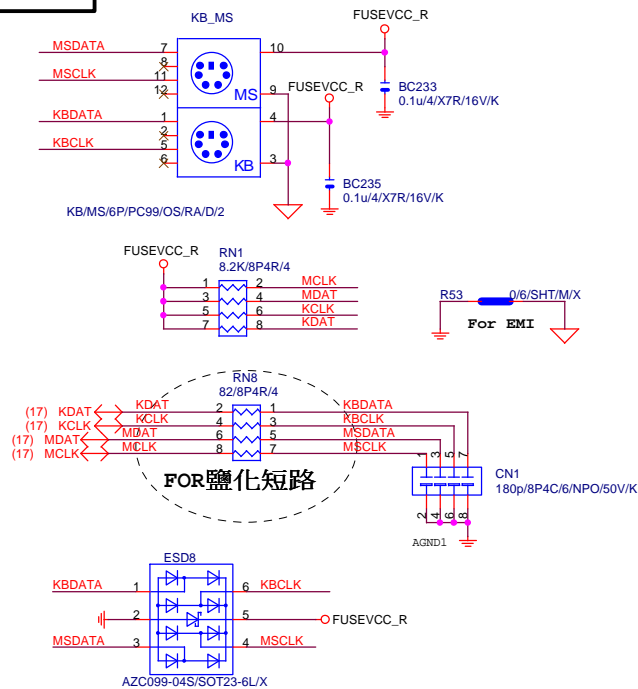
SIO CAP



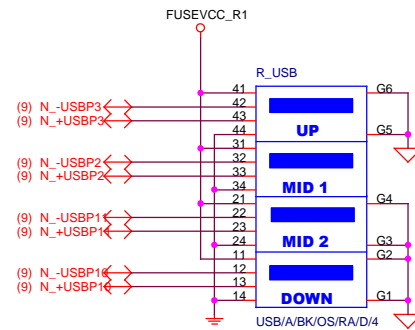
Gigabyte Technology

Title		ITE 8728 LPC IO	
Size	Document Number	Rev	
Custom	GA-Q87M-D2H	1.0	
Date:	Monday, May 20, 2013	Sheet	17 of 32

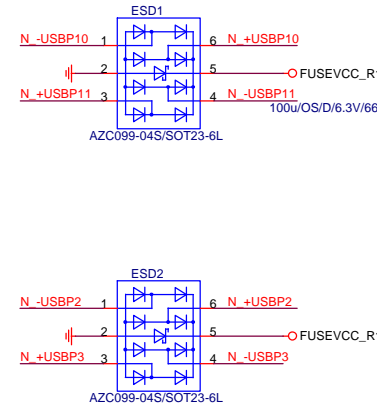
KB/MS



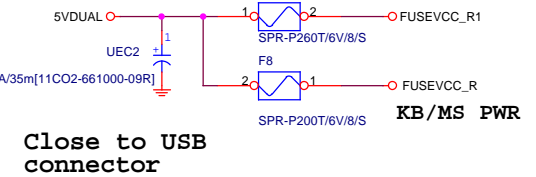
RUSB20



USB2.0 ESD



USB2.0 PWR

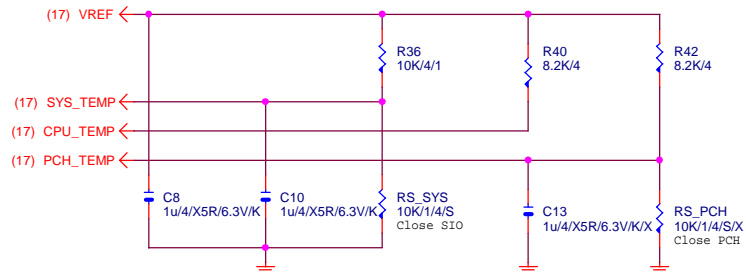


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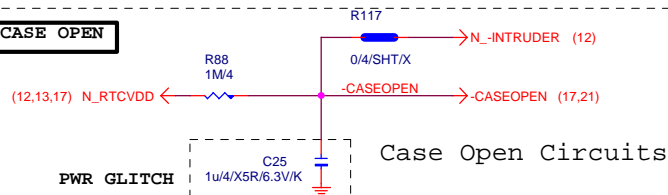
Gigabyte Technology

Title			
KB/MS,RUSB			
Size	Document Number	Rev	
Custom	GA-Q87M-D2H	1.0	
Date:	Monday, May 20, 2013	Sheet	18 of 32

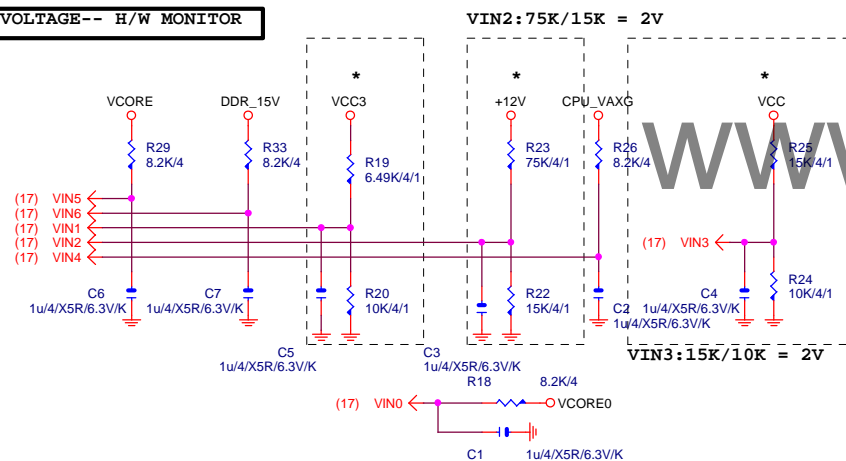
TEMP H/W MONITOR



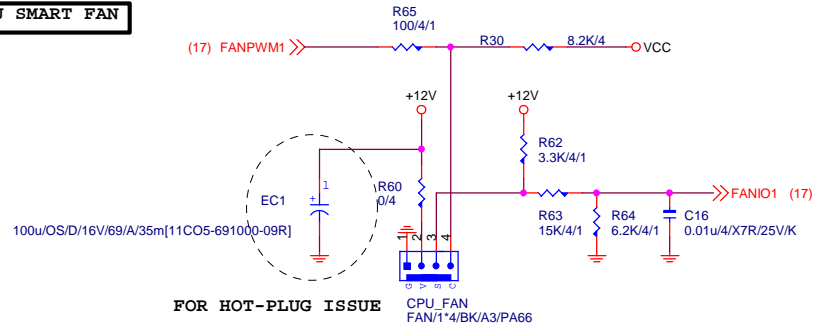
CASE OPEN



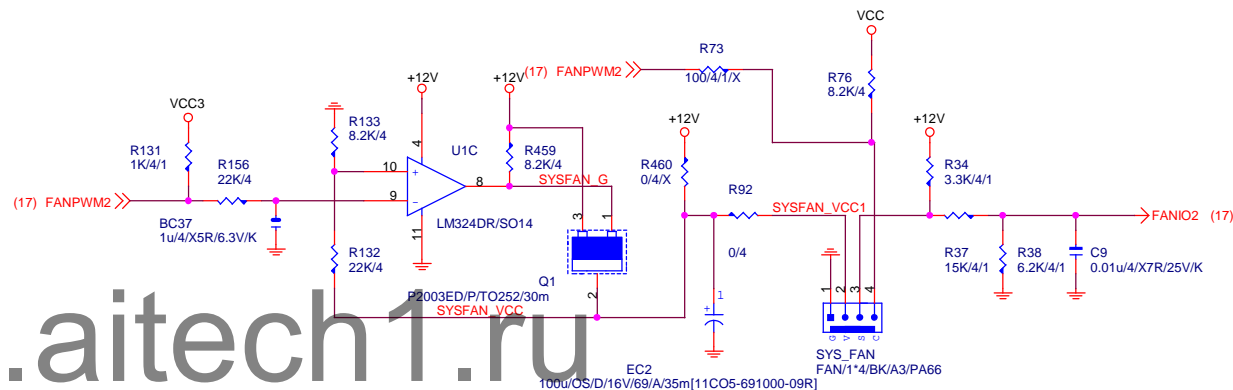
VOLTAGE-- H/W MONITOR



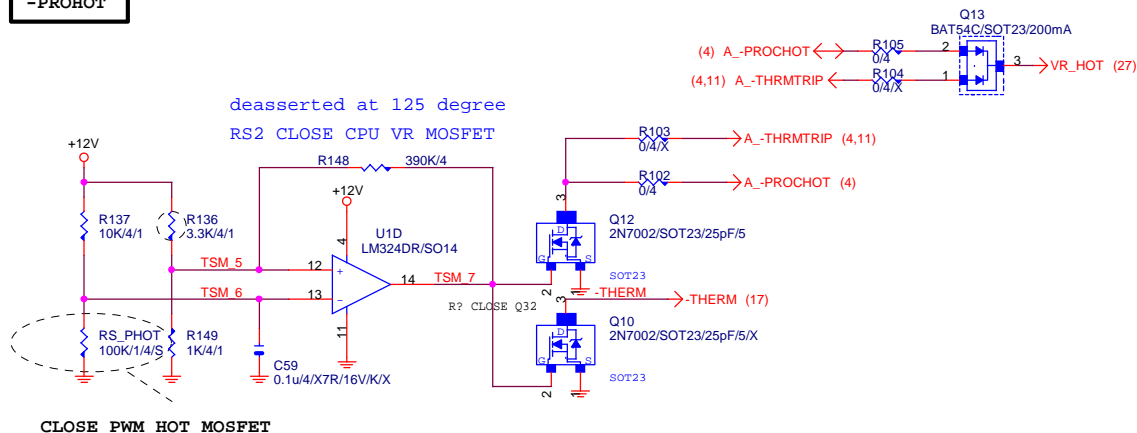
CPU SMART FAN



SYS SMART FAN



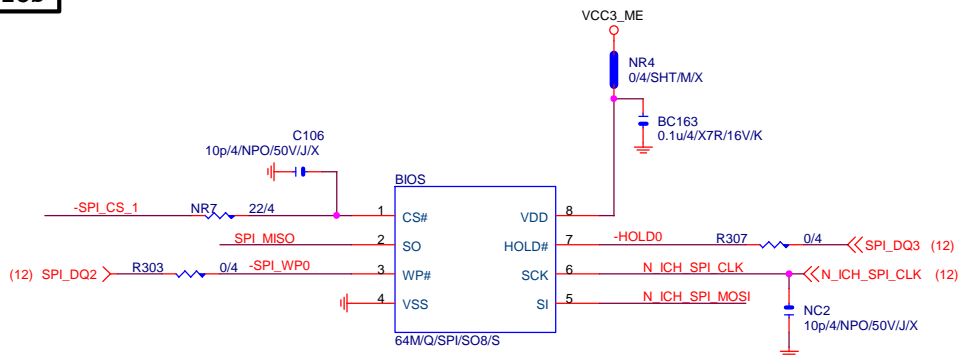
-PROHOT



Gigabyte Technology

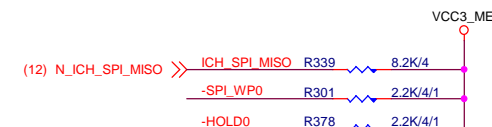
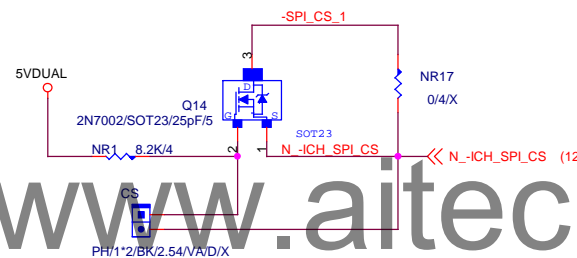
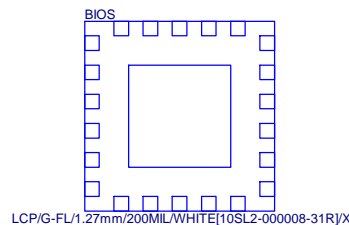
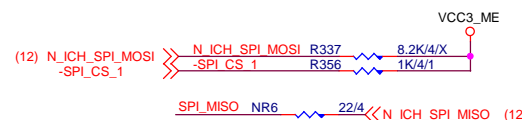
Title			
HWM,FAN CTRL,OV			
Size	Document Number	Rev	
Custom	GA-Q87M-D2H	1.0	
Date:	Monday, May 20, 2013	Sheet	19 of 32

BIOS

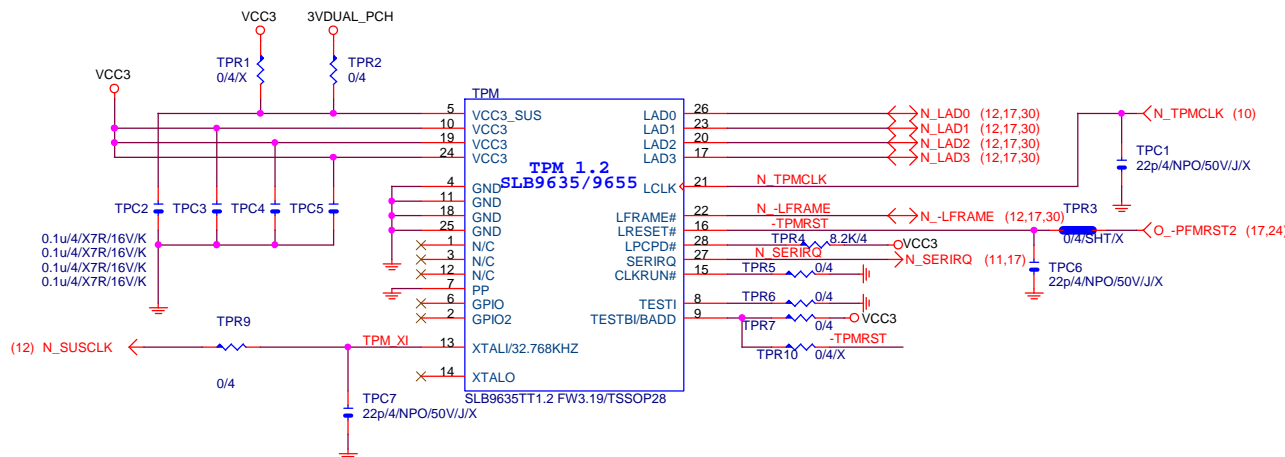


BOOT DEVICE	GP51	GP19
LPC	0	0
SPI	1	1

1 means internal PU
0 means PD 1K



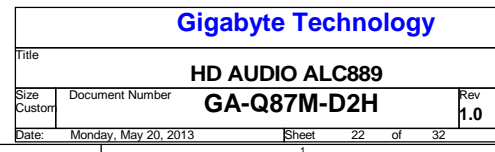
TPM



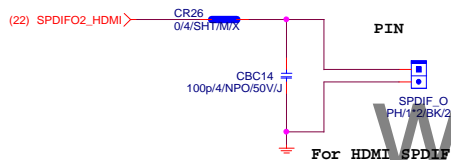
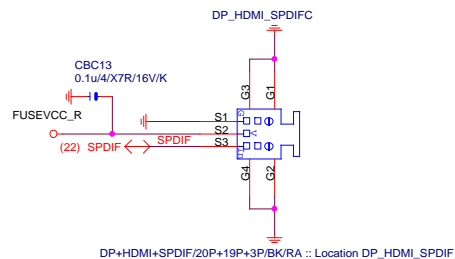
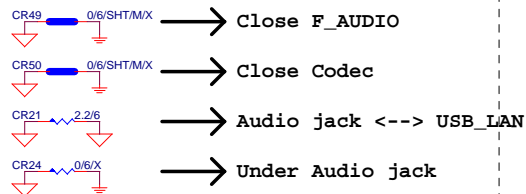
	SLB9635	SLB9655
TPR2, TPR4, TPR5, TPR6, TPR7, TPR9	MOUNT	N/A
TPR1, TPR10	N/A	MOUNT

Gigabyte Technology

Title		
BIOS ,TPM		
Size	Document Number	Rev
B	GA-Q87M-D2H	1.0
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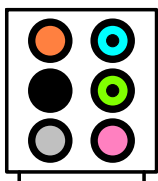


CODEC POWER/EMI PAD

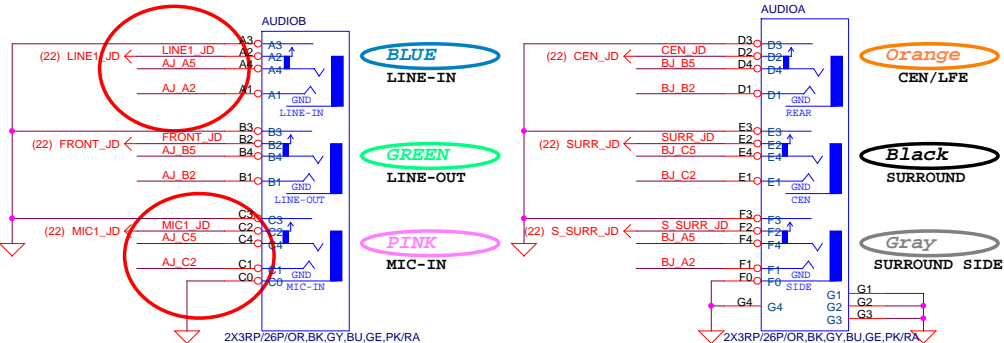


AZALIA JACK

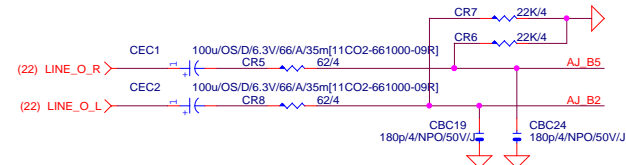
BTX AZALIA CONNECTOR



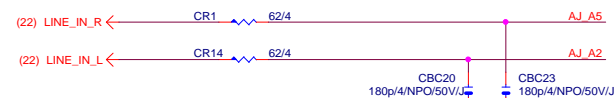
11NR6-403007-21R



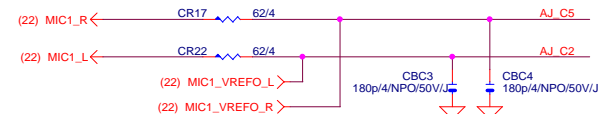
LINE-OUT



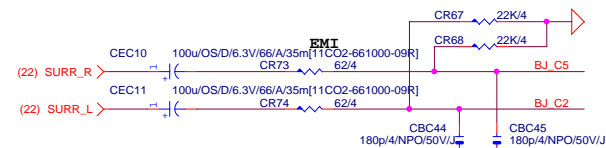
LINE-IN



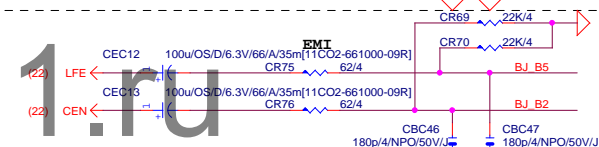
MIC-IN



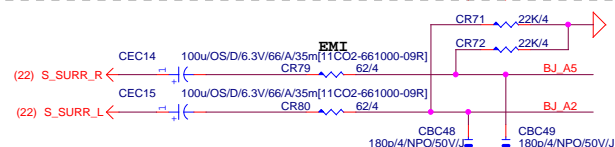
SURROUND



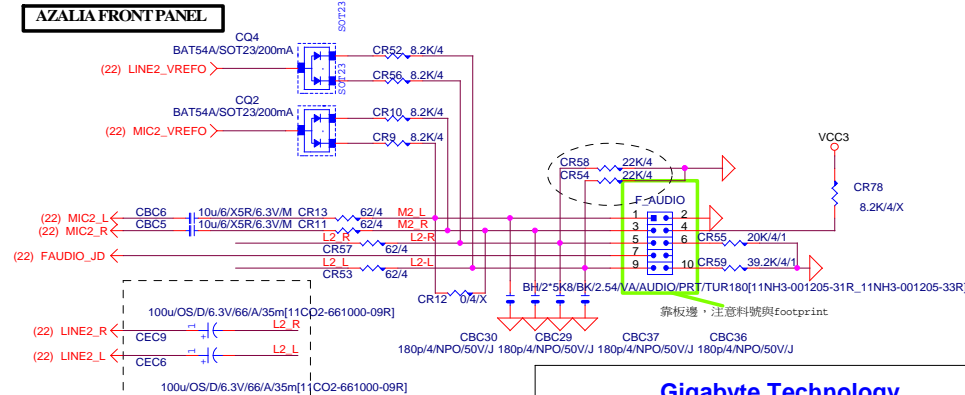
CEN/LFE



SURRBACK



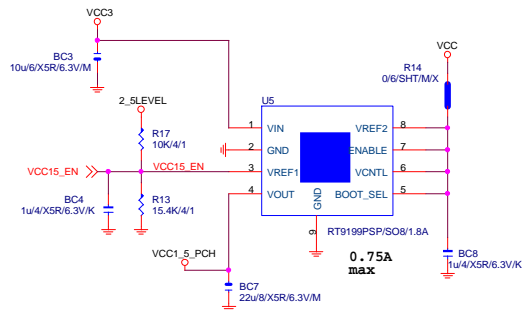
AZALIA FRONT PANEL



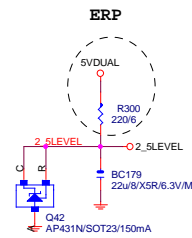
Gigabyte Technology

Title			AUDIO JACK
Size			GA-Q87M-D2H
Date			Monday, May 20, 2013
Sheet			23 of 32
Rev			1.0

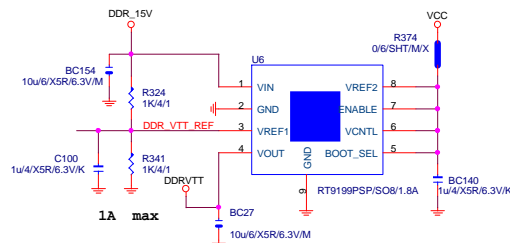
VCC1_5_PCH



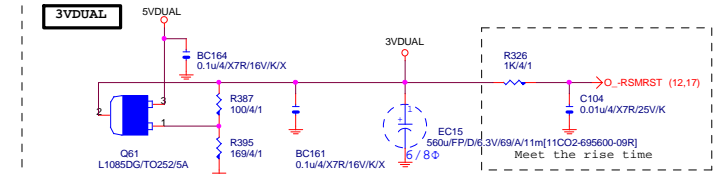
2_5LEVEL



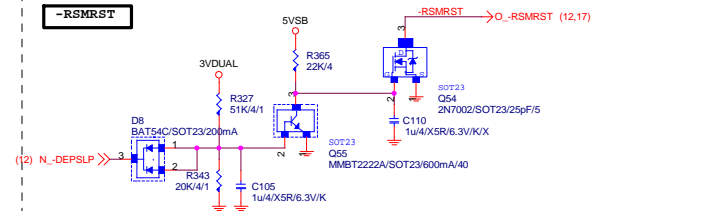
DDRVTT



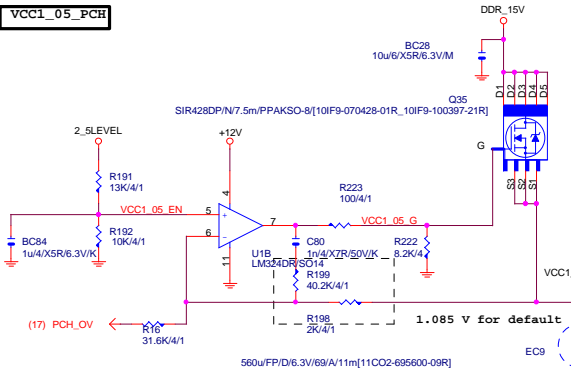
3VDUAL



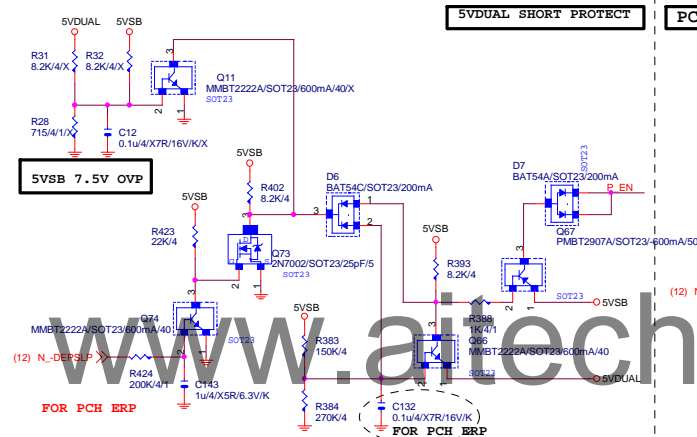
- RSMRST



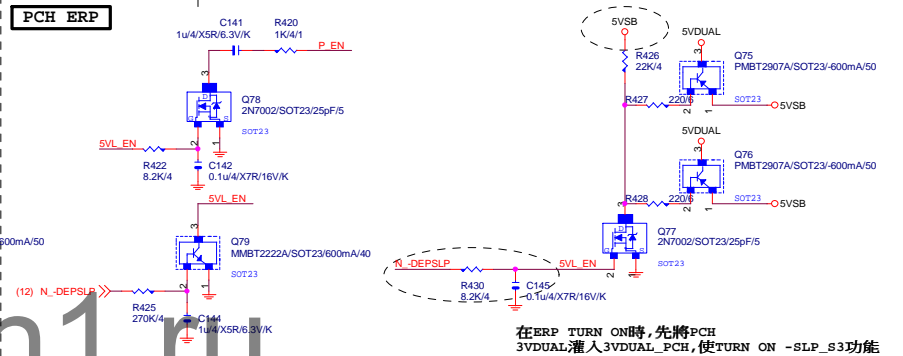
VCC1_05_PCH



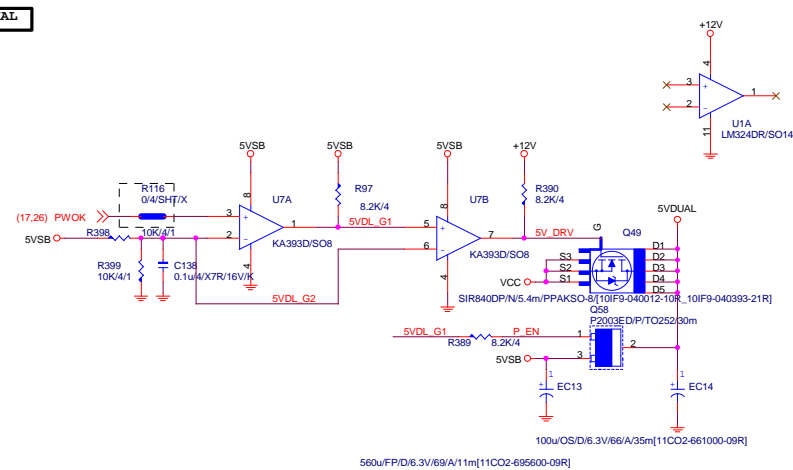
5VDUAL SHORT PROTECT



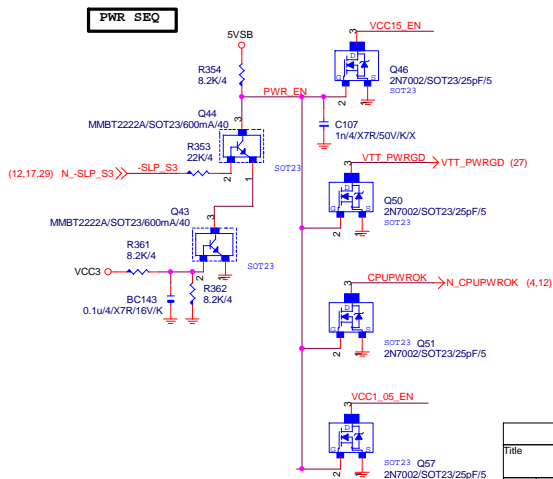
PCH ERP



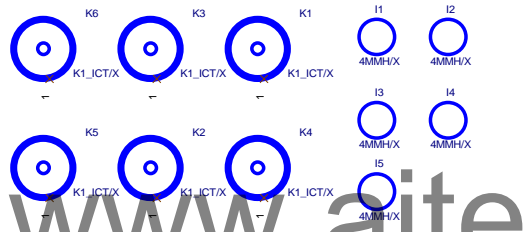
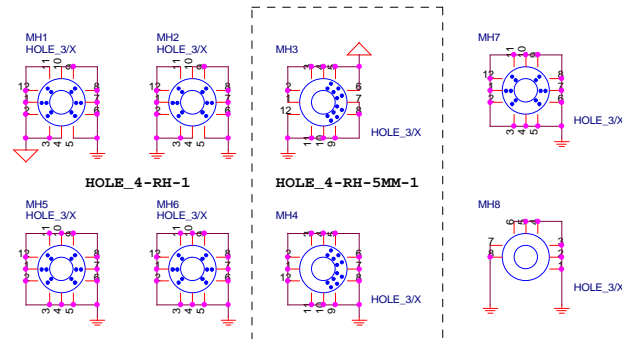
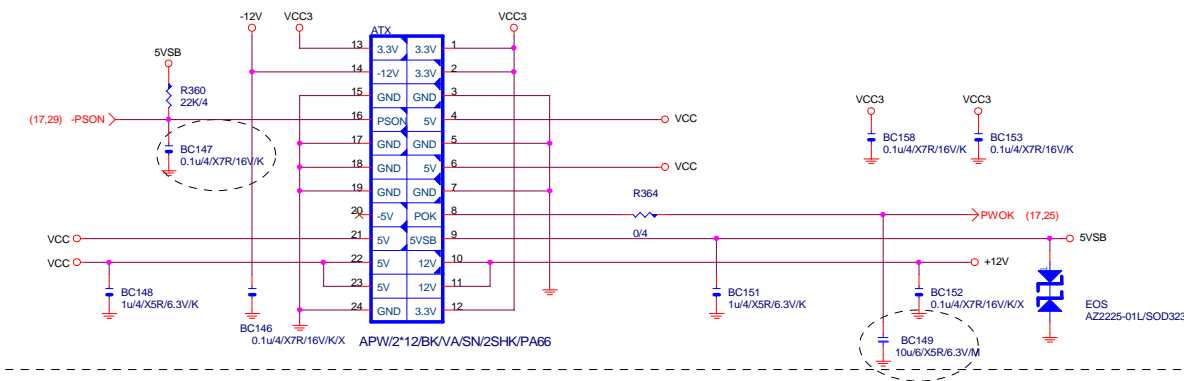
5VDUAL



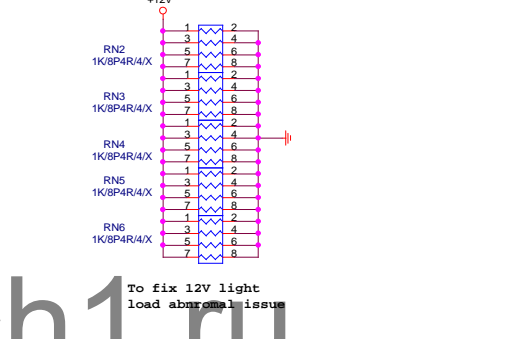
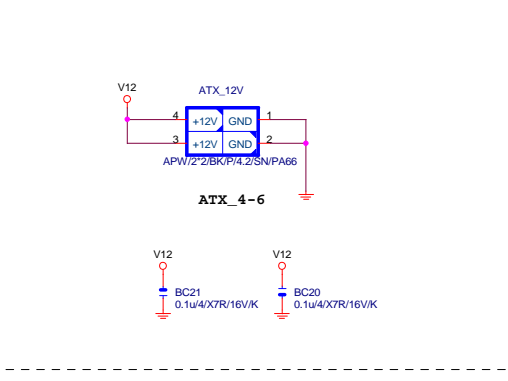
PWR SEQ



ATXX24 POWER CONNECTOR

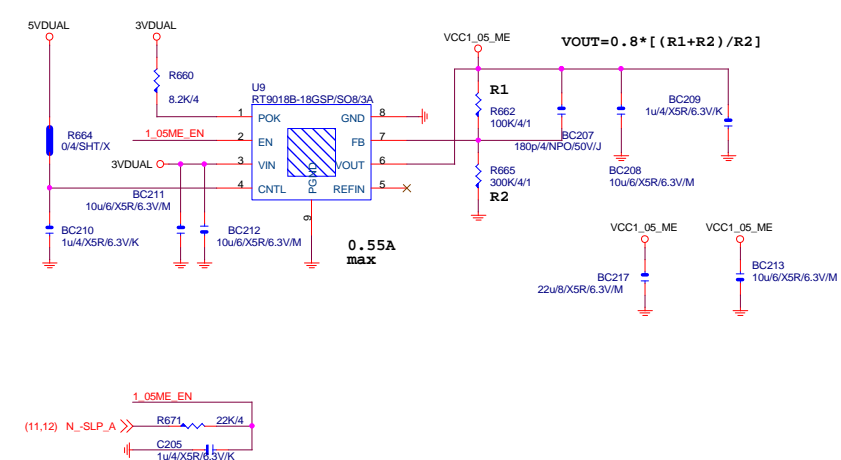


ATXX4 POWER CONNECTOR

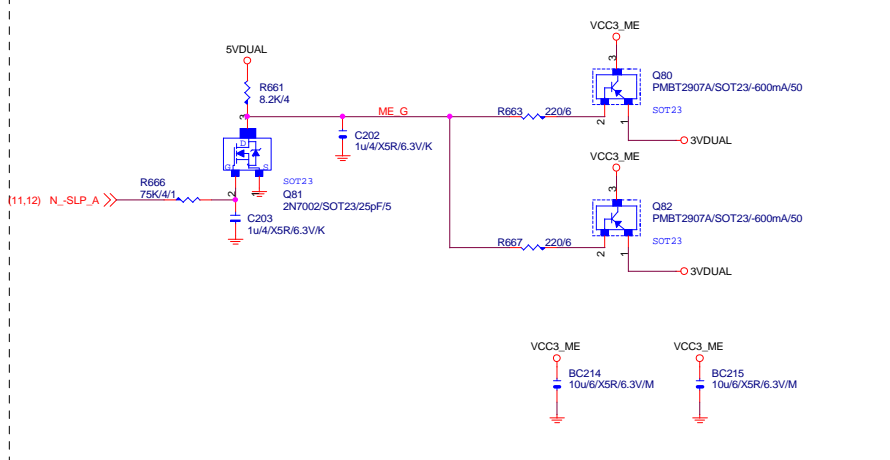


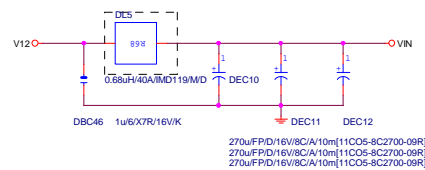
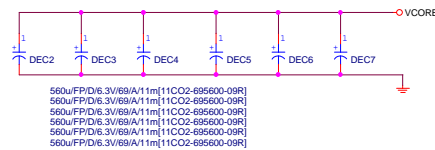
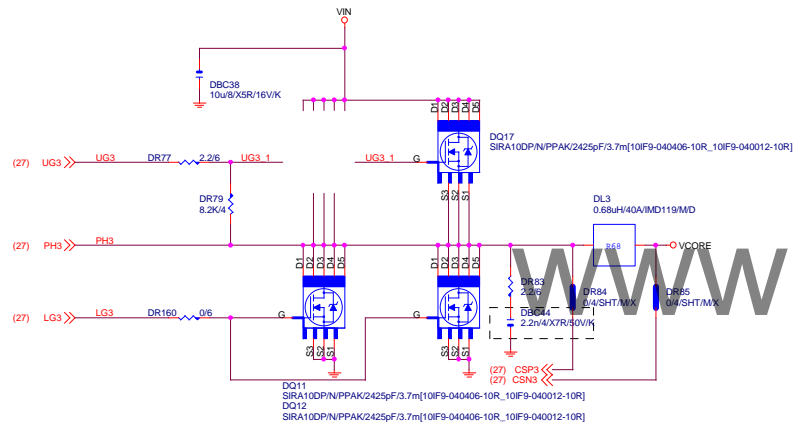
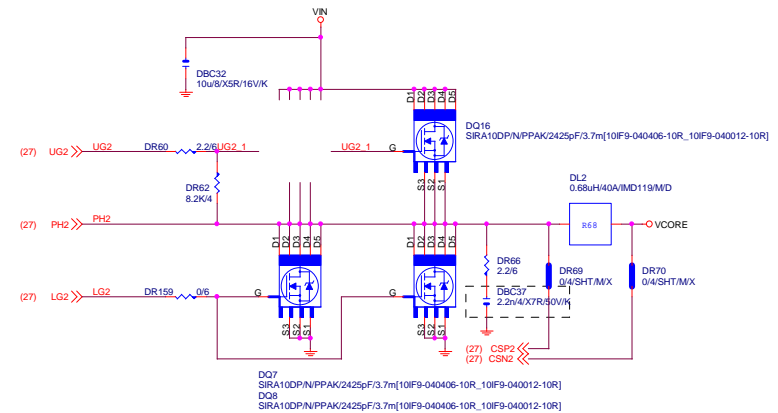
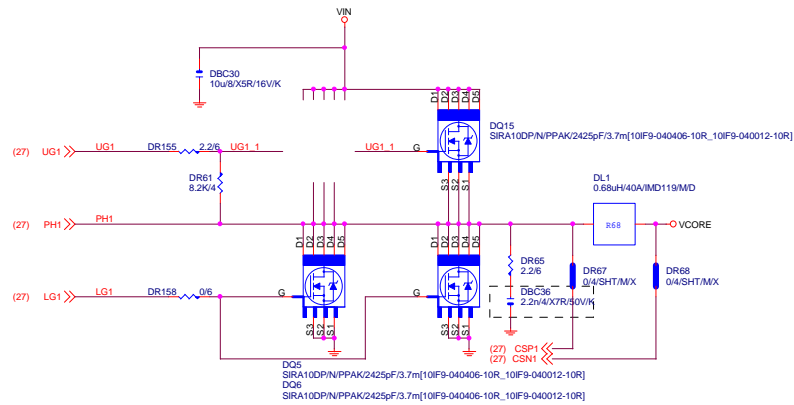
To fix 12v light load abnormal issue
To reduce VCC3 leakage from VGA issue

VCC1_05_ME



VCC3_ME

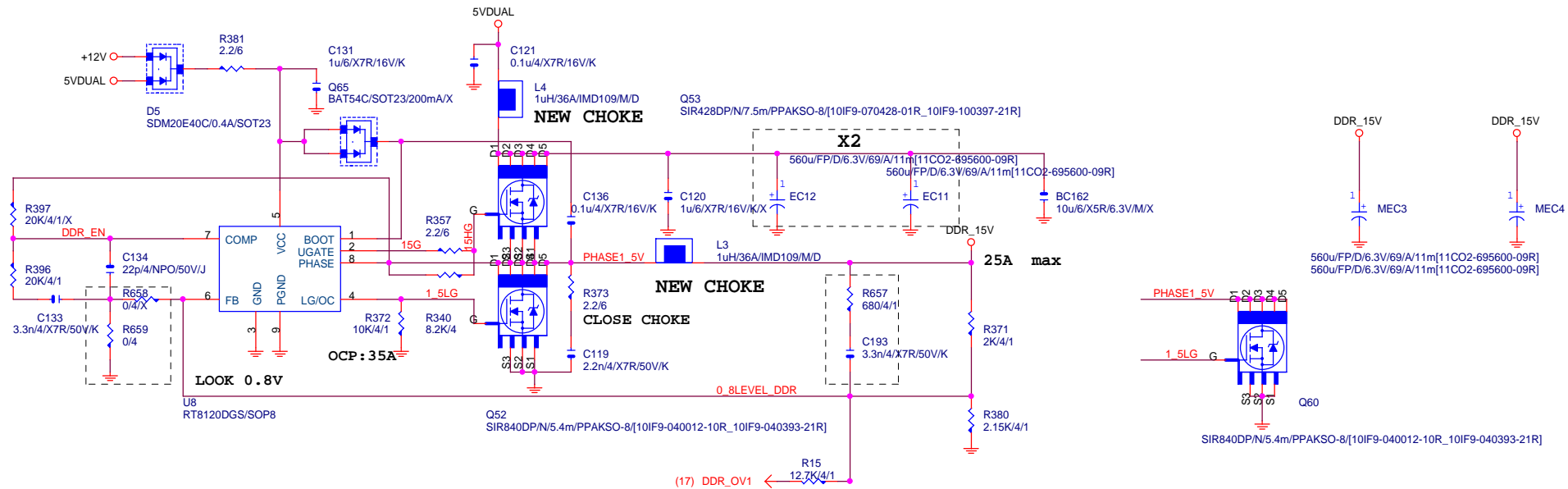




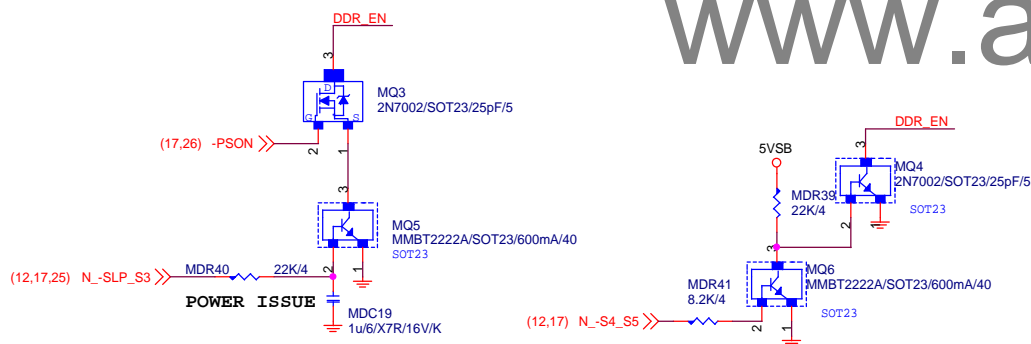
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DDR1.5V



PWR_SEQ



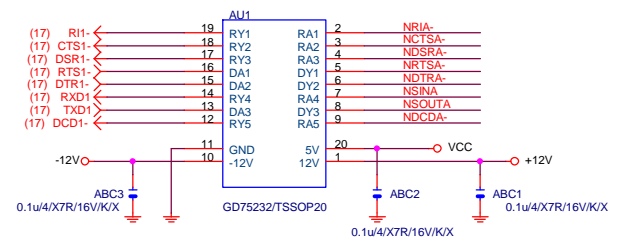
VIN=5V, VOUT=1.5V, IOUT=25A, PHASE=1
 IRMS=11.45A
 560u/FP/D/6.3V/68/8m RIPPLE CURRENT=4.7A
 Coefficient=1.7(85°C), 1(105°C)
 VIN Ripple current=4.7X1.7=7.99A(85°C)
 -->故固態電容須2X7.99=15.98>11.45A

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

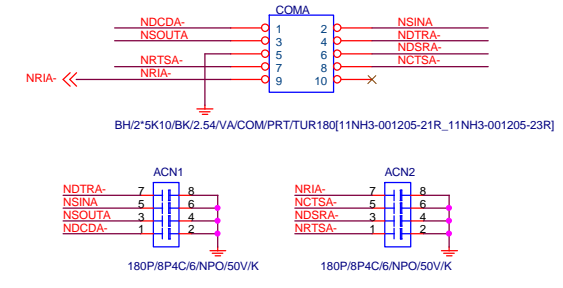
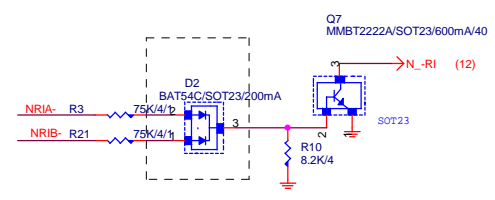
Gigabyte Technology

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DDR POWER		
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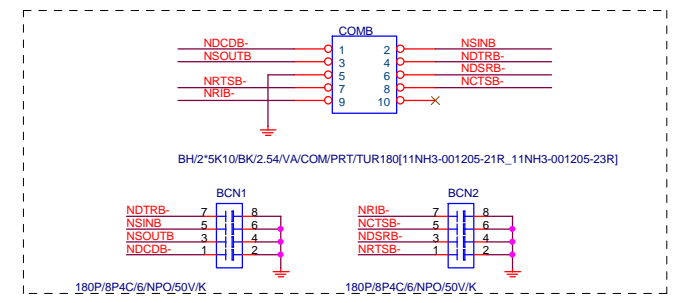
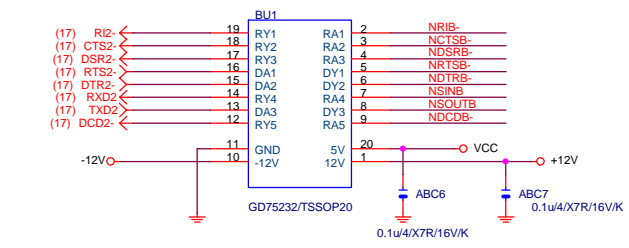
COMA



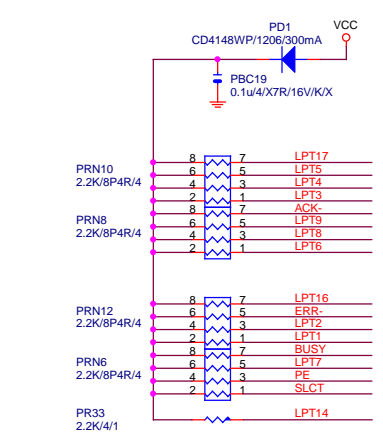
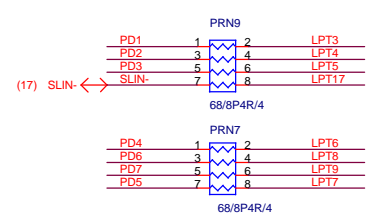
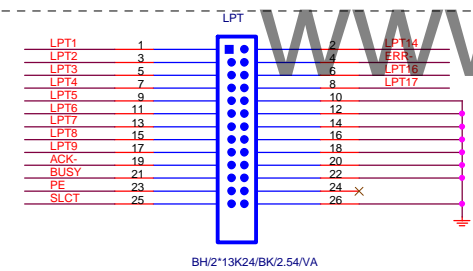
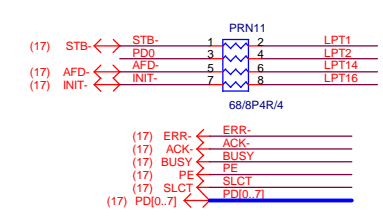
COM RI



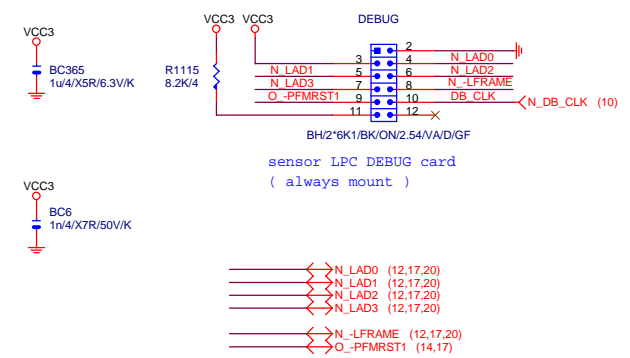
COMB



LPT PORT

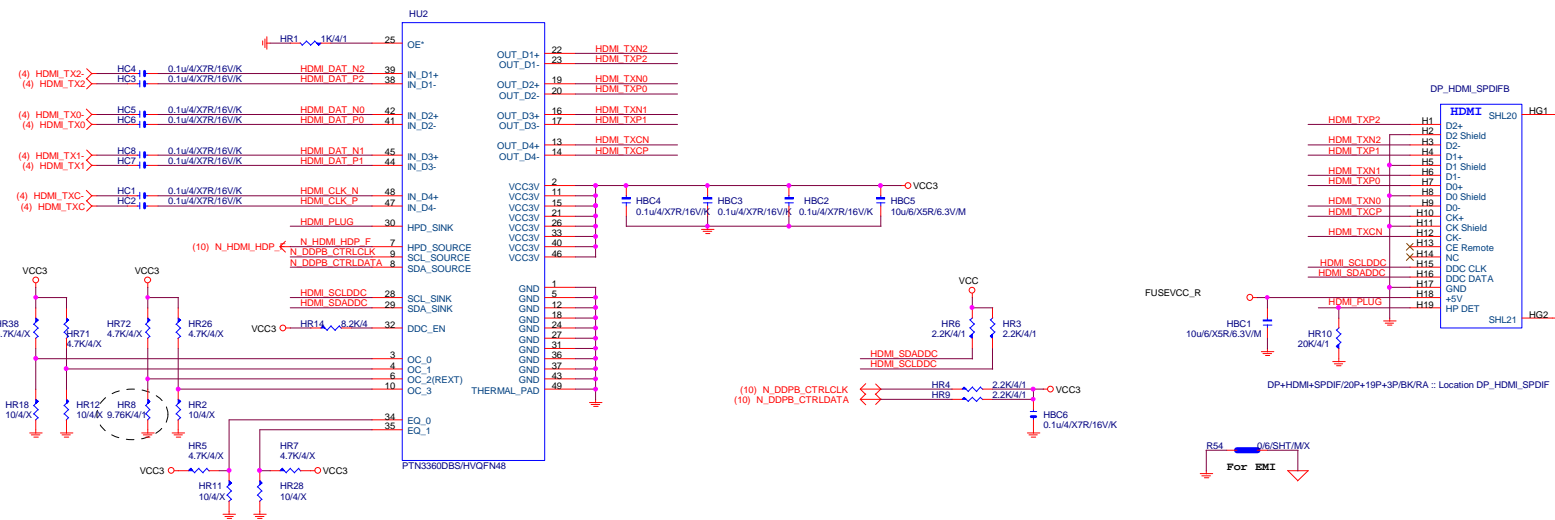


80 PORT

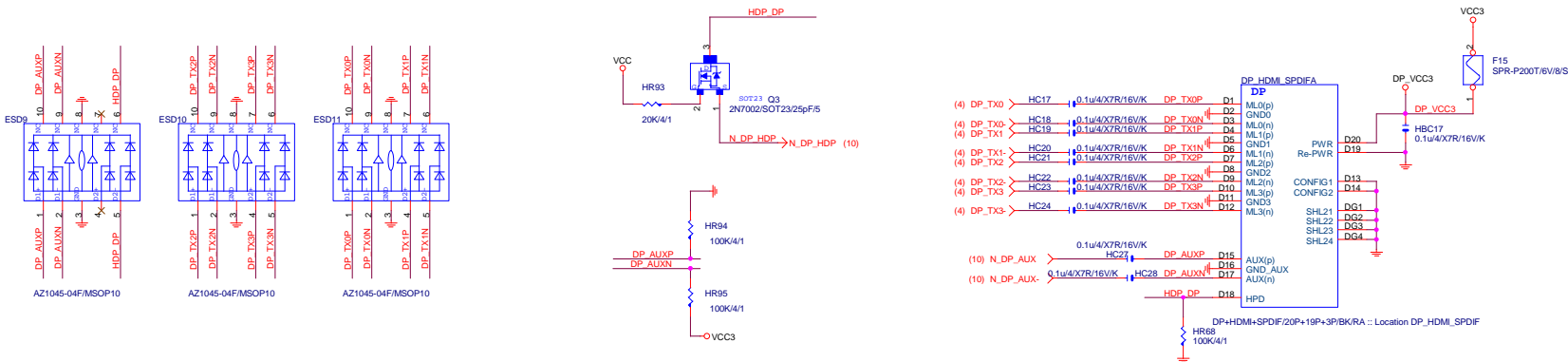
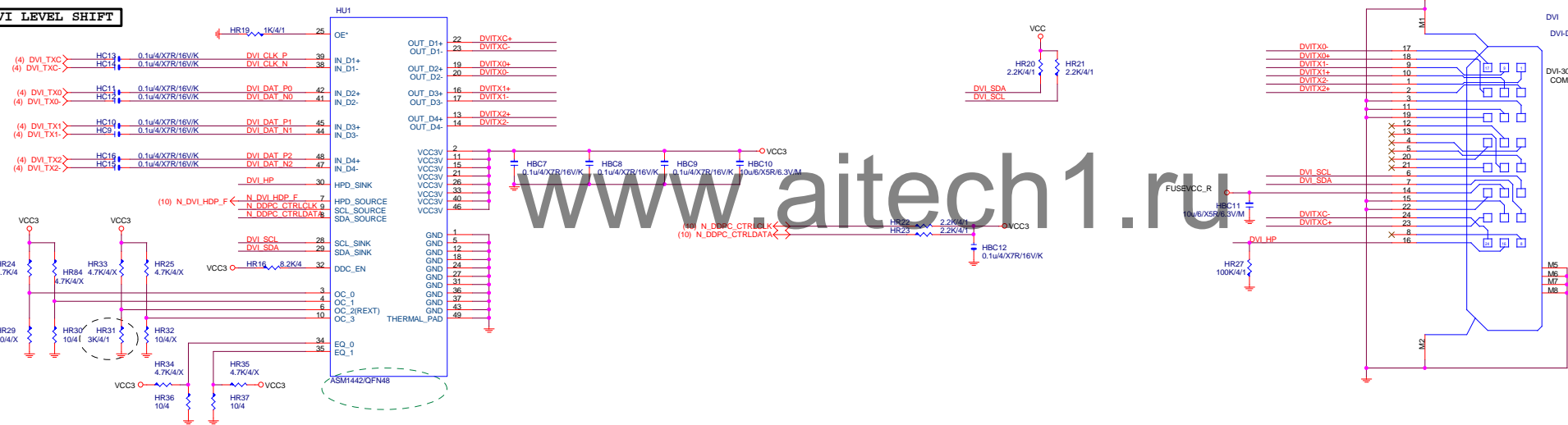


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COM A/B & LPT & 80 PORT			
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HDMI LEVEL SHIFT

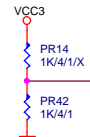
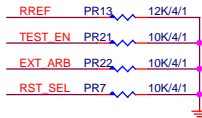
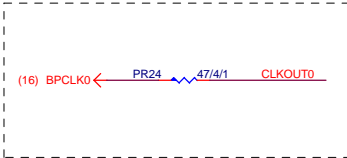
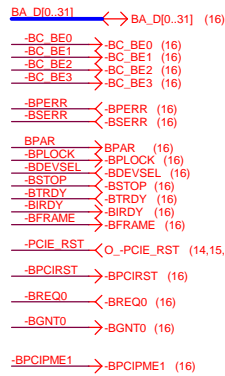


DVI LEVEL SHIFT



PCIE TO PCI

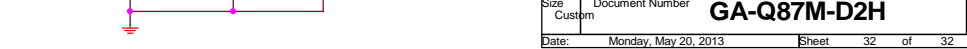
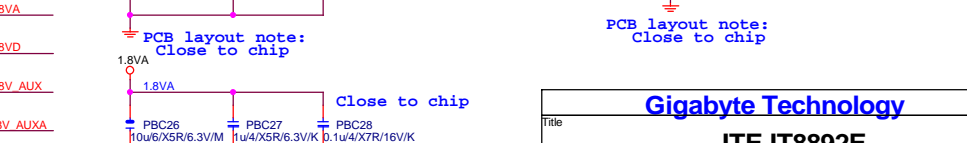
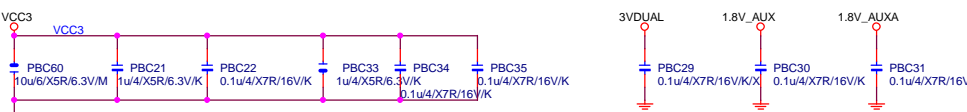
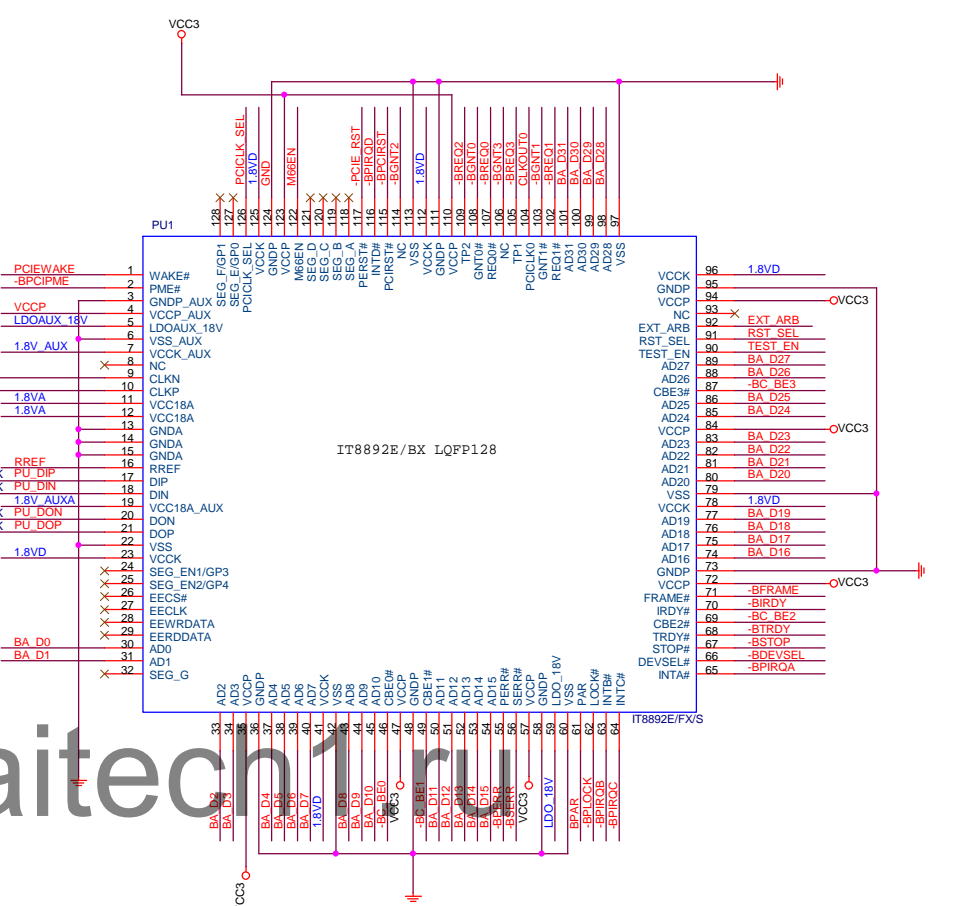
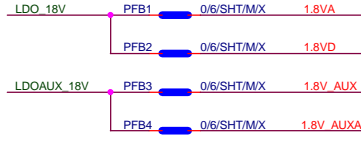
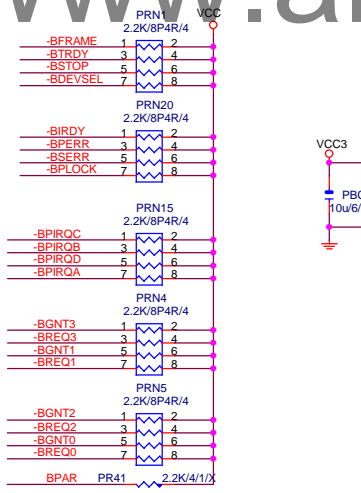
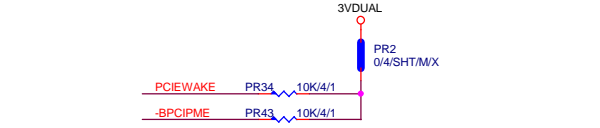
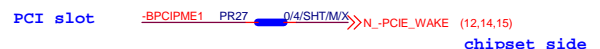
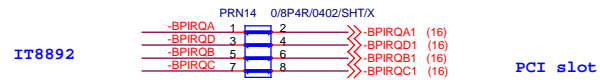
PCI:5/4/5 Impedance=50 +- 15%



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



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



Gigabyte Technology			
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ITE IT8892E			
GA-Q87M-D2H			
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