

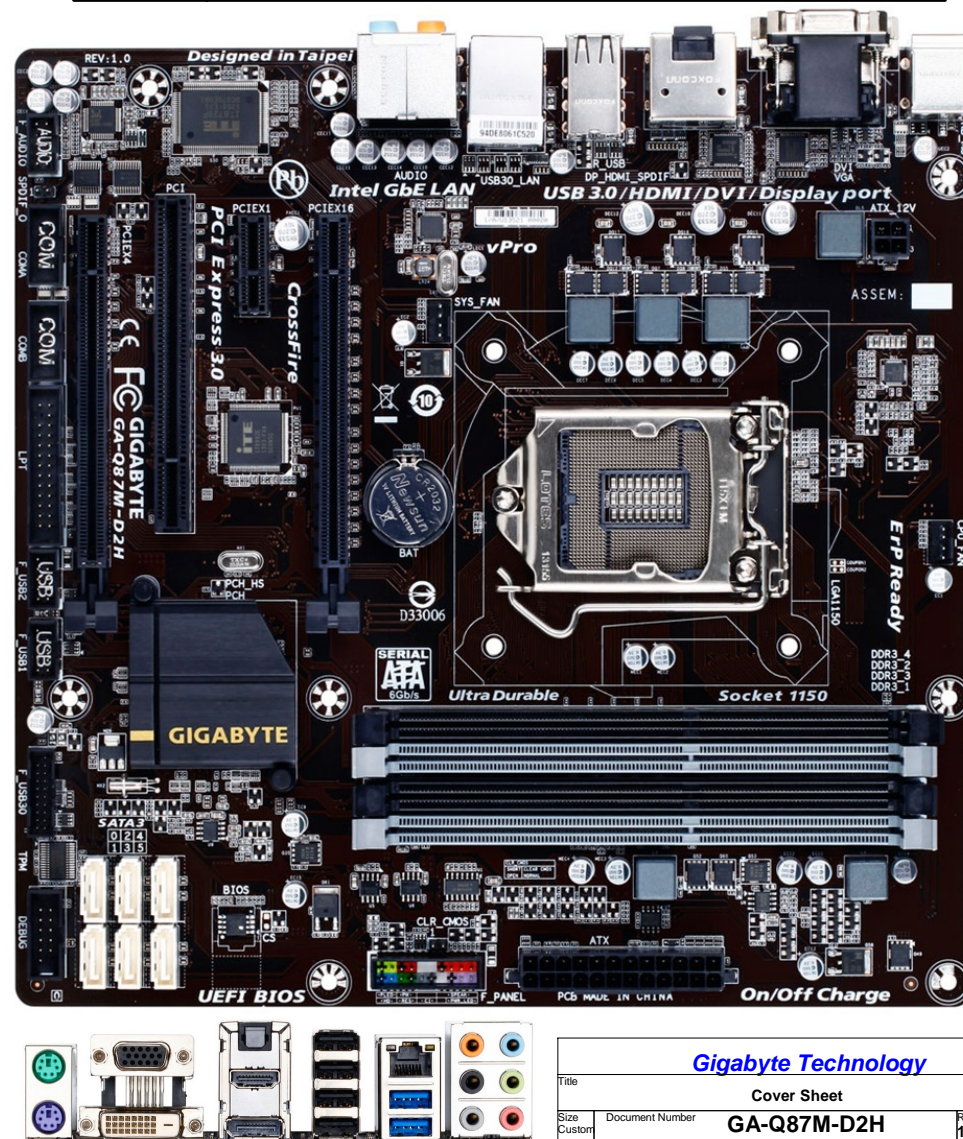
Model Name: GA-Q87M-D2H

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
	DVI , HDMI ,DP
	IT8892E PCI BRIDGE



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Cover Sheet

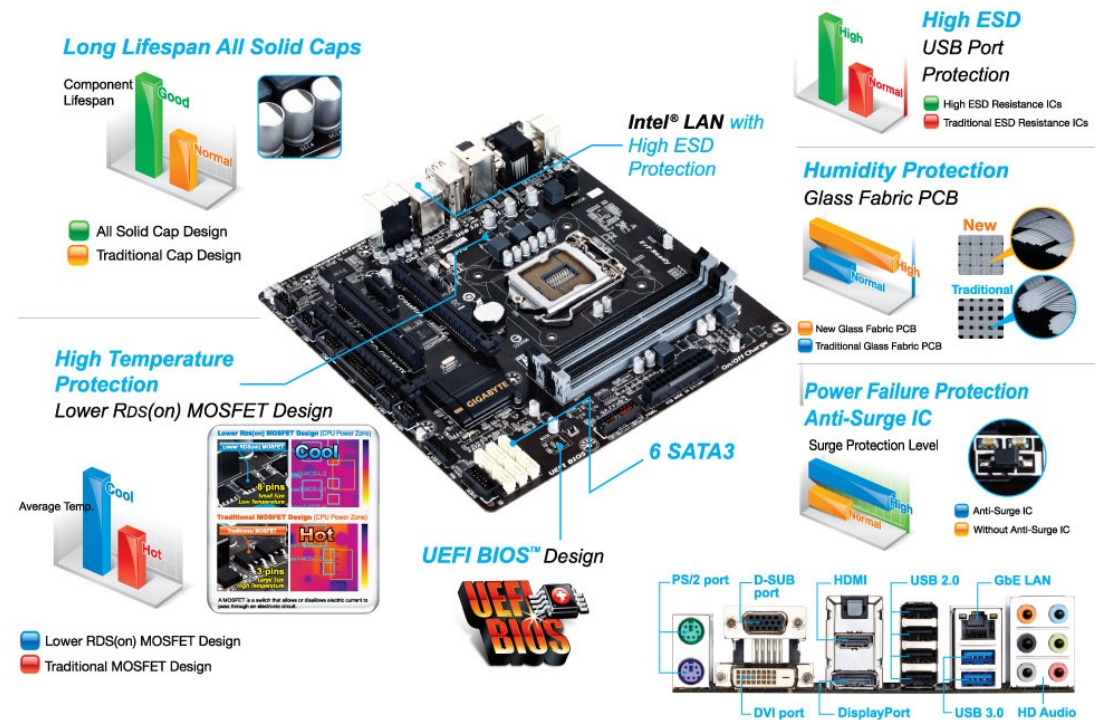
GA-Q87M-D2H

Rev 1.0

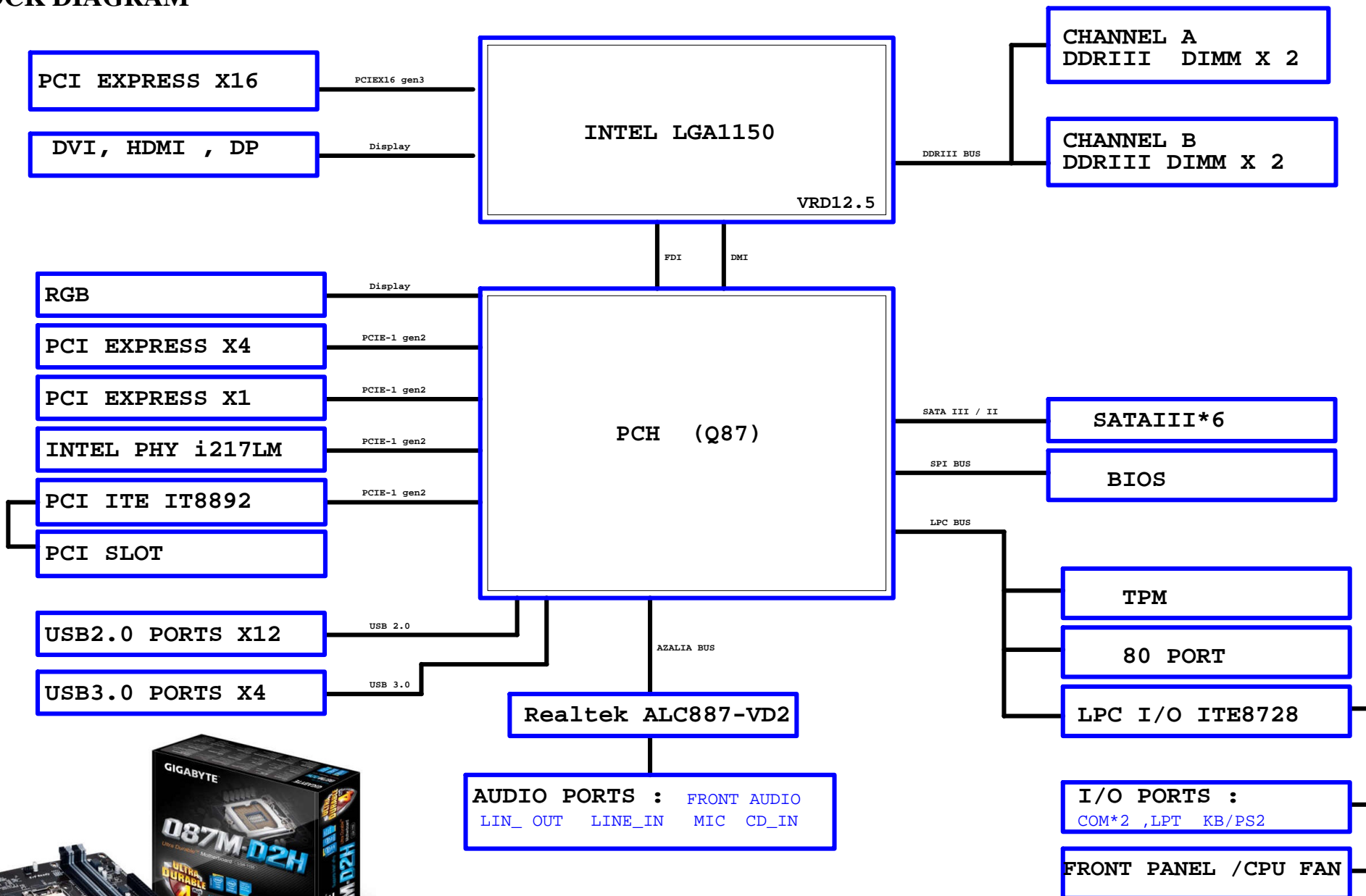
Date: Monday, May 20, 2013 Sheet 1 of 32

Model Name: GA-Q87M-D2H

Component value change history

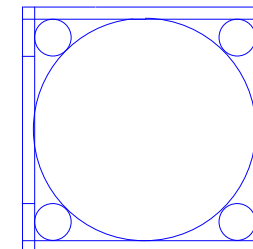
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BLOCK DIAGRAM



LGA1155 (CR)

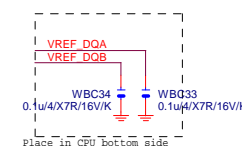
CR
CPU RETAINTION/X



LGA1150



ILM_BP/1156/CS/ILM_BP/1156/CS/12KRC-0F0001-52R_12KRC-0F0001-51R



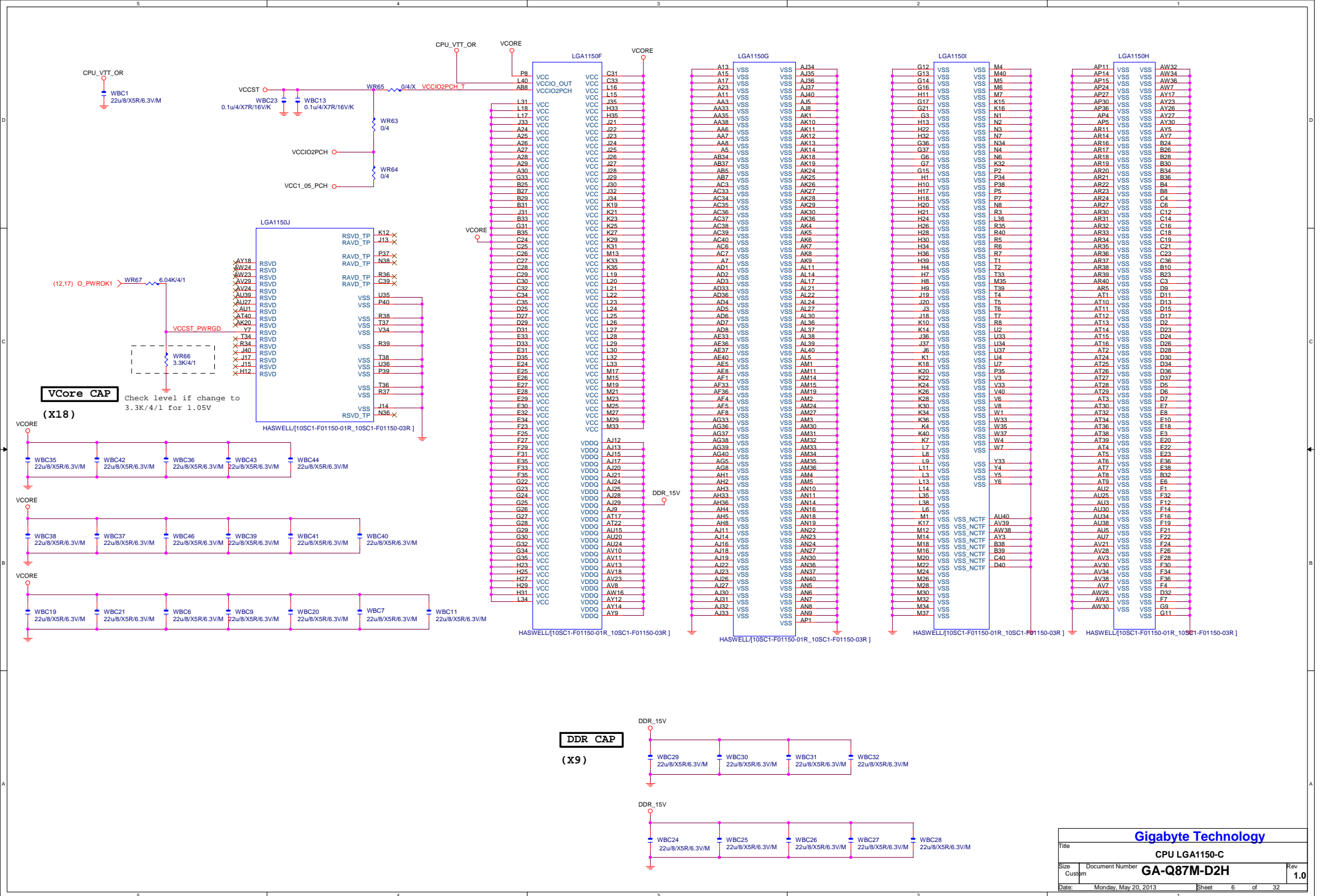
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MAAA6	AV17	DDR0_MA6	DDR0_DQ6
MAAA7	AT18	DDR0_MA7	DDR0_DQ7
MAAA8	AU18	DDR0_MA8	DDR0_DQ8
MAAA9	AT19	DDR0_MA9	DDR0_DQ9
MAAA10	AW11	DDR0_MA10	DDR0_DQ10
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MAAA12	AU19	DDR0_MA12	DDR0_DQ12
MAAA13	AY10	DDR0_MA13	DDR0_DQ13
MAAA14	AT20	DDR0_MA14	DDR0_DQ14
MAAA15	AU21	DDR0_MA15	DDR0_DQ15
MODT_A0	AW10	DDR0_ODT0	DDR0_DQ16
MODT_A1	AY8	DDR0_ODT1	DDR0_DQ17
MODT_A2	AW9	DDR0_ODT2	DDR0_DQ18
MODT_A3	AU8	DDR0_ODT3	DDR0_DQ19
AW33	DDR0_ECC0	DDR0_DQ20	DDR0_DQ21
AV33	DDR0_ECC1	DDR0_DQ22	DDR0_DQ23
AU31	DDR0_ECC2	DDR0_DQ24	DDR0_DQ25
AV31	DDR0_ECC3	DDR0_DQ26	DDR0_DQ27
AT33	DDR0_ECC4	DDR0_DQ28	DDR0_DQ29
AU33	DDR0_ECC5	DDR0_DQ30	DDR0_DQ31
AT31	DDR0_ECC6	DDR0_DQ32	DDR0_DQ33
AW31	DDR0_ECC7	DDR0_DQ34	DDR0_DQ35
SBAA0	AV12	DDR0_BA0	DDR0_DQ36
SBAA1	AY11	DDR0_BA1	DDR0_DQ37
SBAA2	AT21	DDR0_BA2	DDR0_DQ38
CKEA0	AV22	DDR0_CKE0	DDR0_DQ39
CKEA1	AT23	DDR0_CKE1	DDR0_DQ40
CKEA2	AU22	DDR0_CKE2	DDR0_DQ41
CKEA3	AU23	DDR0_CKE3	DDR0_DQ42
CSA0	AU14	DDR0_CS_N0	DDR0_DQ43
CSA1	AV9	DDR0_CS_N1	DDR0_DQ44
CSA2	AU10	DDR0_CS_N2	DDR0_DQ45
CSA3	AW8	DDR0_CS_N3	DDR0_DQ46
DCLKA0	AY15	DDR0_CLK_P0	DDR0_DQ47
DCLKA1	AY16	DDR0_CLK_N0	DDR0_DQ48
DCLKA2	AV15	DDR0_CLK_P1	DDR0_DQ49
DCLKA3	AV14	DDR0_CLK_N1	DDR0_DQ50
DCLKA4	AW14	DDR0_CLK_P2	DDR0_DQ51
DCLKA5	AW13	DDR0_CLK_N2	DDR0_DQ52
DCLKA6	AY13	DDR0_CLK_P3	DDR0_DQ53
DCLKA7	AY13	DDR0_CLK_N3	DDR0_DQ54
RSVD	RSVD	DDR0_DQ55	DDR0_DQ56
RSVD	RSVD	DDR0_DQ57	DDR0_DQ58
RSVD	RSVD	DDR0_DQ59	DDR0_DQ60
RSVD	RSVD	DDR0_DQ61	DDR0_DQ62
RSVD	RSVD	DDR0_DQ63	DDR0_DQ64
RSVD	RSVD	DDR0_DQ65	DDR0_DQ66
RSVD	RSVD	DDR0_DQ67	DDR0_DQ68
RSVD	RSVD	DDR0_DQ69	DDR0_DQ70
RSVD	RSVD	DDR0_DQ71	DDR0_DQ72
RSVD	RSVD	DDR0_DQ73	DDR0_DQ74
RSVD	RSVD	DDR0_DQ75	DDR0_DQ76
RSVD	RSVD	DDR0_DQ77	DDR0_DQ78
RSVD	RSVD	DDR0_DQ79	DDR0_DQ80
RSVD	RSVD	DDR0_DQ81	DDR0_DQ82
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RSVD	RSVD	DDR0_DQ91	DDR0_DQ92
RSVD	RSVD	DDR0_DQ93	DDR0_DQ94
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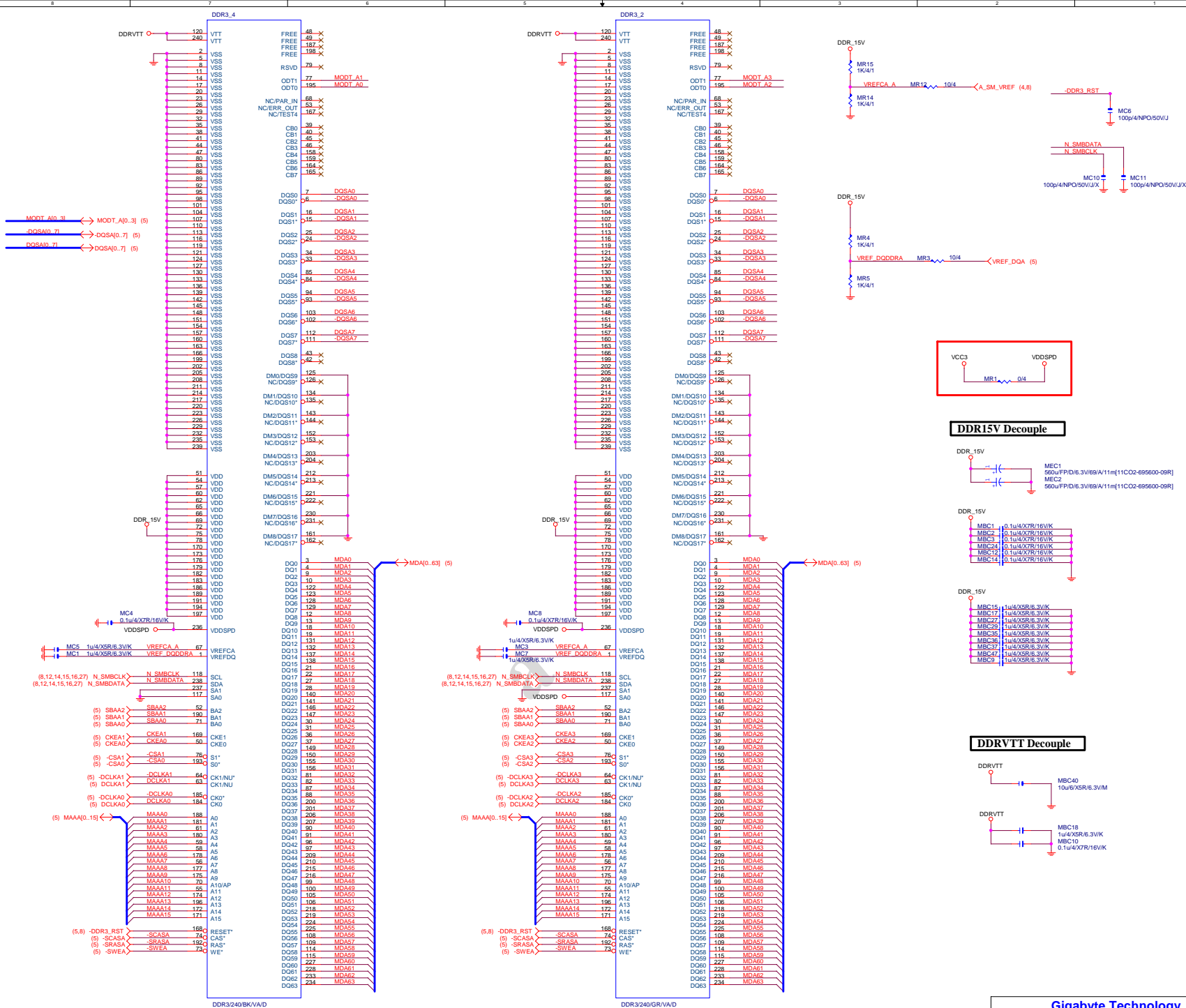
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MAAB4	AP23	DDR1_MA4	DDR1_DQ4
MAAB5	AL23	DDR1_MA5	DDR1_DQ5
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MAAB7	AV25	DDR1_MA7	DDR1_DQ7
MAAB8	AW26	DDR1_MA8	DDR1_DQ8
MAAB9	AW26	DDR1_MA9	DDR1_DQ9
MAAB10	AP18	DDR1_MA10	DDR1_DQ10
MAAB11	AY25	DDR1_MA11	DDR1_DQ11
MAAB12	AV26	DDR1_MA12	DDR1_DQ12
MAAB13	AP15	DDR1_MA13	DDR1_DQ13
MAAB14	AY27	DDR1_MA14	DDR1_DQ14
MAAB15	AY28	DDR1_MA15	DDR1_DQ15
MODT_B0	AM17	DDR1_ODT0	DDR1_DQ16
MODT_B1	AL16	DDR1_ODT1	DDR1_DQ17
MODT_B2	AM16	DDR1_ODT2	DDR1_DQ18
MODT_B3	AK15	DDR1_ODT3	DDR1_DQ19
AM26	DDR1_ECC0	DDR1_DQ20	DDR1_DQ21
AM25	DDR1_ECC1	DDR1_DQ22	DDR1_DQ23
AP25	DDR1_ECC2	DDR1_DQ24	DDR1_DQ25
AP26	DDR1_ECC3	DDR1_DQ26	DDR1_DQ27
AP27	DDR1_ECC4	DDR1_DQ28	DDR1_DQ29
AP28	DDR1_ECC5	DDR1_DQ30	DDR1_DQ31
AP29	DDR1_ECC6	DDR1_DQ32	DDR1_DQ33
AP30	DDR1_ECC7	DDR1_DQ34	DDR1_DQ35
SBAB0	AK17	DDR1_BA0	DDR1_DQ36
SBAB1	AL18	DDR1_BA1	DDR1_DQ37
SBAB2	AW28	DDR1_BA2	DDR1_DQ38
CKEB0	AW29	DDR1_CKE0	DDR1_DQ39
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CKEB2	AU28	DDR1_CKE2	DDR1_DQ41
CKEB3	AU29	DDR1_CKE3	DDR1_DQ42
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CSB1	AN15	DDR1_CS_N1	DDR1_DQ44
CSB2	AN17	DDR1_CS_N2	DDR1_DQ45
CSB3	AL15	DDR1_CS_N3	DDR1_DQ46
DCLKB0	AM20	DDR1_CLK_P0	DDR1_DQ47
DCLKB1	AM21	DDR1_CLK_N0	DDR1_DQ48
DCLKB2	AP22	DDR1_CLK_P1	DDR1_DQ49
DCLKB3	AP21	DDR1_CLK_N1	DDR1_DQ50
DCLKB4	AN20	DDR1_CLK_P2	DDR1_DQ51
DCLKB5	AN21	DDR1_CLK_N2	DDR1_DQ52
DCLKB6	AP19	DDR1_CLK_P3	DDR1_DQ53
DCLKB7	AP20	DDR1_CLK_N3	DDR1_DQ54
SCASB	AP16C	DDR1_CAS*	DDR1_DQ55
SRASB	AL20	DDR1_RAS*	DDR1_DQ56
SWEB	AK16C	DDR1_WE*	DDR1_DQ57
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DQSA9	AN39	DDR1_DQS_N4	DDR1_DQ69
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DQSA13	AN39	DDR1_DQS_N6	DDR1_DQ73
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DQSA16	AN39	DDR1_DQS_P8	DDR1_DQ76
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DQSA19	AN39	DDR1_DQS_N9	DDR1_DQ79
DQSA20	AN39	DDR1_DQS_P10	DDR1_DQ80
DQSA21	AN39	DDR1_DQS_N10	DDR1_DQ81
DQSA22	AN39	DDR1_DQS_P11	DDR1_DQ82
DQSA23	AN39	DDR1_DQS_N11	DDR1_DQ83
DQSA24	AN39	DDR1_DQS_P12	DDR1_DQ84
DQSA25	AN39	DDR1_DQS_N12	DDR1_DQ85
DQSA26	AN39	DDR1_DQS_P13	DDR1_DQ86
DQSA27	AN39	DDR1_DQS_N13	DDR1_DQ87
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DQSA36	AN39	DDR1_DQS_P18	DDR1_DQ96
DQSA37	AN39	DDR1_DQS_N18	DDR1_DQ97
DQSA38	AN39	DDR1_DQS_P19	DDR1_DQ98
DQSA39	AN39	DDR1_DQS_N19	DDR1_DQ99
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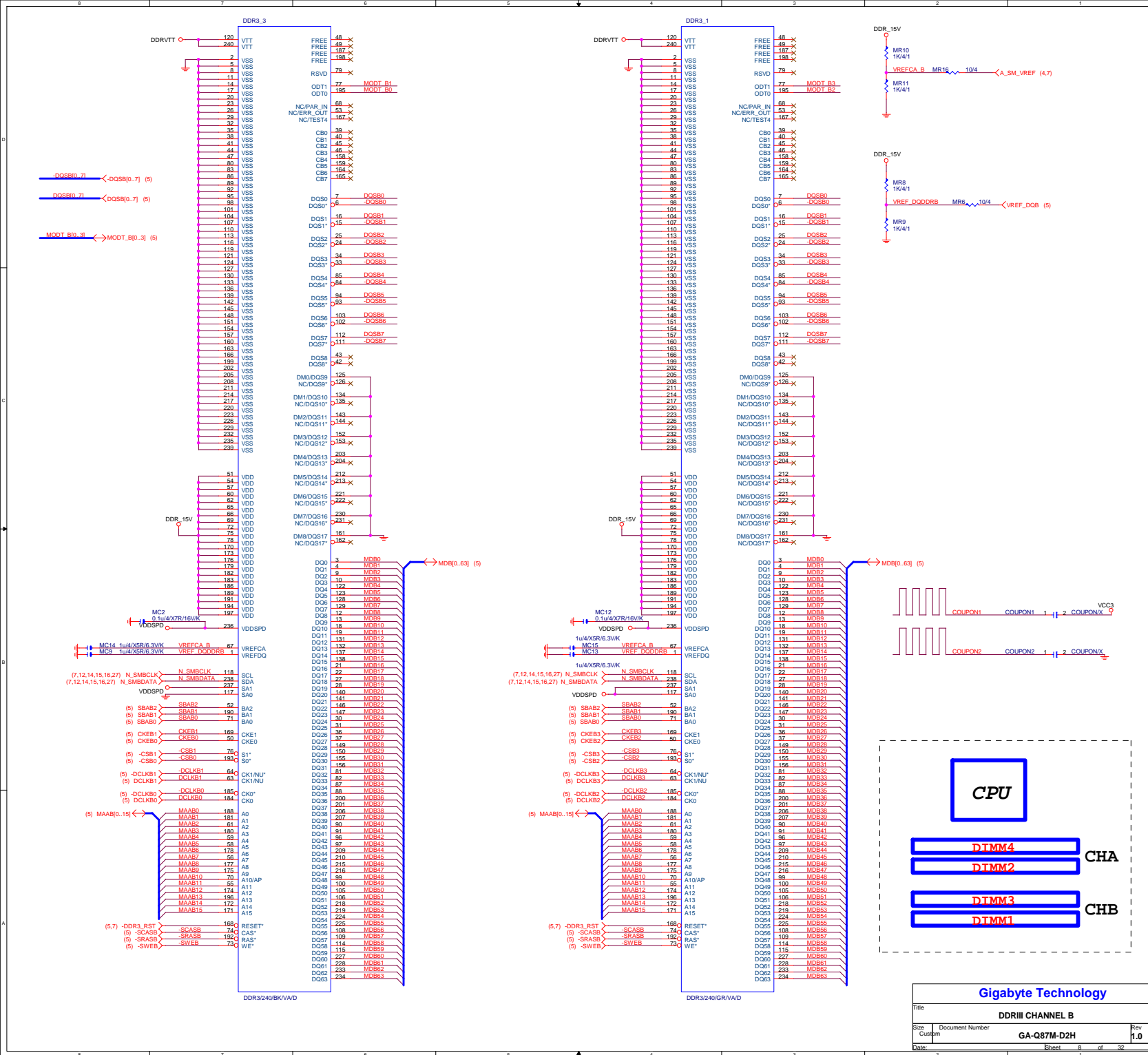
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(7) MDA0[0..63]	MDA0_631
(8) MDB0[0..63]	MDB0_631
(7) DQSA0[0..7]	DQSA0_71
(7) -DQSA0[0..7]	-DQSA0_71
(7) MAAA0[0..15]	MAAA0_151
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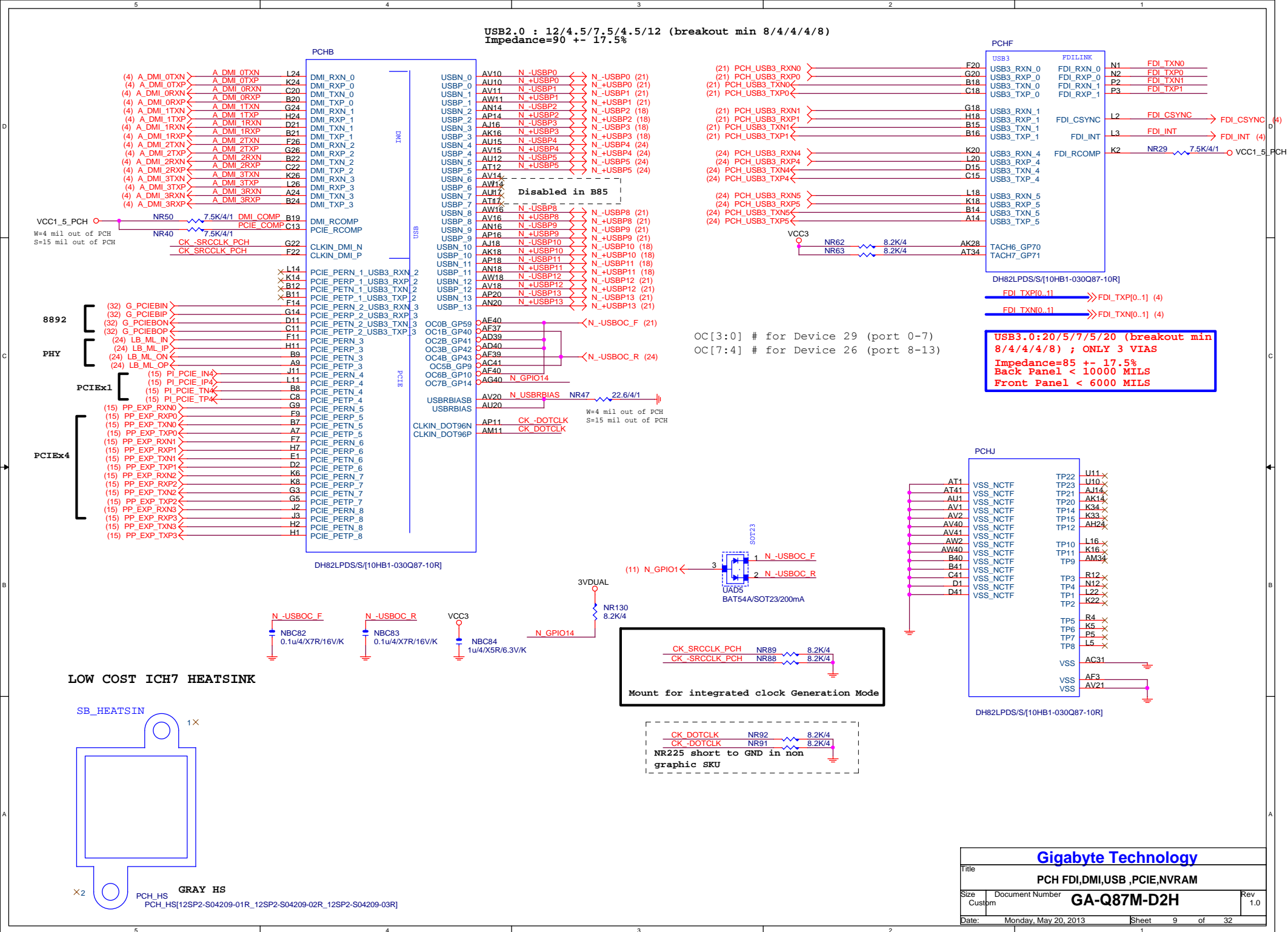


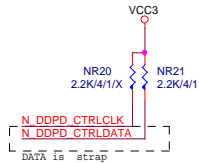
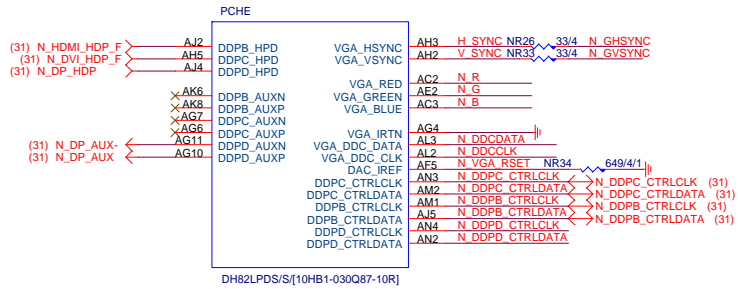


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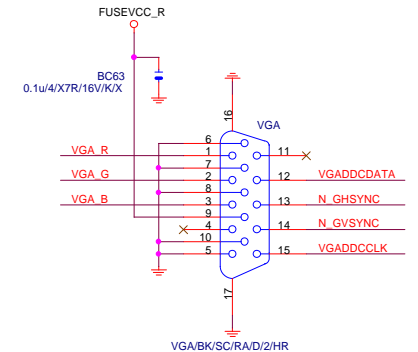
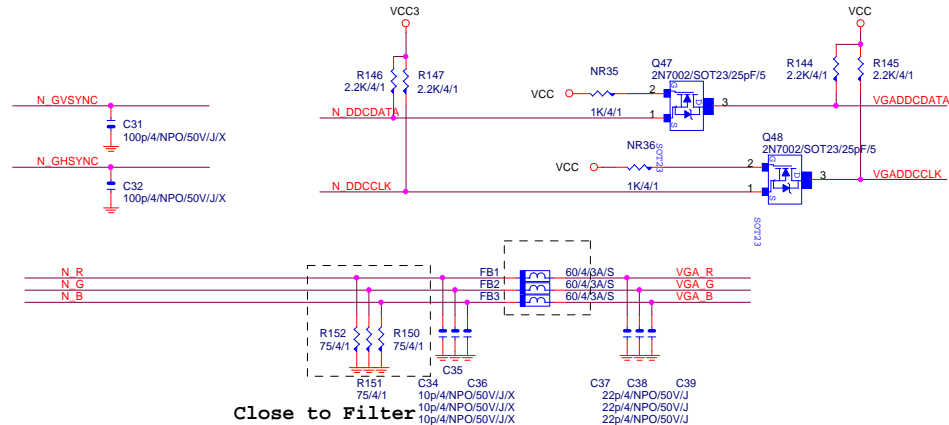
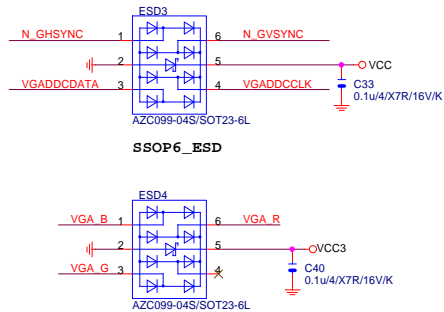
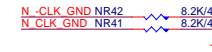
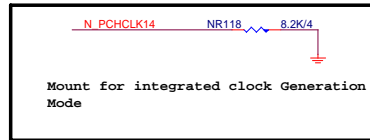
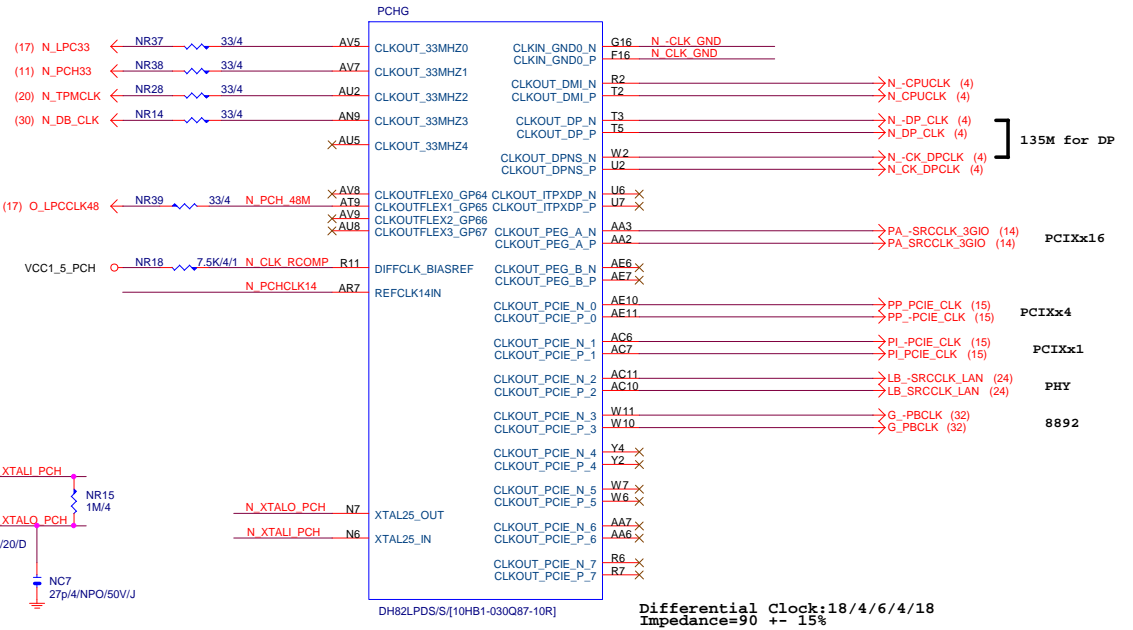
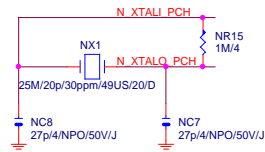
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Size	Document Number	GA-Q87M-D2H	Rev
Custom			1.0
Date:			





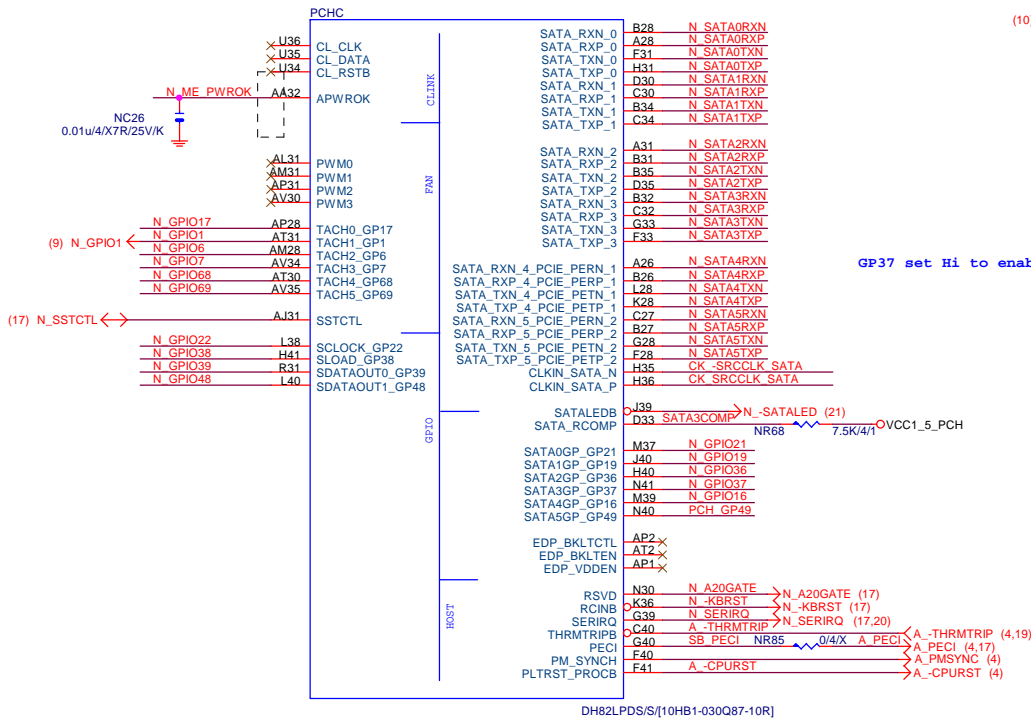


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14/24/33/48MHZ

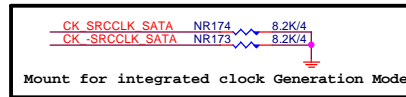


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Title PCH DISPLAY_CLK BUFFER			
Size Custom	Document Number GA-Q87M-D2H	Rev 1.0	
Date: Monday, May 20, 2013	Sheet 10	of 32	

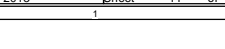
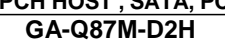
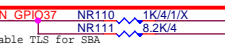
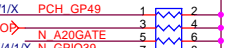
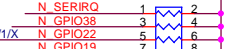
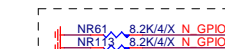
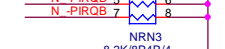
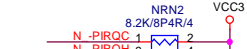
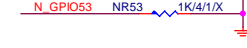
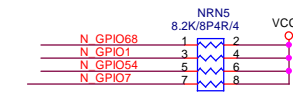
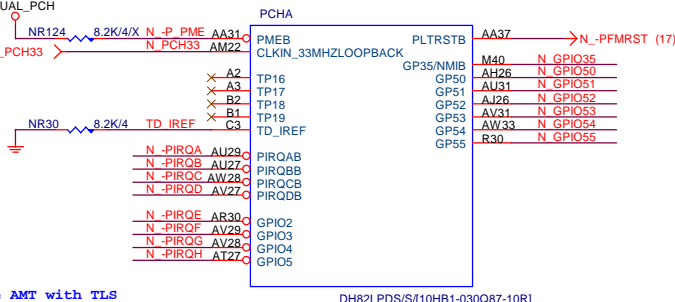
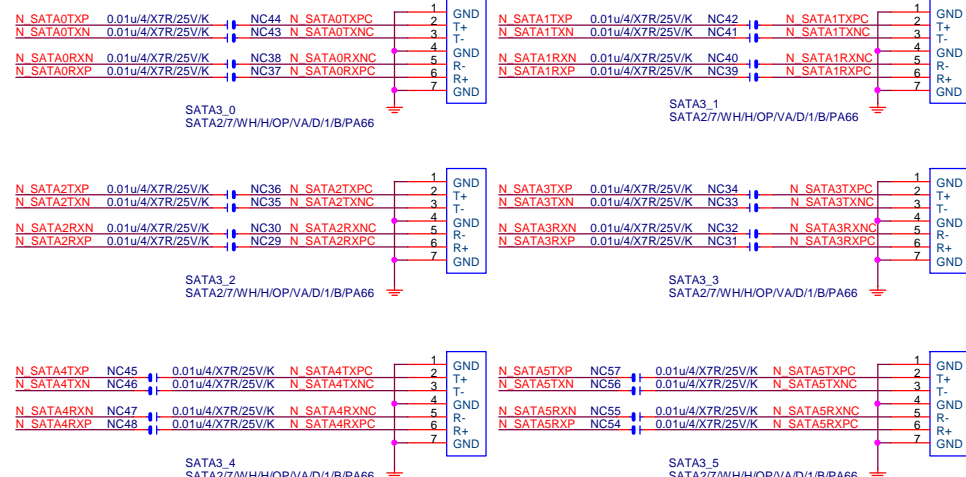
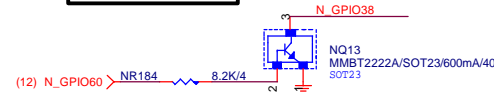
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Impedance=90 +- 17.5%
SATA2 : 15/7.5/4.5/7.5/15 (breakout min 8/4/4/4/8)
Impedance=90 +- 17.5%



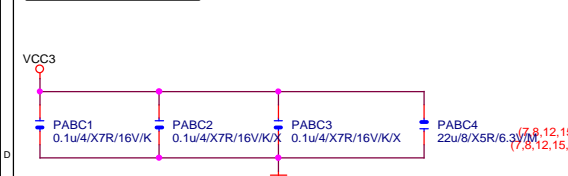
GP37 set Hi to enable AMT with TLS



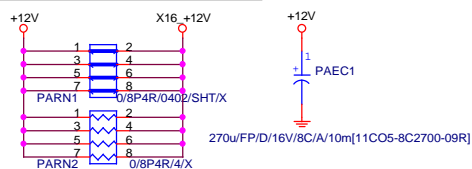
GPI038 Ctrl



PCIEX16 CAP



PCIEX16	PROTECT	SHT
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PCIEX16	AC	CAP
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PA EXP TXP0	PAC5	0.22u/4X5R/6.3V/K	PA EXP TXP9 C
PA EXP TXN0	PAC4	0.22u/4X5R/6.3V/K	PA EXP TXN9 C
PA EXP TXP1	PAC6	0.22u/4X5R/6.3V/K	PA EXP TXP1 C
PA EXP TXN1	PAC7	0.22u/4X5R/6.3V/K	PA EXP TXN1 C
PA EXP TXP2	PAC8	0.22u/4X5R/6.3V/K	PA EXP TXP2 C
PA EXP TXN2	PAC9	0.22u/4X5R/6.3V/K	PA EXP TXN2 C
PA EXP TXP3	PAC10	0.22u/4X5R/6.3V/K	PA EXP TXP3 C
PA EXP TXN3	PAC11	0.22u/4X5R/6.3V/K	PA EXP TXN3 C
PA EXP TXP4	PAC12	0.22u/4X5R/6.3V/K	PA EXP TXP4 C
PA EXP TXN4	PAC13	0.22u/4X5R/6.3V/K	PA EXP TXN4 C
PA EXP TXP5	PAC14	0.22u/4X5R/6.3V/K	PA EXP TXP5 C
PA EXP TXN5	PAC15	0.22u/4X5R/6.3V/K	PA EXP TXN5 C
PA EXP TXP6	PAC16	0.22u/4X5R/6.3V/K	PA EXP TXP6 C
PA EXP TXN6	PAC17	0.22u/4X5R/6.3V/K	PA EXP TXN6 C
PA EXP TXP7	PAC18	0.22u/4X5R/6.3V/K	PA EXP TXP7 C
PA EXP TXN7	PAC19	0.22u/4X5R/6.3V/K	PA EXP TXN7 C
PA EXP TXP8	PAC20	0.22u/4X5R/6.3V/K	PA EXP TXP8 C
PA EXP TXN8	PAC21	0.22u/4X5R/6.3V/K	PA EXP TXN8 C
PA EXP TXP9	PAC22	0.22u/4X5R/6.3V/K	PA EXP TXP9 C
PA EXP TXN9	PAC23	0.22u/4X5R/6.3V/K	PA EXP TXN9 C
PA EXP TXP10	PAC24	0.22u/4X5R/6.3V/K	PA EXP TXP10 C
PA EXP TXN10	PAC25	0.22u/4X5R/6.3V/K	PA EXP TXN10 C
PA EXP TXP11	PAC26	0.22u/4X5R/6.3V/K	PA EXP TXP11 C
PA EXP TXN11	PAC27	0.22u/4X5R/6.3V/K	PA EXP TXN11 C
PA EXP TXP12	PAC28	0.22u/4X5R/6.3V/K	PA EXP TXP12 C
PA EXP TXN12	PAC29	0.22u/4X5R/6.3V/K	PA EXP TXN12 C
PA EXP TXP13	PAC30	0.22u/4X5R/6.3V/K	PA EXP TXP13 C
PA EXP TXN13	PAC31	0.22u/4X5R/6.3V/K	PA EXP TXN13 C
PA EXP TXP14	PAC32	0.22u/4X5R/6.3V/K	PA EXP TXP14 C
PA EXP TXN14	PAC33	0.22u/4X5R/6.3V/K	PA EXP TXN14 C
PA EXP TXP15	PAC34	0.22u/4X5R/6.3V/K	PA EXP TXP15 C
PA EXP TXN15	PAC35	0.22u/4X5R/6.3V/K	PA EXP TXN15 C

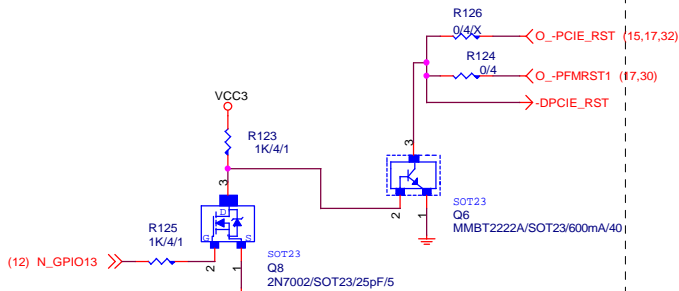
PA EXP RXP[0..15] \gg PA EXP RXP[0..15] (4)

PA_EXP_RXN[0..15] \gg PA_EXP_RXN[0..15] (4)

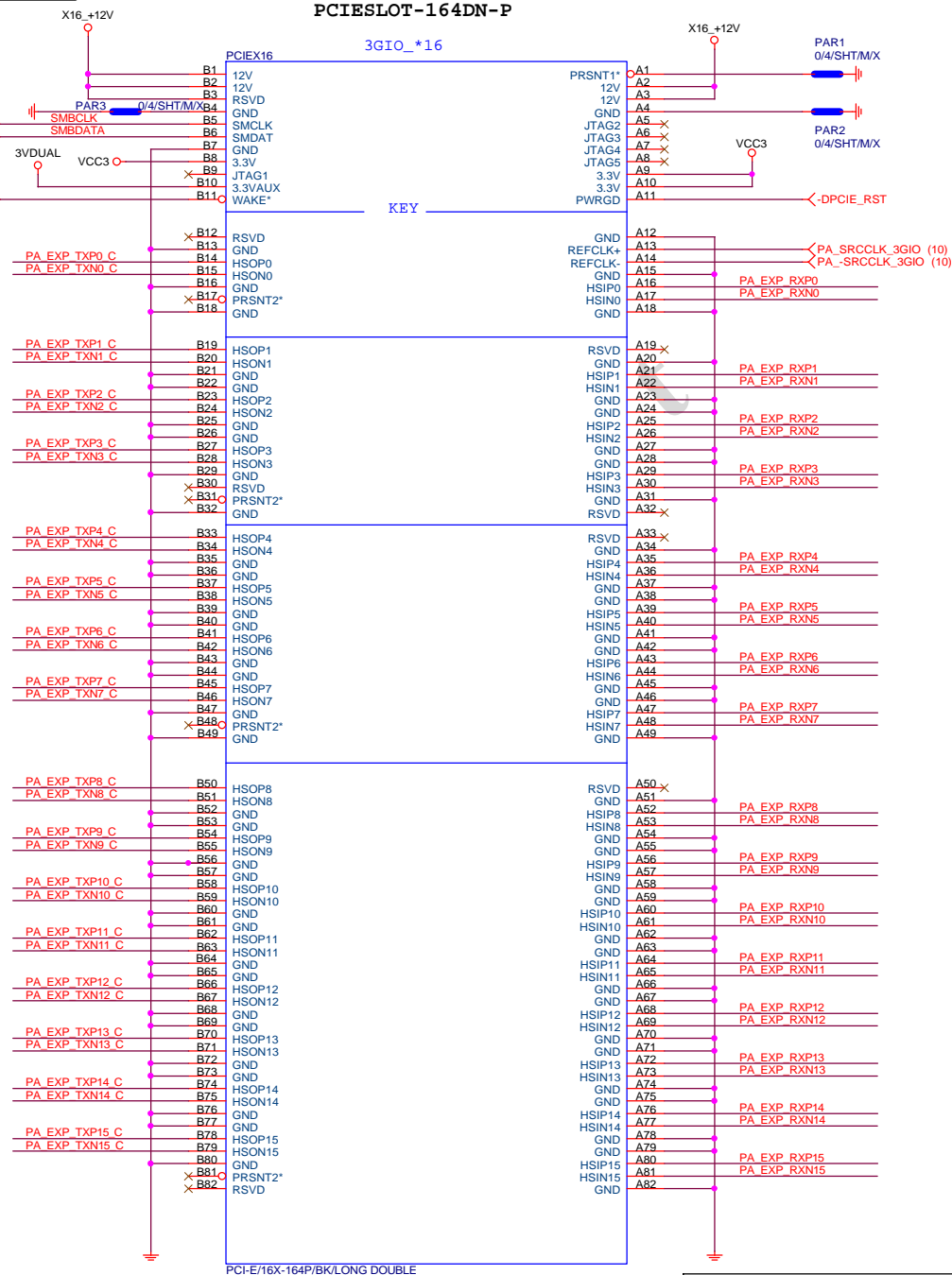
PA_EXP_TXP[0..15] \gg PA_EXP_TXP[0..15] (4)

PA EXP TXN[0..15] \gg PA_EXP_TXN[0..15] (4)

PCIEX16 SOFT RESET



PCIEX16	SLOT
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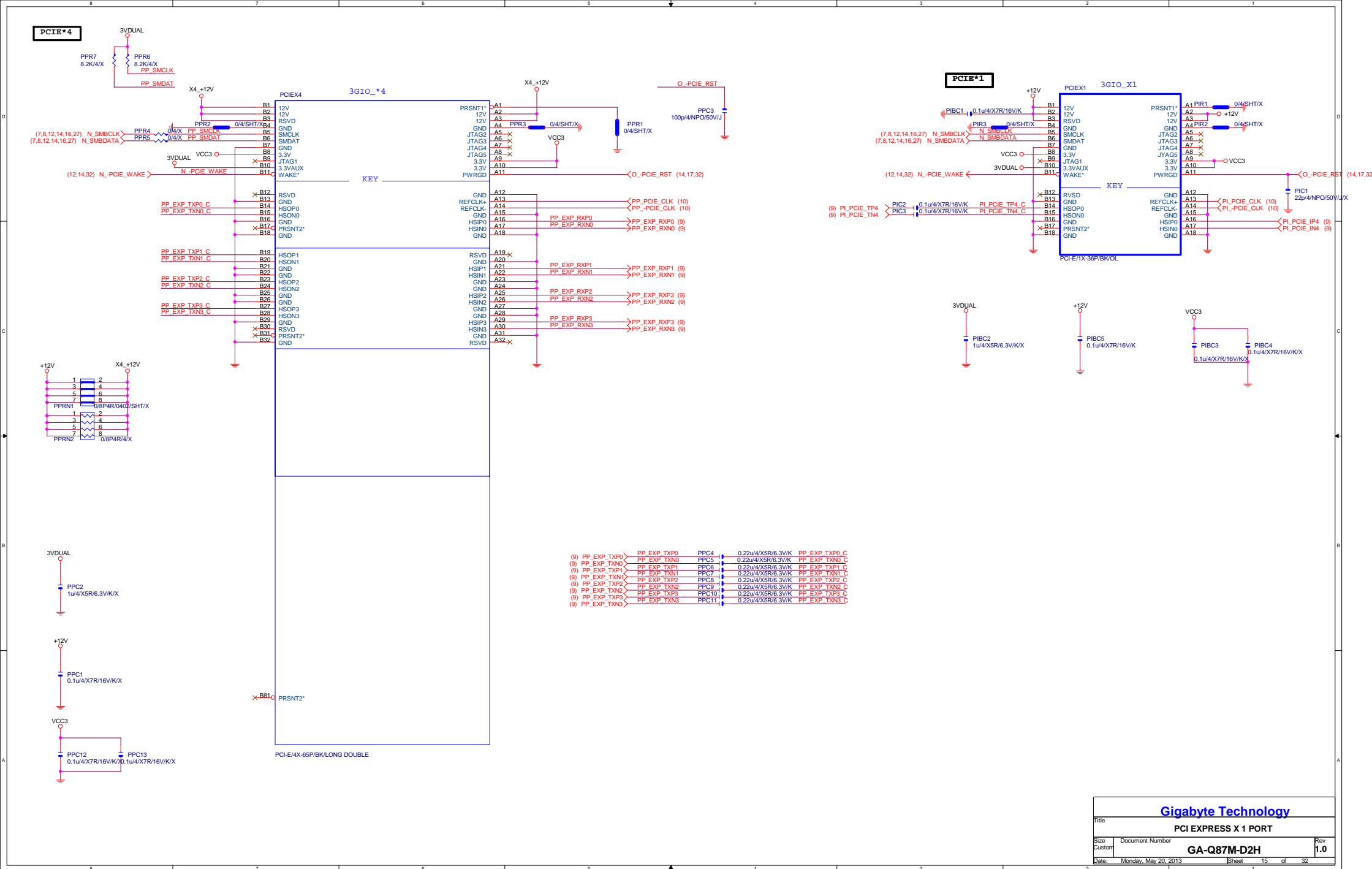


PCI-E/16X-164P/BK/LONG DOUBLE

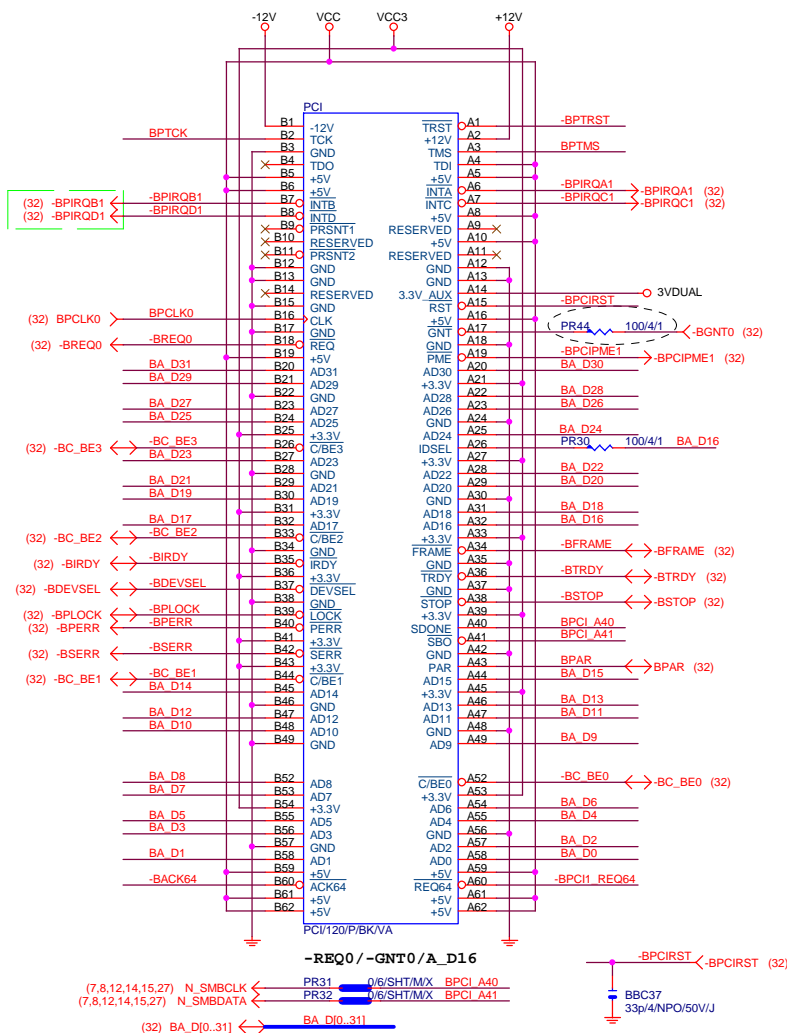
Gigabyte Technology

PCI EXPRESS * 16

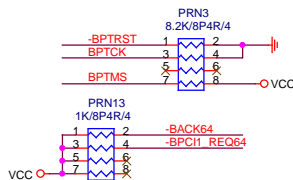
Title						PCI EXPRESS * 16									
Size Custom		Document Number						GA-Q87M-D2H				Rev			
												1.0			
Date:		Monday, May 20, 2013						Sheet		14		of		32	



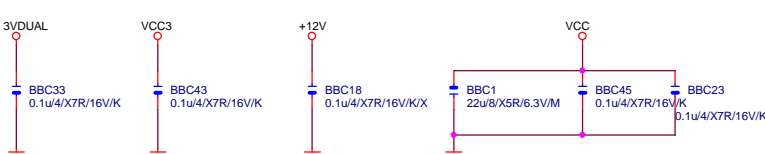
PCI SLOT



PCI PU



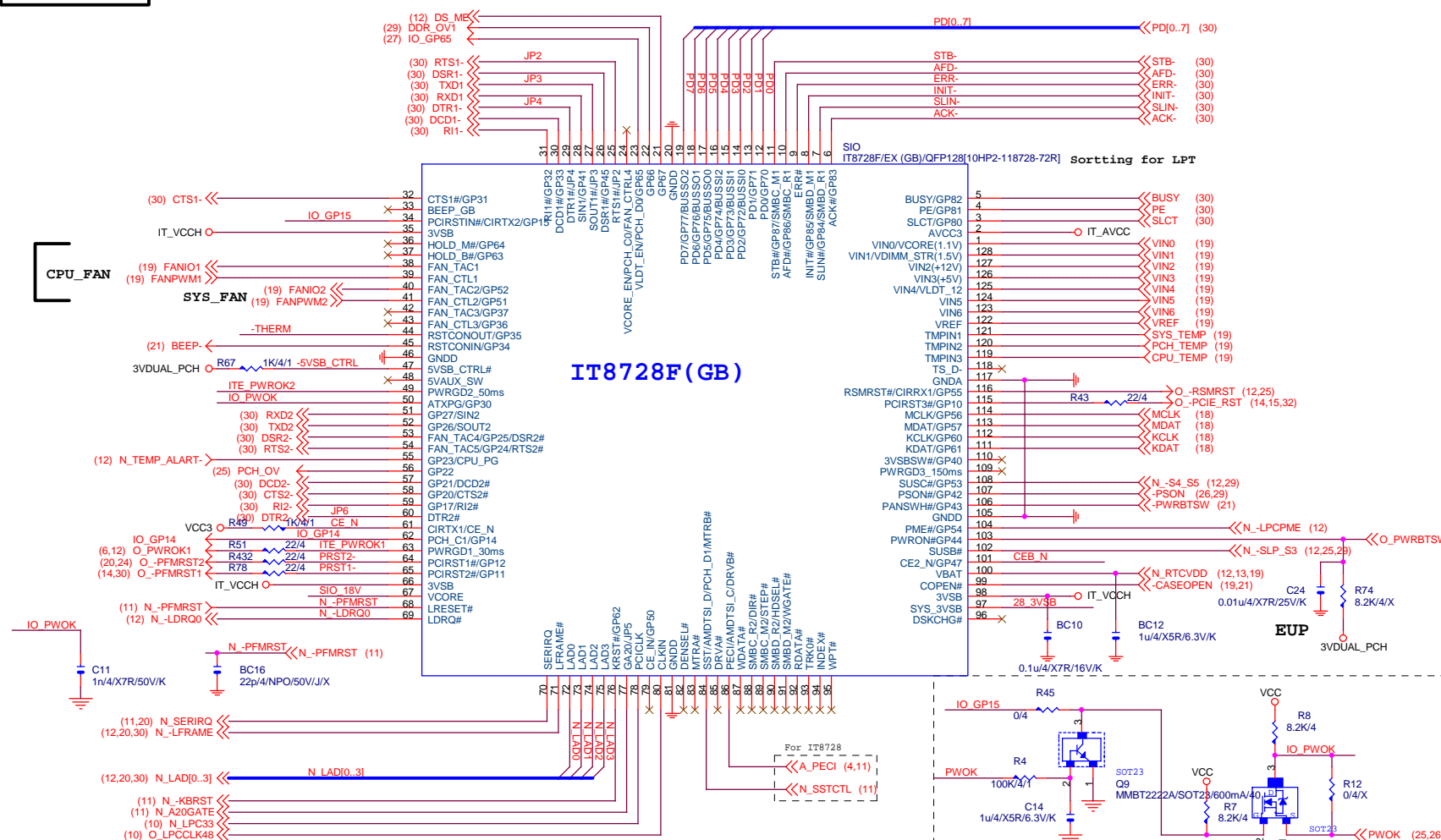
PCI CAP



Gigabyte Technology

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

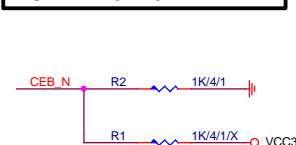
SIO IT8728F



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

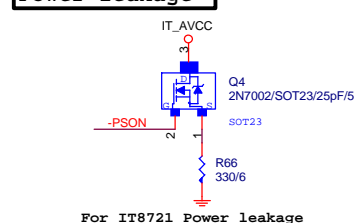
DUAL BIOS OPT STRAP



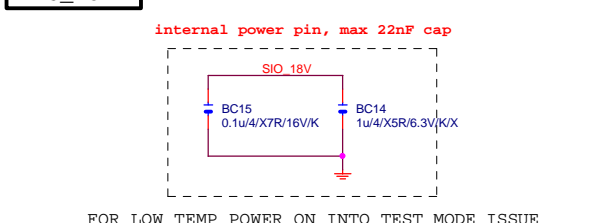
SIO CAP



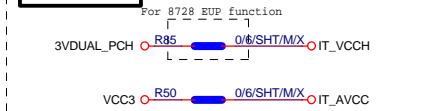
Power leakage



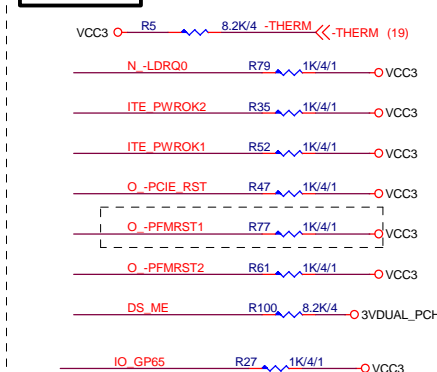
SIO 18V



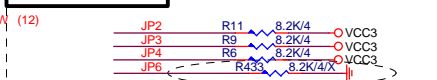
PWR SHT



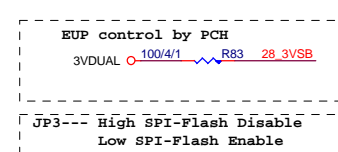
SIO	PU
-----	----



SIO STRAP



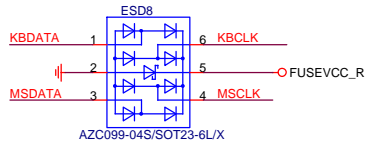
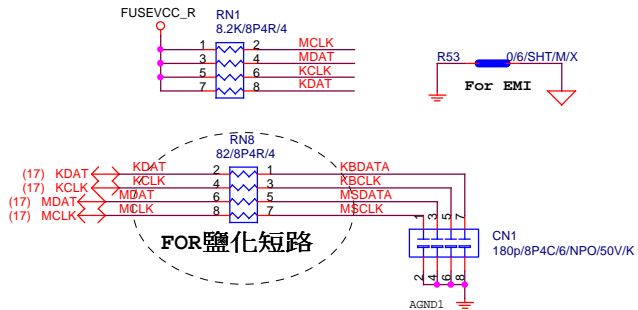
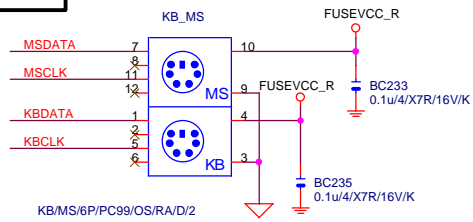
IT8728-EX
PULL DOWN ENABLE FORCE OVP



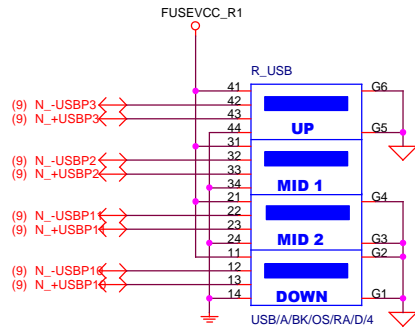
Gigabyte Technology

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

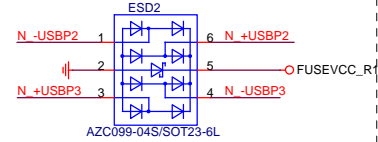
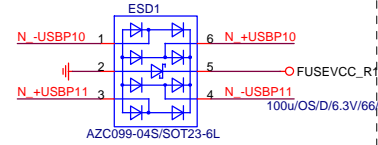
KB/MS



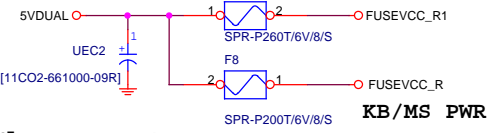
RUSB20



USB2.0 ESD



USB2.0 PWR



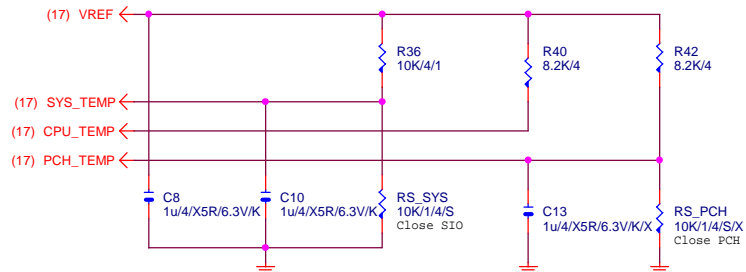
Close to USB connector

KB/MS PWR

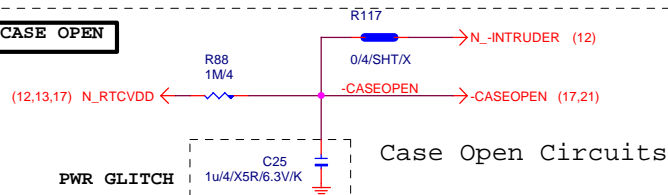
Gigabyte Technology

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

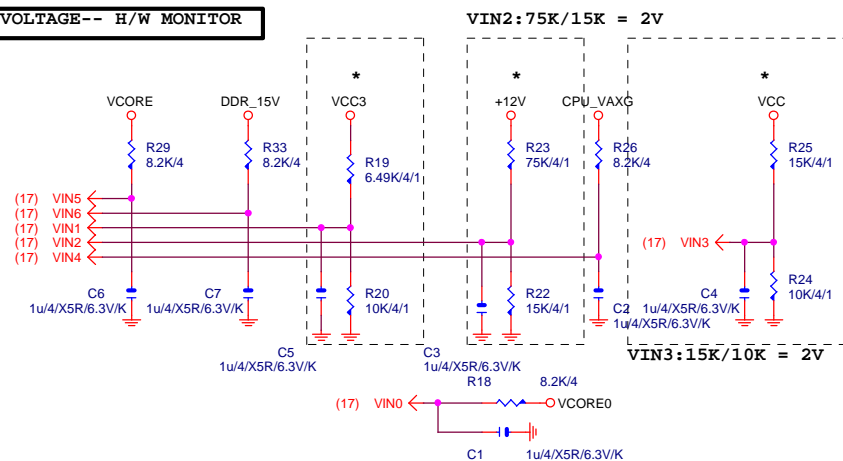
TEMP H/W MONITOR



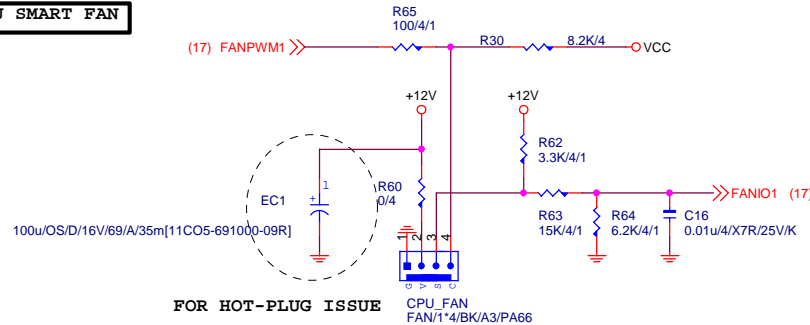
CASE OPEN



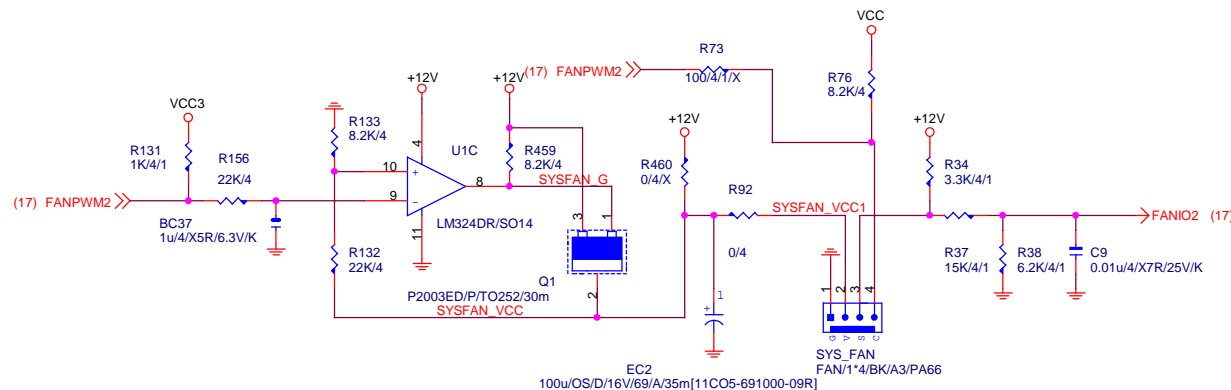
VOLTAGE-- H/W MONITOR



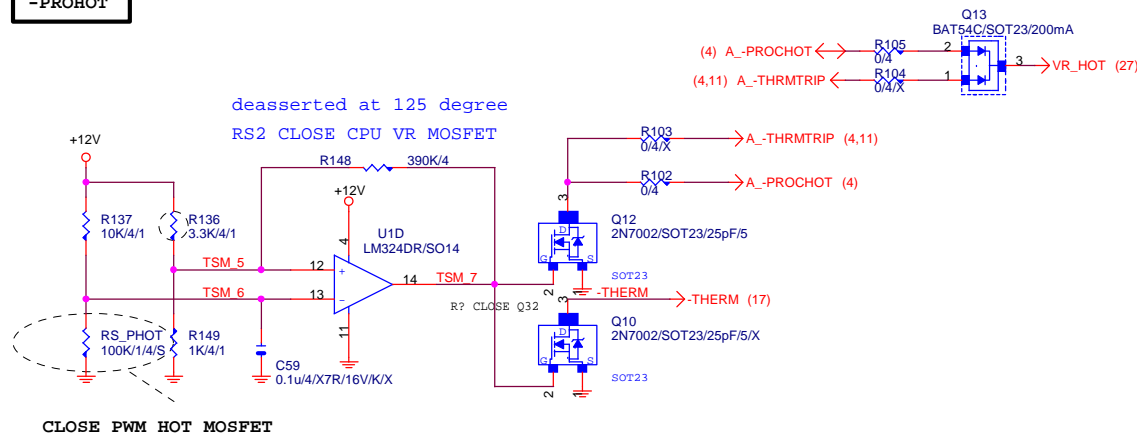
CPU SMART FAN



SYS SMART FAN



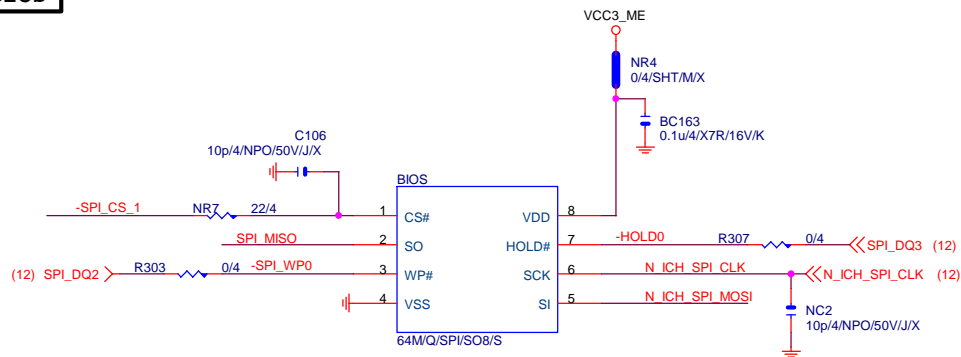
-PROHOT



Gigabyte Technology

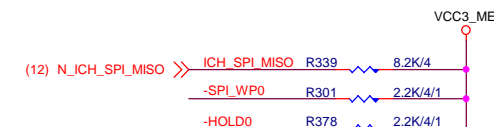
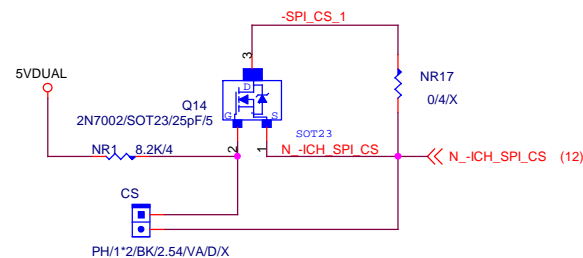
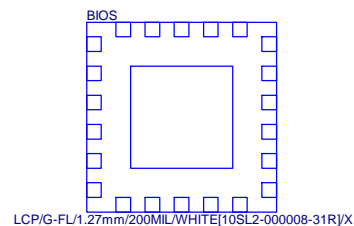
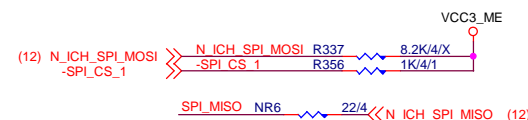
Title			HWM,FAN CTRL,OV
Size	Document Number	Rev	
Custom	GA-Q87M-D2H	1.0	
Date:	Monday, May 20, 2013	Sheet	19 of 32

BIOS

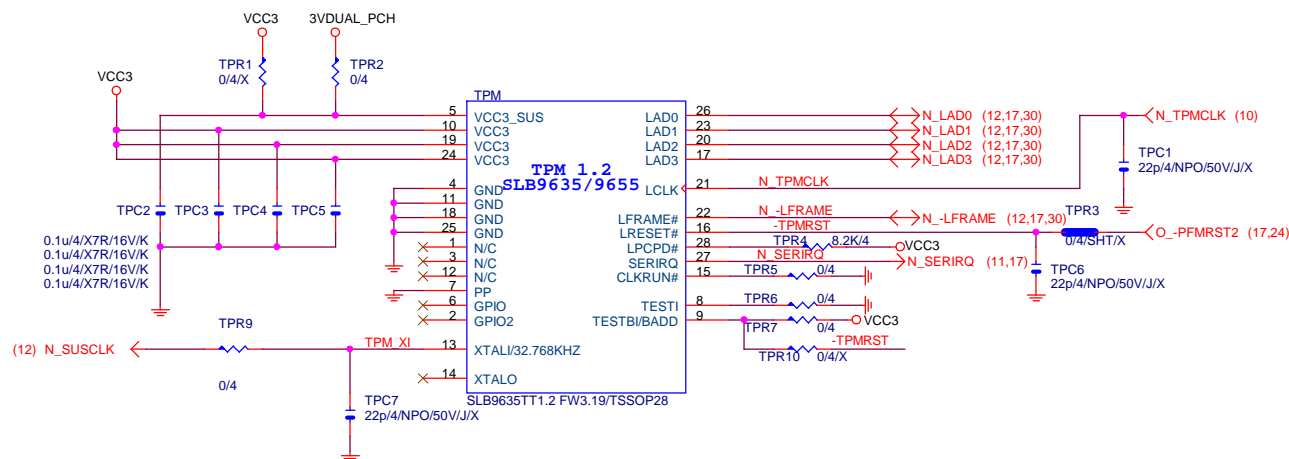


BOOT DEVICE	GP51	GP19
LPC	0	0
SPI	1	1

1 means internal PU
0 means PD 1K



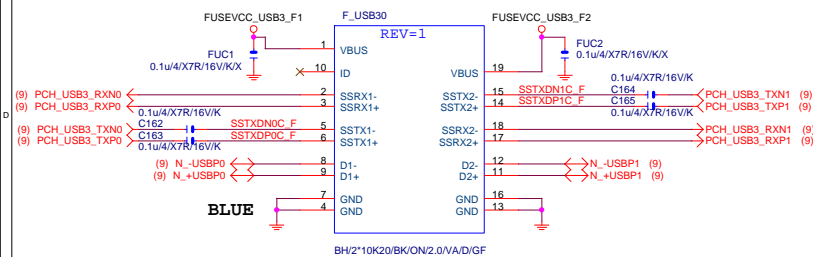
TPM



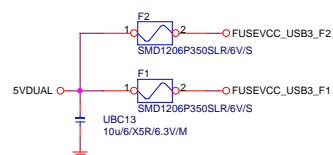
	SLB9635	SLB9655
TPR2, TPR4, TPR5, TPR6, TPR7, TPR9	MOUNT	N/A
TPR1, TPR10	N/A	MOUNT

Gigabyte Technology		
Title BIOS ,TPM		
Size B	Document Number GA-Q87M-D2H	Rev 1.0
Date: Monday, May 20, 2013	Sheet 20	of 32

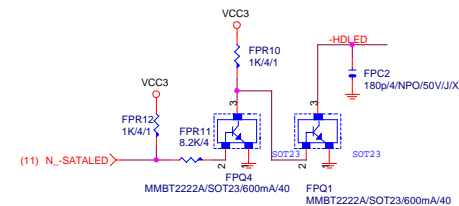
F_USB30



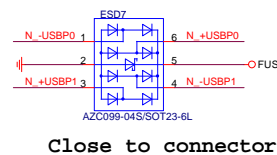
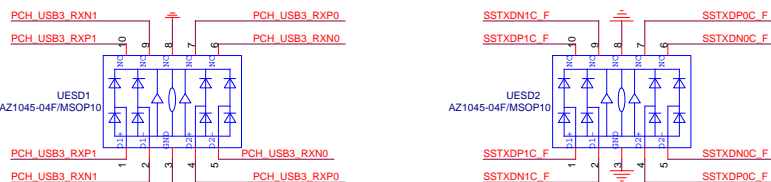
F_USB30 PWR



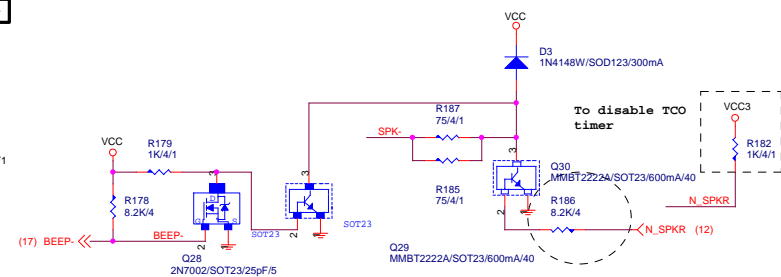
SATA LED



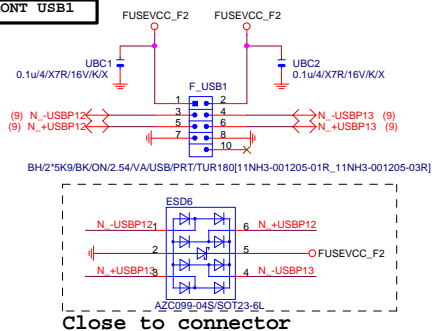
F_USB30 ESD PROTECT



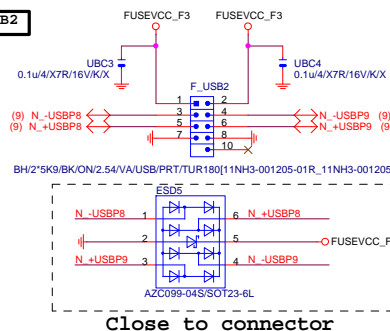
SPKR



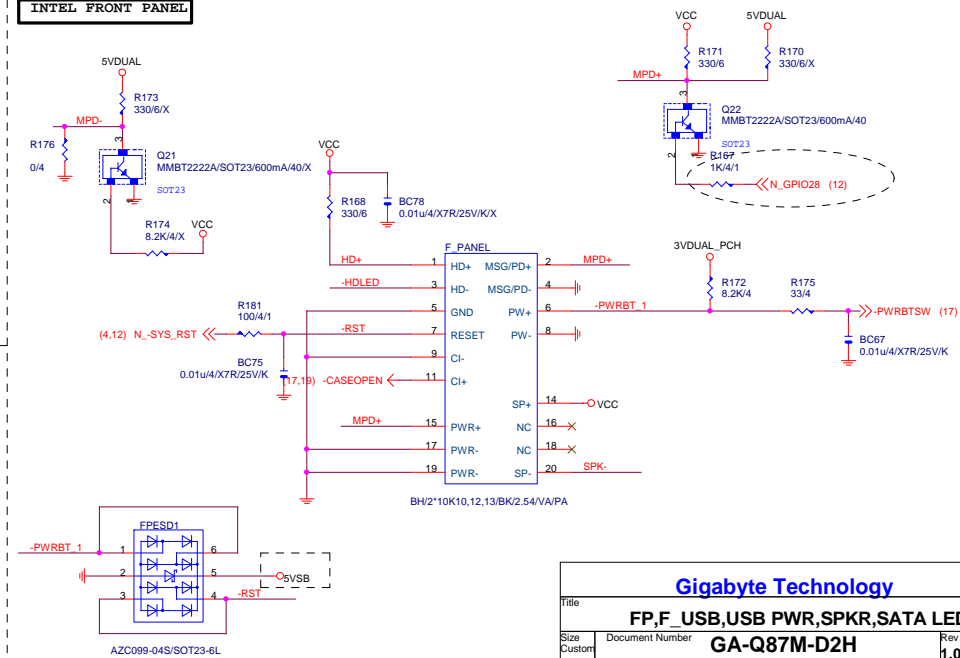
FRONT USB1



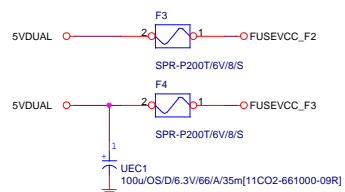
FRONT USB2



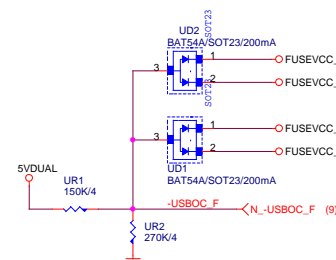
INTEL FRONT PANEL



FUSEVCC_F



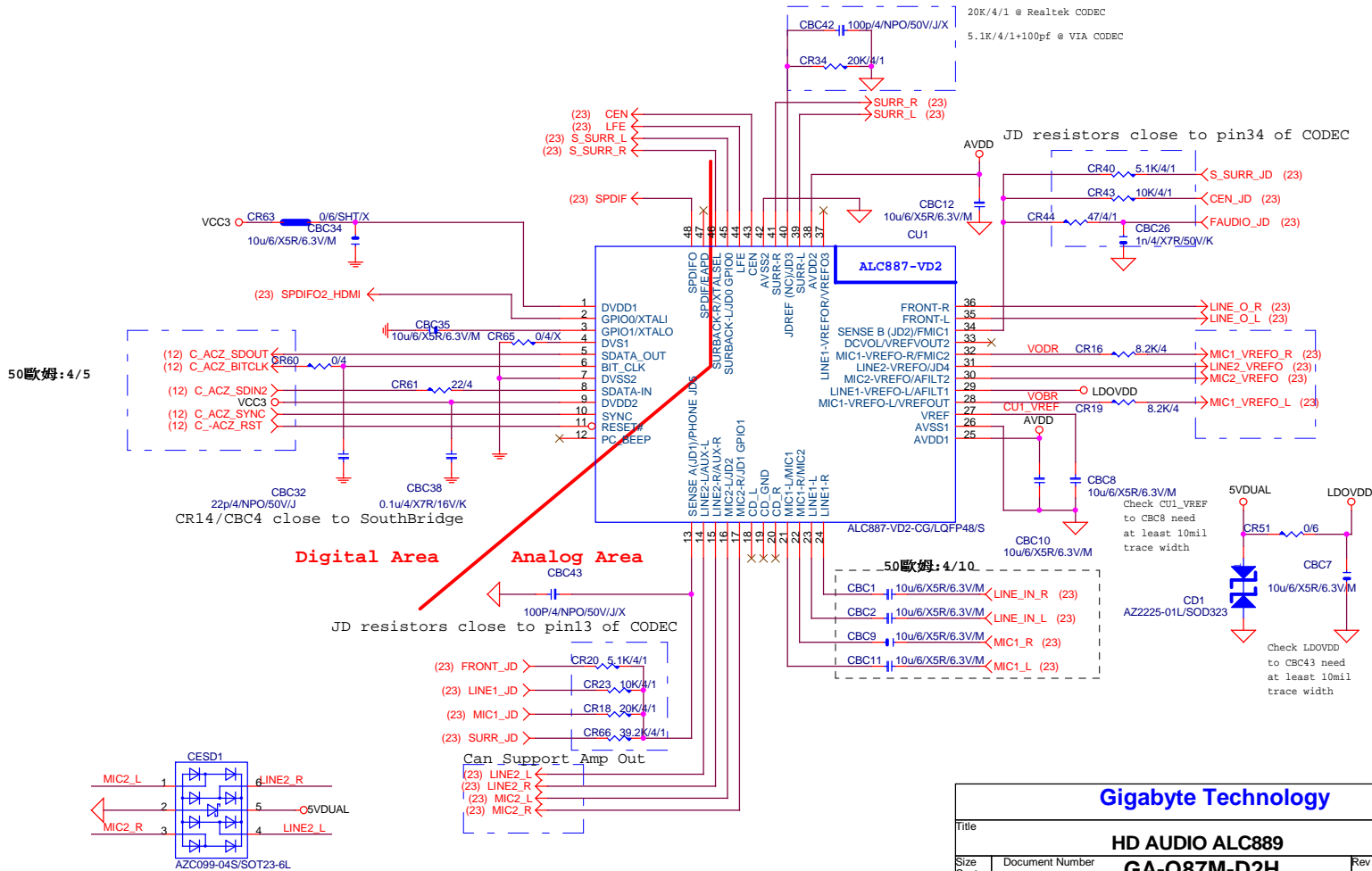
-USB0C_F



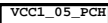
Gigabyte Technology			
Title	FP,F_USB,USB PWR,SPKR,SATA LED		
Size	Custom	Document Number	GA-Q87M-D2H
Date:	Monday, May 20, 2013	Sheet	21 of 32

AZALIA CODEC ALC892/ALC887-VD2/VT1708-CE Colay

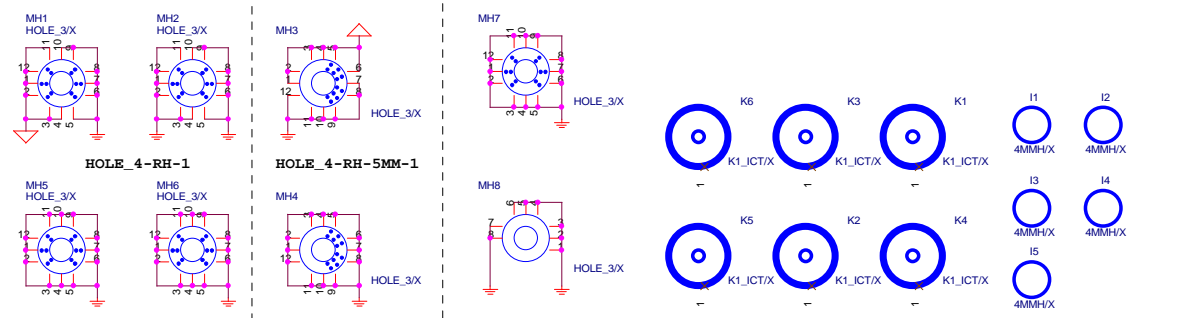
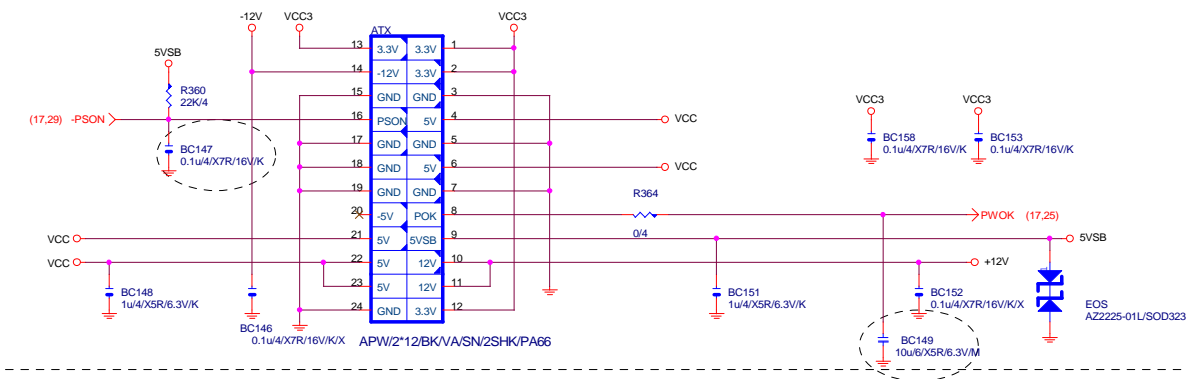
	ALC892	ALC887-VD2	VT1708S-CE
CR44/CBC26	47ohm+1nF	47ohm+1nF	22ohm+100P
CBC42/CBC43	X	X	100P/4
CR6/CR7/CR58/CR54/CR67/CR68/CR69/CR70/CR2/CR4	22K/4	22K/4	10K/4/1
CR5/CR8/CR1/CR14/CR17/CR22/CR73/CR74/CR13/CR11/CR57/CR53/CR75/CR76/CR27/CR29	62 ohm	62 ohm	75 ohm
CR16/CR19	8.2K/4	8.2K/4	3.3K/4
CESD1	O	O	O



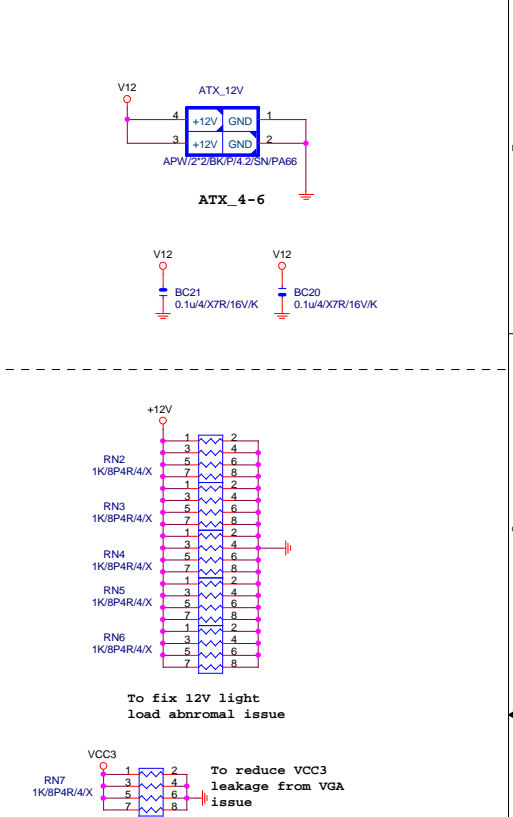
VCC1_5_PCH



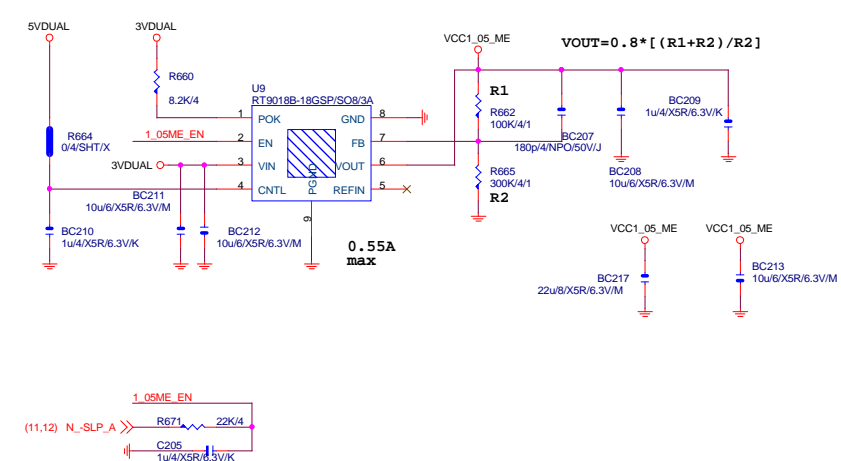
ATXX24 POWER CONNECTOR



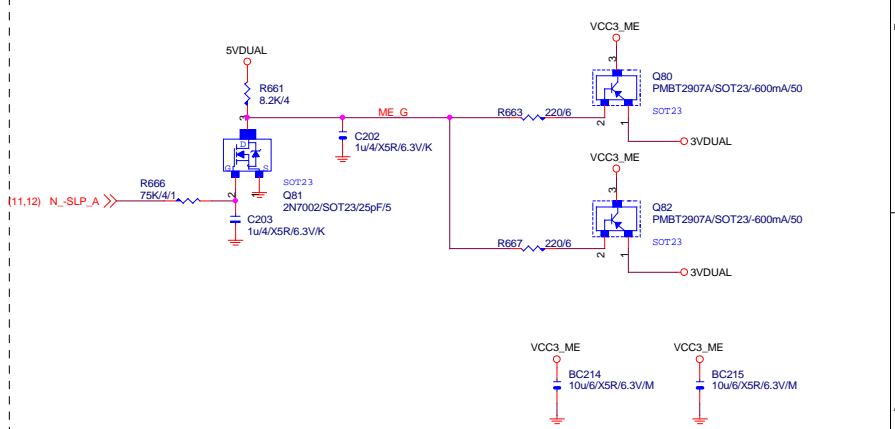
ATXX4 POWER CONNECTOR

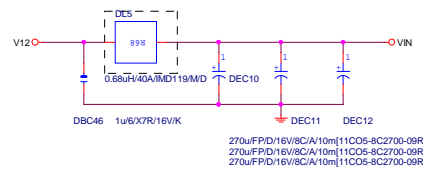
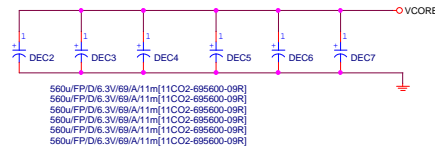
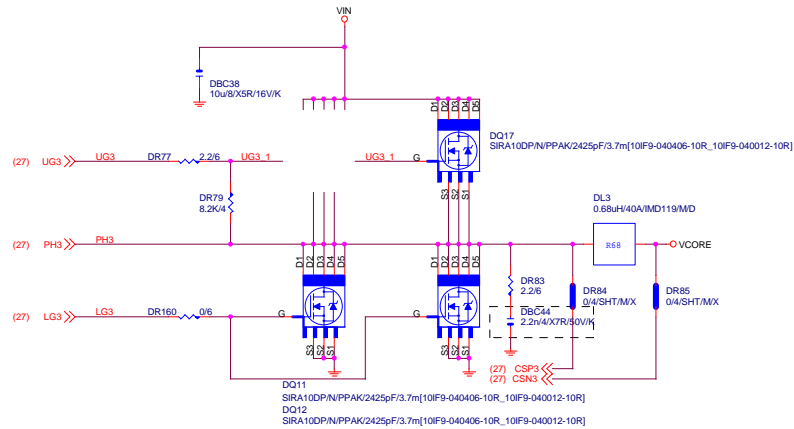
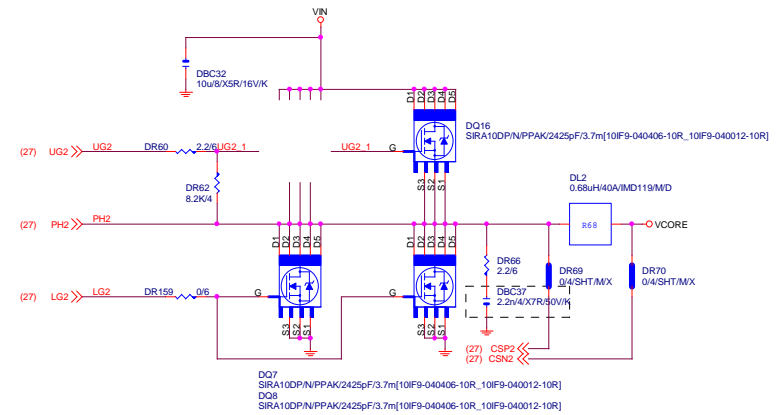
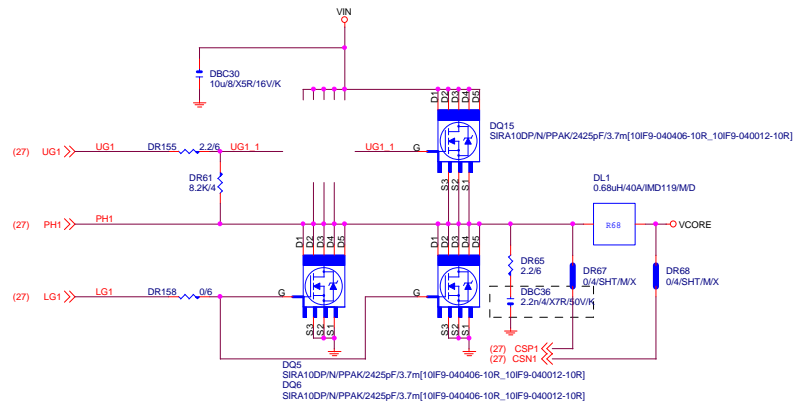


VCC1_05_ME



VCC3_ME

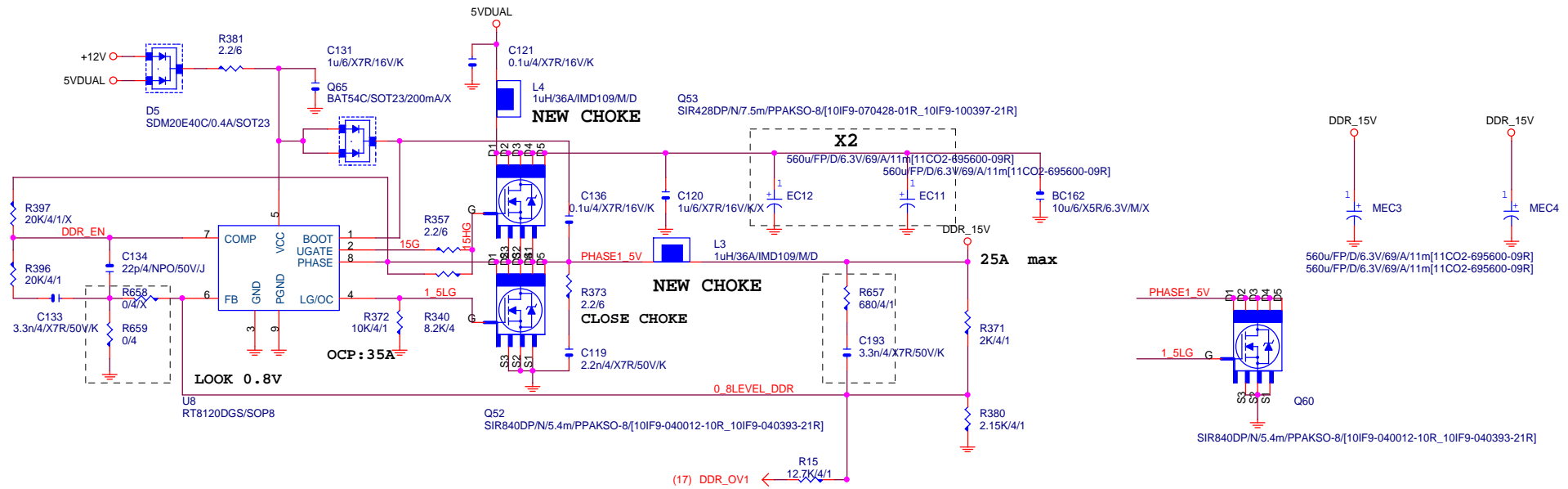




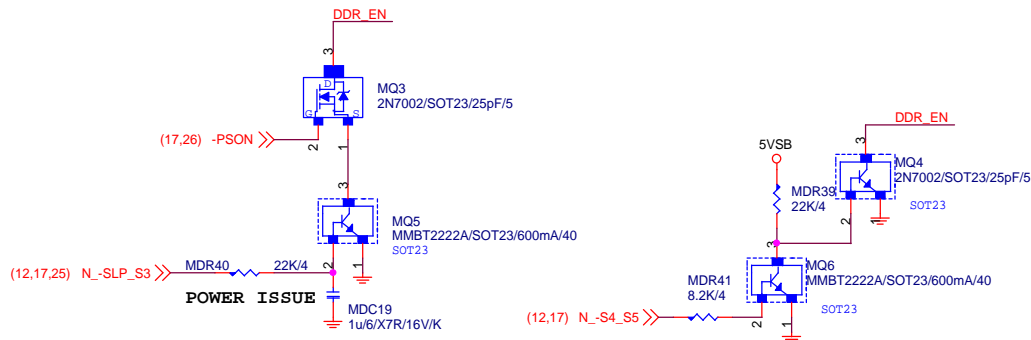
Gigabyte Technology

Title			CPU CORE VR-2
Size	Document Number	GA-Q87M-D2H	
Custom			Rev 1.0
Date:	Monday, May 20, 2013	Sheet	28 of 32

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

$R_{ocset} = (I_{ocp} \cdot L_{gate} + r_{dson}) / I_{ocset}$

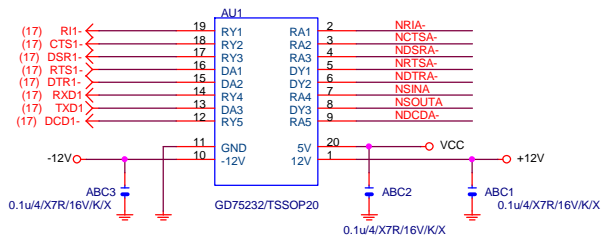
$R_{ocset} = (45A \cdot 6.7m\Omega + 10\mu A) = 30K$

$I_{ocset} = 10\mu A$

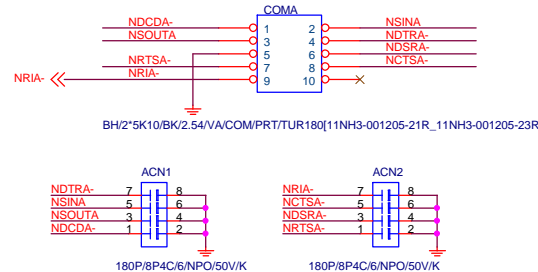
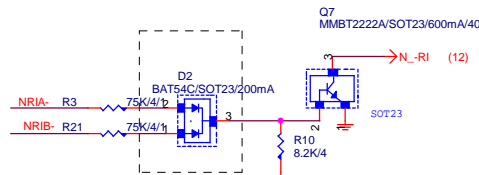
Gigabyte Technology

Title		
DDR POWER		
Size	Document Number	Rev
Custom	GA-Q87M-D2H	1.0
Date:	Monday, May 20, 2013	Sheet 29 of 32

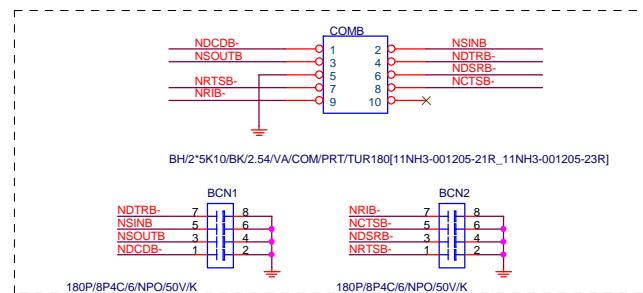
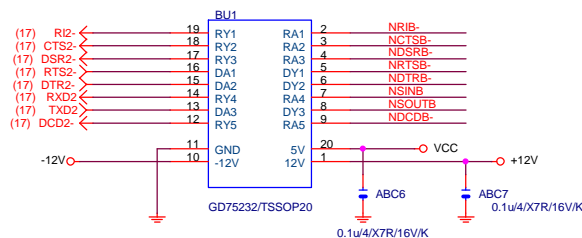
COMA



COM RI

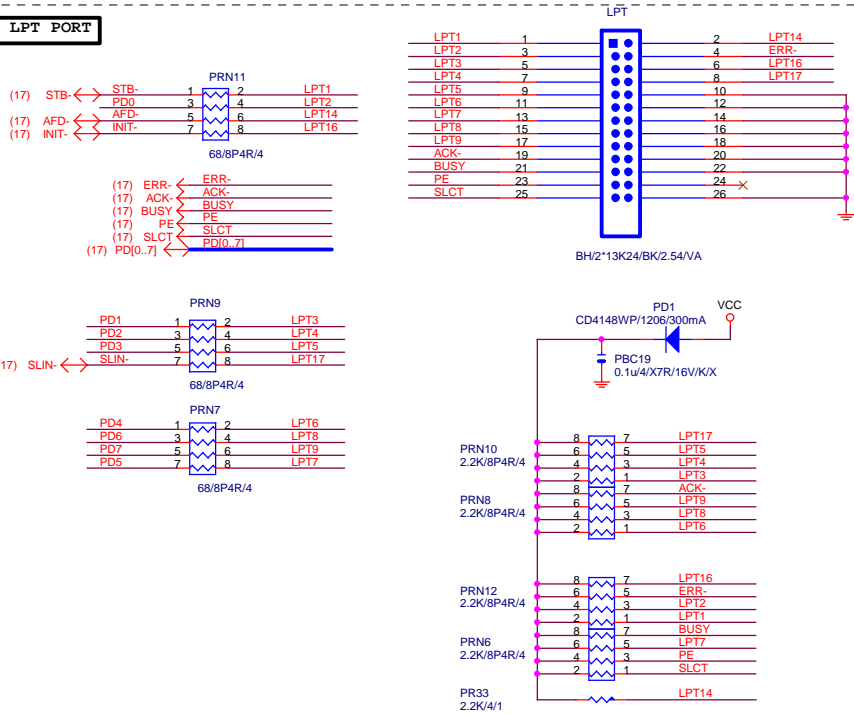


COMB

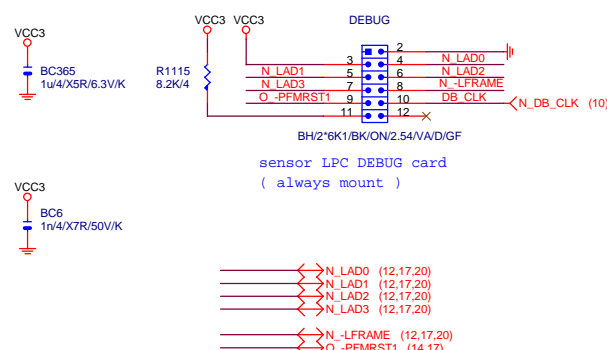


PLACE NEAR COM CONNECTOR

LPT PORT

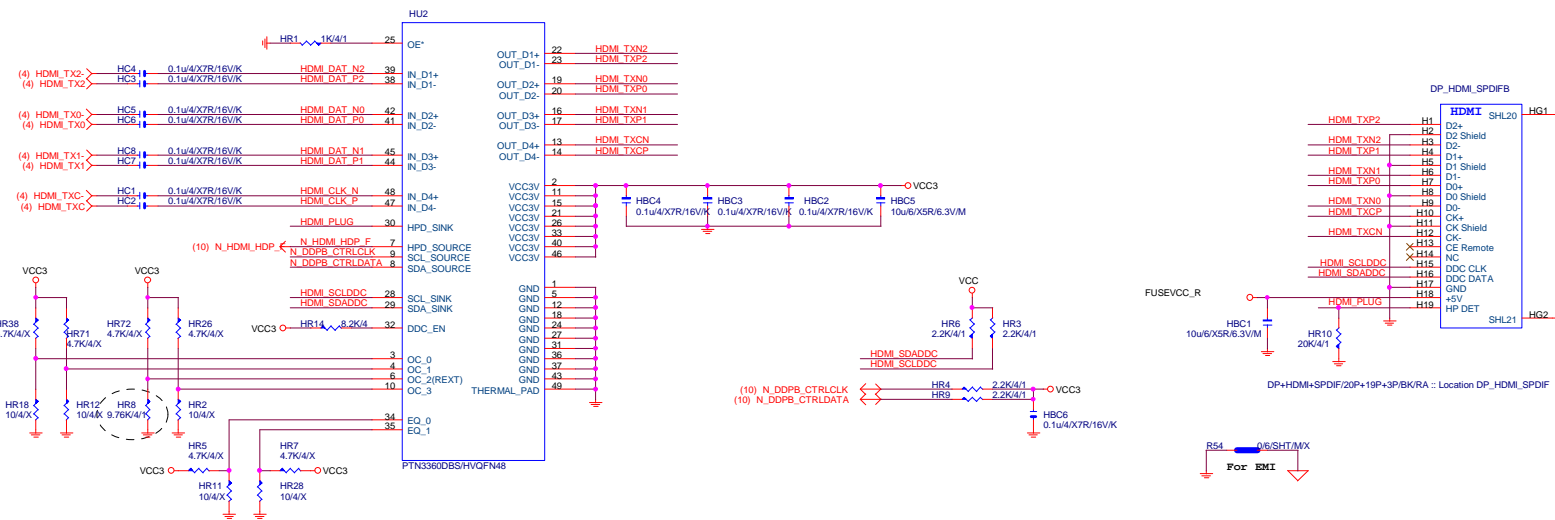


80 PORT



Gigabyte Technology			
Title			
COM A/B & LPT & 80 PORT			
Size	Document Number	Rev	
Custom			
GA-Q87M-D2H			1.0
Date:	Monday, May 20, 2013	Sheet	30 of 32

HDMI LEVEL SHIFT



DVI LEVEL SHIFT

