

Model Name: GA-H81M-HD3

Revision 1.05

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 X16 SLOT
15	PCI EXPRESS X1 SLOT
16	PCI SLOT 1,2
17	ITE 8620 LPC IO
18	COM,LPT,KB_MS
19	HWM,FAN CTRL,OV,-PROCHOT
20	DUAL BIOS
21	R_USB30,FP,FUSB,SPK,SATALED
22	CODEC ALC892
23	REAR AUDIO JACK
24	REALTEK RTL8111F
25	DISCRETE POWER
26	ATX
27	VCORE ISL95812_1

SHEET

TITLE

28	VCORE ISL95812_2
29	RT8120_DDR POWER
30	DVI
31	ITE IT8892E
32	USB3 VL805
33	HDMI/DP
34	F_USB30

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Cover Sheet

Size Custom	Document Number GA-H81M-HD3	Rev 1.05
Date:	Thursday, November 21, 2013	Sheet 1 of 33

Revision 1.05

Component value change history

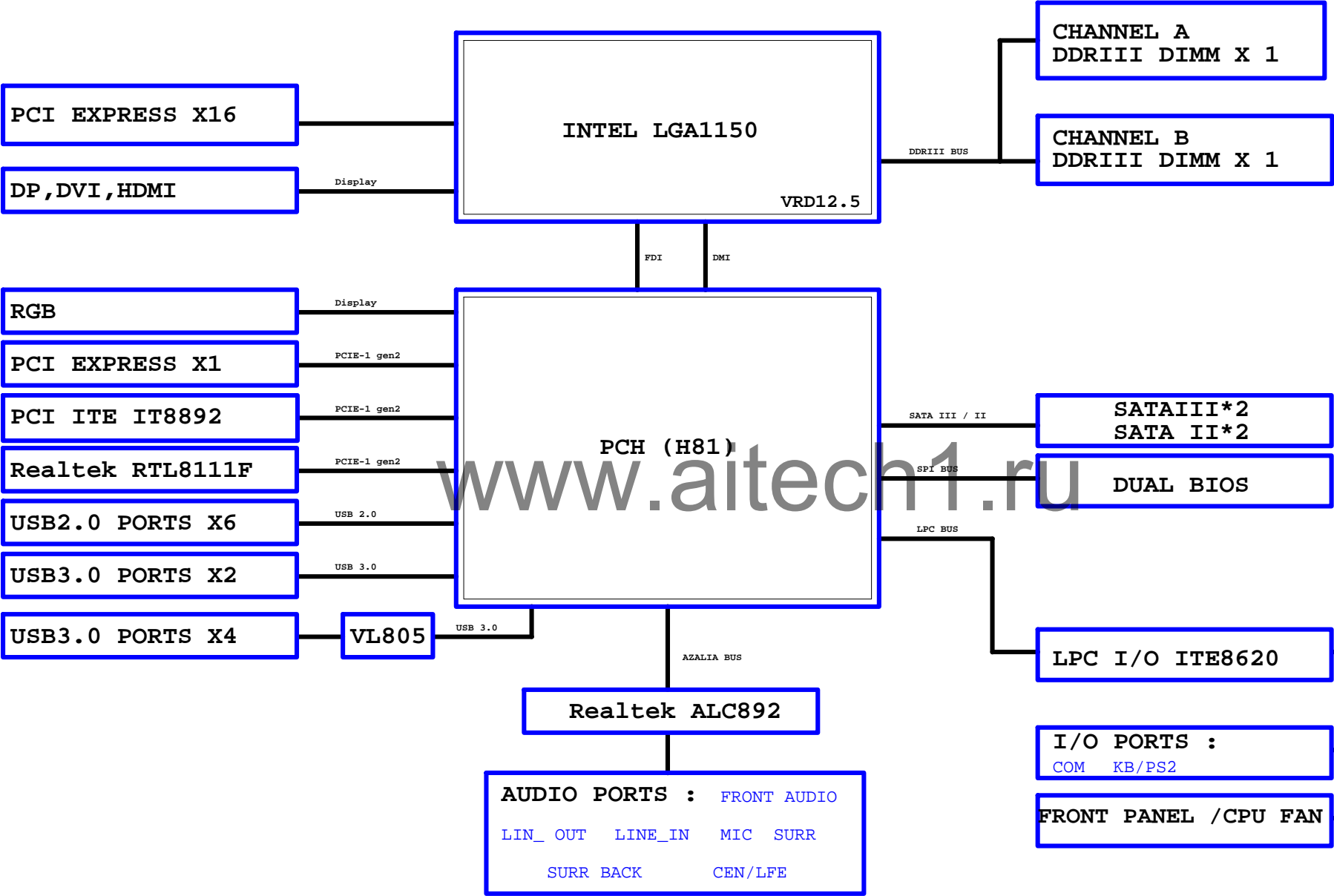
2013/04/22

[illegible]

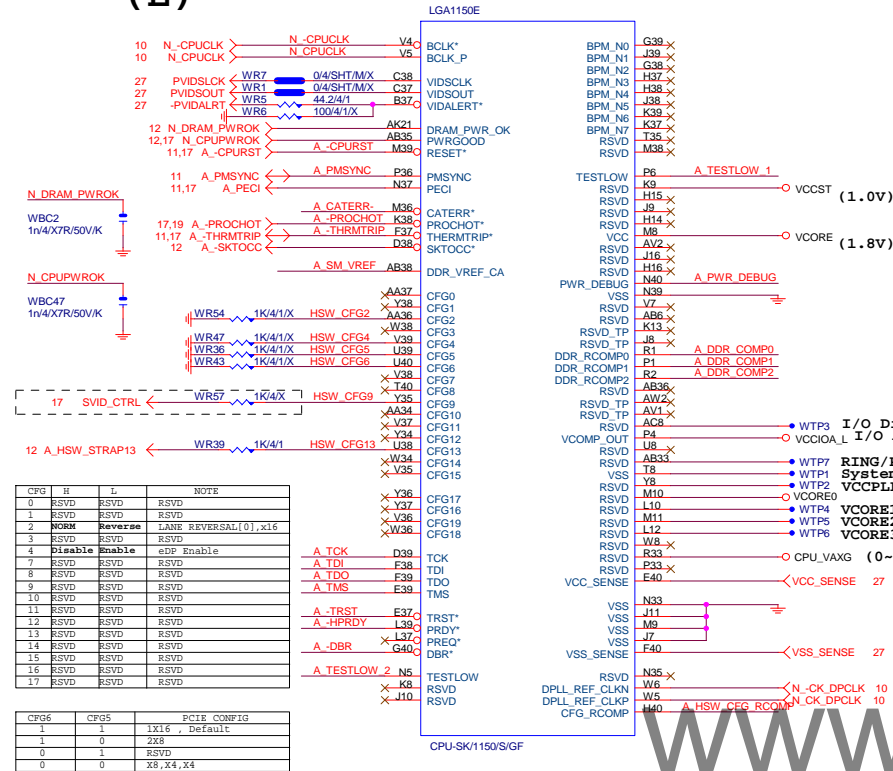
Circuit or PCB layout change

[illegible]

BLOCK DIAGRAM



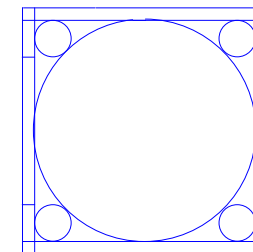
LGA1150 (E)



LGA1150A

CPU-SK/1150/S/GF

LGA1150B

CPU-SK/1150/S/GFCR
CPU RETAINTION/X

LGA1150

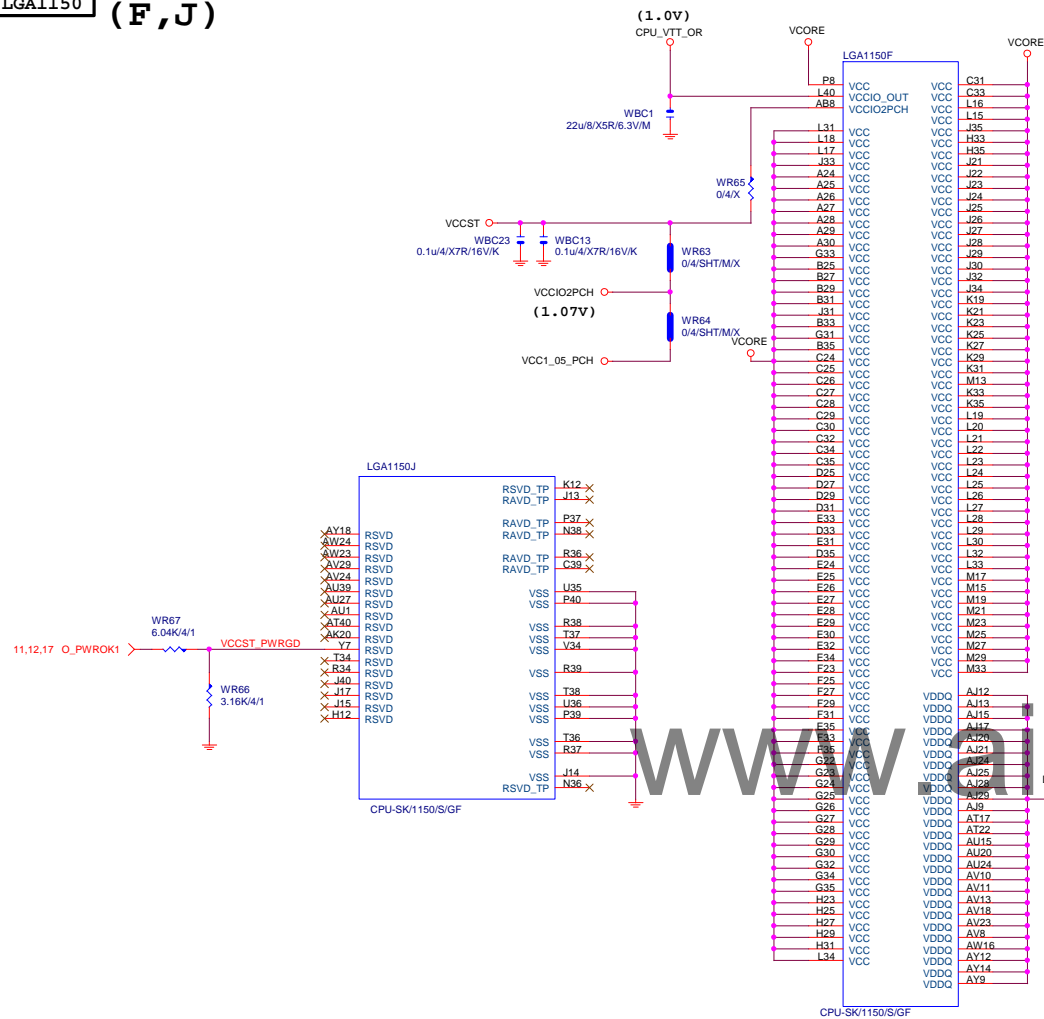


ILM_BP/1156/CSP/ILM_BP/1156/CSP/[12KRC-0F0001-52R 12KRC-0F0001-51R]

DDR BUS

7	MODT_A[0..1]	↔	MODT_A[0..1]
8	MODT_B[0..1]	↔	MODT_B[0..1]
7	MDA[0..63]	↔	MDA[0..63]
8	MDB[0..63]	↔	MDB[0..63]
7	DQSA[0..7]	↔	DQSA[0..7]
7	-DQSA[0..7]	↔	-DQSA[0..7]
7	MAAA[0..15]	↔	MAAA[0..15]
8	MAAB[0..15]	↔	MAAB[0..15]
8	DQSB[0..7]	↔	DQSB[0..7]
8	-DQSB[0..7]	↔	-DQSB[0..7]

LGA1150 (F, J)

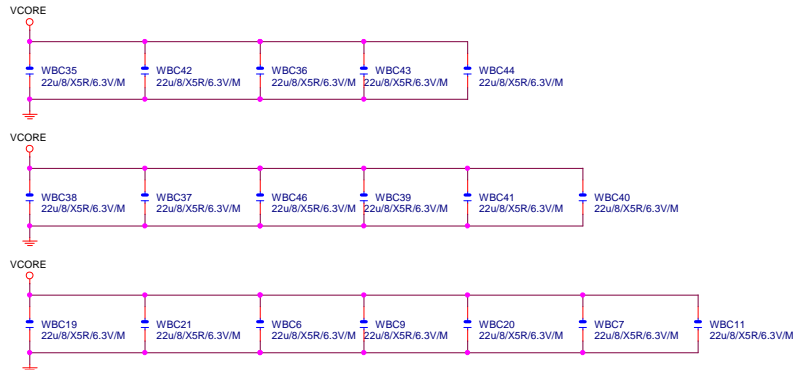


LGA1155 (G,H,I)



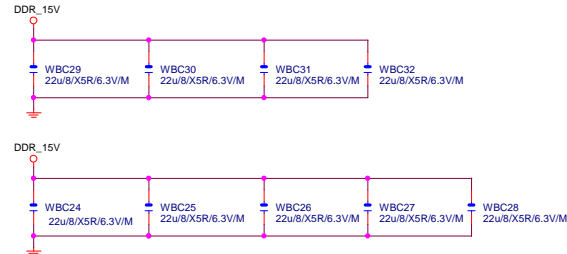
VCore CAP

(X18)



DDR CAP

(x9)



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Title	CD111 CA1150 C
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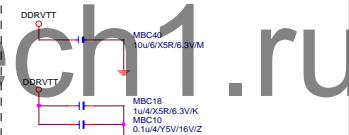
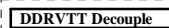
Size	Document Number	Rev
	GA-H81M-HD3	

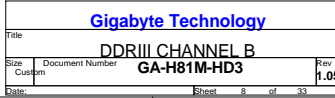
Custom	GA-1101M-TDS	1.05
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(A)



MODT_A[0..1] ↔ MODT_A[0..1] 5
 -DQSA[0..7] ↔ -DQSA[0..7] 5
 DQSA[0..7] ↔ DQSA[0..7] 5





DMI:12/4/4/4/12(breakout min 8/4/4/4/8)
Impedance=85 +- 17.5%

W=4 mil out of PCH 4 A_DMI_3RXN ← A_DMI_3RXP B24 DMI_TXN_3
S=15 mil out of PCH 4 A_DMI_3RXP ← A_DMI_3RXN B24 DMI_TXP_3

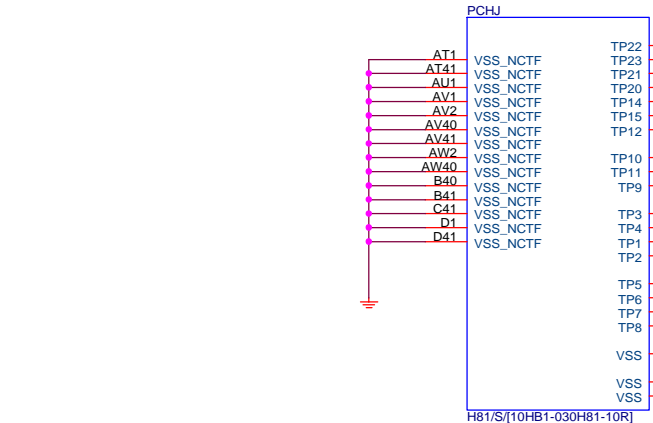
VCC1_5_PCH ○ — NR50 7.5K/4/1 DMI_COMP B19 DMI_RCOMP
NR40 7.5K/4/1 PCIE_COMP C13 PCIE_RCOMP

PCIE Only				
B11	PCIE_PETN_1_USB3_TXN	2		
F14	PCIE_PETP_1_USB3_TXP	2		
G14	PCIE_PERN_2_USB3_RXN	3		
D11	PCIE_PERP_2_USB3_RXP	3		
C11	PCIE_PETN_2_USB3_TXN	3		
	PCIE_PETP_2_USB3_TXP	3		

N/A

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

(5)



PCHB

[illegible]

PCIE_PETN_1_USB3_TXN_2 USBP_12 AP20 H81: Port 6/7/12/13 N/A
PCIE_PETP_1_USB3_TXP_2 USBN_13 AN20
PCIE_PERN_2_USB3_RXN_3 USBP_13
PCIE_PERP_2_USB3_RXP_3
PCIE_PETN_2_USB3_TXN_3 OC0B_GP59 AE40
PCIE_PETR_2_USB3_TXR_3 OC1B_GP40 AF37
N_-USBOC_F 21,33

PCIE_PERP_2	USB3_RXM3_3		OC0B_GP59	AE40		<N_USBOC_F	21,33
PCIE_PETN_2	USB3_TXM3_3		OC1B_GP40	AF37			
PCIE_PERP_3	USB3_TXP3_3		OC2B_GP41	AD39			
PCIE_PERP_3			OC3B_GP42	AD40			
PCIE_PETN_3			OC4B_GP43	AF38		<N_USBOC_R	18,21
PCIE_PETP_3			OC5B_GP8	AC41			
PCIE_PERN_4			OC6B_GP10	AF40			
PCIE_PERP_4			OC7B_GP14	AG40	N GPIO14		
PCIE_PETN_4							
PCIE_PETP_4							
PCIE_PERN_5			USBRBIASB	AV20	N USBRBIAS		
PCIE_PERP_5			USBRBIASB	AU20			
PCIE_PETN_5							
PCIE_PETR_5							
CLKIN_D0T96N				AP11	CK -DOTCLK		
CLKIN_D0T96P				AM11	CK DOTCLK		

PCIE.PETN.6
 PCIE.PETN.6
 PCIE.PERN.7
 PCIE.PERP.7
 PCIE.PETN.7
 PCIE.PETP.7
 PCIE.PERN.8
 PCIE.PERP.8
 PCIE.PETN.8
 PCIE.PETP.8

NR130
 8.2K/4
 3V3DUAL
 N_GPIO14
 N_USB00_F
 N_USB00_R
 NBC82
 0.1u4/X7R/16V/K
 NBC83
 0.1u4/X7R/16V/K

H81/S/I10HB1-030H81-10R]

N/A

X K20	USB3_RXN_4	FDI_RCOMP	K2	NR29	7.5K
L 20	USB3_RXP_4				
D 15	USB3_TXN_4				
C 15	USB3_TXP_4				
X L18	USB3_RXN_5				
K 18	USB3_RXP_5				
B 14	USB3_TXN_5				
A 14	USB3_TXP_5				

N/A

C15	USB3_TXP_4
L18	USB3_RXN_5
K18	USB3_RXP_5
B14	USB3_TXN_5
A14	USB3_TXP_5

VCC3

NR62 8.2K/4 AK28 TACH6_GP70

NR63 8.2K/4 AT34 TACH7_GP71

FDI TXP[0..1] >> FDI TXP[0..1] 4

```
ED1_TXN[0..1]  >> TXN[0..1]

```

USB3.0:20/5/7/5/20 (breakout min
8/4/4/4/8) ; ONLY 3 VIAS

Impedance=85 +/- 17.5%
Back Panel < 10000 MILS
Front Panel < 6000 MILS

PCH CLK PD

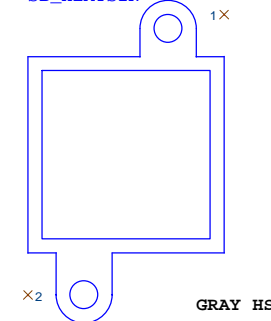
CK_SRCCLK_PCH NR89 8.2K/4
CK_-SRCCLK_PCH NR88 8.2K/4

Mount for integrated clock Generation Mode

CK_DOTCLK NR92 8.2K/4
CK_DOTCLK NR91 8.2K/4
NR225 short to GND in non
graphic SKU

PCH H/S

SB HEATSIN



PCH_HS
PCH_HS/[12SP2-S04208-61R_12SP2-S04208-62R_12SP2-S04208-63R]

USB TABLE

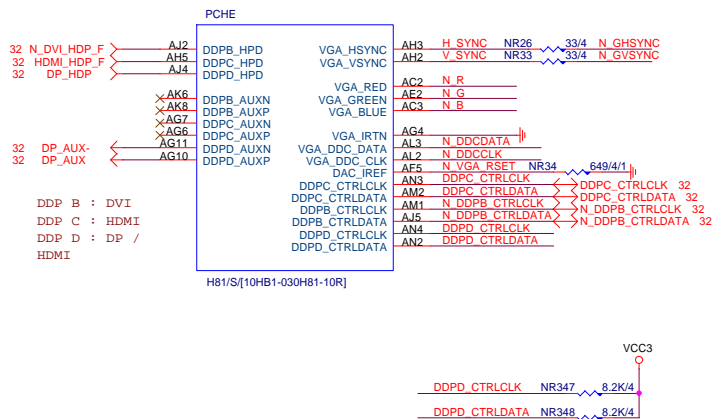
```
OC[3:0]# for Device 29 (ports 0-7)
OC[7:4]# for Device 26 (ports 8-13)
```

USB OC#	Configure
OC0#	R_USB30
OC1#	USB30_LAN
OC2#	N/A
OC3#	N/A
OC4#	F_USB1
OC5#	F_USB2
OC6#	N/A
OC7#	Not Use

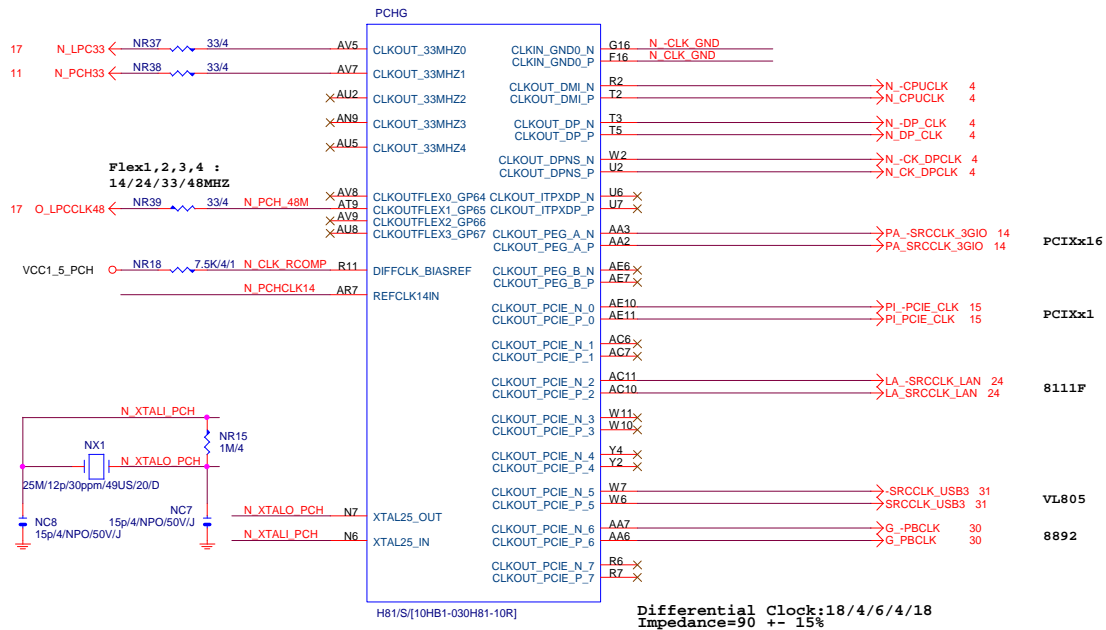
Gigabyte Technology

Title			
PCH FDI,DMI,USB ,PCIE,NVRAM			
Size	Document Number	Rev	
Custom	GA-H81M-HD3	1.05	
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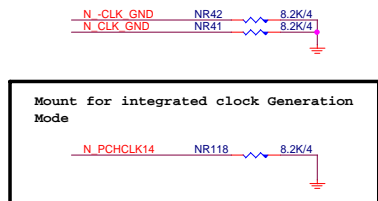
PCH (E)



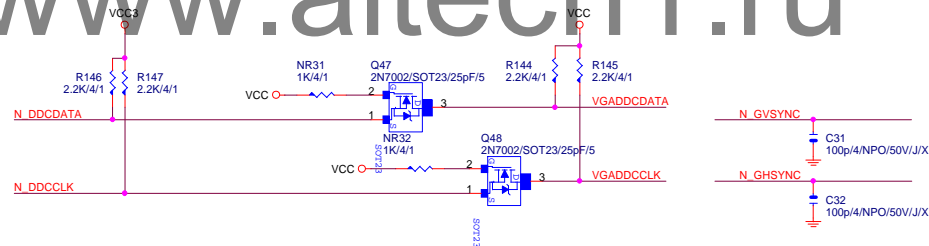
PCH (G)



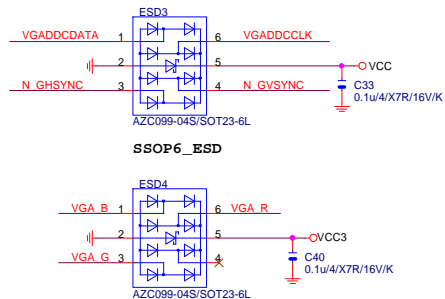
PCH CLK PD



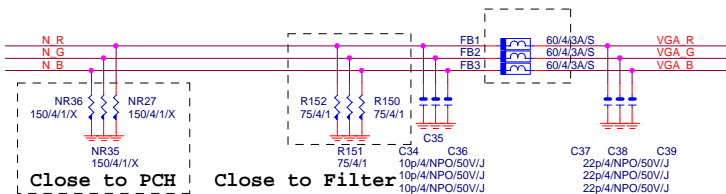
VGA DDC



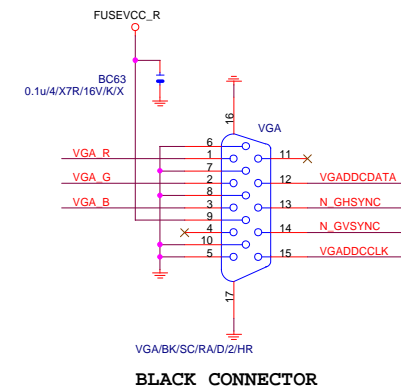
VGA ESD



VGA DDC

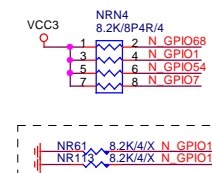
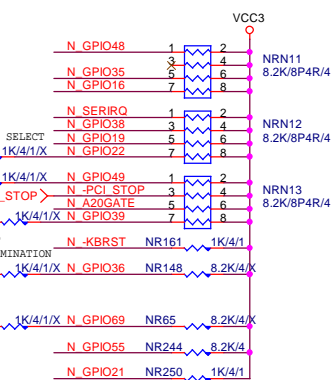
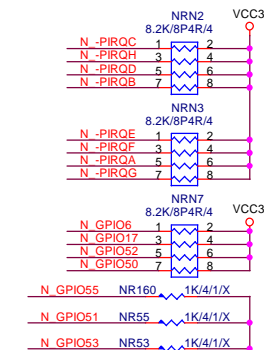
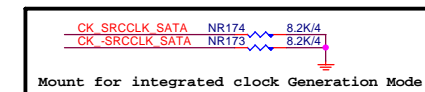
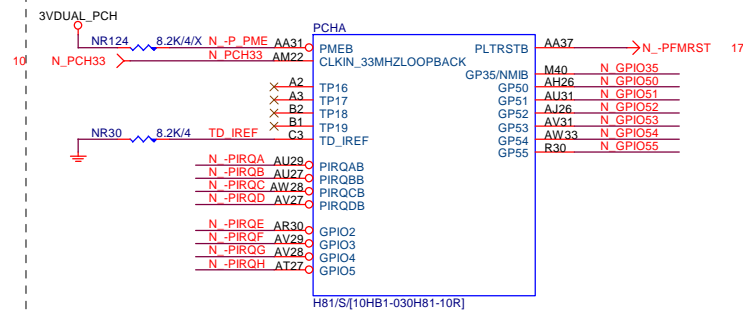


VGA CONNECTOR



Gigabyte Technology			
Title			
PCH DISPLAY_CLK BUFFER			
Size			
Custom			
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SATA3 : 20/7.5/4.5/7.5/20 (breakout min 8/4/4/4/8)
Impedance=90 +- 17.5%
SATA2 : 15/7.5/4.5/7.5/15 (breakout min 8/4/4/4/8)
Impedance=90 +- 17.5%



SATA2_2
SATA2/7/BK/H/OP/NA/D/1/B

SATA2_3
SATA2/7/BK/H/OP/NA/D/1/B

12 V N_GPIO060 NR184 8.2K/4

N_GPIO038 NR114 8.2K/4/X VCC

NQ13 MMBT2222A/SOT23/600mA/40 SOT23

PCH (D)

PCHD

17 N_LAD[0..3] << N_LAD[0..3]

VCC3 NR54 8.2K/4/X N_GPIO23 AK26
17 N_LAD0 N_LAD1 AN24
17 N_LAD1 N_LAD2 AP26
17 N_LAD2 N_LAD3 AN26
17 N_LAD3 N_LDRQ0 AK22
17 N_LDRQ0 N_LFRAME AP24

22 C_ACZ_BITCLK NR45 33/4 AV23
22 C_ACZ_RST NR43 33/4 AU24
22 C_ACZ_SDIN2 NR44 33/4 A_SO
22 C_ACZ_SYNC NR46 33/4 A_SYNC

20 N_ICH_SPI_MOSI R36
20 N_ICH_SPI_MISO R36
20 N_ICH_SPI_CS U39
20 N_ICH_SPI_CLK R35

20 SPI_DQ2 U40
20 SPI_DQ3 U37

6,11,17 O_PWROK1
17,25 O_RSMRST

17 N_LPCPME N_LPCPME AG31
7,8,14,15,16,19 N_SMBCLK N_SMBCLK AG36
7,8,14,15,16,19 N_SMBDATA N_SMBDATA AG32
11 N_GPIO60 N_GPIO60 AG35

19 N_PCH_HOT N_PCH_HOT AK36
N_SML1CLK AK36
N_SML1DAT AK33

H81/S/[10HB1-030H81-10R]

O_PWROK1
NC51 0.01u/4/X7R/25V/K/X
Reserve for EMI test

32.768KHZ

32.768K/12.5p/20ppm/TF38/35K/D

NC16 18P/4/NPO/50V/J
NC18 18P/4/NPO/50V/J

NR104 0/4/SHT/M/X

NR183 8.2K/4

NR182 8.2K/4/X

NR131 680/4/1

NR132 1.47K/4/1

NR133 1.47K/4/1

NR134 1.47K/4/1

NR135 8.2K/4

NR136 8.2K/4

NR137 8.2K/4

NR138 8.2K/4

NR139 8.2K/4/X

NR140 8.2K/4

NR141 8.2K/4

NR142 8.2K/4

NR143 8.2K/4/X

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NR162 8.2K/4/X

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NR344 8.2K/4

NR345 8.2K/4

NR346 8.2K/4

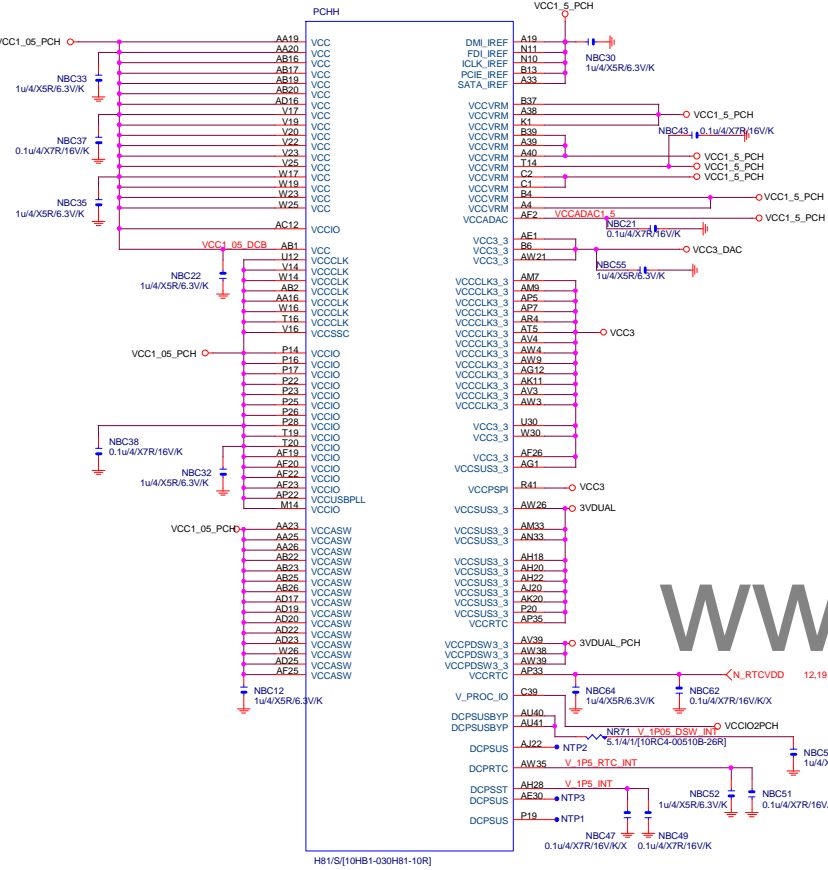
NR347 8.2K/4

NR348 8.2K/4

NR349 8.2K/4

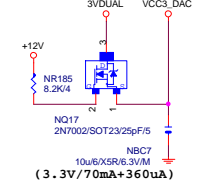
NR350 8.2K/4

PCH (H)

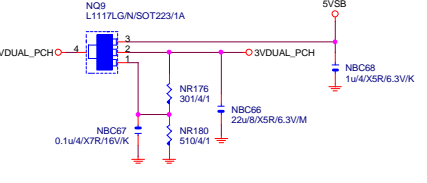


VCC3_DAC

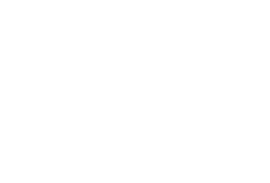
CLOSE北橋(注意震盪水波紋)



3VDUAL_PCH

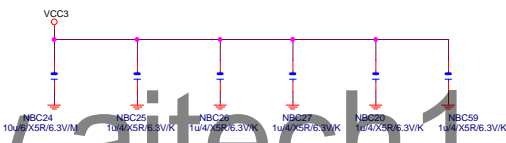


SHT_PWR

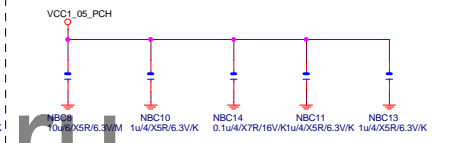


CAP

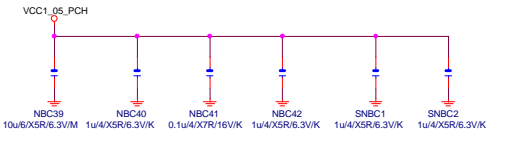
(3.3V) (X6)



(1.05V) (X5)



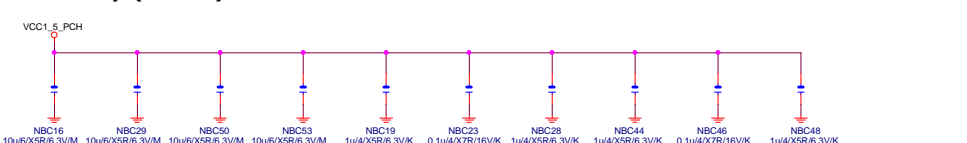
(1.05V) (X6)



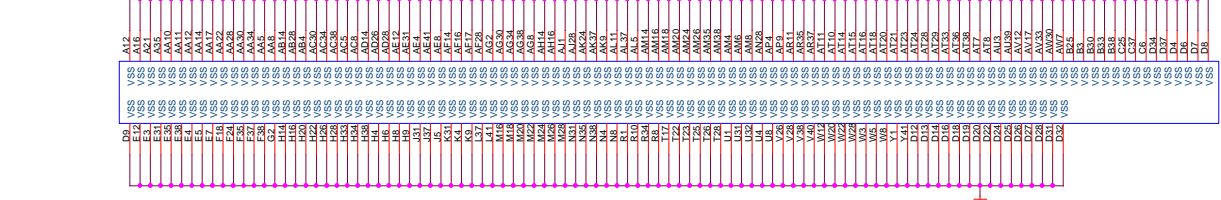
(1.05V) (X2) (3.3V) (X2)



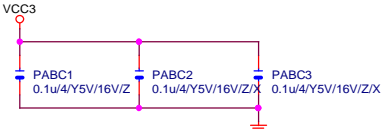
(1.05V) (X10)



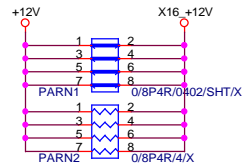
PCH (I)



PCIEX16 CAP



PCIEX16 PROTECT SHT



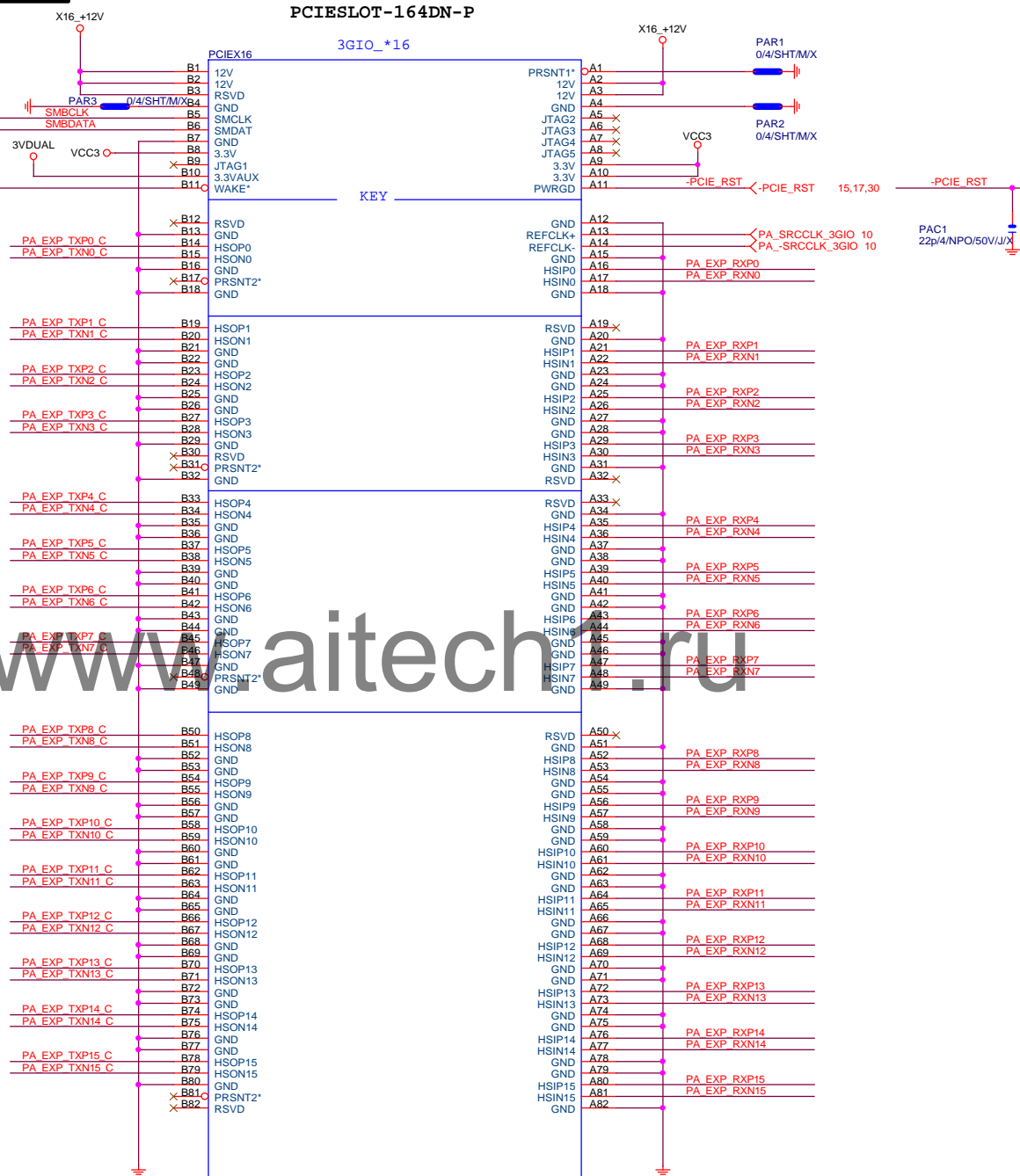
PCIEX16 AC CAP

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

PA EXP RXP0 [15] >>> PA_EXP_RXP[0..15] 4
 PA EXP RXN0 [15] >>> PA_EXP_RXN[0..15] 4
 PA EXP TXP0 [15] >>> PA_EXP_TXP[0..15] 4
 PA EXP TXN0 [15] >>> PA_EXP_TXN[0..15] 4

PCIEX16 SLOT

7,8,12,15,16,19 N_SMBCLK
 7,8,12,15,16,19 N_SMBDATA
 12,15,24,30,31 N_-PCIE_WAKE

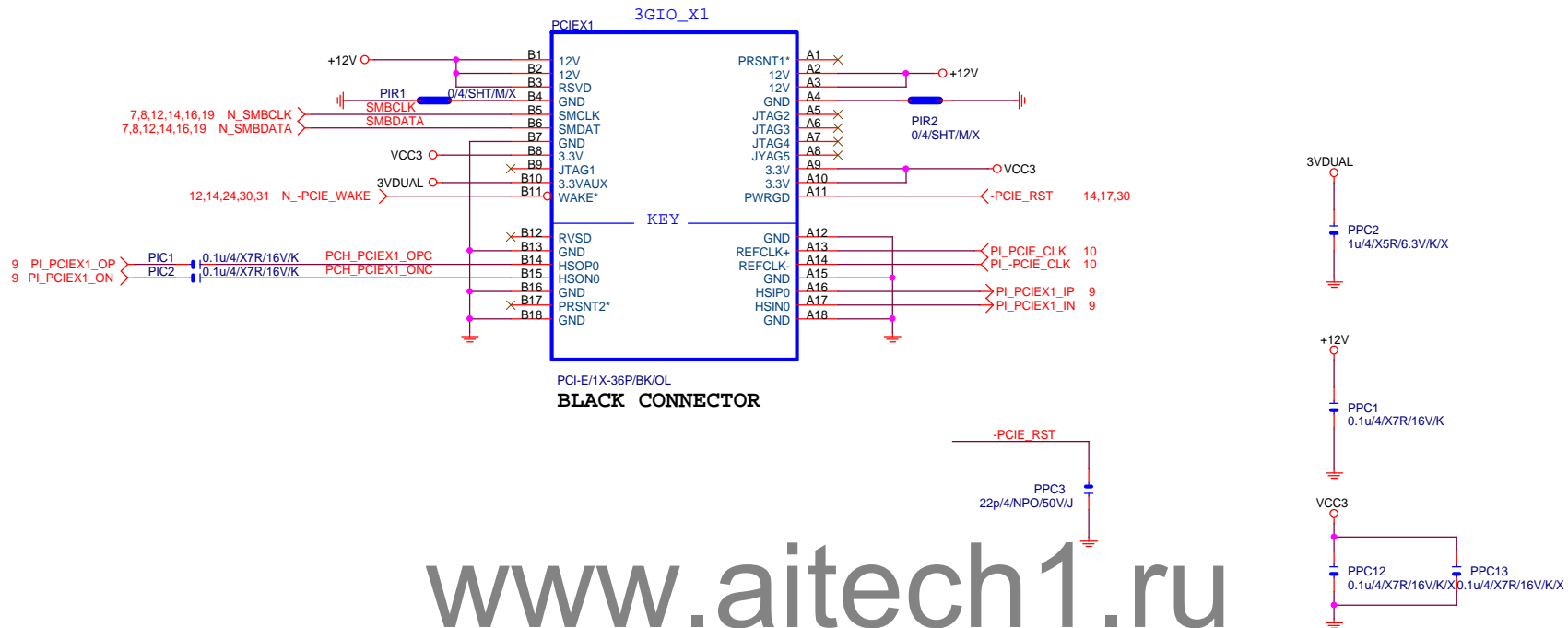


BLACK CONNECTOR

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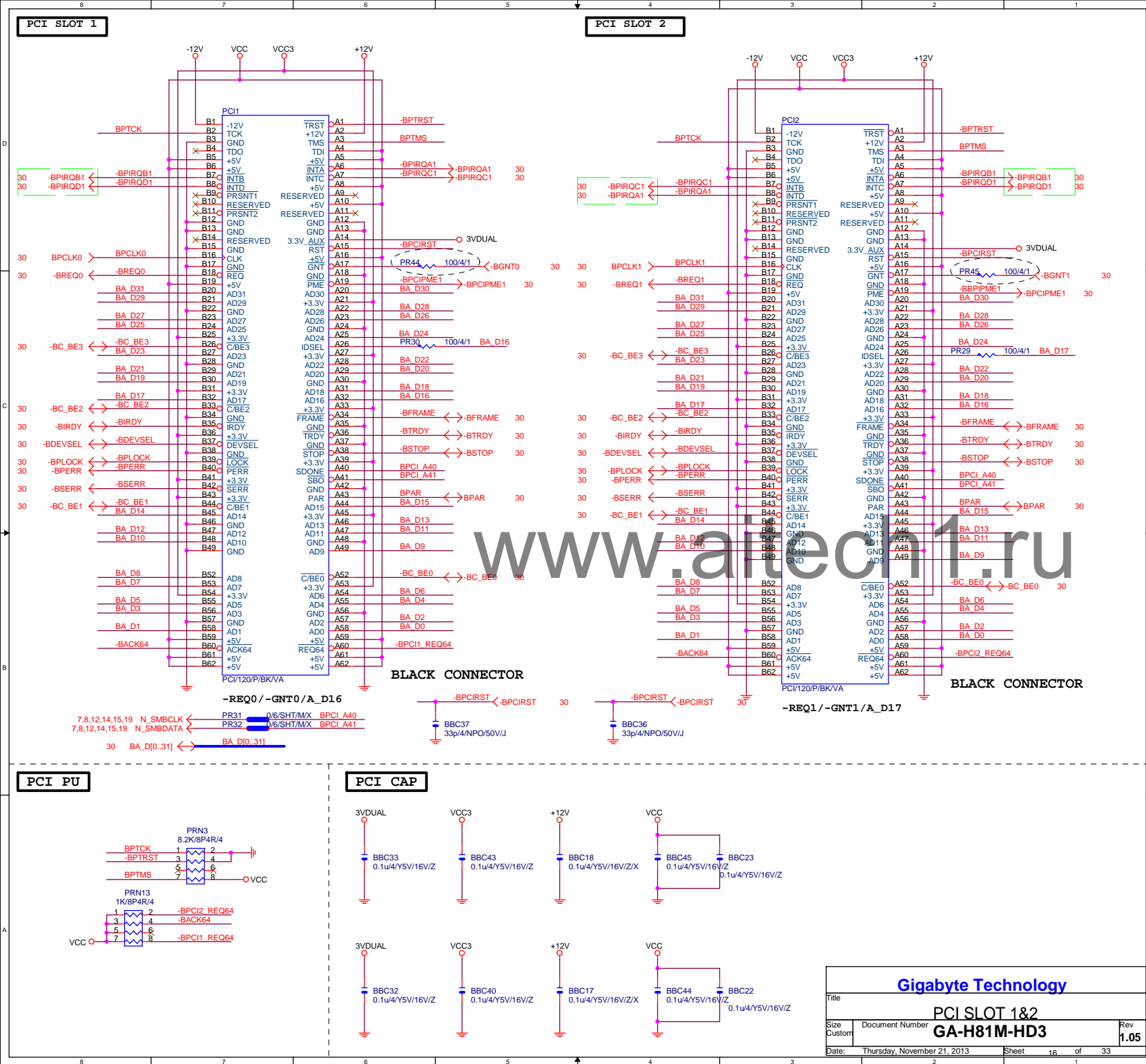
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PCI EXPRESS * 16				
Size	Document Number			Rev
Custom	GA-H81M-HD3			1.05
Date: Thursday, November 21, 2013		Sheet 14 of 33		

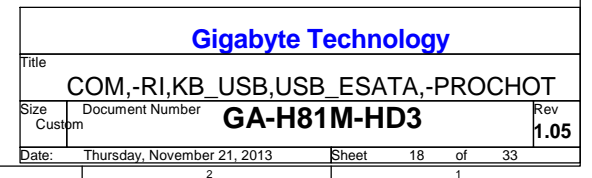
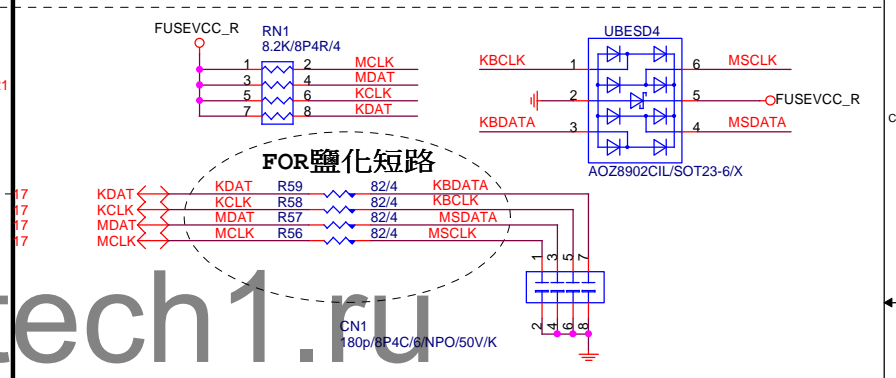
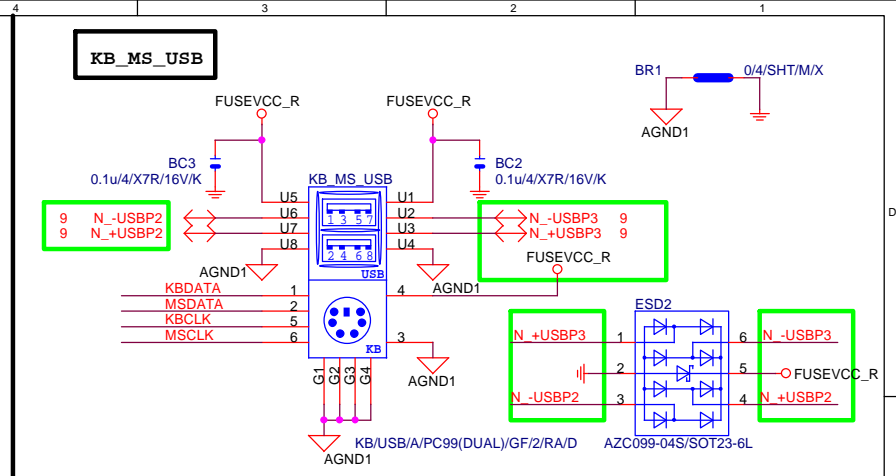
PCIEX1 SLOT



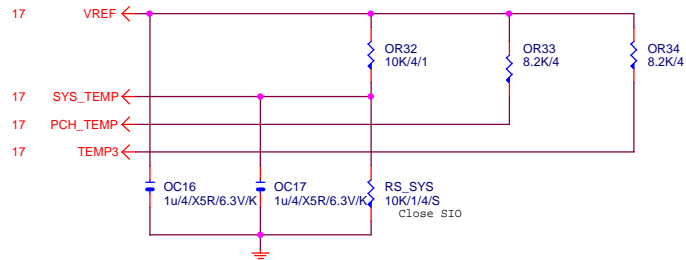
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Gigabyte Technology			
Title			
PCI EXPRESS X 1 PORT			
Size	Document Number	Rev	
Custom		1.05	
Date:	Thursday, November 21, 2013	Sheet	15 of 33

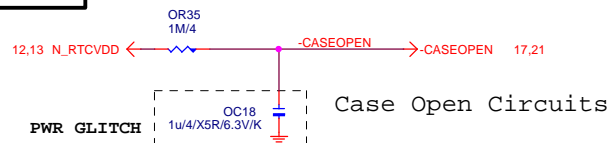




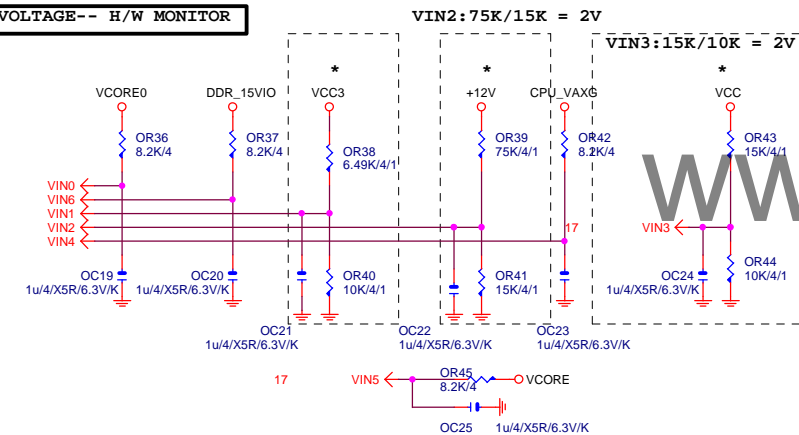
TEMP H/W MONITOR



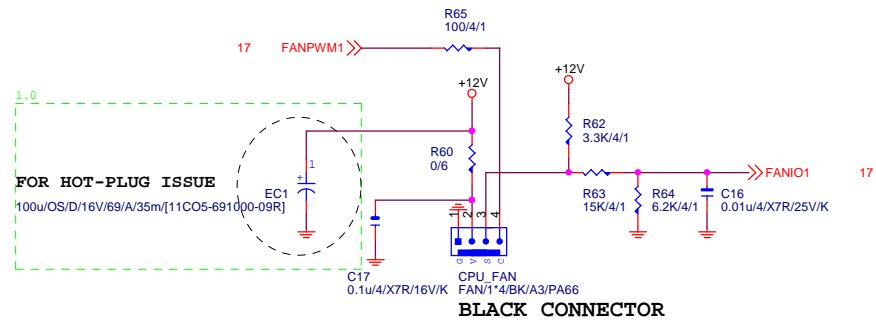
CASE OPEN



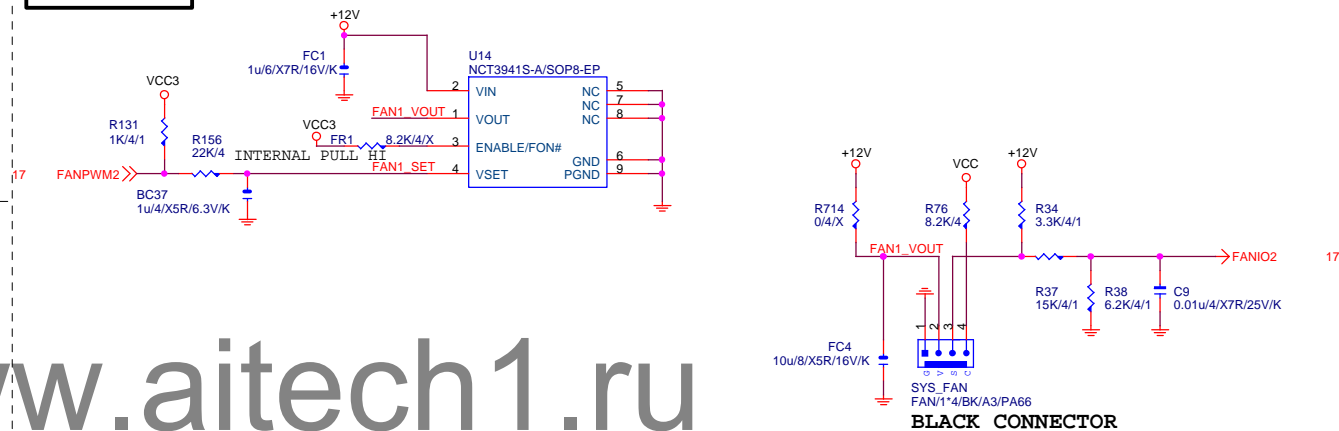
VOLTAGE-- H/W MONITOR



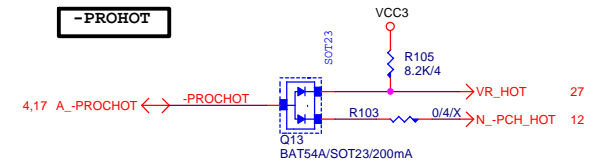
CPU SMART FAN



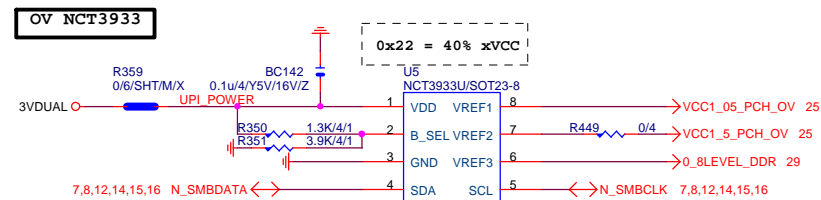
SYS SMART FAN



-PROHOT

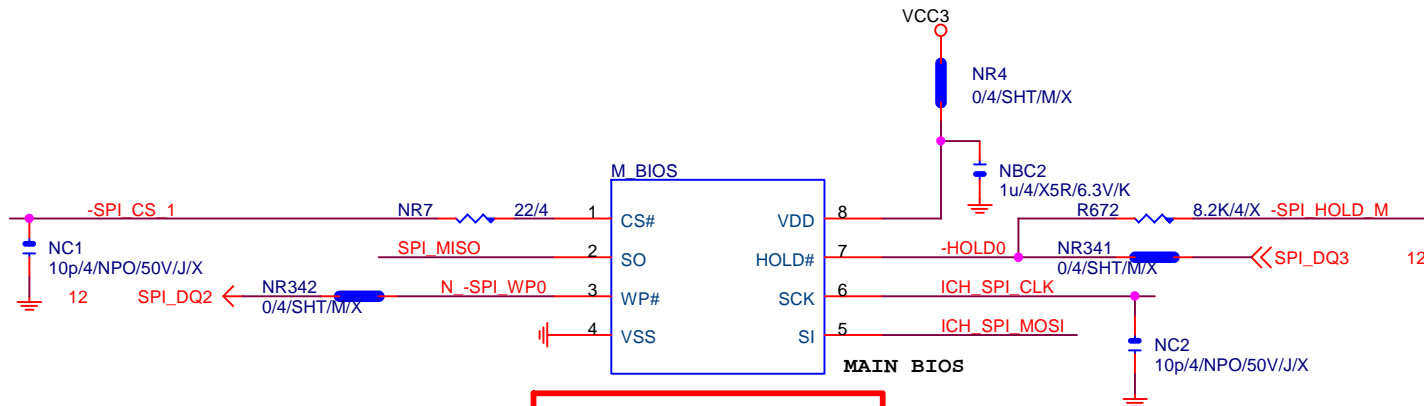


接pwm feedback pin

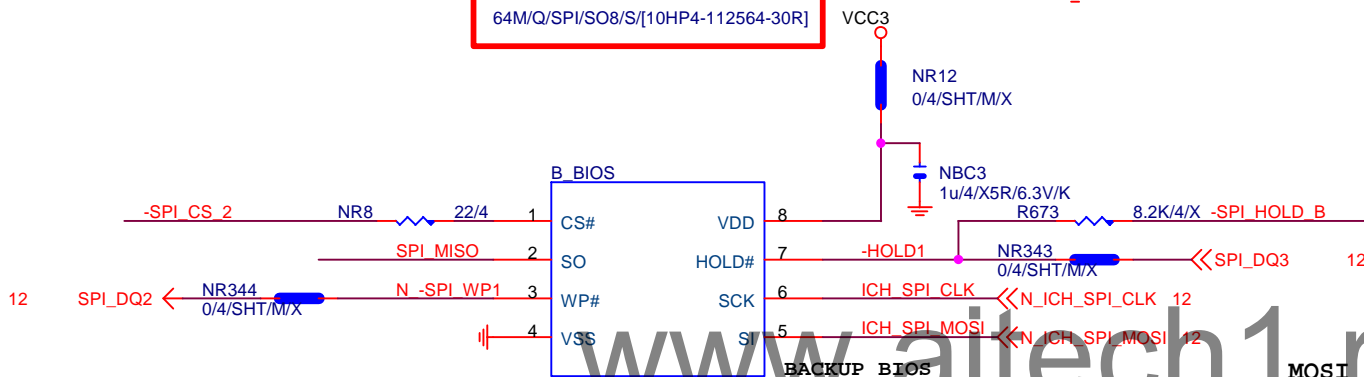


Gigabyte Technology

Gigabyte Technology				
Title				
HWM.FAN CTRL.OV				
Size	Document Number	GA-H81M-HD3		Rev
Custom				1.05
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64M/Q/SPI/SO8/S/[10HP4-112564-30R]

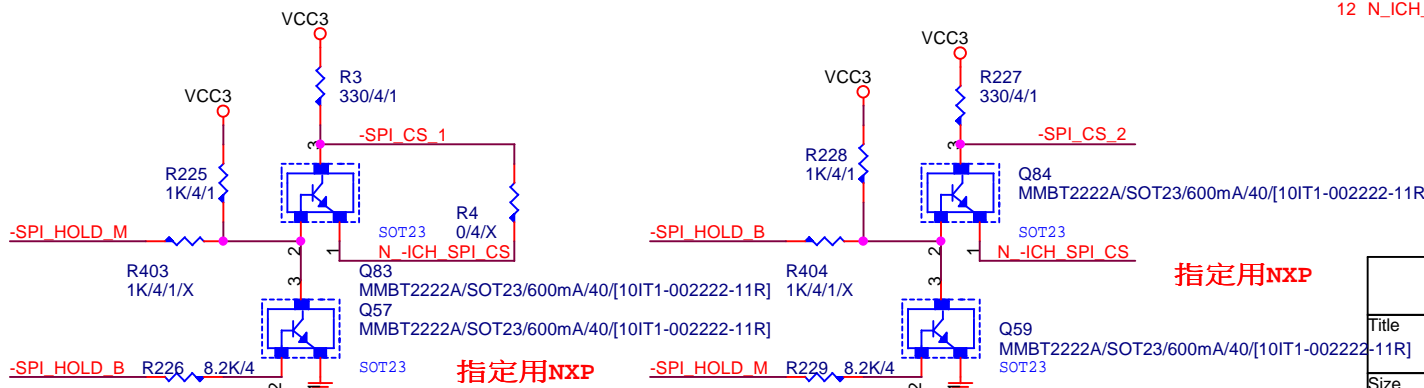
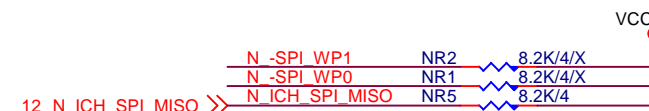
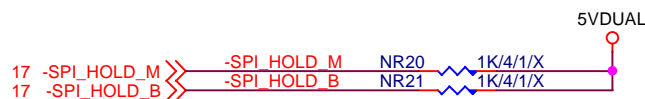
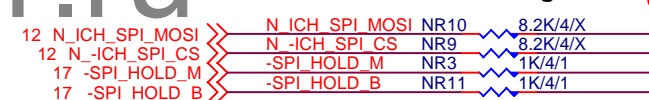


64M/Q/SPI/SO8/S/[10HP4-112564-30R]

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

1 means floating
0 means PD 1K

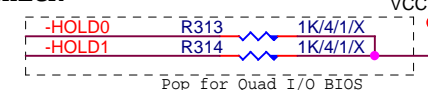
MOSI For DMI RX Termination Voltage



指定用NXP

指定用NXP

CHECK



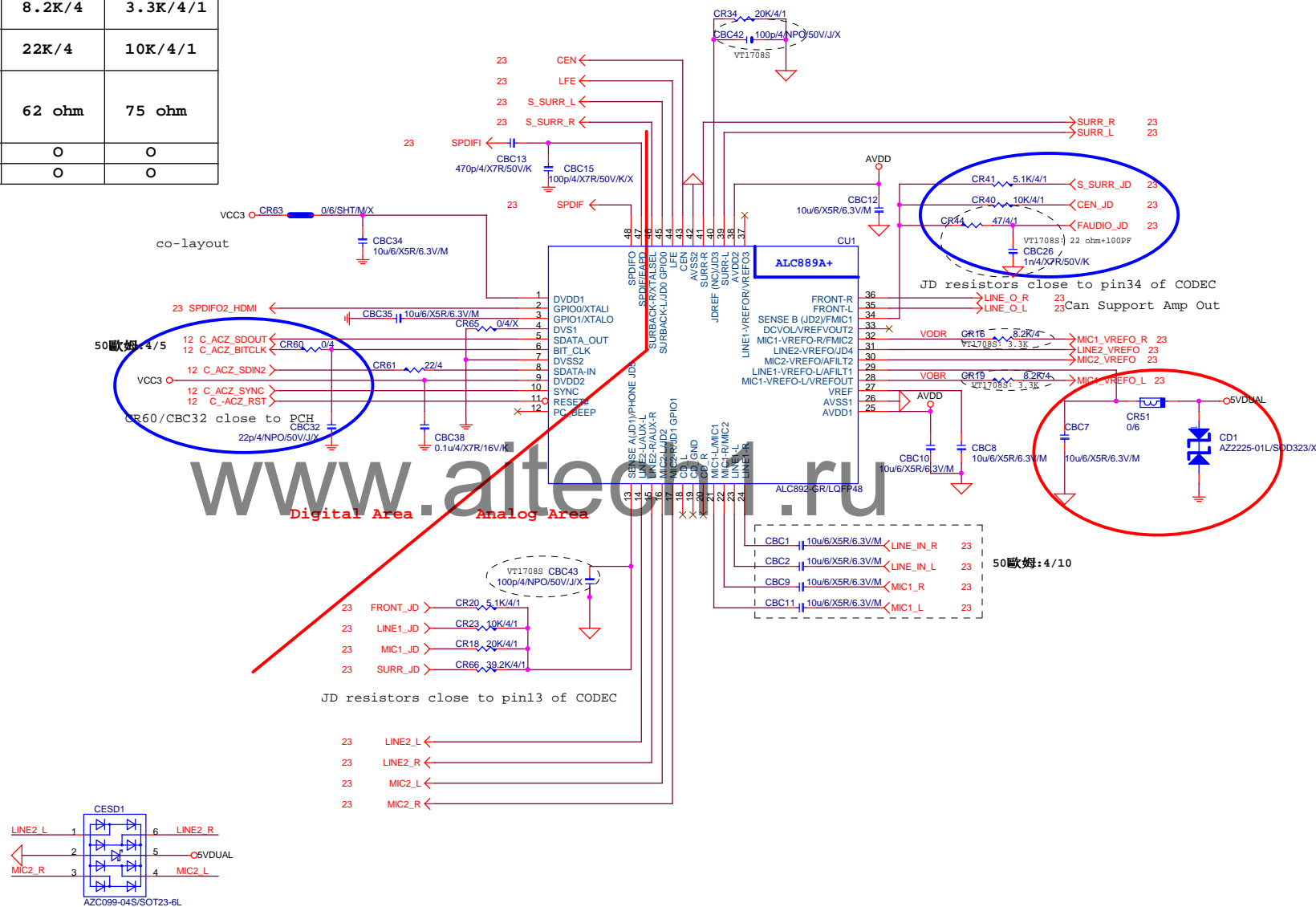
Gigabyte Technology

DUAL BIOS

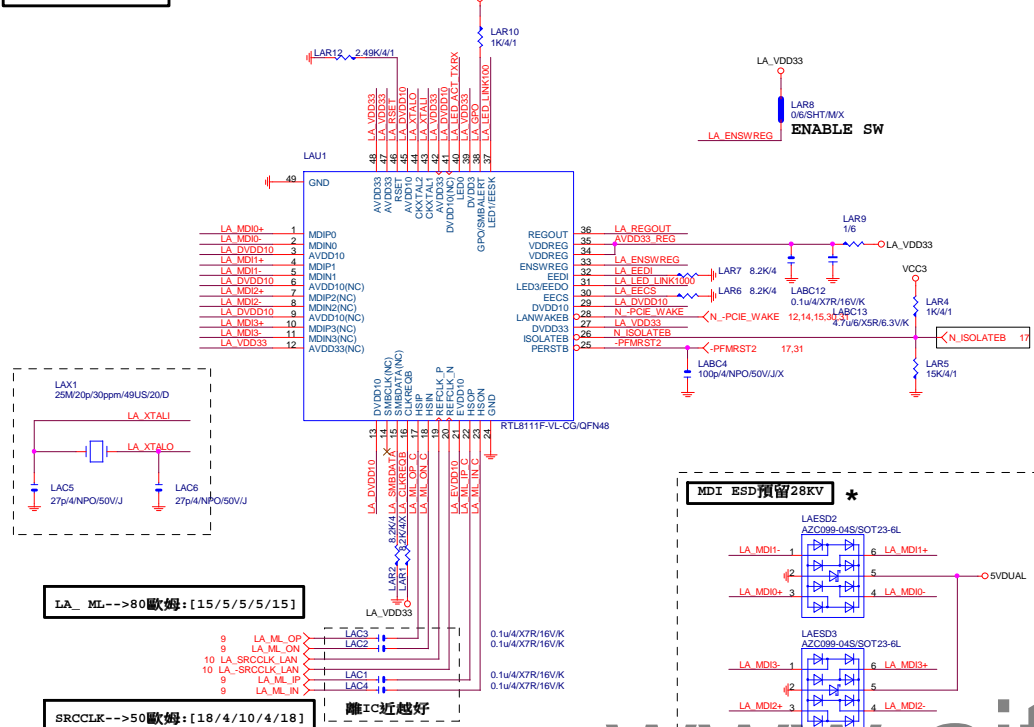
GA-H81M-HD3

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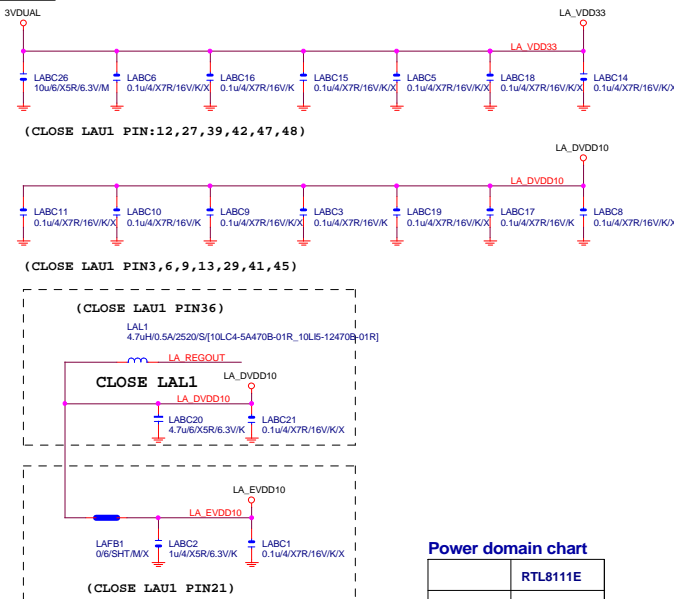
	ALC892	ALC887-VD2	VT1708S-CE
CR44/CBC26	47ohm+1nF	47ohm+1nF	22ohm+100P
CBC42/CBC43	X	X	100P/4
CR16/CR19 CR52/CR56/CR10/CR9	8.2K/4	8.2K/4	3.3K/4/1
CR6/CR7/CR58/CR54/ CR67/CR68/CR69/CR70	22K/4	22K/4	10K/4/1
CR5/CR8/CR1/CR14/ CR17/CR22/CR73/CR74/ CR13/CR11/CR57/CR53/ CR75/CR76	62 ohm	62 ohm	75 ohm
CR51/CD1/CBC7	O	O	O
CESD1	O	O	O



LAN:RTL8111F/VB/VL



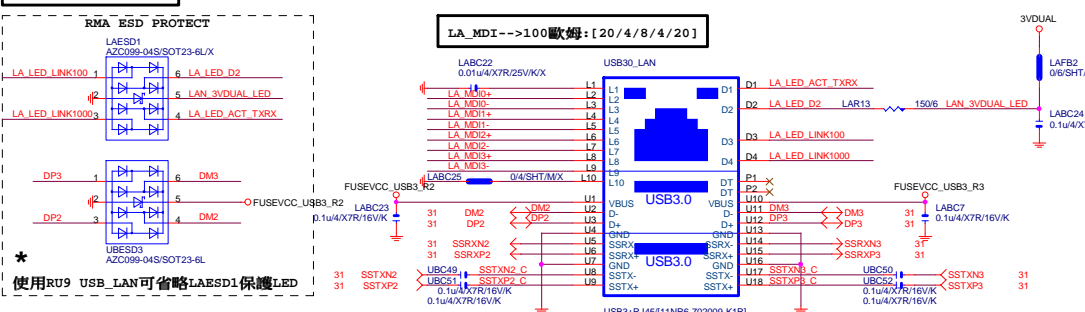
LAN POWER



Power domain chart

	RTL8111E
AVDD33	3.3V
DVDD33	3.3V
VDDREG	3.3V
DVDD10	1.05V

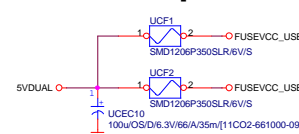
USB_LAN CONNECTOR



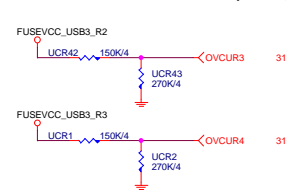
EMI SHORT PAD



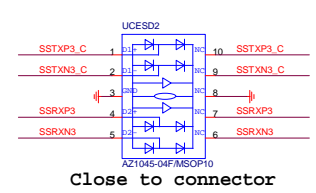
Polyswitch-1206



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



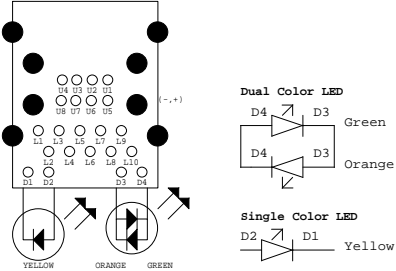
Close to connector



Gigabyte Technology

Title	Realtek RTL8111G
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Date	Thursday, November 21, 2013
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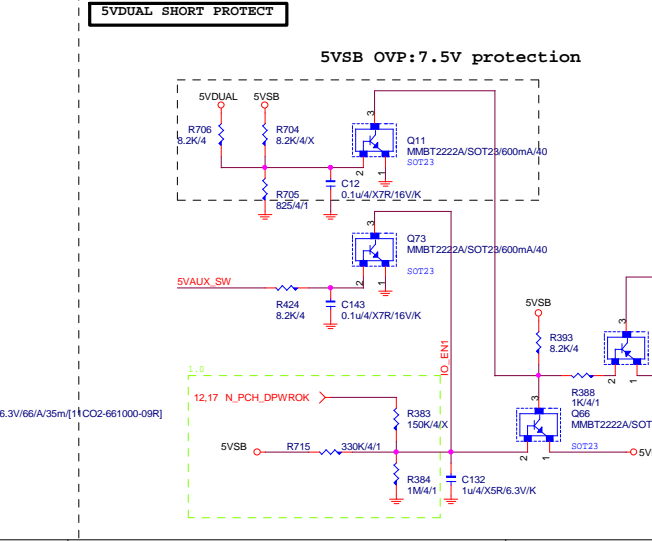
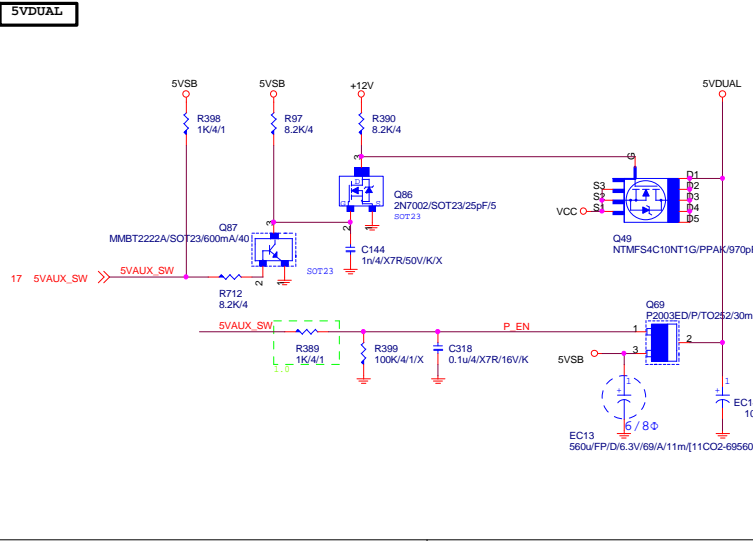
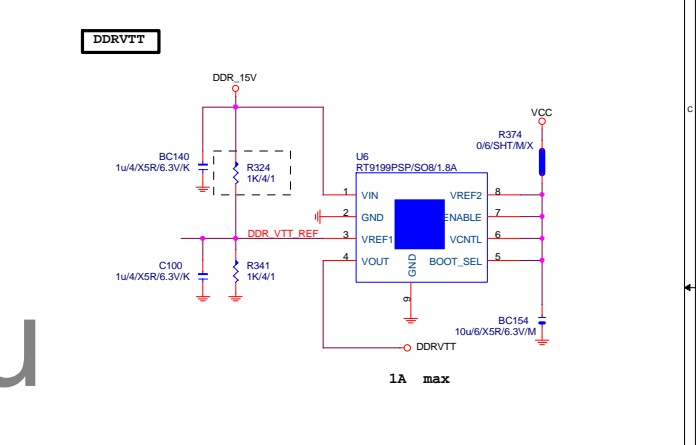
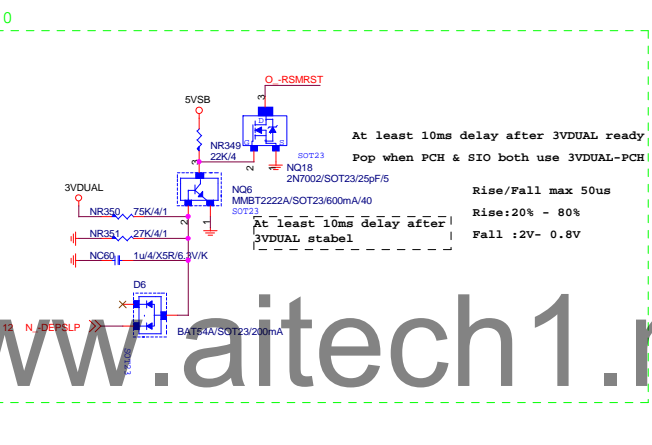
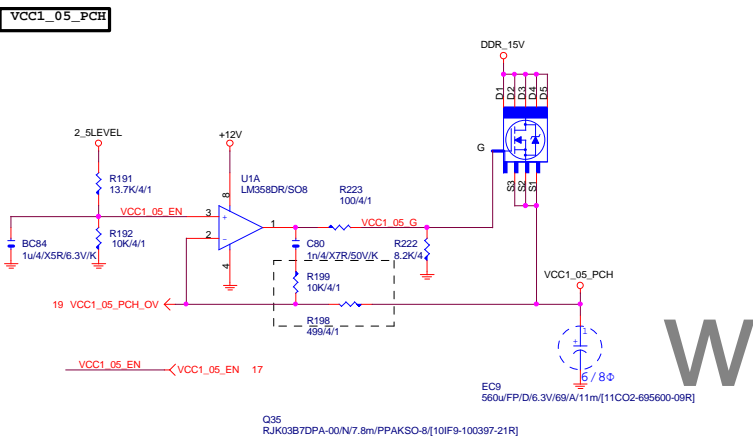
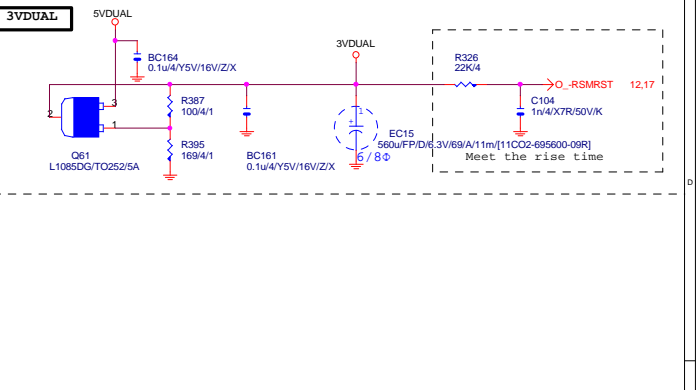
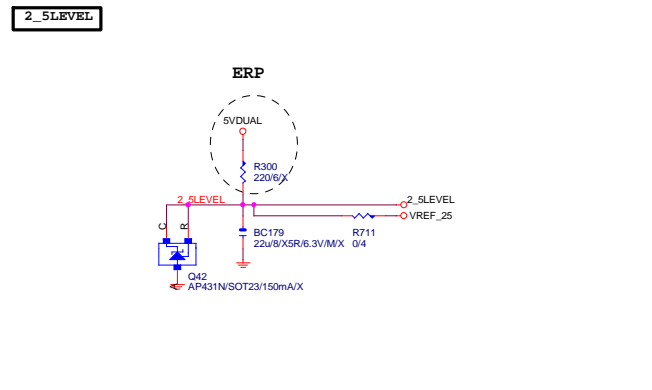
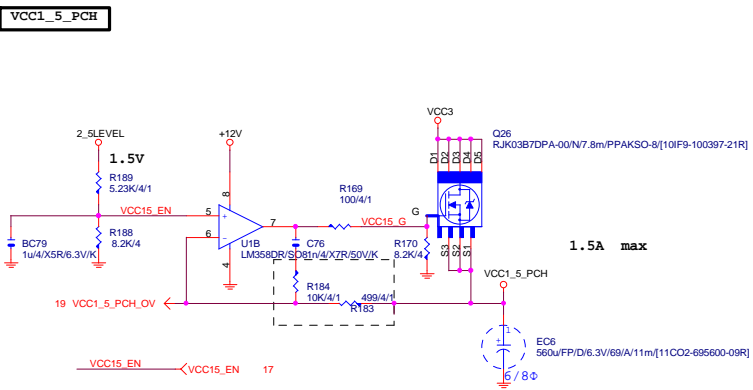


BOM NOTICE

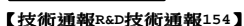
料號	規格	廠商
11NR6-702009-96R	1G LAN (12core)	UDE(RU9 ESD+)
[LED獨立走線, 可省略外加AZC099料件LAESD1]		

- 9KV ESD BOM: USB_LAN (RU9):11NR6-702009-96R
- 28KV ESD BOM: USB_LAN (RU9):11NR6-702009-96R

LAESD2, LAESD3: 上件AZC398-04S



【技術通報R&D技術通報155】



ATX CONNECTOR

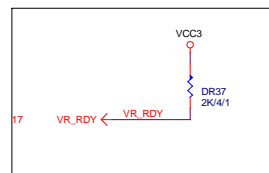
GA-H81M-HD3

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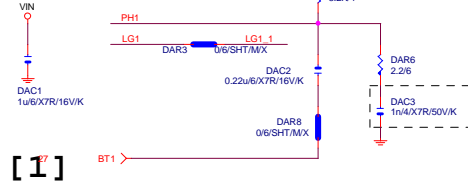
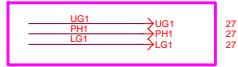
R_PROG1 (Kohm)	3-Phase Iccmax(A)
24.9	105
28.7	114
34.0	129
42.2	144

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

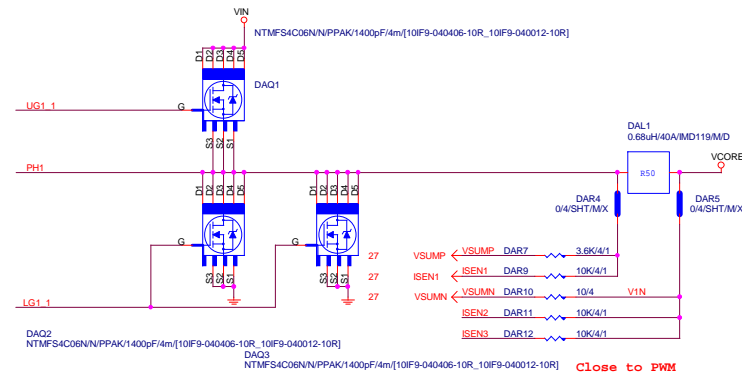
R_PROG3 (Kohm)	Fast Slew Rate (mV/us)
3.24	12
5.76	24
9.31	40
13.3	45



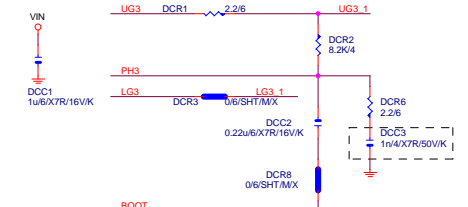
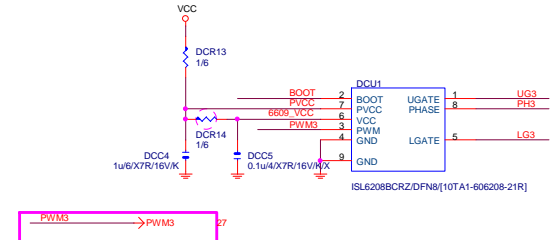
PHASE 1



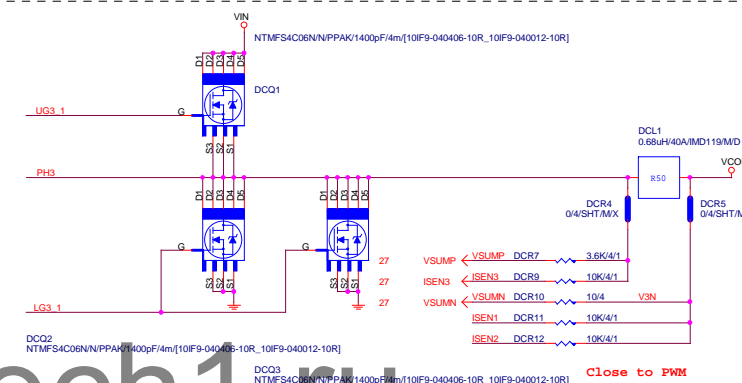
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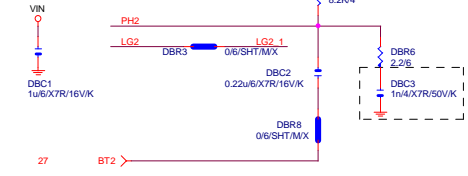
PHASE 3



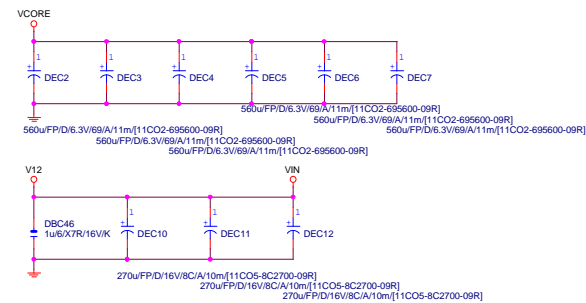
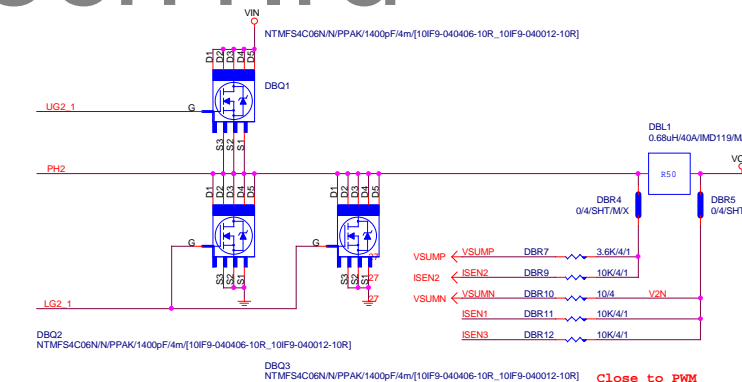
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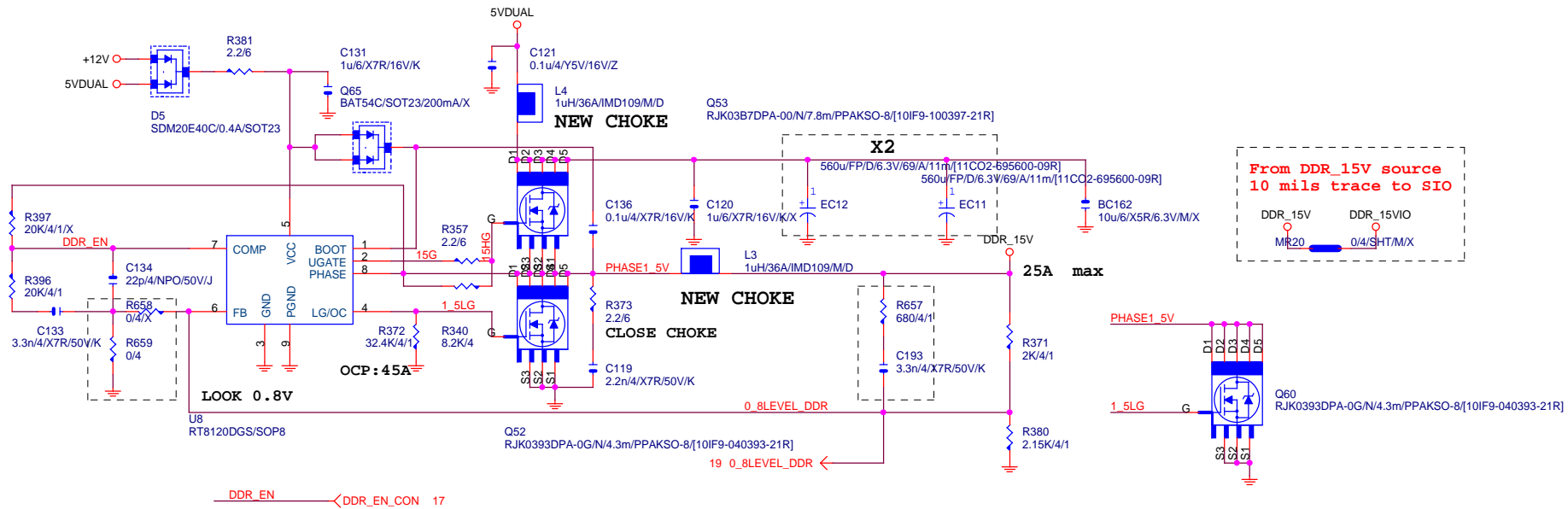
PHASE 2



[2]



DDR15V



PWR_SEQ

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VIN=5V, VOUT=1.5V, IOU=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

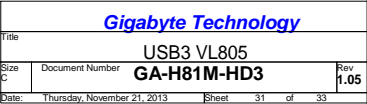
$Rocset = (I_{ocp} * L_{gate, rdson}) / I_{ocset}$
 $Rocset = (45A * 6.7m\Omega) / 10uA = 30K$
 $I_{ocset} = 10uA$

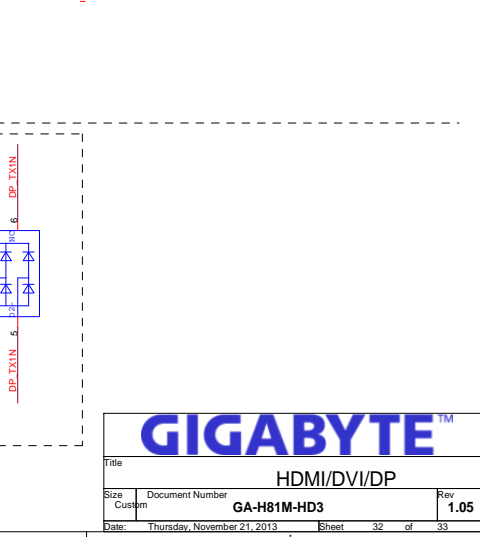
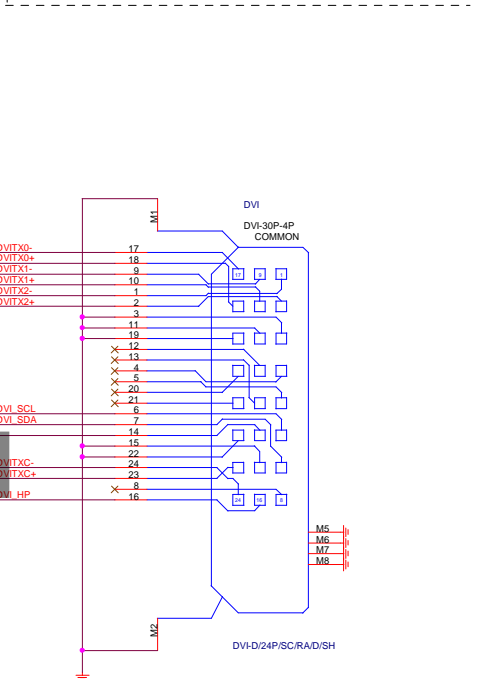
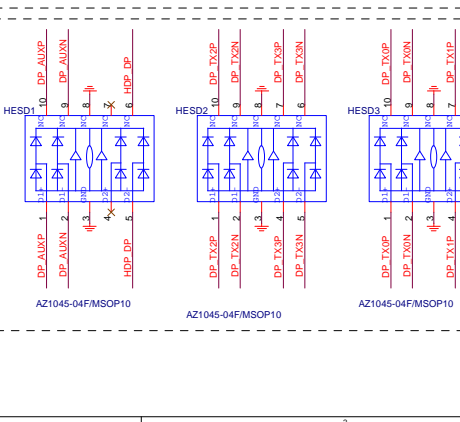
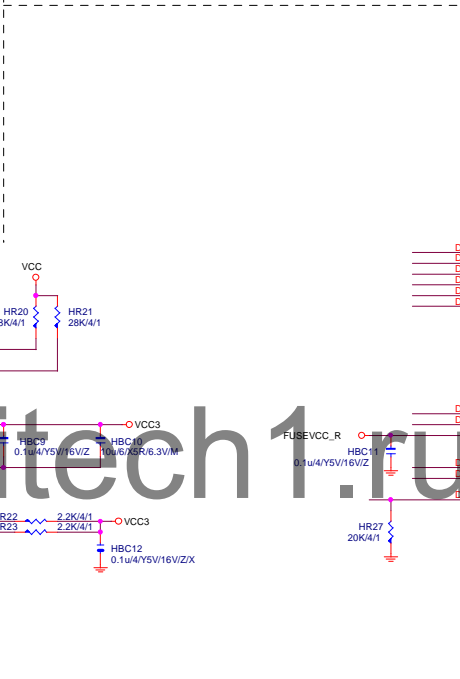
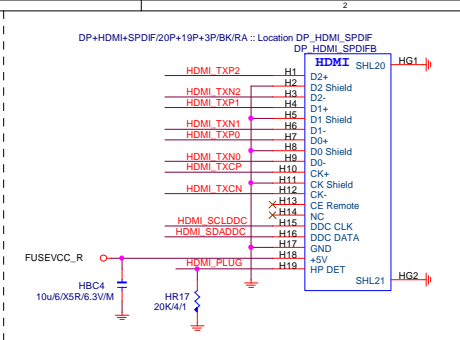
Gigabyte Technology

RT8120_DDR POWER

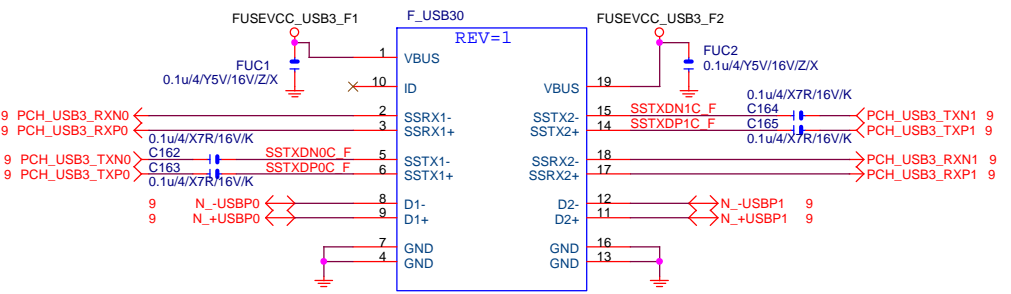
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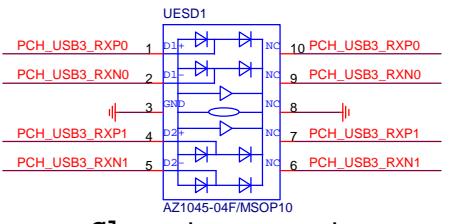




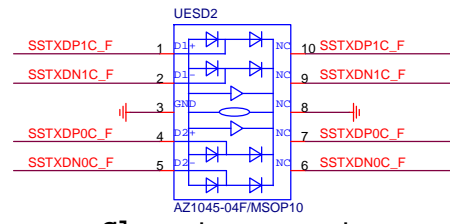
F_USB30



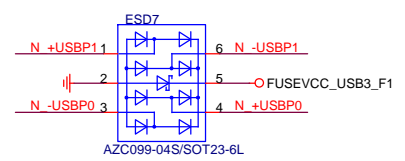
BLACK CONNECTOR



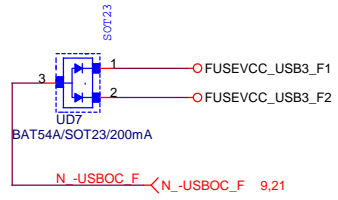
Close to connector



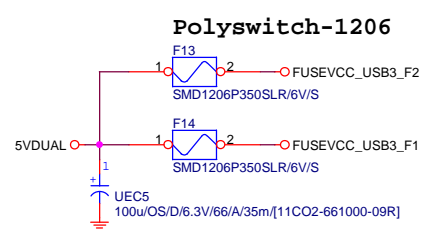
Close to connector



Close to connector



F_USB30 PWR



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

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