

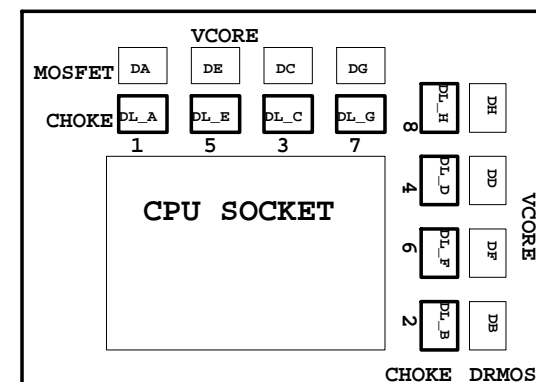
# Model Name: GA-Z87X-D3H Rev 1.1

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
10	PCH_RGB,CLK BUFFER
11	PCH_HOST,SATA,PCI
12	PCH_GPIO,CTRL,AUDIO
13	PCH_PWR,GND
14	PCI EXPRESS*16 SLOT
15	PCI EXPRESS X8 SLOT
16	PCI EXPRESS X16 SWITCH
17	PCIEX1*3 , PCIEX4 SLOT
18	I/O ITE8728
19	COM, -PROHOT, R_USB
20	Dual BIOS , TPM SLB9635TT
21	ALC892 CODEC
22	REAR AUDIO JACK
23	ITE8892 PCI BRIDGE
24	PCI SLOT
25	FUSB 3.0
26	NCP3933 OVER VOLTAGE
27	DISCRETE POWER

SHEET TITLE

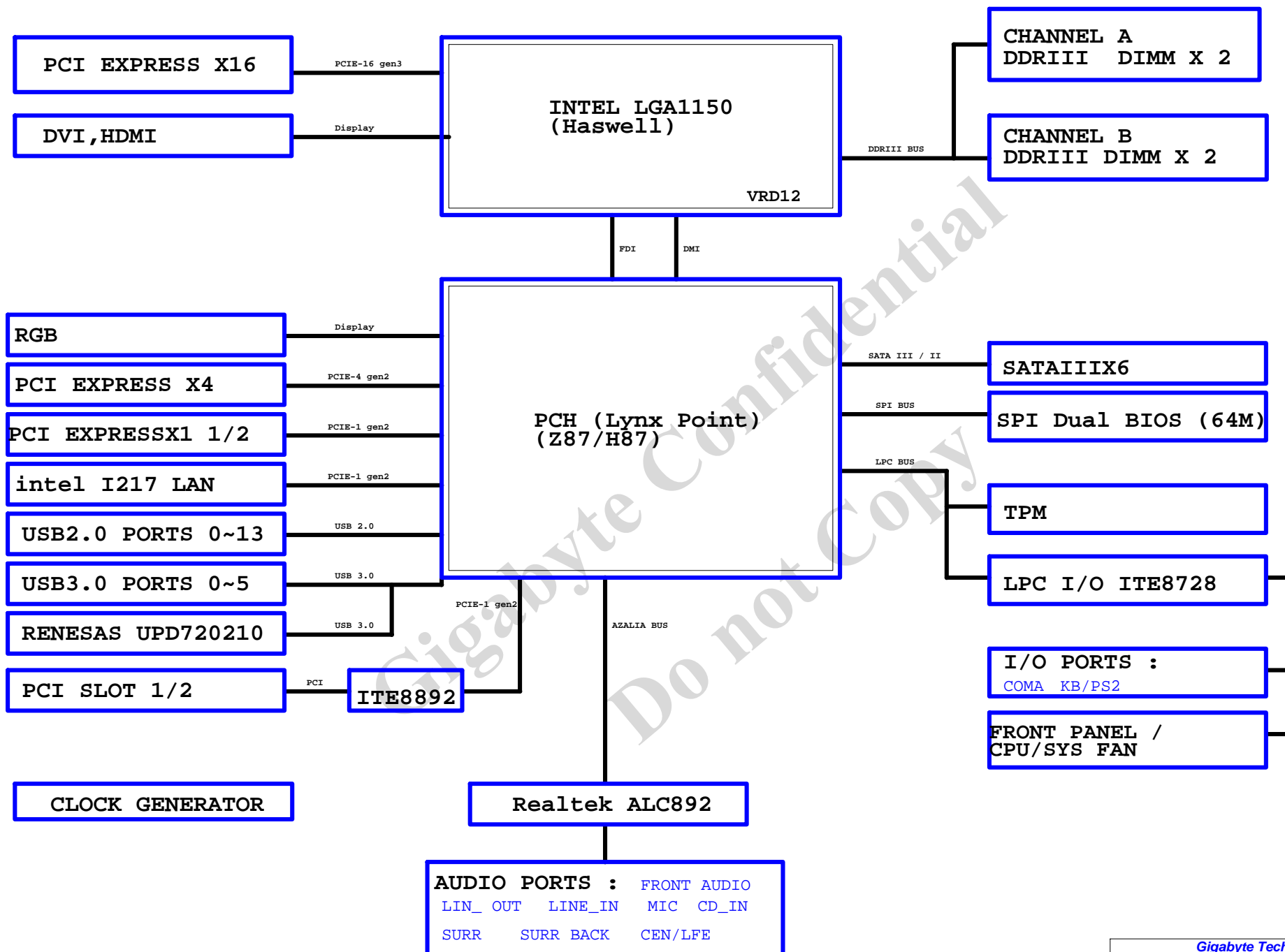
28	F_PANEL , F_USB2.0
29	ATX POWER, CLOCK GEN
30	HWM , KB/MS , FAN CTRL
31	LAN INTEL i217
32	DVI
33	HDMI , R_USB30
34	TABLE LIST
35	IR3563B_PWM
36	IR3550-VCORE
37	IR3570_DDR PWM
38	IR 3598-DDR
39	D720210 4port_Hub
40	D720210 4port_Hub POWER
41	D720210 4port_Hub_B
42	D720210 4port_Hub_B POWER



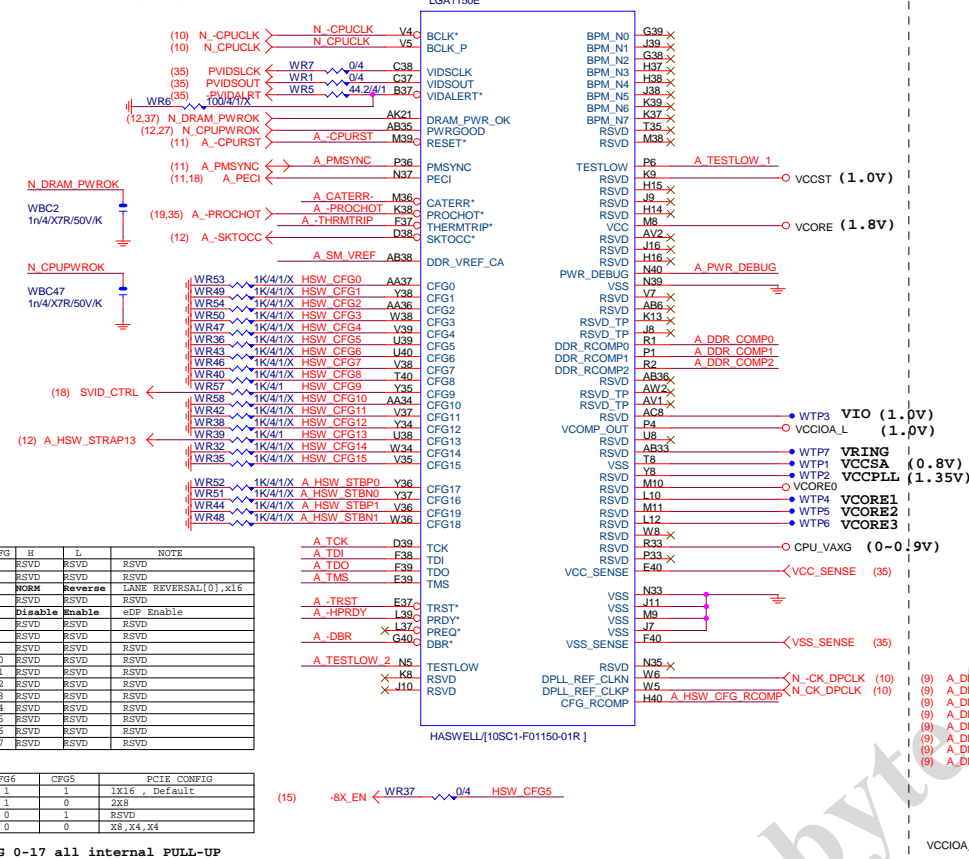
## Component value change history

DATE	Change Item	Reason
2012/11/23	1. Change from Z87-D3H-02.DSN	Rev 0.1
2013/01/11	1. Change from Z87X-D3H_R01_1224B.DSN 2. PCIE_X4 clock change to PCIE_5 3. PCIE_X1_1 clock change to PCIE_3 4. PCIE_X8 clock change to PEG_B 5. N_PCIE_4_SW change to N_GPIO48 6. -PCIE_X1_PR3 change to N_GPIO22 7. Update Note 33, TI H/W charger	Rev 0.2
2013/03/28	1. Add net N_-SLP_A 2. CLR_CMOS 文字面修改 3. 所有的FAN 加0.1u/4, 要非常靠近FAN connect pin 2	Rev 1.01
2013/06/26	1. 只修改文字面版本 Rev 1.1 (For PCH C2 chip)	Rev 1.1

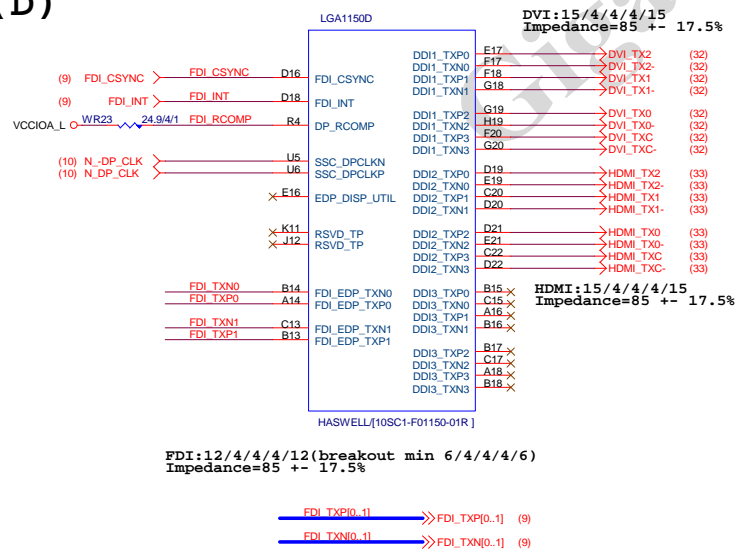
# BLOCK DIAGRAM



LGA1150 (E)

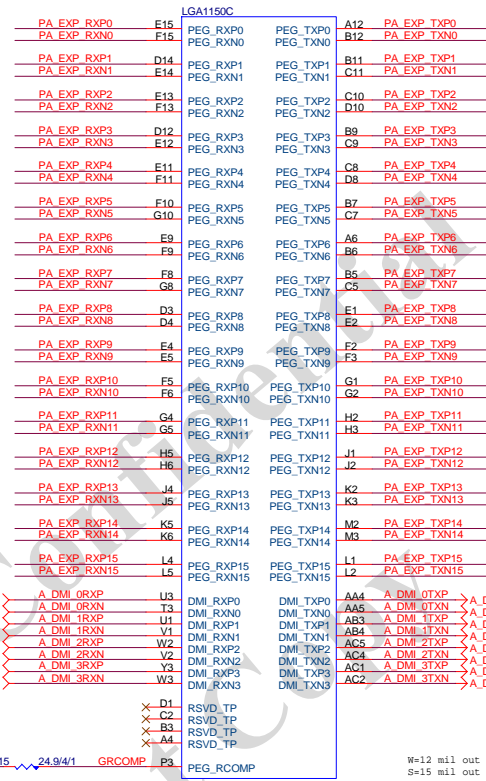


LGA1150 (D)

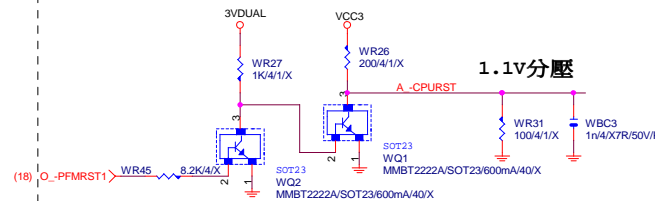


LGA1155 (C)

PCIEX16:20/5/4/5/20(breakout min 10/4/4/4/10)  
Impedance=80 +- 17.5%



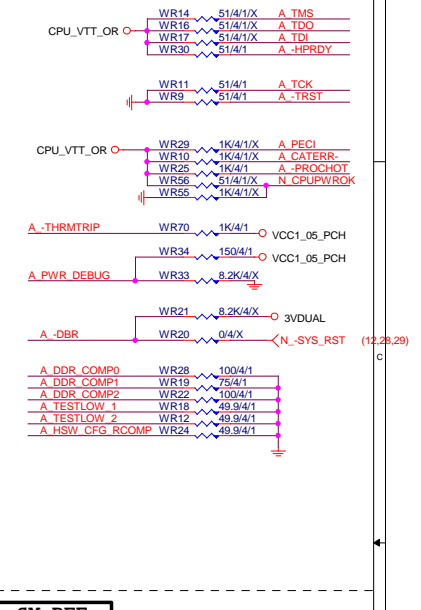
**-CPURST**



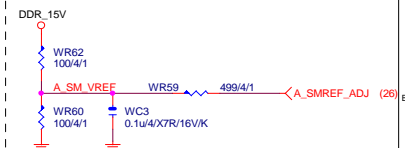
## CPU SVID



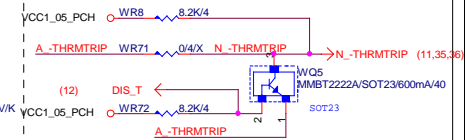
## CPU PU/PD



SM	REF
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THRMTrip DISABLE



## Gigabyte Technology

**CPU LGA1150-A**

GA-Z87X-D3H

1.1

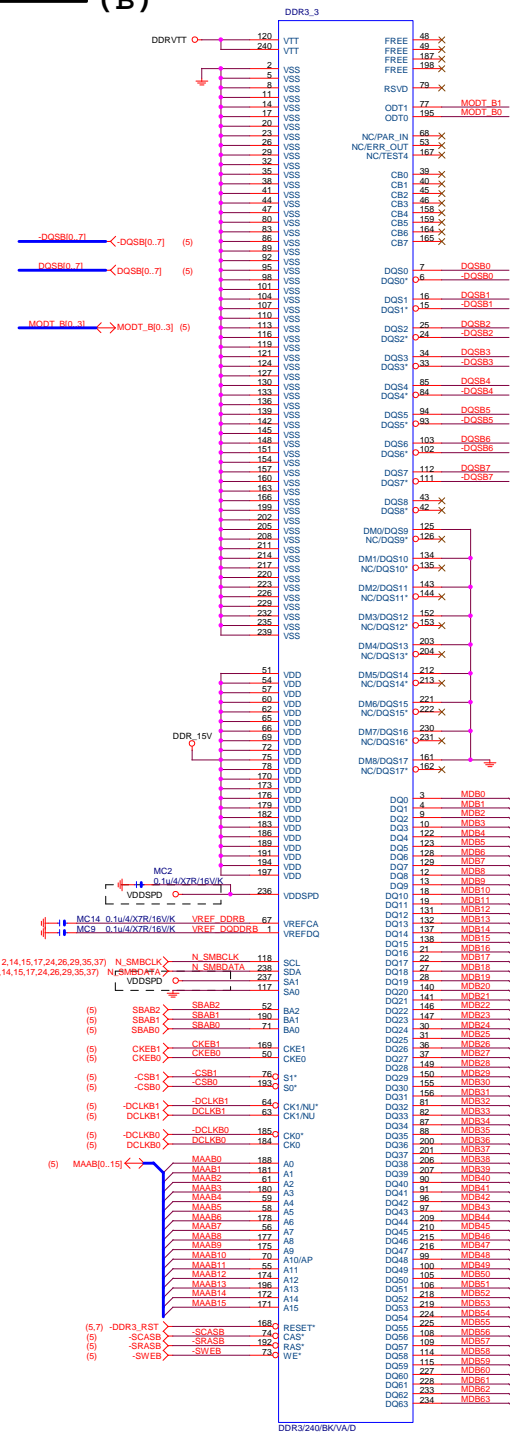




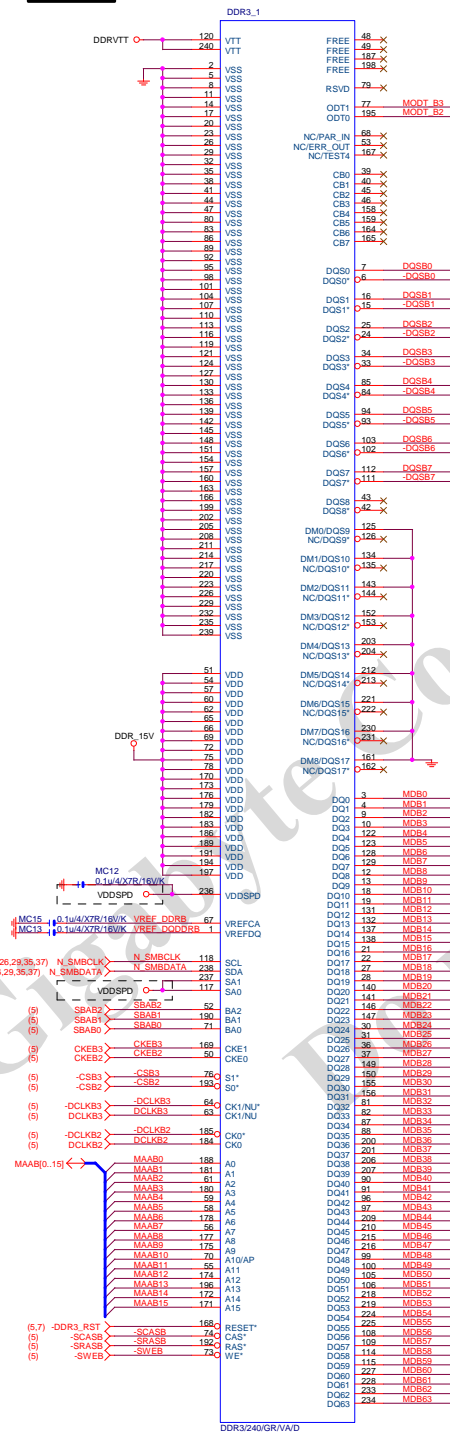


DDR3

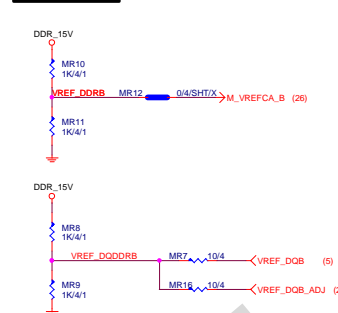
(B)



DDR3



DDR3 VREF

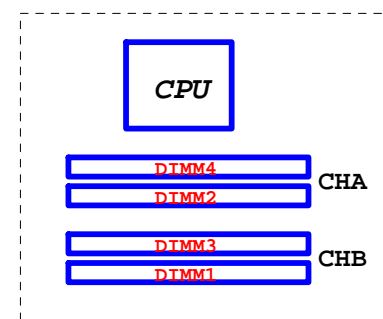
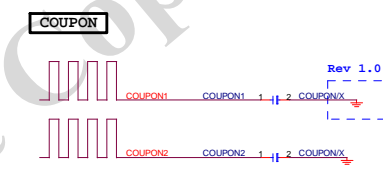


DDR3 1066,1333,1600MHZ BANDWIDTH

DDR3 1066MHZ  
DDR3 clock=533MHZ  
DDR3 single channel bandwidth=533x2x8Byte=8.5GB/s  
DDR3 dual channel bandwidth=533x2x2x8Byte=17GB/s

DDR3 1333MHZ  
DDR3 clock=667MHZ  
DDR3 single channel bandwidth=10.6GB/s  
DDR3 dual channel bandwidth=21GB/s

DDR3 1600MHZ  
DDR3 clock=800MHZ  
DDR3 single channel bandwidth=12.8GB/s  
DDR3 dual channel bandwidth=25.6GB/s

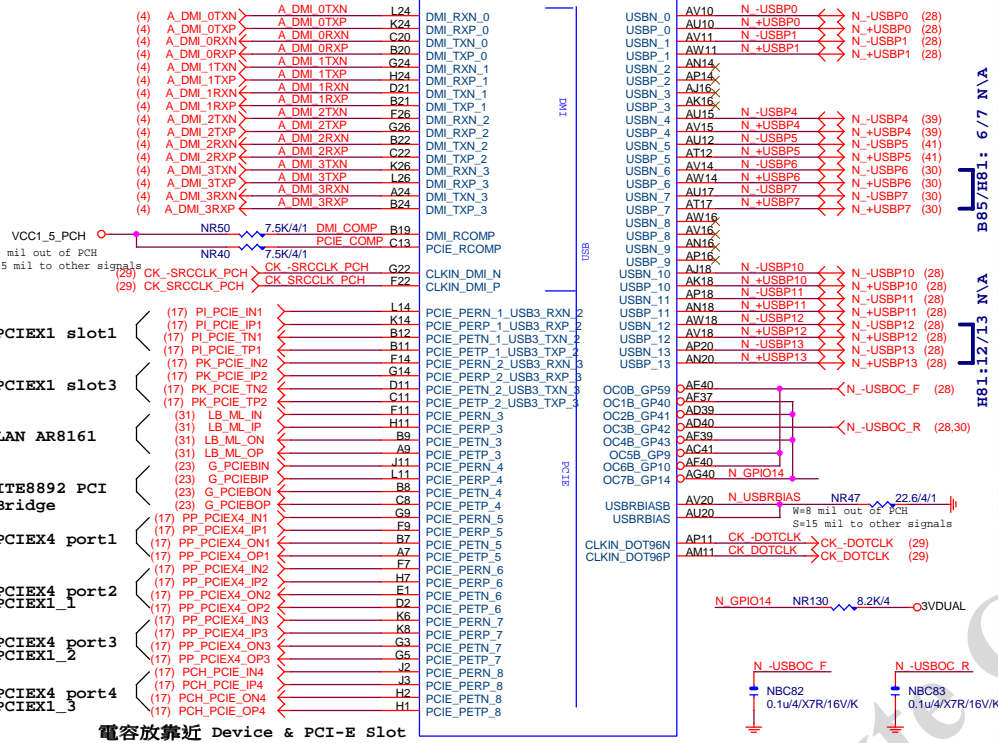


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Title			
DDR3 CHANNEL B			
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# PCB (B)

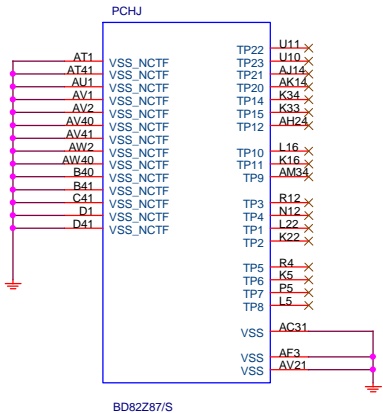
DMI:12/4/4/12(breakout min 8/4/4/4/8)  
Impedance=85 +- 17.5%

USB2.0 : 12/5/7/5/12 (breakout min 8/4/4/4/8)  
Impedance=85 +- 17.5%



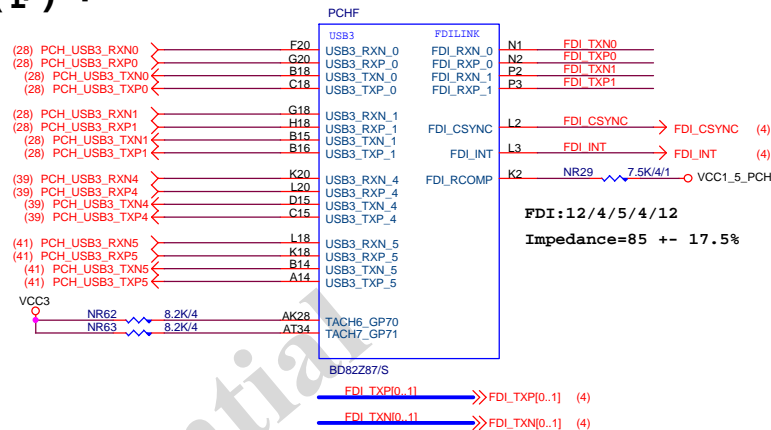
PCIEX1:15/4/4/15 (breakout min 8/4/4/4/8)  
Impedance=85 +- 17.5%

# PCB (J)

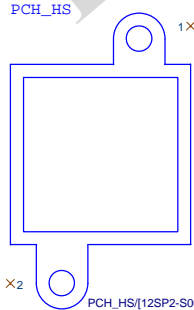


# PCB (F)

USB3.0 : 20/5/7/5/20 (breakout min 8/4/4/4/8)  
Impedance=85 +- 17.5%



# PCB H/S



# USB TABLE

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

USB OC#	Configure
OC0#	USB0,1
OC1#	USB2,3
OC2#	USB4,5
OC3#	USB6,7
OC4#	USB8,9
OC5#	USB10,11
OC6#	USB12,13
OC7#	Not Use

# Gigabyte Technology

Title		
PCH FDI,DMI,USB,PCIE		
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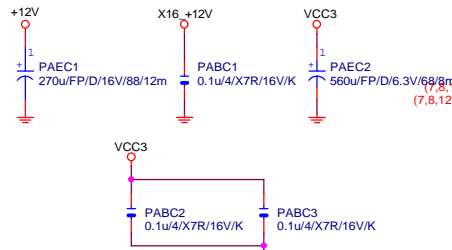






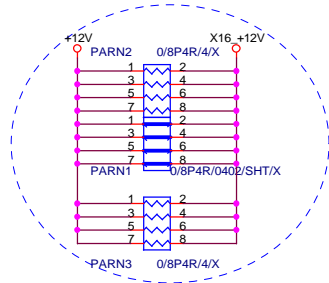


## PCIEX16 CAP



## PCIEX16 PROTECT SHT

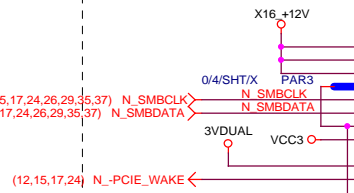
+12 protect  
short-wire test



## PCIEX16 AC CAP

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

## PCIEX16 SLOT



PA EXP TXP0 C  
PA EXP TXN0 C

PA EXP TXP1 C  
PA EXP TXN1 C

PA EXP TXP2 C  
PA EXP TXN2 C

PA EXP TXP3 C  
PA EXP TXN3 C

PA EXP TXP4 C  
PA EXP TXN4 C

PA EXP TXP5 C  
PA EXP TXN5 C

PA EXP TXP6 C  
PA EXP TXN6 C

PA EXP TXP7 C  
PA EXP TXN7 C

PA EXP SW TXP8 C  
PA EXP SW TXN8 C

PA EXP SW TXP9 C  
PA EXP SW TXN9 C

PA EXP SW TXP10 C  
PA EXP SW TXN10 C

PA EXP SW TXP11 C  
PA EXP SW TXN11 C

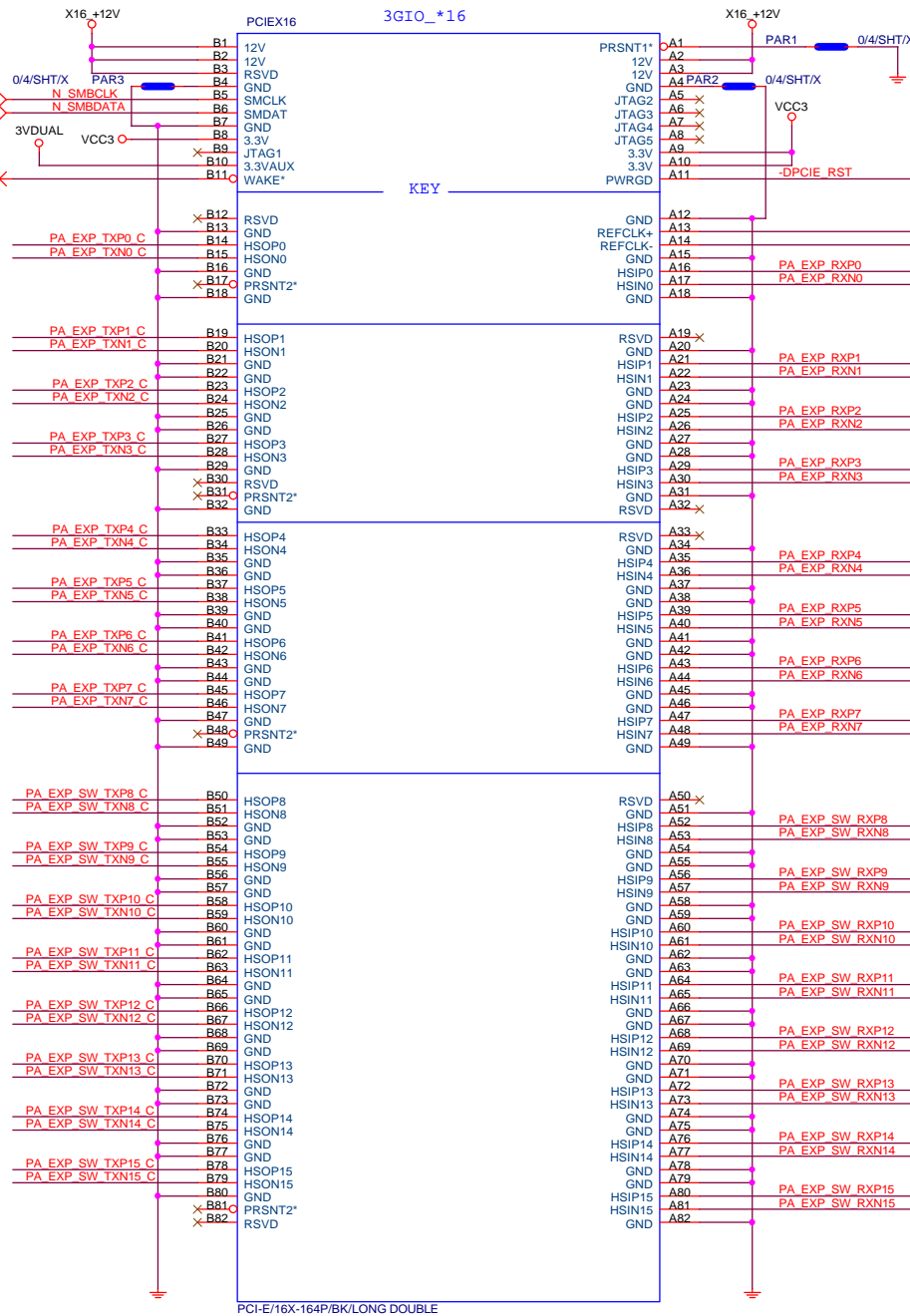
PA EXP SW TXP12 C  
PA EXP SW TXN12 C

PA EXP SW TXP13 C  
PA EXP SW TXN13 C

PA EXP SW TXP14 C  
PA EXP SW TXN14 C

PA EXP SW TXP15 C  
PA EXP SW TXN15 C

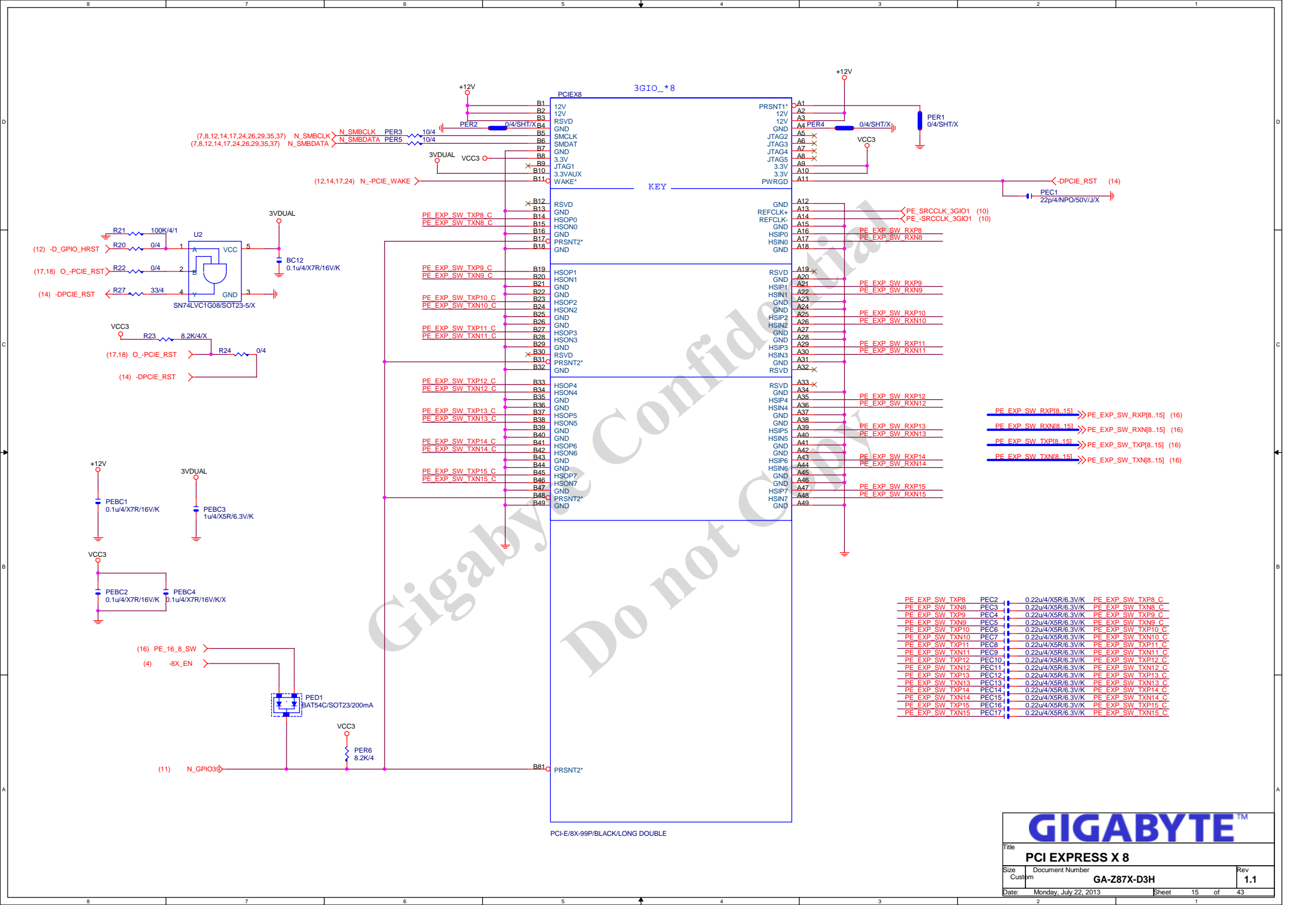
## PCIESLOT-164DN-Q



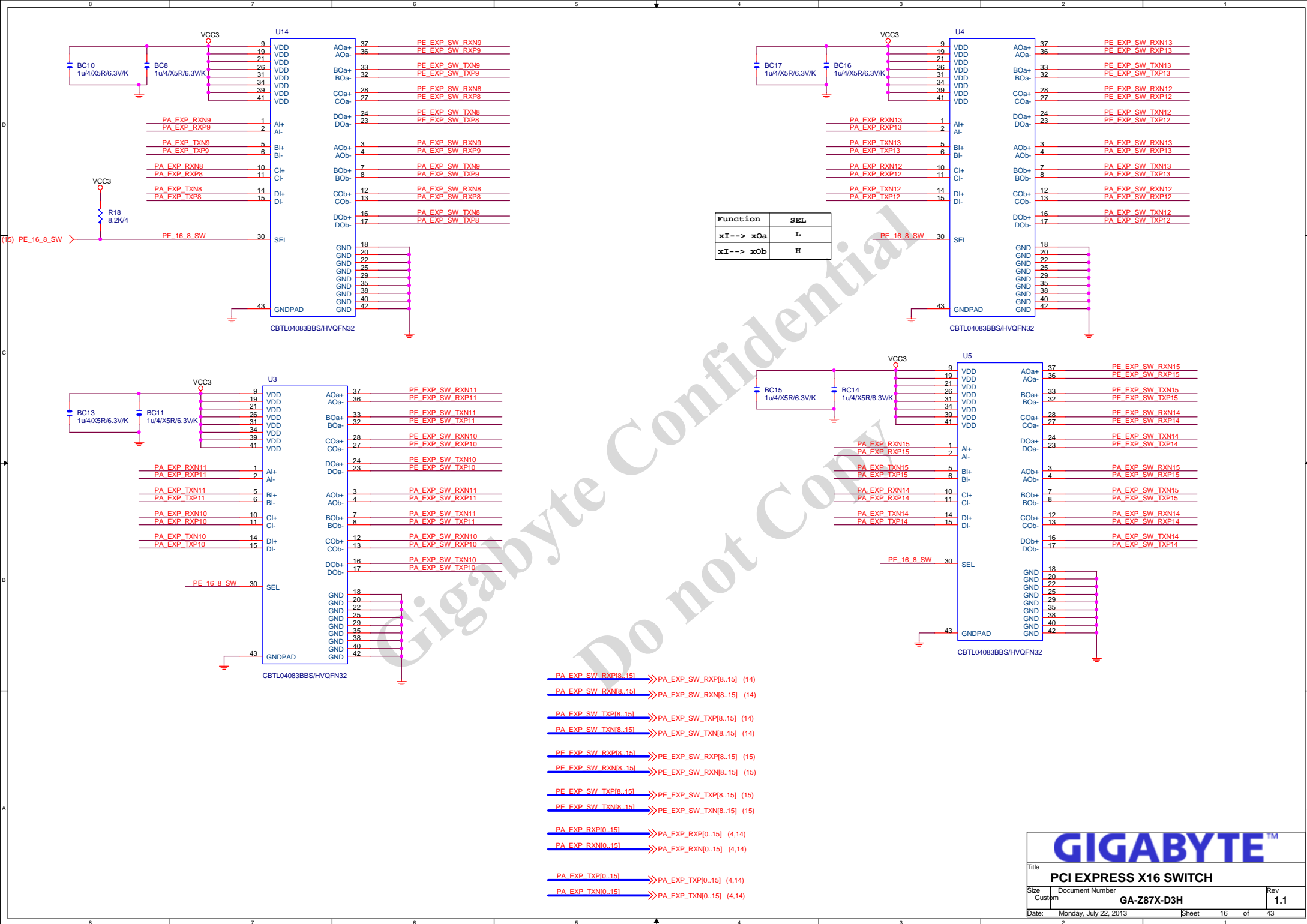
PCI-E/16X-164P/BK/LONG DOUBLE

## Gigabyte Technology

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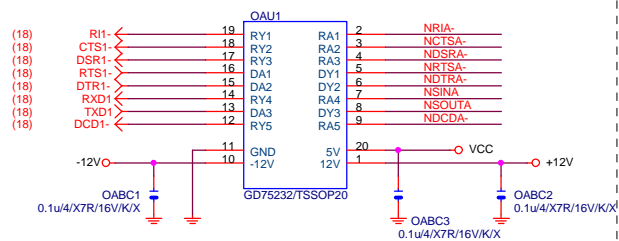
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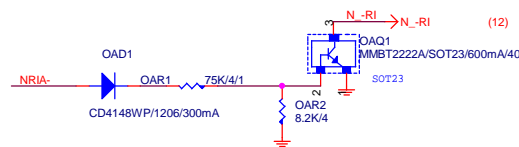




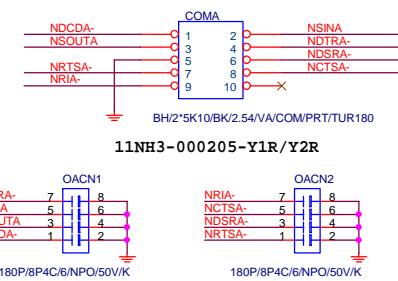
## COMA



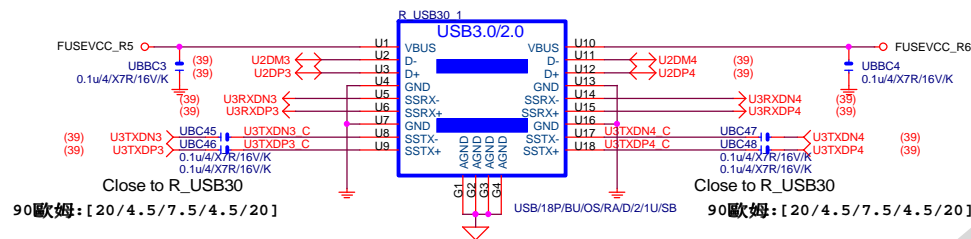
## COM RI



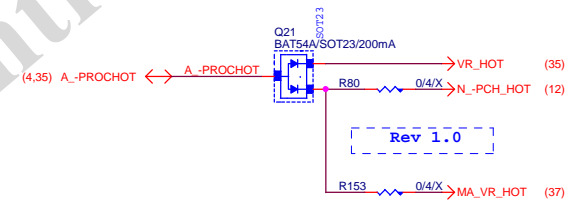
## COM BUFFER



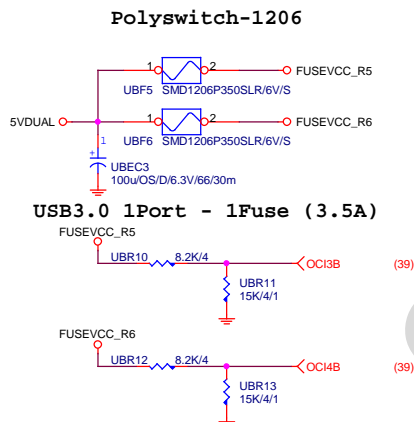
## USB30\_20 CONNECT



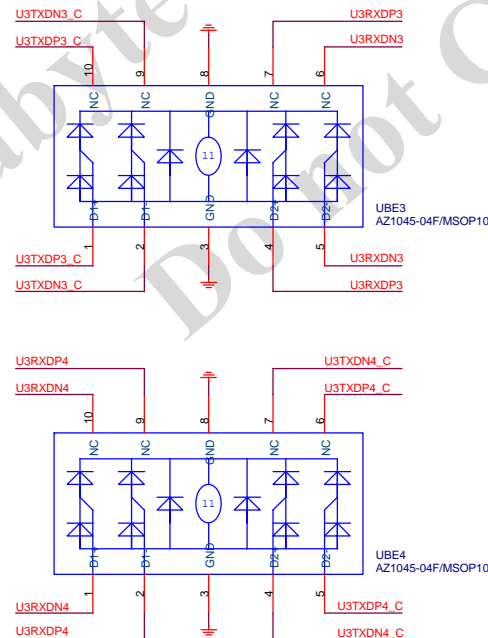
## -PROHOT



## USB30 PWR

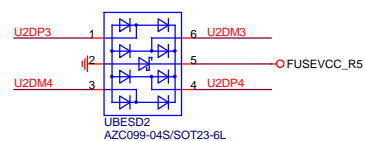


## USB30 ESD PROTECT



## -PROHOT

## USB20 ESD PROTECT

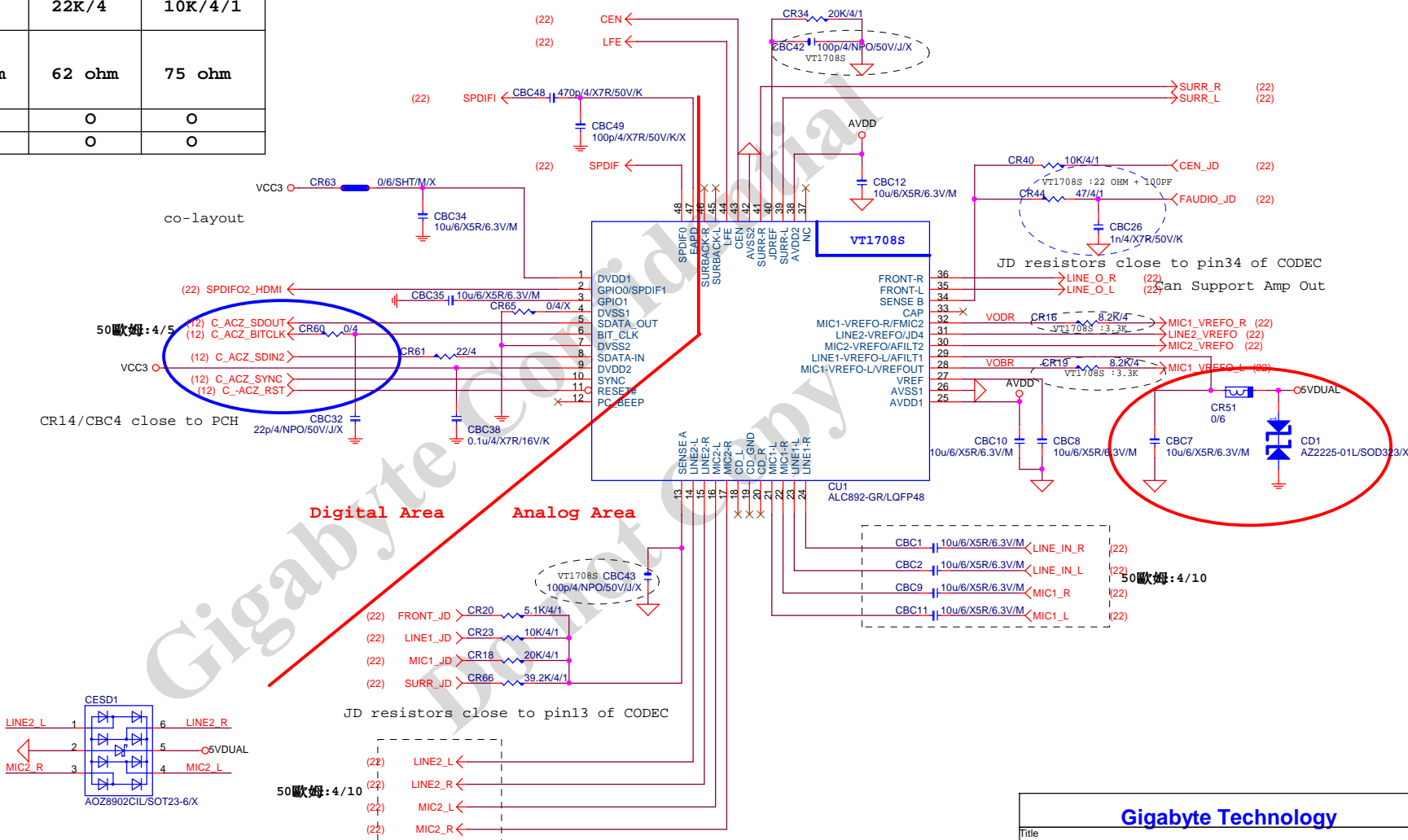


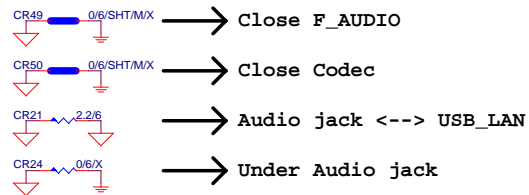
Gigabyte Technology

Title				
COM & PROHOT/Dynamic O.C.				
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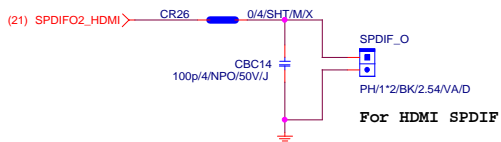


	ALC892	ALC887-VD2	VT1708S-CE
CR44/CBC26	47ohm+1nF	47ohm+1nF	22ohm+100P
CBC42/CBC43	X	X	100P/4
CR16/CR19 CR52/CR56/CR10/CR9	8.2K/4	8.2K/4	3.3K/4/1
CR6/CR7/CR58/CR54/ CR67/CR68/CR69/CR70	22K/4	22K/4	10K/4/1
CR5/CR8/CR1/CR14/ CR17/CR22/CR73/CR74/ CR13/CR11/CR57/CR53/ CR75/CR76	62 ohm	62 ohm	75 ohm
CR51/CD1/CBC7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

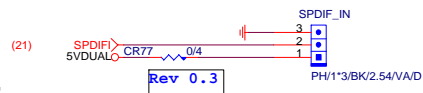




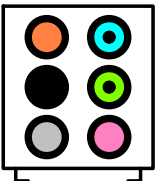
### SPDIF\_OUT



### SPDIF\_IN



### AZALIA JACK

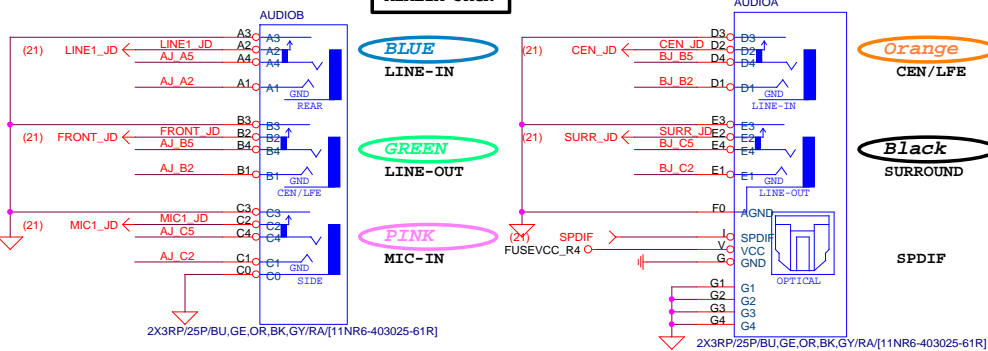


### AZALIA JACK

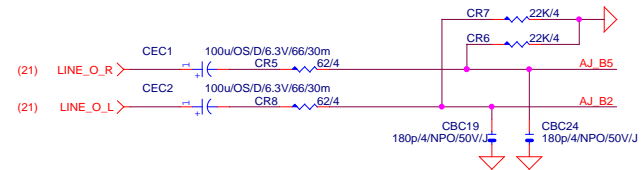
BLUE  
LINE-IN

GREEN  
LINE-OUT

PINK  
MIC-IN

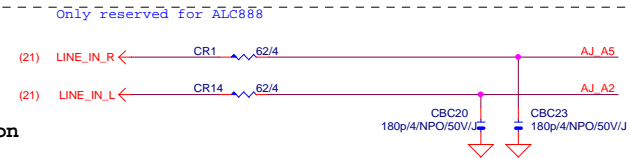


### LINE-OUT



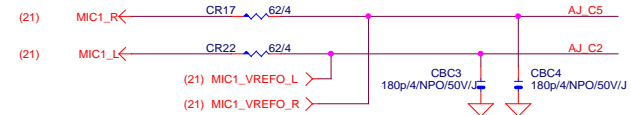
### LINE-IN

Verify MIC function  
in LINE-in

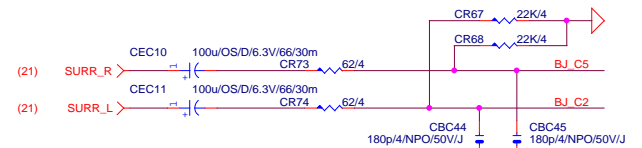


For 889A/888

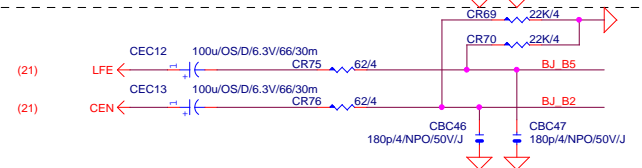
### MIC-IN



### SURROUND

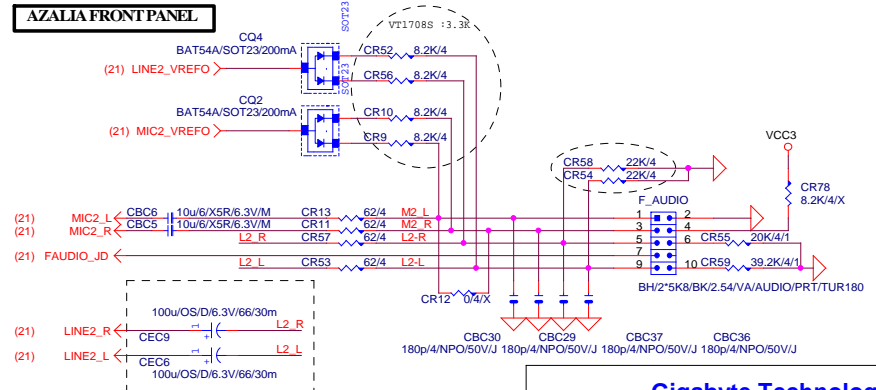


### CEN/LFE



### SURRBACK

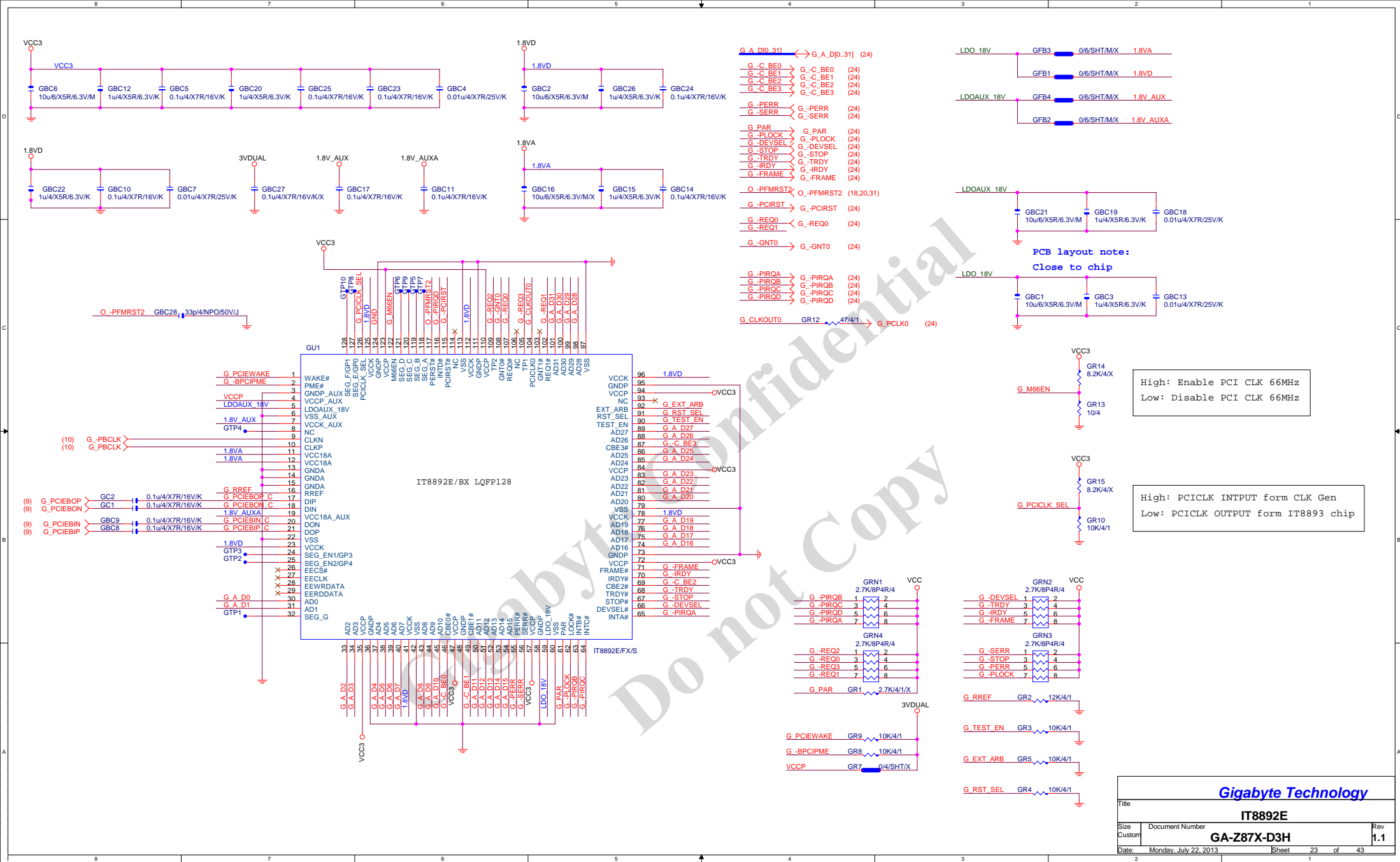
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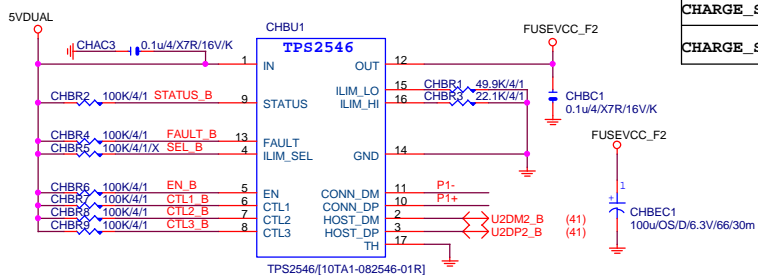
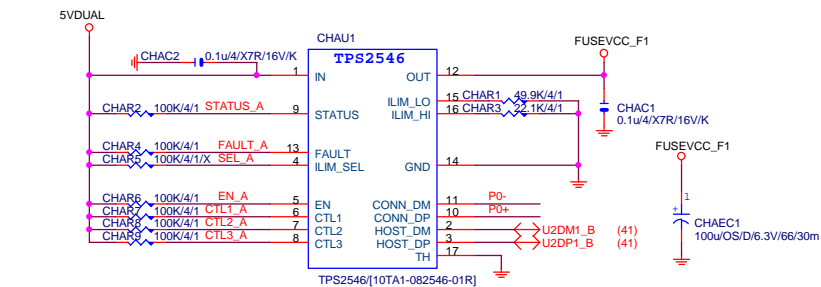
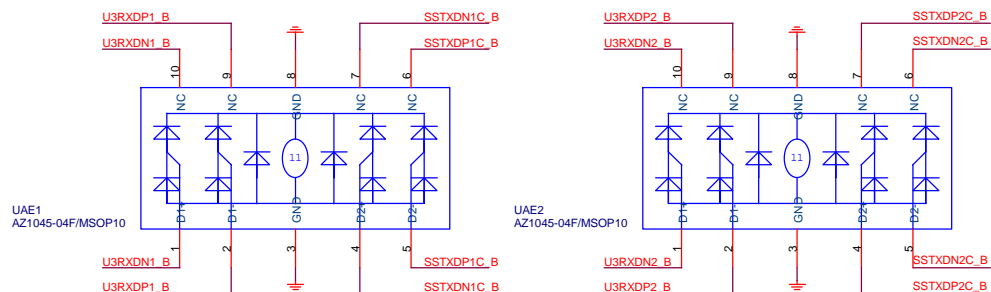
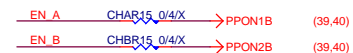
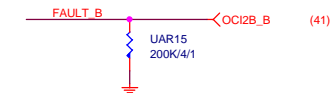
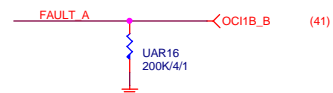
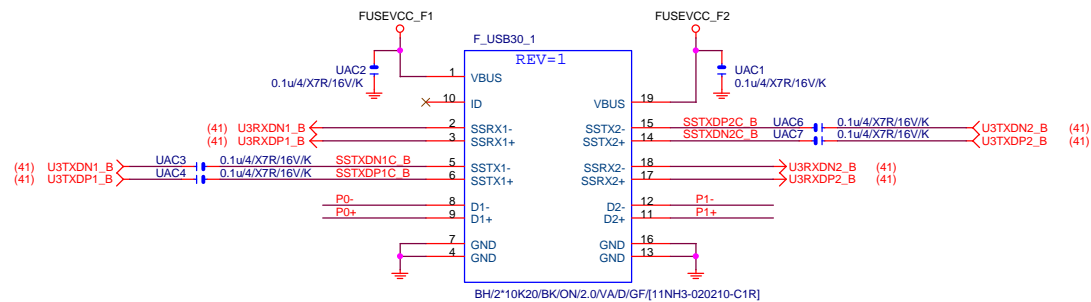
Gigabyte Technology

AUDIO JACK

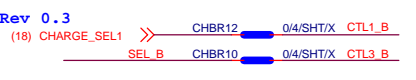
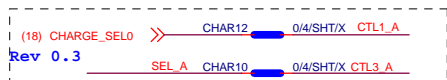
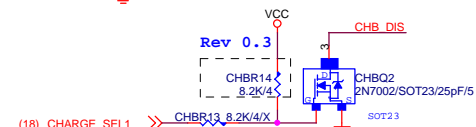
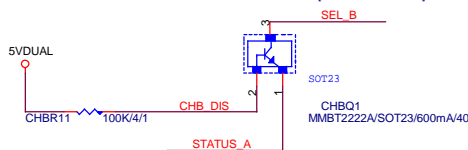
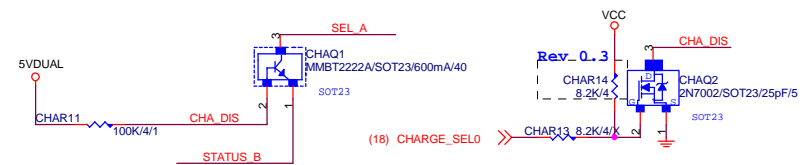
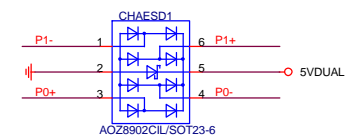
Title	Document Number	Rev
	GA-Z87X-D3H	1.1
Size Custom	Date: Monday, July 22, 2013	Sheet 22 of 43



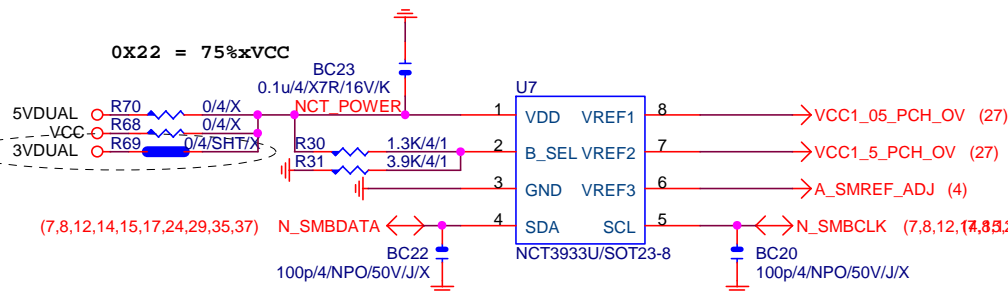




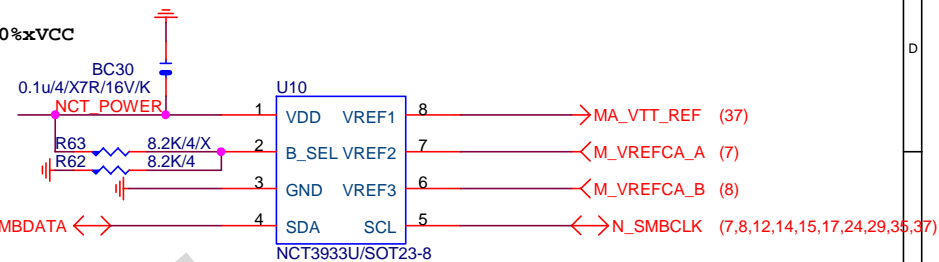
	S0	S3/S4/S5
CHARGE_SEL0	1	0
CHARGE_SEL1	1	0



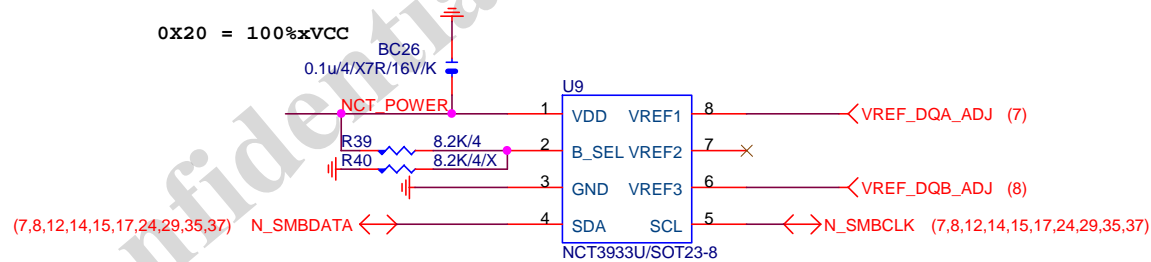
# OVER VOLTAGE



**0X2A = 0%xVCC**



**0X20 = 100%xVCC**



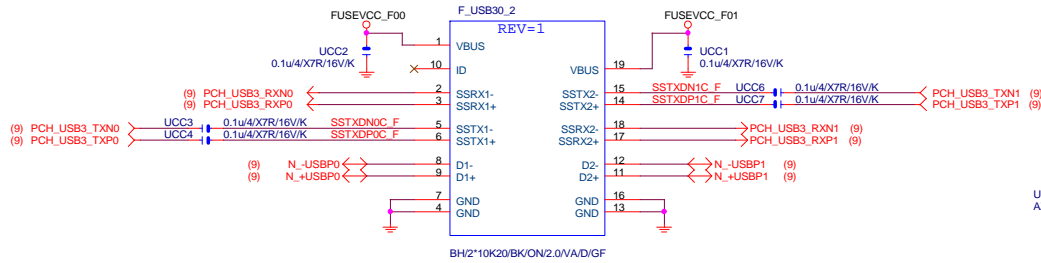
NCT3933	0X2A	0X20	0X22
VREF1	DDRVTT	VREF_DDRA_DQ	PCH Core
VREF2	VREF_DDRA_CA	N/A	VCC1_5_PCH
VREF3	VREF_DDRA_CA	VREF_DDRB_DQ	SMREF

**Gigabyte Technology**

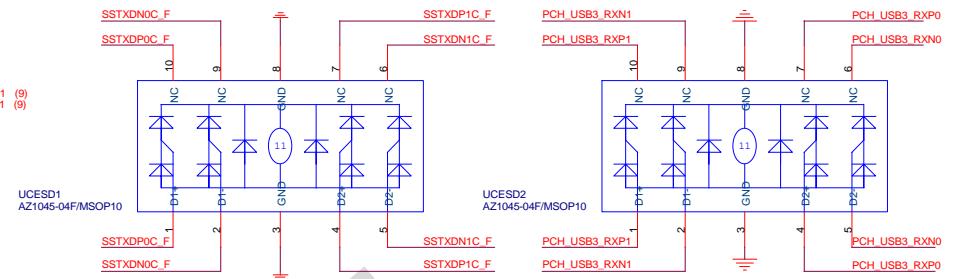
Title			CPU CORE VR-2		
Size		Document Number		GA-Z87X-D3H	
Custom				Rev 1.1	
Date:		Monday, July 22, 2013		Sheet 26 of 43	



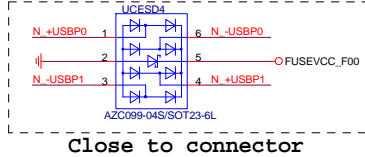
# Front USB3.0



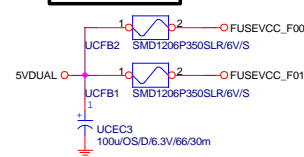
# F\_USB30 ESD PROTECT



# BLUE

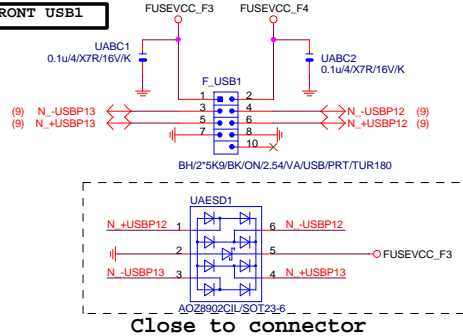


# F\_USB30 PWR



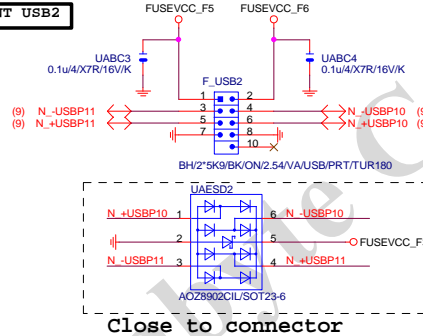
Close to connector

# FRONT USB1



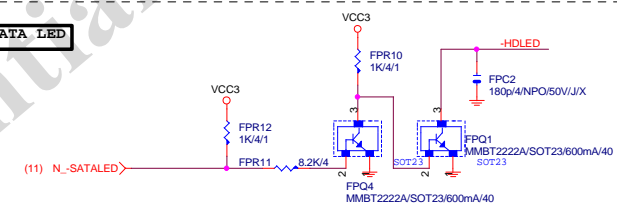
Close to connector

# FRONT USB2

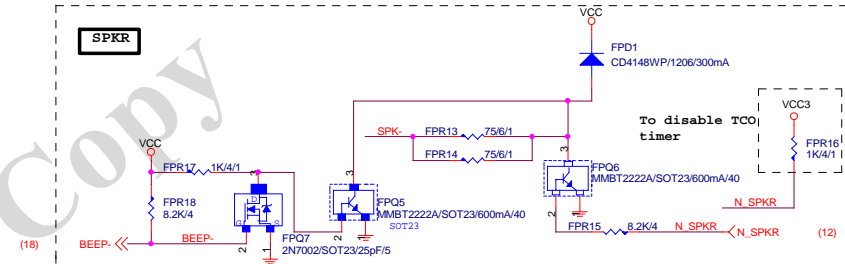


Close to connector

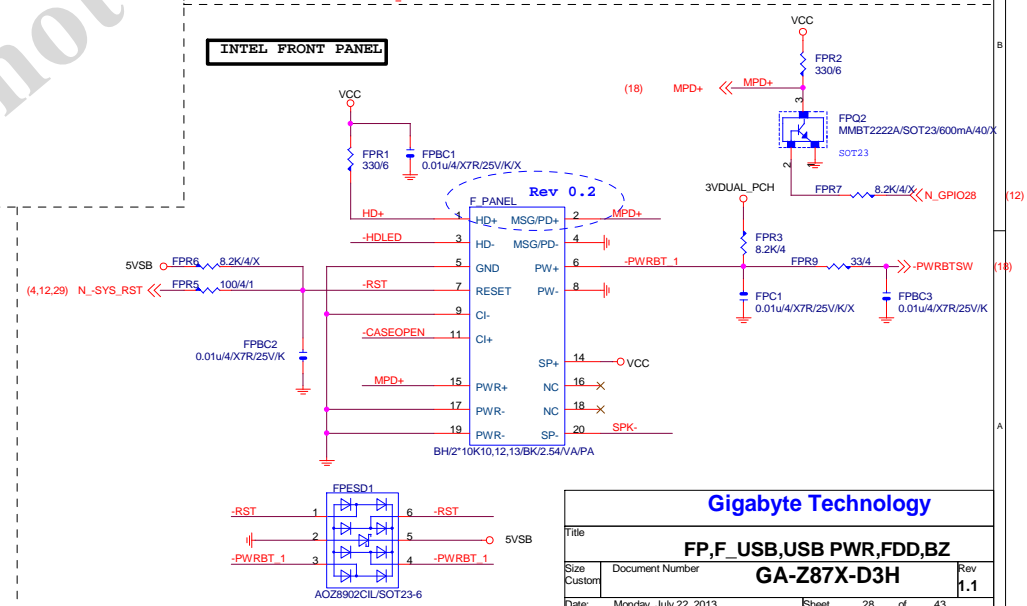
# SATA\_LED



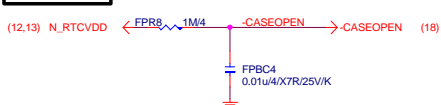
# SPKR



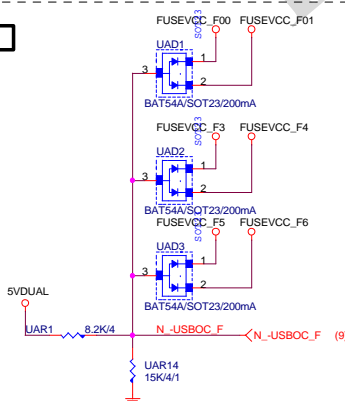
# INTEL FRONT PANEL



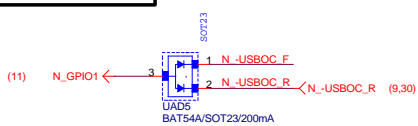
# CASE OPEN



# -USBOC\_F



# F\_USB POWER PROTECT



Gigabyte Technology

Rev F, F\_USB, USB PWR, FDD, BZ

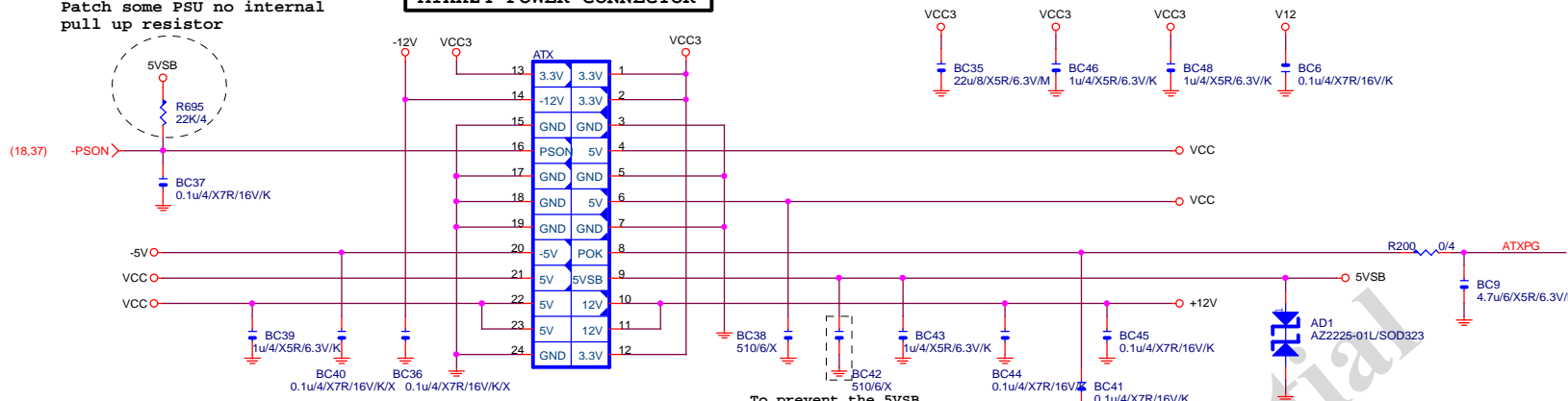
GA-Z87X-D3H

Rev 1.1

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Patch some PSU no internal pull up resistor

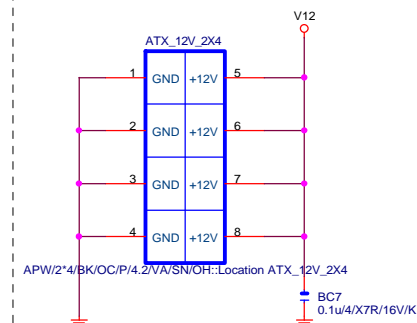
## ATXX24 POWER CONNECTOR



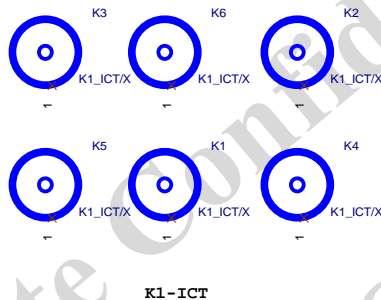
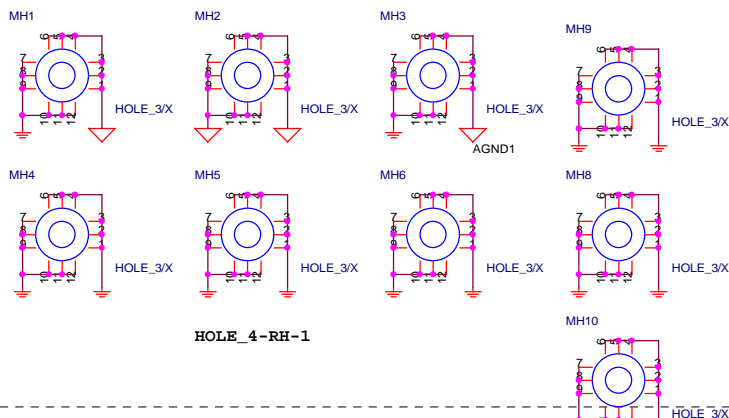
APW/2\*12/BK/VA/SN/2SHK/PA66

To prevent the 5VSB under loading when boot

## ATXX4 POWER CONNECTOR

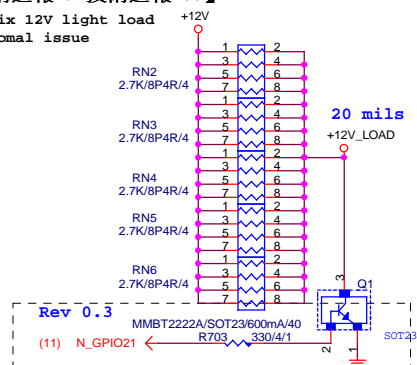


APW/2\*4/BK/OC/P/4.2/VA/SN/OH:Location ATX\_12V\_2X4



## 【技術通報R&D技術通報153】

To fix 12V light load abnormal issue



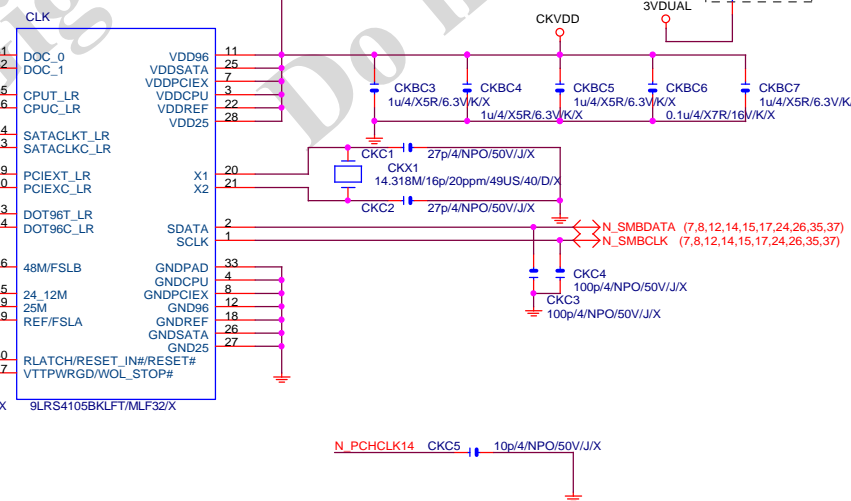
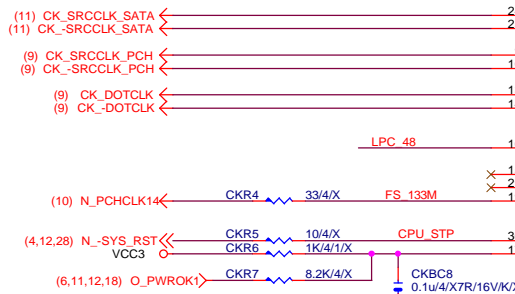
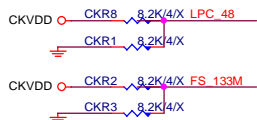
Rev 0.3

(11) N\_GPIO21

## CLK GEN

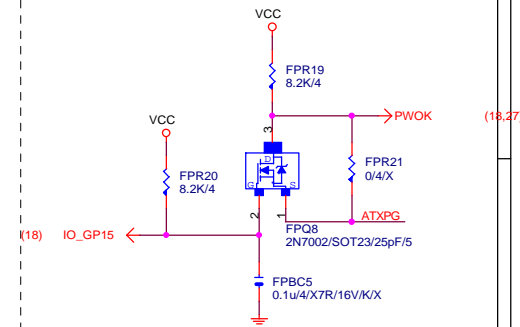
### CPU Frequency Selection

FSLB	FSLA	CPU
0	0	100M <Default>
0	1	133M
1	0	200M
1	1	166M



## PWOK PATCH

### 【技術通報R&D技術通報154】

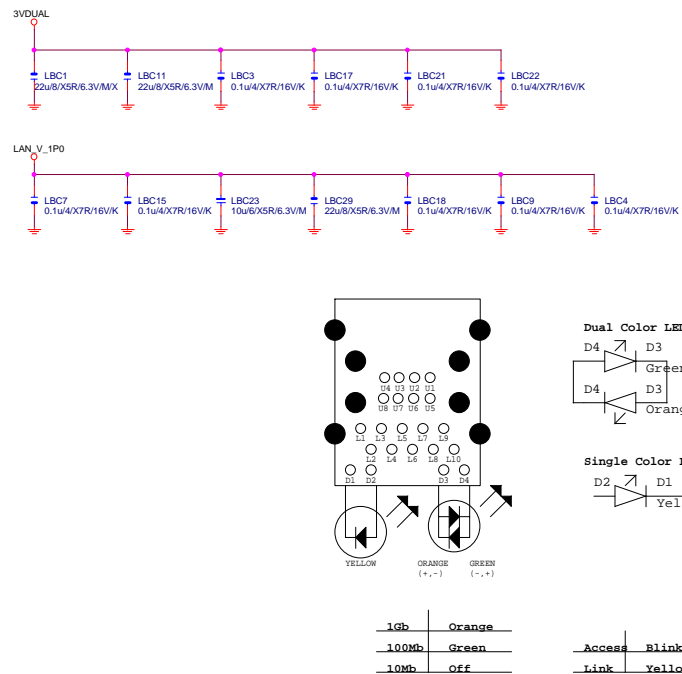
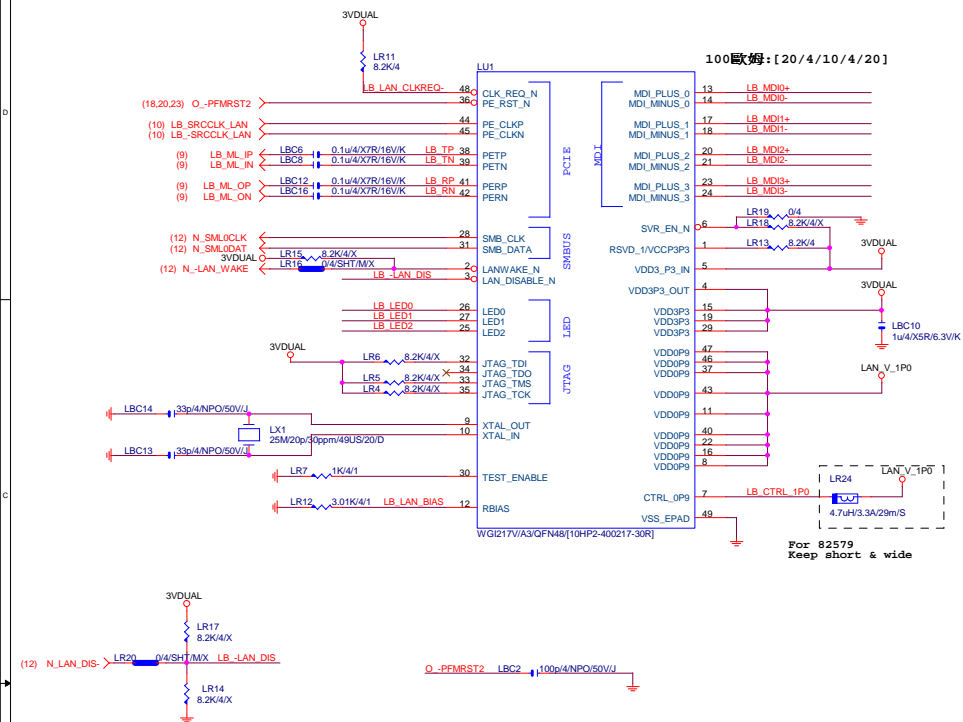


## Gigabyte Technology

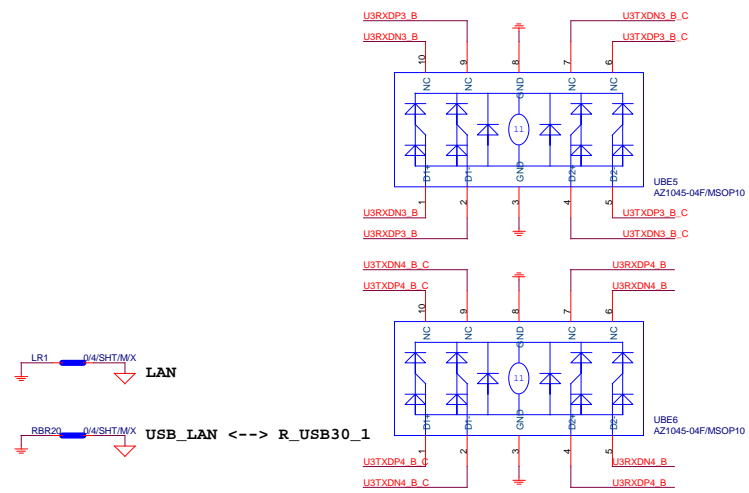
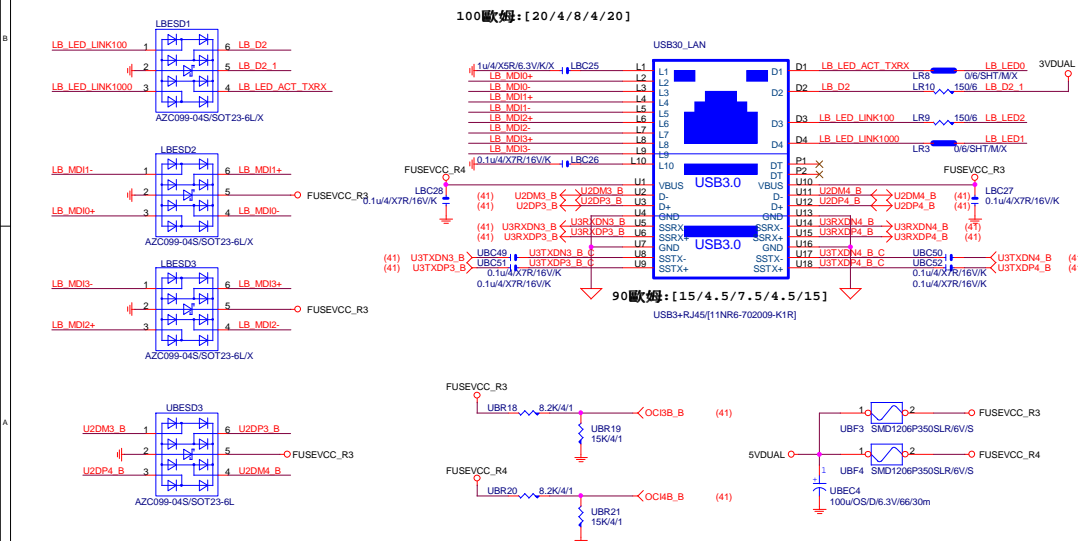
Title				
ATX POWER CONNECTOR				
Size	Document Number			Rev
Custom	GA-Z87X-D3H			1.1
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## LAN:INTEL I217



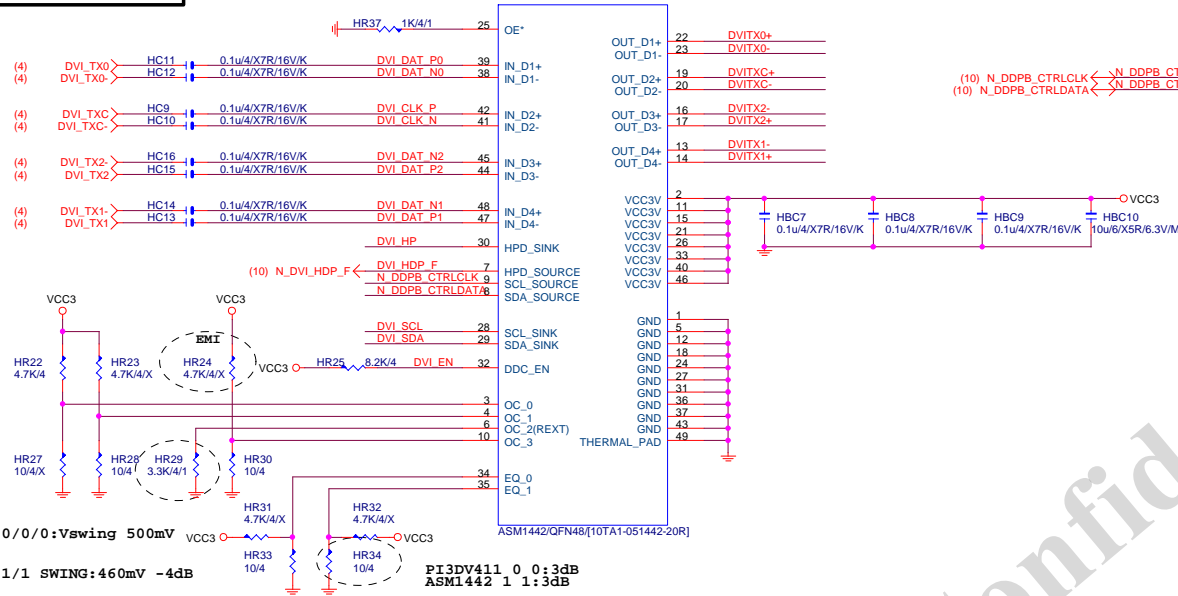
## USB30\_LAN CONNECTOR



# DVI LEVEL SHIFT

DVI:15/4/4/4/15

Impedance=85 +- 17.5%



PERICOM 0/0/0/0:Vswing 500mV  
 ASML442  
 DEFAULT 0/1/1 SWING:460mV -4dB

PI3DV411 0 0:3dB  
 ASML442 1 1:3dB

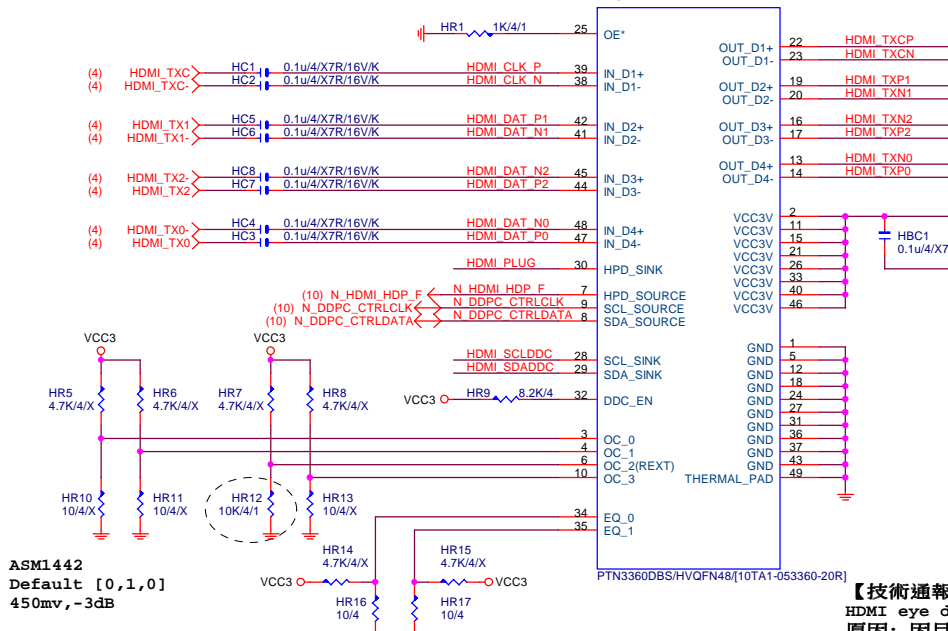
Gigabyte Technology		
Title		
TI TSB43AB23 1394		
Size	Document Number	Rev
Custom	GA-Z87X-D3H	1.1
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## HDMI LEVEL SHIFT

HDMI:15/4/4/15

Impedance=85 +- 17.5%

HU1

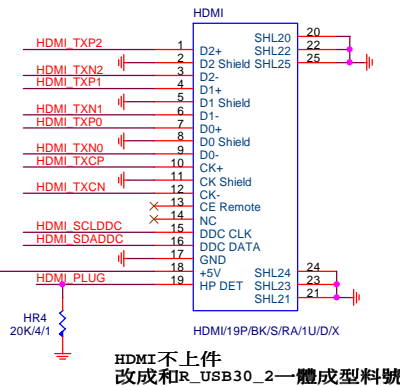


## 【技術通報R&amp;D技術通報150】

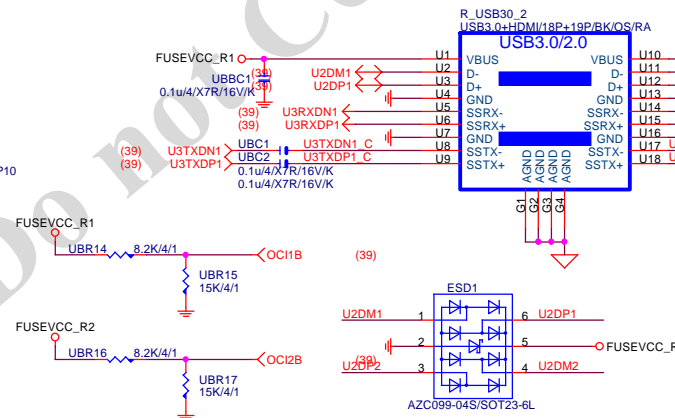
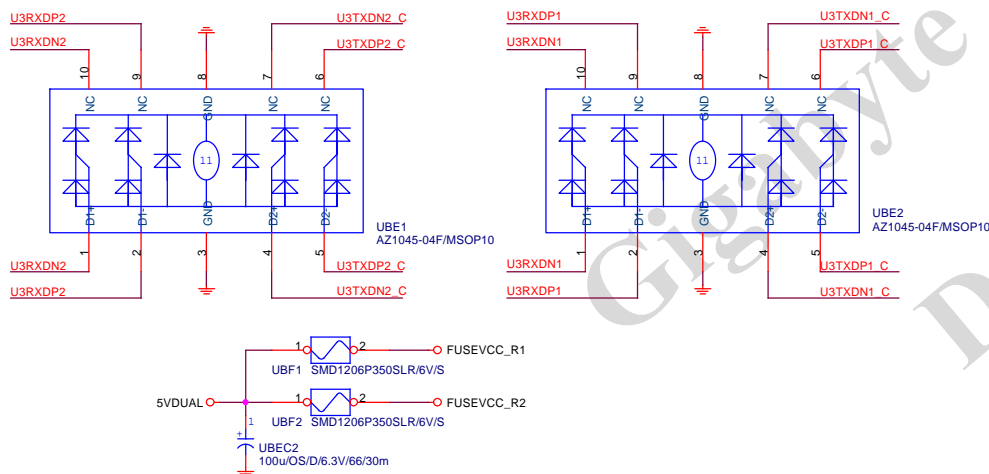
HDMI eye diagram1.4版(deep color)會fail

原因: 因目前的HDMI訊號過長,造成RISING TIME過慢,而會壓到eye diagram

改善: ASMEDIA ASML442 : 3.16K(PIN6 PULL DOWN電阻) 10ohm(PIN4 PULL DOWN電阻)

HDMI不上件  
改成和R\_USB30\_2一體成型料號

## R\_USB30

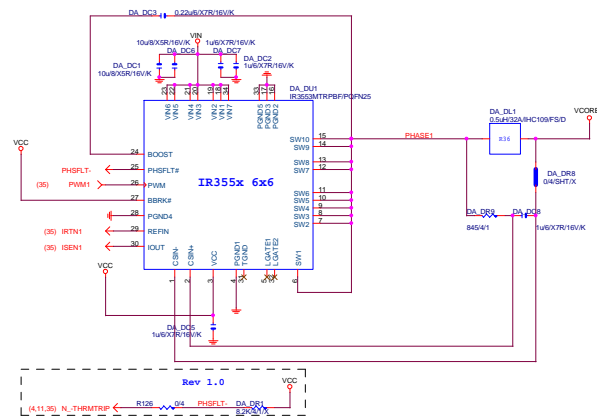


GIGABYTE™			
HDMI & USB			
Size	Document Number	Rev	
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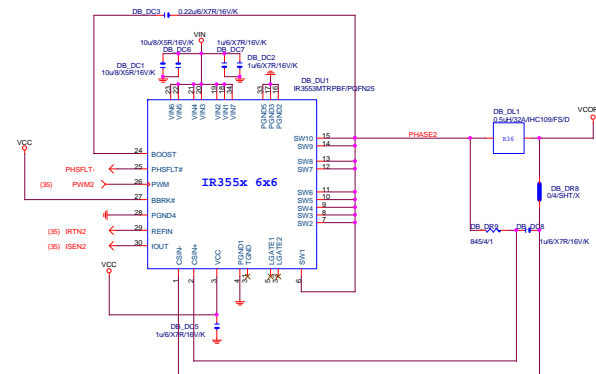




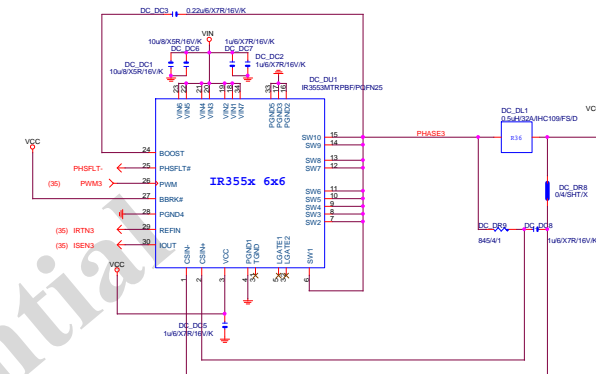
## VCORE-PHASE1



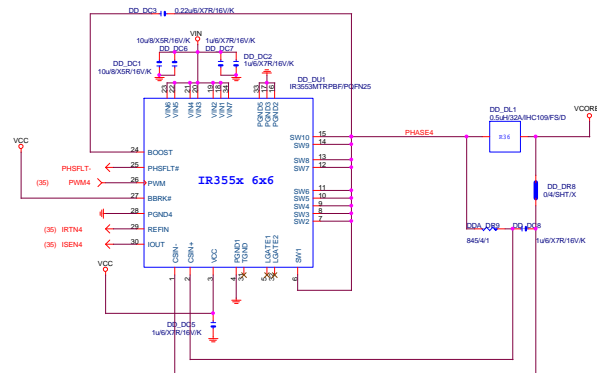
## VCORE-PHASE2



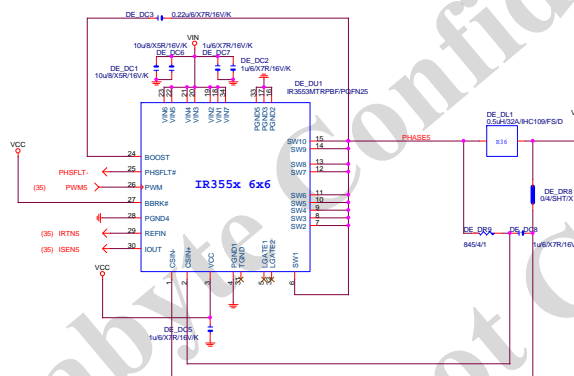
## VCORE-PHASE3



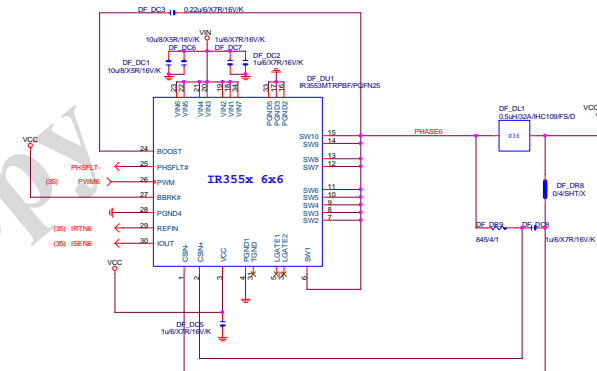
## VCORE-PHASE4



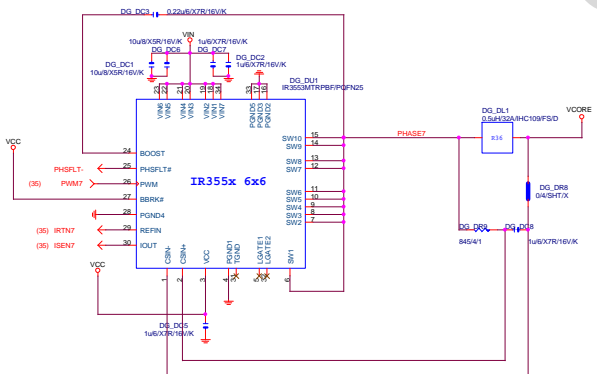
## VCORE-PHASE5



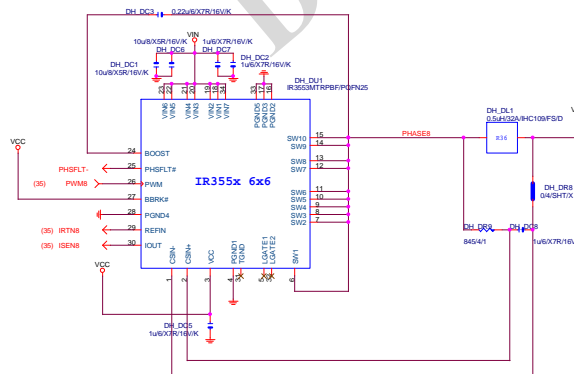
## VCORE-PHASE6

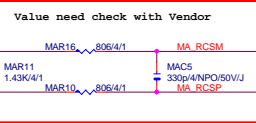
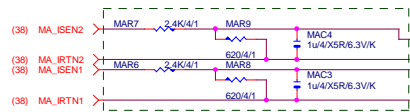
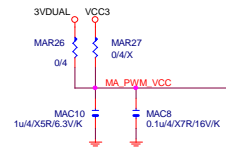
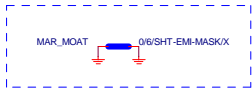


## VCORE-PHASE7



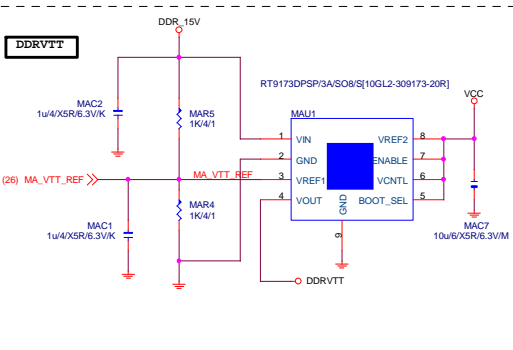
## VCORE-PHASE8





Close to DDR output inductor

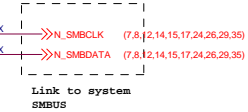
should be routed as differential pair, 7mil width, 8mil spacing



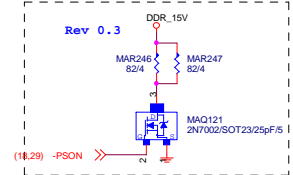
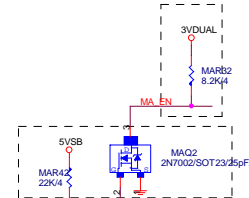
IR3570

MA\_PWM2 (38)  
MA\_PWM1 (38)

Addr: 74h



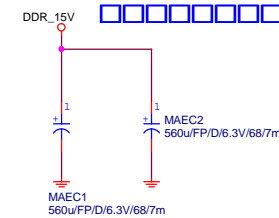
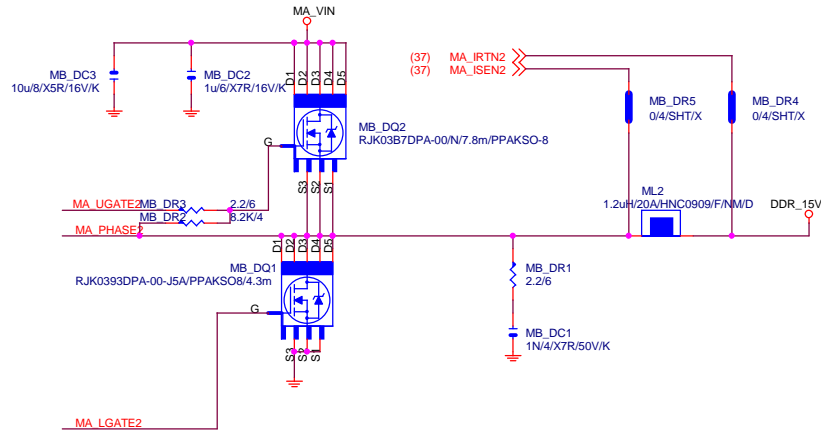
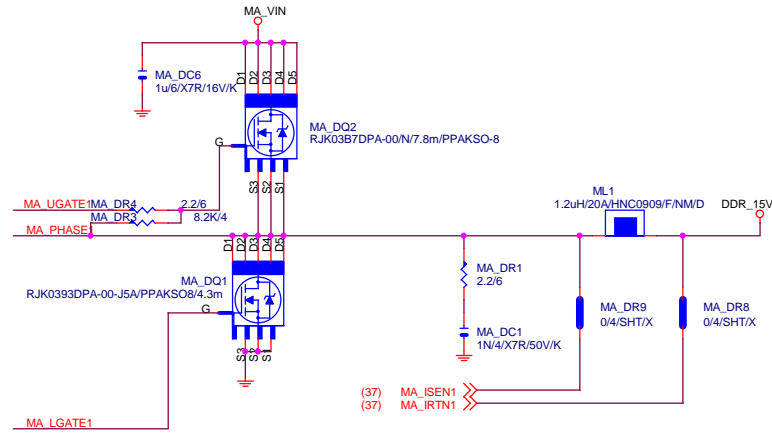
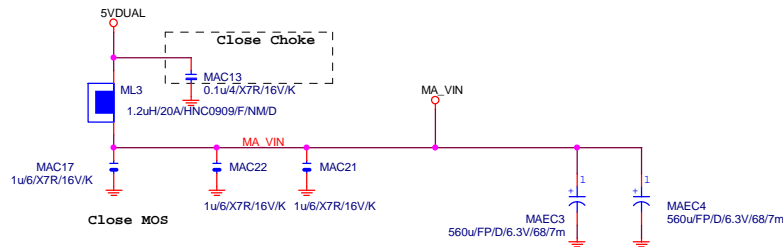
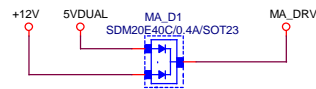
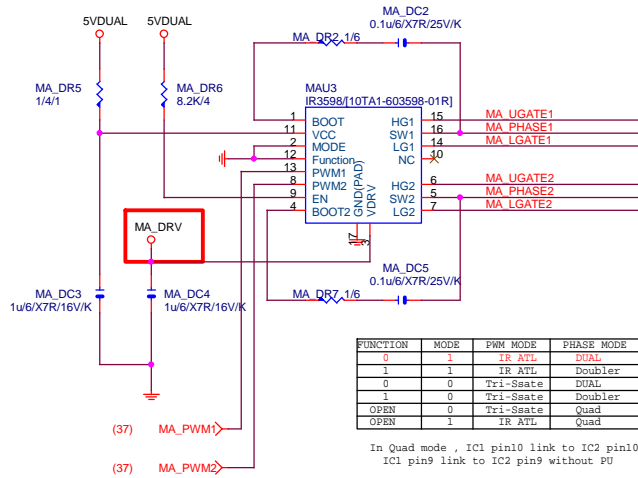
Link to PCH pin BQ46  
Pull up in PCH side

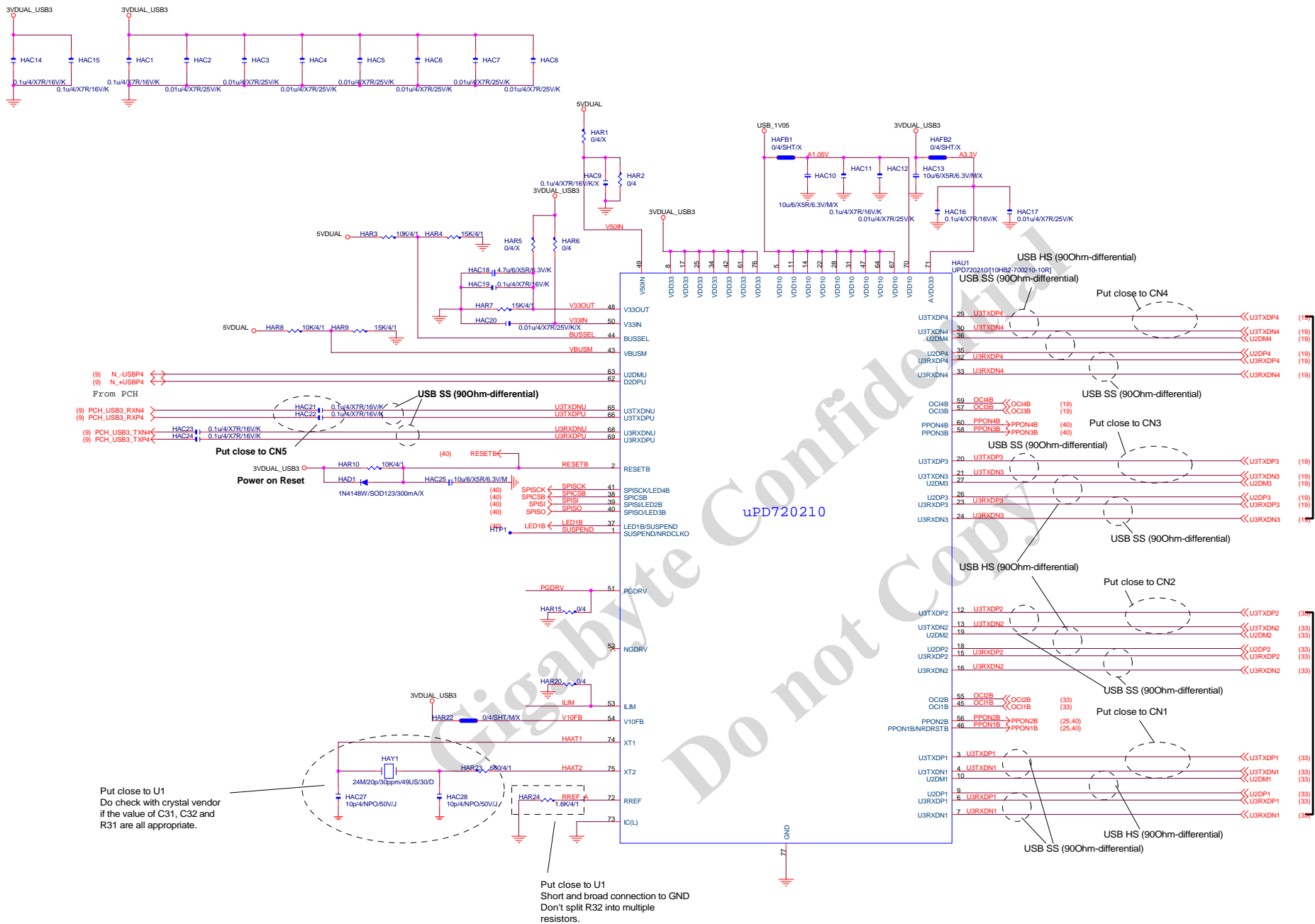


POWER ISSUE  
N\_SLP\_S3  
N\_S4\_S5

GIGABYTE™		
Title		
DDR POWER IR3570		
Size	Document Number	Rev
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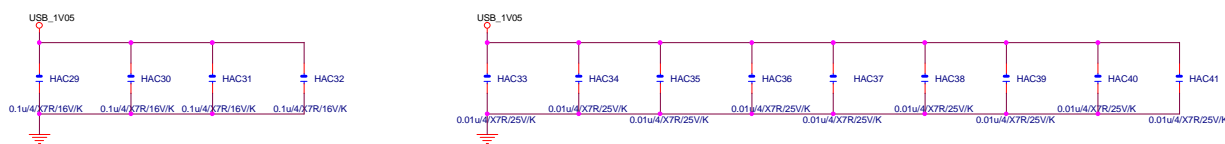
# DDR\_15V



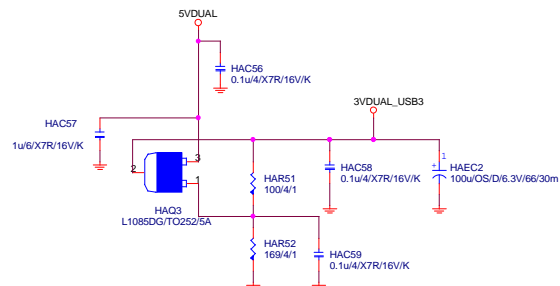


R\_USB30\_1

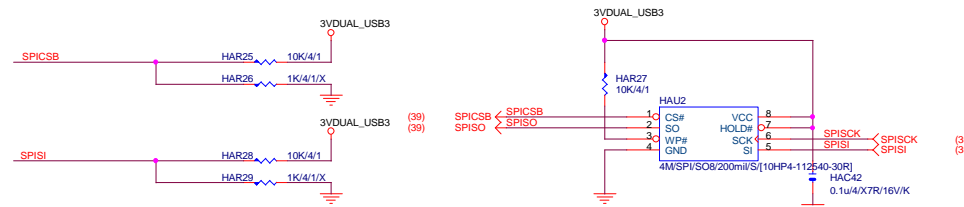
R\_USB30\_2



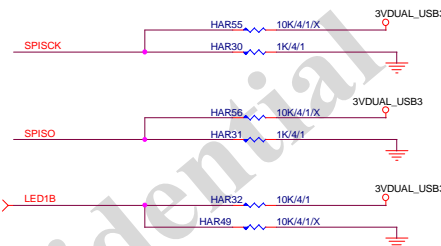
# 3VDUAL\_USB\_1



## # External SPI ROM ; SPI ROM attached mode

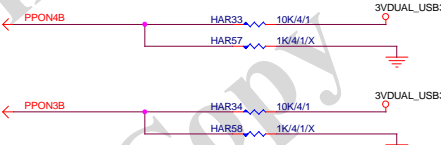


## # Battery Charging



## # Number of Ports ; 4Ports mode

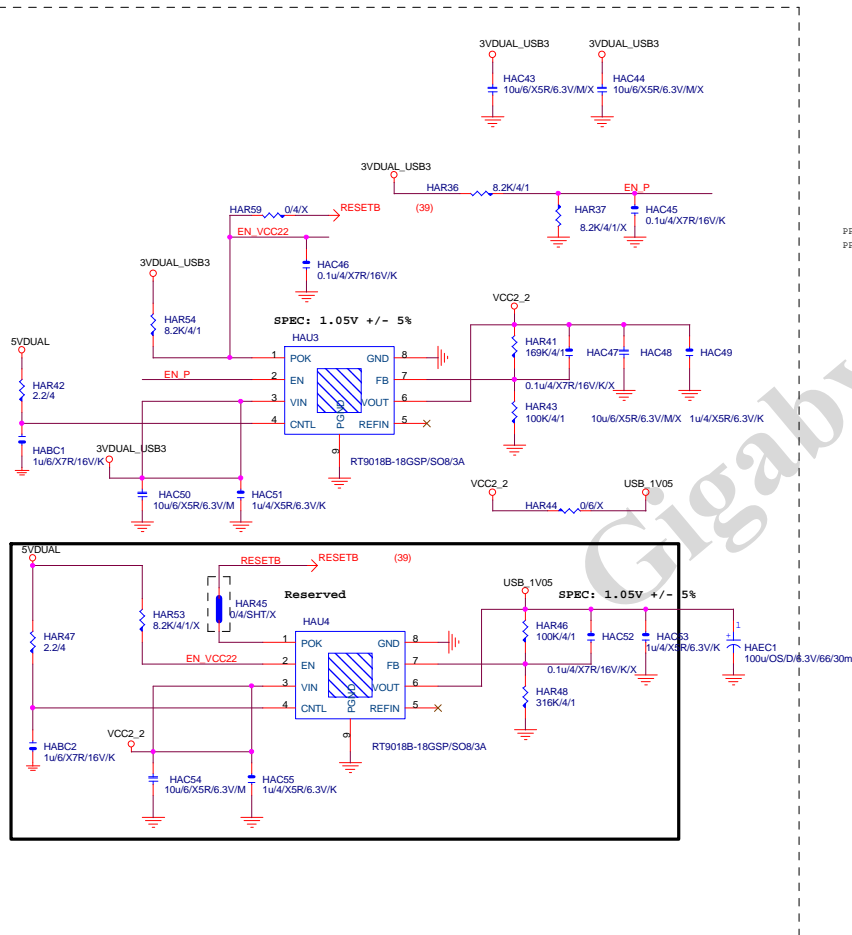
PPON3B / PPON4B : H / H ( 4 port )  
PPON3B / PPON4B : L / L ( 2 port )

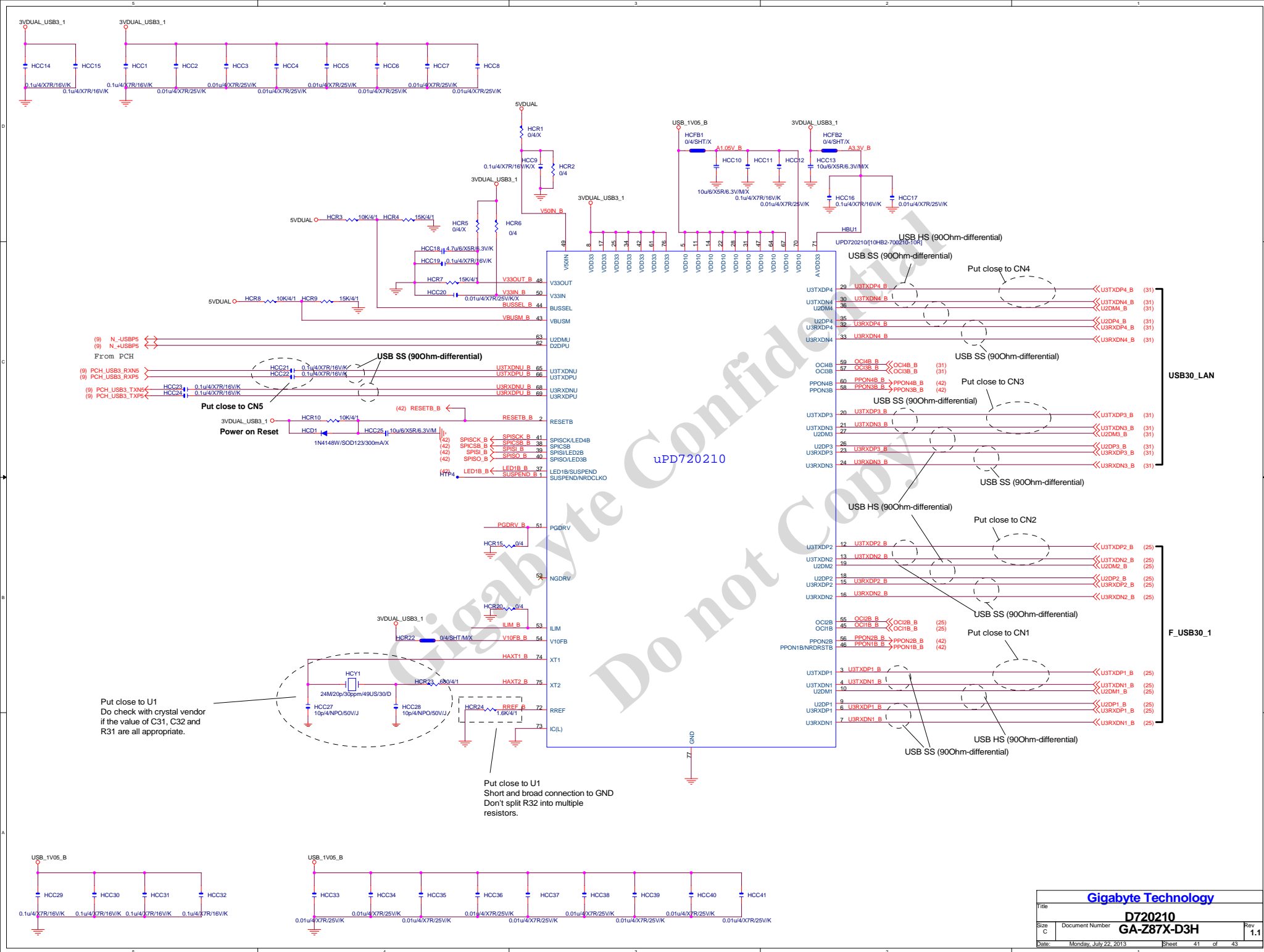


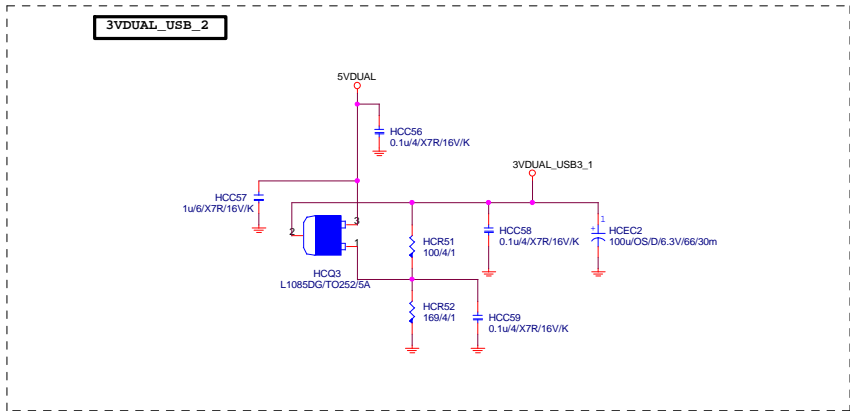
## # VBUS Power Control ; Individual mode



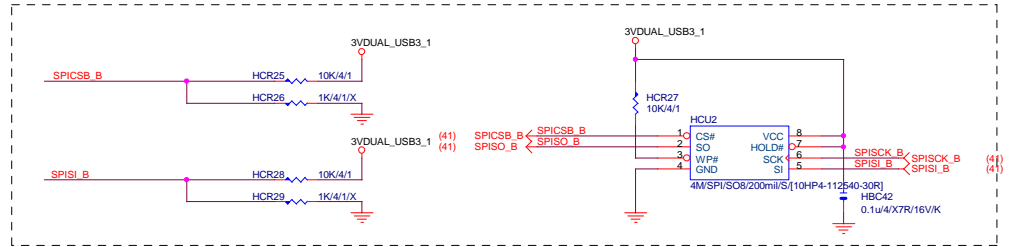
## # PPON1B Pin Function ; Port1 PPONB mode



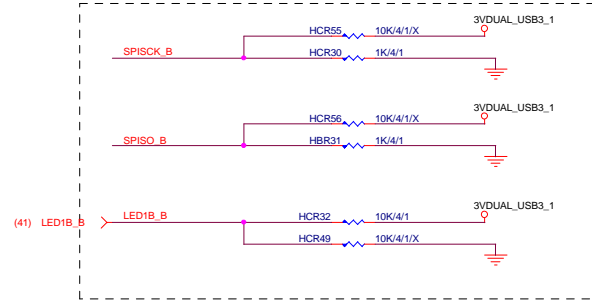




#### # External SPI ROM ; SPI ROM attached mode

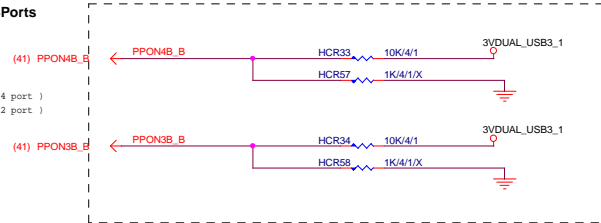


#### # Battery Charging

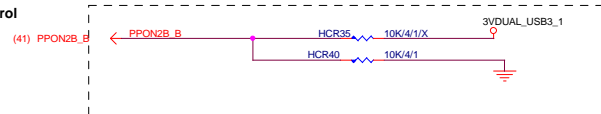


#### # Number of Ports ; 4Ports mode

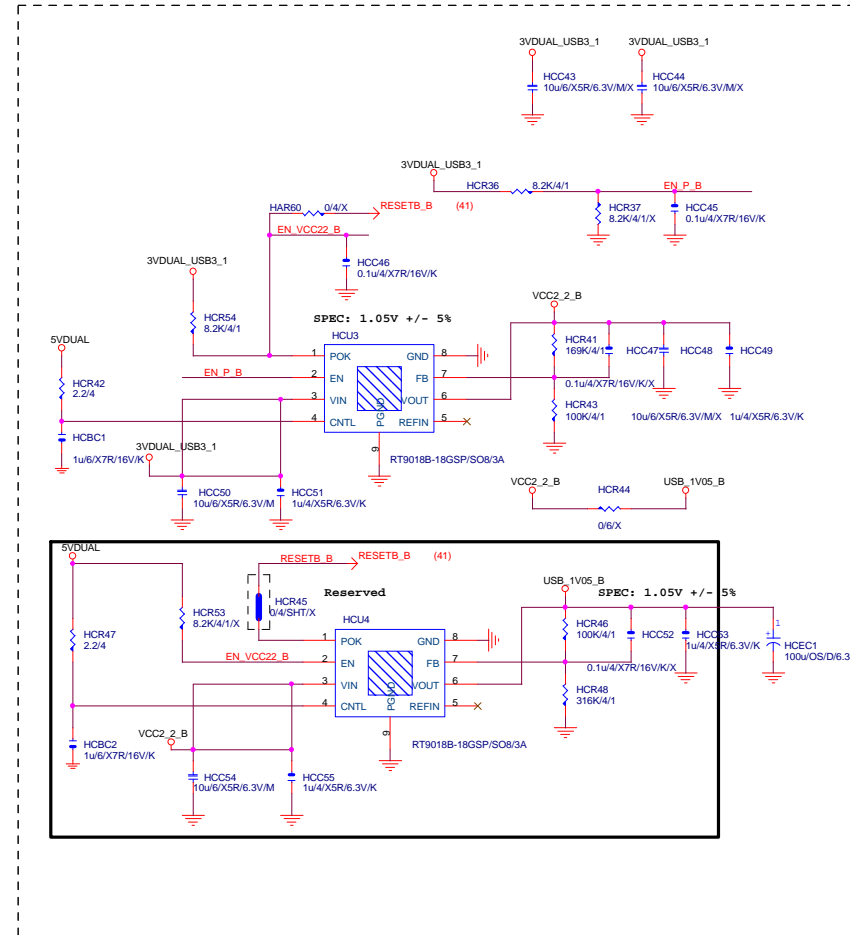
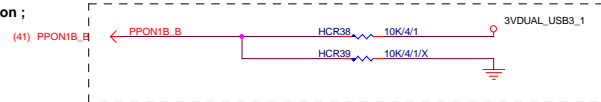
PPON3B / PPON4B : H / H ( 4 port )  
PPON3B / PPON4B : L / L ( 2 port )



#### #5 VBUS Power Control ; Individual mode

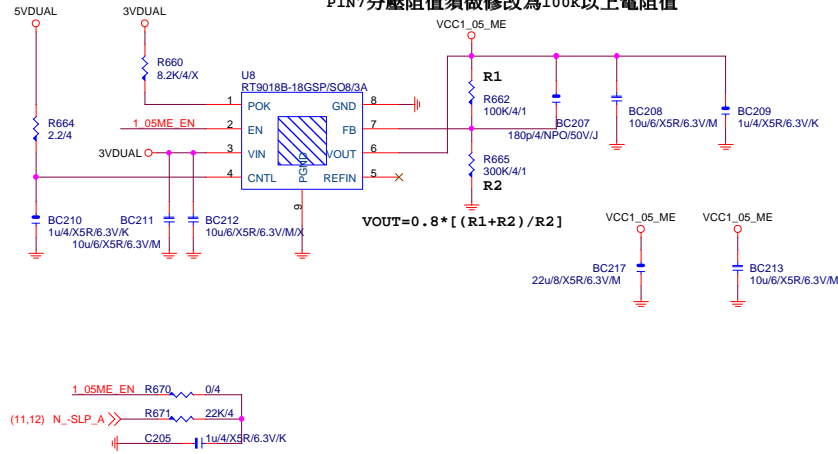


#### # PPON1B Pin Function ; Port1 PPONB mode

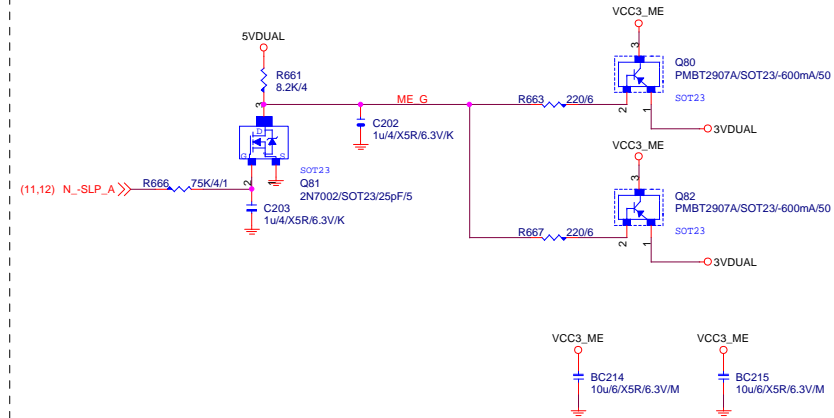


VCC1\_05\_ME

【技術通報R&D技術通報156】  
(RICHTEK), (NUVOTON), (EMC) 做共用  
PIN7分壓阻值須做修改為100K以上電阻值



VCC3\_ME



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