


# LCFC Confidential

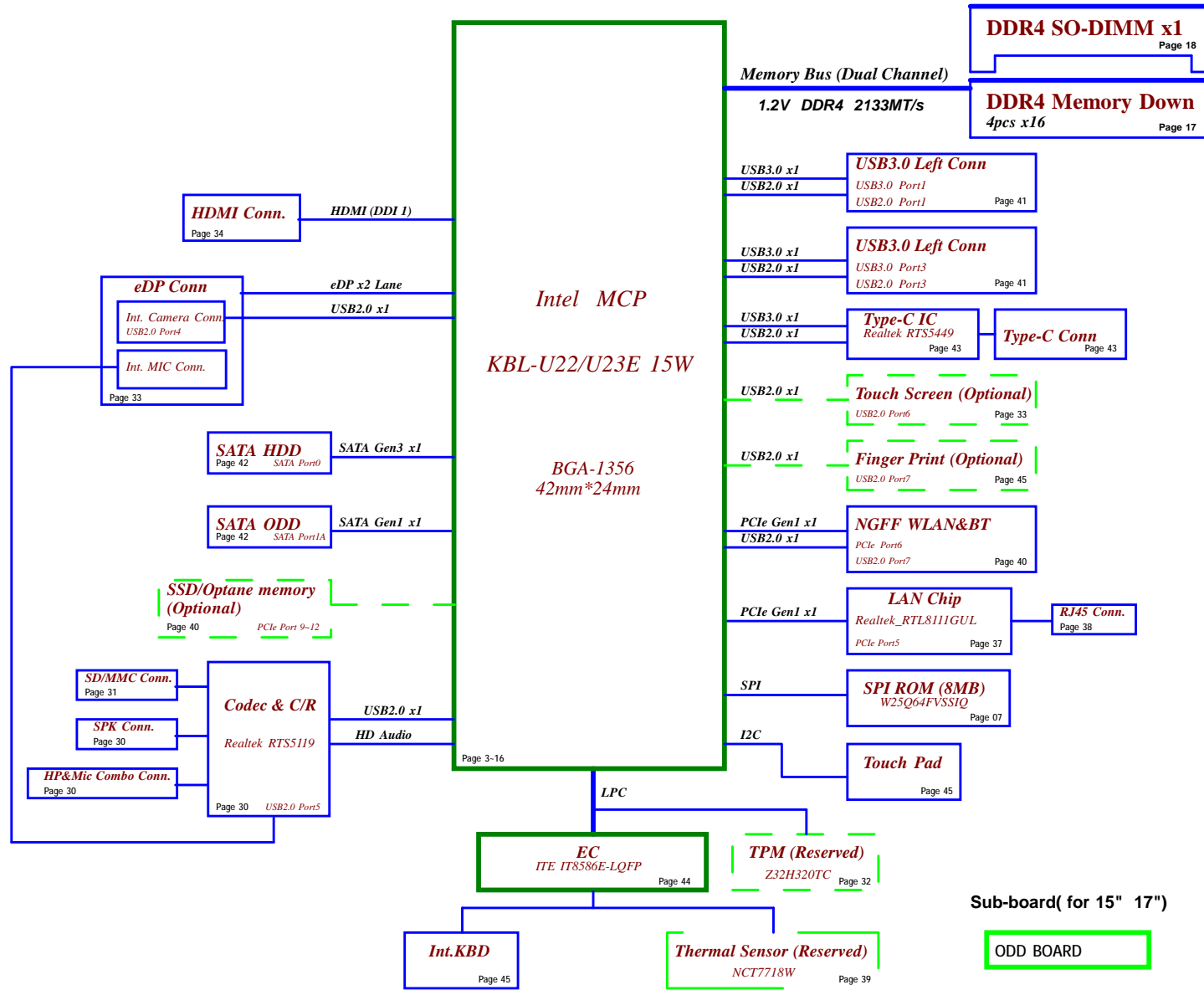
## DG421/DG521/DG721 MB Schematics Document

Kabylake-U22/U23E with DDR4

2017-01-19

REV:1.0

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				Date:	Sunday, January 22, 2017		
				Sheet	1 of 60		



# Voltage Rails ( O --> Means ON , X --> Means OFF )

Power Plane				
State	V20B+	+3VALW +5VALW +3VALW_PCH +1.8VALW +1.0VALW	+1.2V +2.5V_DDR +VCCST	+5VS +3VS +VCCIO +VCCSTG +VCCSA +VCC_GT +CPU_CORE +0.6VS
S0	O	O	O	O
S3	O	O	O	X
S3 Battery only	O	O	O	X
S5 S4 AC Only	O	O	X	X
S5 S4 Battery only	O	X	X	X
S5 S4 AC & Battery don't exist	X	X	X	X

STATE	SIGNAL	SLP_S3#	SLP_S4#	SLP_S5#	+VALW	+V	+VS	Clock
Full ON		HIGH	HIGH	HIGH	ON	ON	ON	ON
S3 (Suspend to RAM)		LOW	HIGH	HIGH	ON	ON	OFF	OFF
S4 (Suspend to Disk)		LOW	LOW	LOW	ON	OFF	OFF	OFF
S5 (Soft OFF)		LOW	LOW	LOW	ON	OFF	OFF	OFF

HSIO PORT	Function
USB3.0	1 USB3.0 Conn Left
	2 USB Type-C
	3 USB3.0 Conn Left
	4 NC
	5 NC
	6 NC
USB2.0	1 USB3.0 Conn Left
	2 USB Type-C
	3 USB3.0 Conn Left
	4 Finger Print
	5 Cardreader
	6 Touch Panel
	7 Bluetooth
	8 Camera
	9 NC
	10 NC
PCIE	1-4 X4 PCIE
	5 LAN
	6 WLAN
	7 SATA HDD
	8 SATA ODD
	9-12 X4 PCIE
	0 HDD
	1A ODD
SATA	1B used as PCIE
	2 used as PCIE

BOM Structure	BTO Item
@	Not stuff
14@	For 14" part
15@	For 15" part
14or15@	For 14" or 15" part
14or17@	For 14" or 17" part
Cannonlake@	For Cannonlake part
CD@	For C cost down
DUALMIC@	For Dual MIC part
EMC@	For EMC part
EMC_15@	For EMC 15" part
EMC_NS@	For EMC nu-stuff part
EMC_PX@	For EMC PX part
EMC_PXNS@	For EMC PX nu-stuff part
ES@	For ES CPU
EXO@	For EXO GPU
ME@	For ME part
NTS@	For nu-touch part
DIS@	For GPU part
OPT@	For NV GPU part
PX@	For AMD GPU part
RANKA@	For VRAM rank A part
RANKB@	For VRAM rank B part
Realtek_SD@	For Realtek SD part
SINGLEMIC@	For single MIC part
SINGLERANK@	For single VRAN rank part
DUALRANK@	For dual VRAN rank part
TS@	For touch screen part
TPM@	For TPM part
UMA@	For UMA part

## SMBUS Control Table

	SOURCE	BATT	Charger	DGPU	IT8586E	Memory Down	PCH	PMIC	SODIMM	Thermal Sensor	WLAN	WiMAX
EC_SMB_CK1 EC_SMB_DA1	IT8586E +3VL_EC	V	V	X	V +3VL_EC	X	X	X	X	X	X	X
EC_SMB_CK2 EC_SMB_DA2	IT8586E +3VS	X	X	V +3VG_AON	V +3VS	X	V +3VALW_PCH	X	X	V	X	X
EC_SMB_CK3 EC_SMB_DA3	IT8586E +3VL_EC	X	X	X	V +3VL_EC	X	X	V	X	X	X	X
PCH_SMB_CLK PCH_SMB_DATA	PCH +3VALW_PCH	X	X	X	X	X	V +3VALW_PCH	X	V +3VS	X	V	V +3VS

## EC SMBus1 address

Device	Address
Smart Battery	need to update
Charger	0001 0010 b

## EC SMBus2 address

Device	Address
Thermal Sensor(NCT7718W)	1001_100xb
PCH	need to update
DGPU	need to update

## EC SMBus3 address

Device	Address
PMIC	need to update

## PCH SM Bus address

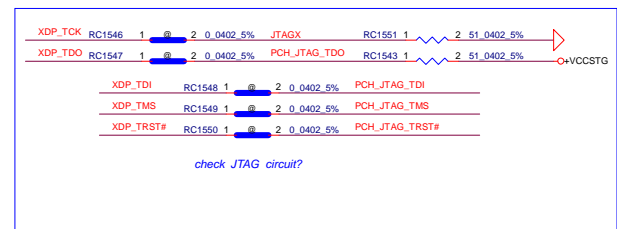
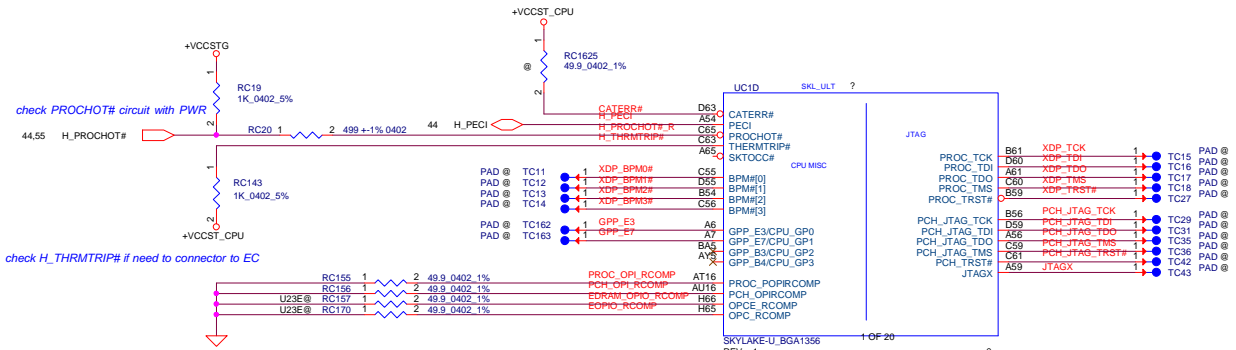
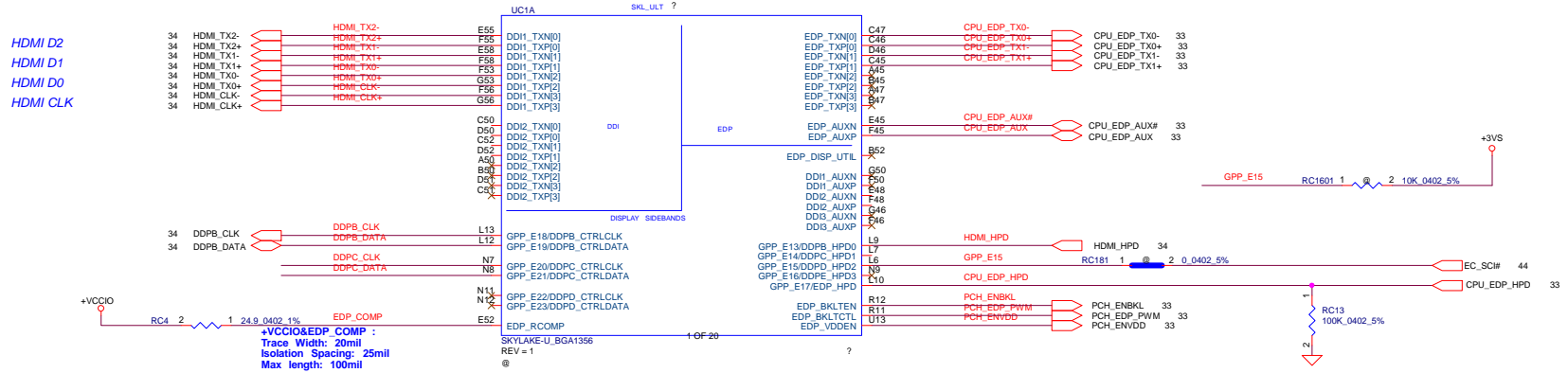
Device	Address
DDR4 SODIMM	need to update
Wlan	Reserved

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					Date: Sunday, January 22, 2017
					Sheet 3 of 60



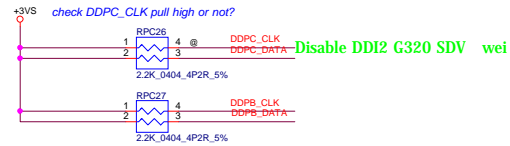
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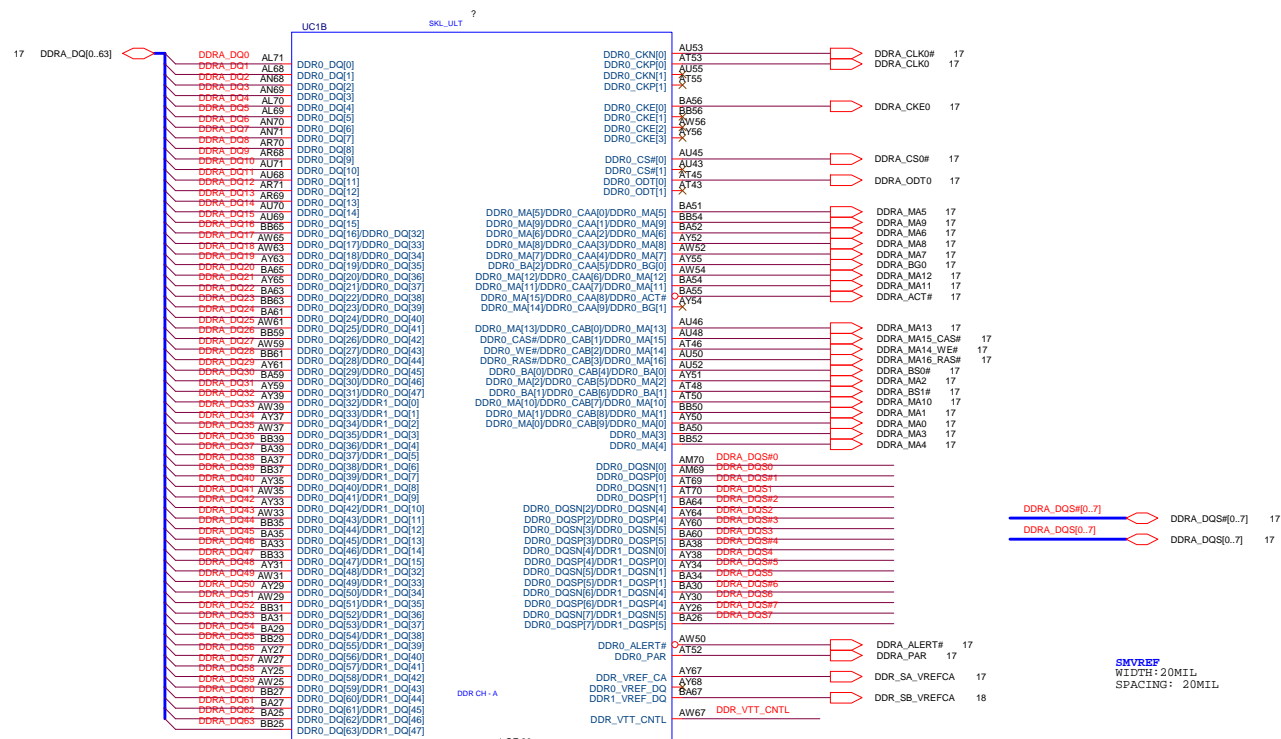
HDMI D2  
HDMI D1  
HDMI D0  
HDMI CLK



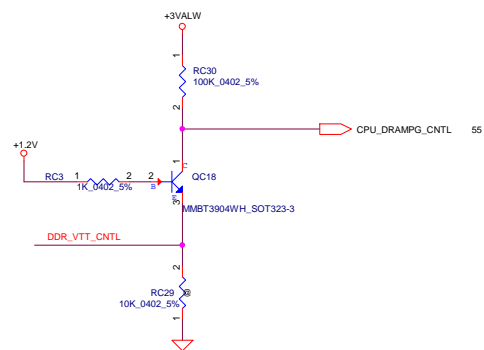
DDP\*\_CTRLDATA strapping sampled on the rising edge of PWROK

Port	Strap	Enable	Disable
Port 1	DDPB_CTRLDATA	Pull up to 3.3 V with 2.2Kohm	NC
Port 2	DDPC_CTRLDATA	Pull up to 3.3 V with 2.2Kohm	NC





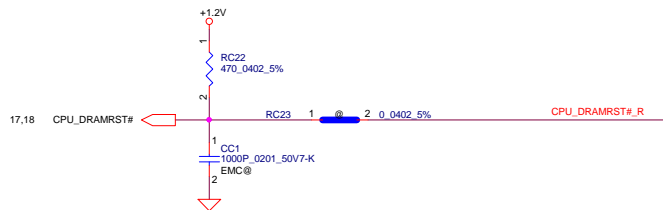
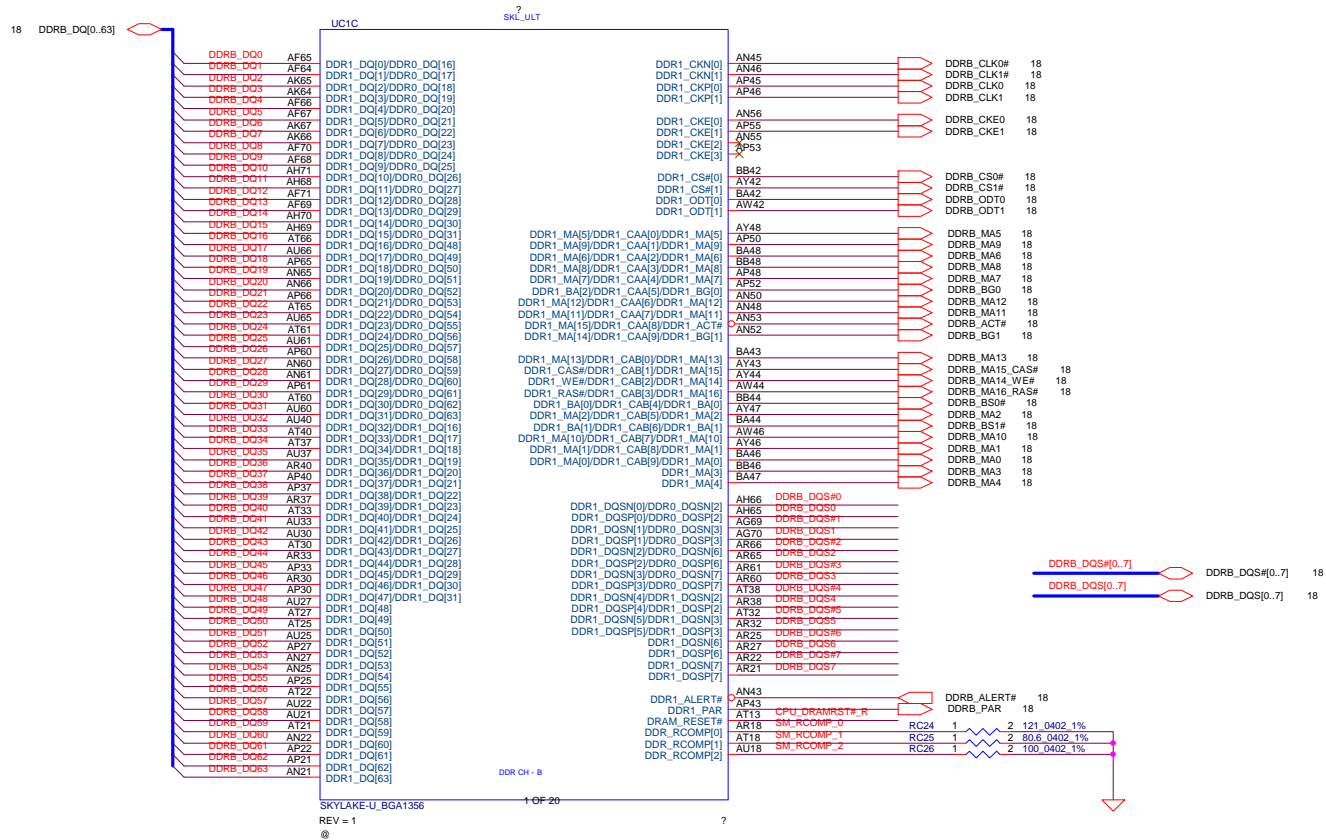
SKYLAKE-U, BGA1356  
REV = 1  
@



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					DG421
				Date: Sunday, January 22, 2017	Sheet 5 of 60

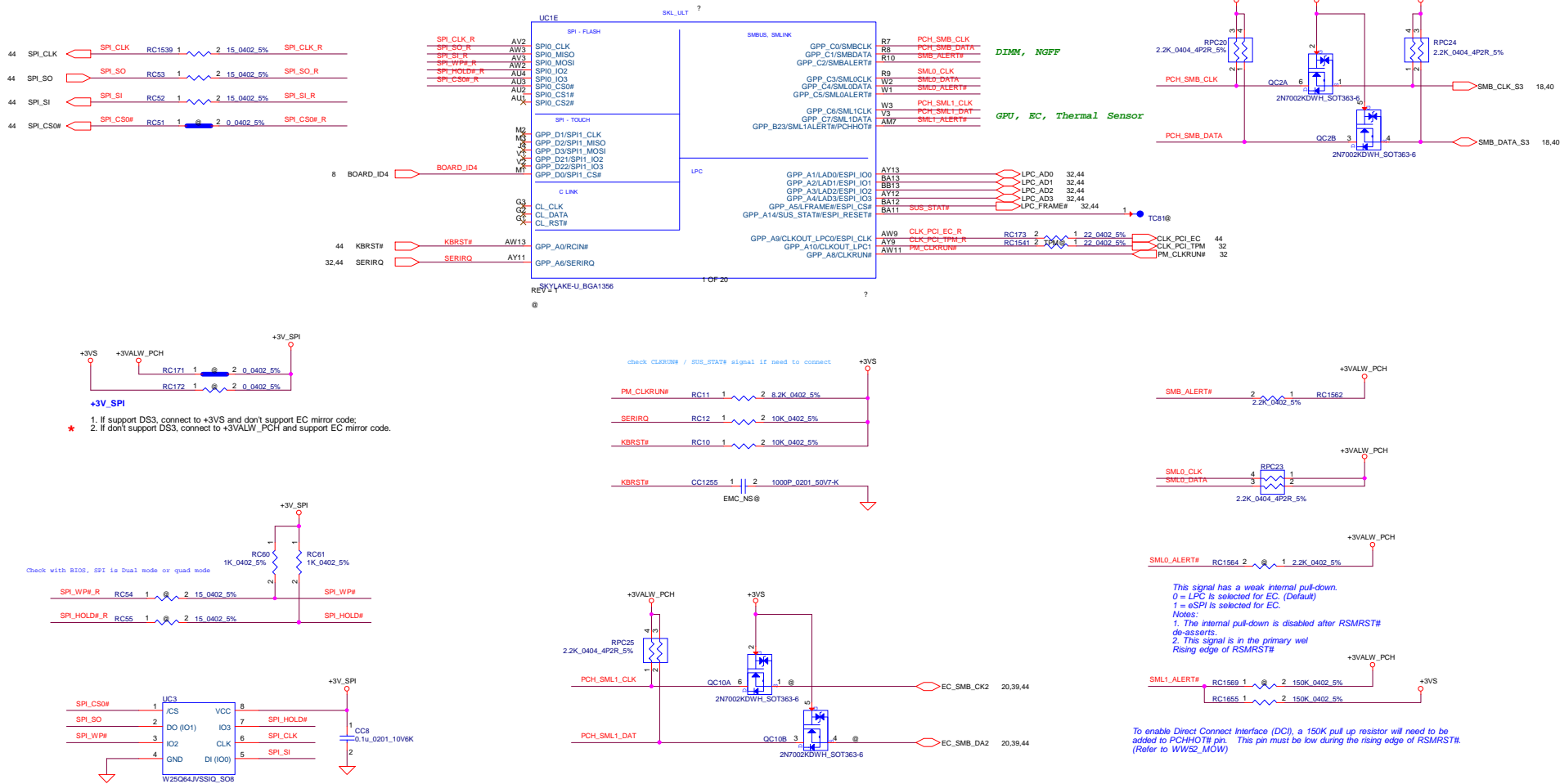


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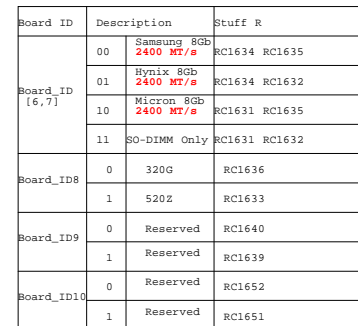
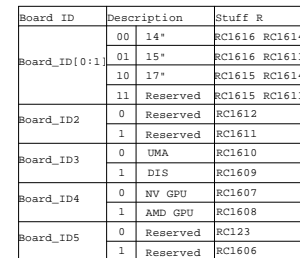
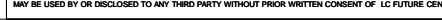
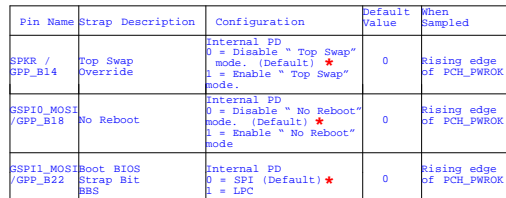
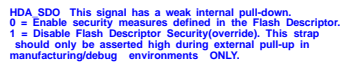
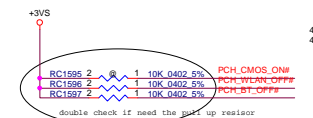


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				Date: Sunday, January 22, 2017	Sheet 6 of 60



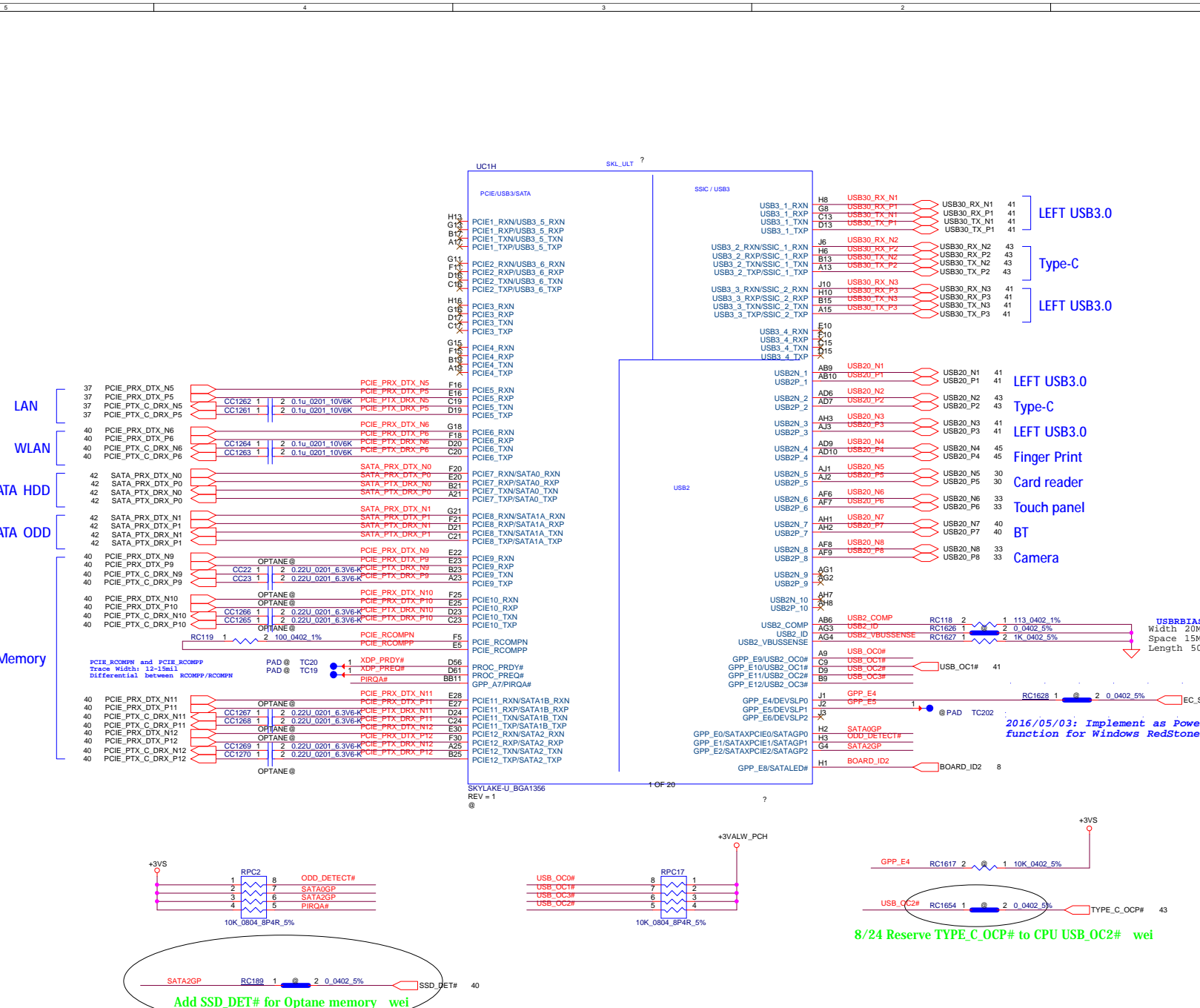


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								DG421	
								Date	
								Sunday, January 22, 2017	
								Sheet 7 of 60	

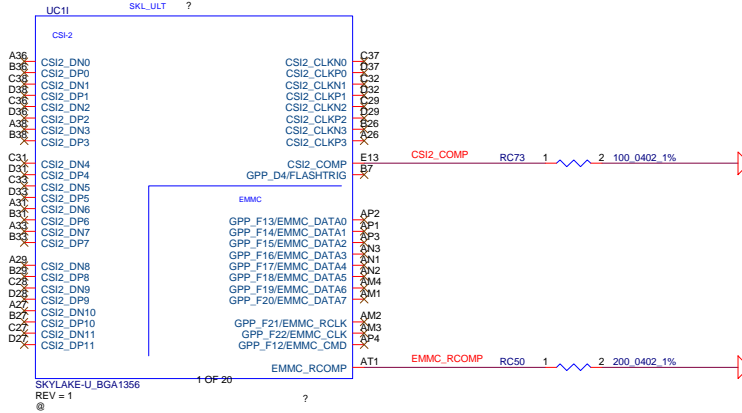
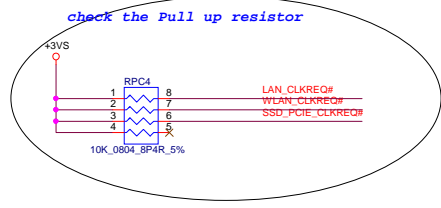


Board ID	Description	Stuff R
Board_ID [6,7]	00 Samsung 8Gb 2400 MT/s	RC1634 RC1635
	01 Hynix 8Gb 2400 MT/s	RC1634 RC1632
	10 Micron 8Gb 2400 MT/s	RC1631 RC1635
	11 SO-DIMM Only	RC1631 RC1632
Board_ID8	0 320G	RC1636
	1 520Z	RC1633
Board_ID9	0 Reserved	RC1640
	1 Reserved	RC1639
Board_ID10	0 Reserved	RC1652
	1 Reserved	RC1651





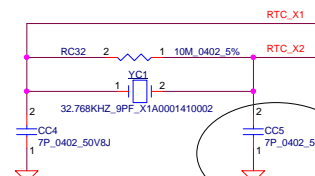
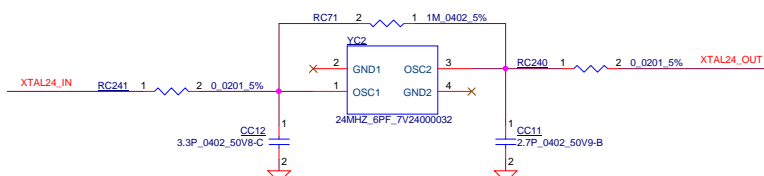
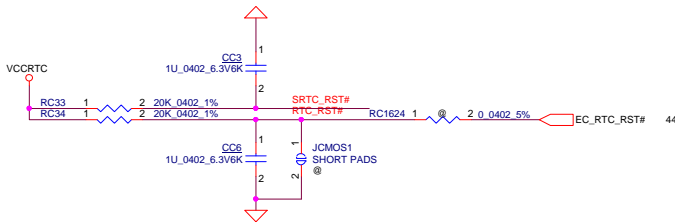
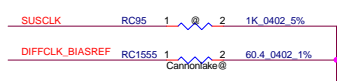
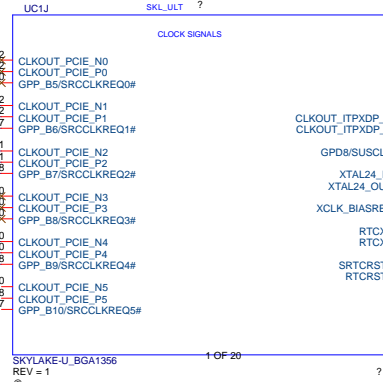
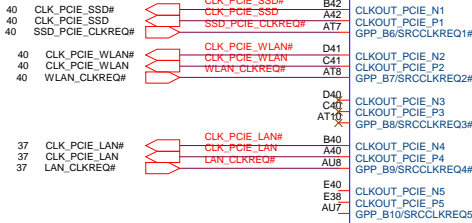
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				Size	
				Document Number	
				Custom	
				DG421	
				Rev 1.0	
				Date: Sunday, January 22, 2017	
				Sheet 9 of 60	



Optane memory


PCIE CLK5 WLAN

PCIE CLK4 LAN



when single end external clock generator used, this pin should be grounded

need to use 38.4MHz (30ohm) for Cannonlake-u

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Date:		Sunday, January 22, 2017		Sheet	10 of 60



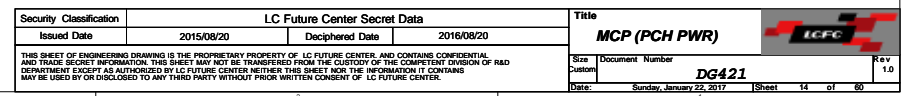
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Date:	Sunday, January 22, 2017	Sheet 11 of 60



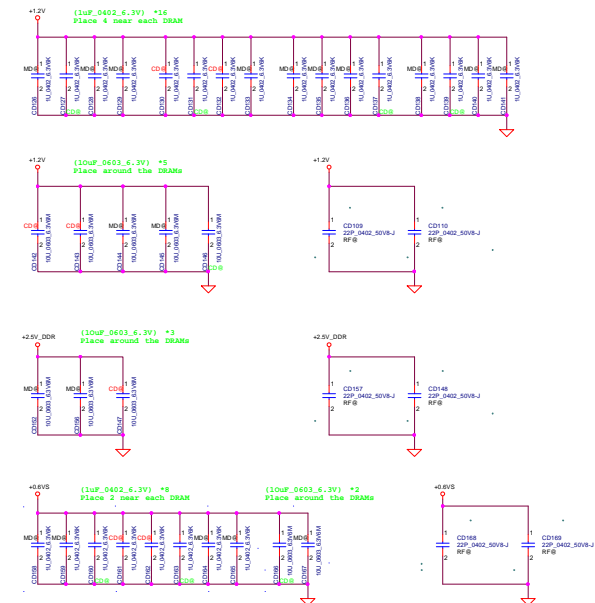




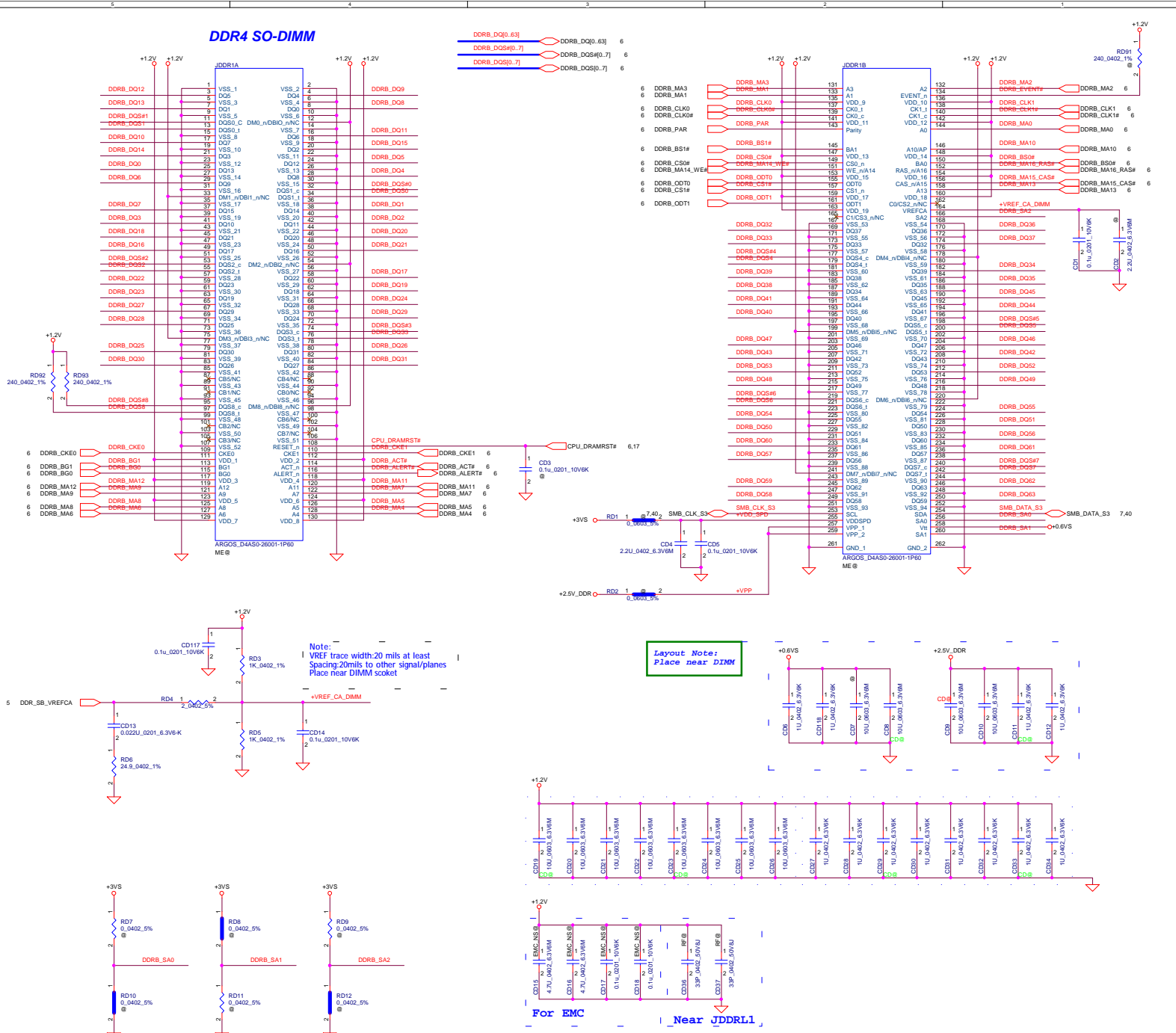










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Date		<b>DG421</b>			
Sunday, January 22, 2017		Sheet		18 of 60	

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Size		Document Number		DG421		Date		Sunday, January 22, 2017		Sheet 19 of 60	

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				Custom	DG421
Date: Sunday, January 22, 2017				Sheet	20 of 80




Rev  
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Size		Document Number		Date		Sunday, January 22, 2017		Sheet 21 of 60		Rev 1.0
								<b>DG421</b>		

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				1	DG421
				Date:	Sunday, January 22, 2017
				Sheet	22 of 60




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Size		Document Number		DG421		Date		Sunday, January 22, 2017		Sheet 23 of 60	

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				1	DG421
				Date:	Sunday, January 22, 2017
				Sheet	24 of 60








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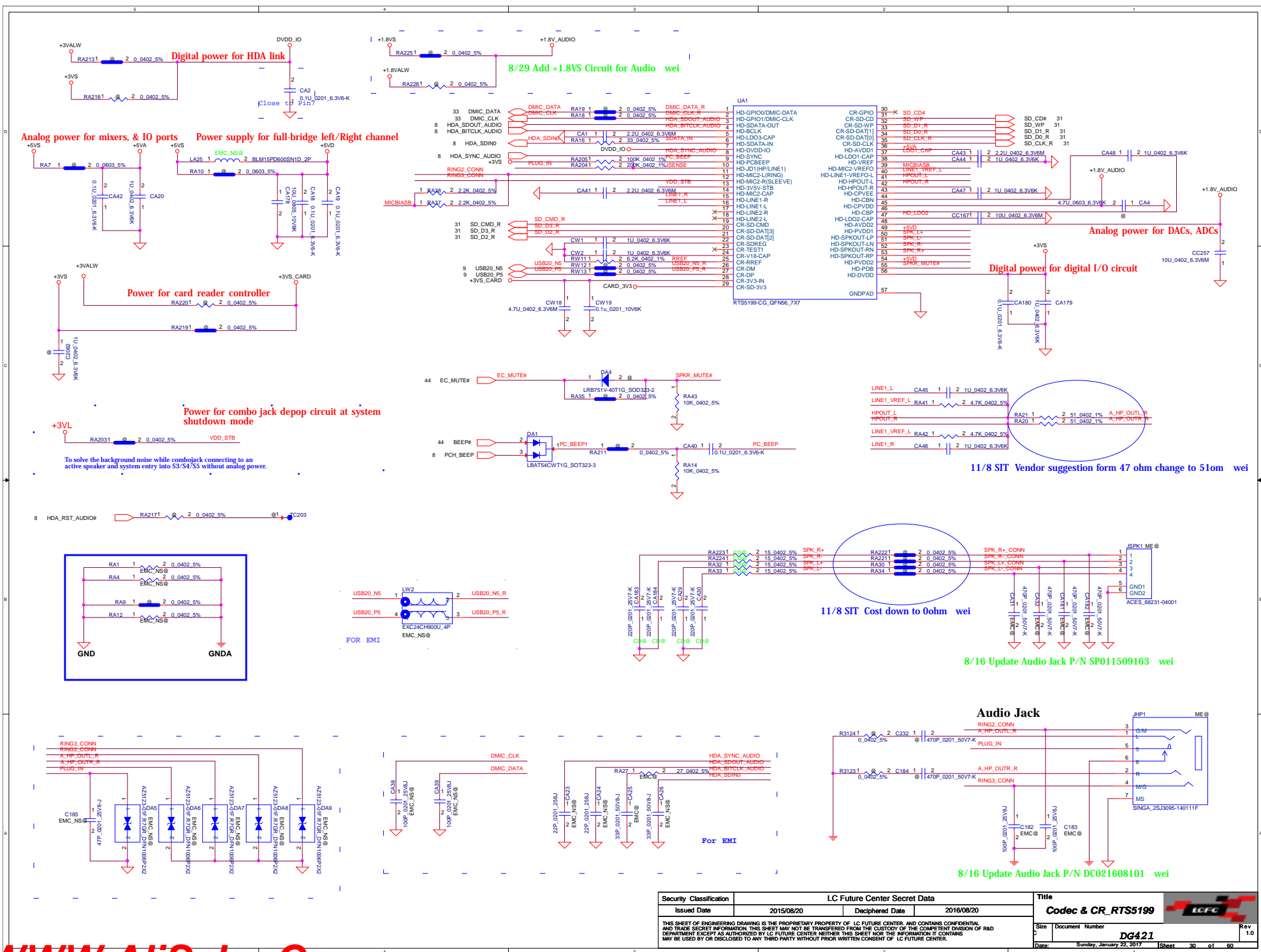
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				Date:	Sunday, January 22, 2017
				Sheet	26 of 60

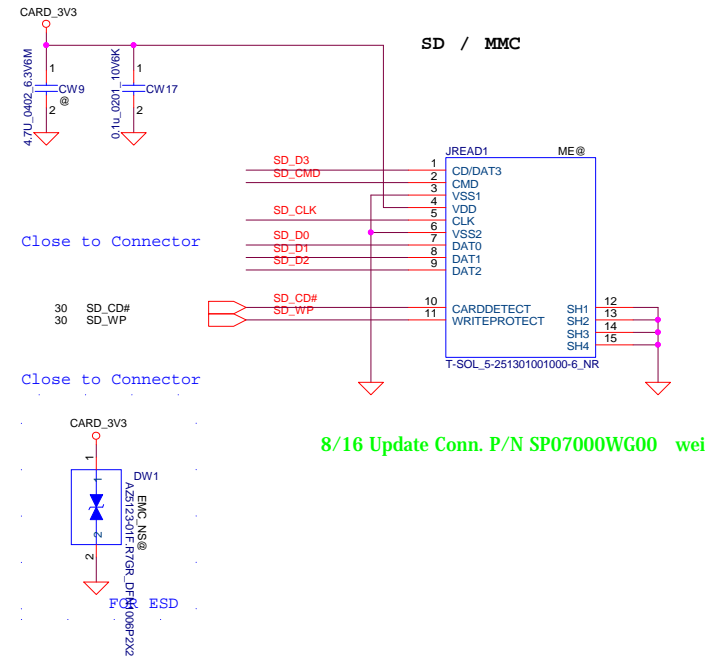
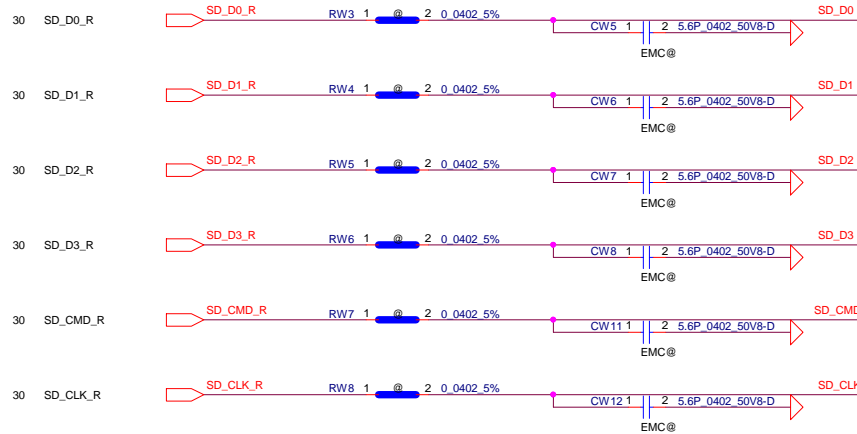


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Size C		Document Number		DG421		Rev 1.0	
Date: Sunday, January 22, 2017				Sheet 27 of 60			

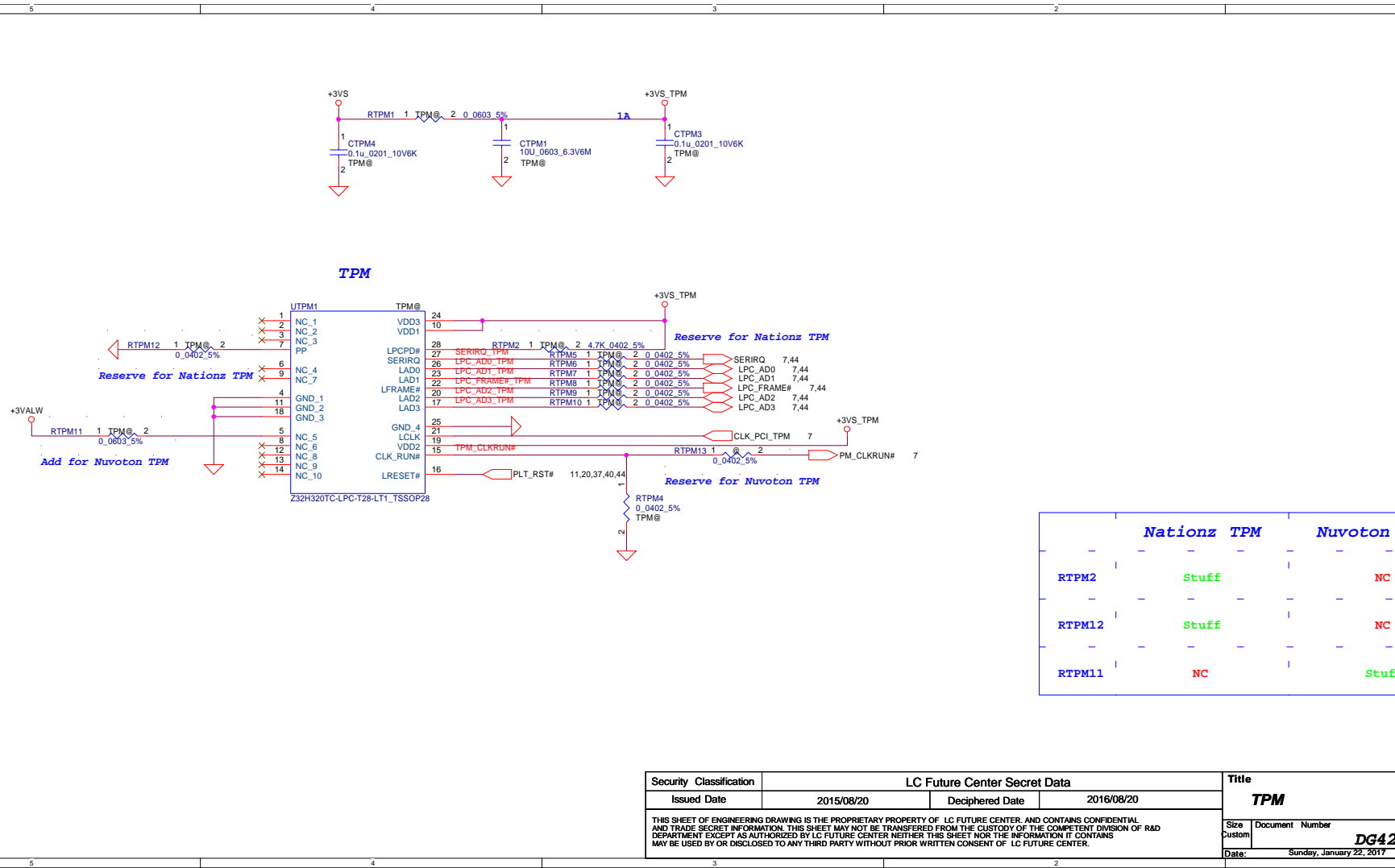
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Issued Date		Deciphered Date		Blank		
2015/08/20		2016/08/20				
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					DG421	1.0
				Date:	Sunday, January 22, 2017	Sheet 28 of 60

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							DG421			
Date: Sunday, January 22, 2017							Sheet 29 of 60			





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Issued Date	2015/08/20	Deciphered Date	2016/08/20	Cardreader	
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				Custom	DG421
				Date:	Sunday, January 22, 2017
				Sheet	31 of 60
				Rev	1.0



Reserve for Nationsz TPM

Add for Nuvoton TPM

Reserve for Nationsz TPM

Reserve for Nuvoton TPM

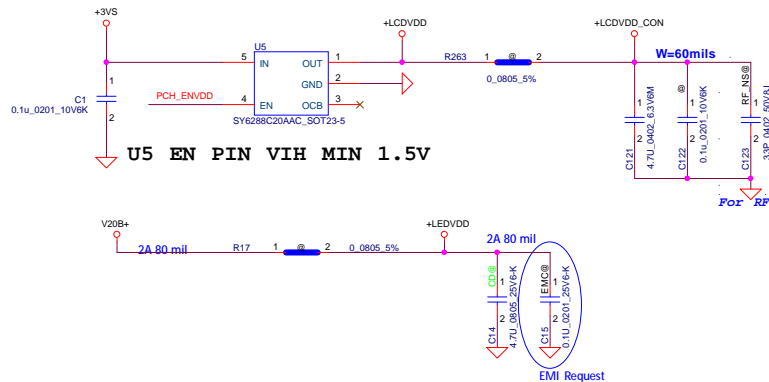
	Nationz TPM	Nuvoton TPM
RTPM2	Stuff	NC
RTPM12	Stuff	NC
RTPM11	NC	Stuff

Security Classification	LC Future Center Secret Data		
Issued Date	2015/08/20	Deciphered Date	2016/08/20
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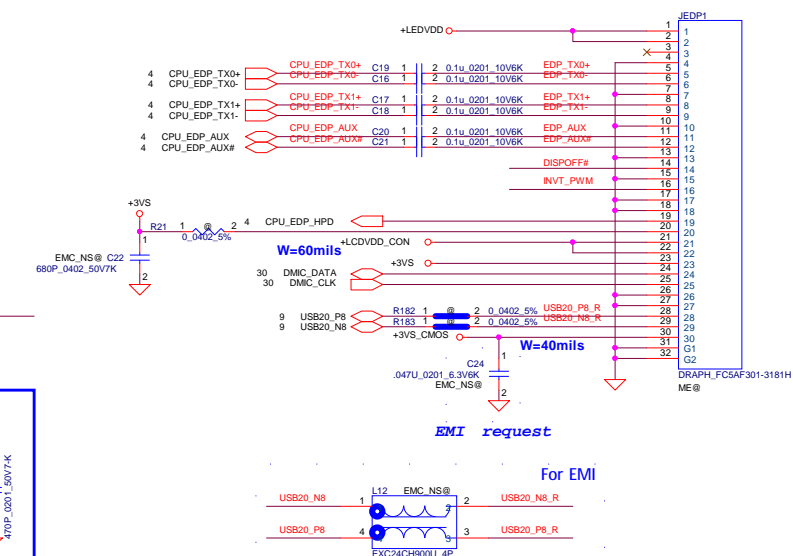
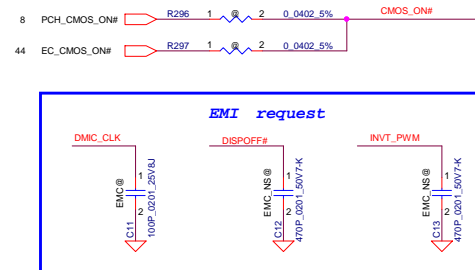
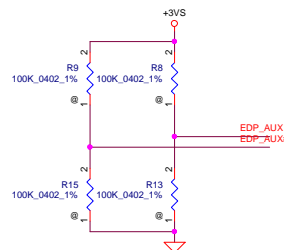
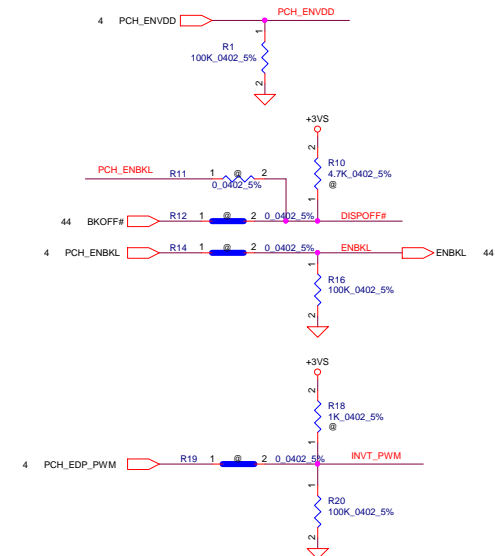
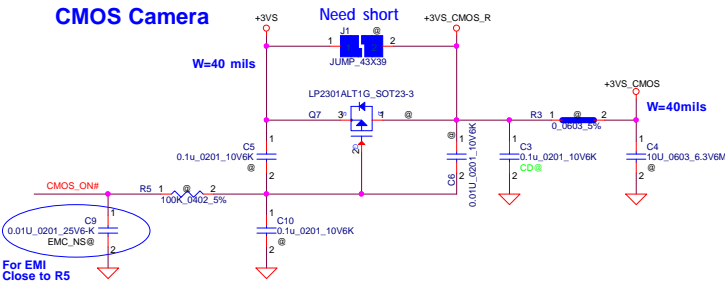
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Size	Custom	Document Number	DG421
Date:	Sunday, January 22, 2017	Sheet	32 of 60
		Rev	1.0



## LCD POWER CIRCUIT

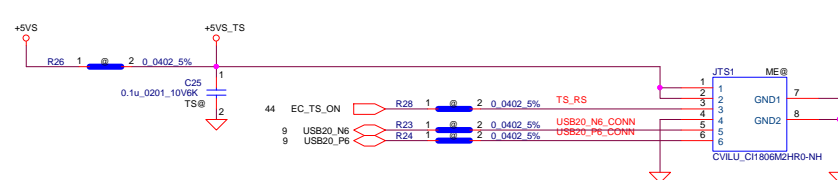
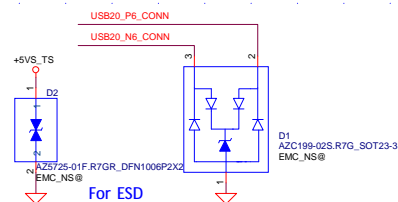
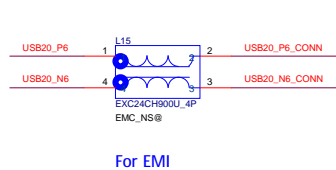



## CMOS Camera



## Touch Screen

### Touch Screen



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Issued Date		2015/08/20	Deciphered Date	2016/08/20	eDP/CMOS/Touch screen 					
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						Custom		DG421		1.0
						Date:		Sunday, January 22, 2017		Sheet 33 of 60

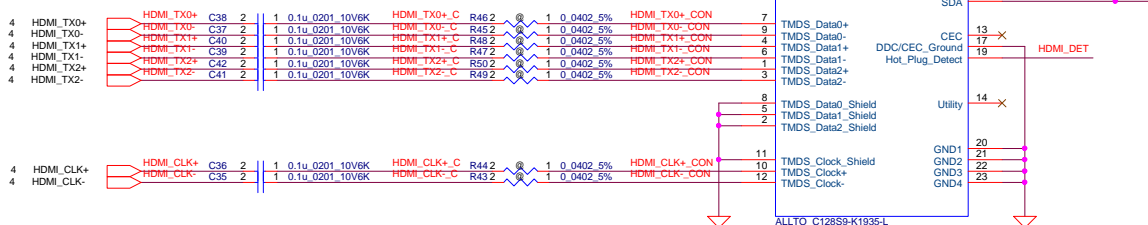
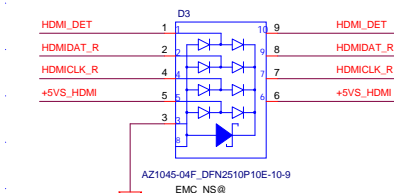





Figure 1: Pin configuration of the AZ1045-04F. The diagram shows a 14-pin connector with pins 1-4 labeled HDMI\_TX1\_-CON, HDMI\_TX1+\_CON, HDMI\_TX2\_-CON, and HDMI\_TX2+\_CON. Pins 5-8 are labeled D7, D6, D5, and D4. Pins 9-12 are labeled HDMI\_TX1\_-CON, HDMI\_TX1+\_CON, HDMI\_TX2\_-CON, and HDMI\_TX2+\_CON. Pin 13 is labeled AZ1045-04F\_DFN2510P10E-10-9 and pin 14 is labeled EMC\_N5Ø.

Title			
HDMI_CONN			
Size Custom	Document Number	Rev 1.1	
DG421			
Date:	Sunday, January 22, 2017	Sheet	34 of 60

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Issued Date		Deciphered Date		<b>P35-Blank</b>			
2015/08/20		2016/08/20		Size Document Number Custom		Rev 1.0 <b>DG421</b>	
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3		1		2		1	

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Issued Date		2015/08/20		Deciphered Date		2016/08/20				Blank					
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Date: Sunday, January 22, 2017										Sheet		36		of 60	

+3VALW TO +3VALW\_LAN

+3VALW\_LAN rising time (10%-90%)  
0.5ms < spec < 100ms

Need short

width : 40 mils

Close to Pin11 Close to Pin32 Close to Pin11 Close to Pin32

manual change the Codec PN to RTL8111GUL-CG

UL1

RTL8111GUL-CG QFN 32P  
8111GUL@

For RTL8111GUL(\$WR mode, reserved)  
For RTL8111H (LDO mode)

Layout Note: LL1 must be  
within 200mil to Pin24,  
CL15,CL16 must be within  
200mil to LL1  
+LAN\_REGOUT: Width = 60mil

Security Classification

LC Future Center Secret Data

Issued Date

2015/08/20

Deciphered Date

2016/08/20

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Date:

Sunday, January 22, 2017

Sheet

37

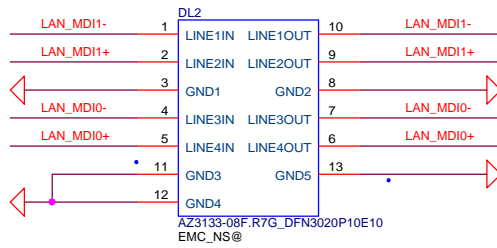
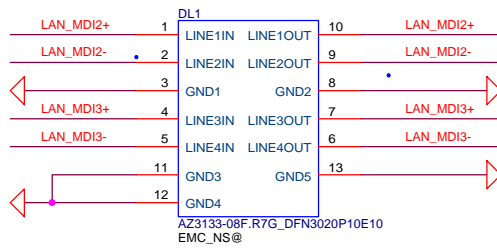
of

60

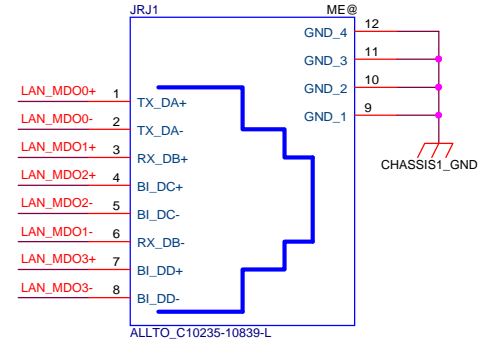
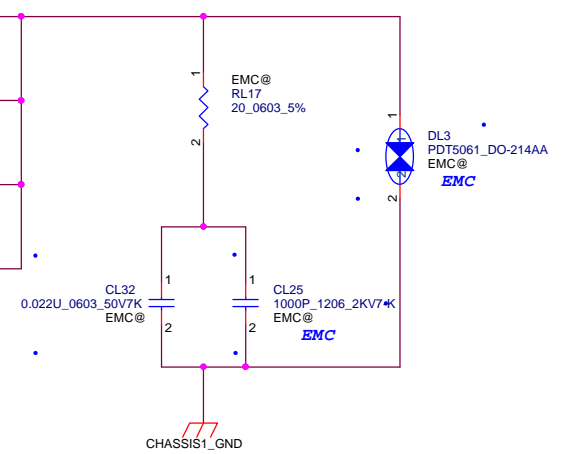
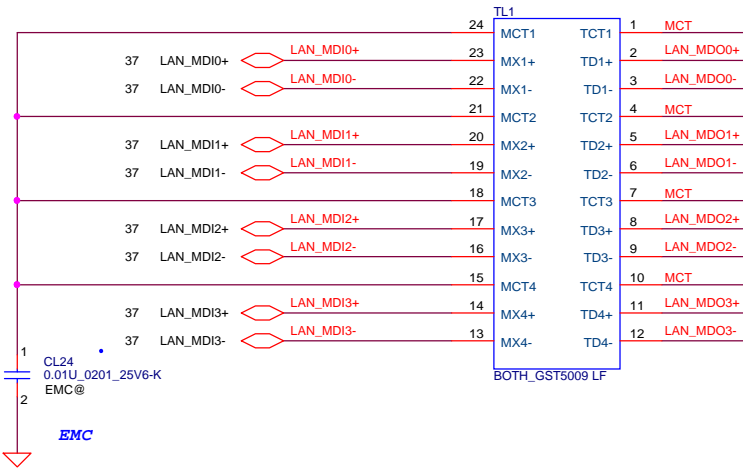
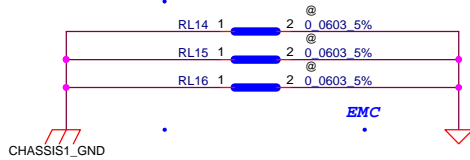
Rev

1.0

# DL1/DL2 1'S PN:SC300003M00



Place Close to TL1

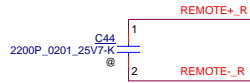


8/16 Update RJ45 P/N DC021608091 wei

Security Classification		LC Future Center Secret Data		Title	
Issued Date	2015/08/20	Deciphered Date	2016/08/20	LAN Transformer	
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				3	DG421
				Date:	Sunday, January 22, 2017
				Sheet	38 of 60
				Rev	1.0

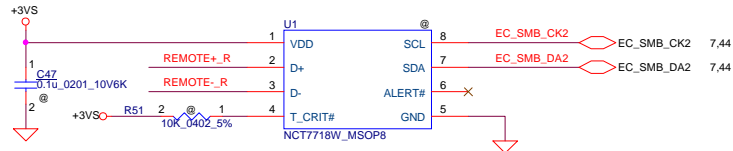


Close to U1

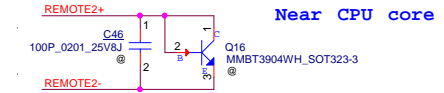


REMOTE+/-\_R, REMOTE1+/-, REMOTE2+/-:  
Trace width/space:10/10 mil  
Trace length:<8"

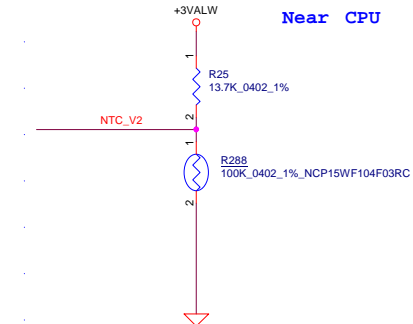
### SMSC thermal sensor placed near DIMM



Address 1001\_101xb

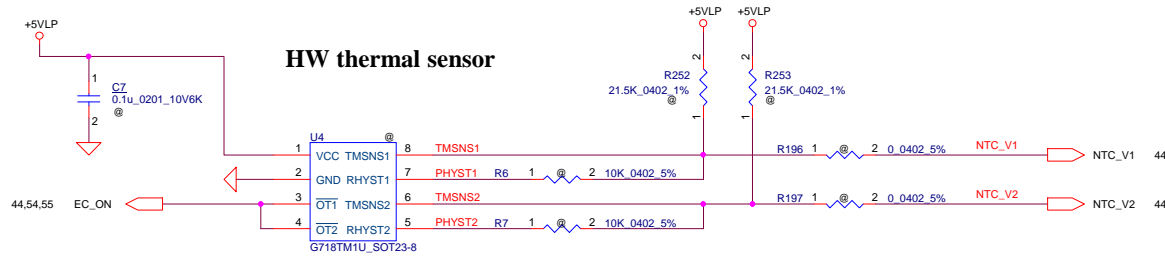


Near CPU



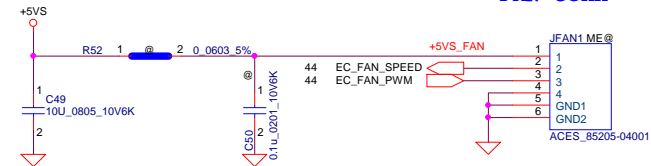
for layout optimized, change the EC\_AGND to GND

### HW thermal sensor



over temperature threshold:  
RSET=3\*RTMH  
92+/-30C  
Hysteresis temperature threshold.  
RHYST=(RSET\*RTML)/(3\*RTML-RSET)  
56+/-30C

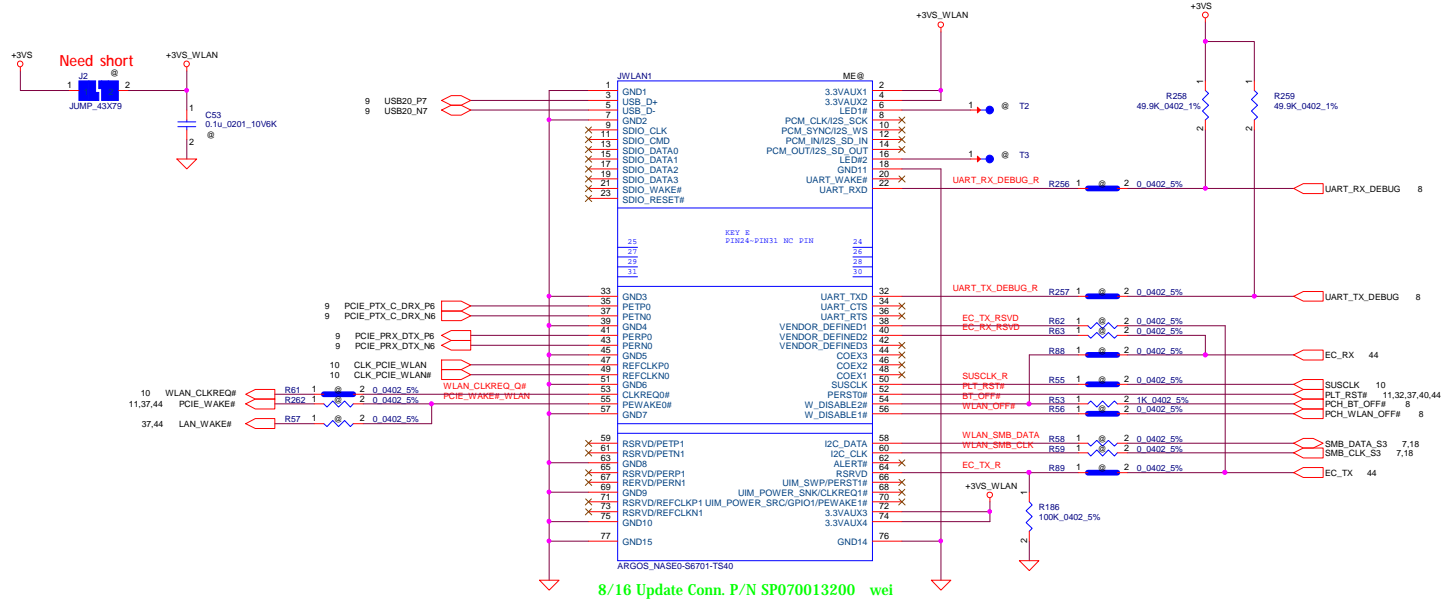
### FAN Conn



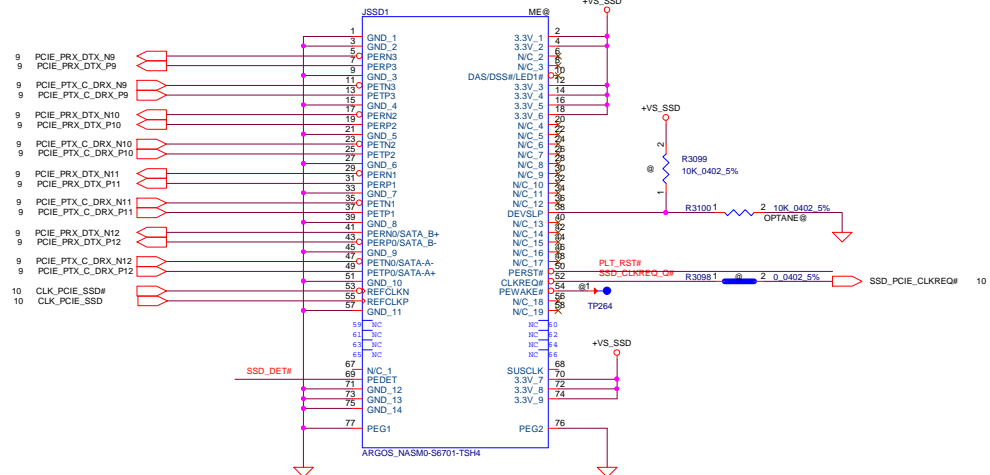
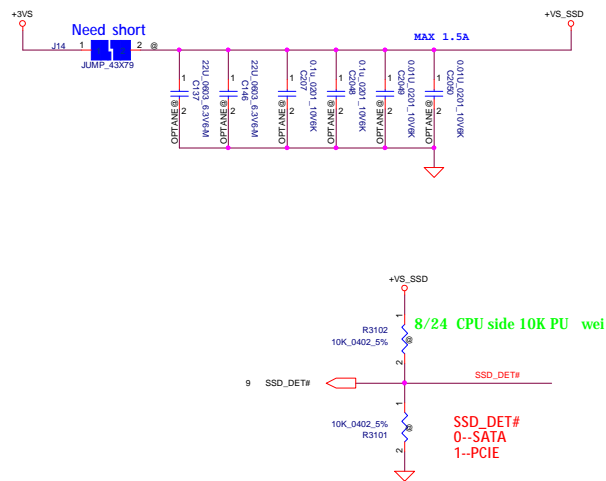
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Issued Date	2015/08/20	Deciphered Date	2016/08/20
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Title		Thermal sensor/FAN Conn	
Size	Document Number	DG421	
Custom			
Date:	Sunday, January 22, 2017	Sheet	39 of 60

# Mini-Express Card(WLAN/WiMAX)



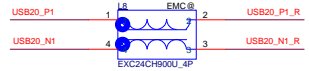
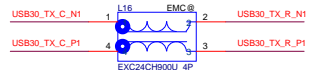
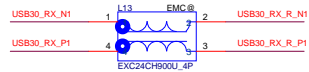
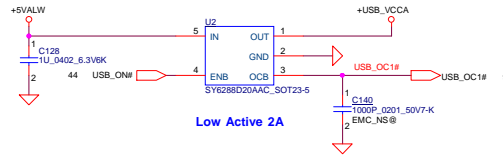
# Optane Memory



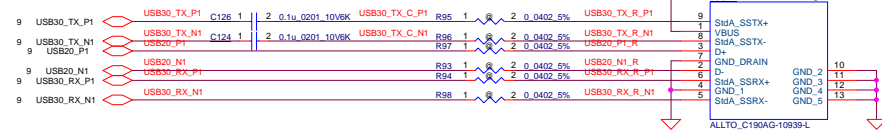
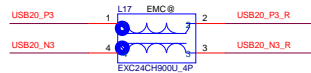
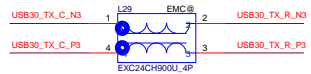
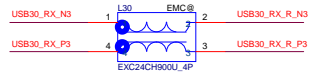
Security Classification	LC Future Center Secret Data		Title
Issued Date	2015/08/20	Deciphered Date	2016/08/20
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Size	Document Number	Rev	1.0
Date	Sunday, January 22, 2017	Sheet	40 of 60



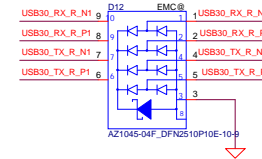
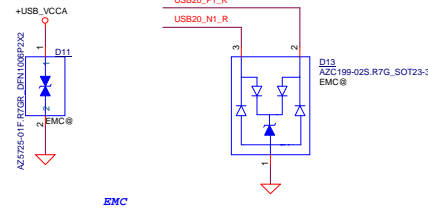
## LEFT SIDE USB3.0 PORT x2



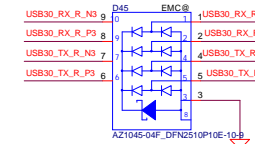
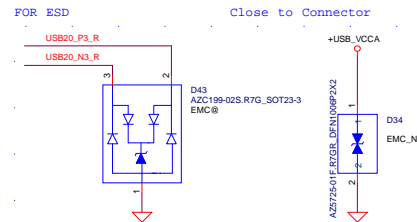
EMC



09/05 Update USBConn. P/N DC021609011 wei

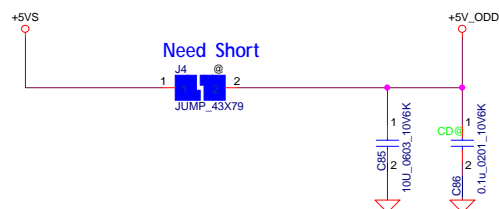
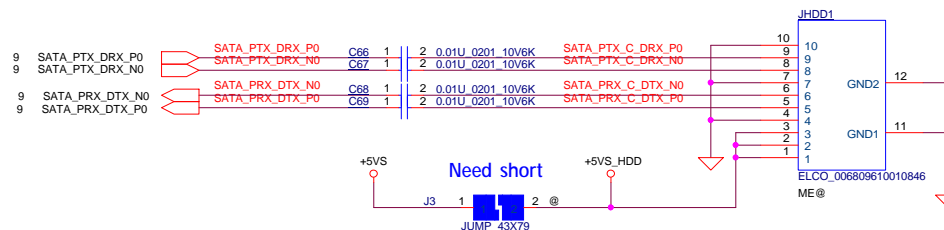
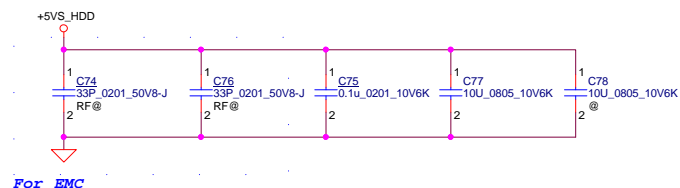


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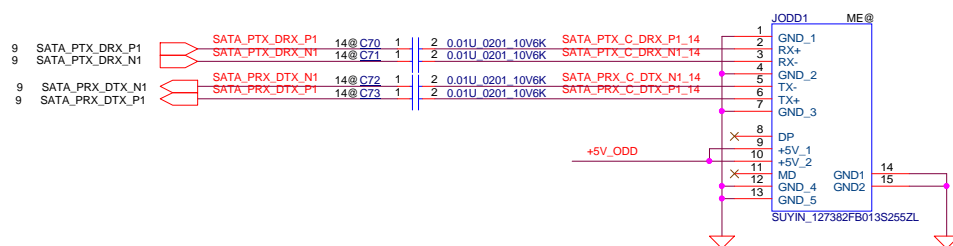


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				Rev	1.0
				Date	Sunday, January 22, 2017
				Sheet	41 of 60

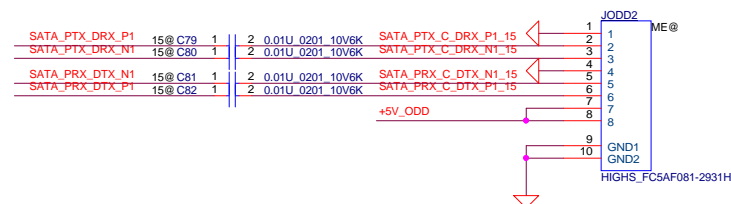
## SATA HDD Conn.



## FOR 14" SATA ODD Conn.



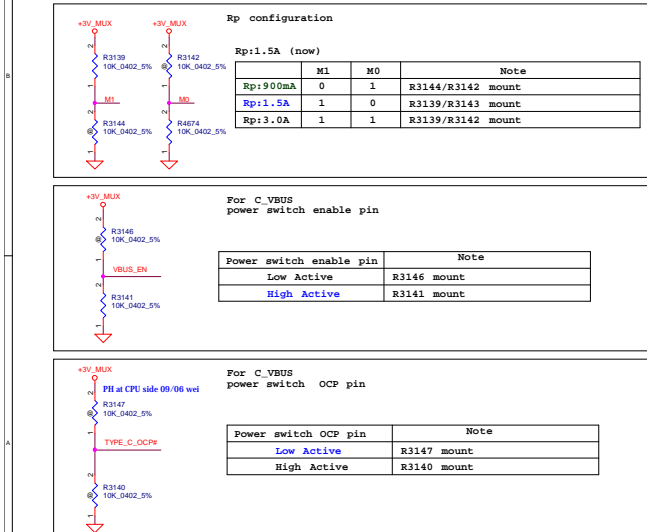
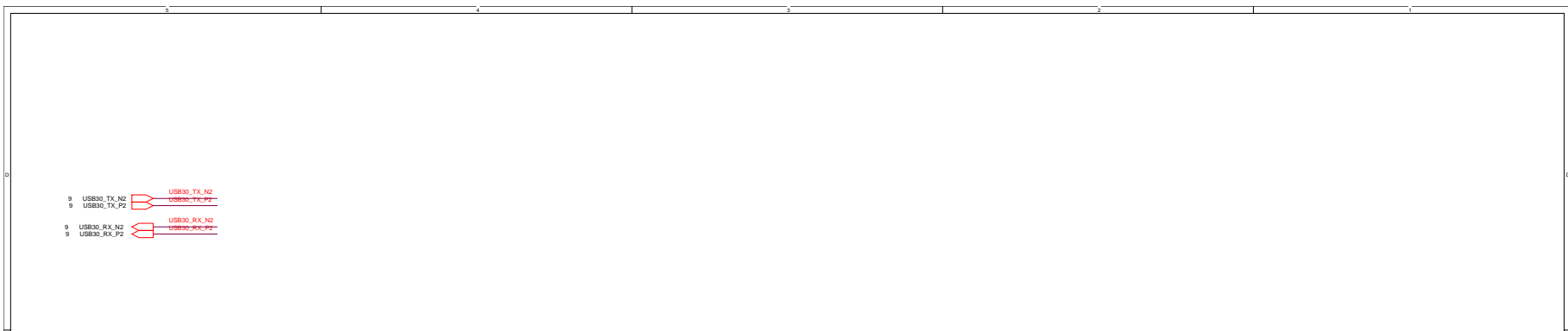
## FOR 15" 17" SATA ODD FFC Conn



8/16 Update Conn. P/N SP01001YV00 wei

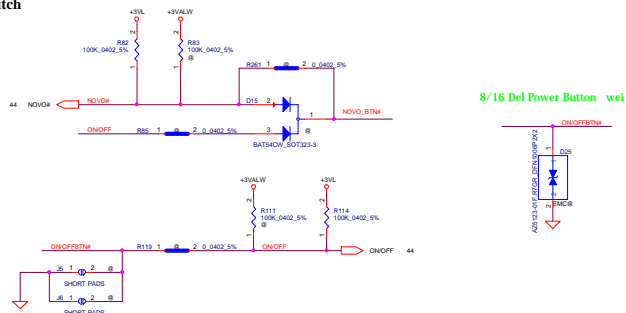
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Issued Date	2015/08/20	Deciphered Date	2016/08/20	HDD/ODD CONN	
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Size	Document	Number	Rev		
Custom	DG421				1
Date:	Sunday, January 22, 2017	Sheet	42	of	60



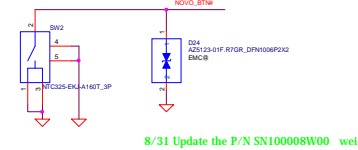




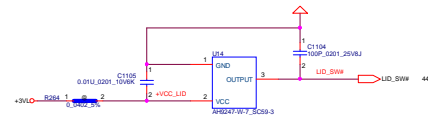
## ON/OFF switch



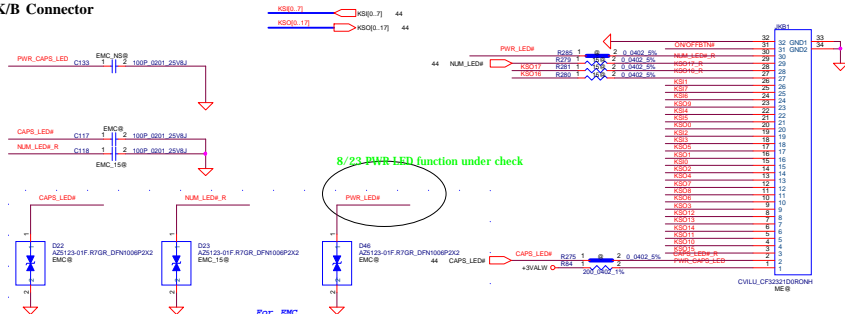
## Novo button



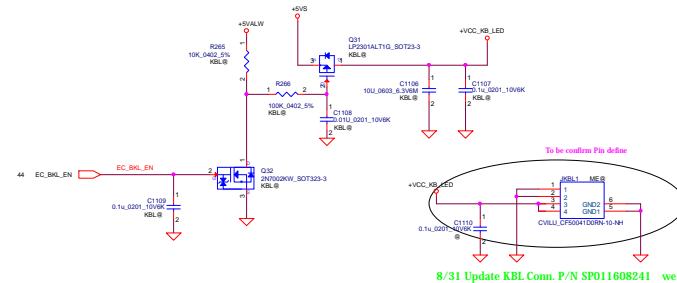
## LID switch



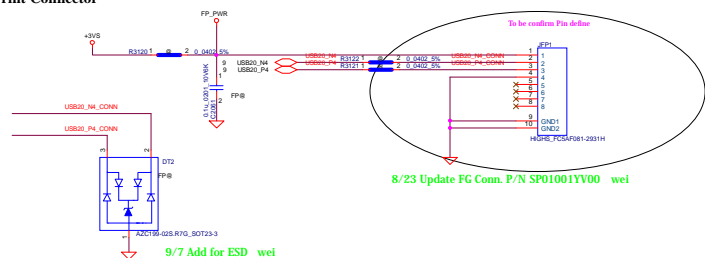
## K/B Connector



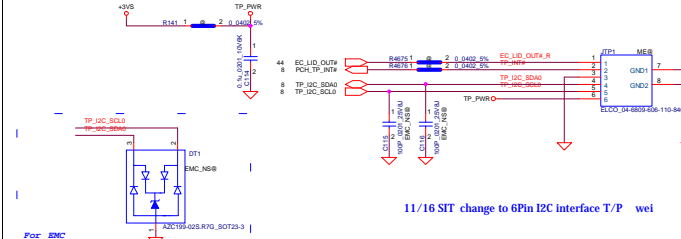
## KB Backlight Connector



## Finger Print Connector

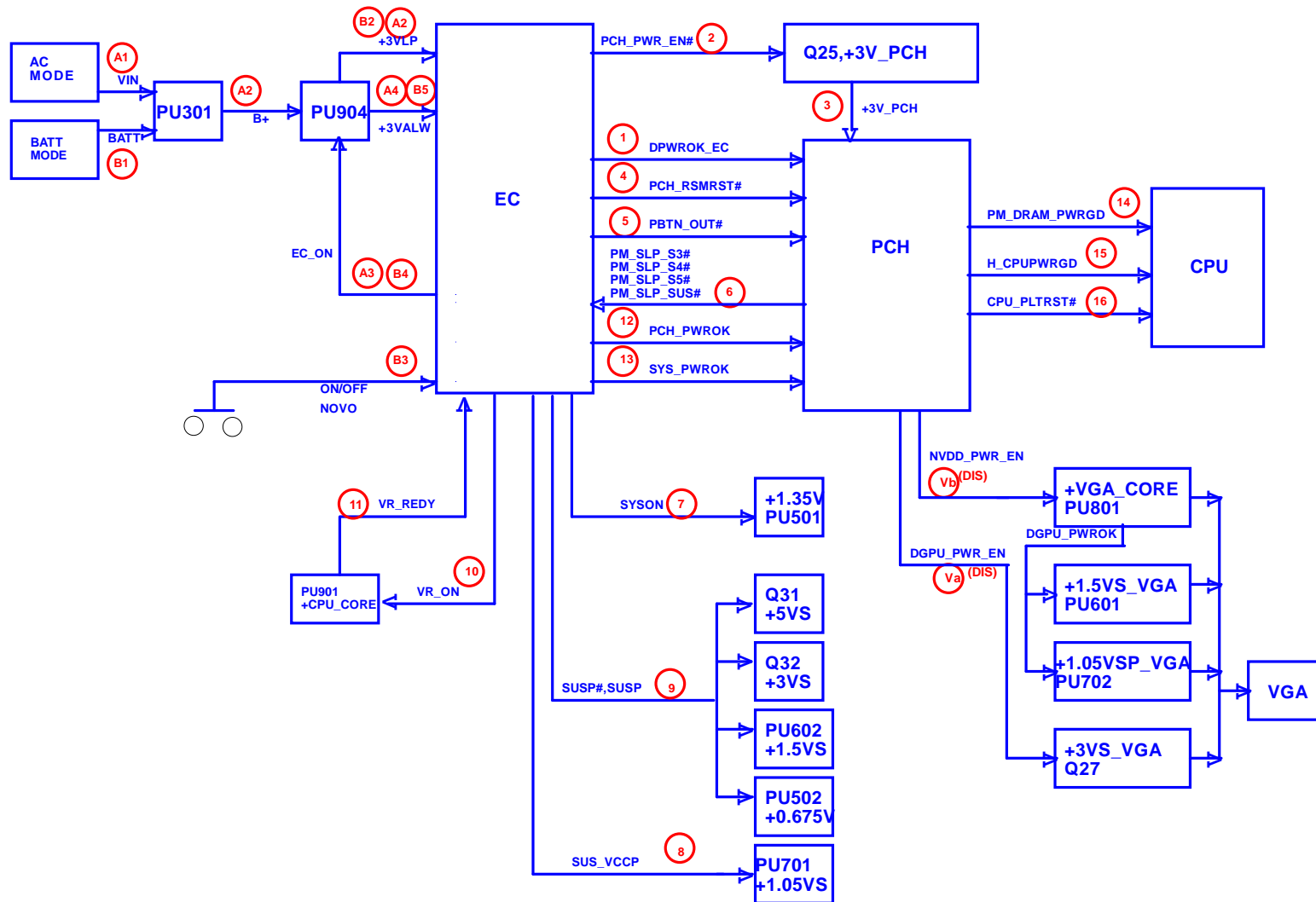


## TP/B Connector



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Date		2015/08/20		2015/08/20		2015/08/20	
Author		D6421		2015/08/20		2015/08/20	
Check		2015/08/20		2015/08/20		2015/08/20	
Release		2015/08/20		2015/08/20		2015/08/20	
Total		2015/08/20		2015/08/20		2015/08/20	





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Title		Power sequence block	
Size	Document Number	DG421	
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Date:	Sunday, January 22, 2017	Sheet	47 of 60

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				1	DG421
				Date:	Sunday, January 22, 2017
				Sheet	48 of 60





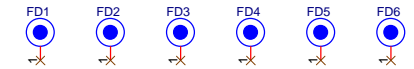
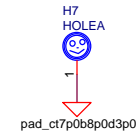
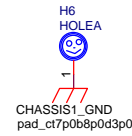
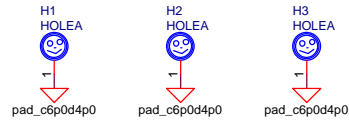
## CPU Thermal Holex3

## GPU Thermal Holex2

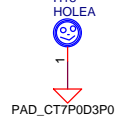
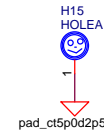
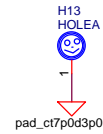
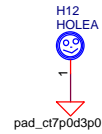
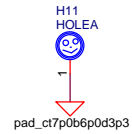
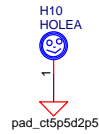
## Close to RJ45

## Close to Audio jack

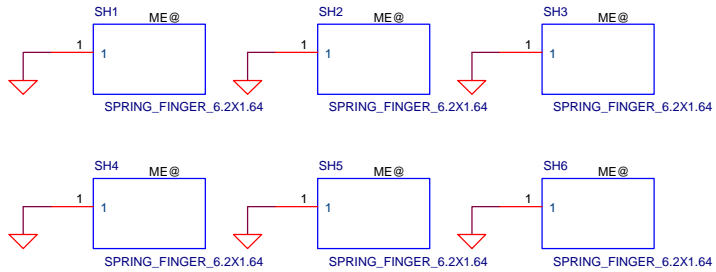
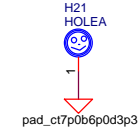
## PCB Fedical Mark PAD



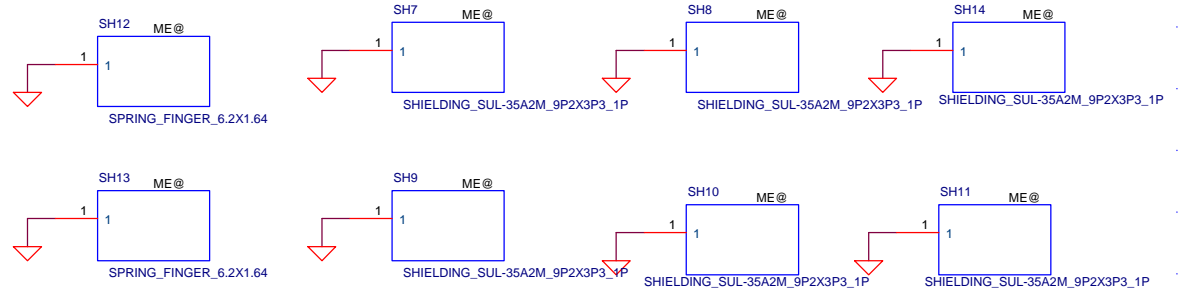
## WLAN Standoff



## Optane Standoff

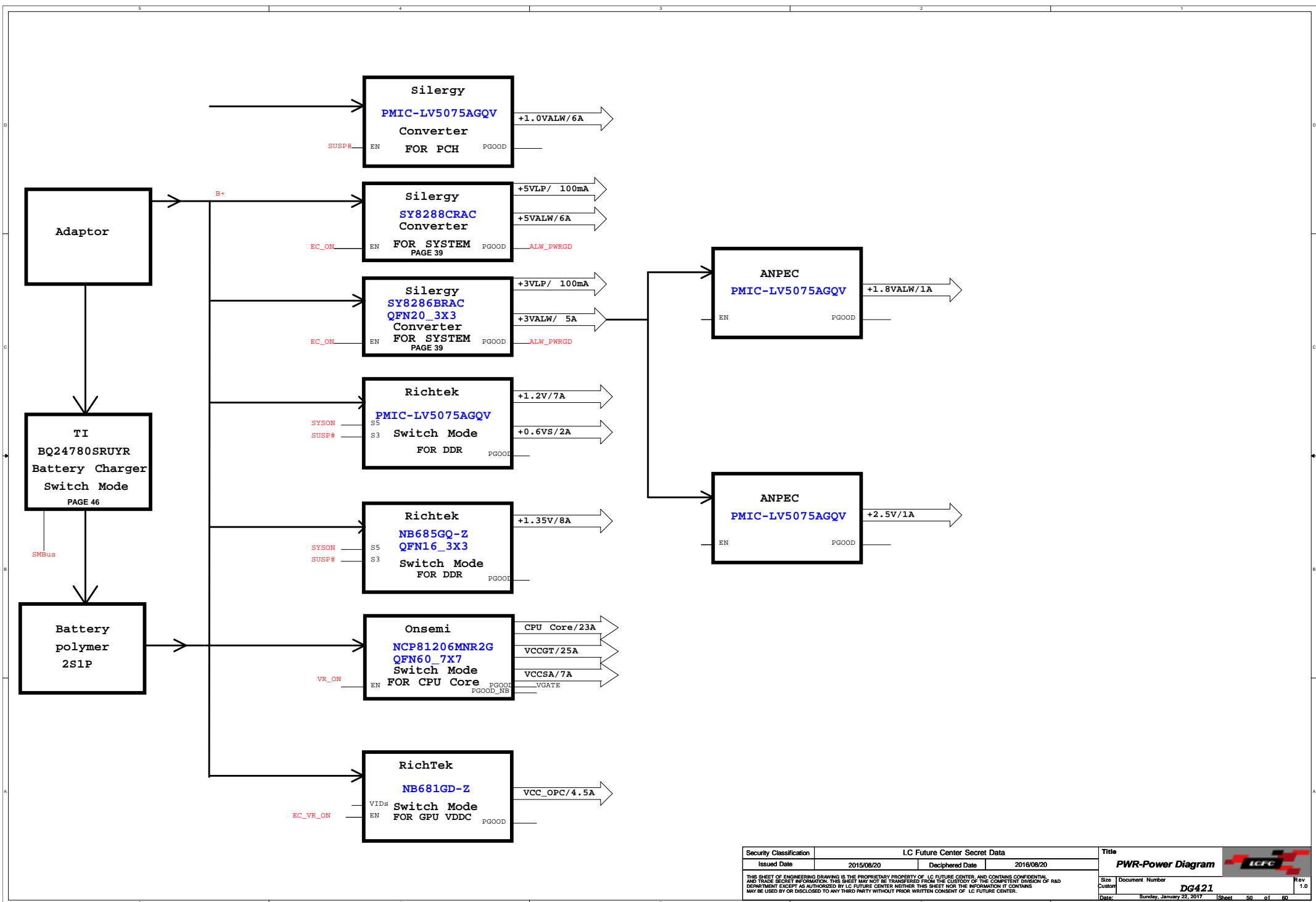


## USB3.0 Shielding

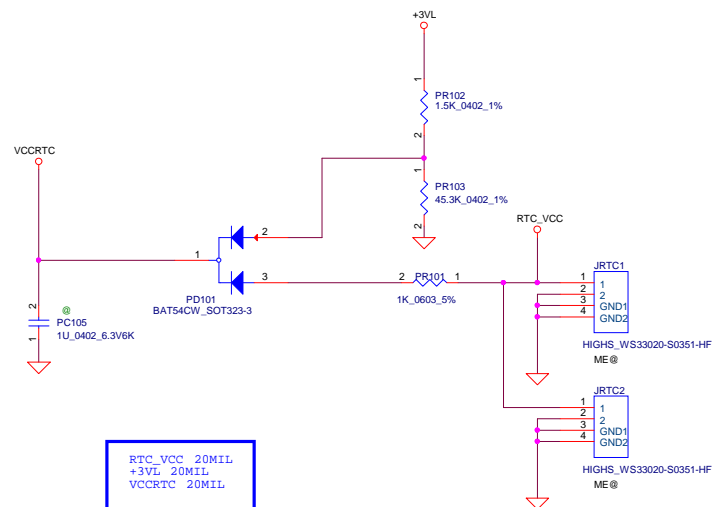
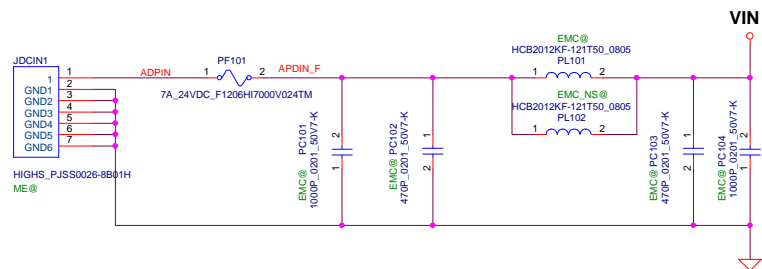


## DDR4 Shielding

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					DG421
				Date:	Sunday, January 22, 2017
				Sheet	49 of 60
				Rev	1.0



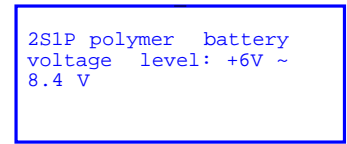
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				Custom	DG421
				Date	Sunday, January 25, 2017
				Sheet	50 of 60



RTC\_VCC 20MIL  
+3VL 20MIL  
VCCRTC 20MIL

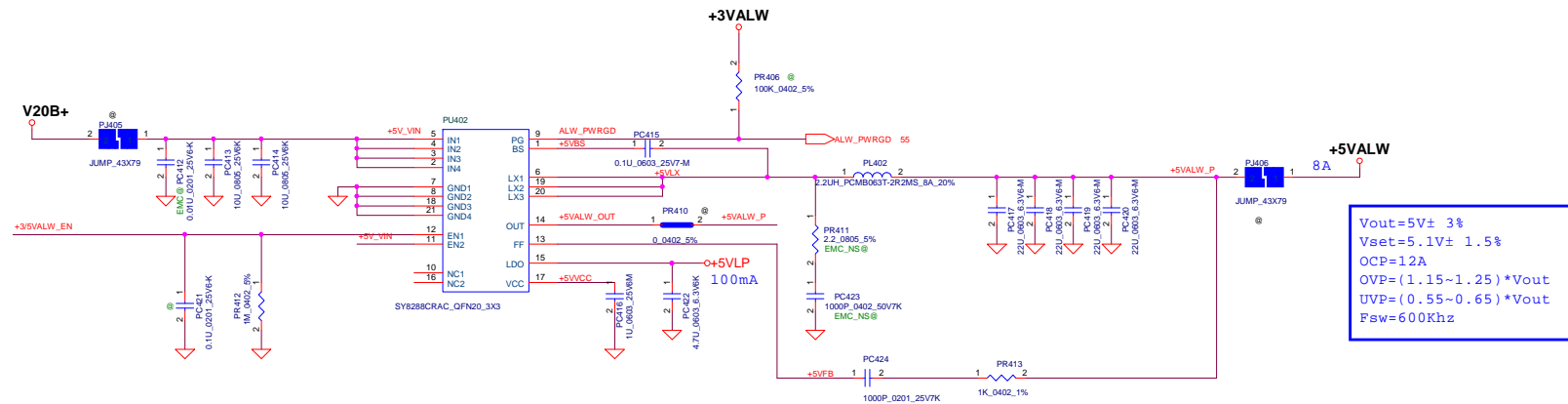
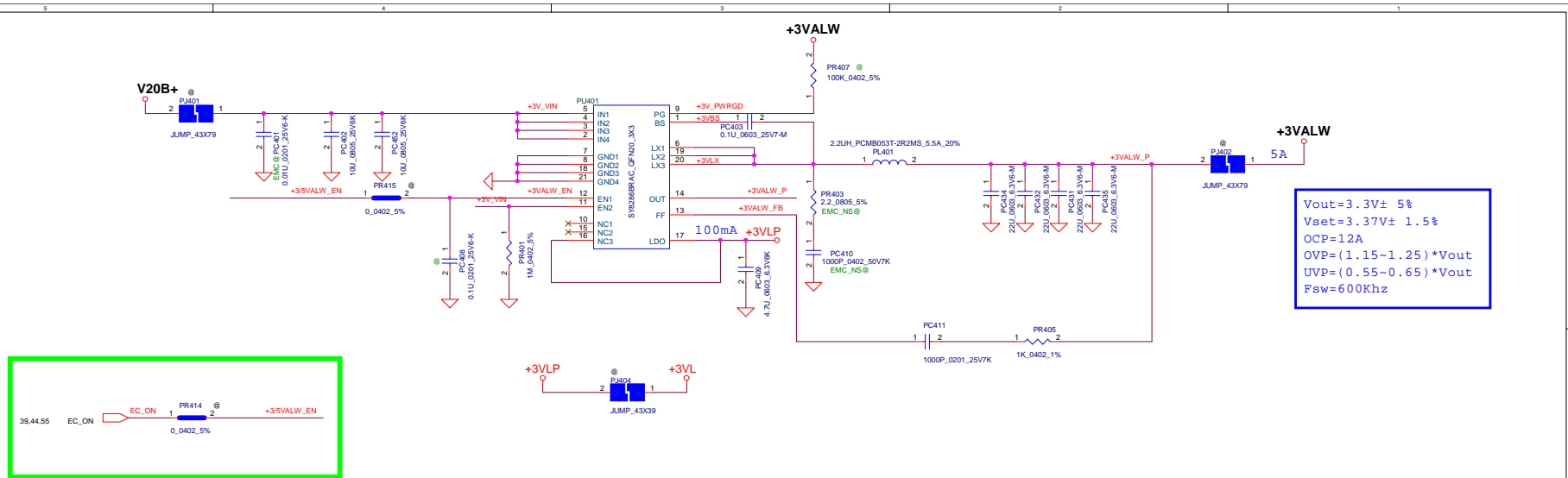
No charge RTC with 35mm cable  
RTC Battery for GCM BOM  
(2nd source and quoted price )

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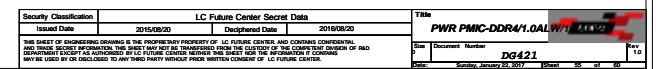



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				Date	Rev
				Sunday, January 22, 2017	1.0
				Sheet	54 of 60



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Date:										Sunday, January 22, 2017										Sheet					56 of 60					1									





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					Sheet 58 of 60		



