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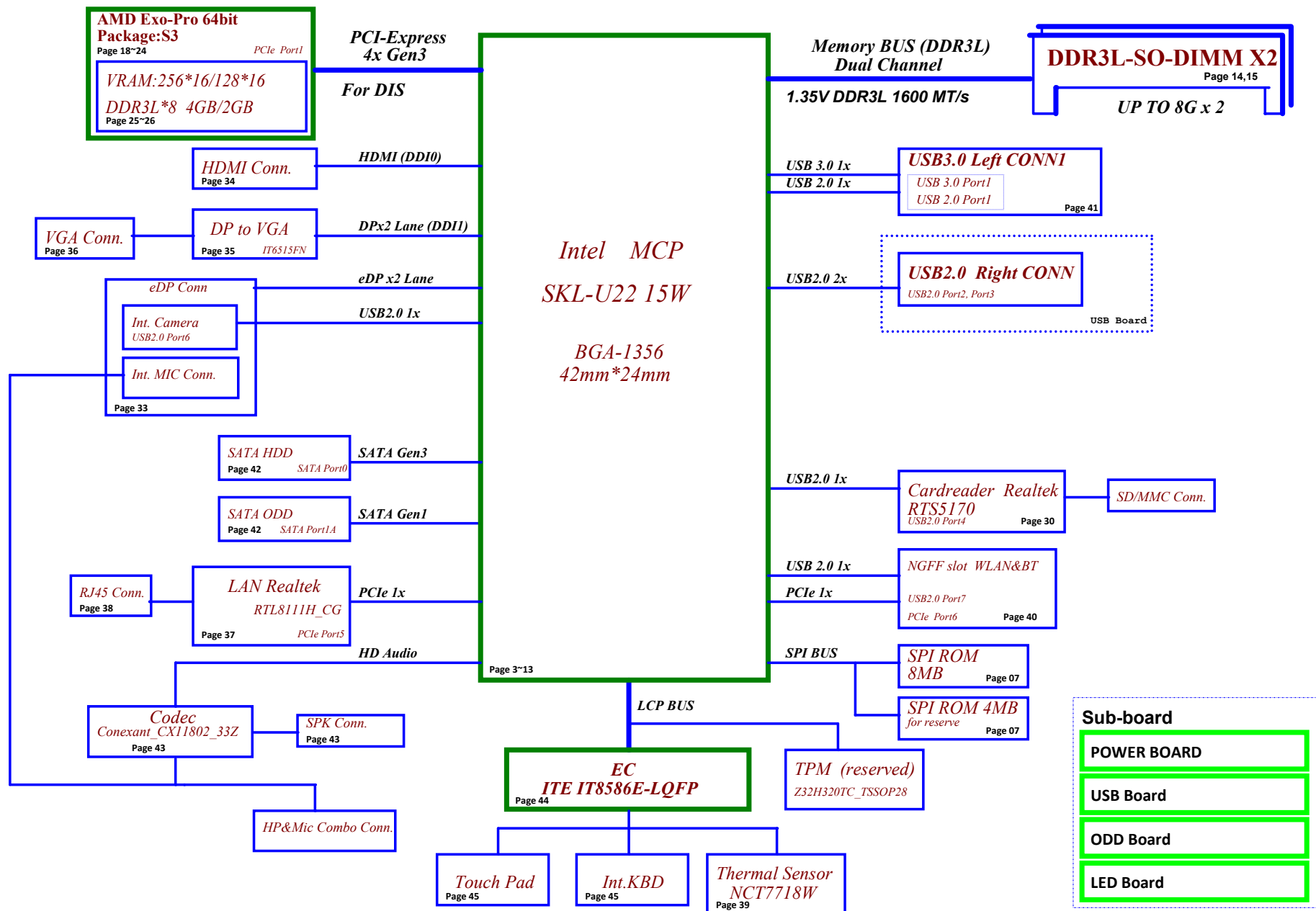
BMWD1 M/B Schematics Document

Intel Skylake U22 with DDRIII L + AMD Exo-Pro-S3 GPU

2015-08-10

REV:1.0

Security Classification	LC Future Center Secret Data			Title		
Issued Date	2014/12/11	Deciphered Date	2015/12/11	Cover Page		
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Voltage Rails (O --> Means ON , X --> Means OFF)

Power Plane / State	B+	+3VALW +5VALW +3VALW_PCH +1.8VALW +1.0VALW	+1.35V +VCCST	+5VS +3VS +VCCIO +VCCSTG +VCCSA +VCC_GT +CPU_CORE +0.675VS
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	BOM Structure	BTO Item
USB3.0	1 USB3.0 CONN left	@	Not stuff
	2 NC	14@	For 14" part
	3 NC	15@	For 15" part
	4 NC	14or15@	For 14" or 15" part
	5 NC	14or17@	For 14" or 17" part
	6 NC	AOAC@	AOAC support part
USB2.0	1 USB3.0 CONN Left	BCD@	For C cost down (BDW)
	2 USB2.0 CONN1 Right	Cannonlake@	For Cannonlake part
	3 USB2.0 CONN2 Right	CD@	For C cost down
	4 Camera	DUALMIC@	For Dual MIC part
	5 Cardreader	EMC@	For EMC part
	6 Touch Panel	EMC_15@	For EMC 15" part
	7 BT	EMC_NS@	For EMC nu-stuff part
	8 NC	EMC_PX@	For EMC PX part
	9 NC	EMC_PXNS@	For EMC PX nu-stuff part
	10 NC	ES@	For ES CPU
PCIE	1 NC	EXO@	For EXO GPU
	2 NC	GCLK@	For GreenCLK part
	3 NC	ME@	For ME part
	4 NC	NTS@	For nu-touch part
	5 LAN	PCH_SDIO@	For PCH SDIO part
	6 WLAN	PCH_SDIO1@	For PCH SDIO path1
	7 used as SATA	PCH_SDIO2@	For PCH SDIO path2
	8 used as SATA	PX@	For PX part
	X4 PCIE (9-12)	RANKA@	For VRAM rank A part
		RANKB@	For VRAM rank B part
		Realtek_SD@	For Realtek SD part
		SINGLEMIC@	For single MIC part
SATA	0 HDD	SINGLERANK@	For single VRAM rank part
	1A ODD	DUALRANK@	For dual VRAM rank part
	1B used as PCIE	TS@	For touch screen part
	2 used as PCIE	TPM@	For TPM part
		UMA@	For UMA part

SMBUS Control Table

	SOURCE	BATT	IT8586E	SODIMM	WLAN WiMAX	Thermal Sensor	PCH	TP Module	charger	DGPU
EC_SMB_CK1	IT8586E	V	V	X	X	X	X	X	V	X
EC_SMB_DA1	+3VALW	V	+3VALW	X	X	X	X	X	V	X
EC_SMB_CK2	IT8586E	X	V	X	X	V	V	X	X	V
EC_SMB_DA2	+3VS	X	+3VS	X	X	+3VS	+3VALW_PCH	X	X	+3VGS
PCH_SMB_CLK	PCH	X	X	V	V	X	V	X	X	X
PCH_SMB_DATA	+3VALW_PCH	X	X	+3VS	+3VS	X	+3VALW_PCH	X	X	X

EC SM Bus1 address

Device	Address
Smart Battery	0X16
Charger	0001 0010 b

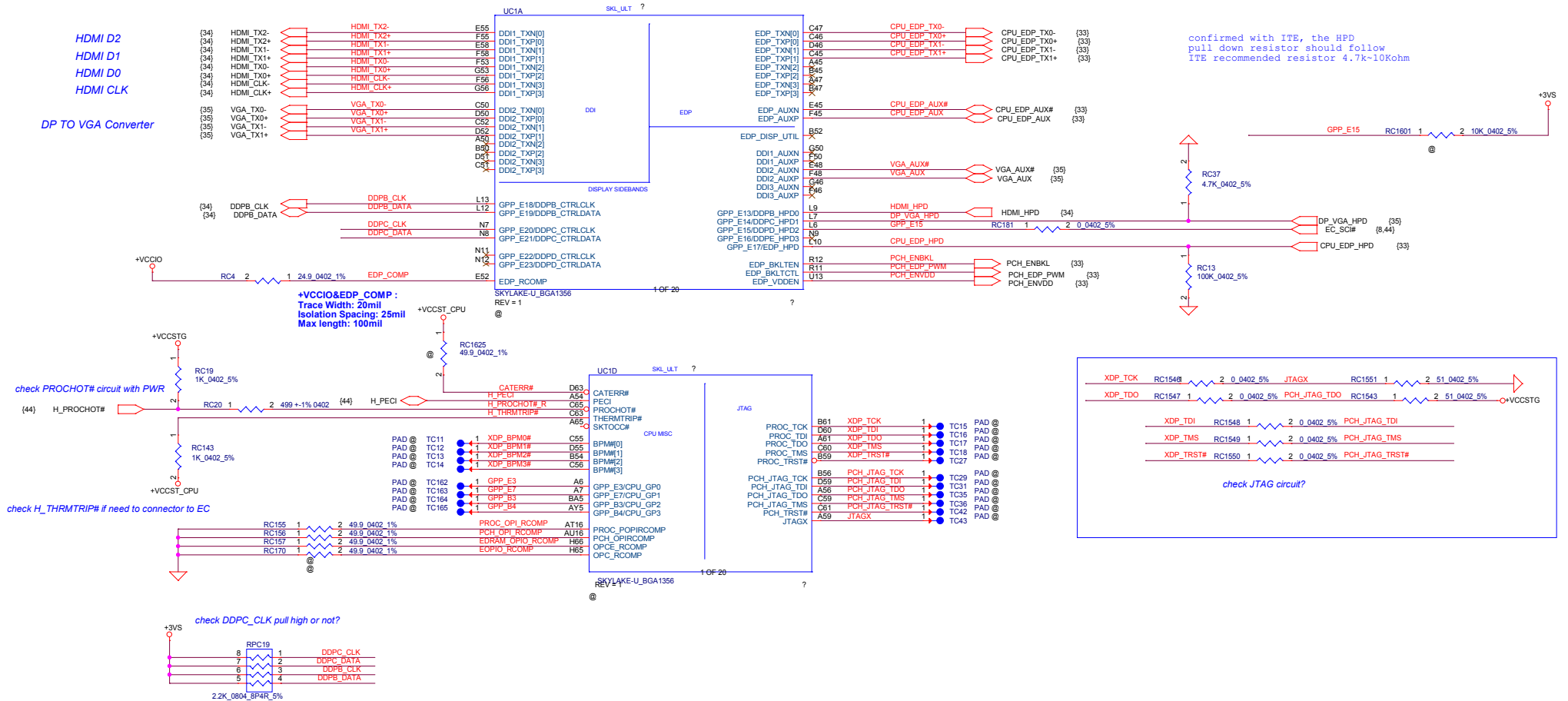
EC SM Bus2 address

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

PCH SM Bus address

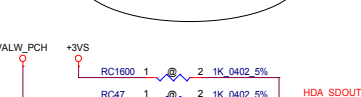
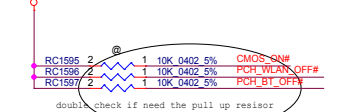
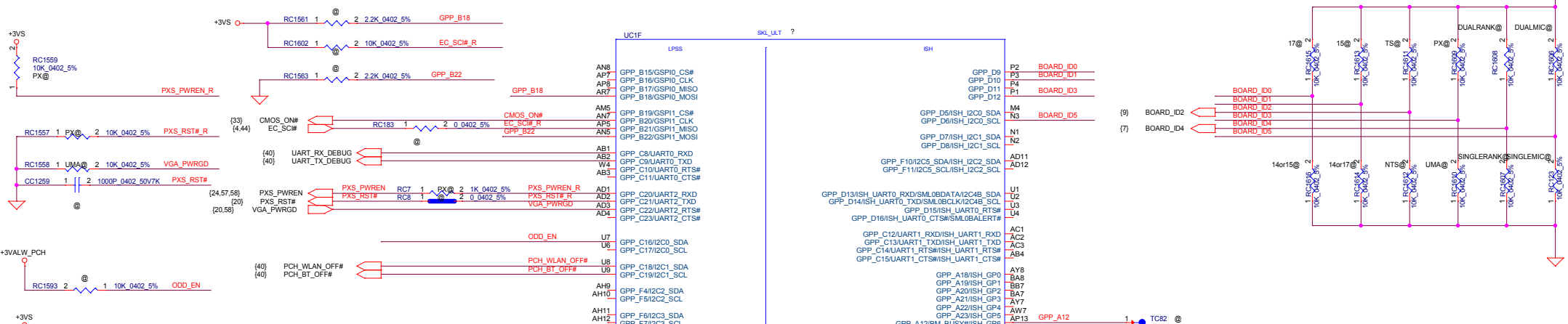
Device	Address
DDR DIMMA	1010 000Xb
DDR DIMMB	1010 010Xb
Wlan	Rsvd

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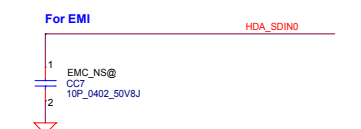


DDP_CTRLDATA strapping sampled on the rising edge of PWROK

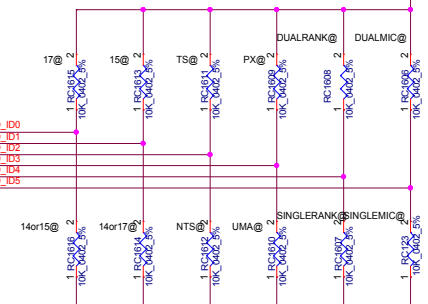
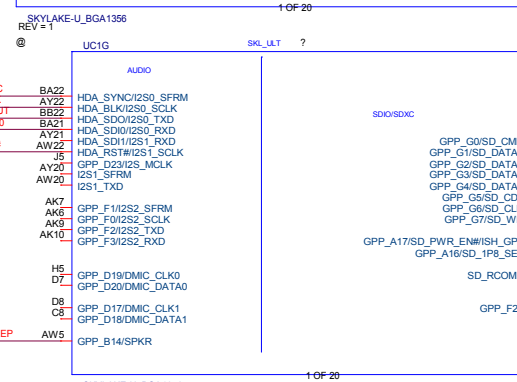
Port	Strap	Enable	Disable
Port 1	DDPB_CTRLDATA	Pull up to 3.3 V with 2.2Kohm	NC
Port 2	DDPB_CTRLDATA	Pull up to 3.3 V with 2.2Kohm	NC



HDA_SDO This signal has a weak internal pull-down.
0 = Enable security measures defined in the Flash Descriptor.
1 = Disable Flash Descriptor Security(override). This strap should only be asserted high during external pull-up in manufacturing/debug environments ONLY.



Pin Name	Strap Description	Configuration	Default Value	When Sampled
SPKR / GPP_B14	Top Swap Override	Internal PD 0 = Disable "Top Swap" mode. (Default) ★ 1 = Enable "Top Swap" mode.	0	Rising edge of PCH_PWROK
GPIO0 MOSI / GPP_B18	No Reboot	Internal PD 0 = Disable "No Reboot" mode. (Default) ★ 1 = Enable "No Reboot" mode	0	Rising edge of PCH_PWROK
GPIO1 MOSI / GPP_B22	Boot BIOS Strap Bit BBS	Internal PD 0 = SPI (Default) ★ 1 = LPC	0	Rising edge of PCH_PWROK



Board ID	Description	Stuff R
Board_ID[0:1]	00	14" RC1616 RC1614
	01	15" RC1616 RC1613
	10	17" RC1615 RC1614
	11	Reserved
Board_ID2	0	Non-touch RC1612
	1	Touch RC1611
Board_ID3	0	UMA RC1610
	1	DIS RC1609
Board_ID4	0	SingleRank RC1607
	1	DualRank RC1608
Board_ID5	0	SingleMIC RC1623
	1	DualMIC RC1606

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Title

MCP (LPSS,ISH,AUDIO,SDI) LCFC

Size

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1.0

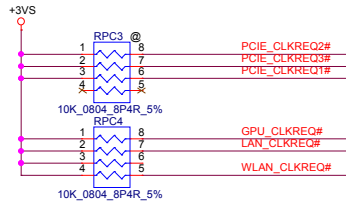
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check the Pull up resistor

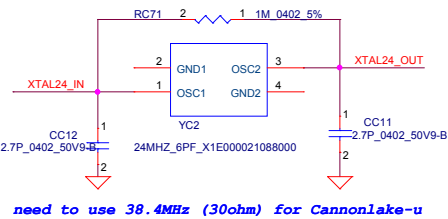


PCIE CLK0 GPU

PCIE CLK5 LAN

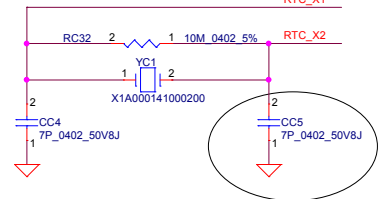
PCIE CLK6 WLAN

check if need to change to 1M_0402_1% follow PDG, CRB is 1M_0402_5%



(31) 24M_CLK RC122 1 2 0.0402 5% XTAL24_IN

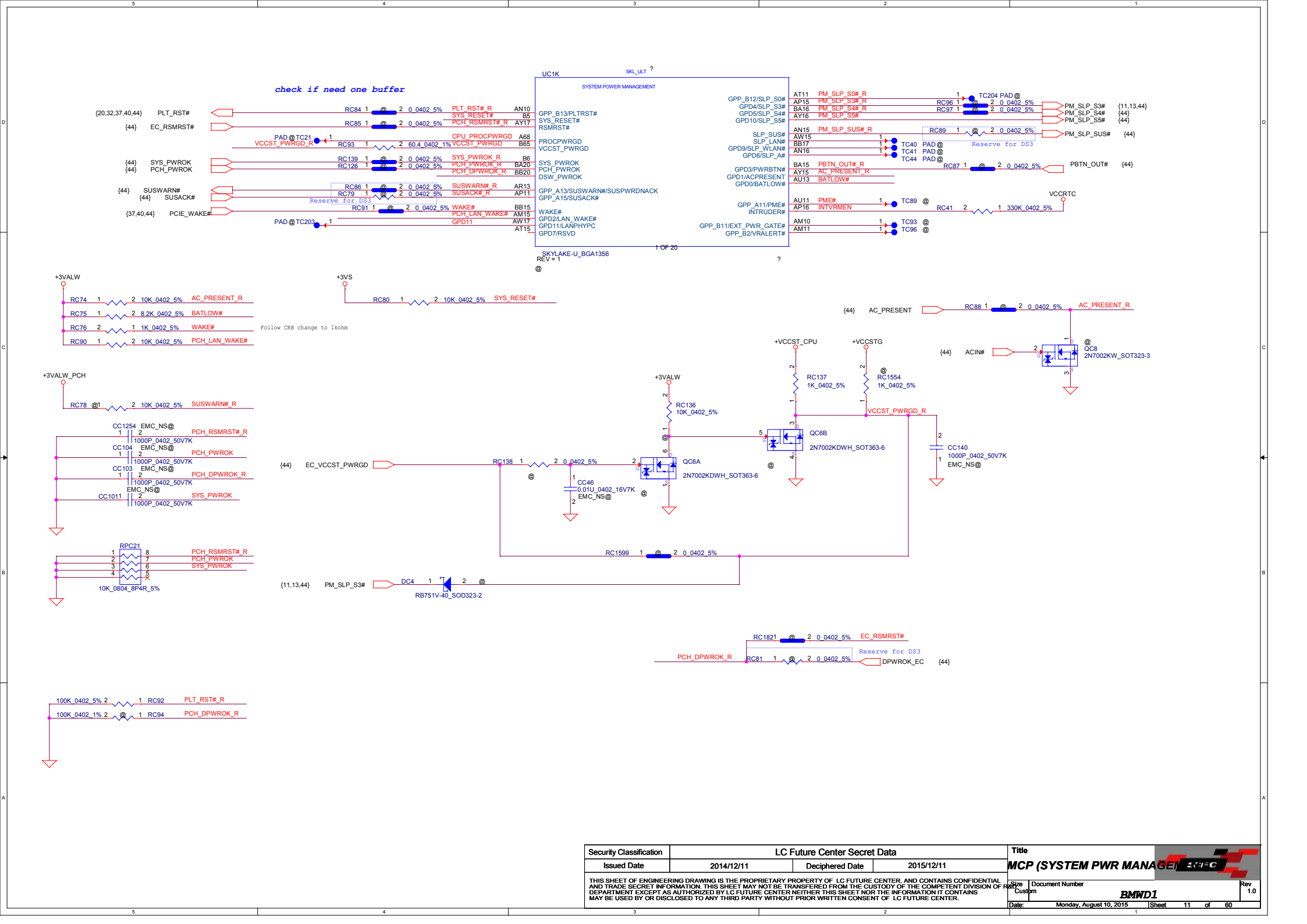
change to SJ10000LM00

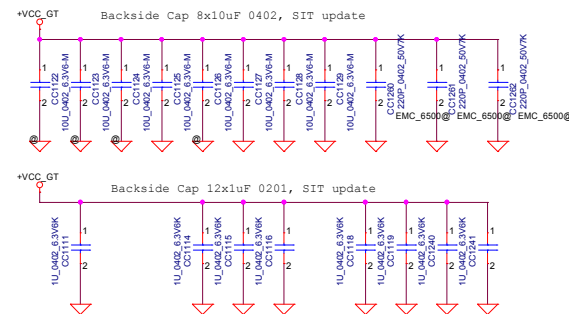
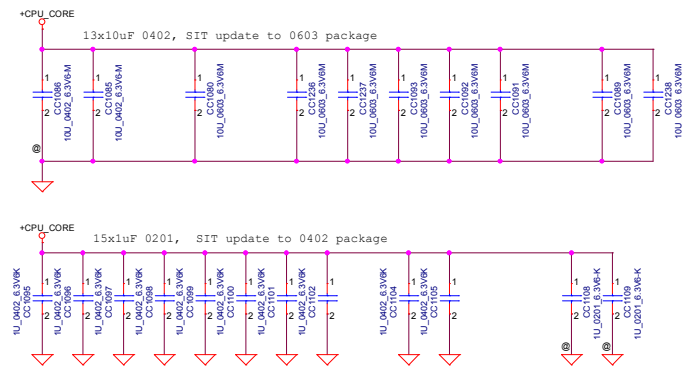
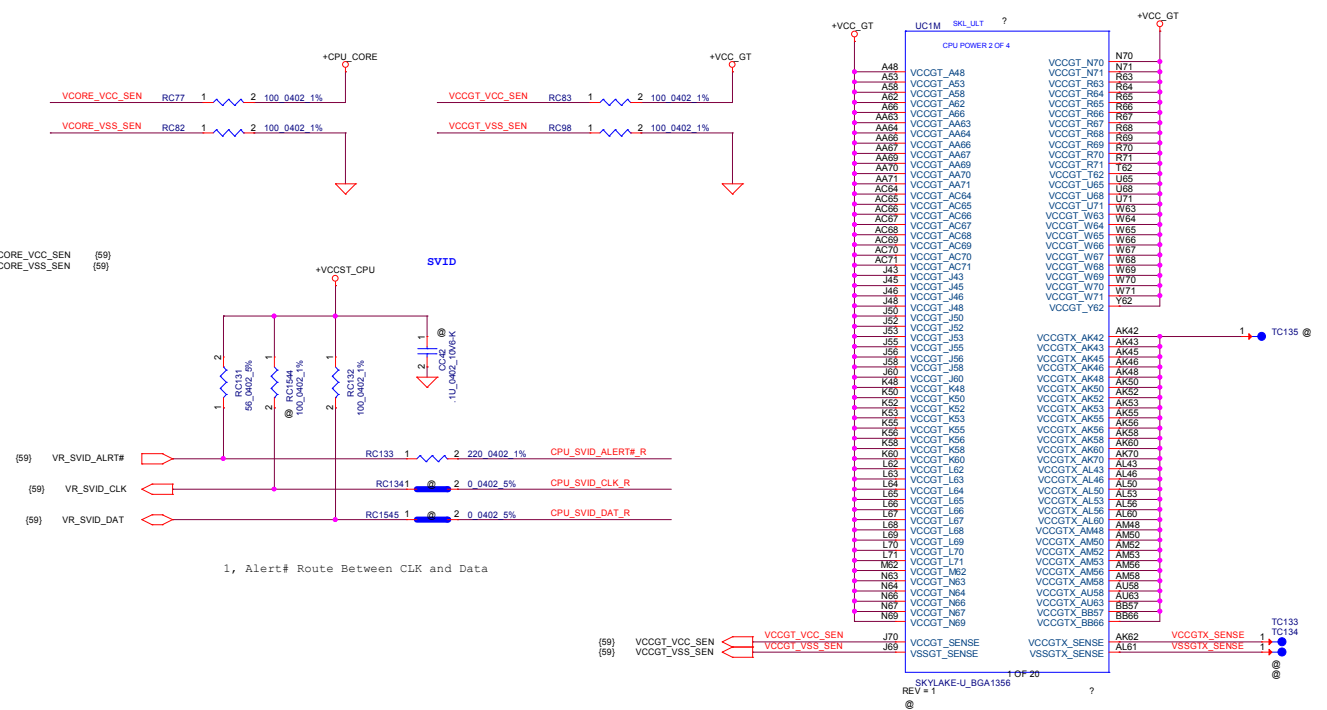
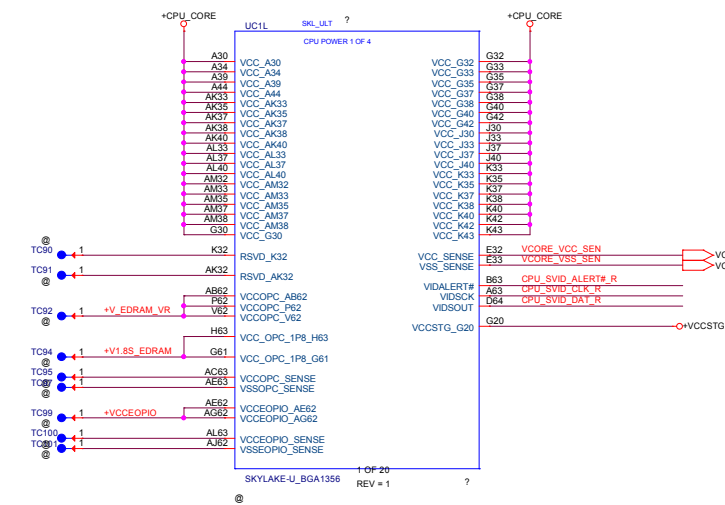



(31) RTC_CLK RC121 1 2 0.0402 5% RTC_X1

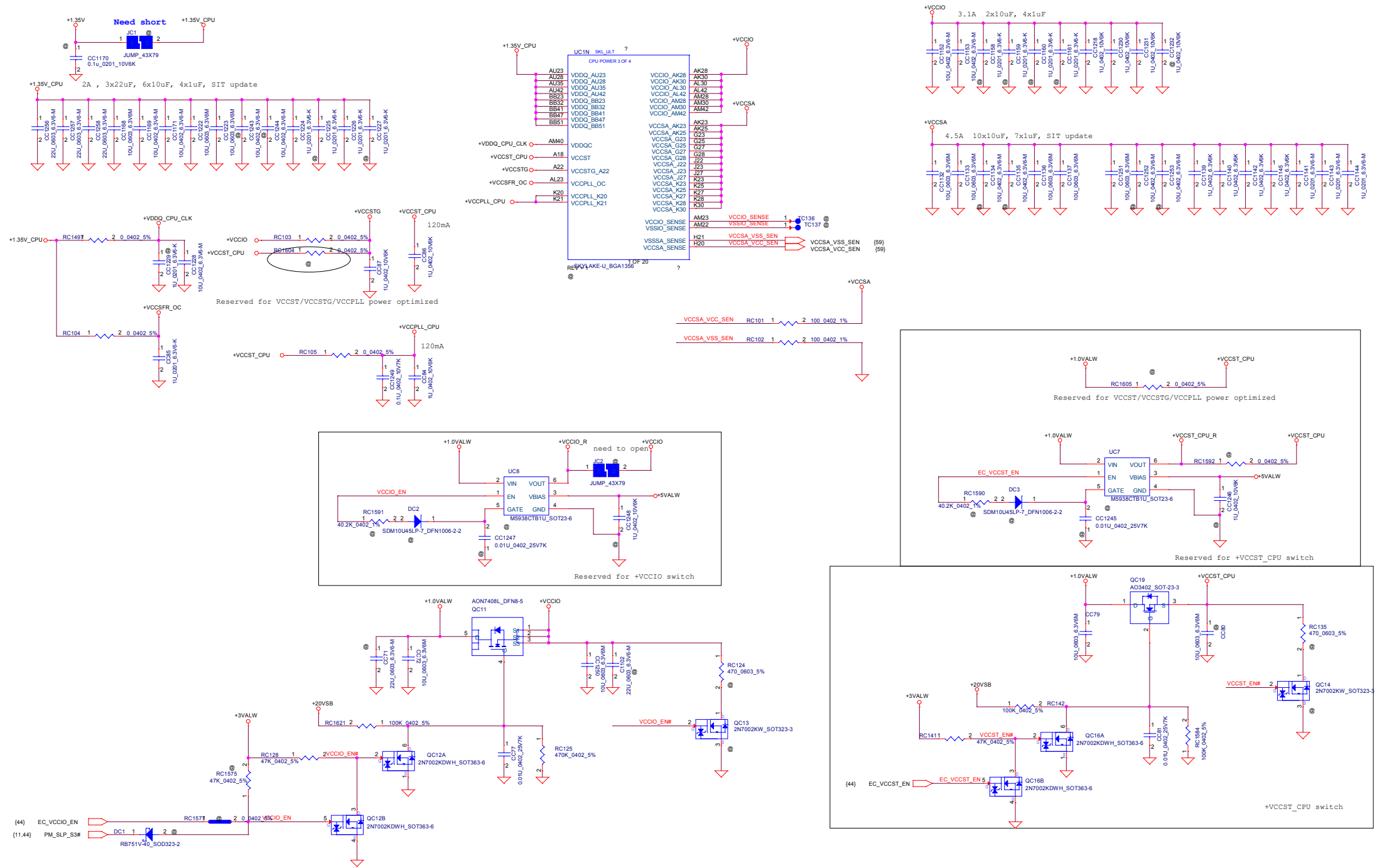
when single end external clock generator used, this pin should be grounded

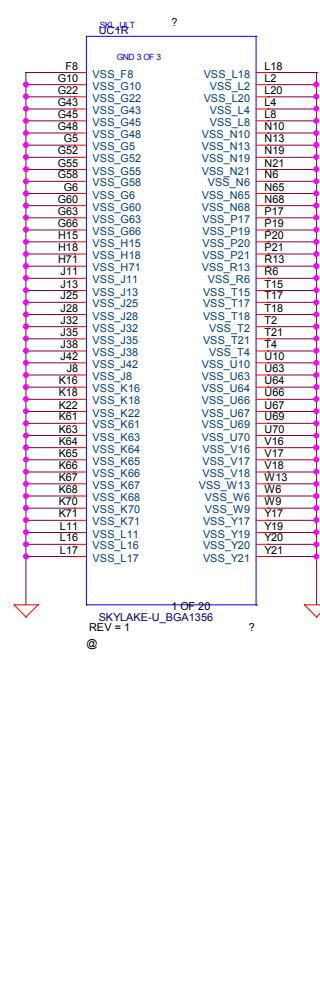
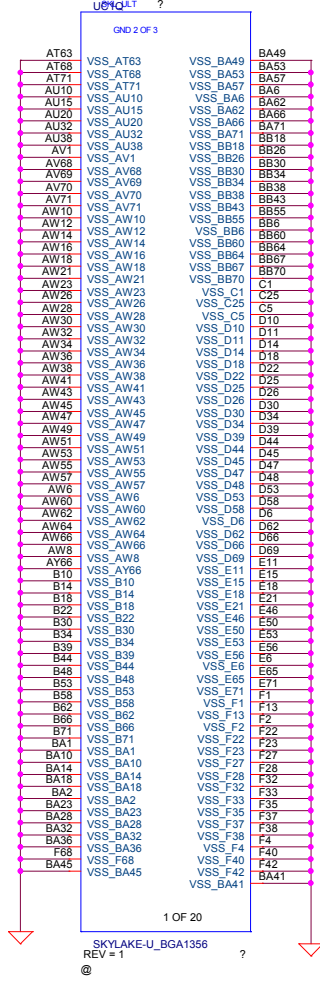
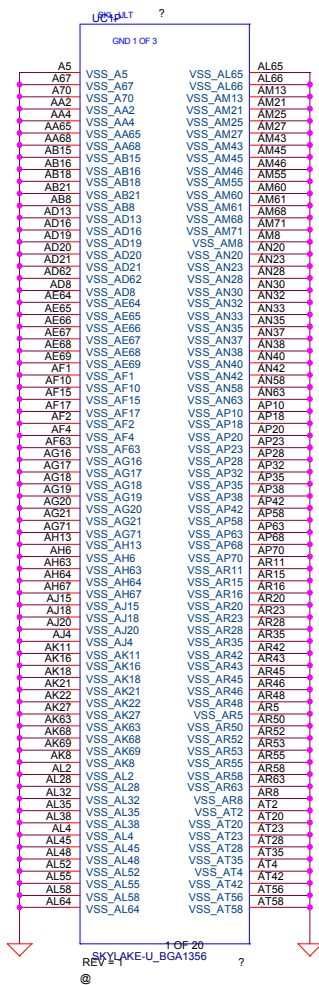
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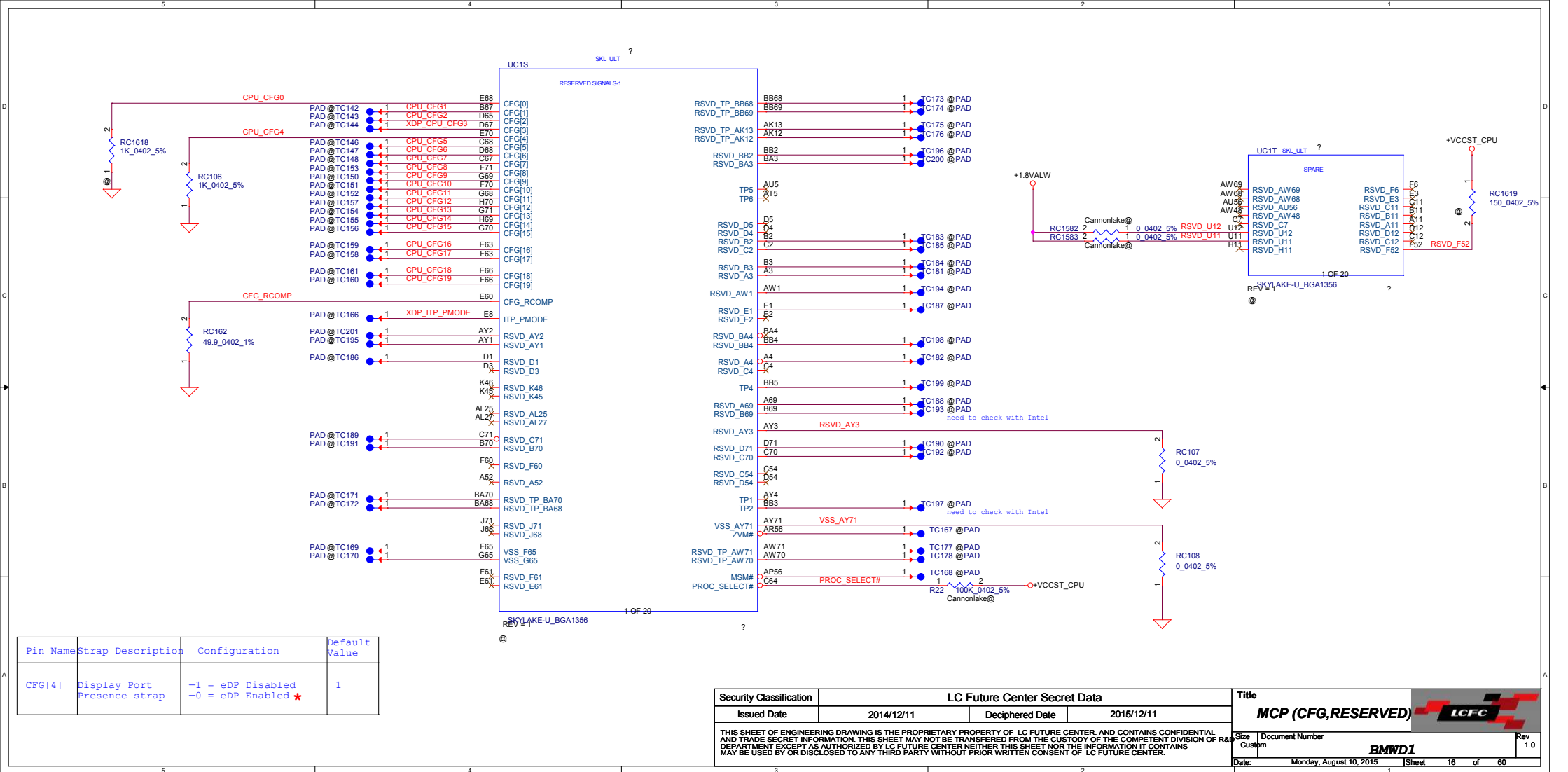


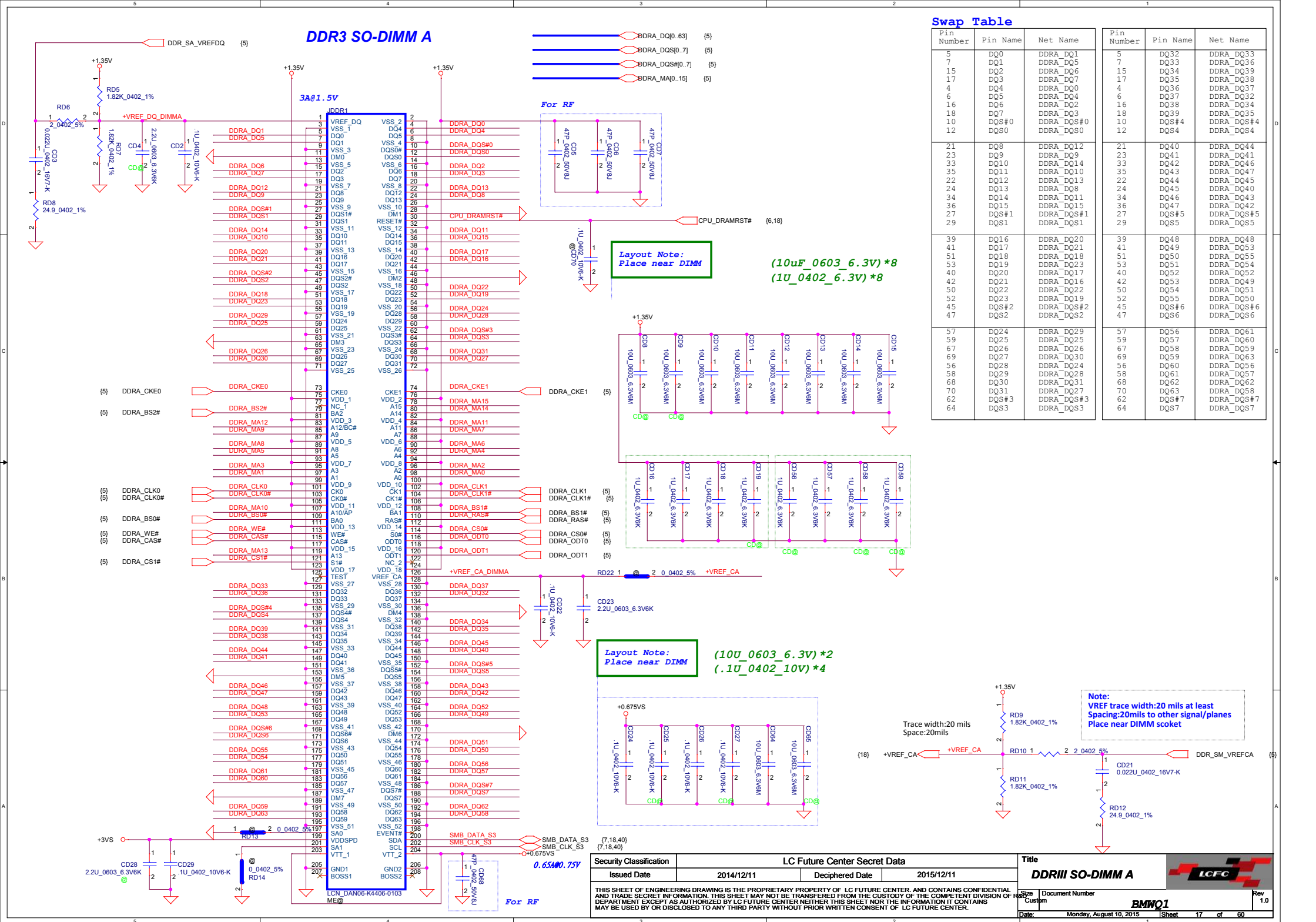


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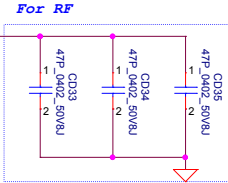




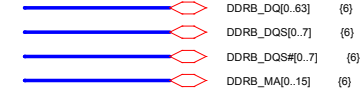




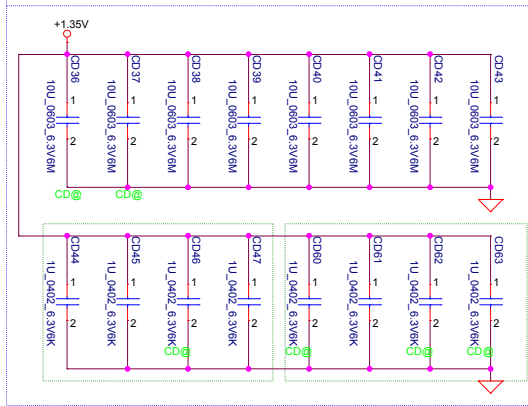
DDR3 SO-DIMM B



Layout Note:
Place near DIMM

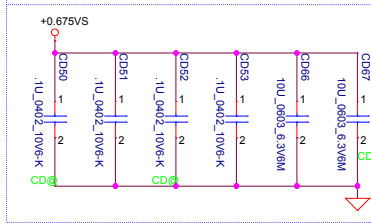


(10uF_0603_6.3V)*8
(1U_0402_6.3V)*8



Layout Note:
Place near DIMM

(10U_0603_6.3V)*2
(.1U_0402_10V)*4



Swap Table

Pin Number	Pin Name	Net Name
5	DQ0	DDR3_DQ12
7	DQ1	DDR3_DQ8
15	DQ2	DDR3_DQ10
17	DQ3	DDR3_DQ11
4	DQ4	DDR3_DQ9
6	DQ5	DDR3_DQ13
16	DQ6	DDR3_DQ14
18	DQ7	DDR3_DQ15
10	DQS#0	DDR3_DQS#1
12	DQS0	DDR3_DQS1
21	DQ8	DDR3_DQ4
23	DQ9	DDR3_DQ5
33	DQ10	DDR3_DQ7
35	DQ11	DDR3_DQ3
22	DQ12	DDR3_DQ1
24	DQ13	DDR3_DQ0
34	DQ14	DDR3_DQ6
36	DQ15	DDR3_DQ2
27	DQS#1	DDR3_DQS#0
29	DQS1	DDR3_DQS0
39	DQ16	DDR3_DQ16
41	DQ17	DDR3_DQ18
51	DQ18	DDR3_DQ19
53	DQ19	DDR3_DQ23
40	DQ20	DDR3_DQ20
42	DQ21	DDR3_DQ21
50	DQ22	DDR3_DQ17
52	DQ23	DDR3_DQ22
45	DQS#2	DDR3_DQS#2
47	DQS2	DDR3_DQS2
57	DQ24	DDR3_DQ29
59	DQ25	DDR3_DQ24
67	DQ26	DDR3_DQ31
69	DQ27	DDR3_DQ30
56	DQ28	DDR3_DQ27
58	DQ29	DDR3_DQ28
68	DQ30	DDR3_DQ25
70	DQ31	DDR3_DQ26
62	DQS#3	DDR3_DQS#3
64	DQS3	DDR3_DQS3
129	DQ32	DDR3_DQ36
131	DQ33	DDR3_DQ37
141	DQ34	DDR3_DQ38
143	DQ35	DDR3_DQ39
130	DQ36	DDR3_DQ33
132	DQ37	DDR3_DQ32
140	DQ38	DDR3_DQ35
142	DQ39	DDR3_DQ34
135	DQS#4	DDR3_DQS#4
137	DQS4	DDR3_DQS4
147	DQ40	DDR3_DQ44
149	DQ41	DDR3_DQ45
157	DQ42	DDR3_DQ47
159	DQ43	DDR3_DQ46
146	DQ44	DDR3_DQ41
148	DQ45	DDR3_DQ40
158	DQ46	DDR3_DQ42
160	DQ47	DDR3_DQ43
152	DQS#5	DDR3_DQS#5
154	DQS5	DDR3_DQS5
163	DQ48	DDR3_DQ52
165	DQ49	DDR3_DQ53
175	DQ50	DDR3_DQ54
177	DQ51	DDR3_DQ51
164	DQ52	DDR3_DQ49
166	DQ53	DDR3_DQ48
174	DQ54	DDR3_DQ50
176	DQ55	DDR3_DQ55
168	DQS#6	DDR3_DQS#6
171	DQS6	DDR3_DQS6
181	DQ56	DDR3_DQ57
183	DQ57	DDR3_DQ60
191	DQ58	DDR3_DQ58
193	DQ59	DDR3_DQ59
180	DQ60	DDR3_DQ56
182	DQ61	DDR3_DQ61
192	DQ62	DDR3_DQ62
194	DQ63	DDR3_DQ63
186	DQS#7	DDR3_DQS#7
188	DQS7	DDR3_DQS7

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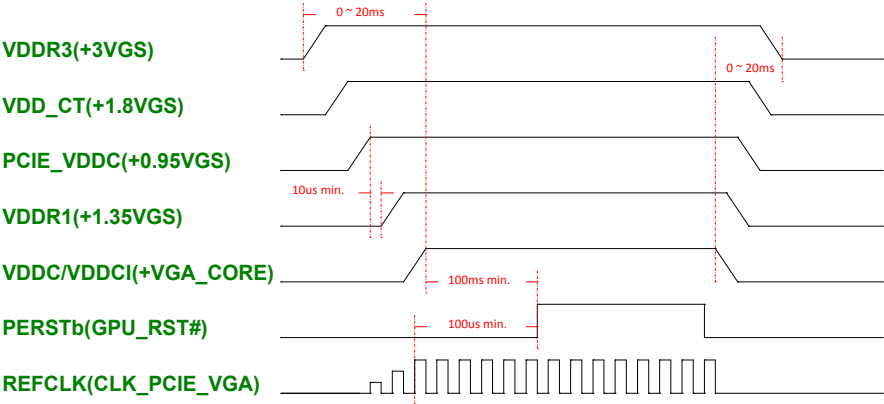
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Power-Up/Down Sequence

"Topaz" has the following requirements with regards to power-supply sequencing to avoid damaging the ASIC:

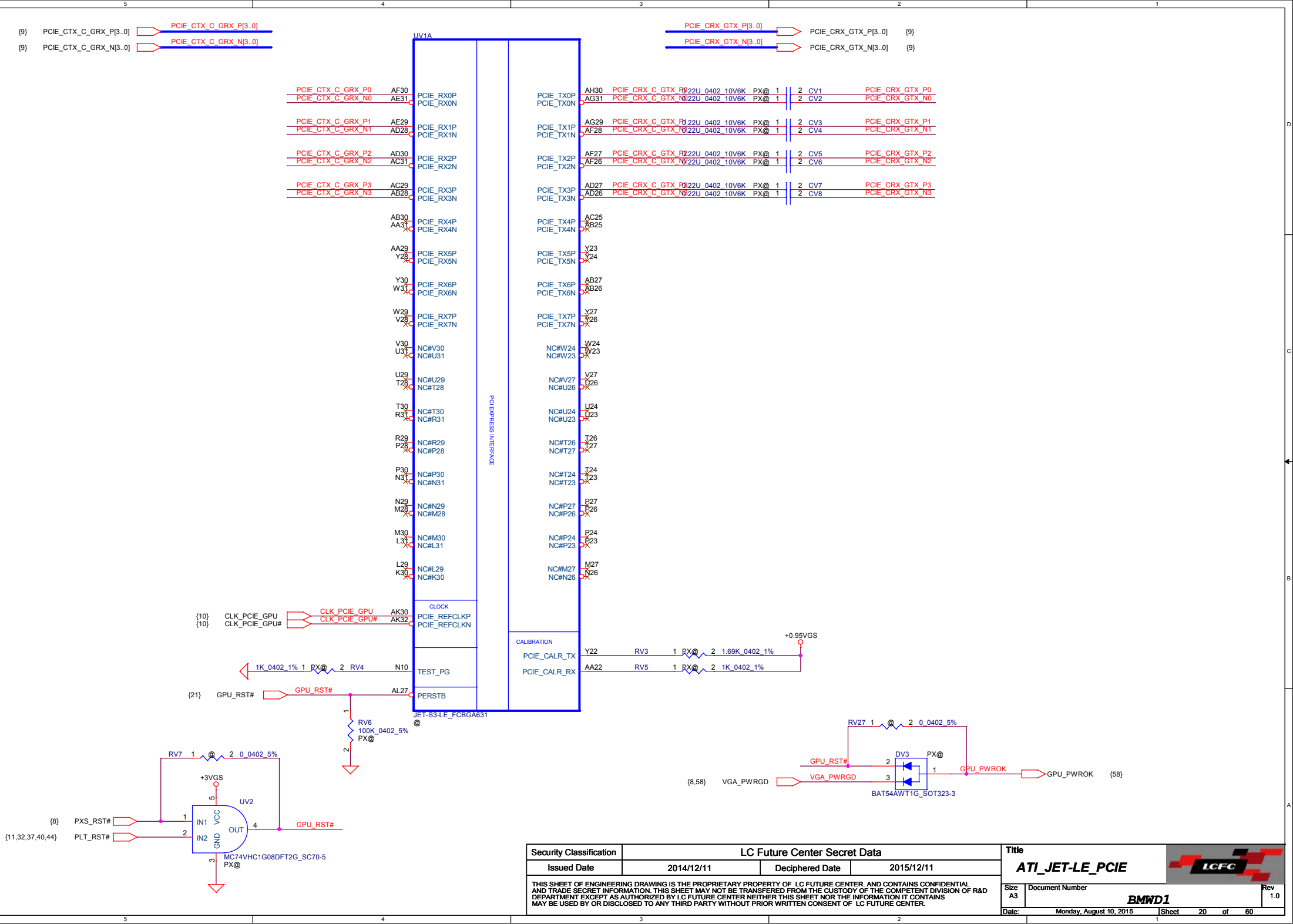
All the ASIC supplies must reach their respective nominal voltages within 20 ms of the start of the ramp-up sequence, though a shorter ramp-up duration is preferred. The maximum slew rate on all rails is 50 mV/μs. It is recommended that the 3.3-V rail ramp up first. The 3.3-V, 1.8-V, and 0.95-V rails must reach their ready state at least 10 μs before VDDC, VDDCI, and VMEMIO start to ramp up. The power rails that are shared with other components on the system should be gated for the dGPU so that when the dGPU is powered down (for example AMD PowerXpress idle state), all the power rails are removed from the dGPU. The gate circuits must meet the slew rate requirement (such as ≤ 50 mV/μs). For power down, reversing the ramp-up sequence is recommended.

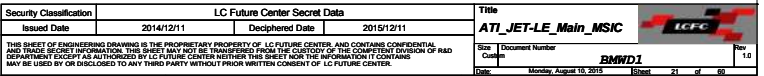


CONFIGURATION STRAPS			RECOMMENDED SETTINGS
ALLOW FOR PULLUP PADS FOR THESE STRAPS AND IF THESE GPIOs ARE USED, THEY MUST NOT CONFLICT DURING RESET			
MLPS Bit	Strap Name	Description	RECOMMENDED SETTINGS
PS_0[1] PS_0[2] PS_0[3]	ROM_CONFIG[0] ROM_CONFIG[1] ROM_CONFIG[2]	Define the ROM type when STRAP_BIOS_ROM_EN = 1. Define the primary memory-aperture size when STRAP_BIOS_ROM_EN = 0. 100 = 256MB	X
PS_0[4]	N/A	Reserved for internal use only. Must be 1 at reset.	1
PS_0[5]	AUD_PORT_CONN_PINSTRAP[0]	The LSB (least significant bit) of the strap option that indicates the number of audio-capable display outputs.	1
PS_1[1]	STRAP_BIF_GEN3_EN_A	1 = PCIe GEN3 is supported. 0 = PCIe GEN3 is not supported. 1= support	X
PS_1[2]	STRAP_BIF_CLK_PM_EN	0 = The CLKREQB power management capability is disabled 1 = The CLKREQB power management capability is enabled	0
PS_1[3]	N/A	Reserved for internal use only. Must be 0 at reset.	0
PS_1[4]	STRAP_TX_CFG_DRV_FULL_SWING	0 = The transmitter half-swing is enabled 1 = The transmitter full-swing is enabled	1
PS_1[5]	STRAP_TX_DEEMPH_EN	0 = Tx deemphasis disabled. 1 = Tx deemphasis enabled. 1= Enable	X
PS_2[1]	N/A	Reserved.	0
PS_2[2]	N/A	Reserved.	0
PS_2[3]	STRAP_BIOS_ROM_EN	0 = Disable the external BIOS ROM device. 1 = Enable the external BIOS ROM device. 0= Disable	X
PS_2[4]	STRAP_BIF_VGA_DIS	0 = VGA controller capacity enabled. 1 = The device will not be recognized as the system's VGA controller.	1
PS_2[5]	N/A	Reserved	1
PS_3[1] PS_3[2] PS_3[3]	BOARD_CONFIG[0] BOARD_CONFIG[1] BOARD_CONFIG[2]	Board configuration related strapping, such as for memory ID 000 = Hynix 256M*16 001 = Hynix 128M*16 100 = Samsung 256M*16 011 = Samsung 128M*16 010 = Micron 256M*16 111 = Micron 128M*16	X
PS_3[4] PS_3[5]	AUD_PORT_CONN_PINSTRAP[1] AUD_PORT_CONN_PINSTRAP[2]	Determines the maximum number of digital display audio endpoints that will be presented to the OS and user.(Combine with PS_0[5]) 111 = No usable endpoints. 110 = One usable endpoint. 101 = Two usable endpoints. 100 = Three usable endpoints. 011 = Four usable endpoints. 010 = Five usable endpoints. 001 = Six usable endpoints. 000 = All endpoints are usable.	11

VRAM ID config

Memory Type		VRAM ID PS_3[3:1]	PU resistor RV33	PD resistor RV36
128Mx16	Hynix H5TC2G63FFR-11C	100	4.53K	4.99K
	Micron MT41J128M16JT-093G	111	4.75K	NC
	Samsung K4W2G1646Q-BC1A	110	3.4K	10K
256Mx16	Hynix H5TC4G63CFR-N0C (New)	000	NC	4.75K
	Micron MT41J256M16HA-093G	010	4.53K	2K
	Samsung K4W4G1646E-BC1A (New no AVL)	001	8.45K	2K





UV1F

NC_VARY_BL
NC_DIGON

AB11 RV115 1 2 0.0402 5% TOPAZ@
AB12 RV116 1 2 0.0402 5% TOPAZ@

+VGA_CORE

NC_UPHYAB_TMDPA_TX0N
NC_UPHYAB_TMDPA_TX0P

AL15
AK14

NC_UPHYAB_TMDPA_TX1N
NC_UPHYAB_TMDPA_TX1P

AH16
AJ15

NC_UPHYAB_TMDPA_TX2N
NC_UPHYAB_TMDPA_TX2P

AL17
AK16

NC_UPHYAB_TMDPA_TX3N
NC_UPHYAB_TMDPA_TX3P

AH18
AJ17

NC_TXOUT_L3P
NC_TXOUT_L3N

AL19
AK18

TMDP

NC_UPHYAB_TMDPB_TX0N
NC_UPHYAB_TMDPB_TX0P

AH20
AJ19

NC_UPHYAB_TMDPB_TX1N
NC_UPHYAB_TMDPB_TX1P

AL21
AK20

NC_UPHYAB_TMDPB_TX2N
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AH22
AJ21


NC_UPHYAB_TMDPB_TX3N
NC_UPHYAB_TMDPB_TX3P

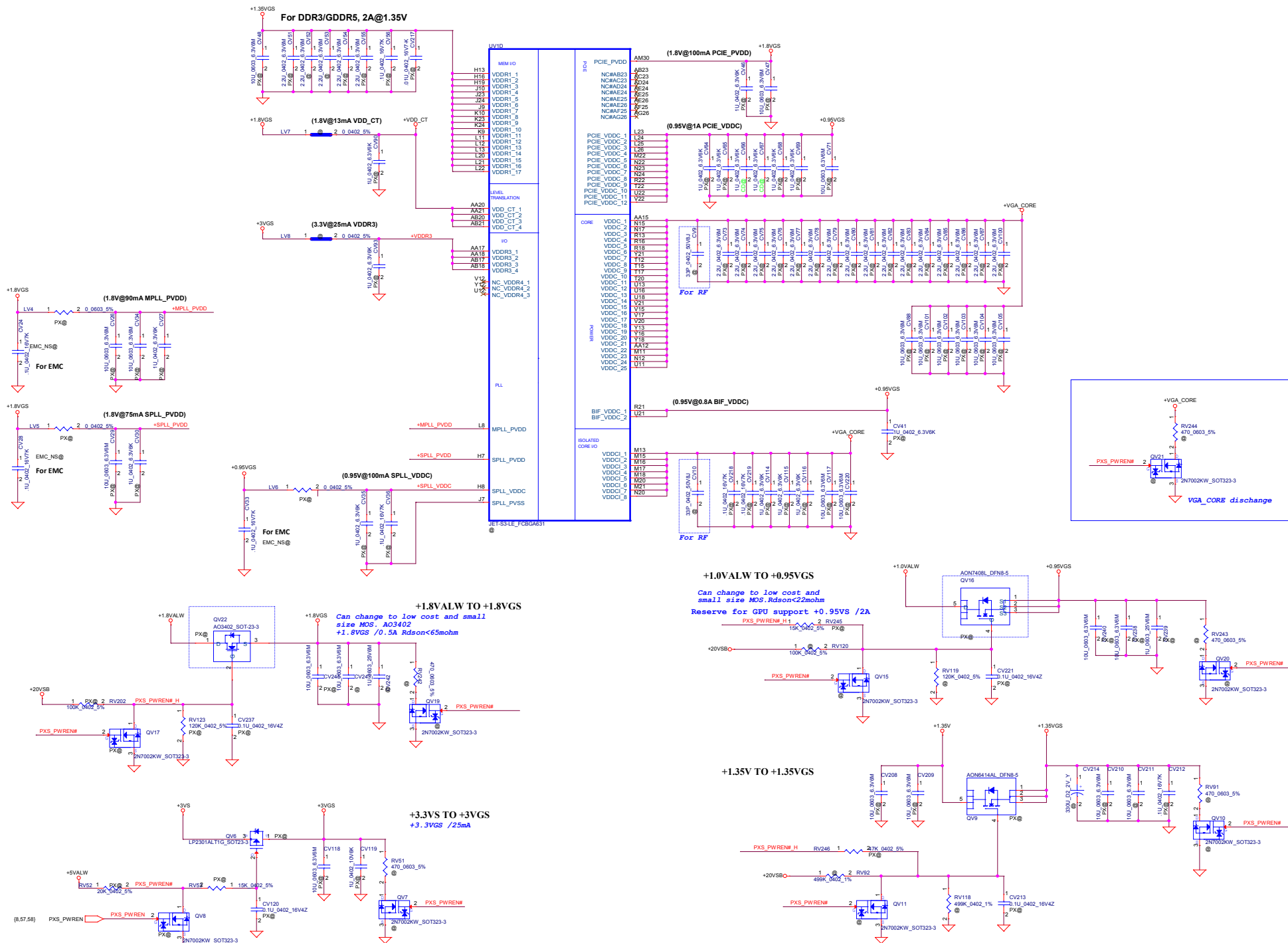
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AK22

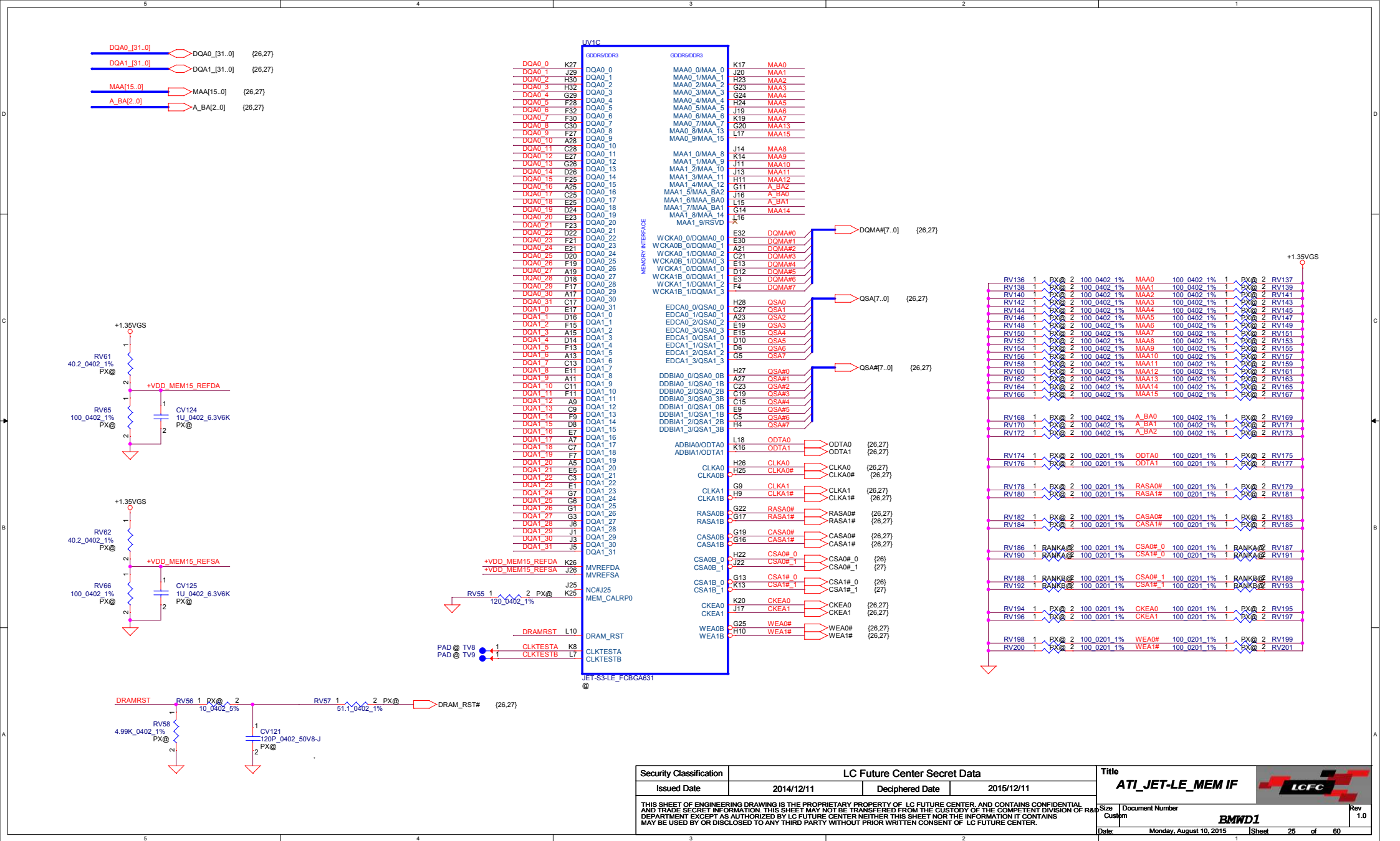
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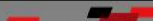
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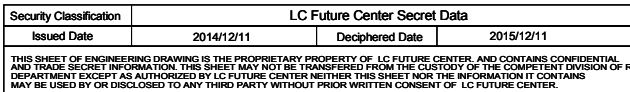
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				Date:	Monday, August 10, 2015	Sheet 22 of 60





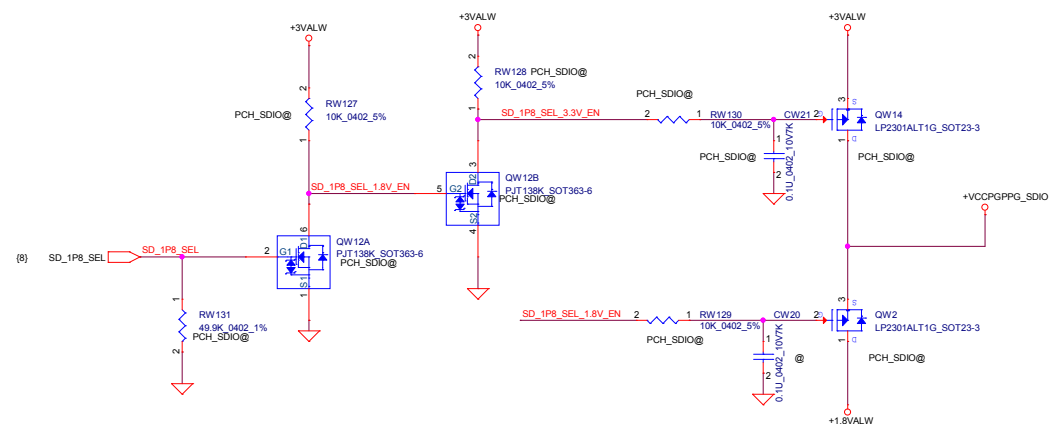
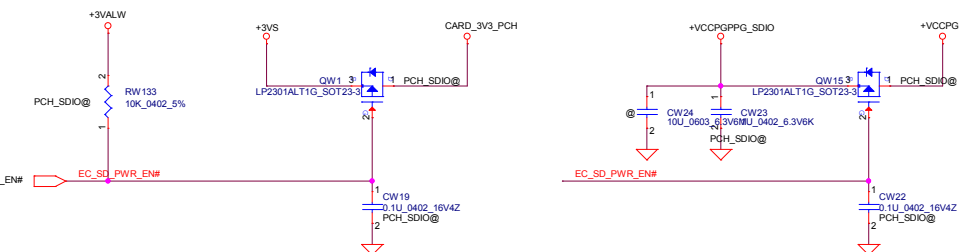
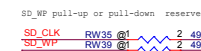
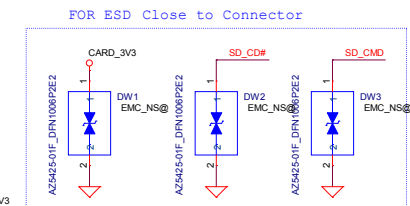
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				Date: Monday, August 10, 2015			Sheet	25	of	60

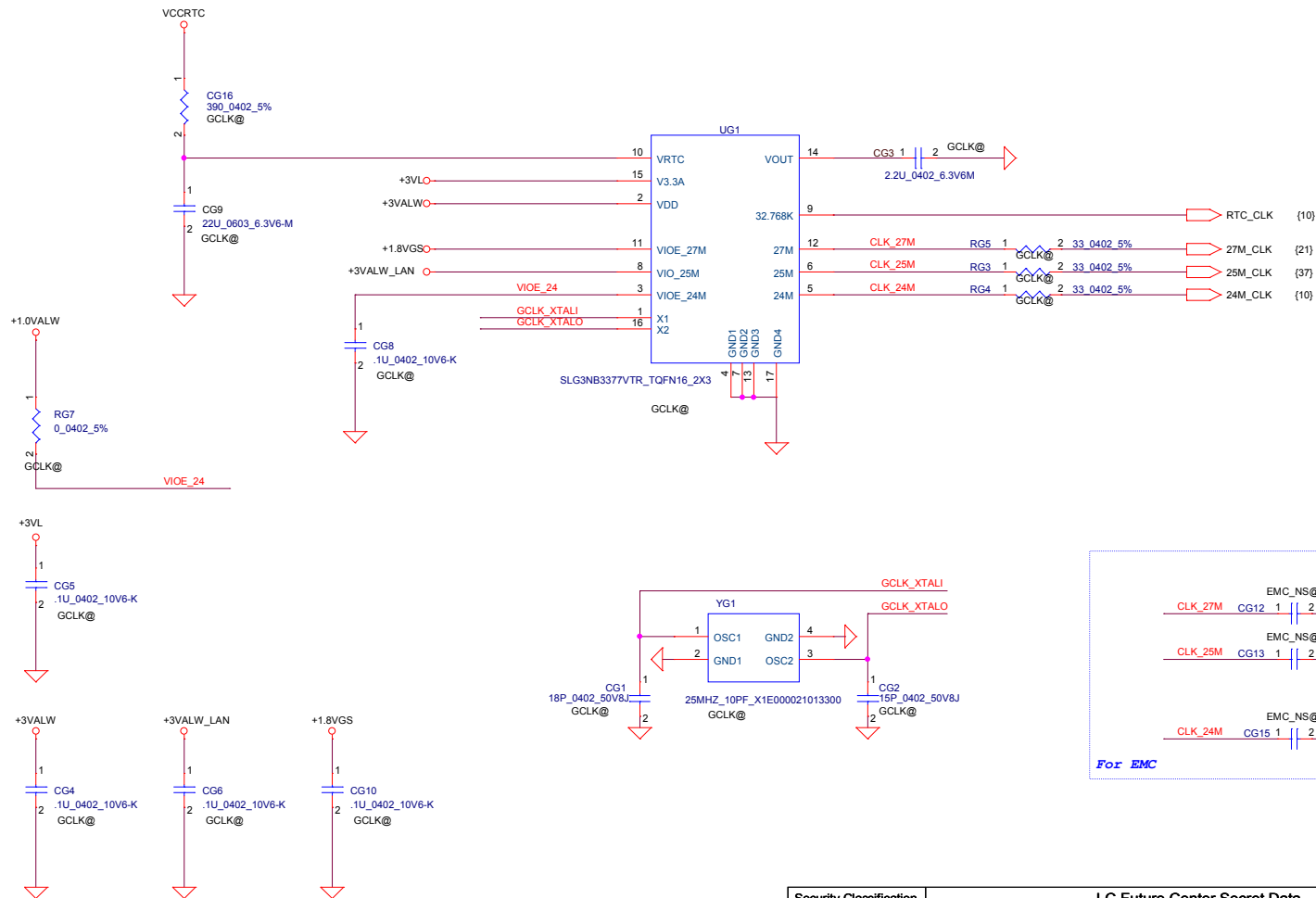


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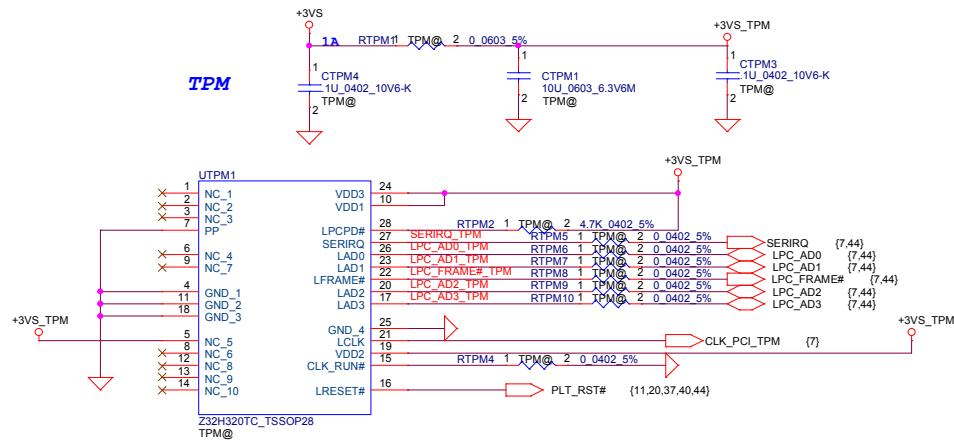



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Date:										Monday, August 10, 2015										Sheet					29 of 60									
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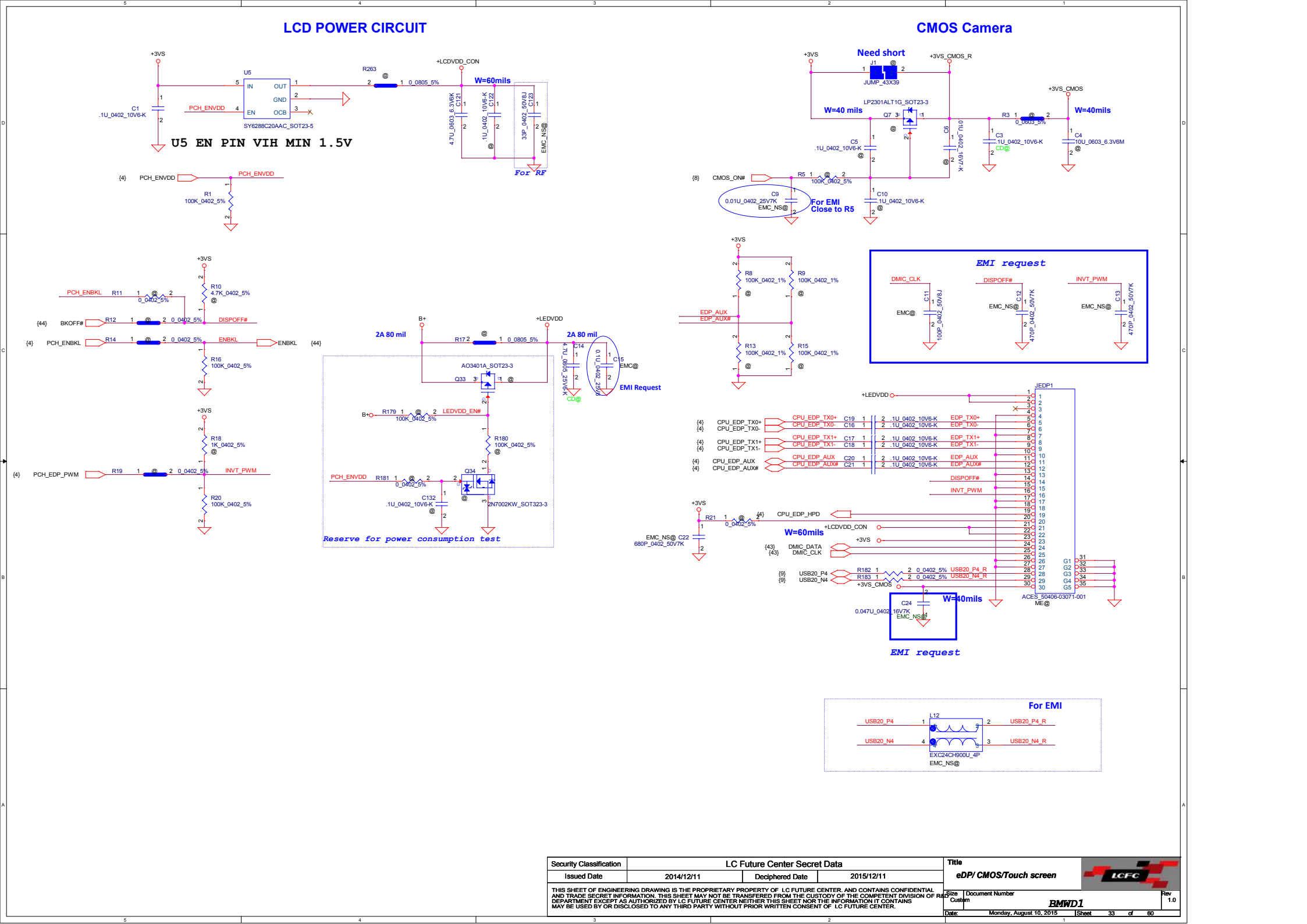
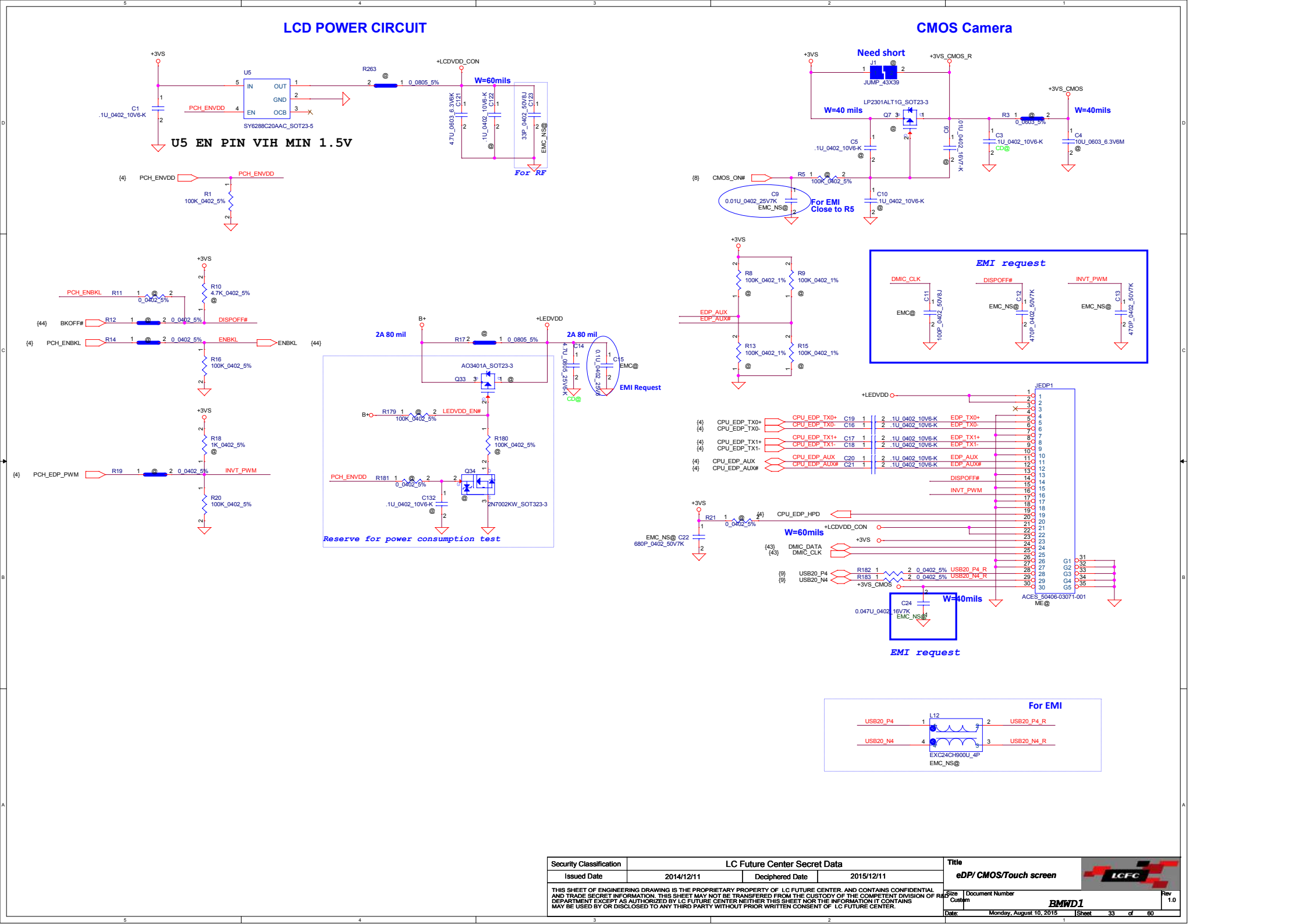
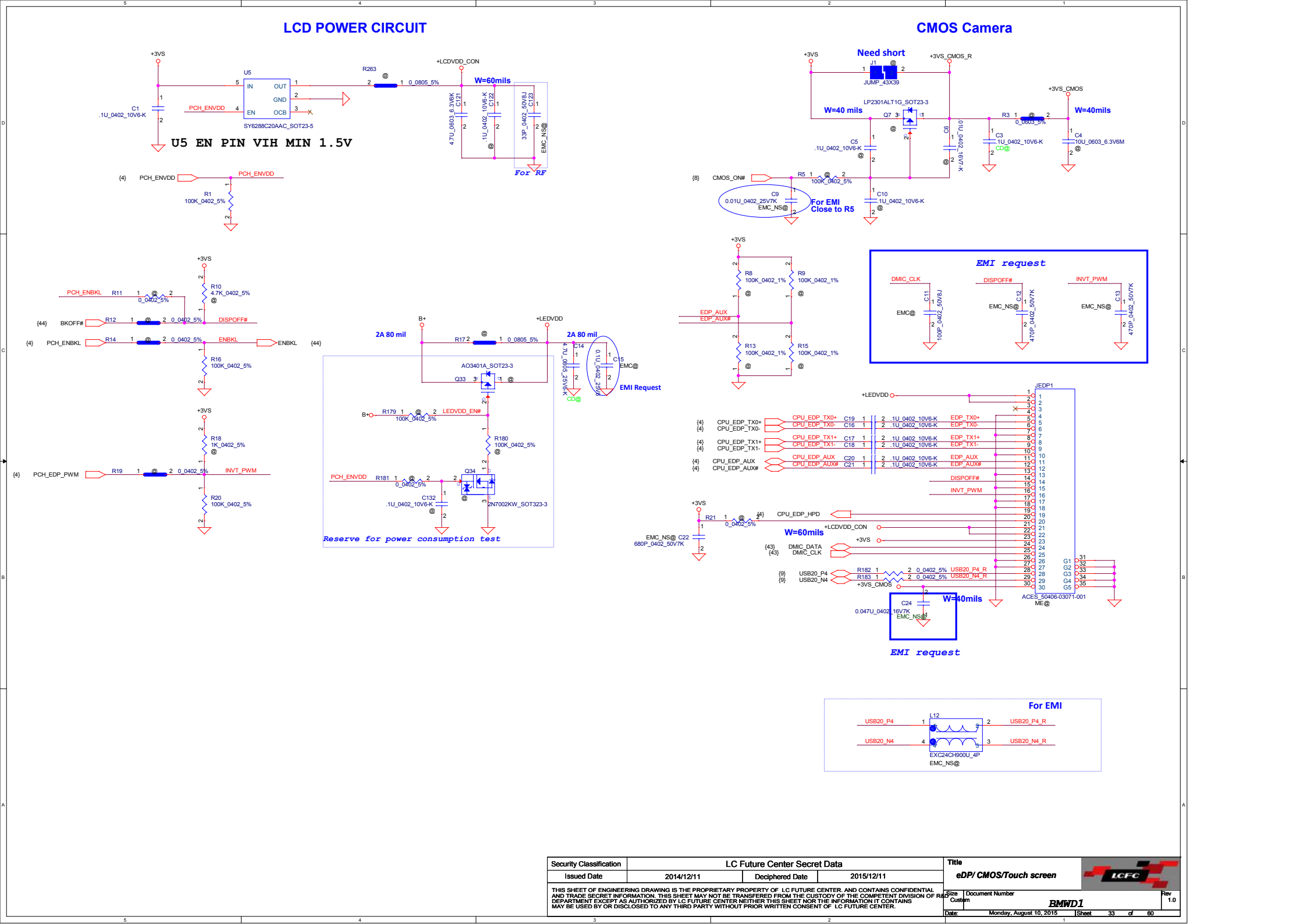
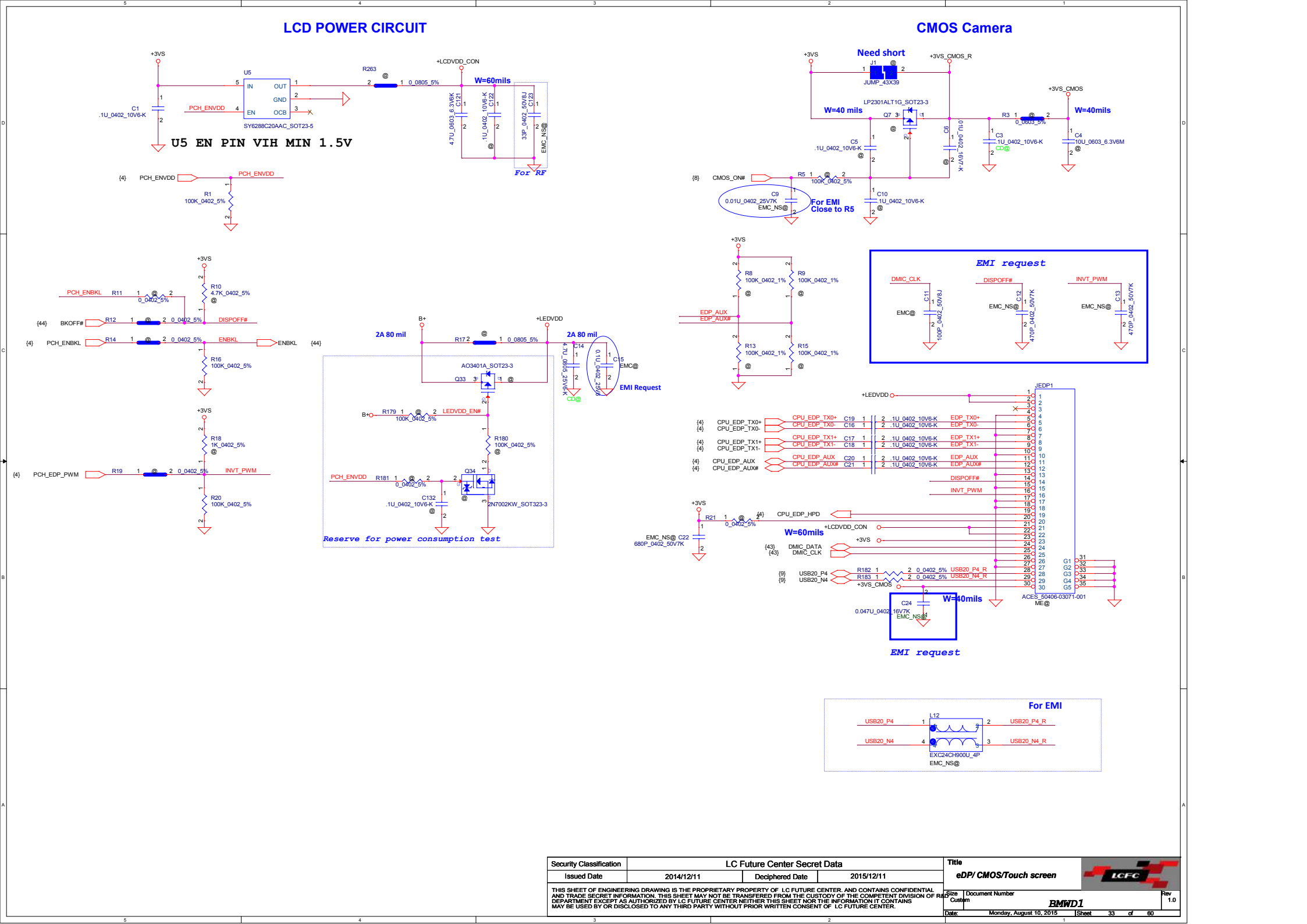
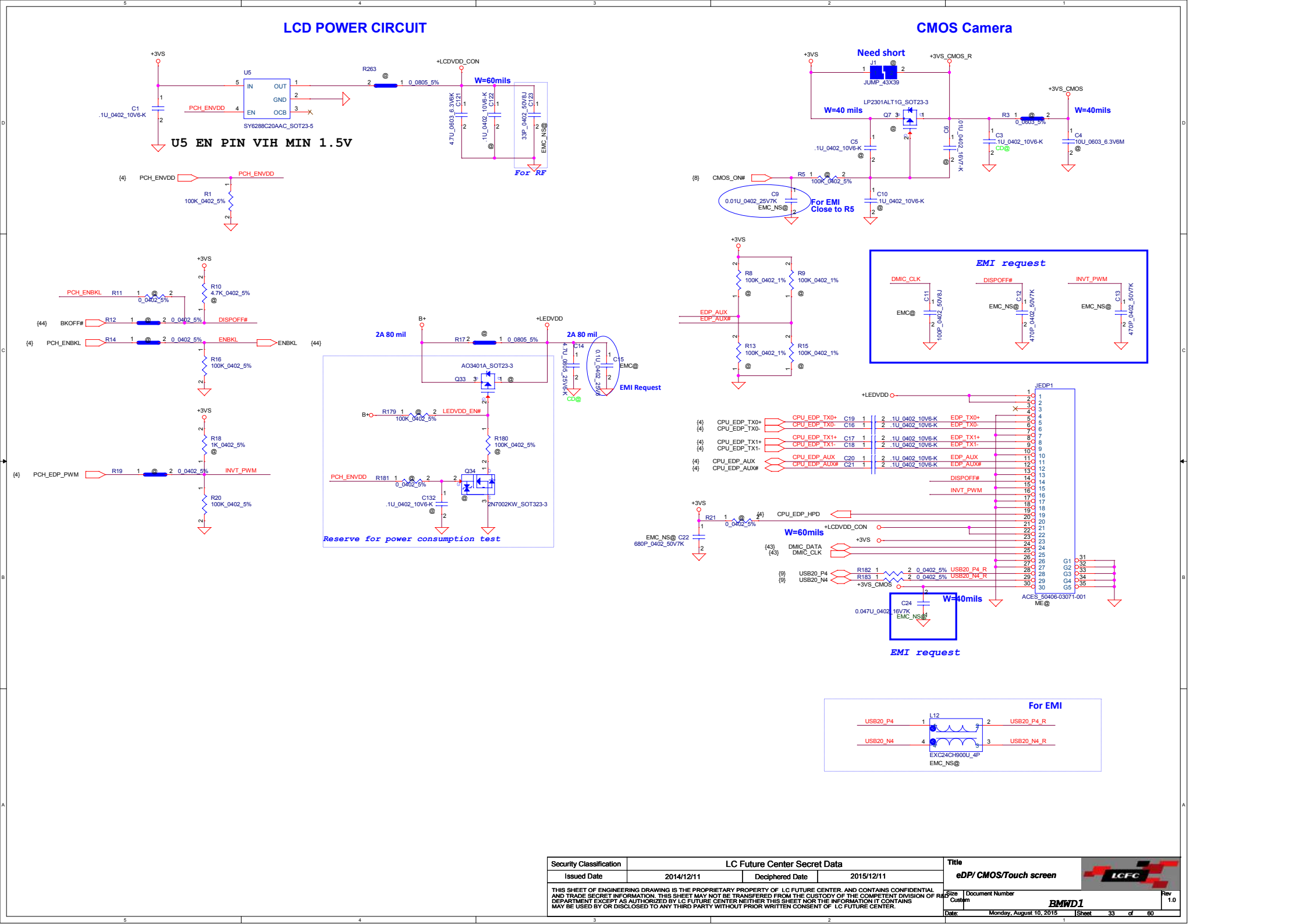


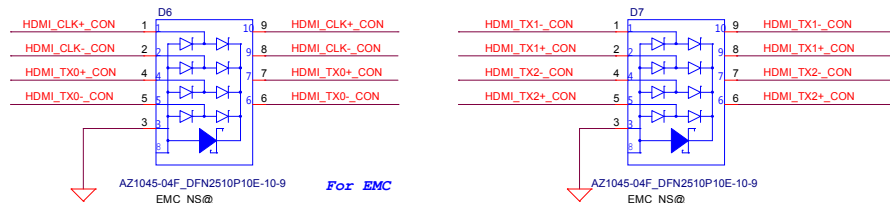
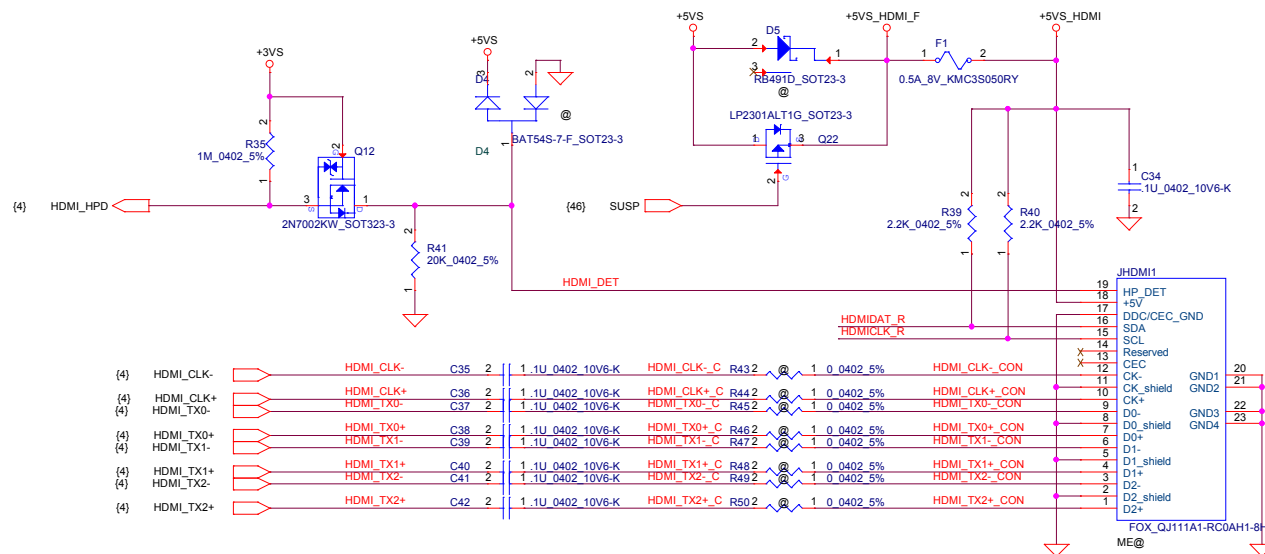
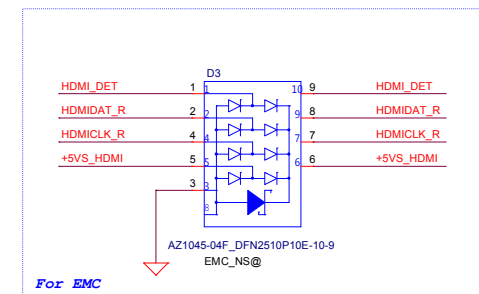
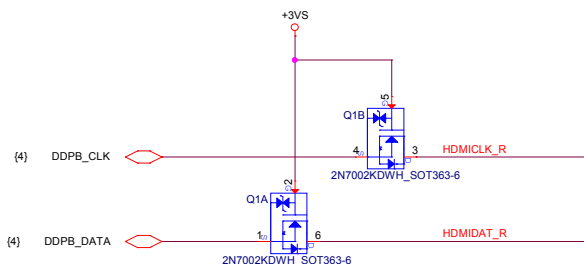


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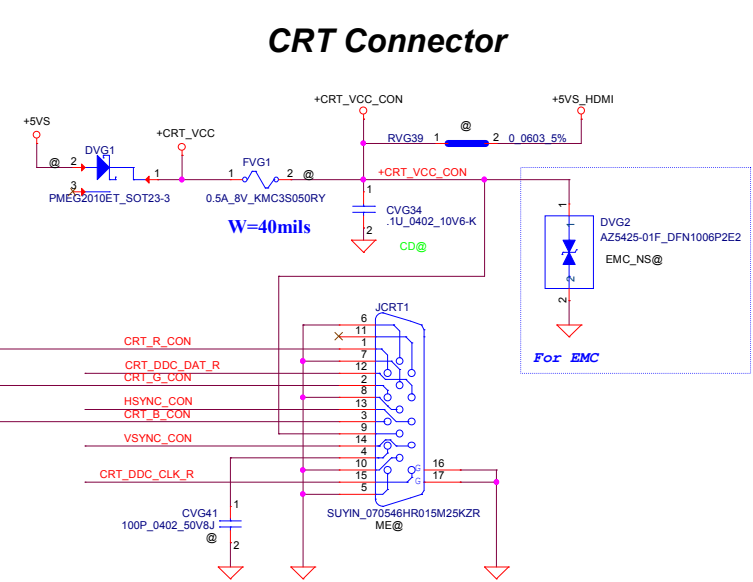
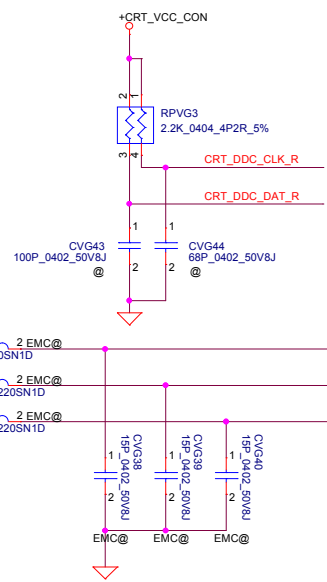
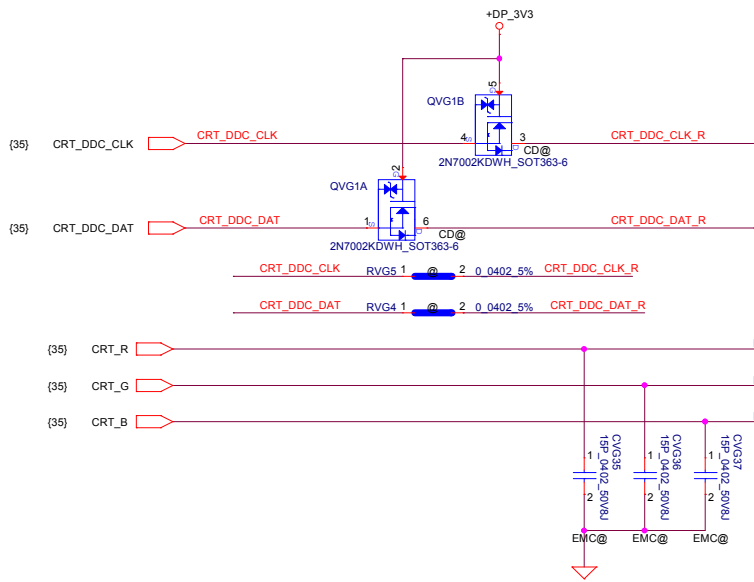
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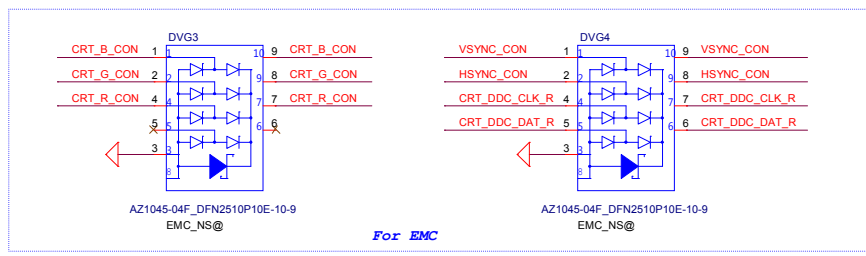


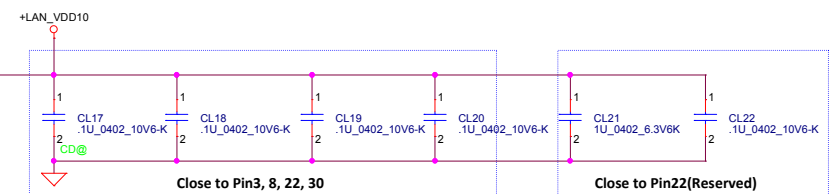
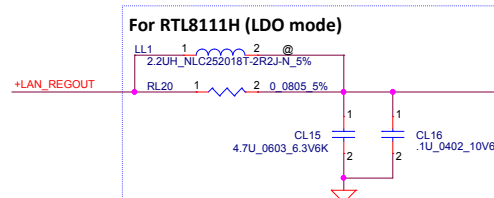
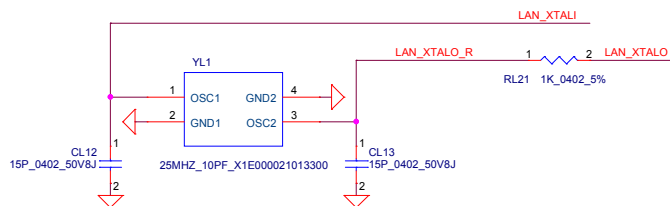
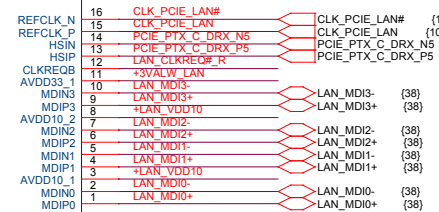
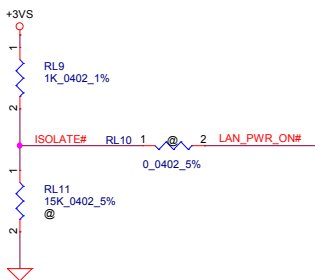
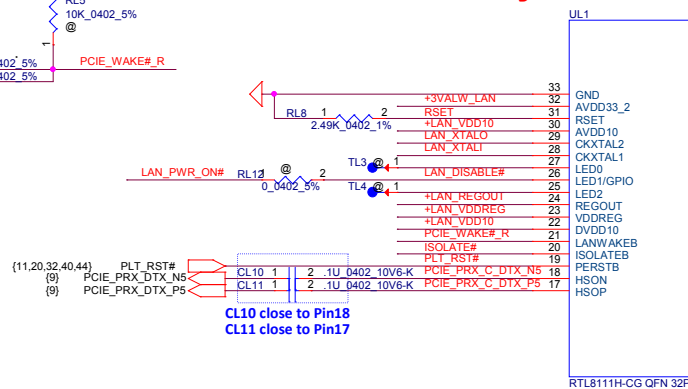
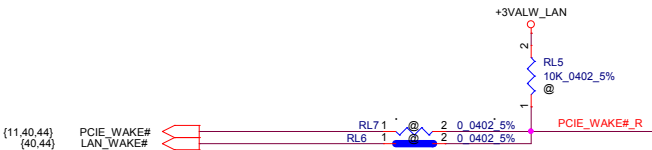
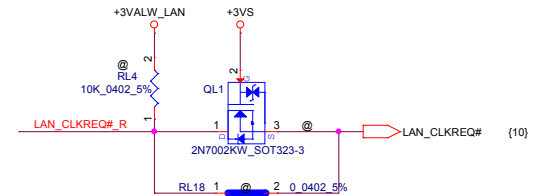
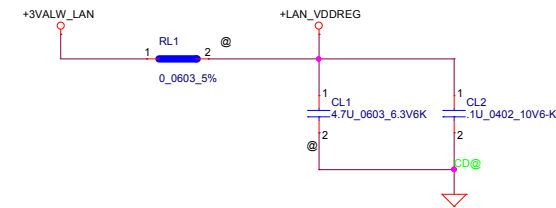
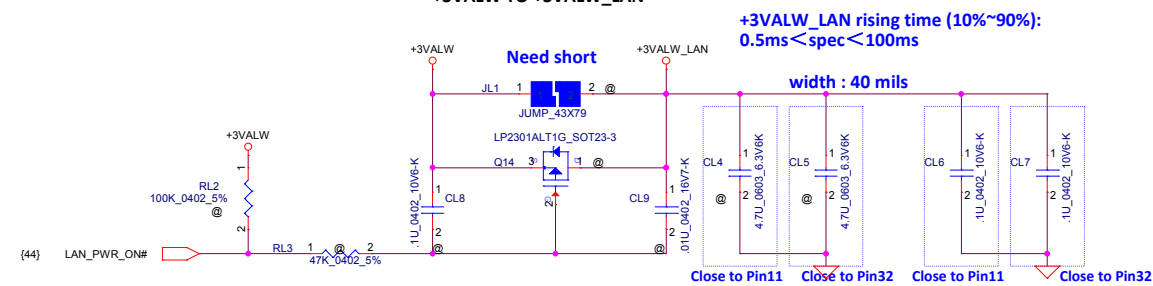
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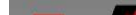
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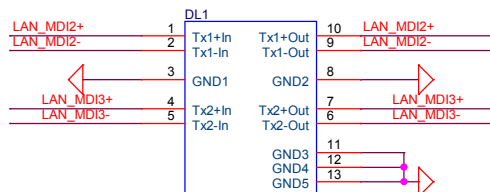


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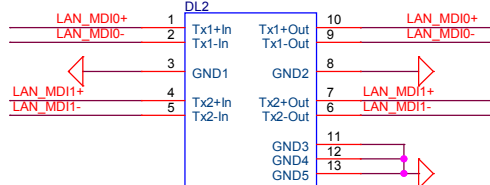
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Size Custom	Document Number	Rev 1.0	
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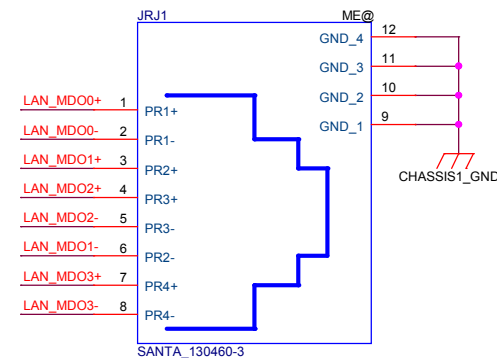
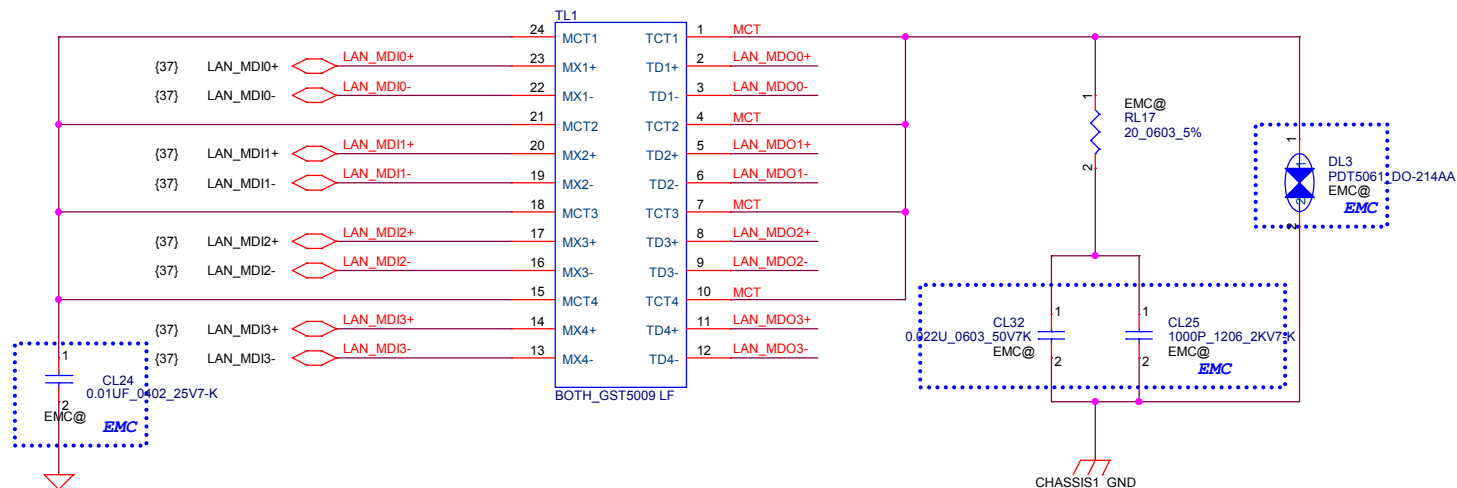
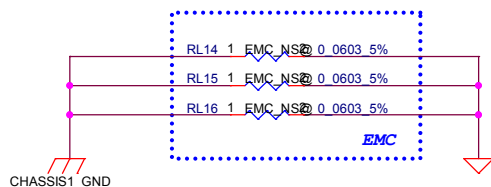
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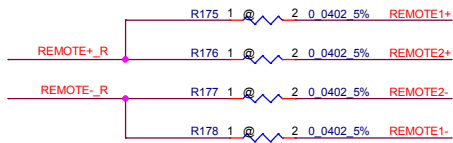
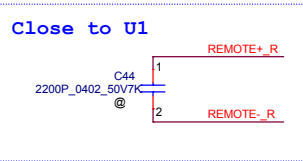
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Place Close to TL2

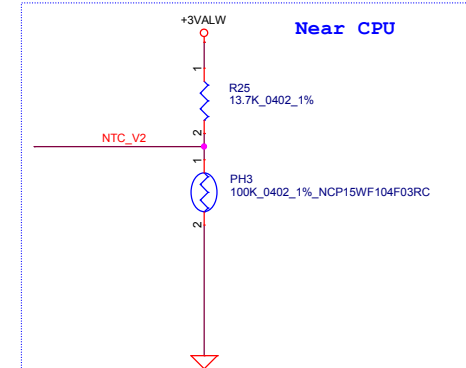
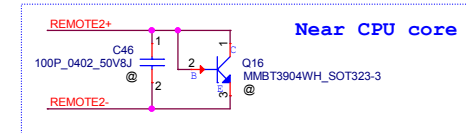
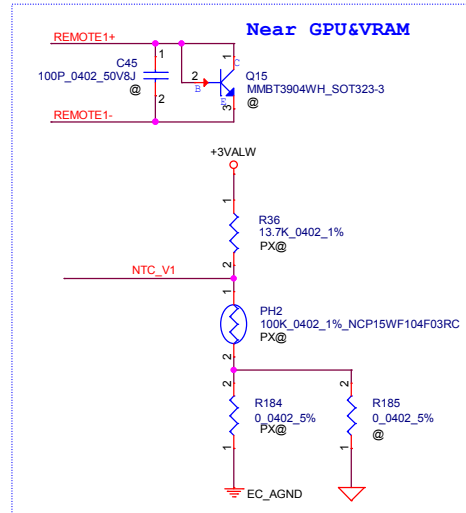
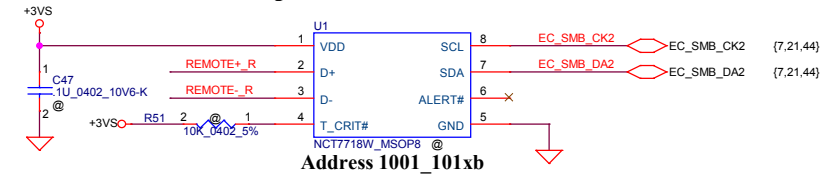


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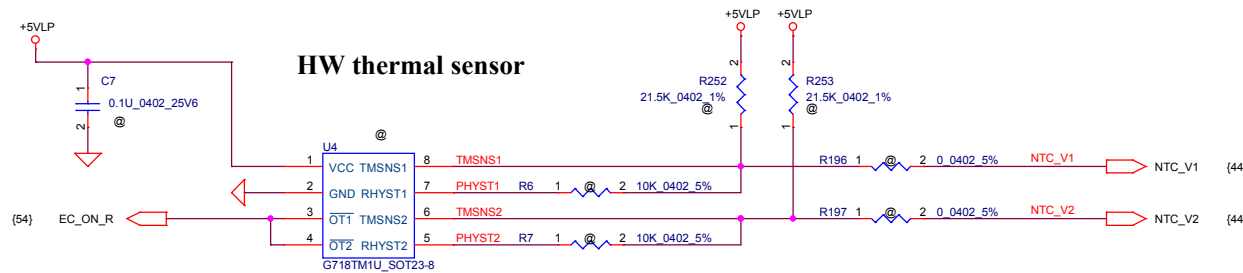
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Trace width/space:10/10 mil
Trace length:<8"

SMSC thermal sensor placed near DIMM



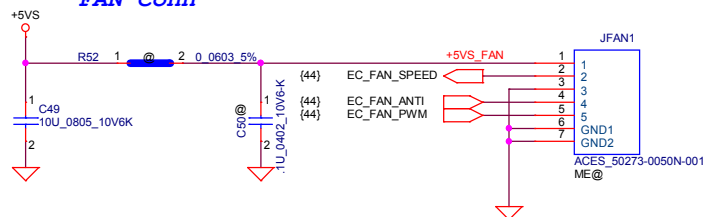
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HW thermal sensor

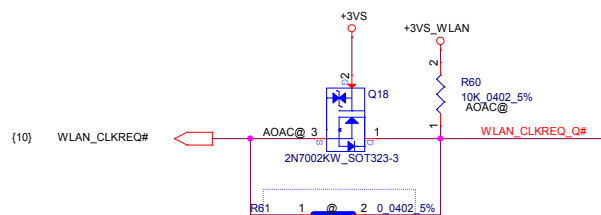
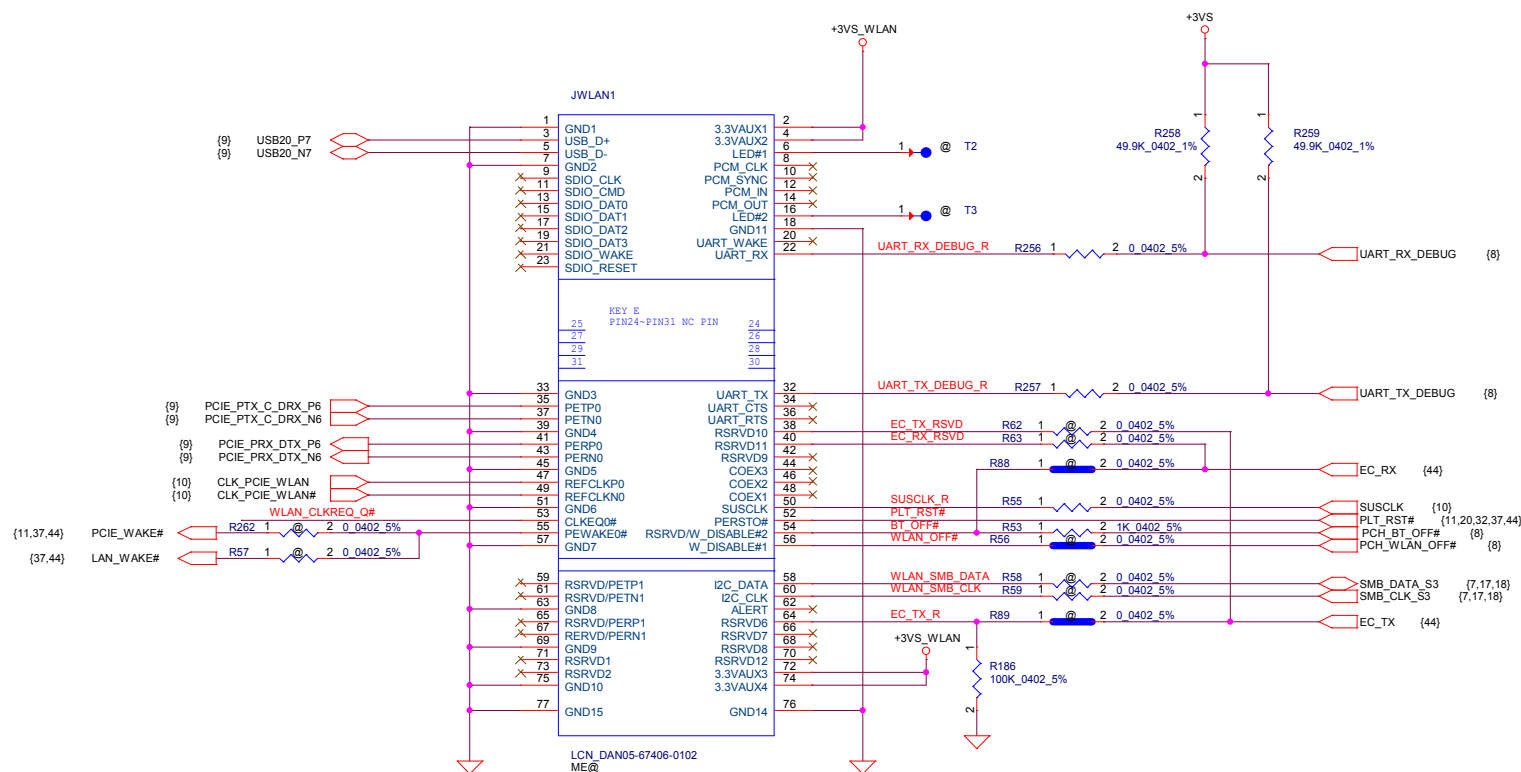


over temperature threshold:
 $RSET=3*RTMH$
92+/-30C
Hysteresis temperature threshold.
 $RHYST=(RSET*RTML)/(3*RTML-RSET)$
56+/-30C

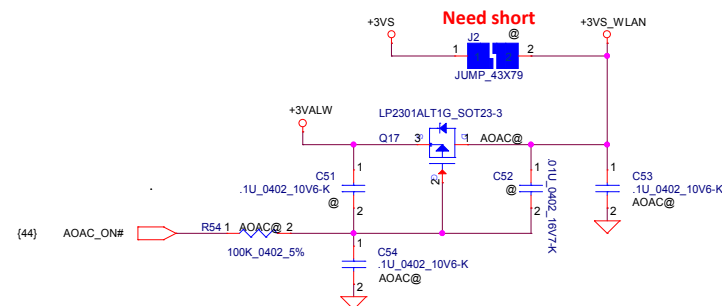
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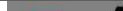


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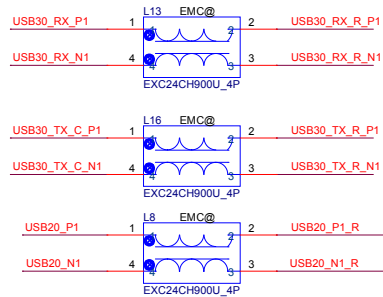
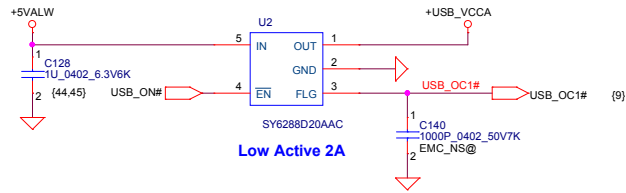


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If support AOAC, NC R61;
if not support AOAC, stuff R61.
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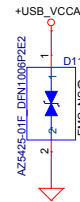
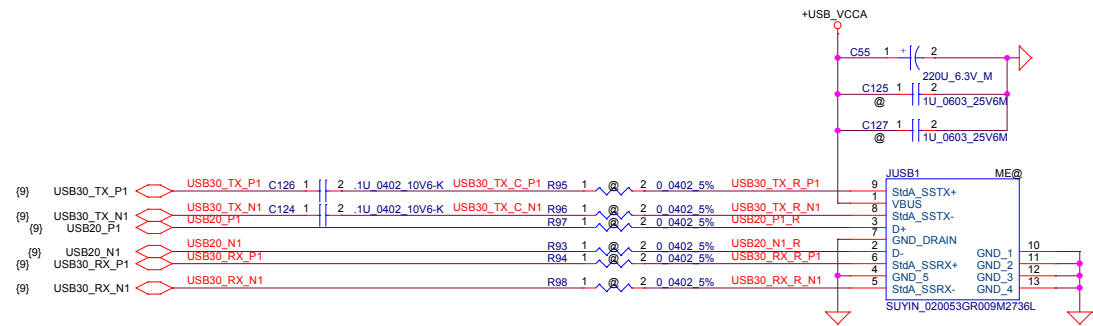


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				Date	Monday, August 10, 2015	Sheet 40 of 60 Rev 1.0

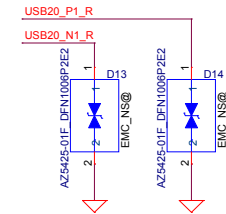
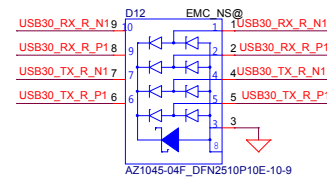
LEFT SIDE USB3.0 PORT x1




EMC

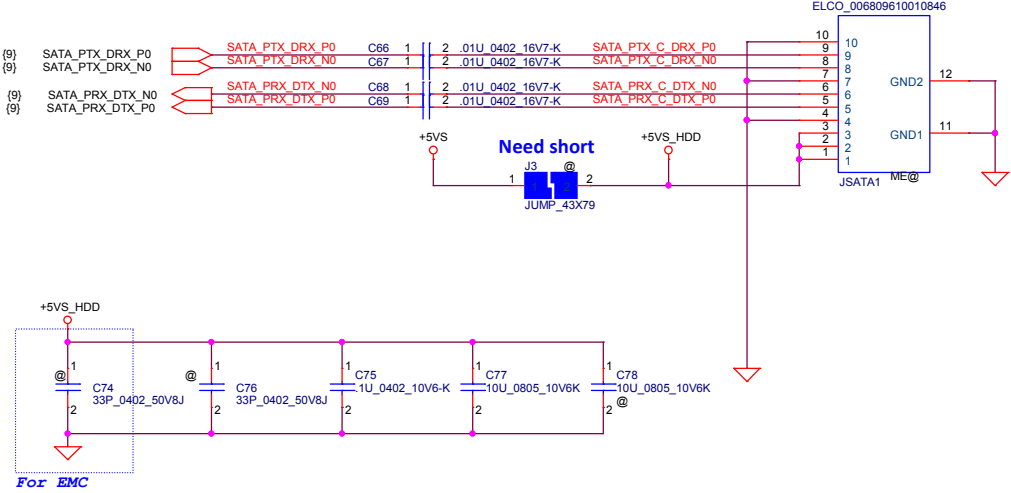


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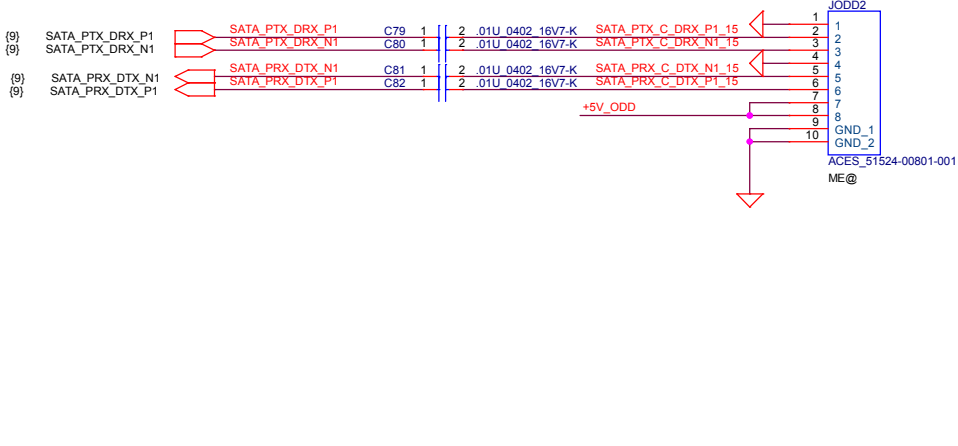



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						Date:	Monday, August 10, 2015	Sheet	41 of 60

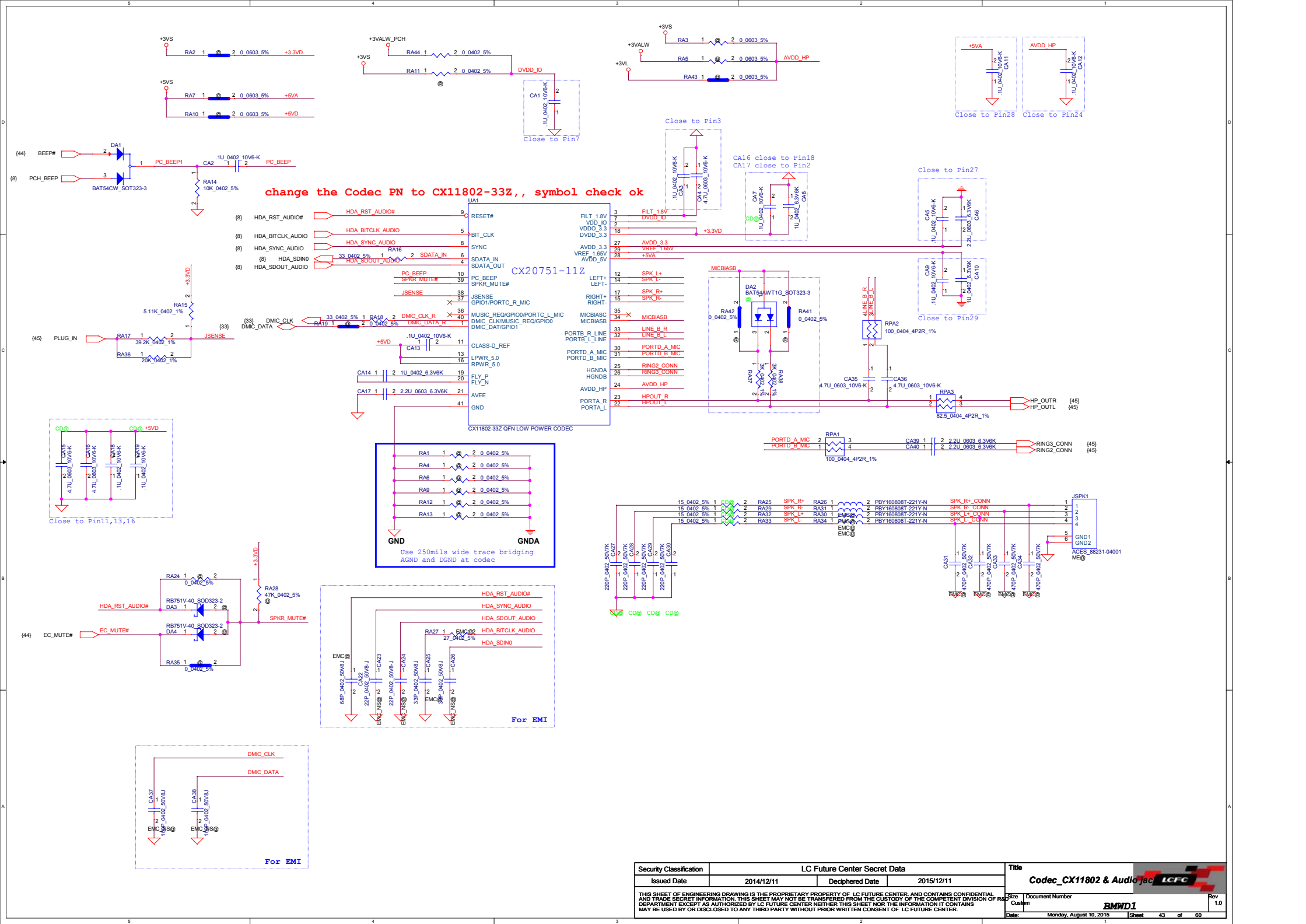
SATA HDD Conn.

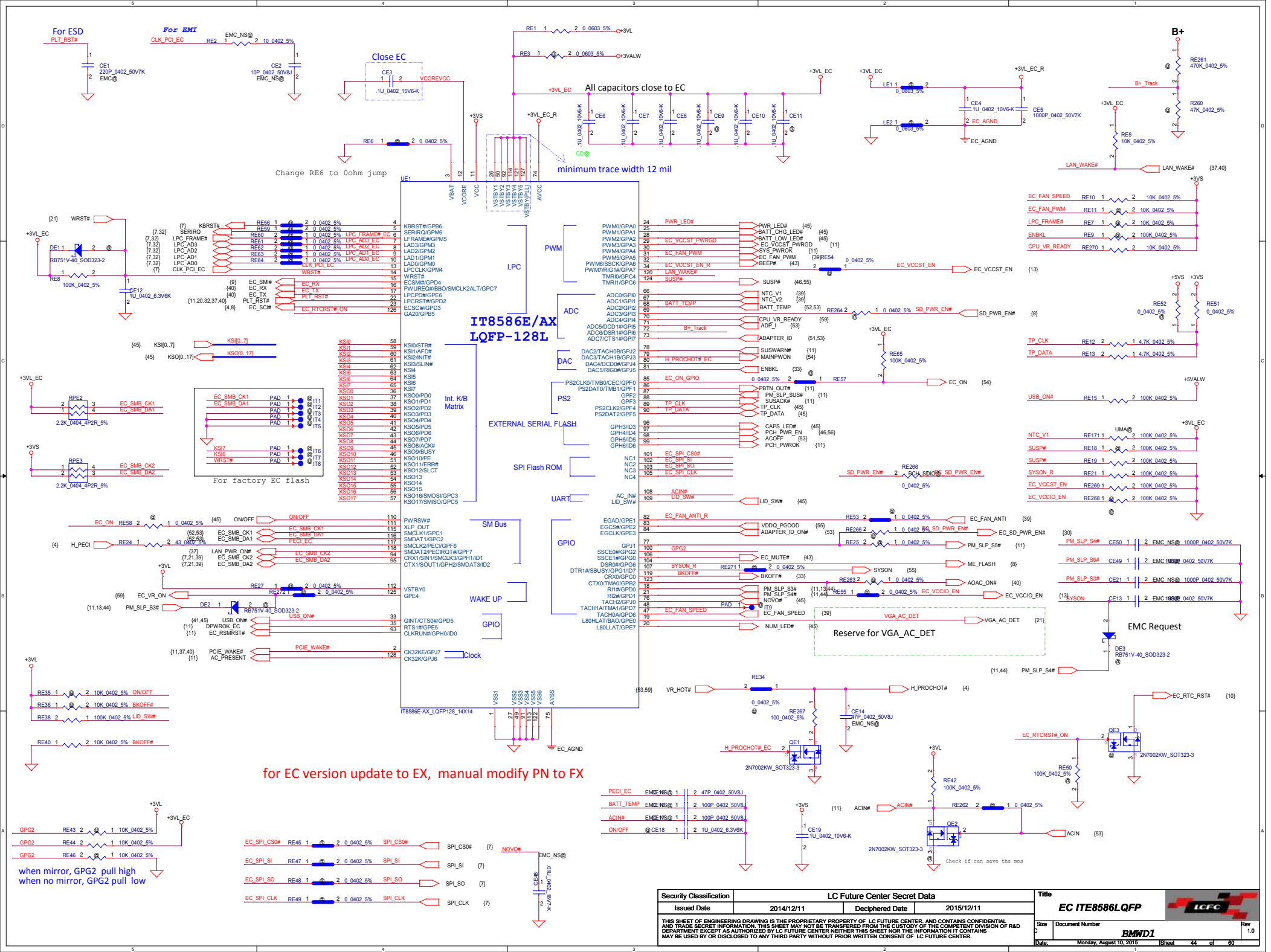


SATA ODD FFC Conn



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Custom						1.0					
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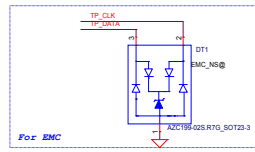
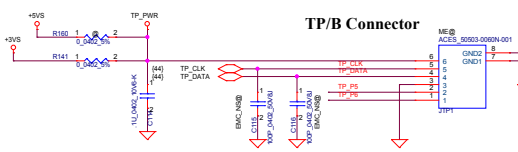
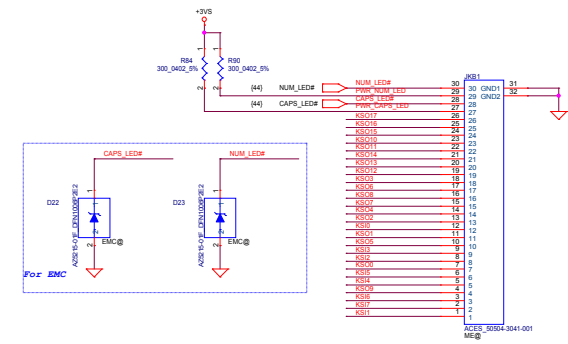
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K/B Connector

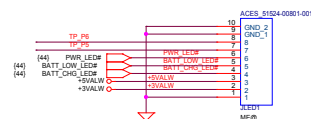
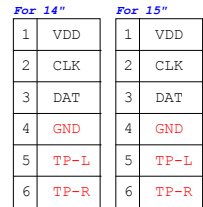
Pinout diagram for the K/B Connector:

- Top Row:
 - KSIO[0..7] (Blue) connected to KSIO[0..7]
 - KSIO[0..17] (Red) connected to KSIO[0..17]
- Bottom Row:
 - PWIR_CAPS_LED C113 (Blue) connected to EMCB[0..7]
 - PWIR_NUM_LED C114 (Red) connected to EMCB[0..7]
 - CAPS_LED C117 (Blue) connected to EMCB[0..7]
 - NUM_LED C118 (Red) connected to EMCB[0..7]

The diagram also shows a 100P 0402 SMD component connected to the EMCB[0..7] pins.



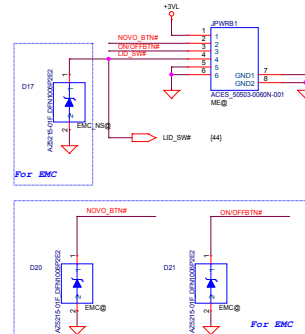
TP/B Connector



The diagram illustrates the PWR/B Connector connections for three components: D17, D20, and D21. Each component is represented by a blue box containing an AN2815-01F connector symbol and an EMC pin. The connections are as follows:

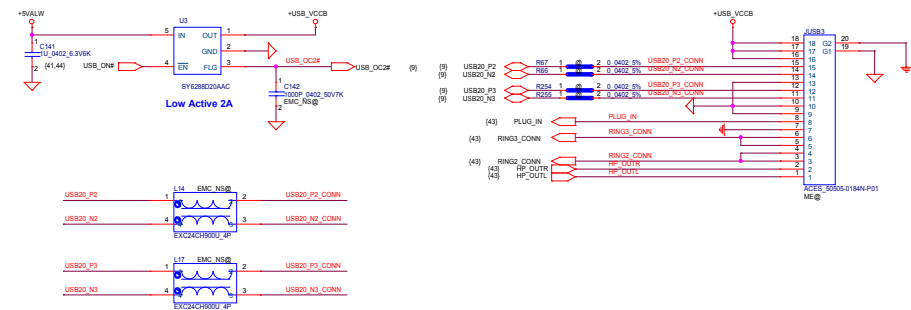
- D17:**
 - NOVO_ST#F (red) connects to +5V.
 - NOVO_F#F#F# (red) connects to 0V.
 - LED_SW# (red) connects to PWRB1.
 - EMC (blue) connects to GND1.
 - LED_SW# (blue) connects to GND2.
- D20:**
 - NOVO_ST#F (red) connects to +5V.
 - NOVO_F#F#F# (red) connects to 0V.
 - EMC (blue) connects to GND1.
- D21:**
 - NOVO_F#F#F# (red) connects to 0V.
 - EMC (blue) connects to GND1.


Additional labels include "For EMC" and "ME" near the ground connections.

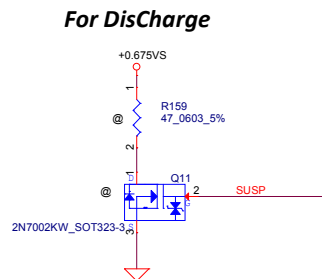
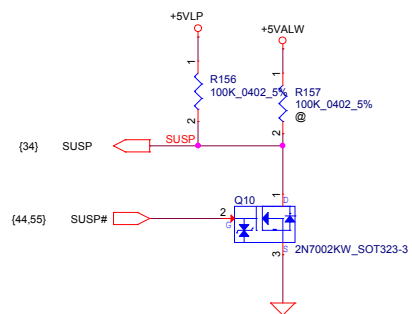
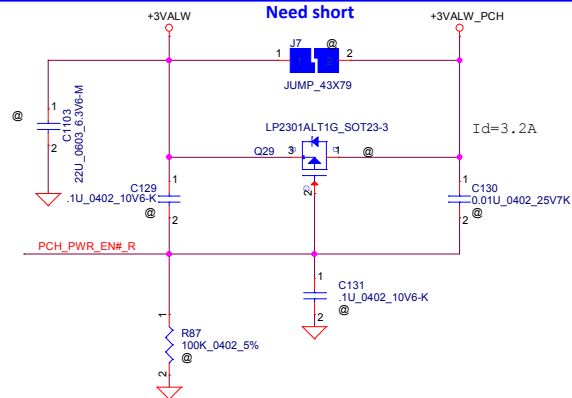
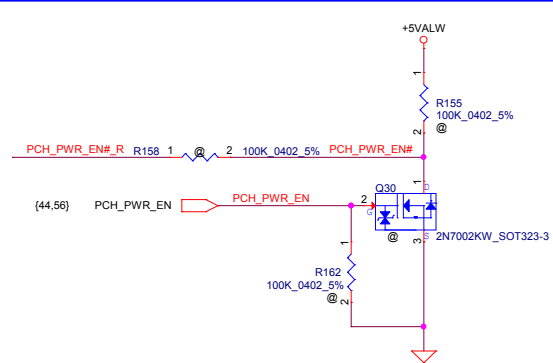
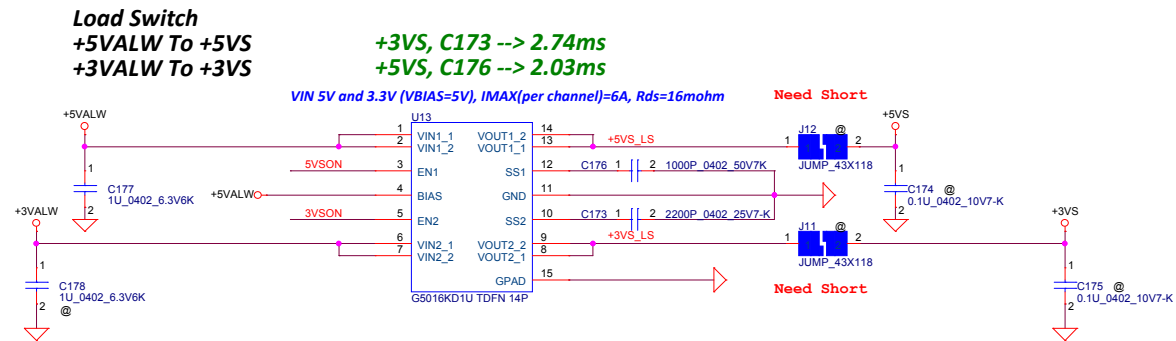


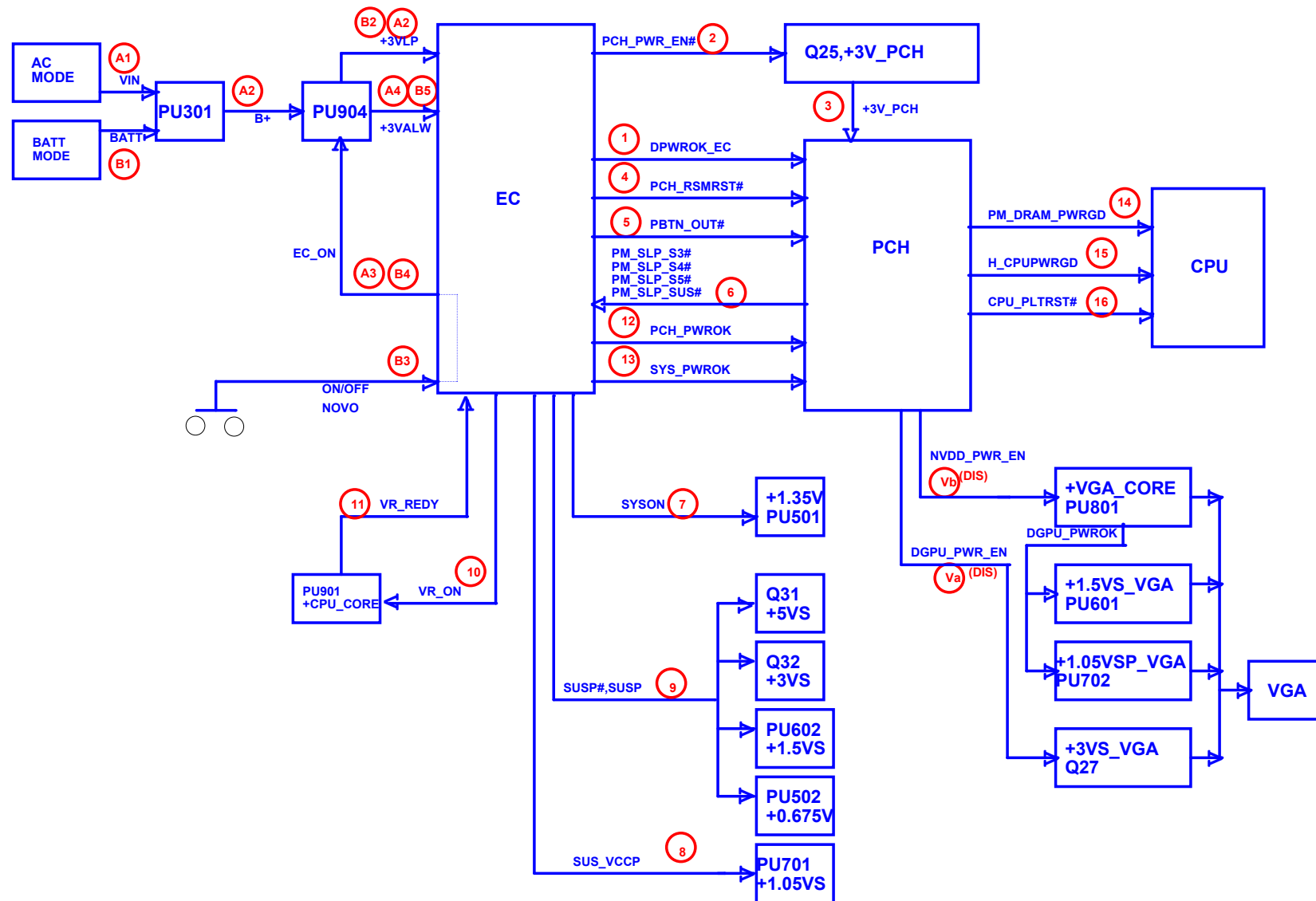
USB I/O Connector

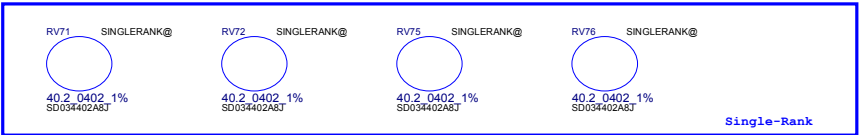
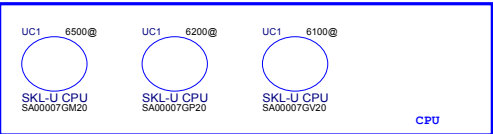
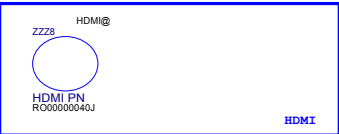
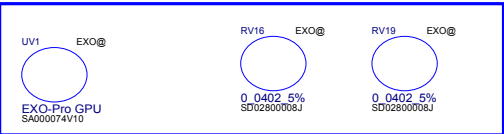
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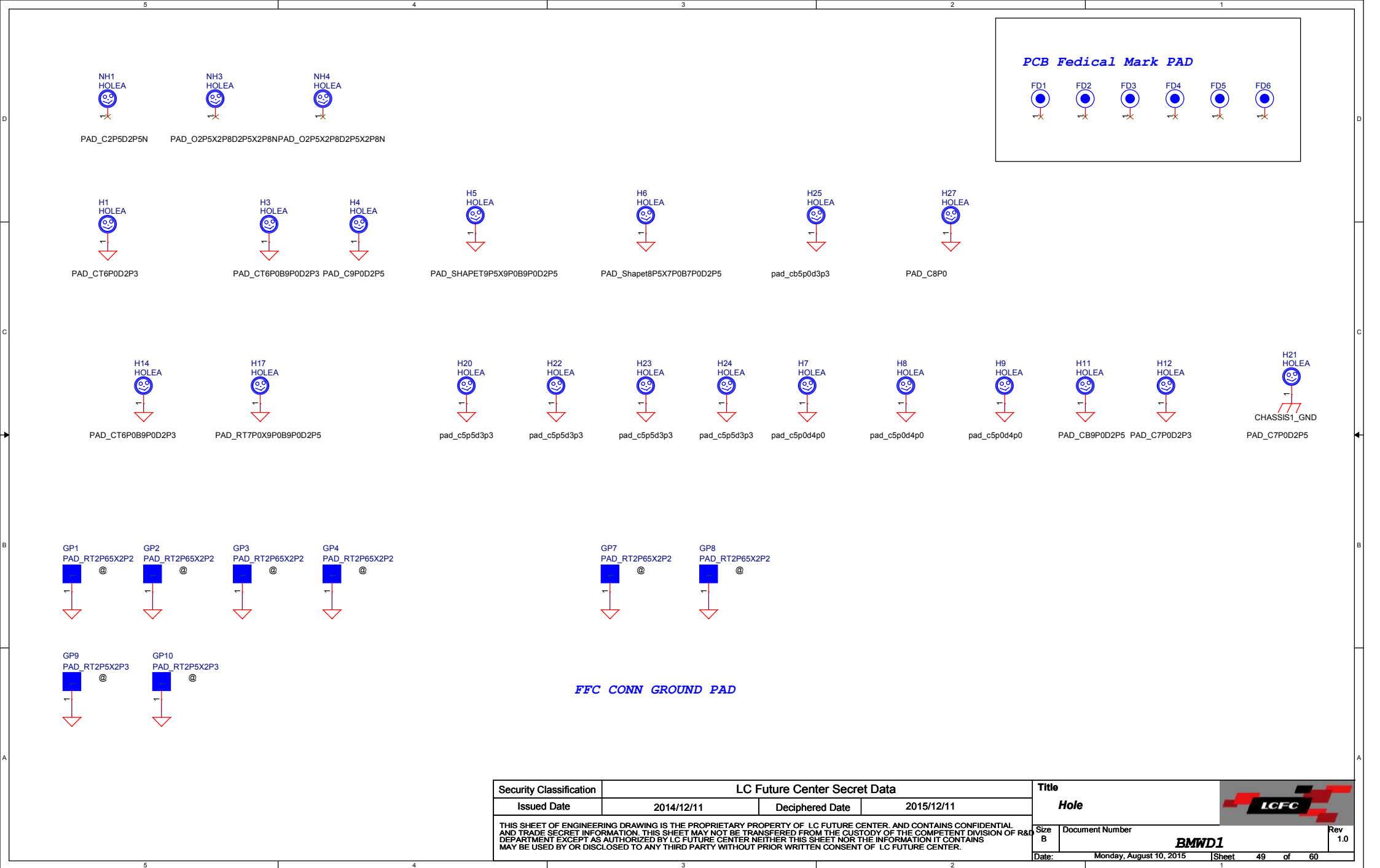



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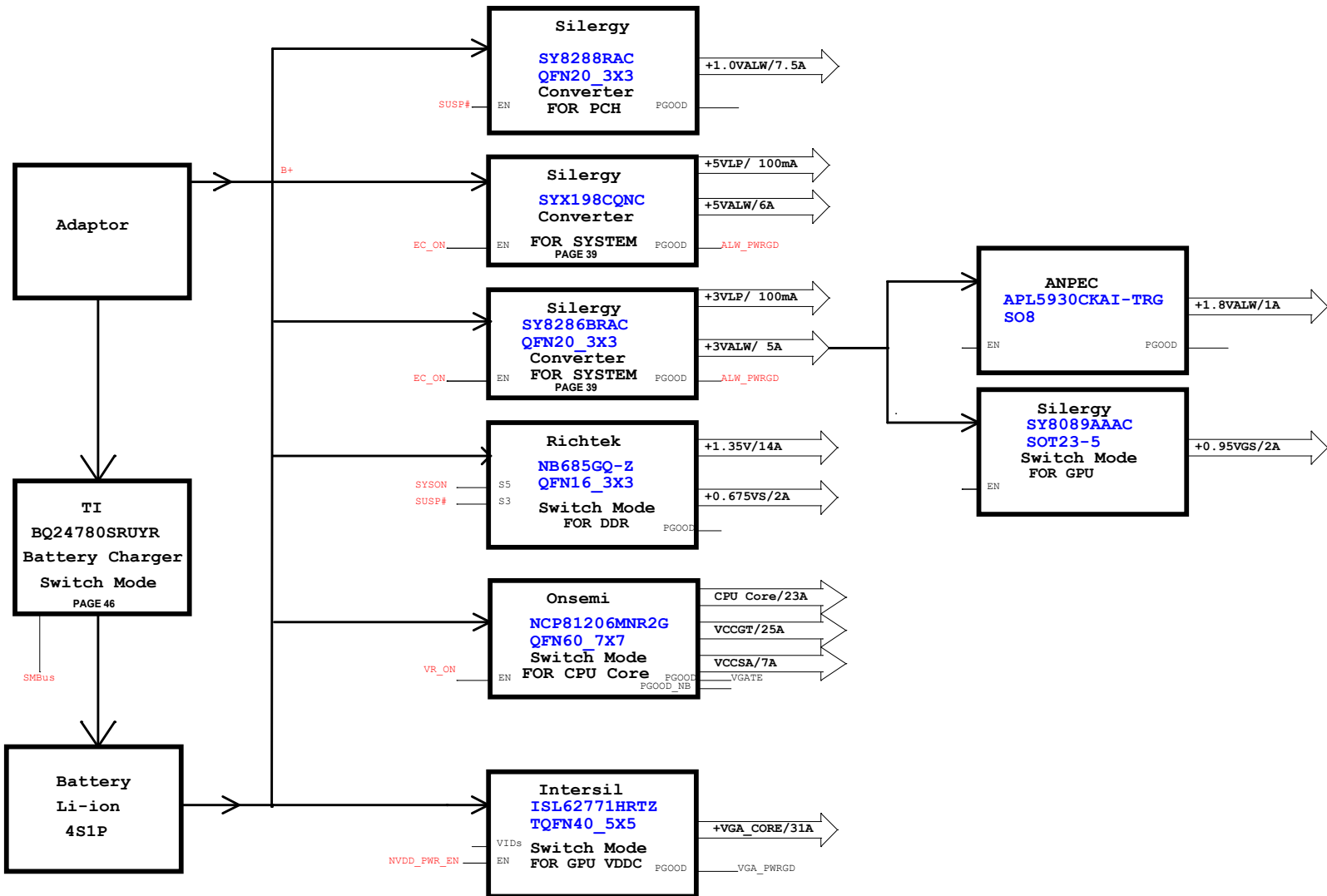


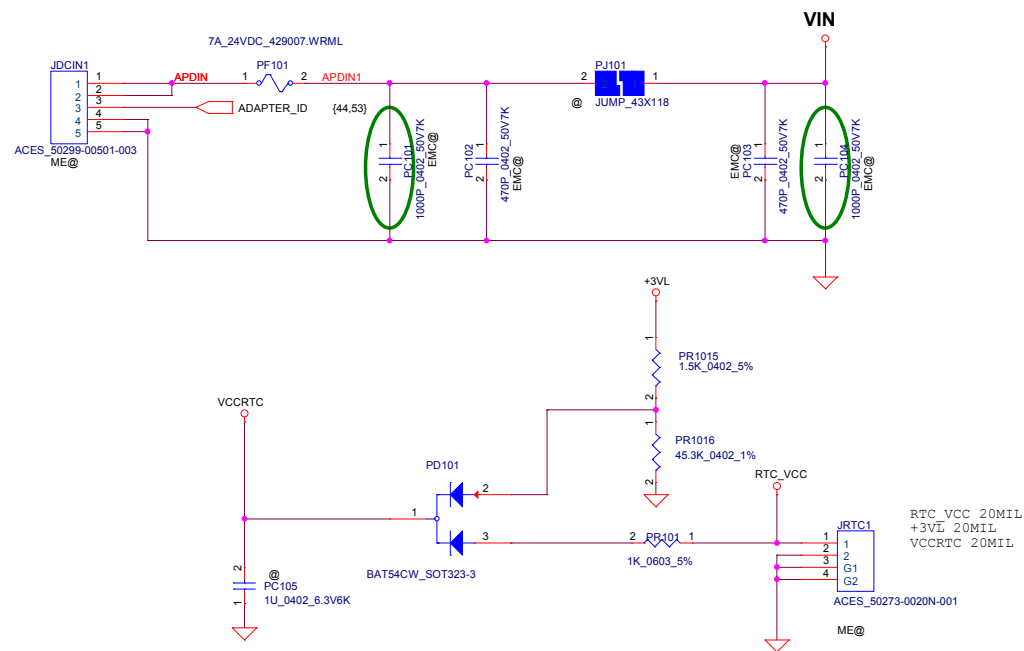





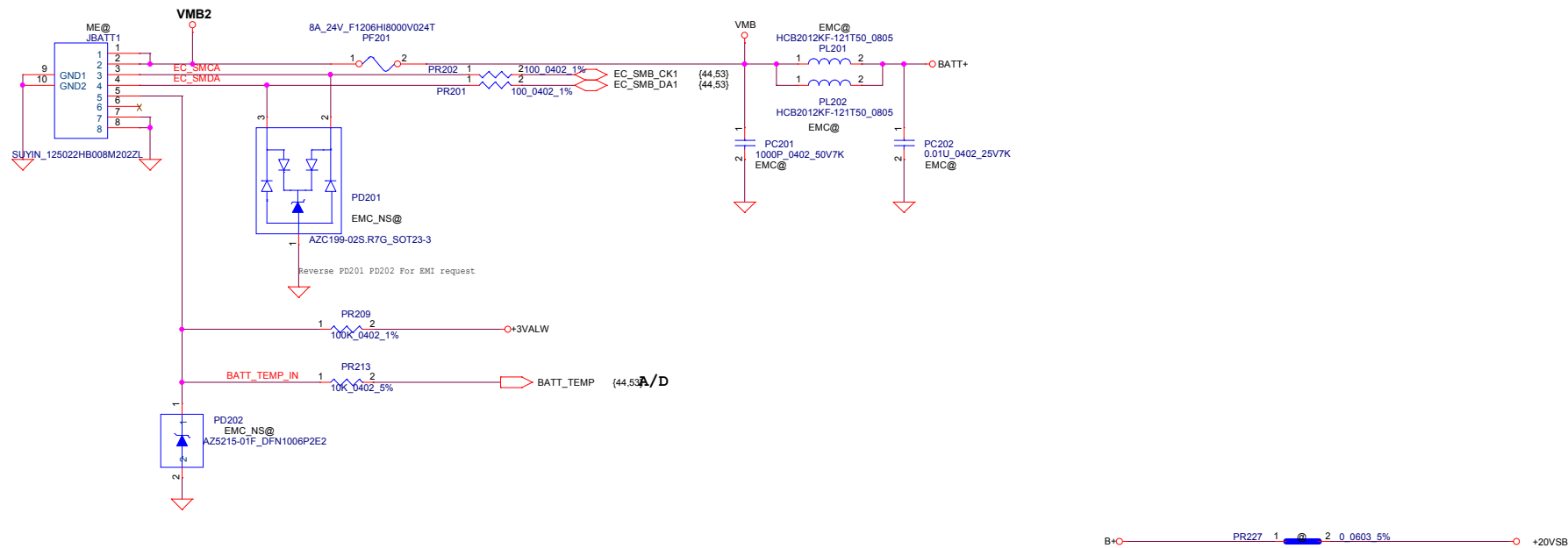
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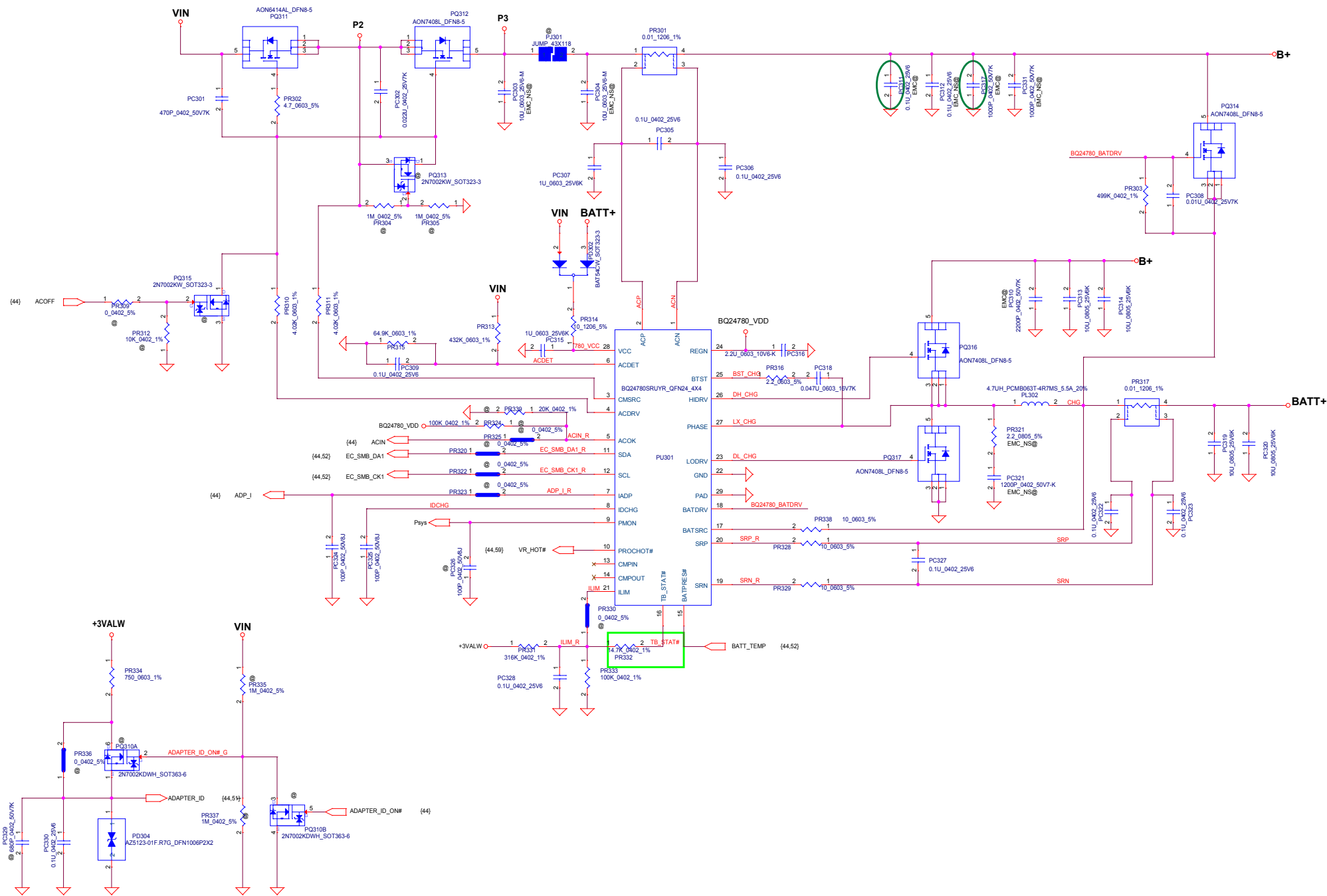
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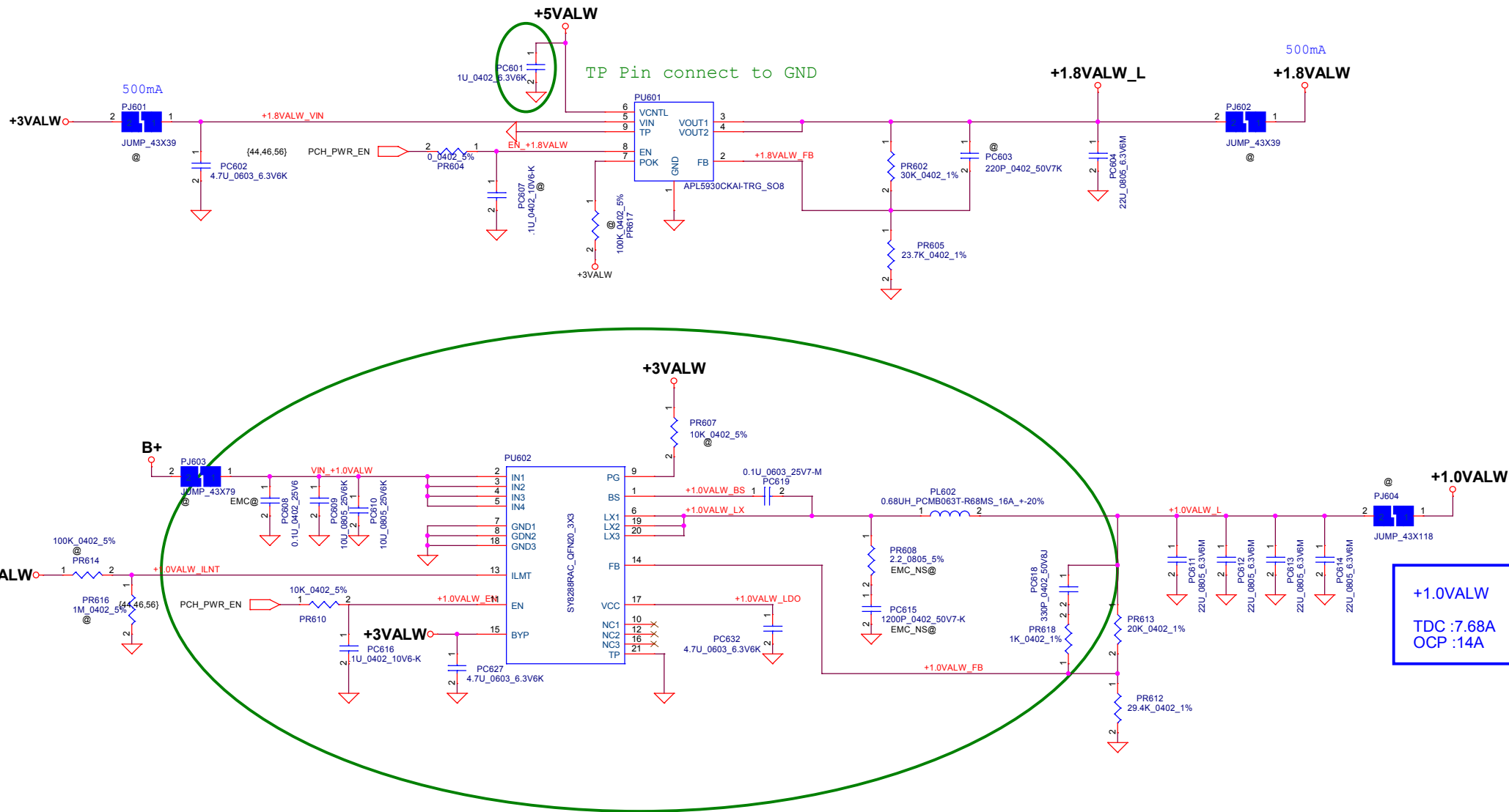


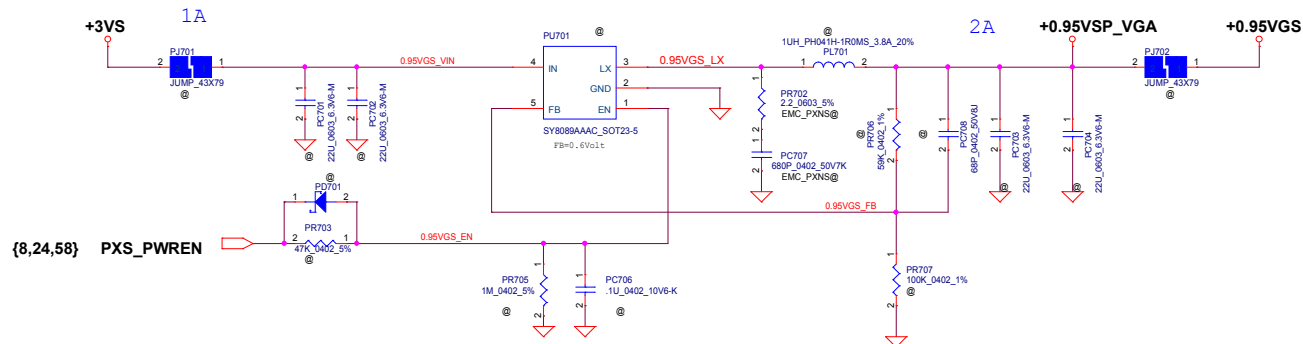


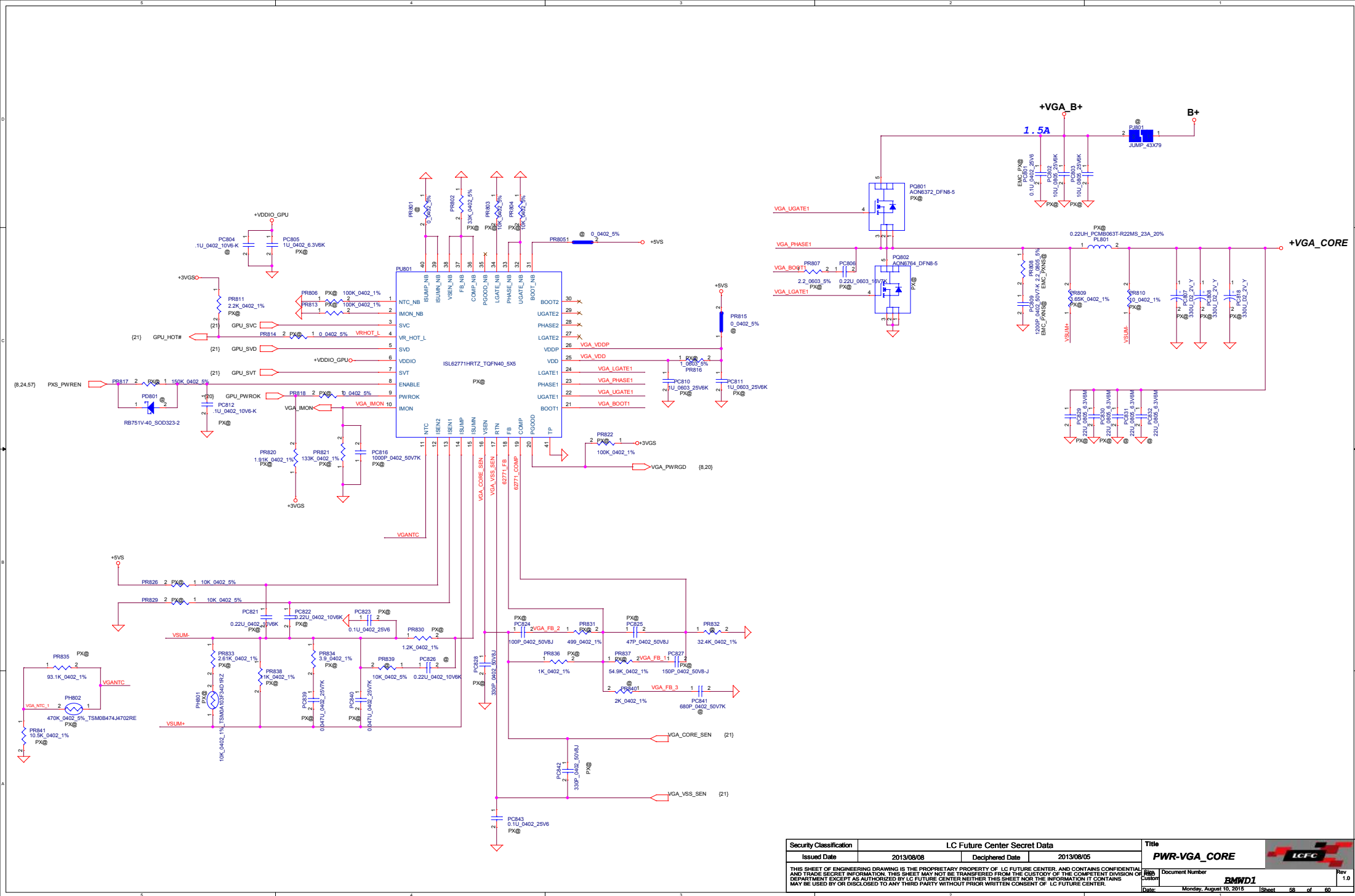
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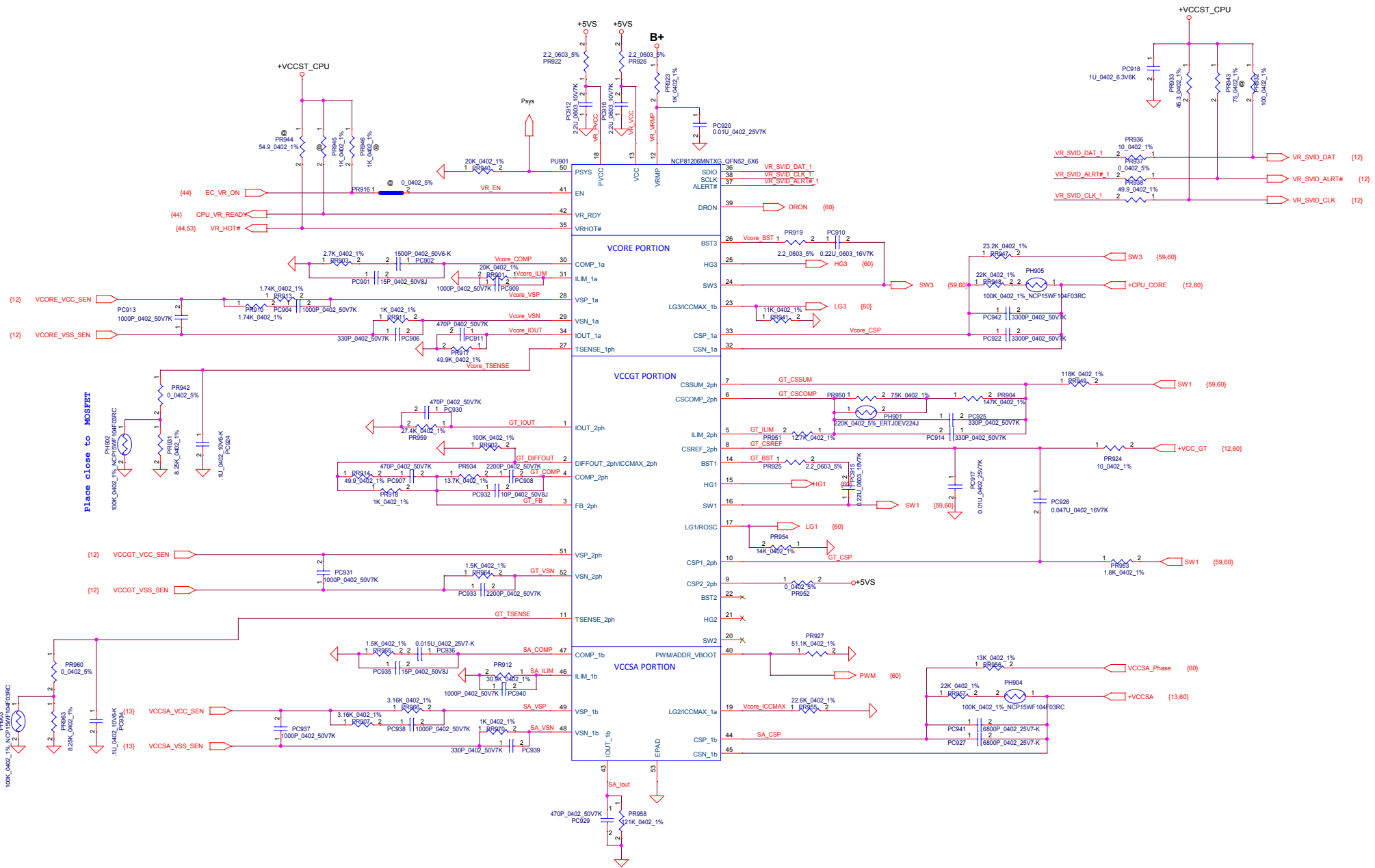













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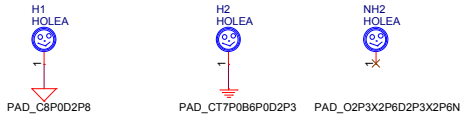
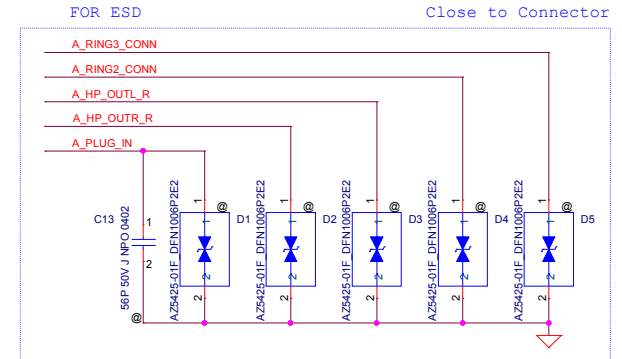
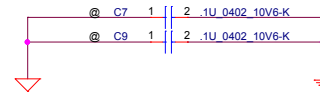
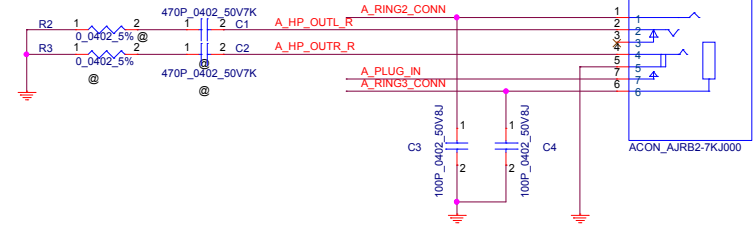
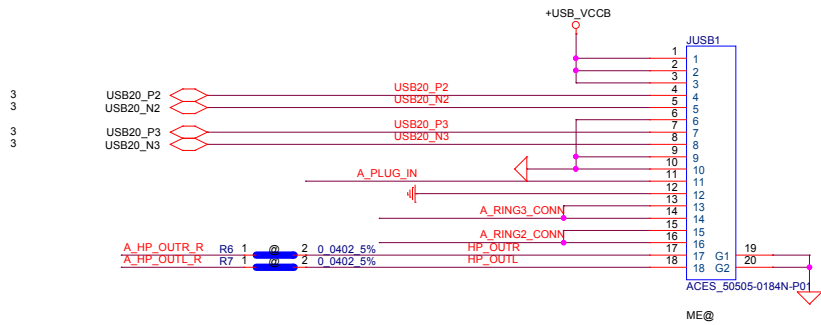
Schematics Document


USB board schematic

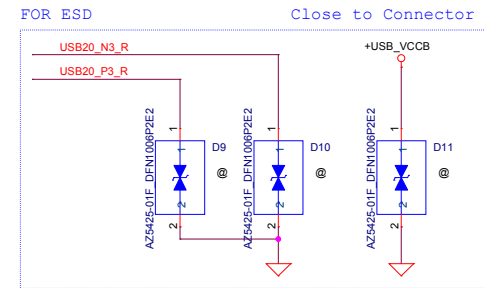
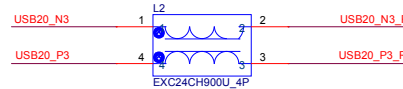
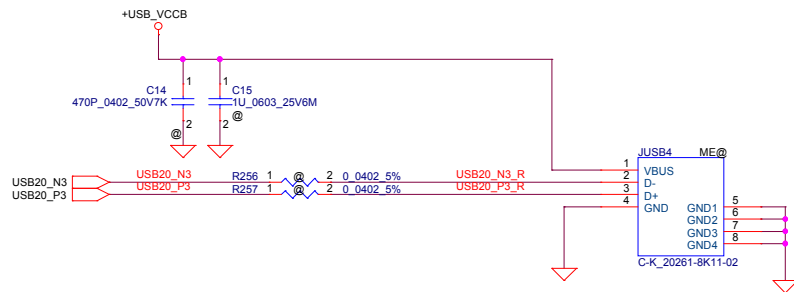
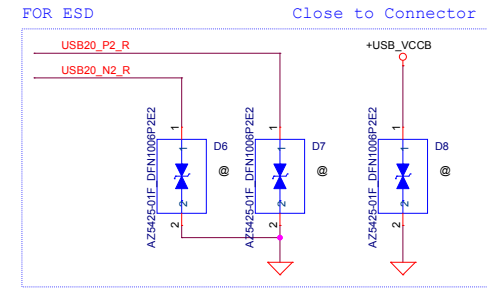
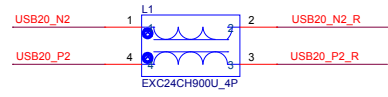
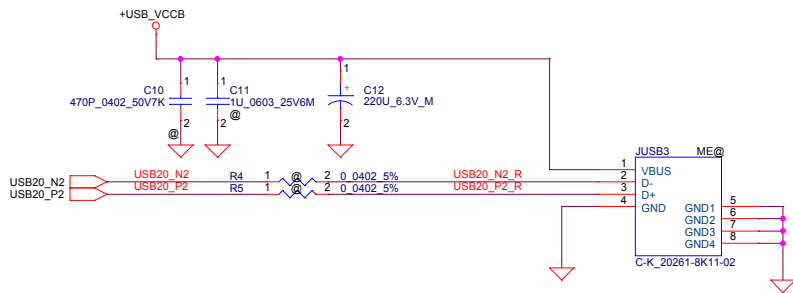
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G(Haswell)

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Schematics Document

LED board schematic

2015-08-10

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PCB PN
DA6000ZY10

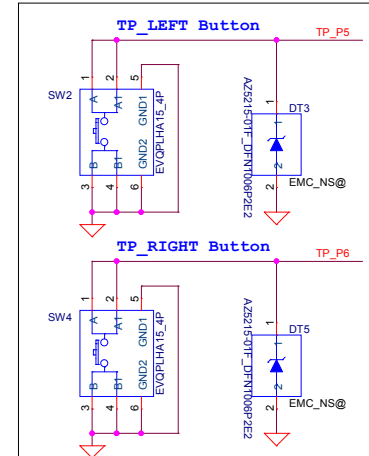
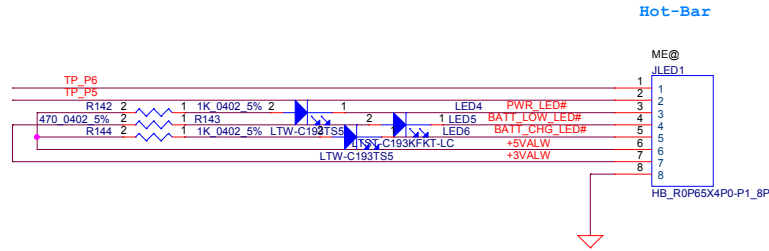
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H1 HOLEA
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NH2 HOLEA
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NH3 HOLEA
PAD_O2P8X2P5D2P8X2P5N

FD1
FD2



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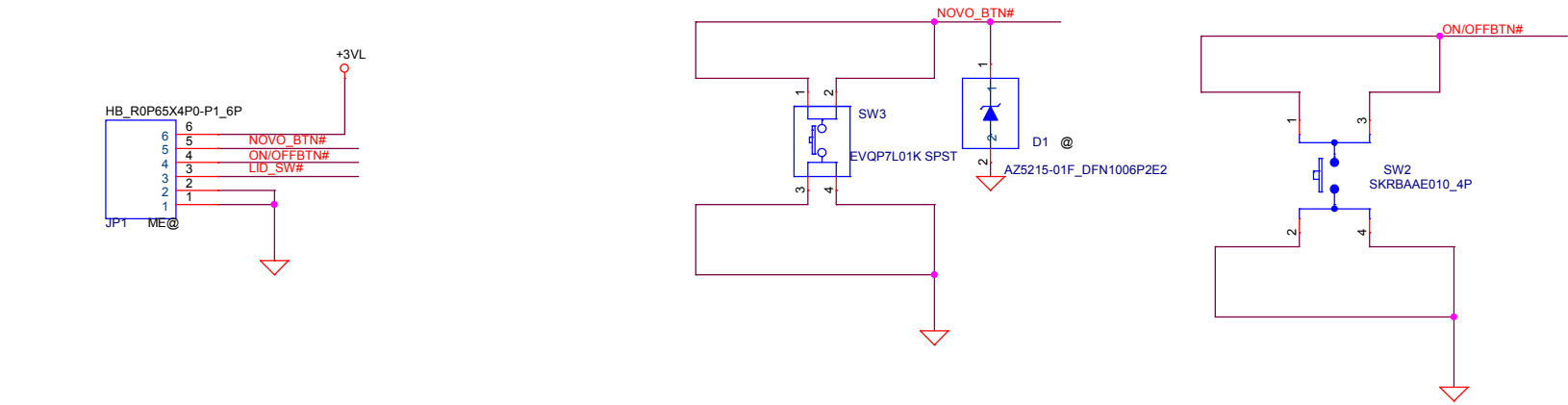
Schematics Document

Power Board Schematic

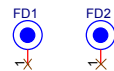
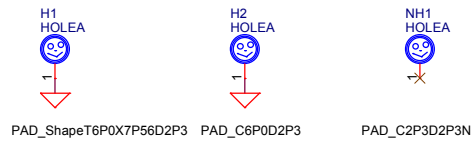
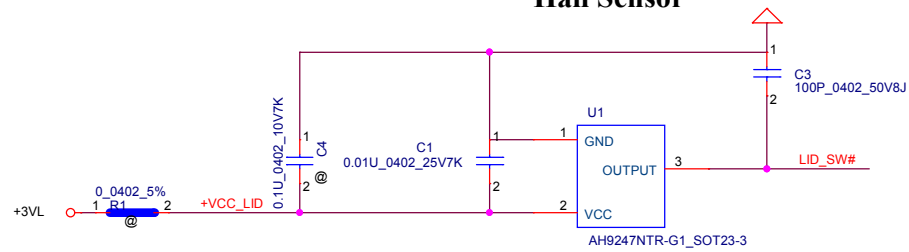
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Hall Sensor



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