


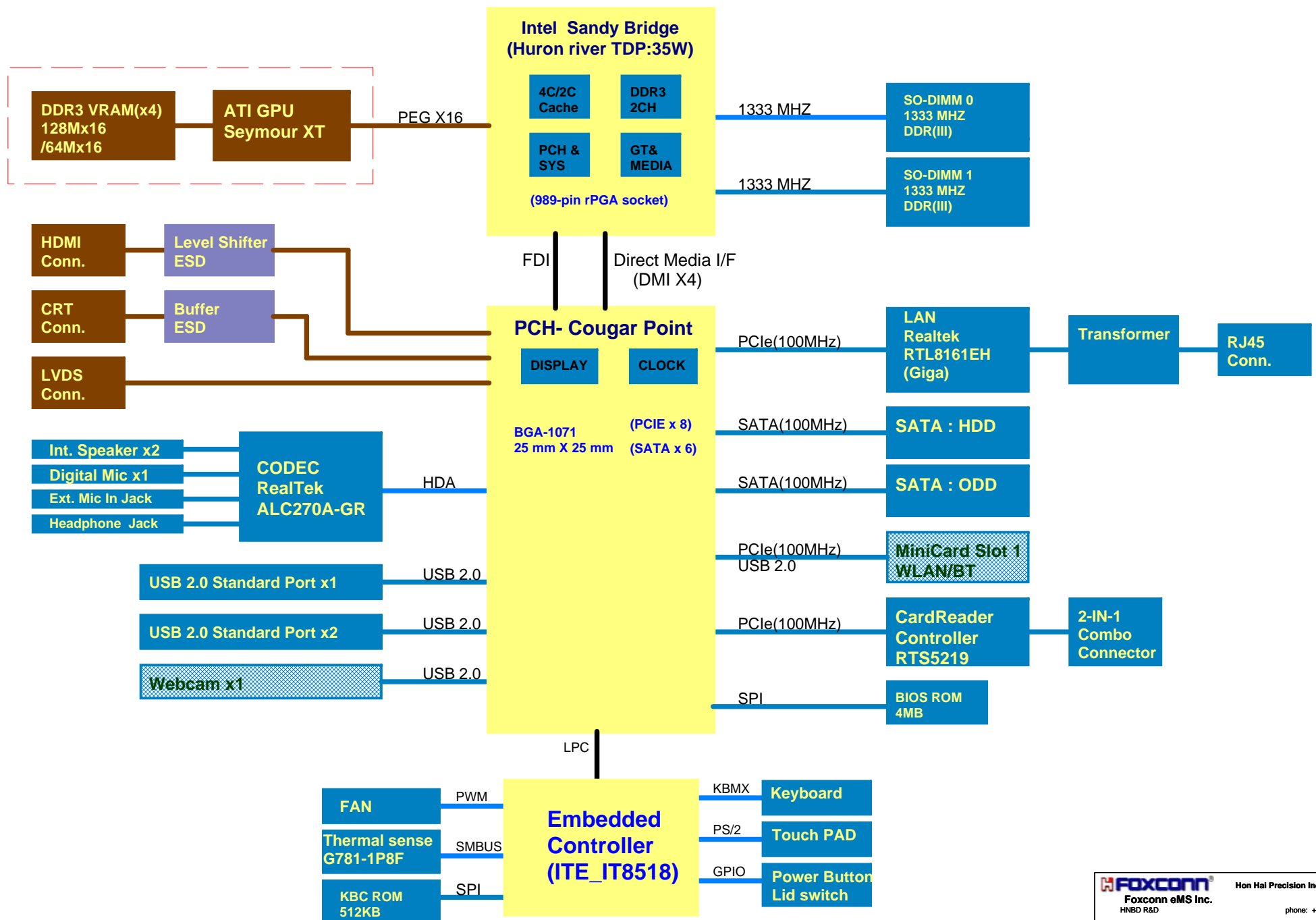
# PROJECT : CHICAGO (For Intel Huron River Platform)

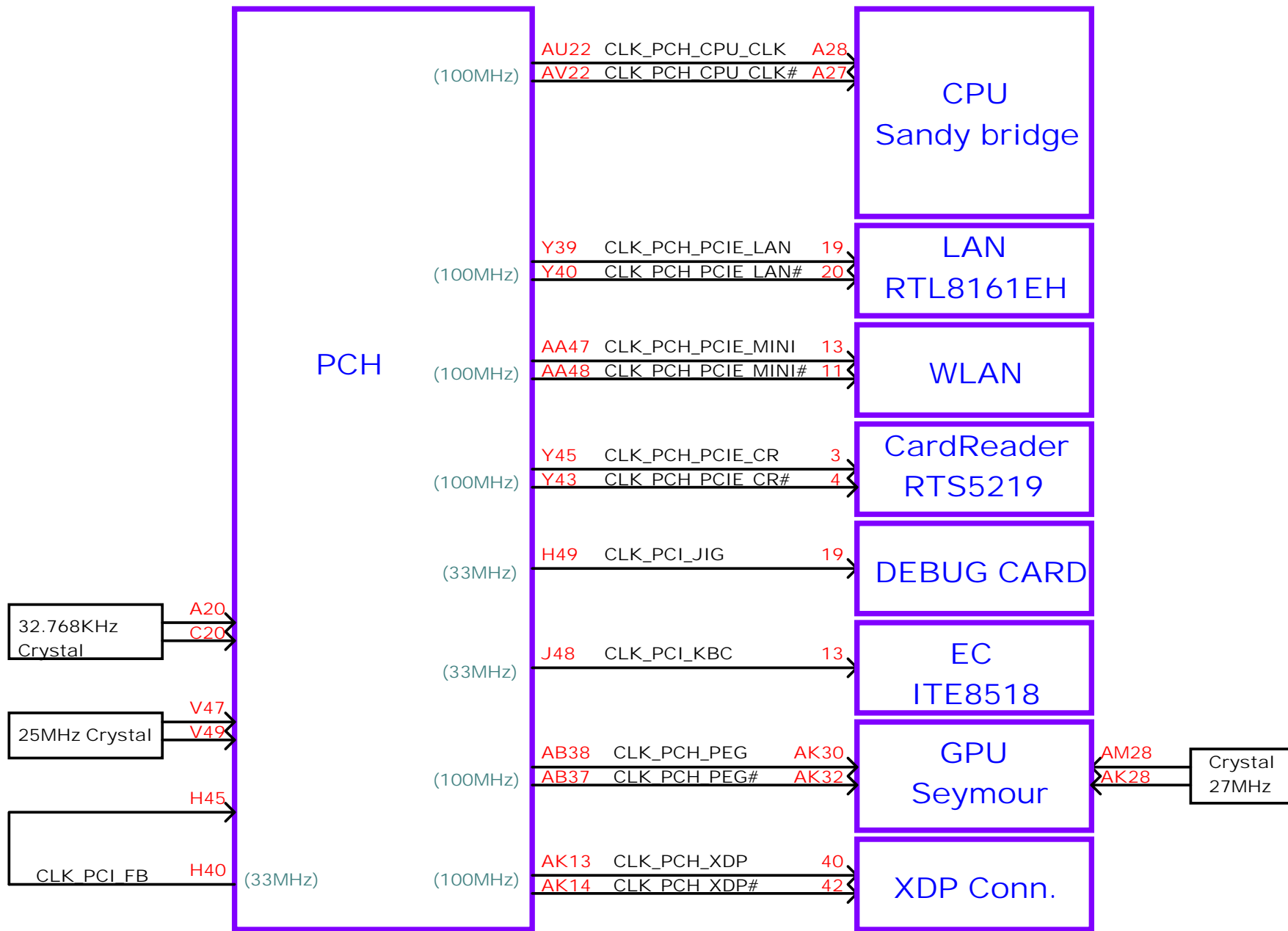
01 -- COVER SHEET	23 -- CougarPoint (HDA, SATA..)
02 -- SYSTEM BLOCK DIAGRAM	24 -- CougarPoint (PCI-E, CLK..)
03 -- CLOCK MAP	25 -- CougarPoint (DMI, FDI..)
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05 -- POWER MAP	27 -- CougarPoint (PWR/GND)
06 -- SMBUS MAP	28 -- CougarPoint (PWR, GND)
07 -- Blank	29 -- DDR3 (SO-DIMM 0&1)
08 -- DCIN/BATT	30 -- VGA (PCI-E/STRAP) 1/3
09 -- PWR_CHARGE	31 -- VGA_S3 (IO) 2/3
10 -- PWR_5V/3.3V	32 -- VGA_S3 (DDR3) 3/3
11 -- PWR_VCCP	33 -- VRAM (DDR3)
12 -- PWR_1.5V/0.75S	34 -- EC+KBC (IT8518) & ROM
13 -- PWR_VCORE	35 -- Audio (CODEC_ALC270A)
14 -- PWR_OTHER	36 -- Audio (JACK+AMP+SPK+Mute)
15 -- PWR_ATVDD	37 -- LAN (RTL8161EH)
16 -- PWR_1.8VS	38 -- Mini PCIe & FAN
17 -- PWR_VCCSA	39 -- USBx2/USB DB/SATA CONN.
18 -- Sandy Bridge (DMI, PEG, FDI)	40 -- Card Reader (RTL5219-GR)
19 -- Sandy Bridge (CLK, JTAG..)	41 -- HDMI & CRT
20 -- Sandy Bridge (DDR3)	42 -- LVDS & Webcam
21 -- Sandy Bridge (PWR/GND)	43 -- Sequence circuit
22 -- Sandy Bridge (GRAPHIC PWR)	

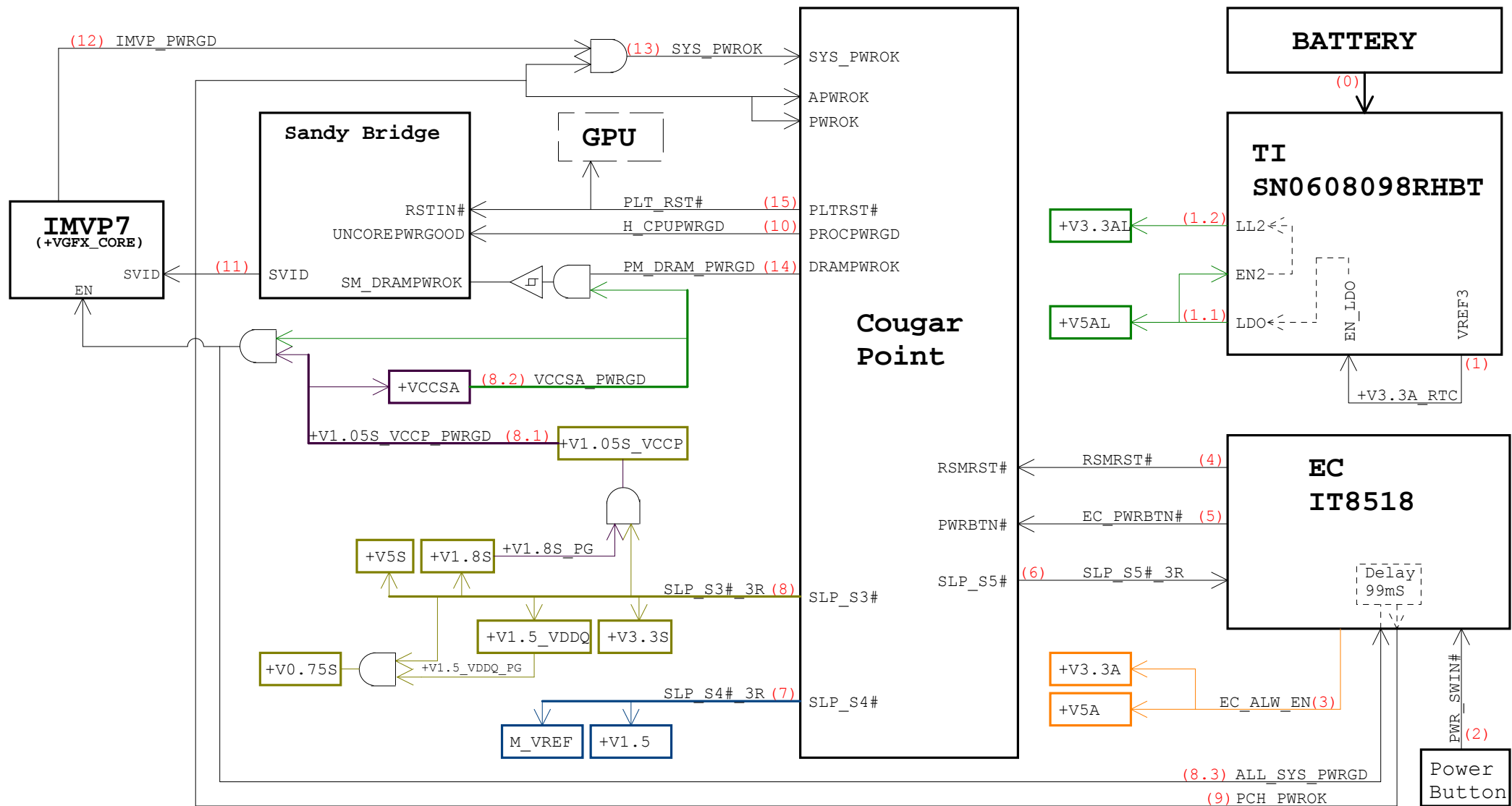
P. Leader	Check by	Design by

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Title		
<b>Index Page</b>		
Size	Document Number	Rev
Custom	<b>CHICAGO</b>	<b>MV</b>
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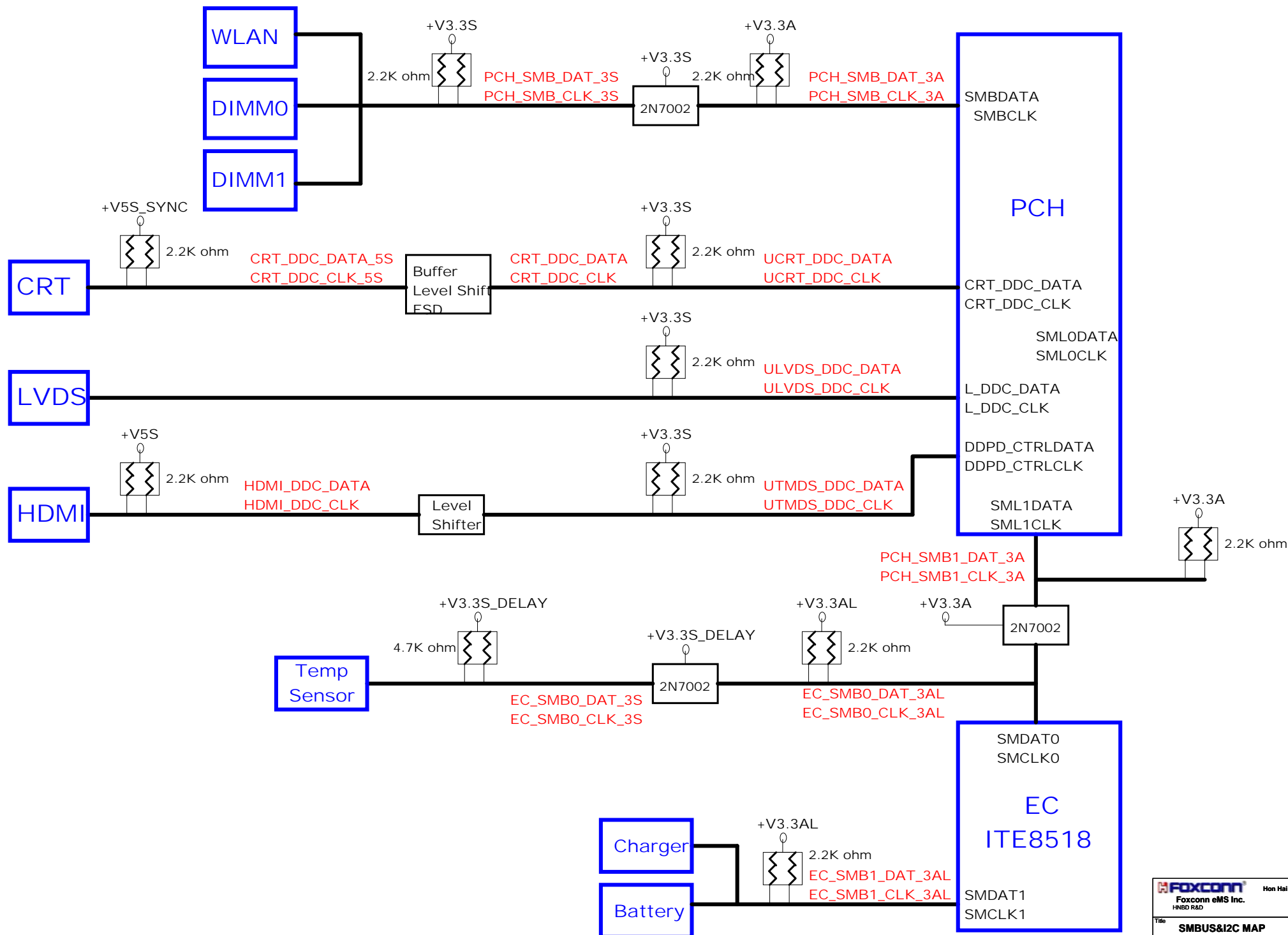


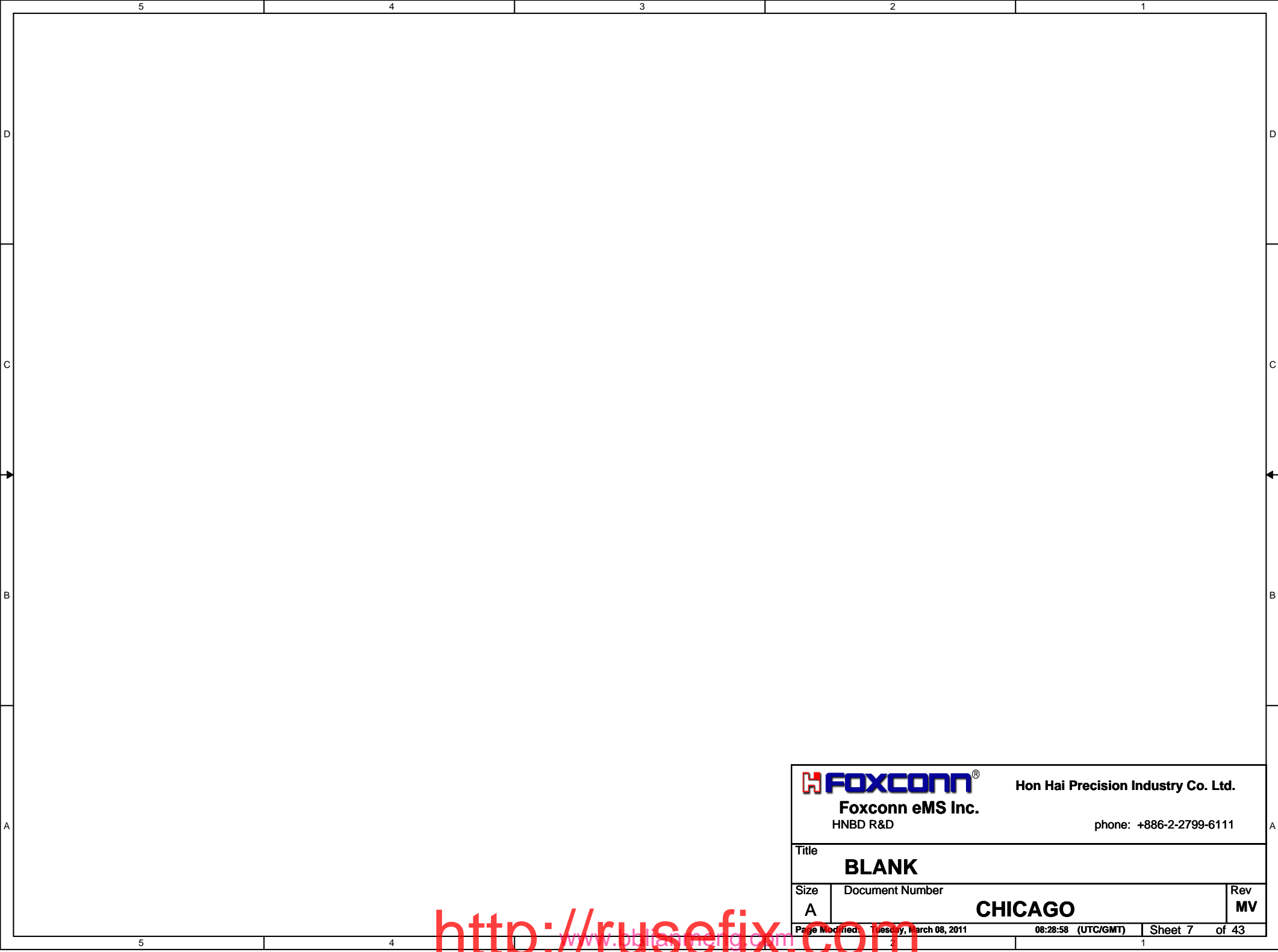


# POWER MAP



<http://www.rusefix.com>



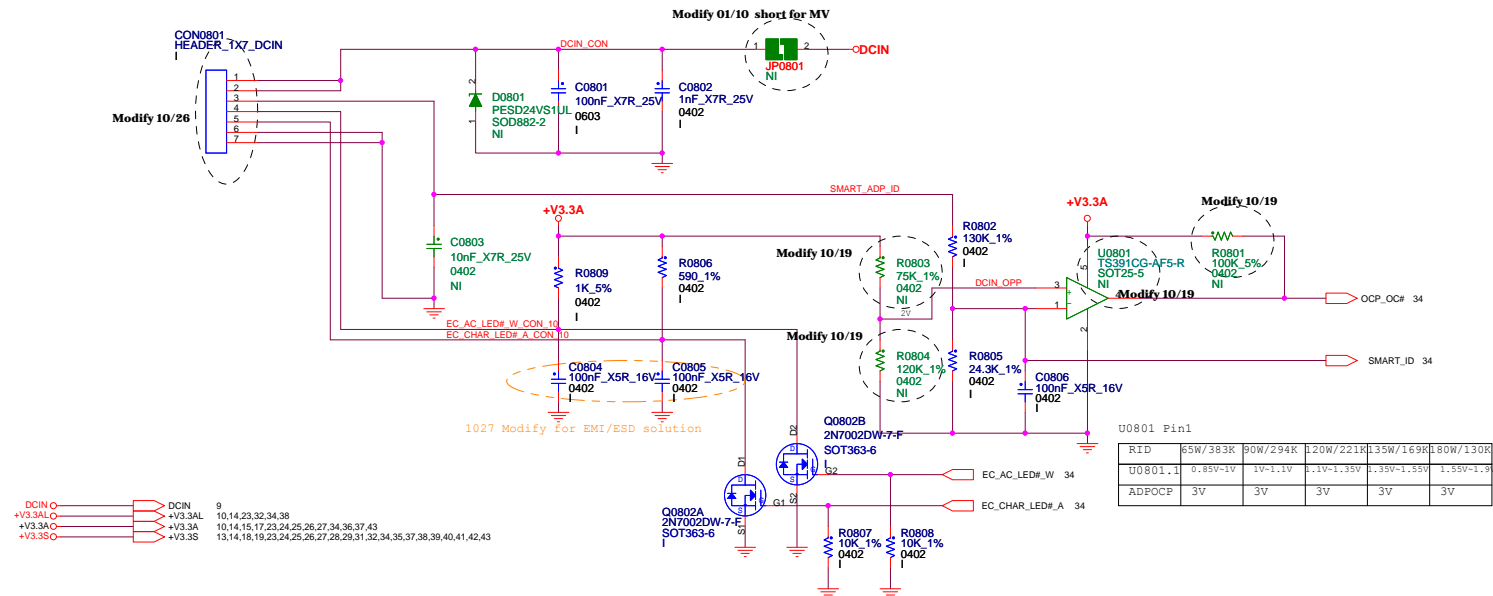


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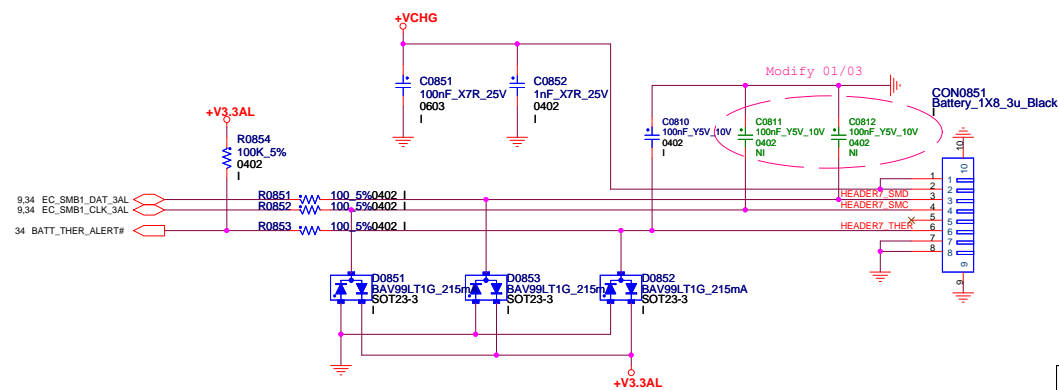
# DC\_JACK WIRE to BOARD CONNECTOR

2010.1203.0



# BATTERY CONNECTOR

2010.0914.0



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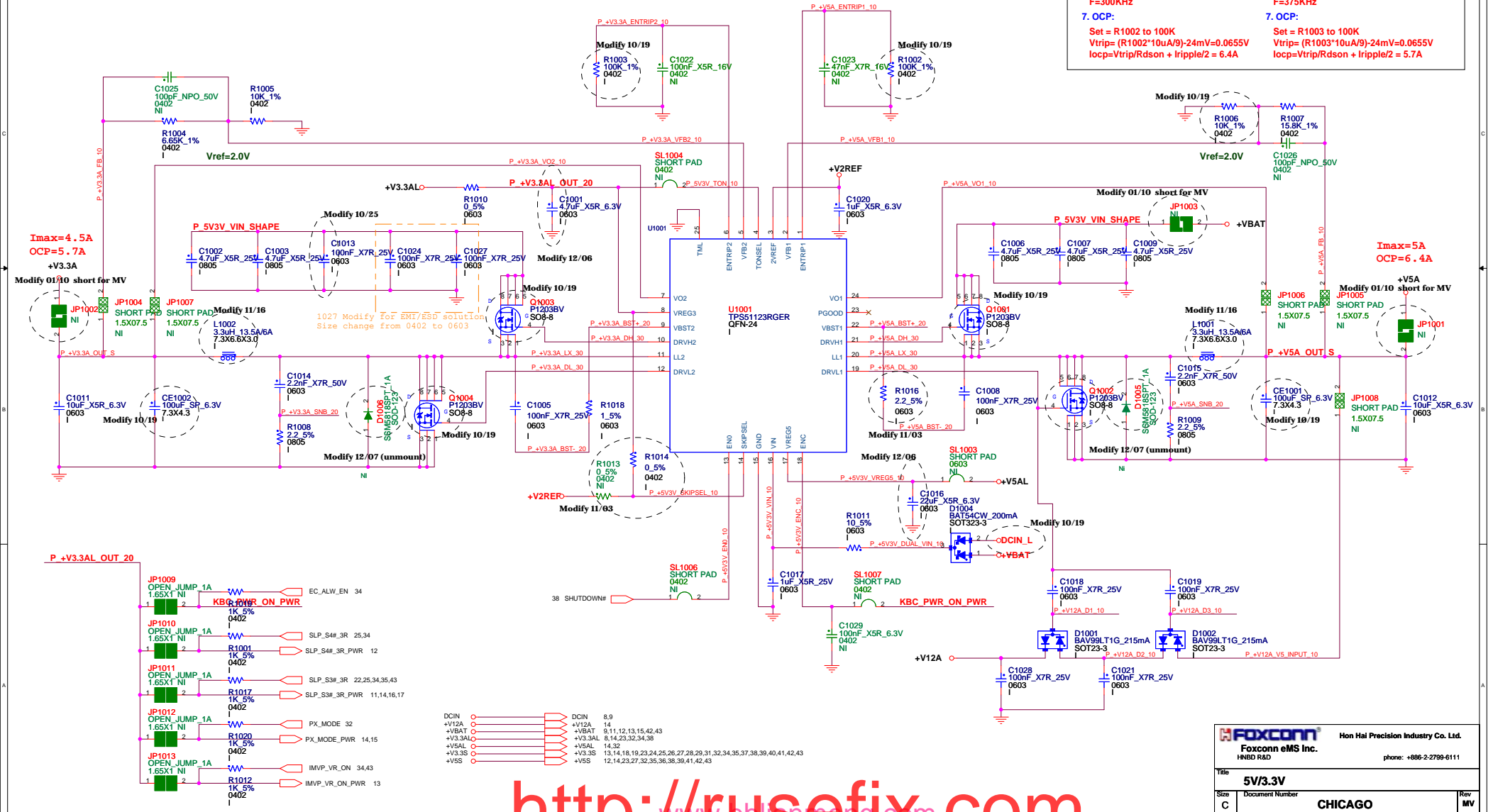
<http://rusefix.com>



# +V5A / +V3.3A POWER SUPPLY

2010.1103.0

<b>+V5A:</b> 1. I/P Current: $I_{in} = V_o \cdot I_o / (0.75 \cdot V_{in}) = 3.7A$ 2. Ripple Current: $I_{rip} = 3.72A$ 3. Ripple Voltage: $ESR/1 = 15mohm$ $V_{rip} = 55.8mV$ 4. Inductor Spec: $I_{sat} = 13.5A$ $I_{dc} = 6A$ $DCR = 30mohm$ 5. MOSFET Spec: H-side MOSFET: IRF8707PBF $R_{ds(ON)} = 17.5mohm$ ( $V_{gs} = 4.5V$ ) $I_{cont} = 11A$ ( $T = 25^\circ C$ ) $I_{peak} = 88A$ (Pause $\geq 10us$ ) 6. Frequency: $F = 300KHz$ 7. OCP: $Set = R1002 \text{ to } 100K$ $V_{trip} = (R1002 \cdot 10uA/9) - 24mV = 0.0655V$ $I_{ocp} = V_{trip} / R_{dson} + I_{ripple} / 2 = 6.4A$	<b>+V3.3A:</b> 1. I/P Current: $I_{in} = V_o \cdot I_o / (0.75 \cdot V_{in}) = 2.2A$ 2. Ripple Current: $I_{rip} = 2.21A$ 3. Ripple Voltage: $ESR/1 = 15mohm$ $V_{rip} = 33.15mV$ 4. Inductor Spec: $I_{sat} = 13.5A$ $I_{dc} = 6A$ $DCR = 30mohm$ 5. MOSFET Spec: L-side MOSFET: IRF8707PBF $R_{ds(ON)} = 17.5mohm$ ( $V_{gs} = 4.5V$ ) $I_{cont} = 11A$ ( $T = 25^\circ C$ ) $I_{peak} = 88A$ (Pause $\geq 10us$ ) 6. Frequency: $F = 375KHz$ 7. OCP: $Set = R1003 \text{ to } 100K$ $V_{trip} = (R1003 \cdot 10uA/9) - 24mV = 0.0655V$ $I_{ocp} = V_{trip} / R_{dson} + I_{ripple} / 2 = 5.7A$
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<http://www.rusefix.com>

# +VTT POWER SUPPLY

2010.1103.0

+V1.05S\_VCCP:

1. I/P Current:

$$I_{in} = V_o \cdot I_o / (0.75 \cdot V_{in}) = 1.24A$$

2. Ripple Current:

$$I_{rip} = 3.42A$$

3. Ripple Voltage:

$$ESR/1 = 9m\Omega$$

$$V_{rip} = 30.78mV$$

4. Inductor Spec:

$$I_{sat} = 36A$$

$$I_{dc} = 18A$$

$$DCR = 3.3m\Omega$$

5. MOSFET Spec:

H-side MOSFET: IRF8707PBF

L-side MOSFET: IRF8707PBF

$$R_{ds(ON)} = 17.5m\Omega \quad (V_{gs} = 4.5V)$$

$$R_{ds(ON)} = 17.5m\Omega \quad (V_{gs} = 4.5V)$$

$$I_{cont} = 11A \quad (T = 25^\circ C)$$

$$I_{cont} = 11A \quad (T = 25^\circ C)$$

$$I_{peak} = 88A \quad (Pause = 10\mu s)$$

$$I_{peak} = 88A \quad (Pause = 10\mu s)$$

6. Frequency:

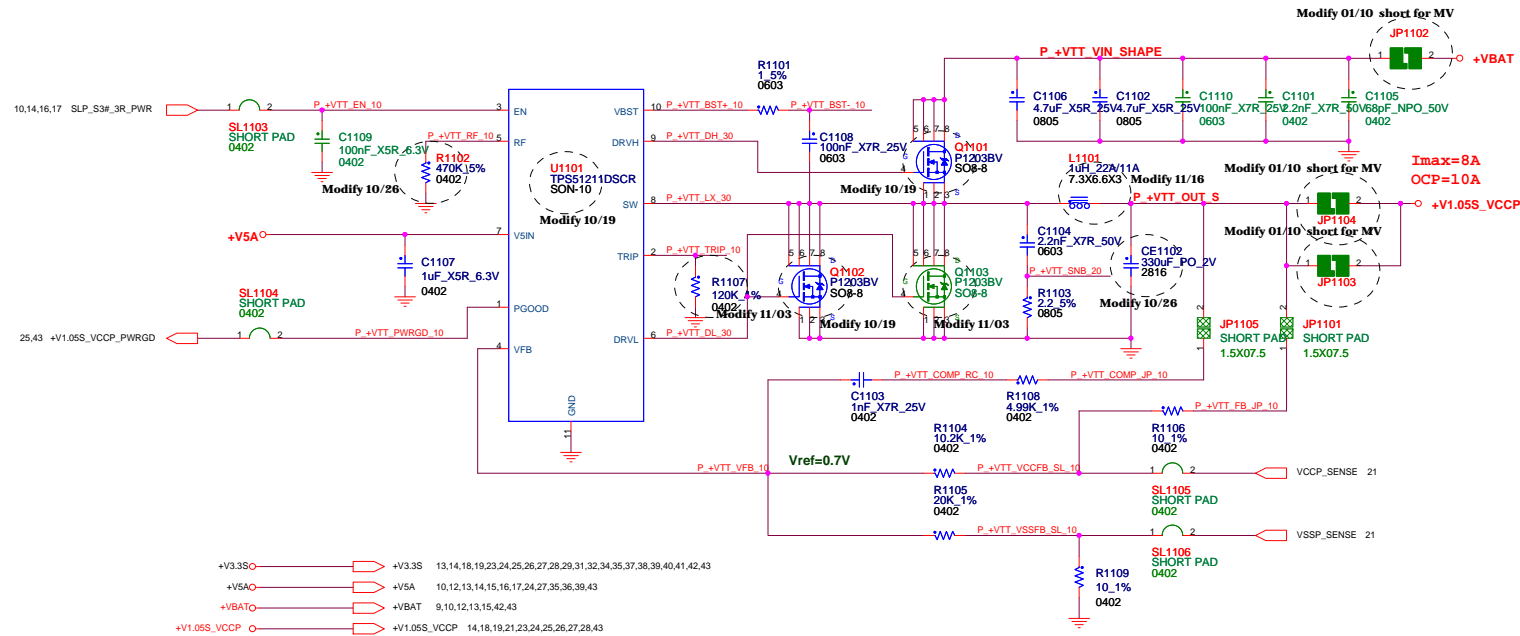
$$F = 290KHz \quad (R1102 = 0\Omega)$$

7. OCP:

$$Set = R1107 \text{ to } 120K$$

$$V_{trip} = R1107 \cdot I_{OCP} = 1.2V$$

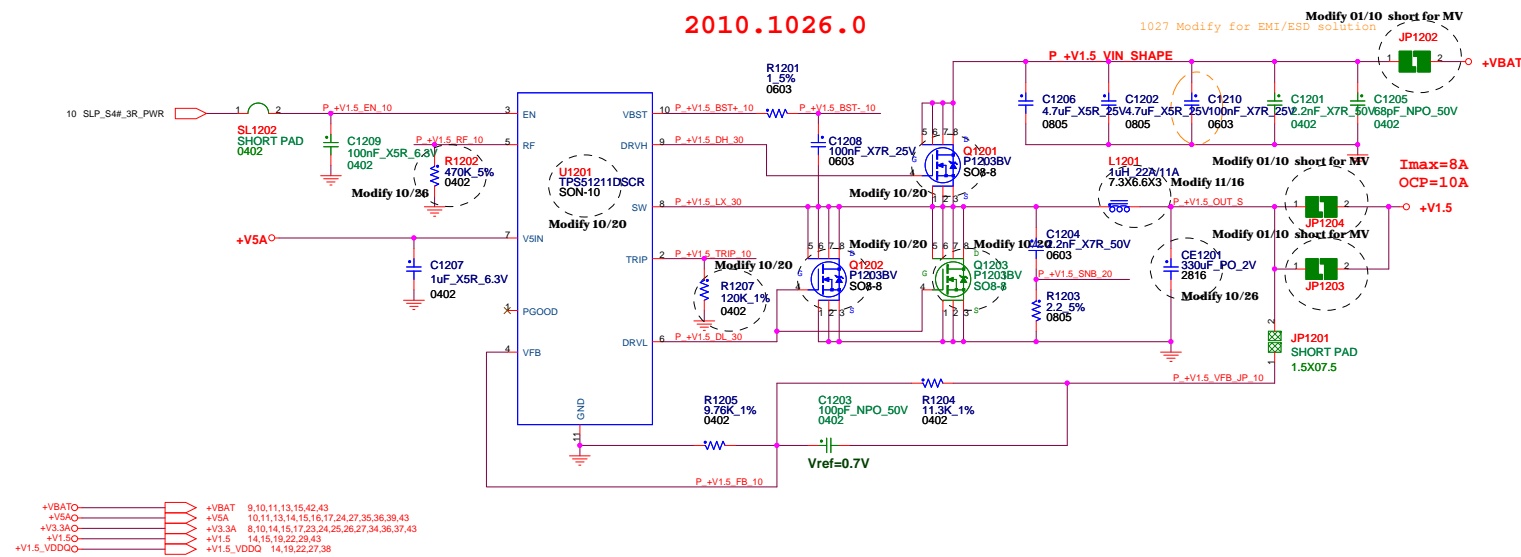
$$I_{OCP} = (V_{trip} / 8 \cdot R_{ds(on)}) + I_{ripple} / 2 = 10A$$



+V3.3S 13,14,18,19,23,24,25,26,27,28,29,31,32,34,35,37,38,39,40,41,42,43  
+V5A 10,12,13,14,15,16,17,24,27,35,36,39,43  
+VBAT 9,10,12,13,15,42,43  
+V1.05S\_VCCP 14,18,19,21,23,24,25,26,27,28,43

<http://www.rusefix.com>

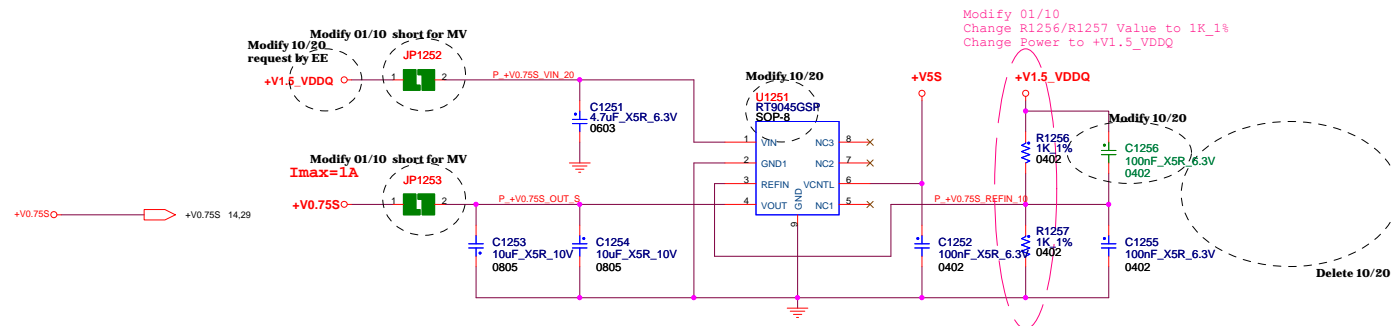
2010.1026.0



- +V1.5:
1. I/P Current:  
 $I_{in} = V_o \cdot I_o / (0.75 \cdot V_{in}) = 1.78A$
  2. Ripple Current:  
 $I_{rip} = 3.34A$
  3. Ripple Voltage:  
 $ESR/1 = 9m\Omega$   
 $V_{rip} = 30.6mV$
  4. Inductor Spec:  
 $I_{sat} = 36A$   
 $I_{dc} = 18A$   
 $DCR = 3.3m\Omega$
  5. MOSFET Spec:  

H-side MOSFET: IRF8707PBF	L-side MOSFET: IRF8707PBF
$R_{ds}(ON) = 17.5m\Omega$ ( $V_{gs} = 4.5V$ )	$R_{ds}(ON) = 17.5m\Omega$ ( $V_{gs} = 4.5V$ )
$I_{cont} = 11A$ ( $T = 25^\circ C$ )	$I_{cont} = 11A$ ( $T = 25^\circ C$ )
$I_{peak} = 88A$ (Pause = 10 us)	$I_{peak} = 88A$ (Pause = 10 us)
  6. Frequency:  
 $F = 290KHz$  ( $R_{0902} = 0\Omega$ )
  7. OCP:  
 $Set = R1207$  to  $120K$   
 $V_{trip} = R1207 \cdot 10uA = 1.2V$   
 $locp = (V_{trip} / 8 \cdot R_{ds(on)}) + I_{ripple} / 2 = 10A$

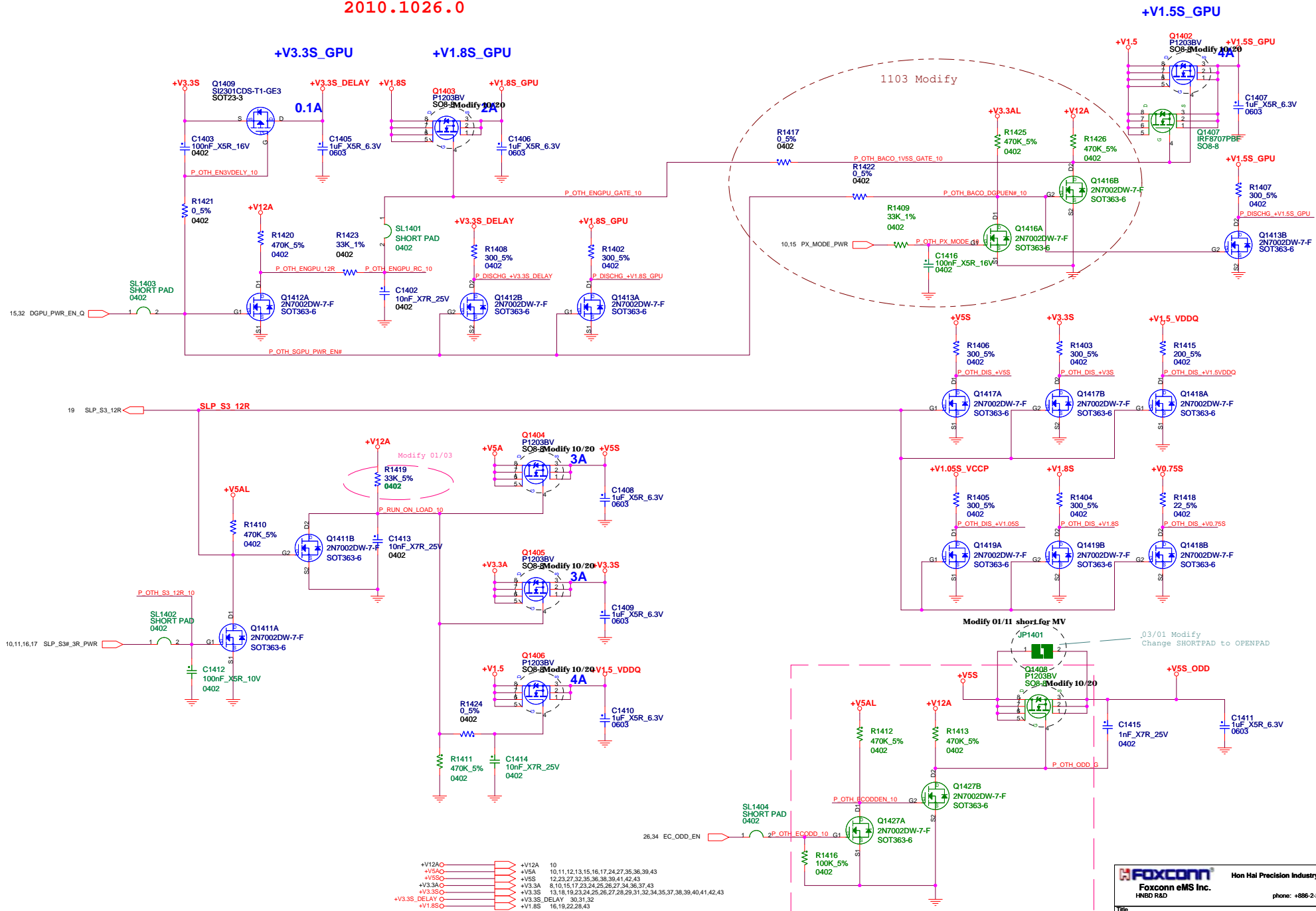
2010.1026.0



2010.1026.0



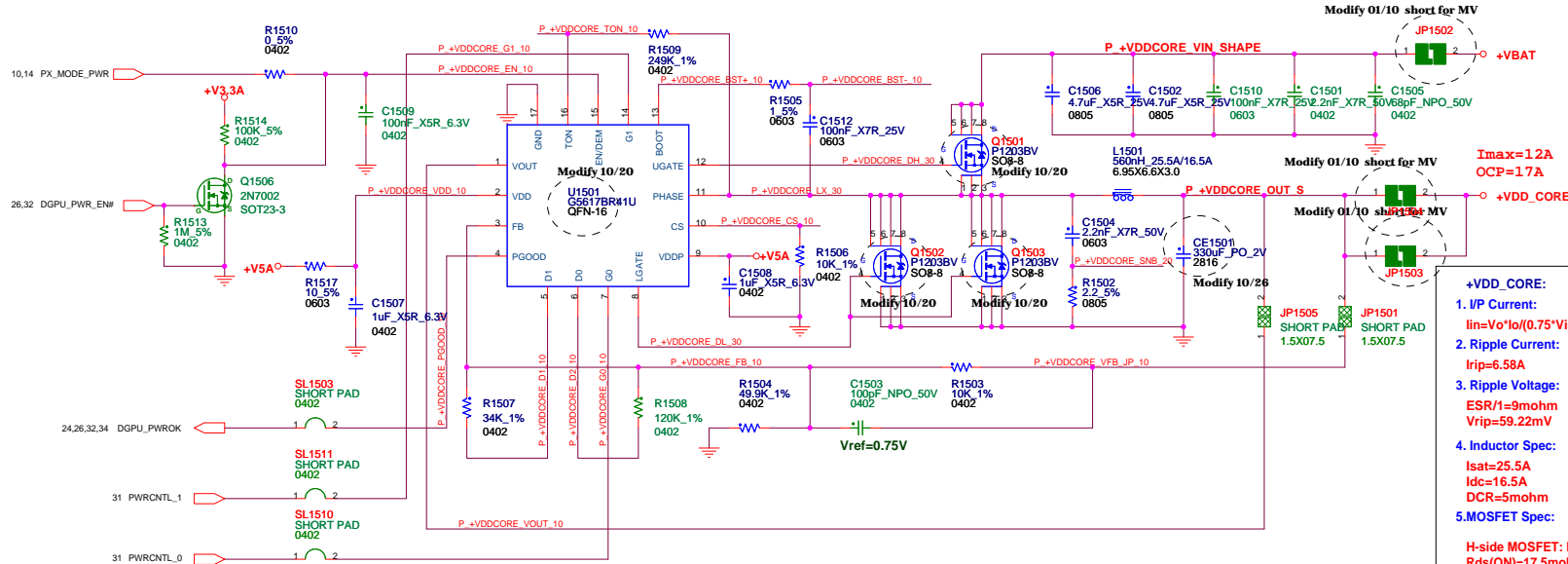
2010.1026.0



<http://www.bhllantern.com>

# +VDD\_CORE POWER SUPPLY

2010.1026.0



PWRCNTL_1	PWRCNTL_0	VDD_CORE
0	---	1.121V
---	---	---
1	---	0.9V
---	---	---

## +VDD\_CORE:

### 1. IP Current:

$I_{in} = V_o \cdot I_o / (0.75 \cdot V_{in}) = 1.48A$

### 2. Ripple Current:

$I_{rip} = 6.58A$

### 3. Ripple Voltage:

$ESR / I = 9m\Omega$

$V_{rip} = 59.22mV$

### 4. Inductor Spec:

$I_{sat} = 25.5A$

$I_{dc} = 16.5A$

$DCR = 5m\Omega$

### 5. MOSFET Spec:

H-side MOSFET: IRF8707PBF

$R_{ds(ON)} = 17.5m\Omega$  ( $V_{gs} = 4.5V$ )

$I_{cont} = 11A$  ( $T = 25^\circ C$ )

$I_{peak} = 88A$  (Pause = 10 us)

L-side MOSFET: IRF8707PBF

$R_{ds(ON)} = 17.5m\Omega$  ( $V_{gs} = 4.5V$ )

$I_{cont} = 11A$  ( $T = 25^\circ C$ )

$I_{peak} = 88A$  (Pause = 10 us)

### 6. Frequency:

$TON = 9.6 \cdot P \cdot R_{1509} \cdot (V_{OUT} + 0.1) / (V_{IN} - 0.3) + 50ns = 206ns$

$F = V_{OUT} / (V_{IN} \cdot TON) = 286KHz$

### 7. OCP:

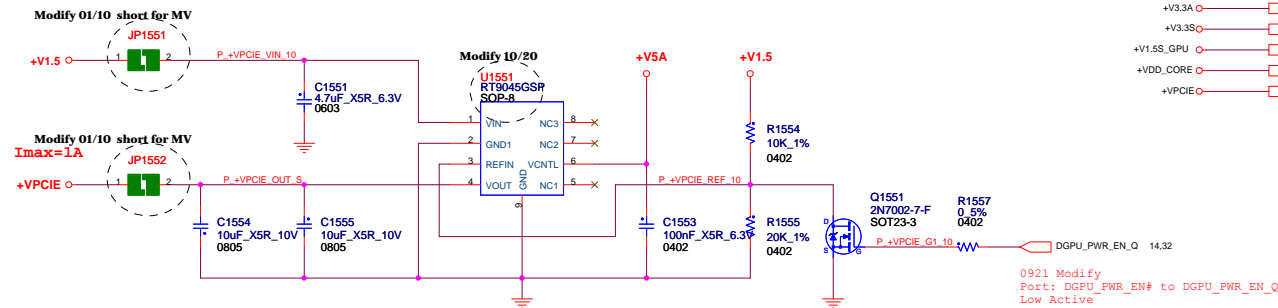
Set = R1506 to 10K

$V_{trip} = R_{1206} \cdot I_{OJA} = 0.1V$

$I_{ocp} = (V_{trip} / R_{ds(on)}) + I_{ripple} / 2 = 17A$

2010.1020.0

# +VPCIE POWER SUPPLY



+VBAT	+VBAT	9,10,11,12,13,42,43
+V5A	+V5A	10,11,12,13,14,16,17,24,27,35,36,39,43
+V3.3A	+V3.3A	8,10,14,17,23,24,25,26,27,34,36,37,43
+V3.3S	+V3.3S	13,14,18,19,23,24,25,26,27,28,29,31,32,34,35,37,38,39,40,41,42,43
+V1.5S_GPU	+V1.5S_GPU	14,30,32,33,43
+VDD_CORE	+VDD_CORE	32,43
+VPCIE	+VPCIE	30,31,32,43

0921 Modify  
Port: DGPU\_PWR\_EN# to DGPU\_PWR\_EN\_Q  
Low Active

# +V1.8S POWER SUPPLY

2010.1025.0

+V1.8S:

1. I/P Current:

$$I_{in} = V_o \cdot I_o / (0.75 \cdot V_{in}) = 1.44A$$

2. Ripple Current:

$$I_{rip} = 0.53A$$

3. Ripple Voltage:

$$ESR/3 = 3.3m\Omega$$

$$V_{rip} = 1.75mV$$

4. Inductor Spec:

$$I_{sat} = 14A$$

$$I_{dc} = 8A$$

$$DCR = 20m\Omega$$

5. MOSFET Spec:

H-side P-MOSFET:

L-side N-MOSFET:

$$R_{ds(ON)} = 110m\Omega \quad (V_{gs} = 4.5V)$$

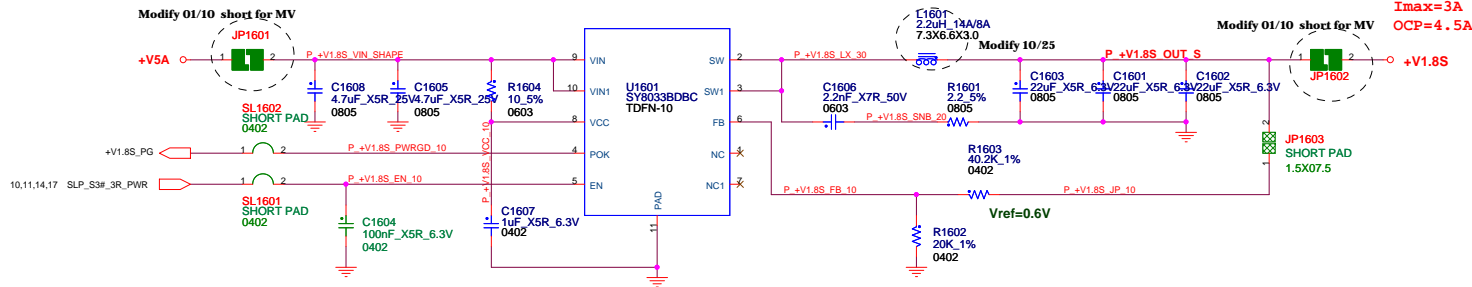
$$R_{ds(ON)} = 75m\Omega \quad (V_{gs} = 4.5V)$$

6. Frequency:

$$F = 1MHz \quad (\min = 800KHz, \max = 1.2MHz)$$

7. OCP:

$$I_{ocp} = 4A(\min) / 4.5A(\text{typ}) / 5A(\max)$$



<http://www.rusefix.com>

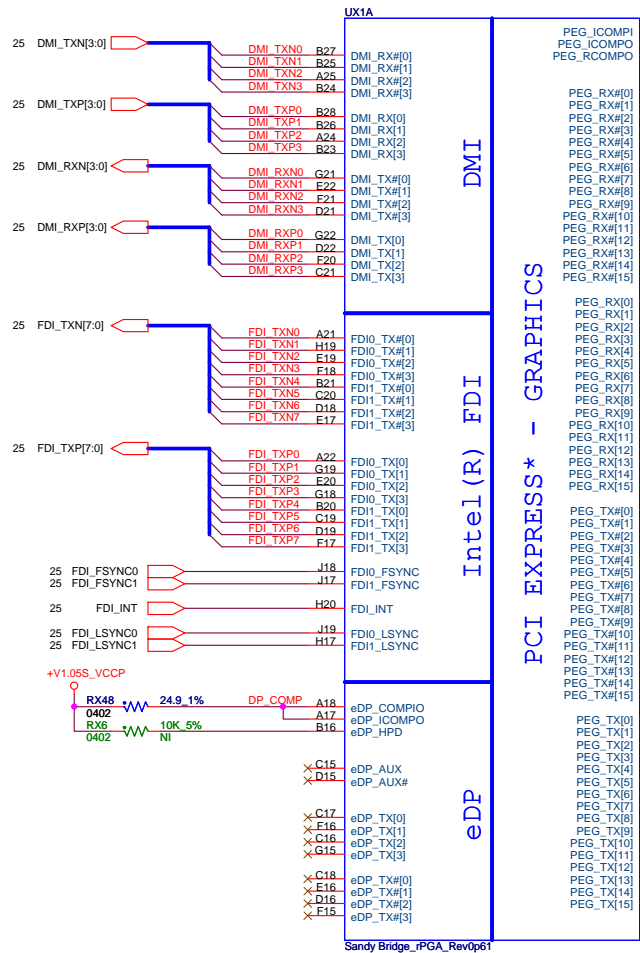


2010.1026.0



<b>VCCSA_SEL</b>	<b>+VCCSA</b>
H	0.80V
L	0.90V

+V3.3S 13,14,19,23,24,25,26,27,28,29,31,32,34,35,37,38,39,40,41,42,43  
+V1.05S\_VCCP 11,14,19,21,23,24,25,26,27,28,43



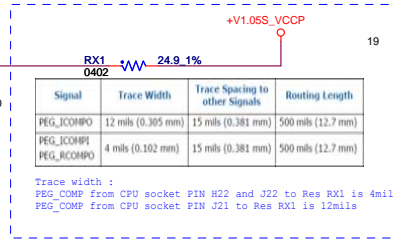
PCI EXPRESS\* - GRAPHICS

DMI

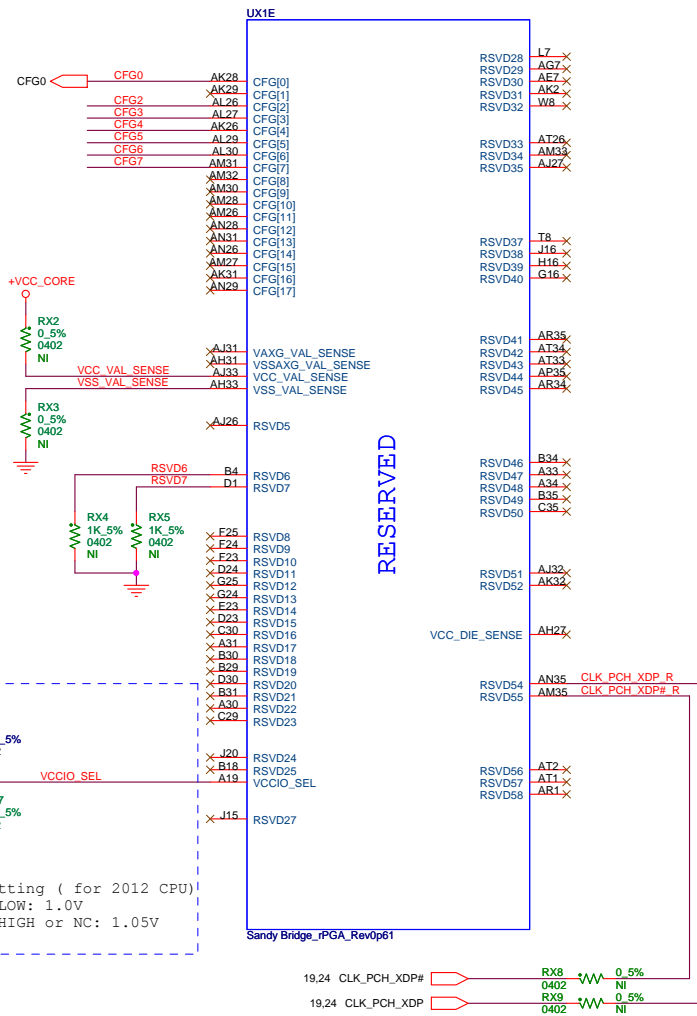
Intel(R) FDI

eDP

Sandy Bridge\_PGA\_Rev0p61



Trace width :  
PEG\_COMP from CPU socket PIN H22 and J22 to Res RX1 is 4mils  
PEG\_COMP from CPU socket PIN J21 to Res RX1 is 12mils



RESERVED

Sandy Bridge\_PGA\_Rev0p61

CFG4 Display Port Presence Strap  
CFG4 1:(Default) Disabled;No Physical Display Port attached to Embedded Display Port  
0:Enabled;An external Display Port is connect to Embedded Display Port

CFG7 PEG DEFER TRAINING  
CFG7 1:(Default) PEG Train immediately following xxRESETB de assertion  
0:PEG Wait for BIOS for training

PCIe Port Bifurcation Straps

CFG[6:5] 11:(Default) x16 - Device 1 functions & 2 disabled  
10:x8,x8 - Device 1 function 1 enabled ; function 2 disabled  
01:Reserved - (Device 1 function 1 disabled ; function 2 enabled  
00:x8,x4,x4 - (Device 1 functions 1 & 2 enabled

PEG Static Lane Reversal - CFG2 is for the 16x

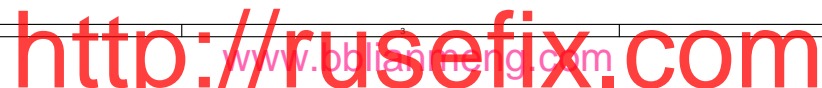
CFG2 1:(Default) Normal Operation;Lane # definition matches socket pin map definition  
0:Lane Reversed

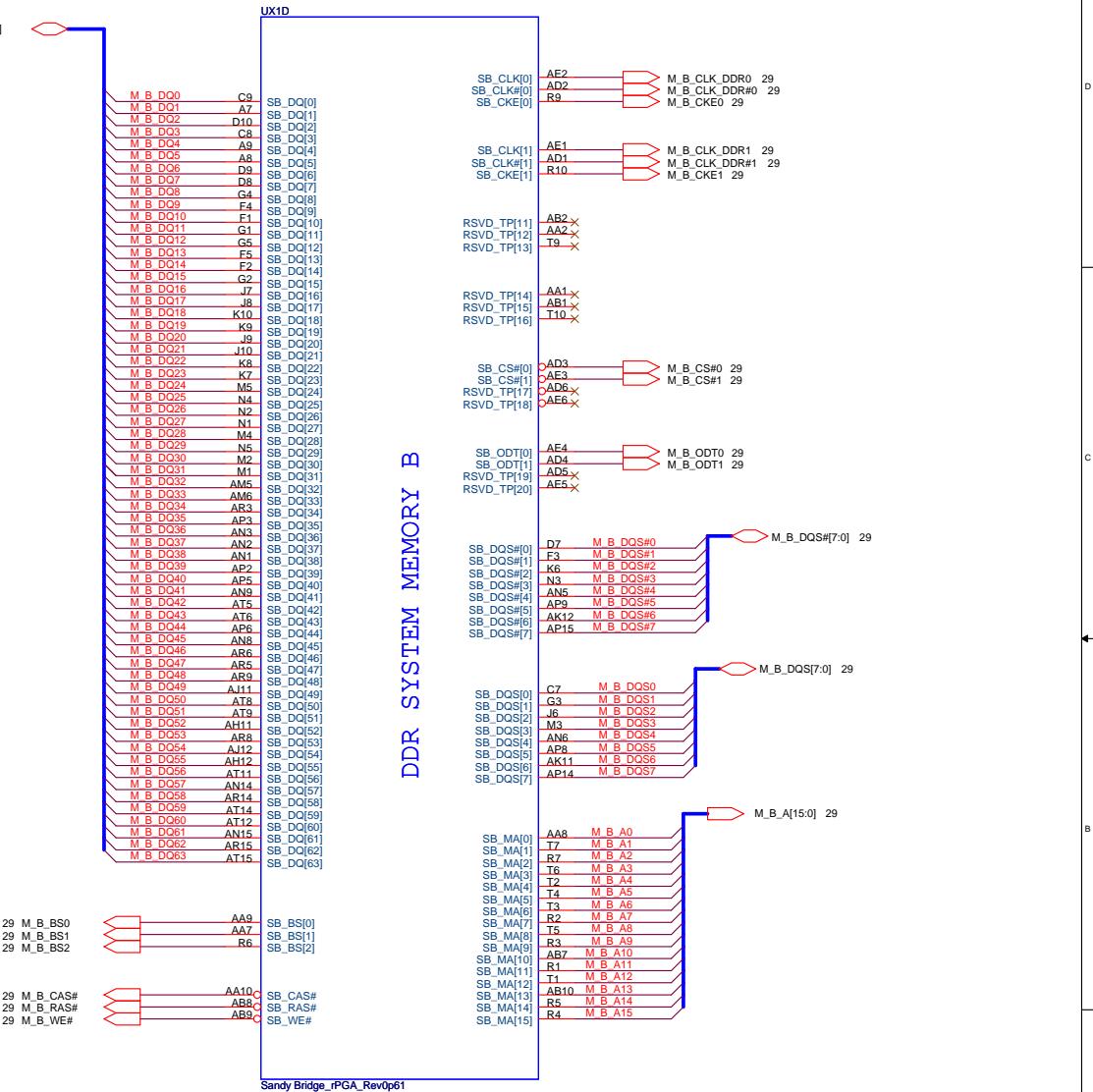
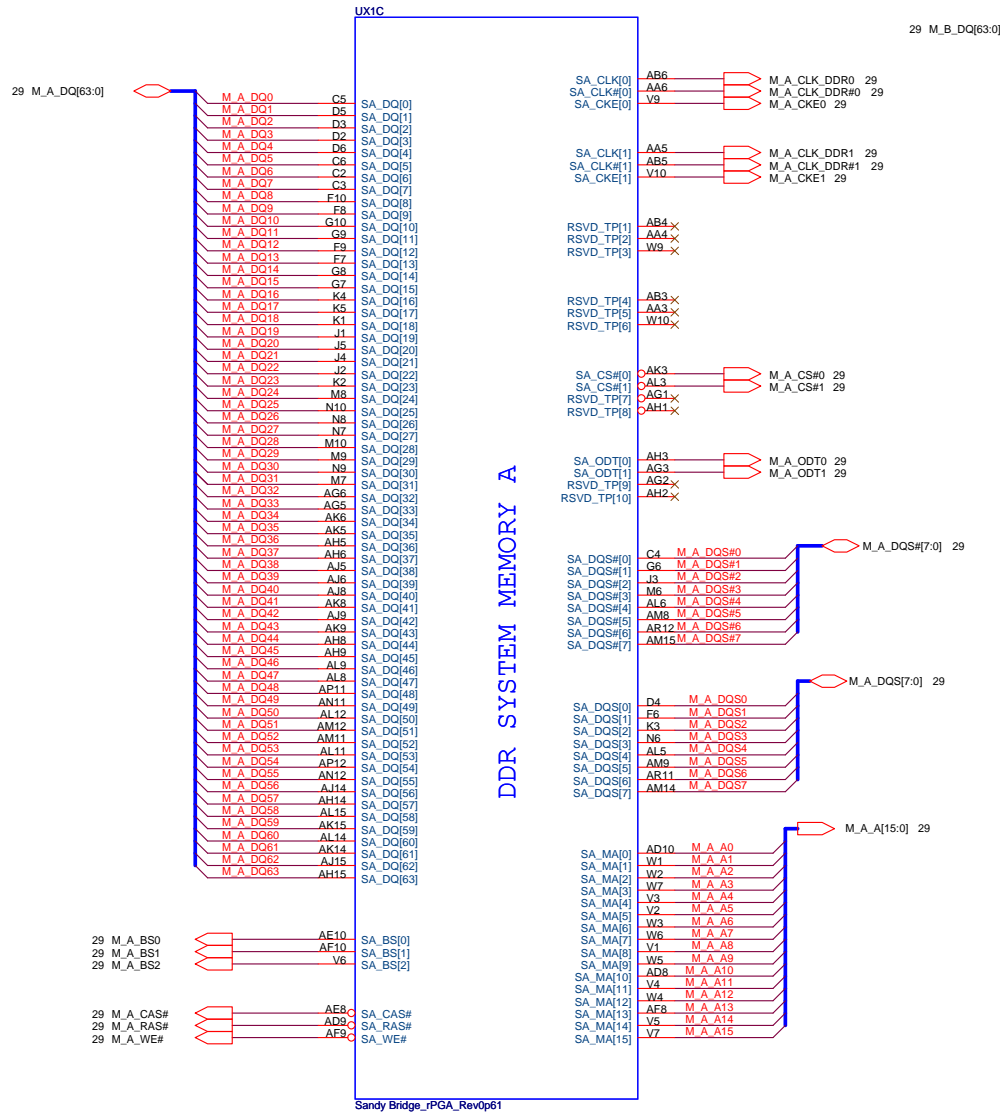
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Size: Document Number  
Custom **CHICAGO** Rev **MV**

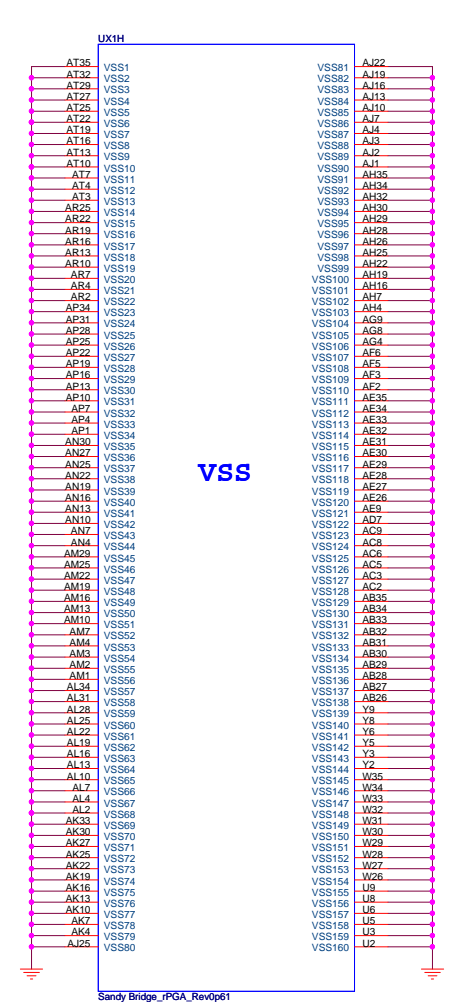
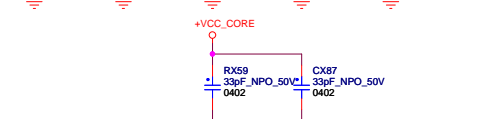
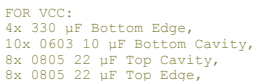
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Sandy Bridge\_PGA\_Rev0p61

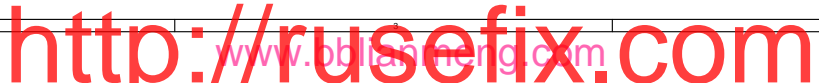
Sandy Bridge\_PGA\_Rev0p61



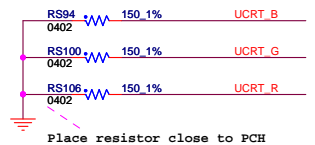
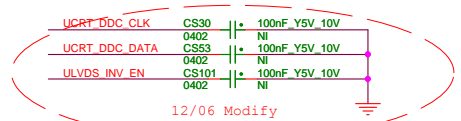
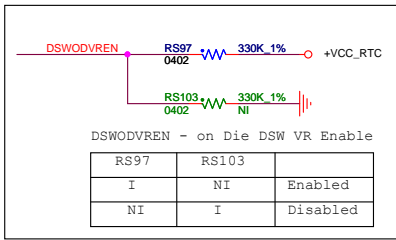
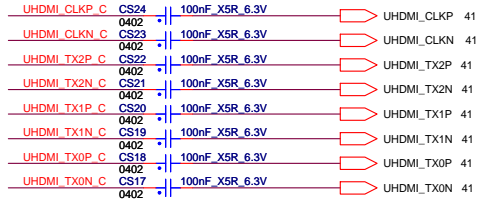
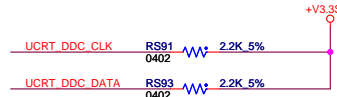
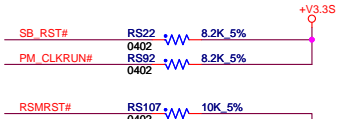
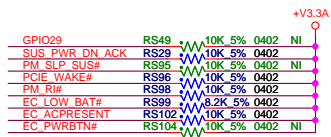
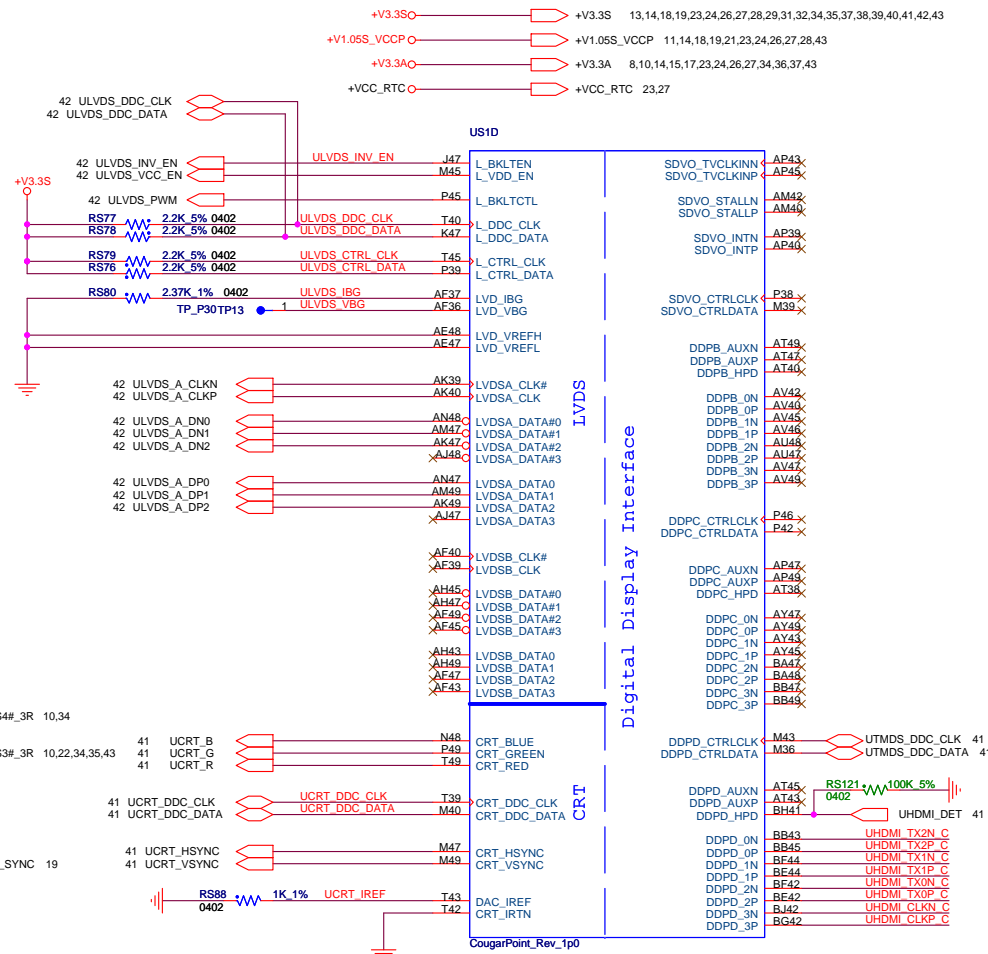
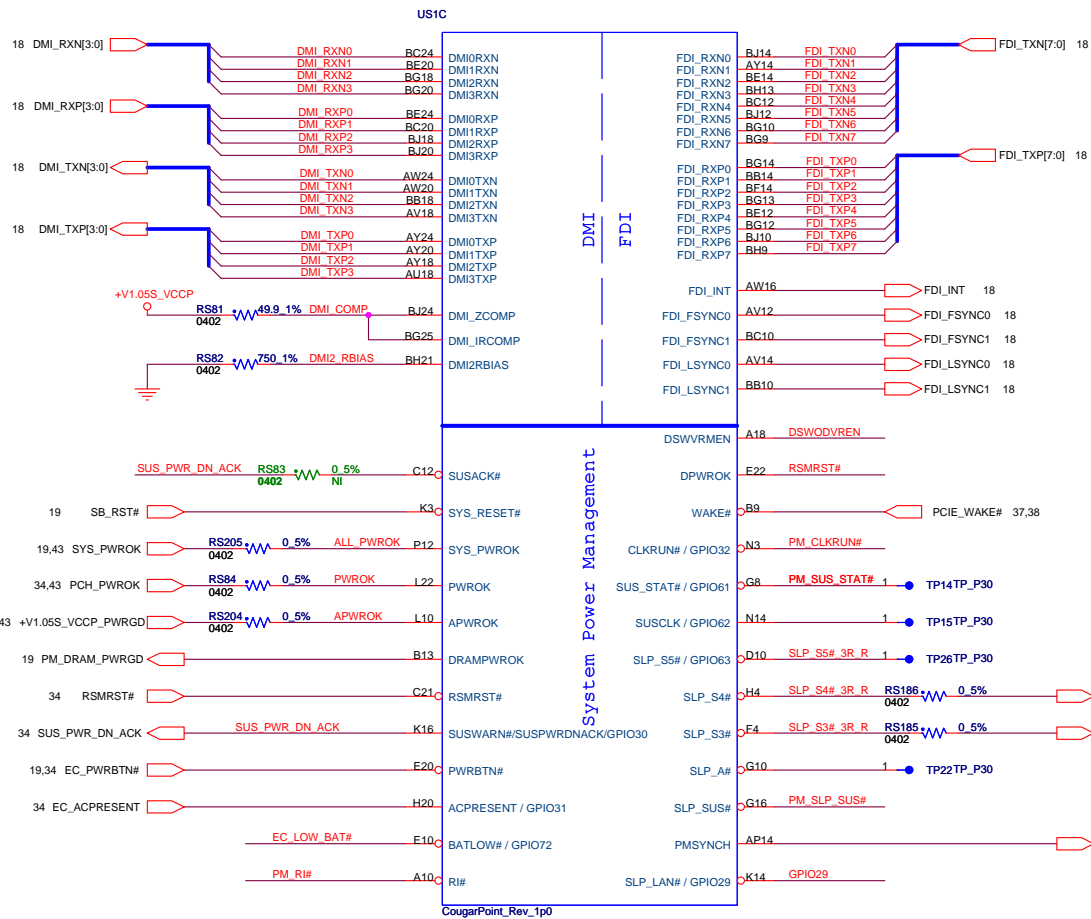






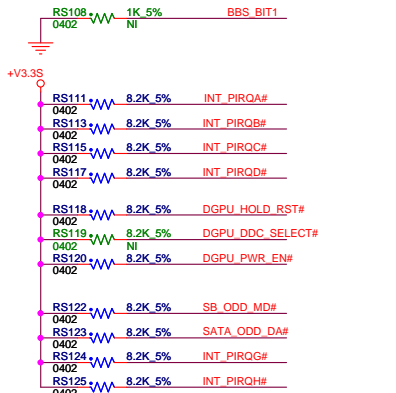




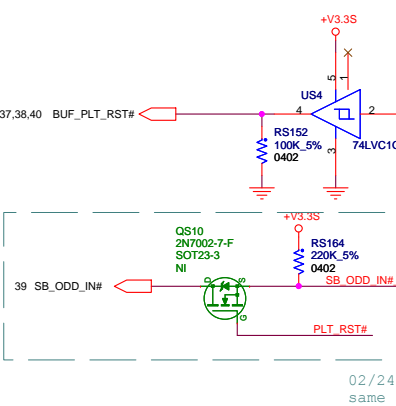
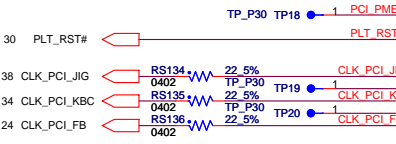
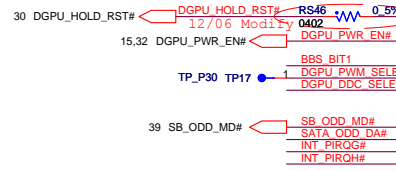


Modify CS30/CS53/CS101 to non-stuff on 01/11

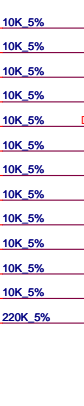
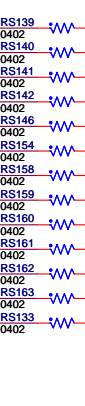
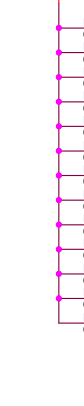
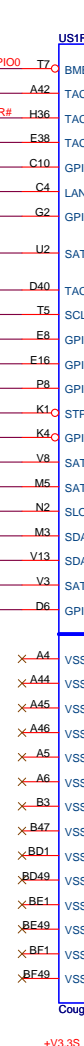
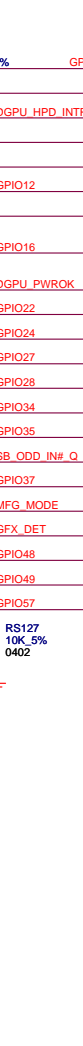
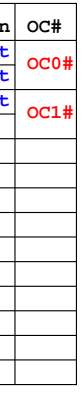
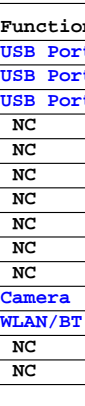
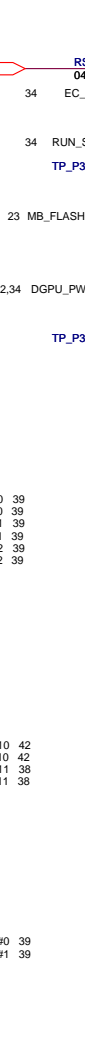
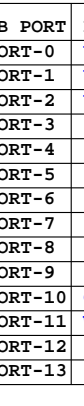
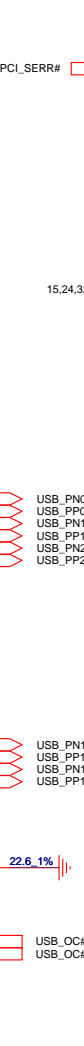
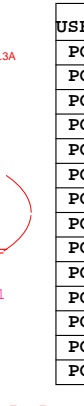
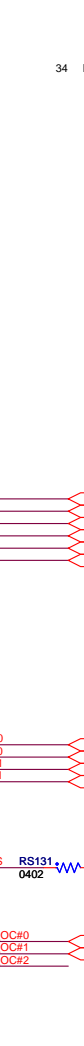
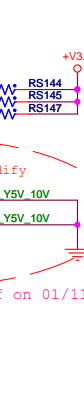
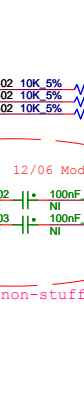
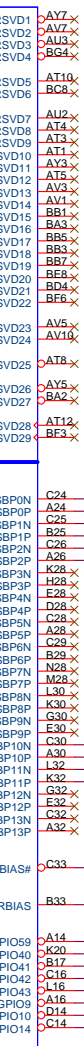
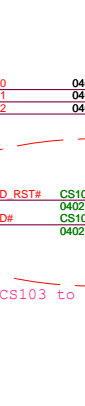
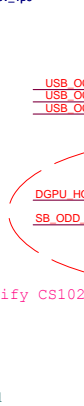
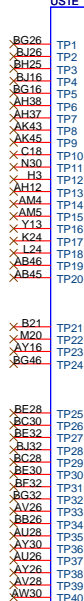
Boot BIOS Strap		
BBS_BIT1	BBS_BIT0	Boot BIOS Location
0	0	LPC
0	1	Reserved (NAND)
1	0	PCI
1	1	SPI

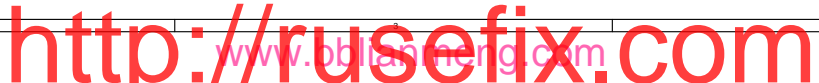


Del RS121 8.2Kohm to +V3.3S  
0820 Update



02/24 Modify same as the PV build

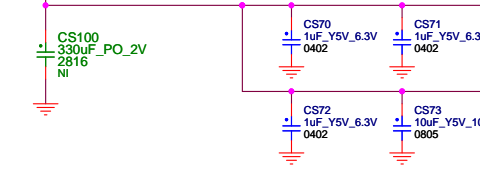




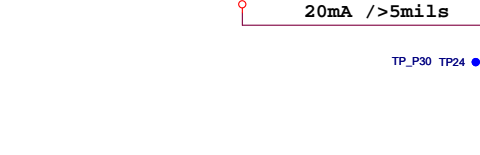
US11		
AY4	VSS[159]	VSS[269]
AY42	VSS[160]	VSS[260]
AY46	VSS[161]	VSS[261]
AY8	VSS[162]	VSS[262]
B11	VSS[163]	VSS[263]
B15	VSS[164]	VSS[264]
B19	VSS[165]	VSS[265]
B23	VSS[166]	VSS[266]
B27	VSS[167]	VSS[267]
B31	VSS[168]	VSS[268]
B35	VSS[169]	VSS[269]
B39	VSS[170]	VSS[270]
B7	VSS[171]	VSS[271]
F45	VSS[172]	VSS[272]
BB12	VSS[173]	VSS[273]
BB16	VSS[174]	VSS[274]
BB20	VSS[175]	VSS[275]
BB22	VSS[176]	VSS[276]
BB24	VSS[177]	VSS[277]
BB28	VSS[178]	VSS[278]
BB30	VSS[179]	VSS[279]
BB38	VSS[180]	VSS[280]
BB4	VSS[181]	VSS[281]
BB46	VSS[182]	VSS[282]
BC14	VSS[183]	VSS[283]
BC18	VSS[184]	VSS[284]
BC22	VSS[185]	VSS[285]
BC26	VSS[186]	VSS[286]
BC32	VSS[187]	VSS[287]
BC34	VSS[188]	VSS[288]
BC36	VSS[189]	VSS[289]
BC40	VSS[190]	VSS[290]
BC42	VSS[191]	VSS[291]
BC48	VSS[192]	VSS[292]
BD46	VSS[193]	VSS[293]
BD5	VSS[194]	VSS[294]
BE22	VSS[195]	VSS[295]
BE26	VSS[196]	VSS[296]
BE40	VSS[197]	VSS[297]
BE10	VSS[198]	VSS[298]
BE12	VSS[199]	VSS[299]
BE16	VSS[200]	VSS[300]
BE20	VSS[201]	VSS[301]
BE24	VSS[202]	VSS[302]
BE28	VSS[203]	VSS[303]
BE30	VSS[204]	VSS[304]
BE38	VSS[205]	VSS[305]
BF40	VSS[206]	VSS[306]
BF8	VSS[207]	VSS[307]
BF16	VSS[208]	VSS[308]
BF20	VSS[209]	VSS[309]
BF24	VSS[210]	VSS[310]
BF28	VSS[211]	VSS[311]
BF30	VSS[212]	VSS[312]
BF32	VSS[213]	VSS[313]
BF34	VSS[214]	VSS[314]
BF38	VSS[215]	VSS[315]
BH11	VSS[216]	VSS[316]
BH15	VSS[217]	VSS[317]
BH17	VSS[218]	VSS[318]
BH19	VSS[219]	VSS[319]
BH20	VSS[220]	VSS[320]
BH22	VSS[221]	VSS[321]
BH31	VSS[222]	VSS[322]
BH33	VSS[223]	VSS[323]
BH35	VSS[224]	VSS[324]
BH39	VSS[225]	VSS[325]
BH43	VSS[226]	VSS[326]
BH7	VSS[227]	VSS[327]
D3	VSS[228]	VSS[328]
D12	VSS[229]	VSS[329]
D16	VSS[230]	VSS[330]
D18	VSS[231]	VSS[331]
D22	VSS[232]	VSS[332]
D24	VSS[233]	VSS[333]
D26	VSS[234]	VSS[334]
D30	VSS[235]	VSS[335]
D32	VSS[236]	VSS[336]
D34	VSS[237]	VSS[337]
D38	VSS[238]	VSS[338]
D42	VSS[239]	VSS[339]
D8	VSS[240]	VSS[340]
E18	VSS[241]	VSS[341]
E26	VSS[242]	VSS[342]
G18	VSS[243]	VSS[343]
G20	VSS[244]	VSS[344]
G26	VSS[245]	VSS[345]
G28	VSS[246]	VSS[346]
G36	VSS[247]	VSS[347]
G48	VSS[248]	VSS[348]
H12	VSS[249]	VSS[349]
H18	VSS[250]	VSS[350]
H22	VSS[251]	VSS[351]
H24	VSS[252]	VSS[352]
H26	VSS[253]	
H30	VSS[254]	
H32	VSS[255]	
H34	VSS[256]	
F3	VSS[257]	
	VSS[258]	

CougarPoint\_Rev\_1p0

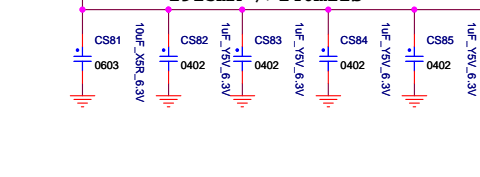
+V1.05S\_VCCP 1300mA />52mils



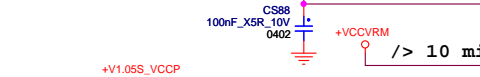
+V1.05S\_VCCP 20mA />5mils



+V1.05S\_VCCP 2925mA />240mils



+V3.3S 50mA />10mils



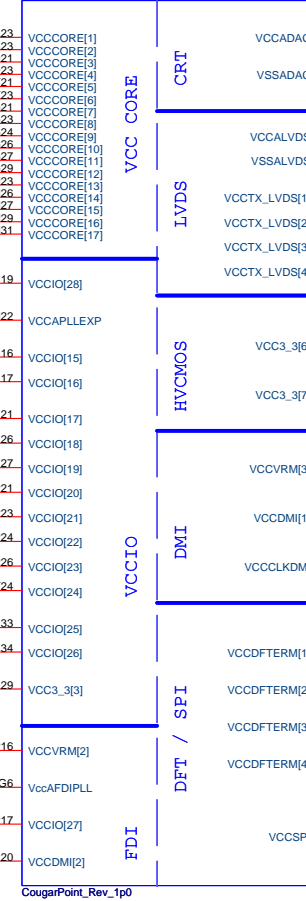
+V1.05S\_VCCP >10mils



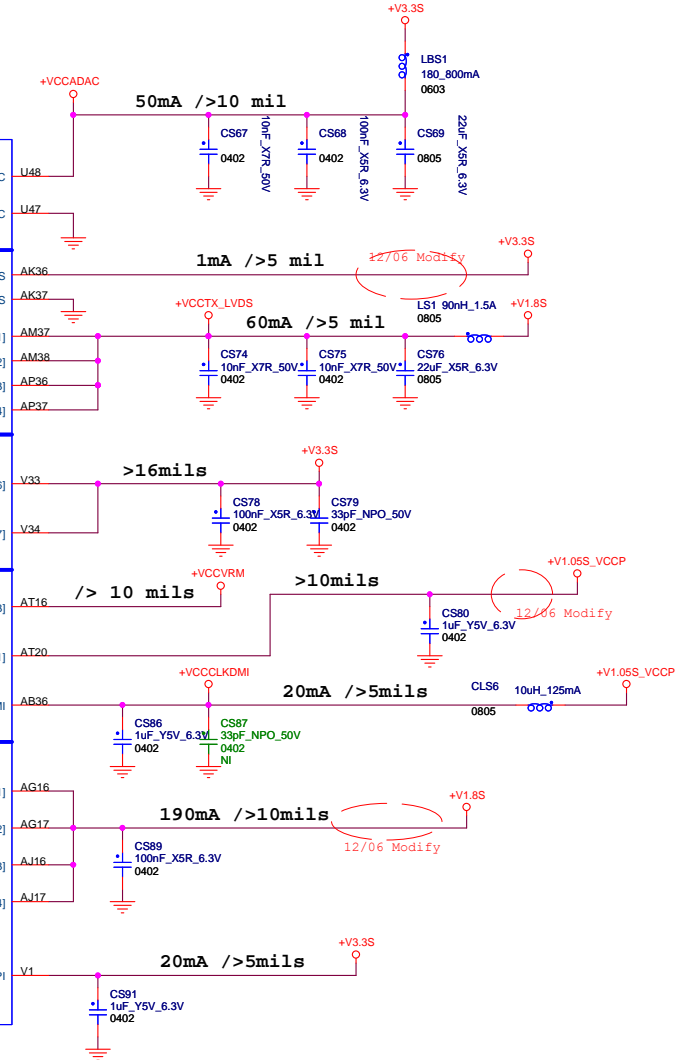
+V1.05S\_VCCP >10mils

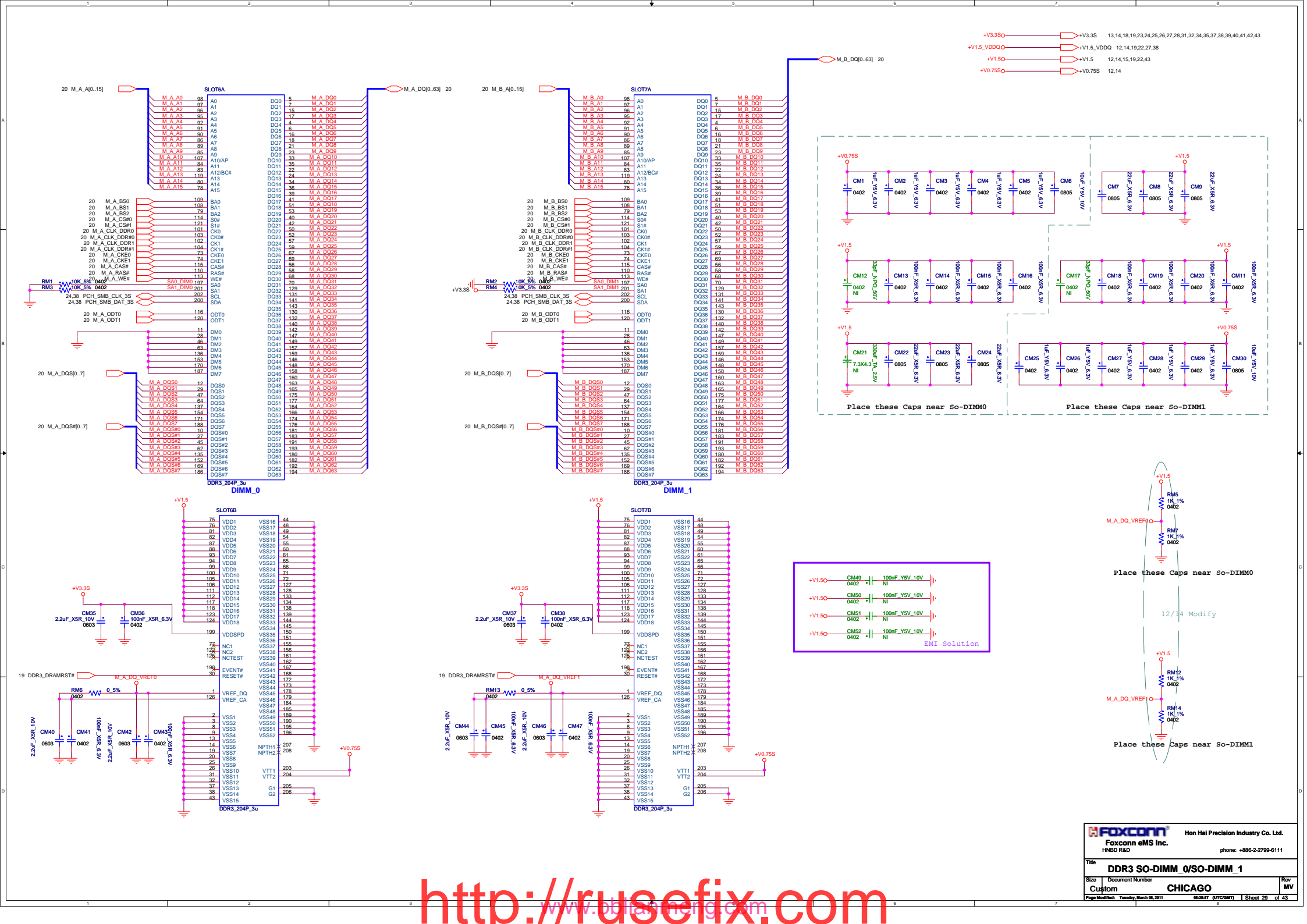


## POWER

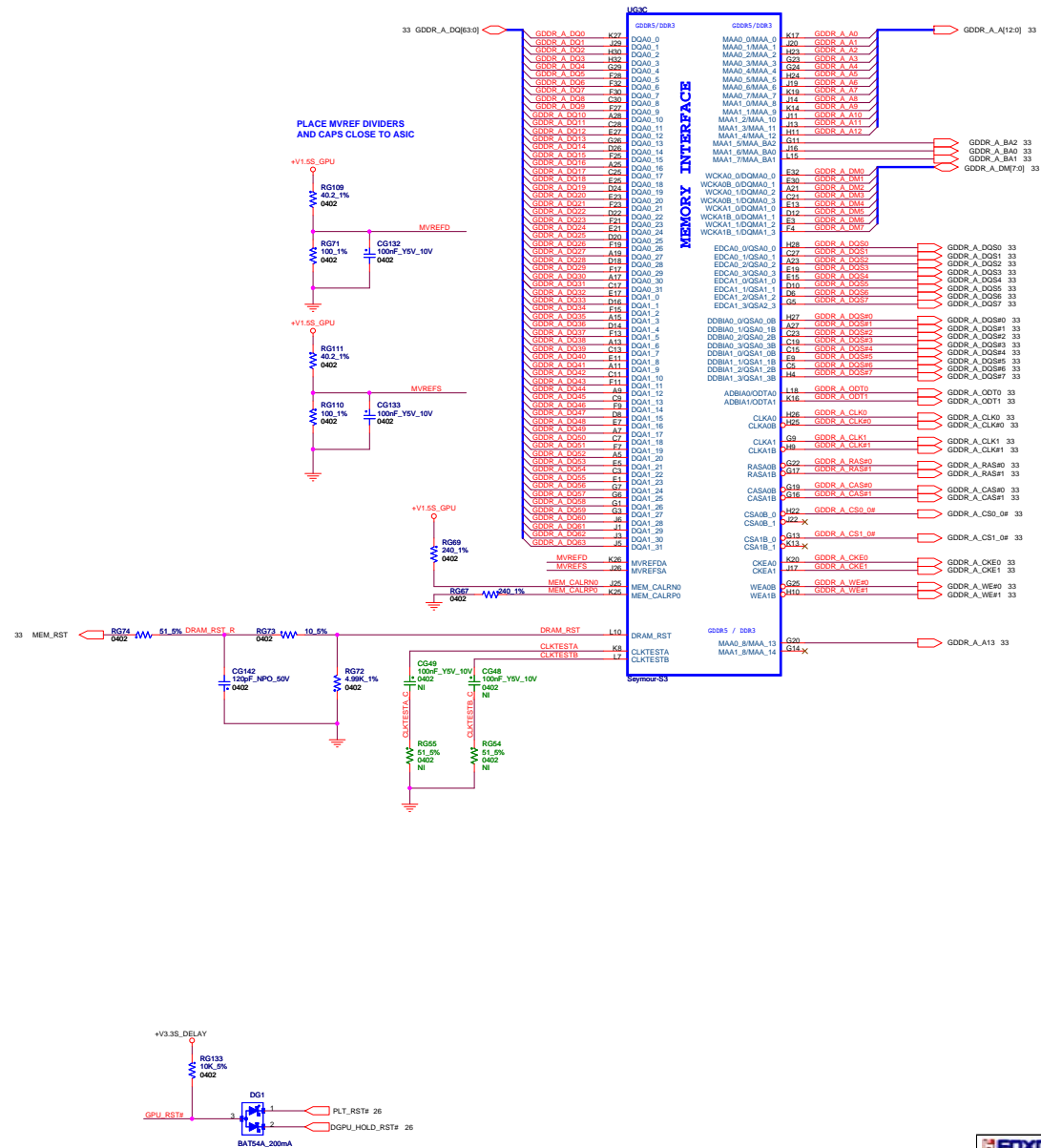
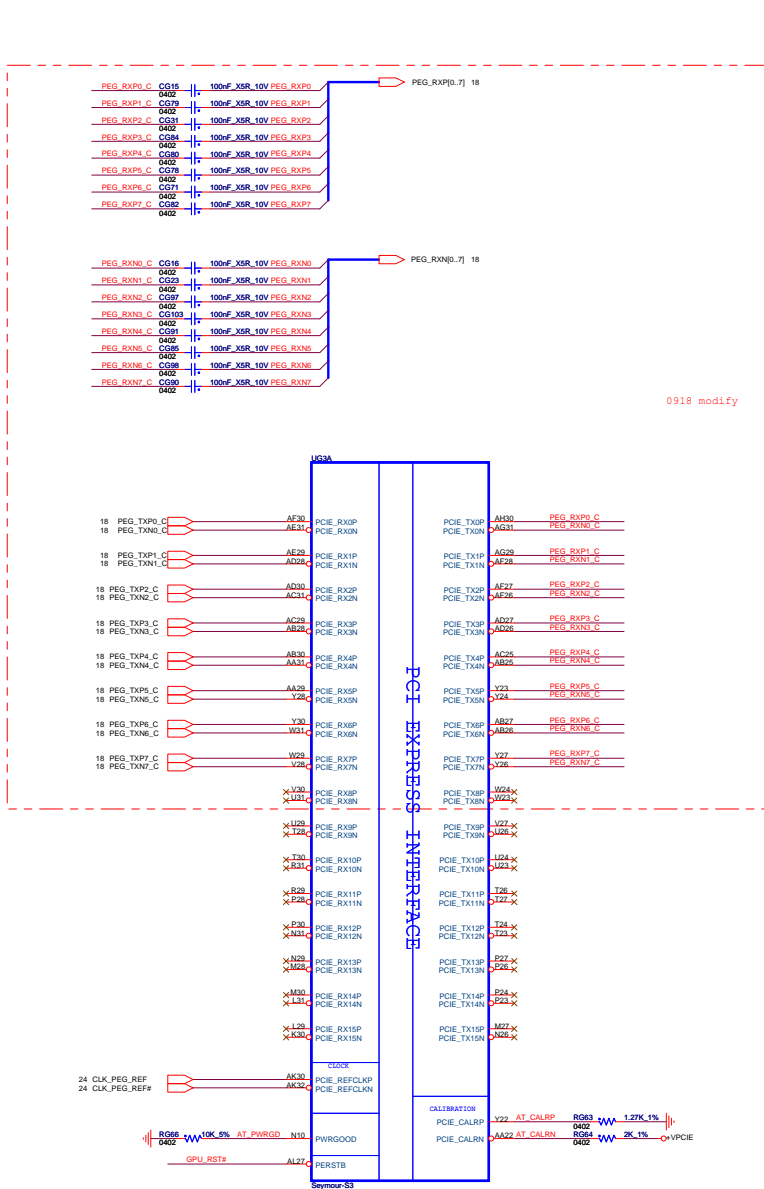


CougarPoint\_Rev\_1p0

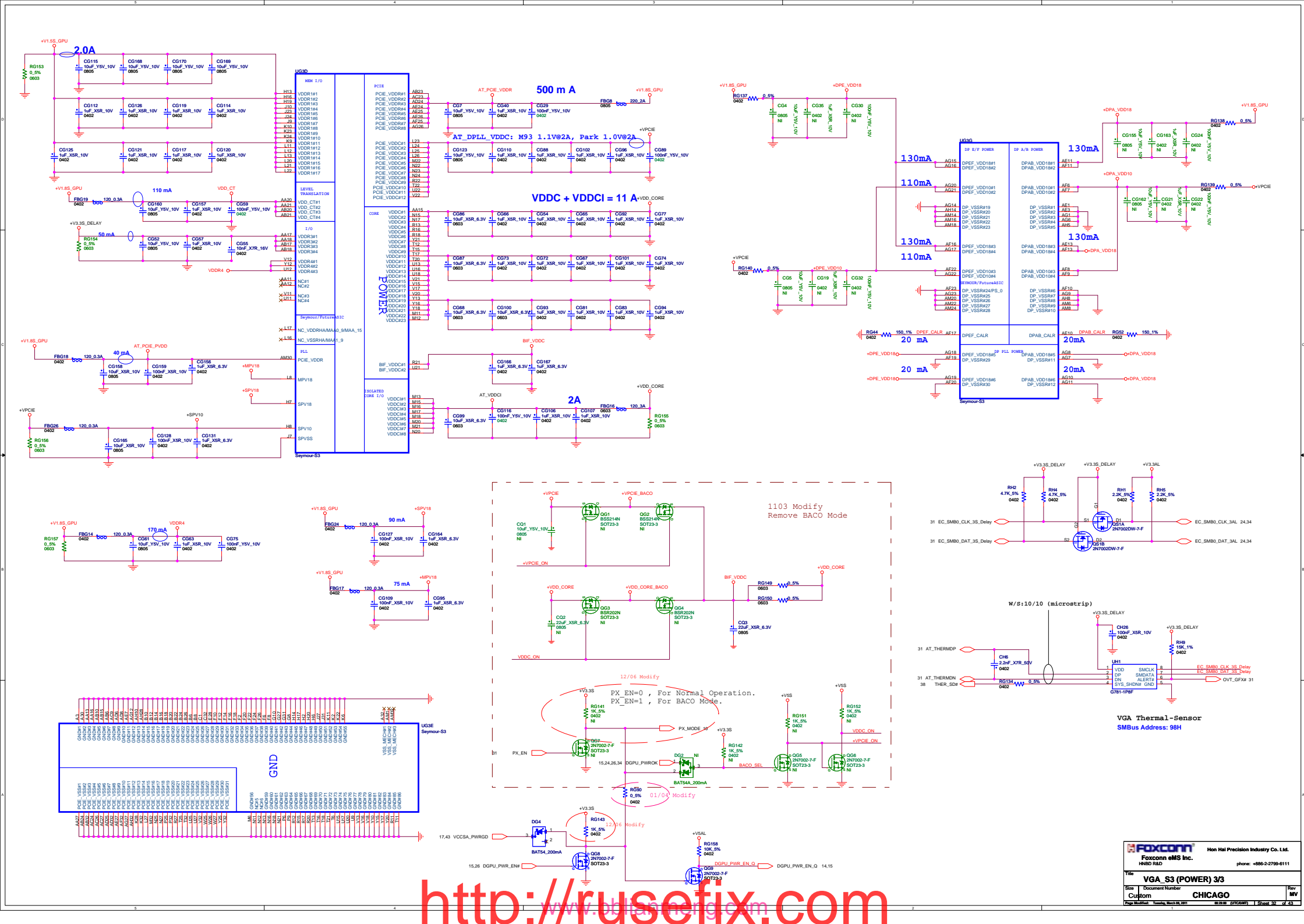










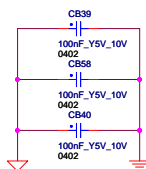
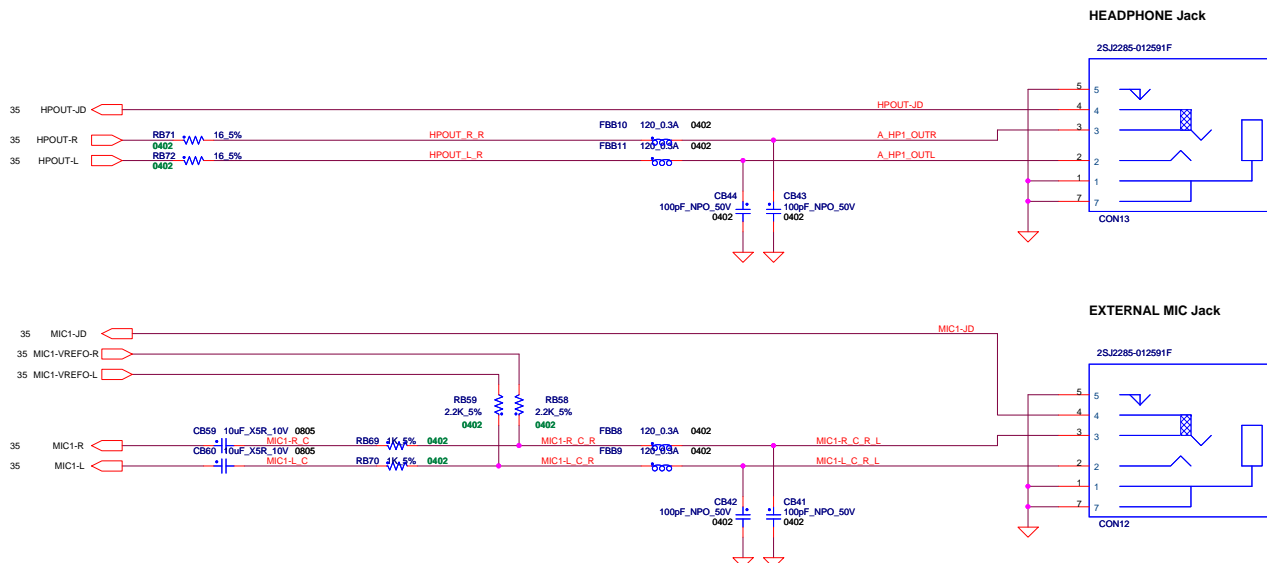
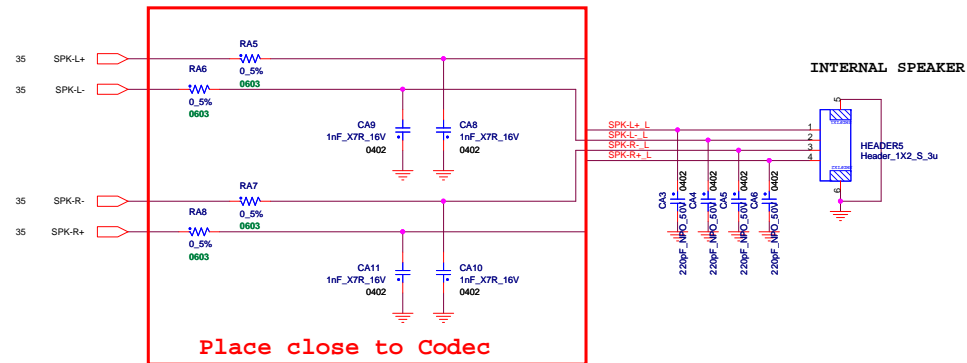
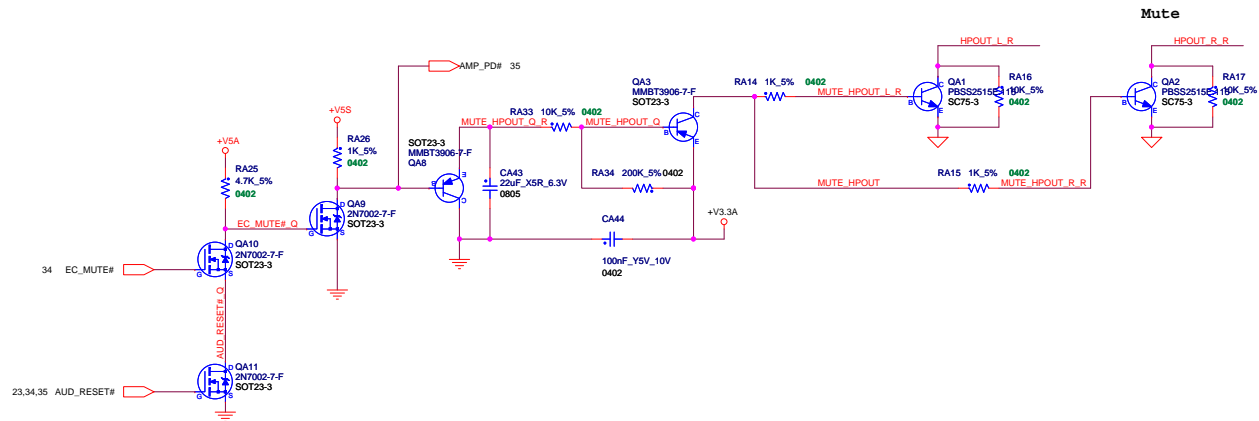




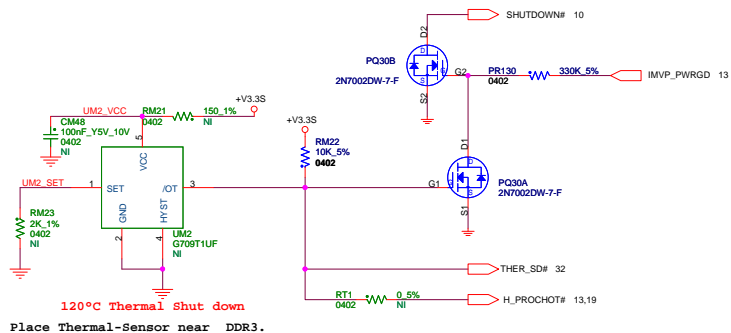
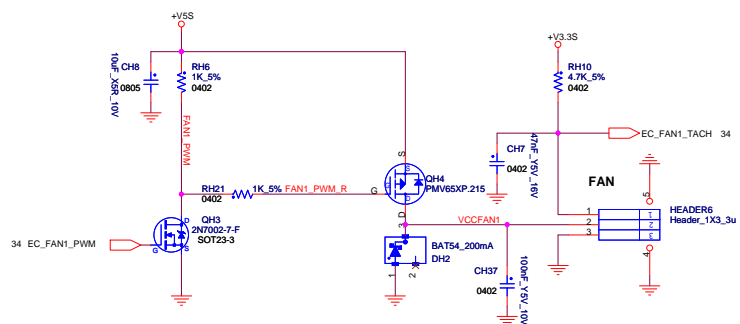
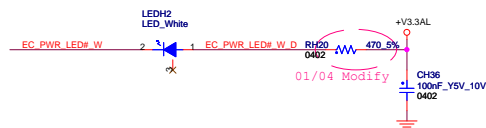




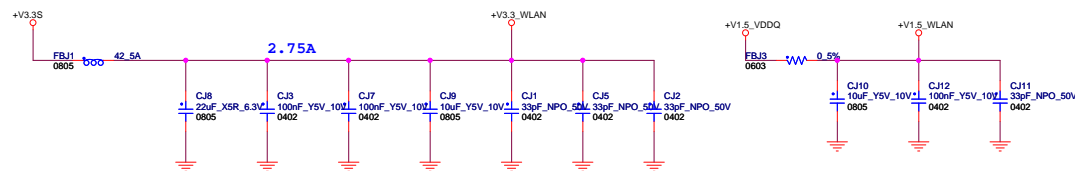
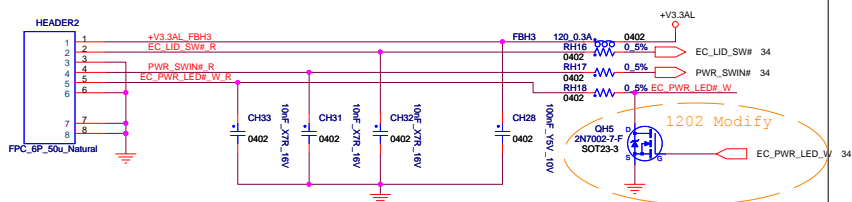




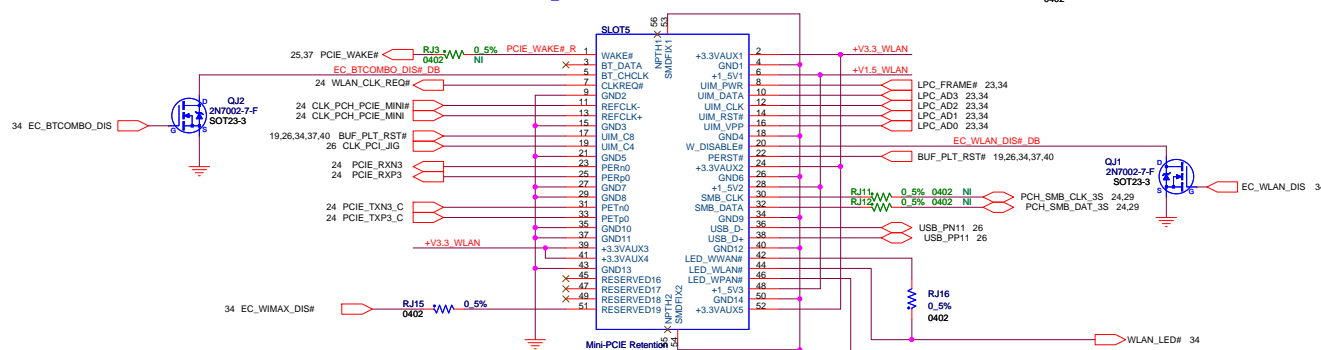




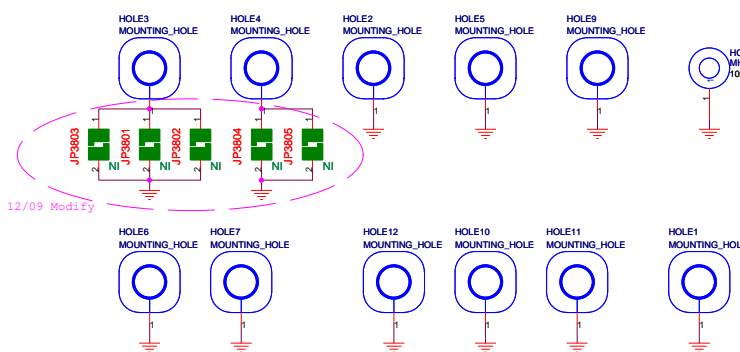
## PWR Board CONN.



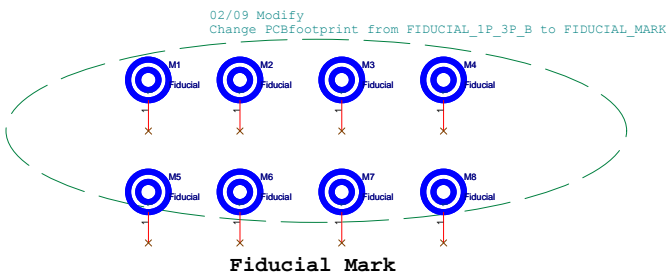
+1.5V=>0.5A Peak/0.375A Normal  
+3.3Vaux=>2.75A Peak/1.1A Normal



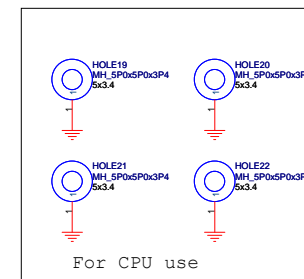
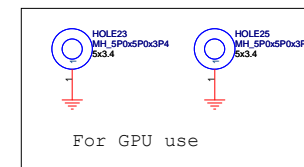
## Half Mini Card for WLAN



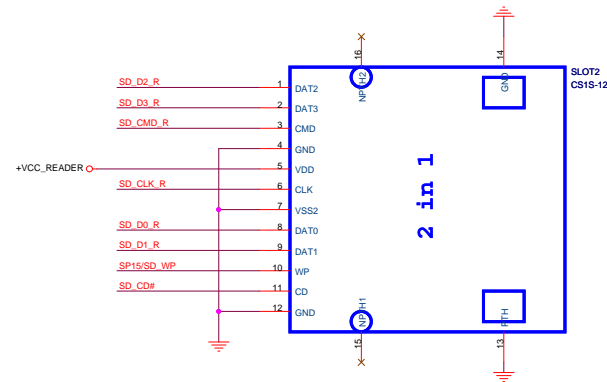
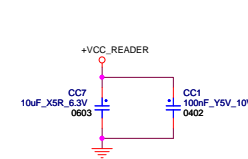
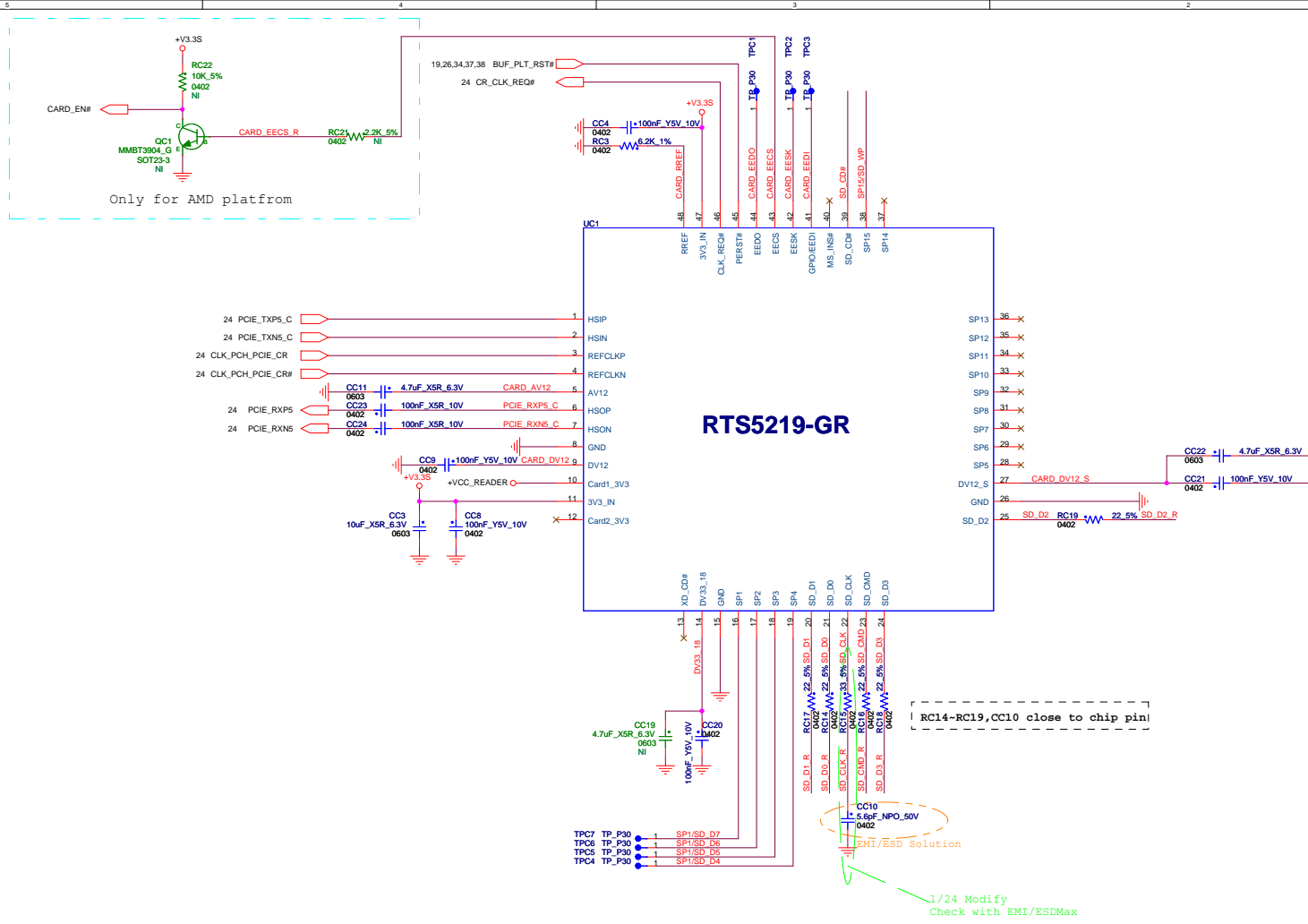
## Mounting HOLE



## Fiducial Mark

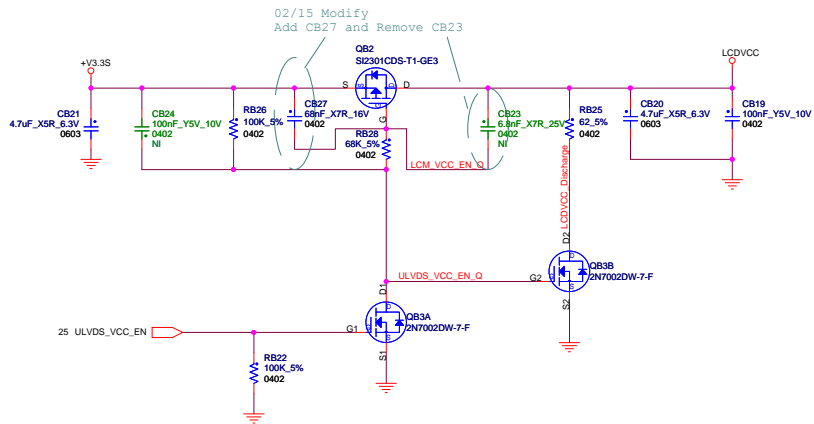
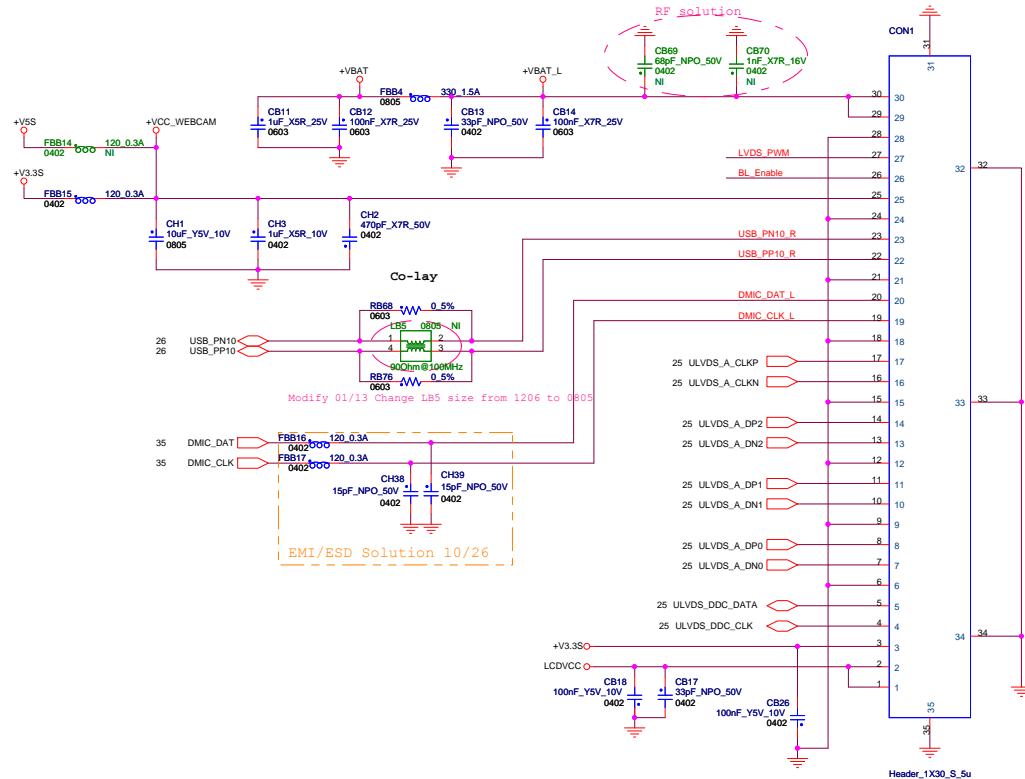
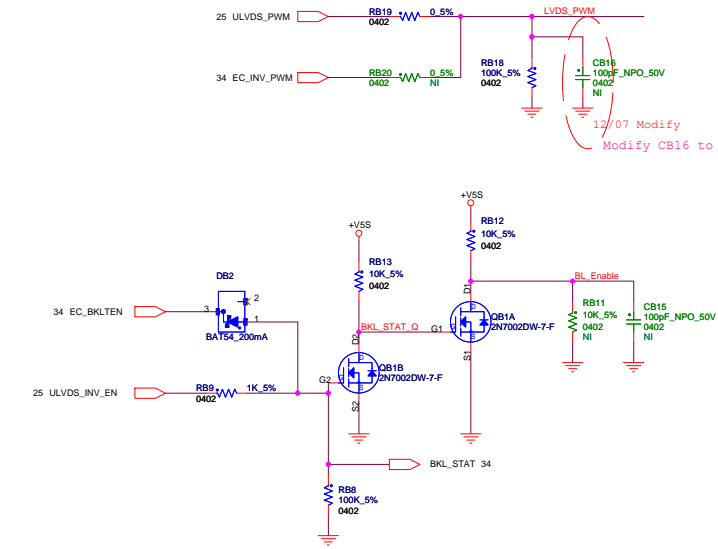


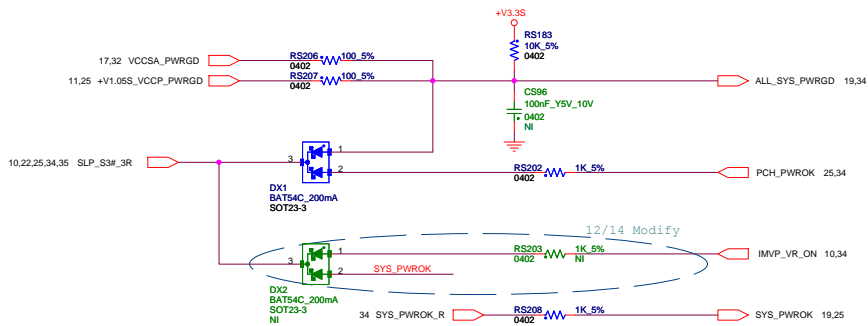








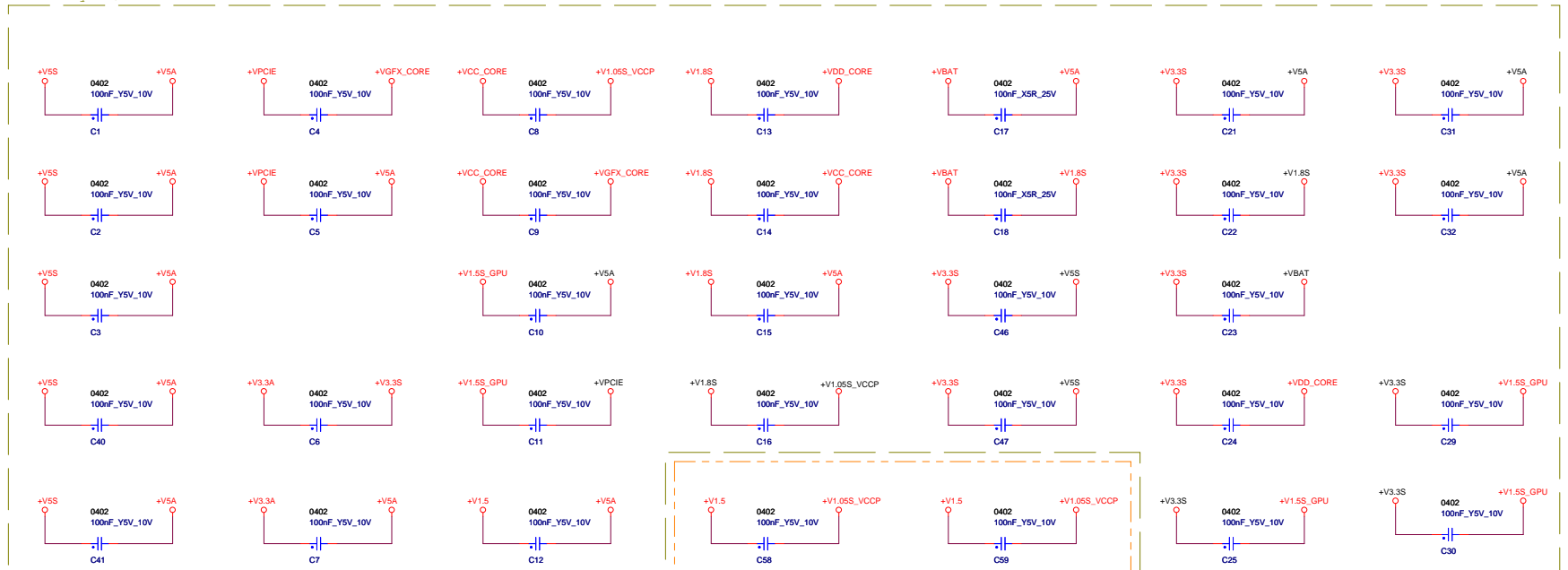
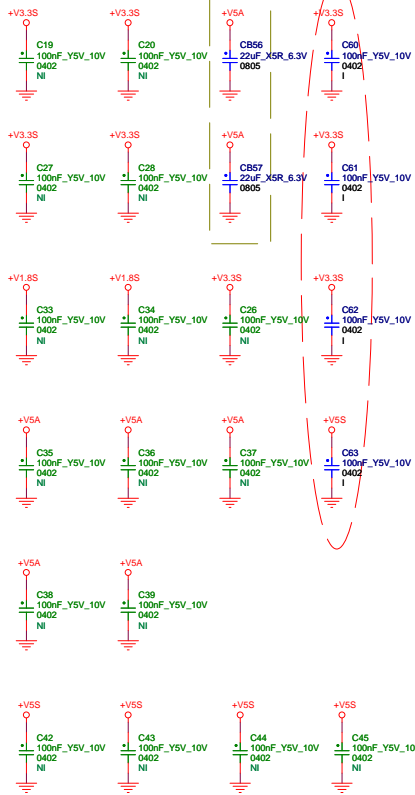




+V5S 12,14,23,27,32,35,36,38,39,41,42  
 +V3.3S 13,14,18,19,23,24,25,26,27,28,29,31,32,34,35,37,38,39,40,41,42  
 +V3.3S\_DELAY 14,30,31,32

12/07 Modify  
 1117 Modify

Modify 11/11



EMI/ESD Solution 10/26

