

MSI CONFIDENTIAL

MS-7948-0B (174mm*175mm)

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CPU:

SOC

OnBoard Chipset:

Audio Codec: Realtek ALC283

LAN: RTL8111GN

SIO: IT8733F-DX colay with IT8732F

Flash ROM: 8MB

Main Memory:

DDR III/L (1333MHZ) * 1 (Max: 8G)

Expansion Slots:

MINI_PCIE Slot * 1

PWM:

Controller: ISL62771

Controller: NCP1589L

Other:

SATAII *1

USB2.0 *4


USB3.0*1(1 have charge fuction)

VGA CONN

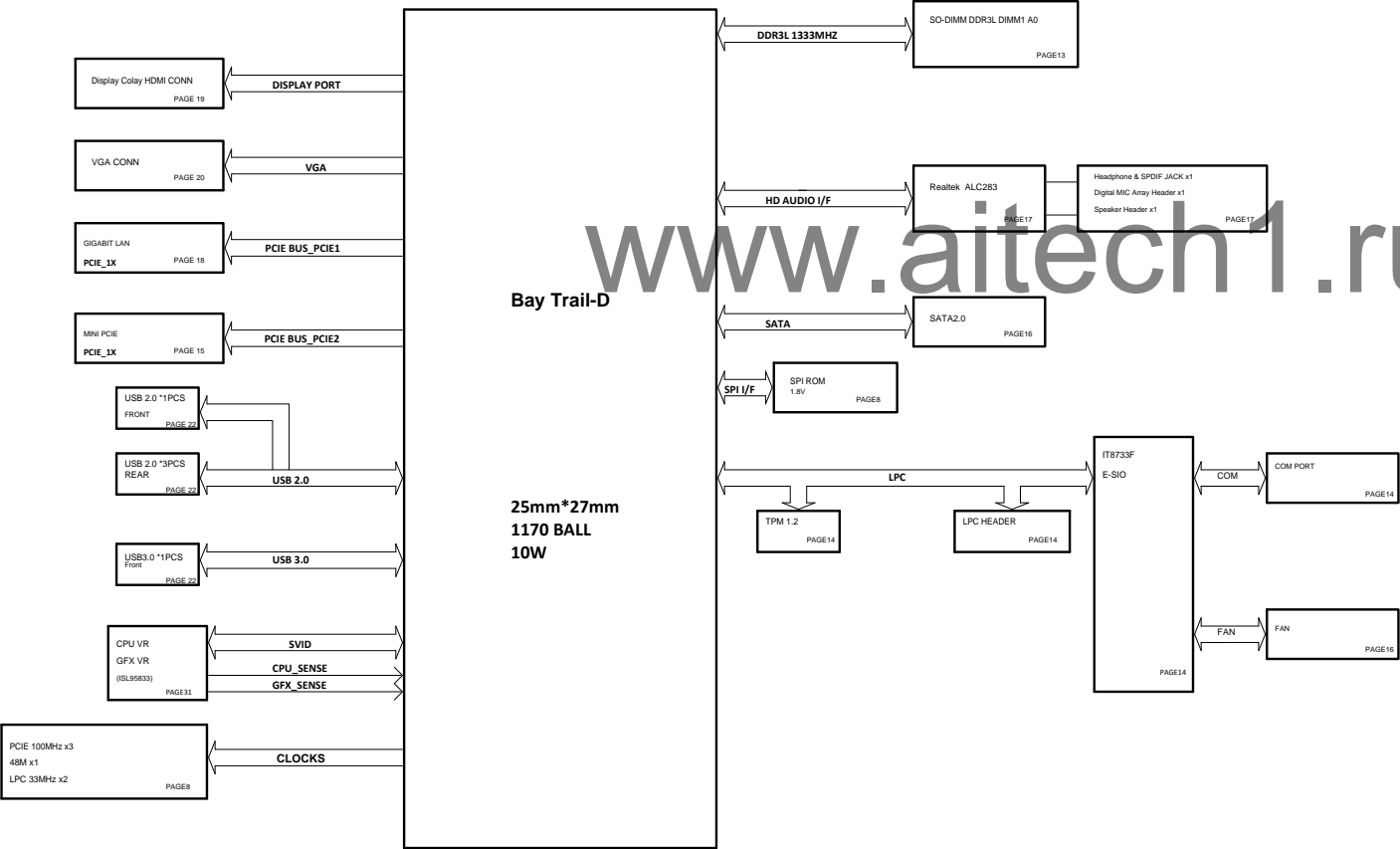
DP CONN

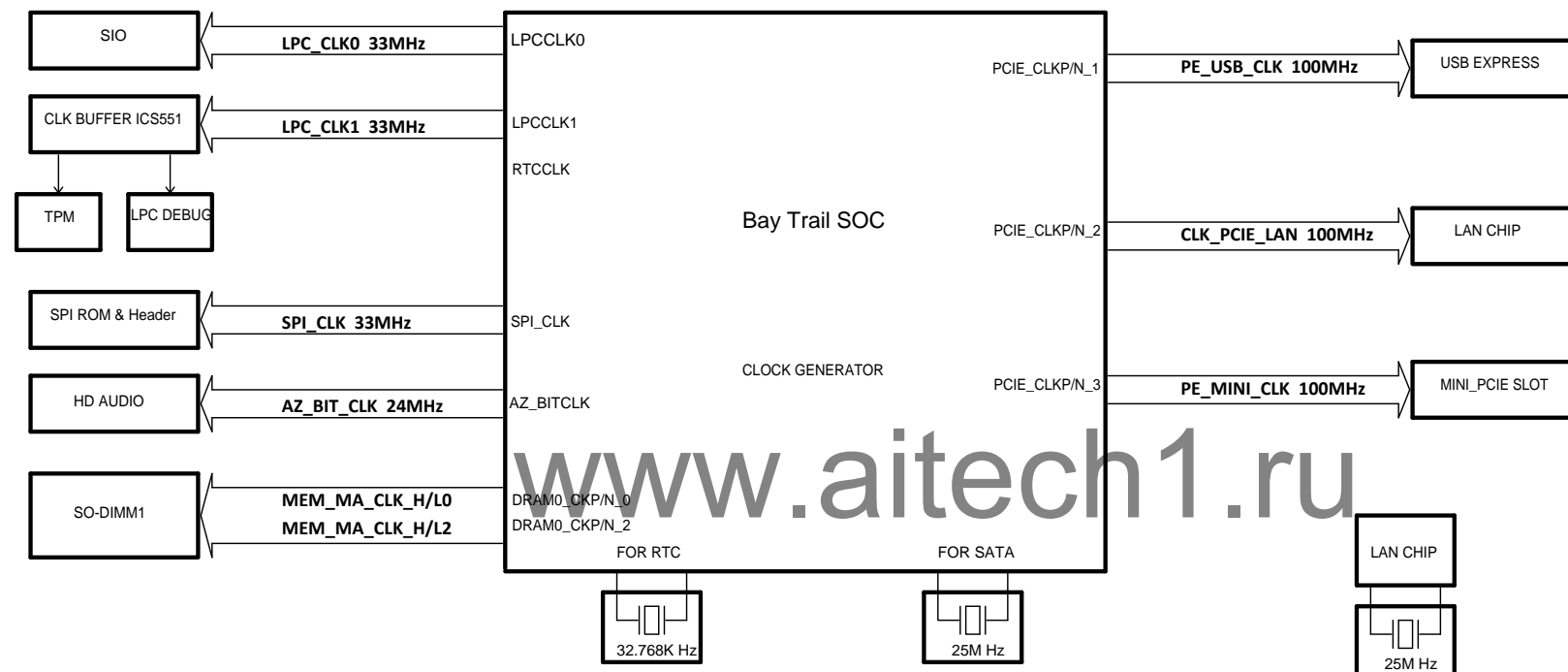
TPM (Reserved)

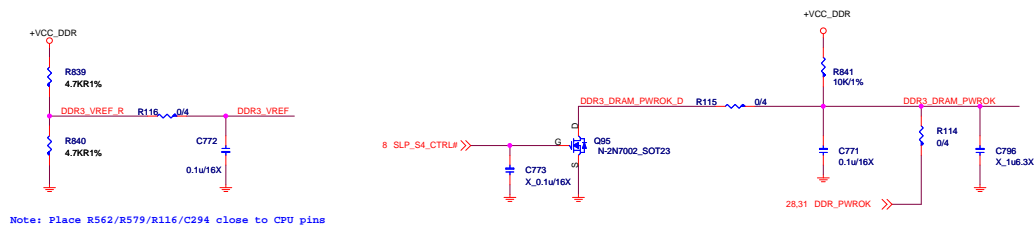
Asset ID

 MICRO-START INT'L CO.,LTD.		
Title Cover Sheet		
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Bay Trail BLOCK DIAGRAM








U49B		
AY45	DRAM1_MA_0	DRAM1_DQ_0
BB42	DRAM1_MA_1	DRAM1_DQ_1
AW43	DRAM1_MA_2	DRAM1_DQ_2
BB44	DRAM1_MA_3	DRAM1_DQ_3
BB50	DRAM1_MA_4	DRAM1_DQ_4
BC53	DRAM1_MA_5	DRAM1_DQ_5
BB49	DRAM1_MA_6	DRAM1_DQ_6
BF50	DRAM1_MA_7	DRAM1_DQ_7
BC52	DRAM1_MA_8	DRAM1_DQ_8
BE52	DRAM1_MA_9	DRAM1_DQ_9
AY48	DRAM1_MA_10	DRAM1_DQ_10
BE51	DRAM1_MA_11	DRAM1_DQ_11
BD47	DRAM1_MA_12	DRAM1_DQ_12
BA51	DRAM1_MA_13	DRAM1_DQ_13
BH49	DRAM1_MA_14	DRAM1_DQ_14
BH50	DRAM1_MA_15	DRAM1_DQ_15
BD38	DRAM1_DM_0	DRAM1_DQ_16
BH36	DRAM1_DM_1	DRAM1_DQ_17
BC36	DRAM1_DM_2	DRAM1_DQ_18
BH42	DRAM1_DM_3	DRAM1_DQ_19
AT51	DRAM1_DM_4	DRAM1_DQ_20
AM42	DRAM1_DM_5	DRAM1_DQ_21
AK50	DRAM1_DM_6	DRAM1_DQ_22
AK52	DRAM1_DM_7	DRAM1_DQ_23
AV45	DRAM1_RAS#	DRAM1_DQ_24
AV44	DRAM1_CAS#	DRAM1_DQ_25
BB51	DRAM1_WE#	DRAM1_DQ_26
AY47	DRAM1_BS_0	DRAM1_DQ_27
AY44	DRAM1_BS_1	DRAM1_DQ_28
BF52	DRAM1_BS_2	DRAM1_DQ_29
AT44	DRAM1_CS#_0	DRAM1_DQ_30
AT45	DRAM1_CS#_2	DRAM1_DQ_31
BG47	DRAM1_CKE_0	DRAM1_DQ_32
BE46	RESERVED_BE46	DRAM1_DQ_33
BD44	DRAM1_CKE_2	DRAM1_DQ_34
BF49	RESERVED_BF48	DRAM1_DQ_35
AP41	DRAM1_ODT_0	DRAM1_DQ_36
AT42	DRAM1_ODT_2	DRAM1_DQ_37
AY50	DRAM1_CKP_0	DRAM1_DQ_38
AV49	DRAM1_CKN_0	DRAM1_DQ_39
AT50	DRAM1_CKP_2	DRAM1_DQ_40
AT48	DRAM1_CKN_2	DRAM1_DQ_41
AT41	DRAM1_DRAMRST#	DRAM1_DQ_42
		DRAM1_DQ_43
		DRAM1_DQ_44
		DRAM1_DQ_45
		DRAM1_DQ_46
		DRAM1_DQ_47
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		DRAM1_DQ_63
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		DRAM1_DQSN_0
		DRAM1_DQSP_1
		DRAM1_DQSN_1
		DRAM1_DQSP_2
		DRAM1_DQSN_2
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		DRAM1_DQSP_7
		DRAM1_DQSN_7
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		BC40
		BA42
		BD42
		BC38
		BD36
		BF42
		BC44
		BH32
		BG32
		BG36
		BJ37
		BG33
		BJ33
		BG37
		BH38
		AU36
		AT36
		AV40
		AT40
		BA36
		AV36
		AY42
		AY40
		BJ41
		BG41
		BJ45
		BH46
		BG40
		BH40
		BH48
		BH47
		AY52
		AY51
		AP52
		AP51
		AW51
		AW53
		AR51
		AR53
		AP47
		AP45
		AK40
		AM41
		AP48
		AP50
		AK42
		AH40
		AM45
		AM49
		AF48
		AF50
		AM48
		AM50
		AH44
		AK45
		AM52
		AL51
		AG53
		AG51
		AL53
		AK51
		AF52
		AF51
		BF40
		BD40
		BG35
		BH34
		BA38
		AY38
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		AP42
		AP44
		AK47
		AK48
		AH52
		AJ51

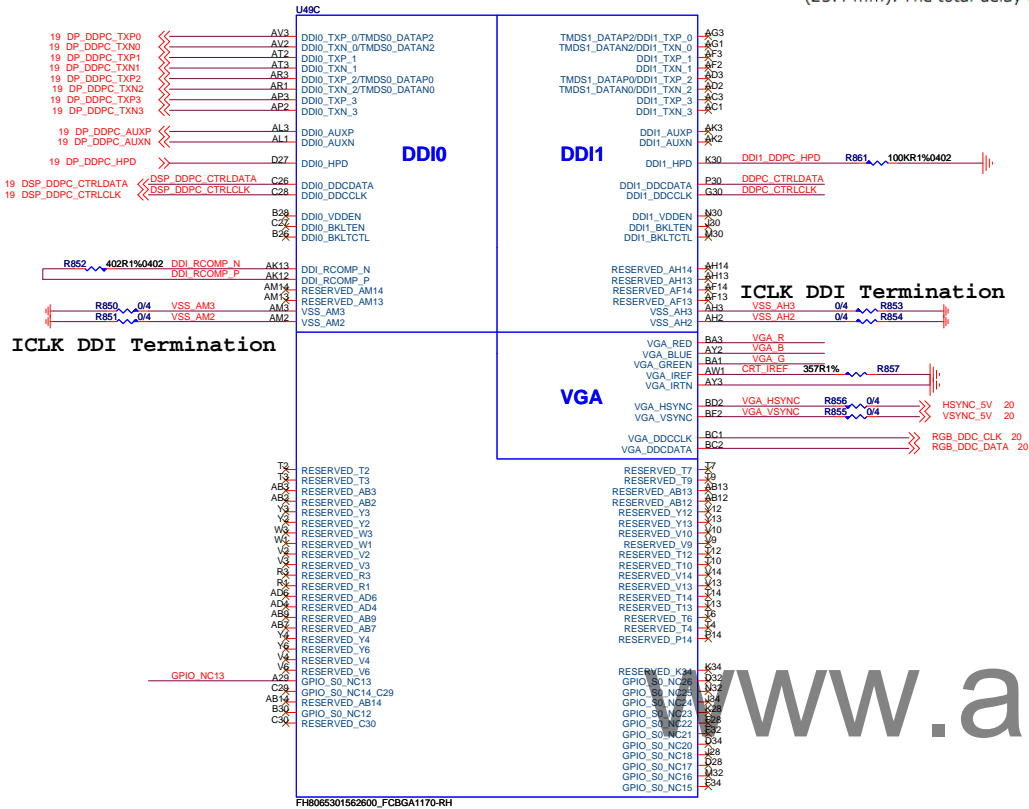
FH8065301562600_FCBGA1170-RH

DDR SYSTEM MEMORY CHANNEL B

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 MICRO-START INT'L CO.,LTD.		
Title		
SOC-2 DDR Channel B		
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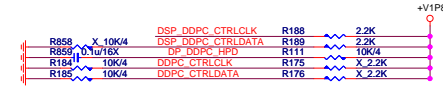
- DDCDATA must be routed same length or longer than DDCCLK within 1000 mils (25.4 mm). The total delay on DDCDATA should be longer than DDCCLK.



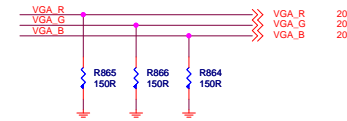
STRAP:

DDIO enable stuff R189, DDIO Disable stuff R858

DDI1 enable stuff R176, DDI1 Disable stuff R185



close to CPU



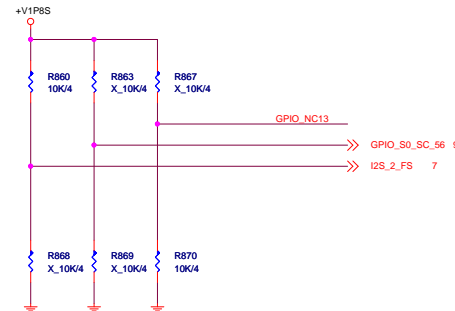
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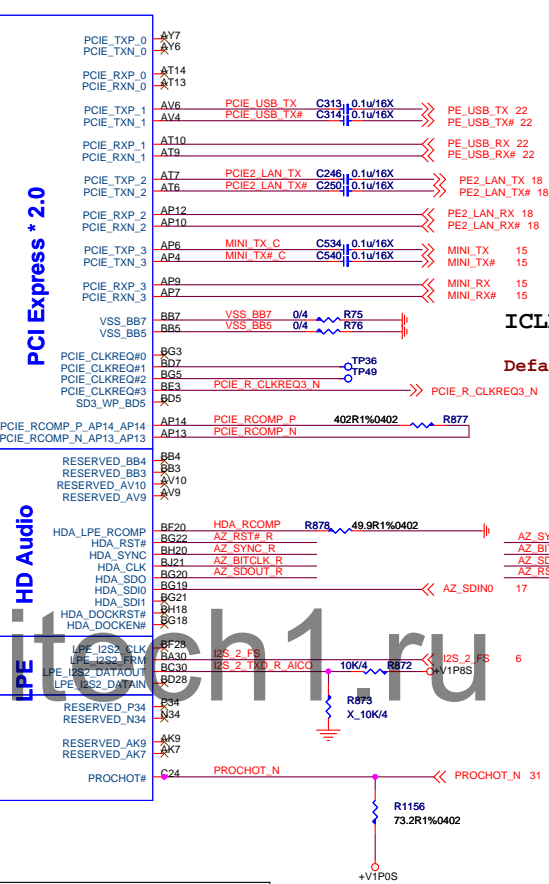
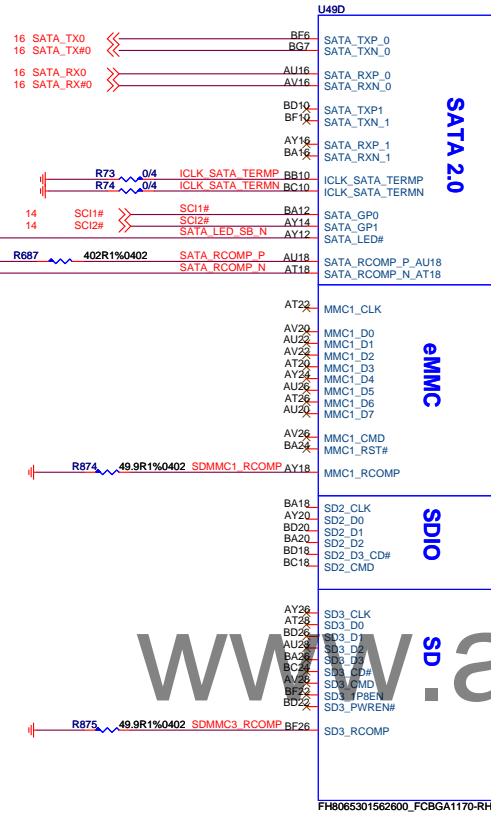
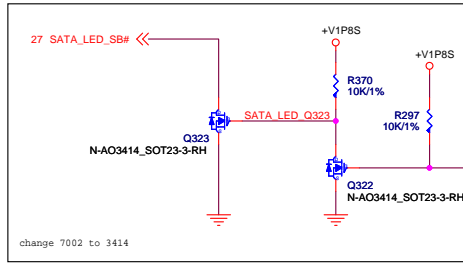
2.25 Hardware Straps

All straps are sampled on the rising edge of PMC_CORE_PWROK.

Table 36. Straps

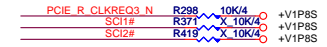
Signal Name	Function	Default	Strap Exit	Strap Description
GPIO_S0_SC[056]	Legacy	1b	PMC_CORE_PWROK de-asserted	Top Swap (A16 Override) 0 = Top address bit is unchanged 1 = Top address bit is inverted
GPIO_S0_SC[063]	Legacy	1b	PMC_CORE_PWROK de-asserted	BIOS Boot Selection 0 = LPC 1 = SPI
GPIO_S0_SC[065]	Legacy	1b	PMC_CORE_PWROK de-asserted	Security Flash Descriptors 0 = Override 1 = Normal Operation
DDIO_DDCDATA	Display	0b	PMC_CORE_PWROK de-asserted	DDIO Detect 0 = DDIO not detected 1 = DDIO detected
DDI1_DDCDATA	Display	0b	PMC_CORE_PWROK de-asserted	DDI1 Detect 0 = DDI1 not detected 1 = DDI1 detected



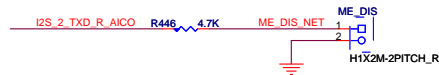


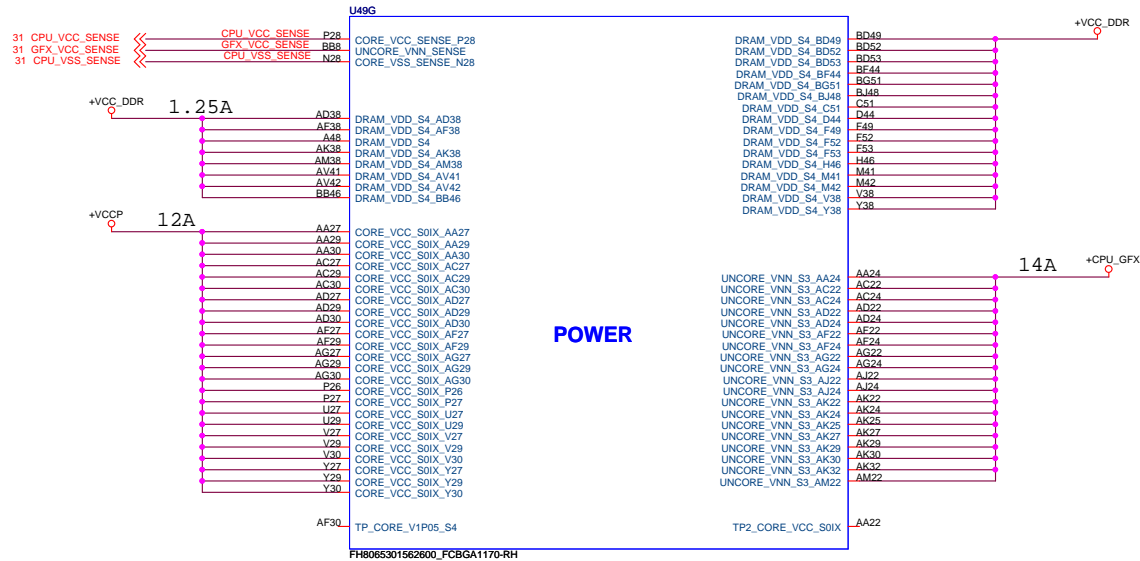
ICLK PCIE Termination

Default disable Clkreq# function.

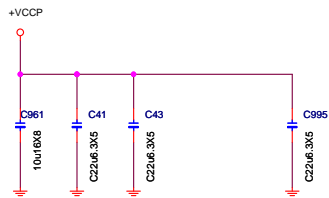


ME_DIS

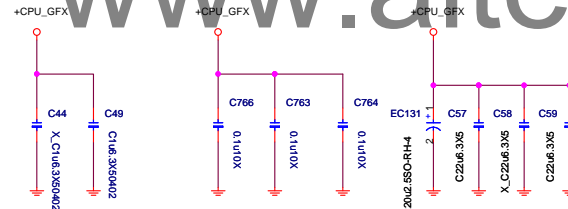




Place the caps under the PKG shadow



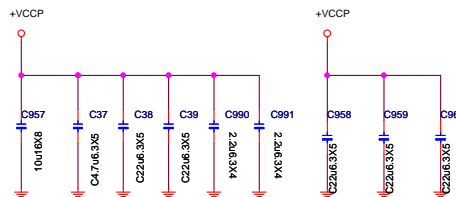
Place the caps under the PKG shadow



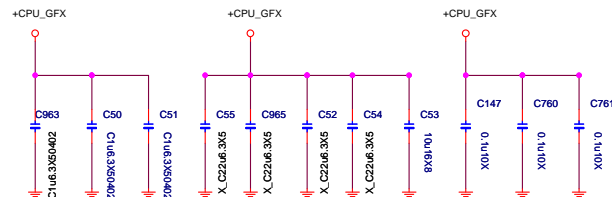
Place the caps under the PKG shadow



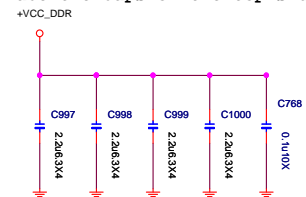
Place the caps on the top side

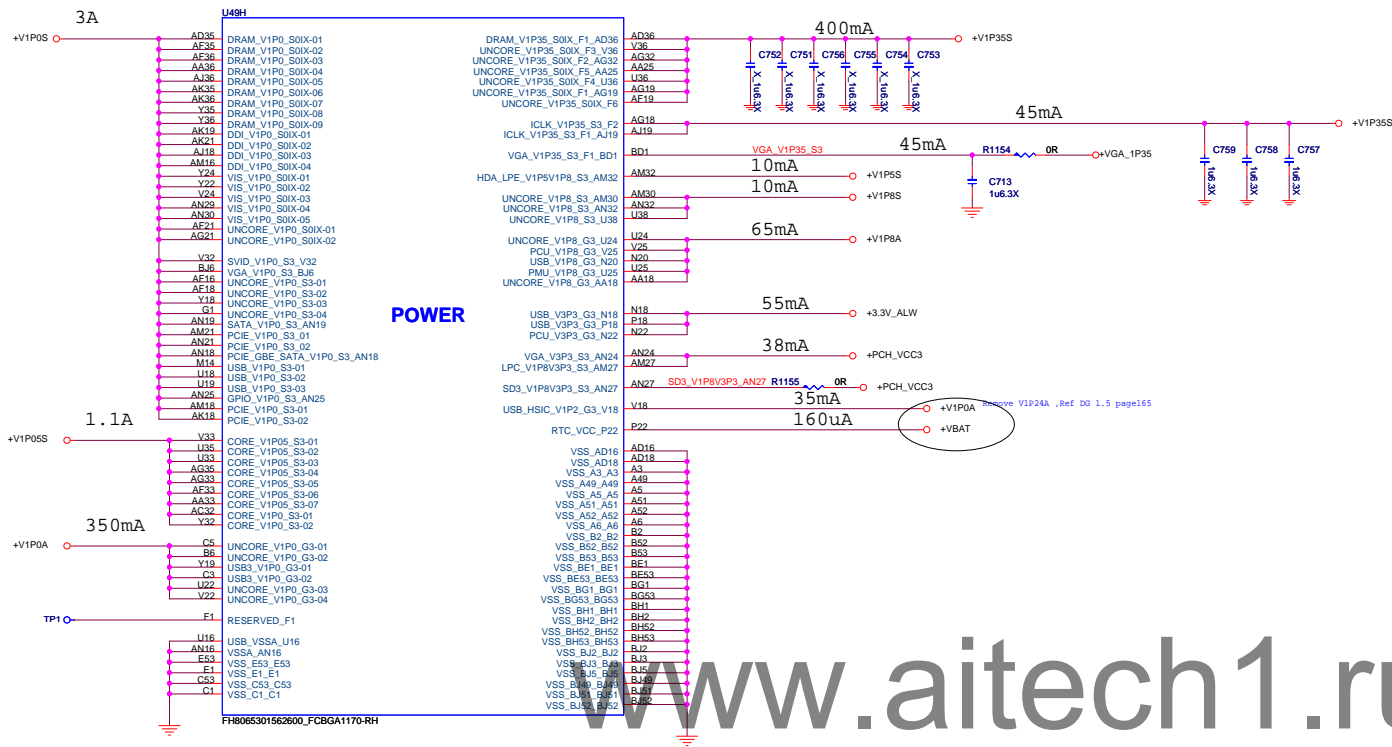


Place the caps on the top side



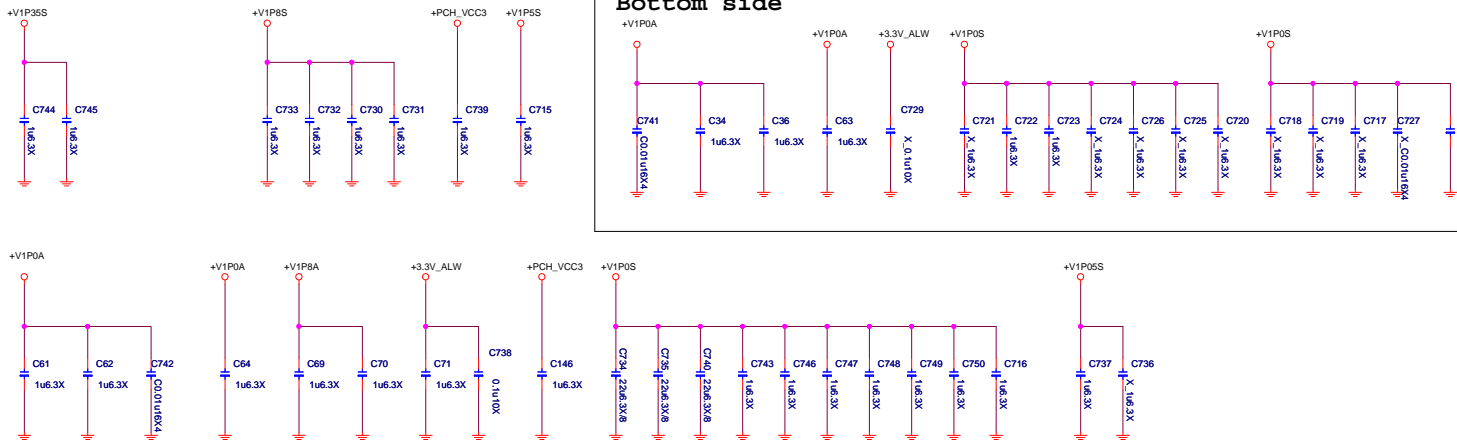
Place the caps on the top side

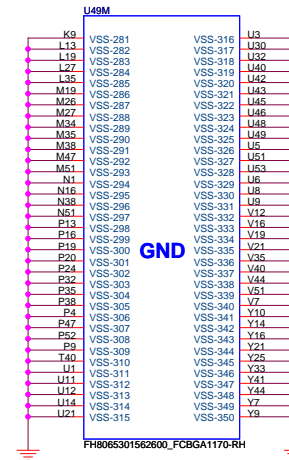
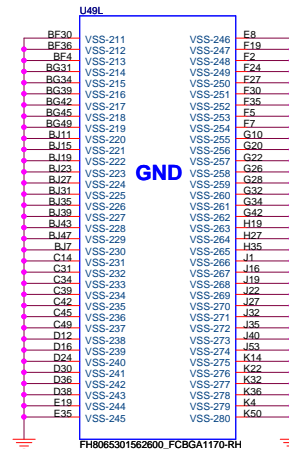
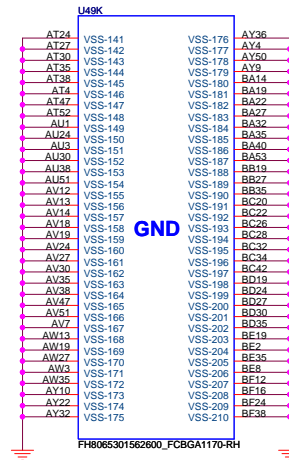
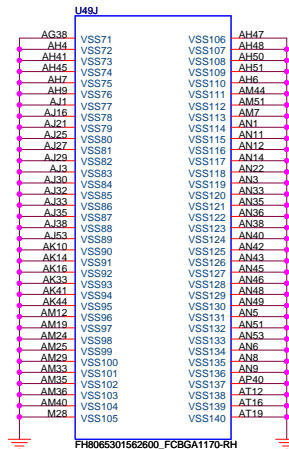
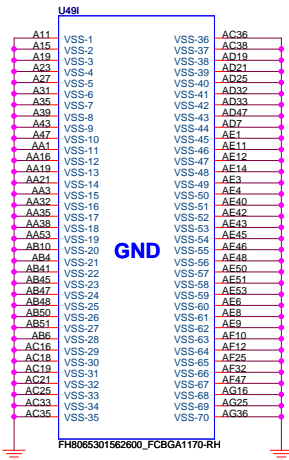




Top side

Bottom side





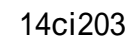
MSI
MICRO-START INT'L CO.,LTD.

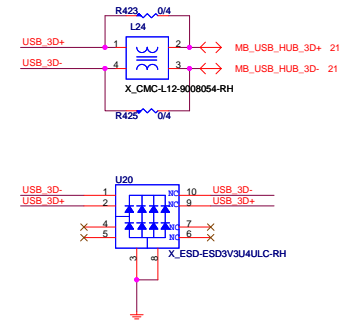
File: **SOC-9 GND**

Size: Document Number **MS-7948** Rev **0B**

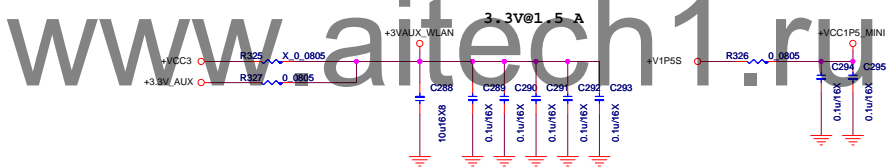
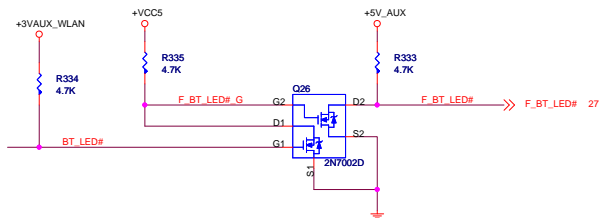
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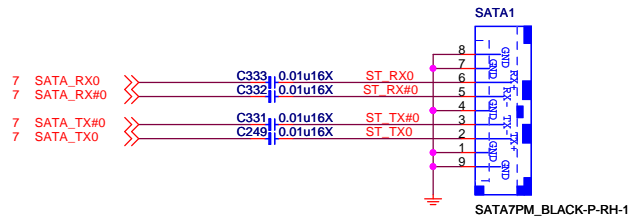




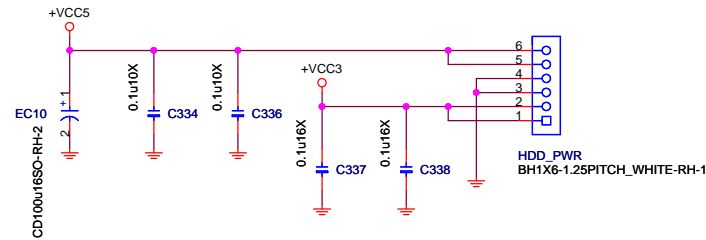
BT LED



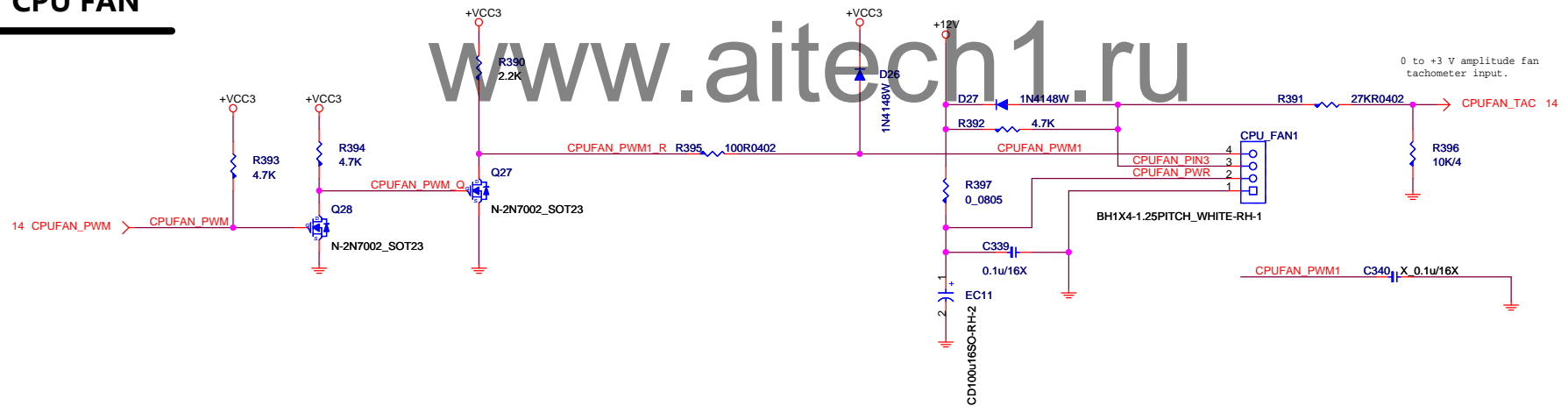
SATA1



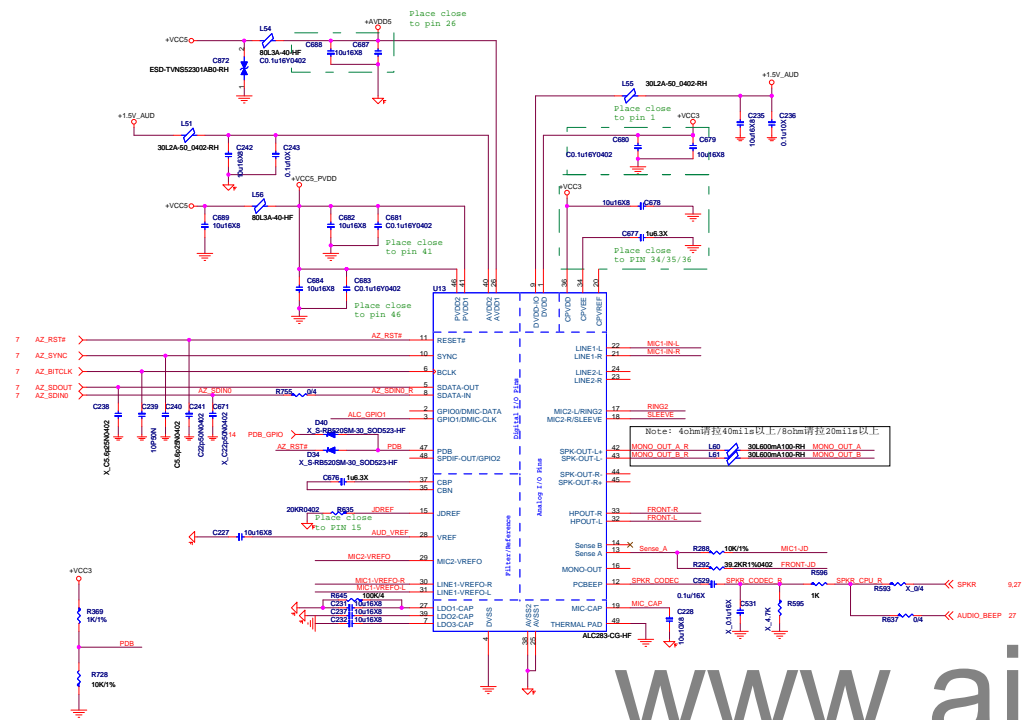
HDD POWER CONNECTOR



CPU FAN

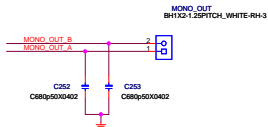


Audio Codec ALC283

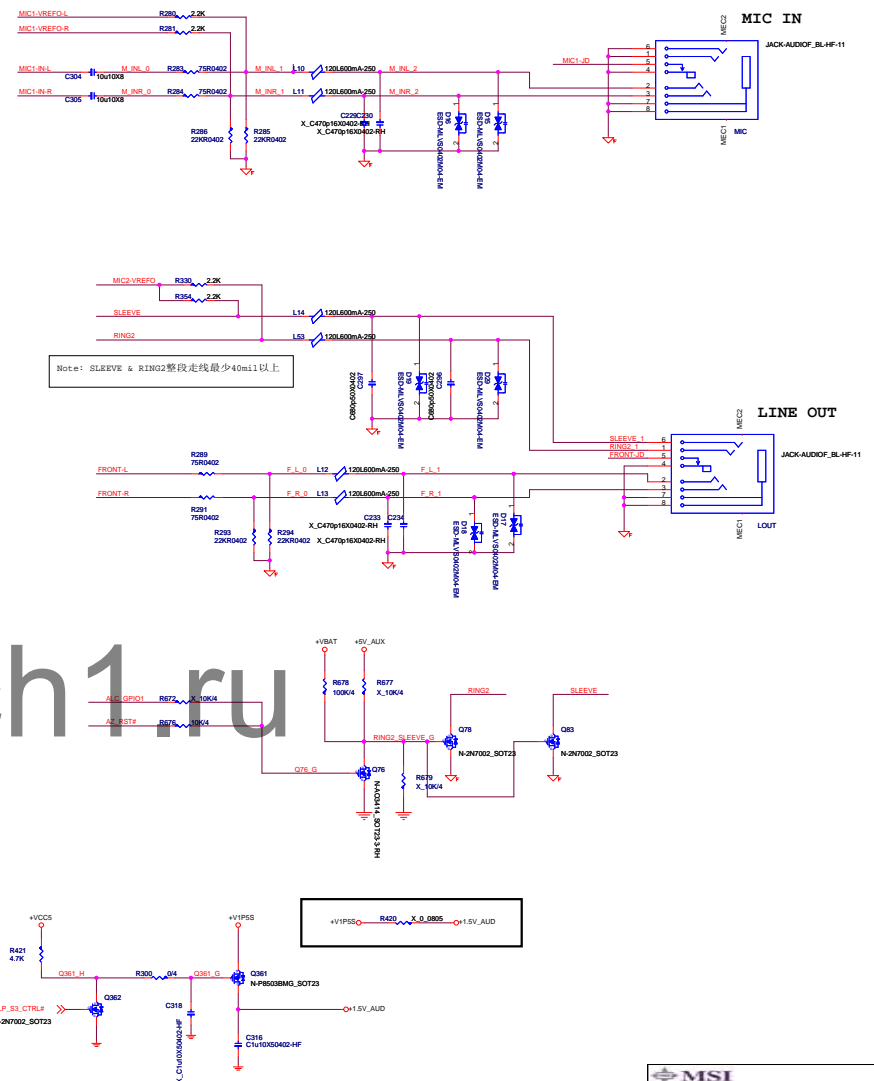


Tied at one point only
under the codec or near
the codec

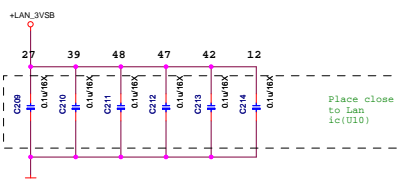
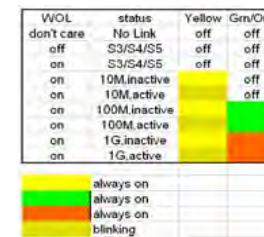
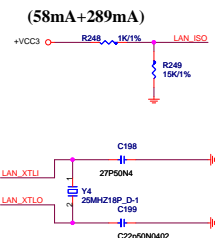
MONO Amplifier



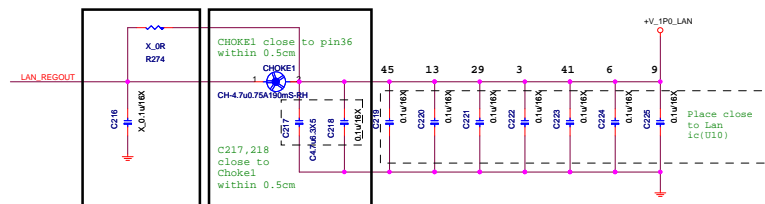
Front Jack



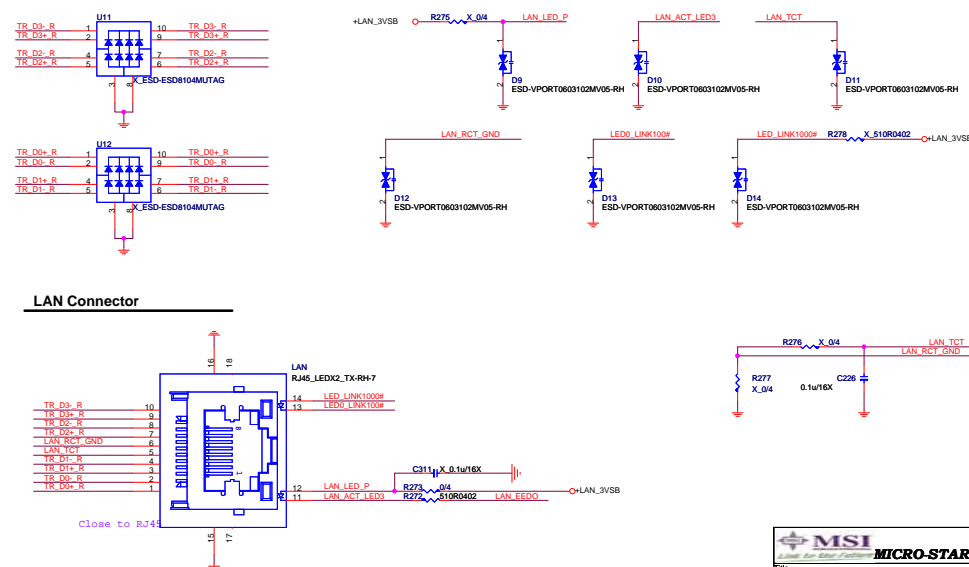
The diagram shows a circuit section for a 3.3V AUX signal. It includes a 100 Ohm resistor labeled R271. The circuit is connected to a 3.3V AUX input and a 3.3V output. A component X10005 is also shown in the circuit.



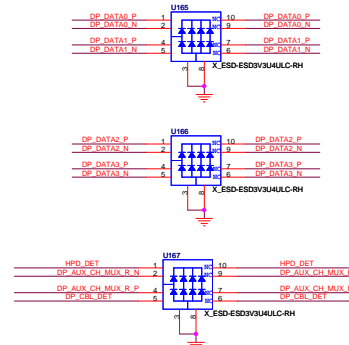
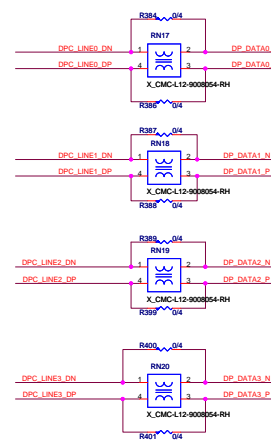
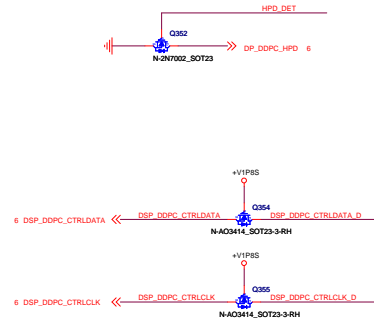
Place Near Pin



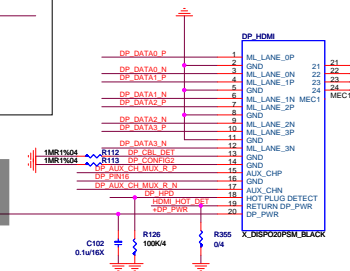
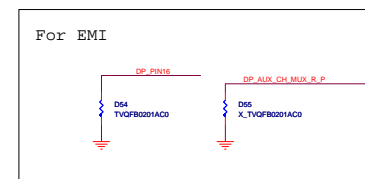
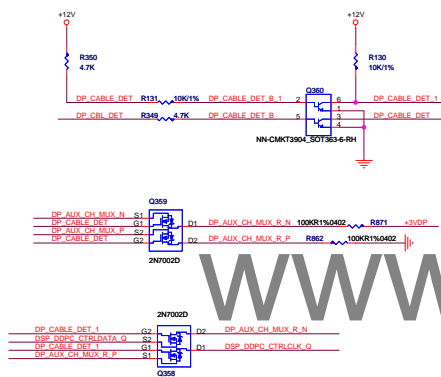
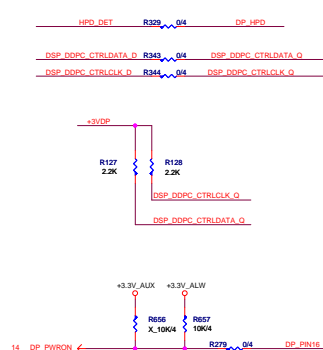
LAN Connector



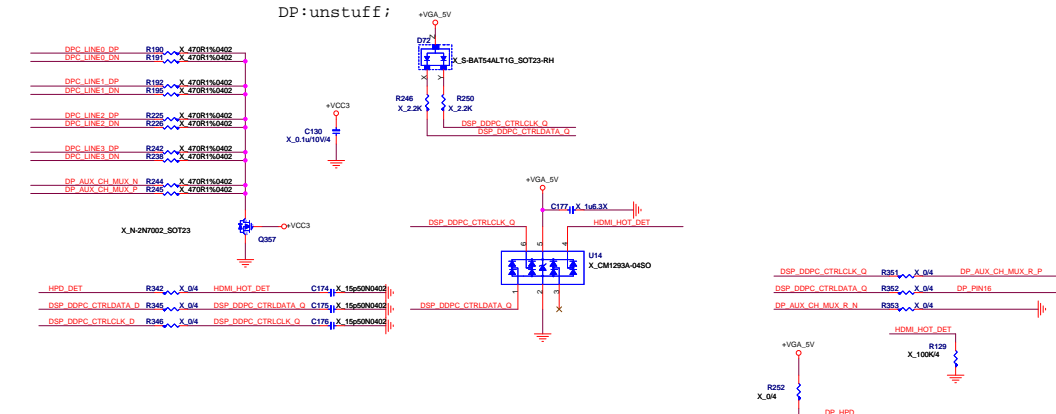
```
DP:stuff;
HDMI:stuff;
```



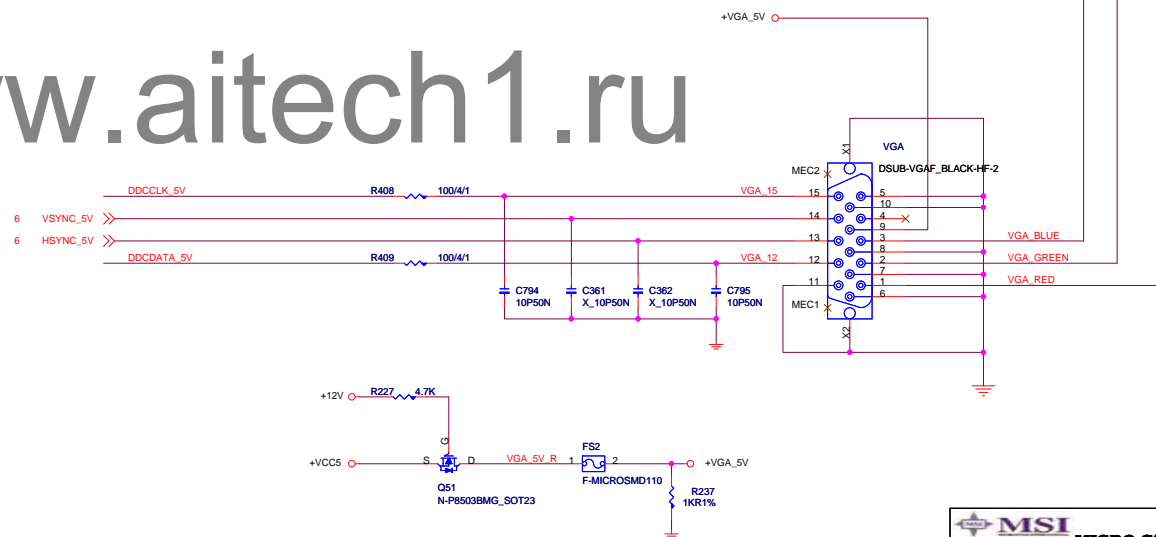
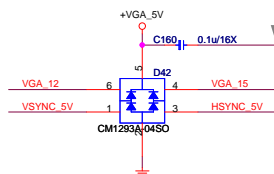
```
DP:stuff;
```



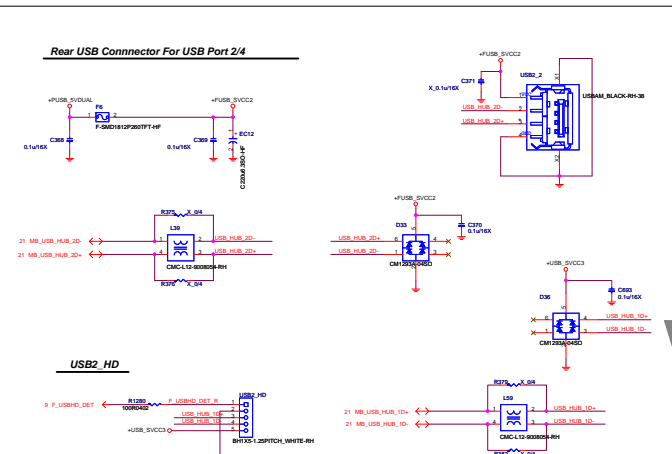
```
HDMI:stuff;
DP:unstuff;
```



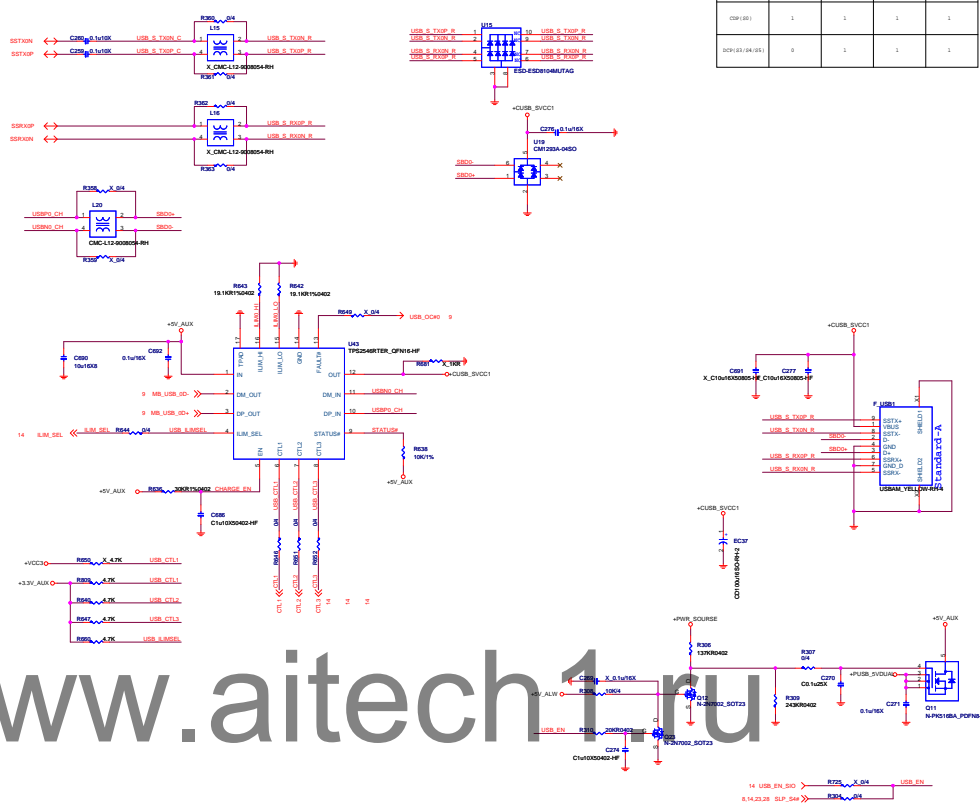
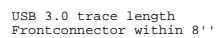
Level shift

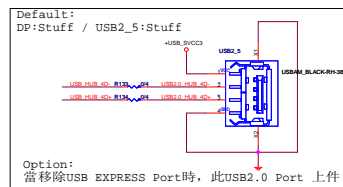


USB POWER ON



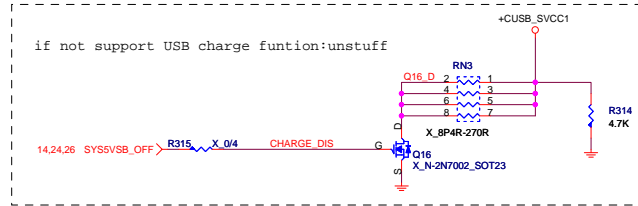
USB Express for ODD



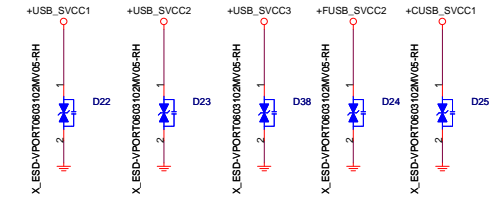
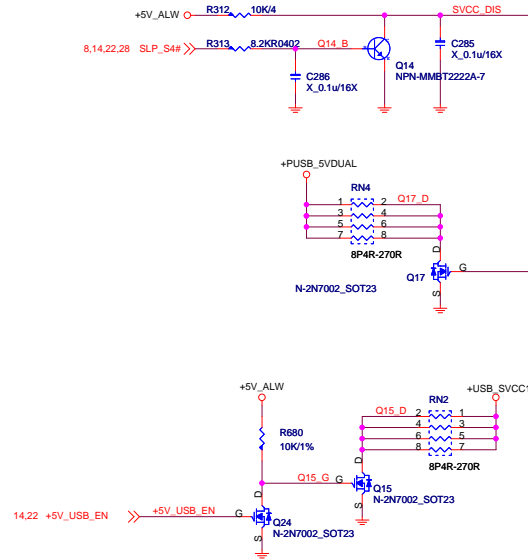


Charge 設定	CYL1	CYL2	CYL3	SLDM_88
COP (80)	1	1	1	1
DOP (83/84/85)	0	1	1	1

USB power discharge circuit



Lenovo Consumer MB common spec V0.2:
Must reserve ESD protection diode on USB front header 5V_Dual power.



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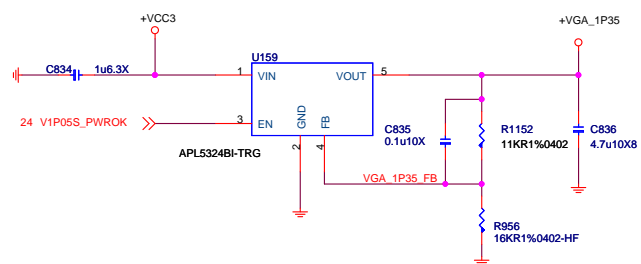
[illegible][illegible][illegible]

The circuit diagram shows a 100W LED driver. Key components and values include:

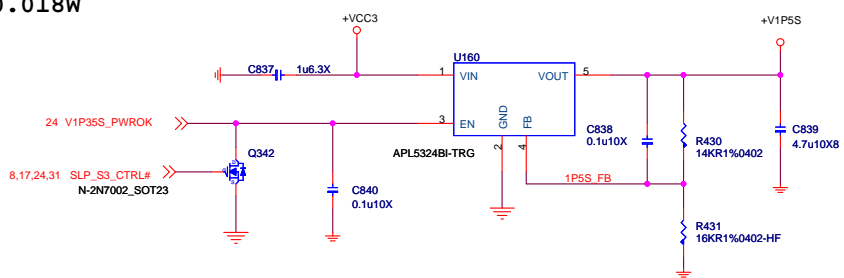
- Input voltage: $V_{IN} = 1.0V$
- Output voltage: $V_{OUT} = 0.8V \cdot (1.0K/10K) = 1V$
- Resistors: $R444 = 4.7K$, $R442 = 4.7K$, $R443 = 4.7K$, $R441 = 10K$, $R440 = 10K$, $R439 = 10K$, $R438 = 10K$, $R437 = 10K$, $R436 = 10K$, $R435 = 10K$, $R434 = 10K$, $R433 = 10K$, $R432 = 10K$, $R431 = 10K$, $R430 = 10K$, $R429 = 10K$, $R428 = 10K$, $R427 = 10K$, $R426 = 10K$, $R425 = 10K$, $R424 = 10K$, $R423 = 10K$, $R422 = 10K$, $R421 = 10K$, $R420 = 10K$, $R419 = 10K$, $R418 = 10K$, $R417 = 10K$, $R416 = 10K$, $R415 = 10K$, $R414 = 10K$, $R413 = 10K$, $R412 = 10K$, $R411 = 10K$, $R410 = 10K$, $R409 = 10K$, $R408 = 10K$, $R407 = 10K$, $R406 = 10K$, $R405 = 10K$, $R404 = 10K$, $R403 = 10K$, $R402 = 10K$, $R401 = 10K$, $R400 = 10K$, $R399 = 10K$, $R398 = 10K$, $R397 = 10K$, $R396 = 10K$, $R395 = 10K$, $R394 = 10K$, $R393 = 10K$, $R392 = 10K$, $R391 = 10K$, $R390 = 10K$, $R389 = 10K$, $R388 = 10K$, $R387 = 10K$, $R386 = 10K$, $R385 = 10K$, $R384 = 10K$, $R383 = 10K$, $R382 = 10K$, $R381 = 10K$, $R380 = 10K$, $R379 = 10K$, $R378 = 10K$, $R377 = 10K$, $R376 = 10K$, $R375 = 10K$, $R374 = 10K$, $R373 = 10K$, $R372 = 10K$, $R371 = 10K$, $R370 = 10K$, $R369 = 10K$, $R368 = 10K$, $R367 = 10K$, $R366 = 10K$, $R365 = 10K$, $R364 = 10K$, $R363 = 10K$, $R362 = 10K$, $R361 = 10K$, $R360 = 10K$, $R359 = 10K$, $R358 = 10K$, $R357 = 10K$, $R356 = 10K$, $R355 = 10K$, $R354 = 10K$, $R353 = 10K$, $R352 = 10K$, $R351 = 10K$, $R350 = 10K$, $R349 = 10K$, $R348 = 10K$, $R347 = 10K$, $R346 = 10K$, $R345 = 10K$, $R344 = 10K$, $R343 = 10K$, $R342 = 10K$, $R341 = 10K$, $R340 = 10K$, $R339 = 10K$, $R338 = 10K$, $R337 = 10K$, $R336 = 10K$, $R335 = 10K$, $R334 = 10K$, $R333 = 10K$, $R332 = 10K$, $R331 = 10K$, $R330 = 10K$, $R329 = 10K$, $R328 = 10K$, $R327 = 10K$, $R326 = 10K$, $R325 = 10K$, $R324 = 10K$, $R323 = 10K$, $R322 = 10K$, $R321 = 10K$, $R320 = 10K$, $R319 = 10K$, $R318 = 10K$, $R317 = 10K$, $R316 = 10K$, $R315 = 10K$, $R314 = 10K$, $R313 = 10K$, $R312 = 10K$, $R311 = 10K$, $R310 = 10K$, $R309 = 10K$, $R308 = 10K$, $R307 = 10K$, $R306 = 10K$, $R305 = 10K$, $R304 = 10K$, $R303 = 10K$, $R302 = 10K$, $R301 = 10K$, $R300 = 10K$, $R299 = 10K$, $R298 = 10K$, $R297 = 10K$, $R296 = 10K$, $R295 = 10K$, $R294 = 10K$, $R293 = 10K$, $R292 = 10K$, $R291 = 10K$, $R290 = 10K$, $R289 = 10K$, $R288 = 10K$, $R287 = 10K$, $R286 = 10K$, $R285 = 10K$, $R284 = 10K$, $R283 = 10K$, $R282 = 10K$, $R281 = 10K$, $R280 = 10K$, $R279 = 10K$, $R278 = 10K$, $R277 = 10K$, $R276 = 10K$, $R275 = 10K$, $R274 = 10K$, $R273 = 10K$, $R272 = 10K$, $R271 = 10K$, $R270 = 10K$, $R269 = 10K$, $R268 = 10K$, $R267 = 10K$, $R266 = 10K$, $R265 = 10K$, $R264 = 10K$, $R263 = 10K$, $R262 = 10K$, $R261 = 10K$, $R260 = 10K$, $R259 = 10K$, $R258 = 10K$, $R257 = 10K$, $R256 = 10K$, $R255 = 10K$, $R254 = 10K$, $R253 = 10K$, $R252 = 10K$, $R251 = 10K$, $R250 = 10K$, $R249 = 10K$, $R248 = 10K$, $R247 = 10K$, $R246 = 10K$, $R245 = 10K$, $R244 = 10K$, $R243 = 10K$, $R242 = 10K$, $R241 = 10K$, $R240 = 10K$, $R239 = 10K$, $R238 = 10K$, $R237 = 10K$, $R236 = 10K$, $R235 = 10K$, $R234 = 10K$, $R233 = 10K$, $R232 = 10K$, $R231 = 10K$, $R230 = 10K$, $R229 = 10K$, $R228 = 10K$, $R227 = 10K$, $R226 = 10K$, $R225 = 10K$, $R224 = 10K$, $R223 = 10K$, $R222 = 10K$, $R221 = 10K$, $R220 = 10K$, $R219 = 10K$, $R218 = 10K$, $R217 = 10K$, $R216 = 10K$, $R215 = 10K$, $R214 = 10K$, $R213 = 10K$, $R212 = 10K$, $R211 = 10K$, $R210 = 10K$, $R209 = 10K$, $R208 = 10K$, $R207 = 10K$, $R206 = 10K$, $R205 = 10K$, $R204 = 10K$, $R203 = 10K$, $R202 = 10K$, $R201 = 10K$, $R200 = 10K$, $R199 = 10K$, $R198 = 10K$, $R197 = 10K$, $R196 = 10K$, $R195 = 10K$, $R194 = 10K$, $R193 = 10K$, $R192 = 10K$, $R191 = 10K$, $R190 = 10K$, $R189 = 10K$, $R188 = 10K$, $R187 = 10K$, $R186 = 10K$, $R185 = 10K$, $R184 = 10K$, $R183 = 10K$, $R182 = 10K$, $R181 = 10K$, $R180 = 10K$, $R179 = 10K$, $R178 = 10K$, $R177 = 10K$, $R176 = 10K$, $R175 = 10K$, $R174 = 10K$, $R173 = 10K$, $R172 = 10K$, $R171 = 10K$, $R170 = 10K$, $R169 = 10K$, $R168 = 10K$, $R167 = 10K$, $R166 = 10K$, $R165 = 10K$, $R164 = 10K$, $R163 = 10K$, $R162 = 10K$, $R161 = 10$

Two circuit diagrams are shown. The left diagram shows a MOSFET (Q251) with its gate connected to a voltage source (+V176A) through a resistor (R1144, 470R176402). The right diagram shows a MOSFET (Q255) with its drain connected to a voltage source (+V176A) through a resistor (R1145, 470R176402). Both diagrams include a ground connection.

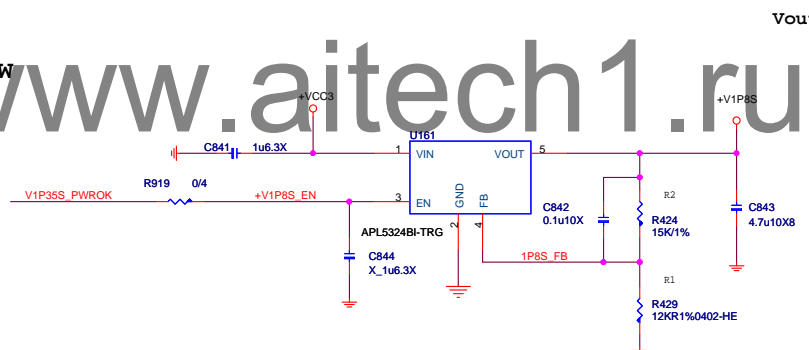
SOC Power: +VGA_1P35 45mA
 Max Power dissipation: $(3.3\text{ V}-1.35\text{ V})\times 0.045\text{ A}=0.08775\text{ W}$
 VIN Range: 0.3 V to 6.5 V
 Enable/disable: $> 1.2\text{ V}$ & $< 0.35\text{ V}$
 Drop voltage: 300 mV at 600 mA



SOC Power: +V1P5S 10mA
 Max Power dissipation: $(3.3\text{ V}-1.5\text{ V})\times 0.01\text{ A}= 0.018\text{ W}$
 VIN Range: 0.3 V to 6.5 V
 Enable/disable: $> 1.2\text{ V}$ & $< 0.35\text{ V}$
 Drop voltage: 300 mV at 600 mA



SOC Power: +V1P8S 10 mA
 Max Power dissipation: $(3.3\text{ V}-1.8\text{ V})\times 0.01\text{ A}=0.015\text{ W}$
 VIN Range: 0.3 V to 6.5 V
 Enable/disable: $> 1.2\text{ V}$ & $< 0.35\text{ V}$
 Drop voltage: 400 mV at 600 mA

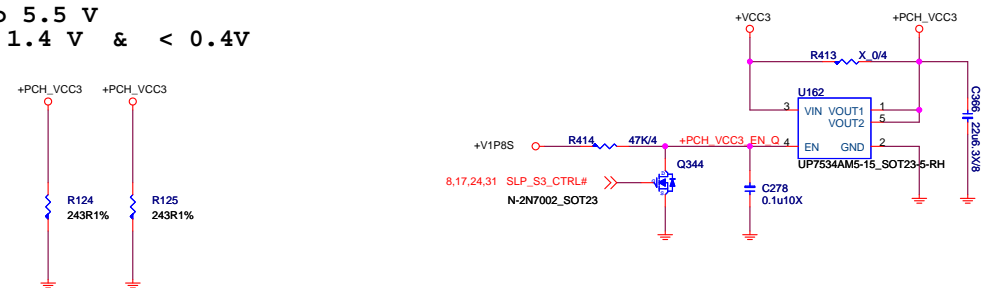


$$V_{out} = V_{ref} \times (R1 + R2) / R1$$

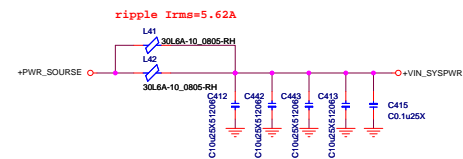
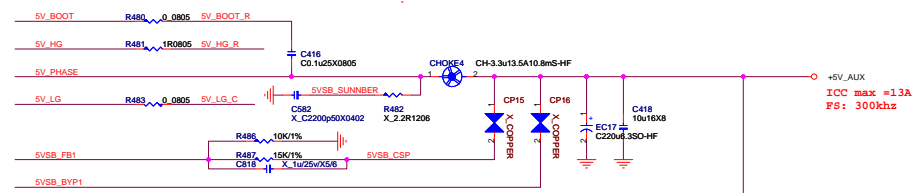
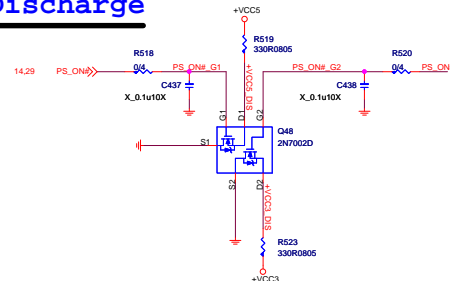
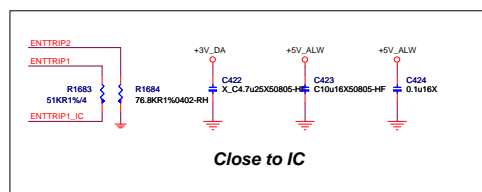
$$= 0.8\text{ V} \times (12\text{ K} + 15\text{ K}) / 12\text{ K}$$

$$= 1.8\text{ V}$$

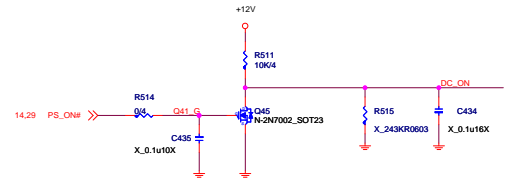
SOC Power: +PCH_VCC3 38 mA
 Continuous Load Current: 1.5A
 VIN Range: 2.7V to 5.5 V
 Enable/disable: $> 1.4\text{ V}$ & $< 0.4\text{ V}$



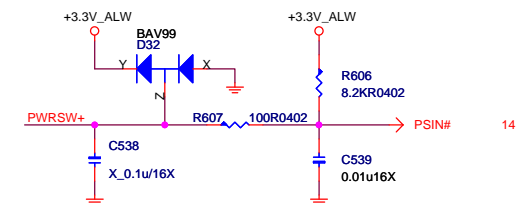
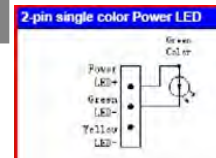
+3.3V



```
Vo = 3.3
Vin = 19
FS = 350K
OCP 150A-200A
Iout = 13A
Vin_IRms = 5.62A
NLCC ripple current = 10A
Choke_Isat = 20A
Choke_DCR = 8.4m
LIR = 27H
Cin_CAP = 18uF
Cout_CAP = 665uF
Cout_CAP_ESR = 10m
```



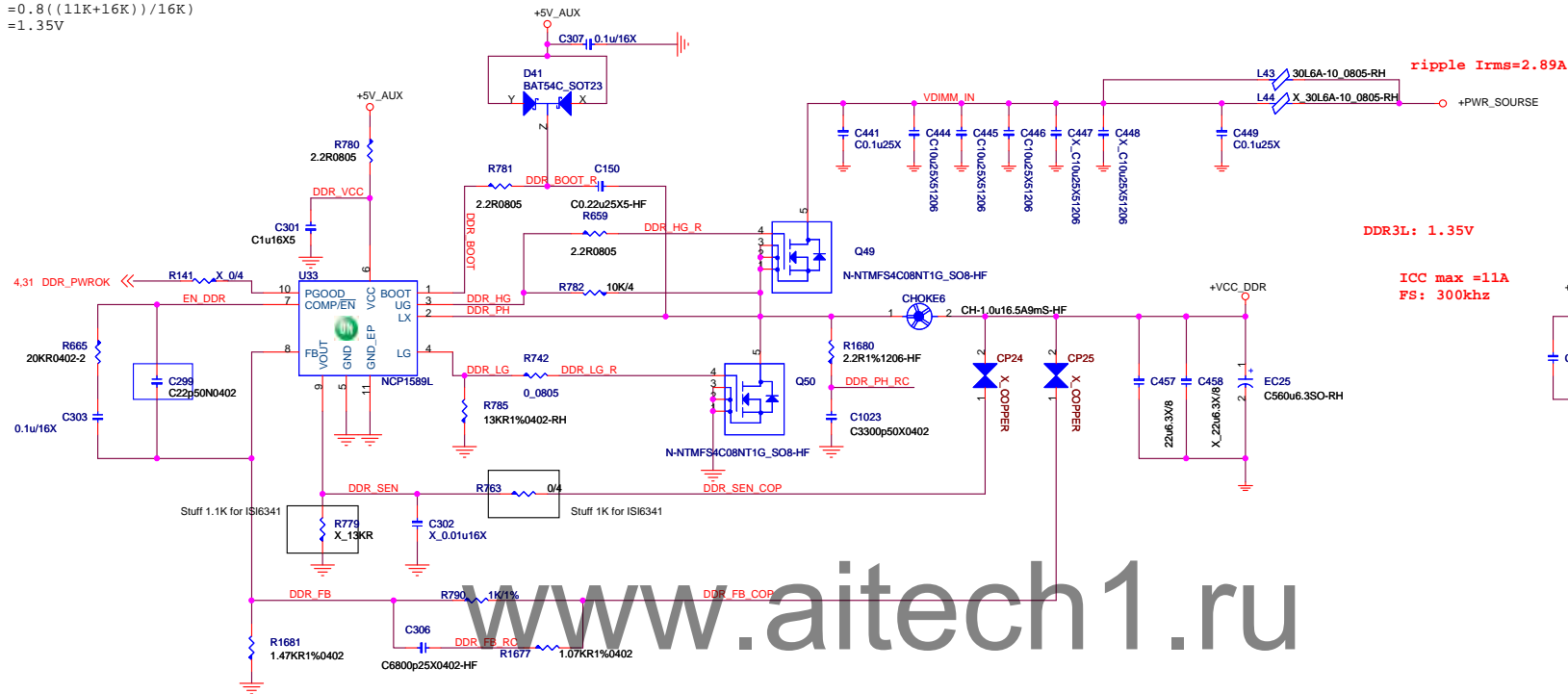
POWER LED



DDR3 DIMM Power

$$V_{out} = 0.8 \left[\frac{(R790 + R1681)}{R1681} \right]$$

$$= 0.8 \left(\frac{(11K + 16K)}{16K} \right) = 1.35V$$



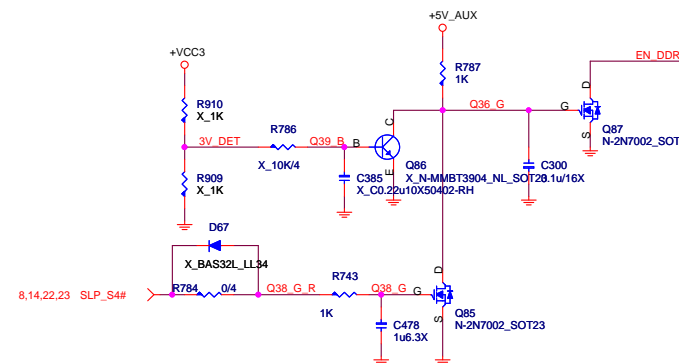
【+VCC_DDR】

$V_o = 1.35$
 $V_{in} = 1.9$
 $F_s = 300K$
 $OC_P = 150\% - 200\%$
 $I_{out} = 11A$
 $V_{in_rms} = 2.89A$
 $MLCC\ ripple\ current = 10A$
 $Choke_I_{max} = 16.5A$
 $Choke_DCR = 9m$
 $LIR = 32\%$
 $C_{in_CAP} = 10uF$
 $C_{out_CAP} = 772uF$
 $C_{out_CAP_ESR} = 8m$

DDR3L: 1.35V

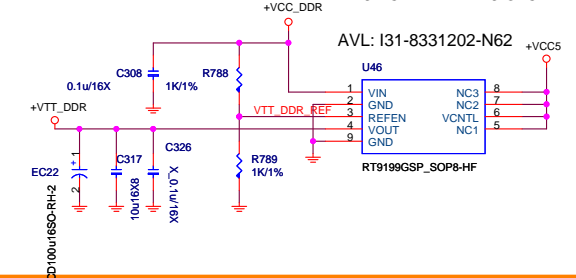
ICC max = 11A
FS: 300khz

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DDR3 Termination Power

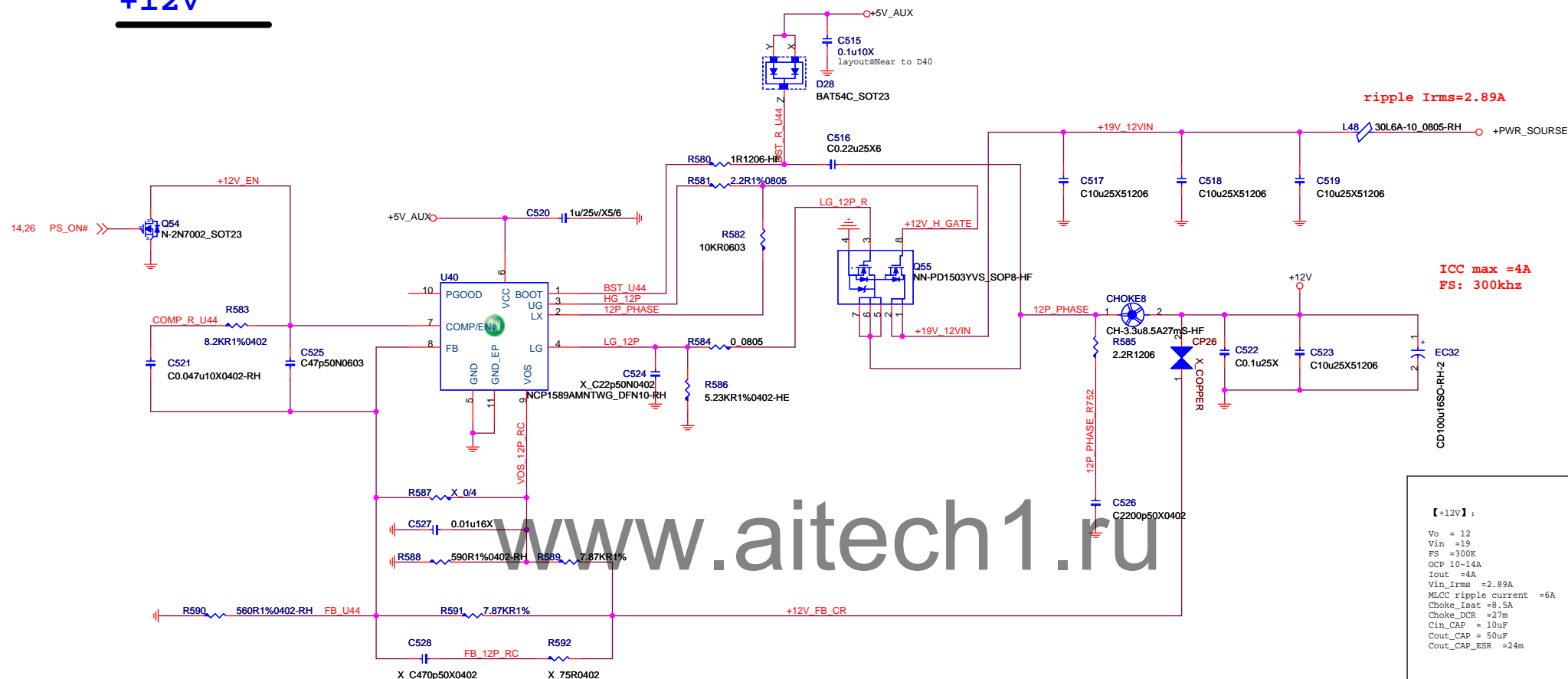
0.75V - 1.1A - 0.825W



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Title			Rev
DDR POWER			0B
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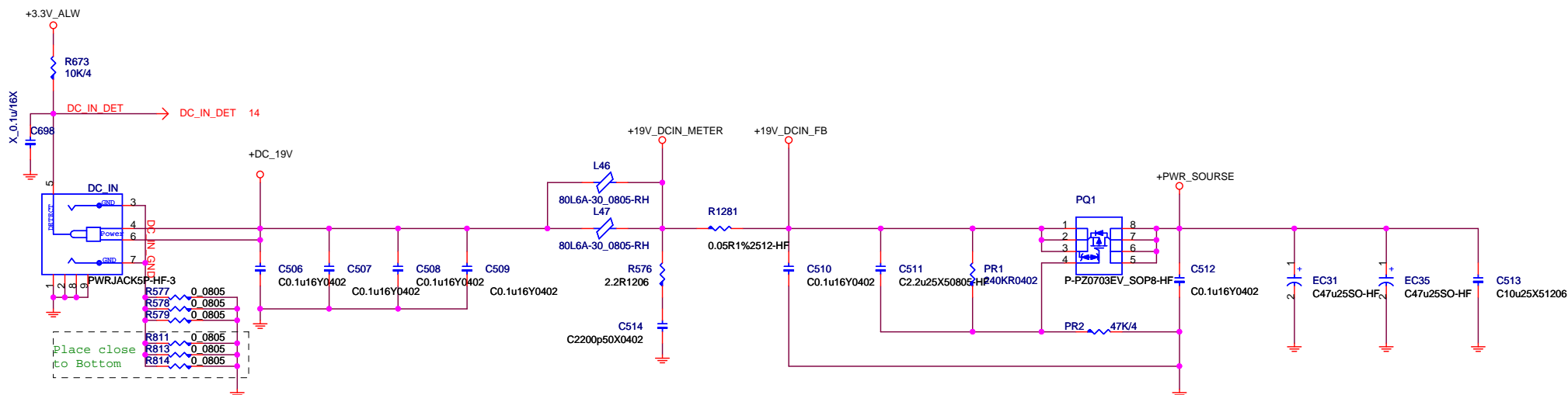
+12V



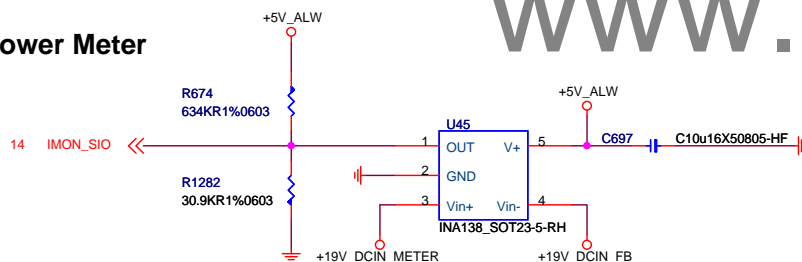
```

    [+12V]:
Vo    = 12
Vin   = 19
FS    = 300K
OCP   10-14A
Iout  = 4A
Vin_Irms = 2.89A
MLCC ripple current = 6A
Choke_Isat = 8.5A
Choke_DCR = 27m
Cin_CAP = 10uF
Cout_CAP = 50uF
Cout_CAP_ESR = 24m


```



Power Meter



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 MICRO-START INT'L CO.,LTD.		
Title DC-IN Supply		
Size	Document Number MS-7948	Rev 0B
Date: Friday, May 16, 2014	Sheet 30 of 35	

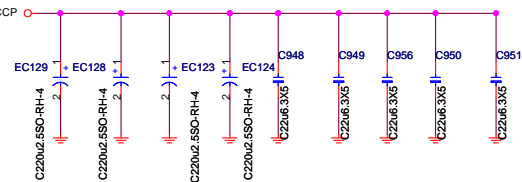
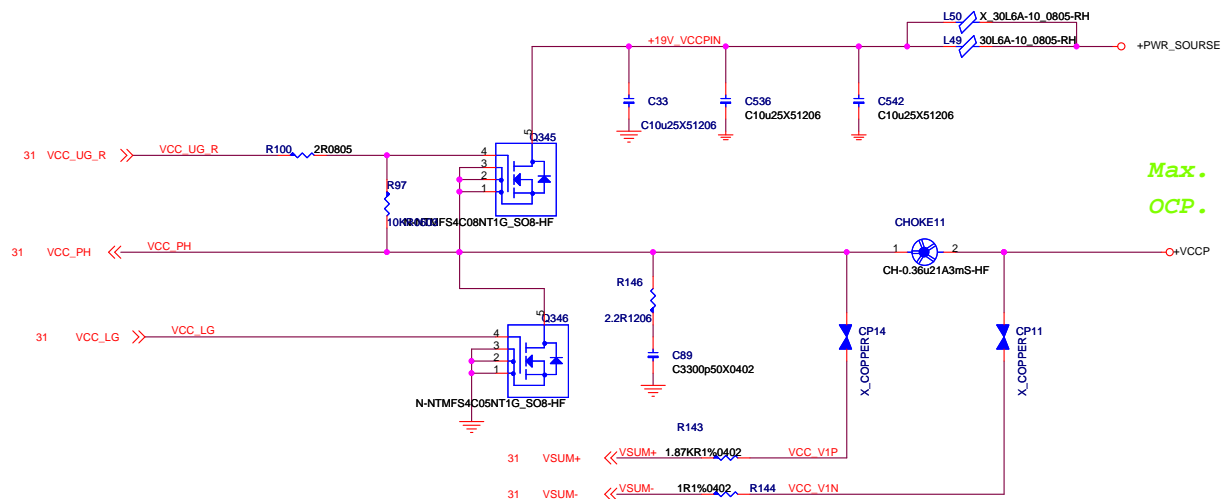


Table 4-16. Decoupling Requirements

Capacitance	Qty	ESR (each)	ESL (each)	Filter	Notes
POSCAP 330 μ F	2	6 m Ω	1.8 nH	Output	1, 2
22 μ F 0805 X5R	4	3 m Ω	0.6 nH	Output	

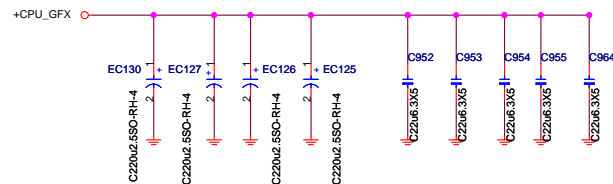
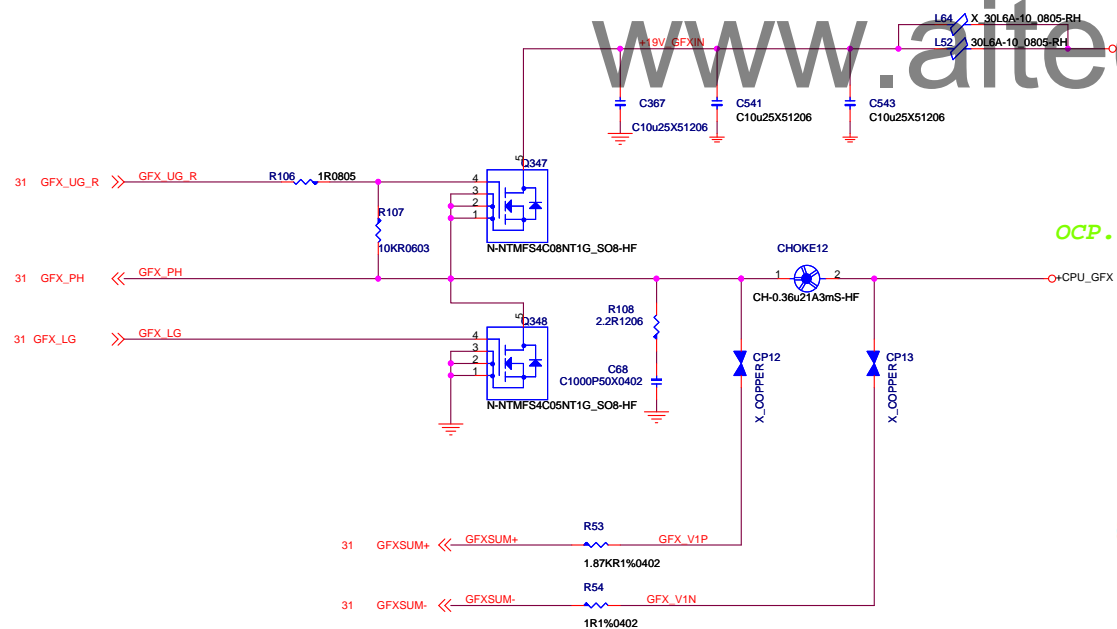
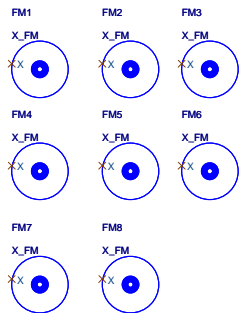


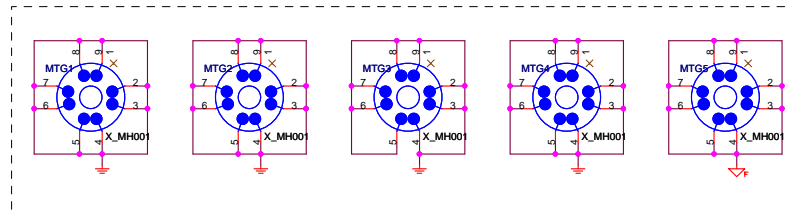
Table 4-17. UNCORE_VNN_S3 Decoupling Requirements

Capacitance	Qty	ESR (each)	ESL (each)	Filter	Notes
POSCAP 330 μ F	3	6 m Ω	1.8 nH	Output	1, 2
22 μ F 0805 X5R	4	3 m Ω	0.6 nH	Output	

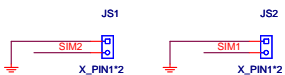
Optics Orientation Holes



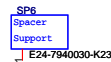
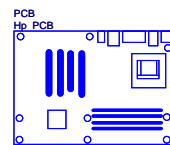
Mounting Holes



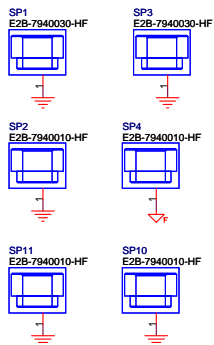
Simulation



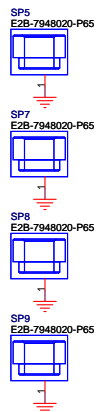
STANDOFF_MINI_PCIE



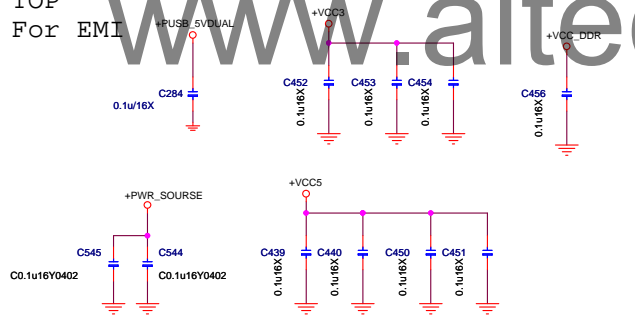
STANDOFF_HDD



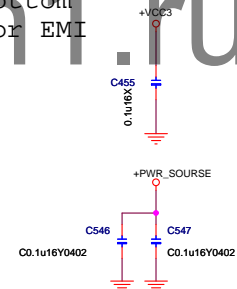
STANDOFF_FAN



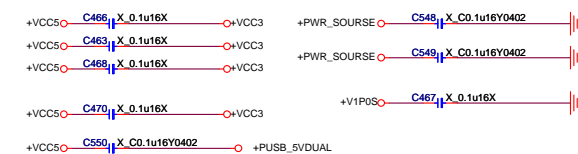
TOP
For EMI



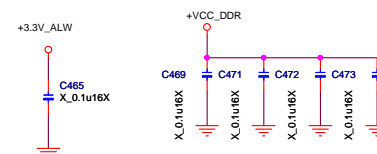
Bottom
For EMI

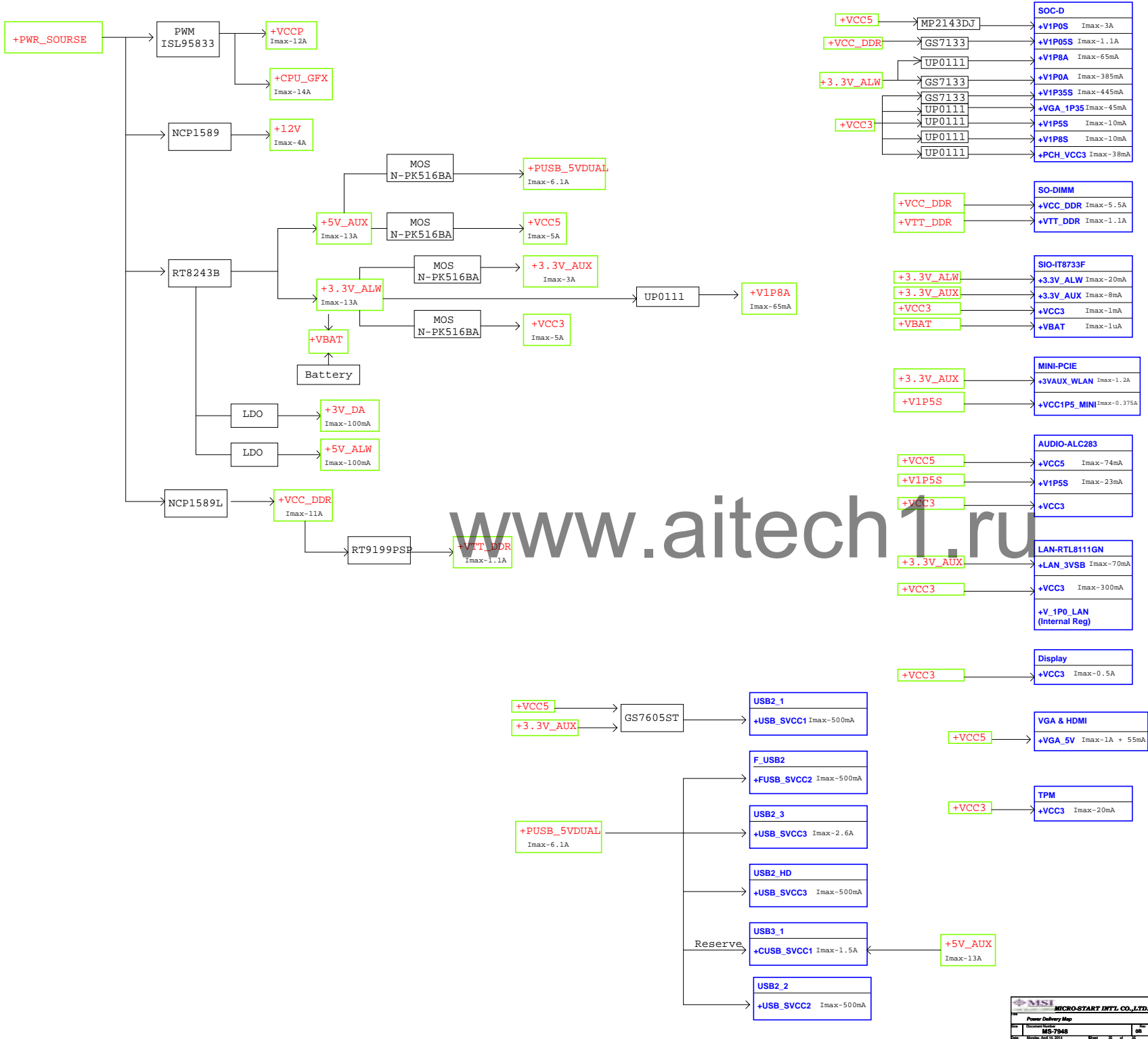


MOAT MLCC For EMI



EMI MLCC





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