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FG540 MB Schematics Document

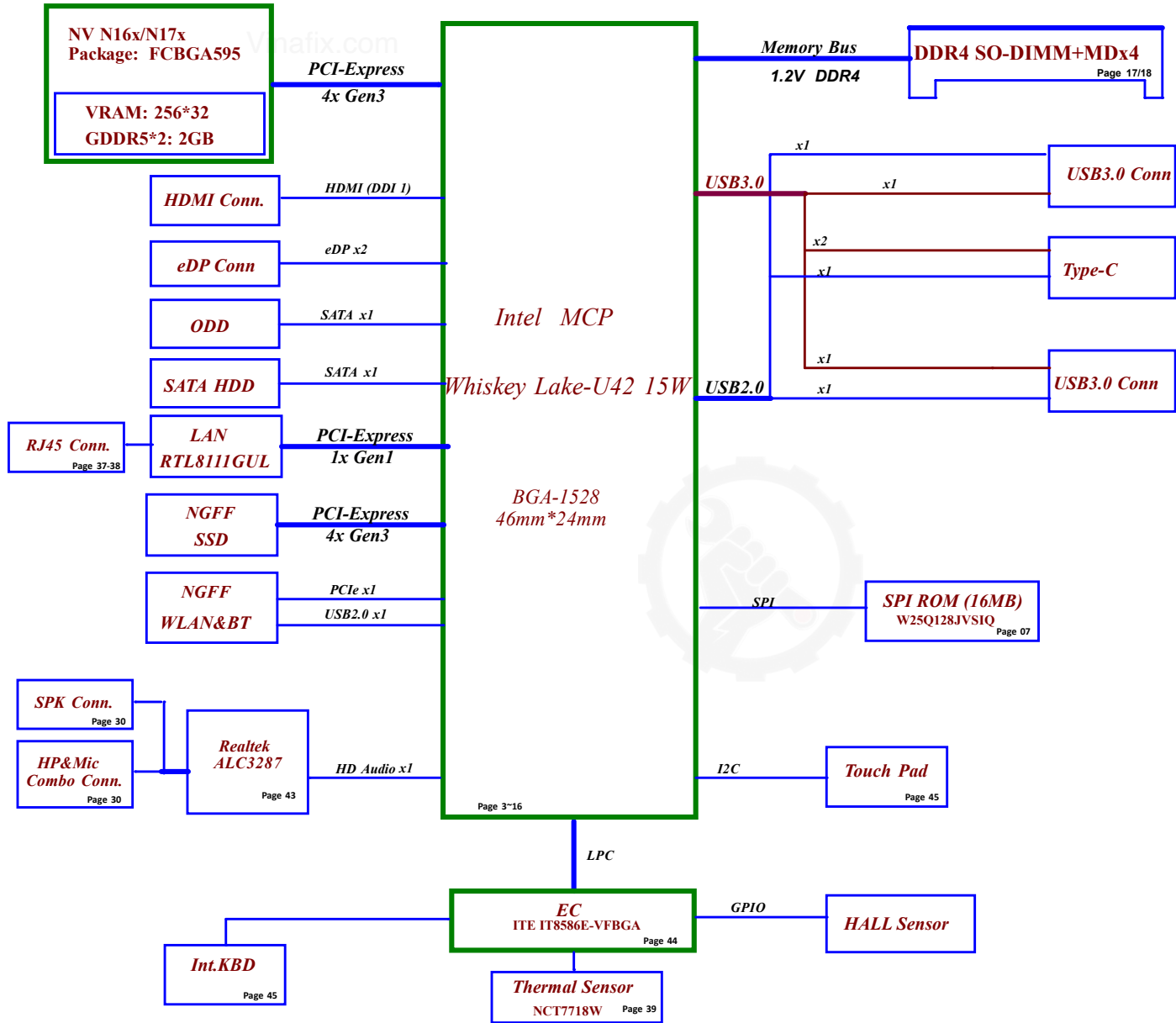
WHL U42 with DDR4 + Nvidia N16V-GM/N17S-G0

2018-07

REV: 0.1



Security Classification	LC Future Center Secret Data		Title			
Issued Date	2015/08/20	Deciphered Date	2016/08/20		Cover Page	
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Voltage Rails (O --> Means ON , X --> Means OFF)

Power Plane / State	V20B+	+3VALW +5VALW +3VALW_PCH +1.8VALW +1.05VALW	+1.2V +2.5V_DDR +VCCST	+5VS +3VS +VCCIO +VCCSTG +VCCSA +VCC_GT +CPU_CORE +0.6VS
S0	O	O	O	O
S3	O	O	O	X
S3 Battery only	O	O	O	X
S5 S4 AC Only	O	O	X	X
S5 S4 Battery only	O	X	X	X
S5 S4 AC & Battery don't exist	X	X	X	X

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

HSIO PORT	Function
USB3.0	1 USB3.0 Conn Right
	2 USB3.0 Conn Left
	3 NC
	4 NC
	5 NC
	6 NC
USB2.0	1 USB3.0 Conn Left
	2 NC
	3 USB3.0 Conn Right
	4 Finger Print
	5 Card reader
	6 NC
	7 Camera
	8 NC
	9 NC
	10 Bluetooth
PCI-E	5-8 X4 DGPU
	9 Giga LAN
	10 NC
	11 SATA HDD
	12 WLAN
	13-16 X4 PCI-E/SATA SSD

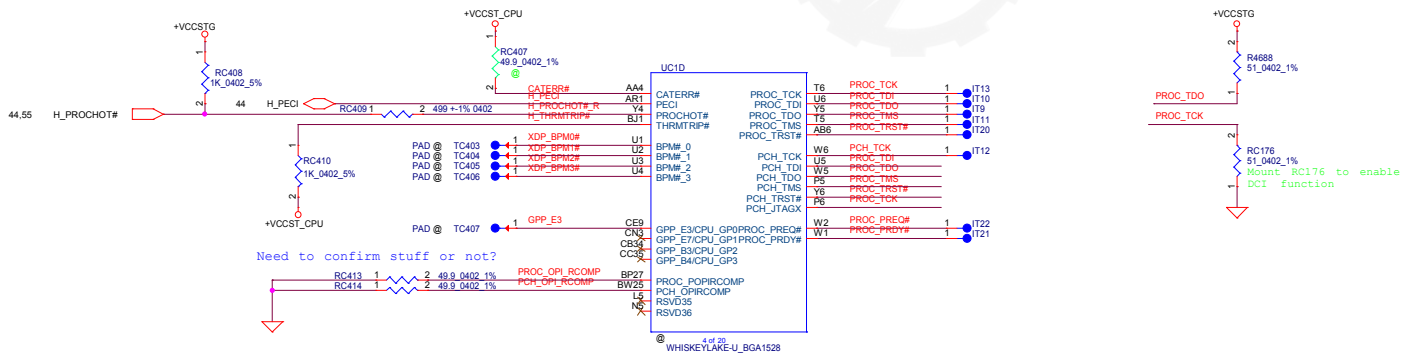
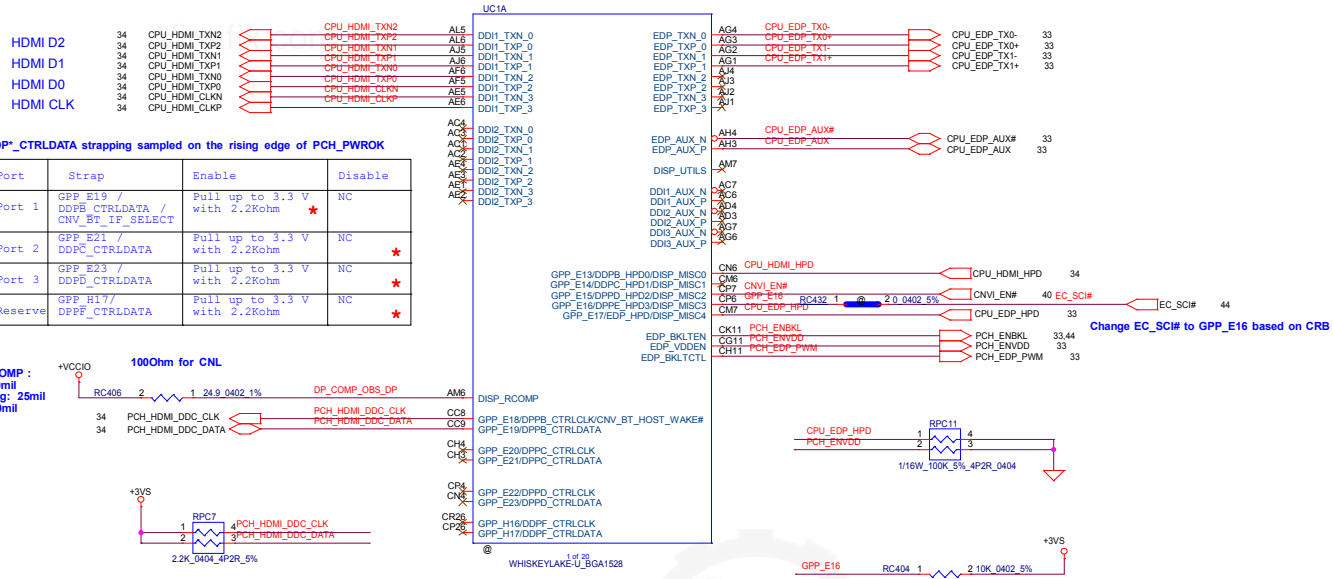
BOM Structure	BTO Item
@	Un-stuff
14@	For 14" part
15@	For 15" part
YOGA@	For YOGA530 part
530@	For 530S part
CD@	For C cost down
EMC@	For EMC part
EMC_15@	For EMC 15" part
EMC_NS@	For EMC un-stuff part
EMC_PX@	For EMC PX part
EMC_PXNS@	For EMC PX nu-stuff part
ME@	For ME part
OPT@	For NV GPU part
OPTN16@	For NV N16S-GTR GPU part
OPTN17@	For NV N17S-G1 GPU part
TS@	For touch screen part
TP@	For Touch Pad Part
UMA@	For UMA part

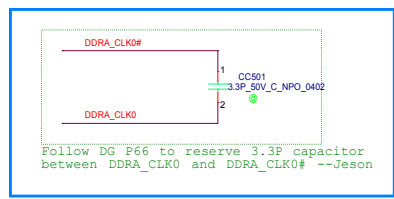
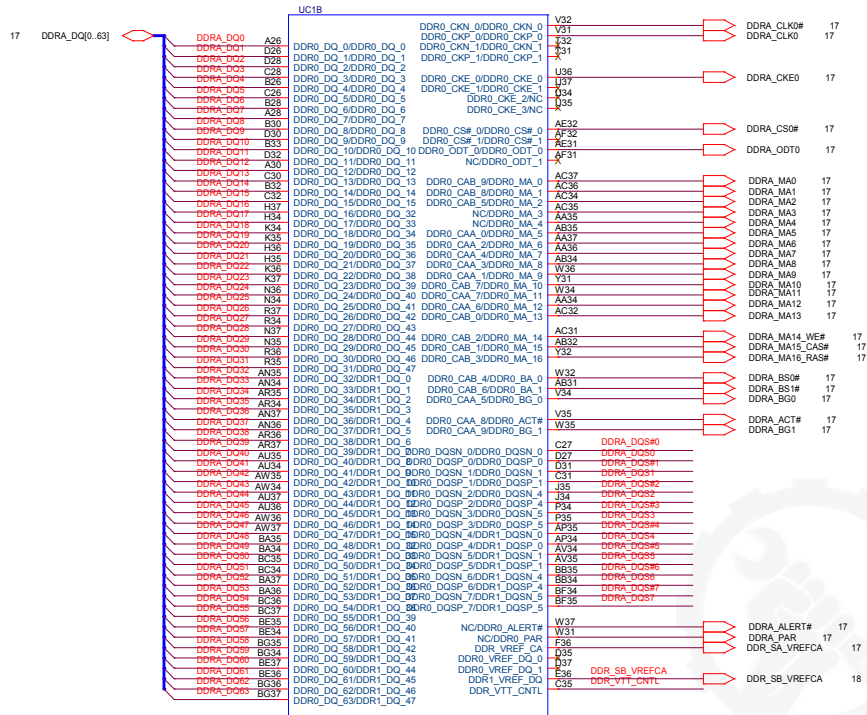
SMBUS Control Table

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

EC SMBus1 address EC SMBus2 address EC SMBus3 address PCH SM Bus address

Device	Address	Device	Address	Device	Address	Device	Address
Smart Battery	need to update	Thermal Sensor(NCT7718W)	1001_100xb	PMIC	need to update	DDR4 SODIMM	need to update
Charger	0001 0010 b	PCH	need to update	DGPU	need to update	Wlan	Reserved



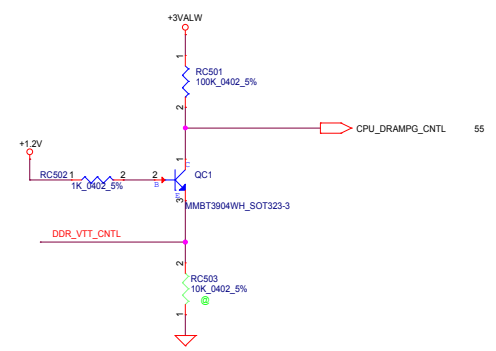


Follow DG P66 to reserve 3.3P capacitor between DDRA_CLK0 and DDRA_CLK0# --Jeson



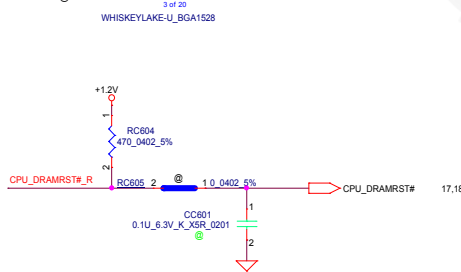
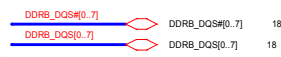
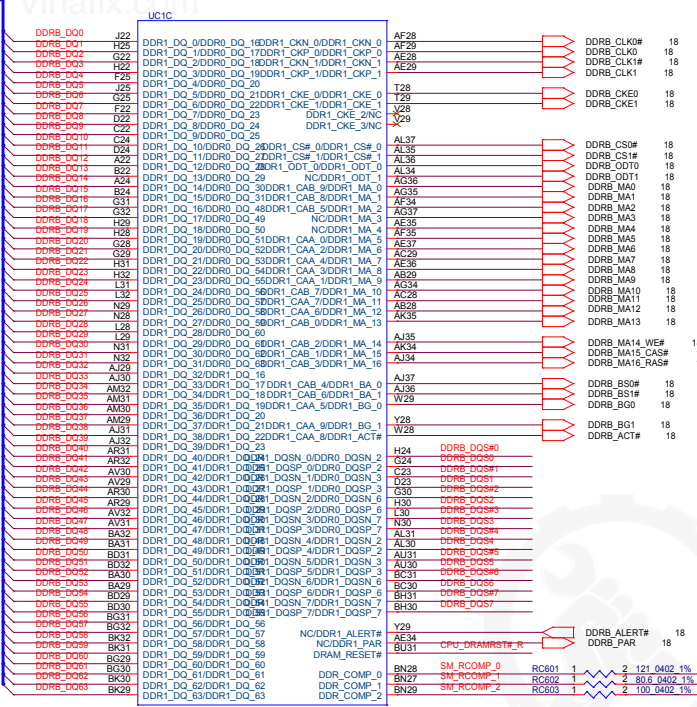
SMVREF
WIDTH: 20MIL
SPACING: 20MIL

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WHISKEYLAKE-U_BGA1528

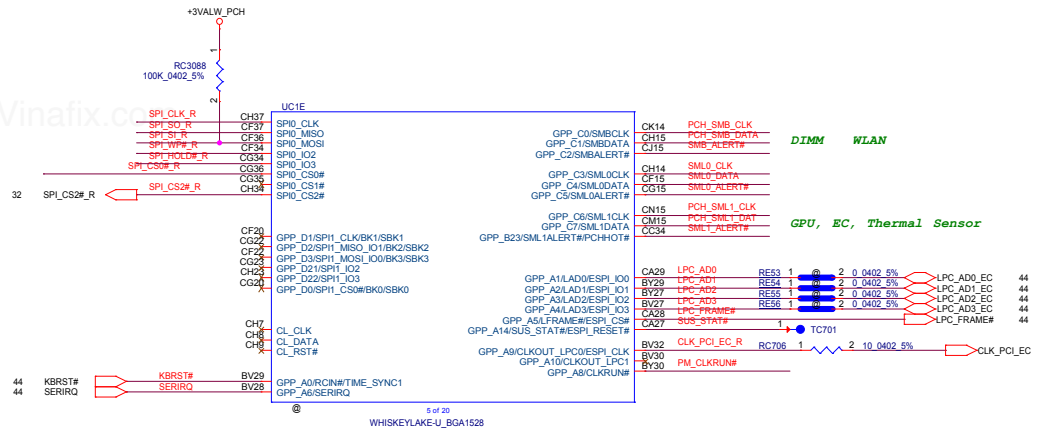


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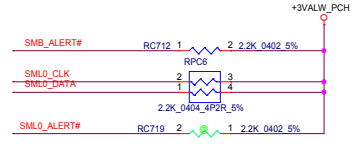
18 DDRB_DQ[0..63]



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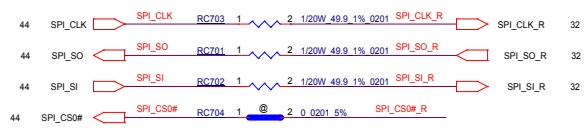
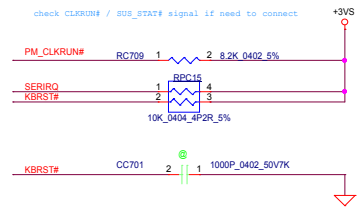
TLS Confidentiality (Rising edge of RSMRST#)
 This signal has a weak internal pull-down.
 0 = Disable Intel ME Crypto Transport Layer Security(TLS) cipher suite (no confidentiality), (Default)
 1 = Enable Intel ME Crypto Transport Layer Security(TLS) cipher suite (with confidentiality), Must be pulled up to support Intel AMT with TLS.
 Notes:
 1. The internal pull-down is disabled after RSMRST# de-asserts.
 2. This signal is in the primary well.



eSPI or LPC (Rising edge of RSMRST#)
 This signal has a weak internal pull-down.
 0 = LPC is selected for EC, (Default)
 1 = eSPI is selected for EC.
 Notes:
 1. The internal pull-down is disabled after RSMRST# de-asserts.
 2. This signal is in the primary well.

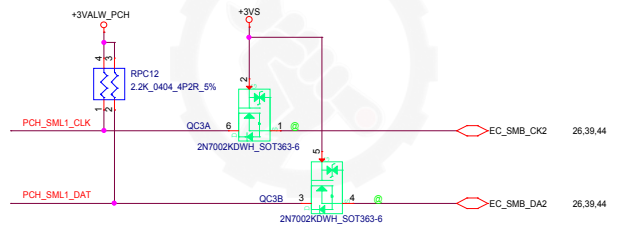
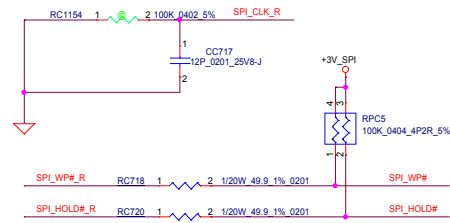


Intel DCI-OOB (Rising edge of RSMRST#)
 This signal has an internal pull-down.
 0 = Disable Intel DCI-OOB (Default)
 1 = Enable Intel DCI-OOB
 Notes:
 1. The internal pull-down is disabled after RSMRST# de-asserts.
 2. When used as PCHHOT# and strap low, a 150K pull-up is needed to ensure it does not override the internal pull-down strap sampling.
 This signal is in the primary well.

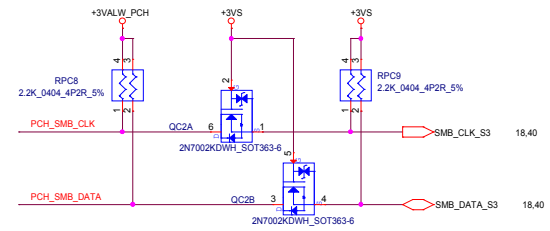
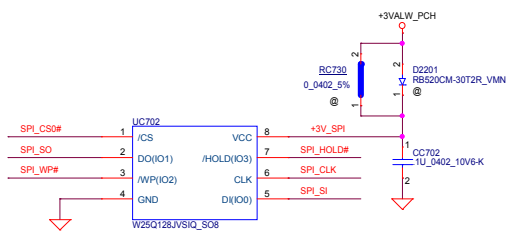


LPC R/C close to PCH

LPC_AD3_EC	CC11	1	2	27P 0402 50V8J	EMC@
LPC_AD2_EC	CC12	1	2	27P 0402 50V8J	EMC@
LPC_AD1_EC	CC13	1	2	27P 0402 50V8J	EMC@
LPC_AD0_EC	CC14	1	2	27P 0402 50V8J	EMC@
CLK_PCI_EC	CC15	1	2	27P 0402 50V8J	EMC@

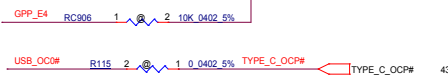
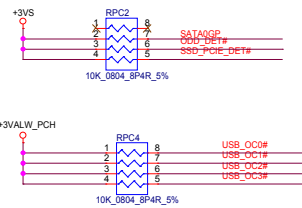
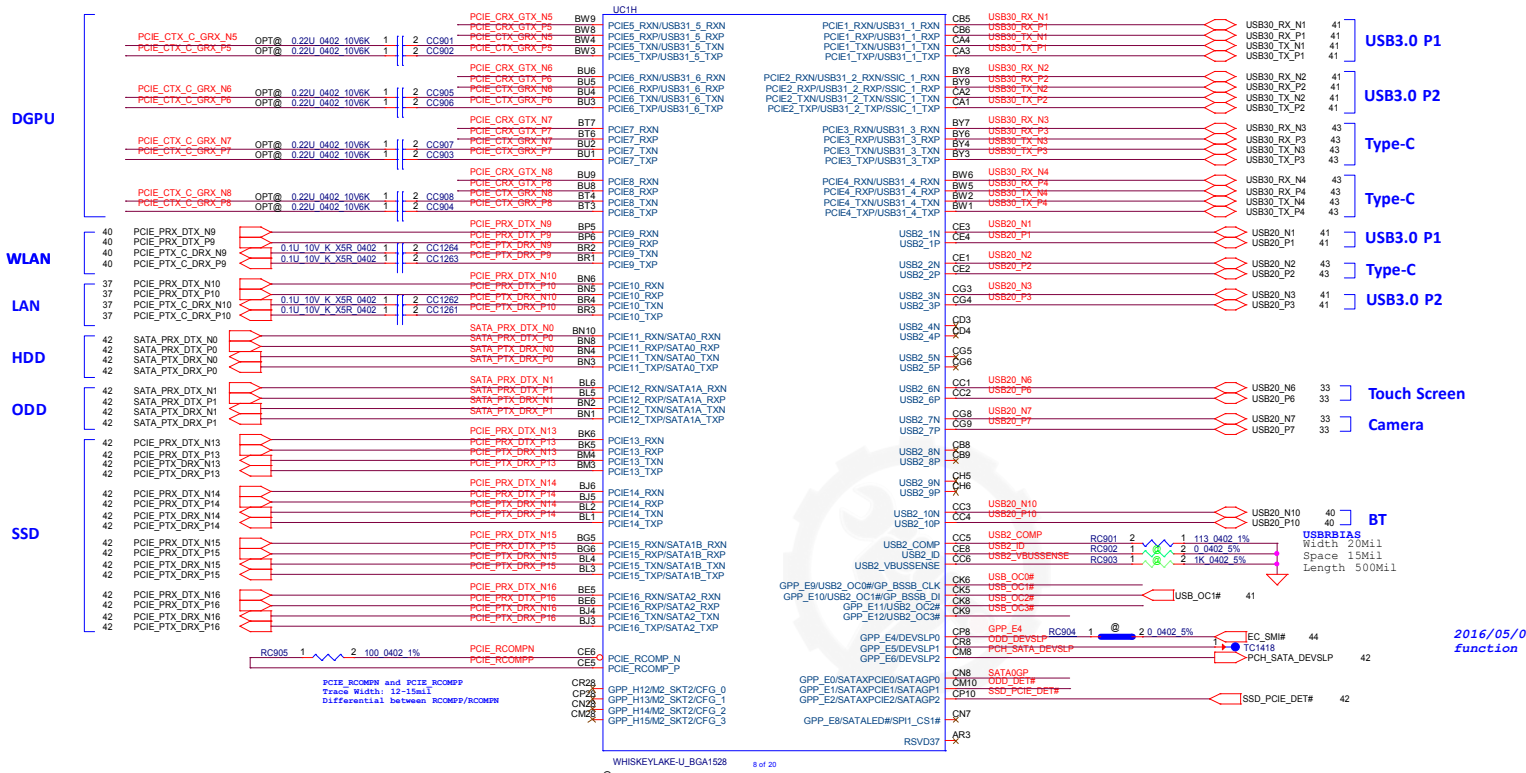


SPI0_MOSI: Reserved (Rising edge of RSMRST#)
 SPI0_IO2: Reserved (Rising edge of RSMRST#)
 SPI0_IO3: Reserved (Rising edge of RSMRST#)
 External pull-up is required. Recommend 100K if pulled up to 3.3V or 75K if pulled up to 1.8V. This strap should sample HIGH. There should NOT be any on-board device driving it to opposite direction during strap sampling.



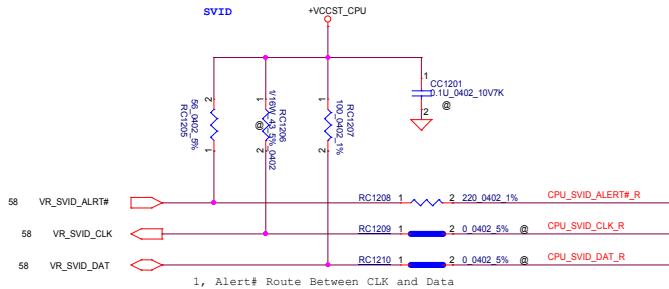
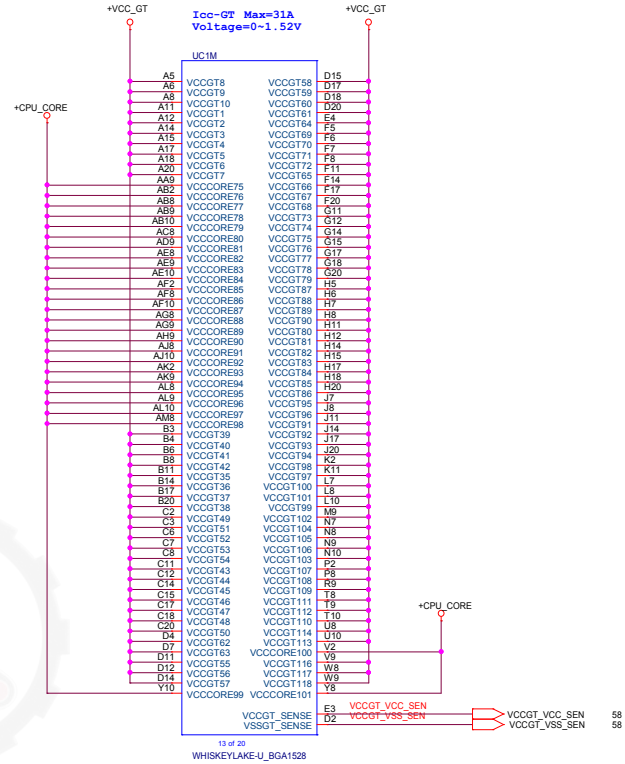
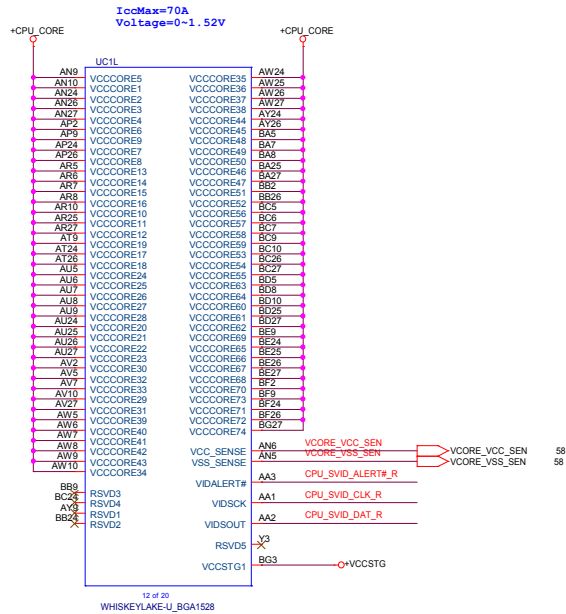
- 20 PCIe_CRX_GTX_N5.8]
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- 20 PCIe_CTX_C_GRX_N5.8]
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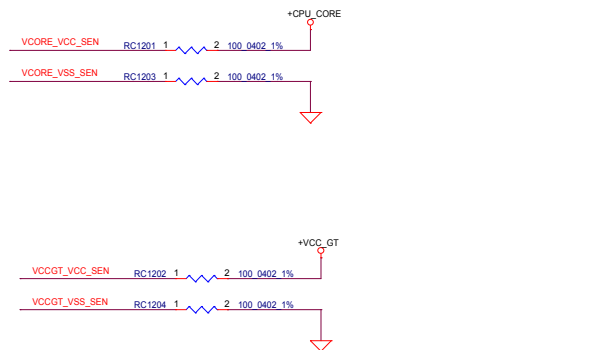


2016/05/03; Implement as Power Button function for Windows RedStone support

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1, Alert# Route Between CLK and Data



UC1S

BT35	VSS_145	VSS_217	BY26
D6	VSS_146	VSS_218	J18
AL32	VSS_147	VSS_219	BE30
BT36	VSS_148	VSS_220	W10
D8	VSS_149	VSS_221	BE31
AL7	VSS_150	VSS_222	CF3
D9	VSS_151	VSS_223	CF4
AM10	VSS_152	VSS_224	W30
BU11	VSS_153	VSS_225	BF3
E23	VSS_154	VSS_226	OC33
AM28	VSS_155	VSS_227	W7
E27	VSS_156	VSS_228	W7
AM33	VSS_157	VSS_229	BF33
E29	VSS_158	VSS_230	AE26
BU23	VSS_159	VSS_231	AE26
VSS_160	VSS_232	AV36	AE26
E31	VSS_161	VSS_233	AE26
BU25	VSS_162	VSS_234	AE26
E33	VSS_163	VSS_235	AE26
AN25	VSS_164	VSS_236	AE26
BU7	VSS_165	VSS_237	AE26
E9	VSS_166	VSS_238	AE26
AN28	VSS_167	VSS_239	AE26
BV11	VSS_168	VSS_240	AE26
F12	VSS_169	VSS_241	AE26
AN29	VSS_170	VSS_242	AE26
F15	VSS_171	VSS_243	AE26
AN30	VSS_172	VSS_244	AE26
F18	VSS_173	VSS_245	AE26
AN31	VSS_174	VSS_246	AE26
BV3	VSS_175	VSS_247	AE26
F2	VSS_176	VSS_248	AE26
AN7	VSS_177	VSS_249	AE26
F21	VSS_178	VSS_250	AE26
AN8	VSS_179	VSS_251	AE26
BV33	VSS_180	VSS_252	AE26
F24	VSS_181	VSS_253	AE26
BV4	VSS_182	VSS_254	AE26
F3	VSS_183	VSS_255	AE26
AP3	VSS_184	VSS_256	AE26
F4	VSS_185	VSS_257	AE26
BW11	VSS_186	VSS_258	AE26
AP33	VSS_187	VSS_259	AE26
Q21	VSS_188	VSS_260	AE26
AP36	VSS_189	VSS_261	AE26
Q27	VSS_190	VSS_262	AE26
AP4	VSS_191	VSS_263	AE26
G33	VSS_192	VSS_264	AE26
AR28	VSS_193	VSS_265	AE26
G36	VSS_194	VSS_266	AE26
G36	VSS_195	VSS_267	AE26
G36	VSS_196	VSS_268	AE26
G36	VSS_197	VSS_269	AE26
AT33	VSS_198	VSS_270	AE26
BW24	VSS_199	VSS_271	AE26
G9	VSS_200	VSS_272	AE26
AT35	VSS_201	VSS_273	AE26
H21	VSS_202	VSS_274	AE26
AT36	VSS_203	VSS_275	AE26
BW7	VSS_204	VSS_276	AE26
H27	VSS_205	VSS_277	AE26
AT4	VSS_206	VSS_278	AE26
BY11	VSS_207	VSS_279	AE26
AU10	VSS_208	VSS_280	AE26
BY15	VSS_209	VSS_281	AE26
H9	VSS_210	VSS_282	AE26
AU28	VSS_211	VSS_283	AE26
BY22	VSS_212	VSS_284	AE26
H12	VSS_213	VSS_285	AE26
AU29	VSS_214	VSS_286	AE26
J15	VSS_215	VSS_287	AE26
VSS_216	VSS_288	N27	AE26
VSS_289	VSS_289	CB25	AE26

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UC1T

N6	VSS_200	VSS_302	CF23
B37	VSS_201	VSS_303	V4
P10	VSS_292	VSS_304	CF28
BS	VSS_293	VSS_305	BE30
CB33	VSS_294	VSS_306	W10
P3	VSS_295	VSS_307	BE31
O4	VSS_296	VSS_308	CF3
B7	VSS_297	VSS_309	CF4
P33	VSS_298	VSS_310	W30
O4	VSS_299	VSS_311	BF3
B9	VSS_300	VSS_312	OC33
P36	VSS_301	VSS_313	W7
VSS_302	VSS_314	VSS_314	BF33
BA10	VSS_303	VSS_315	AE26
Q411	VSS_304	VSS_316	AE26
P4	VSS_305	VSS_317	AE26
BA28	VSS_306	VSS_318	AE26
P7	VSS_307	VSS_319	AE26
BA3	VSS_308	VSS_320	AE26
CC20	VSS_309	VSS_321	AE26
E27	VSS_310	VSS_322	AE26
BB3	VSS_311	VSS_323	AE26
CC25	VSS_312	VSS_324	AE26
R28	VSS_313	VSS_325	AE26
BB33	VSS_314	VSS_326	AE26
CC29	VSS_315	VSS_327	AE26
R29	VSS_316	VSS_328	AE26
BB36	VSS_317	VSS_329	AE26
CC31	VSS_318	VSS_330	AE26
R30	VSS_319	VSS_331	AE26
BB4	VSS_320	VSS_332	AE26
CC37	VSS_321	VSS_333	AE26
R31	VSS_322	VSS_334	AE26
BC25	VSS_323	VSS_335	AE26
CC39	VSS_324	VSS_336	AE26
T27	VSS_325	VSS_337	AE26
CD12	VSS_326	VSS_338	AE26
R30	VSS_327	VSS_339	AE26
CD14	VSS_328	VSS_340	AE26
I33	VSS_329	VSS_341	AE26
T35	VSS_330	VSS_342	AE26
BC32	VSS_331	VSS_343	AE26
CD24	VSS_332	VSS_344	AE26
T36	VSS_333	VSS_345	AE26
CD25	VSS_334	VSS_346	AE26
T7	VSS_335	VSS_347	AE26
BC3	VSS_336	VSS_348	AE26
CD33	VSS_337	VSS_349	AE26
U25	VSS_338	VSS_350	AE26
BD28	VSS_339	VSS_351	AE26
CE36	VSS_340	VSS_352	AE26
U7	VSS_341	VSS_353	AE26
BD33	VSS_342	VSS_354	AE26
CE36	VSS_343	VSS_355	AE26
V25	VSS_344	VSS_356	AE26
BD35	VSS_345	VSS_357	AE26
CE7	VSS_346	VSS_358	AE26
V27	VSS_347	VSS_359	AE26
BD36	VSS_348	VSS_360	AE26
CE11	VSS_349	VSS_361	AE26
V3	VSS_350	VSS_362	AE26
BE10	VSS_351	VSS_363	AE26
CE14	VSS_352	VSS_364	AE26
V30	VSS_353	VSS_365	AE26
BE28	VSS_354	VSS_366	AE26
CE19	VSS_355	VSS_367	AE26
V33	VSS_356	VSS_368	AE26
BE29	VSS_357	VSS_369	AE26
CE27	VSS_358	VSS_370	AE26
V36	VSS_359	VSS_371	AE26
BE3	VSS_360	VSS_372	AE26
VSS_361	VSS_373	VSS_373	AE26

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UC1R


CR34	VSS_1	VSS_73	BL7
BT1	VSS_2	VSS_74	AE26
BY5	VSS_3	VSS_75	BM33
CP35	VSS_4	VSS_76	CM6
CK37	VSS_5	VSS_77	AE27
AW1	VSS_6	VSS_78	BM35
CK37	VSS_7	VSS_79	CM9
CK37	VSS_8	VSS_80	AE30
CK37	VSS_9	VSS_81	BM36
AY4	VSS_10	VSS_82	CM13
AE26	VSS_11	VSS_83	AE7
AE26	VSS_12	VSS_84	BM9
AE26	VSS_13	VSS_85	CM17
AE26	VSS_14	VSS_86	AE27
AE26	VSS_15	VSS_87	BM30
AE26	VSS_16	VSS_88	CM21
AE26	VSS_17	VSS_89	AE3
AE26	VSS_18	VSS_90	BM7
AE26	VSS_19	VSS_91	CM25
AE26	VSS_20	VSS_92	AE30
AE26	VSS_21	VSS_93	CM29
AE26	VSS_22	VSS_94	AE33
AE26	VSS_23	VSS_95	BM15
AE26	VSS_24	VSS_96	AE36
AE26	VSS_25	VSS_97	AE4
AE26	VSS_26	VSS_98	AE7
AE26	VSS_27	VSS_99	AE25
AE26	VSS_28	VSS_100	CM9
AE26	VSS_29	VSS_101	AG10
AE26	VSS_30	VSS_102	BP3
AE26	VSS_31	VSS_103	CP1
AE26	VSS_32	VSS_104	AE4
AE26	VSS_33	VSS_105	BP32
AE26	VSS_34	VSS_106	CP11
AE26	VSS_35	VSS_107	AE27
AE26	VSS_36	VSS_108	BP33
AE26	VSS_37	VSS_109	AE28
AE26	VSS_38	VSS_110	CP13
AE26	VSS_39	VSS_111	AE4
AE26	VSS_40	VSS_112	AE29
AE26	VSS_41	VSS_113	BP7
AE26	VSS_42	VSS_114	CP19
AE26	VSS_43	VSS_115	AE30
AE26	VSS_44	VSS_116	CP21
AE26	VSS_45	VSS_117	AE31
AE26	VSS_46	VSS_118	BR19
AE26	VSS_47	VSS_119	CP27
AE26	VSS_48	VSS_120	AE33
AE26	VSS_49	VSS_121	BR25
AE26	VSS_50	VSS_122	AE35
AE26	VSS_51	VSS_123	CP37
AE26	VSS_52	VSS_124	AE36
AE26	VSS_53	VSS_125	BT15
AE26	VSS_54	VSS_126	AE38
AE26	VSS_55	VSS_127	BT16
AE26	VSS_56	VSS_128	CP9
AE26	VSS_57	VSS_129	AE39
AE26	VSS_58	VSS_130	CP2
AE26	VSS_59	VSS_131	AE4
AE26	VSS_60	VSS_132	CR36
AE26	VSS_61	VSS_133	AE43
AE26	VSS_62	VSS_134	AE44
AE26	VSS_63	VSS_135	AE45
AE26	VSS_64	VSS_136	AE46
AE26	VSS_65	VSS_137	AE47
AE26	VSS_66	VSS_138	AE48
AE26	VSS_67	VSS_139	AE49
AE26	VSS_68	VSS_140	AE50
AE26	VSS_69	VSS_141	AE51
AE26	VSS_70	VSS_142	AE52
AE26	VSS_71	VSS_143	AE53
AE26	VSS_72	VSS_144	AE54

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Size	Document Number	Date: Tuesday, December 11, 2018		Rev
C	FG540/FG740	Sheet 16 of 61		0.1

Apply X76 BOM to control DDP Memory Down stuff components!



N16x GPIO

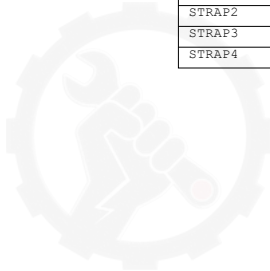
GPIO	I/O	ACTIVE	Function Description
GPIO0	OUT	-	GPU Core VDD PWM control signal
GPIO1	OUT	N/A	FB Enable for GC6 2.0
GPIO2	OUT	N/A	
GPIO3	OUT	N/A	
GPIO4	OUT	N/A	
GPIO5	OUT	N/A	GPU power sequencing--3V3_MAIN_EN
GPIO6	IN	-	GPU wake signal for GC6 2.0
GPIO7	OUT	N/A	
GPIO8	I/O	-	System side PCIe reset Monitor
GPIO9	I/O	N/A	2.2K Pull-up
GPIO10	OUT		FBVREF_ALTV for GDDR5
GPIO11	OUT	-	
GPIO12	IN		AC Power Detect Input (10K pull High)
GPIO13	OUT	-	Phase Shedding
GPIO14	IN	N/A	
GPIO15	IN	N/A	
GPIO16		N/A	
GPIO17	IN	N/A	
GPIO18	IN	N/A	
GPIO19	IN	N/A	
GPIO20		N/A	
GPIO21	OUT		GPU PCIe self-reset control
OVERT	OUT		Active Low Thermal Catastrophic Over Temperature

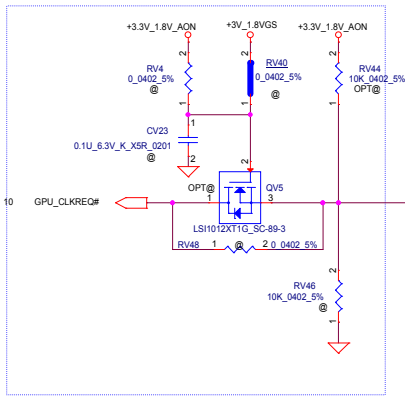
Performance Mode P0 TDP and EDP-Continuous current (GDDR5)

Products	GPU	Mem	Min Core Clk	NVVDD			FBVDD (1.35V)		FBVDDQ (GPU+Mem) (1.35V)		(1.05V) (6)		Other (3.3V)	
	(W)	(W)	(MHz)	(V)	(A)	(W)	(A)	(W)	(A)	(W)	(mA)	(W)	(mA)	(W)
N16S-GMR	16	1.6	849	TBD	19	TBD	2	TBD	4.2	TBD	800	TBD	60	TBD
N16S-GTR	18	1.7	967		26.5		2		4.2		800		60	

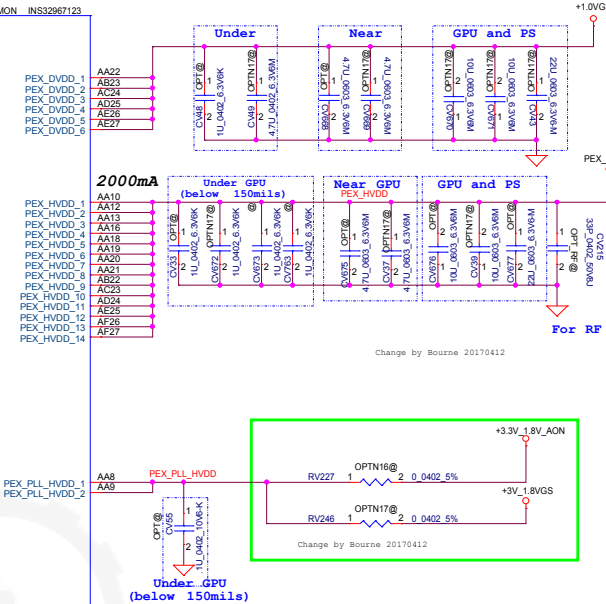
N16x Multi-level Straps

Physical Strapping pin	Power Rail	Logical Strapping Bit3	Logical Strapping Bit2	Logical Strapping Bit1	Logical Strapping Bit0
ROM_SCLK	+3VGS	SOR3_EXPOSED	SOR2_EXPOSED	SOR1_EXPOSED	SOR0_EXPOSED
ROM_SI	+3VGS	RAM_CFG[3]	RAM_CFG[2]	RAM_CFG[1]	RAM_CFG[0]
ROM_SO	+3VGS	DEVID_SEL	PCIE_CFG	SMB_ALT_ADDR	VGA_DEVICE
STRAP0	+3VGS	Reserved(keep pull-up and pull-down footprint and stuff 50Kohm pull-up)			
STRAP1	+3VGS				
STRAP2	+3VGS	Reserved(keep pull-up and pull-down footprint and not stuff by default)			
STRAP3	+3VGS				
STRAP4	+3VGS				





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PEX_DVDD
N16: +1.05VGS (recommend)
+1.0VGS (Used)
N17: +1.0VGS

PEX_HVDD
N16: +1.05VGS (recommend)
+1.0VGS (Used)
N17: +1.8VGS

PEX_PLL_HVDD
N16: +3.3V AON
N17: +1.8VGS

PEX_DVDD/Q Decoupling

MLCC	N16	N17	location
1.0uF	1	1	Under
4.7uF	0	1	
4.7uF	1	2	
10uF	0	2	Midway
22uF	0	1	

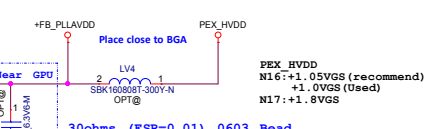
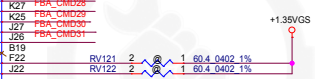
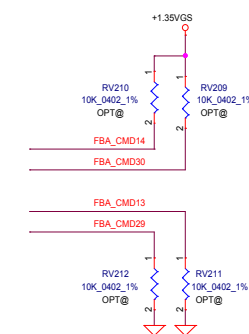
PEX_HVDD/Q Decoupling

MLCC	N16	N17	location
1.0uF	1	4	Under
4.7uF	1	2	Near
10uF	1	2	Midway
22uF	1	1	

PEX_PLL_HVDD/Q Decoupling

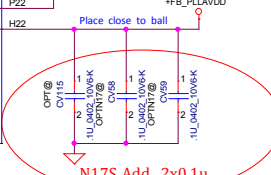
MLCC	N16	N17	location
0.1uF	1	1	Near

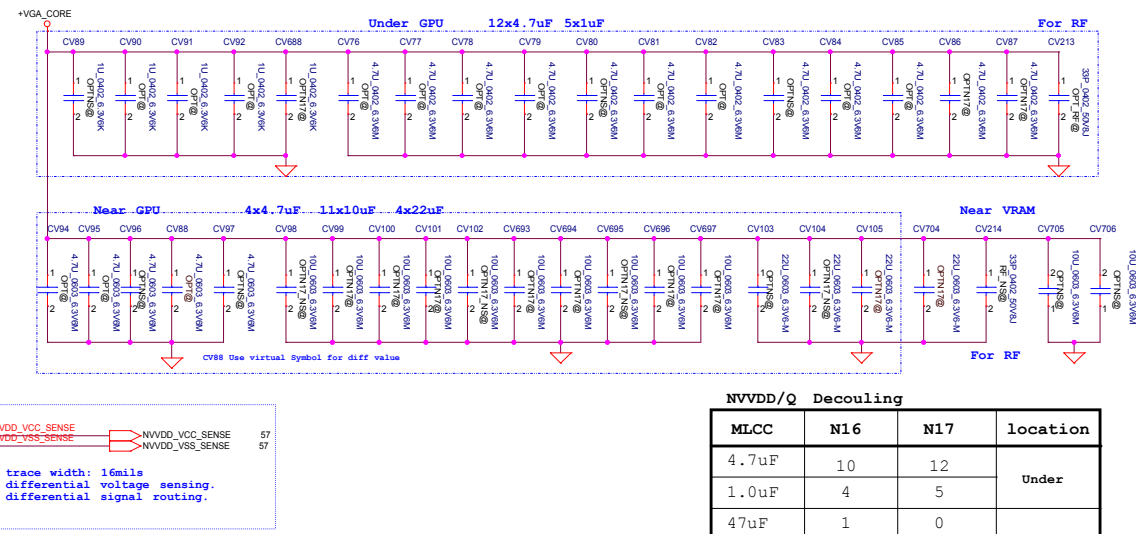
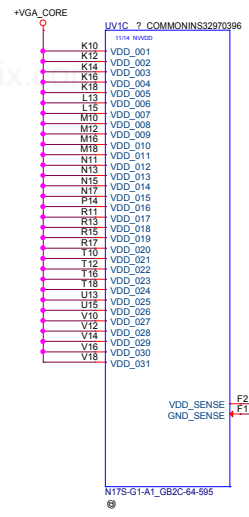
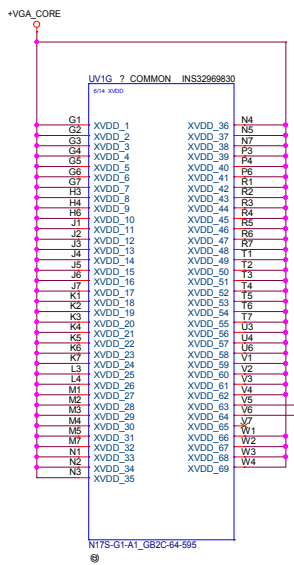
- UV1B 314 FBA ? COMMON INS32967903
- FBA_D0 E18 FBA_D0
 - FBA_D1 F18 FBA_D1
 - FBA_D2 E18 FBA_D2
 - FBA_D3 F17 FBA_D3
 - FBA_D4 D20 FBA_D4
 - FBA_D5 D21 FBA_D5
 - FBA_D6 F20 FBA_D6
 - FBA_D7 C21 FBA_D7
 - FBA_D8 E15 FBA_D8
 - FBA_D9 D15 FBA_D9
 - FBA_D10 F15 FBA_D10
 - FBA_D11 F13 FBA_D11
 - FBA_D12 C13 FBA_D12
 - FBA_D13 B13 FBA_D13
 - FBA_D14 E13 FBA_D14
 - FBA_D15 D13 FBA_D15
 - FBA_D16 B15 FBA_D16
 - FBA_D17 C16 FBA_D17
 - FBA_D18 A13 FBA_D18
 - FBA_D19 A15 FBA_D19
 - FBA_D20 B18 FBA_D20
 - FBA_D21 A19 FBA_D21
 - FBA_D22 C19 FBA_D22
 - FBA_D23 B24 FBA_D23
 - FBA_D24 C23 FBA_D24
 - FBA_D25 A25 FBA_D25
 - FBA_D26 A24 FBA_D26
 - FBA_D27 B21 FBA_D27
 - FBA_D28 B21 FBA_D28
 - FBA_D29 C21 FBA_D29
 - FBA_D30 C21 FBA_D30
 - FBA_D31 C21 FBA_D31
 - FBA_D32 R22 FBA_D32
 - FBA_D33 R21 FBA_D33
 - FBA_D34 T22 FBA_D34
 - FBA_D35 R23 FBA_D35
 - FBA_D36 N25 FBA_D36
 - FBA_D37 N28 FBA_D37
 - FBA_D38 N23 FBA_D38
 - FBA_D39 N24 FBA_D39
 - FBA_D40 V23 FBA_D40
 - FBA_D41 V22 FBA_D41
 - FBA_D42 Y23 FBA_D42
 - FBA_D43 U22 FBA_D43
 - FBA_D44 Y24 FBA_D44
 - FBA_D45 AA24 FBA_D45
 - FBA_D46 Y22 FBA_D46
 - FBA_D47 AA23 FBA_D47
 - FBA_D48 AD27 FBA_D48
 - FBA_D49 AB25 FBA_D49
 - FBA_D50 AD28 FBA_D50
 - FBA_D51 AC25 FBA_D51
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 - FBA_D59 K27 FBA_D59
 - FBA_D60 V26 FBA_D60
 - FBA_D61 V27 FBA_D61
 - FBA_D62 W27 FBA_D62
 - FBA_D63 W25 FBA_D63
 - FBA_D64 FBA_D63
- FBA_CMD0 C27 FBA_CMD0
 - FBA_CMD1 C26 FBA_CMD1
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 - FBA_CMD3 F24 FBA_CMD3
 - FBA_CMD4 D27 FBA_CMD4
 - FBA_CMD5 D26 FBA_CMD5
 - FBA_CMD6 F25 FBA_CMD6
 - FBA_CMD7 F26 FBA_CMD7
 - FBA_CMD8 F23 FBA_CMD8
 - FBA_CMD9 G22 FBA_CMD9
 - FBA_CMD10 G23 FBA_CMD10
 - FBA_CMD11 G24 FBA_CMD11
 - FBA_CMD12 F27 FBA_CMD12
 - FBA_CMD13 G25 FBA_CMD13
 - FBA_CMD14 G27 FBA_CMD14
 - FBA_CMD15 G28 FBA_CMD15
 - FBA_CMD16 M24 FBA_CMD16
 - FBA_CMD17 M24 FBA_CMD17
 - FBA_CMD18 M27 FBA_CMD18
 - FBA_CMD19 M26 FBA_CMD19
 - FBA_CMD20 M26 FBA_CMD20
 - FBA_CMD21 M25 FBA_CMD21
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 - FBA_CMD24 J23 FBA_CMD24
 - FBA_CMD25 J25 FBA_CMD25
 - FBA_CMD26 J24 FBA_CMD26
 - FBA_CMD27 K27 FBA_CMD27
 - FBA_CMD28 K25 FBA_CMD28
 - FBA_CMD29 J27 FBA_CMD29
 - FBA_CMD30 J25 FBA_CMD30
 - FBA_CMD31 B19 FBA_CMD31
 - FBA_CMD32 F22 FBA_CMD32
 - FBA_CMD33 J22 FBA_CMD33
- FBA_CLK0 D24 FBA_CLK0
 - FBA_CLK1 D25 FBA_CLK1
 - FBA_CLK2 N22 FBA_CLK2
 - FBA_CLK3 M22 FBA_CLK3
- FBA_WCKL0 D18 FBA_WCKL0
 - FBA_WCKL1 C18 FBA_WCKL1
 - FBA_WCKL2 D17 FBA_WCKL2
 - FBA_WCKL3 D16 FBA_WCKL3
 - FBA_WCKL4 T24 FBA_WCKL4
 - FBA_WCKL5 U24 FBA_WCKL5
 - FBA_WCKL6 V25 FBA_WCKL6
 - FBA_WCKL7 V25 FBA_WCKL7
- FBA_DQM0 D19 FBA_DQM0
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 - FBA_DQM5 W24 FBA_DQM5
 - FBA_DQM6 AA25 FBA_DQM6
 - FBA_DQM7 U25 FBA_DQM7
- FBA_EDC0 E19 FBA_EDC0
 - FBA_EDC1 C15 FBA_EDC1
 - FBA_EDC2 B16 FBA_EDC2
 - FBA_EDC3 B22 FBA_EDC3
 - FBA_EDC4 W23 FBA_EDC4
 - FBA_EDC5 AA26 FBA_EDC5
 - FBA_EDC6 T28 FBA_EDC6
 - FBA_EDC7 T28 FBA_EDC7
- FBA_DQS_RN0 F19 FBA_DQS_RN0
 - FBA_DQS_RN1 A10 FBA_DQS_RN1
 - FBA_DQS_RN2 A27 FBA_DQS_RN2
 - FBA_DQS_RN3 P25 FBA_DQS_RN3
 - FBA_DQS_RN4 W22 FBA_DQS_RN4
 - FBA_DQS_RN5 AB27 FBA_DQS_RN5
 - FBA_DQS_RN6 T27 FBA_DQS_RN6
 - FBA_DQS_RN7 T27 FBA_DQS_RN7
- FB_VREF D23 FB_VREF



FB_PLL/Q Decoupling

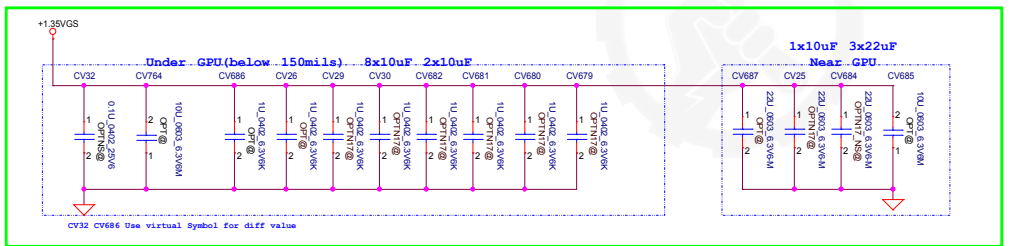
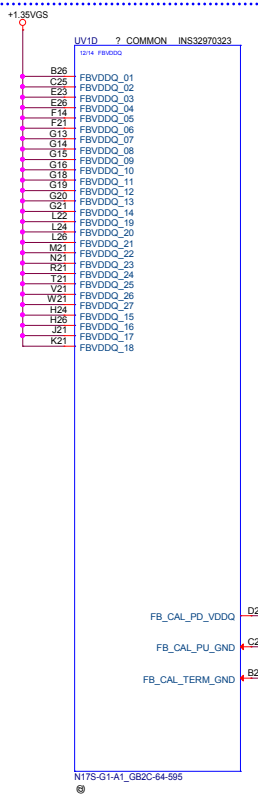
MLCC	N16	N17	location
0.1uF	2	4	Under
22uF	1	1	Near





NVDD/Q Decoupling

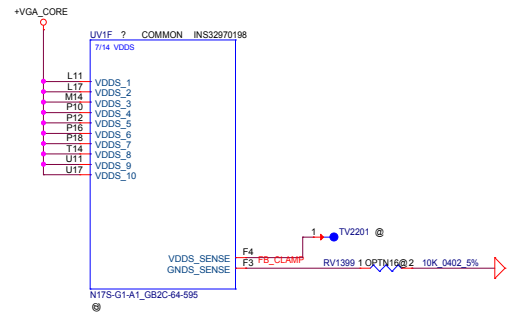
MLCC	N16	N17	location
4.7uF	10	12	Under
1.0uF	4	5	
47uF	1	0	
10uF	0	11	Near
22uF	1	4	
4.7uF	5	4	
330uF	1	2	

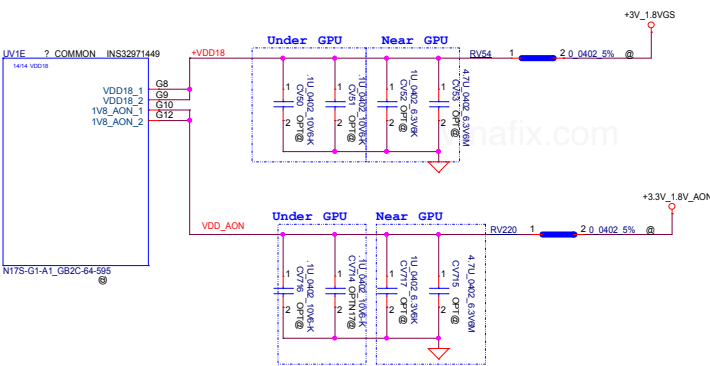


FBVDD/Q Decoupling

MLCC	N16	N17	location
0.1uF	2	0	Under
1.0uF	2	8	
4.7uF	2	0	
10uF	0	2	Near
10uF	1	1	
22uF	1	3	

CALIBRATION PIN	GDDR5
FB CAL x_PD_VDDQ	40.2Ohm
FB CAL x_PU_GND	40.2Ohm
FB CAL xTERM_GND	60.4Ohm



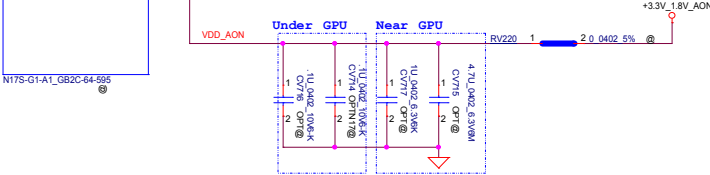


N16 3V3_MAIN(N17 VDD_18) Decoupling

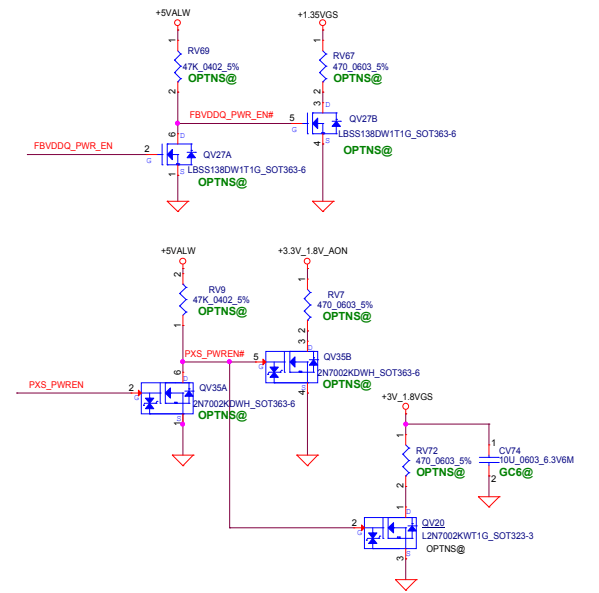
MLCC	N16	N17	location
0.1uF	2	2	Under
1.0uF	1	1	Near
4.7uF	1	1	

N16 3V3_AON(N17 1V8_AON) Decoupling

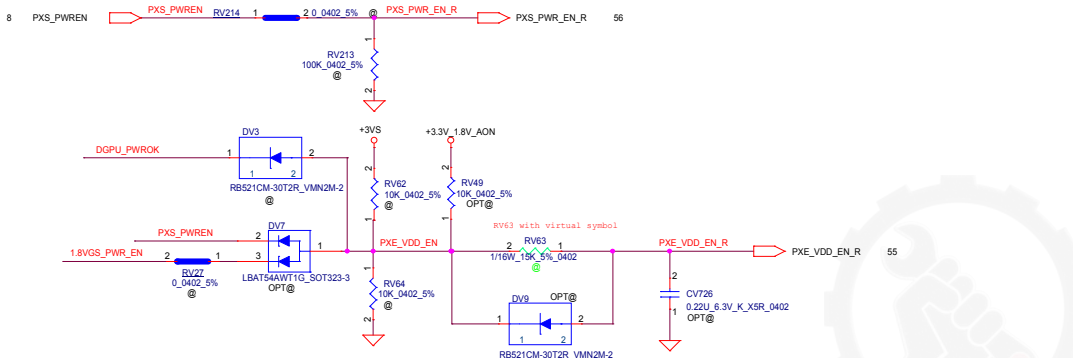
MLCC	N16	N17	location
0.1uF	1	2	Under
1.0uF	1	1	Near
4.7uF	1	1	



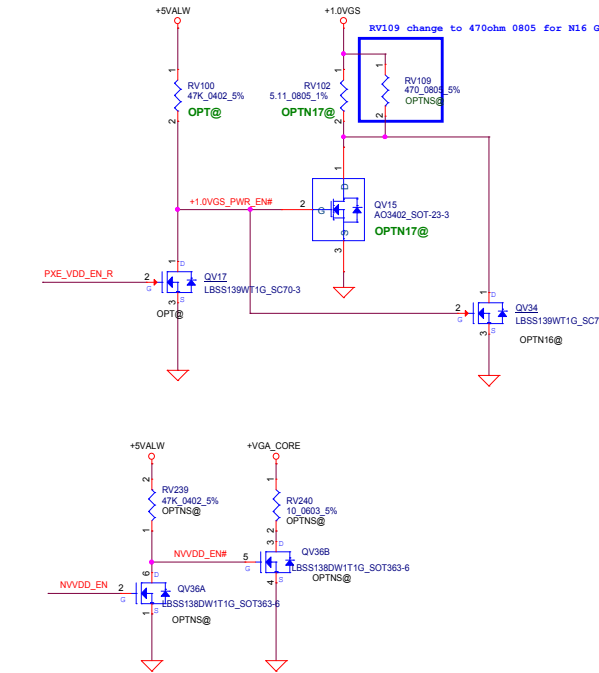
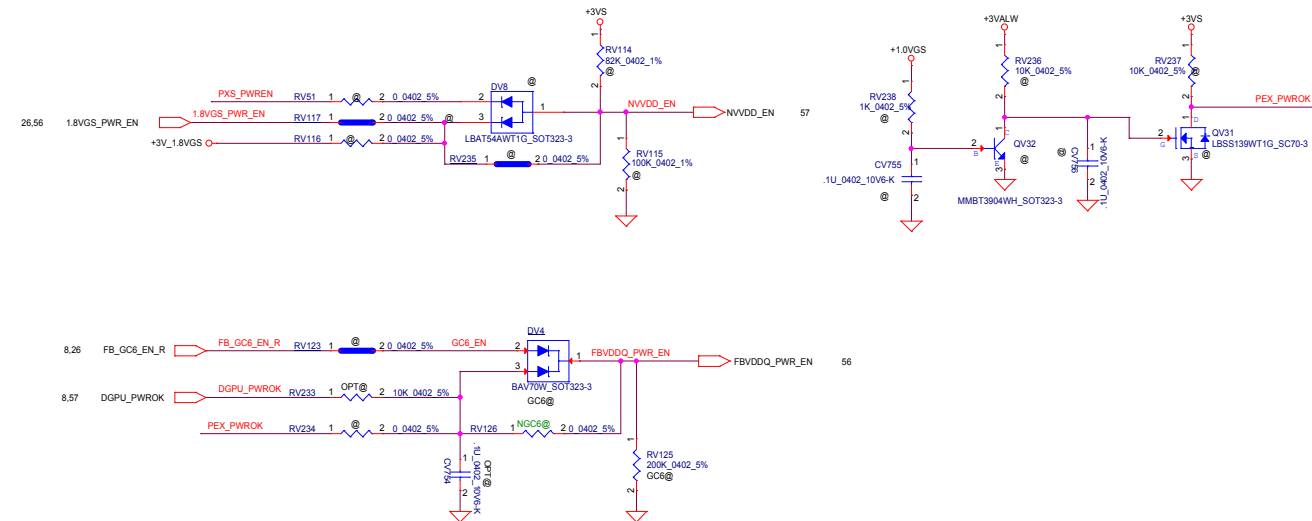
Discharge

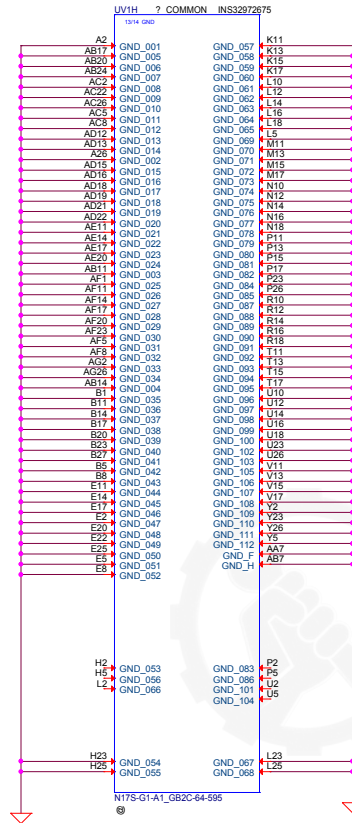



PXE_VDD & 1V8_AON



+1.8VG_AON TO +1.8VGS

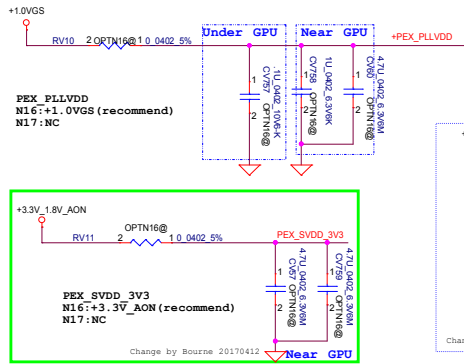




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				Rev 0.1
				Date: Tuesday, December 11, 2018 Sheet 24 of 61

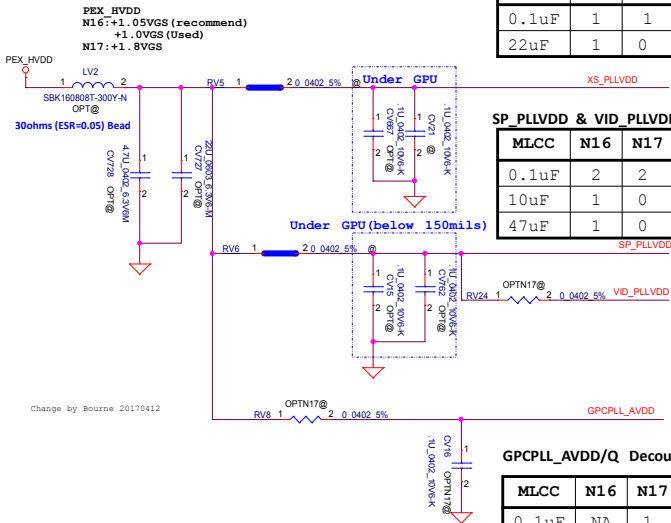
PEX_PLLVDD/Q Decoupling

MLCC	N16	N17	location
1.0uF	1	NA	Under
1uF	1	NA	Near
4.7uF	1	NA	



PEX_SVDD/Q Decoupling

MLCC	N16	N17	location
4.7uF	2	NA	Near



XS_PLLVDD/Q Decoupling

MLCC	N16	N17	location
0.1uF	1	1	Under
22uF	1	0	Near

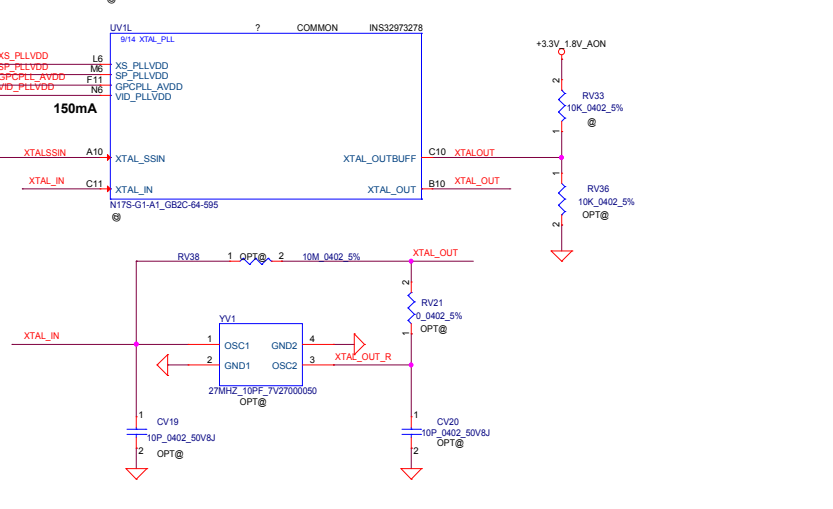
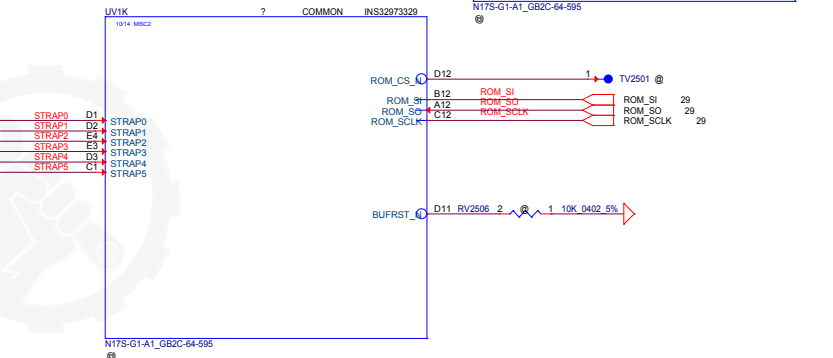
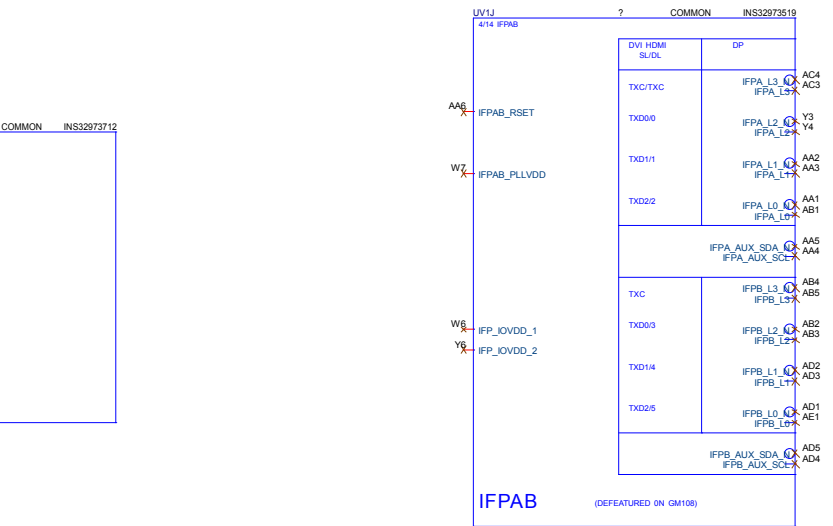
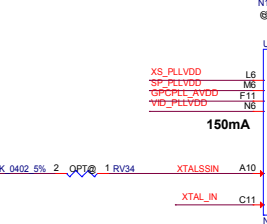
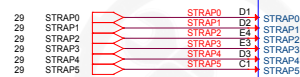
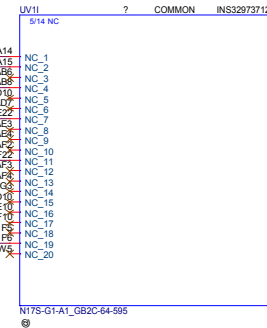
SP_PLLVDD & VID_PLLVDD/Q Decoupling

MLCC	N16	N17	location
0.1uF	2	2	Under
10uF	1	0	Near
47uF	1	0	

GPCPLL_AVDD/Q Decoupling

MLCC	N16	N17	location
0.1uF	NA	1	Under
4.7uF	NA	1	Near
22uF	NA	1	

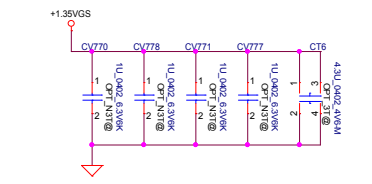
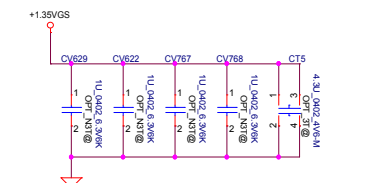
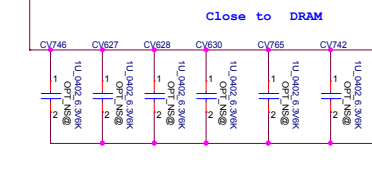
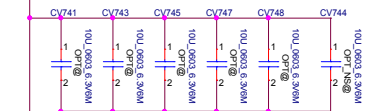
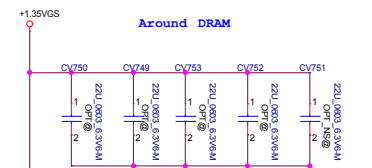
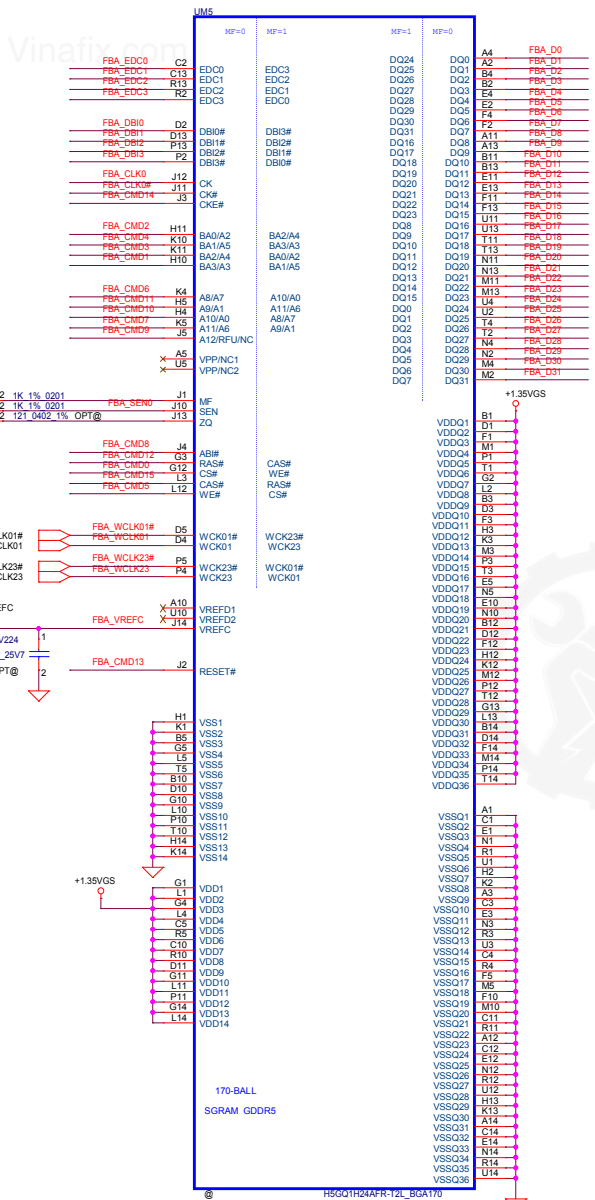
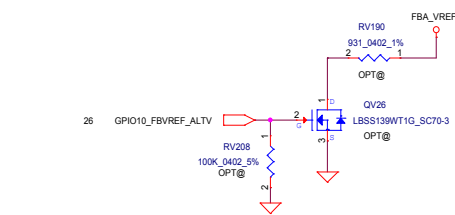
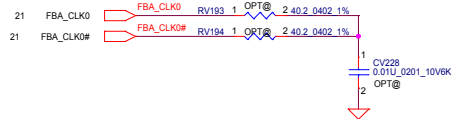
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Lower 32 bits

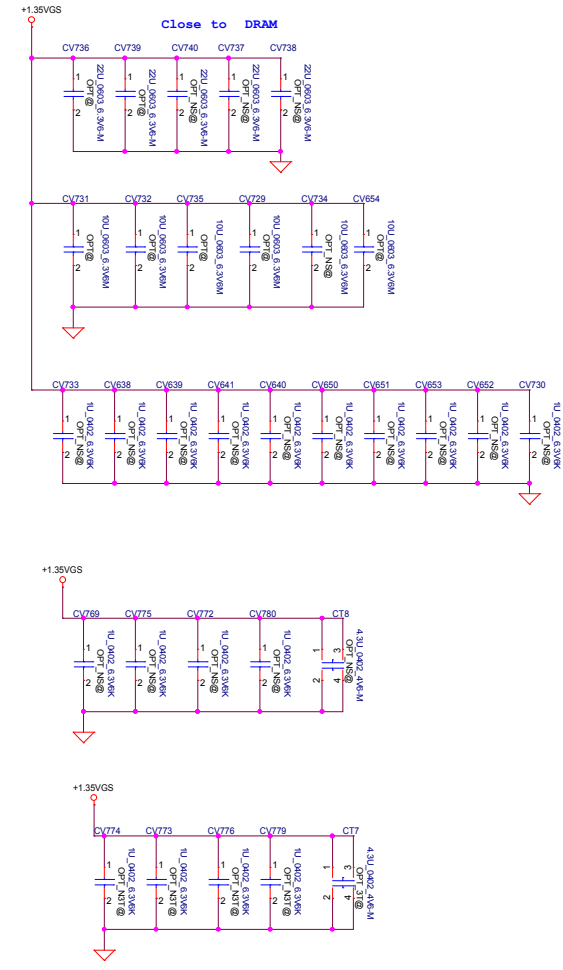
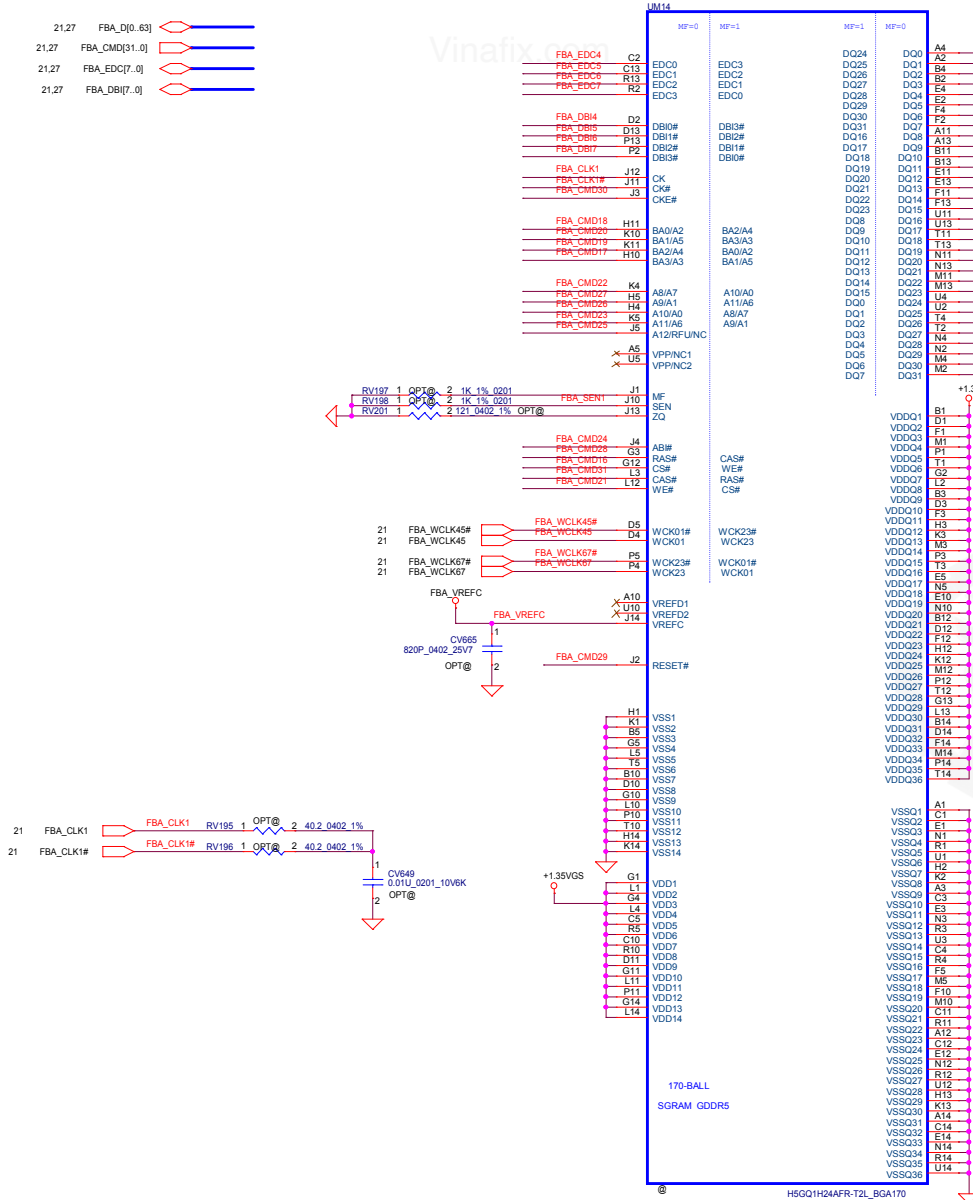
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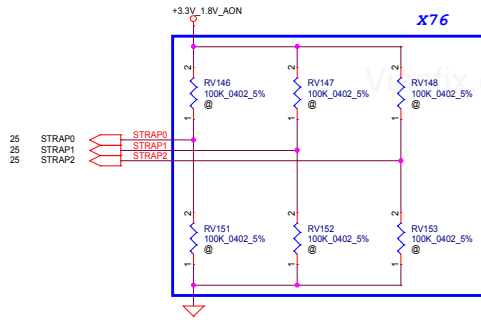
- 21.28 FBA_D0[0..63]
- 21.28 FBA_CMD[31..0]
- 21.28 FBA_EDC[7..0]
- 21.28 FBA_DB[7..0]



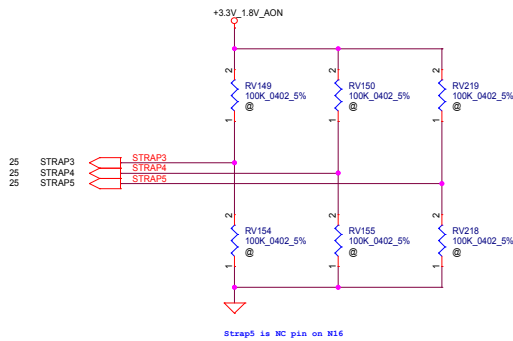
Security Classification	LC Future Center Secret Data		Title	GPU_GDDR5_Rank0 [31:0]
Issued Date	2015/08/20	Deciphered Date	2016/08/20	
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MF=0 No Mirror



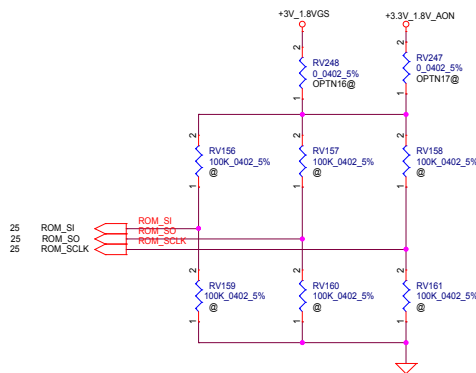


GPU	FB Memory (GDDR5)	RAMCFG[4:0]	STRAP2	STRAP1	STRAP0
8Gb	Samsung 8Gb	K4G80325FB-HC28	0 (0x0000)	L	L
	Micron 8Gb	MT51J256M32HF-70:A	1 (0x0001)	L	L
	Hynix 8Gb	H5GC8H24MJR-R0C	2 (0x0010)	L	H



STRAP5	STRAP4	STRAP3	SMB_ALT_ADDR	DEVID_SEL	PCIE_CFG	VGA_DEVICE
L	L	L	0	0	0	0

- 1: SMB_ALT_ADDR ENABLE
- 0: SMB_ALT_ADDR DISABLE
- 1: DEVID_SEL REBRAND
- 0: DEVID_SEL ORIGINAL
- 1: PCIE_CFG LOW POWER
- 0: PCIE_CFG HIGH POWER
- 1: VGA_DEVICE ENABLE
- 0: VGA_DEVICE DISABLE



	ROM_SO	ROM_SI	ROM_SCLK	SOR_EXPOSED[3:0]
N17S-G1	H	H	M	0000
N16S-GTR				

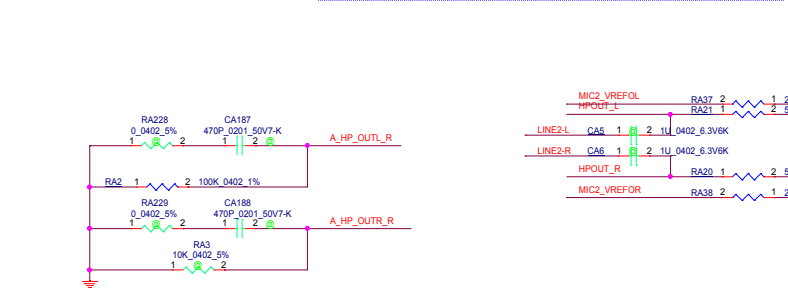
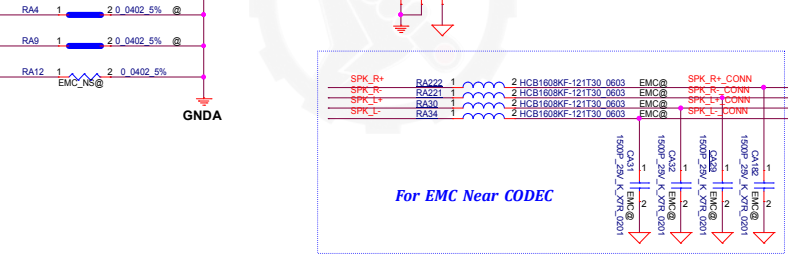
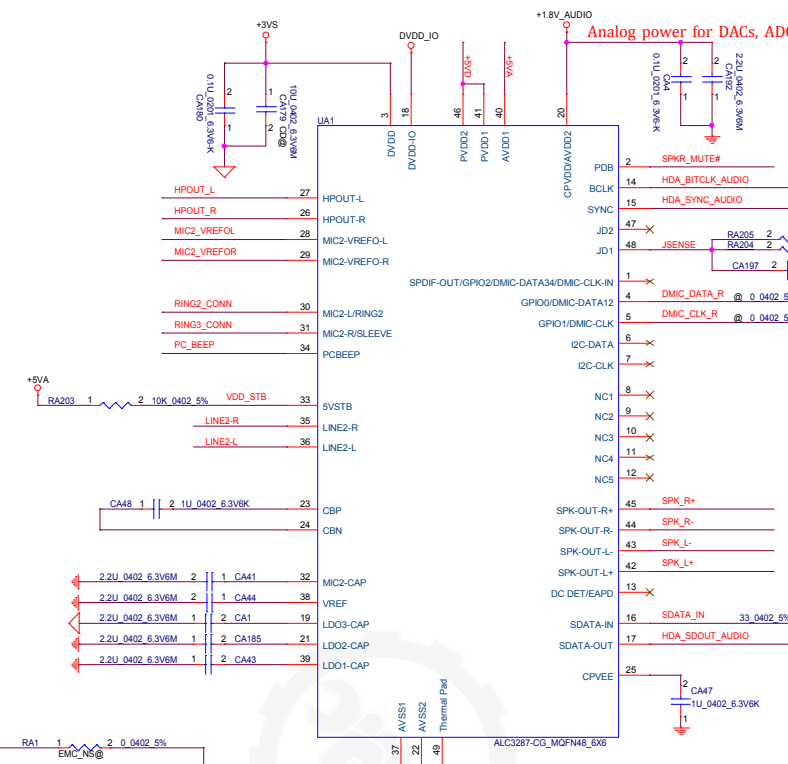
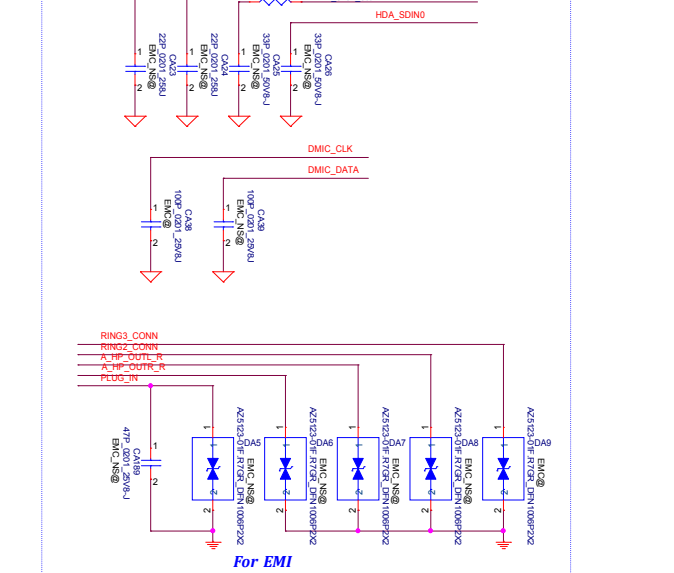
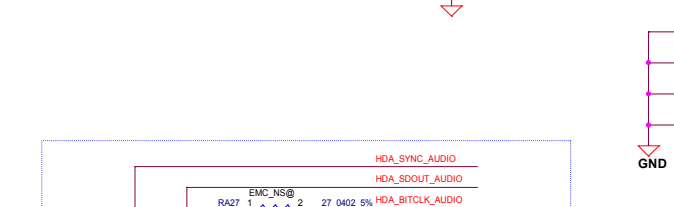
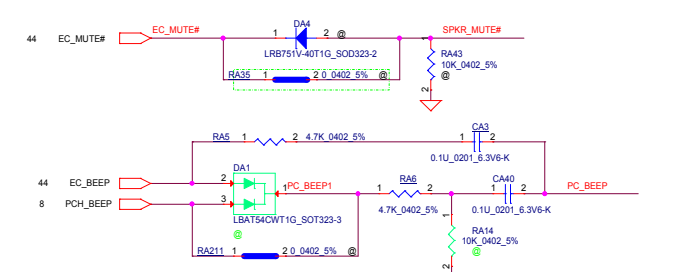
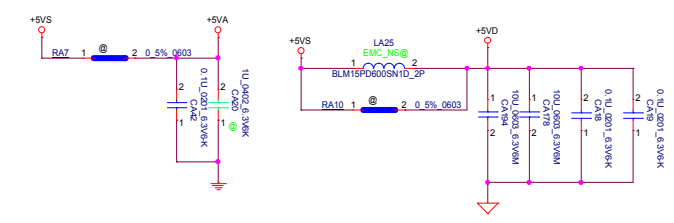
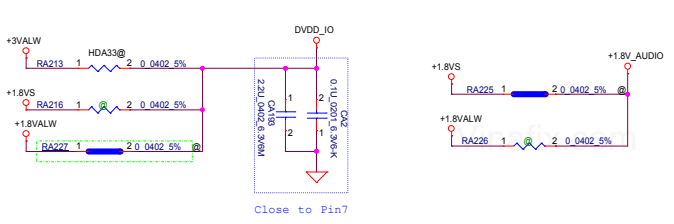
1:ENABLE 0:DISABLE
SOR0/1/2/3 DISABLE

DEVID_SEL	
0	(Default)
1	

PCIE_CFG	
0	(Default)
1	

SMBUS_ALT_ADDR	
0	0x9E (Default)
1	0x9C (Multi-GPU usage)


VGA_DEVICE	
0	3D Device (Class Code 302h)
1	VGA Device (Default)

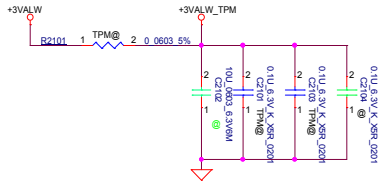


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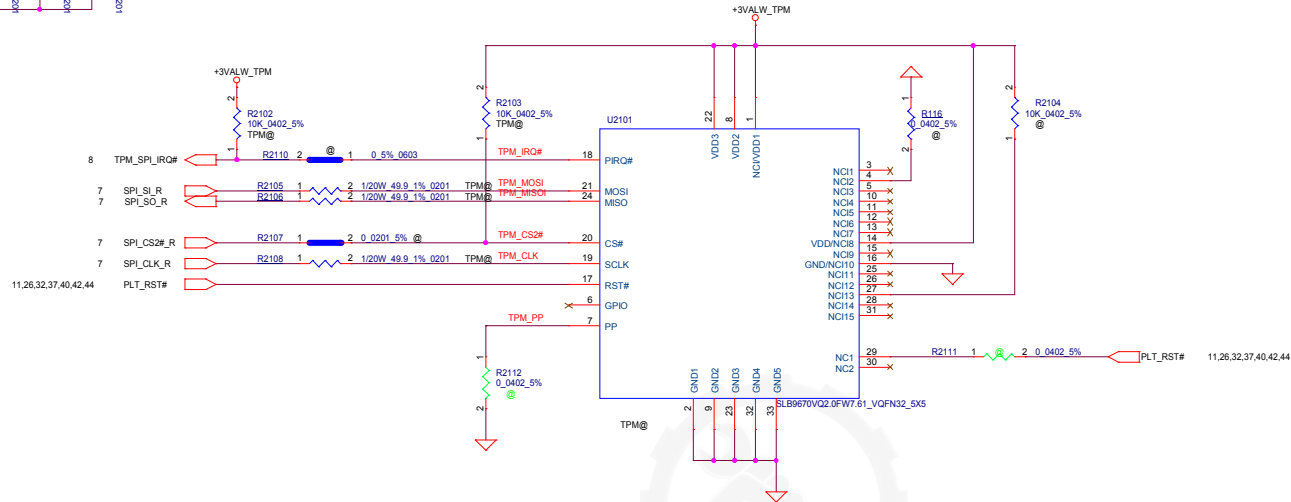
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					c	FG540/FG740	0.1
					Date:	Tuesday, December 11, 2018	Sheet 31 of 60



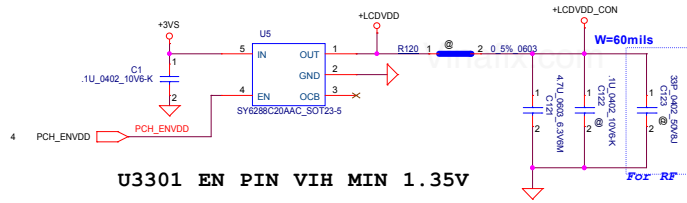
Vinafix.com



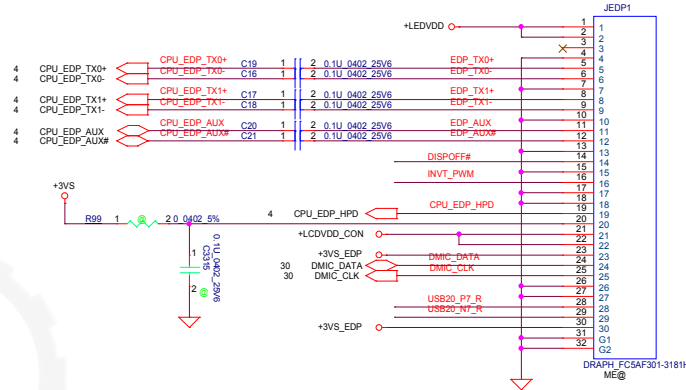
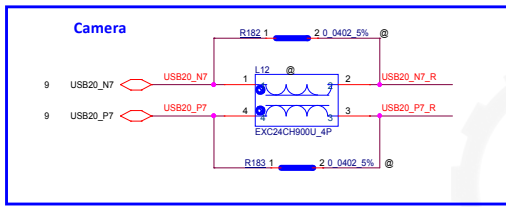
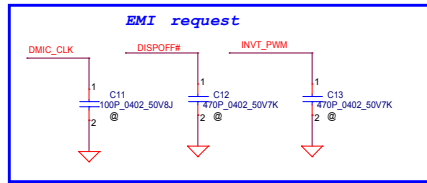
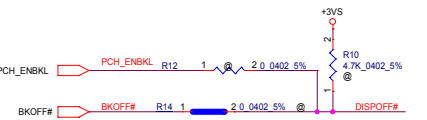
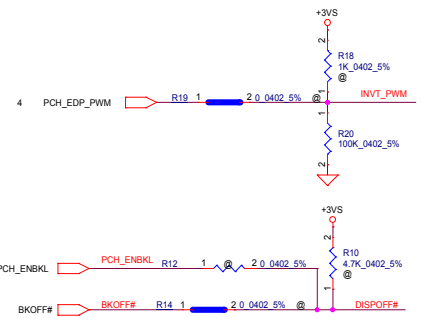
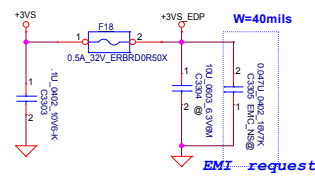
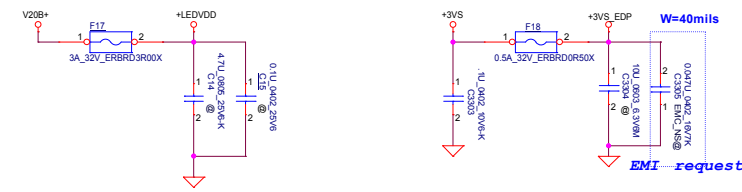
TABLE

Pin No	TCG PTP Spec (v38)	Infineon SLB9670VQ2.0 FW 7.61	ST Micro ST33HTPH2E32AHB4	Nuvoton NPCT750LABYX	NATIONZ Z32H330TC
1	VDD	NC/VDD	NC	VSB	VDD
2	GND	GND	GND	NC	GND
3	GPIO	NC	NC	NC	NC
4	GPIO	NC	NC	NC	NC
5	NC	NC	NC	PP/GPIO6	NC
6	VNC/GPIO	NC	GPIO	NC	NC
7	GPIO/VDD	GPIO	PP	GPIO3	PP
8	VDD	VDD	NC	VHIO	VDD
9	GND	GND	NC	NC	GND
10	VNC	NC	NC	NC	NC
11	NC	NC	NC	NC	NC
12	NC	NC	NC	NC	NC
13	VNC/GPIO	NC	GPIO4	NC	NC
14	VDD	NC/VDD	NC	NC	VDD
15	NC	NC	NC	NC	NC
16	GND	NC/GND	NC	GND	GND
17	SPI_RST#	RST#	SPI_RST#	PLTRST#	SPI_RST#
18	SPI_PIRQ#	PIRQ#	SPI_PIRQ#	PIRQ#/GPIO2	SPI_PIRQ#
19	SPI_CLK	SCLK	SPI_CLK	SCLK	SPI_CLK
20	SPI_CS#	CS#	SPI_CS#	SCS#/GPIO5	SPI_CS#
21	MOSI	MOSI	MOSI	MOSI/GPIO7	MOSI
22	VDD	VDD	VPS	VHIO	VDD
23	GND	GND	NC	GND	GND
24	MISO	MISO	MISO	MISO	MISO
25	NC	NC	NC	NC	NC
26	NC	NC	NC	NC	NC
27	NC	NC	NC	NC	NC
28	NC	NC	NC	NC	NC
29	VNC/GPIO	NC	NC	SDA/GPIO0	NC
30	VNC/GPIO	NC	NC	SCL/GPIO1	NC
31	VNC	NC	NC	NC	NC
32	GND	GND	NC	NC	GND

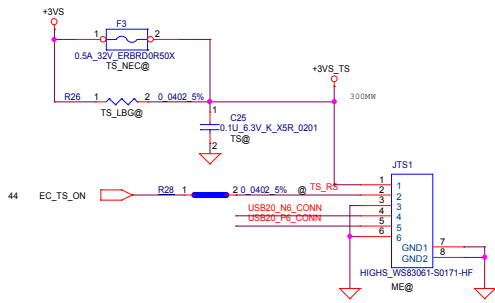
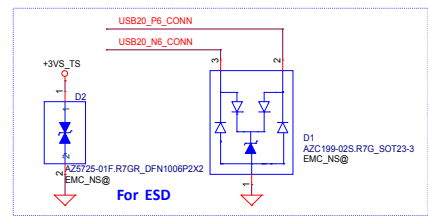
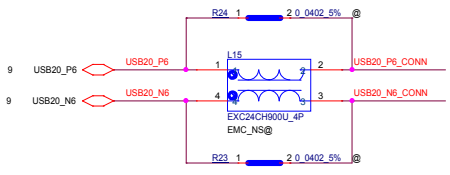
LCD POWER CIRCUIT

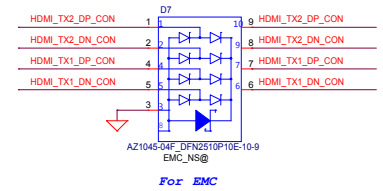
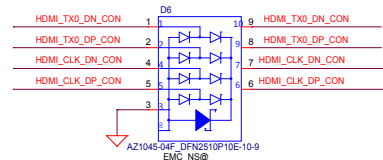
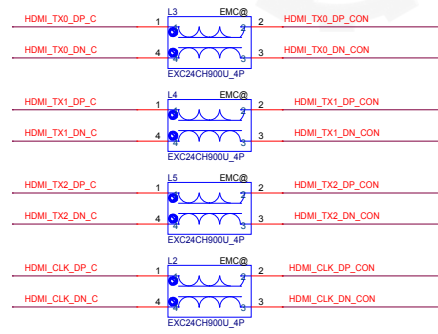
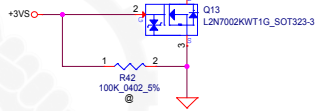
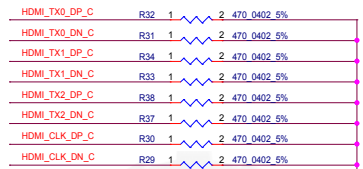
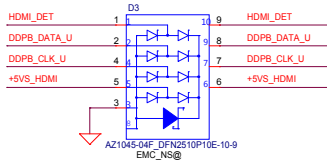
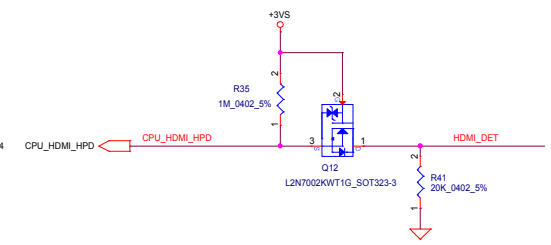
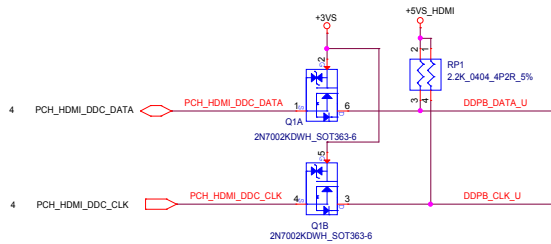
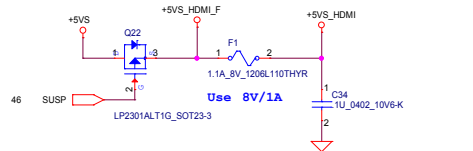
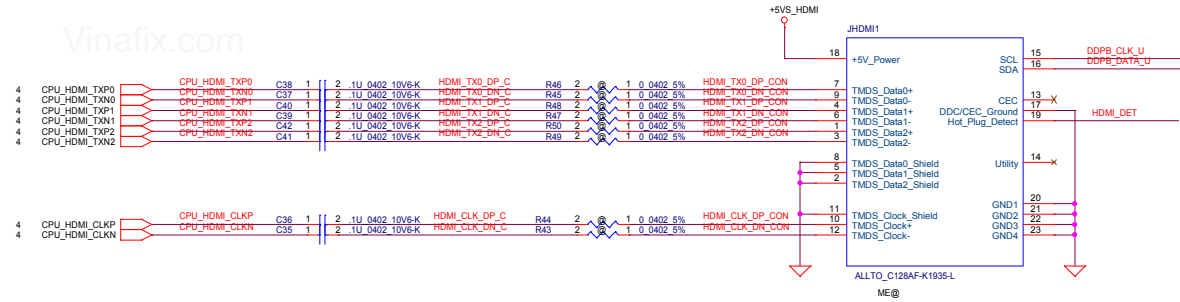


CMOS Camera




Touch Screen






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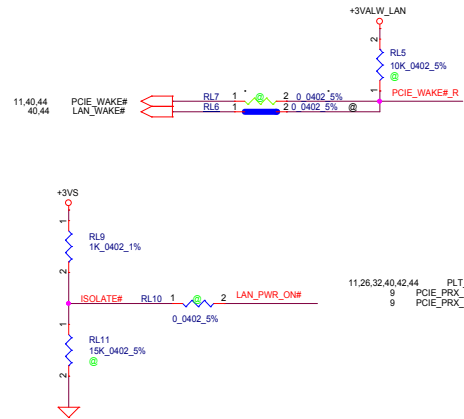
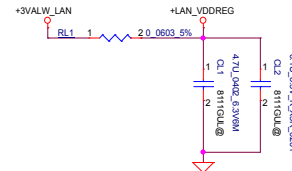
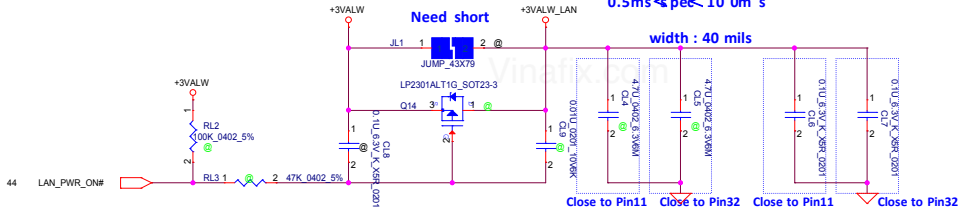
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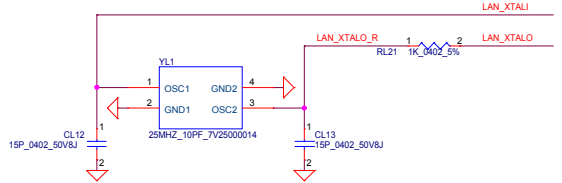
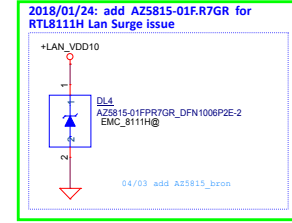
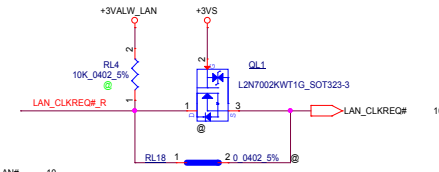
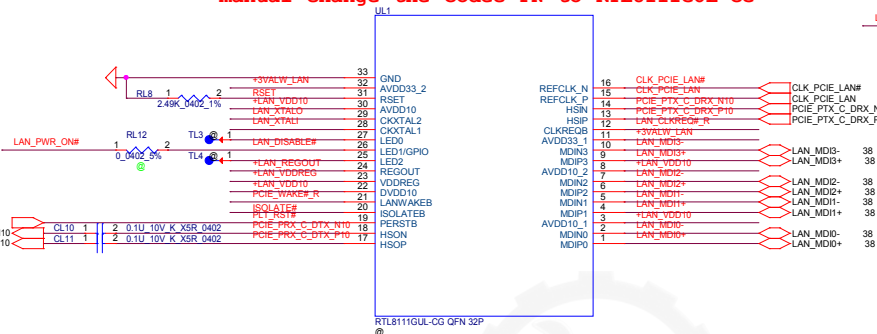
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Issued Date	2015/08/20	Deciphered Date	2016/08/20		HALL Sensor	
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				Date:	Tuesday, December 11, 2018	Sheet 38 of 61

+3VALW TO +3VALW_LAN

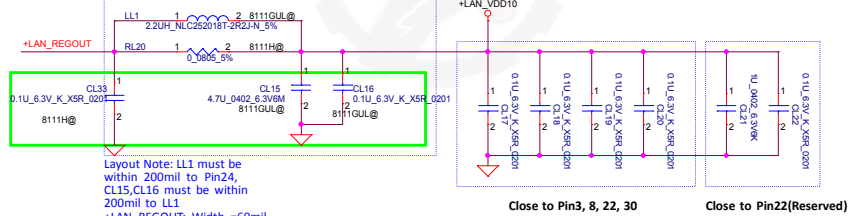
+3VALW_LAN rising time (10%~90%)
0.5ms <= t_rise <= 100ms

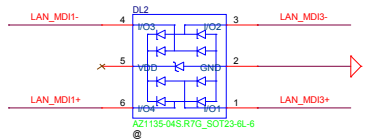
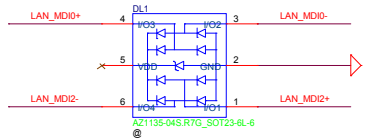
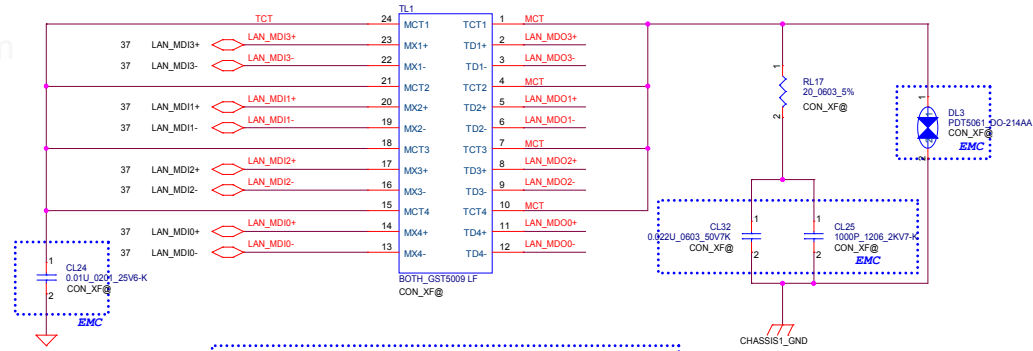


manual change the Codec PN to RTL8111GUL-CG

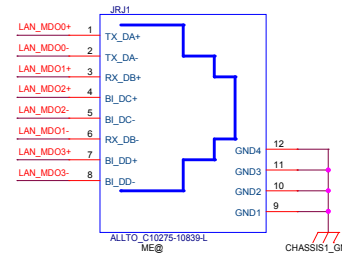
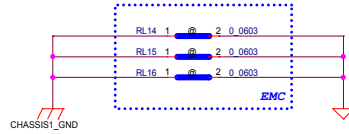
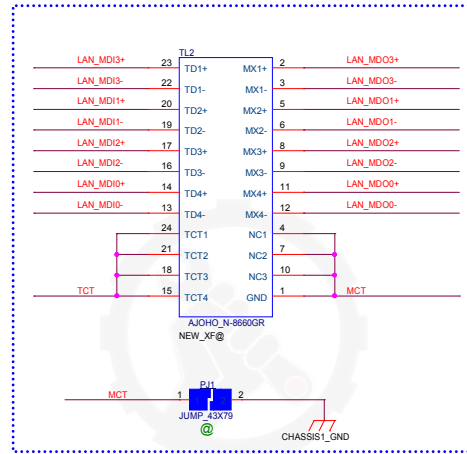


For RTL8111GUL(SWR mode, reserved)
For RTL8111H (LDO mode)





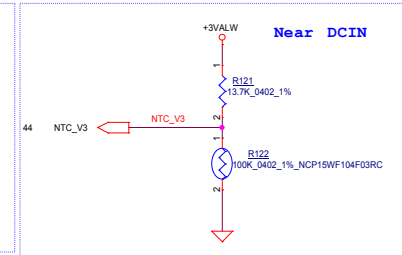
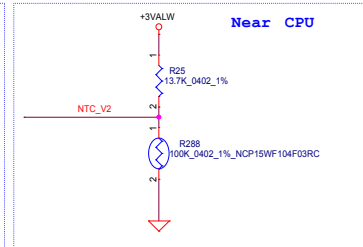
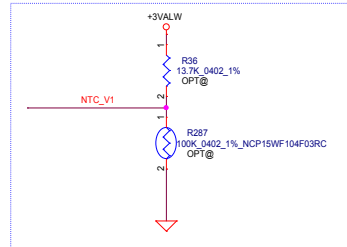
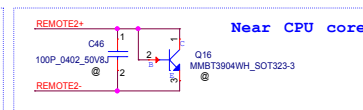
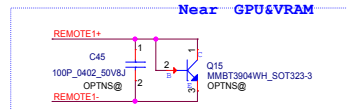
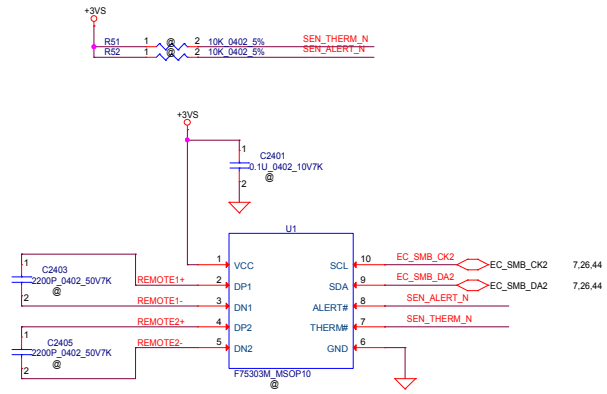
Place Close to TL1
EMC



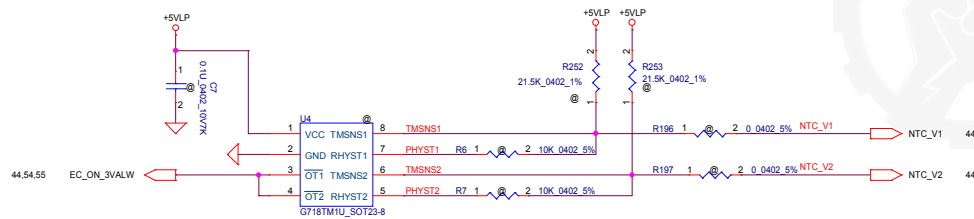
SMSC thermal sensor placed near DIMM

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

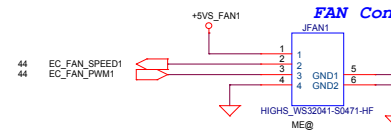
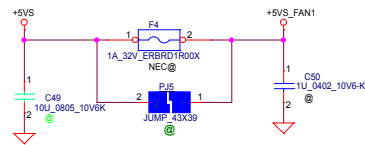
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HW thermal sensor



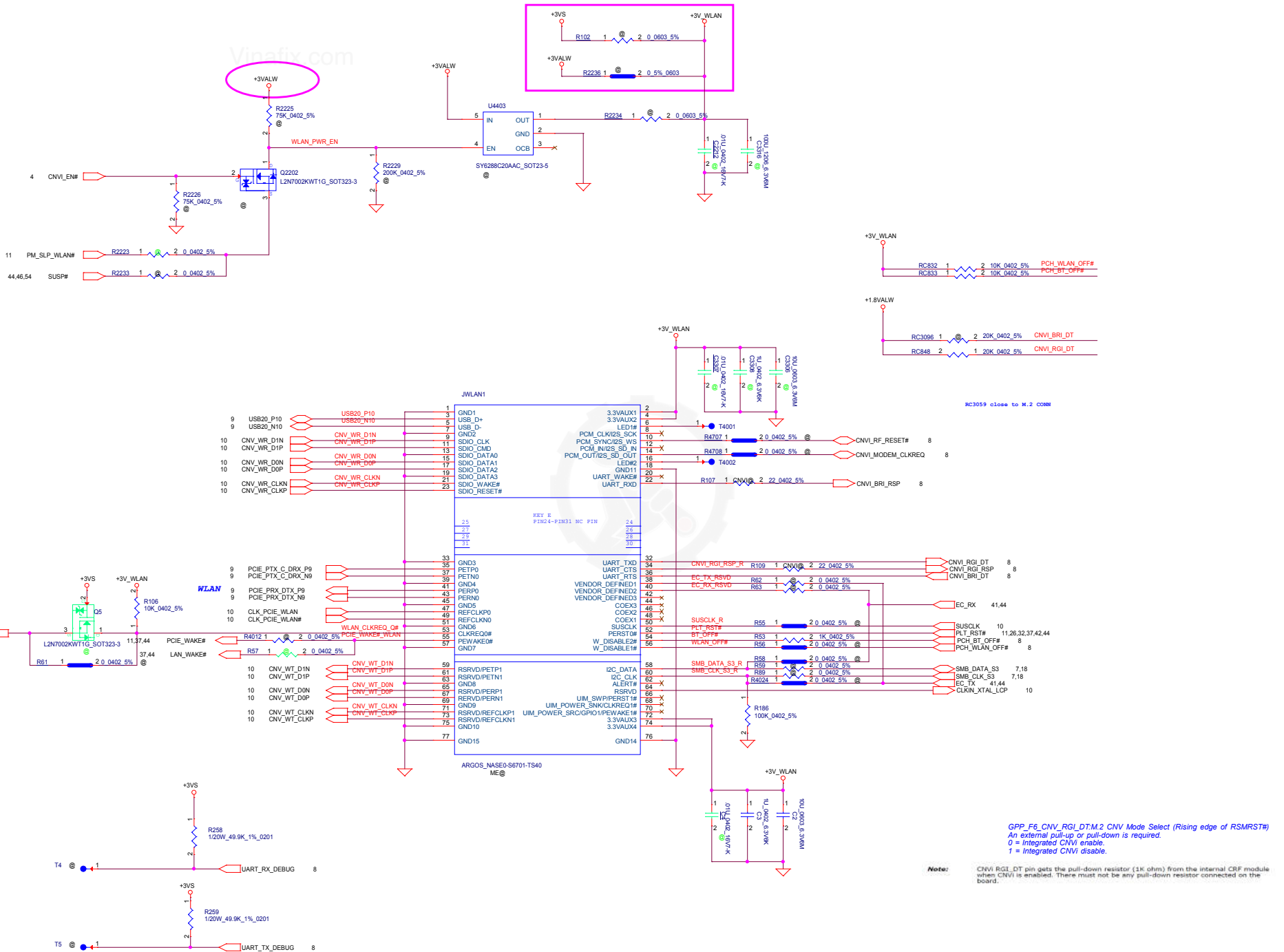
over temperature threshold:
RSET=3*RTMH
92+/-30C
Hysteresis temperature threshold.
RHYST=(RSET*RTML) / (3*RTML-RSET)
56+/-30C



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Mini-Express Card(WLAN/WiMAX)

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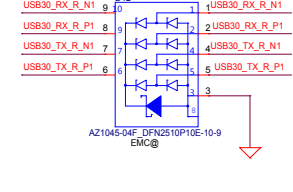
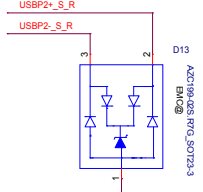
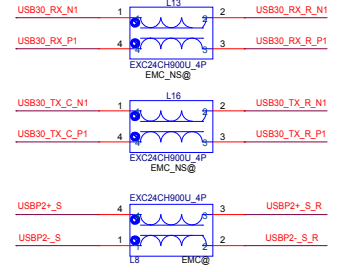
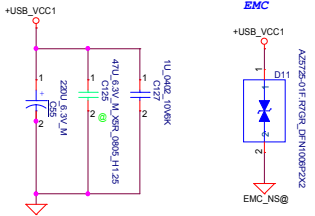
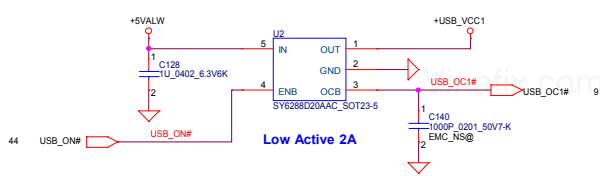


GPP_F6_CNV_RGL_DT.M.2 CNV Mode Select (Rising edge of RSMRST#)
 An external pull-up or pull-down is required.
 0 = Integrated CNVi disable.
 1 = Integrated CNVi enable.

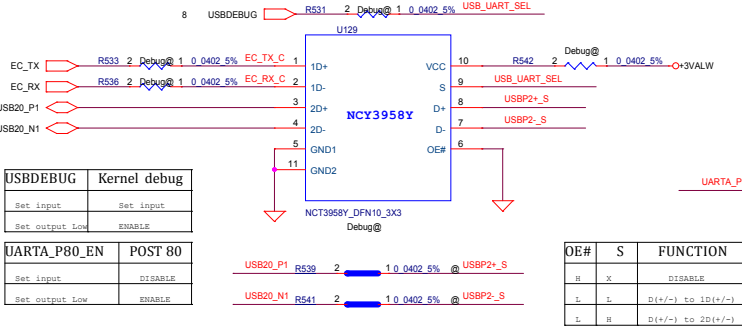
Note: CNVi RGL_DT pin gets the pull-down resistor (1K ohm) from the internal CRF module when CNVi is enabled. There must not be any pull-down resistor connected on the board.

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LEFT SIDE USB3.0 PORT x2



For USB Debug Function

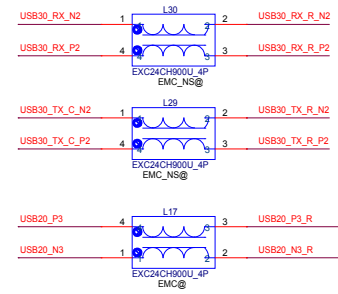
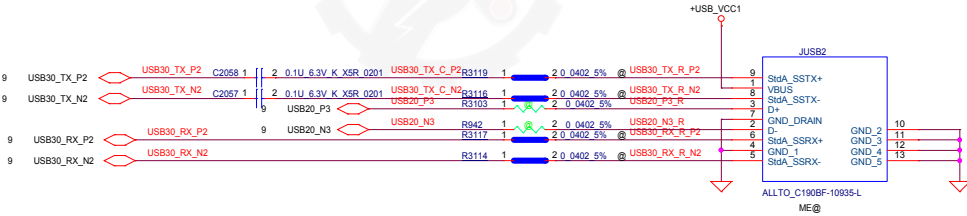
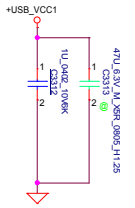
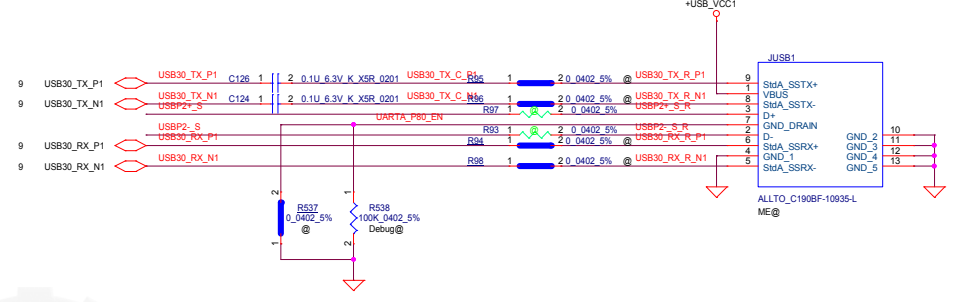


USBDEBUG	Kernel debug
Set input	Set input
Set output Low	ENABLE

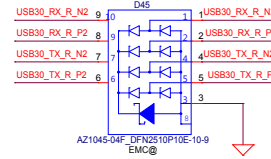
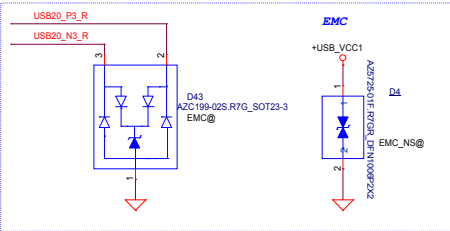
UART_P80_EN	POST 80
Set input	DISABLE
Set output Low	ENABLE

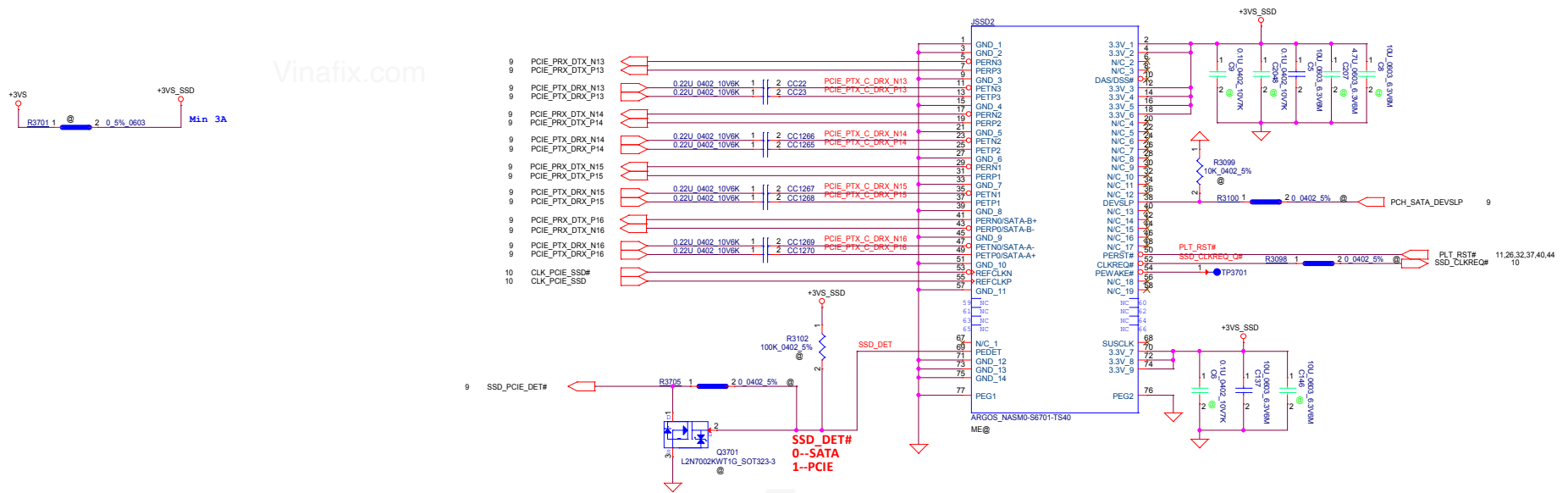
OE#	S	FUNCTION
H	X	DISABLE
L	L	D(+/-) to ID(+/-)
L	H	D(+/-) to 2D(+/-)

04/02 add USB debug function bron

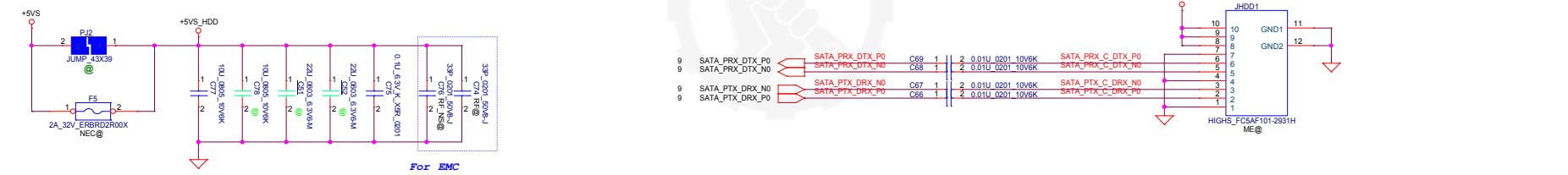


FOR ESD Close to Connector





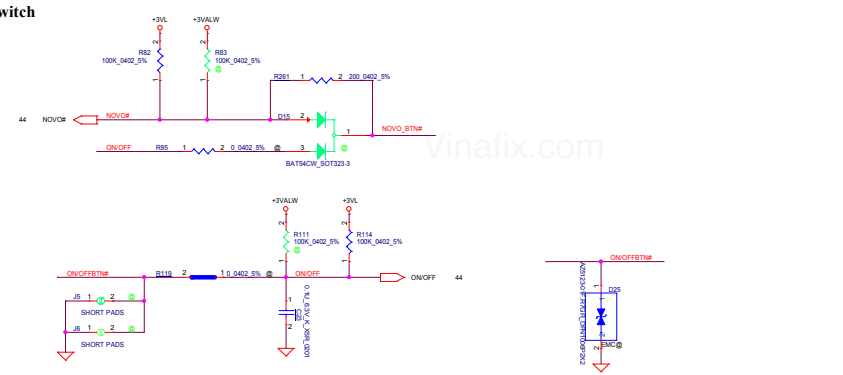
SATA HDD Conn.



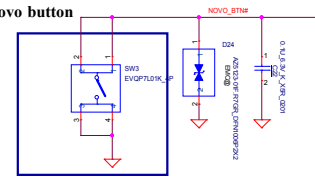
ODD Conn.



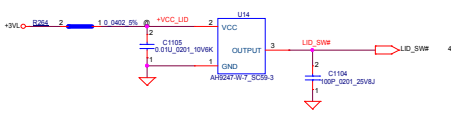
ON/OFF switch



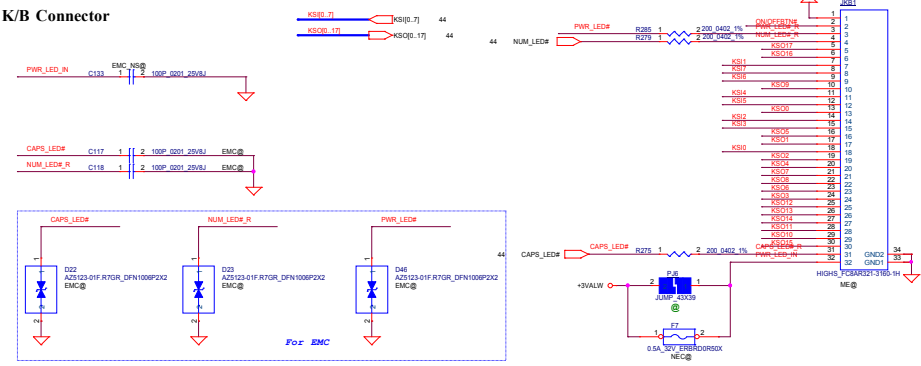
Novo button



LID switch



K/B Connector



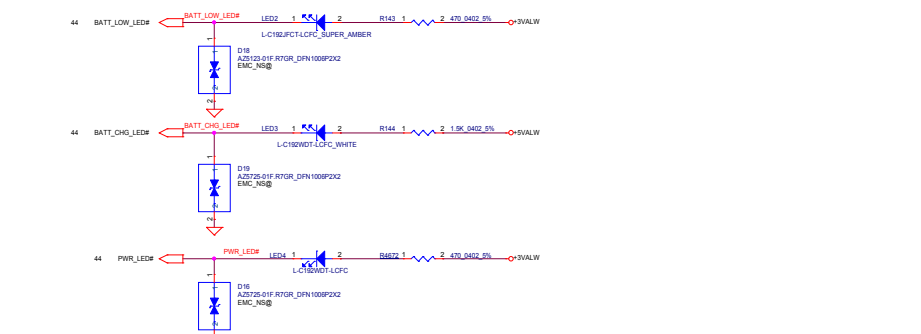
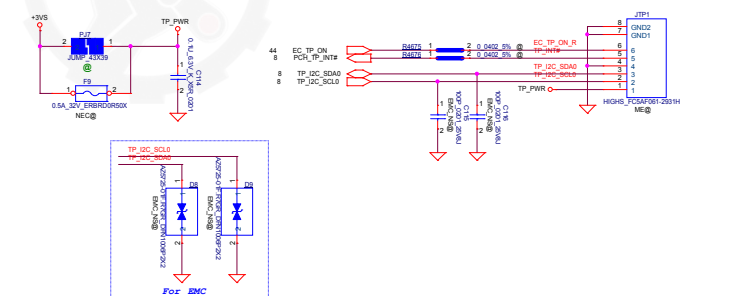
KB Backlight Connector



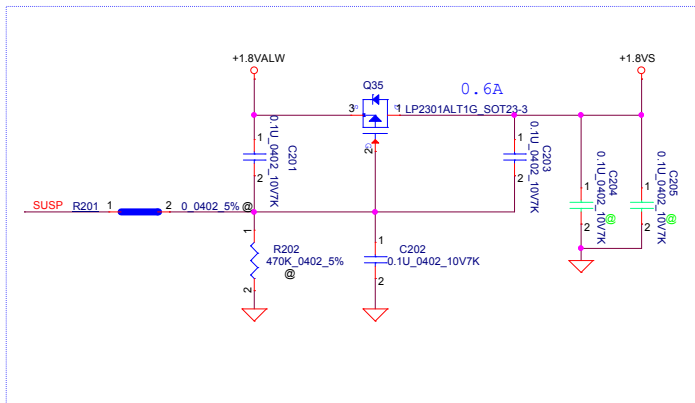
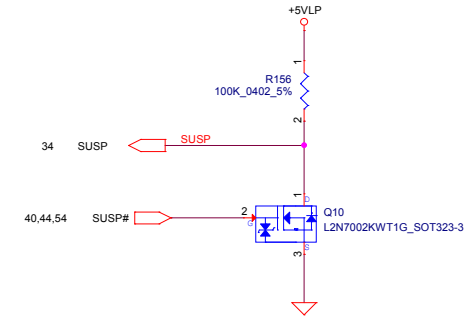
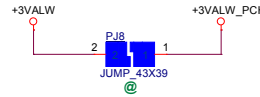
Finger Print Connector



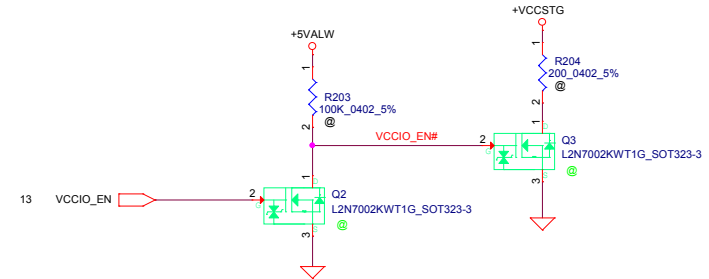
TP/B Connector



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Reserve for VCCSGT discharge



12.1.4 VccSTG Rail Discharge Requirements

As long as VccST and VccSTG are power gated separately, the following requirements are critical to prevent system failure on Whiskey Lake:

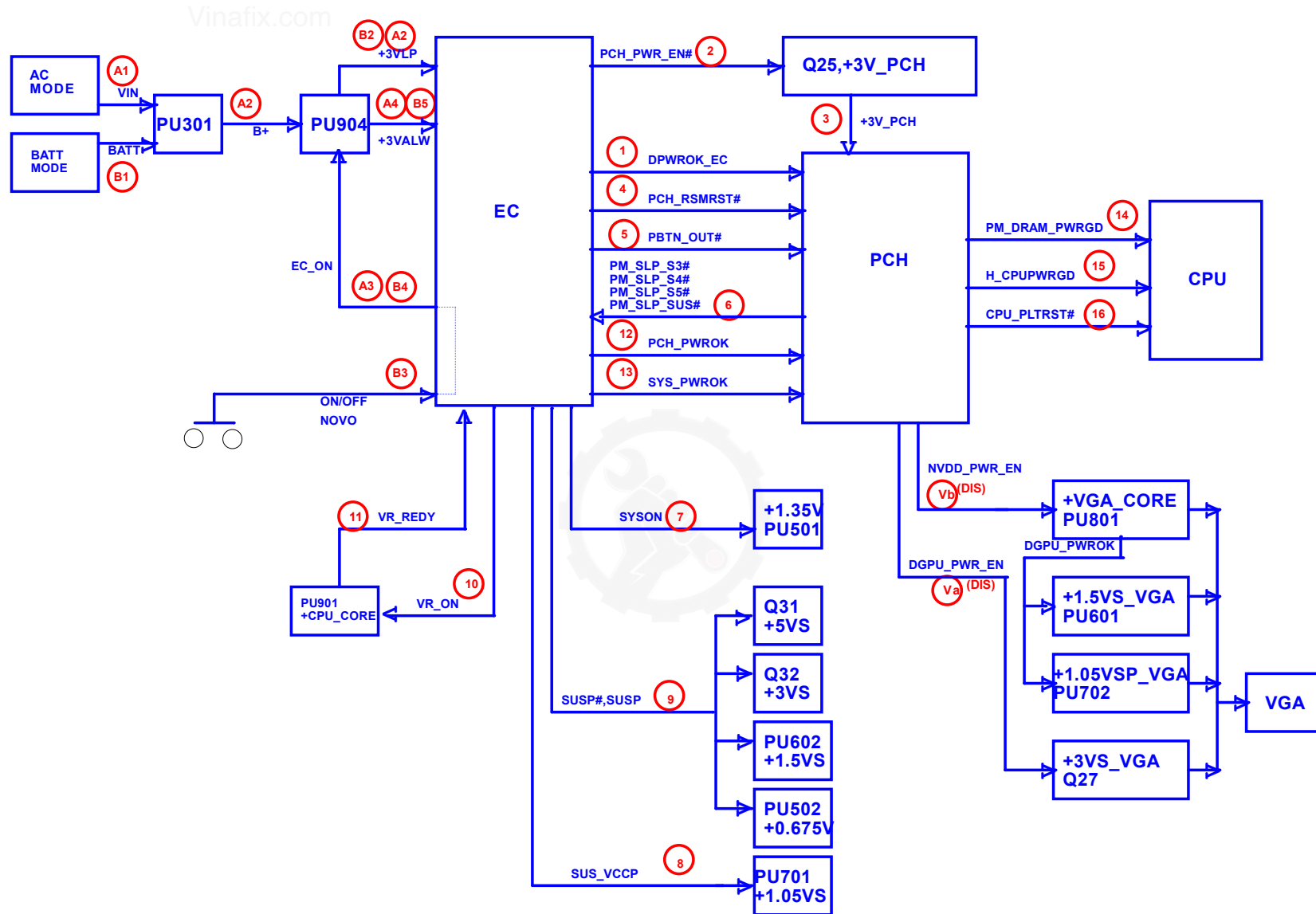
1. VccSTG should have a discharge circuit, either integrated into its load switch or externally on the motherboard. The recommended nominal $R_{discharge} \leq 300\Omega$ to GND. The discharge circuit should be activated when the VccSTG load switch is disabled.
2. If VccST/VccPLL has a discharge circuit, either integrated into its load switch or externally on the motherboard, then VccSTG nominal $R_{discharge} \leq VccST/VccPLL R_{discharge}$.
3. The total capacitance on VccSTG \leq total capacitance on VccST/VccPLL.

For DisCharge



08/29: Need double check enable signal and the resistance

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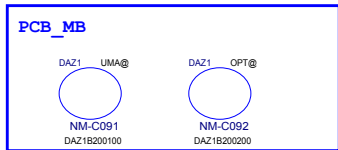
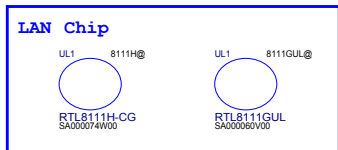
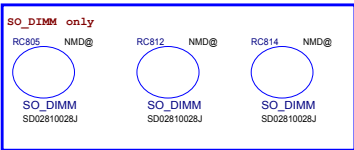
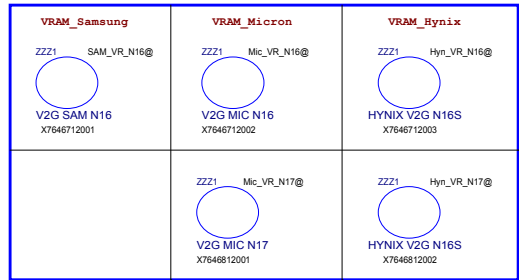
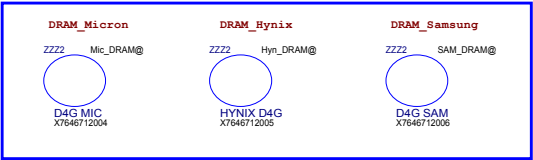
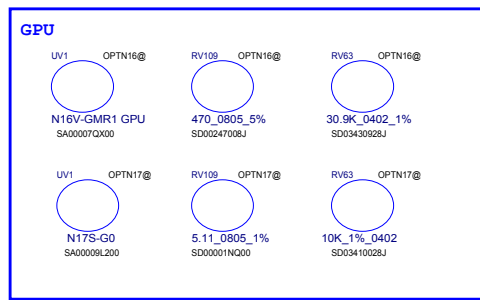
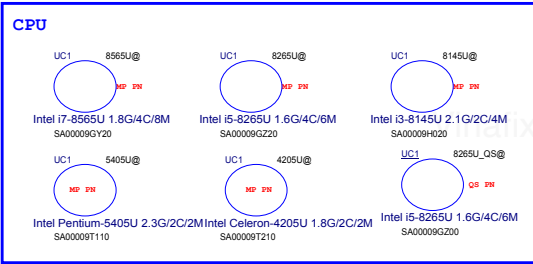


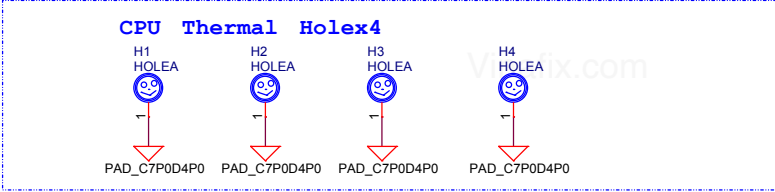
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Issued Date	2015/08/20	Deciphered Date
		2016/08/20

Title	Power sequence block
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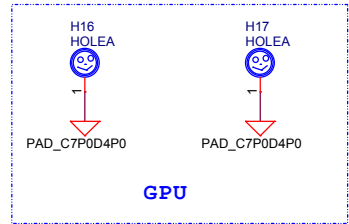
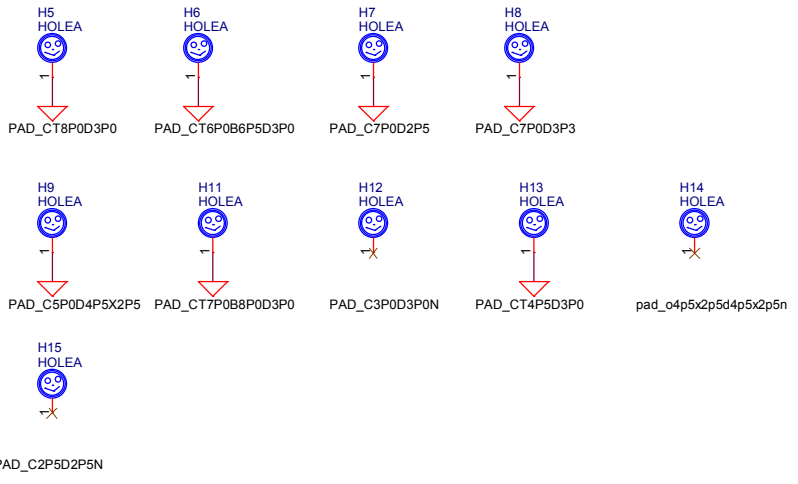
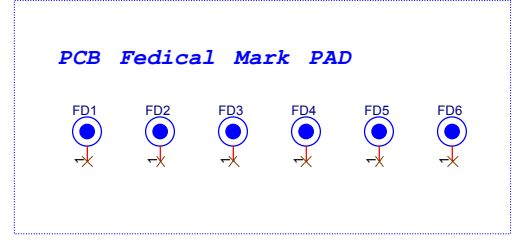
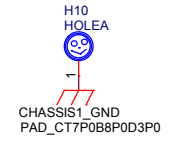
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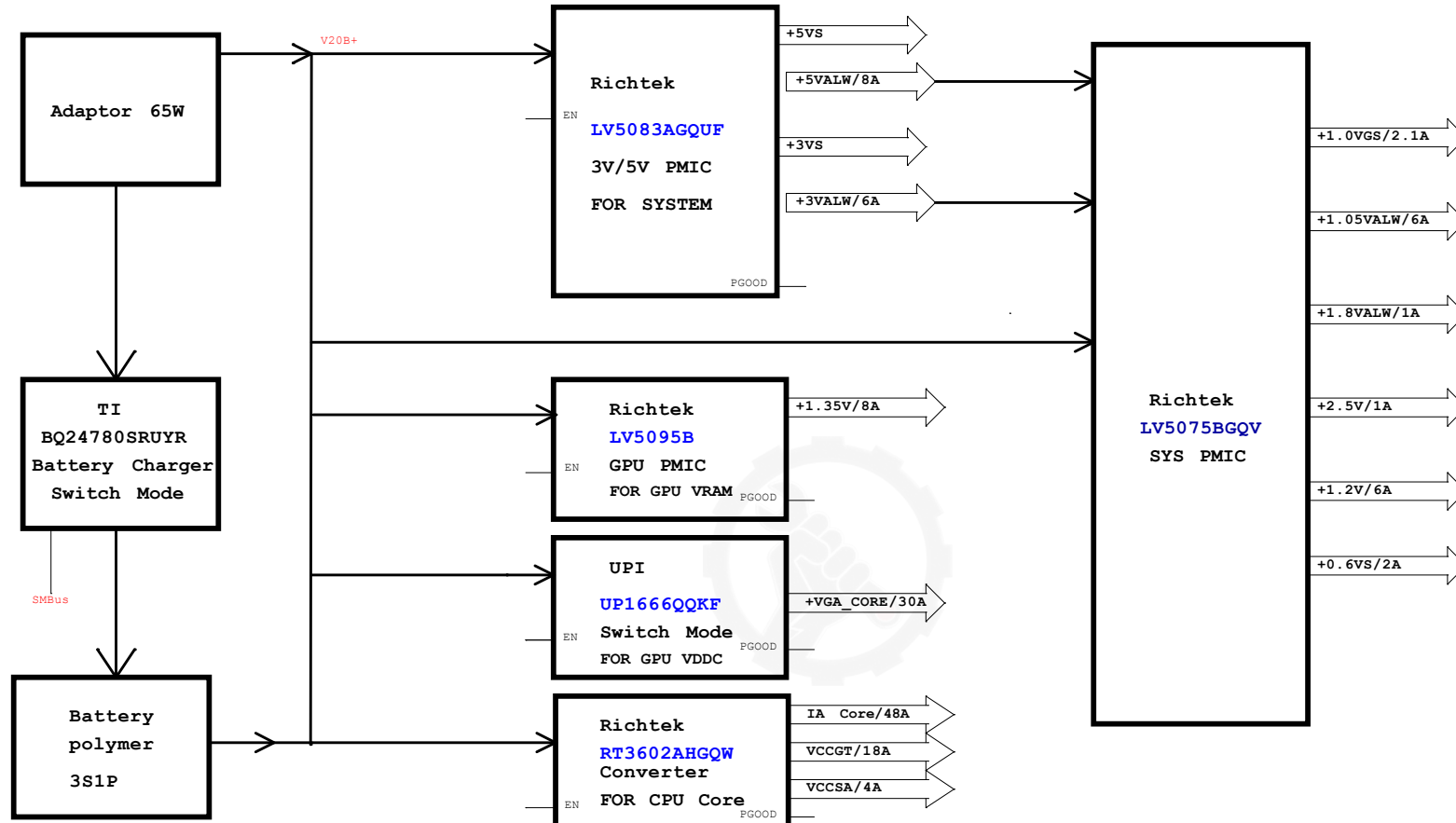
Close to RJ45



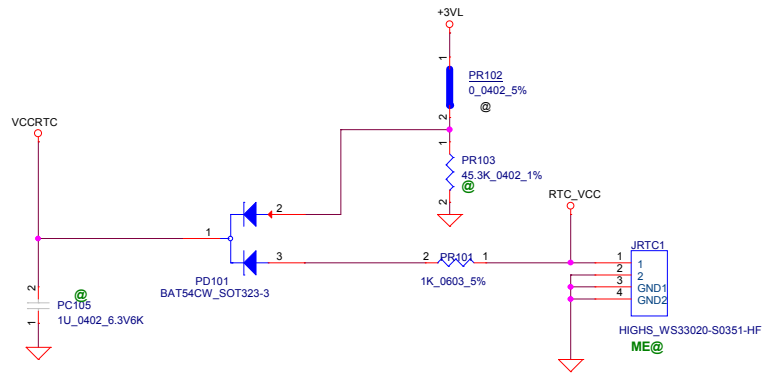
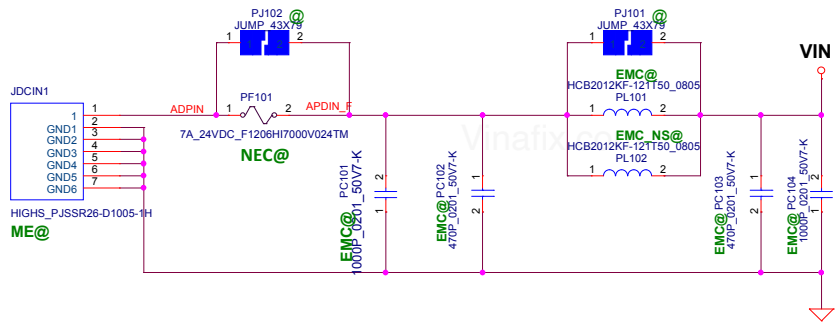
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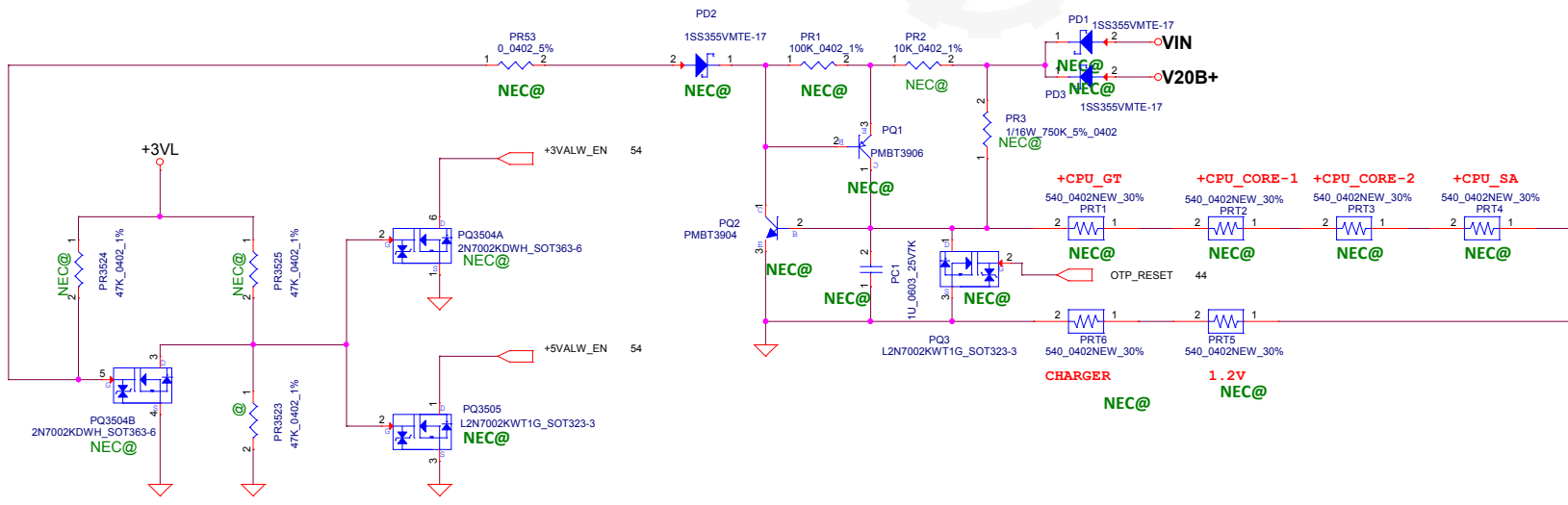


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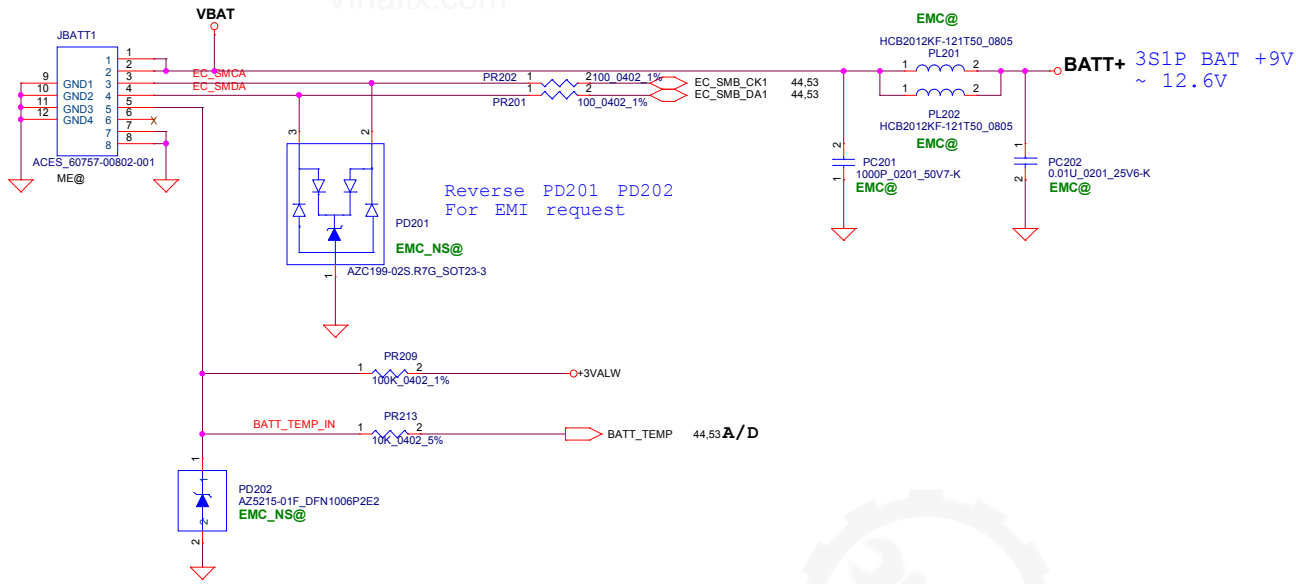
RTC VCC 35MIL
 +3VL 20MIL
 VCCRTC 35MIL

OTP

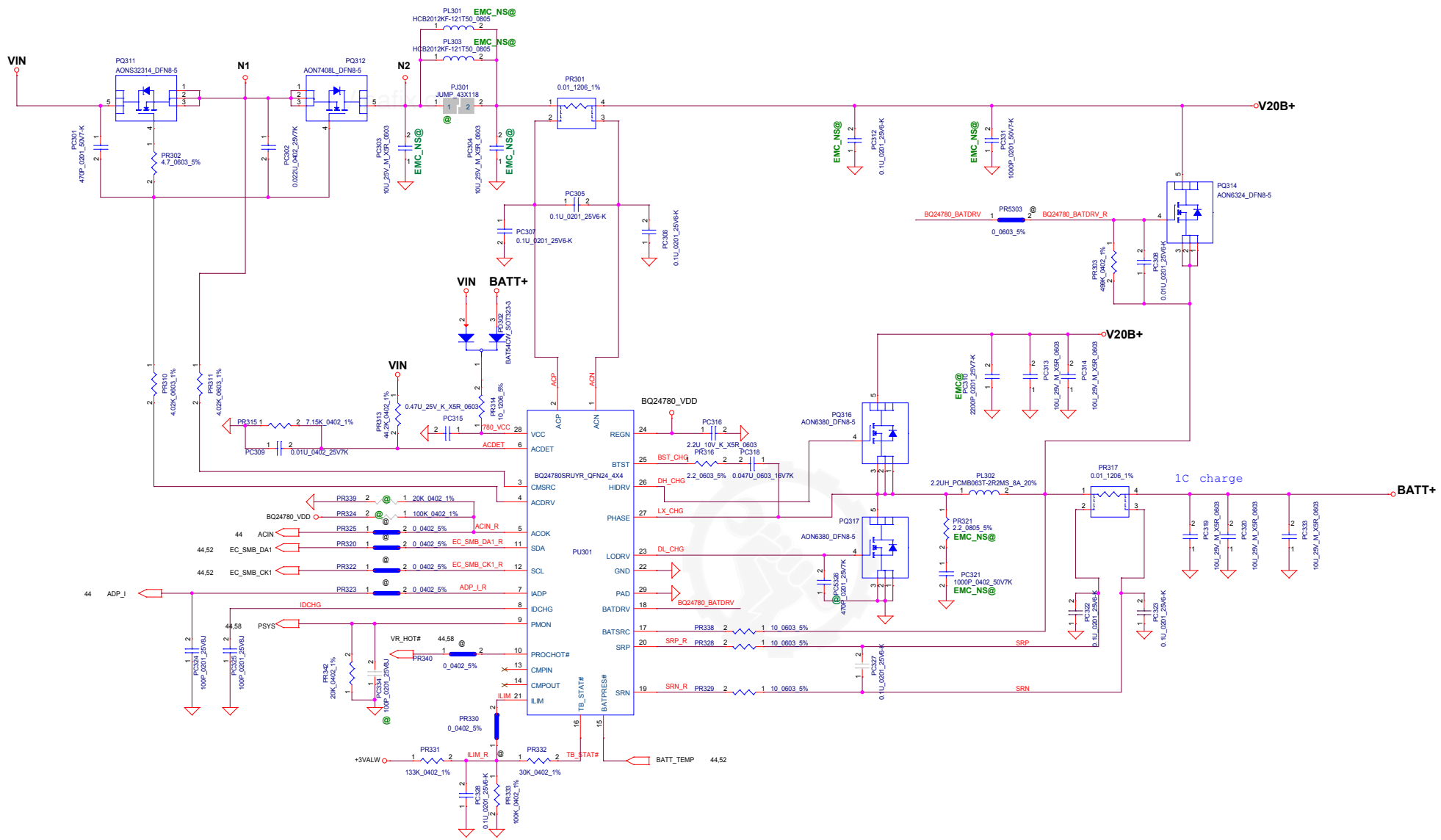


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PWR-DCIN / RTC charger		
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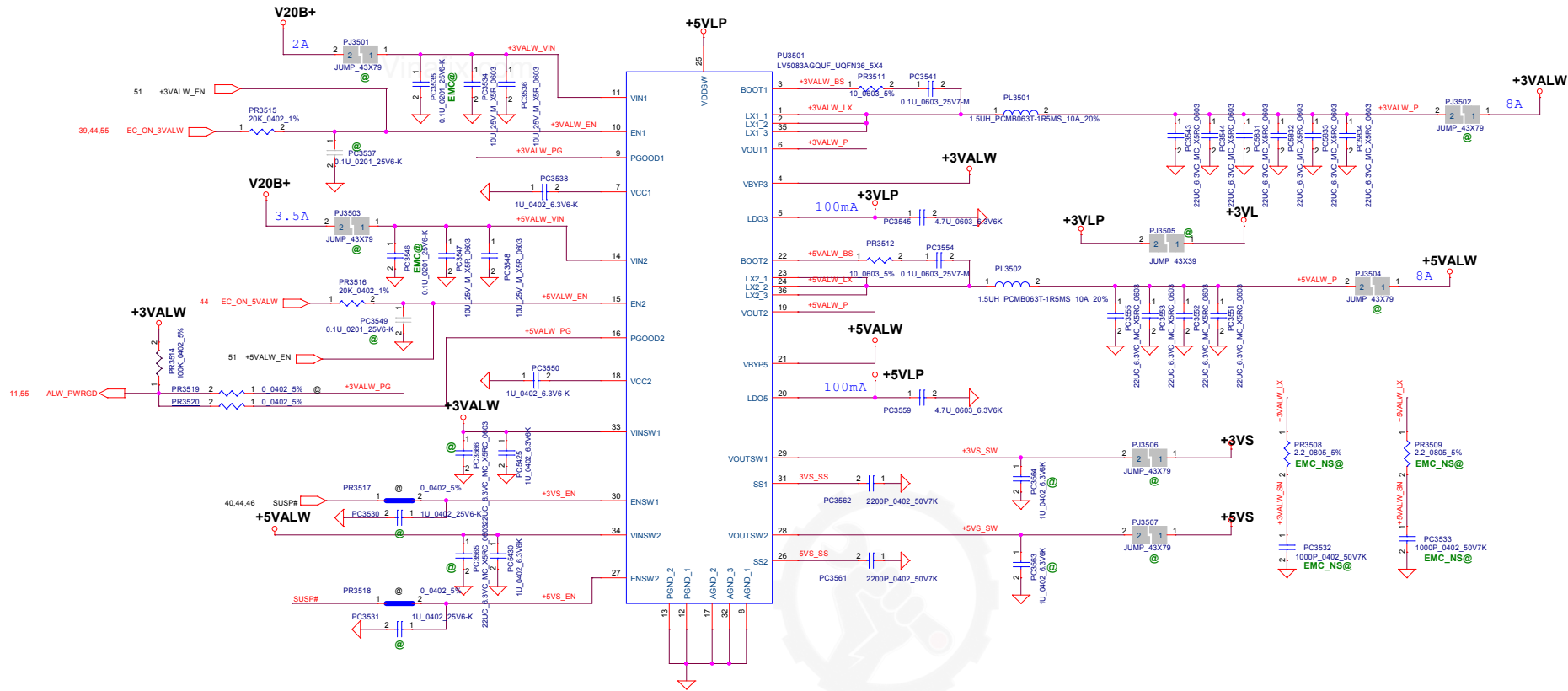


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ACDET setting 17.2V
 Charge current limit HW=7A
 DC discharge limit =26A
 Discharge current limit HW=9A during Turbo boost

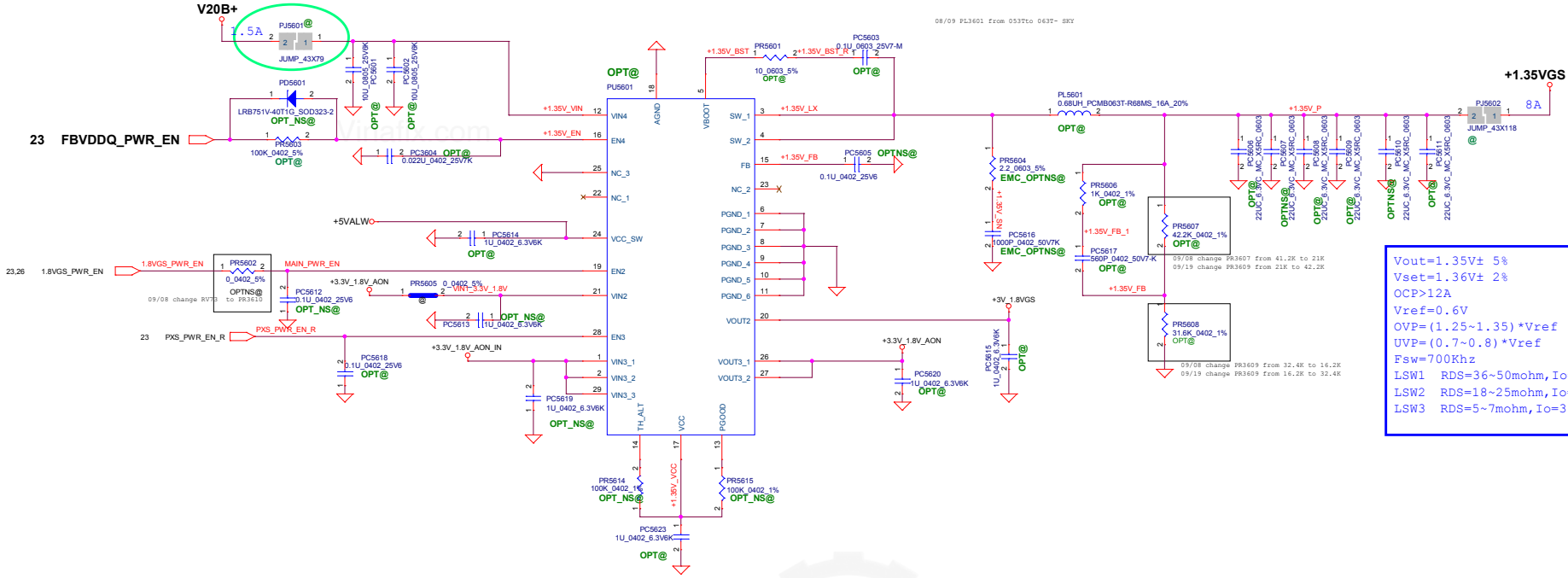
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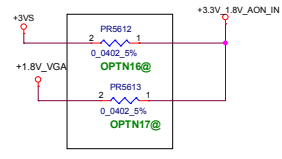
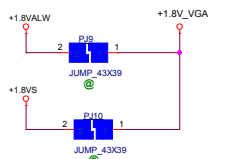
$V_{out}=3.3V \pm 5\%$
 $V_{set}=3.37V \pm 1.5\%$
 $OC=12A$
 $OVP=(1.15 \sim 1.25) * V_{out}$
 $UVP=(0.55 \sim 0.65) * V_{out}$
 $F_{sw}=500Khz$

$V_{out}=5V \pm 3\%$
 $V_{set}=5.1V \pm 1.5\%$
 $OC=12A$
 $OVP=(1.15 \sim 1.25) * V_{out}$
 $UVP=(0.55 \sim 0.65) * V_{out}$
 $F_{sw}=500Khz$

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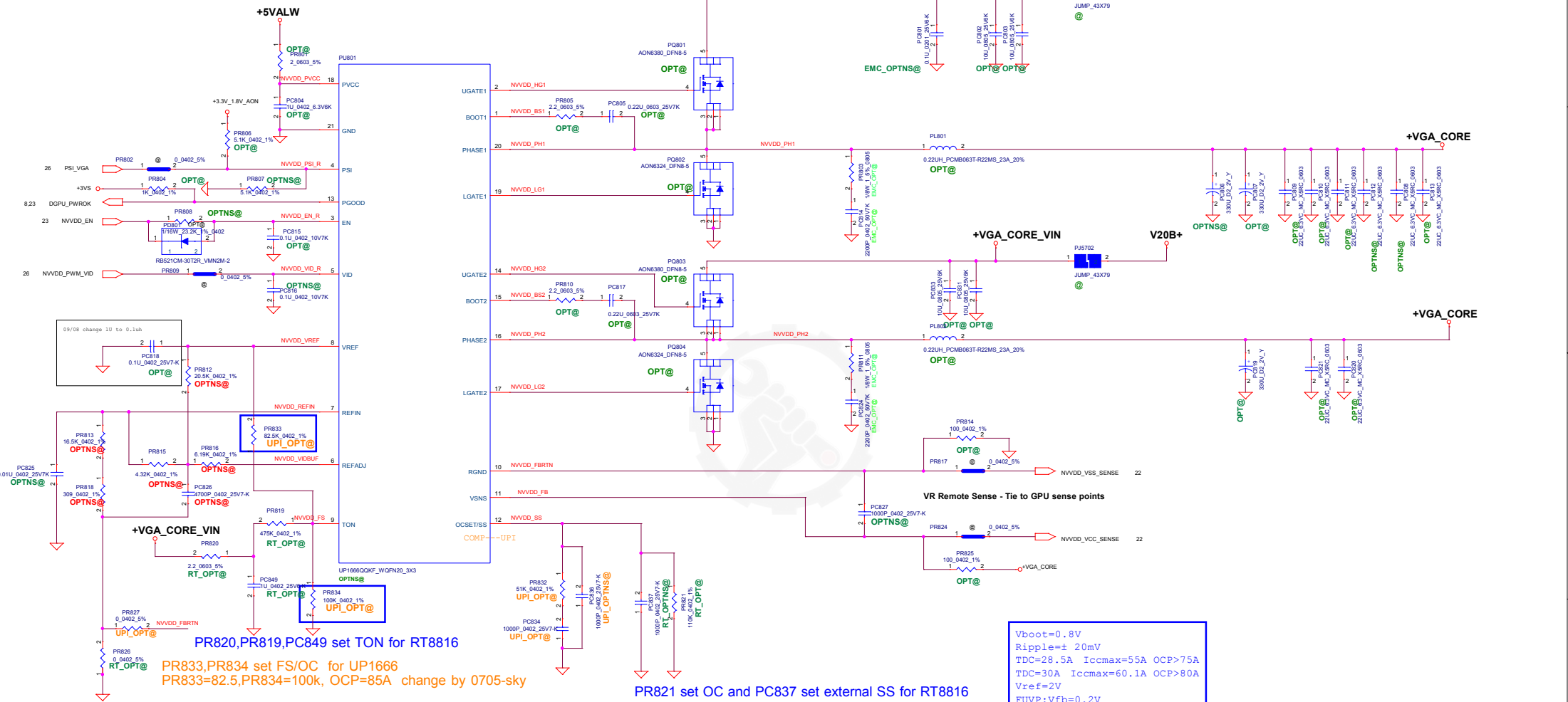
$V_{out} = 1.35V \pm 5\%$
 $V_{set} = 1.36V \pm 2\%$
 $OC_P > 12A$
 $V_{ref} = 0.6V$
 $OVP = (1.25 - 1.35) * V_{ref}$
 $UVP = (0.7 - 0.8) * V_{ref}$
 $F_{sw} = 700Khz$
 $LSW1 \quad R_{DS} = 36 - 50mohm, I_o = 0.5A$
 $LSW2 \quad R_{DS} = 18 - 25mohm, I_o = 1A$
 $LSW3 \quad R_{DS} = 5 - 7mohm, I_o = 3.5A$



PWM-VID Specification			
	N17 Config	N16 Config	B
Vmin (V)	0.3	0.6	
Vmax (V)	1.3	1.2	
Vboot (V)	0.8	0.9	
Vstep (mV)	6.25	6.25	
N(level)	160	96	
Fpwm (KHz)	675	1.125	
Tdmin (nS)	9.26	9.26	
T (uS)	<100	<100	

RT8816 PSI	UPL1666 PSI	Phase Configuration
1.6V~5.5V	1.6~5.5V	2Phase CCM
1.08~1.35V	1~1.4V	2Phase DEM
0.7~0.88V	0.4V~0.8V	1Phase CCM
0~0.4V	0~0.2V	1Phase DEM

Vinafix.com



PR16,PR12,PR15,PR13,PR18,PC26 BOM structure control for N16 or N17

Component	Value	N17	N16
R1 (KΩ)	PR816	6.19	20
R2 (KΩ)	PR812	20.5	20
R3 (KΩ)	PR815	4.32	2
R4 (KΩ)	PR813	16.5	18
R5 (KΩ)	PR818	0.309	0
C (nF)	PC826	4.7	2.7

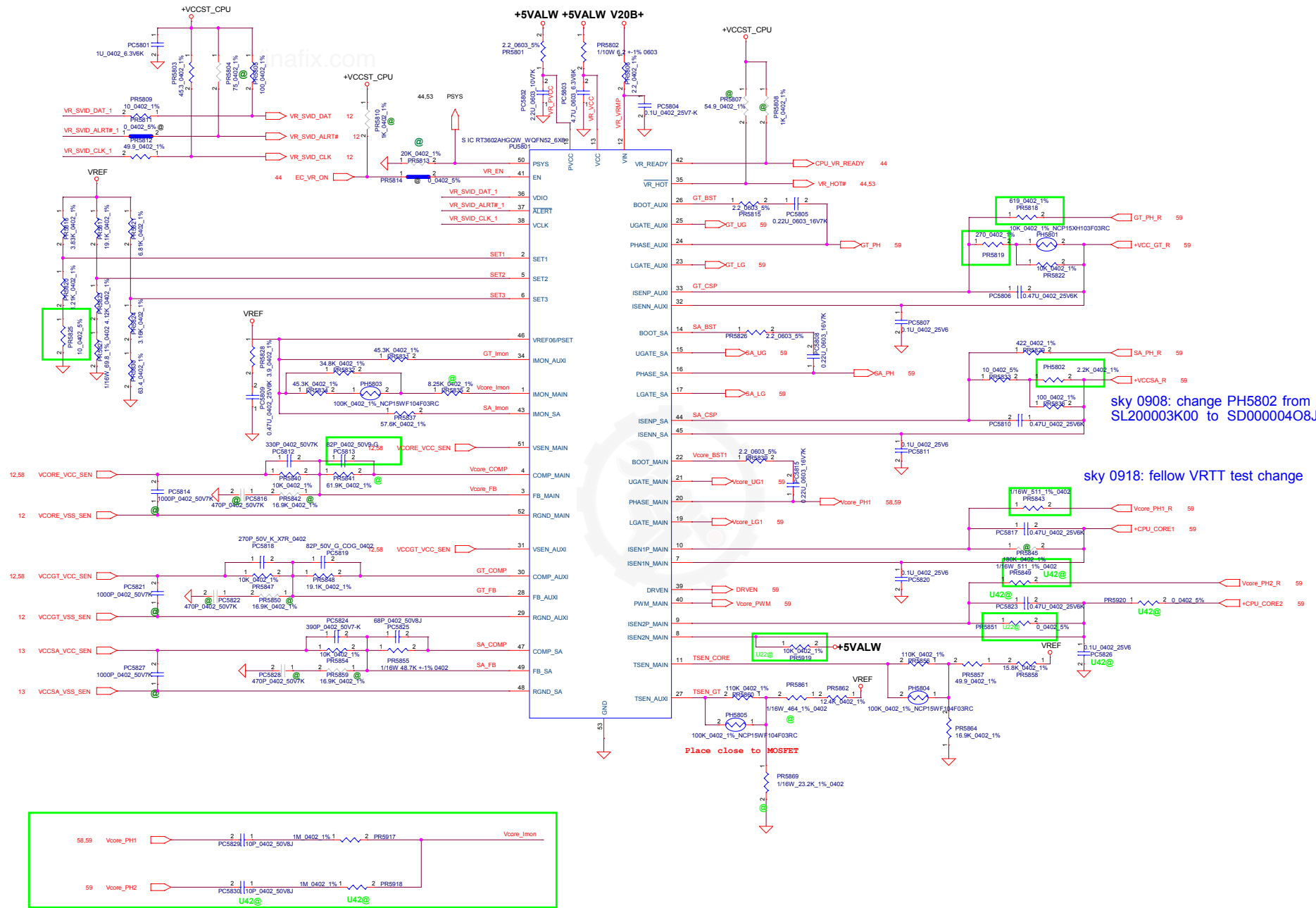
PR820,PR819,PC849 set TON for RT8816
 PR833,PR834 set FS/OC for UP1666
 PR833=82.5,PR834=100k, OCP=85A change by 0705-sky

PR821 set OC and PC837 set external SS for RT8816
 PR832,PC834,PR836 set COMP for UP1666

Vboot=0.8V
 Ripple=± 20mV
 TDC=28.5A Iccmax=55A OCP>75A
 TDC=30A Iccmax=60.1A OCP>80A
 Vref=2V
 FVFP:Vfb=0.2V
 SUVP:Vcomp=3V
 OVP:Vfb=2V
 Fsw=320KHz

UPI_OPT@ : for UP1666
 RT_OPT@ : for RT8816A

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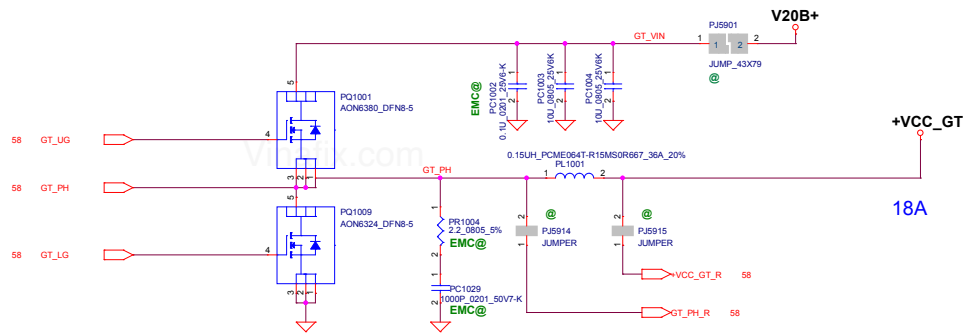


sky 0908: change PH5802 from SL200003K00 to SD00000408.I

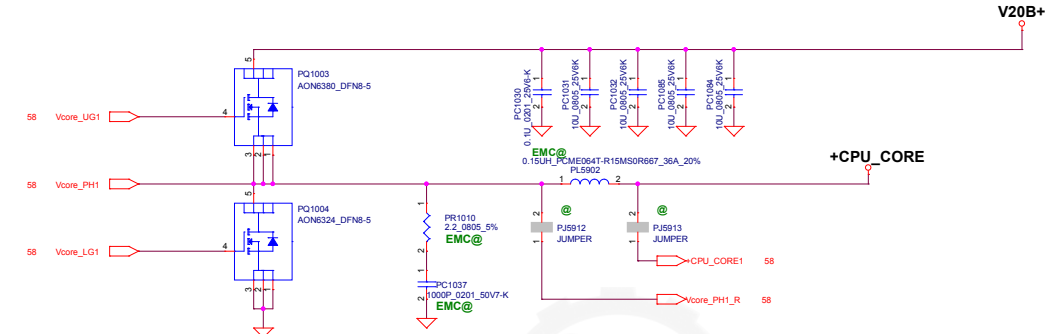
sky 0918: follow VRTT test change

Place close to MOSFET

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A2	FG540/FG740	0.3		0.3	
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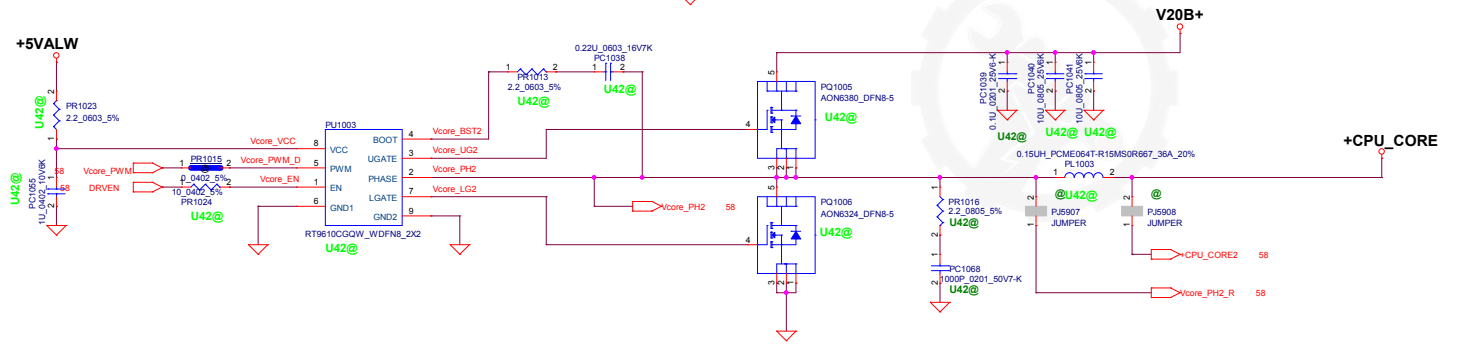


Vboot=0V Loadline=3.1mΩ
 Ripple=±30mV/-10mV (0A~0.5A)
 Ripple=±10mV (0.5A~TDC)
 Ripple=±15mV (TDC~Iccmax)
 TDC=18A Iccmax=31A OCP=37A
 OVP=VID+370mV~VID+430mV
 Max Overshoot:70mv/10us
 UVP=VID-370mV~VID-225mV
 Fsw=550Khz

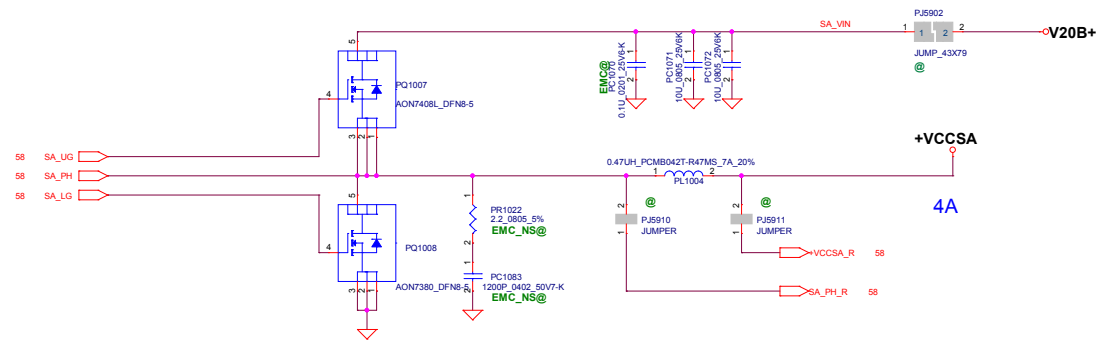


U22 :21A
 U42: 48A

Vboot=0V Loadline=1.8mΩ
 Ripple=±30mV/-10mV (0A~0.5A)
 Ripple=±10mV (0.5A~TDC)
 Ripple=±15mV (TDC~Iccmax)
 TDC=21A/48A Iccmax=32A/70A
 OCP=37A / 74A
 Max Overshoot:70mv/10us
 UVP=VID+370mV~VID+430mV
 Fsw=550Khz

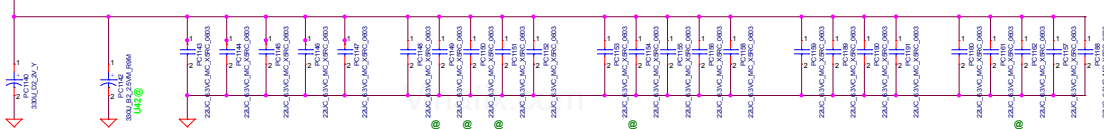


Vboot=0V Loadline=10.3Ω
 Ripple=±30mV/-10mV (0A~0.5A)
 Ripple=±10mV (0.5A~TDC)
 Ripple=±15mV (TDC~Iccmax)
 TDC=4A Iccmax=4.5A OCP=7A
 Max Overshoot:70mv/10us
 OVP=VID+370mV~VID+430mV
 UVP=VID-370mV~VID-225mV
 Fsw=550Khz

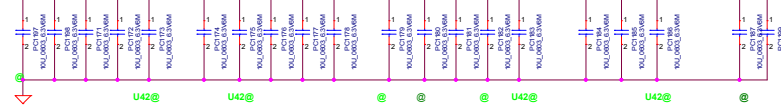


+CPU_CORE

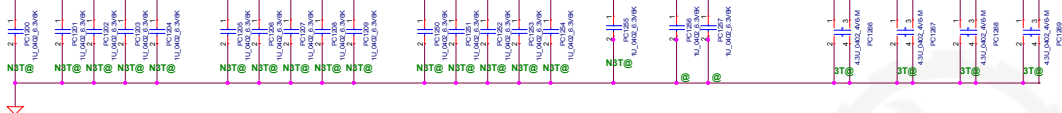
CPU_CORE: 2PCS 330U B2 2V
+19PCS 22U 0603 6V+18PCS 10U_0603_6V
+16PCS 1U_0402_6V=



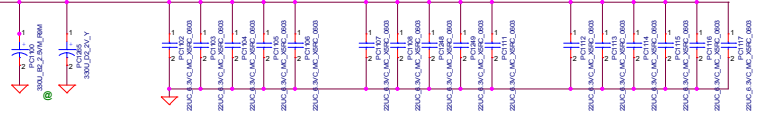
+CPU_CORE



+CPU_CORE

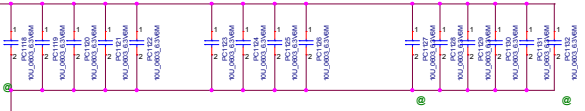


+VCC_GT

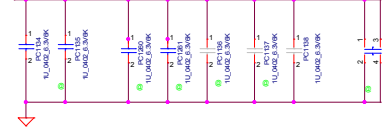


GT : 1PCS 220U B2 2.5V+ 1PCS 330U B2 2.5V
+15PCS 22U 0603 6V + 19PCS 10U_0402_6V
+2PCS 1U_0402_6V=862U

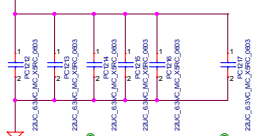
+VCC_GT



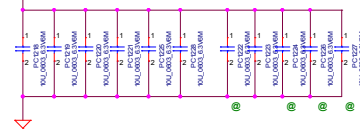
+VCC_GT



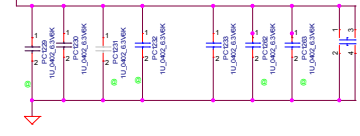
+VCCSA




+VCCSA

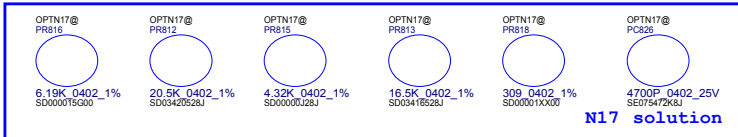
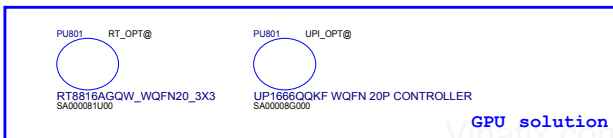


+VCCSA



VCCSA: 6PCS 22U 0603 6V
+6PCS 10U_0402_6V
+2PCS 1U_0402_6V=

Security Classification	LC Future Center Secret Data		Title
Issued Date	2015/08/20	Deciphered Date	2016/08/20
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Size	Document Number	Rev	
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Component	Value	N17	N16S-GTR
R1 (KΩ)	PR816	6.19	20
R2 (KΩ)	PR812	20.5	20
R3 (KΩ)	PR815	4.32	2
R4 (KΩ)	PR813	16.5	18
R5 (KΩ)	PR818	0.309	0
C (nF)	PC826	4.7	2.7

