



Mobile Atom Solo Processor for Mini-ITX Form Factor with Intel 945GSE Express Chipset

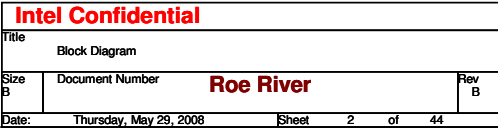
Prototype Schematics

For Roe River Reference Board

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Voltage Rails

Power Plane	Description	Voltage	S0	S3	S4	S5
DCIN	Adapter power supply	12V	✓	✓	✓	✓
+VCC_CORE	Core voltage for CPU	0.5-1.2V	✓	✗	✗	✗
+V1.05S	Chipset Power Rail	1.05V	✓	✗	✗	✗
+V0.9	0.9V Reserved for DDR2 SSTL Term and COMP	0.9V	✓	✗	✗	✗
+V1.8	DDR2 SM	1.8V	✓	✓	✗	✗
+V1.5S	Chipset Power Rail	1.5V	✓	✗	✗	✗
+V2.5S	Chipset Int Gfx Power Rail Iout = 2.5A	2.5V	✓	✗	✗	✗
+V3.3A_LAN	LAN power Iout = 100mA	3.3V	✓	✓	✓	✓
+V3.3A	3.3V Standby	3.3V	✓	✓	✓	✓
+V3.3S	Peripheral Circuit (VCC3)	3.3V	✓	✗	✗	✗
+V5A	5V Standby	5V	✓	✓	✓	✓
+V5S	Peripheral Circuit (VCC)	5V	✓	✗	✗	✗
+5VDUAL	USB POWER	5V	✓	✓	✗	✗
+V15A	Not Used	15V	✓	✓	✓	✗

✓ ON
✗ OFF

CPU Core Power VID

Vcc Boot Voltage typical equal 1.1V							
VID6	VID5	VID4	VID3	VID2	VID1	VID0	Vcc (V)
0	0	1	1	0	0	0	1.2000
0	0	1	1	0	0	1	1.1875
0	0	1	1	0	1	0	1.1750
1	0	0	1	1	1	0	0.5250
1	0	0	1	1	1	1	0.5125
1	0	1	0	0	0	0	0.5000

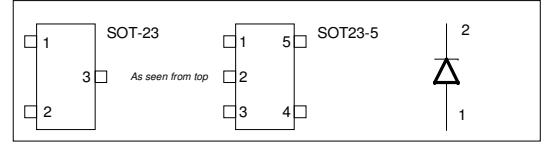
Net Naming Conventions

Suffix
= Active Low Signal
DN and DP are differential pairs
Prefix
H = Host
M = DDR Memory
TP = Test Point (does not connect anywhere else)

Schematic Conventions

NI = Not Inserted.
Blue dotted rectangle = Not Inserted
Black dashed rectangle = CAD NOTE

PCB Footprints



I²C / SMB / SDVO Addresses

Device	Address	Hex	Bus
Clock Generator	1101 001x	D2	SMB_I2CH_S
SO-DIMM0	1010 000x	A0	SMB_I2CH_S
PCIe Mini Slot	TBD	TBD	SMB_I2CH_A
TPM	1001 100x	98	SMB_I2CH_S
XDP	TBD	TBD	SMB_I2CH_S
DVI	70h		SDVO

Jumper Settings

Jumper	Default	Description
J58	1-2	Chassis Intrusion
J59	1-2	Clear CMOS
J60	1-2	BIOS Config

Power States

SIGNAL	PM_EN_S0M_3VA#	PM_SLP_S4#	PM_SLP_S3#	+VPA	+V*	+V'S	Clocks
STATE							
Full ON	HIGH	HIGH	HIGH	ON	ON	ON	ON
S3 (Suspend to RAM)	HIGH	HIGH	LOW	ON	ON	OFF	OFF
S4 (Suspend To Disk)	HIGH	LOW	LOW	ON	OFF	OFF	OFF
S5 / Soft OFF	LOW	LOW	LOW	OFF	OFF	OFF	OFF

Test Notes

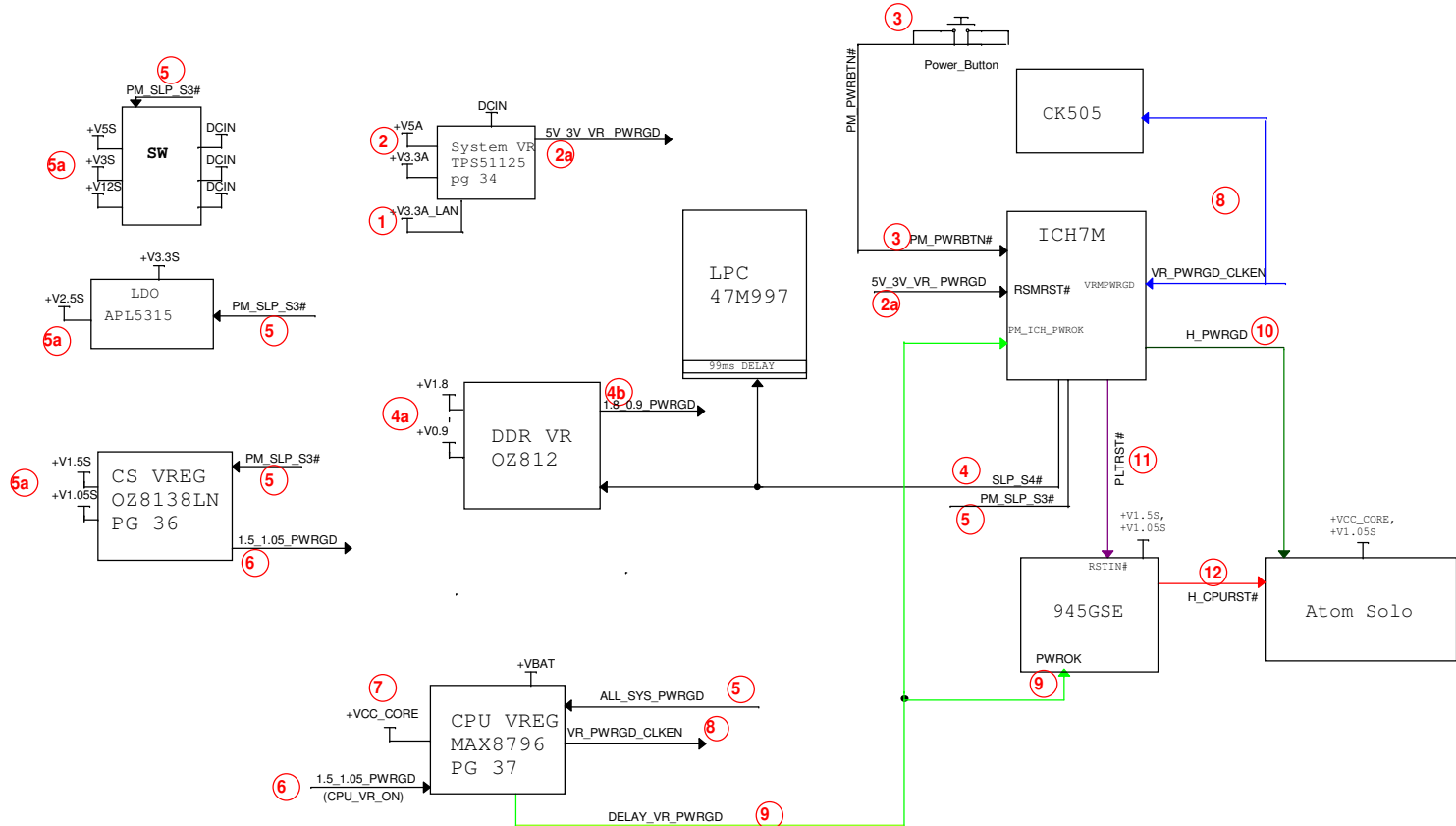
0.002 Ohm resistors for current measurement in Fab A, to be removed in Fab B

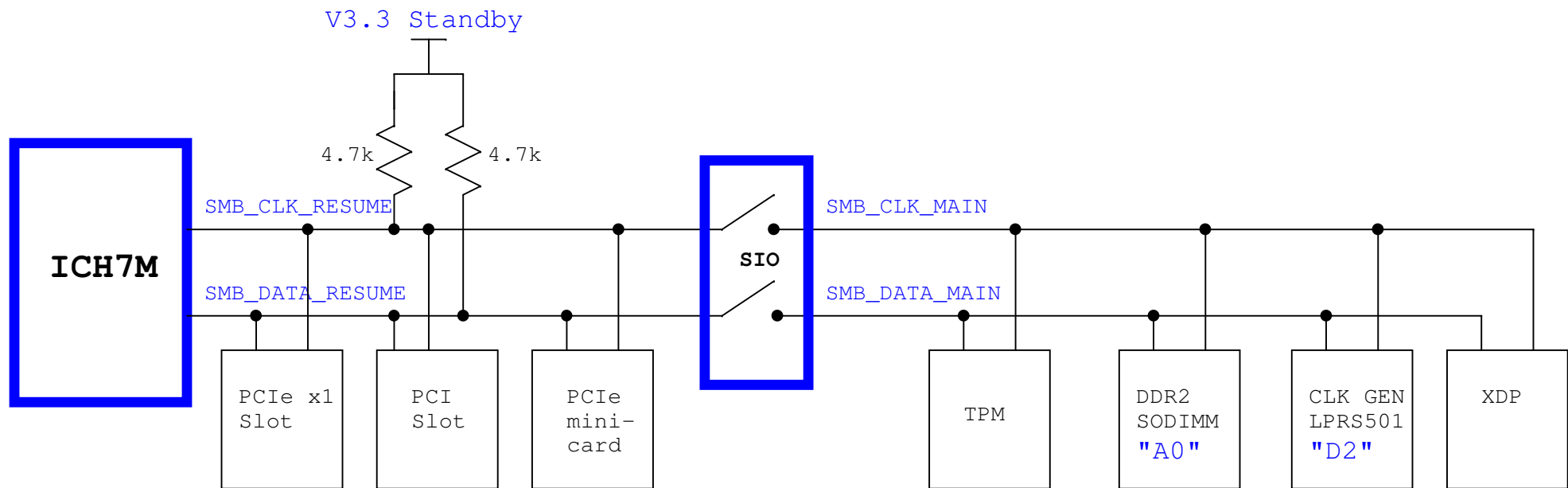
LEDs

LED	Page	Reference
+VCC1_PLED	32	D2
+VPA_PLED	32	D3
+VCC2_PLED	32	D4
+VCC3_PLED	32	D5
+VCC4_PLED	32	D6

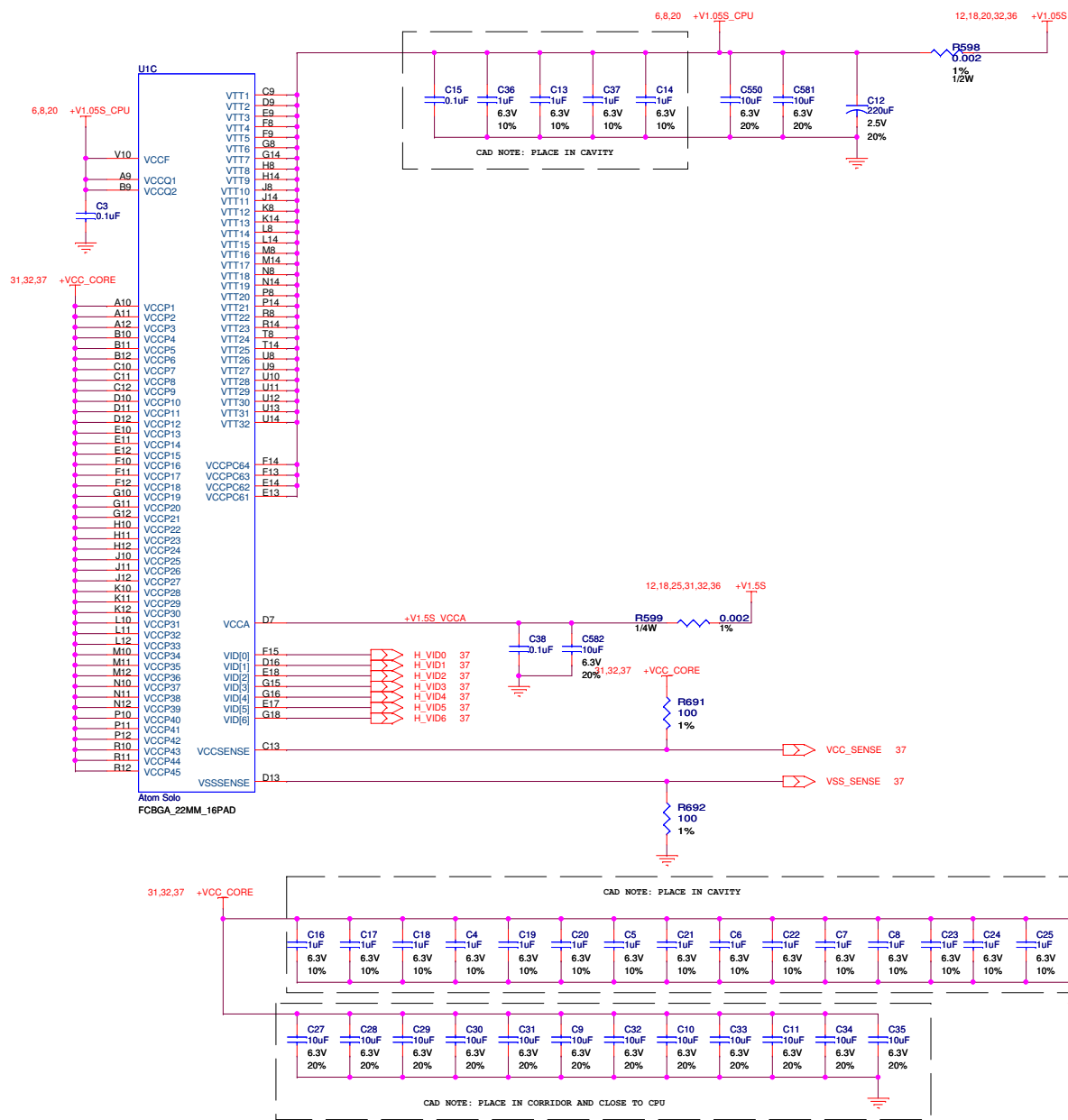
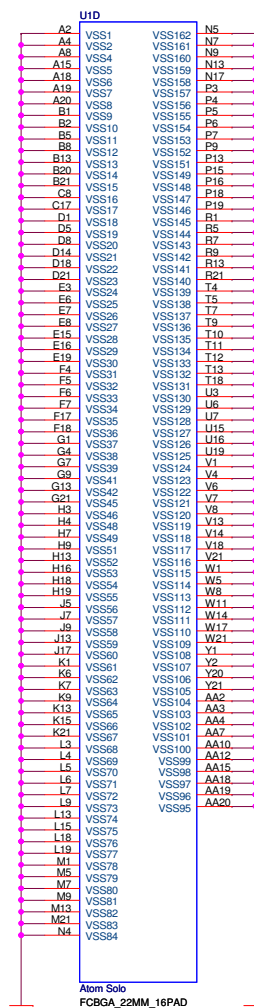
Buttons

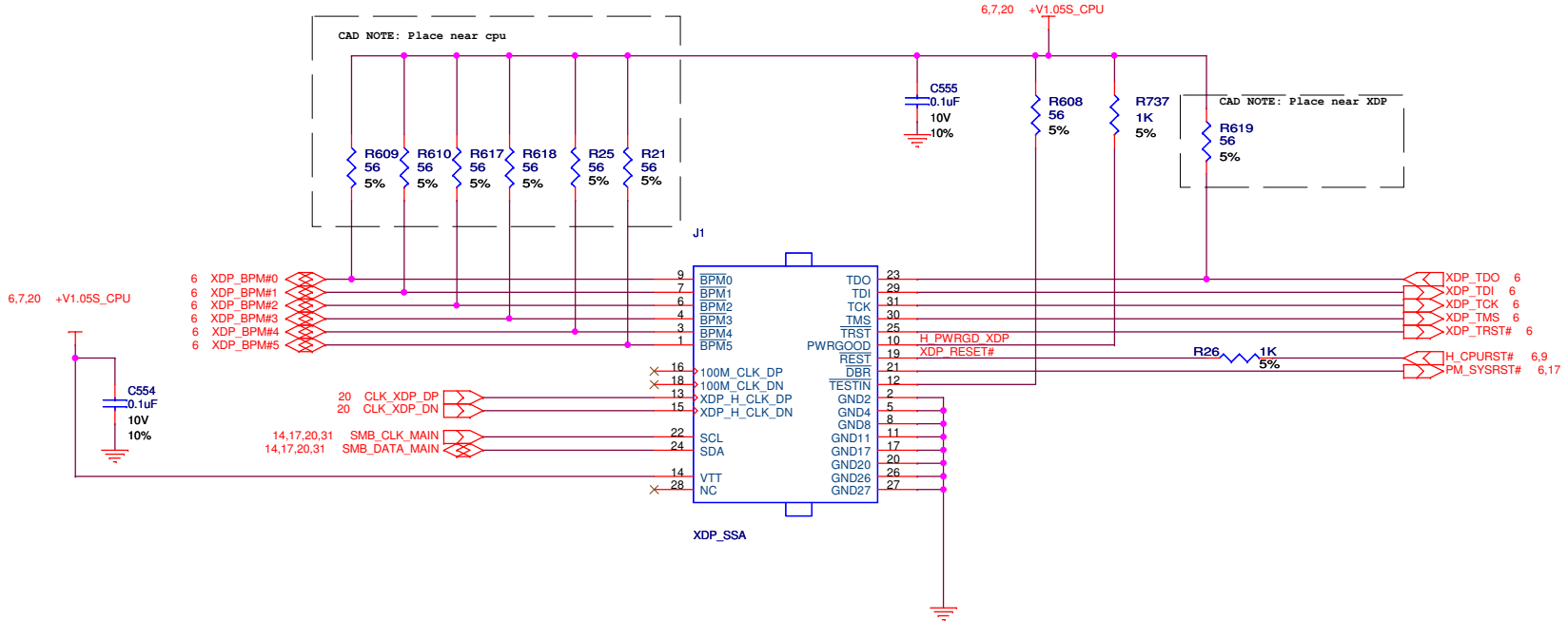
Reference	Description	Page
SW2	Power Button	31



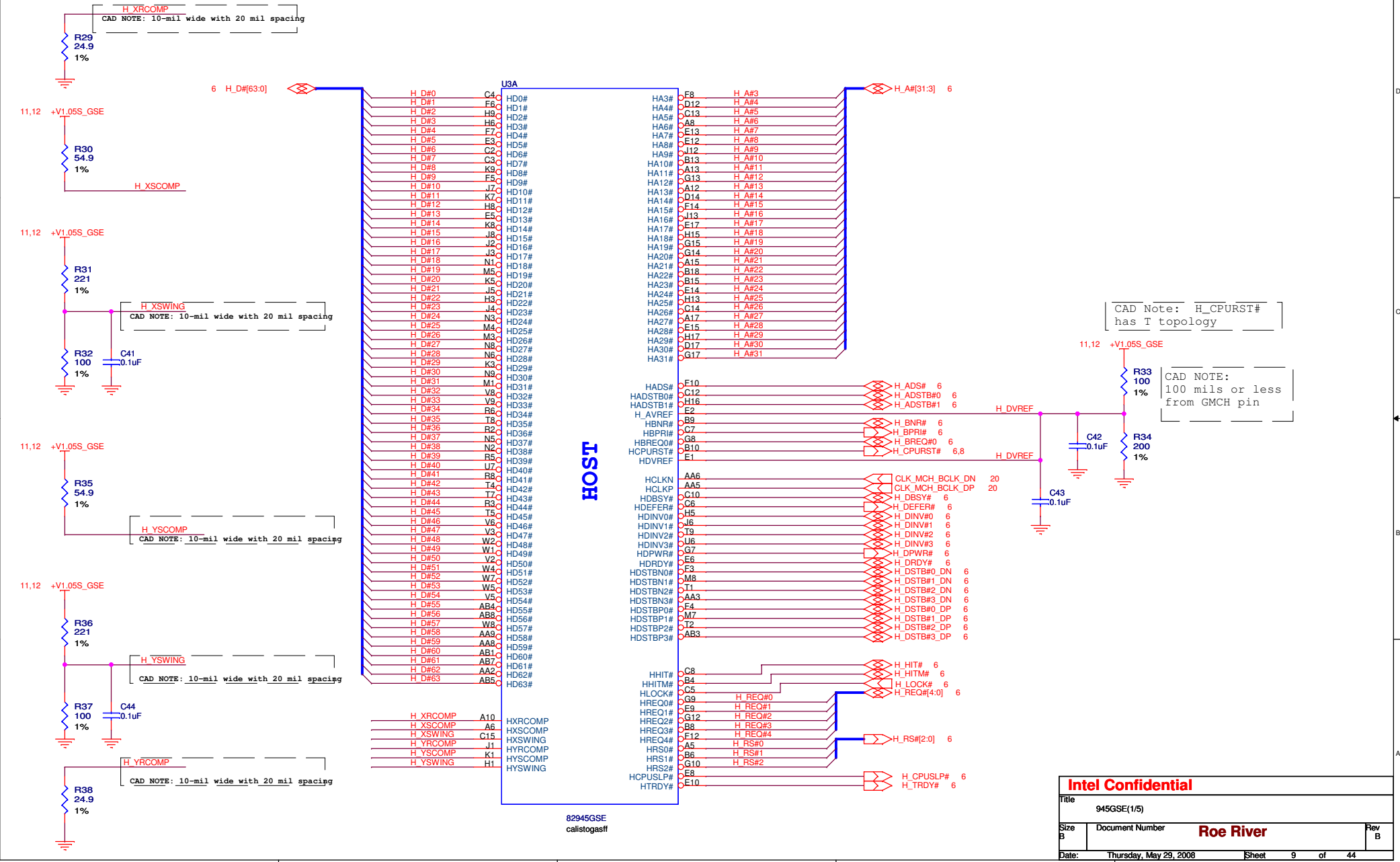


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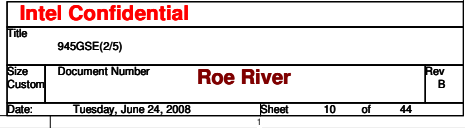


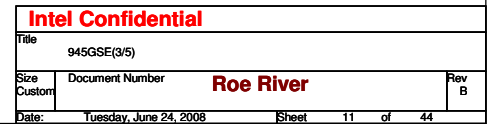


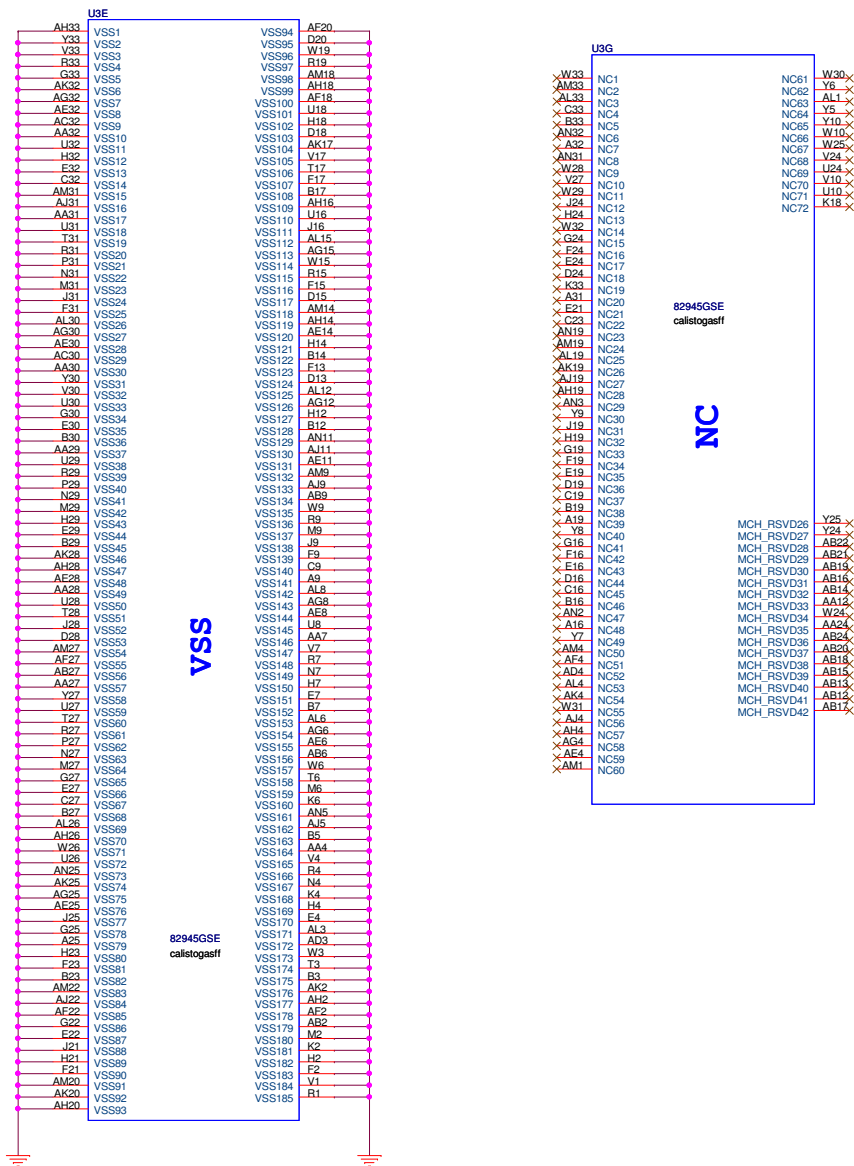
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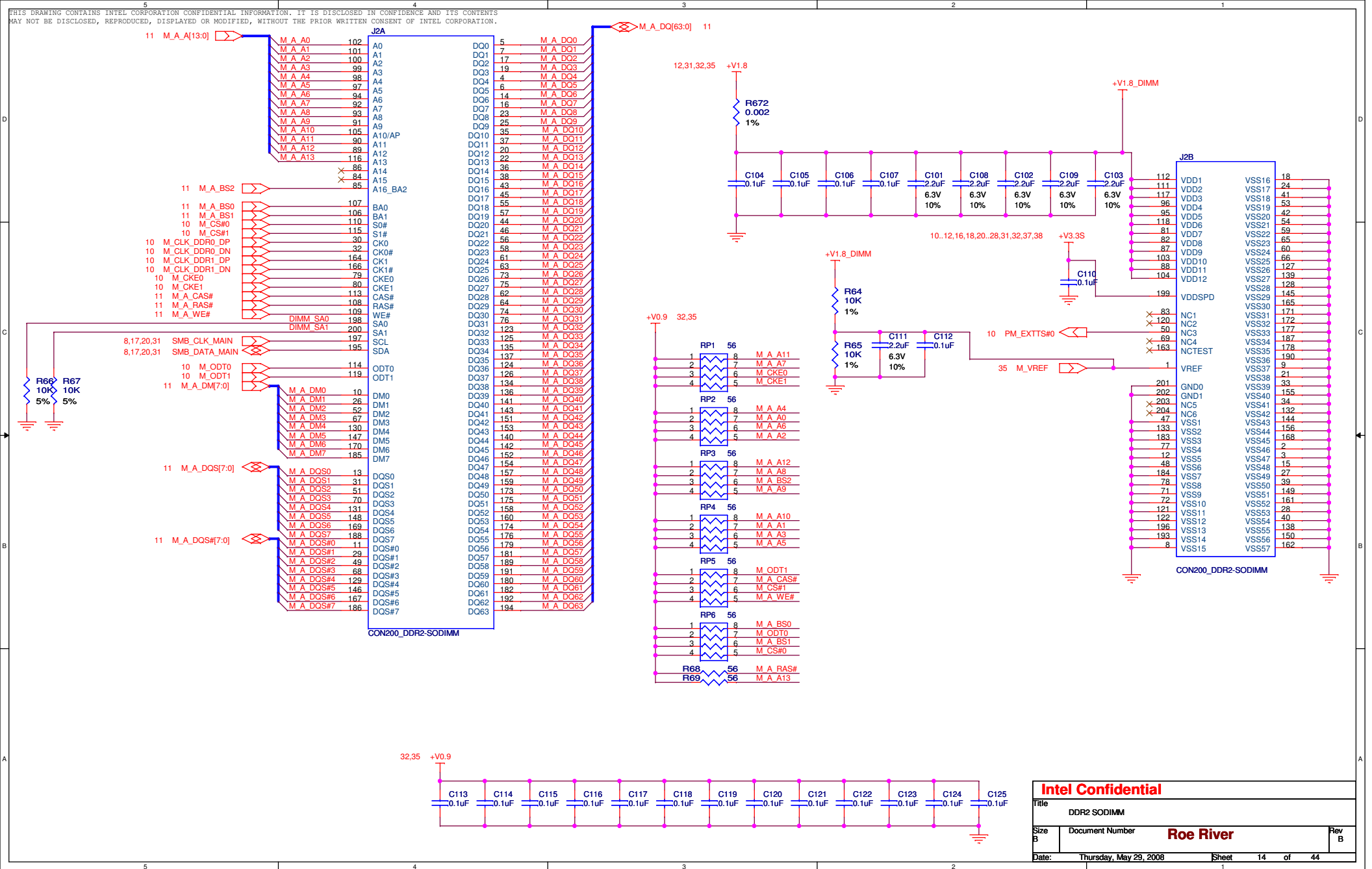


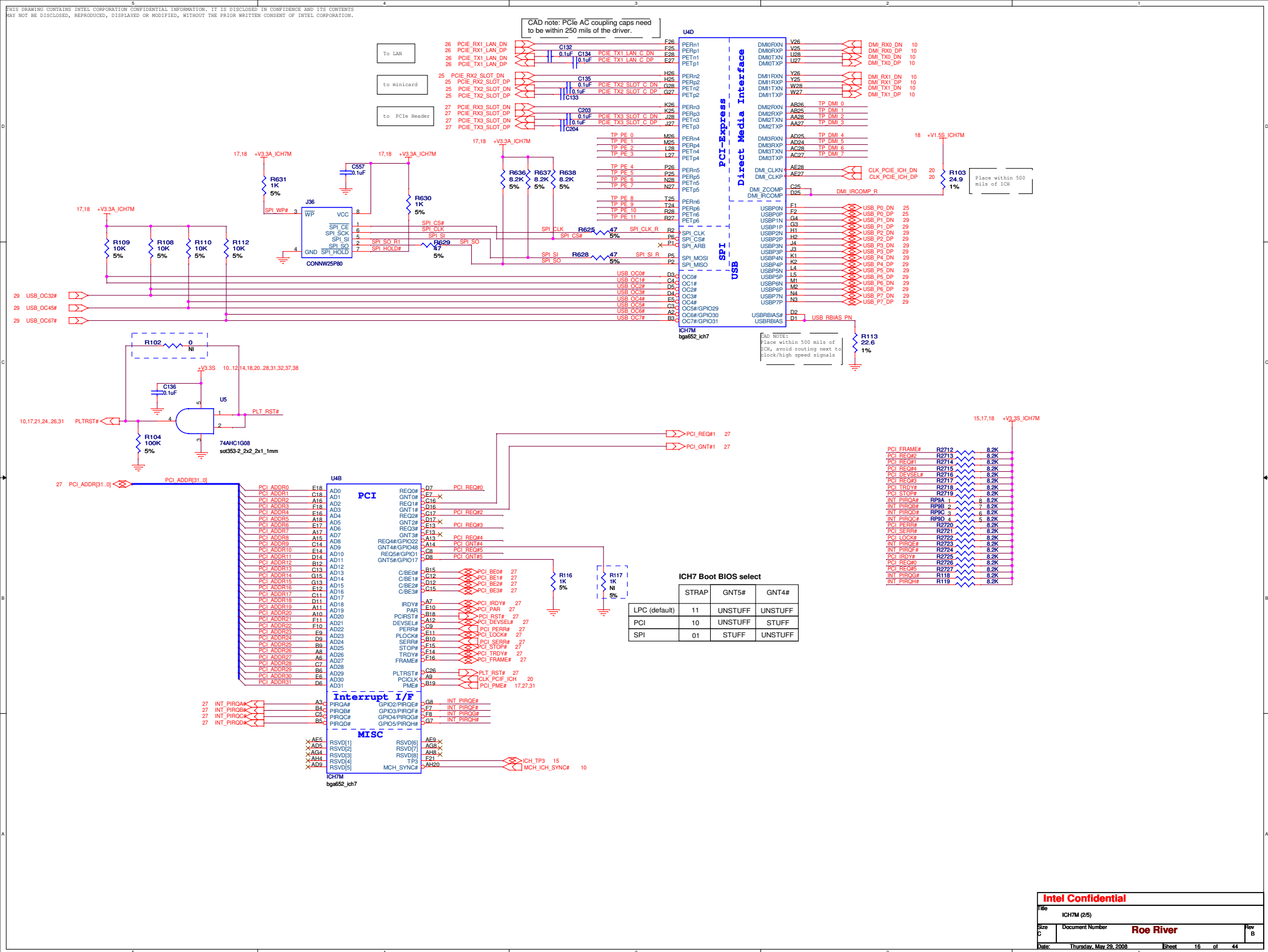
HOST











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16,18 +V3.3A_ICH7M +V3.3S_ICH7M 15,16,18

16,18 +V3.3A_ICH7M 15,16,18

6,8 PM_SYSRST#

20 PM_STPPCI# 20 PM_STPCPU#

15,16,18 +V3.3S_ICH7M

5,37 H_PROCHOT_N

31 PM_THRM_SIO#

25,27 SMB_CLK_RESUME 25,27 SMB_DATA_RESUME

SMB_LINK_ALERT# SMLINK0 SMLINK1 PM_R#

ICH_SPKR

25 PM_SUS_STAT# 10 PM_BMBUS#

SMB_ALERT#

PM_STPPCI_ICH# PM_STPCPU_ICH#

25 RF_KILL# 23 YELLOW_LED_CNTRL 23 GREEN_LED_CNTRL

25 PM_CLKRUN#

25,27 PCIE_WAKE# 25,31 INT_SERIRQ

20,37 VR_PWRGD_CLKEN

28 FP_AUD_DETECT

ICH7M bga652_ich7

GPIO21/SATA0GP GPIO19/SATA1GP GPIO36/SATA2GP GPIO37/SATA3GP

CLK14 CLK48

SUSCLK

SLP_S3# SLP_S4# SLP_S5#

PWROK

GPIO16/DPRSLPVR TP0BATLOW# PWRBTN#

LAN_RST#

RSMRST#

GPIO9 GPIO10 GPIO12 GPIO13 GPIO14 GPIO15 GPIO24 GPIO25 GPIO35 GPIO38 GPIO39

AE19 SATA0_R0 R122 8.2K

AH18 SATA1_R1 R123 8.2K

AH19 SATA2_R2 R124 8.2K

AE19 SATA3_R3 R125 8.2K

AC1 B2 CLK_REF_ICH 20 CLK_USB48 20

C20 SUSCLK 31

B24 D23 TP_SLP_SS# 1 TP19

AA4 PM_ICH_PWROK DELAY_VR_PWRGOOD 10,37

AC22 PM_DPRSLPVR_R R130 0

C21 PM_BATLOW#

C23 PM_PWRBTN# 23

C19 LAN_RST# R136 0

Y4 PM_RSMRST#_ICH R138 100

E20 IDE_PDIAG1 R139 10K

E19 LAN_ISOLATE# 26

E19 PCI_PME# 16,27,31

R3 4.7K

D20 AD24 AD20 AE20

15,16,18 +V3.3S_ICH7M

R150 4.7K

R151 1K

J60

ICH_SPKR

16,18 +V3.3A_ICH7M

+V5S 18,22-24,27,28,30,32,37

R152 4.7K R153 4.7K

Q2 2SK3541

Q3 2SK3541

R172 0 NI R175 0 NI

25,27 SMB_CLK_RESUME

25,27 SMB_DATA_RESUME

SMB_CLK_MAIN 8,14,20,31

SMB_DATA_MAIN 8,14,20,31

ICH_SPKR

R167 1K

Q40 2N3904 SOT23

ICH_SPKR_Q

R168 1K

LS1 SPEAKER

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16,18 +V3.3A_ICH7M +V3.3S_ICH7M 15,16,18

16,18 +V3.3A_ICH7M 15,16,18

6,8 PM_SYSRST#

20 PM_STPPCI# 20 PM_STPCPU#

15,16,18 +V3.3S_ICH7M

5,37 H_PROCHOT_N

31 PM_THRM_SIO#

25,27 SMB_CLK_RESUME 25,27 SMB_DATA_RESUME

SMB_LINK_ALERT# SMLINK0 SMLINK1 PM_R#

ICH_SPKR

25 PM_SUS_STAT# 10 PM_BMBUS#

SMB_ALERT#

PM_STPPCI_ICH# PM_STPCPU_ICH#

25 RF_KILL# 23 YELLOW_LED_CNTRL 23 GREEN_LED_CNTRL

25 PM_CLKRUN#

25,27 PCIE_WAKE# 25,31 INT_SERIRQ

20,37 VR_PWRGD_CLKEN

28 FP_AUD_DETECT

ICH7M bga652_ich7

GPIO

GPIO21/SATA0GP GPIO19/SATA1GP GPIO36/SATA2GP GPIO37/SATA3GP

CLK14 CLK48

SUSCLK

SLP_S3# SLP_S4# SLP_S5#

PWROK

GPIO16/DPRSLPVR GPIO18/STPPCI# GPIO20/STPCPU#

TP0BATLOW# PWRBTN#

LAN_RST#

RSMRST#

GPIO9 GPIO10 GPIO12 GPIO13 GPIO14 GPIO15 GPIO24 GPIO25 GPIO35 GPIO38 GPIO39

AE19 SATA0_R0 R122 8.2K

AH18 SATA1_R1 R123 8.2K

AH19 SATA2_R2 R124 8.2K

AE19 SATA3_R3 R125 8.2K

CLK_REF_ICH 20 CLK_USB48 20

SUSCLK 31

PM_SLP_S3# 32,35,36,38 PM_SLP_S4# 32,35

TP_SLP_SS# 1 TP19

AA4 PM_ICH_PWROK DELAY_VR_PWRGOOD 10,37

AC22 PM_DPRSLPVR_R R130 0

PM_DPRSLPVR 10,37

PM_BATLOW#

PM_PWRBTN# 23

C19 LAN_RST# R136 0

Y4 PM_RSMRST#_ICH R138 100

E20 IDE_PDIAG1 R139 5% 10K

E19 LAN_ISOLATE# 26

E19 PCI_PME# 16,27,31

R3 4.7K

D20 4.7K

AD24 4.7K

AD20 4.7K

AE20 4.7K

15,16,18 +V3.3S_ICH7M

R150 4.7K 5%

R151 1K 5%

ICH_SPKR

16,18 +V3.3A_ICH7M

18,22-24,27,28,30,32,37 +V5S

25,27 SMB_CLK_RESUME

25,27 SMB_DATA_RESUME

SMB_CLK_MAIN 8,14,20,31

SMB_DATA_MAIN 8,14,20,31

ICH_SPKR

ICH_SPKR_R 1

ICH_SPKR_Q

SPEAKER

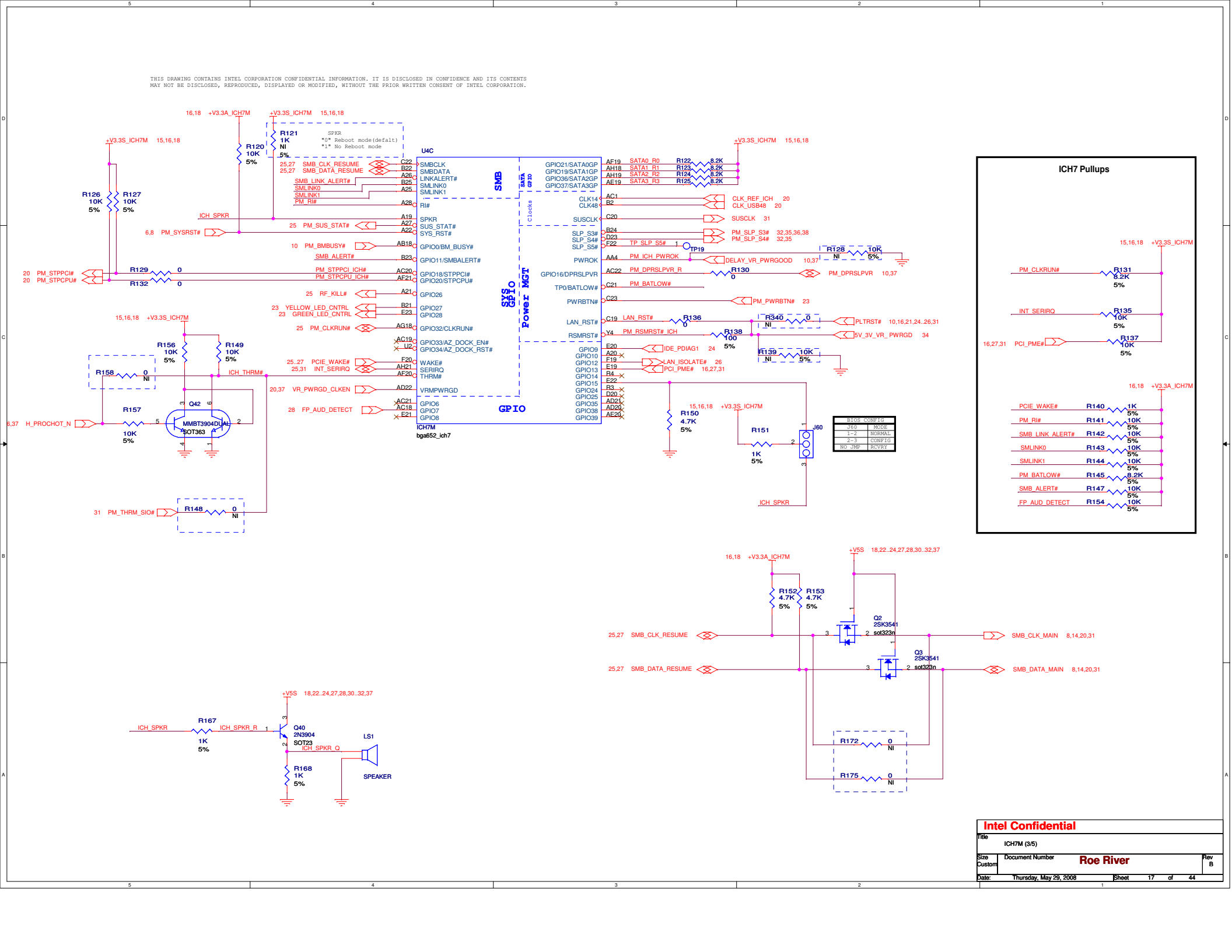
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ICH7M Pullups

Signal	Resistor	Value
PM_CLKRUN#	R131	8.2K
INT_SERIRQ	R135	10K
PCI_PME#	R137	10K
PCIE_WAKE#	R140	1K
PM_R#	R141	10K
SMB_LINK_ALERT#	R142	10K
SMLINK0	R143	10K
SMLINK1	R144	10K
PM_BATLOW#	R145	5.2K
SMB_ALERT#	R147	10K
FP_AUD_DETECT	R154	10K

ICH7M Power Management

Signal	Resistor	Value
PM_CLKRUN#	R131	8.2K
INT_SERIRQ	R135	10K
PCI_PME#	R137	10K
PCIE_WAKE#	R140	1K
PM_R#	R141	10K
SMB_LINK_ALERT#	R142	10K
SMLINK0	R143	10K
SMLINK1	R144	10K
PM_BATLOW#	R145	5.2K
SMB_ALERT#	R147	10K
FP_AUD_DETECT	R154	10K

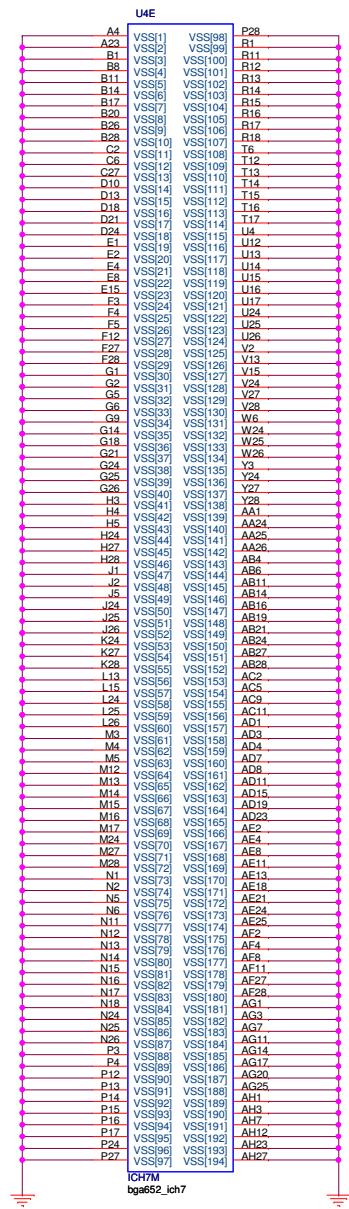
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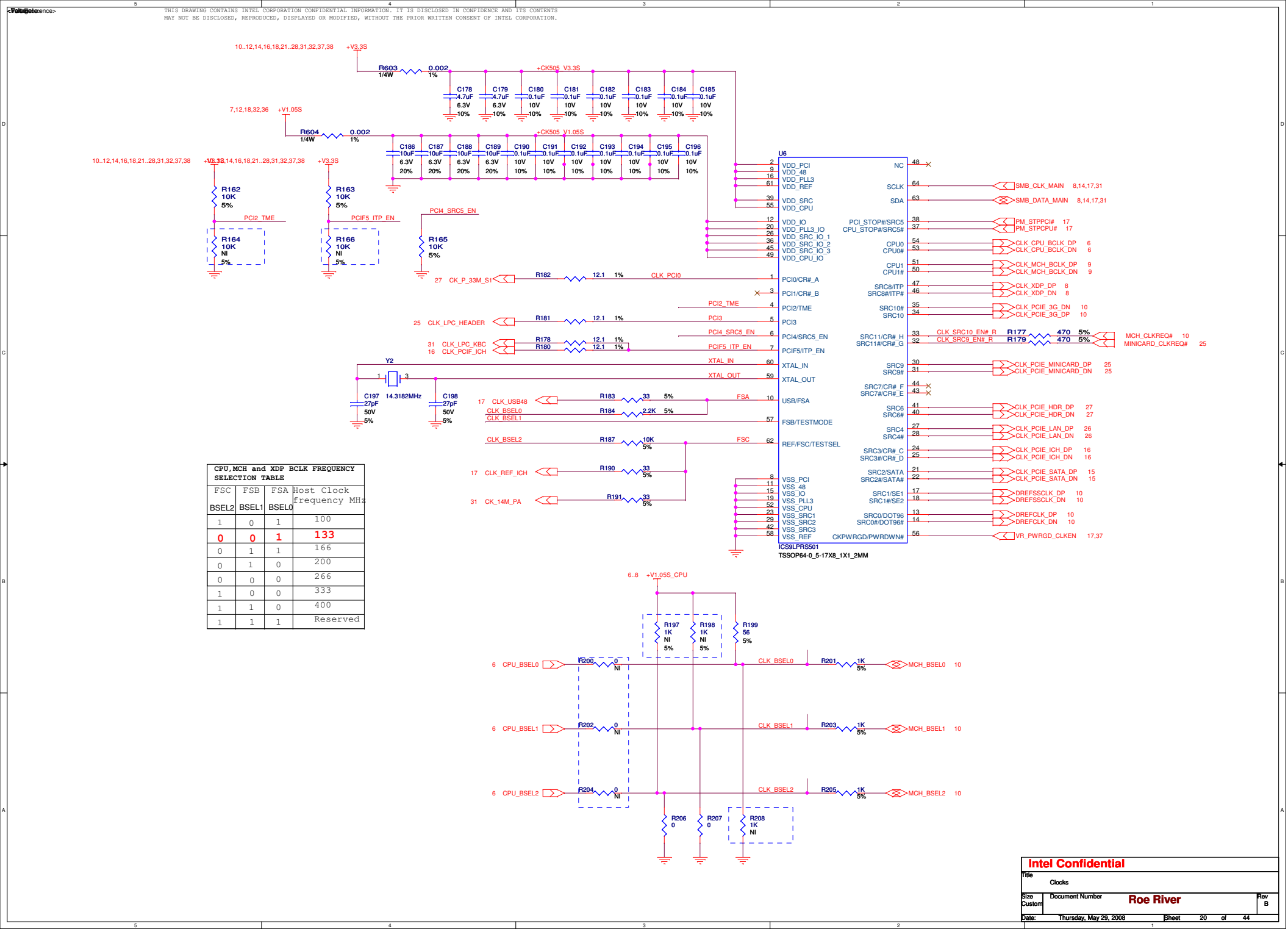
ICH7M Pullups

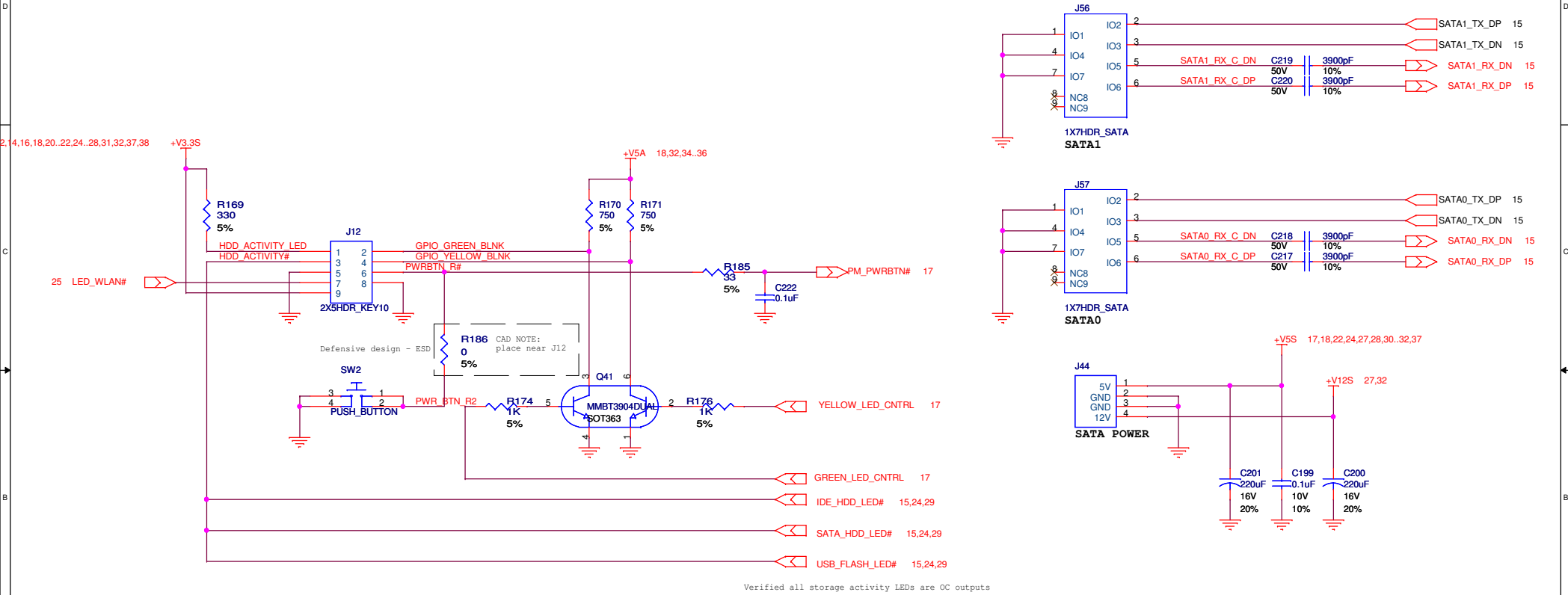
Signal	Resistor	Value
PM_CLKRUN#	R131	8.2K
INT_SERIRQ	R135	10K
PCI_PME#	R137	10K
PCIE_WAKE#	R140	1K
PM_R#	R141	10K
SMB_LINK_ALERT#	R142	10K
SMLINK0	R143	10K
SMLINK1	R144	10K
PM_BATLOW#	R145	5.2K
SMB_ALERT#	R147	10K
FP_AUD_DETECT	R154	10K

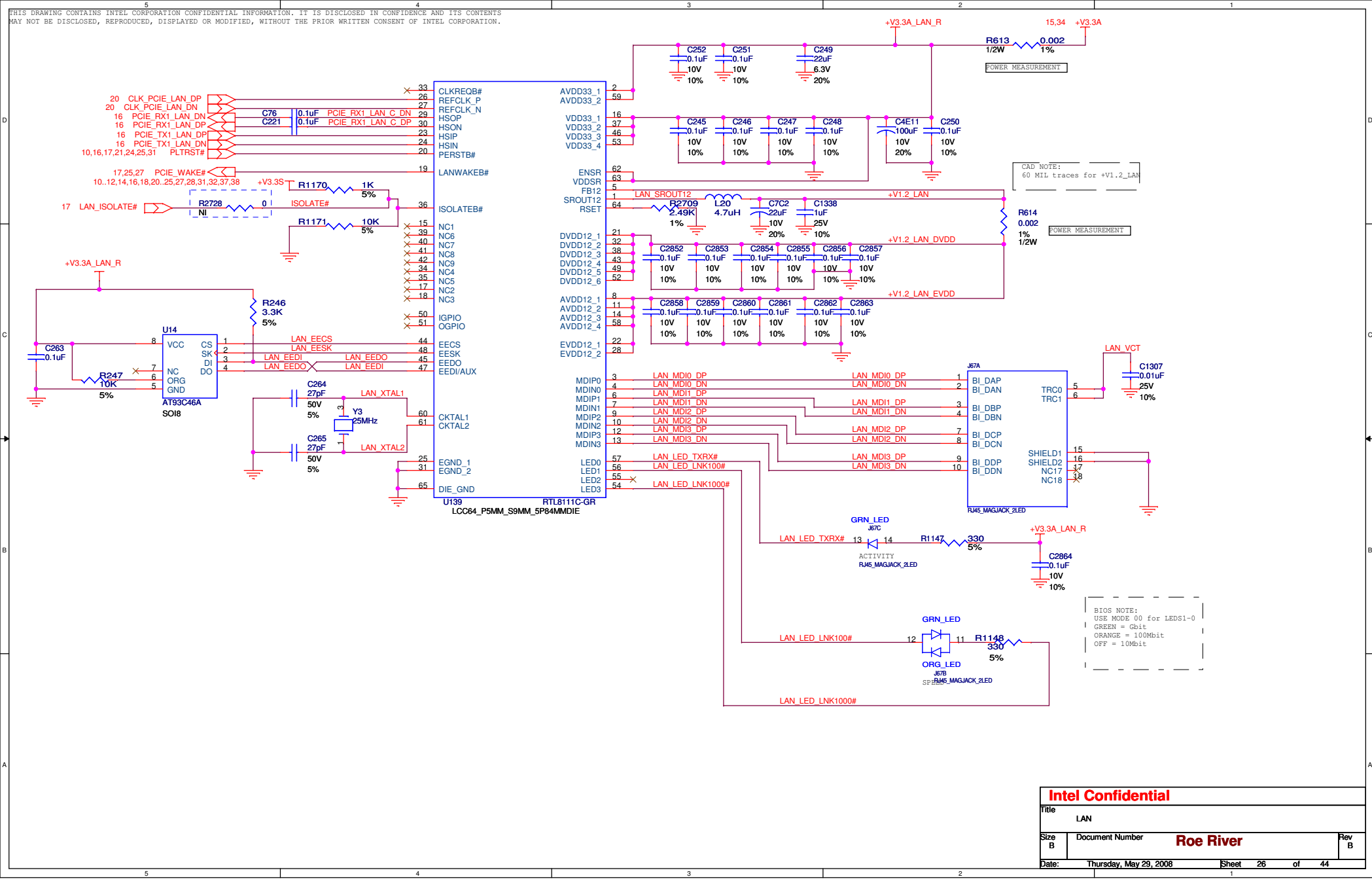
ICH7M Power Management

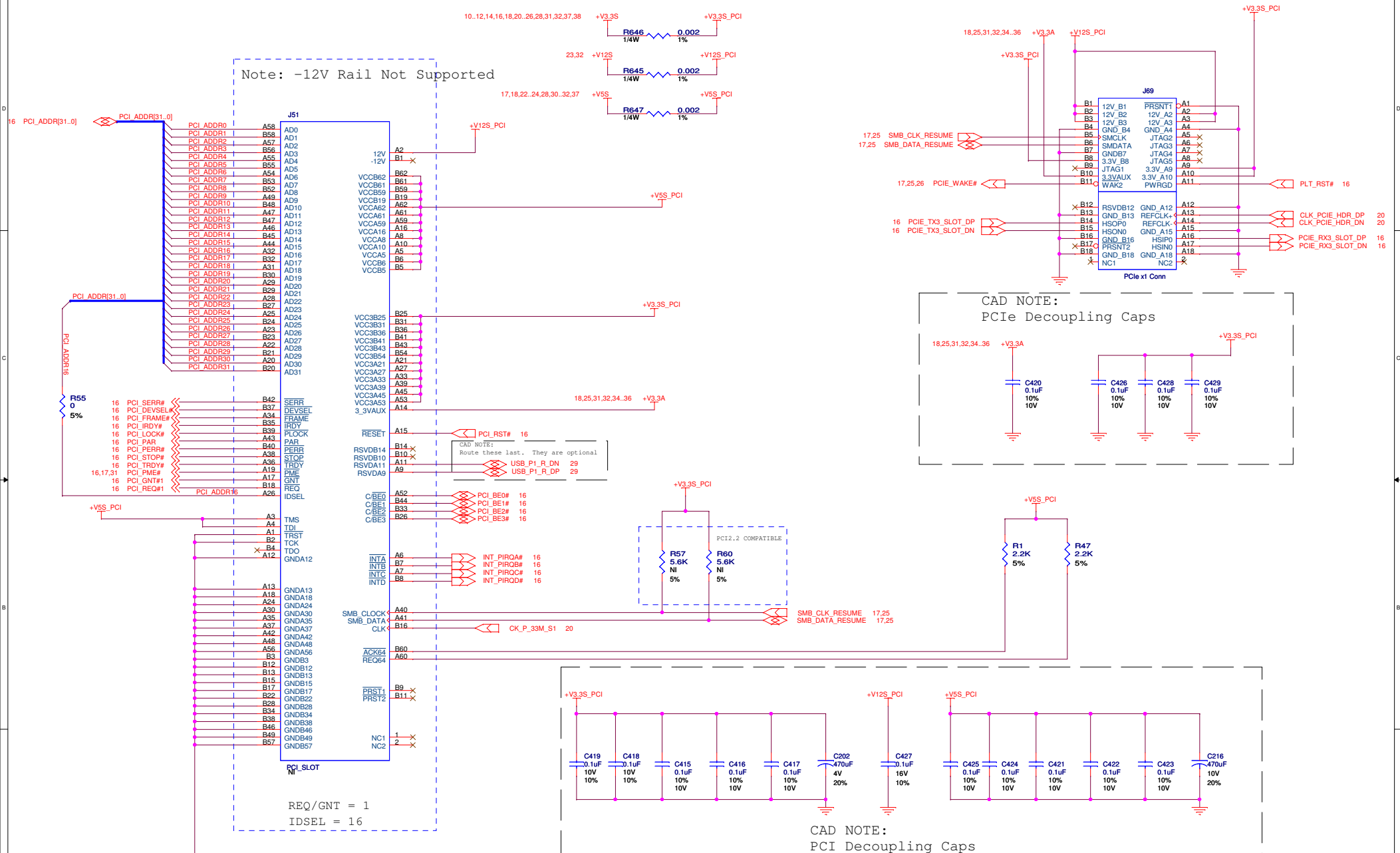
Signal	Resistor	Value
PM_CLKRUN#	R131	8.2K
INT_SERIRQ	R135	10K
PCI_PME#	R137	10K
PCIE_WAKE#	R140	1K
PM_R#	R141	10K
SMB_LINK_ALERT#	R142	10K
SMLINK0	R143	10K
SMLINK1	R144	10K
PM_BATLOW#	R145	5.2K
SMB_ALERT#	R147	10K
FP_AUD_DETECT	R154	10K

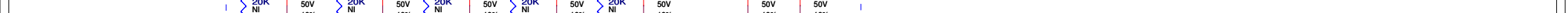


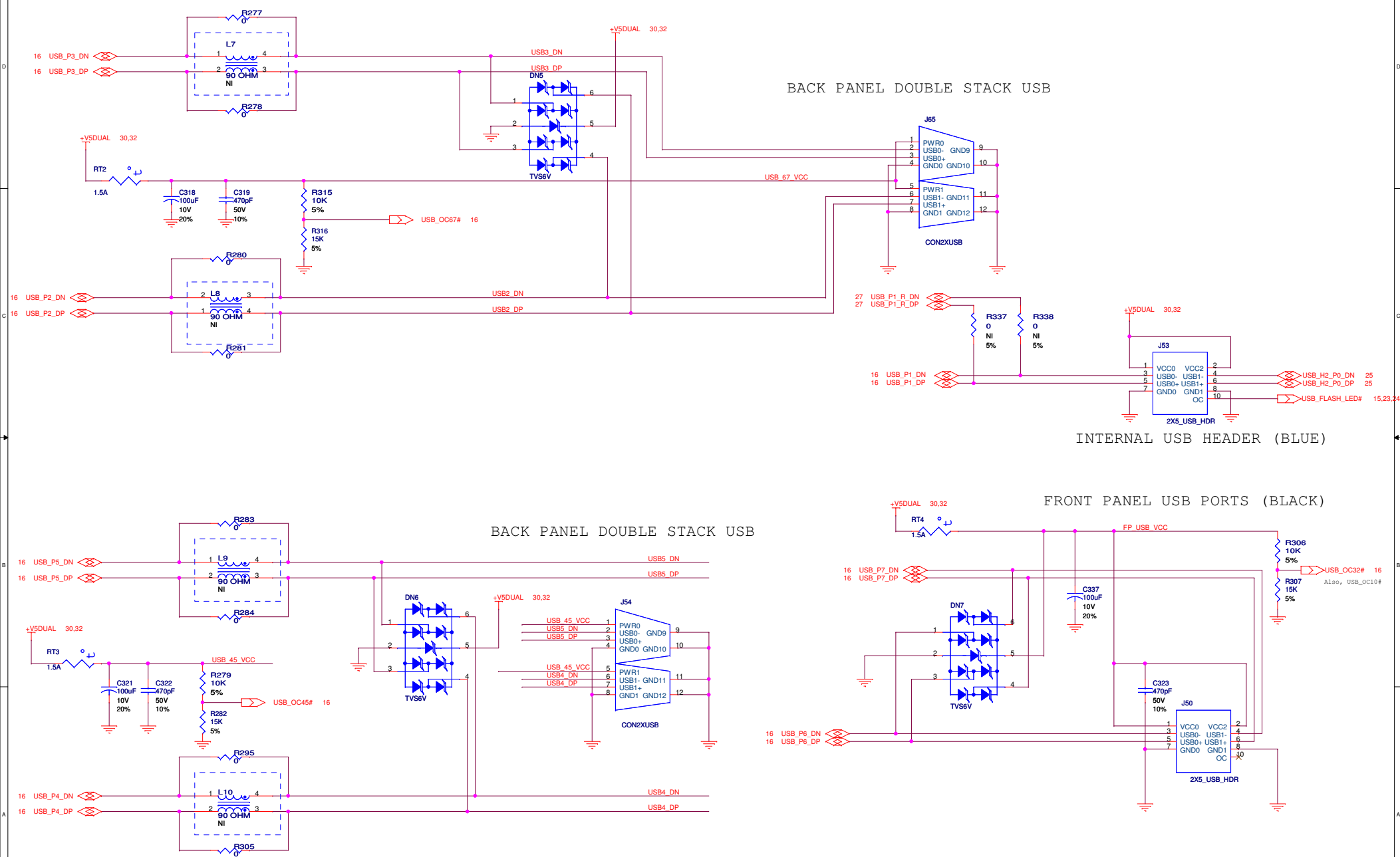


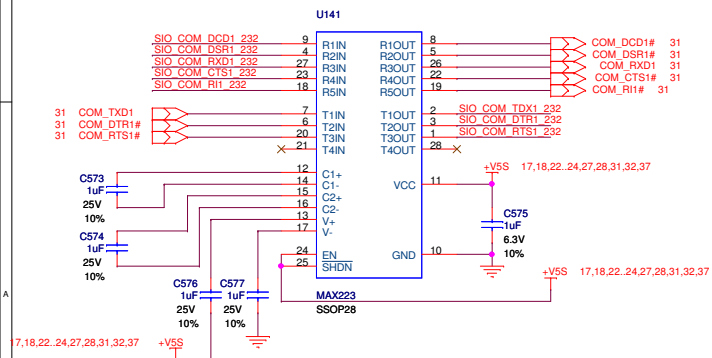
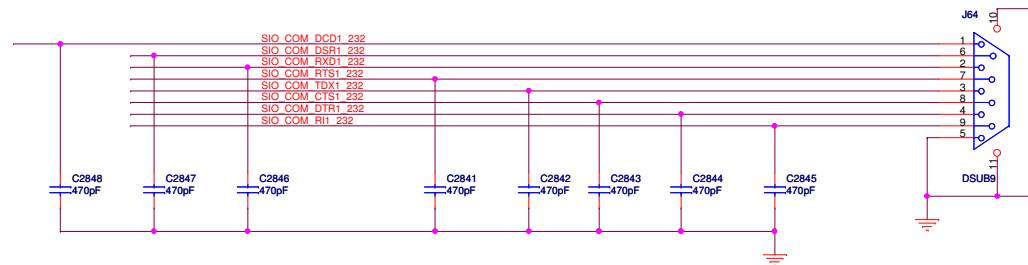
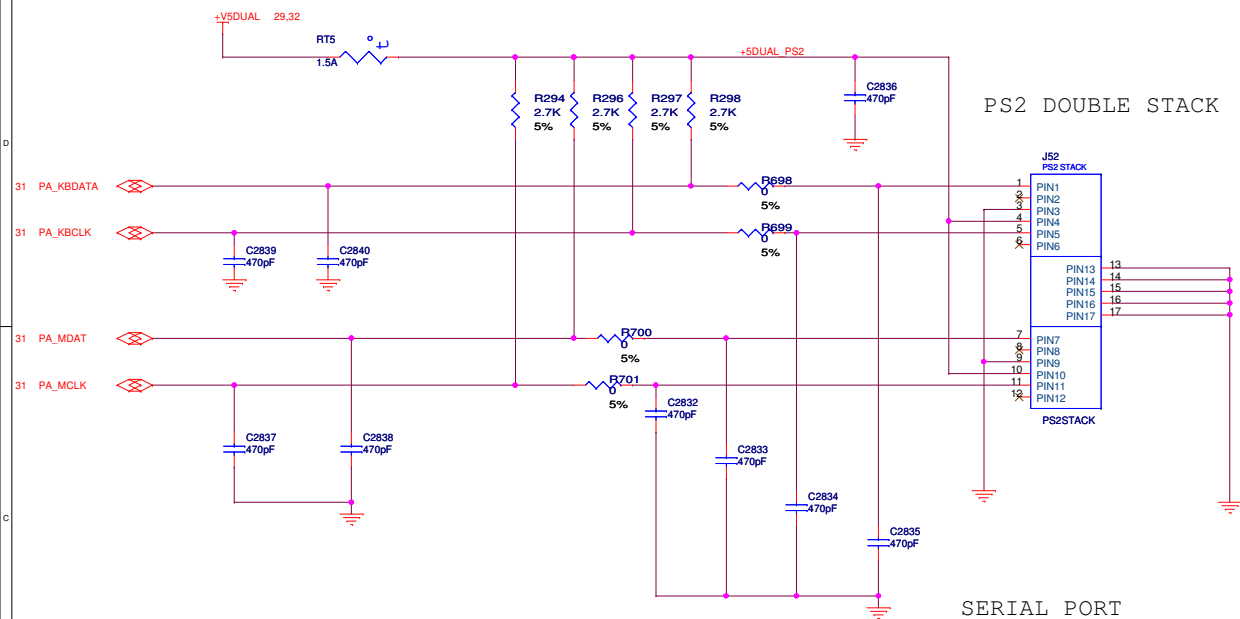


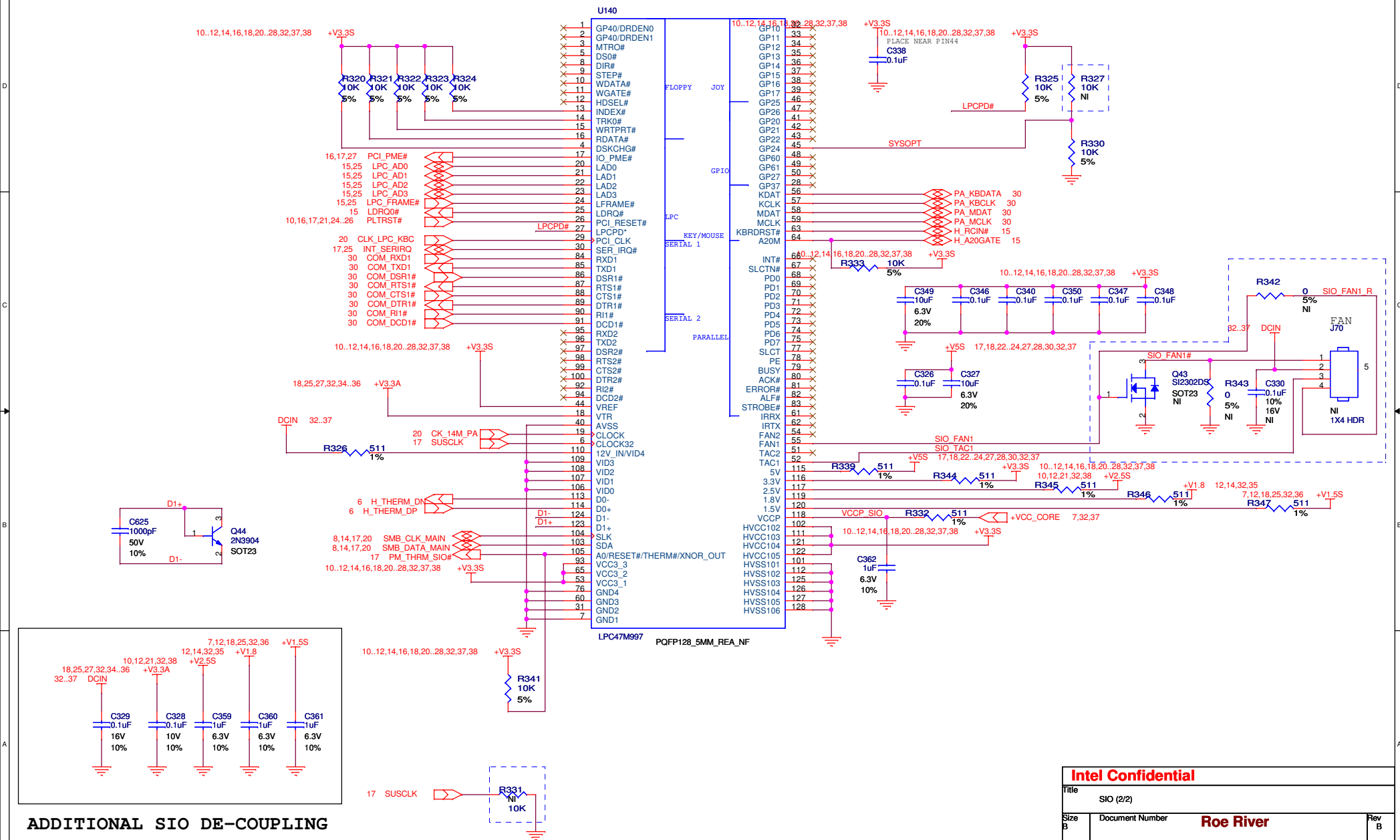


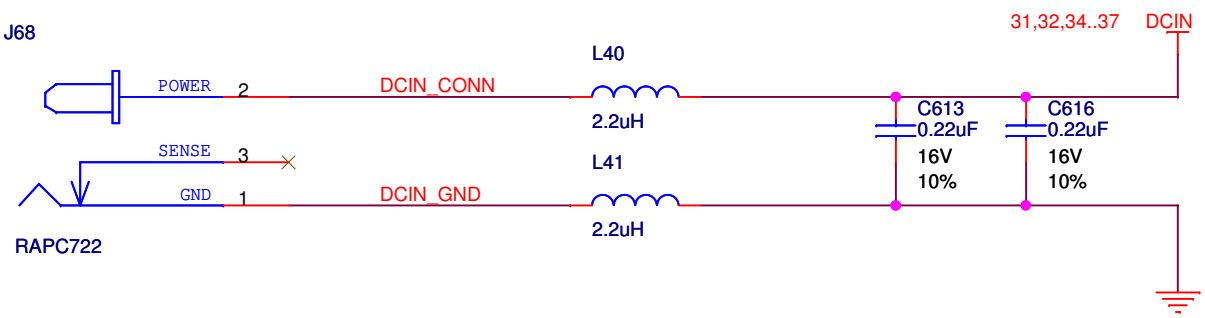


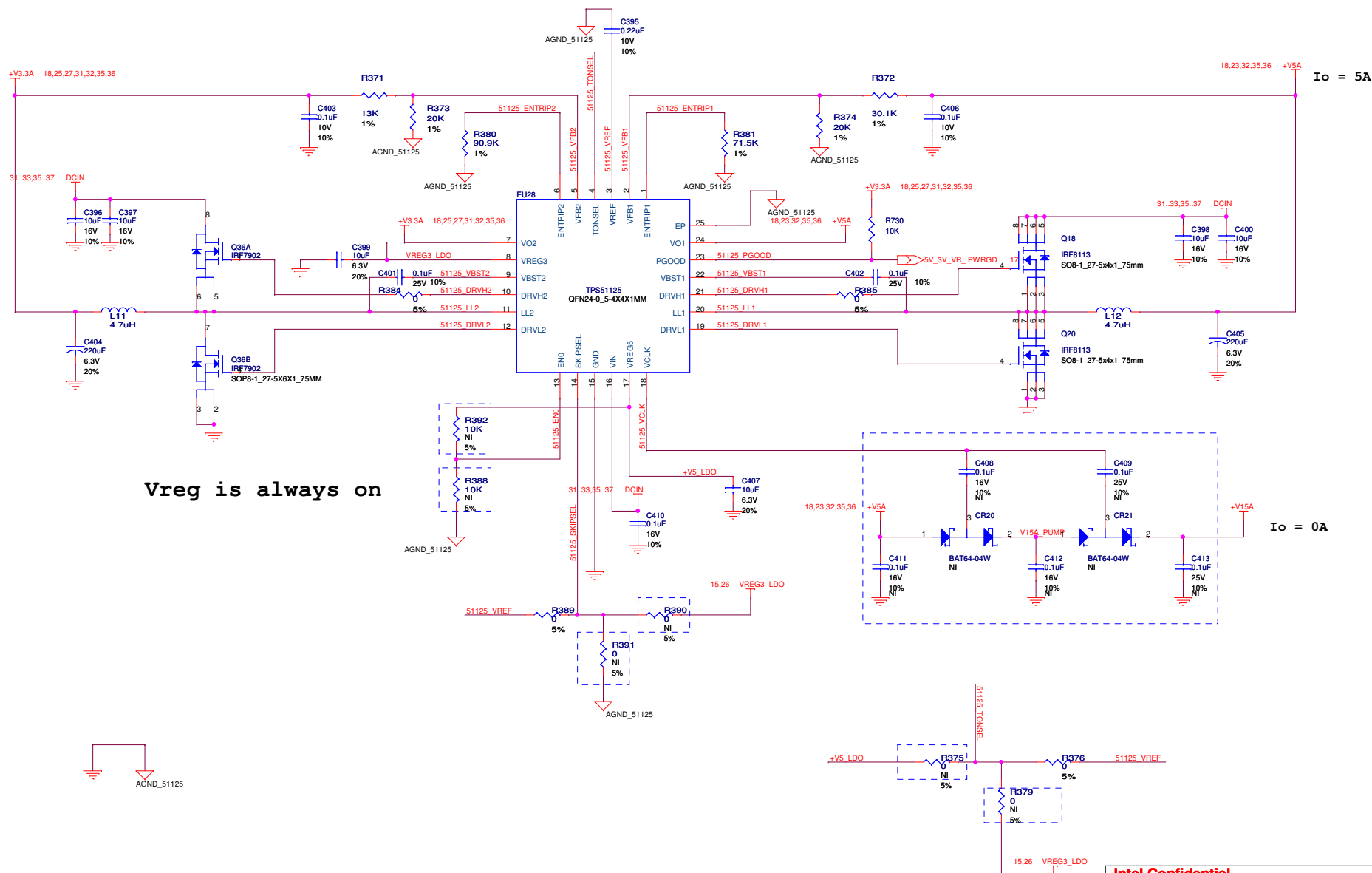


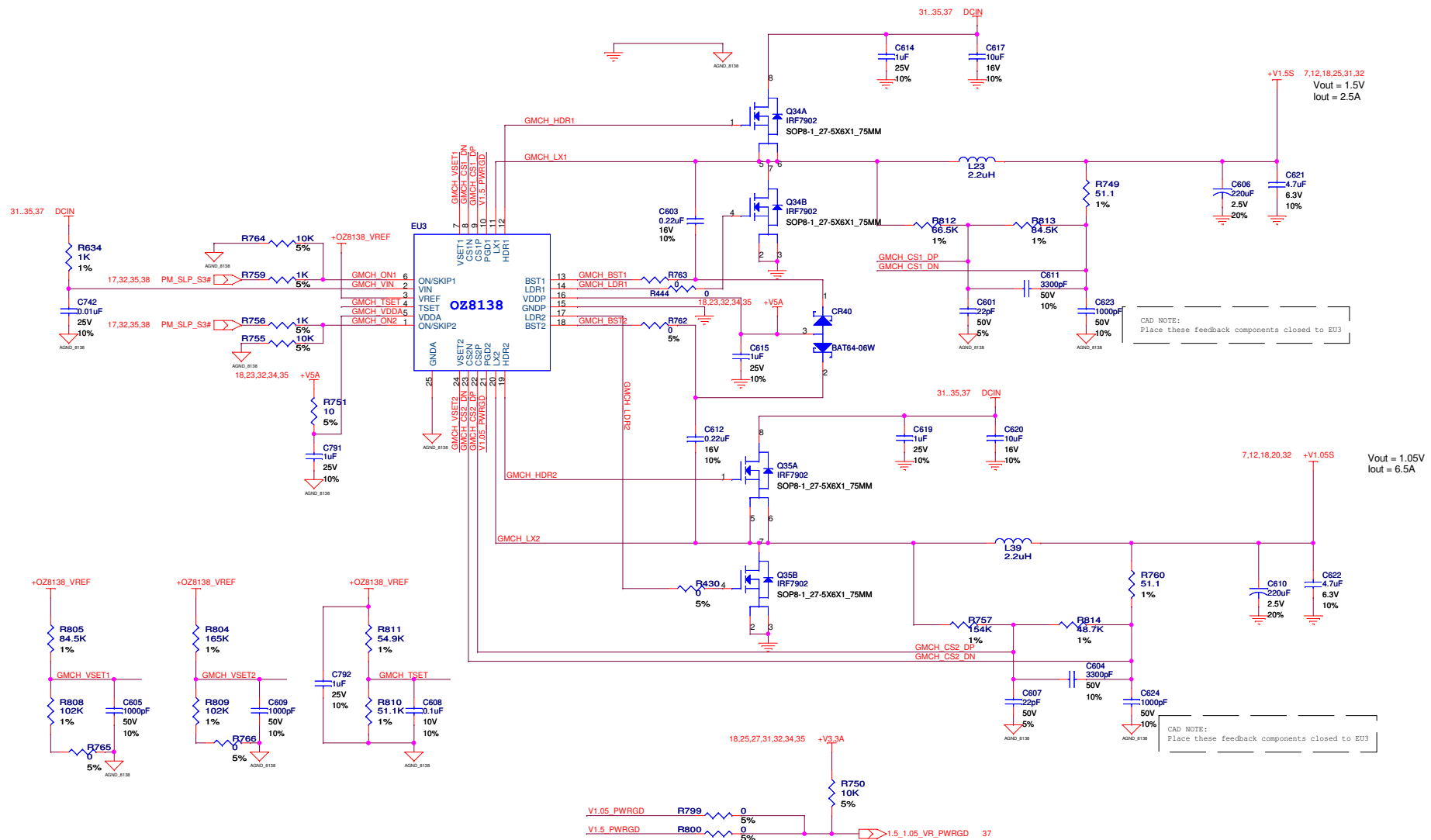


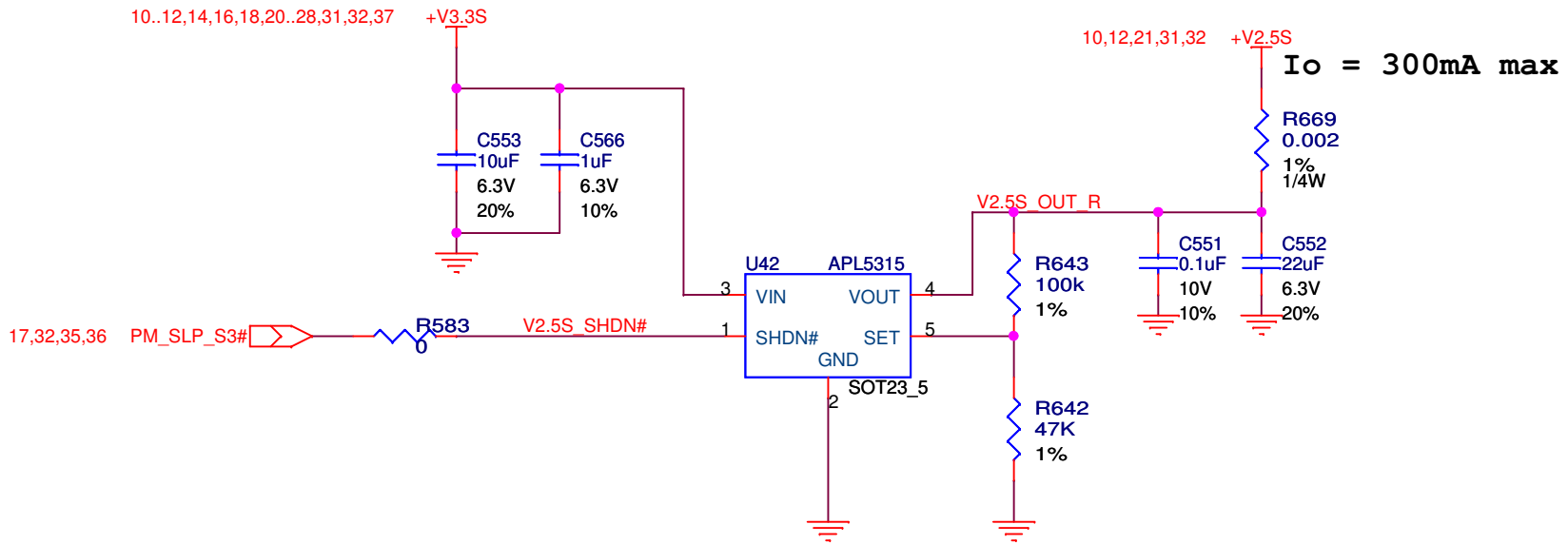












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Item	Reason	Page	Date	
MH1 - MH4	Update solder stencil to allow solder paste on MH1 - MH4 for mounting nut attachment	44	May 5, 2008	
U139: RealTek LAN	Change IPN to E1115-001. Changes part from RTL8111B to RTL8111C.	26	May 7, 2008	
R24: 22 ohm resistor	In series with PROCHOT signal to be consistent with reference designs	6	May 16, 2008	
R608-R610,R617-R619: 56 ohm resistor	Change XDP resistors from 62 ohm to 56 ohm	8	May 16, 2008	
R73,R94: 1K resistors	Removed R94 and moved R73 after diode	15	May 16, 2008	
TPM RTC power	Placed TPM power on BAT_D vs RTC to avoid losing power when CMOS is cleared	25	May 16, 2008	
Q2, Q3: SMB FETs	Changed from +V3.3S rail to +V5S rail to avoid Vgs drop	17	May 16, 2008	
R613: 0.002 OHM Res	Moved to other side of 22uF cap, power entire LAN chip through this res	26	May 16, 2008	
R614: 0.002 OHM Res	Power all +V1.2_LAN through this resistor	26	May 16, 2008	
Back Panel USB	Was connected to +V3.3S, now connected to +5VDUAL	29	May 16, 2008	
ALL USB PORTS	Was connected to +V5A, now connected to +5VDUAL	29	May 16, 2008	
+5VDUAL	Created +5VDUAL rail for USB	32	May 16, 2008	
LEDs	Swapped LED / res placement to allow easier voltage probing	32	May 16, 2008	
R339: 0 Ohm res	+V15A not used, resistor removed	32	May 16, 2008	
R383,R438: 0 Ohm res	Was NI, not used	37	May 16, 2008	
5V_3V_PWRGOOD	Connected to PM_RSMRST#_ICH. Was missing.	17	May 16, 2008	
PM_ICH_PWROK and DELAY_PWR_GOOD	Connected together.	17	May 16, 2008	
R128: 10K resistor	Changed to NI. 10K pulldown also has 10K pullup, so one not required	17	May 16, 2008	
J68: RAPC722	Swapped pins 1 and 2	33	May 16, 2008	
C613,C616: 0.22uF caps	Changed from NI to stuffed due to issue with HP 12V power supply	33	May 16, 2008	
Q12: FET	Changed from N-channel to P-channel due to Vgs voltage droop	32	May 16, 2008	
J1: XDP Connector	Corrected symbol (TMS and TCK swapped)	08	May 16, 2008	
L20: 4.8uH inductor	Changed out to 0805 from 0603	09	May 19, 2008	
J52: +5VA_PS2 --> +5VDUAL_PS2	5V PS2 changed from +V5A to +5VDUAL	30	May 19, 2008	
DN7: +5VDUAL --> FP_USB_VCC	USB FP Diode network changed from +5VDUAL to associated FP_USB_VCC power for ease in routing	29	May 20, 2008	
U14: RealTek EEPROM	Swapped EEDI and EEDO	26	May 20, 2008	
U4: ICH GPIO12	ICH GPIO12 is now LAN_ISOLATE# signal	17,26	May 20, 2008	
U139: LAN_ISOLATE#	LAN_ISOLATE# pulled to +V3.3S instead of +V3.3A so that LAN is isolated in S3 and lower	26	May 20, 2008	
DN1: +V5S_VGA	Diode network connected to +5VS_VGA instead of +5VS to prevent back driving +V5S line	22	May 20, 2008	
LAN: +V3.3A	3.3V LAN changed from LDO to switching Vreg	26	May 27, 2008	
J67: MagJack	Center tap pins 5&6 moved from +V3.3_LAN to LAN_VCT	26	May 28, 2008	
SIO	Added 511 ohm resistors in series with voltage sources	31	May 28, 2008	
SIO	Added thermal diode	32	May 28, 2008	

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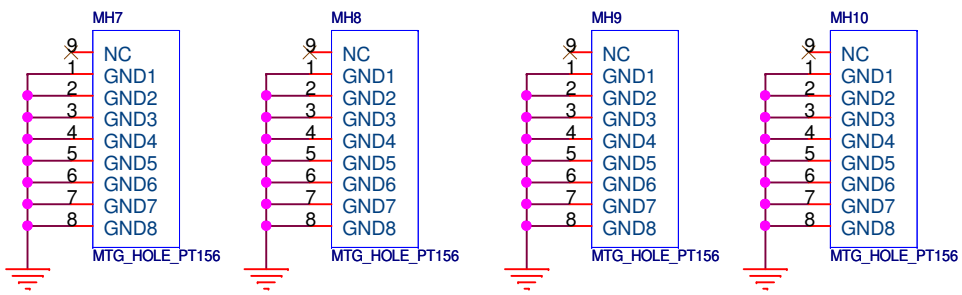
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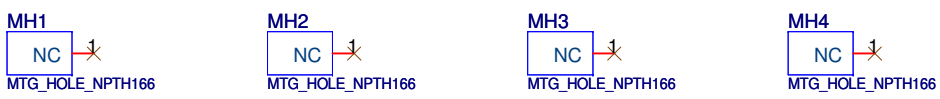
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SCH_MTG_NLX_N156 (Board Mounting Holes)



SCH_MTG_NPTH166 (CPU/MCH MTG HOLES) W/ SMT NUTS



Labels

LB1

PB_FREE

LB2

SILK_E1

LB3

SILK_E2

LB4

SILK_E4

LB5

SERIAL_NUMBER

