

TORINO

PCB thickness: 1mm

CPU : INTEL YONAH-2M
Chip Set : INTEL 945GM & ICH7-M
Remarks : 2 Spindle

Model Name : TORINO
PBA Name : MAIN
PCB Code : BA41-00602A/3A
Dev. Step : MP
Revision : 1.0.0
T.R. Date : 2006.2.16

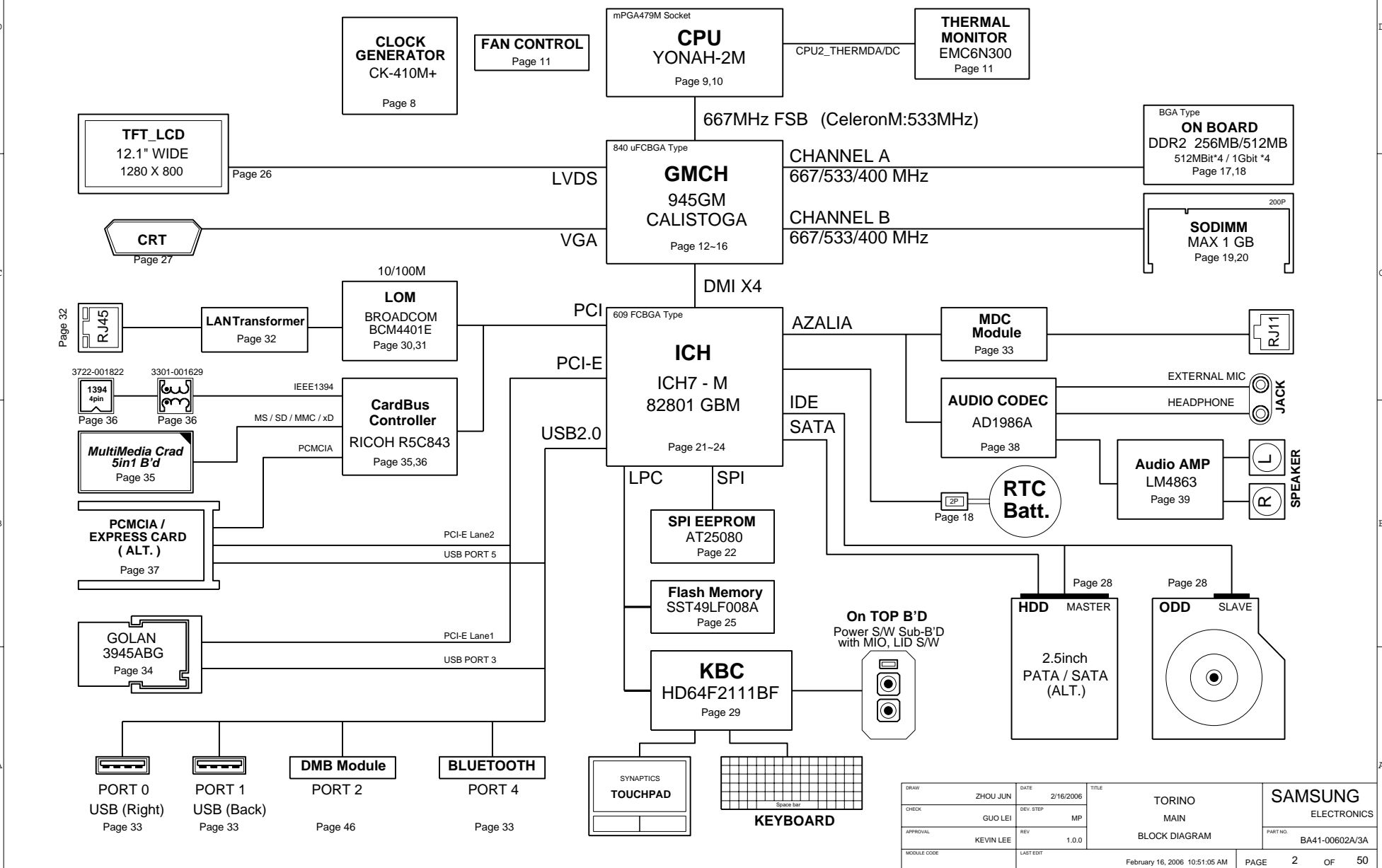
DRAW	CHECK	APPROVAL
-	-	-

Table of Contents

Page. 1	---	COVER	
Page. 2	---	OPERATION BLOCK DIAGRAM	
Page. 3	---	POWER DIAGRAM	
Page. 4	---	POWER SEQUENCE	
Page. 5	---	POWER RAIL	
Page. 6	---	CLOCK DISTRIBUTION	
Page. 7	---	BOARD INFORMATION	DIAGRAM
Page. 8	---	CLOCK GENERATOR (CK-410M+)	
Page. 9~10	---	YONAH-2M	
Page. 11	---	THERMAL MONITOR	
Page. 12~16	---	CALISTOGA (945GM)	
Page. 17~18	---	DDR2 ON BOARD	
Page. 19	---	DDR2 SODIMM	
Page. 20	---	DDR2 TERMINATION	
Page. 21~24	---	ICH7-M	
Page. 25	---	FWH	
Page. 26	---	LCD(LVDS) CONN.	
Page. 27	---	CRT CONN.	
Page. 28	---	HDD & ODD CONNECTOR	
Page. 29	---	MICOM	
Page. 30~31	---	LAN CONTROLLER (10/100M)	
Page. 32	---	LAN & MODEM PORT	
Page. 33	---	USB PORT, MDC CONN. & BLUETOOTH	
Page. 34	---	MINIPCI EXPRESS SOCKET	
Page. 35	---	CARDBUS CONTROLLER(1) & 4IN1	
Page. 36	---	CARDBUS CONTROLLER(2) & 1394(4P)	
Page. 37	---	PCMCIA or PCI-EXPRESS CARD SOCKET	
Page. 38	---	AC'97 CODEC	
Page. 39	---	AUDIO AMP & AUDIO JACK	
Page. 40	---	CHARGER	
Page. 41	---	P3.3V AUX & P5V_AUX	
Page. 42	---	DDR2 POWER	
Page. 43	---	CPU VRM POWER	
Page. 44	---	1.5V & VCCP POWER	
Page. 45	---	SWITCHED POWER	
Page. 46	---	POWER S/W, DMB & KEYBOARD CONN.	
Page. 47	---	LEDS, TOUCHPAD & LID S/W	
Page. 48	---	MOUNT HOLE	
Page. 49	---	TEST POINTS	
Page. 50	---	REVISION HISTORY	

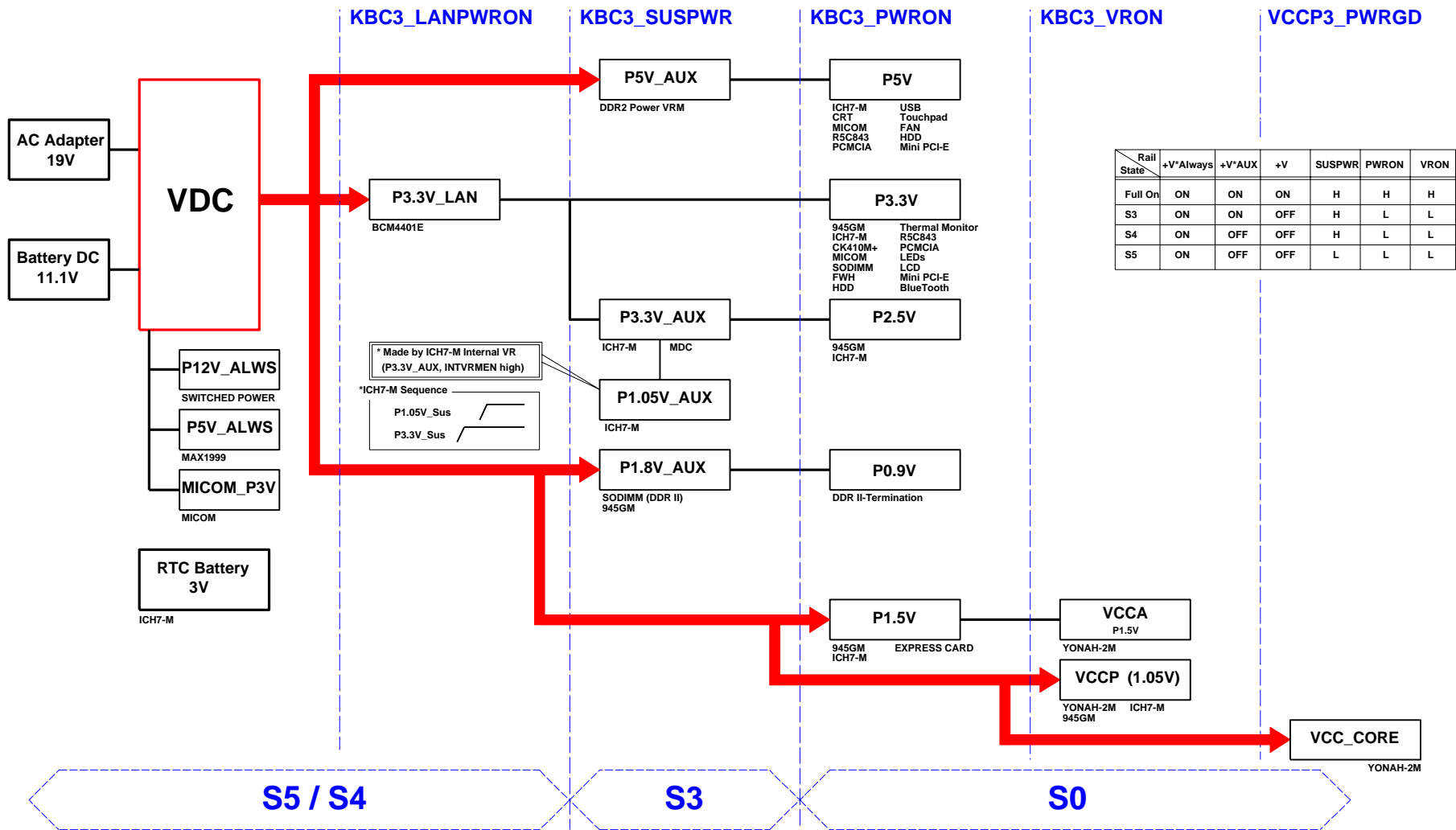
DRAW	ZHOU JUN	DATE	2/16/2006	TITLE	TORINO	SAMSUNG
CHECK	GUO LEI	DEV. STEP	MP	COVER	CONTENTS	ELECTRONICS
APPROVAL	KEVIN LEE	REV	1.0.0			PART NO.
MODULE CODE		LAST EDIT	February 16, 2006 10:51:05 AM			BA41-00602A/3A
				PAGE	1	OF 50

OPERATION BLOCK DIAGRAM



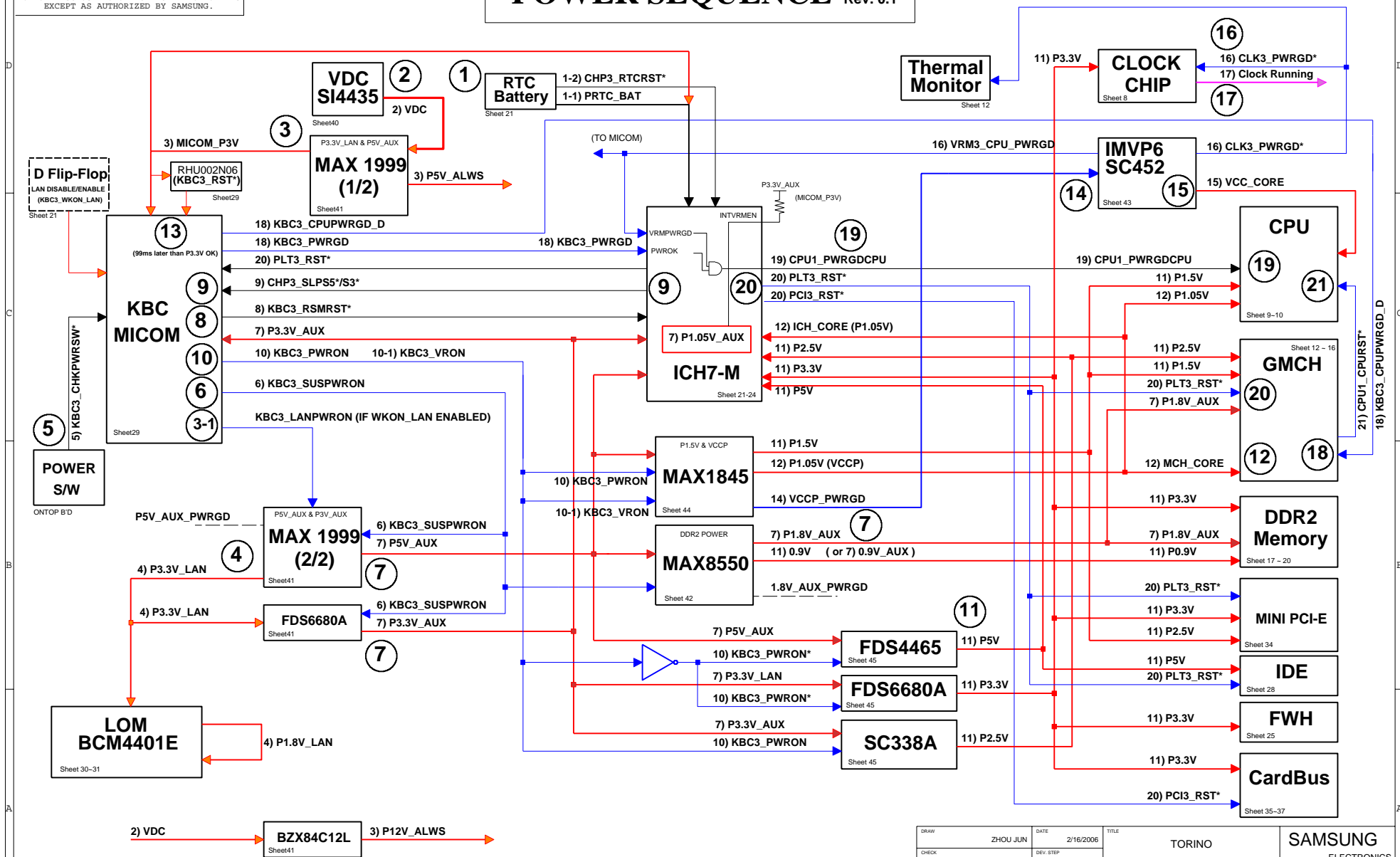
DRAW	ZHOU JUN	DATE	2/16/2006	TITLE	TORINO	SAMSUNG
CHECK	GUO LEI	DEV. STEP	MP	MAIN	MAIN	ELECTRONICS
APPROVAL	KEVIN LEE	REV	1.0.0	BLOCK DIAGRAM	PART NO.	BA41-00602A/3A
MODULE CODE		LAST EDIT		February 16, 2006 10:51:05 AM	PAGE	2 OF 50

POWER DIAGRAM



DRAW	ZHOU JUN	DATE	2/16/2006	TITLE	TORINO MAIN POWER DIAGRAM	SAMSUNG ELECTRONICS
CHECK	GUO LEI	DEV. STEP	MP			PART NO. BA41-00602A/3A
APPROVAL	KEVIN LEE	REV	1.0.0			
MODULE CODE		LAST EDIT	February 16, 2006 10:51:05 AM	PAGE	3	OF 50

POWER SEQUENCE Rev. 0.1

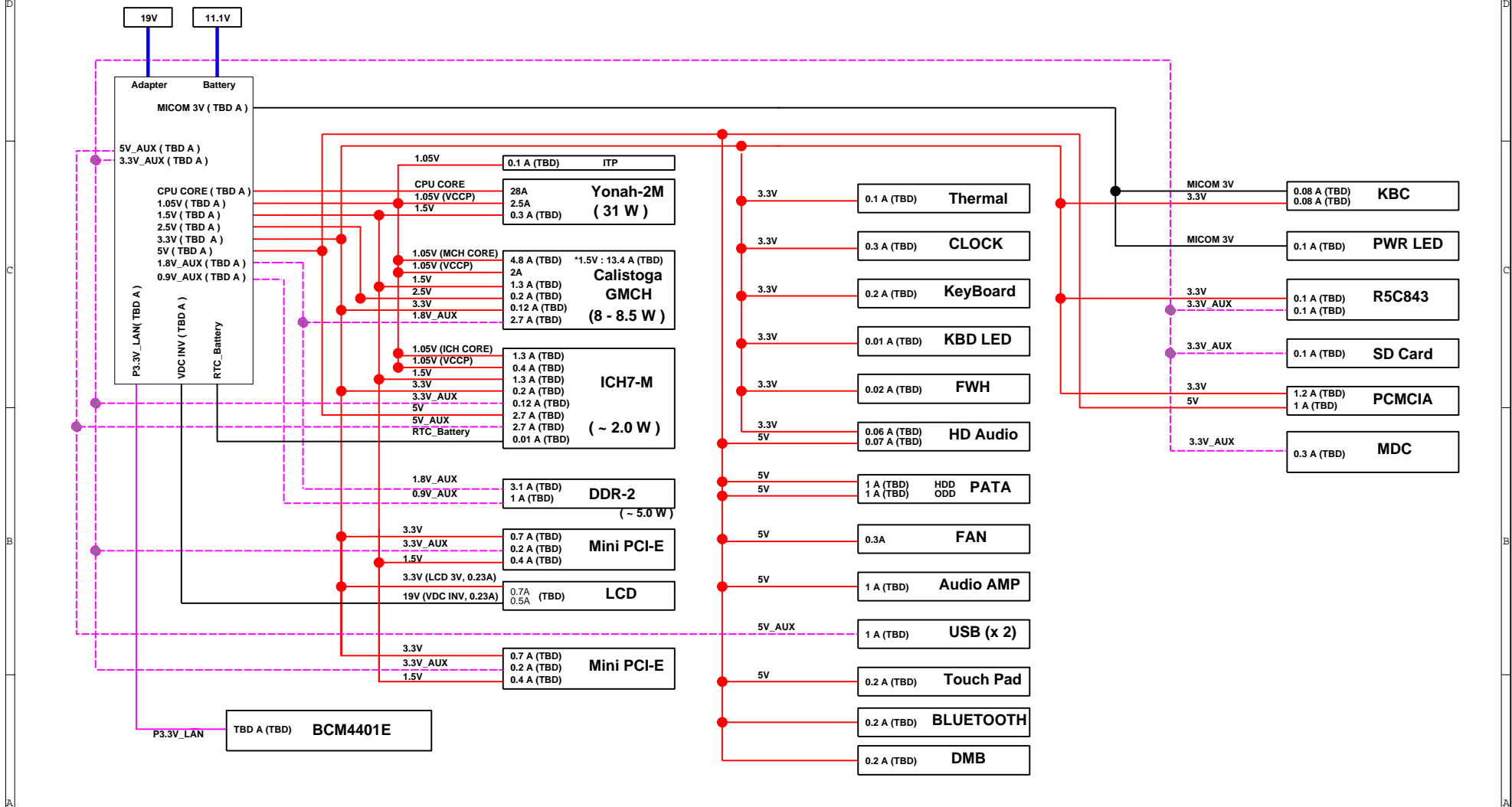


DRAW	ZHOU JUN	DATE	2/16/2006	TITLE	TORINO	SAMSUNG
CHECK	GUO LEI	DEV. STEP	MP	MAIN	MAIN	ELECTRONICS
APPROVAL	KEVIN LEE	REV	1.0.0	POWER SEQUENCE	PART NO.	BA41-00602A/3A
MODULE CODE		LAST EDIT				
				February 16, 2006 10:51:05 AM	PAGE	4 OF 50

POWER RAILS ANALYSIS

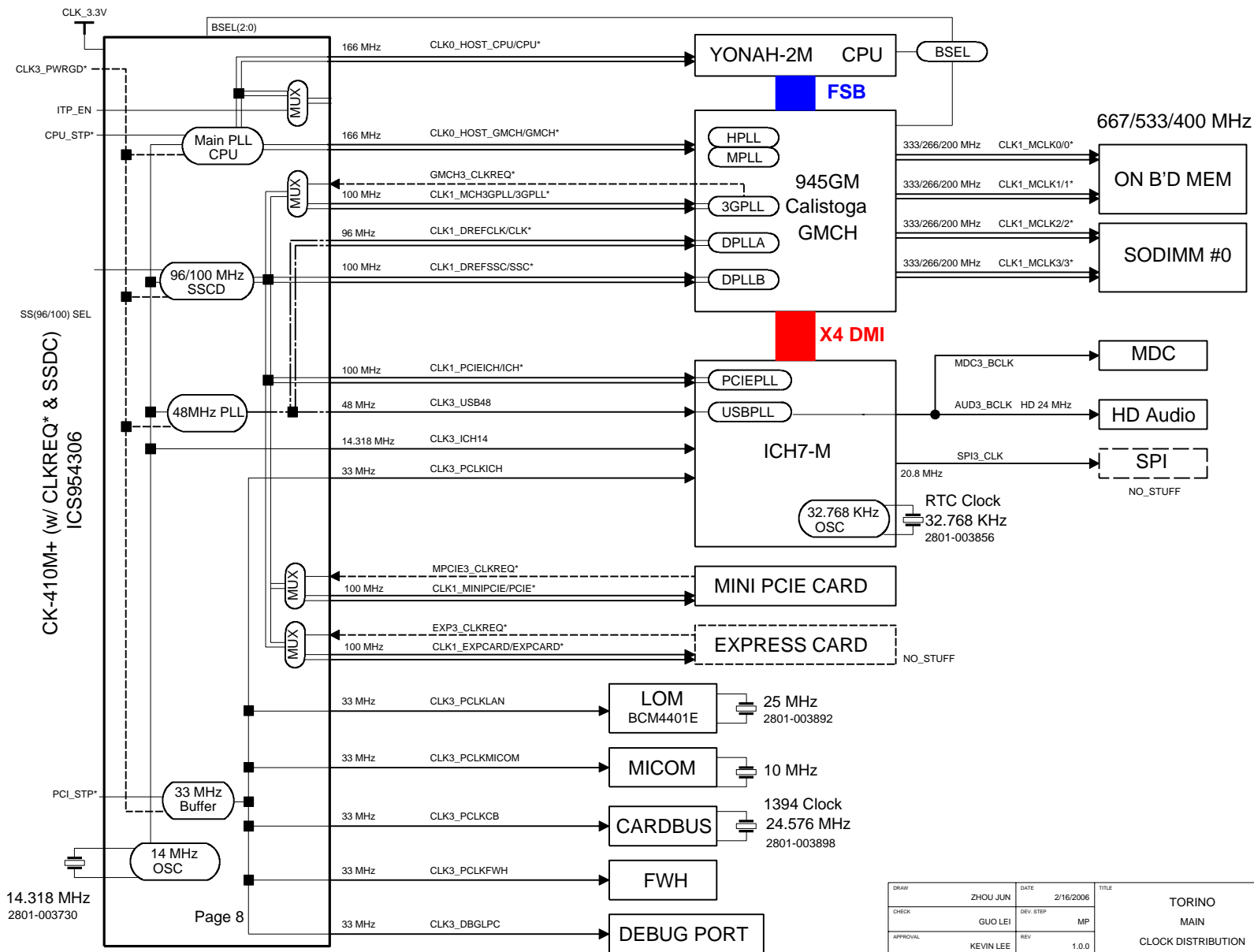
Rev. 0.1

—	S0 - S5
...	S0 - S3
---	OFF IN S3 - S5



DRAW	ZHOU JUN	DATE	2/16/2006	TITLE	TORINO MAIN POWER RAIL	SAMSUNG ELECTRONICS
CHECK	GUO LEI	DEV. STEP	MP			PART NO. BA41-00602A/3A
APPROVAL	KEVIN LEE	REV	1.0.0			
MODULE CODE		LAST EDIT		February 16, 2006 10:51:05 AM	PAGE	5 OF 50

CLOCK DISTRIBUTION Rev. 0.1



DRAW	ZHOU JUN	DATE	2/16/2006	TITLE	TORINO MAIN CLOCK DISTRIBUTION	SAMSUNG ELECTRONICS
CHECK	GUO LEI	DEV. STEP	MP			PART NO. BA41-00602A/3A
APPROVAL	KEVIN LEE	REV	1.0.0			
MODULE CODE		LAST EDIT				
				February 16, 2006 10:51:05 AM	PAGE	6 OF 50

SCHEMATIC ANNOTATIONS AND BOARD INFORMATION

Devices	IDSEL#	REQ/GNT#	Interrupts
Cardbus	AD25	0	E,F,G
LAN	AD21	1	G
USB	AD29(internal)	-	USB2.0 #0 : A USB2.0 #1 : D USB2.0 #2 : C
Hub to PCI	AD30(internal)	-	-
LPC bridge/IDE/AC97/SMBUS	AD31(internal)	-	B
Internal MAC	AD24(internal)	-	B
AC110k	-	-	B

VDC	Primary DC system power supply (7 to 21V)
VCC_CORE	Core voltage for Processor (1.308~1.068V)
VTT	DO#H#A#L#V#S#O Processor System Bus(PSB) Termination (1.05V)
	GMCH & ICH7 Core Voltage
P1.8V_AUX	1.8V power rail for DDR2 (off in S4-S5)
P0.9V	0.9V switched power rail (off in S3-S5)
P1.5V	1.5V switched power rail (off in S3-S5)
P2.5V	2.5V switched power rail (off in S3-S5)
P3.3V	3.3V switched power rail (off in S3-S5)
P5V	5.0V switched power rail (off in S3-S5)
P3.3V_AUX	3.3V power rail (off in S4-S5)
P5V_AUX	5.0V power rail (off in S4-S5)
P3.3V_LAN	3.3V power rail (Always On)
PRTC_BAT	3.0V power rail (ALWAYS ON)
MICOM_P3V	3.3V always on power rail for MICOM
P5V_ALWS	5V power rail (Always On)
P12V_ALWS	12V power rail (Always On)

Devices	Address	Hex	Bus
ICH7	Master	-	SMBUS Master
SODIMM1	1010 001X	A2h	-
CK-410M+ (Clock Generator)	1101 001x	D2h	Clock, Unused Clock Output Disable
MICOM	Master	-	SMBUS Master
BATTERY	0001 011X	16h	-
EMC6N300(CPU Thermal Sensor)	0101 111X	5Eh	Thermal Sensor

PORT NUMBER	ASSIGNED TO
0	SYSTEM PORT A
1	SYSTEM PORT B
2	DMB CARD
3	MINIPCI-E
4	BLUETOOTH
5	EXPRESS CARD
6	RESERVED
7	RESERVED

CHP3_SLPS1*	S1, Powered-On-Suspend(POS) : In this state, all clocks(except the 32.768KHz clock) are stopped. The system context is maintained in system DRAM. Power is maintained to PCI, the CPU, memory controller, memory, and all other critical subsystems. Note that this state does not preclude power being removed from non-essential devices, such as disk drives. During this state, CPU can be selected for either Deep Sleep or Deeper Sleep. In Deeper Sleep, CPU voltage reduced in this state to reduce the leakage power.
CHP3_SLPS3*	S3, Suspend-to-RAM(STR) : The system context is maintained in system DRAM, but power is shut off to non-critical circuits. Memory is retained, and refreshes continue. All clocks stop except RTC clock.
CHP3_SLPS4*	S4, Suspend-to-Disk(STD) : The Context of the system is maintained on the disk. All power is then shut off to the system except for the logic required to resume.
CHP3_SLPS5*	S5, Soft Off(SOFF) : System context is not maintained. All power is shut off except for the logic required to restart. A full boot is required when waking.

TYPE	FREQUENCY	DEVICE	USAGE
Crystal	32.768KHz	ICH7-M	Real Time Clock
Crystal	10MHz	MICOM	HD64F2169/2160
Crystal	14.318MHz	CLOCK-Generator	CK-410M
Crystal	24.576MHz	Cardbus Controller	1384
Crystal	25MHz	LAN	Intel® LAN

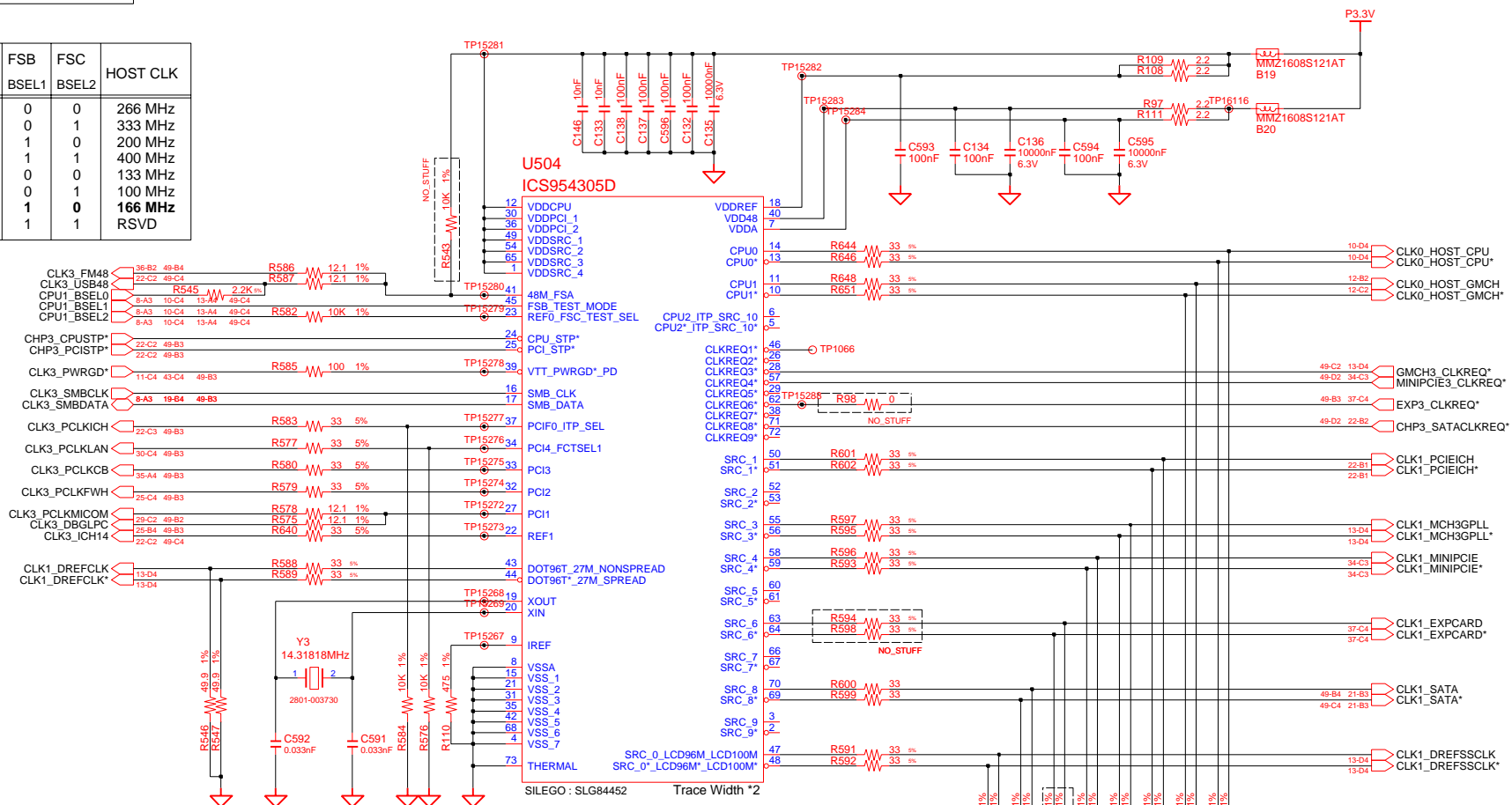
Active Mode							Active/Deeper Sleep Dual Mode Region							Deeper Sleep/Extended Deeper Sleep Dual Mode Region																											
VID(6:0)							Voltage							VID(6:0)							Voltage							VID(6:0)							Voltage						
0	0	0	0	0	0	0	1.5000 V	0	1	0	1	0	0	0	1.0000 V	1	0	1	0	0	0	1	0.4875 V	0	0	0	0	0	0	0.4875 V											
0	0	0	0	0	0	1	1.4875 V	0	1	0	1	0	0	1	0.9875 V	1	0	1	0	0	1	0.4875 V	0	0	0	0	0	0	0.4875 V												
0	0	0	0	0	1	0	1.4750 V	0	1	0	1	0	1	0	0.9750 V	1	0	1	0	1	0	1	0.4625 V	0	0	0	0	0	0	0.4625 V											
0	0	0	0	0	1	1	1.4625 V	0	1	0	1	0	1	1	0.9625 V	1	0	1	0	1	1	0	0.4500 V	0	0	0	0	0	0	0.4500 V											
0	0	0	0	1	1	0	1.4500 V	0	1	0	1	1	1	0	0.9500 V	1	0	1	1	1	0	0	0.4375 V	0	0	0	0	0	0	0.4375 V											
0	0	0	1	1	0	0	1.4375 V	0	1	0	1	1	0	1	0.9375 V	1	0	1	1	0	1	1	0.4250 V	0	0	0	0	0	0	0.4250 V											
0	0	0	1	1	1	0	1.4250 V	0	1	0	1	1	1	0	0.9250 V	1	0	1	1	1	0	1	0.4125 V	0	0	0	0	0	0	0.4125 V											
0	0	0	0	1	1	1	1.4125 V	0	1	0	1	1	1	1	0.9125 V	1	0	1	1	1	0	0	0.4000 V	0	0	0	0	0	0	0.4000 V											
0	0	0	1	1	0	0	1.4000 V	0	1	1	0	0	0	0	0.9000 V	1	0	1	1	0	0	1	0.3875 V	0	0	0	0	0	0	0.3875 V											
0	0	0	1	0	1	0	1.3875 V	0	1	1	0	0	0	1	0.8875 V	1	0	1	1	0	1	0	0.3750 V	0	0	0	0	0	0	0.3750 V											
0	0	0	1	0	0	1	1.3750 V	0	1	1	0	0	1	0	0.8750 V	1	0	1	1	0	0	1	0.3625 V	0	0	0	0	0	0	0.3625 V											
0	0	0	0	1	0	1	1.3625 V	0	1	1	0	0	1	1	0.8625 V	1	0	1	1	1	0	0	0.3500 V	0	0	0	0	0	0	0.3500 V											
0	0	0	0	1	1	0	1.3500 V	0	1	1	0	1	0	0	0.8500 V	1	0	1	1	1	0	1	0.3375 V	0	0	0	0	0	0	0.3375 V											
0	0	0	0	1	1	1	1.3375 V	0	1	1	0	1	0	1	0.8375 V	1	0	1	1	1	1	0	0.3250 V	0	0	0	0	0	0	0.3250 V											
0	0	0	1	1	1	0	1.3250 V	0	1	1	0	1	1	0	0.8250 V	1	0	1	1	1	0	1	0.3125 V	0	0	0	0	0	0	0.3125 V											
0	0	0	1	1	1	1	1.3125 V	0	1	1	0	1	1	1	0.8125 V	1	1	0	0	0	0	0	0.3000 V	0	0	0	0	0	0	0.3000 V											
0	0	1	1	0	0	0	1.3000 V	0	0	1	1	0	0	0	0.8000 V	1	1	0	0	0	0	1	0.2875 V	0	0	0	0	0	0	0.2875 V											
0	0	1	1	0	0	1	1.2875 V	0	0	1	1	0	0	1	0.7875 V	1	1	0	0	0	1	0	0.2750 V	0	0	0	0	0	0	0.2750 V											
0	0	1	0	0	1	0	1.2750 V	0	0	1	1</																														

*Yonah Processor (2.33 GHz / 1.00 GHz)

DRAW	ZHOU JUN	DATE	2/16/2006	TORINO MAIN BOARD INFORMATION	SAMSUNG ELECTRONICS
CHECK	GUO LEI	DEV. STEP	MP		
APPROVAL	KEVIN LEE	REV	1.0.0		
MODULE CODE	LAST EDIT		February 16, 2006 10:51:05 AM		
				PAGE	7 OF 50

SAMSUNG PROPRIETARY
THIS DOCUMENT CONTAINS CONFIDENTIAL
PROPRIETARY INFORMATION THAT IS
SAMSUNG ELECTRONICS CO'S PROPERTY.
DO NOT DISCLOSE TO OR DUPLICATE FOR OTHERS
EXCEPT AS AUTHORIZED BY SAMSUNG.

		FSA	FSB	FSC	HOST CLK
CPU		BSEL0	BSEL1	BSEL2	
➡	0	0	0		266 MHz
	0	0	1		333 MHz
	0	1	0		200 MHz
	0	1	1		400 MHz
	1	0	0		133 MHz
	1	0	1		100 MHz
	1	1	0		166 MHz
	1	1	1		RSVD

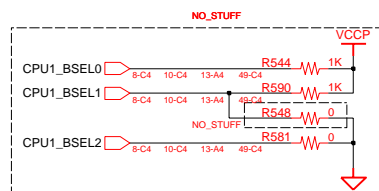
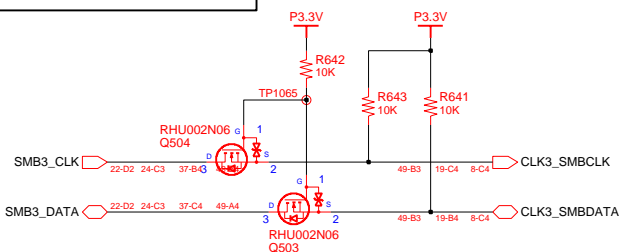


FCTSEL1	Pin43	Pin44	Pin47	Pin48
0	DOT96T	DOT96C	LCD100/96T	LCD100/96C
1	27MHz	27MHz	SRC0_T	SRC0_C

Place 14.318MHz within
500mils of Clock chip

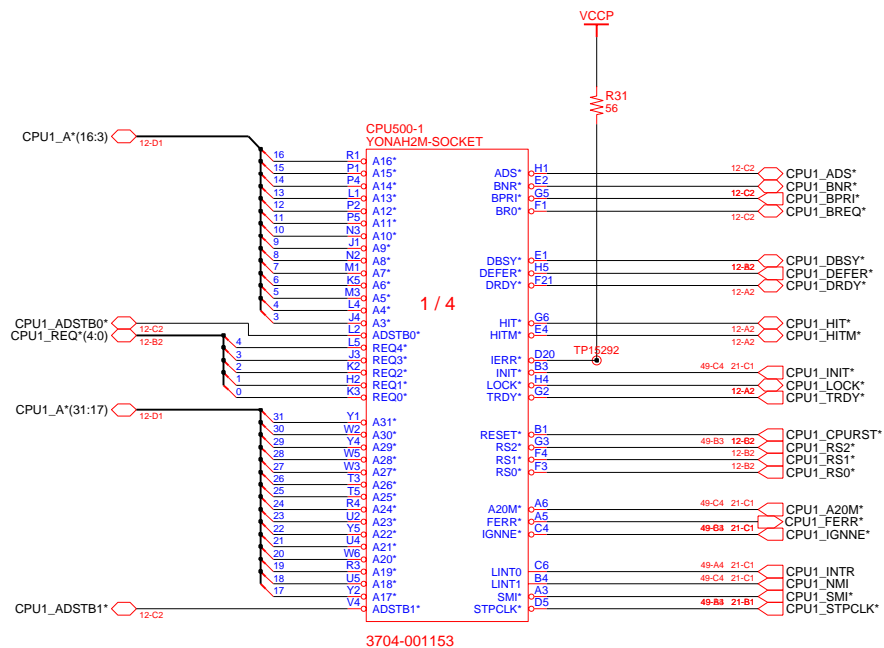
CK-410M+	
w/ CLKREQ w/ SS Clock	ICS954305 SLG8LP455 CY28447

Place Termination
close to CK-410M+

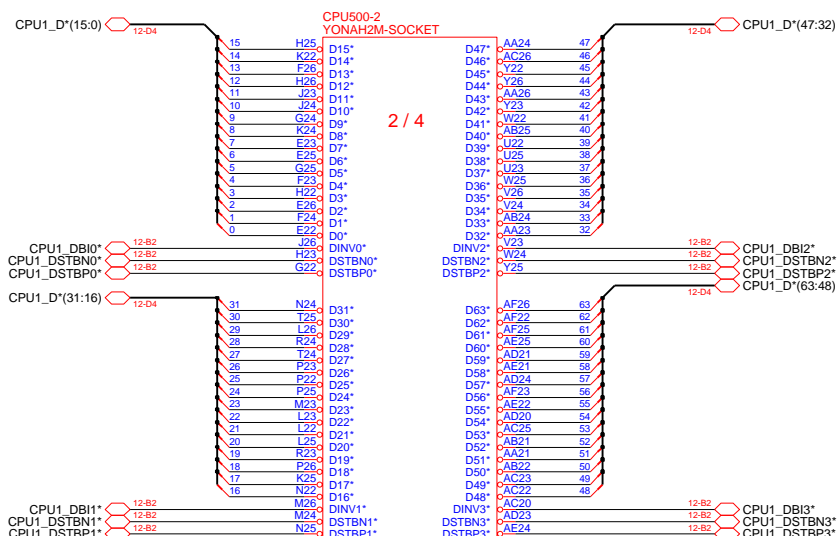


DRAW	ZHOU JUN	DATE	2/16/2006	TITLE TORINO MAIN CLOCK GENERATOR	SAMSUNG ELECTRONICS
CHECK	GUO LEI	DEV. STEP	MP		
APPROVAL	KEVIN LEE	REV	1.0.0		
PART NO.			BA41-00602A/3A		
MODULE CODE		LAST EDIT		February 16, 2006 10:51:05 AM	PAGE 8 OF 50

CPU SOCKET : YONAH-2M



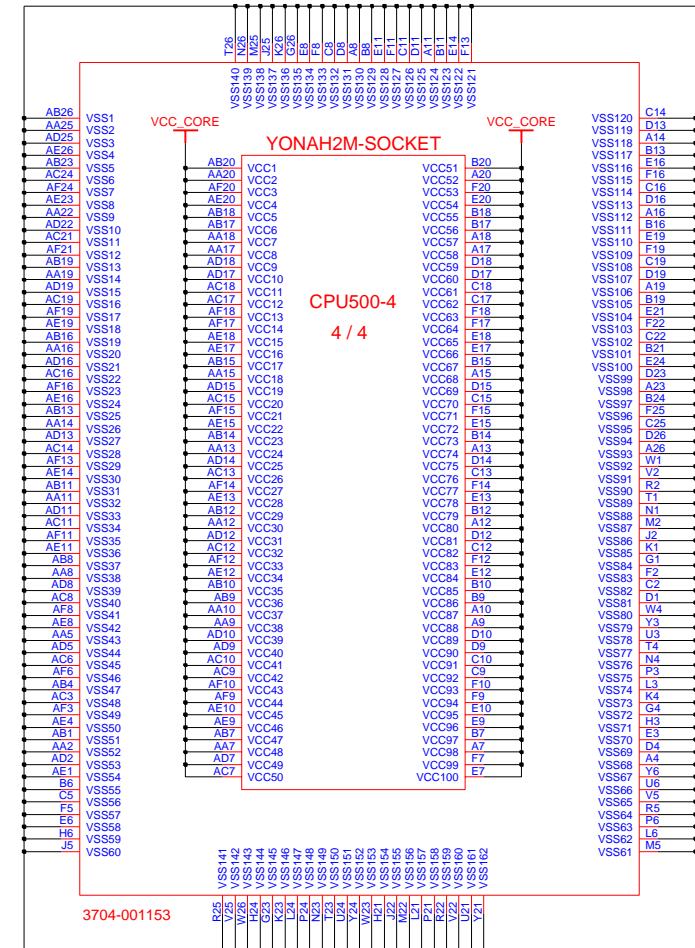
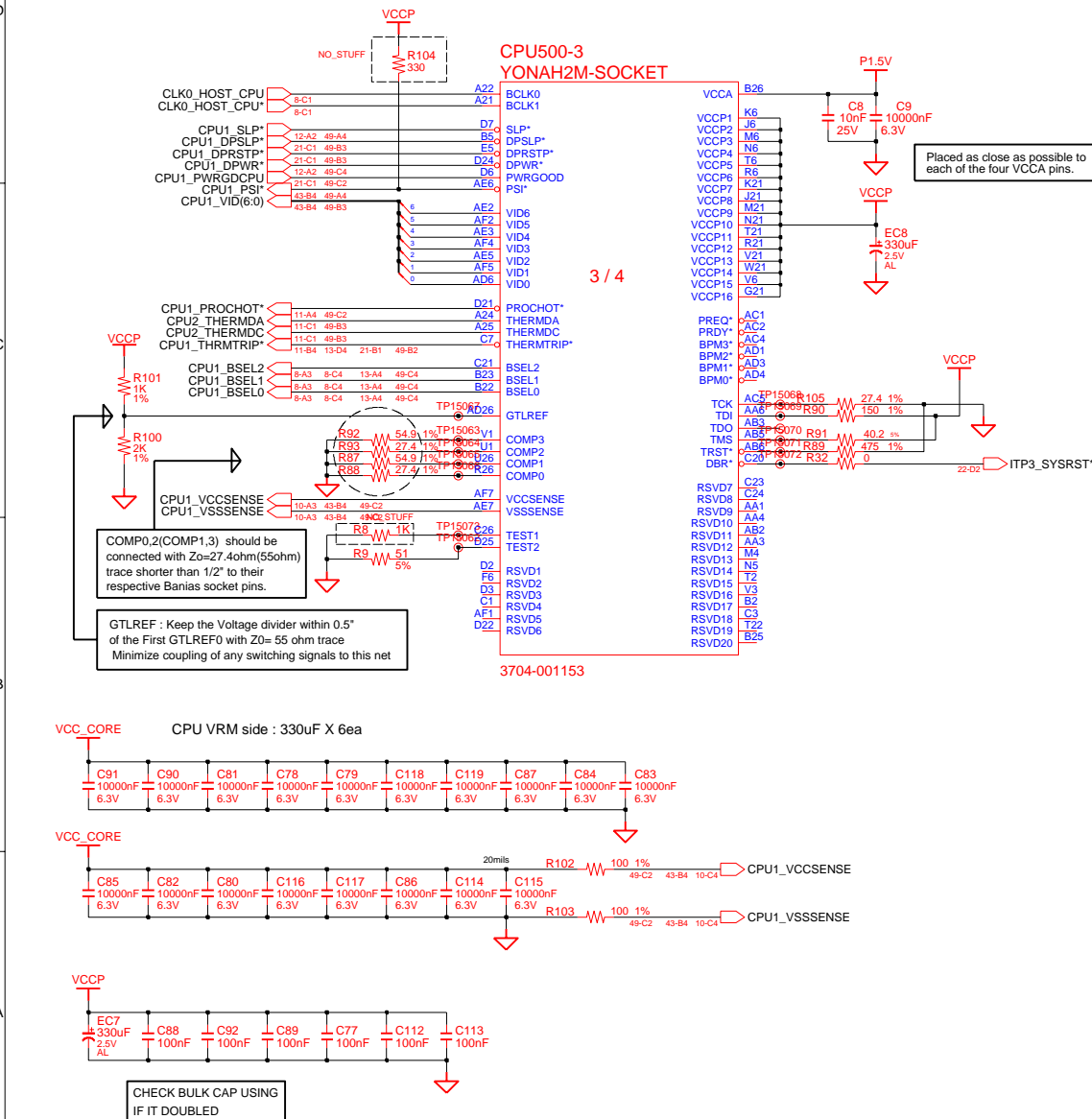
3704-001153

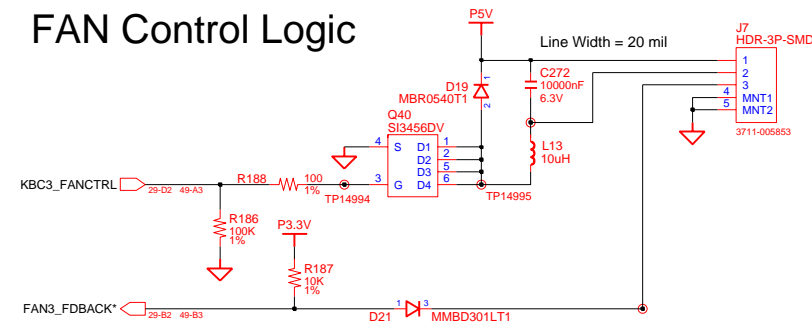


3704-001153

DRAW	ZHOU JUN	DATE	2/16/2006	TITLE	TORINO	SAMSUNG
CHECK	GUO LEI	DEV. STEP	MP	MAIN	ELECTRONICS	
APPROVAL	KEVIN LEE	REV	1.0.0	YONAH-2M(1)	PART NO.	BA41-00602A/3A
MODULE CODE		LAST EDIT	February 16, 2006 10:51:05 AM	PAGE	9	OF 50

CPU SOCKET : YONAH-2M

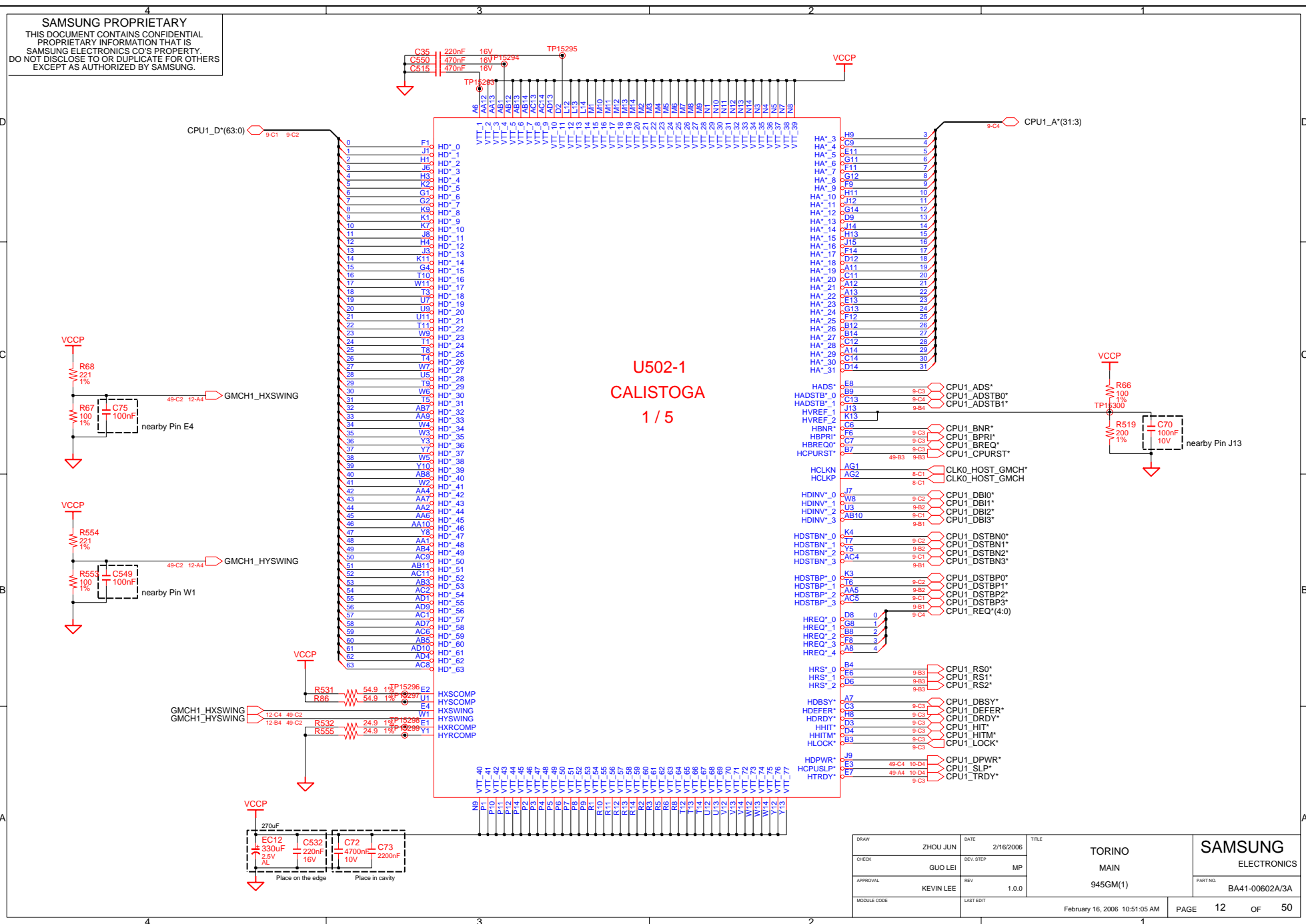




Changed to Control Methode(EBL)

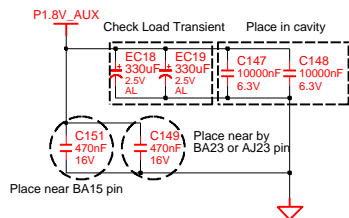
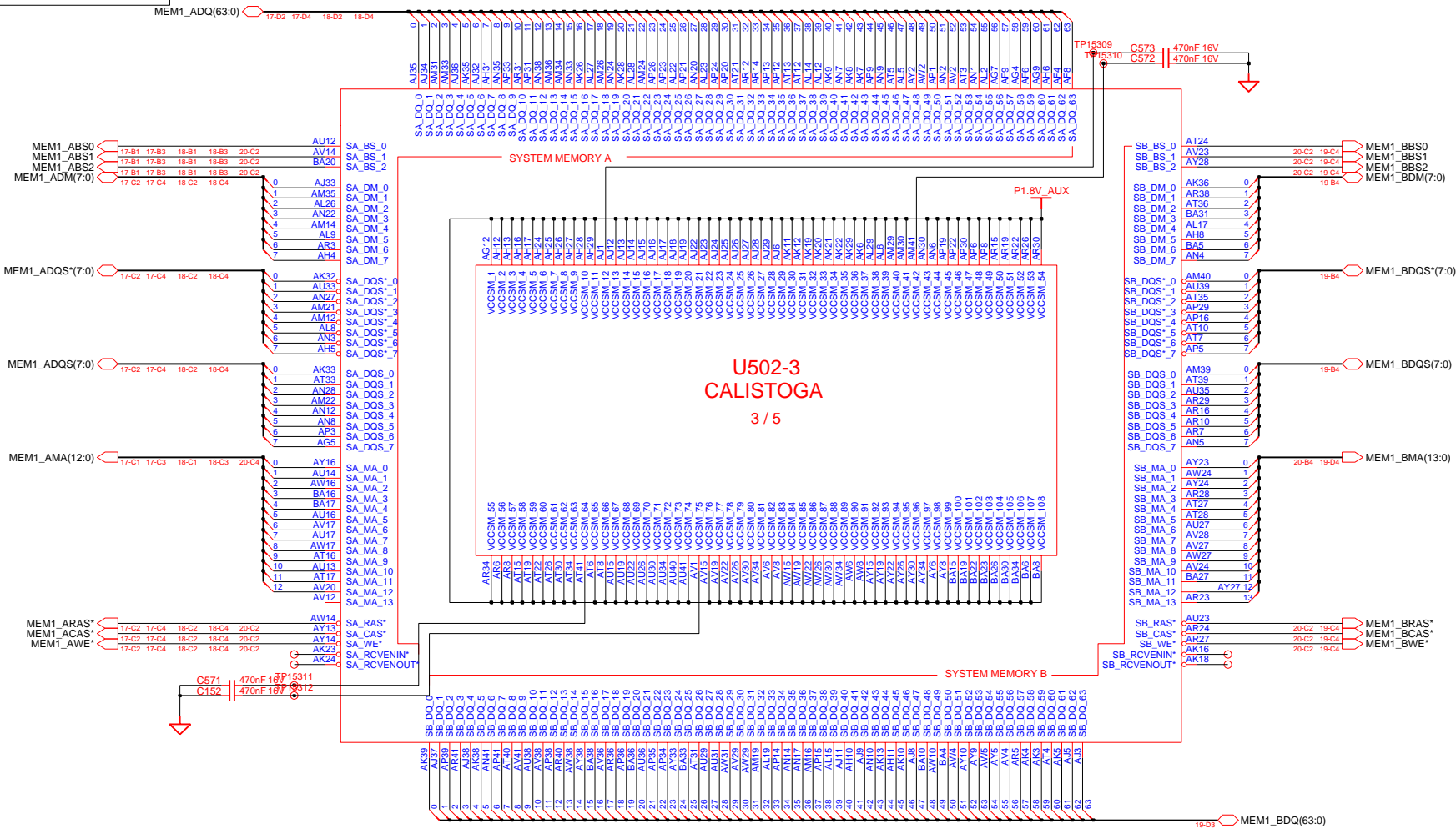
d:/users/mentor/Torino/SR/SR_0215

SAMSUNG PROPRIETARY
THIS DOCUMENT CONTAINS CONFIDENTIAL
PROPRIETARY INFORMATION THAT IS
SAMSUNG ELECTRONICS CO'S PROPERTY.
DO NOT DISCLOSE TO OR DUPLICATE FOR OTHERS
EXCEPT AS AUTHORIZED BY SAMSUNG.



DRAW	ZHOU JUN	DATE	2/16/2006	TITLE	TORINO
CHECK	GUO LEI	DEV. STEP	MP	MAIN	BA41-00602A/3A
APPROVAL	KEVIN LEE	REV	1.0.0	945GM(1)	PAGE 12 OF 50
MODULE CODE	LAST EDIT	February 16, 2006 10:51:05 AM			

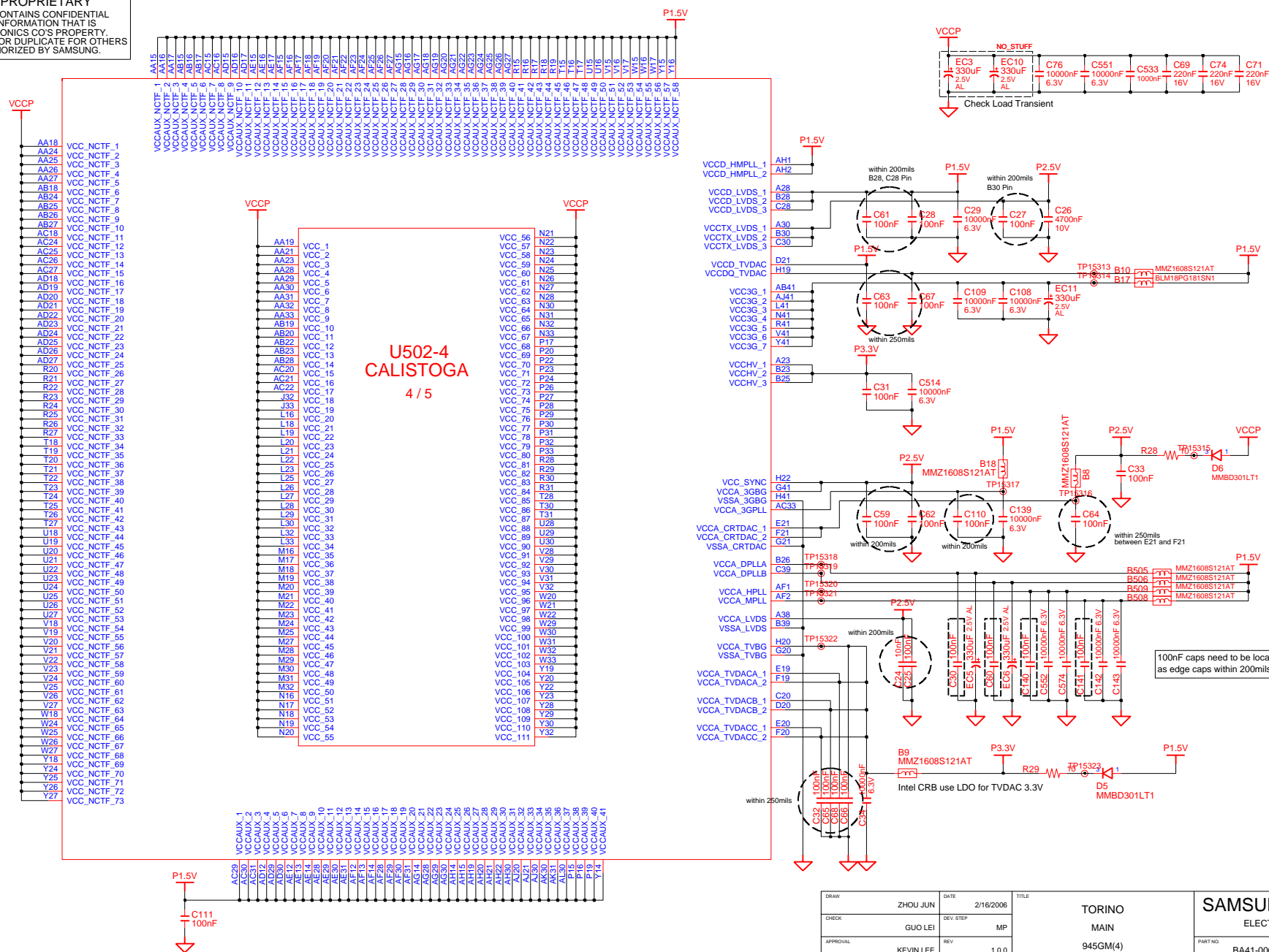
SAMSUNG PROPRIETARY
THIS DOCUMENT CONTAINS CONFIDENTIAL
PROPRIETARY INFORMATION THAT IS
SAMSUNG ELECTRONICS CO'S PROPERTY.
DO NOT DISCLOSE TO OR DUPLICATE FOR OTHERS
EXCEPT AS AUTHORIZED BY SAMSUNG.



Dual Channel	Ch. A (So-DIMM A)	Ch. B (So-DIMM B)
SM_CK(2:0)	SA_CK(2:0)	N/A
SM_CK(2:0)*	SA_CK(2:0)*	N/A
SM_CK(5:3)	N/A	SB_CK(2:0)
SM_CK(5:3)*	N/A	SB_CK(2:0)*
SM_CS(1:0)	SA_CS(1:0)*	N/A
SM_CKE(1:0)	SA_CKE(1:0)	N/A
SM_ODT(1:0)	SA_ODT(1:0)	N/A
SM_CS(3:2)*	N/A	SB_CS(3:2)*
SM_SKE(3:2)	N/A	SB_CKE(3:2)
SM_ODT(3:2)	N/A	SB_ODT(3:2)

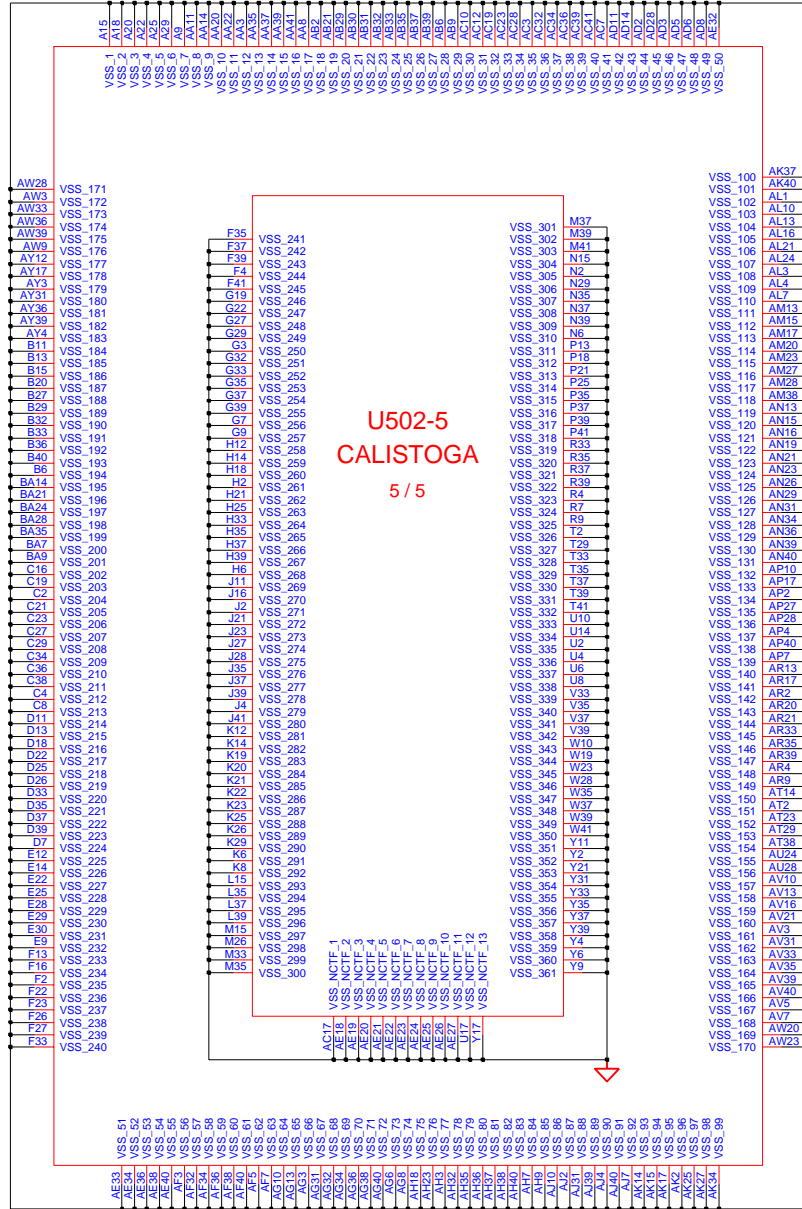
DRAW	ZHOU JUN	DATE	2/16/2006	TITLE	TORINO MAIN 945GM(3)	SAMSUNG ELECTRONICS
CHECK	GUO LEI	DEV. STEP	MP			
APPROVAL	KEVIN LEE	REV	1.0.0			
MODULE CODE		LAST EDIT		February 16, 2006 10:51:05 AM		PAGE 14 OF 50

SAMSUNG PROPRIETARY
THIS DOCUMENT CONTAINS CONFIDENTIAL
PROPRIETARY INFORMATION THAT IS
SAMSUNG ELECTRONICS CO'S PROPERTY.
DO NOT DISCLOSE TO OR DUPLICATE FOR OTHERS
EXCEPT AS AUTHORIZED BY SAMSUNG.



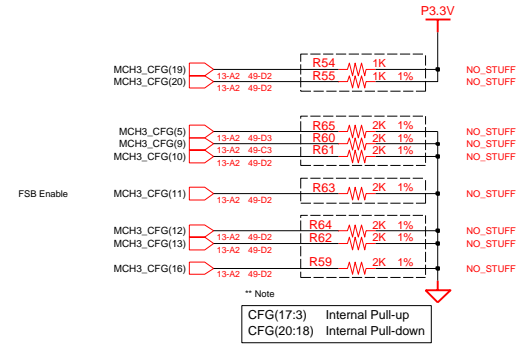
DRAW	ZHOU JUN	DATE	2/16/2006	TITLE	TORINO MAIN 945GM(4)	SAMSUNG ELECTRONICS
CHECK	GUO LEI	DEV. STEP	MP			
APPROVAL	KEVIN LEE	REV	1.0.0			
MODULE CODE		LAST EDIT		February 16, 2006 10:51:05 AM	PAGE	15 OF 50

SAMSUNG PROPRIETARY
THIS DOCUMENT CONTAINS CONFIDENTIAL
PROPRIETARY INFORMATION THAT IS
SAMSUNG ELECTRONICS CO.'S PROPERTY.
DO NOT DISCLOSE TO OR DUPLICATE FOR OTHERS
EXCEPT AS AUTHORIZED BY SAMSUNG.



** Note *POCAFEB-10 Only (Remove in MP Model)

Current Setting (def.: default Option)		
CFG#	Low	High
CFG(5)	DMIX2	DMIX4 (def.)
CFG(6)	Reserved	DDR-II (def.)
CFG(7)	DT/Transportable	Mobile CPU (def.)
CFG(9)	PEG Reversal	Normal
CFG(16)	Dynamic ODT	Dynamic ODT
	Disabled	Enabled (def.)
CFG(18)	VCC 1.05V (def.)	VCC 1.5V
CFG(19)	DMI Lane Normal	DMI Lane Reversal
CFG(20)	SDVO or PCIE X1 Only(def.)	SDVO and PCIE X1 Simultaneously



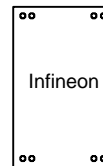
** Note
CFG(17:3) Internal Pull-up
CFG(20:18) Internal Pull-down

DRAW	ZHOU JUN	DATE	2/16/2006	TITLE	TORINO
CHECK	GUO LEI	DEV. STEP	MP	MAIN	945GM(5)
APPROVAL	KEVIN LEE	REV	1.0.0		
MODULE CODE		LAST EDIT	February 16, 2006 10:51:05 AM	PAGE	16 OF 50

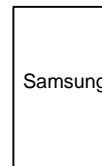
SAMSUNG
ELECTRONICS

PART NO.
BA41-00602A/3A

SAMSUNG PROPRIETARY
THIS DOCUMENT CONTAINS CONFIDENTIAL
PROPRIETARY INFORMATION THAT IS
SAMSUNG ELECTRONICS CO'S PROPERTY.
DO NOT DISCLOSE TO OR DUPLICATE FOR OTHERS
EXCEPT AS AUTHORIZED BY SAMSUNG.



with 8 dummy-ball
92-BALL Package

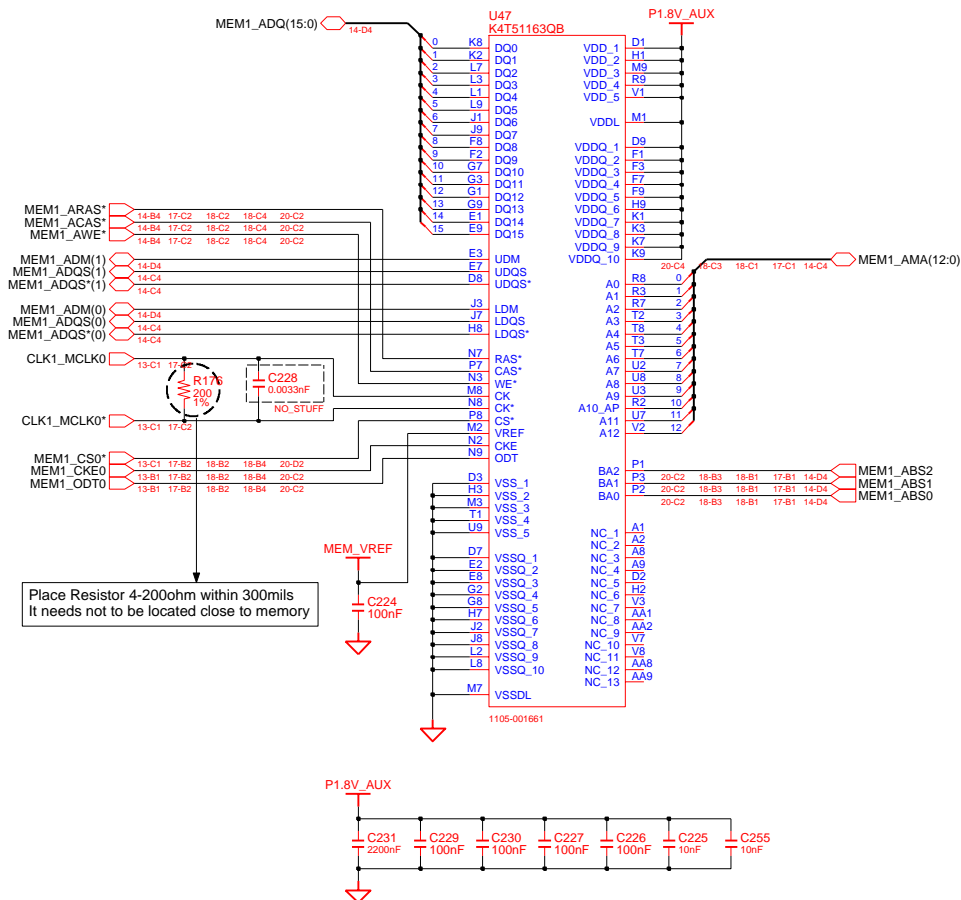


without dummy-ball
84-BALL Package

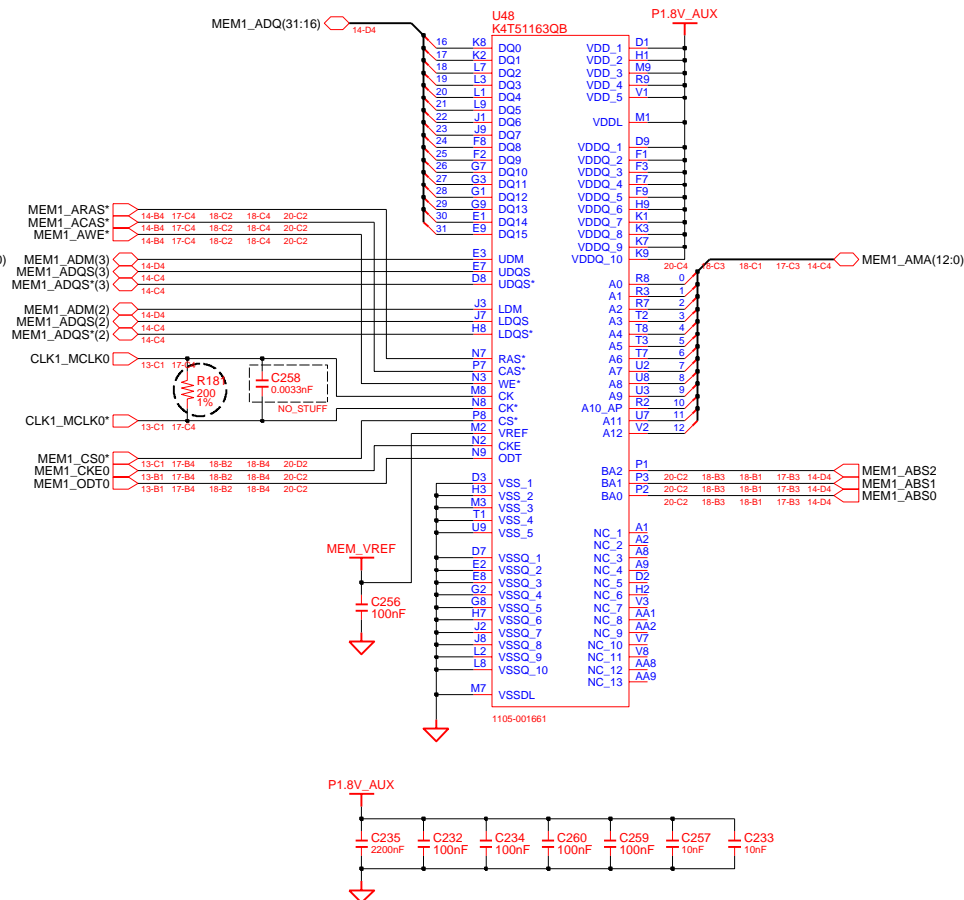
DDR2 ON BOARD MEMORY

- 1Gbit DDR2-667MHz x16 I/O
- SAMSUNG: K4T1G044QA-ZCE6
- 1Gbit DDR2-533MHz x16 I/O
- SAMSUNG: K4T1G044QA-ZCD5
- INFINEON: HYB18T1G160AF-3.7

D0

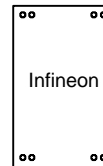


D1

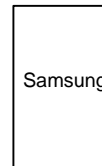


DRAW	ZHOU JUN	DATE	2/16/2006	TITLE	TORINO	SAMSUNG
CHECK	GUO LEI	DEV. STEP	MP	MAIN	MAIN	ELECTRONICS
APPROVAL	KEVIN LEE	REV	1.0.0	ON B'D MEMORY(1)	PART NO.	BA41-00602A/3A
MODULE CODE		LAST EDIT		February 16, 2006 10:51:05 AM	PAGE	17 OF 50

SAMSUNG PROPRIETARY
THIS DOCUMENT CONTAINS CONFIDENTIAL
PROPRIETARY INFORMATION THAT IS
SAMSUNG ELECTRONICS CO.'S PROPERTY.
DO NOT DISCLOSE TO OR DUPLICATE FOR OTHERS
EXCEPT AS AUTHORIZED BY SAMSUNG.



with 8 dummy-ball
92-BALL Package

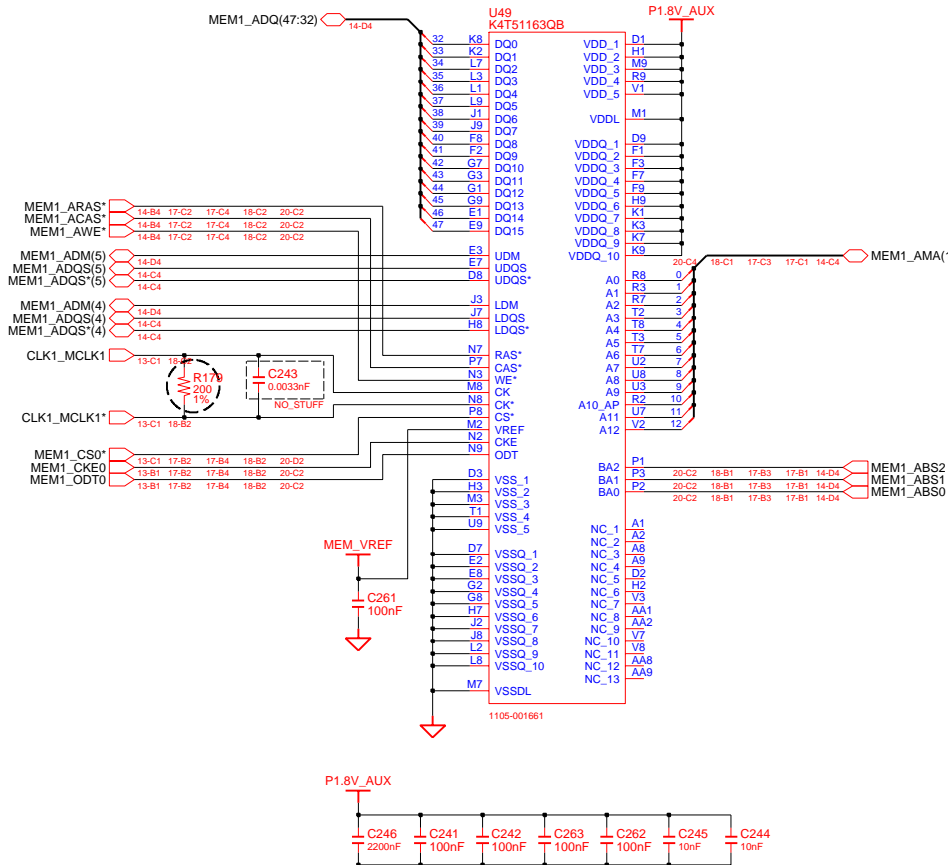


without dummy-ball
84-BALL Package

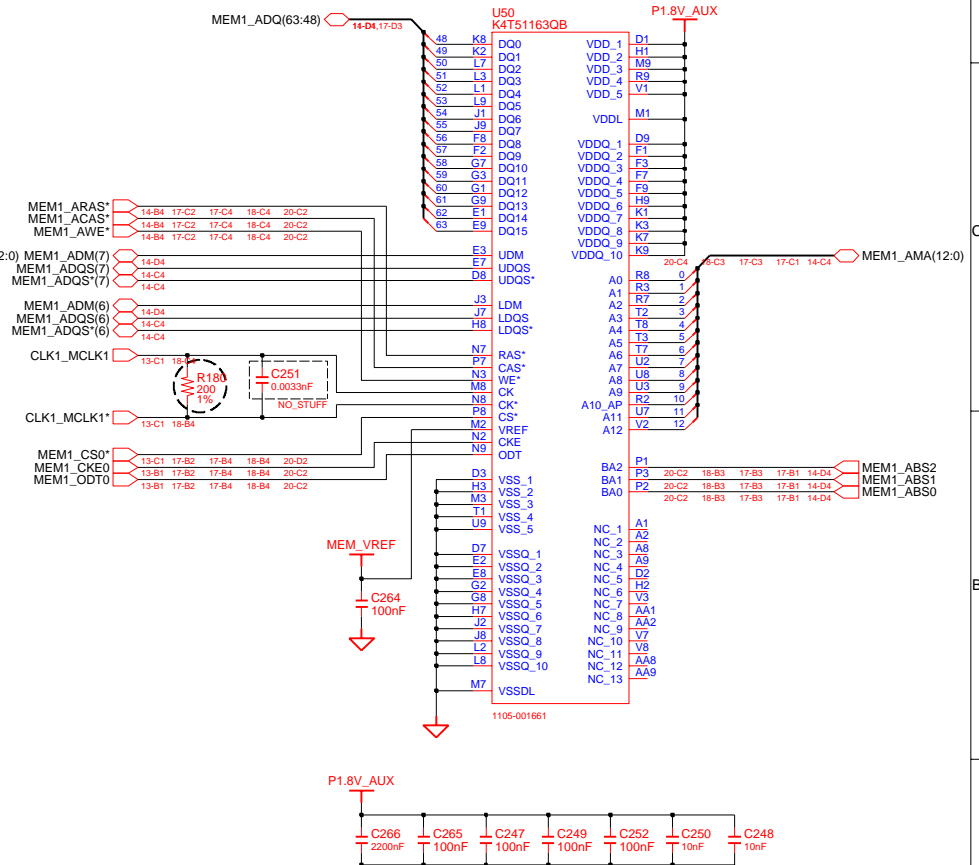
DDR2 ON BOARD MEMORY

- 1Gbit DDR2-667MHz x16 I/O
- SAMSUNG: K4T1G044QA-ZCE6
- 1Gbit DDR2-533MHz x16 I/O
- SAMSUNG: K4T1G044QA-ZCD5
- INFINEON: HYB18T1G160AF-3.7

D2



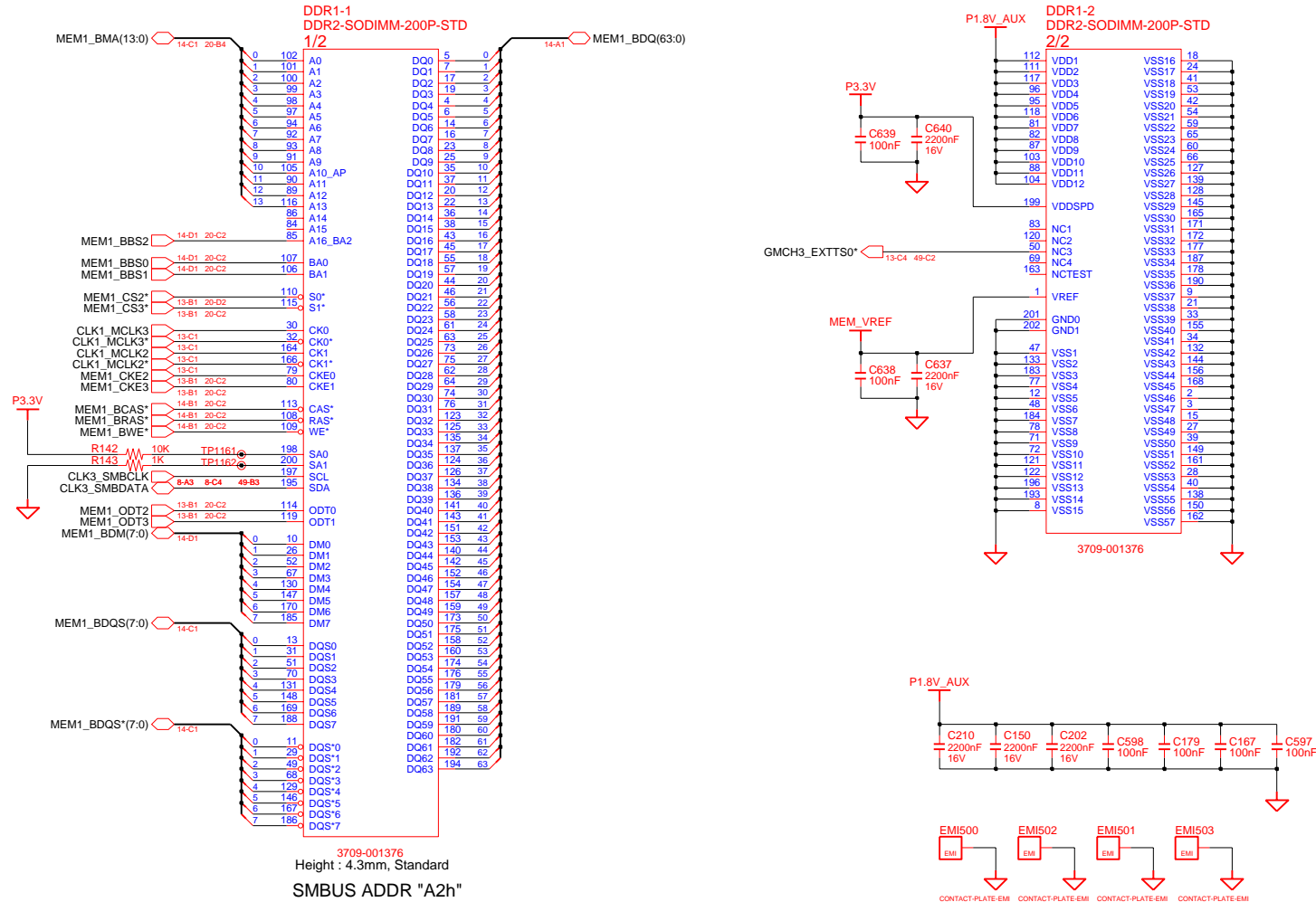
D3



DRAW	ZHOU JUN	DATE	2/16/2006	TITLE	TORINO
CHECK	GUO LEI	DEV. STEP	MP	MAIN	
APPROVAL	KEVIN LEE	REV	1.0.0	ON B'D MEMORY(2)	
MODULE CODE		LAST EDIT			
				February 16, 2006 10:51:05 AM	PAGE 18 OF 50

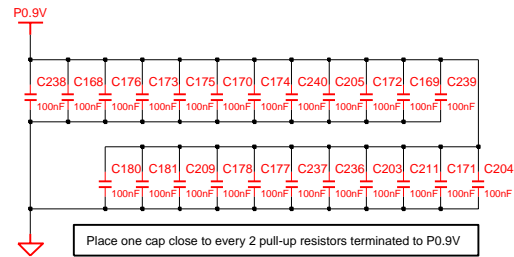
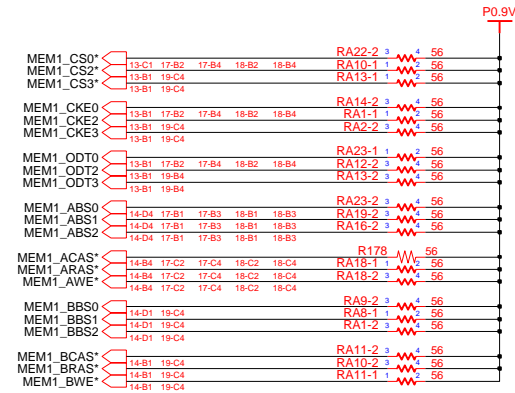
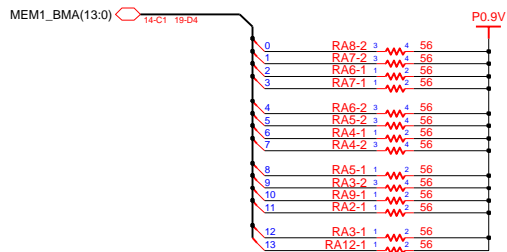
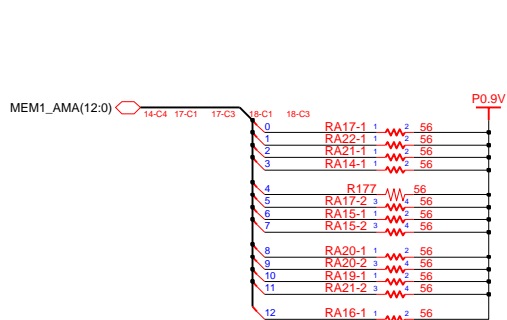
SAMSUNG
ELECTRONICS
PART NO.
BA41-00602A/3A

SAMSUNG PROPRIETARY
THIS DOCUMENT CONTAINS CONFIDENTIAL
PROPRIETARY INFORMATION THAT IS
SAMSUNG ELECTRONICS CO.'S PROPERTY.
DO NOT DISCLOSE TO OR DUPLICATE FOR OTHERS
EXCEPT AS AUTHORIZED BY SAMSUNG.



DRAW	ZHOU JUN	DATE	2/16/2006	TITLE	TORINO
CHECK	GUO LEI	DEV. STEP	MP		MAIN
APPROVAL	KEVIN LEE	REV	1.0.0	DDR2 SODIMM SOCKET	
MODULE CODE		LAST EDIT		February 16, 2006 10:51:05 AM	
PAGE 19 OF 50					

SAMSUNG PROPRIETARY
THIS DOCUMENT CONTAINS CONFIDENTIAL
PROPRIETARY INFORMATION THAT IS
SAMSUNG ELECTRONICS CO'S PROPERTY.
DO NOT DISCLOSE TO OR DUPLICATE FOR OTHERS
EXCEPT AS AUTHORIZED BY SAMSUNG.

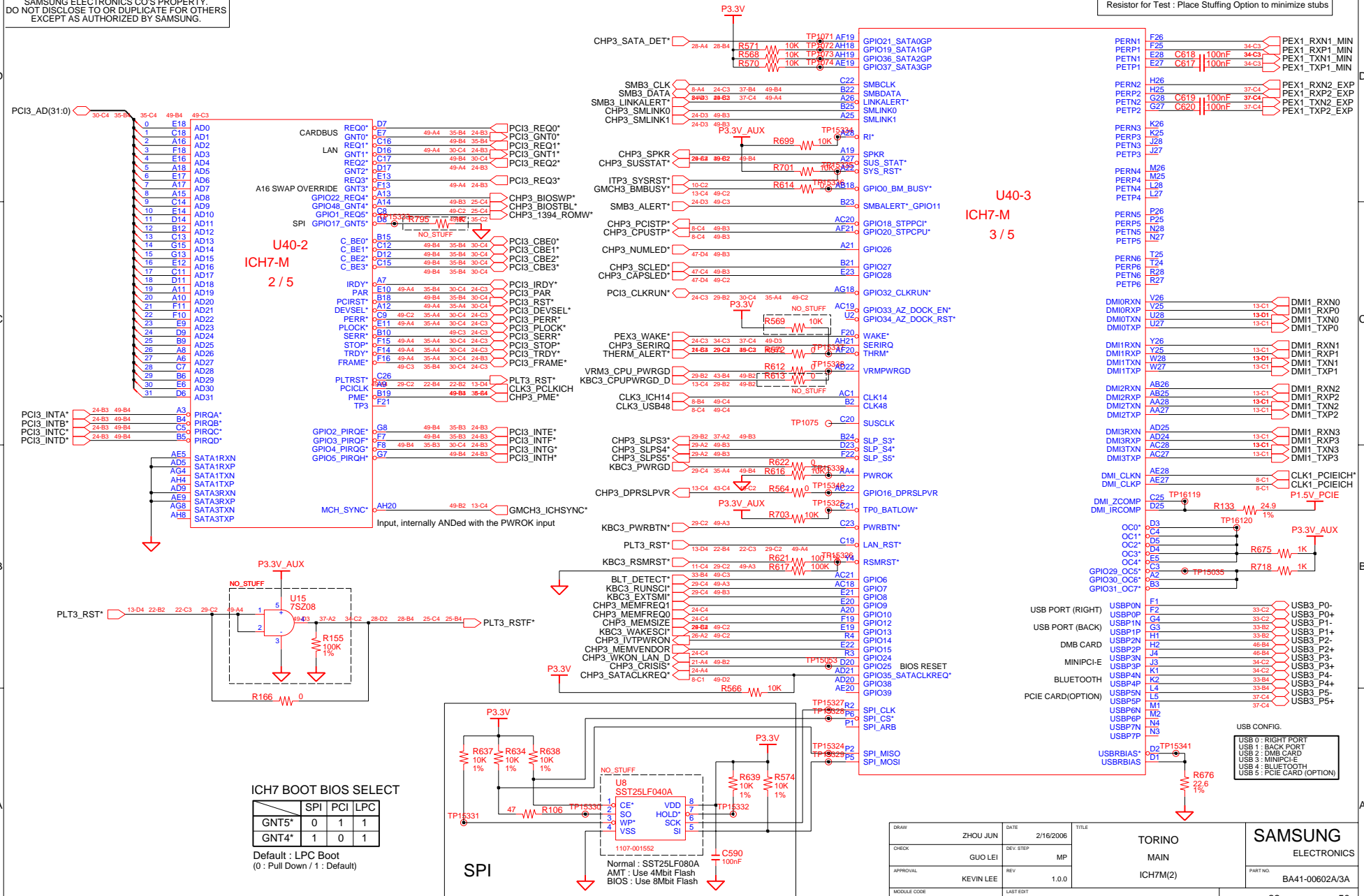


DRAW	ZHOU JUN	DATE	2/16/2006	TITLE	TORINO MAIN	SAMSUNG ELECTRONICS
CHECK	GUO LEI	DEV. STEP	MP			
APPROVAL	KEVIN LEE	REV	1.0.0	DDR2 TERMINATION		PART NO. BA41-00602A/3A
MODULE CODE		LAST EDIT	February 16, 2006 10:51:05 AM	PAGE	20	OF 50

A

SAMSUNG PROPRIETARY
THIS DOCUMENT CONTAINS CONFIDENTIAL
PROPRIETARY INFORMATION THAT IS
SAMSUNG ELECTRONICS CO.'S PROPERTY.
DO NOT DISCLOSE TO OR DUPLICATE FOR OTHERS
EXCEPT AS AUTHORIZED BY SAMSUNG.

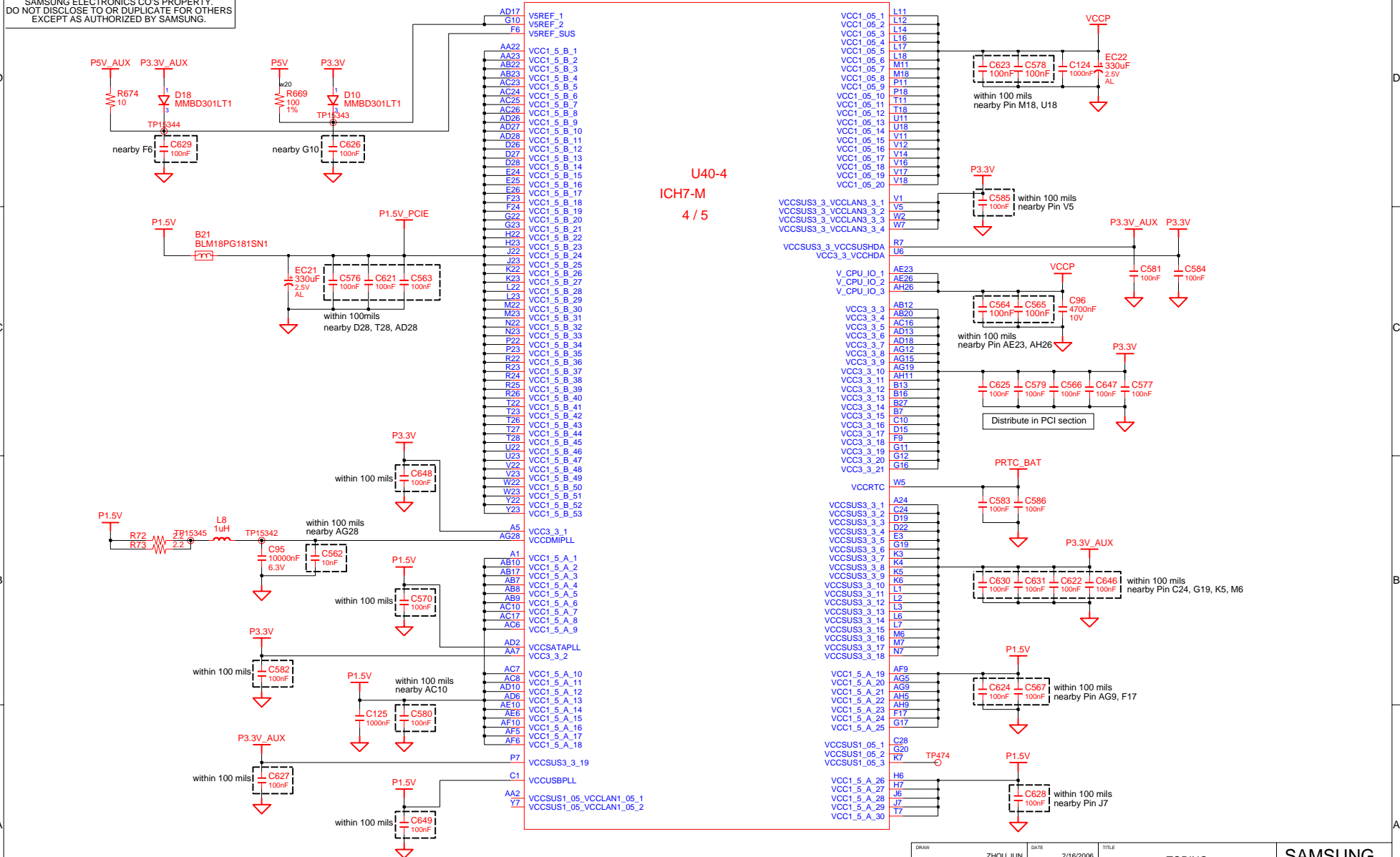
AC caps : PCIE need to be within 250mils of the driver
Resistor for Test : Place Stuffed Option to minimize stubs



DRAW	ZHOU JUN	DATE	2/16/2006	TITLE	TORINO
CHECK	GUO LEI	DEV. STEP	MP	MAIN	ICH7M(2)
APPROVAL	KEVIN LEE	REV	1.0.0		
MODULE CODE		LAST EDIT	February 16, 2006 10:51:05 AM	PAGE	22 OF 50

SAMSUNG
ELECTRONICS
PART NO.
BA41-00602A/3A

SAMSUNG PROPRIETARY
THIS DOCUMENT CONTAINS CONFIDENTIAL
PROPRIETARY INFORMATION THAT IS
SAMSUNG ELECTRONICS CO'S PROPERTY.
DO NOT DISCLOSE TO OR DUPLICATE FOR OTHERS
EXCEPT AS AUTHORIZED BY SAMSUNG.

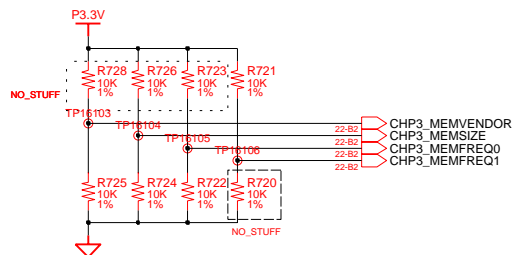
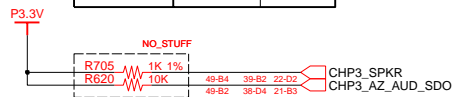


DRAW	ZHOU JUN	DATE	2/16/2006	TITLE	TORINO MAIN ICH7M(3)	SAMSUNG ELECTRONICS
CHECK	GUO LEI	DEV. STEP	MP			
APPROVAL	KEVIN LEE	REV	1.0.0			
MODULE CODE		LAST EDIT		February 16, 2006 10:51:05 AM		PAGE 23 OF 50

SAMSUNG PROPRIETARY
THIS DOCUMENT CONTAINS CONFIDENTIAL
PROPRIETARY INFORMATION THAT IS
SAMSUNG ELECTRONICS CO.'S PROPERTY.
DO NOT DISCLOSE TO OR DUPLICATE FOR OTHERS
EXCEPT AS AUTHORIZED BY SAMSUNG.

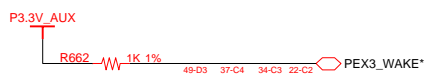
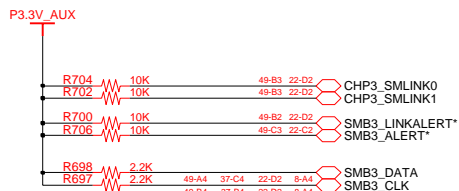
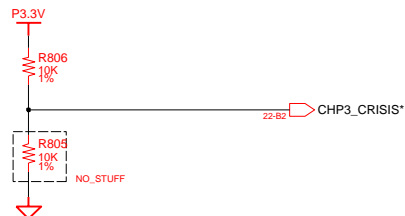
ICH7-M Options

	Function	Default
CHP3_SPKR	No Reboot	No Stuff
AC97_SDO	Safe Mode	TBD

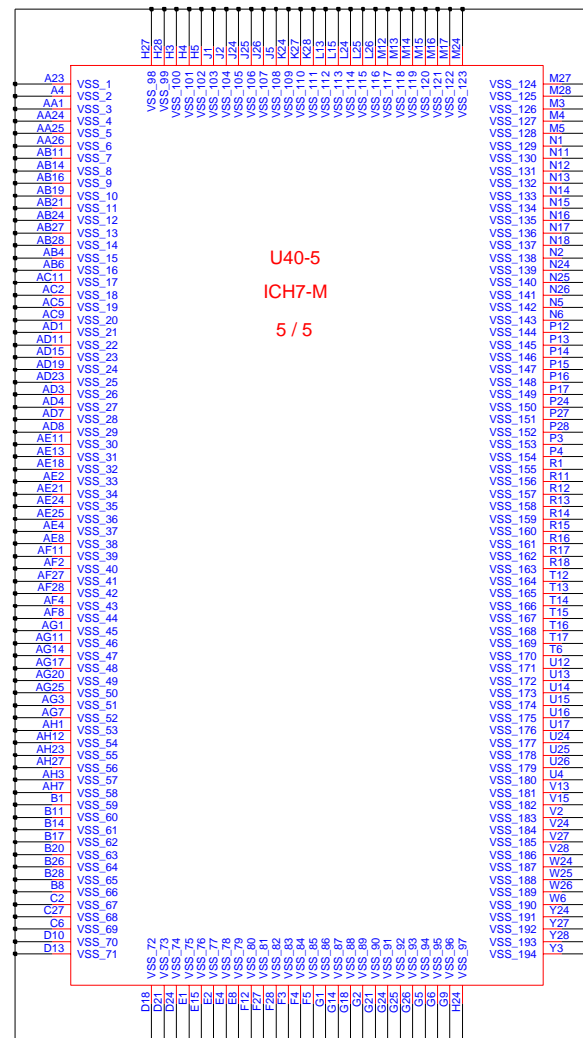
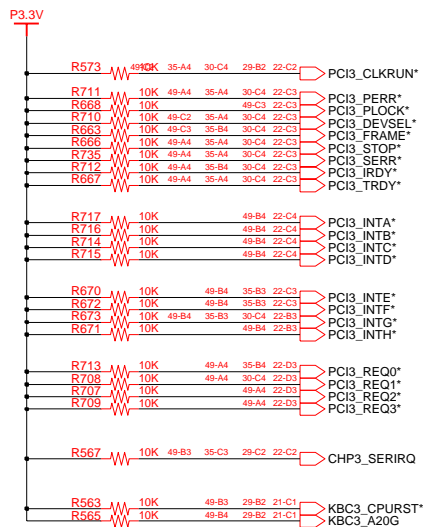


On-Board Memory Type Straps

CHP3_MEMVENDOR	
0	SAMSUNG
1	INFINEON
CHP3_MEMSIZE	
0	256MB
1	512MB
CHP3_MEMFREQ[0:1]	
00	400MHz
01	533MHz
10	667MHz
11	Disable On-Board Memory



Wake on PCI-E, OD, Pull-up to ALWAYS power



DRAW	ZHOU JUN	DATE	2/16/2006	TITLE	TORINO	SAMSUNG ELECTRONICS
CHECK	GUO LEI	DEV. STEP	MP	MAIN	MAIN	
APPROVAL	KEVIN LEE	REV	1.0.0	ICH7M(4)	ICH7M(4)	
MODULE CODE		LAST EDIT				
February 16, 2006 10:51:05 AM						PAGE 24 OF 50

A

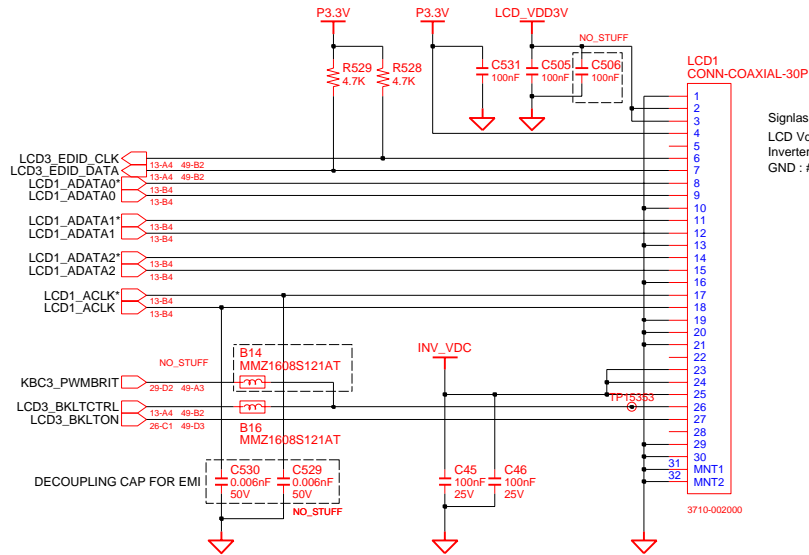


- A

d:/users/mentor/Torino/SR/SR_0215

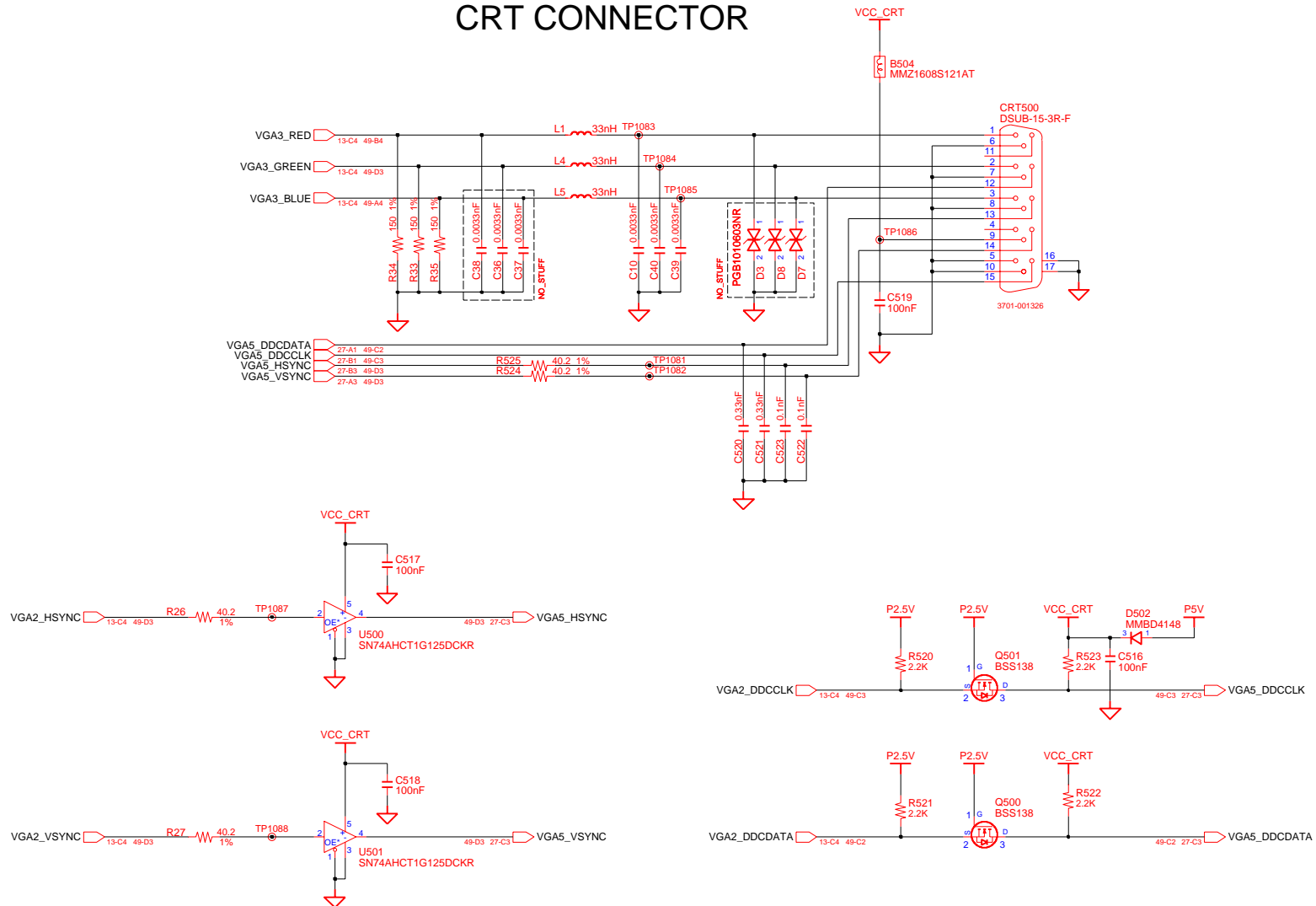
SAMSUNG PROPRIETARY
THIS DOCUMENT CONTAINS CONFIDENTIAL
PROPRIETARY INFORMATION THAT IS
SAMSUNG ELECTRONICS CO.'S PROPERTY.
DO NOT DISCLOSE TO OR DUPLICATE FOR OTHERS
EXCEPT AS AUTHORIZED BY SAMSUNG.

WXGA LCD CONNECTOR



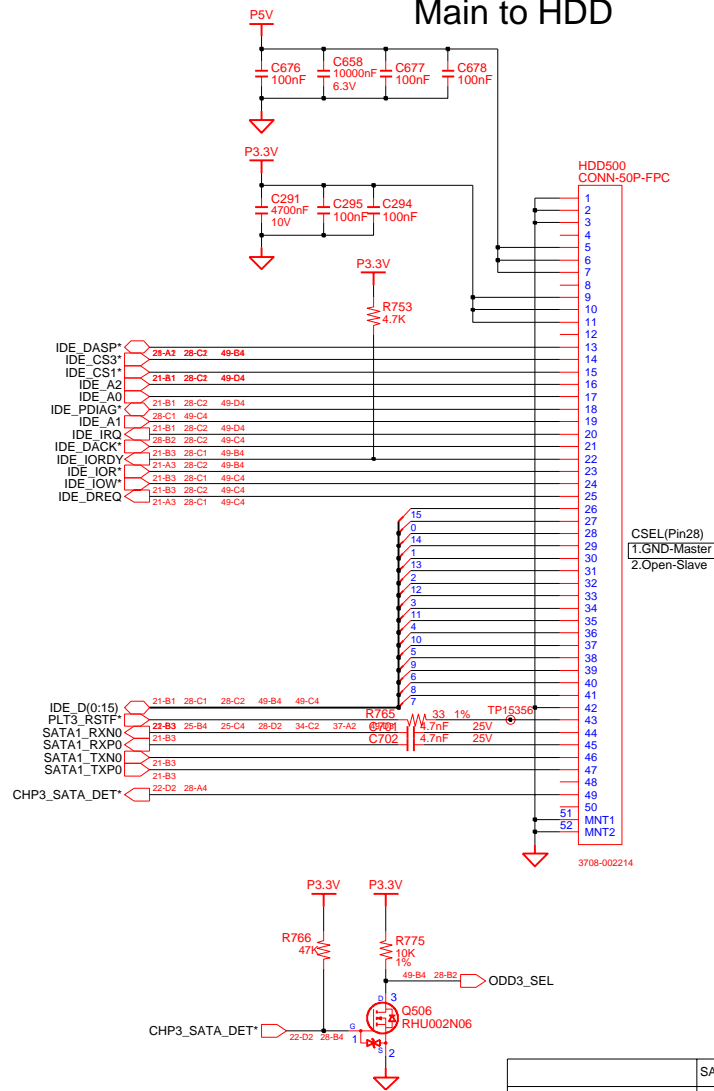
SAMSUNG PROPRIETARY
THIS DOCUMENT CONTAINS CONFIDENTIAL
PROPRIETARY INFORMATION THAT IS
SAMSUNG ELECTRONICS CO'S PROPERTY.
DO NOT DISCLOSE TO OR DUPLICATE FOR OTHERS
EXCEPT AS AUTHORIZED BY SAMSUNG.

CRT CONNECTOR

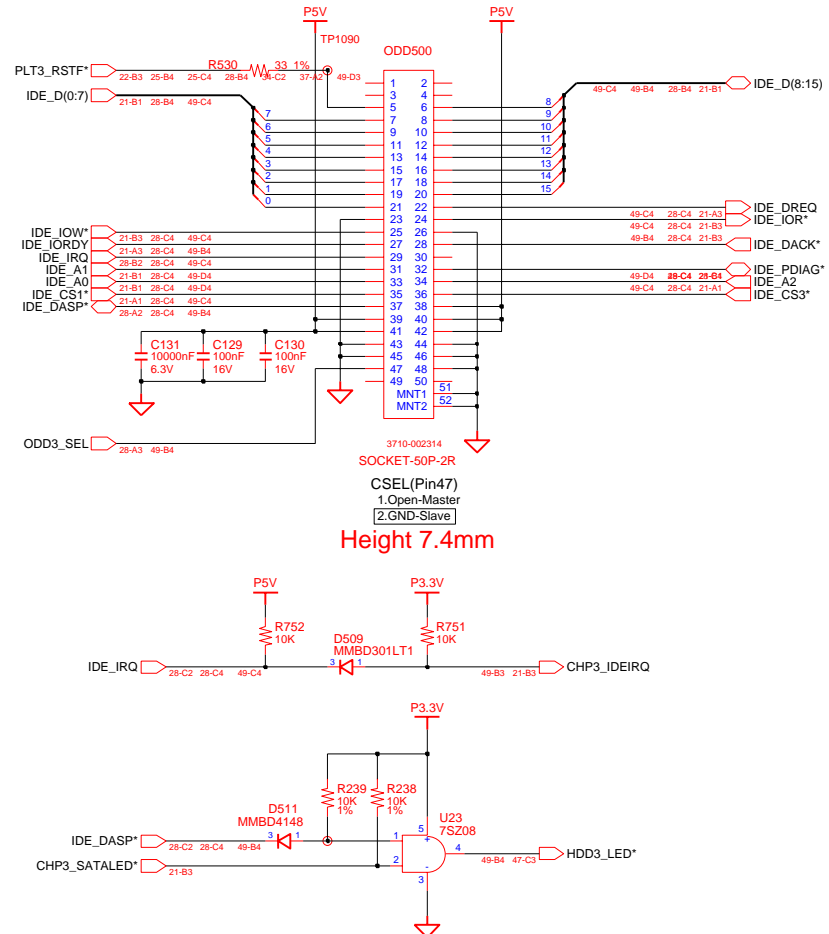


DRAW	ZHOU JUN	DATE	2/16/2006	TITLE	TORINO	SAMSUNG
CHECK	GUO LEI	DEV. STEP	MP	MAIN	ELECTRONICS	
APPROVAL	KEVIN LEE	REV	1.0.0	CRT		
MODULE CODE		LAST EDIT	February 16, 2006 10:51:05 AM	PAGE	27	OF 50

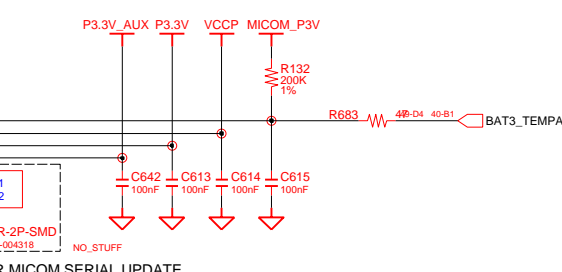
Main to HDD



Main to ODD



	SATA_DET*	ODD (IDE)	2nd HDD (IDE)
If SATA Detected	0	CSEL(#47) : Open (Master)	CSEL(#28) : GND (Master)
If SATA not Detected	1	CSEL(#47) : GND (Slave)	CSEL(#28) : Open (Slave)

[illegible]

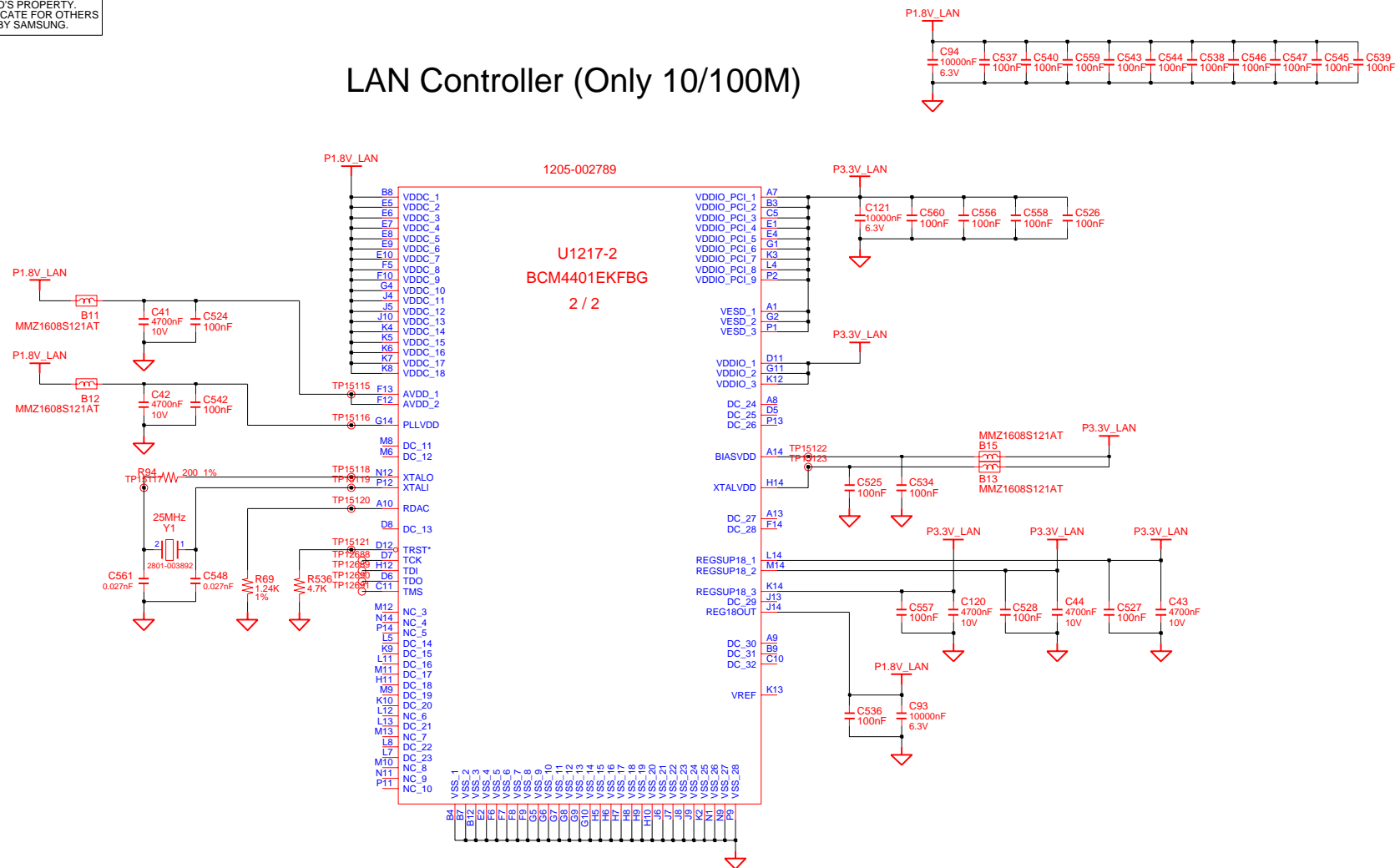
DRAW		ZHOU JUN		DATE	2/16/2006		TITLE		TORINO MAIN MICOM		SAMSUNG ELECTRONICS		
CHECK		GUO LEI		DEV STEP	MP								
APPROVAL		KEVIN LEE		REV	1.0.0								
								PART NO.		BA41-00602A/3A			
MODULE CODE				LAST EDIT				February 16, 2006 10:51:05 AM				PAGE 29 OF 50	

[illegible]

COM-22C-015(1996.6.5) REV. 3 d:\users\mentor\Torino\SR\SR_0215

SAMSUNG PROPRIETARY
THIS DOCUMENT CONTAINS CONFIDENTIAL
PROPRIETARY INFORMATION THAT IS
SAMSUNG ELECTRONICS CO'S PROPERTY.
DO NOT DISCLOSE TO OR DUPLICATE FOR OTHERS
EXCEPT AS AUTHORIZED BY SAMSUNG.

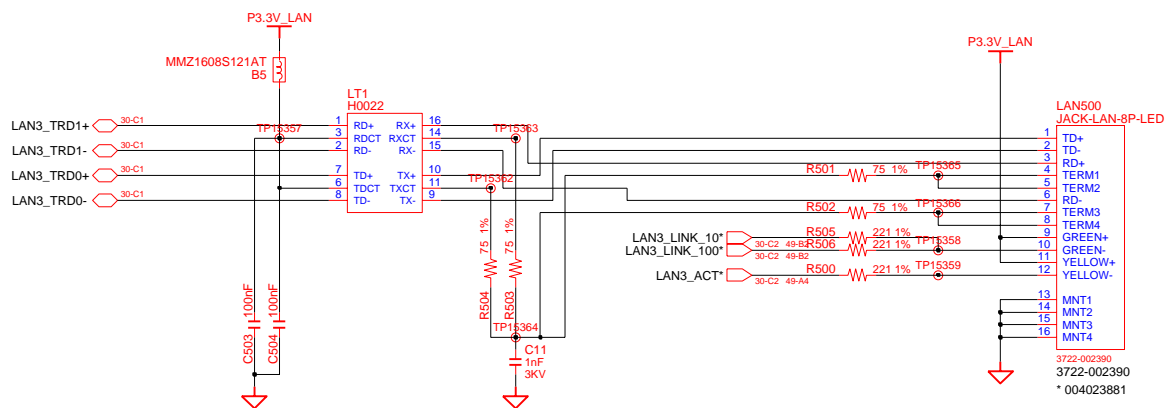
LAN Controller (Only 10/100M)



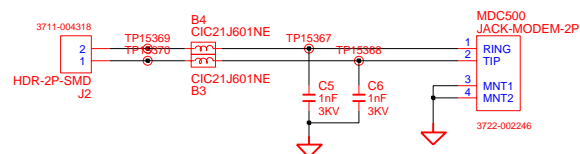
DRWN	ZHOU JUN	DATE	2/16/2006	TITLE	TORINO MAIN LOM(2)	SAMSUNG ELECTRONICS
CHECK	GUO LEI	DEV. STEP	MP			
APPROVAL	KEVIN LEE	REV	1.0.0			
MODULE CODE	LAST EDIT			February 16, 2006 10:51:05 AM	PAGE	31 OF 50

SAMSUNG PROPRIETARY
THIS DOCUMENT CONTAINS CONFIDENTIAL
PROPRIETARY INFORMATION THAT IS
SAMSUNG ELECTRONICS CO'S PROPERTY.
DO NOT DISCLOSE TO OR DUPLICATE FOR OTHERS
EXCEPT AS AUTHORIZED BY SAMSUNG.

LAN Connector

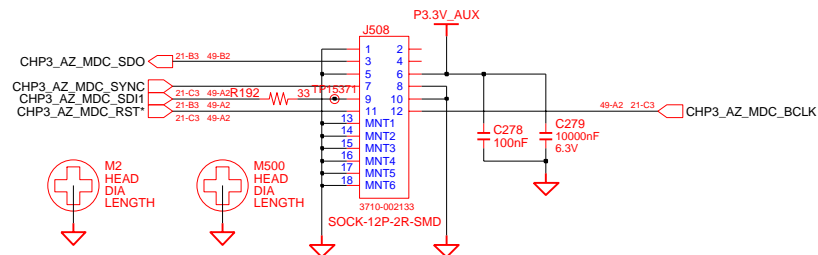


MODEM Connector



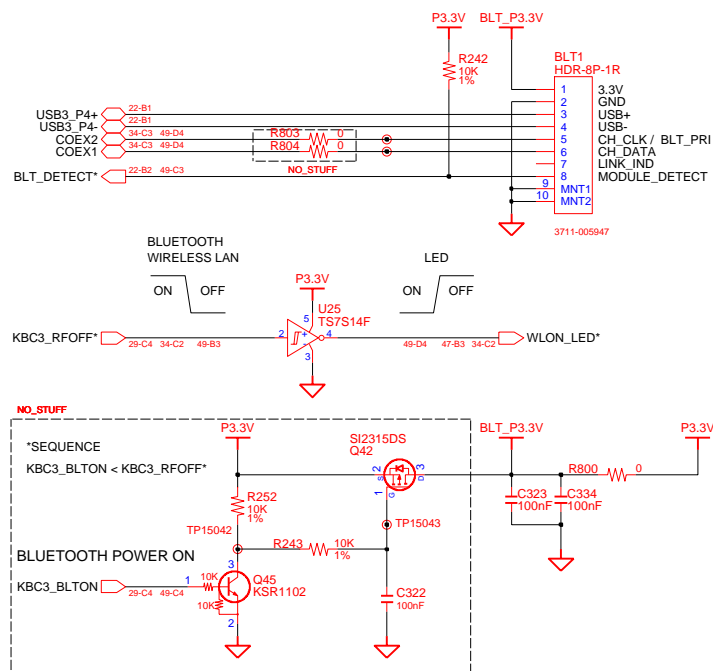
DRAWN	ZHOU JUN	DATE	2/16/2006	TITLE TORINO MAIN LAN & MODEM JACK	PART NO. BA41-00602A/3A	SAMSUNG	
CHECK	GUO LEI	DEV STEP	MP			ELECTRONICS	
APPROVAL	KEVIN LEE	REV	1.0.0				
MODULE CODE	LAST EDIT					February 16, 2006 10:51:05 AM	PAGE

MDC connector

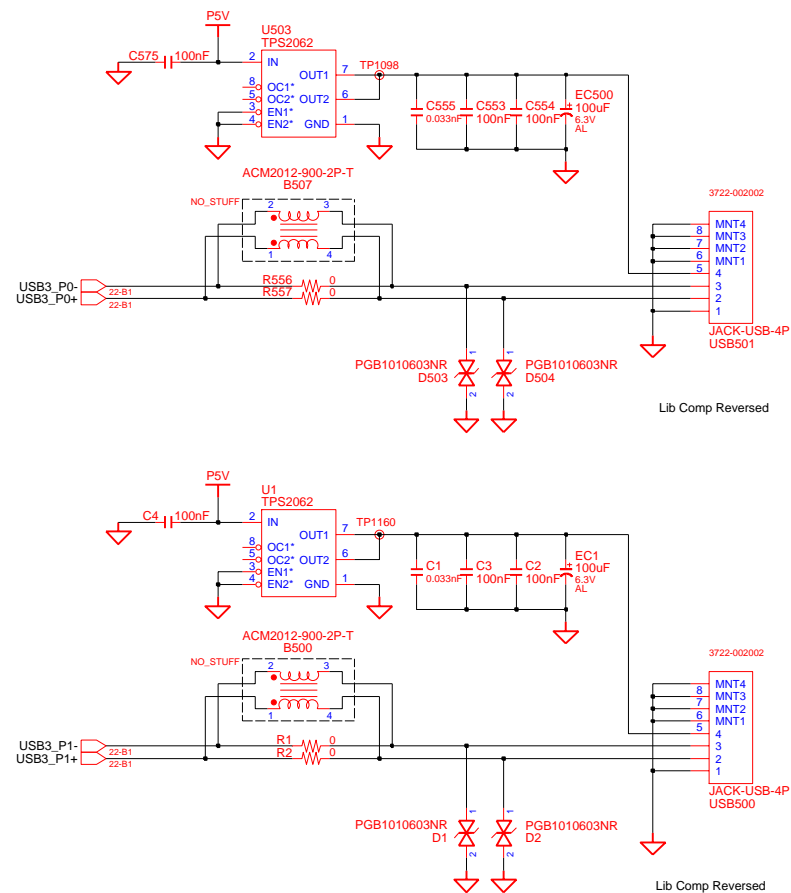


BLUETOOTH

Bluetooth 2.0 Standard

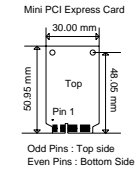
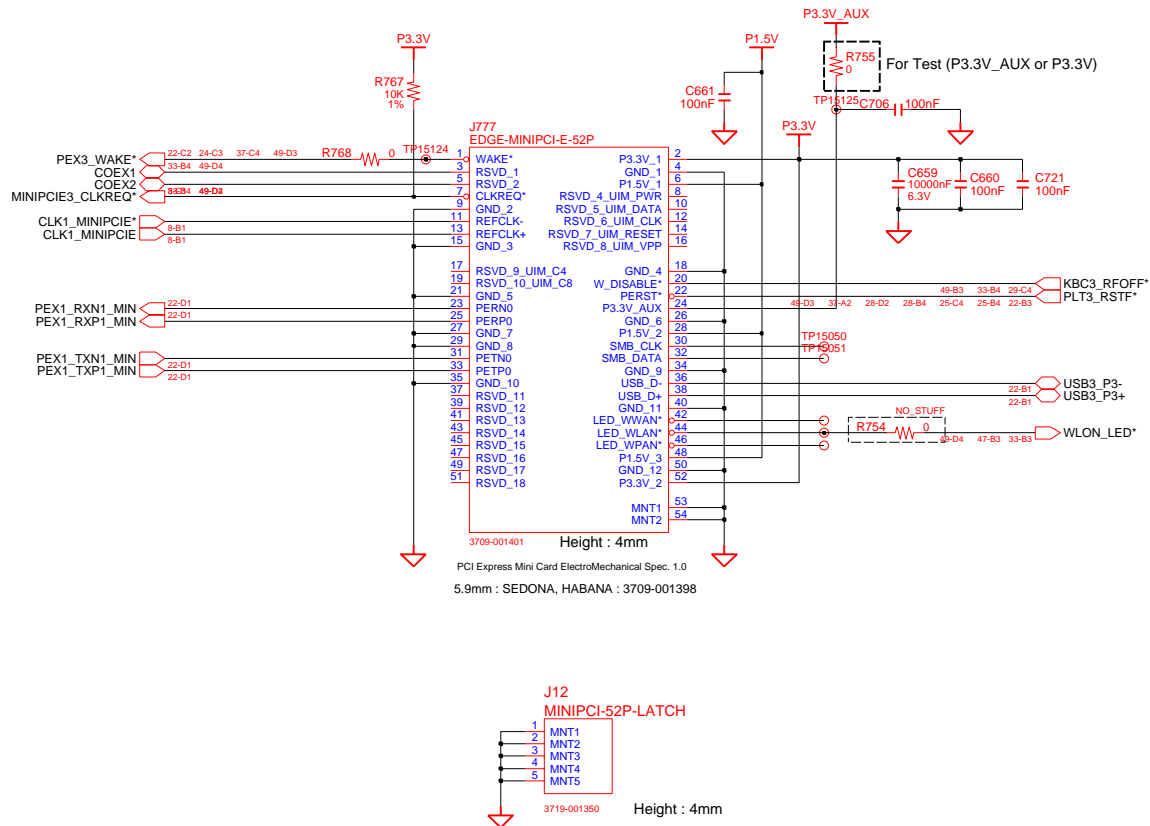


USB Port



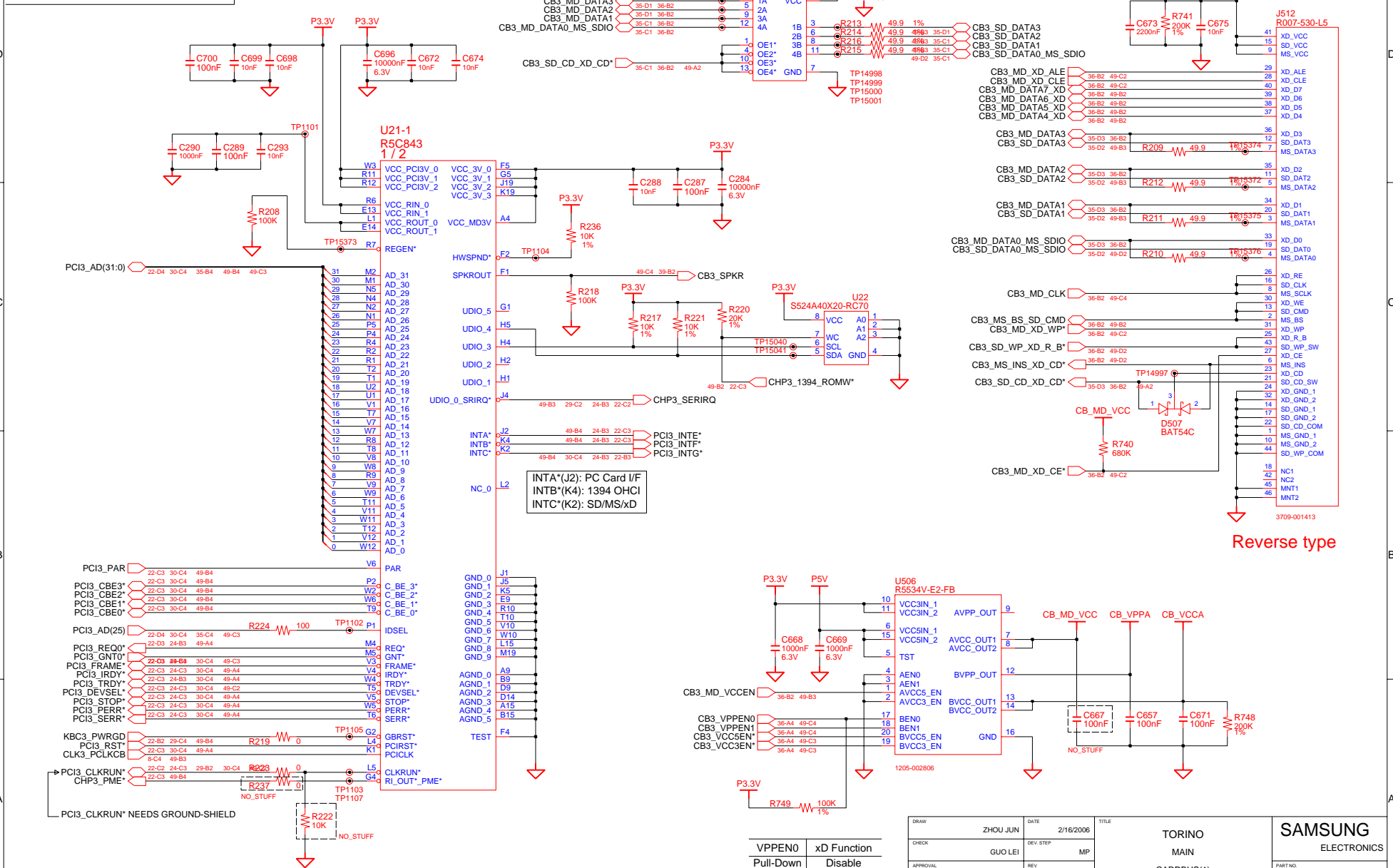
DRWN	ZHOU JUN	DATE	2/16/2006	TITLE		TORINO MAIN		SAMSUNG ELECTRONICS	
CHECK	GUO LIE	DEV. STEP	MP						
APPROVAL	KEVIN LEE	REV	1.0.0	USB,MDC & BLUETOOTH		PART NO.		BA41-00602A/3A	
MODULE CODE	LAST EDIT		February 16, 2006 10:51:05 AM						

Mini PCI-E Card



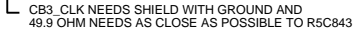
DRAW	ZHOU JUN	DATE	2/16/2006	TITLE	TORINO MAIN MINI CARD	SAMSUNG ELECTRONICS
CHECK	GUO LEI	DEV. STEP	MP			PART NO. BA41-00602A/3A
APPROVAL	KEVIN LEE	REV	1.0.0			
MODULE CODE		LAST EDIT	February 16, 2006 10:51:05 AM	PAGE	34	OF 50

SAMSUNG PROPRIETARY
THIS DOCUMENT CONTAINS CONFIDENTIAL
PROPRIETARY INFORMATION THAT IS
SAMSUNG ELECTRONICS CO.'S PROPERTY.
DO NOT DISCLOSE TO OR DUPLICATE FOR OTHERS
EXCEPT AS AUTHORIZED BY SAMSUNG.

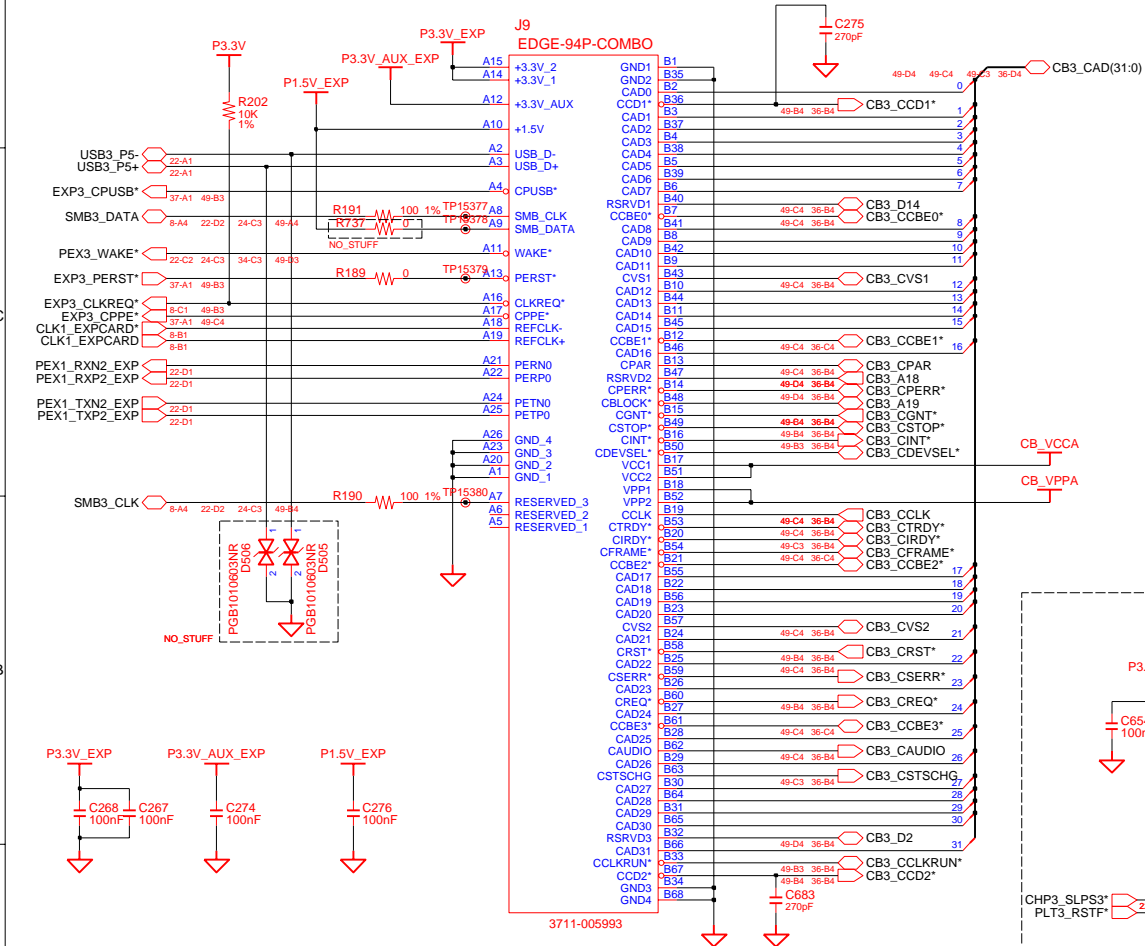


DRAW	ZHOU JUN	DATE	2/16/2006	TITLE	TORINO MAIN CARDBUS(1)	SAMSUNG ELECTRONICS
CHECK	GUO LEI	DEV. STEP	MP			PART NO. BA41-00602A/3A
APPROVAL	KEVIN LEE	REV	1.0.0			
MODULE CODE		LAST EDIT				
February 16, 2006 10:51:05 AM						PAGE 35 OF 50

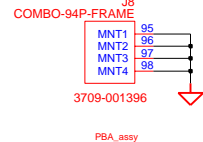
A

d:/users/mentor/Torino/SR/SR_0215

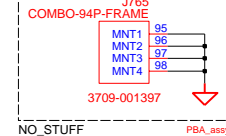
SAMSUNG PROPRIETARY
THIS DOCUMENT CONTAINS CONFIDENTIAL
PROPRIETARY INFORMATION THAT IS
SAMSUNG ELECTRONICS CO.'S PROPERTY.
DO NOT DISCLOSE TO OR DUPLICATE FOR OTHERS
EXCEPT AS AUTHORIZED BY SAMSUNG.



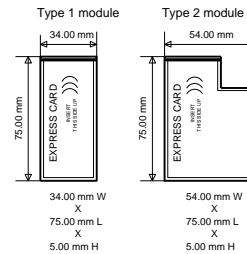
PCMCIA FRAME



PCI-EXP CARD FRAME



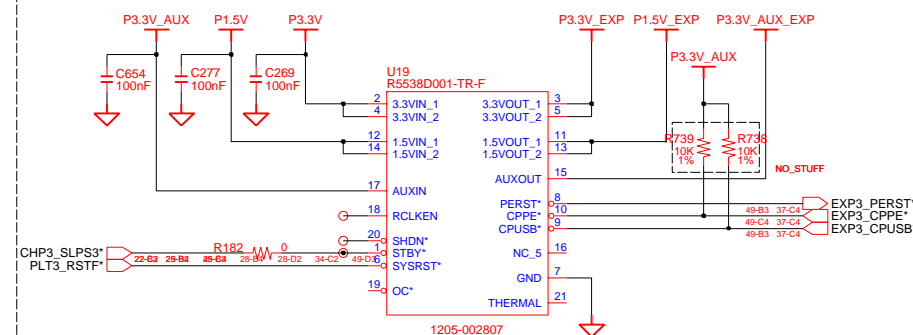
EXPRESS CARD



TBD

NO_STUFF

FOR PCI EXPRESS POWER



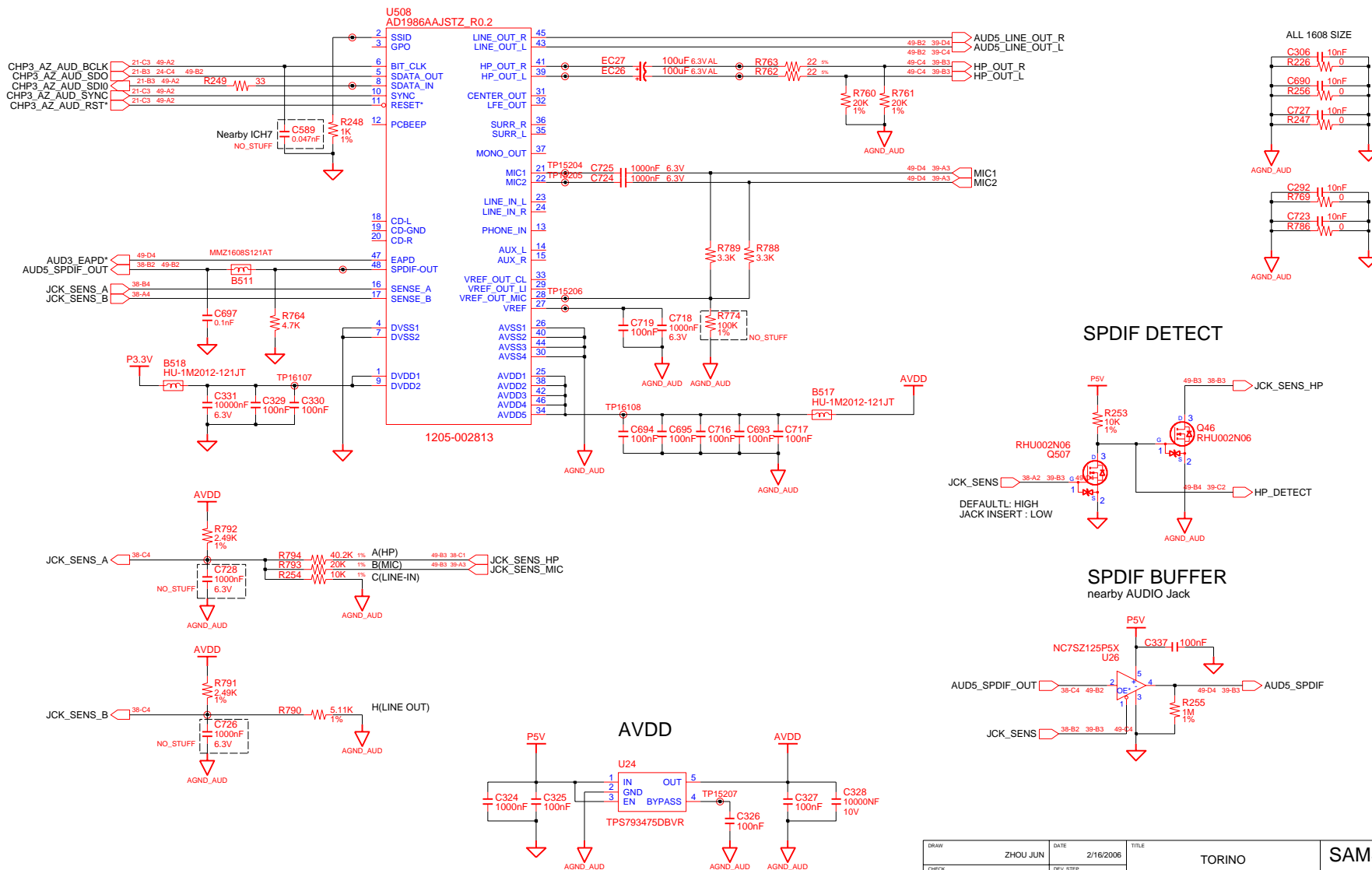
DRAW	ZHOU JUN	DATE	2/16/2006	TITLE	TORINO
CHECK	GUO LEI	DEV. STEP	MP		MAIN
APPROVAL	KEVIN LEE	REV	1.0.0		PCMCIA
MODULE CODE		LAST EDIT			
				February 16, 2006 10:51:05 AM	PAGE 37 OF 50

SAMSUNG
ELECTRONICS
PART NO.
BA41-00602A/3A

SAMSUNG PROPRIETARY
THIS DOCUMENT CONTAINS CONFIDENTIAL
PROPRIETARY INFORMATION THAT IS
SAMSUNG ELECTRONICS CO'S PROPERTY.
DO NOT DISCLOSE TO OR DUPLICATE FOR OTHERS
EXCEPT AS AUTHORIZED BY SAMSUNG.

AUDIO CODEC

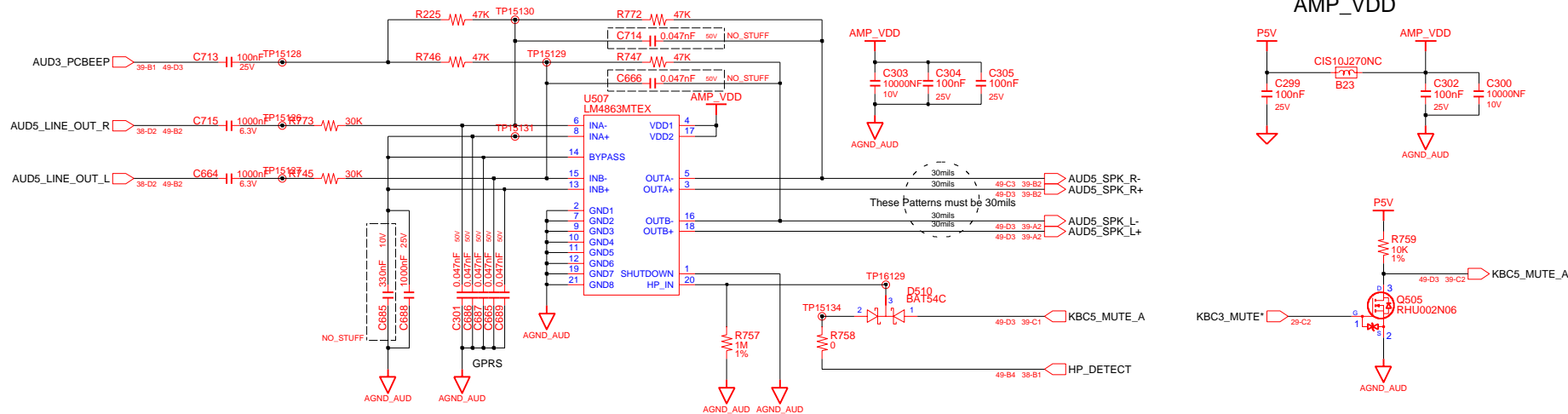
1.AGND_AUD	Audio Ground
2.GND	Digital Ground



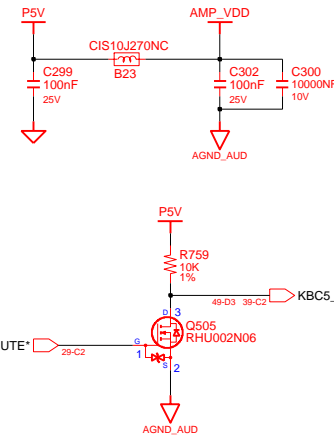
DRAW	ZHOU JUN	DATE	2/16/2006	TITLE	TORINO MAIN AUDIO CODEC	SAMSUNG ELECTRONICS
CHECK	GUO LEI	DEV. STEP	MP			PART NO. BA41-00602A/3A
APPROVAL	KEVIN LEE	REV	1.0.0			
MODULE CODE		LAST EDIT				
				February 16, 2006 10:51:05 AM	PAGE	38 OF 50

SAMSUNG PROPRIETARY
THIS DOCUMENT CONTAINS CONFIDENTIAL
PROPRIETARY INFORMATION THAT IS
SAMSUNG ELECTRONICS CO.'S PROPERTY.
DO NOT DISCLOSE TO OR DUPLICATE FOR OTHERS
EXCEPT AS AUTHORIZED BY SAMSUNG.

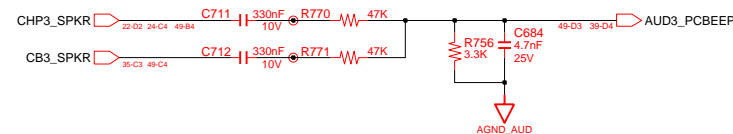
AUDIO AMP



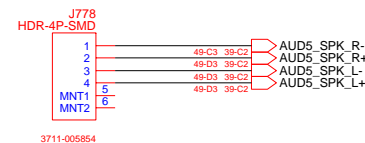
AMP_VDD



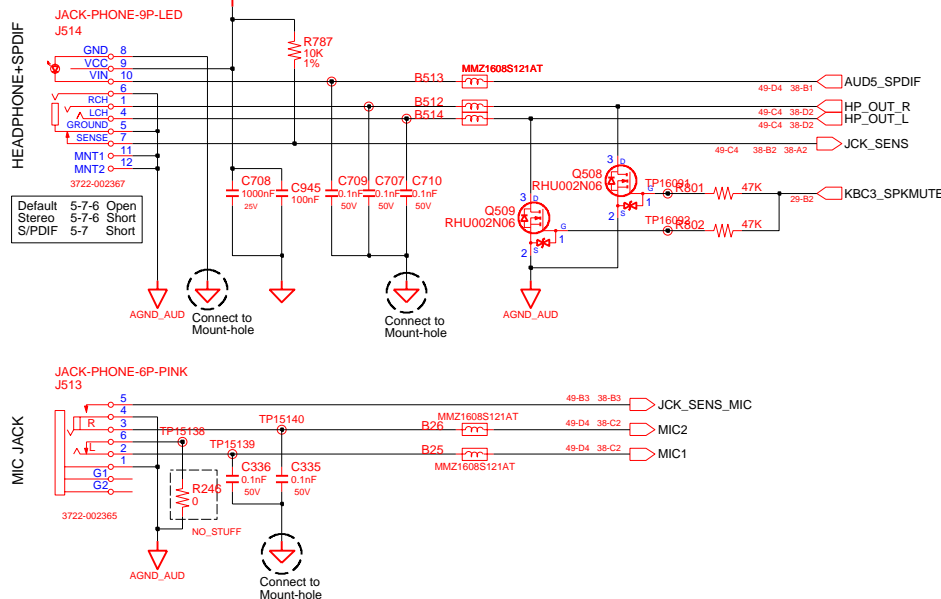
PC BEEP SOUND



INTERNAL STEREO SPEAKERS

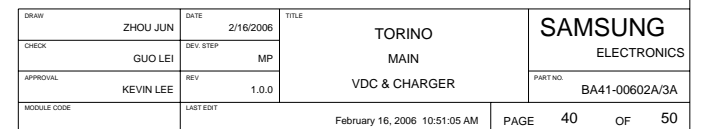


Should be written sign "LEFT", "RIGHT" on the PCB



DRAW	ZHOU JUN	DATE	2/16/2006	TITLE	TORINO MAIN AUDIO AMPLIFIER	SAMSUNG ELECTRONICS
CHECK	GUO LEI	DEV. STEP	MP			PART NO. BA41-00602A/3A
APPROVAL	KEVIN LEE	REV	1.0.0			
MODULE CODE		LAST EDIT				
				February 16, 2006 10:51:05 AM	PAGE	39 OF 50

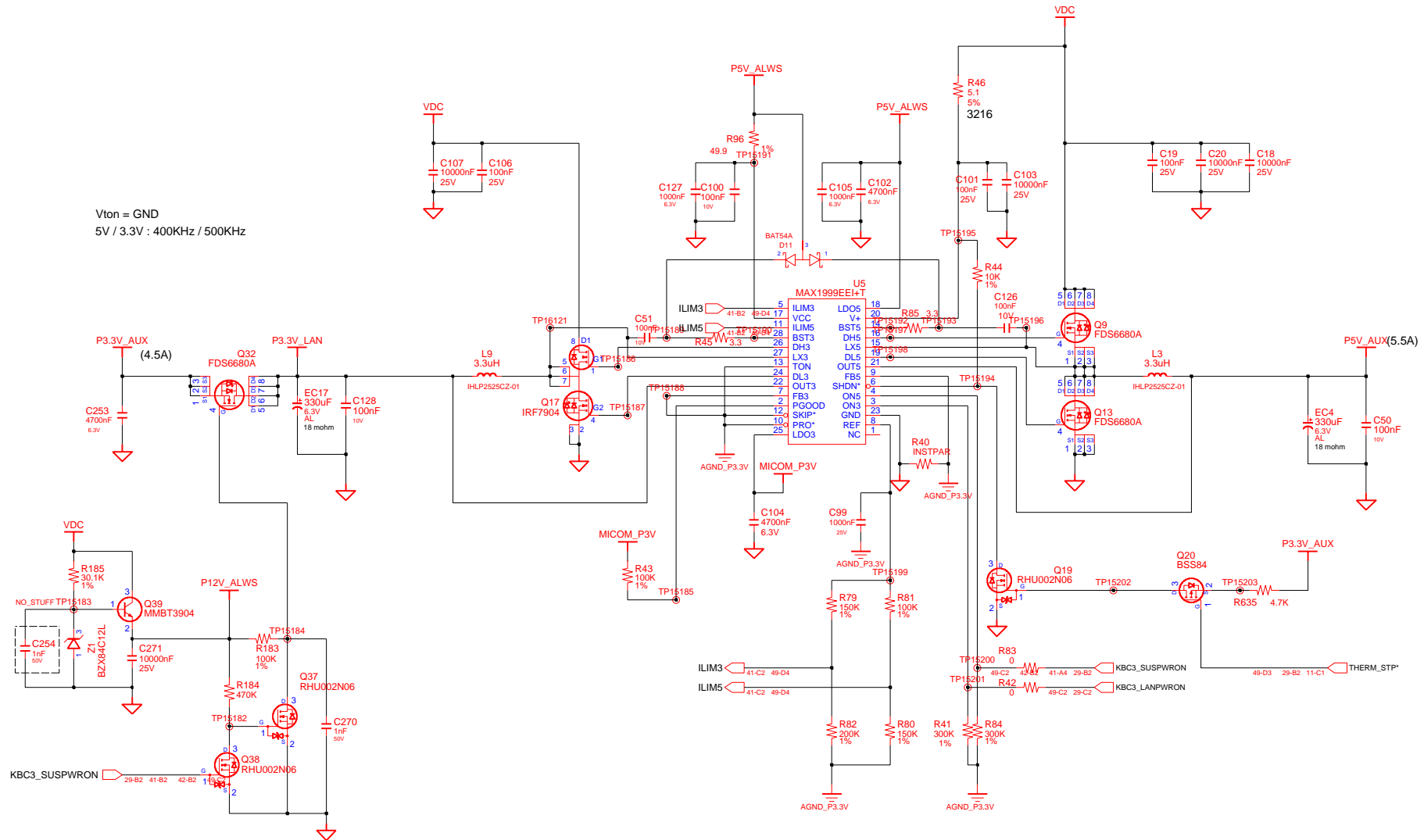
CHARGER & POWER MANAGEMENT



SAMSUNG PROPRIETARY
THIS DOCUMENT CONTAINS CONFIDENTIAL
PROPRIETARY INFORMATION THAT IS
SAMSUNG ELECTRONICS CO'S PROPERTY.
DO NOT DISCLOSE TO OR DUPLICATE FOR OTHERS
EXCEPT AS AUTHORIZED BY SAMSUNG.

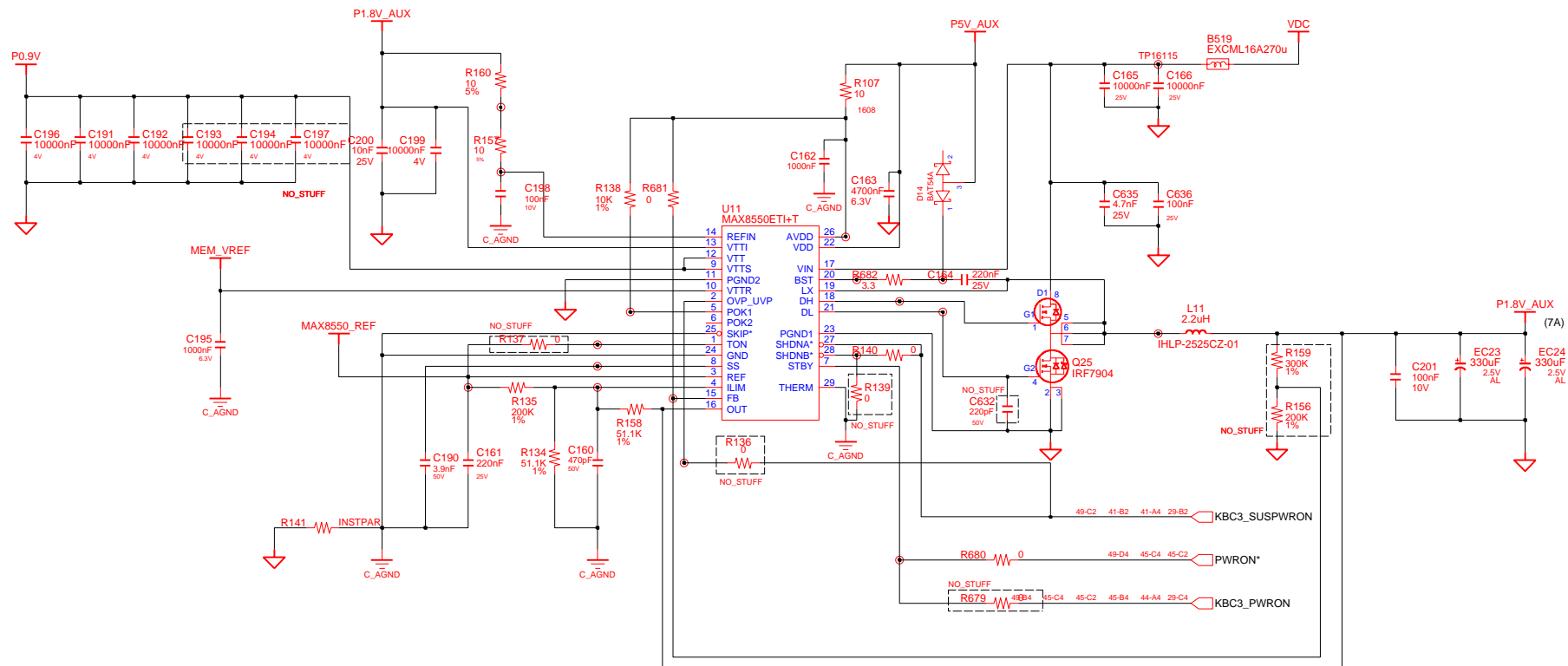
P5V_AUX & P3.3V_LAN(AUX)

V_{ton} = GND
5V / 3.3V : 400KHz / 500KHz



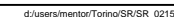
DRAW	ZHOU JUN	DATE	2/16/2006	TITLE	TORINO	SAMSUNG
CHECK	GUO LEI	DEV. STEP	MP	MAIN	MAIN	ELECTRONICS
APPROVAL	KEVIN LEE	REV	1.0.0	P5V_AUX & P3.3V_LAN(AUX)	PART NO.	BA41-00602A/3A
MODULE CODE		LAST EDIT		February 16, 2006 10:51:05 AM	PAGE	41 OF 50

DDR2 POWER

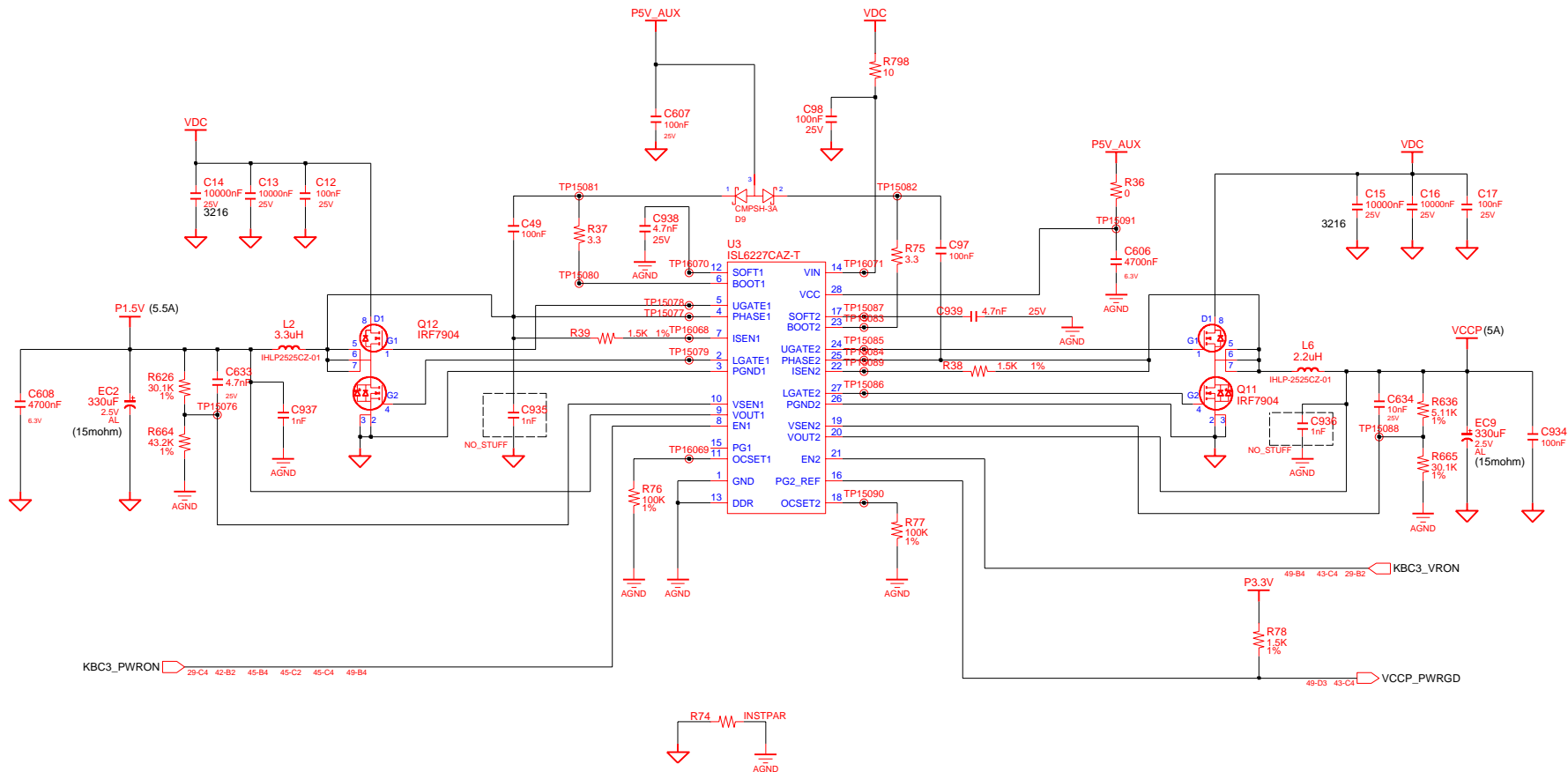


DRAW	ZHOU JUN	DATE	2/16/2006	TITLE	TORINO MAIN	SAMSUNG ELECTRONICS
CHECK	GUO LEI	DEV. STEP	MP			PART NO. BA41-00602A/3A
APPROVAL	KEVIN LEE	REV	1.0.0		DDR2 POWER	
MODULE CODE		LAST EDIT				
				February 16, 2006 10:51:05 AM	PAGE	42 OF 50

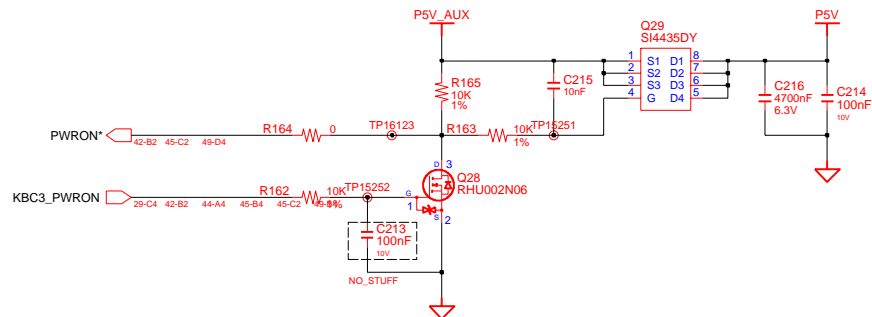
CPU VRM [SEMTECH]



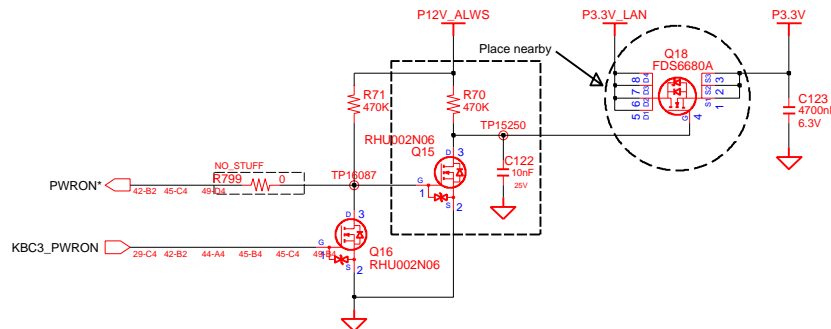
P1.5V & VCCP



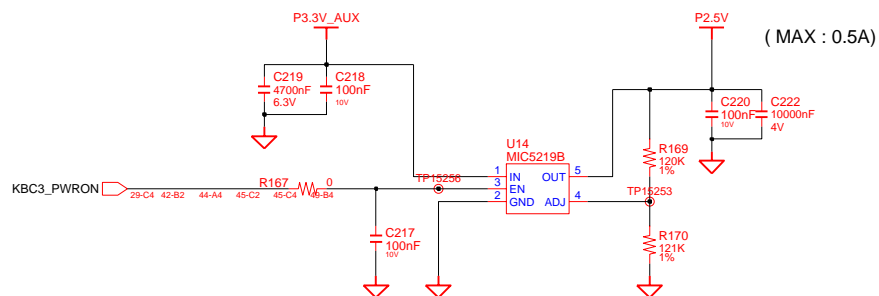
Switched Power On (P5V)



Switched Power On (P3.3V)



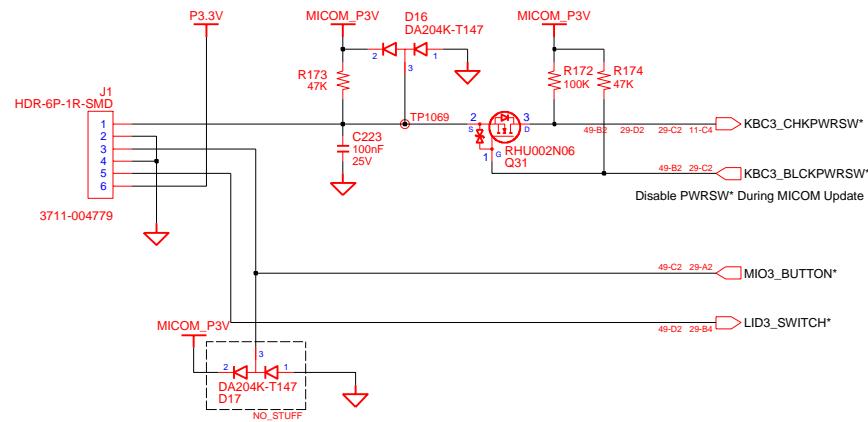
Switched Power On (P2.5V)



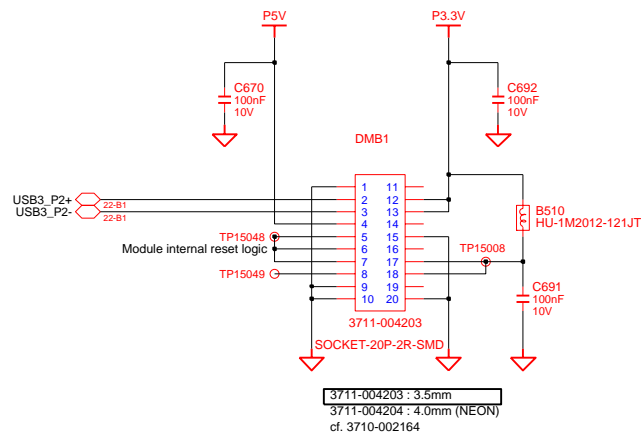
DRAW	ZHOU JUN	DATE	2/16/2006	TITLE	TORINO MAIN SWITCHED POWER	SAMSUNG ELECTRONICS
CHECK	GUO LEI	DEV. STEP	MP			PART NO. BA41-00602A/3A
APPROVAL	KEVIN LEE	REV	1.0.0			
MODULE CODE		LAST EDIT	February 16, 2006 10:51:05 AM	PAGE	45	OF 50

SAMSUNG PROPRIETARY
THIS DOCUMENT CONTAINS CONFIDENTIAL
PROPRIETARY INFORMATION THAT IS
SAMSUNG ELECTRONICS CO.'S PROPERTY.
DO NOT DISCLOSE TO OR DUPLICATE FOR OTHERS
EXCEPT AS AUTHORIZED BY SAMSUNG.

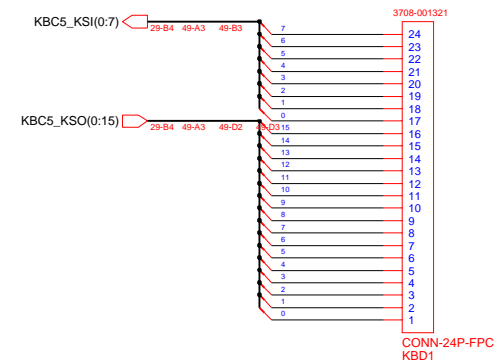
Power Switch Connector



OPTION: DMB INTERFACE

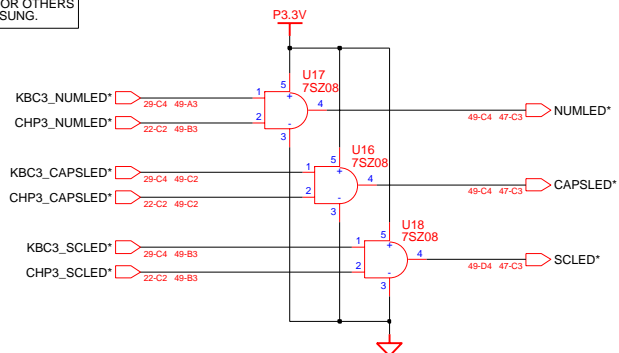


KEYBOARD

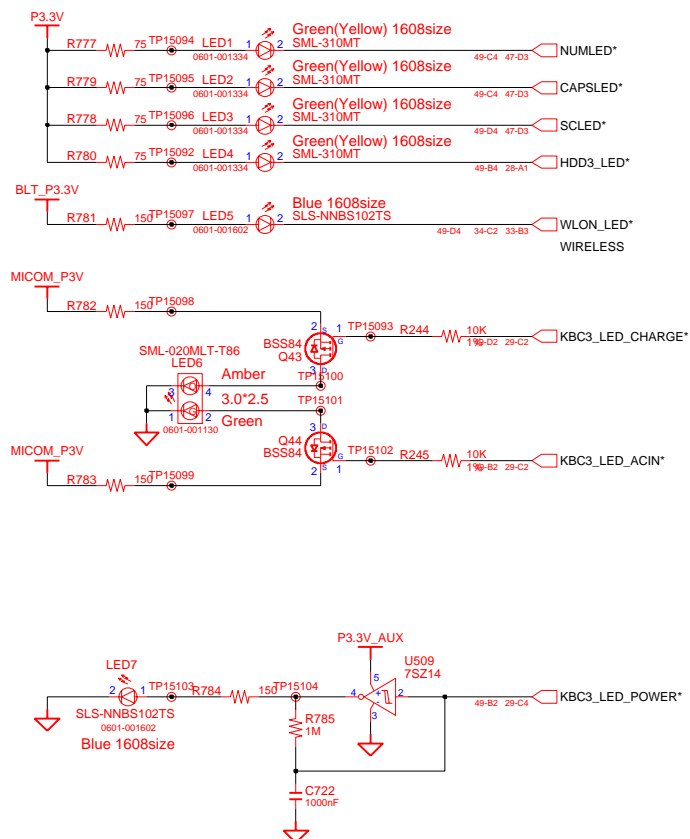


DRAW	ZHOU JUN	DATE	2/16/2006	TITLE	TORINO MAIN	SAMSUNG ELECTRONICS
CHECK	GUO LEI	DEV. STEP	MP			
APPROVAL	KEVIN LEE	REV	1.0.0	MICOM RESET & POWER S/W		PART NO. BA41-00602A/3A
MODULE CODE		LAST EDIT		February 16, 2006 10:51:05 AM	PAGE 46 OF 50	

SAMSUNG PROPRIETARY
THIS DOCUMENT CONTAINS CONFIDENTIAL
PROPRIETARY INFORMATION THAT IS
SAMSUNG ELECTRONICS CO.'S PROPERTY.
DO NOT DISCLOSE TO OR DUPLICATE FOR OTHERS
EXCEPT AS AUTHORIZED BY SAMSUNG.



LEDS



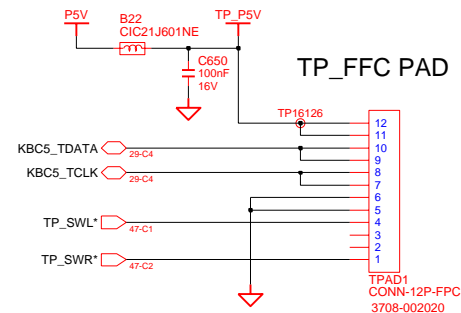
* 1608 Size LEDs

0601-001334	Green	C Grade
0601-001602	Blue	C Grade
0601-001784	Yellow	B Grade

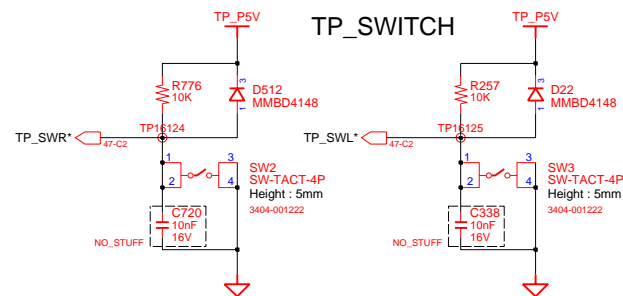
* 3216 Size LEDs

0601-000189	Green	3.2*1.6*1.1
0601-001737	Blue	3.0*1.5*1.4
0601-001130	Amber,Green	3.0*2.5

TOUCH PAD



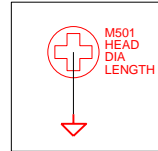
TP_SWITCH



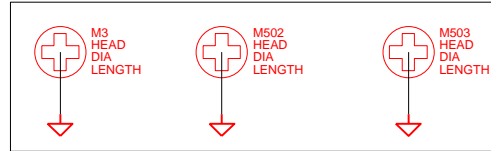
DRAW	ZHOU JUN	DATE	2/16/2006	TITLE	TORINO	SAMSUNG ELECTRONICS
CHECK	GUO LEI	DEV. STEP	MP	MAIN	MAIN	
APPROVAL	KEVIN LEE	REV	1.0.0	SUB B'D & LED	PART NO.	
MODULE CODE		LAST EDIT	February 16, 2006 10:51:05 AM	PAGE	47 OF 50	

SAMSUNG PROPRIETARY
THIS DOCUMENT CONTAINS CONFIDENTIAL
PROPRIETARY INFORMATION THAT IS
SAMSUNG ELECTRONICS CO.'S PROPERTY.
DO NOT DISCLOSE TO OR DUPLICATE FOR OTHERS
EXCEPT AS AUTHORIZED BY SAMSUNG.

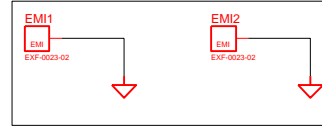
BLT-NUT



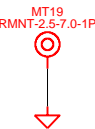
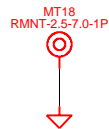
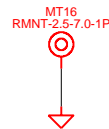
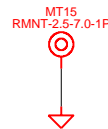
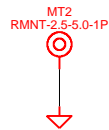
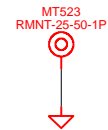
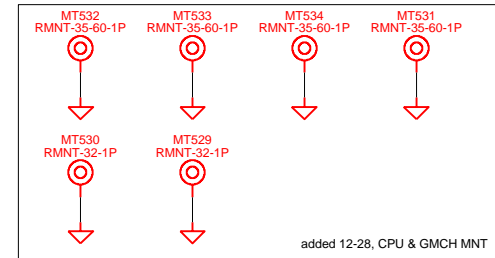
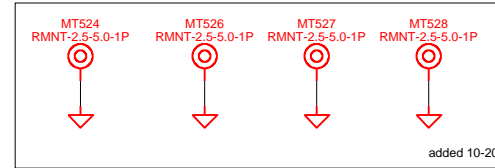
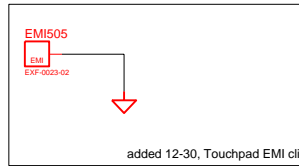
DMB-NUT



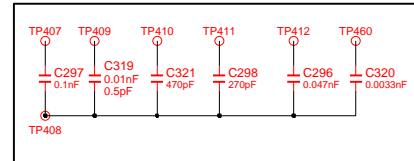
NO_STUFF



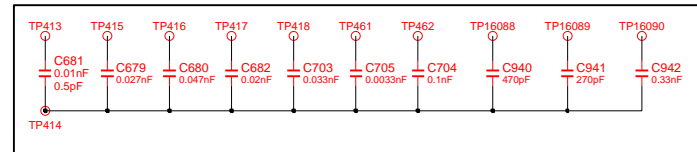
KBD clip, For ESD (06-2-11)



1 ~ 499 SIDE



500 ~ SIDE



REV1
1 O
2 O O3

PCB REVISION CONTROL (ICT)				
NO	CONNECTION	DATE(Y/M/DD)	REVISION	STEP
1	N.C.			
2	1-2			
3	2-3			
4	3-1			
5	1-2-3			
6	N.C.			
7	1-2			
8	2-3			
9	3-1			
10	1-2-3			

DRAW	ZHOU JUN	DATE	2/16/2006	TITLE	TORINO MAIN MOUNT HOLE	SAMSUNG ELECTRONICS
CHECK	GUO LEI	DEV. STEP	MP			PART NO. BA41-00602A/3A
APPROVAL	KEVIN LEE	REV	1.0.0			
MODULE CODE		LAST EDIT	February 16, 2006 10:51:05 AM	PAGE	48	OF 50

SAMSUNG PROPRIETARY
THIS DOCUMENT CONTAINS CONFIDENTIAL
PROPRIETARY INFORMATION THAT IS
SAMSUNG ELECTRONICS CO.'S PROPERTY.
DO NOT DISCLOSE TO OR DUPLICATE FOR OTHERS
EXCEPT AS AUTHORIZED BY SAMSUNG.


TP15882 MIC1
TP15883 MIC2
TP15884 COEX1
TP15885 COEX2
TP15886 ILIM8
TP15887 OILIM5
TP15888 CB3_D2
TP15889 IDE_A0
TP15890 IDE_A1
TP15891 IDE_A2
TP15892 CPUWRN*
TP15905 SCLED*
TP15906 CB3_A18
TP15907 CB3_A19
TP15908 CB3_D14
TP15909 IDE_IRQ
TP15864 NUMLED*
TP15865 ADT3_SEL
TP15866 CAPSLED*
TP15867 CB3_CCLK
TP15868 CB3_CPAR
TP15869 CB3_CVS1
TP15870 CB3_CVS2
TP15871 CB3_SPKR
TP15872 CPU1_NMI
TP15873 HP_OUT_L
TP15874 HP_OUT_R
TP15875 IDE_CS1*
TP15876 IDE_CS3*
TP15877 IDE_D(9)
TP15878 IDE_D(1)
TP15879 IDE_D(2)
TP15880 IDE_D(3)
TP15881 IDE_D(4)
TP15882 IDE_D(5)
TP15831 IDE_D(6)
TP15832 IDE_D(7)
TP15833 IDE_D(8)
TP15834 IDE_D(9)
TP15835 IDE_DREQ
TP15836 IDE_JOR*
TP15837 IDE_IOW*
TP15838 JCK_SENS
TP15839 ODD3_SEL
TP15840 PC13_PAR
TP15841 SMB3_CLK
TP15842 VGA3_RED
TP15843 CB3_CCD1*
TP15844 CB3_CCD2*
TP15845 CB3_CGNT*
TP15846 CB3_CINT*
TP15847 CB3_CREG*
TP15848 CB3_CRST*
TP15849 CHP3_PME*
TP15814 CHP3_SPKR
TP15815 CLK1_SATA
TP15816 CLK3_FIM48
TP15827 HDD3_LED*
TP15828 HP_DETECT
TP15829 IDE_D(10)
TP15799 IDE_D(11)
TP15800 IDE_D(12)
TP15801 IDE_D(13)
TP15802 IDE_D(14)
TP15803 IDE_D(15)
TP15804 IDE_DACK*
TP15805 IDE_DASP*
TP15806 IDE_JORDY
TP15807 KBC3_A20G
TP15808 KBC3_RST*
TP15809 KBC3_VRON
TP15810 LAN3_ACT*
TP15812 PC13_RST*
TP15813 PLT3_RST*
TP15830 CPU1_RVHT*
TP15821 CPU1_PSI*
TP15825 CPU1_SLP*
TP15826 CPU1_SMI*
TP15767 SMB3_DATA
TP15768 VGA3_BLUE


TP15769 WILON_LED*
TP15770 AUD3_EAPD*
TP15771 AUD5_SPDIF
TP15772 BAT3_TEMP
TP15773 BAT3_VOLTA
TP15774 CB3_CAD(0)
TP15775 CB3_CAD(1)
TP15776 CB3_CAD(2)
TP15777 CB3_CAD(3)
TP15778 CB3_CAD(4)
TP15779 CB3_CAD(5)
TP15780 CB3_CAD(6)
TP15781 CB3_CAD(7)
TP15782 CB3_CAD(8)
TP15783 CB3_CAD(9)
TP15784 CB3_CAD(10)
TP15785 CB3_CCB0E*
TP15786 CB3_CCB1*
TP15787 CB3_CCB2*
TP15788 CB3_CCB3*
TP15789 CB3_CORDY*
TP15790 CB3_CPERR*
TP15791 CB3_CSERR*
TP15792 CB3_CSTOP*
TP15793 CB3_CTRDY*
TP15794 CB3_MD_CLK
TP15795 CB3_VPPEN0
TP15796 CB3_VPPEN1
TP15797 CLK1_SATA*
TP15798 CLK3_ICH14
TP15760 CLK3_USB48
TP15761 CPU1_A20M*
TP15762 CPU1_BSEL0
TP15763 CPU1_BSEL1
TP15764 CPU1_BSEL2
TP15725 CPU1_DPWR*
TP15727 CPU1_FERR*
TP15728 CPU1_INIT*
TP15732 EXP3_CPPE*
TP15733 FWH3_INIT*
TP15734 IDE_PDIA*
TP15735 KBC3_BLTON
TP15736 KBC3_CHGEN
TP15737 KBC3_PWRGD
TP15738 KBC3_SCLED*
TP15652 CHP3_SERIRQ
TP15653 CHP3_SLF5*
TP15654 CHP3_SLF5*
TP15655 CHP3_SLF5*
TP15660 CLK3_DBGALPC
TP15661 CLK3_PCLKB
TP15662 CLK3_PWRGD*
TP15663 CLK3_SMBCLK
TP15613 CPU1_DPSLP*
TP15614 CPU1_IGNNE*
TP15615 CPU1_VID(0)
TP15616 CPU1_VID(1)
TP15617 CPU1_VID(2)
TP15618 CPU1_VID(3)
TP15619 CPU1_VID(4)
TP15620 CPU1_VID(5)
TP15621 CPU1_VID(6)
TP15622 EXP3_CPUSB*
TP15623 EXP3_PERST*
TP15624 JCK_SENS_HP
TP15625 KBC3_BKLTON
TP15626 KBC3_RFOFF*
TP15627 KBC3_SCLED*
TP15628 KBC3_SMLCLK*
TP15629 KBC3_KSI(0)
TP15630 KBC3_KSI(1)
TP15631 KBC3_KSI(2)
TP15632 KBC3_KSI(3)
TP15633 KBC3_KSI(4)
TP15634 KBC3_KSI(5)
TP15635 KBC3_KSI(6)
TP15636 KBC3_KSI(7)
TP15637 KBC3_KSI(8)
TP15638 KBC3_KSI(9)
TP15639 KBC3_KSI(10)
TP15640 KBC3_KSI(11)
TP15641 KBC3_KSI(12)
TP15642 KBC3_KSI(13)
TP15643 KBC3_KSI(14)
TP15644 KBC3_KSI(15)
TP15645 KBC3_KSI(16)
TP15646 KBC3_KSI(17)
TP15647 KBC3_KSI(18)
TP15648 KBC3_KSI(19)
TP15649 KBC3_KSI(20)
TP15650 KBC3_KSI(21)
TP15651 KBC3_KSI(22)
TP15652 KBC3_KSI(23)
TP15653 KBC3_KSI(24)
TP15654 KBC3_KSI(25)
TP15655 KBC3_KSI(26)
TP15656 KBC3_KSI(27)
TP15657 KBC3_KSI(28)
TP15658 KBC3_KSI(29)
TP15659 KBC3_KSI(30)
TP15660 KBC3_KSI(31)
TP15661 KBC3_KSI(32)
TP15662 KBC3_KSI(33)
TP15663 KBC3_KSI(34)
TP15664 KBC3_KSI(35)
TP15665 KBC3_KSI(36)
TP15666 KBC3_KSI(37)
TP15667 KBC3_KSI(38)
TP15668 KBC3_KSI(39)
TP15669 KBC3_KSI(40)
TP15670 KBC3_KSI(41)
TP15671 KBC3_KSI(42)
TP15672 KBC3_KSI(43)
TP15673 KBC3_KSI(44)
TP15674 KBC3_KSI(45)
TP15675 KBC3_KSI(46)
TP15676 KBC3_KSI(47)
TP15677 KBC3_KSI(48)
TP15678 KBC3_KSI(49)
TP15679 KBC3_KSI(50)
TP15680 KBC3_KSI(51)
TP15681 KBC3_KSI(52)
TP15682 KBC3_KSI(53)
TP15683 KBC3_KSI(54)
TP15684 KBC3_KSI(55)
TP15685 KBC3_KSI(56)
TP15686 KBC3_KSI(57)
TP15687 KBC3_KSI(58)
TP15688 KBC3_KSI(59)
TP15689 KBC3_KSI(60)
TP15690 KBC3_KSI(61)
TP15691 KBC3_KSI(62)
TP15692 KBC3_KSI(63)
TP15693 KBC3_KSI(64)
TP15694 KBC3_KSI(65)
TP15695 KBC3_KSI(66)
TP15696 KBC3_KSI(67)
TP15697 KBC3_KSI(68)
TP15698 KBC3_KSI(69)
TP15699 KBC3_KSI(70)
TP15700 KBC3_KSI(71)
TP15701 KBC3_KSI(72)
TP15702 KBC3_KSI(73)
TP15703 KBC3_KSI(74)
TP15704 KBC3_KSI(75)
TP15705 KBC3_KSI(76)
TP15706 KBC3_KSI(77)
TP15707 KBC3_KSI(78)
TP15708 KBC3_KSI(79)
TP15709 KBC3_KSI(80)
TP15710 KBC3_KSI(81)
TP15711 KBC3_KSI(82)
TP15712 KBC3_KSI(83)
TP15713 KBC3_KSI(84)
TP15714 KBC3_KSI(85)
TP15715 KBC3_KSI(86)
TP15716 KBC3_KSI(87)
TP15717 KBC3_KSI(88)
TP15718 KBC3_KSI(89)
TP15719 KBC3_KSI(90)
TP15720 KBC3_KSI(91)
TP15721 KBC3_KSI(92)


TP15722 KBC3_KSI(93)
TP15723 KBC3_KSI(94)
TP15724 KBC3_KSI(95)
TP15725 KBC3_KSI(96)
TP15726 KBC3_KSI(97)
TP15727 KBC3_KSI(98)
TP15728 KBC3_KSI(99)
TP15729 KBC3_KSI(100)
TP15730 KBC3_KSI(101)
TP15731 KBC3_KSI(102)
TP15732 KBC3_KSI(103)
TP15733 KBC3_KSI(104)
TP15734 KBC3_KSI(105)
TP15735 KBC3_KSI(106)
TP15736 KBC3_KSI(107)
TP15737 KBC3_KSI(108)
TP15738 KBC3_KSI(109)
TP15739 KBC3_KSI(110)
TP15740 KBC3_KSI(111)
TP15741 KBC3_KSI(112)
TP15742 KBC3_KSI(113)
TP15743 KBC3_KSI(114)
TP15744 KBC3_KSI(115)
TP15745 KBC3_KSI(116)
TP15746 KBC3_KSI(117)
TP15747 KBC3_KSI(118)
TP15748 KBC3_KSI(119)
TP15749 KBC3_KSI(120)
TP15750 KBC3_KSI(121)
TP15751 KBC3_KSI(122)
TP15752 KBC3_KSI(123)
TP15753 KBC3_KSI(124)
TP15754 KBC3_KSI(125)
TP15755 KBC3_KSI(126)
TP15756 KBC3_KSI(127)
TP15757 KBC3_KSI(128)
TP15758 KBC3_KSI(129)
TP15759 KBC3_KSI(130)
TP15760 KBC3_KSI(131)
TP15761 KBC3_KSI(132)
TP15762 KBC3_KSI(133)
TP15763 KBC3_KSI(134)
TP15764 KBC3_KSI(135)
TP15765 KBC3_KSI(136)
TP15766 KBC3_KSI(137)
TP15767 KBC3_KSI(138)
TP15768 KBC3_KSI(139)
TP15769 KBC3_KSI(140)
TP15770 KBC3_KSI(141)
TP15771 KBC3_KSI(142)
TP15772 KBC3_KSI(143)
TP15773 KBC3_KSI(144)
TP15774 KBC3_KSI(145)
TP15775 KBC3_KSI(146)
TP15776 KBC3_KSI(147)
TP15777 KBC3_KSI(148)
TP15778 KBC3_KSI(149)
TP15779 KBC3_KSI(150)
TP15780 KBC3_KSI(151)
TP15781 KBC3_KSI(152)
TP15782 KBC3_KSI(153)
TP15783 KBC3_KSI(154)
TP15784 KBC3_KSI(155)
TP15785 KBC3_KSI(156)
TP15786 KBC3_KSI(157)
TP15787 KBC3_KSI(158)
TP15788 KBC3_KSI(159)
TP15789 KBC3_KSI(160)
TP15790 KBC3_KSI(161)
TP15791 KBC3_KSI(162)
TP15792 KBC3_KSI(163)
TP15793 KBC3_KSI(164)
TP15794 KBC3_KSI(165)
TP15795 KBC3_KSI(166)
TP15796 KBC3_KSI(167)
TP15797 KBC3_KSI(168)
TP15798 KBC3_KSI(169)
TP15799 KBC3_KSI(170)
TP15800 KBC3_KSI(171)
TP15801 KBC3_KSI(172)
TP15802 KBC3_KSI(173)
TP15803 KBC3_KSI(174)
TP15804 KBC3_KSI(175)
TP15805 KBC3_KSI(176)
TP15806 KBC3_KSI(177)
TP15807 KBC3_KSI(178)
TP15808 KBC3_KSI(179)
TP15809 KBC3_KSI(180)
TP15810 KBC3_KSI(181)
TP15811 KBC3_KSI(182)
TP15812 KBC3_KSI(183)
TP15813 KBC3_KSI(184)
TP15814 KBC3_KSI(185)
TP15815 KBC3_KSI(186)
TP15816 KBC3_KSI(187)
TP15817 KBC3_KSI(188)
TP15818 KBC3_KSI(189)
TP15819 KBC3_KSI(190)
TP15820 KBC3_KSI(191)
TP15821 KBC3_KSI(192)
TP15822 KBC3_KSI(193)
TP15823 KBC3_KSI(194)
TP15824 KBC3_KSI(195)
TP15825 KBC3_KSI(196)
TP15826 KBC3_KSI(197)
TP15827 KBC3_KSI(198)
TP15828 KBC3_KSI(199)
TP15829 KBC3_KSI(200)
TP15830 KBC3_KSI(201)
TP15831 KBC3_KSI(202)
TP15832 KBC3_KSI(203)
TP15833 KBC3_KSI(204)
TP15834 KBC3_KSI(205)
TP15835 KBC3_KSI(206)
TP15836 KBC3_KSI(207)
TP15837 KBC3_KSI(208)
TP15838 KBC3_KSI(209)
TP15839 KBC3_KSI(210)
TP15840 KBC3_KSI(211)
TP15841 KBC3_KSI(212)
TP15842 KBC3_KSI(213)
TP15843 KBC3_KSI(214)
TP15844 KBC3_KSI(215)
TP15845 KBC3_KSI(216)
TP15846 KBC3_KSI(217)
TP15847 KBC3_KSI(218)
TP15848 KBC3_KSI(219)
TP15849 KBC3_KSI(220)
TP15850 KBC3_KSI(221)
TP15851 KBC3_KSI(222)
TP15852 KBC3_KSI(223)
TP15853 KBC3_KSI(224)
TP15854 KBC3_KSI(225)
TP15855 KBC3_KSI(226)
TP15856 KBC3_KSI(227)
TP15857 KBC3_KSI(228)
TP15858 KBC3_KSI(229)
TP15859 KBC3_KSI(230)
TP15860 KBC3_KSI(231)
TP15861 KBC3_KSI(232)
TP15862 KBC3_KSI(233)
TP15863 KBC3_KSI(234)
TP15864 KBC3_KSI(235)
TP15865 KBC3_KSI(236)
TP15866 KBC3_KSI(237)
TP15867 KBC3_KSI(238)
TP15868 KBC3_KSI(239)
TP15869 KBC3_KSI(240)
TP15870 KBC3_KSI(241)
TP15871 KBC3_KSI(242)
TP15872 KBC3_KSI(243)
TP15873 KBC3_KSI(244)
TP15874 KBC3_KSI(245)
TP15875 KBC3_KSI(246)
TP15876 KBC3_KSI(247)
TP15877 KBC3_KSI(248)
TP15878 KBC3_KSI(249)
TP15879 KBC3_KSI(250)
TP15880 KBC3_KSI(251)
TP15881 KBC3_KSI(252)
TP15882 KBC3_KSI(253)
TP15883 KBC3_KSI(254)
TP15884 KBC3_KSI(255)
TP15885 KBC3_KSI(256)
TP15886 KBC3_KSI(257)
TP15887 KBC3_KSI(258)
TP15888 KBC3_KSI(259)
TP15889 KBC3_KSI(260)
TP15890 KBC3_KSI(261)
TP15891 KBC3_KSI(262)
TP15892 KBC3_KSI(263)
TP15893 KBC3_KSI(264)
TP15894 KBC3_KSI(265)
TP15895 KBC3_KSI(266)
TP15896 KBC3_KSI(267)
TP15897 KBC3_KSI(268)
TP15898 KBC3_KSI(269)
TP15899 KBC3_KSI(270)
TP15900 KBC3_KSI(271)
TP15901 KBC3_KSI(272)
TP15902 KBC3_KSI(273)
TP15903 KBC3_KSI(274)
TP15904 KBC3_KSI(275)
TP15905 KBC3_KSI(276)
TP15906 KBC3_KSI(277)
TP15907 KBC3_KSI(278)
TP15908 KBC3_KSI(279)
TP15909 KBC3_KSI(280)
TP15910 KBC3_KSI(281)
TP15911 KBC3_KSI(282)
TP15912 KBC3_KSI(283)
TP15913 KBC3_KSI(284)
TP15914 KBC3_KSI(285)
TP15915 KBC3_KSI(286)
TP15916 KBC3_KSI(287)
TP15917 KBC3_KSI(288)
TP15918 KBC3_KSI(289)
TP15919 KBC3_KSI(290)
TP15920 KBC3_KSI(291)
TP15921 KBC3_KSI(292)
TP15922 KBC3_KSI(293)
TP15923 KBC3_KSI(294)
TP15924 KBC3_KSI(295)
TP15925 KBC3_KSI(296)
TP15926 KBC3_KSI(297)
TP15927 KBC3_KSI(298)
TP15928 KBC3_KSI(299)
TP15929 KBC3_KSI(300)
TP15930 KBC3_KSI(301)
TP15931 KBC3_KSI(302)
TP15932 KBC3_KSI(303)
TP15933 KBC3_KSI(304)
TP15934 KBC3_KSI(305)
TP15935 KBC3_KSI(306)
TP15936 KBC3_KSI(307)
TP15937 KBC3_KSI(308)
TP15938 KBC3_KSI(309)
TP15939 KBC3_KSI(310)
TP15940 KBC3_KSI(311)
TP15941 KBC3_KSI(312)
TP15942 KBC3_KSI(313)
TP15943 KBC3_KSI(314)
TP15944 KBC3_KSI(315)
TP15945 KBC3_KSI(316)
TP15946 KBC3_KSI(317)
TP15947 KBC3_KSI(318)
TP15948 KBC3_KSI(319)
TP15949 KBC3_KSI(320)
TP15950 KBC3_KSI(321)
TP15951 KBC3_KSI(322)
TP15952 KBC3_KSI(323)
TP15953 KBC3_KSI(324)
TP15954 KBC3_KSI(325)
TP15955 KBC3_KSI(326)
TP15956 KBC3_KSI(327)
TP15957 KBC3_KSI(328)
TP15958 KBC3_KSI(329)
TP15959 KBC3_KSI(330)
TP15960 KBC3_KSI(331)
TP15961 KBC3_KSI(332)
TP15962 KBC3_KSI(333)
TP15963 KBC3_KSI(334)
TP15964 KBC3_KSI(335)
TP15965 KBC3_KSI(336)
TP15966 KBC3_KSI(337)
TP15967 KBC3_KSI(338)
TP15968 KBC3_KSI(339)
TP15969 KBC3_KSI(340)
TP15970 KBC3_KSI(341)
TP15971 KBC3_KSI(342)
TP15972 KBC3_KSI(343)
TP15973 KBC3_KSI(344)
TP15974 KBC3_KSI(345)
TP15975 KBC3_KSI(346)
TP15976 KBC3_KSI(347)
TP15977 KBC3_KSI(348)
TP15978 KBC3_KSI(349)
TP15979 KBC3_KSI(350)
TP15980 KBC3_KSI(351)
TP15981 KBC3_KSI(352)
TP15982 KBC3_KSI(353)
TP15983 KBC3_KSI(354)
TP15984 KBC3_KSI(355)
TP15985 KBC3_KSI(356)
TP15986 KBC3_KSI(357)
TP15987 KBC3_KSI(358)
TP15988 KBC3_KSI(359)
TP15989 KBC3_KSI(360)
TP15990 KBC3_KSI(361)
TP15991 KBC3_KSI(362)
TP15992 KBC3_KSI(363)
TP15993 KBC3_KSI(364)
TP15994 KBC3_KSI(365)
TP15995 KBC3_KSI(366)
TP15996 KBC3_KSI(367)
TP15997 KBC3_KSI(368)
TP15998 KBC3_KSI(369)
TP15999 KBC3_KSI(370)
TP16000 KBC3_KSI(371)
TP16001 KBC3_KSI(372)
TP16002 KBC3_KSI(373)
TP16003 KBC3_KSI(374)
TP16004 KBC3_KSI(375)
TP16005 KBC3_KSI(376)
TP16006 KBC3_KSI(377)
TP16007 KBC3_KSI(378)
TP16008 KBC3_KSI(379)
TP16009 KBC3_KSI(380)
TP16010 KBC3_KSI(381)
TP16011 KBC3_KSI(382)
TP16012 KBC3_KSI(383)
TP16013 KBC3_KSI(384)
TP16014 KBC3_KSI(385)
TP16015 KBC3_KSI(386)
TP16016 KBC3_KSI(387)
TP16017 KBC3_KSI(388)
TP16018 KBC3_KSI(389)
TP16019 KBC3_KSI(390)
TP16020 KBC3_KSI(391)
TP16021 KBC3_KSI(392)
TP16022 KBC3_KSI(393)
TP16023 KBC3_KSI(394)
TP16024 KBC3_KSI(395)
TP16025 KBC3_KSI(396)
TP16026 KBC3_KSI(397)
TP16027 KBC3_KSI(398)
TP16028 KBC3_KSI(399)
TP16029 KBC3_KSI(400)
TP16030 KBC3_KSI(401)
TP16031 KBC3_KSI(402)
TP16032 KBC3_KSI(403)
TP16033 KBC3_KSI(404)
TP16034 KBC3_KSI(405)
TP16035 KBC3_KSI(406)
TP16036 KBC3_KSI(407)
TP16037 KBC3_KSI(408)
TP16038 KBC3_KSI(409)
TP16039 KBC3_KSI(410)
TP16040 KBC3_KSI(411)
TP16041 KBC3_KSI(412)
TP16042 KBC3_KSI(413)
TP16043 KBC3_KSI(414)
TP16044 KBC3_KSI(415)
TP16045 KBC3_KSI(416)
TP16046 KBC3_KSI(417)
TP16047 KBC3_KSI(418)
TP16048 KBC3_KSI(419)
TP16049 KBC3_KSI(420)
TP16050 KBC3_KSI(421)
TP16051 KBC3_KSI(422)
TP16052 KBC3_KSI(423)
TP16053 KBC3_KSI(424)
TP16054 KBC3_KSI(425)
TP16055 KBC3_KSI(426)
TP16056 KBC3_KSI(427)
TP16057 KBC3_KSI(428)
TP16058 KBC3_KSI(429)
TP16059 KBC3_KSI(430)
TP16060 KBC3_KSI(431)
TP16061 KBC3_KSI(432)
TP16062 KBC3_KSI(433)
TP16063 KBC3_KSI(434)
TP16064 KBC3_KSI(435)
TP16065 KBC3_KSI(436)
TP16066 KBC3_KSI(437)
TP16067 KBC3_KSI(438)
TP16068 KBC3_KSI(439)
TP16069 KBC3_KSI(440)
TP16070 KBC3_KSI(441)
TP16071 KBC3_KSI(442)
TP16072 KBC3_KSI(443)
TP16073 KBC3_KSI(444)
TP16074 KBC3_KSI(445)
TP16075 KBC3_KSI(446)
TP16076 KBC3_KSI(447)
TP16077 KBC3_KSI(448)
TP16078 KBC3_KSI(449)
TP16079 KBC3_KSI(450)
TP16080 KBC3_KSI(451)
TP16081 KBC3_KSI(452)
TP16082 KBC3_KSI(453)
TP16083 KBC3_KSI(454)
TP16084 KBC3_KSI(455)
TP16085 KBC3_KSI(456)
TP16086 KBC3_KSI(457)
TP16087 KBC3_KSI(458)
TP16088 KBC3_KSI(459)
TP16089 KBC3_KSI(460)
TP16090 KBC3_KSI(461)
TP16091 KBC3_KSI(462)
TP16092 KBC3_KSI(463)
TP16093 KBC3_KSI(464)
TP16094 KBC3_KSI(465)
TP16095 KBC3_KSI(466)
TP16096 KBC3_KSI(467)
TP16097 KBC3_KSI(468)
TP16098 KBC3_KSI(469)
TP16099 KBC3_KSI(470)
TP16100 KBC3_KSI(471)
TP16101 KBC3_KSI(472)
TP16102 KBC3_KSI(473)
TP16103 KBC3_KSI(474)
TP16104 KBC3_KSI(475)
TP16105 KBC3_KSI(476)
TP16106 KBC3_KSI(477)
TP16107 KBC3_KSI(478)
TP16108 KBC3_KSI(479)
TP16109 KBC3_KSI(480)
TP16110 KBC3_KSI(481)
TP16111 KBC3_KSI(482)
TP16112 KBC3_KSI(483)
TP16113 KBC3_KSI(484)
TP16114 KBC3_KSI(485)
TP16115 KBC3_KSI(486)
TP16116 KBC3_KSI(487)
TP16117 KBC3_KSI(488)
TP16118 KBC3_KSI(489)
TP16119 KBC3_KSI(490)
TP16120 KBC3_KSI(491)
TP16121 KBC3_KSI(492)
TP16122 KBC3_KSI(493)
TP16123 KBC3_KSI(494)
TP16124 KBC3_KSI(495)
TP16125 KBC3_KSI(496)
TP16126 KBC3_KSI(497)
TP16127 KBC3_KSI(498)
TP16128 KBC3_KSI(499)
TP16129 KBC3_KSI(500)
TP16130 KBC3_KSI(501)
TP16131 KBC3_KSI(502)
TP16132 KBC3_KSI(503)
TP16133 KBC3_KSI(504)
TP16134 KBC3_KSI(505)
TP16135 KBC3_KSI(506)
TP16136 KBC3_KSI(507)
TP16137 KBC3_KSI(508)
TP16138 KBC3_KSI(509)
TP16139 KBC3_KSI(510)
TP16140 KBC3_KSI(511)
TP16141 KBC3_KSI(512)
TP16142 KBC3_KSI(513)
TP16143 KBC3_KSI(514)
TP16144 KBC3_KSI(515)
TP16145 KBC3_KSI(516)
TP16146 KBC3_KSI(517)
TP16147 KBC3_KSI(518)
TP16148 KBC3_KSI(519)
TP16149 KBC3_KSI(520)
TP16150 KBC3_KSI(521)
TP16151 KBC3_KSI(522)
TP16152 KBC3_KSI(523)
TP16153 KBC3_KSI(524)
TP16154 KBC3_KSI(525)
TP16155 KBC3_KSI(526)
TP16156 KBC3_KSI(527)
TP16157 KBC3_KSI(528)
TP16158 KBC3_KSI(529)
TP16159 KBC3_KSI(530)
TP16160 KBC3_KSI(531)
TP16161 KBC3_KSI(532)
TP16162 KBC3_KSI(533)
TP16163 KBC3_KSI(534)
TP16164 KBC3_KSI(535)
TP16165 KBC3_KSI(536)
TP16166 KBC3_KSI(537)
TP16167 KBC3_KSI(538)
TP16168 KBC3_KSI(539)
TP16169 KBC3_KSI(540)
TP16170 KBC3_KSI(541)
TP16171 KBC3_KSI(542)
TP16172 KBC3_KSI(543)
TP16173 KBC3_KSI(544)
TP16174 KBC3_KSI(545)
TP16175 KBC3_KSI(546)
TP16176 KBC3_KSI(547)
TP16177 KBC3_KSI(548)
TP16178 KBC3_KSI(549)
TP16179 KBC3_KSI(550)
TP16180 KBC3_KSI(551)
TP16181 KBC3_KSI(552)
TP16182 KBC3_KSI(553)
TP16183 KBC3_KSI(554)
TP16184 KBC3_KSI(555)
TP16185 KBC3_KSI(556)
TP16186 KBC3_KSI(557)
TP16187 KBC3_KSI(558)
TP16188 KBC3_KSI(559)
TP16189 KBC3_KSI(560)
TP16190 KBC3_KSI(561)
TP16191 KBC3_KSI(562)
TP16192 KBC3_KSI(563)
TP16193 KBC3_KSI(564)
TP16194 KBC3_KSI(565)
TP16195 KBC3_KSI(566)
TP16196 KBC3_KSI(567)
TP16197 KBC3_KSI(568)
TP16198 KBC3_KSI(569)
TP16199 KBC3_KSI(570)
TP16200 KBC3_KSI(571)
TP1

THIS DOCUMENT CONTAINS CONFIDENTIAL
PROPRIETARY INFORMATION THAT IS
SAMSUNG ELECTRONICS CO'S PROPERTY.
DO NOT DISCLOSE TO OR DUPLICATE FOR OTHERS
EXCEPT AS AUTHORIZED BY SAMSUNG.

REVISION	DATE	NO.#	CONTENTS
MP1.0.0	2006-2-16	1	Initialize MP version schematic

Development Stage 

PCB Version 

Schematic Version 

Vendor: SGCE P/N: BA41-00602A
Vendor: TPT P/N: BA41-00603A

DRAW	ZHOU JUN	DATE	2/16/2006	TORINO MAIN REVISION HISTORY	SAMSUNG ELECTRONICS
CHECK	GUO LEI	DEV STEP	MP		
APPROVAL	KEVIN LEE	REV	1.0.0		
MODULE CODE		LAST EDIT			
February 16, 2006 10:51:05 AM				PAGE	50 OF 50