NetSC520 Demonstration Board Schematics and Bill of Materials

NetSC520 Demonstration Board Schematics

Élan™SC520 Microcontroller Demonstration Board With On-Board
Am79C973 10/100Mbps Ethernet and PC/104 and PC/104+ Expansion

27 SEPTEMBER 2000

NetSC520_Rev10.DSN

Schematic: 7200070-001
PC-Board: 1000070-001
Assembly: 0100070-001

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Title	NetSC520 Demonstration Board	
Size C	Document Number COVER	Rev 1.0
Date: Wednesday, January 10, 2001	Sheet 1 of 14	

TABLE OF CONTENTS

Table of Contents

Pre-release Revisions

Rev 0.3 -- Original Release For Review

Rev 0.4 -- Original Release For PC-Board CAD and Build Services
- Deleted RN1, R42, R43
- Flipped RN2-5 180degrees to facilitate PC-Board Routing

Rev 0.5 -- 2nd CAD Release
- Deleted Resistor SIPs [RP5-7,RP13] and changed to SMD R-Packs [RN13-19]
- Deleted R3; C25,49-51,65-68,76-78,113-115,24,52,53,69,70; and TC6,15,23,27; and 2mm Jumpers Z12,13
- Added AMD P/N and Siliconhills parttype to all schematic components
- Changed J8 to match exixting AMD P/N
- Changed J4 to newer 1241-120G2 part number
- Changed power supply resistor values to standard 1% values:

  R61,63,67=4.99K, 1%;
  R62=5.36K, 1%;
  R66=1.82K, 1%;
  R60=165, 1%

- Added Pre-Release Revision Information
- Added Testpoints [TP10-13] to unused SC520 pins [Sheet 4]
- Added PCICLK0 offsheet connection [Sheet 9]
- Revised Block Diagram [Sheet 3]
- Corrected some part number errors
- Fixed a net name error on Sheet 13; corrected net is PONLED2_5
- Swapped signals on R-PAKs and R-NETs to facilitate PC-Board routing
- Added Interplane Capacitors Between VCC12-VCC5 and VCC3-VCC_CPU Split Power Planes

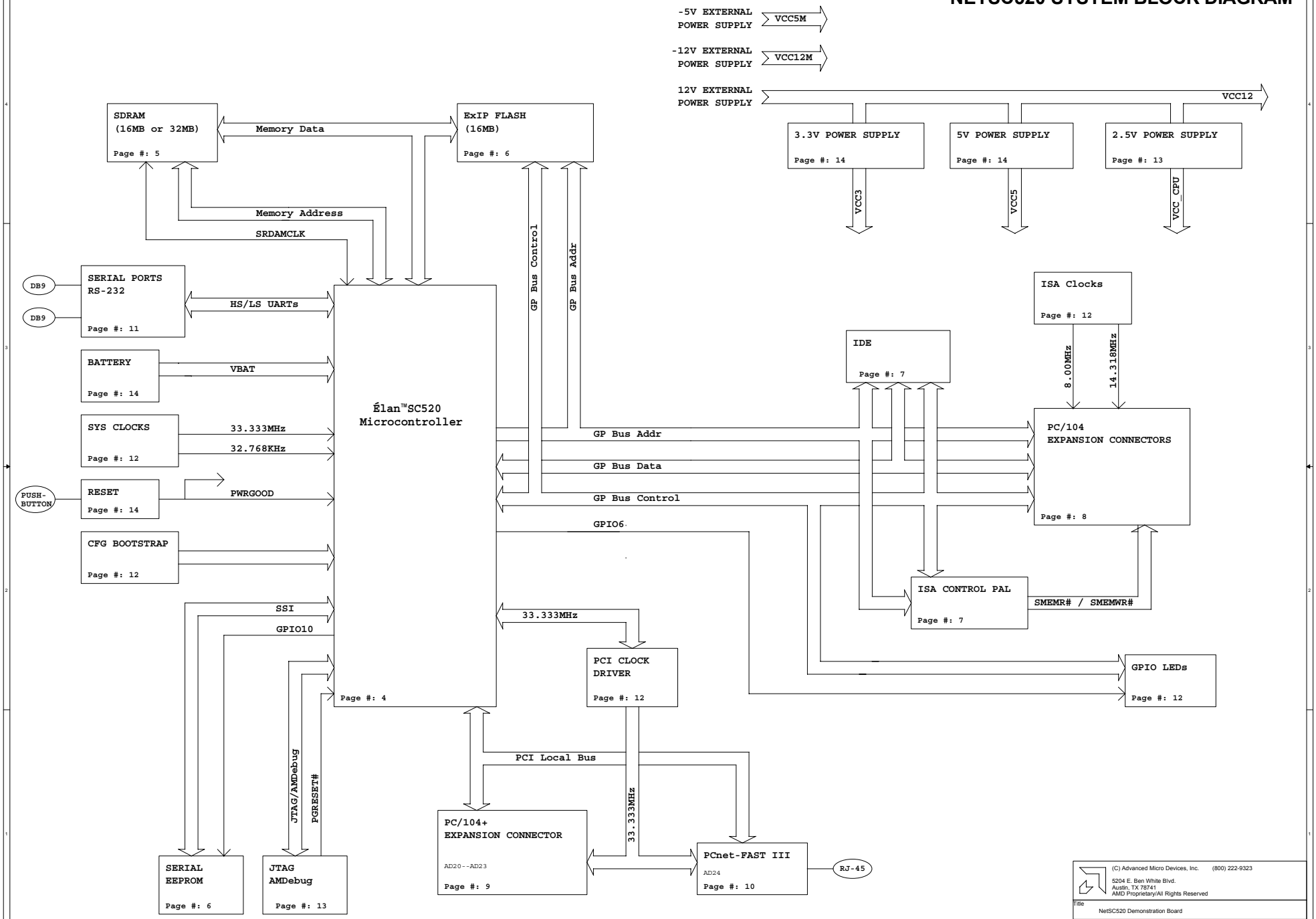
Post-release Revisions

Rev 1.0 -- 1st Board Respin

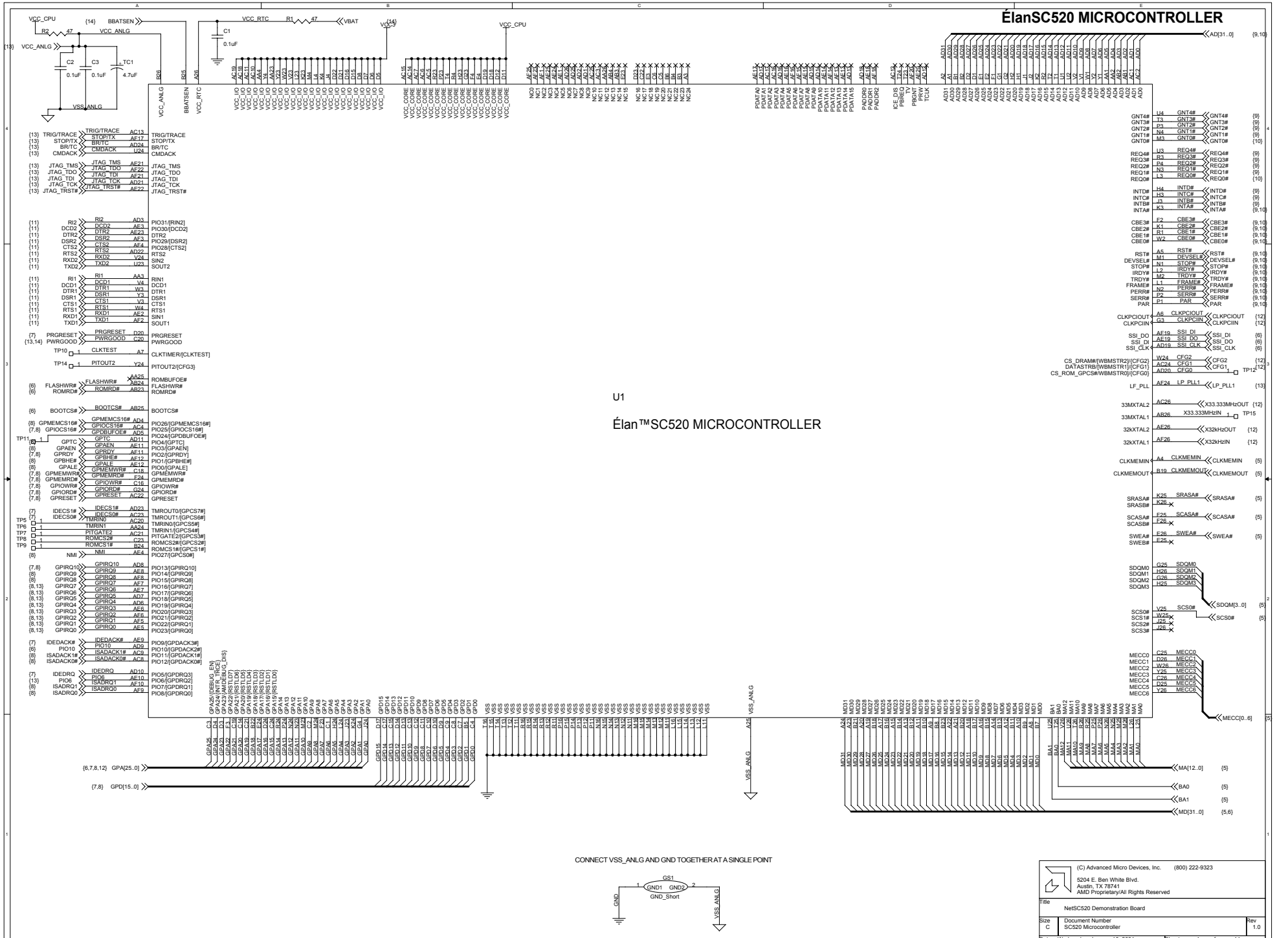
- Added 1.5K pullup to CFG2 [sheet 4 and 12]
- Fixed RESET switch pinout error [sheet 14]
- Removed pullups from GPA[0..25] bus [sheet 8]
- Made LEDs (vs GPIRQx) default population option and R58 a no-pop [sheet 13]
- Fixed Ethernet SEEPROM wiring error [sheet 10]
- Replaces xtal/osc dual footprint with an oscillator only footprint with added enable pin support [sheet 12]
- Cleaned-up some text typos and changes IDE Header Part Number [sheets 7, 9, and 10]

Title	NetSC520 Demonstration Board	
Size C	Document Number TABLE OF CONTENTS	Rev 1.0
Date: Wednesday, January 10, 2001	Sheet 2 of 14	

NETSC520 SYSTEM BLOCK DIAGRAM



Title	NetSC520 Demonstration Board	
Size C	Document Number BLOCK_DIAGRAM	Rev 1.0
Date: Wednesday, January 10, 2001	Sheet 3 of 14	


ÉlanSC520 MICROCONTROLLER
U1
Élan™SC520 MICROCONTROLLER
CONNECT VSS_ANLG AND GND TOGETHER AT A SINGLE POINT
GS1
GND1 GND2
GND_Short
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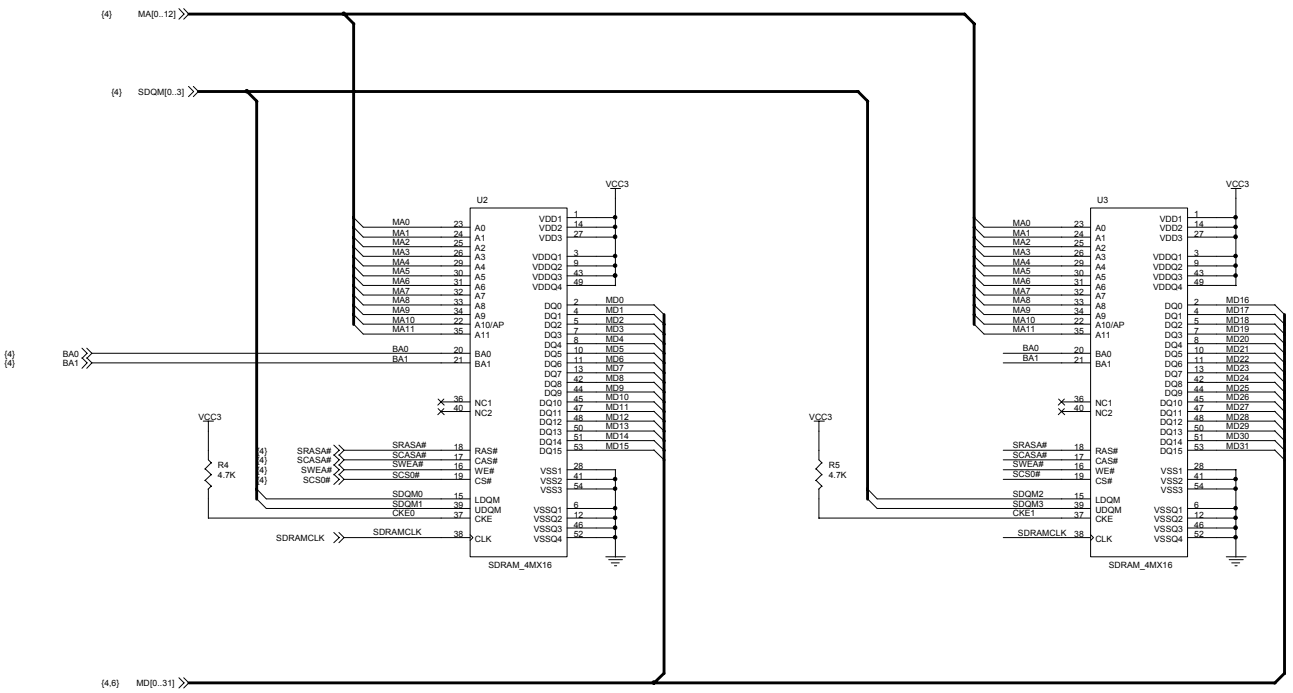
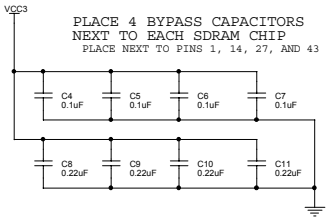
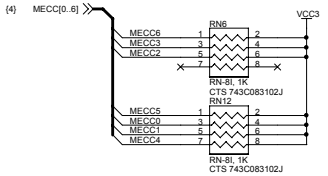
NetSC520 Demonstration Board
Size C
Document Number SC520 Microcontroller
Rev 1.0
Date: Wednesday, January 10, 2001
Sheet 4 of 14

SDRAM MAIN MEMORY INTERFACE



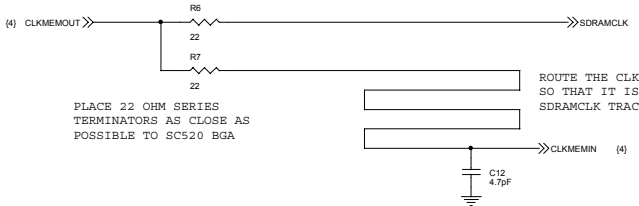


PULL-UP UNUSED ECC BITS



SDRAM POPULATION OPTIONS

16MBYTE SDRAM	4MX16: SAMSUNG K4S641632C
32MBYTE SDRAM	8MX16: SAMSUNG KS281632M

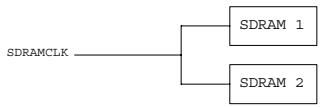


PLACE 22 OHM SERIES TERMINATORS AS CLOSE AS POSSIBLE TO SC520 BGA

ROUTE THE CLKMEMIN TRACE BACK AND FORTH SO THAT IT IS THE SAME LENGTH AS THE SDRAMCLK TRACE TO EITHER SDRAM CHIP

PLACE CAP AS CLOSE AS POSSIBLE TO SC520 BGA; ADJUST VALUE TO EQUALIZE LOADING ON SDRAMCLK AND CLKMEMIN NETS

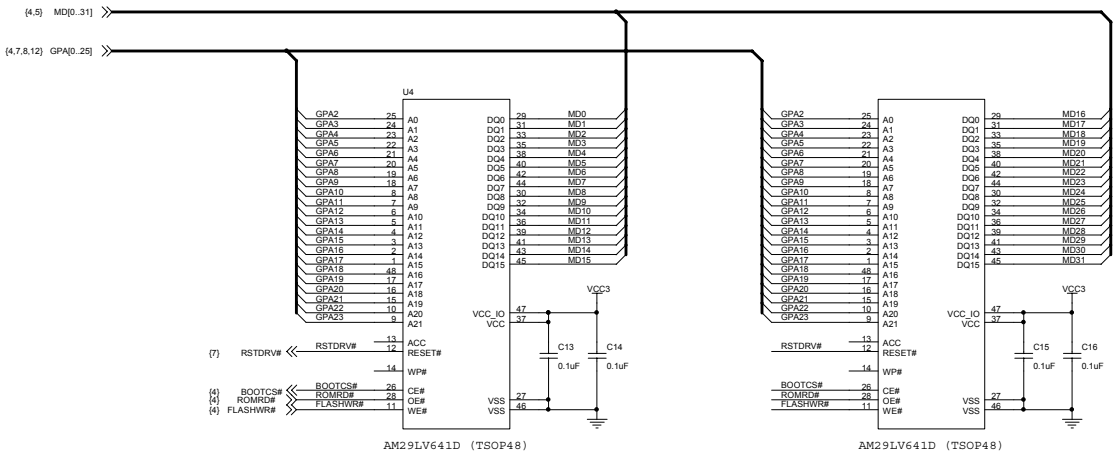
ROUTE THE SDRAMCLK "T" STYLE SO THAT THE TRACE LENGTH TO EACH SDRAM CHIP IS THE SAME



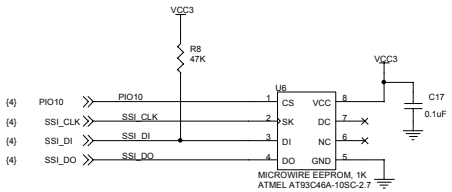
Title	NetSC520 Demonstration Board	
Size C	Document Number SDRAM_MEMORY	Rev 1.0
Date: Wednesday, January 10, 2001	Sheet 5 of 14	

NON-VOLATILE MEMORY

ExIP Flash Memory (16 MByte)



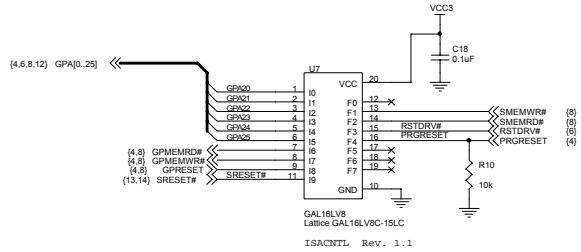
1Kbit Serial EEPROM (64x16)
Synchronous Serial Interface--Microwire SEEPROM



Title	NetSC520 Demonstration Board	
Size C	Document Number Flash_MEM_CHIPS	Rev 1.0
Date: Wednesday, January 10, 2001	Sheet 6 of 14	

IDE INTERFACE AND ISA CONTROL PAL

ISA CONTROL PAL

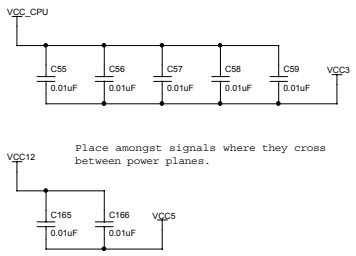


ISACNTL Rev. 1.1

PAL EQUATIONS

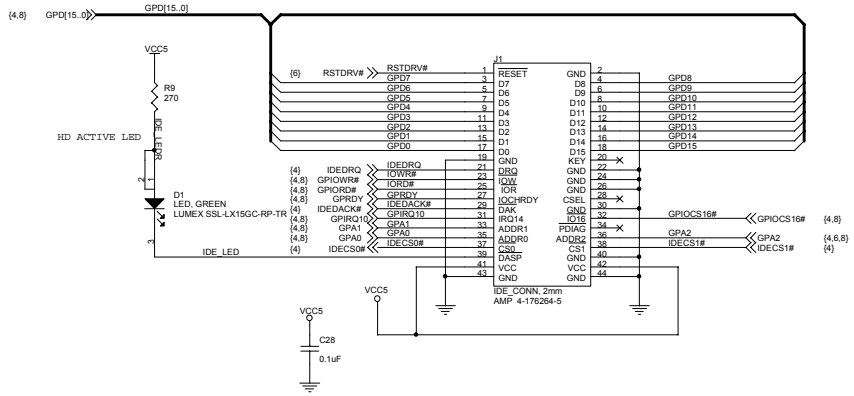
```
SMEMRD# = /GPA20 * /GPA21 * /GPA22 * /GPA23 * /GPA24 * /GPA25 * MEMRD#     ;ASSERT SMSMRD# DURING AN ISA READ
                                                                            ;CYCLE TO ADDRESSES LESS THAN 1 MBYTE

SMEMWR# = /GPA20 * /GPA21 * /GPA22 * /GPA23 * /GPA24 * /GPA25 * MEMWR#     ;ASSERT SMSMWR# DURING AN ISA WRITE
                                                                            ;CYCLE TO ADDRESSES LESS THAN 1 MBYTE

RSTDRV# = /GPRESET                                                          ;INVERT

PRGRESET = /SRESET#                                                         ;INVERT
```

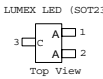
INTERPLANE CAPACITORS

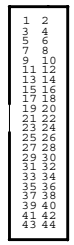


Place amongst signals where they cross between power planes.

IDE INTERFACE (2.5" HARD DISK)







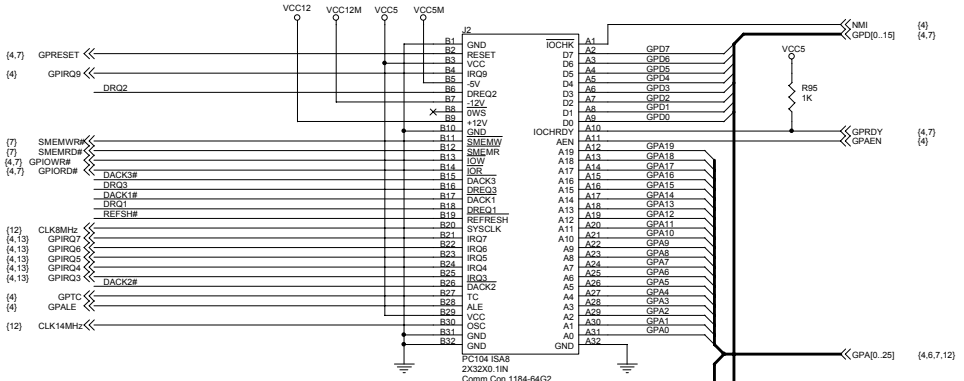
2mm IDE CONNECTOR

Top View

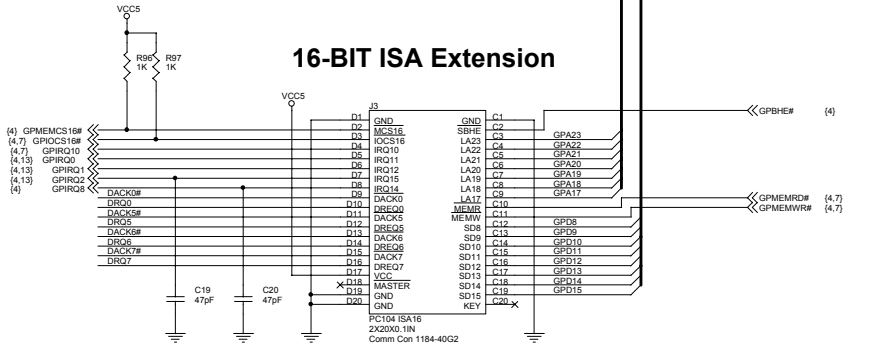
Title	NetSC520 Demonstration Board	
Size C	Document Number PAL and IDE Interface	Rev 1.0
Date: Wednesday, January 10, 2001	Sheet 7 of 14	

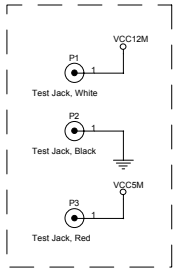
PC/104 INTERFACE

8-BIT ISA Interface

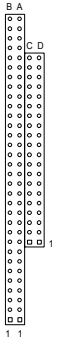


16-BIT ISA Extension

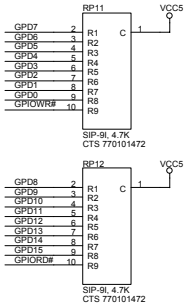


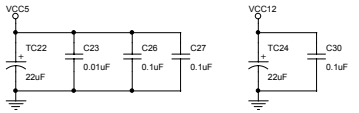


Use External Power Source
To Generate These Voltages

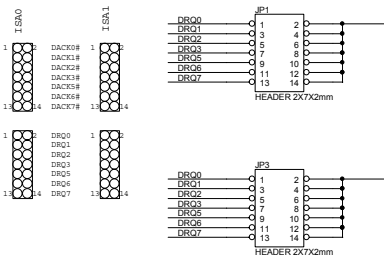


PC/104 Connector
(COMPONENT
SIDE VIEW)

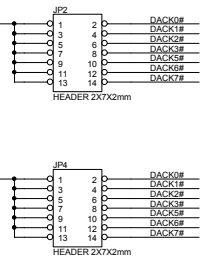


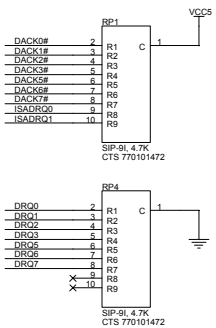


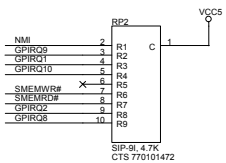
ISA DRQ Select

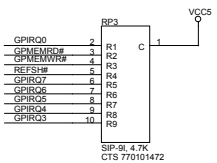


ISA DACK# Select





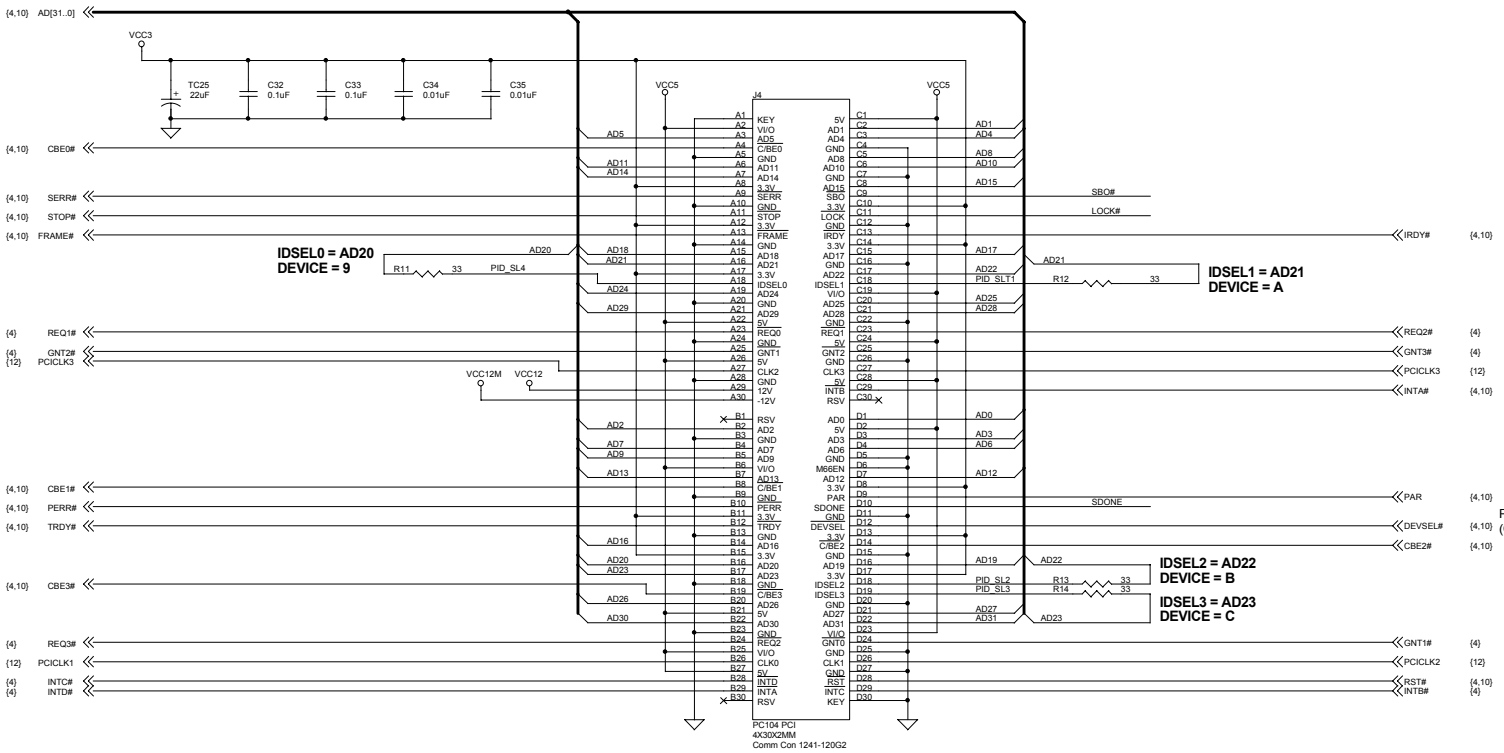


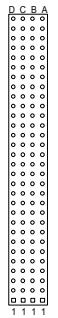


Title	NetSC520 Demonstration Board	
Size C	Document Number PC/104 ISA	Rev 1.0
Date: Wednesday, January 10, 2001	Sheet 8 of 14	

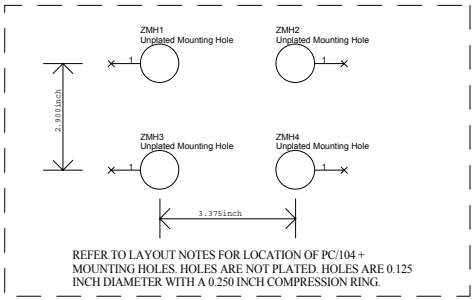
PC/104+ INTERFACE

PCI INTERFACE

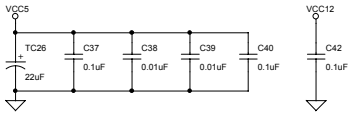




PC/104-PLUS Connector
(COMPONENT SIDE VIEW)

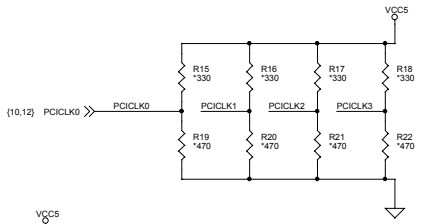


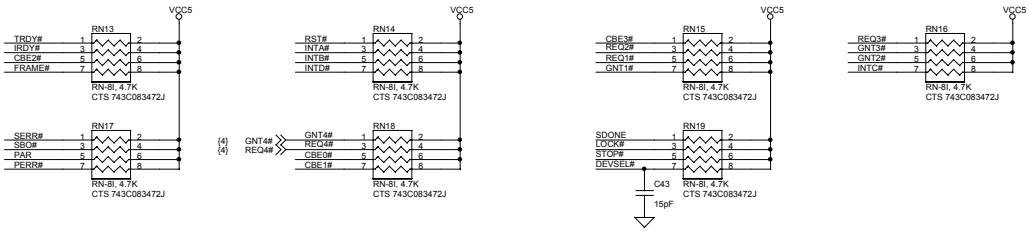
REFER TO LAYOUT NOTES FOR LOCATION OF PC/104 + MOUNTING HOLES. HOLES ARE NOT PLATED. HOLES ARE 0.125 INCH DIAMETER WITH A 0.250 INCH COMPRESSION RING.



PCI Clock Terminators

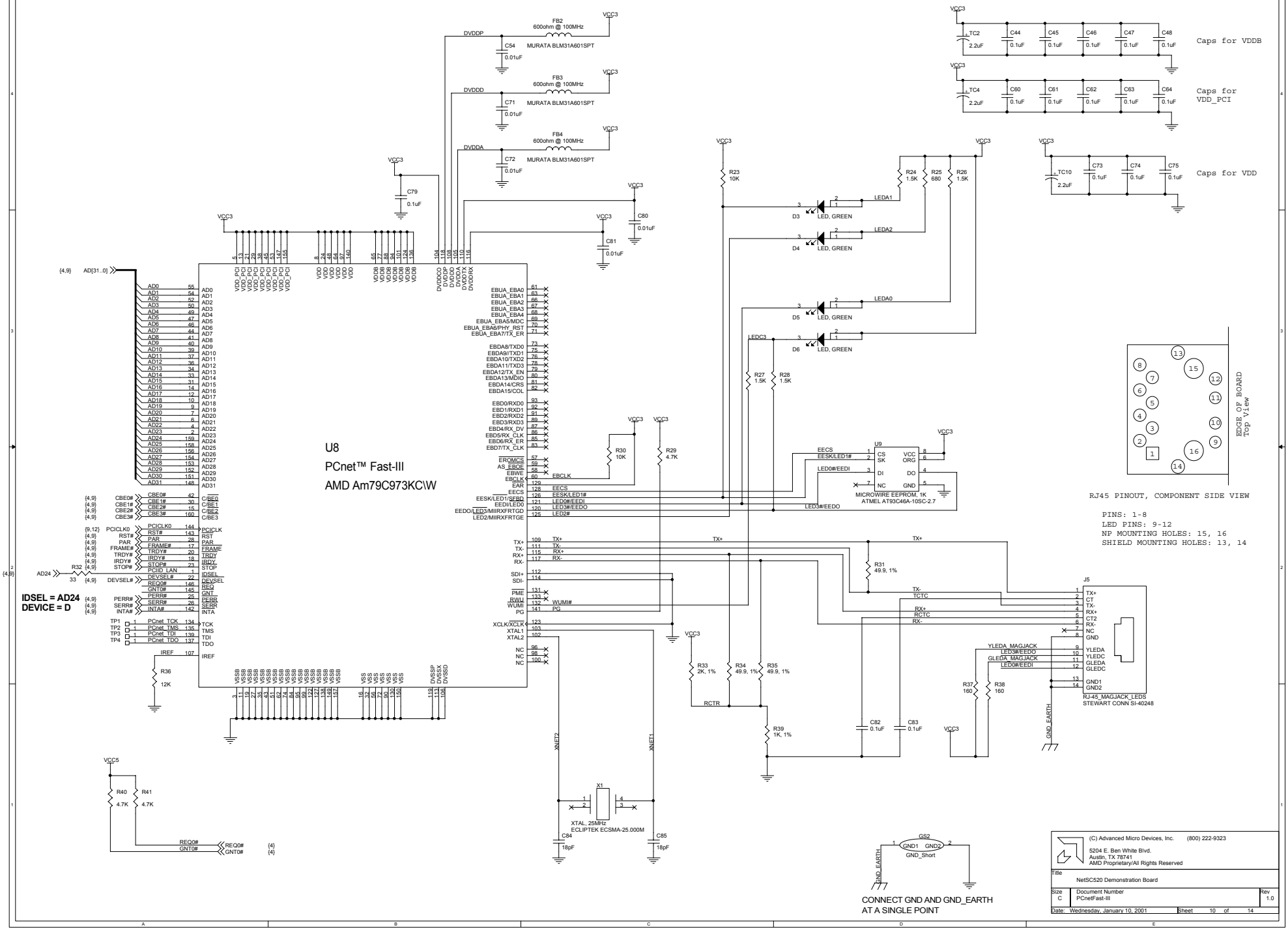
(Place Near Load)





Title	NetSC520 Demonstration Board	
Size C	Document Number PC/104+ PCI	Rev 1.0
Date: Wednesday, January 10, 2001	Sheet 9 of 14	

AM79C973 10/100 ETHERNET INTERFACE



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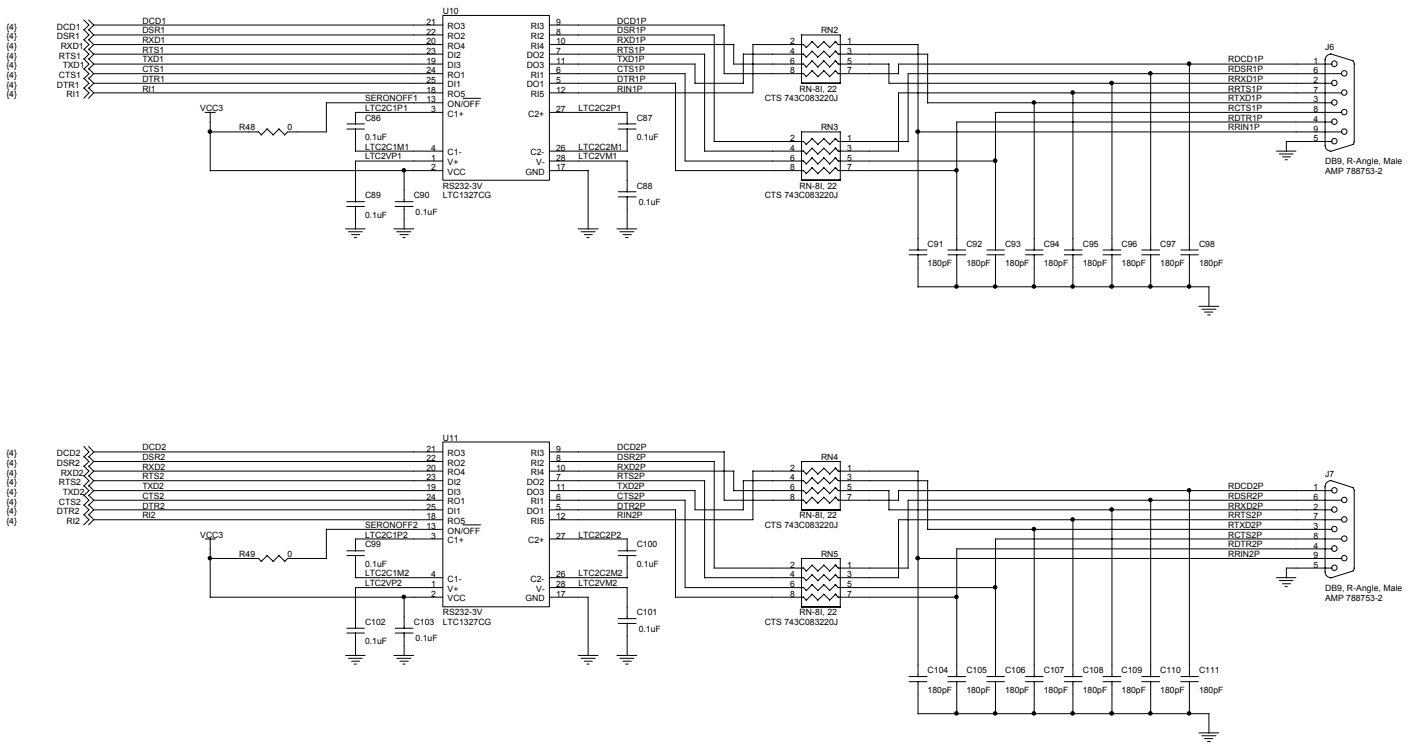
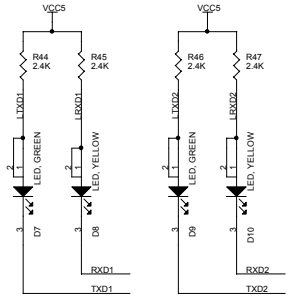
Title	NetSC520 Demonstration Board	
Size C	Document Number PCnetFast-III	Rev 1.0
Date: Wednesday, January 10, 2001	Sheet 10 of 14	

SERIAL PORTS (RS-232)



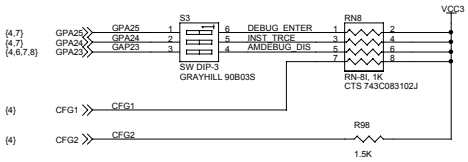


Title	Net SC520 Demonstration Board	
Size C	Document Number SERIAL PORTS	Rev 1.0
Date: Wednesday, January 10, 2001	Sheet 11 of 14	

SYSTEM CLOCKS AND POWER-ON BOOTSTRAP

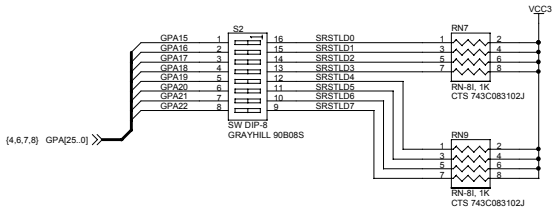
SC520 POWER-UP BOOTSTRAP

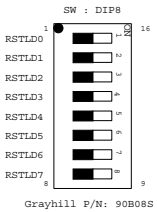
- BOOT FROM 32BIT BOOTCS# CONTROLLED FLASH ROM
- BOOT ROM ON MD[0..31] BUS
- USER CAN SET AMDebug CONFIGURATION

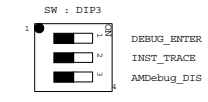


SC520 POWER-ON RESET LATCHED DATA

- USER CAN SELECT CODE LATCHED AT RESET



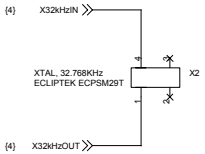


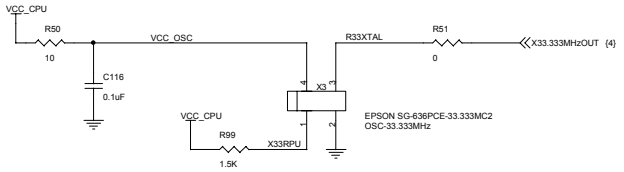


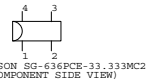
COMPONENTS TO INCLUDE IN B.O.M. FOR ASSEMBLED BOARDS

Z1 BOM Include PC/104 Standoff Comm Con HW-PC600P	Z7 BOM Include PC/104 Standoff Nut Comm Con HW-PC440NP	Z4 BOM Include 2mm Jumper Samtec 2SN-BK	Z17 BOM Include Power Supply Elpac W4012-760
Z6 BOM Include PC/104 Standoff Comm Con HW-PC600P	Z11 BOM Include PC/104 Standoff Nut Comm Con HW-PC440NP	Z9 BOM Include 2mm Jumper Samtec 2SN-BK	
Z10 BOM Include PC/104 Standoff Comm Con HW-PC600P	Z15 BOM Include PC/104 Standoff Nut Comm Con HW-PC440NP	Z5 BOM Include PLCC20 SOCKET, W/ POSTS SAMTEC PLCC-020-T-A	
Z14 BOM Include PC/104 Standoff Comm Con HW-PC600P	Z3 BOM Include 2mm Jumper Samtec 2SN-BK	Z16 BOM Include 12mm 3V Lithium Battery Panasonic BR1225	
Z2 BOM Include PC/104 Standoff Nut Comm Con HW-PC440NP	Z8 BOM Include 2mm Jumper Samtec 2SN-BK		

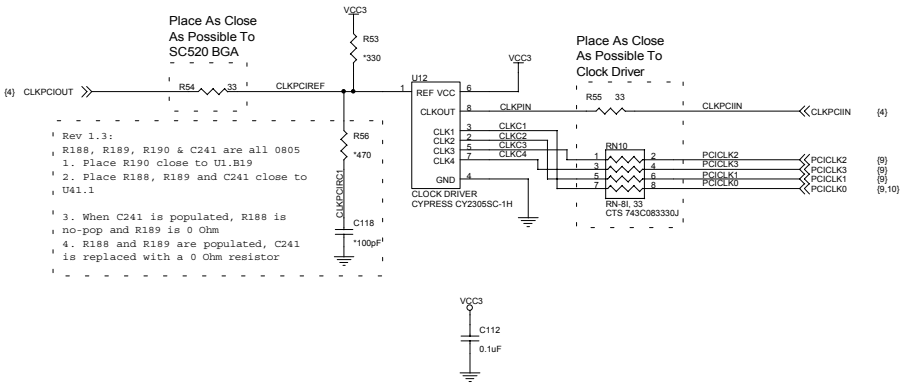
SC520 32KHz and 33MHz CRYSTALS



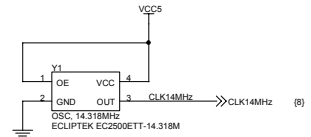


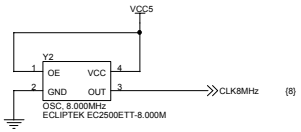


PCI Clock Driver



ISA Clocks

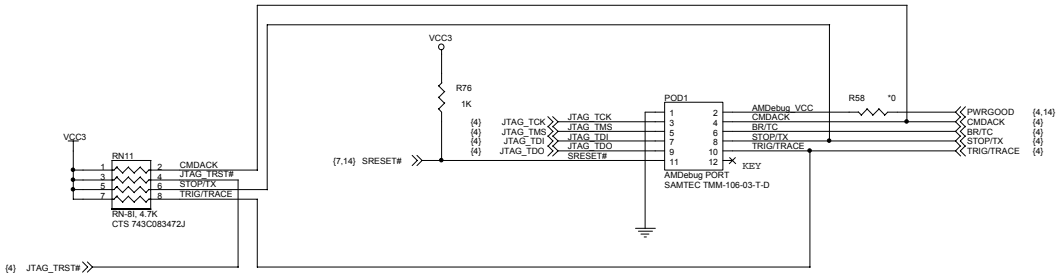


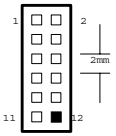


Title	NetSC520 Demonstration Board	
Size C	Document Number CLOCKS	Rev 1.0
Date: Wednesday, January 10, 2001	Sheet 12 of 14	

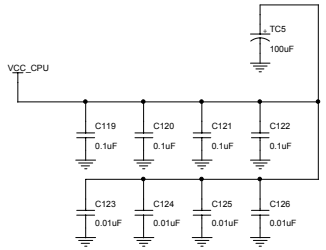
CPU POWER, AMDebug, CPU DECOUPLING, RTC PLL LOOP FILTER, AND GPIO LED

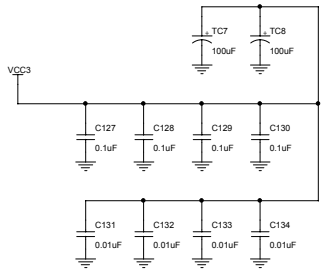
JTAG & AMDebug Port





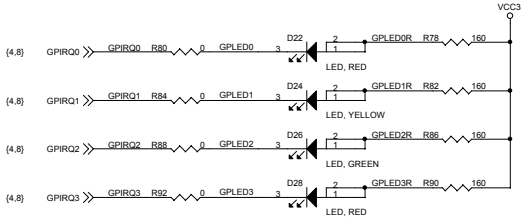
VCC_CPU Decoupling

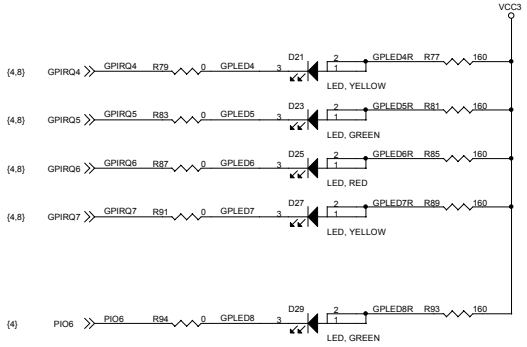




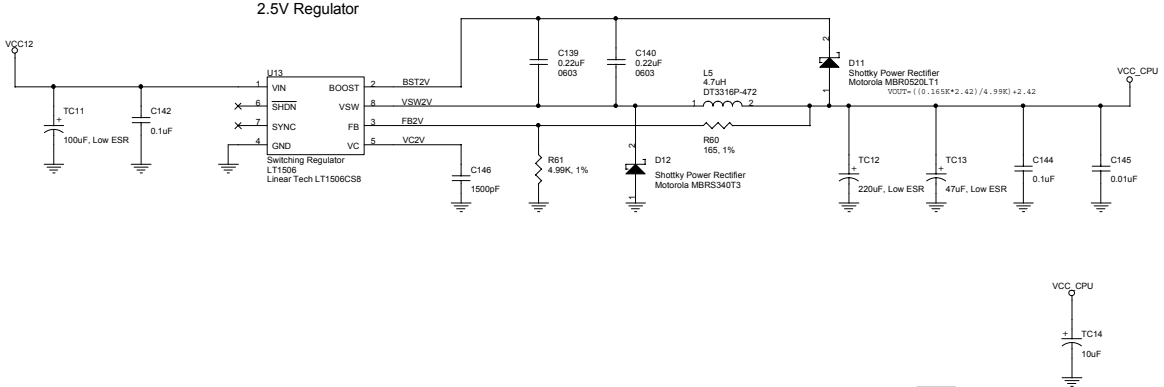
Place the above Caps under the BGA (Back side of the board)

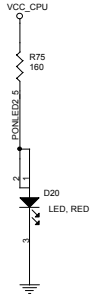
GPIO CONTROLLED LEDs





2.5V Regulator





MRBS340T3
CATHODE (2)

ANODE (1)

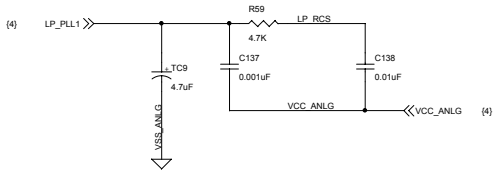
MRB0520LT1
CATHODE (2)

ANODE (1)

SOT-23 LED
(COMPONENT SIDE VIEW)

PLL Loop Filter

(PLACE CLOSE TO SC520 BGA)

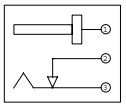


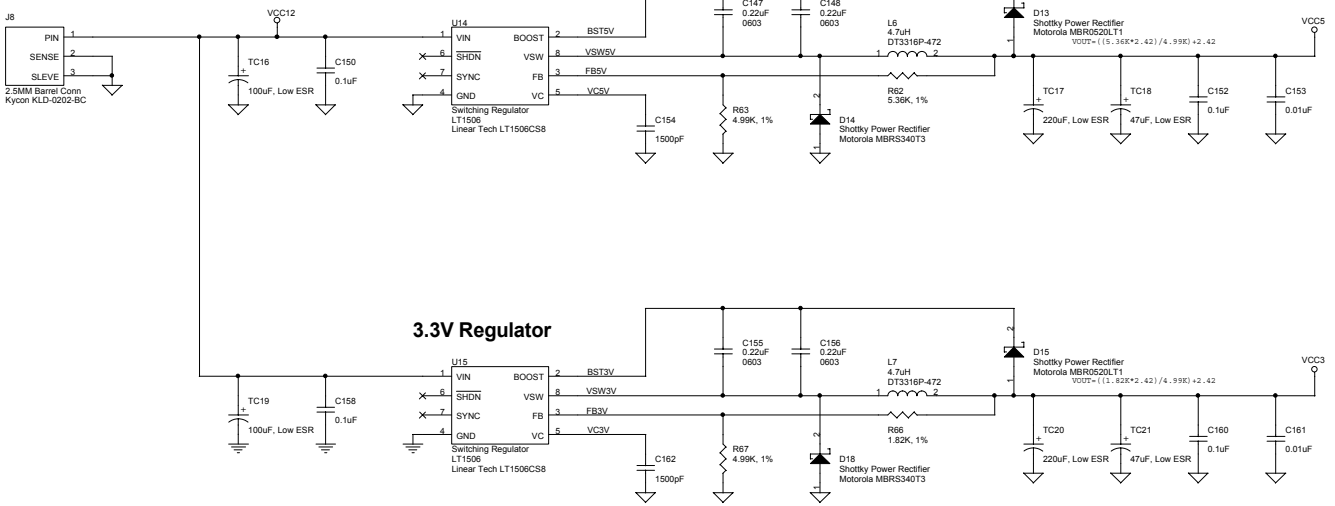
Title	NetSC520 Demonstration Board	
Size C	Document Number RESET AND BYPASS CAPS	Rev 1.0
Date: Wednesday, January 10, 2001	Sheet 13 of 14	

RESET, MAIN POWER, AND BACKUP BATTERY

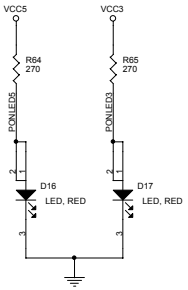
Power Connector

Use 12V Power Cube
Mfg X/ Part Number X





Power LEDs



SOT-23 LED
(COMPONENT SIDE VIEW)

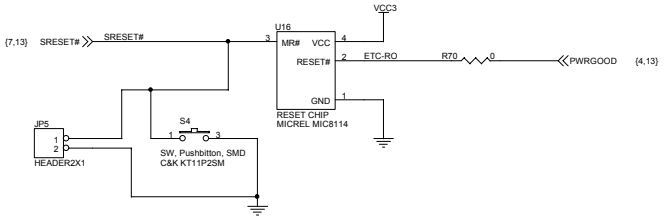
MRB0520LT1
CATHODE (2)

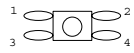
ANODE (1)

MRBS340T3
CATHODE (2)

ANODE (1)

System Reset Control

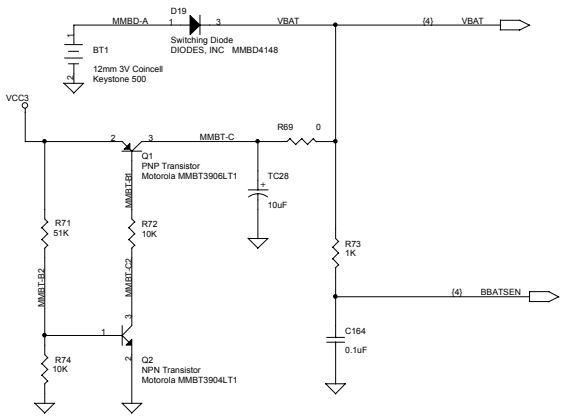




C&K KT11P2SM
(COMPONENT SIDE VIEW)

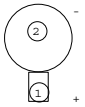
RTC VBAT Power

(PLACE CLOSE TO SC520 BGA)



SOT-23 DIODE
(COMPONENT
SIDE VIEW)

Transistor SOT-23
(COMPONENT
SIDE VIEW)



- Terminal

+ Terminal

BT1 - Battery Holder
Keystone 500

Title	NetSC520 Demonstration Board	
Size C	Document Number POWER	Rev 1.0
Date: Wednesday, January 10, 2001	Sheet 14 of 14	

NetSC520 Reference Design Revised: Tuesday, October 10, 2000
COVER Revision: 1.0

Bill Of Materials Page1

Item	AMD Part Numbe	Quantity	Reference	Part Spec	PCB Footprint	Value
1	4200009-020	1	BT1	Keystone 500	TH-2	12mm 3V Coincell
2	6100001-104	65	C1,C2,C3,C4,C5,C6,C7,C13, C14,C15,C16,C17,C18,C26, C27,C28,C30,C32,C33,C37, C40,C42,C44,C45,C46,C47, C48,C60,C61,C62,C63,C64, C73,C74,C75,C79,C82,C83, C86,C87,C88,C89,C90,C99, C100,C101,C102,C103,C112, C116,C119,C120,C121,C122, C127,C128,C129,C130,C142, C144,C150,C152,C158,C160, C164	+/-10%, X7R, 16V	603	0.1uF
3	6100001-224	10	C8,C9,C10,C11,C139,C140, C147,C148,C155,C156	+/-10%, X7R, 10V	603	0.22uF
4	6000000-004	1	C12	+/-5%, NPO, 16V	603	4.7pF
5	6000000-047	2	C19,C20	+/-5%, NPO, 16V	603	47pF
6	6100000-103	29	C23,C34,C35,C38,C39,C54, C55,C56,C57,C58,C59,C71, C72,C80,C81,C123,C124, C125,C126,C131,C132,C133, C134,C138,C145,C153,C161, C165,C166	+/-10%, X7R, 16V	603	0.01uF
7	6000000-015	1	C43	+/-5%, NPO, 16V	603	15pF
8	6000000-018	2	C84,C85	+/-5%, NPO, 16V	603	18pF
9	6000000-181	16	C91,C92,C93,C94,C95,C96, C97,C98,C104,C105,C106, C107,C108,C109,C110,C111	+/-5%, NPO, 16V	603	180pF
10	6000000-101	1	C118	+/-5%, NPO, 16V	603	*100pF
11	6000000-102	1	C137	+/-5%, NPO, 16V	603	0.001uF
12	6100000-152	3	C146,C154,C162	+/-5%, X7R, 16V	603	1500pF
13	2050002-001	10	D1,D3,D4,D5,D6,D7,D9,D23, D26,D29	LUMEX SSL-LX15GC-RP-TR	SOT-23	LED, GREEN
14	2050002-003	5	D8,D10,D21,D24,D27	LUMEX SSL-LX15SYC-RP-TR	SOT-23	LED, YELLOW
15	2050009-052	3	D11,D13,D15	Motorola MBR0520LT1	SOD-123	Shottky Power Rectifier

16	2050009-340	3	D12,D14,D18	Motorola MBRS340T3	403-03	Shottky Power Rectifier
17	2050002-002	6	D16,D17,D20,D22,D25,D28	LUMEX SSL-LX15RC-RP-TR	SOT-23	LED, RED
18	2050001-414	1	D19	DIODES, INC MMBD4148	SOT-23	Switching Diode
19	2290001-602	3	FB2,FB3,FB4	MURATA BLM31A601SPT	1206	600ohm @ 100MHz
20	No Populate	2	GS2,GS1		25oval	GND_Short
21	4100009-014	4	JP1,JP2,JP3,JP4	SAMTEC TMM-107-03-T-D	TH-2X7X2MM	HEADER 2X7X2mm
22	4100001-002	1	JP5	AMP 103186-1	TH-2X1	HEADER2X1
23	4100013-045	1	J1	AMP 4-176264-5	2X22X2MM	IDE_CONN, 2mm
24	4200014-064	1	J2	Comm Con 1184-64G2	2X32X0.1IN	PC104 ISA8
25	4200014-040	1	J3	Comm Con 1184-40G2	2X20X0.1IN	PC104 ISA16
26	4200015-064	1	J4	Comm Con 1241-120G2	4X30X2MM	PC104 PCI
27	4000013-010	1	J5	STEWART CONN SI-40248	RJ45_Mag_LEDs	RJ-45_MAGJACK_LEDS
28	4000003-109	2	J7,J6	AMP 788753-2	DB9	DB9, R-Angle, Male
29	4000001-025	1	J8	Kycon KLD-0202-BC	TH-3	2.5MM Barrel Conn
30	2290002-472	3	L5,L6,L7	Coilcraft DT3316P-472	SMT-2	4.7uH
31	4100009-012	1	POD1	SAMTEC TMM-106-03-T-D	2X6X2MM	AMDebug PORT
32	4900001-001	1	P1	Johnson 105-0851-001	TH-1	Test Jack, White
33	4900001-002	1	P2	Johnson 105-0853-001	TH-1	Test Jack, Black
34	4900001-003	1	P3	Johnson 105-0852-001	TH-1	Test Jack, Red
35	2150002-396	1	Q1	Motorola MMBT3906LT1	SOT-23	PNP Transistor
36	2150002-394	1	Q2	Motorola MMBT3904LT1	SOT-23	NPN Transistor
37	5300022-022	4	RN2,RN3,RN4,RN5	CTS 743C083220J	RP1206-S8	RN-8I, 22
38	5300022-102	5	RN6,RN7,RN8,RN9,RN12	CTS 743C083102J	RP1206-S8	RN-8I, 1K
39	5300022-033	1	RN10	CTS 743C083330J	RP1206-S8	RN-8I, 33
40	5300022-472	8	RN11,RN13,RN14,RN15,RN16, RN17,RN18,RN19	CTS 743C083472J	RP1206-S8	RN-8I, 4.7K
41	5400010-472	6	RP1,RP2,RP3,RP4,RP11, RP12	CTS 770101472	SIP-10	SIP-9I, 4.7K
42	5100000-047	2	R1,R2	+/-5%, 1/16W, 50V	603	47
43	5100000-472	6	R4,R5,R29,R40,R41,R59	+/-5%, 1/16W, 50V	603	4.7K
44	5100000-022	2	R6,R7	+/-5%, 1/16W, 50V	603	22
45	5100000-473	1	R8	+/-5%, 1/16W, 50V	603	47K
46	5100000-271	3	R9,R64,R65	+/-5%, 1/16W, 50V	603	270
47	5100000-103	5	R10,R23,R30,R72,R74	+/-5%, 1/16W, 50V	603	10K
48	5100000-033	7	R11,R12,R13,R14,R32,R54, R55	+/-5%, 1/16W, 50V	603	33
49	5100000-331	5	R15,R16,R17,R18,R53	+/-5%, 1/16W, 50V	603	*330
50	5100000-471	5	R19,R20,R21,R22,R56	+/-5%, 1/16W, 50V	603	*470
51	5100000-152	6	R24,R26,R27,R28,R98,R99	+/-5%, 1/16W, 50V	603	1.5K
52	5100000-681	1	R25	+/-5%, 1/16W, 50V	603	680
53	5000000-049	3	R31,R34,R35	+/-1%, 1/16W, 50V	603	49.9, 1%
54	5000000-202	1	R33	+/-1%, 1/16W, 50V	603	2K, 1%
55	5100000-123	1	R36	+/-5%, 1/16W, 50V	603	12K
56	5100000-161	12	R37,R38,R75,R77,R78,R81, R82,R85,R86,R89,R90,R93	+/-5%, 1/16W, 50V	603	160
57	5000000-102	1	R39	+/-1%, 1/16W, 50V	603	1K, 1%
58	5100000-242	4	R44,R45,R46,R47	+/-5%, 1/16W, 50V	603	2.4K
59	5100000-000	14	R48,R49,R51,R69,R70,R79, R80,R83,R84,R87,R88,R91,	+/-5%, 1/16W, 50V	603	0

			R92,R94			
60	5100000-010	1	R50	+/-5%, 1/16W, 50V	603	10
61	5100000-000	1	R58	+/-5%, 1/16W, 50V	603	*0
62	5000000-168	1	R60	+/-1%, 1/16W, 50V	603	165, 1%
63	5000000-499	3	R61,R63,R67	+/-1%, 1/16W, 50V	603	4.99K, 1%
64	5000000-536	1	R62	+/-1%, 1/16W, 50V	603	5.36K, 1%
65	5000000-182	1	R66	+/-1%, 1/16W, 50V	603	1.82K, 1%
66	5100000-513	1	R71	+/-5%, 1/16W, 50V	603	51K
67	5100000-102	5	R73,R76,R95,R96,R97	+/-5%, 1/16W, 50V	603	1K
68	4300001-008	1	S2	GRAYHILL 90B08S	DIP-16	SW DIP-8
69	4300001-003	1	S3	GRAYHILL 90B03S	DIP-6	SW DIP-3
70	4300003-004	1	S4	C&K KT11P2SM	SMD-4	SW, Pushbitton, SMD
71	6200002-407	2	TC9,TC1	+/-20%, TANTALUM, B-CASE, 16V	B-CASE	4.7uF
72	6200002-225	3	TC2,TC4,TC10	+/-20%, TANTALUM, B-CASE, 16V	B-CASE	2.2uF
73	6200002-108	3	TC5,TC7,TC8	+/-20%, TANTALUM, E-CASE, 16V	E-CASE	100uF
74	6200002-109	3	TC11,TC16,TC19	+/- 20%, Tantalum, Low ESR, V-CASE, 20V	V-CASE	100uF, Low ESR
75	6200002-278	3	TC12,TC17,TC20	+/- 20%, Tantalum, Low ESR, V-CASE, 16V	V-CASE	220uF, Low ESR
76	6200013-476	3	TC13,TC18,TC21	+/- 20%, Tantalum, Low ESR, D-CASE, 16V	D-CASE	47uF, Low ESR
77	6200010-106	2	TC28,TC14	+/- 20%, Tantalum, B CASE, 16V	B-CASE	10uF
78	6200001-226	4	TC22,TC24,TC25,TC26	+/- 20%, Tantalum, C CASE, 16V	C-CASE	22uF
79	No Populate	14	TP1,TP2,TP3,TP4,TP5,TP6, TP7,TP8,TP9,TP10,TP11, TP12,TP14,TP15			TP
80	1130005-520	1	U1	AMD ElanSC520-133AC	BGA-388	ELAN SC520 MICROCONTROLLER
81	1380010-010	2	U3,U2	Samsung K4S641632C-TC/L10	TSOP54	SDRAM_4MX16
82	1380001-641	2	U5,U4	AMD Am29LV641DH90REI	TSOP48	FLASH_4MX16
83	1340005-010	2	U9,U6	ATMEL AT93C46A-10SC-2.7	SO-8	MICROWIRE EEPROM, 1K
84	1420008-015	1	U7	Lattice GAL16LV8C-15LC	PLCC20S	GAL16LV8
85	1290001-973	1	U8	AMD Am79C973KC\W	PQR160	PCNet Fast-III
86	1640001-327	2	U11,U10	LTC1327CG	SSOP28	RS232-3V
87	1840005-003	1	U12	CYPRESS CY2305SC-1H	SO-8	CLOCK DRIVER
88	1680002-506	3	U13,U14,U15	Linear Tech LT1506CS8	SO-8	Switching Regulator
89	2980004-814	1	U16	MICREL MIC8114	SOT-143	RESET CHIP
90	3100001-250	1	X1	ECLIPTEK ECSMA-25.000M	SMD-XTL1	XTAL, 25MHz
91	3100002-328	1	X2	ECLIPTEK ECPSM29T	SMD-XTL2	XTAL, 32.768KHz
92	3300001-333	1	X3	EPSON SG-636PCE-33.333MC2	SMD-OSC	OSC-33.333MHz
93	3300001-145	1	Y1	ECLIPTEK EC2500ETT-14.318M	SMD-OSC2	OSC, 14.318MHz
94	3300001-008	1	Y2	ECLIPTEK EC2500ETT-8.000M	SMD-OSC2	OSC, 8.000MHz
95	No Populate	4	ZMH1,ZMH2,ZMH3,ZMH4	N/A	TH-1	Unplated Mounting Hole
96	9900000-007	4	Z1,Z6,Z10,Z14	Comm Con HW-PC600P	N/A	PC/104 Standoff
97	9900000-006	4	Z2,Z7,Z11,Z15	Comm Con HW-PC440NP	N/A	PC/104 Standoff Nut
98	4900000-002	4	Z3,Z4,Z8,Z9	Samtec 2SN-BK	N/A	2mm Jumper
99	4200004-021	1	Z5	SAMTEC PLCC-020-T-A	PLCC20P	PLCC20 SOCKET, W/ POSTS
100	2390001-103	1	Z16	Panasonic BR1225	N/A	12mm 3V Lithium Battery
101	0370001-012	1	Z17	Elpac W4012-760	N/A	Power Supply