NS7520 Jumpers and Components

Making DEVICE NETWORKING easy™

NS7520 Jumpers and Components Guide

Part number/version: 90000354_C
Release date: January 2006
www.digi.com

Digi International
11001 Bren Road East
Minnetonka, MN 55343 U.S.A.
United States: +1 877 912-3444
Other locations: +1 952 912-3444

www.digi.com/support/
www.digi.com

Contents

Using This Guide

Review this section for basic information about this guide, as well as for general support contact information.

About this guide

This guide provides information about the jumpers and components of the NS7520 development boards. The NS7520, part of the NET+ARM line of SoC (System-on-Chip) products, supports any type of high bandwidth application in Intelligent Networked Devices.

The NET+ARM is part of the NET+Works integrated product family, which includes the NET+OS network software suite.

Who should read this guide

This guide is for hardware developers, system software developers, and application programmers who want to use the NS7520 for development.

To complete the tasks described in this guide, you must:

- Understand the basics of hardware and software design, operating systems, and microprocessor design.
- Understand the NS7520 architecture.

What's in this guide

This table shows where you can find information in this guide:

To read about	See
A description of the NET+Works development board hardware	Chapter 1, "Hardware Description"
The NS7520 board schematics	Chapter 2, "Schematics"
The bill of materials (BOM) for the NS7520 development board	Chapter 3, "Bill of Materials"

Conventions used in this guide

This table describes the typographic conventions used in this guide:

This convention	Is used for
italic type	Emphasis, new terms, variables, and document titles.
bold, sans serif type	Menu commands, dialog box components, and other items that appear on-screen.
Select **Menu → option**	Menu commands. The first word is the menu name; the words that follow are menu selections.
`monospaced type`	Filenames, pathnames, and code examples.

Related documentation

- For information on the chip you are using, see the *NS7520 Hardware Reference*.
- For information on third-party products and other components, review the documentation CD-ROM that came with your development kit.
- See the NET+OS software documentation for information appropriate to the chip you are using.

Documentation updates

Digi occasionally provides documentation updates on the Web site (www.digi.com/support).

Be aware that if you see differences between the documentation you received in your package and the documentation on the Web site, the Web site content is the latest version.

Customer support

To get help with a question or technical problem with this product, or to make comments and recommendations about our products or documentation, use the contact information listed in this table:

For	Contact information
Technical support	United States: +1 877 912-3444 Other locations: +1 952 912-3444 www.digi.com/support www.digi.com

Hardware Description

CHAPTER 1

This chapter provides a hardware description of the NS7520 development board. In addition, this chapter describes how to configure the base address for each chip select.

Overview

The board is identifiable by this information:

- **Market name.** NET+Works Development Board
- **Part number.** 6152000
- **NS7520.** Consists of a 177-pin BGA package. The NS7520 is a high-performance, cost-effective, highly-integrated 32-bit chip, designed for use in intelligent network devices and Internet appliances.

Features of the development board

The NET+Works development board provides these basic features:

- 55 MHz NS7520.
- 18.432 MHz crystal or an external oscillator. NS7520 development boards may be populated with an external 18.432 MHz crystal or 55 MHz oscillator for system clock generation.
- ARM JTAG ICE port
- 20 LED indicators: eight each on PORT A and PORT C, two on the Ethernet connector, one power indicator, and one CPU LED
- 2 ASYNC 1 Mbps serial ports, one with RS485 option, user selectable
- 10/100BaseT Ethernet port
- 128 Mb SDRAM (16 MB)
- 2 MB flash, expandable to 16 MB
- Bootstrap configuration headers
- Breakout headers for logic analyzer connections
- GPIO PORTA and PORTC breakout headers

Chip select configuration

The peripheral devices can be tied to different chip selects on the NS7520. The chip select must be configured using NS7520 development board jumpers (as shown in this table). CSSEL0 is set to 0 by installing the jumper at JP14 and set to 1 by removing the jumper at JP14. CSSEL1 is set to 0 by installing the jumper at J20 and set to 1 by removing the jumper at JP20.

CSSEL1	CSSEL0	Chip selects
0	0	CS0 = flash; CS1 = SDRAM; CS4 = PIC(u9)
0	1	CS2 = flash; CS1 = SDRAM; CS0 = PIC(u9)
1	0	CS3 = flash; CS1 = SDRAM; CS2 = PIC(u9)
1	1	CS4 = flash; CS1 = SDRAM; CS3 = PIC(u9)

The board is built and shipped with CS0 set to flash; CS1 set to SDRAM, and CS4 set to PIC(u9).

Jumpers

This table defines the jumpers. The entry `default = DISABLED` means that the jumper is removed from the board.

Signal name	Purpose
JP1	Port C RS485; 1-2 = ENABLE; default = DISABLED
JP2	Reserved
JP3	Port C RS485; 1-2 = ENABLE; default = DISABLED
JP4	Reserved
JP5	Port A Force 232 OFF; 1-2 = DISABLED; default = ENABLED
JP6	Port C Force 232 OFF; 1-2 = DISABLED; default = ENABLED
JP7	Port C RS485; 1-2 = ENABLE; default = DISABLED
JP8	Reserved

Signal name	Purpose
JP9	Port C RS485; 1-2 = ENABLE; default = DISABLED
JP10	Port C RS232/485; 1-2 = ENABLE RS232; 2-3 = ENABLE RS485
JP11	8 pin Header Port C GPIO [0:7]
JP12	6 pin JTAG header for U9 CPLD (ISP)
JP13	BWSEL0; 1-2 = 0; default = 1; Bus Width Select
JP14	CSSEL0; 1-2 = 0; default = 1; Chip Select Config
JP15	8 pin Header Port A GPIO [0:7]
JP16	TDO_PIC; 1-2 = TDO signal from JP12 Header to U9
JP17	TDI_PIC; 1-2 = TDI signal to U9
JP18	FLASH_EN; 1-2 = ENABLED; default = DISABLED
JP19	BWSEL1; 1-2 = 0; default = 1; Bus Width Select
JP20	CSSEL1; 1-2 = 0; default = 1; Chip Select Config
JP21	JTAG TDO ENABLE; 1-2 = ICE (default); 2-3 = Boundary SCAN
JP22	Reserved
JP23	Reserved
JP24	Reserved
JP25	A27 Endian configuration; 1-2 = little; default = big
JP26	A26 CPU Bootstrap; 1-2 = ARM CPU disabled; default = ARM CPU Enabled
JP27	A25 GEN_IARB; 1-2 = External Bus Arbiter; default = Internal Bus Arbiter
JP28	A24 CSO/MMCR[19]; 1-2 = 0; default = 1; CSO Bootstrap Setting
JP29	A23 CSO/MMCR[18]; 1-2 = 0; default = 1; CSO Bootstrap Setting
JP30	A22 Reserved
JP31	A21 Reserved
JP32	A20 Reserved
JP33	A19 GEN_ID[10]; 1-2 = 0; default = 1; user defined
JP34	A18 GEN_ID[9]; 1-2 = 0; default = 1; user defined
JP35	A17 GEN_ID[8]; 1-2 = 0; default = 1; user defined

Signal name	Purpose
JP36	A16 GEN_ID[7]; 1-2 = 0; default = 1; user defined
JP37	A15 GEN_ID[6]; 1-2 = 0; default = 1; user defined
JP38	A14 GEN_ID[5]; 1-2 = 0; default = 1; user defined
JP39	A13 GEN_ID[4]; 1-2 = 0; default = 1; user defined
JP40	A12 GEN_ID[3; 1-2 = 0; default = 1; user defined
JP41	14 pin JTAG header for NS7520
JP42	A11 GEN_ID[2]; 1-2 = 0; default = 1; user defined
JP43	A10 GEN_ID[1]; 1-2 = 0; default = 1; user defined
JP44	A9 GEN_ID[0]; 1-2 = 0; default = 1; user defined
JP45	A8 PLL_IS[1]; 1-2 = 0; default = 1
JP46	A7 PLL_IS[0]; 1-2 = 0; default = 1
JP47	A6 PLL_FS[1]; 1-2 = 0; default = 1
JP48	A5 PLL_FS[0]; 1-2 = 0; default = 1
JP49	A4 PLL_ND[4]; 1-2 = 0; default = 1
JP50	A3 PLL_ND[3]; 1-2 = 0; default = 1
JP51	A2 PLL_ND[2]; 1-2 = 0; default = 1
JP52	A1 PLL_ND[1]; 1-2 = 0; default = 1
JP53	A0 PLL_ND[0]; 1-2 = 0; default = 1
JP54	SCANEN; 1-2 = 0; default = 1; active low signal
JP55	PLLTST; 1-2 = 0; default = 1; active low signal
JP56	BISTEN; 1-2 = 0; default = 1; active low signal

Connectors

This table defines the connectors and their designations:

Reference number	Type	Purpose
J1/J3	Mini/din jack	Power connector - 5 pin din populated
J5	RJ45 MAG-jack	10/100 BT Ethernet with magnetics and LEDs
J6-12	Mictor 38 pin	Breakout emulator headers
P1	DB9 male	Serial port A RS232, 1 Mbps, full modem support
P2	DB9 male	Serial Port C RS232, 1 Mbps or RS485
JP41	Header 2x7	ARM ICE port
P3	Header 1x6	Manufacturing test plug

Ethernet interface

The development board provides a full-duplex 10/100 Mbps Ethernet interface using the Intel 3V PHY in a BGA package, which uses the standard MII interface.

The RJ45 connector is integrated with the isolation transformer, EMI filter components, link, and receive LEDs.

You also can use the MII interface to determine the current Ethernet link status. Change of link status can cause an interrupt on IRQ0*.

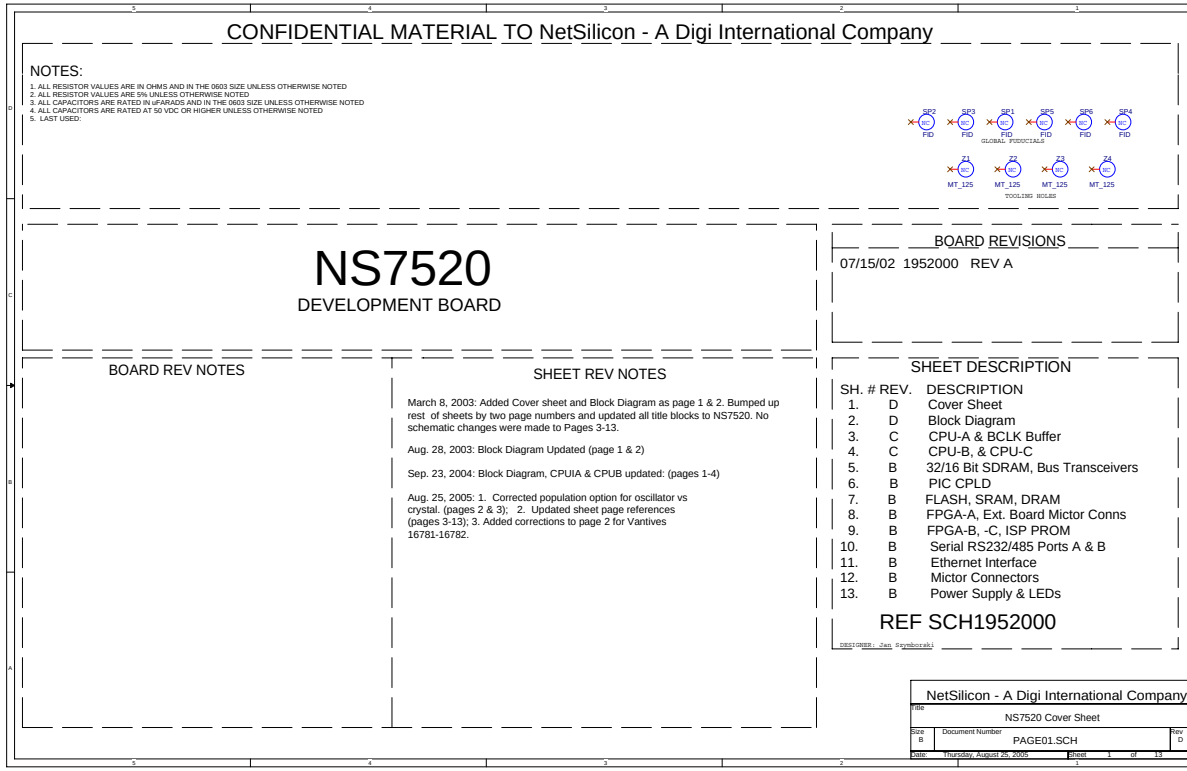
Schematics

CHAPTER 2

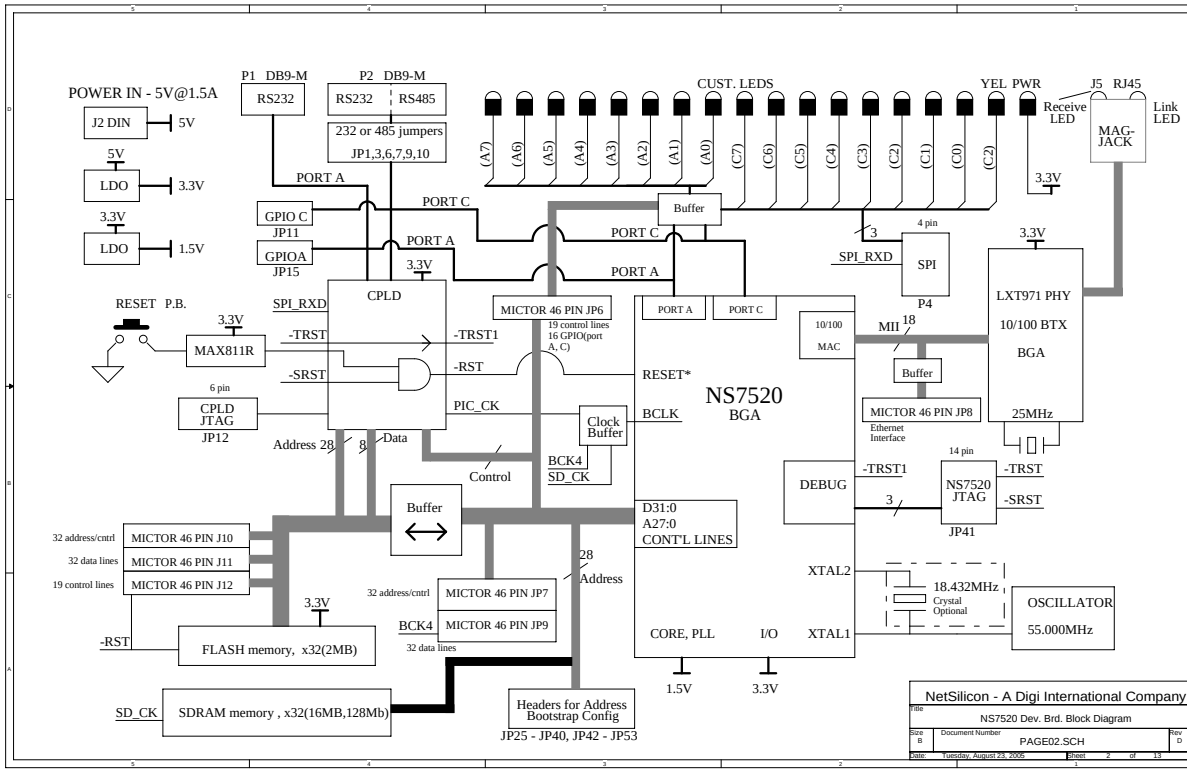
This chapter provides the schematics for the development board. The schematics in this chapter are at a small scale. For larger (and most up-to-date) diagrams, see the file `NS7520_schematics.pdf` on the NS7520 hardware documentation CD.

Schematics

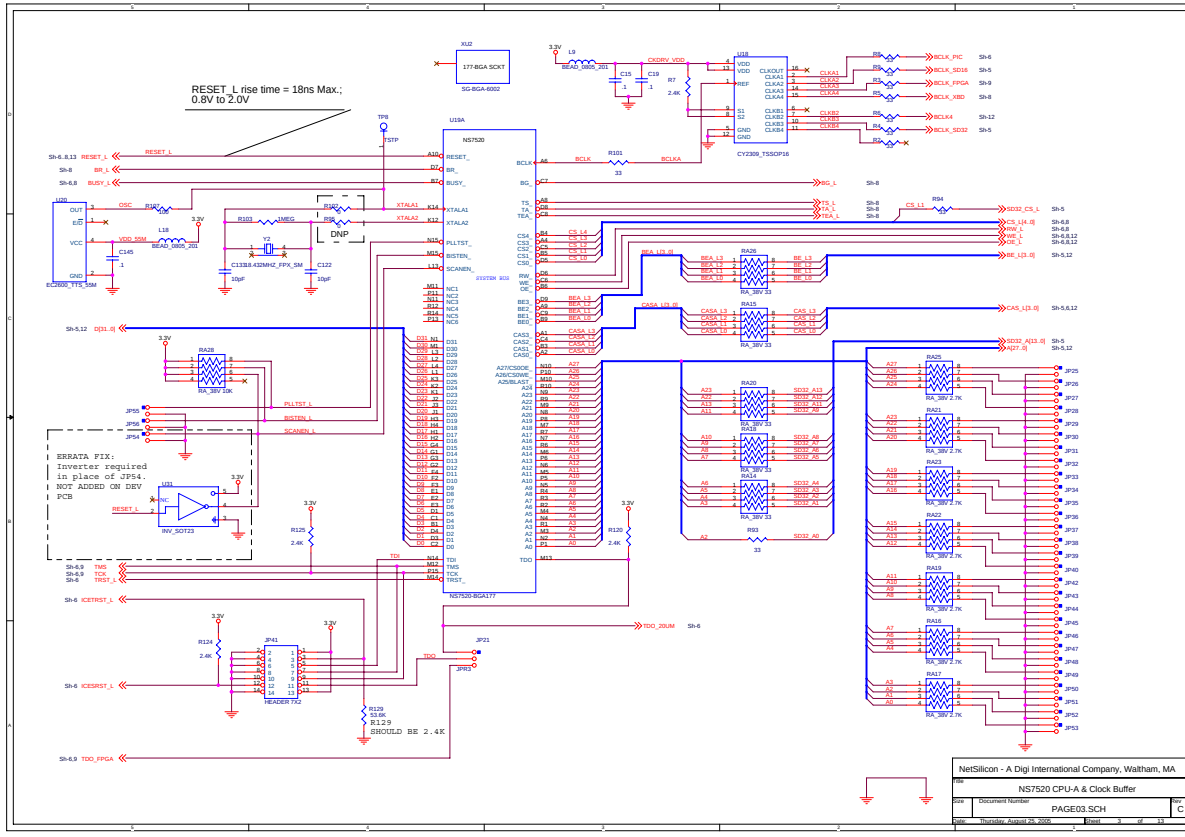
Cover sheet



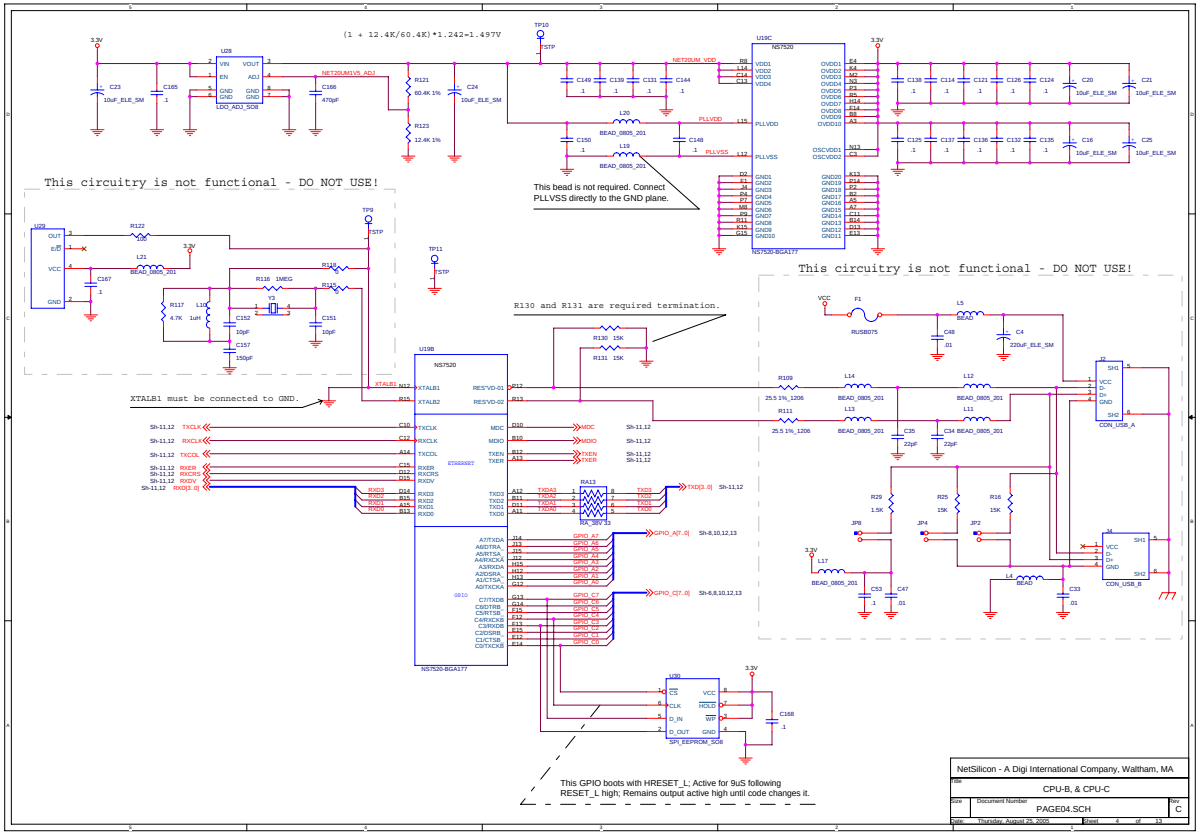
Block diagram



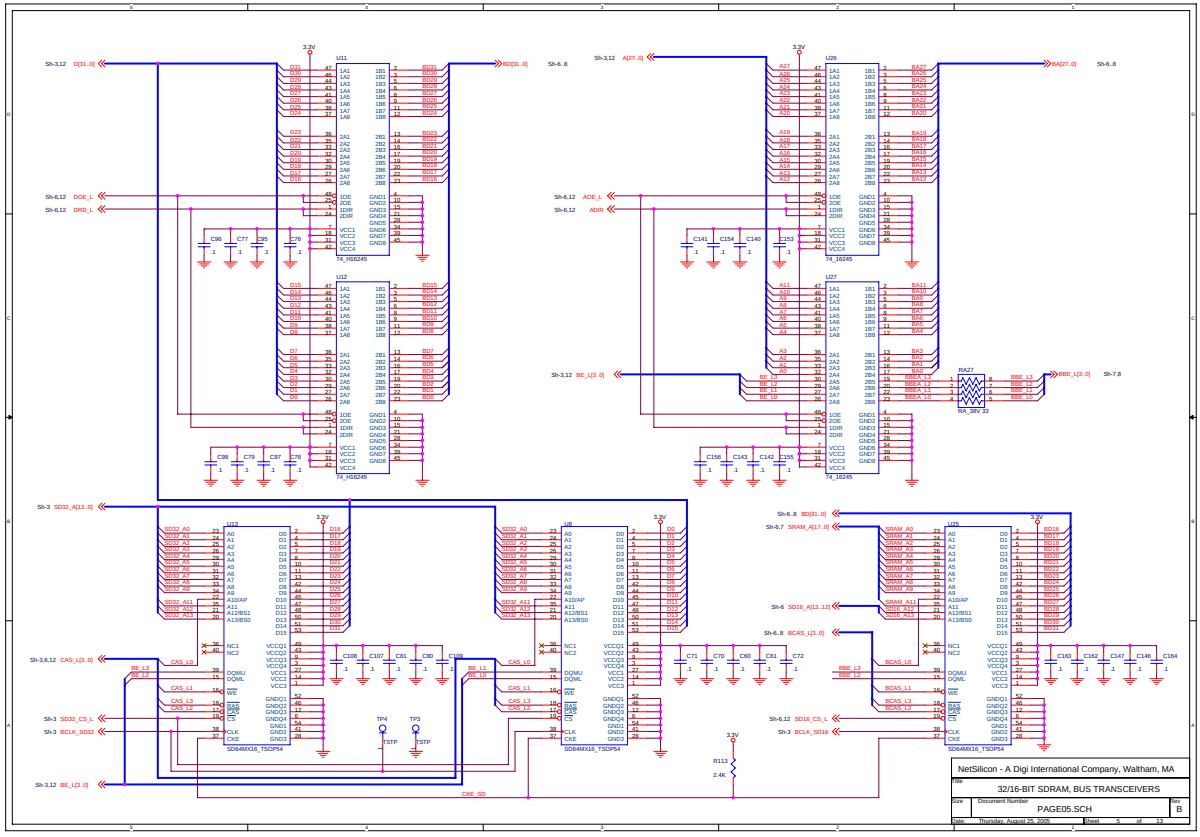
CPU-A & B CLK Buffer



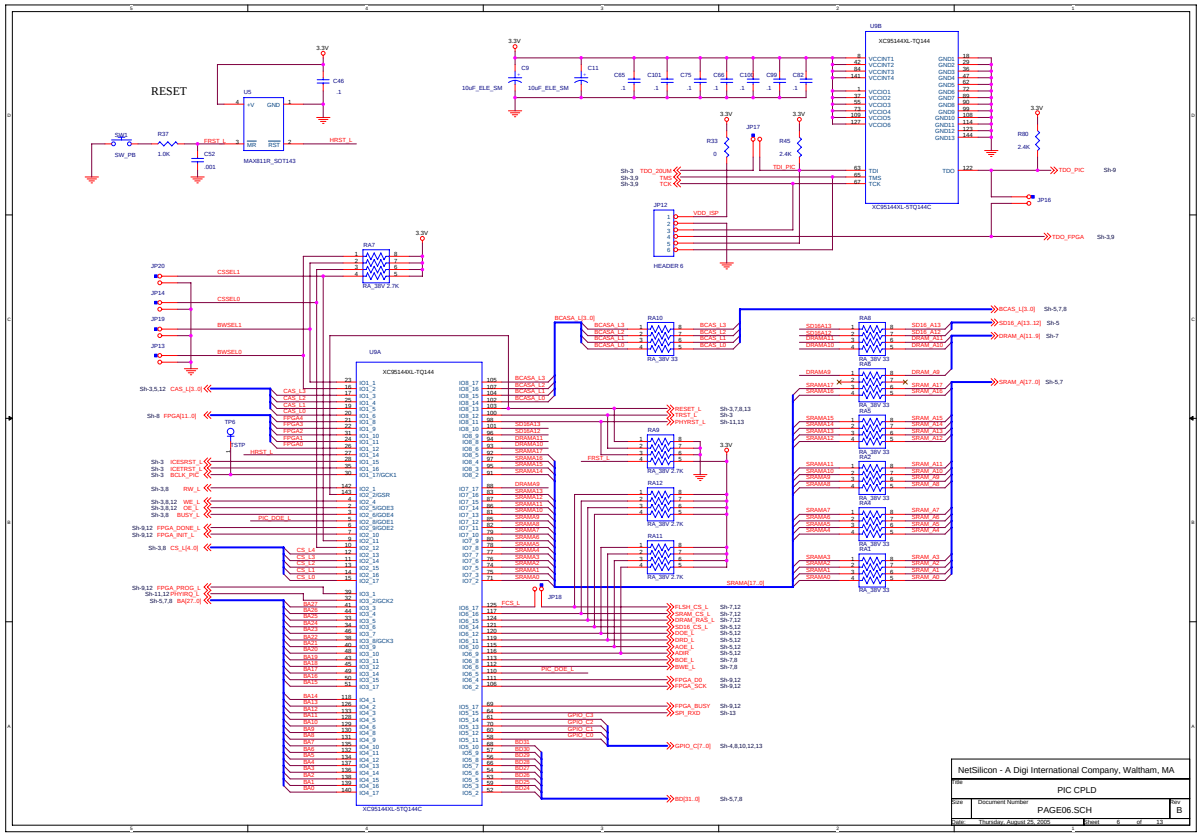
CPU-B & CPU-C


This circuitry is not functional - DO NOT USE!
This bead is not required. Connect PLLVSS directly to the GND plane.
This circuitry is not functional - DO NOT USE!
R130 and R131 are required termination.
XTALB1 must be connected to GND.
This GPIO boots with HRESET_L; Active for 9uS following RESET_L high; Remains output active high until code changes it.
NetSilicon - A Digi International Company, Waltham, MA
CPU-B, & CPU-C
PAGE04.SCH

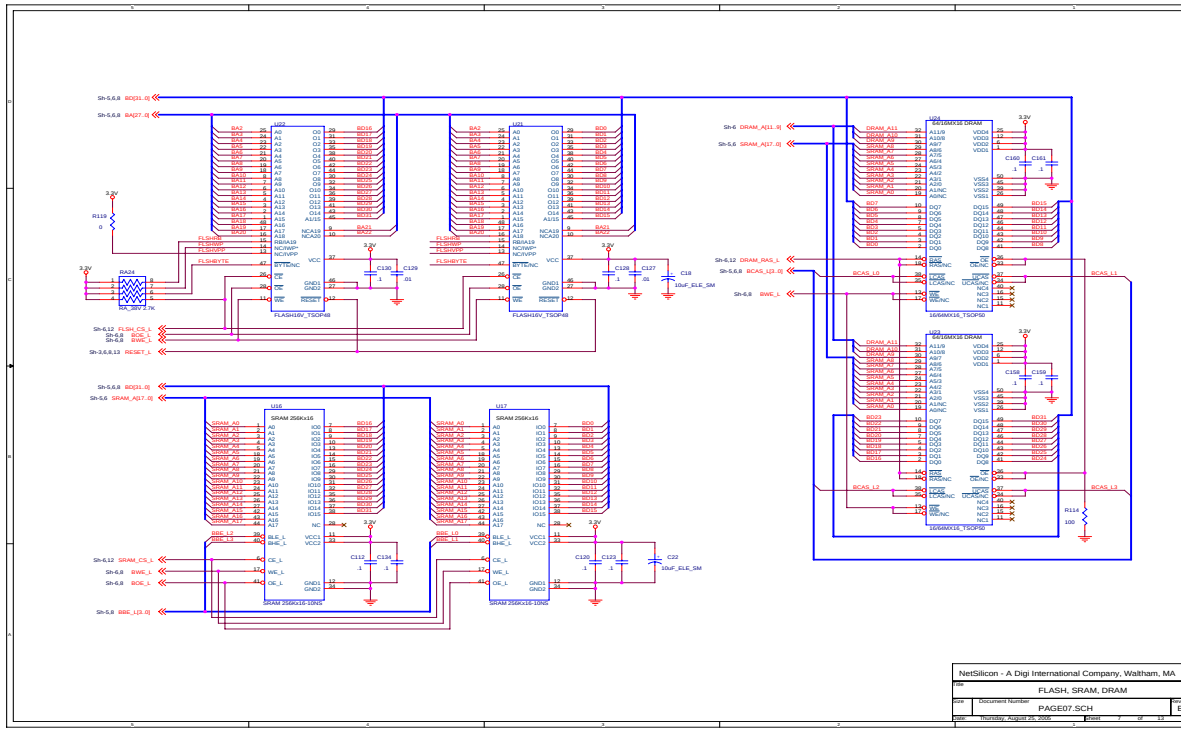
32/16 bit SDRAM, Bus Transceivers



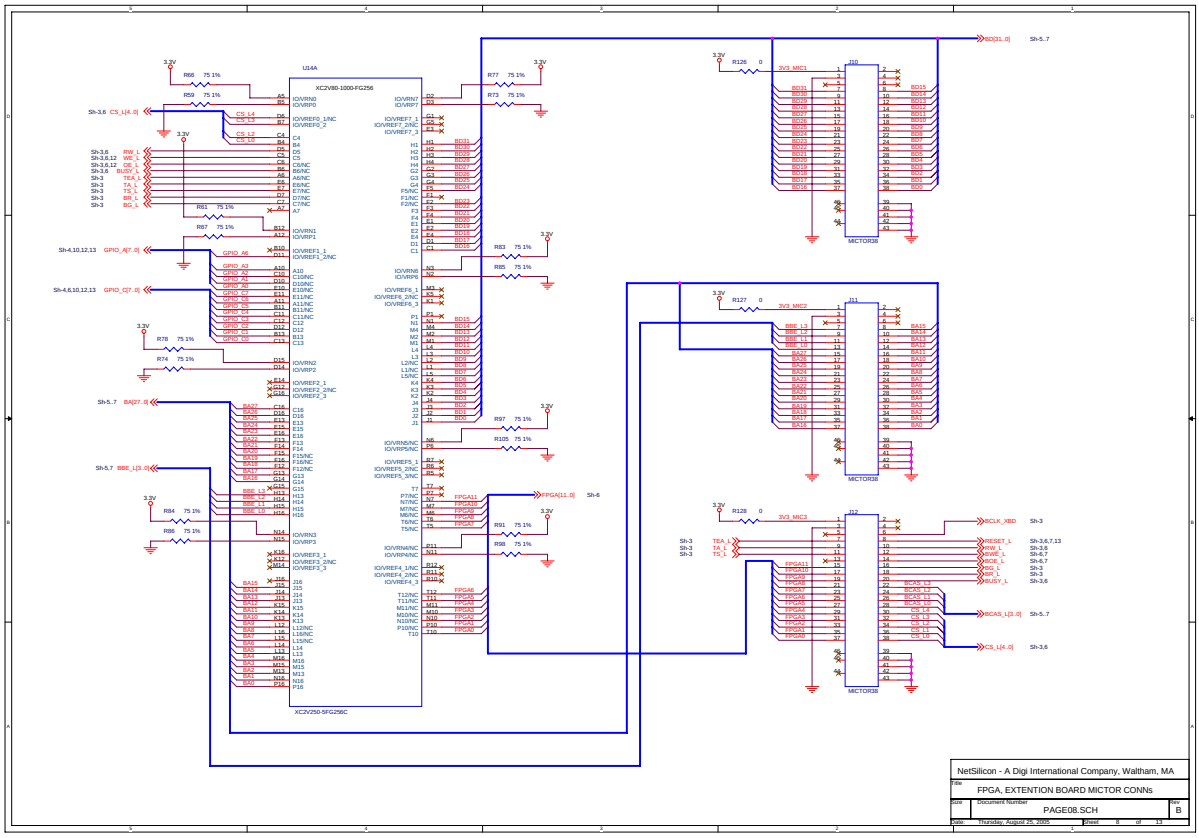
PIC CPLD


RESET
MAX811R_SOT143
XC95144XL-TQ144
XC95144XL-5TQ144C
NetSilicon - A Digi International Company, Waltham, MA
PIC CPLD
PAGE06.SCH
Thursday, August 25, 2005

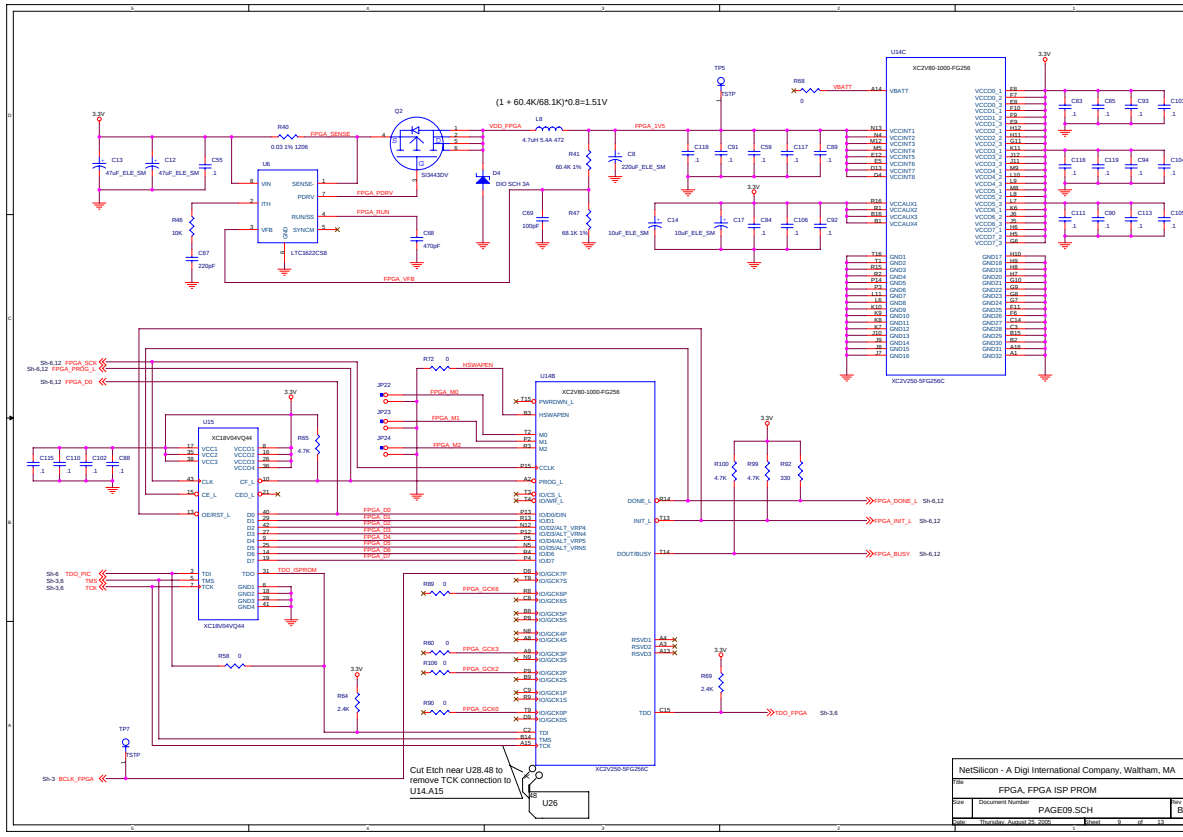
FLASH, SRAM, DRAM



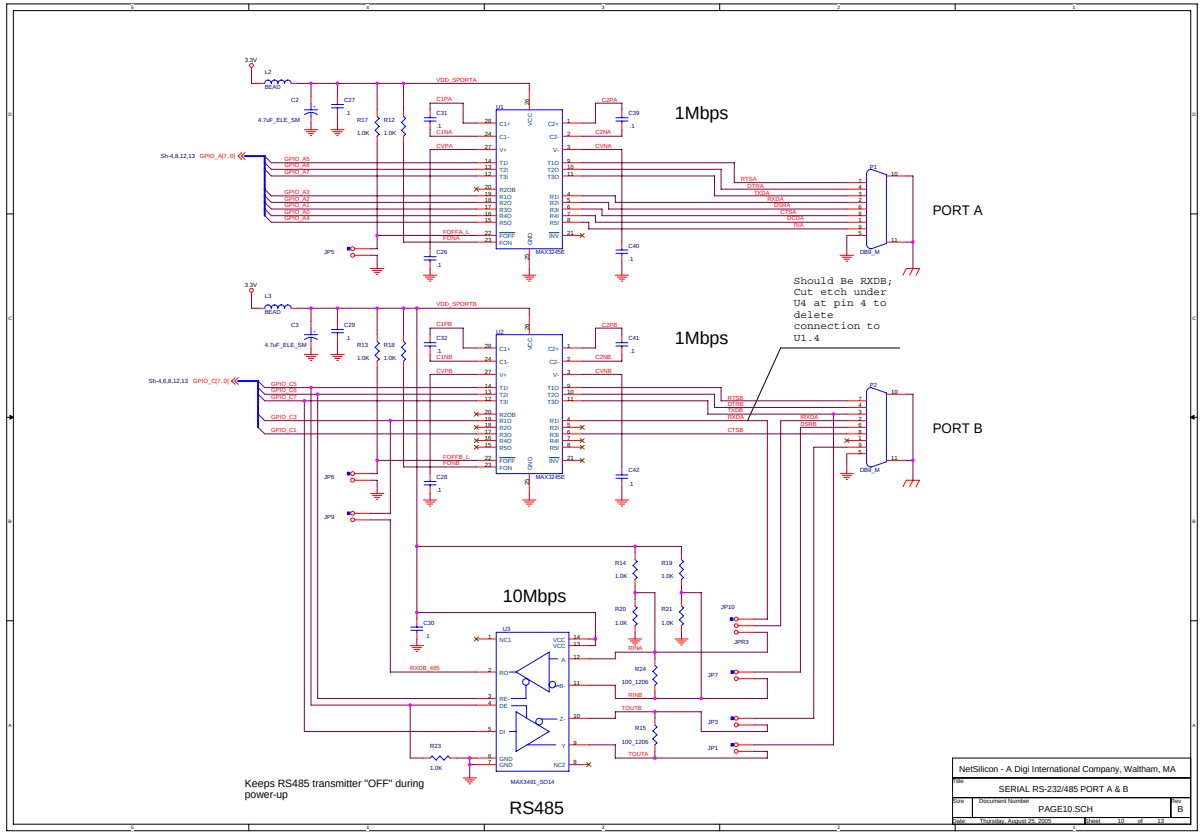
FPGA-A, Ext. Board Mictor Conns



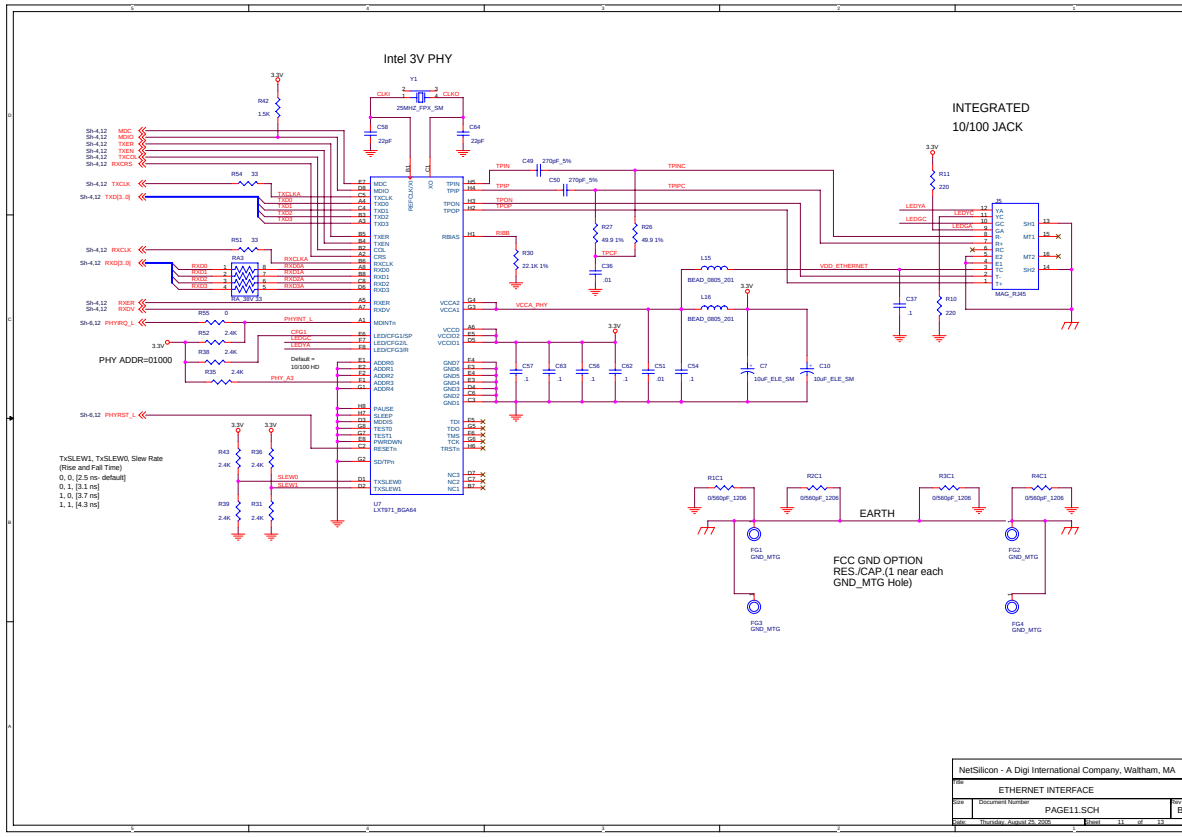
FPGA, FPGA ISP PROM



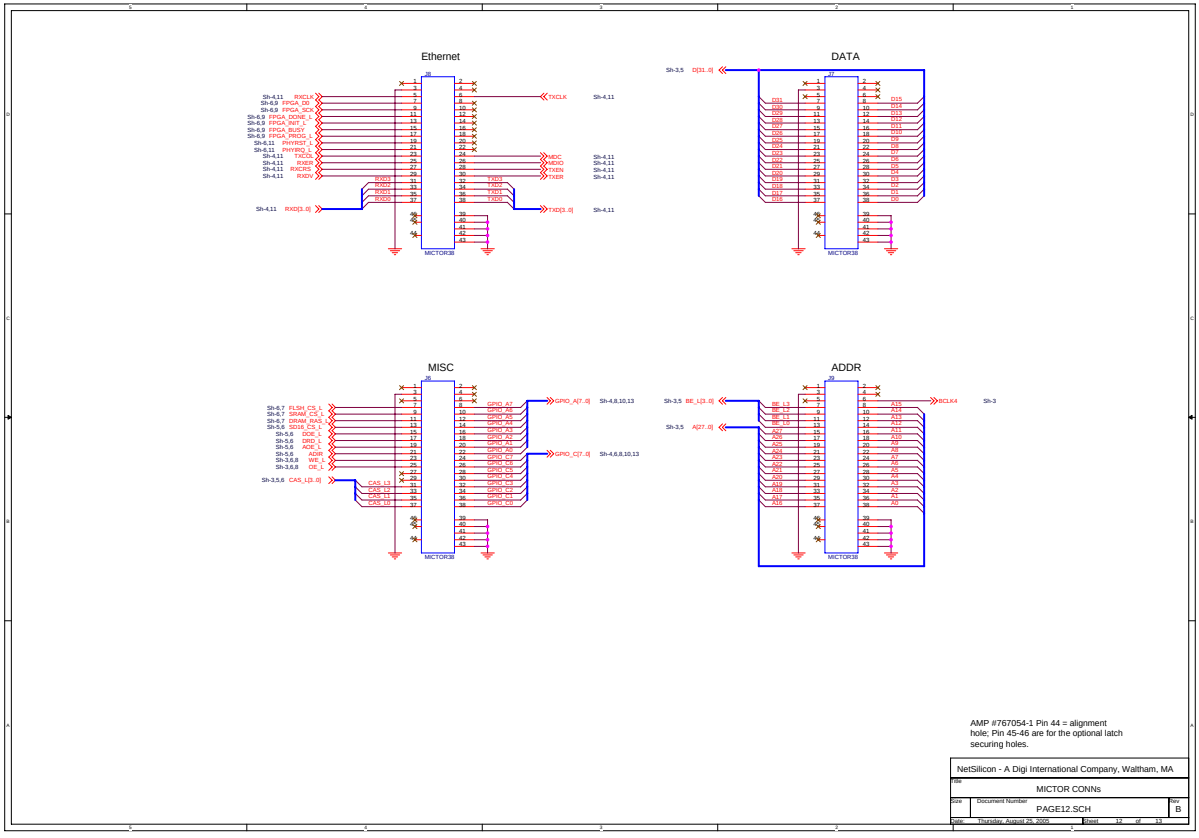
Serial RS232/485 Ports A & B



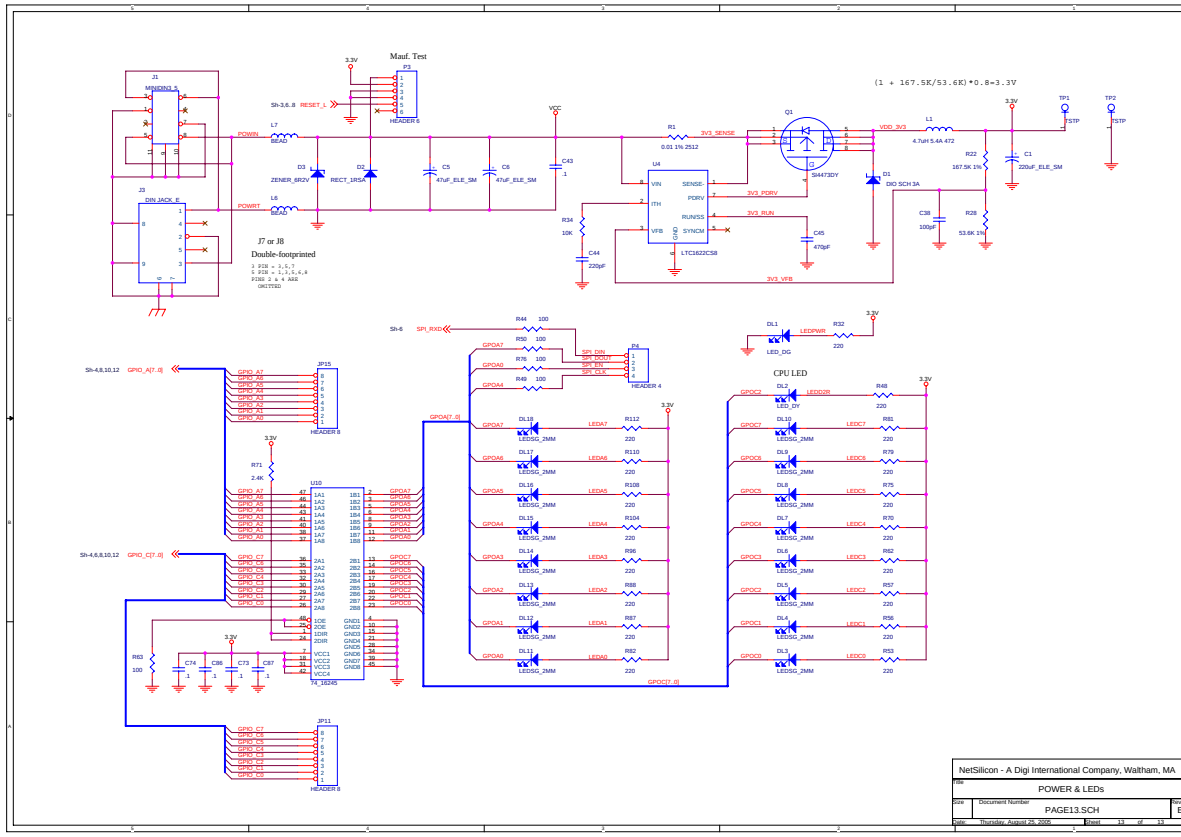
Ethernet Interface



Mictor Connectors



Power Supply & LEDs



Bill of Materials

CHAPTER 3

This chapter provides the bill of materials (BOM) for the NET+Works NS7520 development board.

BOM — NS7520 development board

This table provides information for each part in the NS7520 development board bill of materials (manufactured item: 6152000):

- Reference description (Ref)
- Description (Desc)
- Manufacturer (Mfg)
- Manufacturer part number (Mfg PN)

Ref	Desc	Mfg	Mfg PN
U21, 22	FLASH ROM 512KX16 3.3V TSOP48	Fujitsu	MBM29LV800BA90PFTN
		St Micro	M29W800AB90NS
		AMD	AM29LV800BB-90EC
TP1-4, 6, 8, 10, 11	TESTPOINT, MINIATURE BLACK	Keystone	5001
U5	IC POWER MONITOR 3.3V SOT143	Maxim	MAX811R-EUS-T
U7	IC 10/100 PHY 3.3V 64 PIN BGA	Intel	FLLXT971ABC
		Intel	LXT971ABC
U10, 26, 27	IC 16-BIT TRANCEIVER 3.3V SS	Texas Instruments	SN74LVC6245ADLR
		Pericom	PI74LCX16245VX
		Integrated Device Tech.	74LVC16245APV
		Fairchild	74LCX16245MEA
U11, 12	IC 16-BIT XCVR 1.65 - 3.6V S	Texas Instruments	SN74ALVCH16245DLR
U3	IC 16-BIT TRANCEIVER 3.3V 12MBPS RS	Maxim	MAX3491ECSD
U1, 2	IC 16-BIT TRANCEIVER RS-232 TSSOP-2	Maxim	MAX3245EEAI
Q1	IC P-CHANNEL 14-V MOSFET SO-8	Vishay	SI4473DY
U28	REGULATOR MIC5219 ADJUSTABLE	Micrel	MIC5219BMM
U4	IC CURRENT MODE DC/DC/CONTROL	Linear Tech	LTC1622CS8
U18	IC BUFFER ZERO DELAY 3.3V 16	Cypress	CY2309ZC-1H
U19	IC NS7520 BGA	NetSilicon	NS7520

Ref	Desc	Mfg	Mfg PN
D2	DIODE 1.5A RECTIFIER SOD-87	Phillips	BYD17D
D1	DIODE SCHOTTKY, 3A 20V SM	Diodes Inc	SK32
D3	DIODE ZM4735A ZENER ZM-41(SM))	Diodes Inc	ZM4735A-13
		American Power Device	ZM4735A-13
		ITT	ZM4735A-13
L1	INDUCTOR 4.7 uH 5.4A SM	Coil Craft	DO3316P-472
SW1	SWITCH PUSH BUTTON	C & K	PTS635SL50
Y2	CRYSTAL 18.432 MHZ 20 PF (SMT)	Epson	MA40618.432M-GO
		Fox	FPX-18.432-20
		HEC	HEC3A-18.432-MHZ-20PF
Y1	CRYSTAL 25 MHZ FUNDAMENTAL 20	Epson	MA40625.000M-GO
		Fox	FPX-SM-25
		HEC	HEC-3A-25MHZ-20PF500PPM
U20	OSCILLATOR 55MHZ 4PIN 3.3V HC	Epson	SG-710ECK55.000MB0
		Ecliptek	EC2600-TTS-55.000MTR
L2, 3, 6, 7	FERRITE BEAD 90Z @ 100MHZ (SM)	ACT	FB863226-Y7
		Fair-Rite	2743021447
L9, 15, 16, 18-20	FERRITE BEAD 200Z 100MHZ (SM	TDK	ACB2012M-150T
		Murata	BLM21B201S
		Steward	LI0805H151R-00
		Steward	LI0805D121R
C1	CAP 220 MF 10V 20% SIZE E ELE	NIC	NACE221M10V6.3X8TR13
		NIC	NACE221M16V6.3X8TR13
		Nipon	NACE221M16V6.3X8TR13
		Cal Chip	GACE221M10V6.3X8TR13
C49, 50	CAP 270 PF 50V 5% NPO SM0603	Murata	GRM1885C1H271JA01E
		AVX	06035C0G271JAT2A

Ref	Desc	Mfg	Mfg PN
C58, 64	CAP 22 PF 50V 5% 0603	Vitramon	VJ0603A2220JXAAT
		NIC	NMC0603NPO220J50TR
		Kemet	C0603C220J5GAC
		AVX	06035A220JAT2A
C45, 66	CAP 470 PF 50V 10% 0603	NIC	NMC0603X7R471J50TRP
C52	CAP .001 MFD 50V 10% 0603	Vitramon	VJ0603Y102KXAAT
		AVX	06035C102KAT2A
C36, 51, 127, 129	CAP .01 MFD 50V 10% 0603	Vitramon	VJ0603Y103KXAAT
		Kemet	C0603C103K5RAC
		AVX	06035C103KAT2A
C7, 9-11, 16, 18, 20, 21, 23-25	CAP 10UF 16V ELE SM B SIZE	NIC	NACE100M16V4X5.5TR13
		Panasonic	ECEV1CA100R
		Nichicon	UWX1C100MCR1GB
		Cal Chip	GACE100M16V4X5.5TR13
C2,3	CAP 4.7 MF 25V 20% SIZE B ELE	Panasonic	ECEV1VA4R7SR
		Cal Chip	GACE4R7M25V4X5.4TR13
C5, 6	CAP 47 MF 16V 20% SIZE D ELE S	NIC	NACE470M16V6.3X5.5TR13
		Panasonic	ECEV1CA470ER
		Cal Chip	GACE470M16V6.3X5.5 TR13
R1C1, R2C1, R3C1, R4C1	RES 0 OHM 1/8W 5% (SM 1206) TF	Any	ANY MFG
R15, 24	RES 100 OHM 1/8W 1% (SM 1206)	TAD Components, Inc.	CR181000FM
R44, 49, 50, 63, 76, 107	RES 100 OHM 5% 1/16W 0603	Panasonic	ERJ3GEYJ101V

Ref	Desc	Mfg	Mfg PN
R10, 11, 32, 37, 48, 53, 56, 57, 62, 70, 75, 79, 81, 82, 87, 88, 96, 104, 108, 110, 112	RES 220 OHM 5% 1/16W 0603	AVX	CR10-221J-T
		Panasonic	ERJ3GEYJ221V
R123	RES 12.4K 1% 1/16W 0603	AVX	CR10-1241F-T
		SEI	RMC 1/16 12.4K 1% R
R42	RES 1.5 5% 1/16W 0603	AVX	CR10-152J-T
		Panasonic	ERJ3GEYJ152V
R26, 27	RES 49.9 OHM 1/16W 1% 0603	AVX	CR10-49R9F-T
R34	RES 10K 5% 1/16W 0603	AVX	CR10-103J-T
		Panasonic	ERJ3GEYJ103V
R7, 31, 35, 38, 39, 45, 52, 71, 80, 113, 120, 124, 125	RES 2.4K 5% 1/16W 0603	AVX	CR10-242J-T
		Panasonic	ERJ3GEYJ242V
R1	RES POWER 0.01 OHM 1% SM 2512	Vishay	WSL-2512 R01 1% tr1000
R121, 129	RES 60.4K 1% 1/16W 0603	AVX	CR10-6041F-T
		SEI	RMC 1/16 60.4K 1% R
		SEI	RMC1/1660K41TR
R30	RES 22.1K 1% 1/16W 0603	AVX	CR10-2211F-T
DL1	LED GREEN	Kingbrite	L73GD
		P-TEC	PL16-CD-G
DL3-18 Assemble with polarity reversed	LED, 2MM, GREEN, STR, HOUSE	Kingbrite	AM2520EJ/LSGD
		IDI/Chicago Mini	5370T5LC

Ref	Desc	Mfg	Mfg PN
DL2	LED YELLOW T1 3/4 STD DUFF	Kingbrite	L73YD
J5	CONN PULSE THRU HOLE TAB DN RJ	Pulse	J0026D21B
J3	CONN DIN JACK 5 CONTACT 180 D	Singatron	DJ-021-5P
P1, 2	CONN 9 PIN RA MALE .318FP (DB	Kycon	K22-E9P-N
J6-12	CONN VERTICAL 38 POS MICTOR	AMP	767054-1
JP10, 21	HEADER 3PIN SINGLE ROW STRAIGH	Singatron	201-1X3-GS
		RDI	PHSS03G1
JP1, 3, 5-7, 9, 13, 14, 16-20, 25-40, 42-56	HEADER 2PIN SINGLE ROW STRAIGH	Singatron	2201-2-S-02
		RDI	PHSS02G1
JP12, P3	HEADER 6PIN SINGLE ROW STRAIGH	Singatron	2201-6-S-02
		RDI	PHSS06G1
JP11, 15	HEADER 8PIN SINGLE ROW STRAIGH	RDI	PHSS08G1
P4	HEADER 4PIN SINGLE ROW STRAIGH	RDI	PHSS04G1
JP41	HEADER 7 X 2 DOUBLE ROW STRAIG	Singatron	2202-14-S-02
		RDI	PHDS14G1
Installed at JP10-232, JP14, JP18, JP20, JP21-ICE, JP28	SHUNT, SHORTING FEM 02P .100C	AMP Incorporated	390088-2
		MOLEX	15-29-1024
R2-6, 8, 9, 51, 54, 93, 94, 101	SMRES,33.2R 0603 .063W 1% FILM	NIC	NRC06F33R2TR
		DALE	CRCW060333R2FRT-1
		KOA	RK73H1JT33R2F
		Panasonic	ERJ3EKF33R2V
r33, 55, 58, 60, 68, 69, 89, 90, 106, 119, 126-128	SMRES,0 R 0603 FILM	AVX Corporation	CJ10-000J-T
		NIC	NRC06Z0TR
		Dale	CRCW0603000JRT-1
		KOA	RM73Z1JT

Ref	Desc	Mfg	Mfg PN
RA28	SMRN,10K .063W 08P ISOL 5%	AVX Corporation	CRA3A4E103JT
		Bourns	CAT16-103J4
		CTS Corporation	742C083103JTR
		PANASONIC	EXBV8V103JV
RA7, 9, 11, 12, 16, 17, 19, 21-25	SMRN,2.7K .063W 08P ISOL 5%	AVX Corporation	CRA3A4E272JT
		Bourns	CAT16-272J4
		Panasonic	EXBV8V272J
R103	SMRES,1M 0603 .063W 5% FILM	AVX Corporation	CR10-105J-B
		AVX Corporation	CR10-105J-T
		KOA	RM73B1J105J
		KOA	RM73B1JT105J
RA1-6, 8, 10, 13-15, 18, 20, 26, 27	SMRN,33 8P ISOL 5% .063W	AVX Corporation	CRA3A4E330JT
		CTS Corporation	742083330JTR
		CTS Corporation	742C083330JTR
		KOA	CN1J4T330J
R12-14, 17-21, 23	SMRES 1.0K 0603 .063W 5% FILM	AVX	CR10-102J-T
		Panasonic	ERJ3GEYJ102V
R28	SMRES,84.5K 0603 .063W 1% FILM	KOA	RK73H1JT8452F
		KOA	RK73H1JTE8452F
		Vishay Dale	CRCW06038452FRT1
		Vishay Dale	CRCW06038452FRT2
R22	SMRES,270K 0603 .063W 1% FILM	KOA	RK73H1JT2703F
		KOA	RK73H1JTE2703F
		Vishay Dale	CRCW06032703FRT1
		Vishay Dale	CRCW06032703FRT2

Ref	Desc	Mfg	Mfg PN
C15, 19, 26-32, 39-43, 46, 54, 56, 57, 60-63, 65, 66, 70-82, 86, 87, 95-101, 107-109, 114, 121, 124-126, 128, 130-132, 135-150, 153-156, 159-161, 163-165	SMCAP, .10UF 0603 X7R 16V 10%	Vitramon	VJ0603Y104KXJAT
		NIC	NMC0603X7R104K16TR
		AVX	0603YC104KAT2A
C38	SMCAP,100PF 0603 NPO 50V	AVX Corporation	06035A101KAT2A
		Kemet Electronics	C0603C101K5GAC
C44	SMCAP,220PF 0603 COG 50V 5%	AVX Corporation	06035A221JAT2A
		NIC	NMC0603NPO221J50TRP
		Kemet Electronics	C0603C221J5GAC
C122, 133	SMCAP,10PF 0603 COG 50V 5%	AVX Corporation	06035A100JAT2A
		Kemet Electronics	C0603C100J5GAC
U8, 13	SMIC,SDRAM 4MX16 133MHZ 54TSOP	Hitachi America Limited	HM5264165FTT-75
		Micron Technology, Inc.	MT48LC4M16A2TG-75
	PWB NS7520 DEV BD	NetSilicon	
U9	SMF/W,PLD XC95144XL	XILINX	XC95144XL-5TQ144C


Digi®