

UNC20 Base Board

User's Manual



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1. General

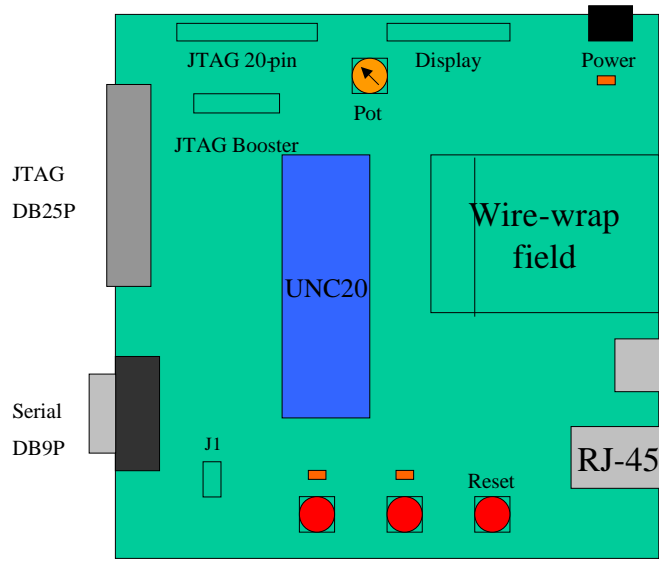
The UNC20 Base Board is the standard carrier board as used in the UNC20 Developer's Kits.

This document refers to the UNCBAS_2 revision of the board, which has the Part Number 358. The board's name can be found on the label above the combined part number / serial number.

2. Features

- Base board which accommodates one UNC20 Module
- Ethernet interface with RJ45 connector with integrated link LED
- 1 serial communication RS232 interfaces
- JTAG interface
- LEDs for power and communication
- 2 switches for use by application
- Reset switch
- Support for external Character Display
- Provision for future host USB support (USB1.1 compliant)

3. Block Diagram Of Base Board



4. Detailed Description

4.1. UNC20 Module

The UNC20 Module is a cost-effective, highly integrated module in a 48-pin dual-inline package.

The salient features of the UNC20 Module, as delivered with the Developer's Kit, are listed below:

- NetSilicon's NS7520 microcontroller based on a 32-bit ARM7TDMI core
- 16 Mbytes SDRAM
- 8 Mbytes Flash
- Ethernet interface
- 2 serial communication interfaces
- I2C interface
- JTAG interface

Please refer to the UNC20 User's Manual for more details on this module.

The pin-out for the UNC20 Module can be found at the end of this Manual.

4.2. RS232 Serial Interface

The NS7520 provides two serial ports. Since these ports are multiplexed with the General Purpose I/O pins (ports A and C), it was decided only to assemble one serial port and leave the other for the user to configure.

4.2.1. Serial Port 1

Serial Port 1 can be used as a console port to communicate with a host PC.

An RS232 driver, the MAX3320 from Maxim, is assembled on the Base Board. This driver guarantees baudrates up to 250kbps.

This port will operate in asynchronous RS232 full-duplex mode. The RS232 port supports minimal hardware control signals, namely RTS and CTS only, and is derived from the UNC20 module's Port C pins.

A 9-pin D-type connector (male) is assembled on the base board.

The pin allocation of the 9 way D-type connector is as defined in the table below:

Pin	Function
1	N/C
2	RXD
3	TXD
4	N/C
5	GND
6	N/C
7	RTS
8	CTS
9	N/C

If a serial console is not required and the 4 PortC pins are required for GPIO, then the serial driver can be forced into an “off” state, meaning that the on-chip power supply is shut down, by connecting a jumper between pins 3 & 4 of J1.

PIN	A	Description when inserted	Factory default
3	█	Serial driver forced off	Not inserted
4	█		

Jumper settings for J1

█ = *connected pins*

To disable the serial driver, the jumper has to be inserted.

4.2.2. Serial Port 2

Serial Port 2 is available on the UNC20 module’s Port A [0-7] pins, which are led out to the wire-wrap area, so that users can configure this port to suit their application.

4.3. Ethernet

The 10/100 Ethernet MAC controller and PHY are included on the UNC20 Module.

An RJ45 jack is used with a status LED for Link/Activity which is visible through a light pipe in the jack. A separate Pulse transformer is assembled.

The pin allocation of the RJ45 connector is as defined in the table below:

Pin	Function
1	TD+
2	TD-

3	RD+
4	N/C
5	N/C
6	RD-
7	N/C
8	N/C

4.4. JTAG / Debugging

A JTAG interface is required both for debug purposes and for boundary scan testing of the UNC20 Module during the manufacturing process.

The address lines ADDR[5..9] from the processor are multiplexed with the 5 JTAG lines. The selection is done via the LEDLNK/SEL signal. JTAG is active when the LED, connected to LEDLNK/SEL, is shorted to ground. This is achieved by inserting a jumper (J1) on the base board.

PIN	A	Description when inserted	Factory default
1	■	JTAG active	Not inserted
2	■		

Jumper settings for J1

■ = *connected pins*

To activate the JTAG interface, the jumper has to be inserted.

There are 3 connectors available on the base board for accessing JTAG: firstly, the ARM-defined 20-pin header; secondly, the 8-pin header for FS Forth-Systeme's JTAG Booster; thirdly, the Parallel Port JTAG adapter (PPJ) is implemented on the board using a buffer together with a standard 25-pin parallel port connector (DB25P).

4.4.3. Parallel Port JTAG Adapter

The parallel port JTAG adapter allows for a direct connection between the host PC's parallel port and the JTAG pins of the UNC20. This allows a number of low-cost Development Tools to be used without additional hardware.

A 25-pin male D-type connector (X5) is provided for this purpose.

Pin	Parallel Function	JTAG Function
2	D0	TDI
3	D1	TMS
4	D2	TCK
5	D3	TRST#
7	D5	Reset#
8	D6	Port Sense
10	ACK#	Port Sense
12	PE	TDO
15	ERROR#	VCC sense

A parallel cable for connecting the host PC's parallel port to X5 is provided with the UNC20 Developer's Kits.

4.4.4. JTAG Booster

FS Forth-Systeme offers a JTAG Booster which allows accelerated programming of the on-board Flash. An 8-pin header (X3) is provided for connecting the JTAG Booster.

Note that the JTAG Booster is not part of the standard UNC20 Developer's Kit.

4.4.5. ARM-standard JTAG Connector

The JTAG connector is a 20-pin header as defined by ARM Ltd. and can be used for connecting a range of development tools such as ARM's Multi-ICE, Abatron's BDI2000 and EPI's JEENI.

Pin	Function	Pin	Function
1	3.3V	2	3.3V
3	TRST#	4	GND
5	TDI	6	GND
7	TMS	8	GND
9	TCK	10	GND
11	RTCK	12	GND
13	TDO	14	GND
15	SRST#	16	GND
17	N/C	18	GND
19	N/C	20	GND

The signal RTCK is not used and is connected via a 0R resistor to TCK.

4.5. Peripherals

An 8-bit data bus and 10-bit address bus are provided for connecting external peripherals to the UNC20. Two individually programmable chip selects (CS3# and CS4#) and an OE# (Output Enable) and WE# (Write Enable) signal allow a vast range of 8-bit peripherals to be connected directly to the UNC20 without any glue logic. In addition, the UNC20 Module has two 8-bit General Purpose I/O ports (GPIO). Some of these 16 GPIO pins are already used on the Base Board. The following table gives an overview, showing those signals which are free to be used by additional hardware in the wire-wrap area.

Port A	Use	Port C	Use
A0	Free	C0	Push-button (free if don't use button)
A1	Free	C1	Serial_1_CTS
A2	Free	C2	I2C (SDA)
A3	Free	C3	Serial_1_RxD
A4	LED (free if jumper removed)	C4	Push-button (free if don't use button)
A5	Free	C5	Serial_1_RTS (free if don't use Serial_1)
A6	LED (free if jumper removed)	C6	I2C (SCL)
A7	Free	C7	Serial_1_TxD (free if don't use Serial_1)

4.5.6. Switches and LEDs

The Base Board contains 2 push-buttons which can be used by the application to input information. Also 2 user LEDs are assembled to signal output activity for the applications. The 2 LEDs and 2 switches are connected to 4 GPIO pins. Since the LEDs use Port A4 and Port A6, which might be required by other peripherals in the wire-wrap area, they can be disabled by removing J1/5-6.

PIN	A	Description when inserted	Factory default
5	■	LEDs active	Inserted
6	■		

Jumper settings for J1

■ = *connected pins*

4.5.7. Character Display

A 16-pin header (X8), with 0.1" (2.54mm) spacing, is available on the Base Board to allow the user to add a simple character display module, e.g. 20 characters by 4 lines or 20 characters by 2 lines. A potentiometer is also assembled for adjusting the contrast (VO). The display uses CS3#.

This display module is **not** included with the UNC20 Developer's Kit. Since the pinning is standardized, these modules are readily available.

Pin	Symbol	Description
1	VSS	GND
2	VDD	+5V
3	VO	LCD contrast adjust
4	RS	Register Selection
5	R/W#	Read / Write#
6	E	Enable
7	D0	
8	D1	
9	D2	

10	D3	
11	D4	
12	D5	
13	D6	
14	D7	
15	VLED +	LED Backlight Anode
16	VLED -	LED Backlight Cathode

4.5.8. Wire-Wrap Area

A wire-wrap area is provided on the Base Board to allow users to quickly try out their own peripherals. On the left of the wire-wrap area is the 42-pin header X6, which is not assembled. Pinout of X6 is described below.

Pin	Function	Pin	Function
1	ADDR4	2	3.3V
3	ADDR5	4	CS4#
5	ADDR6	6	CS3#
7	ADDR7	8	OE#
9	ADDR8	10	WE#
11	ADDR9	12	ADDR3
13	PortA0	14	ADDR2
15	PortA1	16	ADDR1
17	PortA2	18	ADDR0
19	PortA3	20	D0
21	PortA4	22	D1
23	PortA5	24	D2

25	PortA6	26	D3
27	PortA7	28	D4
29	PortC0	30	D5
31	CTS1 (PortC1)	32	D6
33	SDA_I2C	34	D7
35	RxD1 (PortC3)	36	RESET#
37	PortC4	38	TxD1 (PortC7)
39	RTS1 (PortC5)	40	GND
41	SCL_I2C	42	GND

4.6. USB

Originally the UNC20 Module was intended to have a USB1.1-compliant USB controller supporting host mode. However, NetSilicon dropped this feature from the NS7520 processor. Although the current UNC20 Module will now never have USB, 2 of the 48 pins are reserved for USB to allow a future pin-compatible module to support USB. Therefore, a USB host connector is foreseen on the base board, although it is not assembled on the UNCBAS_2.

The pin allocation of the USB connector is as defined in the table below:

Pin	Function
1	N/C
2	USB-
3	USB+
4	GND

4.7. Power Supply and Reset

The external main power supply is provided by a standard pluggable power supply (e.g. Friwo MPP15-FW7555M/06) which is connected to the power socket (X1) on the Base Board.

The Base Board provides the power supply for the UNC20 Module and all onboard devices such as the serial line driver. The external power supply for the board is 5V DC. There is no power switch available. The board is switched on, by plugging in the power supply. A red LED on the base board denotes power-on. A reset button is also provided.

4.7.9. Voltage Requirements

For the UNC20 module only a single 3.3V DC power supply is needed. However, the character display (X8) requires a 5V supply.

5. UNC20**Connector**

Pin	Signal	Type	Description
1	ADDR4	O	
2	ADDR5/TCK	O/I	ADDR[5..9] are multiplexed with
3	ADDR6/TMS	O/I	JTAG functionality – controlled by
4	ADDR7/TDI	O/I	LEDLNK/SEL signal
5	ADDR8/TDO	O/O	
6	ADDR9/TRST #	O/I	
7	PORTA0	I/O	
8	PORTA1	I/O	
9	PORTA2	I/O	
10	PORTA3	I/O	
11	PORTA4	I/O	
12	PORTA5	I/O	
13	PORTA6	I/O	
14	PORTA7	I/O	
15	PORTC0	I/O	
16	PORTC1	I	RS232 CTS
17	PORTC2	O	Hardwired as I2C data signal (SDA)
18	PORTC3	I	RS232 RXD
19	PORTC4	I/O	
20	PORTC5	O	RS232 RTS
21	PORTC6	I/O	Hardwired as I2C clock signal (SCL)
22	PORTC7	O	RS232 TXD
23	+3.3V	P	Power Supply

24	GND	P	Ground Connection
25	RSTIN#	I	Reset Input
26	TPIP	I	Ethernet Input+
27	TPIN	I	Ethernet Input-
28	TPOP	O	Ethernet Output+
29	TPON	O	Ethernet Output-
30	LEDLNK/SEL	O	Ethernet Activity LED; ADDR/JTAG Selection: JTAG active when grounded
31	USB-	I/O	USB differential data negative
32	USB+	I/O	USB differential data positive
33	DATA31	I/O	Data line D7
34	DATA30	I/O	D6
35	DATA29	I/O	D5
36	DATA28	I/O	D4
37	DATA27	I/O	D3
38	DATA26	I/O	D2
39	DATA25	I/O	D1
40	DATA24	I/O	D0
41	ADDR0	O	Address Line
42	ADDR1	O	Address Line
43	ADDR2	O	Address Line
44	ADDR3	O	Address Line
45	WE#	O	Write Enable
46	OE#	O	Output Enable
47	CS3#	O	Chip Select 3
48	CS4#	O	Chip Select 4

The UNC20 connector is based on a standard DIP48 socket.