ConnectCore™ 7U Hardware Reference

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Contents

Using this Guide

This guide provides information about the Digi ConnectCore 7U embedded core module.

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.
`monospaced type`	Filenames, pathnames, and code examples.

Digi information

Related documentation

For additional documentation, see the Documentation folder in the NET+OS Start menu.

Documentation updates

Digi occasionally provides documentation updates on the Web site (www.digiembedded.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.

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About the Module

CHAPTER 1

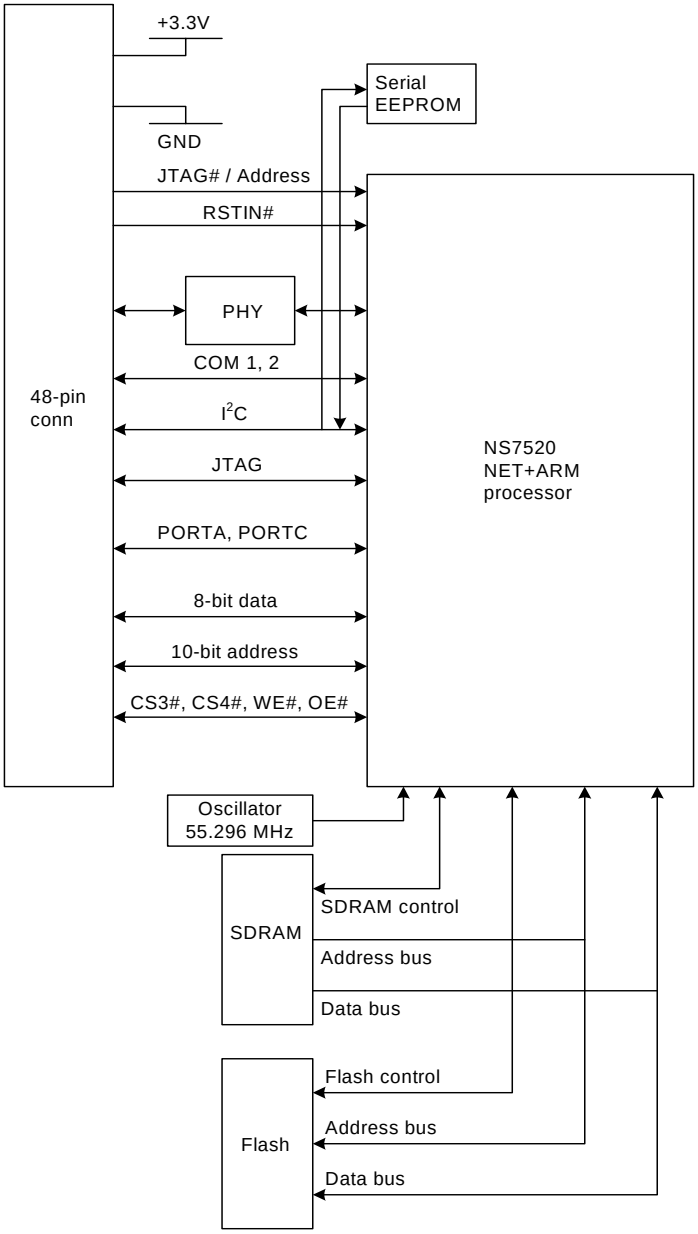
Built on leading NetSilicon® 32-bit NET+ARM technology, the ConnectCore 7U is a powerful and universal embedded core processor module in a compact 48-pin DIP (dual in-line package) form factor. The module provides the ideal core processor platform for product designs demanding an additional level of performance, connectivity, and development platform flexibility.

The ConnectCore 7U embedded module offers 16 MB of RAM and up to 8 MB of on-board Flash memory, an integrated 10/100 Mb Ethernet MAC/PHY, up to two configurable UART/SPI ports, an I^2C bus software interface, 16 shared GPIO ports for application-specific use, and an external 10-bit address/8-bit data bus interface for added component integration flexibility.

The ConnectCore 7U module uses the NS7520 microprocessor. For information about the NS7520, see the *NS7520 Hardware Reference* available through your Jump Start kit.

ConnectCore 7U block diagram

This diagram shows how the NS7520 and ConnectCore 7U module work together.



Features and functionality

- 55 MHz 32-bit NS7520 NET+ARM processor
- Up to 16MB SDRAM, 32 bit wide
- Up to 8MB Flash memory, 16 bit wide
- PHY for 10/100 Base-T Ethernet connection
- Two RS232 line drivers, LVTTL level

- Serial EEPROM (8KB) for storing configuration parameters and MAC address
- External I^2C port (except addresses 0xA0 and 0xA1)
- Up to 16 programmable digital I/O pins (multiplexed with other functions)
- JTAG interface, multiplexed with five address lines
- 8-bit external data bus and 10-bit external address bus
- Two external chip selects
- Operating temperatures of 0°C–70°C or -40°C–+85°C

Module variations

The ConnectCore 7U module is currently available in these standard variations:

- 16MB SDRAM, 8MB Flash, 8 kB EEPROM, Big Endian, 55MHz, 0°C min / 70°C max
- 16MB SDRAM, 2MB Flash, 8 kB EEPROM, Big Endian, 55 MHz, 0°C min / 70°C max
- 16MB SDRAM, 8MB Flash, 8 kB EEPROM, Big Endian, 55MHz, -40°C min / +85°C max

Interfaces

Memory

The module provides 16MB of 32-bit wide SDRAM, in one SDRAM bank.

A 16-bit wide Flash device, which can provide up to 8 MB of Flash memory, is also available. See the list of standard module configurations immediately before this section.

Ethernet

The module supports full-duplex and half-duplex modes for both 10 Mbps and 100 Mbps operations, as well as address filtering for broadcasts and multicasts. The PHY on the module supports auto-negotiation and can drive a 100Base-Tx line or 10Base-T line.

The module provides four pins for connecting a twisted-pair RJ-45 interface using an external transformer with a 1:1 turns ratio.

Magnetics specifications

H1112 magnetics, 10/100 Base-T, 1:1 SMT, RM2.0, 12-pin, 0°C-70°C

Reference parts: Pulse H1278NL, Pulse H1112NL

General purpose I/O (GPIO)

The module provides two 8-bit ports (PORTA and PORTC) for digital I/O. These 16 pins are multiplexed with other functions such as serial communication, external DMA, or other, special functions. You can configure all pins individually as inputs or outputs, with these exceptions:

- PORTC2 is hardwired for use as I2C_SDA.
- PORTC6 is hardwired for use as I2C_SCL.
- PORTC4 provides a reset output until the startup code initializes the port pin. PORTC4 outputs a reset pulse that remains in output mode as active high until the code sets it otherwise

Note: You can use pins C0, C1, and C3 to generate a level-sensitive interrupt to the ARM core's IRQ signal.

Serial communication

The module implements two independent serial channels that operate in these modes:

- **UART (universal asynchronous/synchronous receive/transmitter) mode.** This mode operates at speeds up to 230 kbps, with 5 to 8 data bits; odd, even, or no parity; and 1 or 2 stop bits.
- **SPI (serial peripheral interface) mode.** Use this full-duplex, synchronous 4-wire interface to connect different peripherals to the module.

  Note: The NS7520 supports SPI master mode only.

The pins for the two serial channels are multiplexed with the 16 GPIO (general purpose I/O) pins.

- Serial port A is on PORTA, with all eight signals available: RxD, TxD#, RTS#, CTS#, DCD#, RI#, DSR#, and DTR#.
- Serial port B is on PORTC, with six signals available: RxD, TxD#, RTS#, CTS#, DCD#, and RI#. The remaining two pins are reserved for I^2C use.

The serial channel voltage level is 3.3V. For RS232 or RS485 communication, you must use external drivers.

Serial EEPROM / I^2C

The module has a 8KB EEPROM with an I^2C interface to provide storage for configuration data, such as the MAC address for the Ethernet controller.

Two GPIO pins — PORTC2 and PORTC6 — act as the I^2C bus. You can connect any 3.3V I^2C device to these pins as long as the pins do not use address 0xA0 or 0xA1. These addresses are used by the 8KB EEPROM on the module.

JTAG interface

The JTAG interface is used primarily for debug purposes. The five JTAG pins — TCK, TMS, TDI, TDO, and TRST# — are multiplexed with five address lines (ADDR5 through ADDR9) and are available on pins 2 through 6 on the module's DIL-48.

Select the JTAG signals by tying pin 30 (LEDLNK/SEL#) low. When LEDLNK/SEL# is not tied to GND, it is used as the LEDLNK output from the PHY and drives an LED on the development board to indicate Ethernet link and activity.

For normal operation, you must not connect signal LEDLNK/SEL# to GND. If LEDLNK/SEL# is connected to ground, debug mode can be entered accidently, affecting normal operation.

Reset

A power-on reset controller resets all components on the module, if the power supply of the module is below 2.88V.

- The RESET# signal is output on pin 25 of the ConnectCore 7U connector, so it can be used to reset components on your base development board at power-on.
- The RESET# signal has open drain characteristics allowing devices on your base development board, such as a reset switch, to reset the module.
- The RESET# signal has a pullup resistor on the ConnectCore 7U; it's nominal value is 5K.
- External reset sources connected to pin 25 of the module must also have open drain characteristics. This is also true for a debugger controlling the reset signal of the module.
- The reset controller on the module does extend an external reset signal by (max) 560ms. This extra delay after end-of-reset must be considered when working with a debugger.
- If your development board uses a pushbutton reset, it should not be connected directly to pin 25. The pushbutton reset should be debounced on your base development board, to be compatible with the module.

Reset controller specifications

Reference part: Fairchild FM1233A

Supervisor, 2.88V, 140 ms, SOT23-3, -40°C-+105°C

Bi-directional

Reset timing

Reset time	Value
Minimum	140 ms
Typical	256 ms
Maximum	560 ms

External peripheral bus

The module provides an 8-bit data bus (DATA7 through DATA0) and a 10-bit address bus (ADDR0 through ADDR9) to connect peripherals to the module. Two individually programmable chip selects (CS3# and CS4#), as well as an OE# (output enable) signal and WE# (write enable) signal, allow you to connect a wide range of 8-bit peripherals directly to the module without additional glue logic.

The signals of this bus are the unbuffered CPU signals. Only a single load can be connected to these signals. If more than a single peripheral is connected to this bus, external buffers are needed.

The address bus signals configure the module at end of reset. You cannot connect extra pullups or pulldowns to the address bus.

Reset configuration

Configuration is done at the end of each hardware reset. The reset status of the NS7520 is configured by connecting pulldown resistors of ~1K0 to signals A27–A0. All address lines have an internal weak pullup. This is the default powerup configuration:

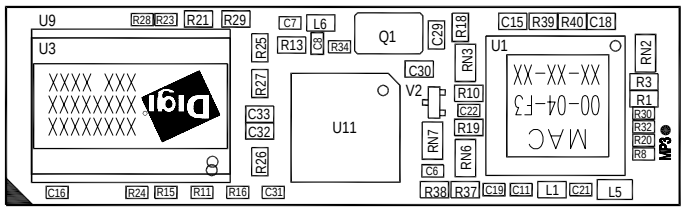
Signal	Function	Settings
A27	Endian configuration	0 Little endian configuration 1 Big endian configuration (Default)
A26	CPU bootstrap	0 CPU disabled, GEN_BUSER = 1 (1/4 speed) 1 CPU enabled, GEN_BUSER = 0 (full speed) (Default)
A25	Bus arbiter setting	0 External system bus arbiter 1 Internal system bus arbiter (Default)
A[24:23]	CSO/MMCR setting	00 8-bit SRAM, 63 wait states/b00 01 32-bit SRAM 63 wait states/b01 10 32-bit SRAM 11 16-bit SRAM, 63 wait states/b11 (Default)
A[22:20]	N/A	No connect
A[19:09]	GEN_ID setting	GEN_ID = A[19:09], Default = 0x3FF
A[08:07]	PLL_IS setting	IS = A[8:7], Default = 10
A[06:05]	PLL_FS setting	FS = A[6:5], Default = 00
A{04:00]	PLL_ND setting	ND = A[4:0], Default = 01101

DIL-48 module connector

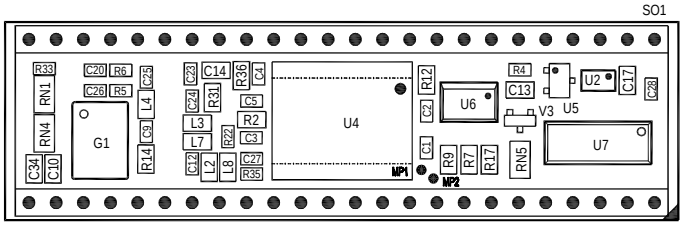
Module layout

The next drawings show the top and bottom of the module. The small black triangle in the lower left corner of the top drawing and lower right corner of the bottom drawing indicate where pin 1 is.

Top



Bottom



Module pinout legend

Pin:	Pin number on ConnectCore 7U connector
Signal:	Signal name
Type:	I = Input O = Output
Drive:	Output drive
U/D:	U = pullup D = pulldown blank = neither a pullup nor a pulldown w = weak (8.33K pullup, 10.30K pulldown)
Description:	Pin description

Note: The GPIO configurations for PORTA and PORTC values, described as *GPIO* in this table, are shown in tables following this section.

Module pinout

Pin	Signal	Type	Drive	U/D	Description
1	ADDR4	O	4 mA	U 10K	
2	ADDR5	O	4 mA	U 10K	LEDLNK = open (address function)
	TCK	I		U 10K	LEDLNK = GND (JTAG function)
3	ADDR6	O	4 mA	U 10K	LEDLNK = open (address function)
	TMS	I		U 10K	LEDLNK = GND (JTAG function)
4	ADDR7	O	4 mA	U 10K	LEDLNK = open (address function)
	TDI	I		U 10K	LEDLNK = GND (JTAG function)
5	ADDR8	O	4 mA	U 10K	LEDLNK = open (address function)
	TDO	O	2 mA	U 10K	LEDLNK = GND (JTAG function)
6	ADDR9	O	4 mA	U 10K	LEDLNK = open (address function)
	TRST#	I		D w	LEDLNK = GND (JTAG function)
7	PORTA0	I/O	2 mA	U w	GPIO
8	PORTA1	I/O	2 mA	U w	GPIO
9	PORTA2	I/O	2 mA	U w	GPIO
10	PORTA3	I/O	2 mA	U w	GPIO
11	PORTA4	I/O	2 mA	U w	GPIO
12	PORTA5	I/O	2 mA	U w	GPIO
13	PORTA6	I/O	2 mA	U w	GPIO
14	PORTA7	I/O	2 mA	U w	GPIO
15	PORTC0	I/O	2 mA	U w	GPIO
16	PORTC1	I/O	2 mA	U w	GPIO
17	I2C_SDA	O	2 mA	U 4K7	Hardwired — I^2C data signal
18	PORTC3	I/O	2 mA	U w	GPIO
19	PORTC4	I/O	2 mA	U w	GPIO
20	PORTC5	I/O	2 mA	U w	GPIO
21	I2C_SCL	I/O	2 mA	U 4K7	Hardwired — I^2C clock signal
22	PORTC7	I/O	2 mA	U w	GPIO
23	3.3V	P	n/a		3.3V power connection
24	GND	P	n/a		Ground connection
25	RSTIO#	I/O	5 mA	U 5K	Reset (bi-directional)
26	TPIP	I	n/a		Ethernet input +
27	TPIN	I	n/a		Ethernet input-
28	TPOP	O	n/a		Ethernet output +
29	TPON	O	n/a		Ethernet output-

Pin	Signal	Type	Drive	U/D	Description
30	LEDLNK/SEL#	O I	n/a		Ethernet activity LED ADDR/JTAG selection: GND = JTAG, open = A5…A9
31	NC	I/O	n/a		Reserved
32	NC	I/O	n/a		Reserved
33	DATA7	I/O	4 mA		External data line D7
34	DATA6	I/O	4 mA		D6
35	DATA5	I/O	4 mA		D5
36	DATA4	I/O	4 mA		D4
37	DATA3	I/O	4 mA		D3
38	DATA2	I/O	4 mA		D2
39	DATA1	I/O	4 mA		D1
40	DATA0	I/O	4 mA		D0
41	ADDR0	O	4 mA	U 10K	Address line
42	ADDR1	0	4 mA	U 1K	Address line
43	ADDR2	O	4 mA	U 1K	Address line
44	ADDR3	O	4 mA	U 10K	Address line
45	WE#	O	4 mA		Write enable
46	OE#	O	4 mA		Output enable
47	CS3#	O	4 mA		Chip select 3
48	CS4#	O	4 mA		Chip select 4

GPIO configuration

The next table shows the configuration for PORTA and PORTC. In the second *Serial* column in both tables, *Ser* indicates the serial channel:

- PORTA configuration applies to serial port A.
- PORTC configuration applies to serial port B

GPIO	Serial	Other	Pin	I/O	Serial	Other
A7	TxDA		14	I/O	Ser B TxD	
A6	DTRA#	DREQ1#	13	I/O	Ser B DTR#	DMA channel 3/5 req
A5	RTSA#		12	I/O	Ser B RTS#	
A4	RxCA / RIA# / OUT1A#		11	I/O	Pgmbl Out / Ser B RxCLK / Ser B ring signal / Ser B SPI clock (CLK)	

GPIO	Serial	Other	Pin	I/O	Serial	Other
A3	RxDA	DACK1#	10	I/O	Ser B RxD	DMA channel 3/5 ack
A2	DSRA#	AMUX	9	I/O	Ser B DSR#	DRAM addr mux
A1	CTSA#	DONE1_(O)	8	I/O	Ser B CTS#	DMA channel 3/5 DONE_Out
A0	TxCA / OUT2A# / DCDA#	DONE1_(I)	7	I/O	Pgmbl Out / Ser B DCD / Ser B SPI Enable (SEL#) / Ser B TxCLK	DMA channel 3/5 DONE_In
C7	TxDB		22	I/O	Ser A TxD	GEN interrupt out
C6	DTRB#	DREQ2#	21	I/O	Ser A DTR#	DMA channel 4/6 req I^2C clock signal (SCL)
C5	RTSB#	REJECT#	20	I/O	Ser A RTS#	CAM reject
C4	RxCB / RIB# / OUT1B#	RESET#	19	I/O	Pgmbl Out / Ser A RxCLK / Ser A ring signal / Ser A SPI clock (CLK)	RESET output
C3*	RxDB	LIRQ3 / DACK2#	18	I/O	Ser A RxD	Level-sensitive IRQ / DMA channel 4/6 ack
C2	DSRB#	LIRQ2 / RPSF#	17	O	Ser A DSR#	Level-sensitive IRQ / CAM request I^2C data signal (SDA)
C1*	CTSB#	LIRQ1 / DONE2_(O)	16	I/O	Ser A CTS#	Level-sensitive IRQ / DMA channel 4/6 DONE_Out
C0*	TxCB / OUT2B / DCDB#	LIRQ0 / DONE2_(I)	15	I/O	Pgmbl Out / Ser A DCD / Ser A SPI enable (SEL#) / Ser A TxCLK	Level-sensitive IRQ / DMA channel 4/6 DONE_In

* You can use these GPIO pins to generate a level-sensitive interrupt to the ARM core's IRQ signal.

About the Development Board

CHAPTER 2

This chapter describes the components of the ConnectCore 7U development board and explains how to configure the board to meet your requirements.

What's on the Development Board

Features

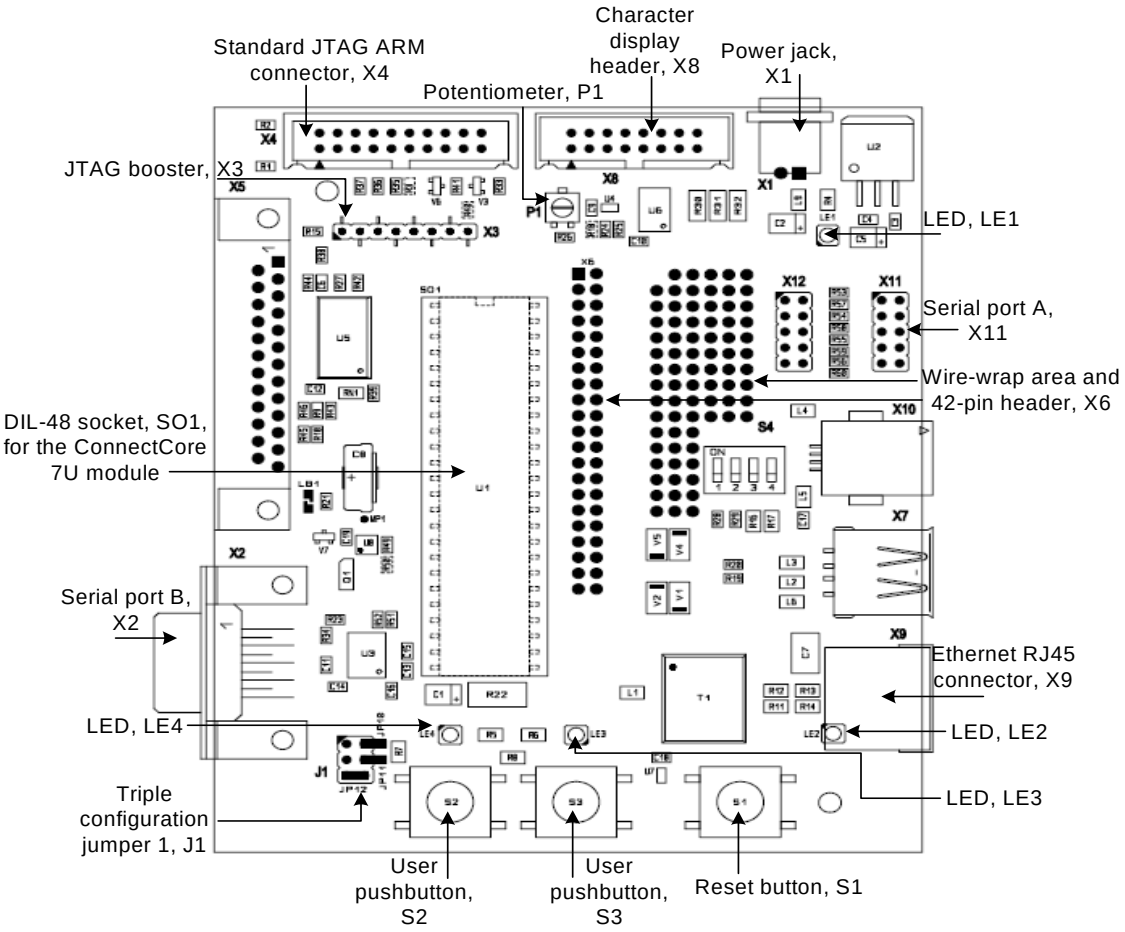
- RS232 serial interface with DB9 connector
- Ethernet interface with RJ45 connector
- LEDs for power and communication
- Two user connector pushbuttons for the application
- Manual reset switch
- Support for external character display
- JTAG interface

Important

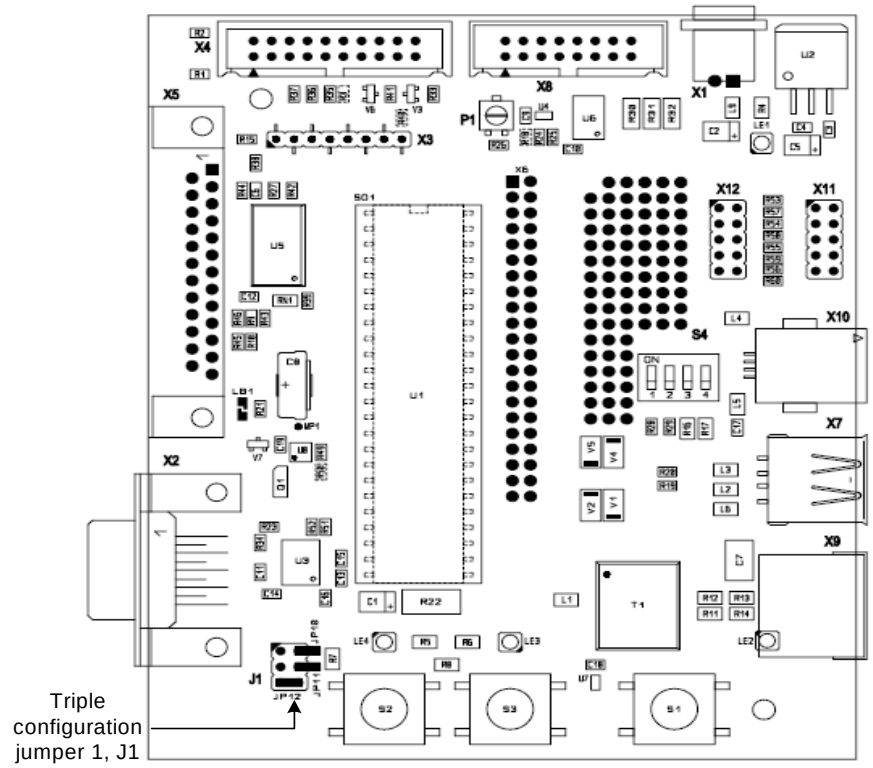
The development board in your development kit has three components that are not used in conjunction with the ConnectCore 7U. Please ignore these components:

- X7: USB Host connector
- X10: USB Device connector
- X12: Serial port 3

The development board



Jumper 1, triple configuration jumper



Header J1

J1 is a 6-pin header that holds three jumpers — JP10, JP11, and JP12. Pin 1 is in the upper left corner of the header; Pin 6 is in the lower right corner.

Jumpers

Jumper	Plugs onto	Default delivery status	Jumper set	Jumper not set
JP10	Pins 1 and 2	Not set — Plugged on pin 2 only	JTAG not active	JTAG active
JP11	Pins 3 and 4	Not set — Plugged on pin 4 only	RS232 driver enabled	RS232 driver disabled
JP12	Pins 5 and 6	Set — Plugged on pins 5 and 6	LE3 and LE4 active	LE3 and LE4 inactive

The jumpers are included with the development kit.

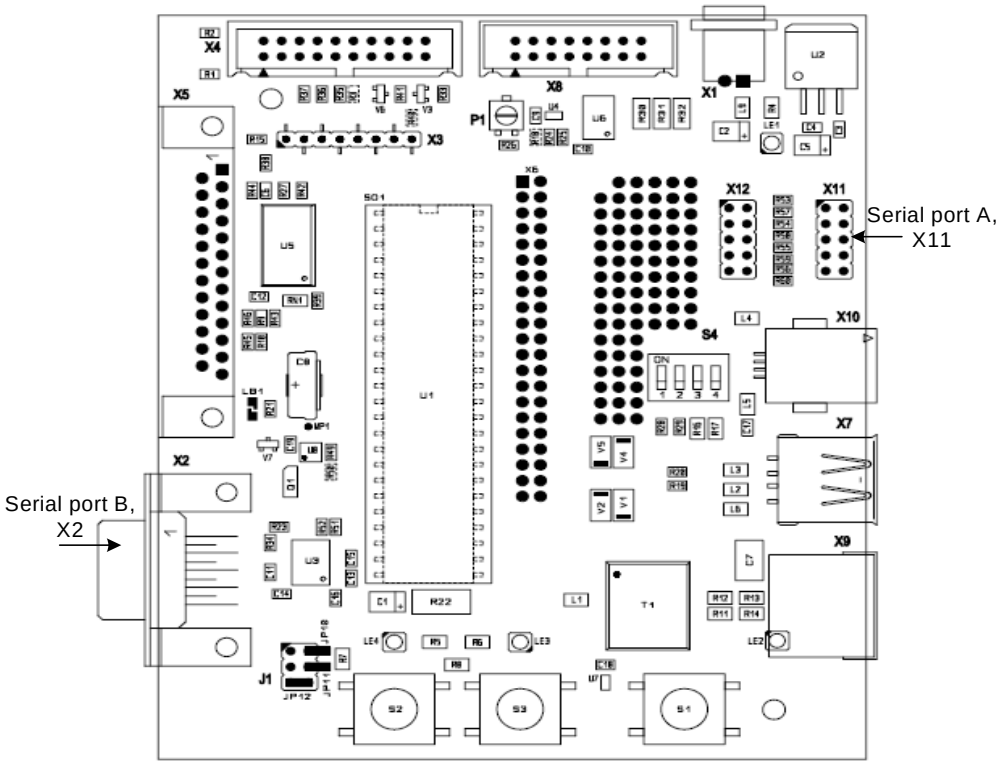
Function

Use header J1 to enable or disable specific functionality on the development board:

- You can activate the JTAG interface by plugging JP10 on pins 1 and 2 of header J1.
- You can force the RS232 line driver into an *off* state by plugging JP11 on pins 3 and 4 of header J1.
- You can disable the LEDs connected to the PORTA4 and PORTA6 pins by removing JP12 from pins 5 and 6 of header J1.

RS232 serial interface

There are two serial ports — serial port A and serial port B— on the ConnectCore 7U development board. Because these ports are multiplexed with the programmable GPIO pins (PORTA and PORTC), only one serial port — serial port B — is preconfigured for use. You can configure serial port A to meet your application needs.



Serial port B, X2

Use serial port B as a console port for communication with a host PC. The development board comes with an RS232 driver (Maxim MAX3320) already assembled. This driver guarantees baud rates up to 250 kbps.

Serial port B operates in asynchronous RS232 full-duplex mode. This port supports only the RTS and CTS hardware control signals, and connects to the ConnectCore 7U module's PORTC pins.

Serial port B: connector

The development board serial port connector is a DB type connector (male). Pins are allocated on the connector as shown:

Pin	Function	Level	Comment
1	No connect		
2	RXD	RS232	PORTC3 (module pin 18)
3	TXD	RS232	PORTC7 (module pin 22)
4	No connect		
5	GND		
6	No connect		
7	RTS#	RS232	PORTC5 (module pin 20)
8	CTS#	RS232	PORTC1 (module pin 16)
9	No connect		

Serial port B: *Off* state

If a serial connection is not necessary and the four PORTC pins (PORTC1, PORTC3, PORTC5, and PORTC7) are for GPIO, the RS232 line driver can be forced into an *off* state by plugging jumper JP11 on pins 3 and 4 of header J1. An *off* state means that the on-chip power supply is shut down.

Important: To disable the RS232 line driver, you must plug in JP11.

Pin	A	Description when inserted	Factory default
3	▌	Serial driver forced off	Not inserted
4			

▌ = connected pins

Serial port A, X11

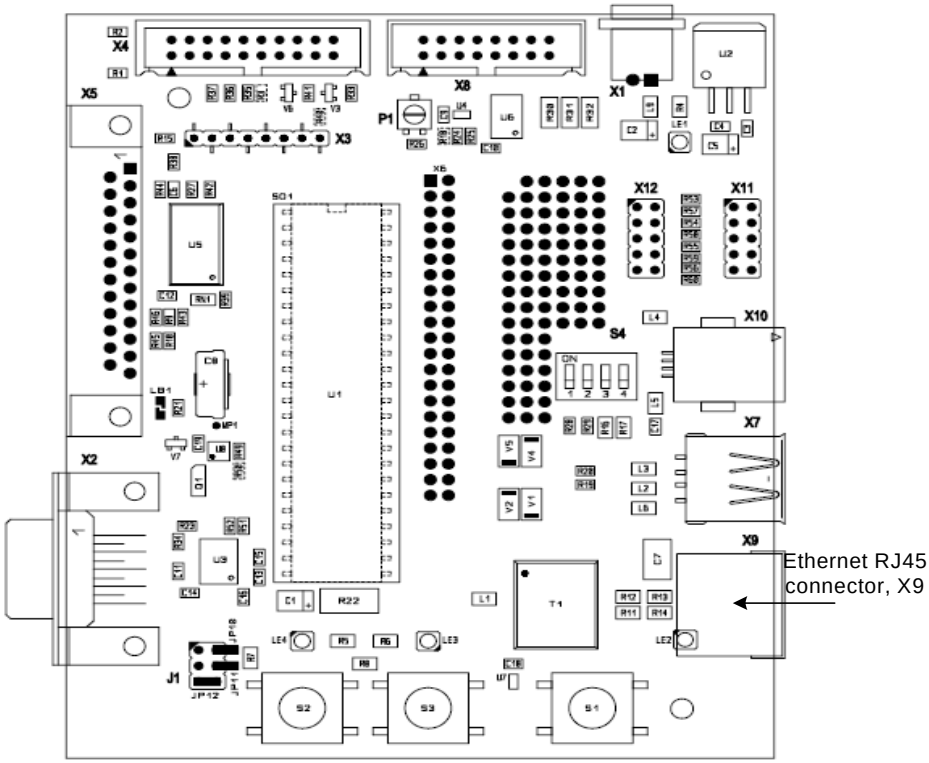
Serial port A connects to the module's PORTA pins. These pins lead to the wire-wrap area, so you can configure the port to meet the requirements of your application. The pins are also connected to connector X11 and are configured as shown:

Pin	Function	Level	Comment
1	DCD#	LVTTL	PORTA0 (module pin 7)
2	DSR#	LVTTL	PORTA2 (module pin 9)
3	RXD	LVTTL	PORTA3 (module pin 10)
4	RTS#	LVTTL	PORTA5 (module pin 12)
5	TXD	LVTTL	PORTA7 (module PIN 14)
6	CTS#	LVTTL	PORTA1 (module pin 8)
7	DTR#	LVTTL	PORTA6 (module pin13)
8	RI#	LVTTL	PORTA4 (module pin 11)
9	GND		
10	+ 3.3V		

Note: A TTL-to-RS232 converter module (part number FS-276) for use with connector X11 is available as an accessory item. For additional information, contact your Digi sales representative or visit the Digi Web site.

Ethernet connector, X9

The module provides the 10/100 Ethernet MAC controller and PHY. The development board provides a 1:1 transformer and a RJ45 jack with an LED that shows the link/activity status of the Ethernet line.



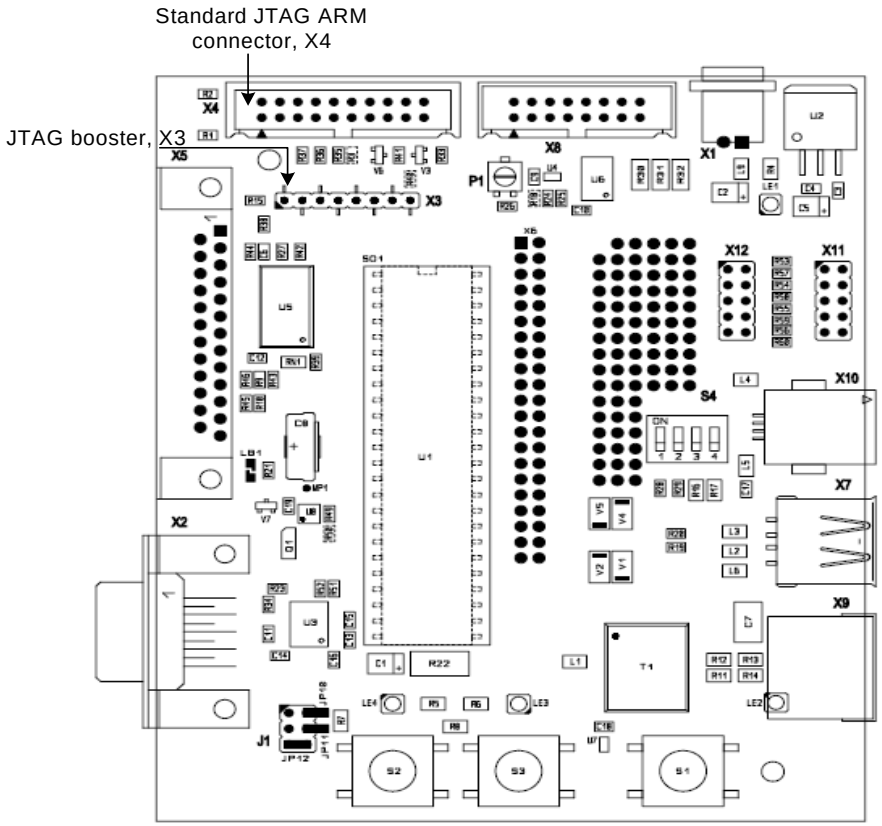
RJ45 pin allocation

RJ45 connector pins are configured as shown:

Pin	Function
1	TD +
2	TD-
3	RD +
4	No connect
5	No connect
6	RD-
7	No connect
8	No connect

JTAG

A JTAG interface is available both for debug purposes and during application development using the Digi JTAG Link debugger. Because the module has only 48 pins, the JTAG interface is multiplexed with address lines ADDR[5...9]. The voltage level on pin LEDLNK/SEL# controls the multiplexing.



Activating the JTAG interface

The JTAG interface is activated when the level on LEDLNK/SEL# is below 0.7V, which means that LEDLNK/SEL# is connected directly to GND. LEDLNK/SEL# is connected to GND when jumper JP10 is plugged onto pins 1 and 2 of header J1.

Important: To activate the JTAG interface, you must plug in JP10.

Pin	A	Description when inserted	Factory default
1	▌	JTAG active	Not inserted
2			

▌ = connected pins

Debugging notes

Debugging means that the JTAG interface is selected.

- When debugging, the Ethernet status LED (link/activity) is not available.
- When debugging, address lines ADDR[0...4] are available.
- When debugging, address lines ADDR[5...9] are not available.
- If the board is operating under normal conditions — that is, JP10 is not plugged onto header J1 — the debugger or JTAG booster must be removed.

Standard ARM JTAG connector, X4

The JTAG connector, X4, is a 20-pin header and can be used to connect supported development tools such the Digi JTAG Link, EPI Majic, and others. The JTAG connector pins are configured as shown:

Pin	Functionality	Pin	Functionality
1	V_{TREF} (= 3.3V)	2	3.3V
3	TRST#	4	GND
5	TDI	6	GND
7	TMS	8	GND
9	TCK	10	GND
11	RTCK (not connected)	12	GND
13	TDO	14	GND
15	SRST# (= RSTIO#)	16	GND
17	No connect	18	GND
19	No connect	20	GND

Notes:

- Because the ConnectCore 7U does not support RTCK, the corresponding pin on the debug header is left floating.
- The debugger must be configured to have open drain characteristics as its SRST# output. The module has a pullup resistor of 5K.
- If you want to use a debugger not provided by Digi, contact Digi technical support (www.digiembedded.com/support) to ensure that the debugger is supported.

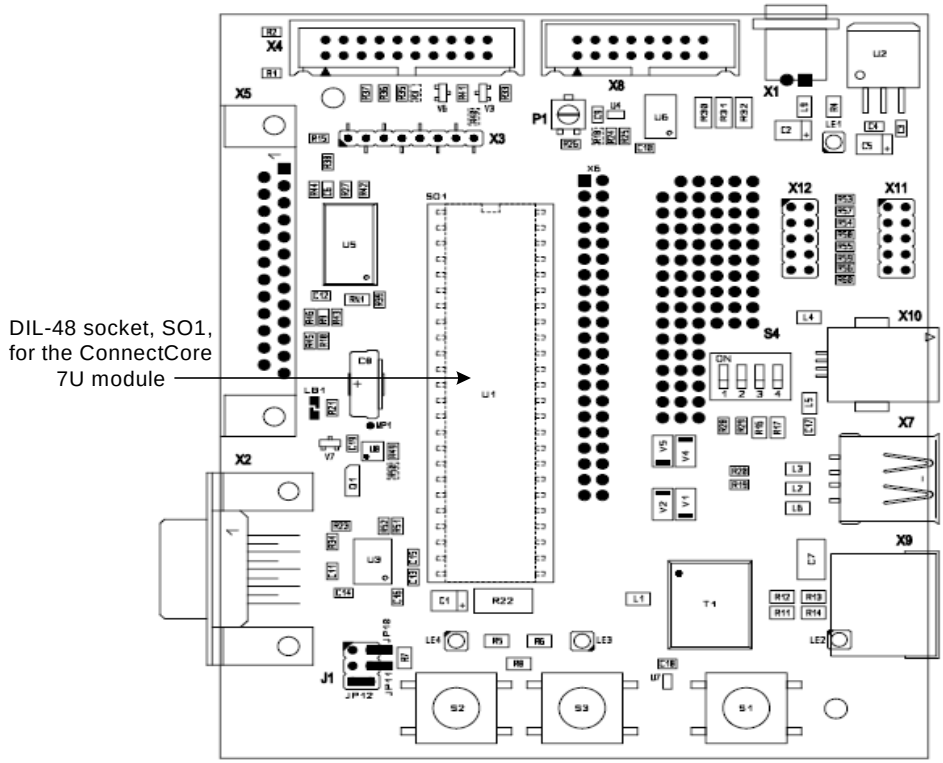
JTAG booster, X3

You can use an optional Digi JTAG booster that allows accelerated programming of the on-board Flash. An 8-pin header, X3, is provided on the development board for connecting the JTAG booster.

Important: The Digi JTAG booster is not part of the standard ConnectCore 7U development kit. For more information, contact your local Digi sales office or distributor.

DIL 48-pin socket, SO1

The ConnectCore 7U module is plugged into the DIL 48-pin socket, SO1, on the development board.



Specifications

Socket, THT, DIL48, 600mil, w/o center bar, Goldflash 0.1µm

Reference part: PreciDip 110-87-648-41-001-151 or PreciDip 110-81-648-41-001-151

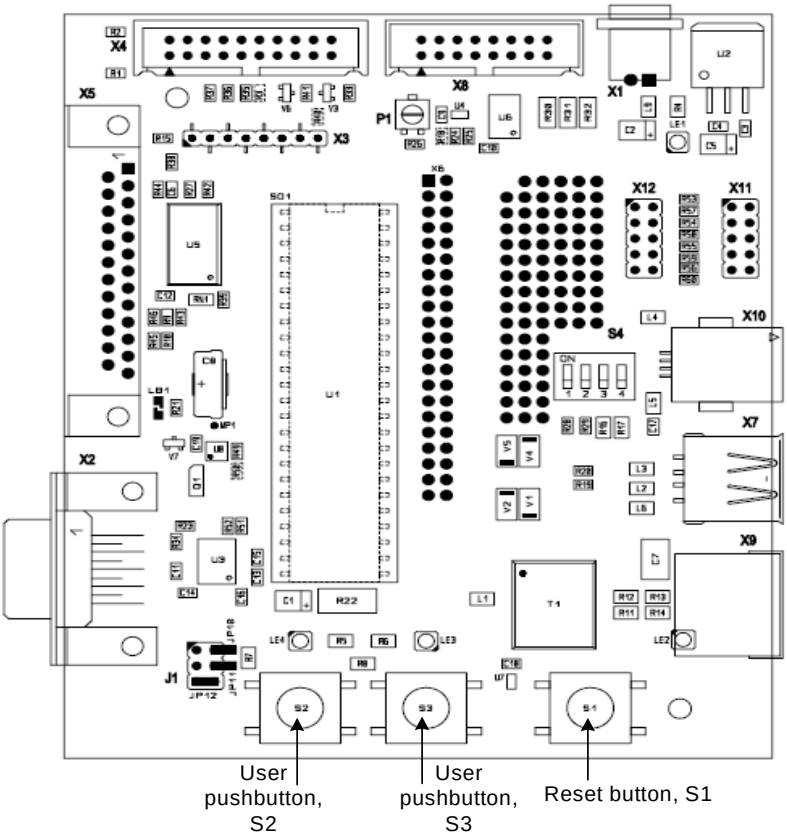
Socket pinout

For the DIL-48 socket pinout, see “Module pinout legend” on page 7.

For information about the PORTA and PORTC GPIO configurations, see “GPIO configuration” on page 9.

Pushbuttons

The development board has a reset button (S1) and two user pushbuttons (S2 and S3).



Reset button, S1

You can manually reset the module using the reset button, S1, on the development board.

The ConnectCore 7U has a bi-directional reset signal that is extended on the module by its controller.

User pushbuttons, S2 and S3

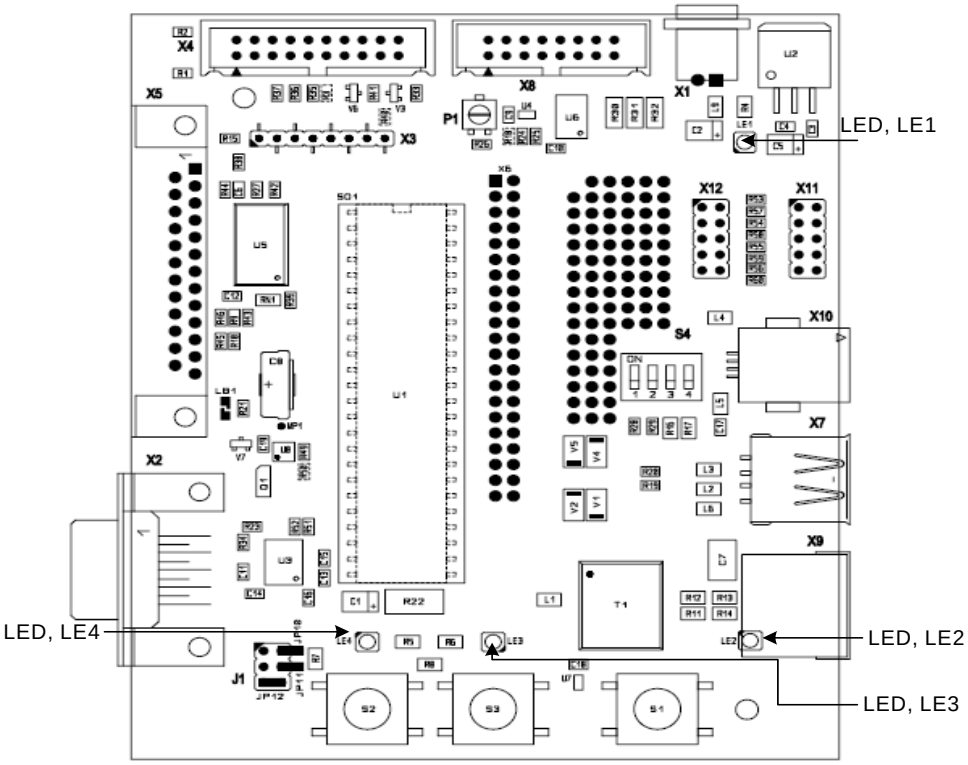
The S2 and S3 user pushbuttons allow you to manipulate PORTC0 and PORTC4 UART serial functions, by transitional between open and closed positions.

- The S2 user switch button is connected to the PORTC0 pin.
- The S3 user switch button is connected to the PORTC4 pin.

Both pushbuttons have a series resistor (680R) to avoid module damage should the pushbutton be pressed while the associated GPIO is configured as an output.This is especially important for GPIO C4, as this GPIO is configured as an active low reset-out by default.

LEDs

The board has four LEDs for power and communication.



LE1 LED LE1 is a 3.3V power indicator. When the LED is red, the power is on.

LE2 LED LE2 is the status indicator for Ethernet link/activity. The LED is visible on the upper left corner of the RJ-45 connector and, when lit, indicates that there is an active link on the Ethernet interface. When there is receive or transmit activity, the LED stays on for 20 milliseconds.

LE3 and LE4 LEDs LE3 and LE4 are connected to the PORTA4 (default debug) and PORTA6 pins, respectively. These pins might be required by other peripherals in the wire-wrap area. You can disable the pins by removing jumper JP12 from header J1.

Pin	A	Description when inserted	Factory default
5	▌	LEDs active	Inserted
6			

▌ = connected pins

When Jumper J12 is removed and the LEDs are not active, they are no longer connected to +3.3V. Because the LEDs are unidirectional, they have no effect on PORTA4 and PORTA6 when disconnected.

Peripherals

The development board has an 8-bit data bus and 10-bit address bus for connecting external peripherals. Two individually programmable chip selects (CS3# and CS4#), as well as OE# (output enable) and WE# (write enable) signals, allow 8-bit peripherals to be connected directly to the module without any glue logic. In addition, there are two 8-bit GPIO ports (PORTA and PORTC) available on the module connector pins.

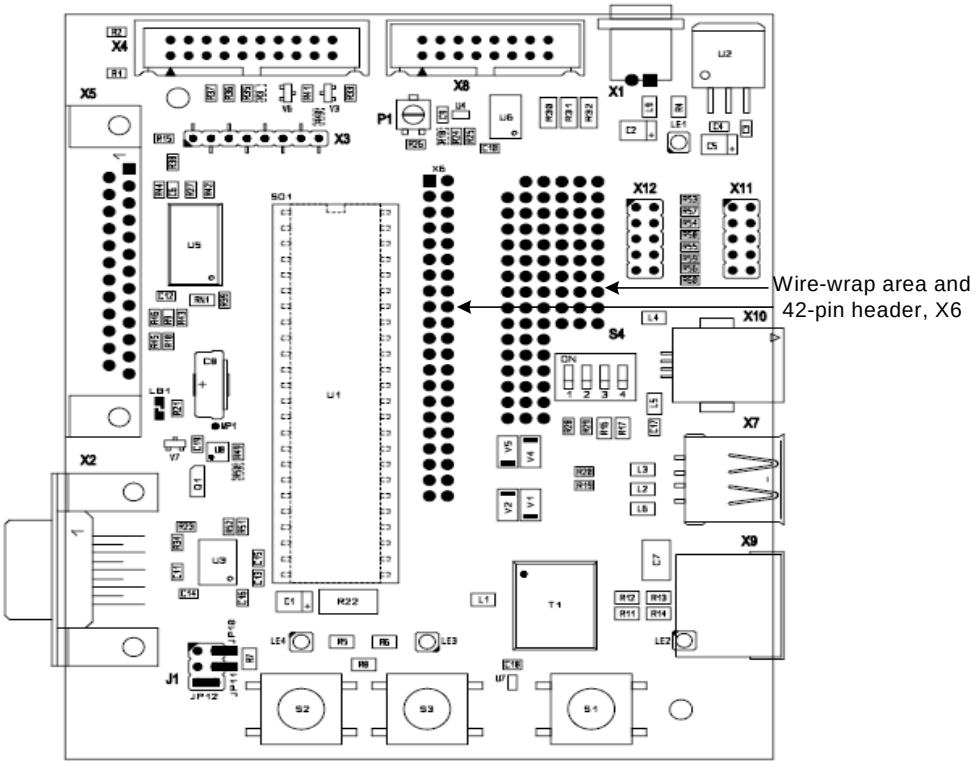
GPIO port pinout

This table describes the programmable GPIO pins used by the development board and those pins/signals that are available for use by additional hardware in the wire-wrap area (X6).

PORTA	Use	PORTC	Use
A0	DCD1# (Free if serial port A is not used)	C0	Pushbutton (Free if pushbutton S2 is not used)
A1	CTS1# (Free if serial port A is not used)	C1	CTS2# (Free if CTS2# is not used)
A2	DSR1# (Free if serial port A is not used)	C2	I^2C (SDA)
A3	RXD1 (Free if serial port A is not used)	C3	RXD1
A4	LED or RI# (Free if jumper removed and serial port A is not used)	C4	Pushbutton (Free if pushbutton S3 is not used)
A5	RTS1# (Free if serial port A is not used)	C5	RTS2# (Free if RTS2# is not used)
A6	LED or DTR1# (Free if jumper is removed and serial port A is not used)	C6	I^2C (SCL)
A7	TXD1 (Free if serial port A is not used	C7	TXD2 (Free if TXD2 is not used

Wire-wrap section, X6

The X6 section on the development board includes a 77-pin wire-wrap area and a 42-pin header.



Wire-wrap area

The wire-wrap area allows you to connect through-hole components for rapid prototyping purposes.

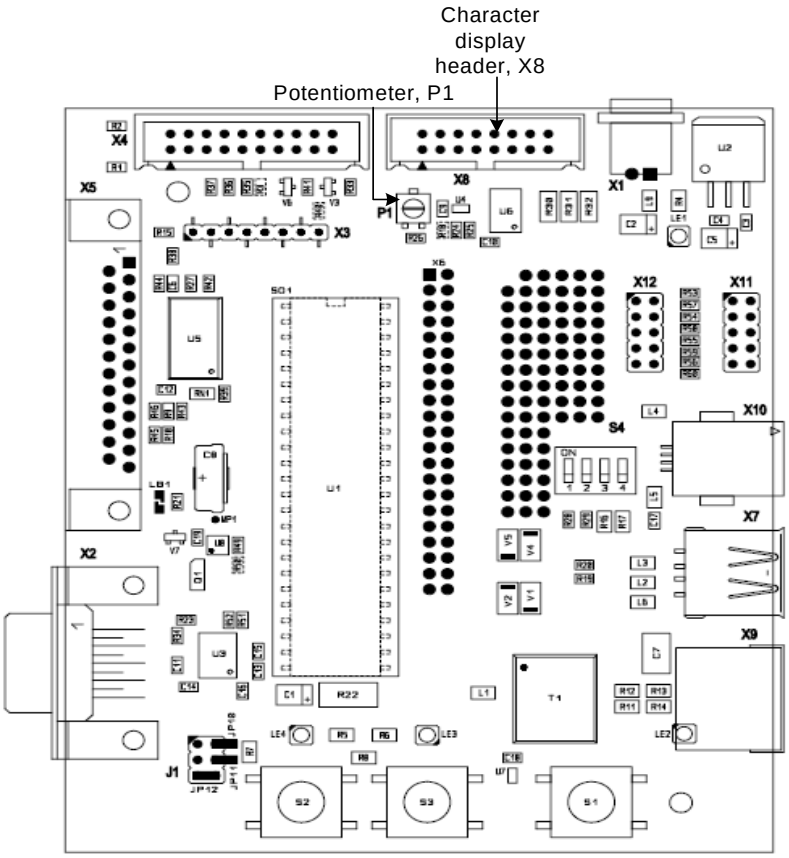
42-pin header

You can place an optional 42-pin header (reference part: Samtec TSW-127-07-D) here. This header connector is a through-hole signal rail that provides 1:1 access to module signals. The size of the connector is 2x21 pins.

Signal assignments

Pin	Function	Pin	Function
1	ADDR4	2	3.3V
3	ADDR5 / TCK	4	CS4#
5	ADDR6 / TMS	6	CS3#
7	ADDR7 / TDI	8	OE#
9	ADDR8 / TDO	10	WE#
11	ADDR9 / TRST#	12	ADDR3
13	PORTA0	14	ADDR2
15	PORTA1	16	ADDR1
17	PORTA2	18	ADDR0
19	PORTA3	20	DATA0
21	PORTA4	22	DATA1
23	PORTA5	24	DATA2
25	PORTA6	26	DATA3
27	PORTA7	28	DATA4
29	PORTC0	30	DATA5
31	CTSB# (PORTC1)	32	DATA6
33	I2C_SDA (PORTC2)	34	DATA7
35	RXDB (PORTC3)	36	RSTIO#
37	PORTC4	38	TXDB (PORTC7)
39	RTSB# (PORTC5)	40	GND
41	I2C_SCL (PORTC6)	42	GND

Character display header and potentiometer



Character display header, X8

X8 on the development board is a 16-pin header with 0.1” (2.45 mm) spacing (display header reference part: EDT EW20220GLY, Matrix LCD-Module 2 x 20, mating connector reference part: Harting IDC 09 18 516 6803). Use this header to add a simple character display module; for example, 20 characters by 4 lines or 20 characters by two lines. The display uses either CS3# (R24 default-fitted) or CS4# (populate R18 and remove R24).

The character display module requires a 5 VDC power supply.

Potentiometer, P1

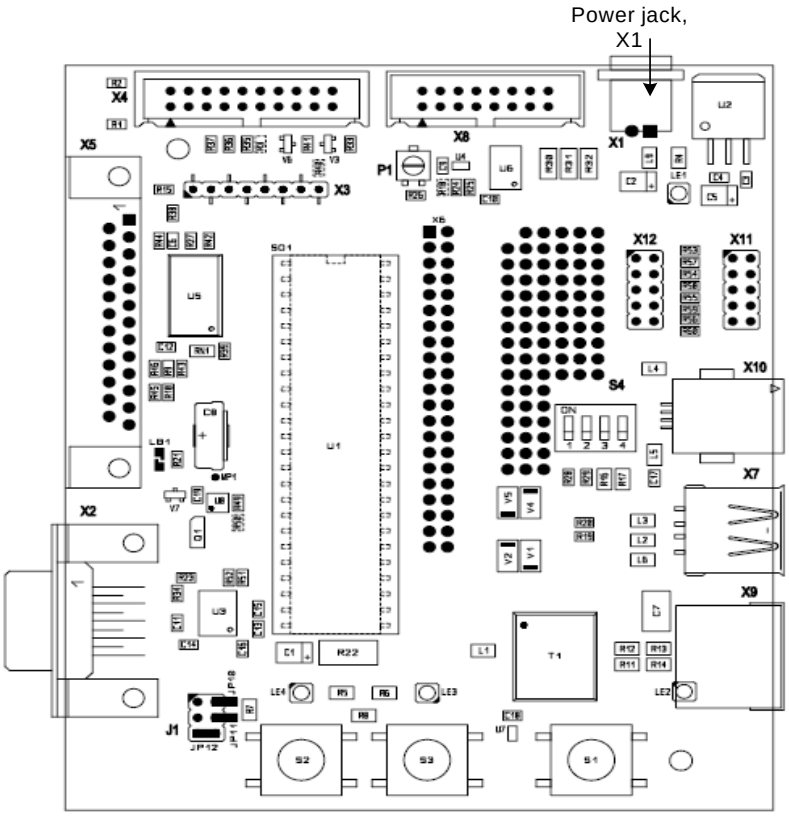
P1 on the development board is a variable resistor (potentiometer); use this to adjust the contrast (VO) of a connected character LCD.

Display header pin configuration

Pin	Symbol	Description
1	VSS	GND
2	VDD	+ 5V
3	VO	LCD control adjust
4	RS	Register selection This is the same as the module's ADDR0 pin.
5	R/W#	Read / Write# This is the same as the module's ADDR1 pin.
6	E	Enable This is the inverted version of one of the module's chip select signals.
7	DATA0	This is the buffered version of the module's DATA0 pin.
8	DATA1	This is the buffered version of the module's DATA1 pin.
9	DATA2	This is the buffered version of the module's DATA2 pin.
10	DATA3	This is the buffered version of the module's DATA3 pin.
11	DATA4	This is the buffered version of the module's DATA4 pin.
12	DATA5	This is the buffered version of the module's DATA5 pin.
13	DATA6	This is the buffered version of the module's DATA6 pin.
14	DATA7	This is the buffered version of the module's DATA7 pin.
15	VLED +	LED backlight anode
16	VLED-	LED backlight cathode

Power jack, X1

The power jack, X1, is a connector that uses only +5V power supply.



The power jack's polarity is +9 to +30 VDC.

Module and Development Board Specifications

APPENDIX A

This appendix provides ConnectCore 7U module and electrical specifications, as well as module and development board mechanical specifications.

Temperature and power specifications

Characteristic	Min	Max	Unit
Operating temperature (ambient)	0	70	°C
Industrial temperature	-40	85	°C

Power consumption

The power consumption for the ConnectCore 7U module, at 3.3V, is 90 mA minimum and 280 mA maximum.

Electrical characteristics

The ConnectCore 7U operates at 3.3V power

Absolute maximum ratings: Module

This table defines the maximum values for the voltages that the ConnectCore 7U can withstand without being damaged.

Symbol	Parameter	Min	Max
V_{CC}	I/O supply voltage	-0.3V	3.6V
V_{IN}	Input voltage	-0.3V	V_{CC} + 0.3V
V_{OUT}	Output voltage	-0.3V	V_{CC}

Absolute maximum ratings: Base board

V_{CC} base development board supply voltage:

- Min = -0.3V
- Max = 5.5V

Recommended operating conditions

Recommended operating conditions specify voltage and temperature ranges over which a circuit's correct logic function is guaranteed.

Sym	Parameter	Conditions	Min	Typ	Max	Unit
V_{CC}	I/O supply voltage		3.0	3.3	3.6	V
T_{OP}	Ambient temperature:					
		Commercial	0		70	°C
		industrial	-40		85	°C

Power dissipation

The typical power dissipation of the ConnectCore 7U module is 1.3W (Fsysclk 55MHz).

DC input characteristics

This table shows DC characteristics for inputs.

Sym	Parameter	Min	Max
V_{IH}	Input high voltage	2.0V	V_{CC}
V_{IL}	Input low voltage	V_{SS}	0.8V

DC output characteristics

This table shows DC characteristics for outputs.

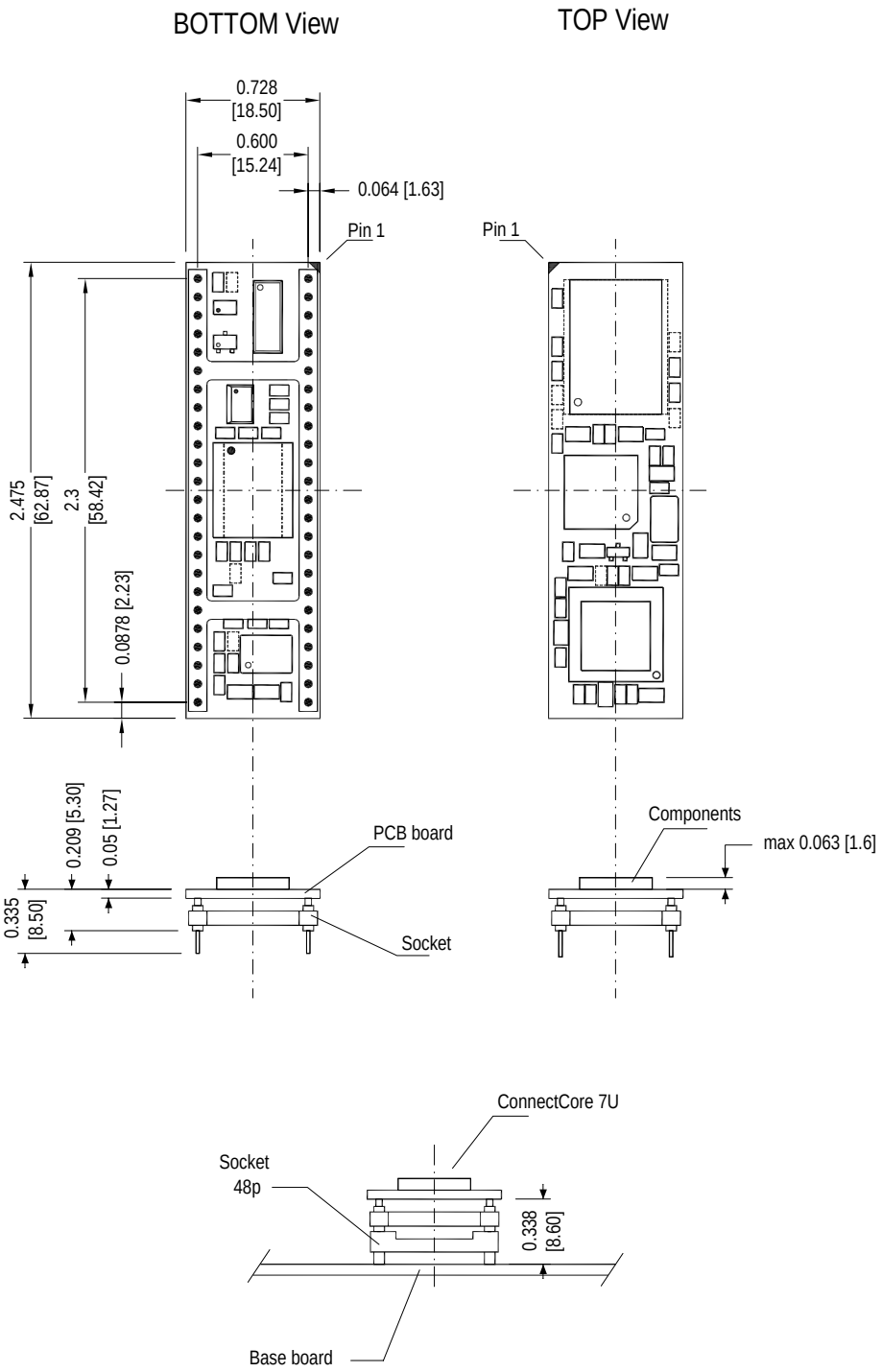
Sym	Parameter	Condition	Min	Max	Unit
V_{OL}	Output low voltage	Outputs and bi-directional	0	0.4	V
V_{OH}	Output high voltage	Outputs and bi-directional	2.4	V_{CC}	V

Output drive

The output drive varies from ±2..4mA, depending on the pin; see "Module pinout" on page 8 for individual pin assignments.

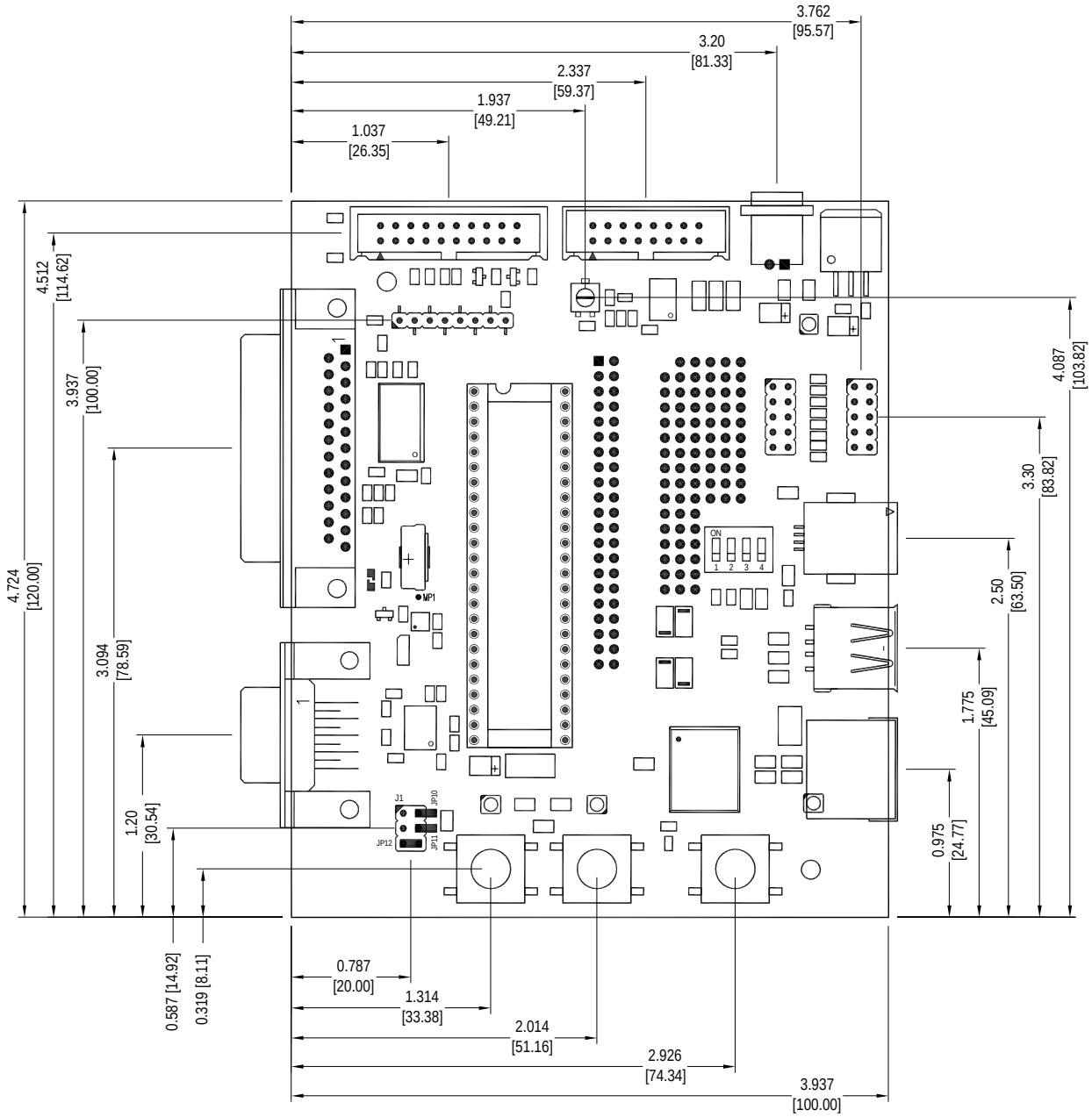
Mechanical specifications - Module

The next drawing shows the module's mechanical specifications. Dimensions are in inches and [millimeters].



Mechanical specifications - Development board

This drawing shows the development board's mechanical specifications, top view, in inches and millimeters (in [ ]).



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