



# ConnectCore® 9C/Wi-9C

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## Hardware Reference Manual

## Revision history—90000789

| Revision | Date           | Description                                               |
|----------|----------------|-----------------------------------------------------------|
| A        | August, 2006   | Initial release.                                          |
| B        | February, 2007 | Updated antenna graphics.                                 |
| C        | May, 2007      | Minor updates for the NetOS 7.2 release.                  |
| D        | June, 2010     | Made minor corrections in content, images and tables.     |
| E        | June, 2017     | Updated branding and added statements for RED compliance. |

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## Maximum power and frequency specifications

# About the Modules

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The ConnectCore 9C and ConnectCore Wi-9C modules are powerful ARM9-based modules in a compact and universal SO-DIMM (Small Outline Dual Inline Memory Module) form factor. The modules provide core processing functionality with integrated wired and wireless network connectivity and a complete set of peripheral options in a footprint-compatible interchangeable SO-DIMM form factor that allows you to optimize your system for either Ethernet, WLAN, or both.

- The ConnectCore 9C provides 10/100 Ethernet connectivity only.
- The ConnectCore Wi-9C provides both 10/100 Ethernet and 802.11b/g wireless networking capabilities.
- All modules are fully compliant with EU directive 2002/95/EC (RoHS).

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## Common module features

- 32-bit NS9360 high performance RISC processor @ 155 MHz
- Up to 256 MB Flash and 256 MB SDRAM
- Compact SO-DIMM (Small Outline-Dual Inline Memory Module) design
- Low power consumption
- Industrial/extended operating temperature
- 10/100 Mbps Ethernet interface with optional on-board RJ-45 connector
- IEEE802.3af compliant power pass-through (mid-span and end-span)
- Up to four high-speed serial ports — UART and SPI mode configurable
- I<sup>2</sup>C bus interface
- USB 2.0 Host and Device interfaces
- Optional on-board USB Host connector
- Integrated LCD controller
- Up to eight independent 16-/32-bit programmable timers, counters, or four PWM functions
- Four programmable external interrupts
- Up to 55 shared General Purpose Input/Output (GPIO) ports
  - Up to seven high-current (8mA) pins
- 8-bit wide data/address bus with external chip select
- Processor-powered on-chip Real-Time Clock (RTC)
- Population options available (processor speed, memory, connectors)

## Wi-9C specific features

- 802.11b/g WLAN interface
- WEP, WPA, and WPA2/802.11i security standard
- Single or dual-diversity antenna options

## Memory

The module's standard memory configuration is 4 MB Flash and 16 MB SDRAM.

## Memory clocks

Memory clocks = 77.5 MHz

- Not available for off-DIMM use
- `clk_out[0]` — Not used; turned off by code
- `clk_out[1]` — Connected to `clk_in`
- `clk_out[2]` — Used for one bank of two X16 SDRAMs
- — Not used

## Other system clocks

- Source clock is a 29.4912 MHz crystal or spread spectrum oscillator.
- USB uses a 48.000 MHz oscillator
- Ethernet versions have a 25.0000 MHz crystal

## Interfaces

The ConnectCore 9C/Wi-9C module supports several system interfaces. This section details the features of these interfaces.

### Ethernet

The module provides a 10/100 Mbps Ethernet interface with optional on-board RJ-45 connector and integrated LEDs. On modules not populated with the RJ-45 connector, the Ethernet PHY signals are available on the SO-DIMM edge connector.

- Full-duplex or half-duplex
- Station, broadcast, or multicast address filtering
- 2 kB RX FIFO
- 256-byte TX FIFO with on-chip buffer descriptor ring
- Separate TX and RX DMA channels
- Intelligent receive-side buffer size selection
- Full statistics gathering support
- External CAM filtering support

### WLAN

The ConnectCore Wi-9C provides integrated 802.11b/g wireless networking capabilities.

Standard compliance: IEEE 802.11g-2003

Frequency: 2.4 GHz

Data rates: Up to 54 Mbps with fallback

Modulation:

- DBPSK (1 Mbps)
- DQPSK (2 Mbps)
- CCK (5.5, 11 Mbps)
- BPSK (6, 9 Mbps)

- QPSK (12, 18 Mbps)
- 16-QAM (24, 36 Mbps)
- 64-QAM (48, 54 Mbps)

Transmit power: 12 dBm typical

Receive sensitivity:

| Receive sensitivity |         |         |
|---------------------|---------|---------|
| Data Rate           | MIN     | TYP     |
| 11Mbps              | -76 dBm | -87 dBm |
| 54Mbps              | -65 dBm | -73 dBm |

Antenna connectors: U.FL or RP-SMA

Dual-diversity: Available on modules with two U.FL or RP-SMA connectors

## USB 2.0 host and device

- USB v2.0 full speed (12 Mbps) and low speed (1.5 Mbps)
- Independent OHCI Host and Device ports
- Internal USB PHY
- External USB PHY interface

The module provides a population option for a four-port hub with onboard dual-connector (500mA, 5V only) and full speed/low speed support.

## Serial

- Bit rates from 75 bps to 921.6 kbps: asynchronous mode
- Bit rates from 1.2 kbps to 11.25 Mbps: synchronous mode
- UART provides:
  - High performance hardware and software flow control
  - Odd, even, or no parity
  - 5, 6, 7, or 8 bits
  - 1 or 2 stop bits
  - Receive-side character and buffer gap timers
- Four receive-side data match detectors
- Two dedicated DMA channels per module; 8 channels total
- 32 byte TX FIFO and 32 byte RX FIFO per module

## I<sup>2</sup>C

- I<sup>2</sup>C v.1.0 configurable to master or slave
- Bit rates: fast (400 kHz) or normal (100 kHz) with clock stretching

- 7-bit and 10-bit address modes
- Supports I<sup>2</sup>C bus arbitration

## External Memory bus

- 8-bit address bus
- 8-bit data bus
- 1 external chip select

## LCD

- Dual 64-deep, 32-bit wide FIFOs for buffering incoming display data
- Support for color and monochrome single- and dual-panel for Super Twisted Nematic (STN) displays with 4- or 8-bit interfaces
- Support for Thin Film Transistor (TFT) color displays
- Resolution up to 800 x 600 pixels
- 15 gray-level mono, 3375 color STN, and 64K color TFT support
  - Patented gray-scale algorithm
- 1, 2, or 4 bits-per-pixel (bpp) palettized displays for mono STN
- 1, 2, 4, or 8 bpp palettized color displays for STN and TFT
- 16 bpp true-color non-palettized, for color STN and TFT
- Programmable timing for different display panels
- 256 entry, 16-bit palette RAM, arranged as a 128 x 32-bit RAM
- Frame, line, and pixel clock signals
- AC bias signal for STN, data enable signal for TFT panels
- Support for multiple data formats

## ConnectCore 9C configurations

The ConnectCore 9C module is available in these base configurations:

- **Fully populated.** A fully populated module includes on-board Ethernet PHY, Ethernet magnetics with RJ-45, a USB hub and Type A female connector.
- **With Ethernet but no USB Host.** With this setup, Ethernet PHY or Ethernet magnetics with RJ-45 are on the module. The module does not have an on-board USB hub and Type A female connector, although USB Host and Device signals are available on the edge connector.

- **No additional on-board connectors.** With this setup, there is no Ethernet RJ-45 with integrated magnetics on the module, but does have the Ethernet PHY. The module does not have an on-board USB Hub and type A female connector.

---

**Note** Modules without an on-board Ethernet connector provide the Ethernet PHY signals through the SO-DIMM edge connector. Modules with on-board USB hub have access to hub ports 3 and 4 through the SO-DIMM edge connector. Modules without on-board USB hub have access to HDMI, DP1, GPIO16, and GPIO17 through the SO-DIMM connector. All modules have access to the USB device only signals which require an external PHY through the SO-DIMM connector (see appendix A, USB Device only Table).

---

Design aid schematics are available for interfacing to all of the module versions.

See the *cc9c-wi-9c\_baseboard\_design\_aids* file at [www.digi.com/support](http://www.digi.com/support) > *ConnectCore 9C* or *ConnectCore Wi-9C* documentation.

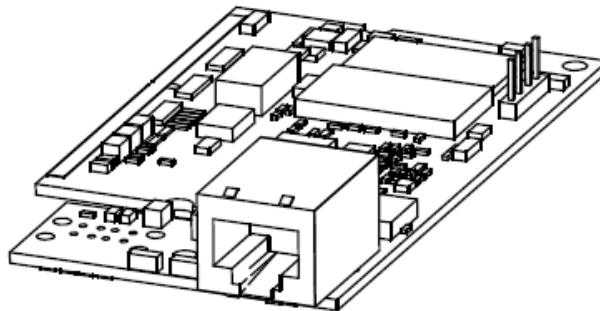
See the table in [Module / SO-DIMM signal characteristics](#).

Additional population options are available. For information, contact your local Digi sales office or distributor.

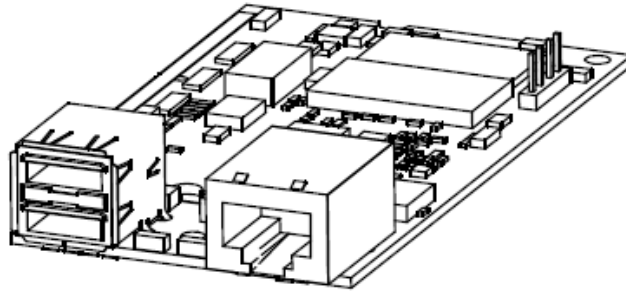
## Configuration diagrams

The diagrams in this section show configurations for the ConnectCore 9C module, illustrated with top and edge views.

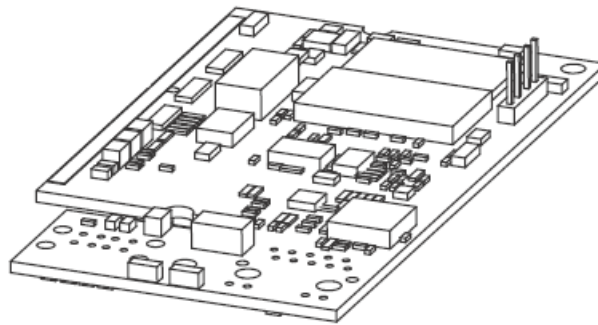
### Standard configuration with Ethernet without USB



### With Ethernet and USB



**Without Ethernet and USB**



## ConnectCore Wi-9C configurations

The ConnectCore Wi-9C module is available in these base configurations:

- **Fully populated, 2xRP-SMA.** A fully populated module using RP-SMA includes on-board Ethernet PHY, Ethernet magnetics with RJ-45, a USB hub and Type A female connector, and two RP-SMA connectors.
- **With Ethernet, without USB, and with single RP-SMA.** With this setup, Ethernet PHY or Ethernet magnetics with RJ-45 are on the module. The module does not have an on-board USB hub and Type A female connector. There is one RP-SMA connector.

- **No additional on-board connectors, with single RP-SMA.** With this setup, there is no Ethernet RJ-45 with integrated magnetics on the module. There is one RP-SMA connector with the Ethernet PHY. The module does not have an on-board USB Hub and Type A female connector.

---

**Note** Modules without an on-board Ethernet connector provide the Ethernet PHY signals through the SO-DIMM edge connector.

---

- **With Ethernet, without USB, and with 2xU.FL.** With this setup, Ethernet PHY or Ethernet magnetics with RJ-45 are on the module. The module does not have an on-board USB hub and Type A female connector, although USB Host and Device signals are available on the edge connector. There are two U.FL connectors.

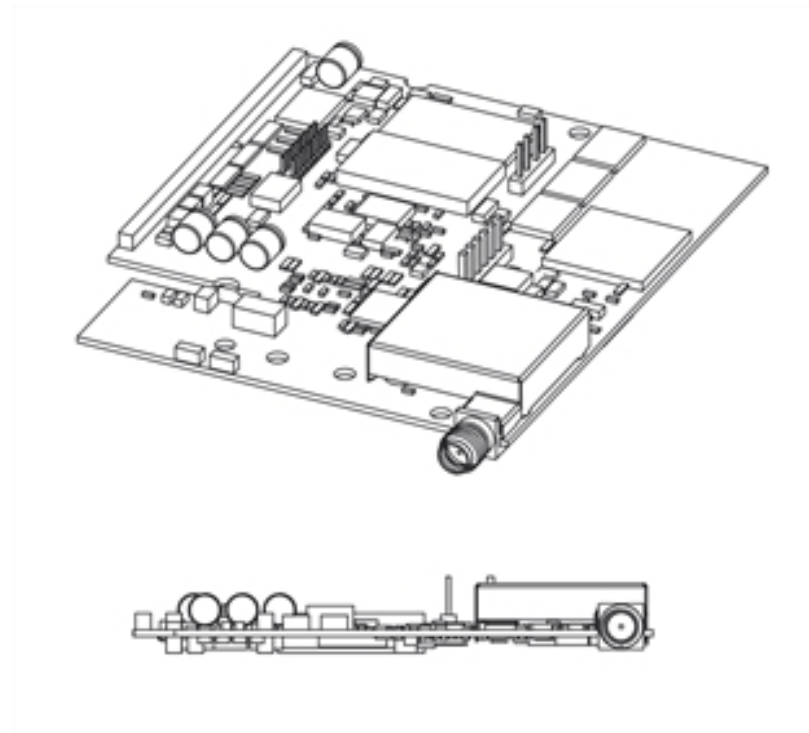
Additional population options are available. For information, contact your local Digi sales office or distributor.

## Configuration diagrams

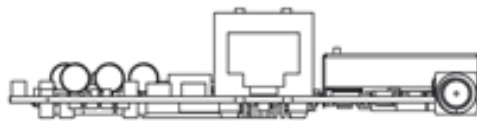
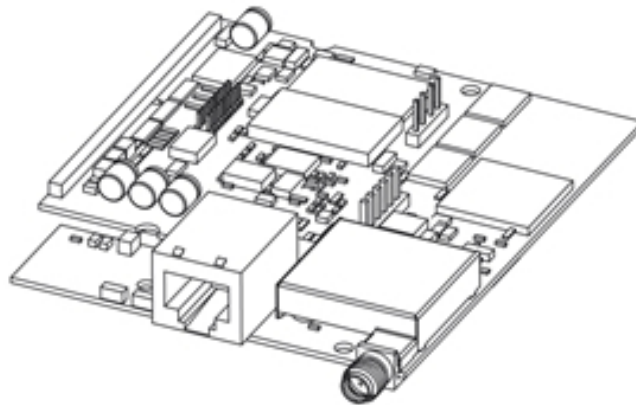
The diagrams in this section show configurations for the ConnectCore Wi-9C module, illustrated with top and edge views.

### Standard configuration

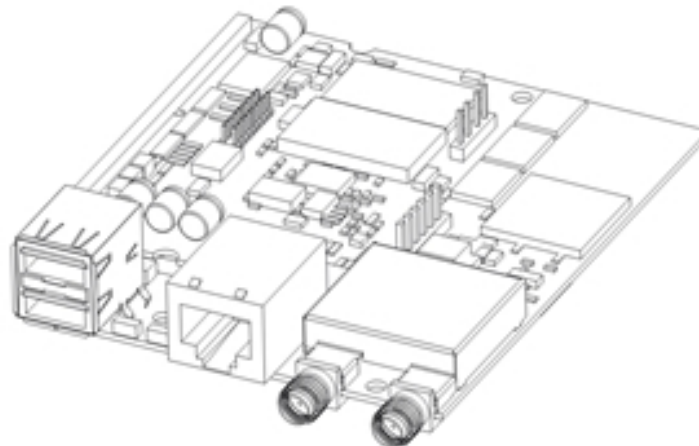
**No Ethernet, No USB, With 1xRP-SMA connector**



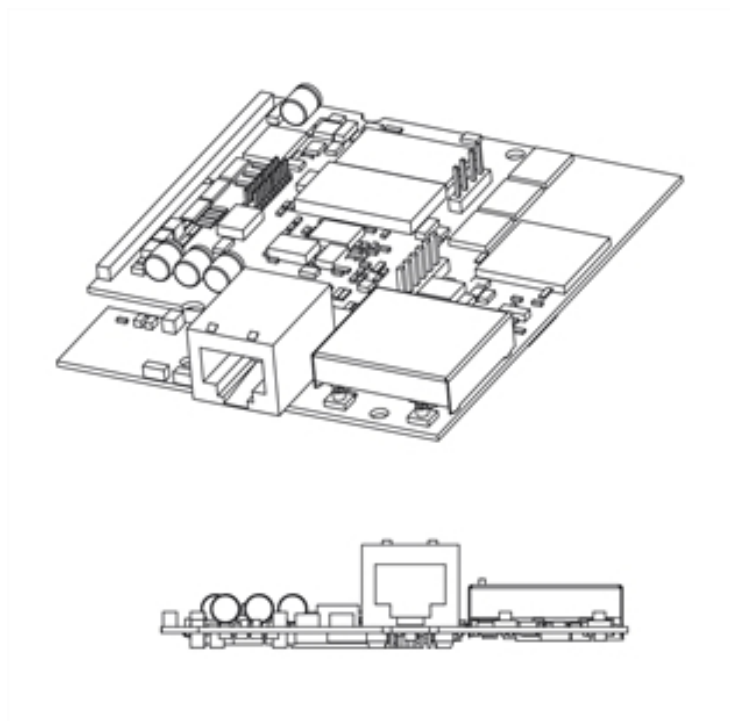
**With Ethernet and 1xRP-SMA connector, no USB**



**Fully populated with Ethernet, USB, and 2xRP-SMA connectors**



**With Ethernet and 2xU.FL connectors, no USB**



## What's on the module?

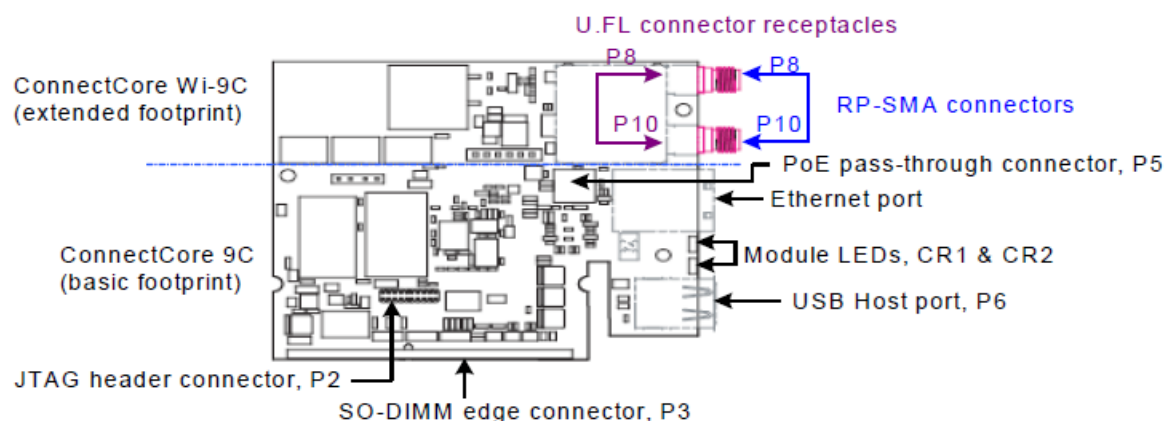
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This chapter describes the ConnectCore 9C/Wi-9C modules. See [Module specification](#) for the mechanical specifications and electrical characteristics of the modules.

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## Module layout

The module design you use depends on whether you want to use the ConnectCore Wi-9C wireless capabilities. The basic footprint for the ConnectCore 9C and ConnectCore Wi-9C is the same; an extension of the footprint provides the active components and antenna connectors for wireless functionality.



**Note** The ConnectCore Wi-9C module is populated with either one RP-SMA connector, two RP-SMA connectors, or 2 U.FL connectors (see [About the Modules](#) for all module configuration options). The U.FL connectors are located in the same positions as the RP-SMA connectors, but do not extend past the edge of the module.

## Ethernet connector

The Ethernet connector is an 8-wire RJ-45 jack with integrated magnetics that meets the ISO 8877 requirements for 10/100BASE-T. The connector provides both Ethernet interface pins (in the upper portion) and two integrated LEDs (in the lower portion).



## Ethernet connector pins

There are eight Ethernet connector pins in the upper portion of the connector. Pin 1 is in the upper left corner of the connector, above the yellow LED. Pins 4, 5, 7, and 8 are used with Power-over-Ethernet (PoE) only (see [Ethernet connector pins](#)).

| Pin | Signal | 802.3af End-Span (Mode A) | 802.3af Mid-Span (Mode B) | Description         |
|-----|--------|---------------------------|---------------------------|---------------------|
| 1   | TXD+   | Negative $V_{Port}$       |                           | Transmit data +     |
| 2   | TXD-   | Negative $V_{Port}$       |                           | Transmit data -     |
| 3   | RXD+   | Positive $V_{Port}$       |                           | Receive data +      |
| 4   | EPWR+  |                           | Positive $V_{Port}$       | Power from switch + |
| 5   | EPWR+  |                           | Positive $V_{Port}$       | Power from switch + |
| 6   | RXD-   | Positive $V_{Port}$       |                           | Receive data -      |
| 7   | EPWR-  |                           | Negative $V_{Port}$       | Power from switch - |
| 8   | EPWR-  |                           | Negative $V_{Port}$       | Power from switch - |

## Ethernet LEDs

The RJ-45 connector has two LEDs located near the outer lower corners of the Ethernet port. These LEDs are controlled by the Ethernet PHY on the module, and are not programmable.

| LED    | Description                                                                                       |
|--------|---------------------------------------------------------------------------------------------------|
| Green  | Network link: On indicates an active network link; Off indicates that no network link is present. |
| Yellow | Network activity: Flashing when network traffic detected; Off when no network traffic detected.   |

## 802.3af Power over Ethernet (PoE) pass-through connector, P5

The PoE pass-through connector, P5, mates with the P20 header on the development board. This PoE pass-through feature passes PoE power connections from the Ethernet signal cable to the user's equipment through P5. The PoE feature provides a power source for compliant "powered" equipment, and is nominally 48VDC with a possible 30–57VDC 13 W maximum range.



## Connector description

| Pin | Signal   | Description                      |
|-----|----------|----------------------------------|
| 1   | TX_CT    | Ethernet transformer transmit CT |
| 2   | RJ45_7/8 | Ethernet connector pins 7 and 8  |
| 3   | RX_CT    | Ethernet transformer receive CT  |
| 4   | RJ45_4/5 | Ethernet connector pins 4 and 5  |

## PoE support

If you are planning to add PoE support to your product, see the most recent revision of the IEEE 802.3af specification available at <http://www.ieee802.org/3/af/>. The document provides detailed information about the standard and its proper implementation.

## Module LEDs

By default, the ConnectCore 9C/Wi-9C modules use the CR1 and CR2 LEDs as described:

- **ConnectCore Wi-9C module:** To indicate WLAN-related information, such as association status and network activity.
- **ConnectCore 9C and Wi-9C modules:** CR1 will flash a repeating blink pattern in a major system failure; for example, a processor exception or Power on Self Test failure.

The ConnectCore Wi-9C LED assignments can be reassigned; that is, you can use different GPIOs to drive CR1/CR2 LEDs.



## Description

| ID  | Connects to | Default | Description                                   |
|-----|-------------|---------|-----------------------------------------------|
| CR1 | GPIO67      | Off     | Setting to output logic “0” turns on the LED. |
| CR2 | GPIO66      | Off     | Setting to output logic “0” turns on the LED. |

## ConnectCore Wi-9C default use

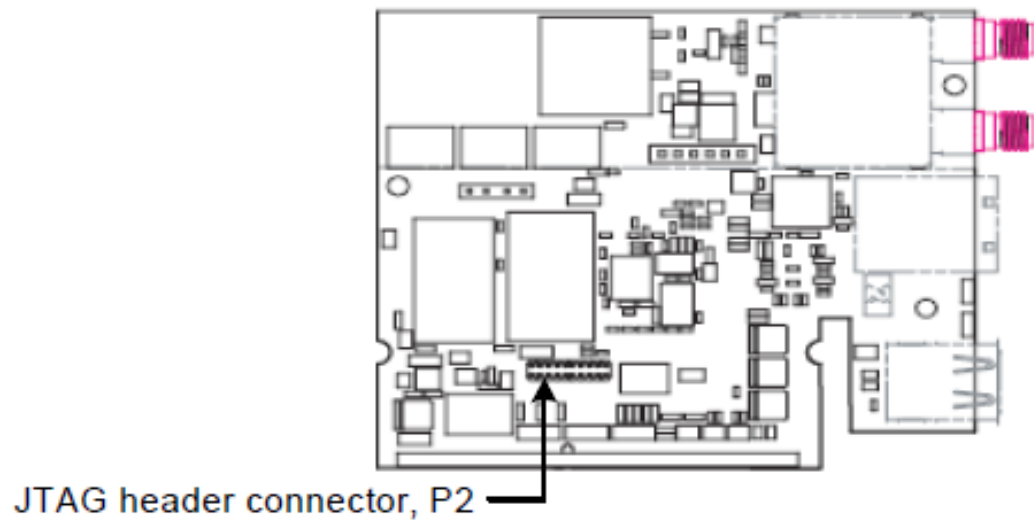
| ID  | Color  | LED              | Blink pattern | Status/Activity                                                 |
|-----|--------|------------------|---------------|-----------------------------------------------------------------|
| CR1 | Green  | Link integrity   | On            | The unit is associated to an access point (infrastructure mode) |
|     |        |                  | Slow          | The unit is in ad-hoc mode                                      |
|     |        |                  | Quick         | The unit is scanning for a network                              |
| CR2 | Yellow | Network activity | Blinking      | Network traffic is received or transmitted                      |
|     |        |                  | Off           | Network is idle                                                 |

**Note** The network activity LED is used for diagnostic purposed during boot-up.

## JTAG 20-pin header connector, P2

The JTAG connector is a standard, male, ARM 20-pin pinout in a miniature connector, with a 50-mil pitch. A JTAG adapter, which ships with each Jump Start kit, expands the JTAG connector to a 100 mil pitch. Use the included JTAG adapter to connect the debugger.

The JTAG connector on the module is *keyed*, as are the two connectors on the JTAG adapter, which means there is only one way to attach ribbon cables to the module and JTAG adapter. For details, see [JTAG adapter assembly](#).



## Pin assignment

| Pin | Signal  | Description                         |
|-----|---------|-------------------------------------|
| 1   | 3.3V    | ARM9 I/O supply                     |
| 2   | 3.3V    | ARM9 I/O supply                     |
| 3   | TRST#   | Test mode reset                     |
| 4   | GND     | Ground                              |
| 5   | TDI     | Test data in                        |
| 6   | GND     | Ground                              |
| 7   | TMS     | Test mode select                    |
| 8   | GND     | Ground                              |
| 9   | TCK     | Test clock                          |
| 10  | GND     | Ground                              |
| 11  | RTCK    | Returned test clock (ARM core only) |
| 12  | GND     | Ground                              |
| 13  | TDO     | Test data out                       |
| 14  | GND     | Ground                              |
| 15  | DBSRST# | System reset                        |
| 16  | GND     | Ground                              |
| 17  | N/A     | N/A                                 |

| Pin | Signal  | Description                                                                                                                                                                              |
|-----|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 18  | GND     | Ground                                                                                                                                                                                   |
| 19  | BISTEN# | ARM9 mode select: <ul style="list-style-type: none"> <li>■ Debug = Pull high: 220 ohms to pin 2 (3.3V)</li> <li>■ Boundary scan / normal = Pull low: 220 ohms to pin 20 (GND)</li> </ul> |
| 20  | GND     | Ground                                                                                                                                                                                   |

## JTAG adapter assembly

Use the JTAG adapter assembly, shipped with the ConnectCore 9C/Wi-9C Jump Start Kit, to attach your debugger to the module. The JTAG adapter assembly consists of the Digi JTAG Link USB debugger with a ribbon cable attached and the JTAG adapter with a ribbon cable attached. The Jump Start Kit also includes a USB cable.

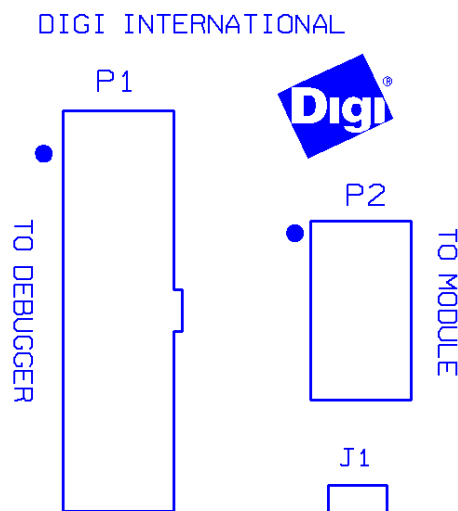
The two connectors on the JTAG adapter are *keyed*, as is the JTAG connector header (P2) on the module. Keyed connectors eliminate cable attachment errors by ensuring that there is only one way to mate the connectors.

### JTAG adapter

The JTAG adapter has two 20-pin connectors, P1 and P2.

- **P1** is a keyed male connector into which you attach the debugger's ribbon cable.
- **P2** is a keyed male connector into which you attach the ribbon cable that plugs into the module.
- **J1** is a jumper that determines the mode in which the module operates: debug or boundary scan. Depending on the JTAG adaptor you are using, J1 has either two pins or three pins.

This drawing shows the JTAG adapter with a 2-pin J1 header.

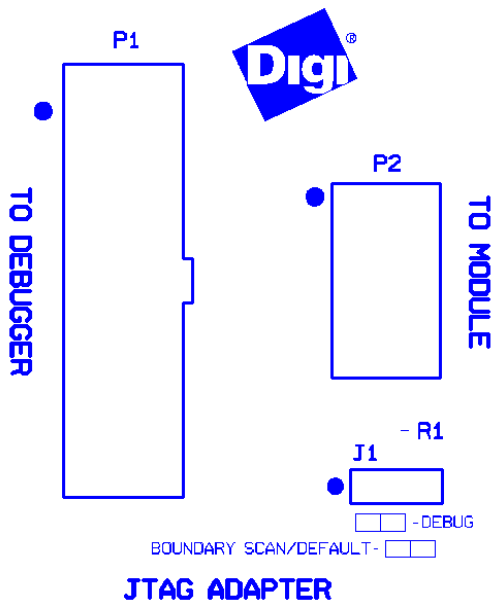


For **debug** mode — Do not plug a jumper onto J1.

For **boundary scan** mode — Plug a jumper onto J1.

For the 3-pin version having pins 1 and 2 jumpered puts you into debug mode, this again is the 'default' mode. Having pins 2 and 3 jumpered puts you into a boundary scan mode.

This drawing shows the JTAG adapter with a 3-pin J1 header. The pin positions for debug and boundary scan are shown in the lower right of the drawing:

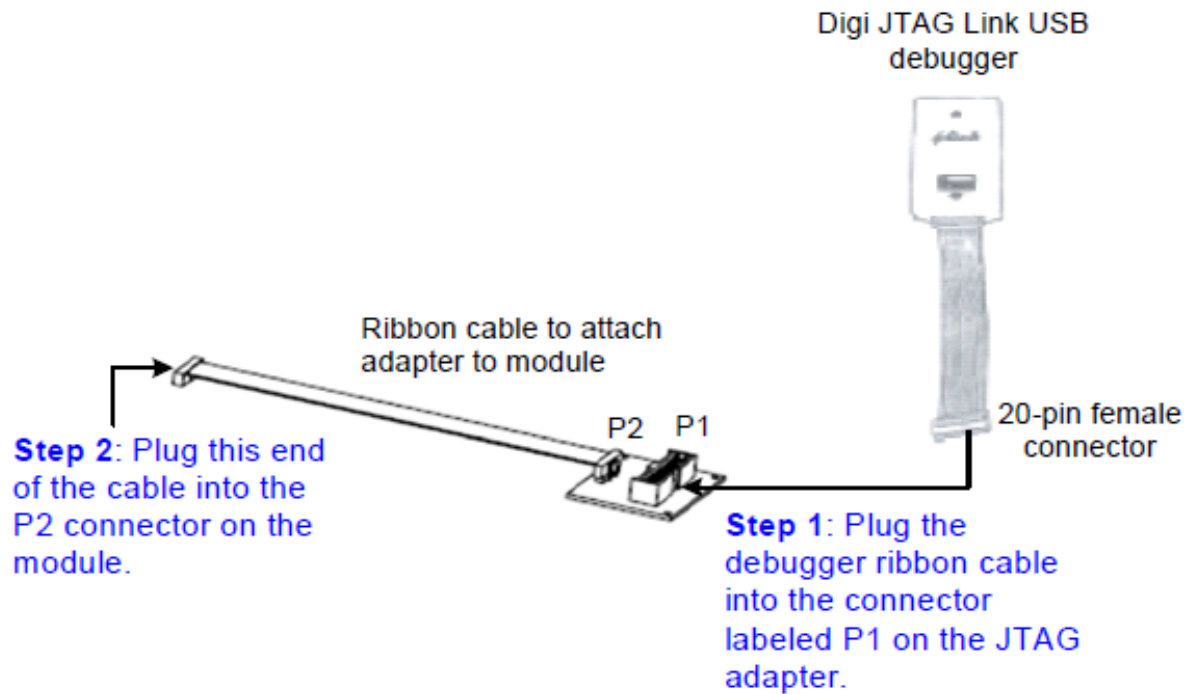


For **debug** mode — Plug a jumper on pins 1 and 2.

For **boundary scan** mode (the default) — Plug a jumper on pins 2 and 3.

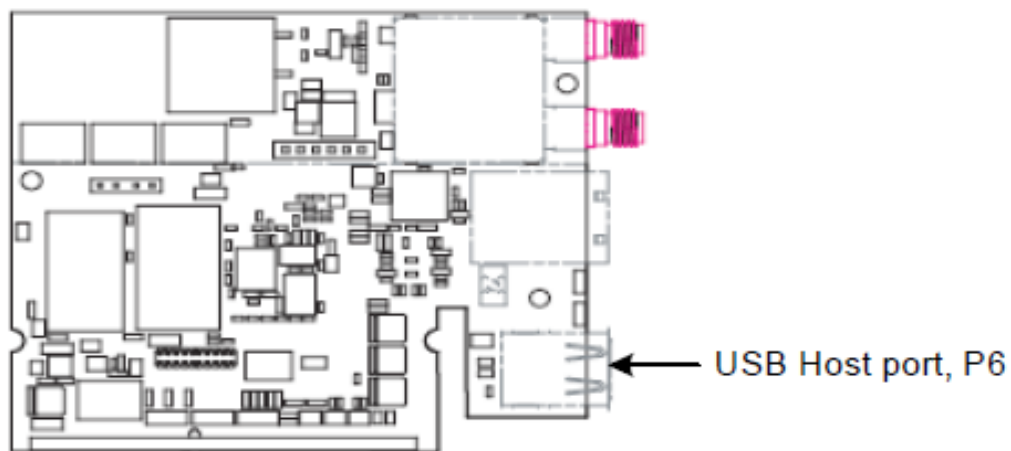
## Assembly

1. Plug the debugger ribbon cable into the connector labeled P1 on the JTAG adapter.
2. Plug the adapter ribbon cable (attached to P2 on the adapter) into the P2 connector on the module.



## USB Host connector, P6

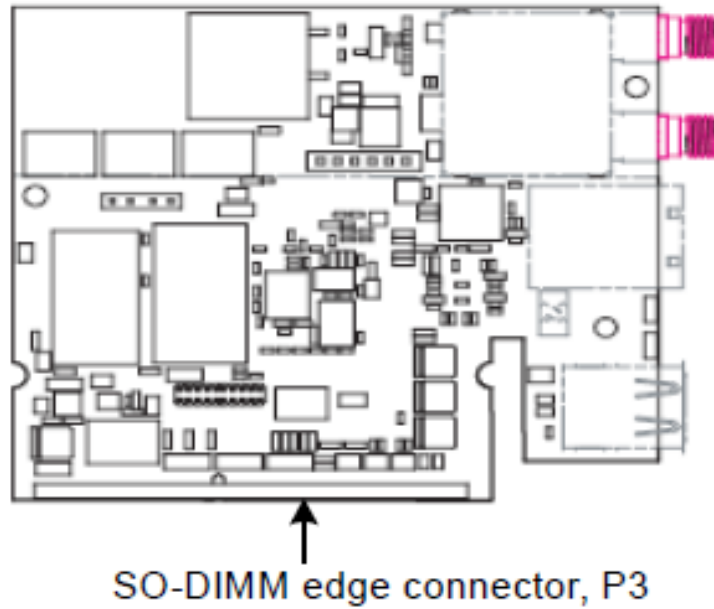
When populated, the USB Host connector is on the same side of the module as the Ethernet connector, separated from the Ethernet connector by CR1 and CR2.



See [USB interface](#) for information about the USB interface.

## Edge connector, P3 ConnectCore 9C and Wi-9C

The edge connector is a 144-pin SO-DIMM connector located on the short edge of the module. P3 mates with P15 (also a 144-position SO-DIMM connector) on the development board or an SO-DIMM connector on your design.




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**Note** The clearance underneath the module and development board should be 2.54mm (0.10”).

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## Pin assignment

The next tables show information for all pins on the edge connector, in DIMM pin order. For additional SO-DIMM pin characteristics, see [Module / SO-DIMM signal characteristics](#).

- Some signals are multiplexed to two different GPIO pins, to maximize the number of possible applications. The primary/duplicate signals are noted in the Notes column in the table. Using the primary GPIO pin and the duplicate pin for the same function is not recommended.

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**Note** Functions in parentheses are duplicates; for example, pin 63 has two entries in the LCD column: CLD6 and (CLD10). CLD10 is a duplicate signal for pin 63; the Notes column identifies the primary function for that signal.

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- A # next to a signal indicates that this signal is active low.
- A **bold** value in the System / Other / Bootstrap column indicates the bootstrap signal.

## Pin assignment by SO-DIMM pin number

| Dim<br>m<br>Pin | Signal   | BootStrap (BS)<br>/<br>System<br>/<br>Other | UART | SPI | I2C | USB | LCD | IEEE<br>1284 | PWM<br>/<br>Timer<br>/<br>IRQ | Notes                                                |
|-----------------|----------|---------------------------------------------|------|-----|-----|-----|-----|--------------|-------------------------------|------------------------------------------------------|
| 1               | GND      |                                             |      |     |     |     |     |              |                               | Common GND return                                    |
| 2               | GND      |                                             |      |     |     |     |     |              |                               | Common GND return                                    |
| 3               | +3.3V    |                                             |      |     |     |     |     |              |                               | Power to module                                      |
| 4               | +3.3V    |                                             |      |     |     |     |     |              |                               | Power to module                                      |
| 5               | +3.3V    |                                             |      |     |     |     |     |              |                               | Power to module                                      |
| 6               | +3.3V    |                                             |      |     |     |     |     |              |                               | Power to module                                      |
| 7               | WAKEUP#  | System                                      |      |     |     |     |     |              |                               | Wi-9C:<br>WAKEUP#<br>/<br>Reserved                   |
| 8               | BUFFERR# | System                                      |      |     |     |     |     |              |                               | Use to isolate bootstrap GPIOs from external loading |
| 9               | DATA_0   | Data bus                                    |      |     |     |     |     |              |                               | CSO parallel port                                    |
| 10              | DATA_1   | Data bus                                    |      |     |     |     |     |              |                               | CSO parallel port                                    |
| 11              | DATA_2   | Data bus                                    |      |     |     |     |     |              |                               | CSO parallel port                                    |

| Dim<br>m<br>Pin | Signal        | BootStrap (BS)<br>/<br>System<br>/<br>Other | UART | SPI | I2C | USB | LCD | IEEE<br>1284 | PWM<br>/<br>Timer<br>/<br>IRQ | Notes                          |
|-----------------|---------------|---------------------------------------------|------|-----|-----|-----|-----|--------------|-------------------------------|--------------------------------|
| 12              | DATA_3        | Data bus                                    |      |     |     |     |     |              |                               | CSO parallel port              |
| 13              | DATA_4        | Data bus                                    |      |     |     |     |     |              |                               | CSO parallel port              |
| 14              | DATA_5        | Data bus                                    |      |     |     |     |     |              |                               | CSO parallel port              |
| 15              | DATA_6        | Data bus                                    |      |     |     |     |     |              |                               | CSO parallel port              |
| 16              | DATA_7        | Data bus                                    |      |     |     |     |     |              |                               | CSO parallel port              |
| 17              | ADDRESS_0     | Address bus                                 |      |     |     |     |     |              |                               | CSO parallel port              |
| 18              | ADDRESS_1     | Address bus                                 |      |     |     |     |     |              |                               | CSO parallel port              |
| 19              | GND           |                                             |      |     |     |     |     |              |                               | Common GND return              |
| 20              | GND           |                                             |      |     |     |     |     |              |                               | Common GND return              |
| 21              | ADDRESS_2     | Address bus                                 |      |     |     |     |     |              |                               | CSO parallel port              |
| 22              | MFGI_GPIO[72] |                                             |      |     |     |     |     |              |                               | Reserved 15K pull-up on module |
| 23              | ADDRESS_3     | Address bus                                 |      |     |     |     |     |              |                               | CSO parallel port              |

| Dim<br>m<br>Pin | Signal    | BootStrap (BS)<br>/<br>System<br>/<br>Other | UART | SPI | I2C     | USB | LCD | IEEE<br>1284 | PWM<br>/<br>Timer<br>/<br>IRQ | Notes                                                                                                                                                                    |
|-----------------|-----------|---------------------------------------------|------|-----|---------|-----|-----|--------------|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 24              | GPIO[71]  |                                             |      |     | iic_sda |     |     |              |                               | <b>GPIO[71]:</b><br>Output drive 8mA<br><b>iic_sda:</b><br>Primary on GPIO[35] 15K (cc9c) or 2k4 (wi-0c) pull-up on module<br>Wi-9C uses iic_sda @ addr A2/A3 on module. |
| 25              | ADDRESS_4 | Address bus                                 |      |     |         |     |     |              |                               | CS0 parallel port                                                                                                                                                        |
| 26              | GPIO[70]  |                                             |      |     | iic_scl |     |     |              |                               | <b>GPIO[70]:</b><br>Output drive 8mA<br><b>iic_scl:</b><br>Primary on GPIO[34] 15K (cc9c) or 2k4 (wi-0c) pull-up on module<br>Wi-9C uses iic_sda @ addr A2/A3 on module. |
| 27              | ADDRESS_5 | Address bus                                 |      |     |         |     |     |              |                               | CS0 parallel port                                                                                                                                                        |

| Dim<br>m<br>Pin | Signal        | BootStrap (BS)<br>/<br>System<br>/<br>Other | UART      | SPI        | I2C | USB | LCD  | IEEE<br>1284 | PWM<br>/<br>Timer<br>/<br>IRQ | Notes                                                                                                                                      |
|-----------------|---------------|---------------------------------------------|-----------|------------|-----|-----|------|--------------|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| 28              | GPIO[69]      |                                             |           |            |     |     |      |              | IRQ1                          | <b>GPIO[69]:</b><br>Output<br>drive 8mA<br><b>IRQ1:</b><br>Primary on<br>GPIO[07]<br><br><b>Add 10-<br/>15K<br/>pullup if<br/>not used</b> |
| 29              | GND           |                                             |           |            |     |     |      |              |                               | Common<br>GND<br>return                                                                                                                    |
| 30              | GND           |                                             |           |            |     |     |      |              |                               | Common<br>GND<br>return                                                                                                                    |
| 31              | GPIO[27]      |                                             | DC<br>D_D | ENB<br>L_D |     |     | CLD3 |              | TIME<br>R4                    |                                                                                                                                            |
| 32              | No<br>connect |                                             |           |            |     |     |      |              |                               |                                                                                                                                            |
| 33              | GPIO[26]      |                                             | RI_<br>D  | CLK_<br>D  |     |     | CLD2 |              | TIME<br>R3                    |                                                                                                                                            |
| 34              | GPIO[67]      |                                             |           |            |     |     |      |              |                               | Reserved:<br>CR1-<br>Green user<br>LED+MFGO<br>Output<br>drive 8mA                                                                         |
| 35              | GPIO[25]      |                                             | DS<br>R_D |            |     |     | CLD1 |              |                               |                                                                                                                                            |
| 36              | GPIO[66]      |                                             |           |            |     |     |      |              |                               | Reserved:<br>CR2-<br>Yellow<br>user LED+<br>F/F resed<br>on module.<br>Output<br>drive 8mA                                                 |

| Dim<br>m<br>Pin | Signal   | BootStrap (BS)<br>/<br>System<br>/<br>Other                    | UART      | SPI        | I2C | USB  | LCD          | IEEE<br>1284 | PWM<br>/<br>Timer<br>/<br>IRQ | Notes                                                  |
|-----------------|----------|----------------------------------------------------------------|-----------|------------|-----|------|--------------|--------------|-------------------------------|--------------------------------------------------------|
| 37              | GPIO[24] | <b>BS:<br/>CS1_<br/>MSB</b>                                    | DT<br>R_D |            |     |      | CLD0         |              |                               |                                                        |
| 38              | GPIO[23] |                                                                | DC<br>D_C | ENB<br>L_C |     |      | LINE_END     |              |                               |                                                        |
| 39              | GND      |                                                                |           |            |     |      |              |              |                               | Common<br>GND<br>return                                |
| 40              | GND      |                                                                |           |            |     |      |              |              |                               | Common<br>GND<br>return                                |
| 41              | GPIO[47] |                                                                | CT<br>S_D |            |     | RXD- |              | PINIT#       |                               | <b>RXD-:</b> Only<br>used for<br>unidirectional<br>PHY |
| 42              | GPIO[22] |                                                                | RI_<br>C  | CLK_<br>C  |     |      | CLAC         |              |                               |                                                        |
| 43              | GPIO[46] |                                                                | RT<br>S_D |            |     | RXD+ |              | PAFD#        |                               | <b>RXD+:</b> Only<br>used for<br>unidirectional<br>PHY |
| 44              | GPIO[21] |                                                                | DS<br>R_C |            |     |      | CLFP VSYNC   |              |                               |                                                        |
| 45              | GPIO[45] |                                                                | RX<br>D_D | DIN_<br>D  |     | RCV  |              | PSTB#        |                               |                                                        |
| 46              | GPIO[20] | <b>BS:<br/>CS1_<br/>LSB</b>                                    | DT<br>R_C |            |     |      | CLCP/LDCCLKO |              |                               | <b>GPIO[20]:</b><br>Output<br>drive 8mA                |
| 47              | GPIO[44] | <b>BS:<br/>Endian<br/>Pull<br/>down<br/>for Big<br/>Endian</b> | TX<br>D_D | DOU<br>T_D |     | OE   |              | PSELO        |                               |                                                        |

| Dim<br>m<br>Pin | Signal   | BootStrap (BS)<br>/<br>System<br>/<br>Other | UART      | SPI        | I2C     | USB    | LCD   | IEEE<br>1284 | PWM<br>/<br>Timer<br>/<br>IRQ | Notes                                                                                                               |
|-----------------|----------|---------------------------------------------|-----------|------------|---------|--------|-------|--------------|-------------------------------|---------------------------------------------------------------------------------------------------------------------|
| 48              | GPIO[43] |                                             | CT<br>S_C |            |         | DATA-  |       | PD1R         |                               | <b>Add 10-15K pullup if not used</b>                                                                                |
| 49              | GND      |                                             |           |            |         |        |       |              |                               | Common GND return                                                                                                   |
| 50              | GND      |                                             |           |            |         |        |       |              |                               | Common GND return                                                                                                   |
| 51              | GPIO[38] |                                             |           |            |         |        | CLD14 | PD7          | PWM 2                         | <b>PWM2:</b><br>Duplicate on GPIO [13]                                                                              |
| 52              | GPIO[42] |                                             | RT<br>S_C |            |         | DATA + |       |              |                               | Add 10-15K pullup if not used                                                                                       |
| 53              | GPIO[36] |                                             |           |            |         |        | CLD12 | PD5          | PWM 0                         | <b>PWM0:</b><br>Duplicate on GPIO [10]                                                                              |
| 54              | GPIO[41] |                                             | RX<br>D_C | DIN_C      |         |        | CLD17 |              |                               |                                                                                                                     |
| 55              | GPIO[34] |                                             |           |            | SC<br>L |        | CLD10 | PD3          |                               | <b>SCL:</b><br>Duplicate on GPIO [70]<br>Wi-9C uses 12_CSDA on GPIO [71]<br><b>CLD10:</b><br>Duplicate on GPIO [30] |
| 56              | GPIO[40] |                                             | TX<br>D_C | DOU<br>T_C |         |        | CLD16 |              | IRQ3                          | <b>IRQ3:</b><br>Duplicate on GPIO [18]                                                                              |

| Dim<br>m<br>Pin | Signal   | BootStrap (BS)<br>/<br>System<br>/<br>Other | UART | SPI | I2C | USB | LCD          | IEEE<br>1284 | PWM<br>/<br>Timer<br>/<br>IRQ | Notes                                                                            |
|-----------------|----------|---------------------------------------------|------|-----|-----|-----|--------------|--------------|-------------------------------|----------------------------------------------------------------------------------|
| 57              | GPIO[32] |                                             |      |     |     |     | CLD8         | PD1          | IRQ2                          | <b>CLD8:</b><br>Duplicate on GPIO [28]<br><b>IRQ2:</b><br>Duplicate on GPIO [11] |
| 58              | GPIO[39] |                                             |      |     |     |     | CLD15        | PD8          | PWM 3                         | <b>PWM3:</b><br>Duplicate on GPIO [14]                                           |
| 59              | GND      |                                             |      |     |     |     |              |              |                               | Common GND return                                                                |
| 60              | GND      |                                             |      |     |     |     |              |              |                               | Common GND return                                                                |
| 61              | GND      |                                             |      |     |     |     |              |              |                               | Common GND return                                                                |
| 62              | GND      |                                             |      |     |     |     |              |              |                               | Common GND return                                                                |
| 63              | GPIO[30] |                                             |      |     |     |     | CLD6 (CLD10) |              | TIME R6                       | <b>CLD10:</b><br>Primary on GPIO[34]                                             |
| 64              | GPIO[37] |                                             |      |     |     |     | CLD13        | PD6          | PWM 1                         | <b>PWM1:</b><br>Duplicate on GPIO [12]                                           |
| 65              | GPIO[28] |                                             |      |     |     |     | CLD4 (CLD8)  |              | IRQ1                          | CLD8:<br>Primary on GPIO[32]<br>IRQ1:<br>Primary on GPIO[07]                     |

| Dim<br>m<br>Pin | Signal   | BootStrap (BS)<br>/<br>System<br>/<br>Other | UART  | SPI   | I2C | USB | LCD             | IEEE<br>1284 | PWM<br>/<br>Timer<br>/<br>IRQ | Notes                                                                                                            |
|-----------------|----------|---------------------------------------------|-------|-------|-----|-----|-----------------|--------------|-------------------------------|------------------------------------------------------------------------------------------------------------------|
| 66              | GPIO[35] |                                             |       |       | SDA |     | CLD11           | PD4          |                               | <b>SDA:</b><br>Duplicate on GPIO [71]<br>Wi-9C uses 12C_SDA on GPIO [71]<br><b>CLD11:</b><br>Primary on GPIO[13] |
| 67              | GPIO[15] |                                             | DCD_A | ENBLA |     |     | LCDCCLKI        |              | TIMER2                        |                                                                                                                  |
| 68              | GPIO[33] |                                             |       |       |     |     | CLD9            | PD2          |                               | <b>CLD9:</b><br>Duplicate on GPIO [29]                                                                           |
| 69              | GPIO[14] |                                             | RI_A  | CLKA  |     |     |                 |              | PWM3<br>TIMER1                | <b>PWM3:</b><br>Primary on GPIO[39]<br><b>TIMER1:</b><br>Duplicate on GPIO [00]                                  |
| 70              | GPIO[31] |                                             |       |       |     |     | CLD7<br>(CLD11) |              | TIMER7                        | <b>CLD11:</b><br>Primary on GPIO[35]<br><b>TIMER7:</b><br>Duplicate on GPIO [06]                                 |
| 71              | GND      |                                             |       |       |     |     |                 |              |                               | Common GND return                                                                                                |
| 72              | GND      |                                             |       |       |     |     |                 |              |                               | Common GND return                                                                                                |

| Dim<br>m<br>Pin | Signal   | BootStrap (BS)<br>/<br>System<br>/<br>Other | UART      | SPI        | I2C | USB | LCD            | IEEE<br>1284 | PWM<br>/<br>Timer<br>/<br>IRQ | Notes                                                                                |
|-----------------|----------|---------------------------------------------|-----------|------------|-----|-----|----------------|--------------|-------------------------------|--------------------------------------------------------------------------------------|
| 73              | GPIO[13] |                                             | DS<br>R_A |            |     |     |                |              | PWM<br>2<br>IRQ0              | <b>PWM2:</b><br>Primary on<br>GPIO[38]<br><b>IRQ0:</b><br>Primary on<br>GPIO[01]     |
| 74              | GPIO[29] |                                             |           |            |     |     | CLD5<br>(CLD9) |              | TIME<br>R5                    | <b>CLD9:</b><br>Primary on<br>GPIO[33]                                               |
| 75              | GPIO[12] | <b>BS: ND3</b>                              | DT<br>R_A |            |     |     |                |              | PWM<br>1                      | <b>PWM1:</b><br>Primary on<br>GPIO[37]                                               |
| 76              | GPIO[07] | NAND<br>Ver.<br>SPI_<br>ENB#                | DC<br>D_B | ENB<br>L_B |     |     |                |              | IRQ1                          | <b>IRQ1:</b><br>Duplicate<br>on GPIO<br>[28]                                         |
| 77              | GPIO[11] | NAND<br>Ver.<br>SPI_CLK                     | CT<br>S_A |            |     |     |                |              | TIME<br>R0<br>IRQ2            | <b>TIMER0:</b><br>Primary on<br>GPIO[02]<br><b>IRQ2:</b><br>Primary on<br>GPIO[32]   |
| 78              | GPIO[06] |                                             | RI_<br>B  | CLK_<br>B  |     |     |                | PFAUL<br>T#  | TIME<br>R7                    | <b>PFAULT:</b><br>Primary on<br>GPIO[16]<br><b>TIMER7:</b><br>Primary on<br>GPIO[31] |
| 79              | GPIO[10] | <b>BS: ND2</b>                              | RT<br>S_A |            |     |     |                |              | PWM<br>0                      | <b>PWM0:</b><br>Primary on<br>GPIO[36]                                               |
| 80              | GPIO[05] |                                             | DS<br>R_B |            |     |     |                | PERR         |                               |                                                                                      |
| 81              | GND      |                                             |           |            |     |     |                |              |                               | Common<br>GND<br>return                                                              |

| Dim<br>m<br>Pin | Signal   | BootStrap (BS)<br>/<br>System<br>/<br>Other | UART      | SPI        | I2C | USB | LCD            | IEEE<br>1284 | PWM<br>/<br>Timer<br>/<br>IRQ | Notes                                               |
|-----------------|----------|---------------------------------------------|-----------|------------|-----|-----|----------------|--------------|-------------------------------|-----------------------------------------------------|
| 82              | GND      |                                             |           |            |     |     |                |              |                               | Common<br>GND<br>return                             |
| 83              | GPIO[09] |                                             | RXD_A     | DIN_A      |     |     |                |              |                               |                                                     |
| 84              | GPIO[04] | <b>BS: ND0</b>                              | DT<br>R_B |            |     |     |                | PBUSY        |                               |                                                     |
| 85              | GPIO[08] | <b>BS: ND1</b>                              | TX<br>D_A | DOU<br>T_A |     |     |                |              |                               |                                                     |
| 86              | GPIO[03] | NAND<br>Ver.<br>NAND<br>BSY#                | CT<br>S_B |            |     |     |                | PACK#        |                               |                                                     |
| 87              | GPIO[19] | <b>BS:<br/>PLL_<br/>BYP</b>                 |           |            |     |     | CLLP/<br>HSYNC |              |                               | <b>PLL_BYP:</b><br>Reserved.<br>Do not pull<br>down |
| 88              | GPIO[02] | <b>BS: FS1</b>                              | RT<br>S_B |            |     |     |                |              | TIME<br>R0                    | <b>TIMER0:</b><br>Duplicate<br>on GPIO<br>[11]      |
| 89              | GPIO[18] |                                             |           |            |     |     | CLPOWER        |              | IRQ3                          | IRQ3:<br>Primary on<br>GPIO[40]                     |
| 90              | GPIO[01] | NAND<br>Ver.<br>SPI_<br>RXD                 | RXD_B     | DIN_B      |     |     |                |              | IRQ0                          | IRQ0:<br>Duplicate<br>on GPIO<br>[13]               |
| 91              | OE#      | Output<br>enable                            |           |            |     |     |                |              |                               | CS0<br>parallel<br>port                             |
| 92              | GPIO[00] | BS: FS0<br>NAND<br>Ver.<br>SPT_<br>TXD      | TX<br>D_B | DOU<br>T_B |     |     |                |              | TIME<br>R1                    | <b>TIMER1:</b><br>Primary on<br>GPIO[14]            |

| Dim<br>m<br>Pin | Signal   | BootStrap (BS)<br>/ System<br>/ Other | UART | SPI | I2C | USB  | LCD | IEEE<br>1284 | PWM<br>/ Timer<br>/ IRQ | Notes                                                  |
|-----------------|----------|---------------------------------------|------|-----|-----|------|-----|--------------|-------------------------|--------------------------------------------------------|
| 93              | GND      |                                       |      |     |     |      |     |              |                         | Common<br>GND<br>return                                |
| 94              | GND      |                                       |      |     |     |      |     |              |                         | Common<br>GND<br>return                                |
| 95              | WE#      | Write<br>enable                       |      |     |     |      |     |              |                         | CSO<br>parallel<br>port                                |
| 96              | GPIO[49] | <b>BS: CS_<br/>POL</b>                |      |     |     | SPD  |     | PLH          |                         |                                                        |
| 97              | CS#      | Chip<br>select                        |      |     |     |      |     |              |                         | CSO<br>parallel<br>port                                |
| 98              | GPIO[48] |                                       |      |     |     | SUSP |     | PSELI        |                         |                                                        |
| 99              | TXB+R    | Etherne<br>t                          |      |     |     |      |     |              |                         | Remote if<br>no Ether<br>net<br>connector<br>on Module |
| 100             | TXA+R    | Etherne<br>t                          |      |     |     |      |     |              |                         | Remote if<br>no Ether<br>net<br>connector<br>on Module |
| 101             | GND      |                                       |      |     |     |      |     |              |                         | Common<br>GND<br>return                                |
| 102             | GND      |                                       |      |     |     |      |     |              |                         | Common<br>GND<br>return                                |
| 103             | TXB-R    | Etherne<br>t                          |      |     |     |      |     |              |                         | Remote if<br>no Ether<br>net<br>connector<br>on Module |

| Dim<br>m<br>Pin | Signal        | BootStr<br>ap (BS)<br>/<br>System<br>/<br>Other | UAR<br>T | SPI | I2<br>C | USB | LCD | IEEE<br>1284 | PWM<br>/<br>Timer<br>/<br>IRQ | Notes                                                                                                            |
|-----------------|---------------|-------------------------------------------------|----------|-----|---------|-----|-----|--------------|-------------------------------|------------------------------------------------------------------------------------------------------------------|
| 104             | TXA-R         | Etherne<br>t                                    |          |     |         |     |     |              |                               | Remote if<br>no Ether<br>net<br>connector<br>on Module                                                           |
| 105             | RST#          | System                                          |          |     |         |     |     |              |                               | Hardware<br>reset<br>(input;<br>active<br>LOW;<br>minimum<br>pulse<br>width<br>10uS)<br>15K pull-up<br>on module |
| 106             | ACT_LED#      | Etherne<br>t                                    |          |     |         |     |     |              |                               | Reserved                                                                                                         |
| 107             | BOOTMUX<br>R# | System                                          |          |     |         |     |     |              |                               | Remote if<br>no Ether<br>net<br>connector<br>on Module                                                           |
| 108             | LNK_LED       | Etherne<br>t                                    |          |     |         |     |     |              |                               | Remote if<br>no Ether<br>net<br>connector<br>on Module                                                           |

| Dim<br>m<br>Pin | Signal    | BootStrap (BS)<br>/<br>System<br>/<br>Other | UART | SPI | I2C | USB   | LCD | IEEE<br>1284 | PWM<br>/<br>Timer<br>/<br>IRQ | Notes                                                                                                                                                                                                                                                                                         |
|-----------------|-----------|---------------------------------------------|------|-----|-----|-------|-----|--------------|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 109             | GPIO[16]  |                                             |      |     |     | OVRH# |     | PFAULT#      | PWM0                          | <p><b>OVRH#:</b><br/>USB overcurrent input. Available as GPIO on modules with USB hub or Ethernet only. Not available as GPIO if an external Host USB port is implemented using DM1 and DP1.</p> <p><b>PFAULT#:</b><br/>Primary on GPIO[06]</p> <p><b>PWM0:</b><br/>Duplicate on GPIO[10]</p> |
| 110             | ADDRESS_6 | Address bus                                 |      |     |     |       |     |              |                               | CS0 parallel port                                                                                                                                                                                                                                                                             |

| Dim<br>m<br>Pin | Signal    | BootStrap (BS)<br>/<br>System<br>/<br>Other | UART | SPI | I2C | USB       | LCD | IEEE<br>1284 | PWM<br>/<br>Timer<br>/<br>IRQ | Notes                                                                                                                                                                                  |
|-----------------|-----------|---------------------------------------------|------|-----|-----|-----------|-----|--------------|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 111             | GPIO[17]  | <b>ND4</b>                                  |      |     |     | PON<br>H# |     |              |                               | <b>PONH#:</b><br>USB power on output. Available as GPIO on modules with USB hub or Ethernet only. Not available as GPIO if an external Host USB port is implemented using DM1 and DP1. |
| 112             | ADDRESS_7 | Address bus                                 |      |     |     |           |     |              |                               | CS0 parallel port                                                                                                                                                                      |
| 113             | OVR3#     |                                             |      |     |     |           |     |              |                               | USB port 3 overcurrent<br>Remote if Hub on module                                                                                                                                      |
| 114             | OVR4#     |                                             |      |     |     |           |     |              |                               | USB port 4 overcurrent<br>Remote if Hub on module                                                                                                                                      |
| 115             | PON3#     |                                             |      |     |     |           |     |              |                               | USB port 3 power-on<br>Remote if Hub on module                                                                                                                                         |

| Dim<br>m<br>Pin | Signal | BootStrap (BS)<br>/<br>System<br>/<br>Other | UART | SPI | I2C | USB | LCD | IEEE<br>1284 | PWM<br>/<br>Timer<br>/<br>IRQ | Notes                                                      |
|-----------------|--------|---------------------------------------------|------|-----|-----|-----|-----|--------------|-------------------------------|------------------------------------------------------------|
| 116             | PON4#  |                                             |      |     |     |     |     |              |                               | USB port 4 power-on Remote if Hub on module                |
| 117             | OVR1#  |                                             |      |     |     |     |     |              |                               | USB port 1 overcurrent Reserved for future use; no connect |
| 118             | OVR2#  |                                             |      |     |     |     |     |              |                               | USB port 2 overcurrent Reserved for future use; no connect |
| 119             | PON1#  |                                             |      |     |     |     |     |              |                               | USB port 1 power-on Reserved for future use; no connect    |
| 120             | PON2#  |                                             |      |     |     |     |     |              |                               | USB port 2 power-on Reserved for future use; no connect    |
| 121             | GND    |                                             |      |     |     |     |     |              |                               | Common GND return                                          |
| 122             | GND    |                                             |      |     |     |     |     |              |                               | Common GND return                                          |

| Dim<br>m<br>Pin | Signal | BootStrap (BS)<br>/<br>System<br>/<br>Other | UART | SPI | I2C | USB | LCD | IEEE<br>1284 | PWM<br>/<br>Timer<br>/<br>IRQ | Notes                                                      |
|-----------------|--------|---------------------------------------------|------|-----|-----|-----|-----|--------------|-------------------------------|------------------------------------------------------------|
| 123             | DM4    |                                             |      |     |     |     |     |              |                               | USB port 4 data (-)<br>Remote if Hub on module             |
| 124             | DP4    |                                             |      |     |     |     |     |              |                               | USB port 4 data (+)<br>Remote if Hub on module             |
| 125             | GND    |                                             |      |     |     |     |     |              |                               | Common GND return                                          |
| 126             | GND    |                                             |      |     |     |     |     |              |                               | Common GND return                                          |
| 127             | DM3    |                                             |      |     |     |     |     |              |                               | USB port 3 data (-)<br>Remote if Hub on module             |
| 128             | DP3    |                                             |      |     |     |     |     |              |                               | USB port 3 data (+)<br>Remote if Hub on module             |
| 129             | GND    |                                             |      |     |     |     |     |              |                               | Common GND return                                          |
| 130             | GND    |                                             |      |     |     |     |     |              |                               | Common GND return                                          |
| 131             | DM2    |                                             |      |     |     |     |     |              |                               | USB port 2 data (-)<br>Reserved for future use; no connect |

| Dim<br>m<br>Pin | Signal | BootStrap (BS)<br>/<br>System<br>/<br>Other | UART | SPI | I2C | USB | LCD | IEEE<br>1284 | PWM<br>/<br>Timer<br>/<br>IRQ | Notes                                                             |
|-----------------|--------|---------------------------------------------|------|-----|-----|-----|-----|--------------|-------------------------------|-------------------------------------------------------------------|
| 132             | DP2    |                                             |      |     |     |     |     |              |                               | USB port 2 data (+)<br>Reserved for future use; no connect        |
| 133             | GND    |                                             |      |     |     |     |     |              |                               | Common GND return                                                 |
| 134             | GND    |                                             |      |     |     |     |     |              |                               | Common GND return                                                 |
| 135             | DM1    |                                             |      |     |     |     |     |              |                               | USB port 1 data (-)<br>Remote if no USB on module                 |
| 136             | DP1    |                                             |      |     |     |     |     |              |                               | USB port 1 data (+)<br>Remote if no USB on module                 |
| 137             | GND    |                                             |      |     |     |     |     |              |                               | Common GND return                                                 |
| 138             | GND    |                                             |      |     |     |     |     |              |                               | Common GND return                                                 |
| 139             | +5V    |                                             |      |     |     |     |     |              |                               | Power to USB, if used (Used only with a module with on-board USB) |

| Dim<br>m<br>Pin | Signal | BootStrap (BS)<br>/<br>System<br>/<br>Other | UART | SPI | I2C | USB | LCD | IEEE<br>1284 | PWM<br>/<br>Timer<br>/<br>IRQ | Notes                                                             |
|-----------------|--------|---------------------------------------------|------|-----|-----|-----|-----|--------------|-------------------------------|-------------------------------------------------------------------|
| 140             | +5V    |                                             |      |     |     |     |     |              |                               | Power to USB, if used (Used only with a module with on-board USB) |
| 141             | +5V    |                                             |      |     |     |     |     |              |                               | Power to USB, if used (Used only with a module with on-board USB) |
| 142             | +5V    |                                             |      |     |     |     |     |              |                               | Power to USB, if used (Used only with a module with on-board USB) |
| 143             | GND    |                                             |      |     |     |     |     |              |                               | Common GND return                                                 |
| 144             | GND    |                                             |      |     |     |     |     |              |                               | Common GND return                                                 |

**Note** When using the ConnectCore 9C or ConnectCore Wi-9C you'll want to pay attention to when the BUFFENR line (pin 8) goes low, as this means the GPIO pins are ready to be used. Creating any kind of load or driving the GPIO pins during boot up (before the BUFFENR line goes low) can cause the NS9360 processor to enter an unknown state.

## Pin assignment by GPIO

| Signal    | SO-DIMM | BootStrap (BS / System / Other)     | UART      | SPI        | I2C | USB | LCD | IEEE 1284   | PWM / Timer / IRQ | Notes                                                                                |
|-----------|---------|-------------------------------------|-----------|------------|-----|-----|-----|-------------|-------------------|--------------------------------------------------------------------------------------|
| GPIO [00] | 92      | BS: FS0<br>NAND<br>Ver. SPI_<br>TXD | TX<br>D_B | DOU<br>T_B |     |     |     |             | TIMER<br>1        | <b>TIMER1:</b><br>Primary on<br>GPIO[14]                                             |
| GPIO [01] | 90      | Nand<br>Ver. SPI_<br>RXD            | RX<br>D_B | DIN_<br>B  |     |     |     |             | IRQ0              | <b>IRQ0:</b><br>Duplicate<br>on GPIO[13]                                             |
| GPIO [02] | 88      | BS: FS1                             | RT<br>S_B |            |     |     |     |             | TIMER<br>0        | <b>TIMER0:</b><br>Duplicate<br>on GPIO[11]                                           |
| GPIO [03] | 86      | NAND<br>VER.<br>NAND<br>BSY#        | CT<br>S_B |            |     |     |     | PACK#       |                   |                                                                                      |
| GPIO [04] | 84      | BS: ND0                             | DT<br>R_B |            |     |     |     | PBUSY       |                   |                                                                                      |
| GPIO [05] | 80      |                                     | DS<br>R_B |            |     |     |     | PERR        |                   |                                                                                      |
| GPIO [06] | 78      | NAND<br>Ver. SPI_<br>CLK            | RI_B      | CLK_<br>B  |     |     |     | PFAUL<br>T# | TIMER<br>7        | <b>PFAULT:</b><br>Primary on<br>GPIO[16]<br><b>TIMER7:</b><br>Primary on<br>GPIO[31] |
| GPIO [07] | 76      | NAND<br>Ver. SPI<br>ENB#            | DC<br>D_B | ENB<br>L_B |     |     |     |             | IRQ1              | <b>IRQ1:</b><br>Duplicate<br>on GPIO[28]                                             |
| GPIO [08] | 85      | <b>BS: ND1</b>                      | TX<br>D_A | DOU<br>T_A |     |     |     |             |                   |                                                                                      |
| GPIO [09] | 83      |                                     | RX<br>D_A | DIN_A      |     |     |     |             |                   |                                                                                      |
| GPIO [10] | 79      | <b>BS: ND2</b>                      | RT<br>S_A |            |     |     |     |             | PWM0              | <b>PWM0:</b><br>Primary on<br>GPIO[36]                                               |

| Signal    | SO-DIMM | BootStrap (BS / System / Other) | UART   | SPI     | I2C | USB | LCD     | IEEE 1284 | PWM / Timer / IRQ | Notes                                                                          |
|-----------|---------|---------------------------------|--------|---------|-----|-----|---------|-----------|-------------------|--------------------------------------------------------------------------------|
| GPIO [11] | 77      |                                 | CTS_A  |         |     |     |         |           | TIMER 0<br>IRQ2   | <b>TIMER0:</b><br>Primary on GPIO[02]<br><b>IRQ2:</b><br>Primary on GPIO[32]   |
| GPIO [12] | 75      | <b>BS: ND3</b>                  | DT R_A |         |     |     |         |           | PWM1              | <b>PWM1:</b><br>Primary on GPIO[37]                                            |
| GPIO [13] | 73      |                                 | DS R_A |         |     |     |         |           | PWM2<br>IRQ0      | <b>PWM2:</b><br>Primary on GPIO[38]<br><b>IRQ0:</b><br>Primary on GPIO[01]     |
| GPIO [14] | 69      |                                 | RI_A   | CLK_A   |     |     |         |           | PWM3<br>TIMER 1   | <b>PWM3:</b><br>Primary on GPIO[39]<br><b>TIMER1:</b><br>Duplicate on GPIO[00] |
| GPIO [15] | 67      |                                 | DC D_A | ENB L_A |     |     | LCDCLKI |           | TIMER 2           |                                                                                |

| Signal    | SO-DIMM | BootStrap (BS / System / Other) | UART | SPI | I2C | USB   | LCD        | IEEE 1284 | PWM / Timer / IRQ | Notes                                                                                                                                                                                                                          |
|-----------|---------|---------------------------------|------|-----|-----|-------|------------|-----------|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| GPIO [16] | 109     |                                 |      |     |     | OVRH# |            | PFAULT#   | PWM0              | <b>OVRH#:</b><br>USB overcurrent input. Available as GPIO on modules with USB hub or Ethernet only, used for external USB Host support.<br><br><b>PFAULT#:</b><br>Primary on GPIO[06]<br><b>PWM0:</b><br>Duplicate on GPIO[10] |
| GPIO [17] | 111     | <b>ND4</b>                      |      |     |     | PONH# |            |           |                   | <b>PONH#:</b><br>USB power on output. Available as GPIO on modules with USB hub or Ethernet only, used for external USB Host support.                                                                                          |
| GPIO [18] | 89      |                                 |      |     |     |       | CLPOWER    |           | IRQ3              | <b>IRQ3:</b><br>Primary on GPIO[40]                                                                                                                                                                                            |
| GPIO [19] | 87      | <b>BS: PLL_BYP</b>              |      |     |     |       | CLLP/HSYNC |           |                   | <b>PLL_BYP:</b><br>Reserved. Do not pull down                                                                                                                                                                                  |

| Signal    | SO-DIMM | BootStrap (BS / System / Other) | UART   | SPI     | I2C | USB | LCD          | IEEE 1284 | PWM / Timer / IRQ | Notes                                                                     |
|-----------|---------|---------------------------------|--------|---------|-----|-----|--------------|-----------|-------------------|---------------------------------------------------------------------------|
| GPIO [20] | 46      | <b>BS: CS1_LSB</b>              | DT R_C |         |     |     | CLCP/LDCCLKO |           |                   | <b>GPIO[20]:</b> Output drive 8mA                                         |
| GPIO [21] | 44      |                                 | DS R_C |         |     |     | CLFP VSYNC   |           |                   |                                                                           |
| GPIO [22] | 42      |                                 | RI_C   | CLK_C   |     |     | CLAC         |           |                   |                                                                           |
| GPIO [23] | 38      |                                 | DC D_C | ENB L_C |     |     | CLLE         |           |                   |                                                                           |
| GPIO [24] | 37      | <b>BS: CS1_MSB</b>              | DT R_D |         |     |     | CLD0         |           |                   |                                                                           |
| GPIO [25] | 35      |                                 | DS R_D |         |     |     | CLD1         |           |                   |                                                                           |
| GPIO [26] | 33      |                                 | RI_D   | CLK_D   |     |     | CLD2         |           | TIMER 3           |                                                                           |
| GPIO [27] | 31      |                                 | DC D_D | ENB L_D |     |     | CLD3         |           | TIMER 4           |                                                                           |
| GPIO [28] | 65      |                                 |        |         |     |     | CLD4 (CLD8)  |           | IRQ1              | <b>CLD8:</b> Primary on GPIO[32]<br><b>IRQ1:</b> Primary on GPIO[07]      |
| GPIO [29] | 74      |                                 |        |         |     |     | CLD5 (CLD9)  |           | TIMER 5           | <b>CLD9:</b> Primary on GPIO[33]                                          |
| GPIO [30] | 63      |                                 |        |         |     |     | CLD6 (CLD10) |           | TIMER 6           | <b>CLD10:</b> Primary on GPIO[34]                                         |
| GPIO [31] | 70      |                                 |        |         |     |     | CLD7 (CLD11) |           | TIMER 7           | <b>CLD11:</b> Primary on GPIO[35]<br><b>TIMER7:</b> Duplicate on GPIO[06] |

| Signal    | SO-DIMM | BootStrap (BS / System / Other) | UART | SPI | I2C | USB | LCD   | IEEE 1284 | PWM / Timer / IRQ | Notes                                                                                                          |
|-----------|---------|---------------------------------|------|-----|-----|-----|-------|-----------|-------------------|----------------------------------------------------------------------------------------------------------------|
| GPIO [32] | 57      |                                 |      |     |     |     | CLD8  | PD1       | IRQ2              | <b>CLD8:</b><br>Duplicate on GPIO[28]<br><b>IRQ2:</b><br>Duplicate on GPIO[11]                                 |
| GPIO [33] | 68      |                                 |      |     |     |     | CLD9  | PD2       |                   | <b>CLD9:</b><br>Duplicate on GPIO[29]                                                                          |
| GPIO [34] | 55      |                                 |      |     | SCL |     | CLD10 | PD3       |                   | <b>SCL:</b><br>Duplicate on GPIO[70]<br>Wi-9C uses I2C_SCL on GPIO[70]<br>CLD10:<br>Duplicate on GPIO[30]      |
| GPIO [35] | 66      |                                 |      |     | SDA |     | CLD11 | PD4       |                   | <b>SDA:</b><br>Duplicate on GPIO[71]<br>Wi-9c uses I2C_SDA on GPIO[71]<br><b>CLD11:</b><br>Primary on GPIO[13] |
| GPIO [36] | 53      |                                 |      |     |     |     | CLD12 | PD5       | PWM0              | <b>PWM0:</b><br>Duplicate on GPIO[10]                                                                          |
| GPIO [37] | 64      |                                 |      |     |     |     | CLD13 | PD6       | PWM1              | <b>PWM1:</b><br>Duplicate on GPIO[12]                                                                          |
| GPIO [38] | 51      |                                 |      |     |     |     | CLD14 | PD7       | PWM2              | <b>PWM2:</b><br>Duplicate on GPIO[13]                                                                          |
| GPIO [39] | 58      |                                 |      |     |     |     | CLD15 | PD8       | PWM3              | <b>PWM3:</b><br>Duplicate on GPIO[14]                                                                          |

| Signal    | SO-DIMM | BootStrap (BS / System / Other)            | UART   | SPI     | I2C | USB   | LCD   | IEEE 1284 | PWM / Timer / IRQ | Notes                                         |
|-----------|---------|--------------------------------------------|--------|---------|-----|-------|-------|-----------|-------------------|-----------------------------------------------|
| GPIO [40] | 56      |                                            | TX D_C | DOU T_C |     |       | CLD16 |           | IRQ3              | <b>IRQ3:</b> Duplicate on GPIO[18]            |
| GPIO [41] | 54      |                                            | RX D_C | DIN_C   |     |       | CLD17 |           |                   |                                               |
| GPIO [42] | 52      |                                            | RT S_C |         |     | DATA+ |       |           |                   | Add 10-15K pullup if not used                 |
| GPIO [43] | 48      |                                            | CT S_C |         |     | DATA- |       | PDIR      |                   | Add 10-15K pullup if not used                 |
| GPIO [44] | 47      | <b>BS: Endian Pull down for Big Endian</b> | TX D_D | DOU T_D |     | OE    |       | PSELO     |                   |                                               |
| GPIO [45] | 45      |                                            | RX D_D | DIN_D   |     | RCV   |       | PSTB#     |                   |                                               |
| GPIO [46] | 43      |                                            | RT S_D |         |     | RXD+  |       | PAFD#     |                   | <b>RXD+:</b> Only used for unidirectional PHY |
| GPIO [47] | 41      |                                            | CT S_D |         |     | RXD-  |       | PINIT#    |                   | <b>RXD-:</b> Only used for unidirectional PHY |
| GPIO [48] | 98      |                                            |        |         |     | SUSP  |       | PSELI     |                   |                                               |
| GPIO [49] | 96      | <b>BS: CS_POL</b>                          |        |         |     | SPD   |       | PLH       |                   |                                               |
| GPIO [65] |         |                                            |        |         |     |       |       |           |                   | IRQ1                                          |

| Signal    | SO-DIMM | BootStrap (BS / System / Other) | UART | SPI | I2C     | USB | LCD | IEEE 1284 | PWM / Timer / IRQ | Notes                                                                                                                                                                                                 |
|-----------|---------|---------------------------------|------|-----|---------|-----|-----|-----------|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| GPIO [66] | 36      |                                 |      |     |         |     |     |           |                   | Reserved:<br>CR2- Yellow<br>user LED<br>F/F reset<br>on module<br>Output<br>drive 8mA                                                                                                                 |
| GPIO [67] | 34      |                                 |      |     |         |     |     |           |                   | Reserved:<br>CR1- Green<br>user LED +<br>MFGO<br>Output<br>drive 8mA<br>MFGO_CR1                                                                                                                      |
| GPIO [68] | NC      |                                 |      |     |         |     |     |           |                   | No connect                                                                                                                                                                                            |
| GPIO [69] | 28      |                                 |      |     |         |     |     |           | IRQ1              | <b>GPIO[69]:</b><br>Output<br>drive 8mA<br><b>IRQ1:</b><br>Primary on<br>GPIO[07]<br><br>Add 10-15K<br>pullup if not<br>used                                                                          |
| GPIO [70] | 26      |                                 |      |     | iic_scl |     |     |           |                   | <b>GPIO[70]:</b><br>Output<br>drive 8mA<br><b>iic_scl:</b><br>Primary on<br>GPIO[34]<br>15K (cc9c)<br>or 2k4 9wi-<br>9c) pull-up<br>on module<br>Wi-9C uses<br>iic_scl<br>@addr<br>A2/A3 on<br>module |

| Signal          | SO-DIMM | BootStrap (BS / System / Other) | UART | SPI | I2C     | USB | LCD | IEEE 1284 | PWM / Timer / IRQ | Notes                                                                                                                                                                  |
|-----------------|---------|---------------------------------|------|-----|---------|-----|-----|-----------|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| GPIO [71]       | 24      |                                 |      |     | iic_sda |     |     |           |                   | <b>GPIO[71]:</b><br>Output drive 8mA<br><b>iic_sda:</b><br>Primary on GPIO[35] 15K (cc9c) or 2k4 9wi-9c) pull-up on module<br>Wi-9C uses iic_scl @addr A2/A3 on module |
| MFG I_GPIO [72] | 22      |                                 |      |     |         |     |     |           |                   | Reserved 15K pull-up on module                                                                                                                                         |

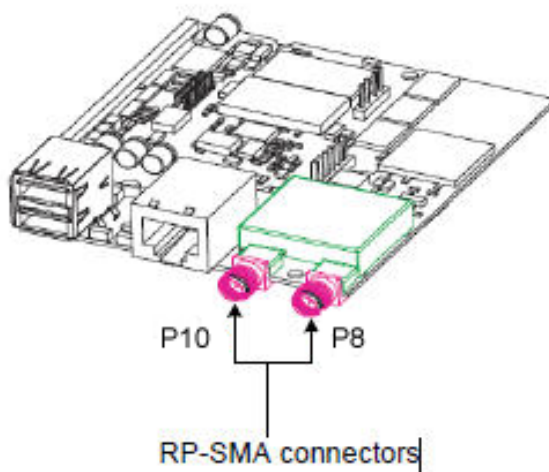
## Antenna connectors: RP/SMA and U.FL (ConnectCore Wi-9C only)

The ConnectCore Wi-9C supports two types of antenna connectors: RP-SMA and U.FL. The standard connector population option is 1 RP-SMA connector. Dual diversity operation and custom connector populations are available.

For antenna specifications, see [Antenna information](#).

### RP-SMA connectors, P10 and P8

The antenna is connected to the module via a reverse polarity SMA connector (subminiature size A). The antenna fits on the module only one way, to ensure proper connection.



**CAUTION!** Be sure that your antenna choice complies with the regulatory requirements of your region. In North America, for example, you can operate only with antennas provided by Digi International, Inc., or antennas matching the specifications of the Digi-approved antennas.

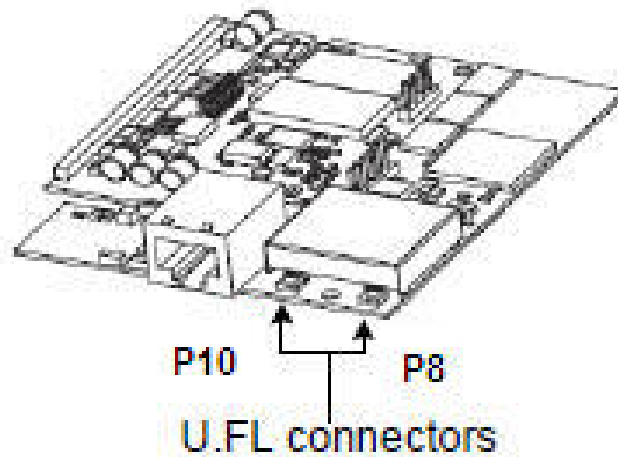
#### Primary RP-SMA antenna, P8

P8 is the primary RP-SMA antenna, for both receive and transmit. This is the connector/antenna provided with the standard RP-SMA module configuration.

#### Secondary RP-SMA antenna, P10

P10 is the secondary RP-SMA antenna, used for receive only. This connector/antenna is provided only when you select the two-RP-SMA population option.

## U.FL connectors, P10 and P8



Both U.FL connectors are provided on the module when you select the U.FL population option.

### Primary U.FL antenna, P8

P8 is the primary U.FL antenna, for both receive and transmit. P10 is the secondary U.FL antenna, used for receive only.

### Secondary U.FL antenna, P10

P10 is the secondary U.FL antenna, used for receive only. This connector/antenna is provided only when you select the two-U.FL population option.

## About the development board

---

This chapter provides information for configuring the ConnectCore 9C/Wi-9C development board, and details the development board's default and optional configuration states. The development board serves as a carrier board platform for product evaluation and design. The board is also available as a separate accessory item for quick prototyping purposes.

For more detailed information on the development board, see the documentation available on your Jump Start Kit CD.

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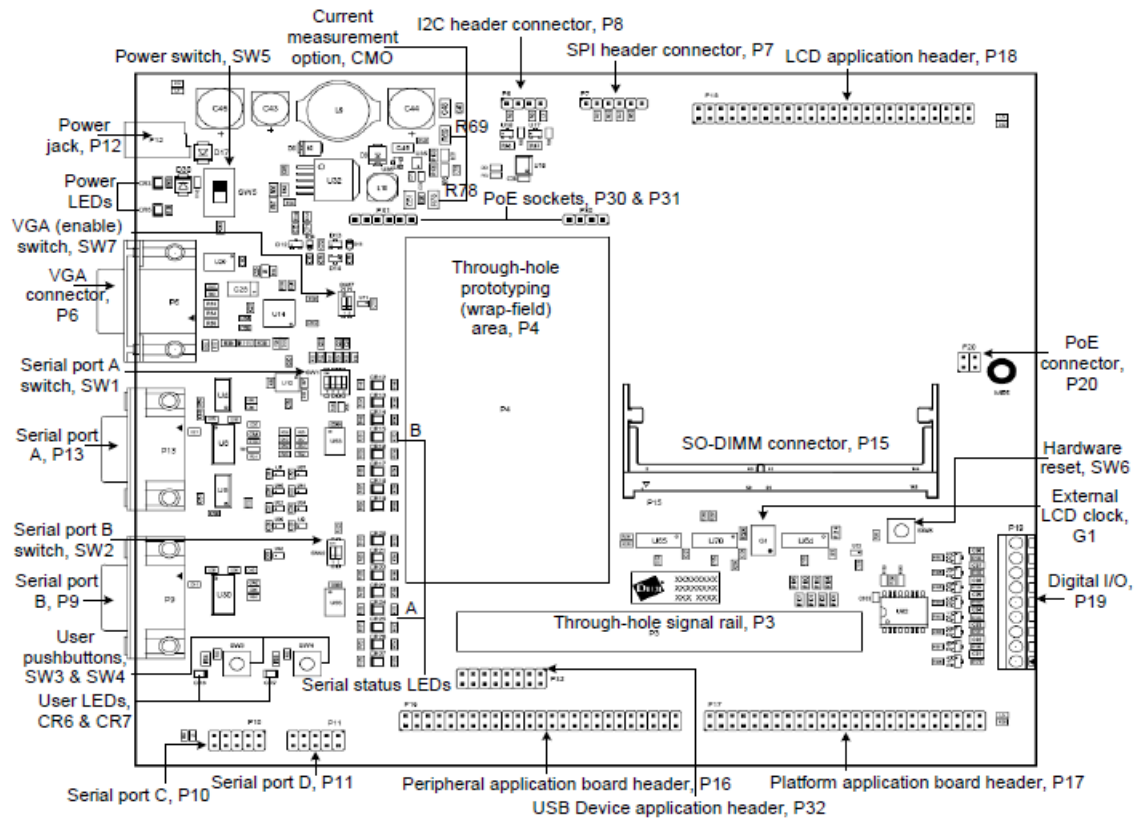
## Features

The ConnectCore 9C/Wi-9C development board supports these features:

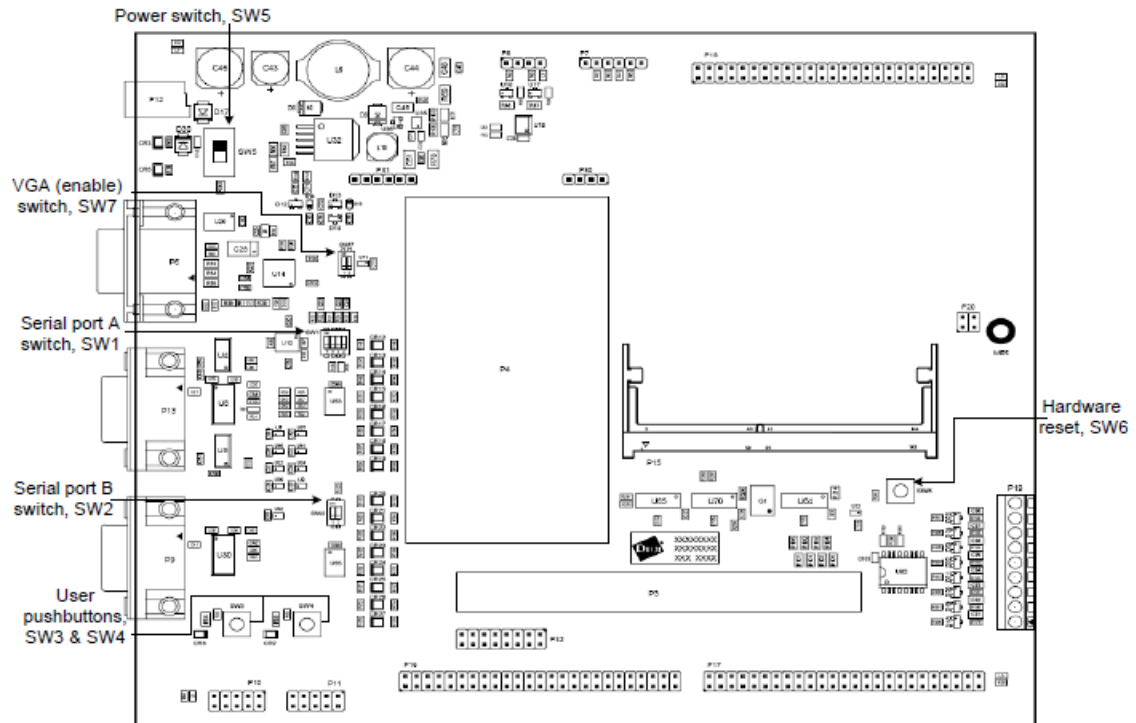
- Four 921kbps serial ports
  - Serial port A: EIA-232/422/485 switch-selectable (DB-9)
  - Serial port B: EIA-232 (DB-9)
  - Serial port C: TTL-level
  - Serial port D: TTL-level
- SPI and I<sup>2</sup>C interface headers
- Eight digital GPIOs
- Two user LEDs and pushbuttons
- VGA interface
- LCD panel connector
- Application-specific expansion connectors
- Through-hole prototyping area
- +3.3V, +5V, +12V, -12V, and GND test points
- Current measurement option
- Power on/off switch
- 9-30VDC power input
- Board and module mounting holes

## Basic description

The development board contains connectors, switches, and LEDs that you use when integrating the ConnectCore 9C or ConnectCore Wi-9C module into your design. The board also provides test points; see [Test points](#) for more information.



## Switches and buttons



### Serial Port A switch, SW1

The Serial Port A switch is a 4-position DIP switch. Use this switch to set the signal modes for serial port A, EIA-232/422/485.

| Position | Description                                                                                                                           | Default position |
|----------|---------------------------------------------------------------------------------------------------------------------------------------|------------------|
| 1        | Determines whether the interface is configured for EIA-232 or EIA-485:<br>ON — EIA-232 interface mode<br>OFF — EIA-485 interface mode | ON               |
| 2        | Enables/disables EIA-232 auto power down:<br>ON — Not supported<br>OFF — Disabled                                                     | OFF              |
| 3        | Determines whether the interface is configured for 4-wire or 2-wire EIA-485:<br>ON — 2-wire EIA-485 mode<br>OFF — 4-wire EIA-485 mode | OFF              |
| 4        | Enables/disables termination for the EIA-485/EIA-422 interface:<br>ON — Termination enabled<br>OFF — Termination disabled             | OFF              |

## Serial Port B switch, SW2

The Serial Port B switch is a 2-position DIP switch that enables or disables the serial port B transceiver.

| Position | Setting                                                                | Default position |
|----------|------------------------------------------------------------------------|------------------|
| 1        | Enable/disable auto power down<br>ON — Not supported<br>OFF — Disabled | OFF              |
| 2        | Enable/disable EIA-232 transceiver<br>ON — Enabled<br>OFF — Disabled   | ON               |

## User pushbuttons, SW3 and SW4

The development board has two user pushbuttons — SW3 and SW4 — that allow you to interact with applications running on the ConnectCore 9C or Wi-9C module. The application detects the button push through the associated GPIO.

## SW3 and SW4 pin assignment

| Signal name        | Switch | GPIO   |
|--------------------|--------|--------|
| USER_PUSH_BUTTON_1 | SW3    | GPIO72 |
| USER_PUSH_BUTTON_2 | SW4    | GPIO69 |

## Power switch, SW5

SW5 is the main power switch. ON/OFF positions are marked on the development board.

## Hardware Reset button, SW6

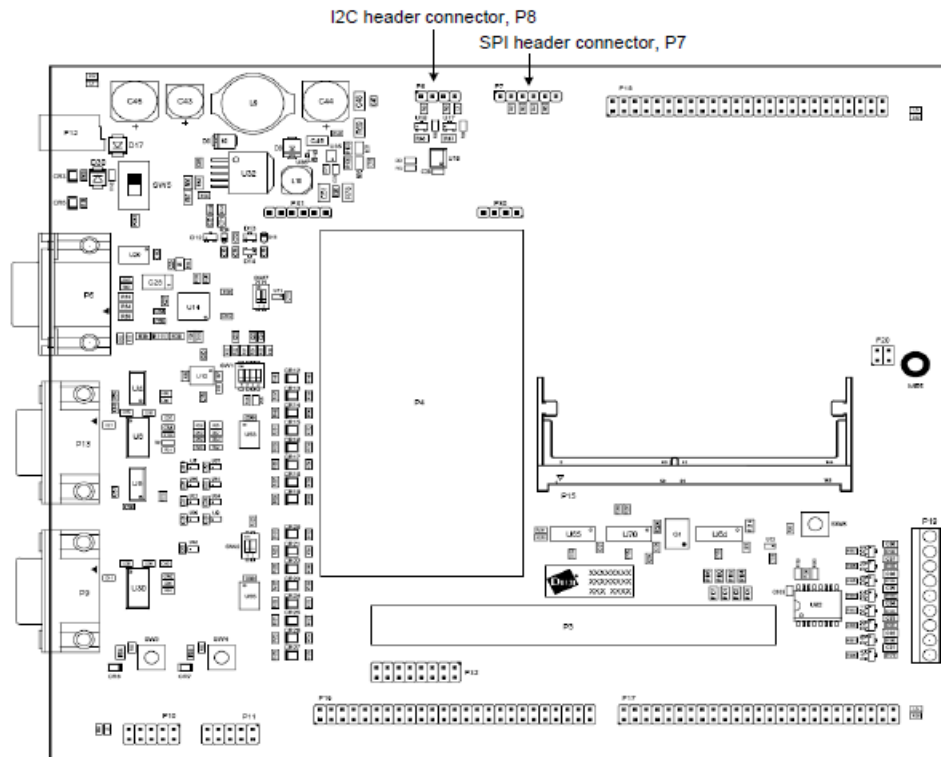
Press the hardware reset (push) button to reset the whole platform (module and development board).

## VGA (enable) switch, SW7

The VGA (enable) switch is a 2-position DIP switch that determines whether GPIO40 and GPIO41 are connected to the VGA controller or available for serial port C (see [Serial port C header connector, P10](#)). The switch position also determines whether the oscillator is connected to GPIO15 or is free for serial port A use.

| Position | Setting                                | Default position |
|----------|----------------------------------------|------------------|
| 1        | ON — VGA Disabled<br>OFF — VGA Enabled | ON               |
| 2        | Not Supported                          | OFF              |

## I2C and SPI header connectors



### I2C header connector, P8

The development board has a 4-pin I2C header connector, labeled P8.

### P8 pin assignment

| Pin | Signal  | Description           |
|-----|---------|-----------------------|
| 1   | I2C_SDA | I2C serial data line  |
| 2   | +5V     | +5V                   |
| 3   | I2C_SCL | I2C serial clock line |
| 4   | GND     | Ground                |

### SPI header connector, P7

The development board has one 6-pin SPI header connector, labeled P7.

**Important:** If you use the SPI header connector, Serial Port B must be *disabled* (in software).

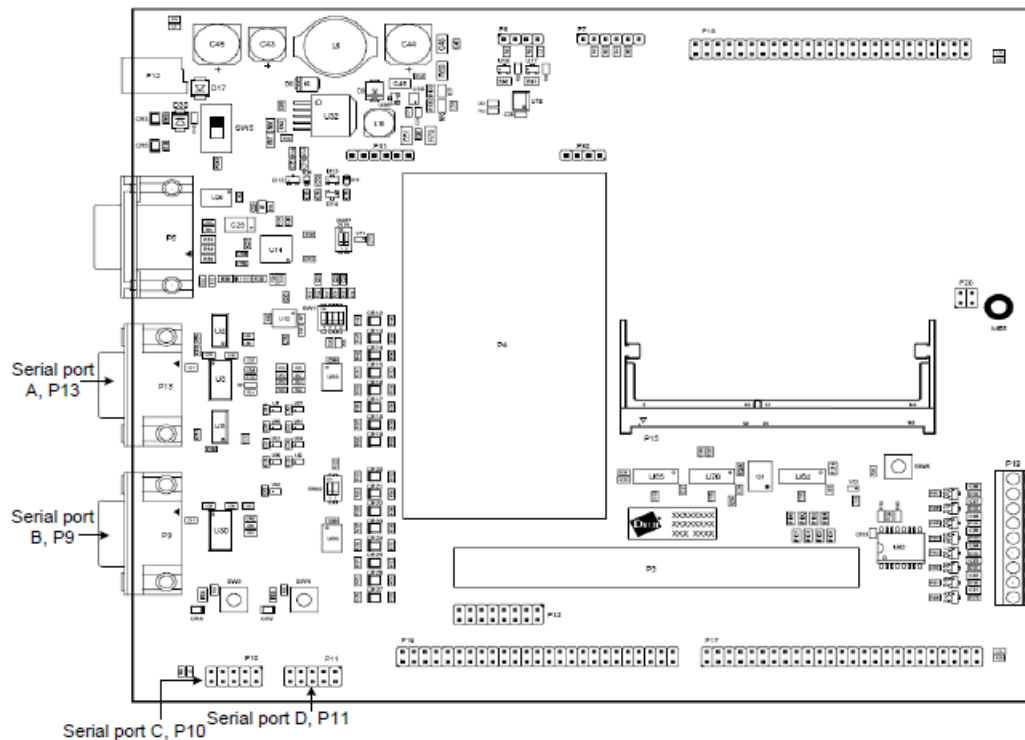
## P7 pin assignment

| Pin | Signal   | Description     |
|-----|----------|-----------------|
| 1   | +3.3V    | +3.3V           |
| 2   | SPI_DOUT | SPI data out    |
| 3   | SPI_DIN  | SPI data in     |
| 4   | SPI_CLK  | SPI clock       |
| 5   | SPI_CS#  | SPI chip select |
| 6   | GND      | Ground          |

All SPI signals are protected for the respective module's boot strapping.

## Serial port connectors

The development board has four serial ports: A (P13), B (P9), C (P10), and D (P11). Serial ports A and B support full EIA-232 functionality; serial ports C and D do not.



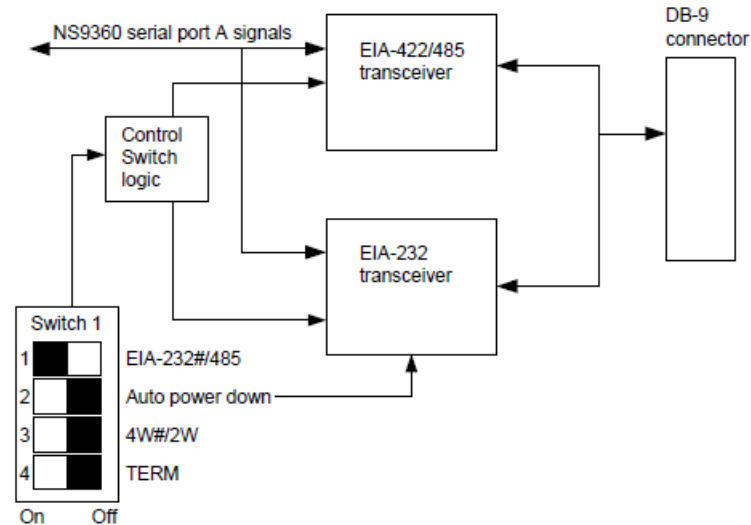
### Serial port A (EIA-232/422/485) connector, P13

The serial port A connector is a single DB-9 male connector for EIA-232/EIA-485 switchable mode, labeled P13. The serial port A interface corresponds to NS9360 serial port A, and is a switch-selectable

EIA-232/422/485 interface with a maximum baud rate of 921 kbps (see [Serial Port A switch, SW1](#)). Each signal is available with its status LED, and all status LEDs are bi-color, red or green.

## Serial port A diagram

This diagram shows the switch-selectable EIA-232/422/485 interface.



## P13 connector pin assignment

| Pin | EIA-232 signal    | EIA-232 signal description | EIA-422/485 4/8 wire | EIA-485 2-wire |
|-----|-------------------|----------------------------|----------------------|----------------|
| 1   | DCD# <sup>1</sup> | Data Carrier Detect        | CTS- (B)             |                |
| 2   | RXD               | Receive Data               | RXD+ (A)             | DATA+ (A)      |
| 3   | TXD               | Transmit Data              | TXD+ (A)             |                |
| 4   | DTR#              | Data Terminal Ready        | RTS- (B)             |                |
| 5   | GND               | Ground                     | GND                  | GND            |
| 6   | DSR#              | Data Set Ready             | RXD- (B)             | DATA- (B)      |
| 7   | RTS#              | Request to Send            | RTS+ (A)             |                |
| 8   | CTS#              | Clear to Send              | CTS+ (A)             |                |
| 9   | RI#               | Ring Indicator             | TXD- (B)             |                |

1. When the VGA (enable) switch, SW7, is OFF (default), DCD is *not* available. Shell is chassis GND.

## Serial port B (EIA-232) connector, P9

The serial port B connector is a single, DB-9 male connector, labeled P9. The serial port B interface corresponds to NS9360 serial port B, and is a standard EIA-232 interface with a maximum baud rate of

921 kbps. Each signal is available with its LED, and all status LEDs are bi-color, red or green. The serial port B line driver can be disabled using Switch 2 (see [Serial Port B switch, SW2](#)).

## P9 connector pin assignment

| Pin | Signal | Description         |
|-----|--------|---------------------|
| 1   | DCD#   | Data Carrier Detect |
| 2   | RXD    | Receive Data        |
| 3   | TXD    | Transmit Data       |
| 4   | DTR#   | Data Transmit Ready |
| 5   | GND    | Ground              |
| 6   | DSR#   | Data Set Ready      |
| 7   | RTS#   | Request to Send     |
| 8   | CTS#   | Clear to Send       |
| 9   | RI#    | Ring Indicator      |

## Serial port C header connector, P10

The serial port C header connector is a 2x5-pin serial port, labeled P10. The connector is a UART interface, with signals available on TTL-level. The serial port C interface corresponds to NS9360 serial port C.

The serial port C interface signals are available on TTL-level, and support only the TXD, RXD, RTS#, and CTS# signals, where # indicates an active low signal. These pins default to LCD or DIGITAL\_I/O signals when switch 7 is configured for VGA functionality (see [VGA \(enable\) switch, SW7](#)).

## P10 connector pin assignment

| Pin | Signal        | Description     | VGA enabled (SW7) |
|-----|---------------|-----------------|-------------------|
| 1   | Not connected | n/a             | n/a               |
| 2   | Not connected | n/a             | n/a               |
| 3   | RXD_C         | Receive Data    | LCD_D17           |
| 4   | RTS_C#        | Request to Send | DIGITAL_IO_9      |
| 5   | TXD_C         | Transmit Data   | LCD_D16           |
| 6   | CTS_C#        | Clear to Send   | DIGITAL_IO_10     |
| 7   | Not connected | n/a             | n/a               |
| 8   | Not connected | n/a             | n/a               |

| Pin | Signal | Description | VGA enabled (SW7) |
|-----|--------|-------------|-------------------|
| 9   | GND    | Ground      | n/a               |
| 10  | +3.3V  | Power       | n/a               |

## Serial port D header connector, P11

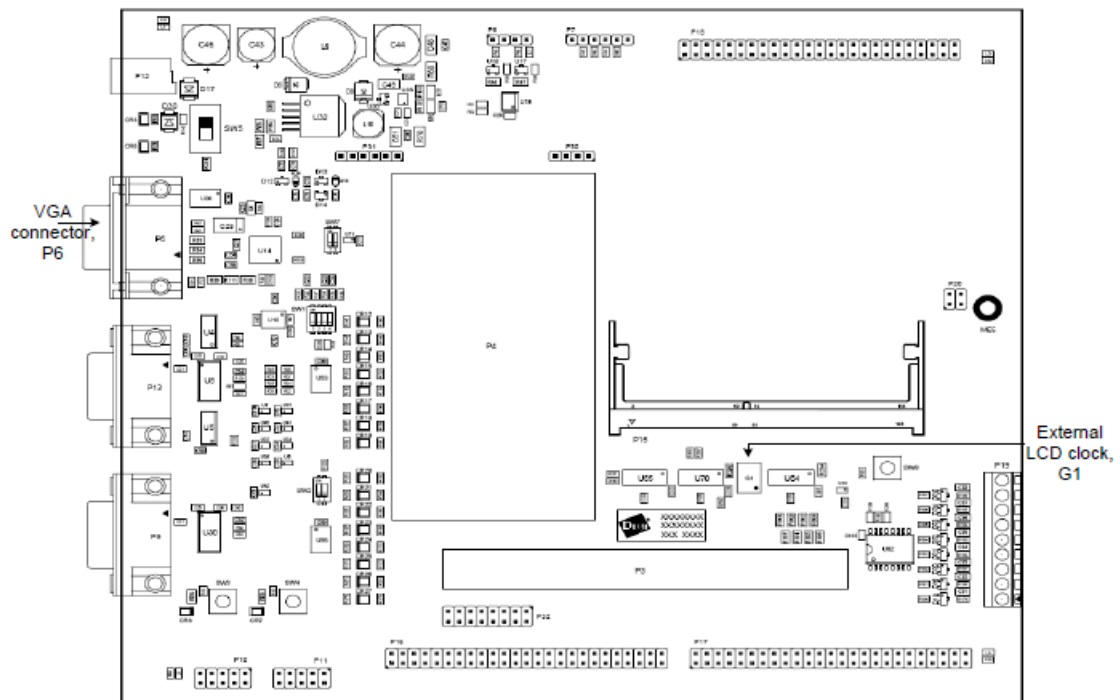
The serial port D header connector is a 2x5-pin serial port, labeled P11. The connector is a UART interface, with signals available on TTL-level. The serial port D interface corresponds to NS9360 serial port D.

The serial port D interface signals are available on TTL-level and support only the TXD, RXD, RTS#, and CTS# signals, where # indicates an active low signal. These pins default to GPIO signals 44-47. To use the pins for serial port D functions, you need to configure them in software.

## P11 connector pin assignment

| Pin | Signal        | Description     | Defaults to |
|-----|---------------|-----------------|-------------|
| 1   | Not connected | n/a             | n/a         |
| 2   | Not connected | n/a             | n/a         |
| 3   | RXD_D         | Receive Data    | GPIO45      |
| 4   | RTS_D#        | Request to Send | GPIO46      |
| 5   | TXD_D         | Transmit Data   | GPIO44      |
| 6   | CTS_D#        | Clear to Send   | GPIO47      |
| 7   | Not connected | n/a             | n/a         |
| 8   | Not connected | n/a             | n/a         |
| 9   | GND           | Ground          | n/a         |
| 10  | +3.3V         | Power           | n/a         |

## VGA connector / External LCD clock



### P6 pin assignment

The VGA connector is a 15-pin female connector, labeled P6.

### External LCD clock, G1

An external LCD controller clock is provided to avoid picture quality deterioration due to the low-emission spread spectrum clock used on the module.

G1 is a 48MHz oscillator that supports resolutions up to 640 x 480. The maximum NS9360 external LCD clock frequency is 90MHz. The frequency is divided by 2 before being used as the LCD clock source. For more information, see [Sample applications](#).

## Development board SO-DIMM connector, P15

**Manufacturer part number: AMP INCORPORATED 390112-1**

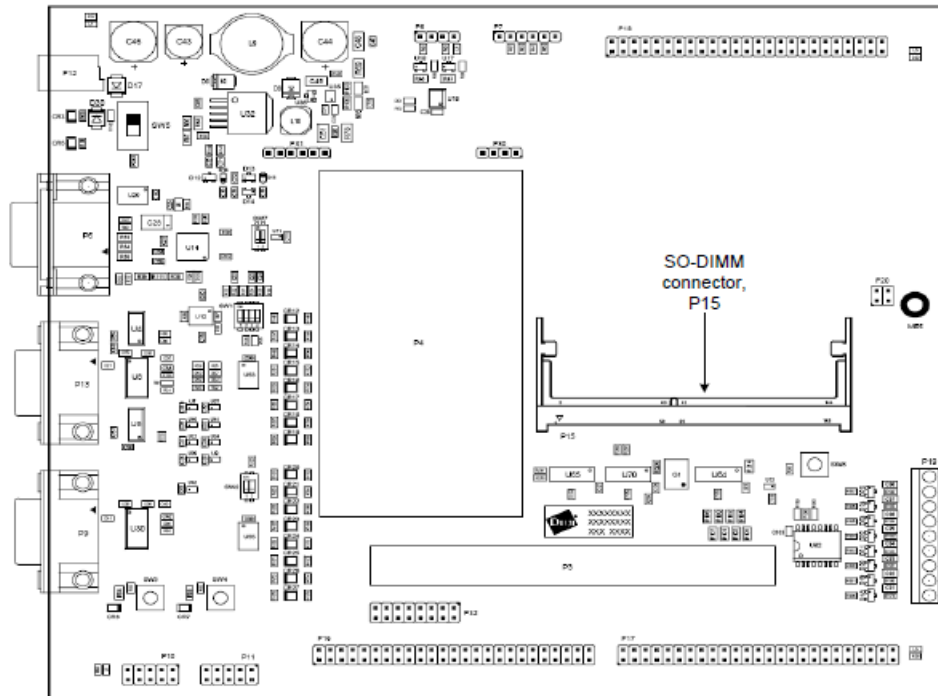
P15 is a 144-pin SO-DIMM connector on the development board. Plug the ConnectCore 9C/Wi-9C module SO-DIMM connector, P3, into P15.

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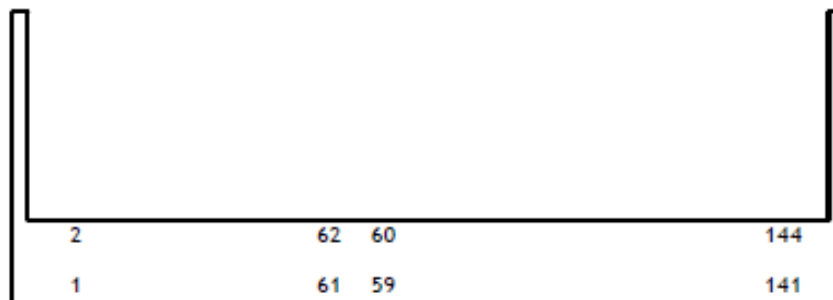
**Note** The clearance between the module and your development board must be 2.54mm (0.10").

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## Bird's-eye view



## Close-up

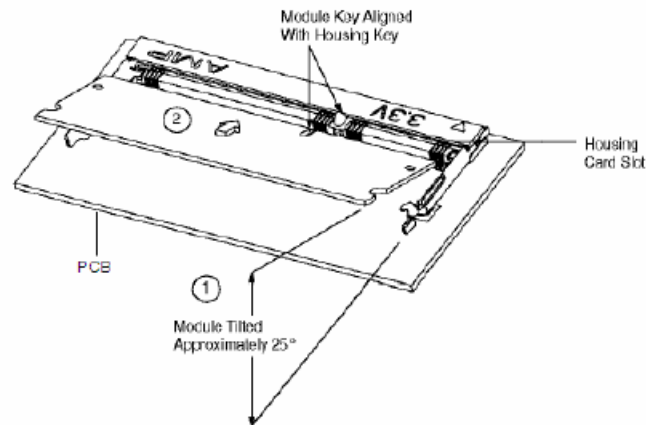


## Inserting the module into the SO-DIMM connector

To be sure you insert the module into the SO-DIMM connector properly, review these steps and figures:

1. Align the module key with the housing key (see the image below).
2. Slide the module into the housing (see the image below).

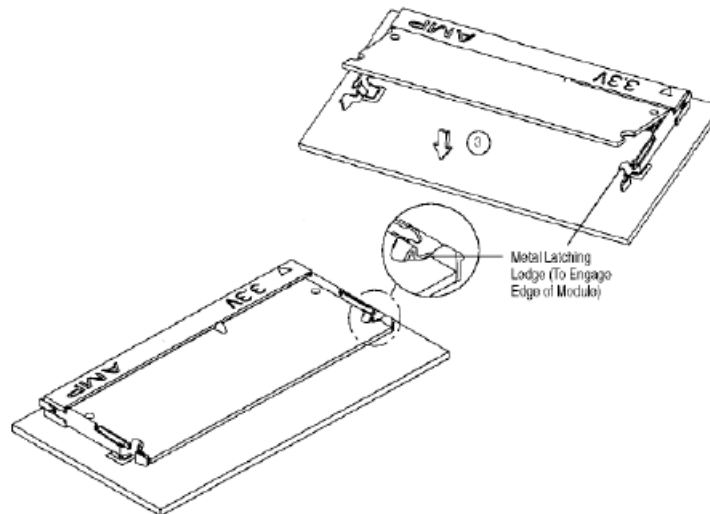
### Inserting the module into the development board SO-DIMM connector, steps 1 & 2



### Inserting the module into the development board SO-DIMM connector, step 3

3. Push the board down until the module snaps in (see the image below).

Be sure the metal latching edge engages the edge of the module.



### P15 pin assignment

The pin assignment for P15 is the same as that for P3, the SO-DIMM connector on the module. For the complete pin assignment list, see [Pin assignment by SO-DIMM pin number](#).

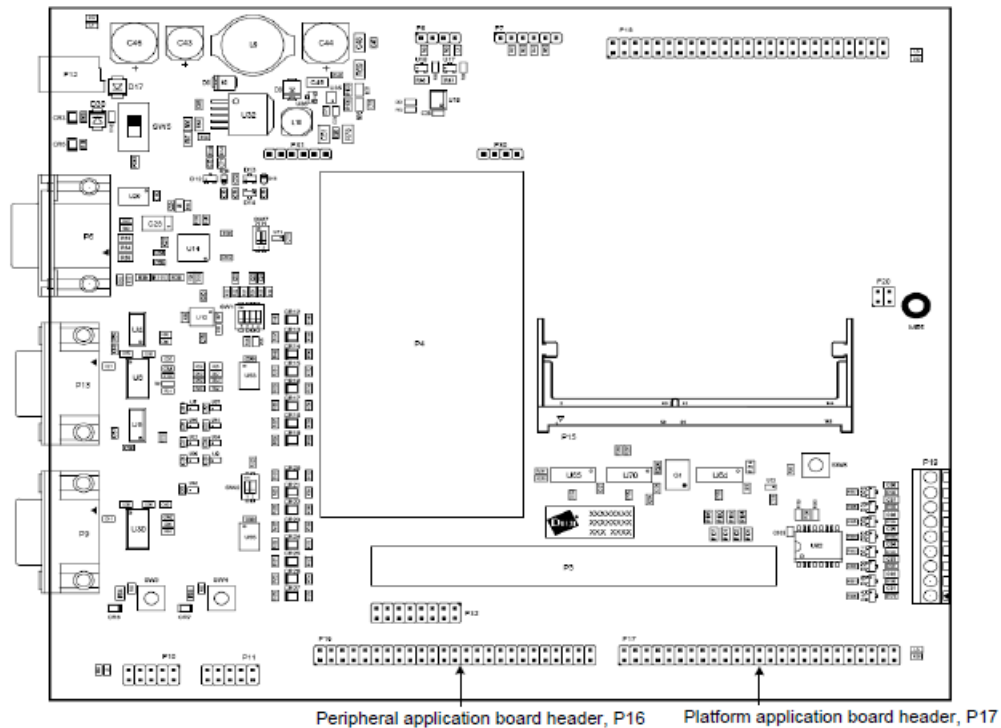
## Application-specific expansion headers — P16 and P17

**Manufacturer part numbers:**

**SAMTEC TSM-125-02-L-DV**

**PINREX 212-92-25GB01**

**WAVE TECH EPS01-50-A-1-0-B**



The development board provides two, 2x25-pin, 0.10" (2.54mm) pitch headers for supporting application-specific daughter cards/expansion boards:

- **P16, Peripheral board header.** Provides access to an 8-bit data bus, 8-bit address bus, and control signals (for example, CS#, WE#), as well as I<sup>2</sup>C and power. Using these signals, you can connect Digi-specific extension modules or your own daughter card to the module's address/data bus.
- **P17, Platform application header.** Provides access to the serial port B signal, one SPI interface, one USB channel, eight GPIOs, power, and the module's IEEE 802.3af signals. You can attach Digi-provided application kits or your own daughter card design.

## Peripheral application board header, P16

| Pin | Signal | Description / Comment | Pin | Signal | Description / Comment |
|-----|--------|-----------------------|-----|--------|-----------------------|
| 1   | GND    | Ground                | 2   | DATA_0 | Data bus              |
| 3   | DATA_1 | Data bus              | 4   | DATA_2 | Data bus              |
| 5   | DATA_3 | Data bus              | 6   | GND    | Ground                |
| 7   | DATA_4 | Data bus              | 8   | DATA_5 | Data bus              |
| 9   | DATA_6 | Data bus              | 10  | DATA_7 | Data bus              |

| Pin | Signal               | Description / Comment                 | Pin | Signal               | Description / Comment                         |
|-----|----------------------|---------------------------------------|-----|----------------------|-----------------------------------------------|
| 11  | GND                  | Ground                                | 12  | Reserved (DATA_8)    | n/a                                           |
| 13  | Reserved (DATA_9)    | n/a                                   | 14  | Reserved (DATA10)    | n/a                                           |
| 15  | Reserved (DATA_11)   | n/a                                   | 16  | GND                  | Ground                                        |
| 17  | Reserved (DATA_12)   | n/a                                   | 18  | Reserved (DATA_13)   | n/a                                           |
| 19  | Reserved (DATA_14)   | n/a                                   | 20  | Reserved (DATA_15)   | n/a                                           |
| 21  | GND                  | Ground                                | 22  | +3.3V                | 8 bit /16 bit#<br>3.3V selects 8-bit data bus |
| 23  | GND                  | Ground                                | 24  | +3.3V                | Power                                         |
| 25  | +3.3V                | Power                                 | 26  | ADDRESS_0            | Address bus                                   |
| 27  | ADDRESS_1            | Address bus                           | 28  | ADDRESS_2            | Address bus                                   |
| 29  | ADDRESS_3            | Address bus                           | 30  | GND                  | Ground                                        |
| 31  | ADDRESS_4            | Address bus                           | 32  | ADDRESS_5            | Address bus                                   |
| 33  | ADDRESS_6            | Address bus                           | 34  | ADDRESS_7            | Address bus                                   |
| 35  | GND                  | Ground                                | 36  | Reserved (ADDRESS_8) | n/a                                           |
| 37  | Reserved (ADDRESS_9) | n/a                                   | 38  | GND                  | Ground                                        |
| 39  | CS#                  | Static memory chip select 0           | 40  | I2C_SDA / GPIO71     | I <sup>2</sup> C serial data line             |
| 41  | WE#                  | Write enable                          | 42  | OE#                  | Output enable                                 |
| 43  | I2C_SCL / GPIO70     | I <sup>2</sup> C serial clock line    | 44  | PERI_INT#            | USER_PUSH_BUTTON2 / PERI_INT0# / GPIO69       |
| 45  | +3.3V                | Power                                 | 46  | +3.3V                | Power                                         |
| 47  | PERI_GPIO0           | DIGITAL_IO_9 / UART3_RTS / GPIO42_PRT | 48  | PERI_GPIO1           | DIGITAL_IO_10 / UART3_CTS# / GPIO43_PRT       |
| 49  | RESET_OUT            | Connected to inverted BUFFENR# signal | 50  | GND                  | Ground                                        |

## Platform application board header, P17

| Pin | Signal                    | GPIO/Other | Pin | Signal                | GPIO/Other   |
|-----|---------------------------|------------|-----|-----------------------|--------------|
| 1   | GND                       | n/a        | 2   | TXD_B / SPI_DO        | GPIO0        |
| 3   | RXD_B / SPI_DI            | GPIO1      | 4   | CTS_B#                | GPIO3        |
| 5   | DSR_B#                    | GPIO5      | 6   | DCD_B# / SPI_CE       | GPIO7        |
| 7   | RI_B# / SPI_CLK           | GPIO6      | 8   | DTR_B#                | GPIO4        |
| 9   | RTS_B#                    | GPIO2      | 10  | GND                   | n/a          |
| 11  | I2C_SCL                   | GPIO70     | 12  | I2C_SDA               | GPIO71       |
| 13  | GND                       | n/a        | 14  | RST#                  | System reset |
| 15  | GND                       | n/a        | 16  | DP1                   | n/a          |
| 17  | DM1                       | n/a        | 18  | GND                   | n/a          |
| 19  | LCD_D2                    | GPIO26     | 19  | LCD_D3                | GPIO27       |
| 21  | TXD_D                     | GPIO44     | 22  | RXD_D                 | GPIO45       |
| 23  | GND                       | n/a        | 24  | +3.3V                 | n/a          |
| 25  | GND                       | n/a        | 26  | +3.3V                 | n/a          |
| 27  | DIGITAL_IO_1              | GPIO23     | 28  | DIGITAL_IO_2          | GPIO16       |
| 29  | DIGITAL_IO_3              | GPIO17     | 30  | DIGITAL_IO_4          | GPIO18       |
| 31  | USER_LED_1 / DIGITAL_IO_5 | GPIO66     | 32  | GND                   | n/a          |
| 33  | USER_LED_2 / DIGITAL_IO_6 | GPIO67     | 34  | DIGITAL_IO_9 / RTS_C# | GPIO42       |
| 35  | DIGITAL_IO_10 / CTS_C#    | GPIO43     | 36  | GND                   | n/a          |
| 37  | Not connected             | n/a        | 38  | Not connected         | n/a          |
| 39  | Not connected             | n/a        | 40  | Not connected         | n/a          |
| 41  | Not connected             | n/a        | 42  | Not connected         | n/a          |
| 43  | Not connected             | n/a        | 44  | Not connected         | n/a          |
| 45  | Not connected             | n/a        | 46  | Not connected         | n/a          |
| 47  | Not connected             | n/a        | 48  | Not connected         | n/a          |
| 49  | Not connected             | n/a        | 50  | Not connected         | n/a          |

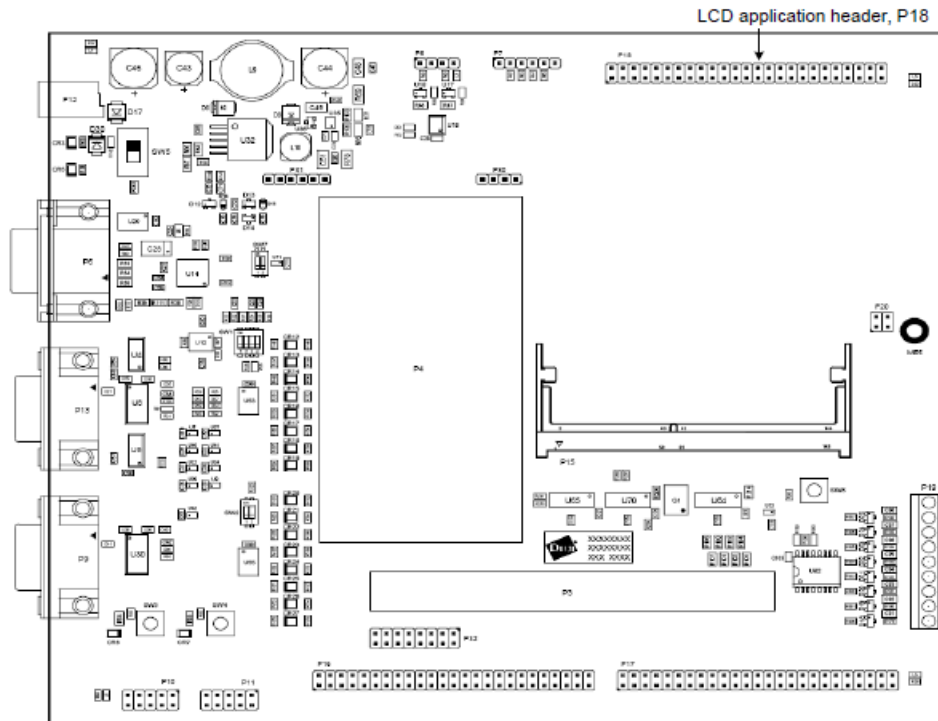
## LCD application board header, P18

**Manufacturer part numbers:**

**SAMTEC TSM-125-02-L-DV**

**PINREX 212-92-25GB01**

**WAVE TECH EPS01-50-A-1-0-B**



The LCD application header, P18, is a 2x25-pin, 0.10" (2.54mm) pitch header that provide access to the LCD signals and SPI signals for touch controller purposes. Use with the Digi-provided LCD application kit or attach your own LCD application board.

## P18 pin assignment

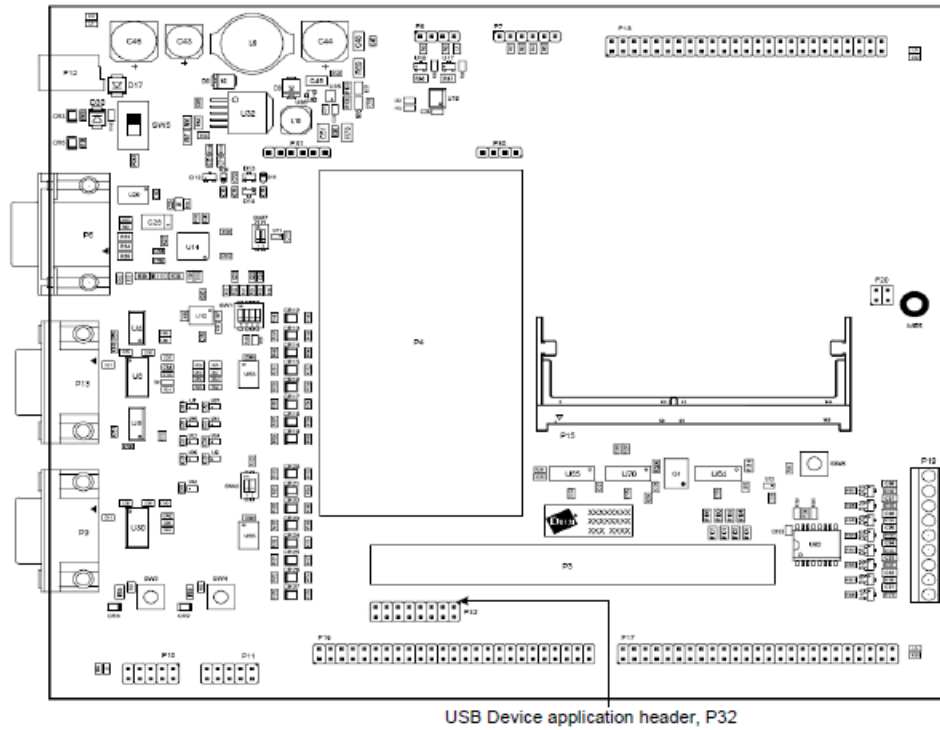
| Pin | Signal  | GPIO/Other | Pin | Signal           | GPIO/Other |
|-----|---------|------------|-----|------------------|------------|
| 1   | GND     | N/A        | 2   | LCD_D0           | GPIO24     |
| 3   | LCD_D1  | GPIO25     | 4   | LCD_D2           | GPIO26     |
| 5   | LCD_D3  | GPIO27     | 6   | GND              | N/A        |
| 7   | LCD_D4  | GPIO28     | 8   | LCD_D5           | GPIO29     |
| 9   | LCD_D6  | GPIO30     | 10  | LCD_D7           | GPIO31     |
| 11  | GND     | N/A        | 12  | LCD_D8           | GPIO32     |
| 13  | LCD_D9  | GPIO33     | 14  | LCD_D10          | GPIO34     |
| 15  | LCD_D11 | GPIO35     | 16  | GND              | N/A        |
| 17  | LCD_D12 | GPIO36     | 18  | LCD_D13          | GPIO37     |
| 19  | LCD_D14 | GPIO38     | 20  | LCD_D15          | GPIO39     |
| 21  | GND     | N/A        | 22  | LCD_D16 / TXD_C# | GPIO40     |

| Pin | Signal           | GPIO/Other         | Pin | Signal          | GPIO/Other         |
|-----|------------------|--------------------|-----|-----------------|--------------------|
| 23  | LCD_D17 / RXD_C# | GPIO41             | 24  | GND             | (Reserved) LCD_D18 |
| 25  | GND              | (Reserved) LCD_D19 | 26  | GND             | N/A                |
| 27  | GND              | (Reserved) LCD_D20 | 28  | GND             | (Reserved) LCD_D21 |
| 29  | I2C_SDA          | GPIO71             | 30  | I2C_SCL         | GPIO70             |
| 31  | GND              | N/A                | 32  | LCD_CLOCK       | GPIO20             |
| 33  | LCD_BIAS         | GPIO22             | 34  | LCD_HSYNC       | GPIO19             |
| 35  | LCD_VSYNC        | GPIO21             | 36  | CLPOWER         | GPIO18             |
| 37  | LINE_END         | GPIO23             | 38  | +3.3V           | N/A                |
| 39  | GND              | (Reserved) TSPX    | 40  | GND             | (Reserved) TSPY    |
| 41  | GND              | (Reserved) TSMX    | 42  | GND             | (Reserved) TSMY    |
| 43  | +3.3V            | N/A                | 44  | RI_B# / SPI_CLK | GPIO6              |
| 45  | DCD_B# / SPI_CE# | GPIO7              | 46  | TXD_B / SPI_DO  | GPIO0              |
| 47  | RXD_B / SPI_DI   | GPIO1              | 48  | +3.3V           | N/A                |
| 49  | GND              | TOUCH/SPI#         | 50  | GND             | N/A                |

## USB Device application header, P32

### Manufacturer part number: EPT 972-08009-21

The USB Device application header, P32, is a press fit 2x8 pin, straight RM2.54 (Y=6.7mm) header. Use this header to connect an external USB Device application to the development board, which then provides USB Device functionality.



## P32 pin assignment

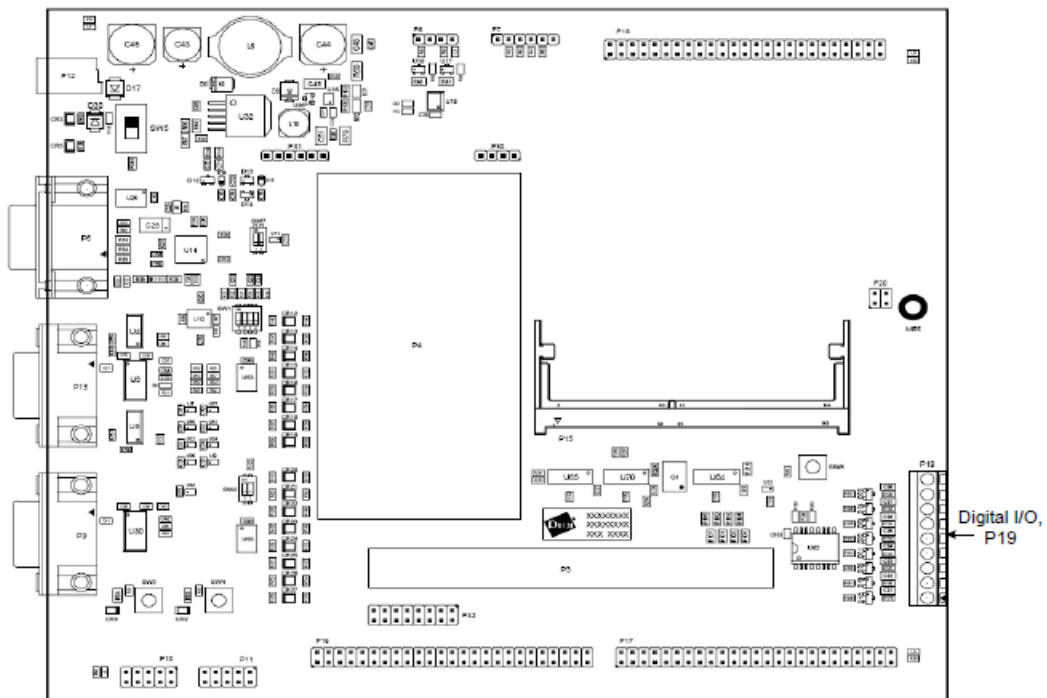
| Pin | Signal                                  | Comment                 |
|-----|-----------------------------------------|-------------------------|
| 1   | +3.3V                                   |                         |
| 2   | GND                                     |                         |
| 3   | +5V                                     |                         |
| 4   | GND                                     |                         |
| 5   | DIGITAL_IO_9 / UART3_RTS# / GPIO42_PRT  | USB_VP functionality    |
| 6   | DIGITAL_IO_10 / UART3_CTS# / GPIO43_PRT | USB_VM functionality    |
| 7   | GND                                     |                         |
| 8   | GND                                     |                         |
| 9   | GPIO44 / UART4_TXD / SPID_DO_PRT        | USB_OE# functionality   |
| 10  | USER_LED_3 / DIGITAL_IO_7 / GPIO48      | USB_SPND functionality  |
| 11  | USER_LED_4 / DIGITAL_IO_8 / GPIO49      | USB_SPEED functionality |
| 12  | GPIO45 / UART4_RXD / SPID_DI_PRT        | USB_RCV functionality   |
| 13  | GPIO46 / UART4_RTS#_PRT                 | USB_ENUM functionality  |

| Pin | Signal               | Comment |
|-----|----------------------|---------|
| 14  | GND                  |         |
| 15  | I2C_SDA / GPIO71_PRT |         |
| 16  | I2C_SCL / GPIO70_PRT |         |

## Digital I/O, P19

**Manufacturer part number: BlockMaster MTS0900T**

The Digital I/O connector, P19, is a MTS, 9-pin terminal block for PCB RM3.81.

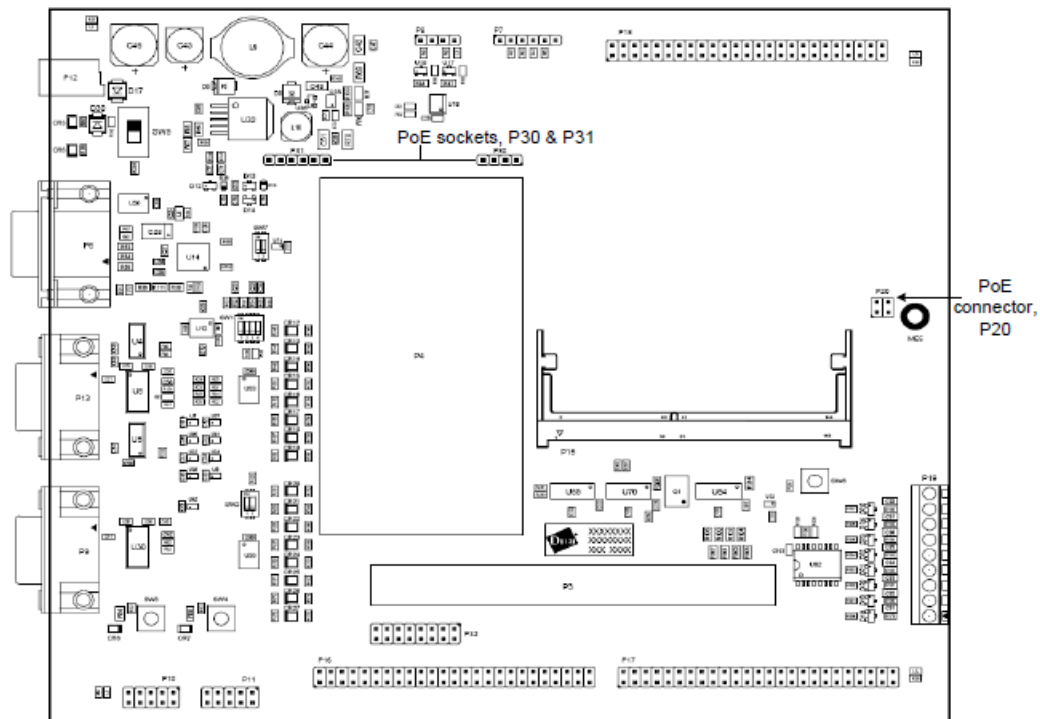


## P19 pin assignment

| Pin | Signal   | Pin | Signal   |
|-----|----------|-----|----------|
| 1   | I2C_IO_0 | 2   | I2C_IO_1 |
| 3   | I2C_IO_2 | 4   | I2C_IO_3 |
| 5   | I2C_IO_4 | 6   | I2C_IO_5 |
| 7   | I2C_IO_6 | 8   | I2C_IO_7 |
| 9   | GND      |     |          |

## Power over Ethernet (PoE) connectors

The development board provides three PoE connectors: P20, P30, and P31.



The PoE connector, P20, captures PoE signals from the module on the development board and routes them to the PoE module connector, P30. See [What's on the module?](#) for more information.

The P30 and P31 connectors support the IEEE 802.3af PoE application module.

- P30 is the input connector of the PoE module, providing access to the PoE signals coming from the ConnectCore 9C/Wi-9C module through P20.
- P31 provides the output voltage and ground signals from the PoE module. When you use PoE, this output voltage powers the development board; you do not need the main power supply.

### 802.3afPoE connector, P20

#### Manufacturer part numbers:

AMP INCORPORATED 5-146256-2

AMP INCORPORATED 5-146257-2

SAMTEC TSW-102-07-L-D

P20 pins are allocated as shown:

| Pin | Signal       | Actual signal name | Description                     |
|-----|--------------|--------------------|---------------------------------|
| 1   | POE_TX_CT    | POE_RJ45_4/5       | Ethernet connector pins 4 and 5 |
| 2   | POE_RJ45_7/8 | POE_RX_CT          | Ethernet transformer receive CT |

| Pin | Signal       | Actual signal name | Description                      |
|-----|--------------|--------------------|----------------------------------|
| 3   | POE_RX_CT    | POE_RJ45_7/8       | Ethernet connector pins 7 and 8  |
| 4   | POE_RJ45_4/5 | POE_TX_CT          | Ethernet transformer transmit CT |

## P30 connector

**Manufacturer part number: Samtec SLW-104-01-G-S**

The P30 input connector is a 1x4 pin socket with these characteristics: SLW, THT, RM2.54 (h=4.57mm). P30 pins are allocated as shown:

| Pin | Signal       |
|-----|--------------|
| 1   | POE_TX_CT    |
| 2   | POE_RX_CT    |
| 3   | POE_RJ45_4/5 |
| 4   | POE_RJ45_7/8 |

## P31 connector

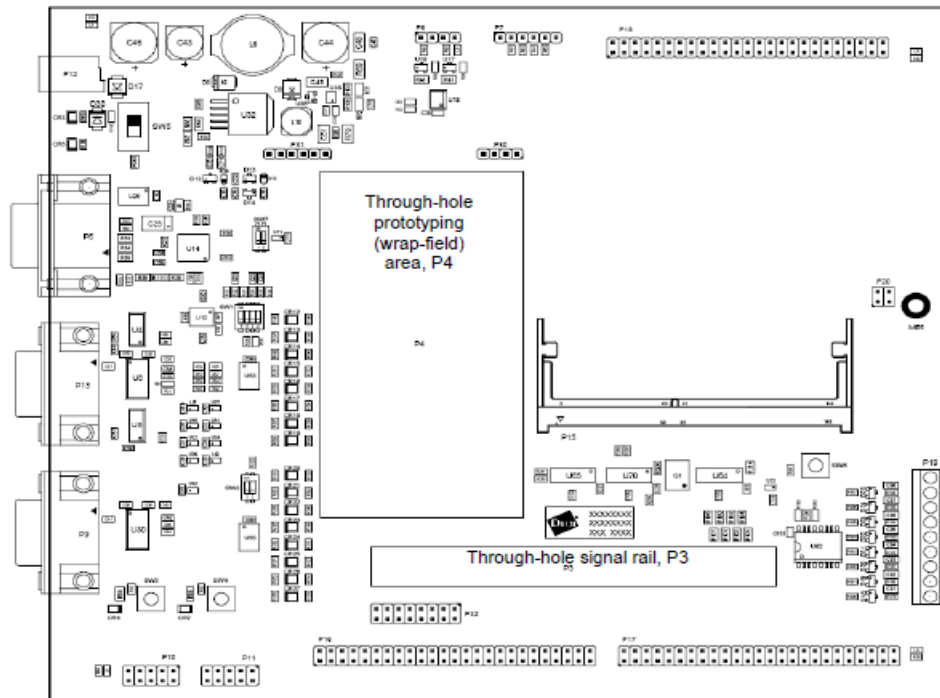
**Manufacturer part number: Samtec SLW-106-01-G-S**

The P31 connector is a 1x6 pin socket with these characteristics: SLW, THT, RM2.54 (h=4.57mm). P31 pins are allocated as shown:

| Pin | Signal   | Pin | Signal   |
|-----|----------|-----|----------|
| 1   | +12V_POE | 2   | +12V_POE |
| 3   | GND      | 4   | GND      |
| 5   | POE_GND  | 6   | POE_GND  |

## Through-hole prototyping (wrap-field) area, P3 and P4

The through-hole prototyping area has two parts, P3 and P4.

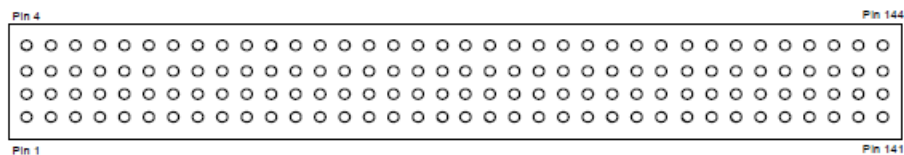


### Through-hole signal rail, P3

**Manufacturer part number: SAMTEC TSW-136-xx-D**

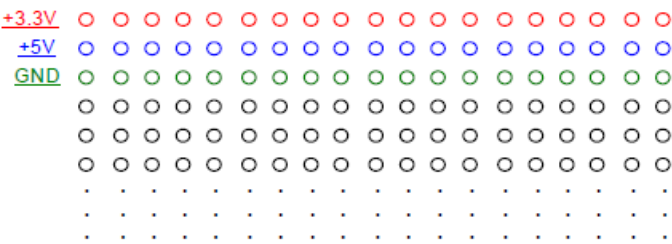
Where *xx* is the length of the header pins; you choose the connector that best fits your application. P3 is a four-column, 144-signal, through-hole signal rail that provides 1:1 access to all module signals. You can solder every 2.54mm through-hole header. The size of the P3 connector is 4x36 pins (see the drawing following the next paragraph) — note, however, that you can solder only a smaller header onto the connector. If you want to solder a complete header over the through-hole signal rail, use 2 headers of 2x36 pins each.

The signal assignments for P3 are the same as those for the edge connector, P3, on the module; see [Pin assignment by SO-DIMM pin number](#) for detail.

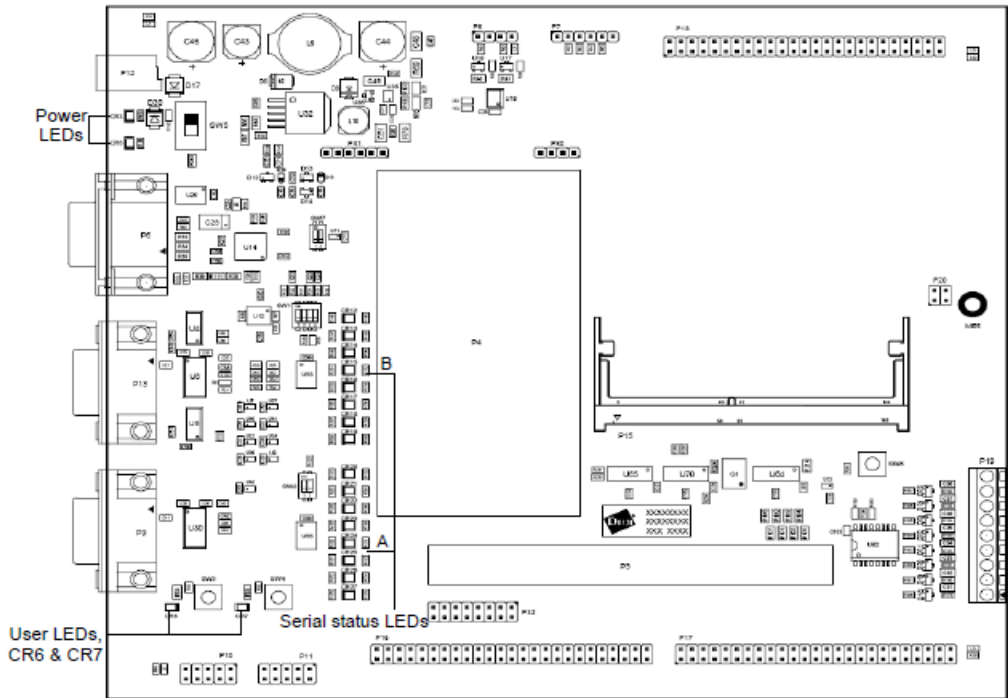


### Wrap-field area, P4

P4 is a wrap field area that allows you to connect through-hole components. The +3.3, +5V, and GND buses run along the top edge of the wrap-field area.



Development board LEDs



Power LEDs, CR3 and CR5

The power LEDs are single-color (RED) LEDs, located below the power jack, P12.

| LED | Condition when ON     |
|-----|-----------------------|
| CR3 | 5V power is present   |
| CR5 | 3.3V power is present |

User LEDs, CR6 and CR7

The user LEDs are single-color (GREEN) LEDs, located next to switches 3 and 4 on the development board.

|     | Condition when ON             |
|-----|-------------------------------|
| CR6 | Value of GPIO48 is a logic 0  |
| CR7 | Value of GPIO49 is a logic 0. |

## Serial LEDs

The serial port A LEDs are to the right of the serial port A (EIA-232/EIA-485) connector, on the left side of the wrap-field area. The serial port B LEDs are to the right of the serial port B (EIA-232) connector, on the left side of the wrap-field area.

| Serial port A LEDs                                                                  | Name | Function | Serial Port B LEDs                                                                   | Name | Function |
|-------------------------------------------------------------------------------------|------|----------|--------------------------------------------------------------------------------------|------|----------|
|    | CR12 | DCD#     |    | CR20 | DCD#     |
|    | CR13 | RI#      |    | CR21 | RI#      |
|    | CR14 | DSR#     |    | CR22 | DSR#     |
|    | CR15 | DTR#     |    | CR23 | DTR#     |
|    | CR16 | CTS#     |    | CR24 | CTS#     |
|   | CR17 | RTS#     |   | CR25 | RTS#     |
|  | CR18 | RXD      |  | CR26 | RXD      |
|  | CR19 | TXD      |  | CR27 | TXD      |

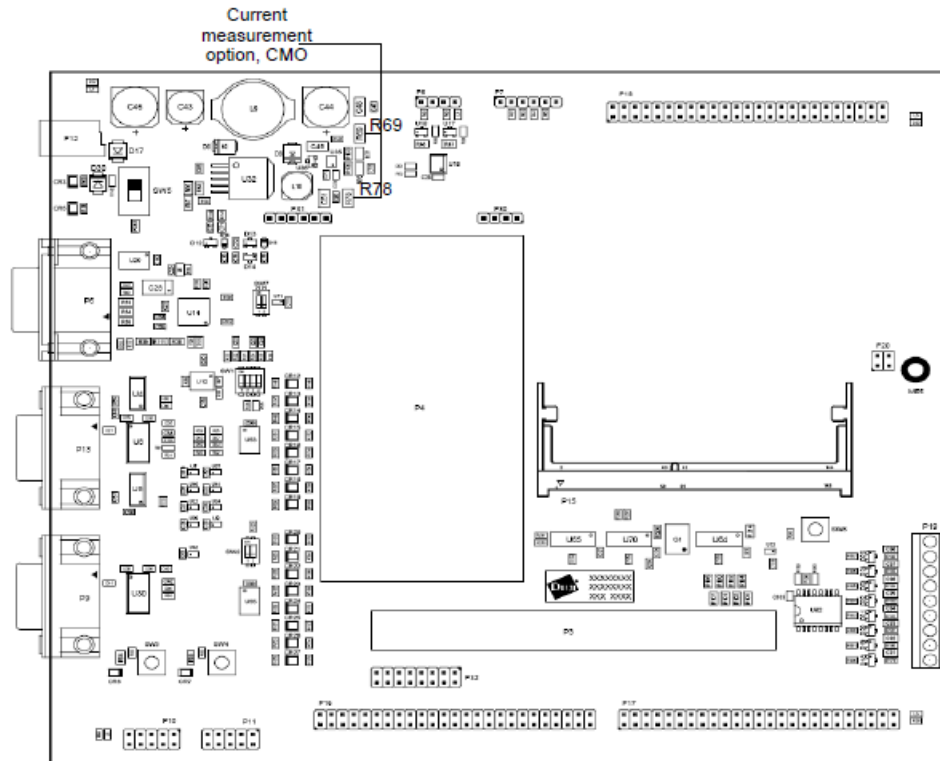
The LED indicators are dual-state, and are connected to the TTL side of the EIA transceivers.

- Green represents a negative voltage on the DB9 connector pin.
- Red represents a positive voltage DB9 connector pin.

The intensity and color of the LED will change when the voltage is switching.

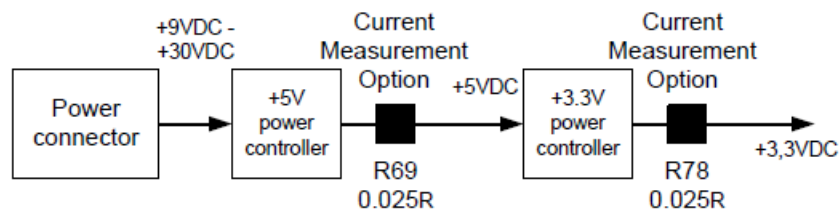
## Current Measurement Option (CMO)

The Current Measurement Option uses 0.025R series resistors to measure the current on the development board's +3.3V (R78) and +5V (R69) power supplies.



## How the CMO works

This drawing shows how the Current Measurement Option works.

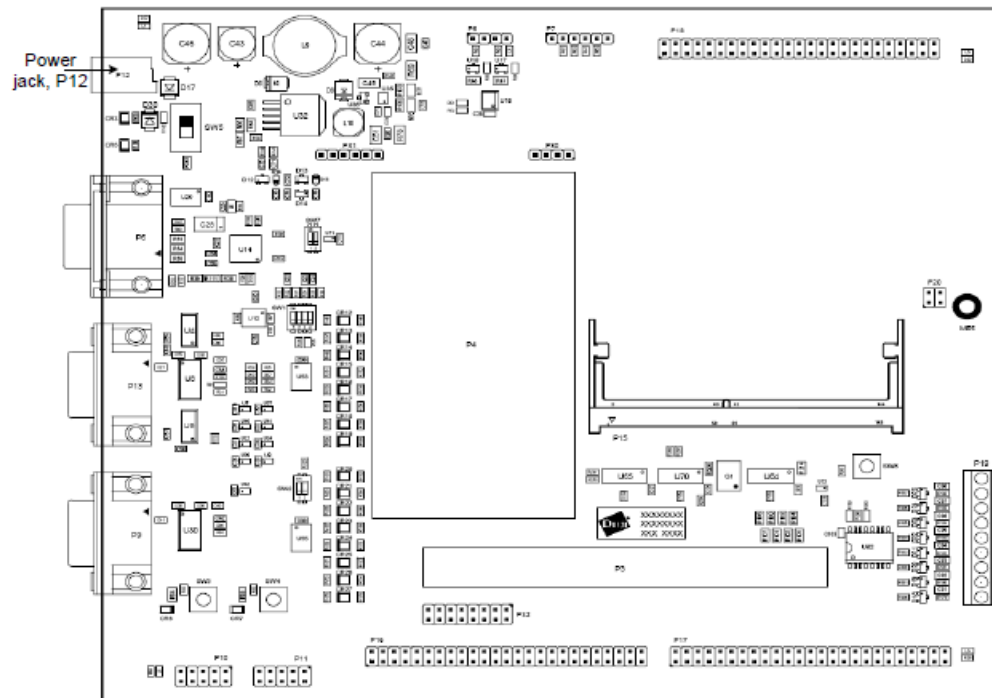


To measure the load current used on different power supplies, measure DC voltage across the sense (CMO) resistor. The value of the resistor is  $0.025R \pm 1\%$ . Calculate the current using this equation:  $I = E/R$

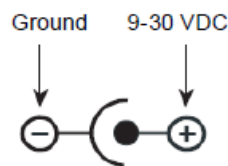
where

- $I$  = current in Amps
- $E$  = measured voltage in Volts
- $R = 0.025$  Ohms

## Power jack, P12



The power jack is a barrel connector with 9-30VDC operating range. The power jack is labeled P12 on the development board. This figure schematically represents the power jack's polarity:



## Test points

The development board provides five test points that can be identified by board label or test point number. The board labels are adjacent to each test point on the board. The test point numbers are in the development board schematic drawings.

## Numbers and description

| Test point | Label | Source/Comment                             |
|------------|-------|--------------------------------------------|
| TP36       | +12V  | +Charge pump off of DC/DC regulator (U32)  |
| TP37       | -12V  | - Charge pump off of DC/DC regulator (U32) |
| TP38       | +5V   | DC/DC regulator (U32) with 9-30VDC input   |

| Test point | Label | Source/Comment                       |
|------------|-------|--------------------------------------|
| TP41       | +3.3V | DC/DC regulator (U35) with +5V input |
| TP42       | GND   | Common Ground return                 |

## Factory default interface configuration for development board

These interfaces are enabled as shown per the factory default configuration:

| Interface                         | Factory default status                                     |
|-----------------------------------|------------------------------------------------------------|
| LCD VGA                           | Enabled                                                    |
| I <sup>2</sup> C (5V tolerant)    | Enabled                                                    |
| I <sup>2</sup> C user-driven I/Os | Enabled                                                    |
| EIA-232 Serial Port A             | Enabled (No DCD unless LCD_VGA is disabled)                |
| EIA-485 Serial Port A             | Disabled                                                   |
| EIA-232 Serial Port B             | Enabled (Full modem support)                               |
| TTL Serial Port C                 | Disabled (Disabled when LCD_VGA is enabled)                |
| TTL Serial Port D                 | Disabled (GPIO signals 44-47 default as GPIOs)             |
| SPI Serial Port B                 | Disabled (No SPI unless EIA-232 Serial Port B is disabled) |

# LCD and USB configuration

---

This chapter addresses module specifics pertaining to the LCD and USB interfaces.

See the application note “LCD Displays Supported by the NetSilicon NS9750/NS9360 Processors” (available on <http://www.digiembedded.com>) for additional information about the application-specific configuration and capabilities of the LCD controller on the ConnectCore 9C/Wi-9C module.

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## LCD displays

There are seven categories of LCD displays, all of which the module supports:

- Color TFT (thin film transistor, also called active matrix (AM)):
  - 18-bit
- Six types of STN (super twisted nematic, also called passive matrix (PM)):
  - Three single panel displays
  - Three dual panel displays

Each STN display is either color or monochrome:

- Color display: Up to 8-pin using color-enhancing palette RAM
- Monochrome display: Up to 8-pin or 4-pin using grayscale-enhancing palette RAM

## Control and data pins

The ConnectCore 9C/Wi-9C LCD interface has six control pins. The number of data pins depends on the display type. Displays typically require 4–6 control pins. The next two tables list the control pins and the data pins, respectively.

**Note** Most of the pins on the Wi-9C, if not used, can be left floating. The pins that cannot be left floating are ones that are required (power, ground, UBUFFEN, etc).

## LCD controller control pins

| Pin # | Signal name  | Type   | Description                                                             |
|-------|--------------|--------|-------------------------------------------------------------------------|
| 89    | CLPOWER      | Output | LCD panel power enable                                                  |
| 87    | CLLP (HSYNC) | Output | Line synchronization pulse (STN)/horizontal synchronization pulse (TFT) |
| 46    | CLCP         | Output | LCD panel clock                                                         |
| 44    | CLFP         | Output | Frame pulse (STN)/vertical synchronization pulse (TFT)                  |
| 42    | CLAC         | Output | STN AC bias drive or TFT data enable output                             |
| 38    | CLLE         | Output | Line end signal                                                         |

## LCD controller data pins

| Display type   | Number of data pins: Panel 1 | Number of data pins: Panel 2 |
|----------------|------------------------------|------------------------------|
| TFT—Color only |                              |                              |
| Color 18-bit   | 18                           | Not applicable               |

| Display type       | Number of data pins:<br>Panel 1 | Number of data pins:<br>Panel 2 |
|--------------------|---------------------------------|---------------------------------|
| STN—Color          |                                 |                                 |
| Single panel 8-bit | 8                               | Not applicable                  |
| Dual panel 8-bit   | 8                               | 8                               |
| STN—Monochrome     |                                 |                                 |
| Single panel 4-bit | 4                               | Not applicable                  |
| Dual panel 4-bit   | 4                               | 4                               |
| Single panel 8-bit | 8                               | Not applicable                  |
| Dual panel 8-bit   | 8                               | 8                               |

**Important:** Double-panel displays use twice as many pins but do not offer more color or gray shades.

## Colors and gray shades

The number of colors and gray shades correlates with the number of data pins but also depends on color processing techniques and data-shifting techniques.

For exact values, see the *NS9360 Hardware Reference*, LCD Controller chapter, “Number of Colors” and “Grayscale.” You can access the *NS9360 Hardware Reference* through the Jump Start Kit.

## Sample displays

ConnectCore 9C/Wi-9C uses an internal programmable palette-LUT and a grayscale to support different color-processing techniques; three sample displays are provided here:

- **18-pin TFT display** (for example, the SHARP LQ10D421). Accepts 18 color RGB bits (6 bits per color) at a time. Only 16 bits are transferred from SDRAM: five bits each for the three colors — R (red), G (green), and B (blue) — and a single LSB (least significant bit) that is split into three equal values between R, G, and B. This produces close to  $2^{16}$ , or 64 thousand colors.
- **8-pin STN color display** (for example, the SHARP LM057QC1T01). Shifts eight color bits at a time: RGBRGBRG bits followed by BRGBRGBR bits followed by GBRGBRGB, and so on. This produces color enhancing in 3375 color grades.
- **4-pin STN monochrome display** (for example, the Grand Pacific Optoelectronics GM0008-13). Shifts four monochrome bits at a time, resulting in 15 gray shades ( $2^4 - 1$ ).

## Resolution

The LCD resolution is programmable. These standard displays, with the following resolutions, are supported:

- QVGA = 320 x 240
- VGA = 640 x 480

Lower resolution displays also are supported. Displays typically have programmable vertical resolutions within a certain range, especially if they are used for TV displays (to accommodate different television standards).

## Refresh frequency

The LCD refresh frequency is programmable. Lower refresh frequency drains less power, but might flicker. TFT displays usually flicker less than STN displays, as they have a transistor switch behind each pixel on the screen and can hold the capacitive charge longer.

## Sample applications

The LCD interface uses memory as a video buffer. The display resolution is determined by the product of three parameters: *number of data bits x display resolution x refresh frequency*. This product cannot exceed the system bus bandwidth allocated to the display.

Be aware that the actual bandwidth used by the display is:

$$\text{display clock rate} \times \text{number of bits per clock}$$

For example, a clock rate of 50MHz with 16 bits of color yields a bandwidth of 100 MBps. To minimize bandwidth requirements, you might need to use an external oscillator to get the exact rate.

The ConnectCore 9C/Wi-9C development board has a 48MHz external oscillator and resulting LCD clock of 24MHz. 16 bits of color requires 48 MBps for the display.

## Default LCD controller

The default LCD controller configuration supported by the NS9360 is 640 x 480, with 8 bits for color. The bandwidth is guaranteed; the designer does not need to be concerned with bandwidth use. Higher resolutions are possible but require care in their setup and design.

## Formula

The ConnectCore 9C/Wi-9C module operates at 155 MHz system bus speed. This speed grade results in 310 MBps bus bandwidth, as the bus is 4 bytes wide. For bandwidth planning, this maximum bandwidth must be reduced to account for overhead and read/write switching. The effective bandwidth is 1/2 of the system bandwidth; that is, 155 MBps. This value is predicted as the worst case for the ConnectCore 9C/Wi-9C. The architecture allocates half of the system bandwidth to the module. The remaining four bus master peripherals (Ethernet TX, Ethernet RX, peripheral bus bridge, and LCD controller) share the other half of the bandwidth. The bandwidth assignment of these peripherals is programmable.

Use this formula to estimate the amount of bandwidth available for your LCD display:

$$\text{CPU bandwidth} = 77.5 \text{ MBps}$$

$$\text{All other peripherals (including LCD)} = 77.5 \text{ MBps}$$

## Example 1: 18-bit VGA

The 18-bit TFT display transfers 16 bits per pixel and generates the last two bits inside the LCD controller. This display packs two-color RGB pixels into a single 4-byte word.

The 18-bit VGA display (640 x 480), refreshing 60 times per second, requires 37 MBps:

$$2 \times 640 \times 480 \times 60 = 37 \text{ MBps}$$

40.5 MBps are left to all other peripherals. If the LCD refresh frequency increases to 70 Hz, the required bandwidth increases to 43 MBps.

---

**Note** The module LCD controller supports 18-bit VGA displays in most applications.

---

## Supported TFT displays

| Display type           | Refresh frequency in Hz | BW required for display in MBps | Display in MBps<br>BW left to other peripherals in MBps |
|------------------------|-------------------------|---------------------------------|---------------------------------------------------------|
| 18b VGA<br>(640 x 480) | 50                      | 31                              | 46.5                                                    |
|                        | 60                      | 37                              | 40.5                                                    |
|                        | 70                      | 43                              | 34.5                                                    |

## USB configuration

When you purchase the Ethernet plus USB hub version of the ConnectCore 9C/Wi-9C module, the USB hub is installed on the module.

On modules without USB, NS9360 dedicated USB signals are brought out to the Application header, P17:

| P17 pin | Signal    | Description     |
|---------|-----------|-----------------|
| 16      | DP1       | USB data (+)    |
| 17      | DM1       | USB data (-)    |
| 28      | USB_OVRH# | USB overcurrent |
| 29      | USB_PONH# | USB power-on    |

See also

- [Power requirements](#) for power required per USB port.
- [USB interface](#) for information about integrating the module without on-board USB and without need for USB.
- [USB internal PHY DC electrical inputs and outputs](#)

## Module specification

---

This section provides ConnectCore 9C/Wi-9C module specifications.

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## Mechanical dimensions

### ConnectCore 9C

- Length: 3.590 inches (91.19 mm)
- Add 0.136 inches (3.45 mm) for USB and/or Ethernet connector overhang
- Width: 2.055 inches (52.2 mm)
- Height:
  - 0.799 inches (20.3 mm) with Dual USB connector
  - 0.712 inches (18.08 mm) with RJ-45 Ethernet connector

### ConnectCoreWi-9C

- Length: 3.590 inches (91.19 mm)
  - Add 0.136 inches (3.45 mm) for USB and/or Ethernet connector overhang
  - Add 0.375 inches (8.95 mm) for RP-SMA antenna overhang
- Width: 3.055 inches (77.60 mm)
- Height:
  - 0.799 inches (20.3 mm) with dual USB connector
  - 0.712 inches (18.08 mm) with RJ-45 Ethernet connector

## Environmental information

### ConnectCore 9C

- Operating temperature: -40° C to +85° C (-40° F to +185° F)
- Storage temperature: -40° C to +125° C (-40° F to 257° F)
- Relative humidity: 5% to 95% (non-condensing)
- Altitude: 12,000 ft (3657.6 m)

### ConnectCore Wi-9C

- Operating temperature: -30° C to +75° C (-22° F to +167° F)
- Storage temperature: -40° C to +125° C (-40° F to 257° F)
- Relative humidity: 5% to 95% (non-condensing)
- Altitude: 12,000 ft (3657.6 m)

## Network interface

### Ethernet

- Standard: IEEE 802.3
- Physical layer: 10/100Base-T
- Data rate: 10/100 Mbps (auto-sensing)
- Mode: Full or half duplex (auto-sensing)
- On-board connector: RJ-45 with magnetics (optional)
- 802.3af power pass-through (mid-span and end-span)

### WLAN

- Standard: IEEE802.11b/g
- Frequency: 2.4 GHz
- Data rate: Up to 54 Mbps with fallback
- Modulation: DBPSK (1 Mbps), DQPSK (2 Mbps), CCK (11,5.5 Mbps), BPSK (6,9 Mbps), QPSK (12,18 Mbps), 16-QAM (24,36 Mbps), 64-QAM (48,54 Mbps)
- Transmit power: 16 dBm typical
- Receive sensitivity:

|        | MIN     | TYP     |
|--------|---------|---------|
| 11Mbps | -76 dBm | -87 dBm |
| 54Mbps | -65 dBm | -73 dBm |

- Connector: 1/2 x RP-SMA or 2 x U.FL

## Power requirements

### ConnectCore 9C

- Module: 3.3VDC @ 0.75A max
- USB interface: 5VDC @ 0.5A max per port (optional)

### ConnectCore Wi-9C

- Module: 3.3V  $\pm$  5% @ 0.95A max, 0.70A typ
- Optional USB: 5V  $\pm$  10% @ 1.0A max

## Power up

The rise time of both the 3.3V power supply and 5V power supply must be between 700  $\mu$ s and 140 ms, and the inrush current must be limited to less than 2A.

## Real-time clock

The accuracy of the internal Real-Time Clock on the module's processor is .15%.

## I<sup>2</sup>C signals

The I<sup>2</sup>C signals are multiplexed with GPIO.

### Legend

- SO-DIMM pin #: Pin number assignment for signal
- Signal: Pin name for each signal.
- U/D: Indicates whether the pin has an internal pullup resistor or pulldown resistor.
  - U — Pullup
  - D— Pulldown
  - Blank — Neither an internal pullup or pulldown resistor
- OD (mA): The output drive of an output buffer.
- I/O: Type of signal input (I), output (O), or input/output (I/O)

### Signals

| SO-DIMM Pin# | Signal name | GPIO     | U/D | OD (mA) | I/O | Description                                                  |
|--------------|-------------|----------|-----|---------|-----|--------------------------------------------------------------|
| 55           | iic_scl     | GPIO[34] | U   | 4       | I/O | I <sup>2</sup> C serial clock line.<br>Duplicate on GPIO[70] |
| 66           | iic_sda     | GPIO[35] | U   | 4       | I/O | I <sup>2</sup> C serial data line.<br>Duplicate on GPIO[71]  |
| 26           | iic_scl     | GPIO[70] |     | 8       | I/O | I <sup>2</sup> C serial clock line.<br>Primary on GPIO[34]   |
| 24           | iic_sda     | GPIO[71] |     | 8       | I/O | I <sup>2</sup> C serial data line.<br>Primary on GPIO[35]    |

## USB interface

### USB host

The USB Host consists of a USB Host controller that conforms to the Open Host Controller Interface (OHCI) specification and a wrapper to interface the module to the rest of the system. The USB Host

interfaces to the internal USB PHY provided by the NS9360, and is connected to an *optional* hub on the module.)

## USB device

The USB Device module provides a USB 2.0-compliant interface for both full-speed (12Mbps) and low-speed (1.5 Mbps) operation. The module supports one bidirectional endpoint and up to 10 unidirectional endpoints that can be individually programmed for endpoint type (interrupt, bulk, or isochronous) and direction. Each endpoint is assigned to a DMA channel in a multi-channel BBus DMA controller. The USB Device module interfaces to either the internal NS9360 USB PHY or an external USB PHY using GPIO.

## Support

Both USB Host and Device can be supported at the same time:

- USB Device, in this case, must use the only the signals shown in the table in the section [USB Device only](#).
- USB Host can be on the module or external to the module. If USB Host is external to the module, use only the signals shown in the table in the section [No USB on module](#).

---

**Note** All output drivers for USB meet the standard USB driver specifications.

---

## USB Host with hub on module

- Connect up to two ports using the dual USB connector, P6.
- All hub signals out to the SO-DIMM edge connector, P3, are reserved for future use.

## No USB on module

- USB data lines are brought out on DM1 and DP1.
  - Terminate DM1 and DP1 with 15K pulldowns, if not used.
- OVR1# and PON1# are multiplexed with GPIO16 and GPIO17.
- Can be used as Host or Device (USB PHY is internal)

| SO-DIMM pin # | Signal name    | I/O | Description |
|---------------|----------------|-----|-------------|
| 135           | DM1            | I/O | USB data -  |
| 136           | DP1            | I/O | USB data+   |
| 109           | OVRH# / gpio16 | I   | Overcurrent |
| 111           | PONH# / gpio17 | O   | Power-on    |

## USB Device only

The USB Device interface only requires an external PHY. The USB signals are multiplexed with GPIOs. On the Digi development board, these functions are lost:

- Serial Port D: TXDD, RXDD, RTSD#, AND CTSD# on GPIO[44], GPIO[45], GPIO[46], and GPIO[47]
- Serial Port C: RTSC# and CTSC# on GPIO[42] and GPIO[43]
- User LED3 and LED4 on GPIO[48] and GPIO[49]

| SO-DIMM pin | Signal name      | I/O | Description                   |
|-------------|------------------|-----|-------------------------------|
| 48          | DATA- / GPIO[43] | I/O | USB VM                        |
| 52          | DATA+ / GPIO[42] | I/O | USB VP                        |
| 47          | OE / GPIO[44]    | O   | USB OE                        |
| 45          | RCV / GPIO[45]   | I   | USB RCV                       |
| 43          | RXD+ / GPIO[46]  | I/O | USB RXP/EMUN                  |
| 41          | RXD- / GPIO[47]  | I   | USB RXM (unidirectional only) |
| 96          | SPD / GPIO[49]   | O   | USB SPD                       |
| 98          | SUSP / GPIO[48]  | O   | USB SUSP                      |

## Module reset

The module reset pin is on the module SO-DIMM connector, P3 — pin 105, signal RST#.

- Active low signal.
- An ADM811S voltage supervisor is provided to reset the ConnectCore 9C module at any time the power phases out. If +3.3V power supply dips below 2.93 volts, the ADM811S asserts and holds the reset signal.

The ADM811S asserts the hard reset signal, causing the entire system to go into reset. Manual reset input is wired to ADM811S from JTAG header P2.

- The minimum pulse width for reset signal is 10 $\mu$ s.

## Module / SO-DIMM signal characteristics

**Note** All signal directions are referenced as into or out of the ConnectCore 9C and Wi-9C modules.

### I/O class details

| I/O class | Class description | Minimum high-level input current source | Minimum low-level input current sink |
|-----------|-------------------|-----------------------------------------|--------------------------------------|
| Class 1   | Standard LVTTL    | 10 $\mu$ A                              | 10 $\mu$ A                           |

| I/O class | Class description                                          | Minimum high-level input current source | Minimum low-level input current sink |
|-----------|------------------------------------------------------------|-----------------------------------------|--------------------------------------|
| Class 2   | LVTTL + internal pullup                                    | 10 $\mu$ A                              | 210 $\mu$ A                          |
| Class 3   | LVTTL + internal pullup+2.4k external pulldown (strapping) | 840 $\mu$ A                             | 210 $\mu$ A                          |
| Class 4   | 3.3V LVC BUS HOLD LVTTL I/O                                | 75 $\mu$ A                              | 75 $\mu$ A                           |

## Signal characteristics

| Pin | Signal name | Internal U/D | OD (mA) | I/O | Description                    | I/O class | Notes / Bootstrapping (BS)                                        |
|-----|-------------|--------------|---------|-----|--------------------------------|-----------|-------------------------------------------------------------------|
| 1   | GND         |              |         |     |                                |           |                                                                   |
| 2   | GND         |              |         |     |                                |           |                                                                   |
| 3   | +3.3V       |              |         | I   |                                |           |                                                                   |
| 4   | +3.3V       |              |         | I   |                                |           |                                                                   |
| 5   | +3.3V       |              |         | I   |                                |           |                                                                   |
| 6   | +3.3V       |              |         | I   |                                |           |                                                                   |
| 7   | WAKEUP#     |              |         | I   | Wi-9C: Wakeup after sleep mode |           | Reserved<br>15K pull-up with a RC filter,<br>(330R & 10nF)        |
| 8   | UBUFFENR#   |              | 24      | O   | User buffer enable             |           | Holds user buffers off during powerup/down and until boot is done |
| 9   | DATA_0      |              | 12      | BI  | Data bus signal                | 4         | CSO Parallel Port, see Note 4                                     |
| 10  | DATA_1      |              | 12      | BI  | Data bus signal                | 4         | CSO parallel port, see Note 4                                     |
| 11  | DATA_2      |              | 12      | BI  | Data bus signal                | 4         | CSO parallel port, see Note 4                                     |
| 12  | DATA_3      |              | 12      | BI  | Data bus signal                | 4         | CSO parallel port, see Note 4                                     |
| 13  | DATA_4      |              | 12      | BI  | Data bus signal                | 4         | CSO parallel port, see Note 4                                     |
| 14  | DATA_5      |              | 12      | BI  | Data bus signal                | 4         | CSO parallel port, see Note 4                                     |

| Pin | Signal name    | Internal U/D | OD (mA) | I/O | Description        | I/O class | Notes / Bootstrapping (BS)           |
|-----|----------------|--------------|---------|-----|--------------------|-----------|--------------------------------------|
| 15  | DATA_6         |              | 12      | BI  | Data bus signal    | 4         | CSO parallel port, see Note 4        |
| 16  | DATA_7         |              | 12      | BI  | Data bus signal    | 4         | CSO parallel port, see Note 4        |
| 17  | ADDRESS_0      |              | 12      | O   | Address bus signal | 4         | CSO parallel port, see Note 4        |
| 18  | ADDRESS_1      |              | 12      | O   | Address bus signal | 4         | CSO parallel port, see Note 4        |
| 19  | GND            |              |         |     |                    |           |                                      |
| 20  | GND            |              |         |     |                    |           |                                      |
| 21  | ADDRESS_2      |              | 12      | O   | Address bus signal | 4         | CSO parallel port, see Note 4        |
| 22  | MFGI_GPIO [72] |              | 8       | I/O |                    | 1         | Reserved - 15K pull-up on the module |
| 23  | ADDRESS_3      |              | 12      | O   | Address bus signal | 4         | CSO parallel port, see Note 4        |
| 24  | GPIO[71]       |              | 8       | I/O |                    | 1         | 15K pull-up on the module (12C_SDA)  |
| 25  | ADDRESS_4      |              | 12      | O   | Address bus signal | 4         | CSO parallel port, see Note 4        |
| 26  | GPIO[70]       |              | 8       | I/O |                    | 1         | 15K pull-up on the module (12_SCL)   |
| 27  | ADDRESS_5      |              | 12      | O   | Address bus signal | 4         | CSO parallel port, see Note 4        |
| 28  | GPIO[69]       |              | 8       | I/O |                    | 1         | Add 10-15K pull-up if not used.      |
| 29  | GND            |              |         |     |                    |           |                                      |
| 30  | GND            |              |         |     |                    |           |                                      |
| 31  | GPIO[27]       | U            | 4       | I/O |                    | 2         |                                      |
| 32  | No connect     |              |         |     |                    |           |                                      |
| 33  | GPIO[26]       | U            | 4       | I/O |                    | 2         |                                      |
| 34  | MFGO_GPIO [67] |              | 8       | I/O |                    | 1         | Reserved - Green module LED          |
| 35  | GPIO[25]       | U            | 4       | I/O |                    | 2         |                                      |

| Pin | Signal name | Internal U/D | OD (mA) | I/O | Description | I/O class | Notes / Bootstrapping (BS)                                                  |
|-----|-------------|--------------|---------|-----|-------------|-----------|-----------------------------------------------------------------------------|
| 36  | GPIO[66]    |              | 8       | I/O |             | 1         | Reserved - yellow LED + Reset/FF                                            |
| 37  | GPIO[24]    | U            | 4       | I/O |             | 3         | BS: Chip select 1 MSB data width bootstrap select (Default=0, 16-bit width) |
| 38  | GPIO[23]    | U            | 4       | I/O |             | 2         |                                                                             |
| 39  | GND         |              |         |     |             |           |                                                                             |
| 40  | GND         |              |         |     |             |           |                                                                             |
| 41  | GPIO[47]    | U            | 2       | I/O |             | 2         |                                                                             |
| 42  | GPIO[22]    | U            | 4       | I/O |             | 2         |                                                                             |
| 43  | GPIO[46]    | U            | 2       | I/O |             | 2         |                                                                             |
| 44  | GPIO[21]    | U            | 4       | I/O |             | 2         |                                                                             |
| 45  | GPIO[45]    | U            | 2       | I/O |             | 2         |                                                                             |
| 46  | GPIO[20]    | U            | 8       | I/O |             | 3         | BS: Chip select 0 data width bootstrap select (Default=0, 16-bit width)     |
| 47  | GPIO[44]    | U            | 2       | I/O |             | 3         | BS: Endian mode (Default=0, Big if NOR; 1, Little NAND)                     |
| 48  | GPIO[43]    |              | 2       | I/O |             | 1         | Add 10-15K pull-up if not used                                              |
| 49  | GND         |              |         |     |             |           |                                                                             |
| 50  | GND         |              |         |     |             |           |                                                                             |
| 51  | GPIO[38]    | U            | 4       | I/O |             | 2         |                                                                             |
| 52  | GPIO[42]    |              | 2       | I/O |             | 1         | Add 10-15K pull-up if not used                                              |
| 53  | GPIO[36]    | U            | 4       | I/O |             | 2         |                                                                             |
| 54  | GPIO[41]    | U            | 4       | I/O |             | 2         |                                                                             |
| 55  | GPIO[34]    | U            | 4       | I/O |             | 2         |                                                                             |
| 56  | GPIO[40]    | U            | 4       | I/O |             | 2         |                                                                             |
| 57  | GPIO[32]    | U            | 4       | I/O |             | 2         |                                                                             |
| 58  | GPIO[39]    | U            | 4       | I/O |             | 2         |                                                                             |
| 59  | GND         |              |         |     |             |           |                                                                             |
| 60  | GND         |              |         |     |             |           |                                                                             |

| Pin | Signal name | Internal U/D | OD (mA) | I/O | Description | I/O class | Notes / Bootstrapping (BS)                |
|-----|-------------|--------------|---------|-----|-------------|-----------|-------------------------------------------|
| 61  | GND         |              |         |     |             |           |                                           |
| 62  | GND         |              |         |     |             |           |                                           |
| 63  | GPIO[30]    | U            | 4       | I/O |             | 2         |                                           |
| 64  | GPIO[37]    | U            | 4       | I/O |             | 2         |                                           |
| 65  | GPIO[28]    | U            | 4       | I/O |             | 2         |                                           |
| 66  | GPIO[35]    | U            | 4       | I/O |             | 2         |                                           |
| 67  | GPIO[15]    | U            | 2       | I/O |             | 2         |                                           |
| 68  | GPIO[33]    | U            | 4       | I/O |             | 2         |                                           |
| 69  | GPIO[14]    | U            | 2       | I/O |             | 2         |                                           |
| 70  | GPIO[31]    | U            | 4       | I/O |             | 2         |                                           |
| 71  | GND         |              |         |     |             |           |                                           |
| 72  | GND         |              |         |     |             |           |                                           |
| 73  | GPIO[13]    | U            | 2       | I/O |             | 2         |                                           |
| 74  | GPIO[29]    | U            | 2       | I/O |             | 2         |                                           |
| 75  | GPIO[12]    | U            | 2       | I/O |             | 3         | BS: PLL_ND[3] (Default=0, PLL multiplier) |
| 76  | GPIO[07]    | U            | 2       | I/O |             | 2         | Used on NAND modules until UBUFFENR# = 0  |
| 77  | GPIO[11]    | U            | 2       | I/O |             | 2         |                                           |
| 78  | GPIO[06]    | U            | 2       | I/O |             | 2         | Used on NAND modules until UBUFFENR# = 0  |
| 79  | GPIO[10]    | U            | 2       | I/O |             | 3         | BS: PLL_ND[2] (Default=0, PLL multiplier) |
| 80  | GPIO[05]    | U            | 2       | I/O |             | 2         |                                           |
| 81  | GND         |              |         |     |             |           |                                           |
| 82  | GND         |              |         |     |             |           |                                           |
| 83  | GPIO[09]    | U            | 2       | I/O |             | 2         |                                           |
| 84  | GPIO[04]    | U            | 2       | I/O |             | 2         | BS: PLL_ND[0] (Default=1, PLL multiplier) |
| 85  | GPIO[08]    | U            | 2       | I/O |             | 3         | BS: PLL_ND[1] (Default=0, PLL multiplier) |

| Pin | Signal name | Internal U/D | OD (mA) | I/O | Description           | I/O class | Notes / Bootstrapping (BS)                                                                       |
|-----|-------------|--------------|---------|-----|-----------------------|-----------|--------------------------------------------------------------------------------------------------|
| 86  | GPIO[03]    | U            | 2       | I/O |                       | 2         | Used on NAND modules until UBUFFENR# = 0                                                         |
| 87  | GPIO[19]    | U            | 4       | I/O |                       | 2         | BS: PLL_BYP (This pin must not be pulled to logic 0 during Boot)                                 |
| 88  | GPIO[02]    | U            | 2       | I/O |                       | 3         | BS: PLL_FS[1] (Default=1, PLL frequency divide by 2)                                             |
| 89  | GPIO[18]    | U            | 4       | I/O |                       | 2         |                                                                                                  |
| 90  | GPIO[01]    | U            | 2       | I/O |                       | 2         | Used on NAND modules until UBUFFENR# = 0                                                         |
| 91  | OE#         |              | 24      | O   | Output enable         |           | CSO parallel port, see Note 4                                                                    |
| 92  | GPIO[00]    | U            | 2       | I/O |                       | 3         | BS: PLL_FS[1] (Default=1, PLL frequency divide by 2)<br>Used on NAND modules until UBUFFENR# = 0 |
| 93  | GND         |              |         |     |                       |           |                                                                                                  |
| 94  | GND         |              |         |     |                       |           |                                                                                                  |
| 95  | WE#         |              | 24      | O   | Write enable          |           | CSO parallel port, see Note 4                                                                    |
| 96  | GPIO[49]    | U            | 2       | I/O |                       | 2         | BS: CS_POL (Chip select polarity, 0=Active high, 1=Active low)                                   |
| 97  | CS#         |              | 24      | O   | Chip select           |           | CSO parallel port, see Note 4                                                                    |
| 98  | GPIO[48]    | U            | 2       | I/O |                       | 2         |                                                                                                  |
| 99  | TXB+R       |              |         | I/O | Ethernet TX B+        |           | Remote if no Ethernet on module, see Note 5                                                      |
| 100 | TXA+R       |              |         | I/O | Ethernet TX A+        |           | Remote if no Ethernet on module, see Note 5                                                      |
| 101 | GND         |              |         |     |                       |           |                                                                                                  |
| 102 | GND         |              |         |     |                       |           |                                                                                                  |
| 103 | TXB-R       |              |         | I/O | Remote Ethernet TX B- |           | Remote if no ethernet on module, see Note 5                                                      |
| 104 | TXA-R       |              |         | I/O | Remote Ethernet TX A- |           | Remote if no Ethernet on module, see Note 5                                                      |
| 105 | MODRST#     |              |         | I   | Reset                 | 1         | 15K pull-up on module                                                                            |
| 106 | ACT_LED#    |              |         | I   | PHY activity LED      |           | Remote if no Ethernet on module, see Note 5                                                      |

| Pin | Signal name | Internal U/D | OD (mA) | I/O | Description        | I/O class | Notes / Bootstrapping (BS)                                                                         |
|-----|-------------|--------------|---------|-----|--------------------|-----------|----------------------------------------------------------------------------------------------------|
| 107 | BOOTMUXR#   |              |         | O   | Boot mux           |           | Reserved                                                                                           |
| 108 | LNK_LED     |              |         | I   | PHY link LED       |           | Remote if no Ethernet on module, see Note 5                                                        |
| 109 | GPIO[16]    | U            | 2       | I/O |                    | 2         | Remote USB Host OVR# if no USB on module, see Note 5                                               |
| 110 | ADDRESS_6   |              | 12      | O   | Address bus signal | 4         | CSO parallel port, see Note 4                                                                      |
| 111 | GPIO[17]    | U            | 2       | I/O |                    | 2         | BS: PLL_ND[4] (Default=1, PLL multiplier)<br>Remote USB Host BONH# if no USB on module, see Note 5 |
| 112 | ADDRESS_7   |              | 12      | O   | Address bus signal | 4         | CSO parallel port, see Note 4                                                                      |
| 113 | OVR3#       |              |         | I   | USB over-current 3 |           | Remote if Hub on module, see Note 5                                                                |
| 114 | OVR4#       |              |         | I   | USB over-current 4 |           | Remote if Hub on module, see Note 5                                                                |
| 115 | PON3#       |              | 4       | O   | USB power-on 3     |           | Remote if Hub on module, see Note 5                                                                |
| 116 | PON4#       |              | 4       | O   | USB power-on 4     |           | Remote if Hub on module, see Note 5                                                                |
| 117 | OVR1#       |              |         | I   | USB over-current 1 |           | Reserved                                                                                           |
| 118 | OVR2#       |              |         | I   | USB over-current 2 |           | Reserved                                                                                           |
| 119 | PON1#       |              | 4       | O   | USB power-on 1     |           | Reserved                                                                                           |
| 120 | PON2#       |              | 4       | O   | USB power-on 2     |           | Reserved                                                                                           |
| 121 | GND         |              |         |     |                    |           |                                                                                                    |
| 122 | GND         |              |         |     |                    |           |                                                                                                    |
| 123 | DM4         |              |         | I/O | USB data-4         |           | Remote if Hub on module, see Note 5                                                                |
| 124 | DP4         |              |         | I/O | USB data+4         |           | Remote if Hub on module, see Note 5                                                                |

| Pin | Signal name | Internal U/D | OD (mA) | I/O | Description | I/O class | Notes / Bootstrapping (BS)             |
|-----|-------------|--------------|---------|-----|-------------|-----------|----------------------------------------|
| 125 | GND         |              |         |     |             |           |                                        |
| 126 | GND         |              |         |     |             |           |                                        |
| 127 | DM3         |              |         | I/O | USB data-3  |           | Remote if Hub on module, see Note 5    |
| 128 | DP3         |              |         | I/O | USB data+3  |           | Remote if Hub on module, see Note 5    |
| 129 | GND         |              |         |     |             |           |                                        |
| 130 | GND         |              |         |     |             |           |                                        |
| 131 | DM2         |              |         | I/O | USB data-2  |           | Reserved                               |
| 132 | DP2         |              |         | I/O | USB data+2  |           | Reserved                               |
| 133 | GND         |              |         |     |             |           |                                        |
| 134 | GND         |              |         |     |             |           |                                        |
| 135 | DM1         |              |         | I/O | USB data-1  |           | Remote if no USB on module, see Note 5 |
| 136 | DP1         |              |         | I/O | USB data+1  |           | Remote if no USB on module, see Note 5 |
| 137 | GND         |              |         |     |             |           |                                        |
| 138 | GND         |              |         |     |             |           |                                        |
| 139 | +5V         |              |         | I   |             |           | Not required for modules without USB   |
| 140 | +5V         |              |         | I   |             |           | Not required for modules without USB   |
| 141 | +5V         |              |         | I   |             |           | Not required for modules without USB   |
| 142 | +5V         |              |         | I   |             |           | Not required for modules without USB   |
| 143 | GND         |              |         |     |             |           |                                        |
| 144 | GND         |              |         |     |             |           |                                        |

**Note 1:** For internal pullup calculations, see the *NS9360 Hardware Reference* (available through the Jump Start Kit).

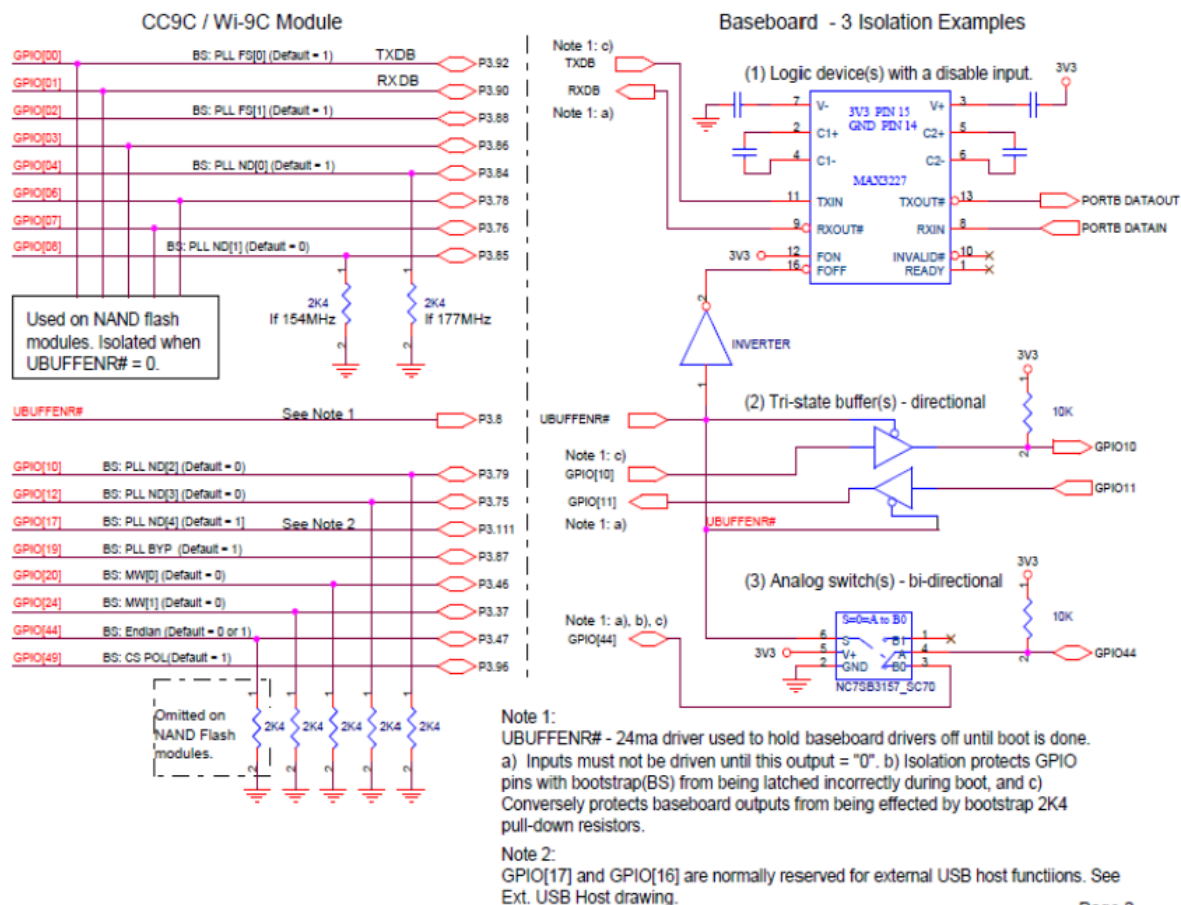
**Note 2:** All GPIOs, UBUFFENR#, MODRST#, and BOOTMUX# have 22ohms in series.

**Note 3:** GPIOs with internal pull-ups are indicated by a “U” and GPIOs with internal pull-downs are indicated by a “D” under the Internal U/D column .

**Note 4:** Detailed information about the DATA\_n, ADDRESS\_n, CS#, WE# ,and OE# signals is provided in the application note "CCX9C Parallel Peripheral Port App Note". Additional design information related to GPIO signals with BootStrap and special functions, external Ethernet connector, and external USB

is covered in the document "ConnectCore 9C/Wi-9C Baseboard Design Aid". Both documents are available in the corresponding product documentation section at [www.digi.com/support](http://www.digi.com/support).

**Note 5:** For GPIOs with BootStrap, Special function, external Ethernet connector and external USB connector(s) baseboard design examples, see the *cc9c\_wi-9c\_baseboard\_design\_aids* file on the Digi website under support, *ConnectCore 9C* or *ConnectCore Wi-9C* documentation.

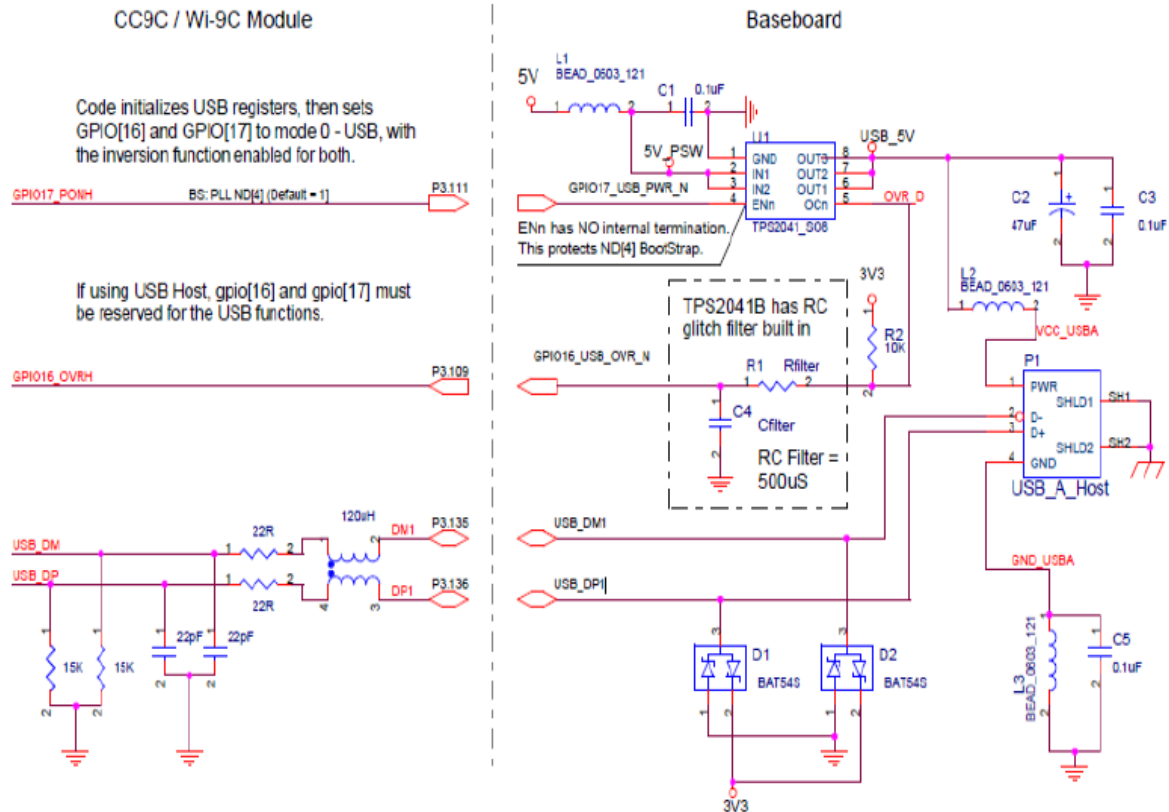


### BootStrap Isolation Considerations

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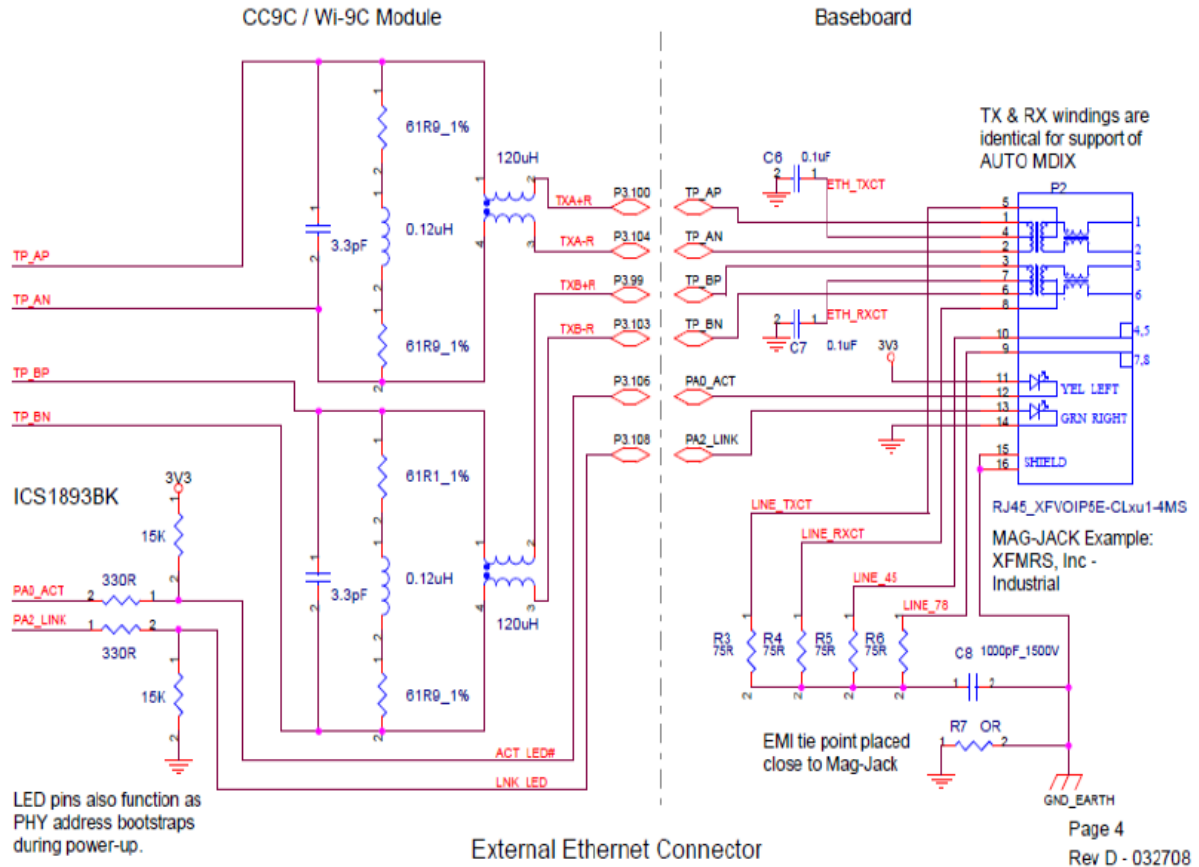
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**Note 6:** Earth GND and Signal GND are shorted to a solid GND plane on the molecule . If the baseboard design requires isolation, a module without USB and Ethernet connectors must be used. This module has the Ethernet PHY, but doesn't have the USB Hub. To not connect the mounting hole next to the POE connector to Earth GND. See Note 5 for a design aid file available on the Digi website.



External USB Host using DM1 &amp; DP1 (No HUB or USB on module)

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## Electrical characteristics

The ConnectCore 9C/Wi-9C operates at a 3.3V with an additional 5V supply for USB device power.

### Absolute maximum ratings

Permanent device damage can occur if the absolute maximum ratings are ever exceeded.

| Parameter                                                                      | Symbol†    | Rating                | Unit |
|--------------------------------------------------------------------------------|------------|-----------------------|------|
| DC supply voltage                                                              | $V_{DDA}$  | -0.3 to +3.6          | V    |
| DC input voltage                                                               | $V_{INA}$  | -0.3 to $V_{DDA}+0.3$ | V    |
| DC output voltage                                                              | $V_{OUTA}$ | -0.3 to $V_{DDA}+0.3$ | V    |
| DC input current                                                               | $I_{IN}$   | ±10                   | mA   |
| Storage temperature                                                            | $T_{STG}$  | -40 to +125           | °C   |
| † $V_{DDA}$ , $V_{INA}$ , $V_{OUTA}$ : Ratings of I/O cells for 3.3V interface |            |                       |      |

## Recommended operating conditions

Recommended operating conditions specify voltage and temperature ranges over which a circuit's correct logic function is guaranteed. The specified DC electrical characteristics (see [DC electrical characteristics](#)) are satisfied over these ranges.

For operating temperatures, see [Environmental information](#).

| Parameter                             | Symbol | Rating         | Unit |
|---------------------------------------|--------|----------------|------|
| DC supply                             | +3.3V  | +3.0 to +3.6   | V    |
| USB DC supply (modules with USB only) | +5V    | +4.75 to +5.25 | V    |

## Power dissipation

The *typical power dissipation* for the ConnectCore 9C module is 1.6W.

The *typical power dissipation* for the ConnectCore Wi-9C module at 3.3V, is 2.75W. The *maximum* power dissipation is 3.25W at 3.46V, when the radio is continuously transmitting. Note that these values do not include USB power.

## DC electrical characteristics

DC characteristics specify the worst-case DC electrical performance of the I/O buffers that are guaranteed over the specified temperature range.

### Inputs

All electrical inputs are 3.3V interface.

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**Note**  $V_{SS} = 0V$  (GND)

---

| Sym       | Parameter                                                            | Condition                      | Value              |                  | Unit               |
|-----------|----------------------------------------------------------------------|--------------------------------|--------------------|------------------|--------------------|
| $V_{IH}$  | High-level input voltage:<br>LVTTTL level                            |                                | Min                | 2.0              | V                  |
| $V_{IL}$  | Low-level input voltage:<br>LVTTTL level                             |                                | Max                | 0.8              | V                  |
| $I_{IH}$  | High level input current (no pulldown)<br>Input buffer with pulldown | $V_{INA}=V_{DDA}$              | Min/Max<br>Min/Max | -10/10<br>10/200 | $\mu A$<br>$\mu A$ |
| $I_{IL}$  | Low-level input current (no pullup)<br>Input buffer with pullup      | $V_{INA}=V_{SS}$               | Min/Max<br>Min/Max | -10/10<br>10/200 | $\mu A$<br>$\mu A$ |
| $I_{OZ}$  | High-impedance leakage current                                       | $V_{OUTA}=V_{DDA}$ or $V_{SS}$ | Min/Max            | -10/10           | $\mu A$            |
| $I_{DDs}$ | Quiescent supply current                                             | $V_{INA}=V_{DDA}$ or $V_{SS}$  | Max                | TBD              |                    |

### Outputs

All electrical outputs are 3.3V interface.

| Sym             | Parameter                         | Value |                       | Unit |
|-----------------|-----------------------------------|-------|-----------------------|------|
| V <sub>OH</sub> | High-level output voltage (LVTTL) | Min   | V <sub>DDA</sub> -0.6 | V    |
| V <sub>OL</sub> | Low-level output voltage (LVTTL)  | Max   | 0.4                   | V    |

## USB internal PHY DC electrical inputs and outputs

The USB internal PHY DC electrical inputs and outputs are used only when there is no USB configuration on the module.

### USB internal PHY DC electrical inputs

| Symbol          | Parameter                      | Min | Max | Units | Notes |
|-----------------|--------------------------------|-----|-----|-------|-------|
| V <sub>IH</sub> | Input high level (driven)      | 2.0 |     | V     |       |
| V <sub>IZ</sub> | Input high level (floating)    | 2.7 | 3.6 | V     |       |
| V <sub>IL</sub> | Input low level                |     | 0.8 | V     |       |
| V <sub>DI</sub> | Differential input sensitivity | 0.2 |     | V     | 1     |
| V <sub>CM</sub> | Differential common mode range | 0.8 | 2.5 | V     | 2     |

#### Notes:

1. |(usb\_dp) – (usb\_dm)|
2. Includes V<sub>DI</sub> range.

### USB internal PHY DC electrical outputs

| Symbol           | Parameter                       | Min | Max | Units | Notes |
|------------------|---------------------------------|-----|-----|-------|-------|
| V <sub>OL</sub>  | Output low level                | 0.0 | 0.3 | V     | 1     |
| V <sub>OH</sub>  | Output high level               | 2.8 | 3.6 | V     | 2     |
| V <sub>CRS</sub> | Output signal crossover voltage | 1.3 | 2.0 | V     | 3     |

#### Notes:

1. Measured with R<sub>L</sub> of 1.425k ohm to 3.6V.
2. Measured with R<sub>L</sub> of 14.25k ohm to GND.
3. Excluding the first transition from the idle state.

## Antenna information

The ConnectCore Wi-9C module provides use of one of these antenna types:

- 2 dBi Dipole
- 5 dBi Dipole
- 2 dBi PCB mount

Be sure that your antenna choice complies with the regulatory requirements of your region. In North America, for example, you can operate only with antennas approved by Digi International Inc., or antennas matching the specifications of the Digi-approved antennas.

## Antenna specifications — 2 dBi Dipole

### Attributes

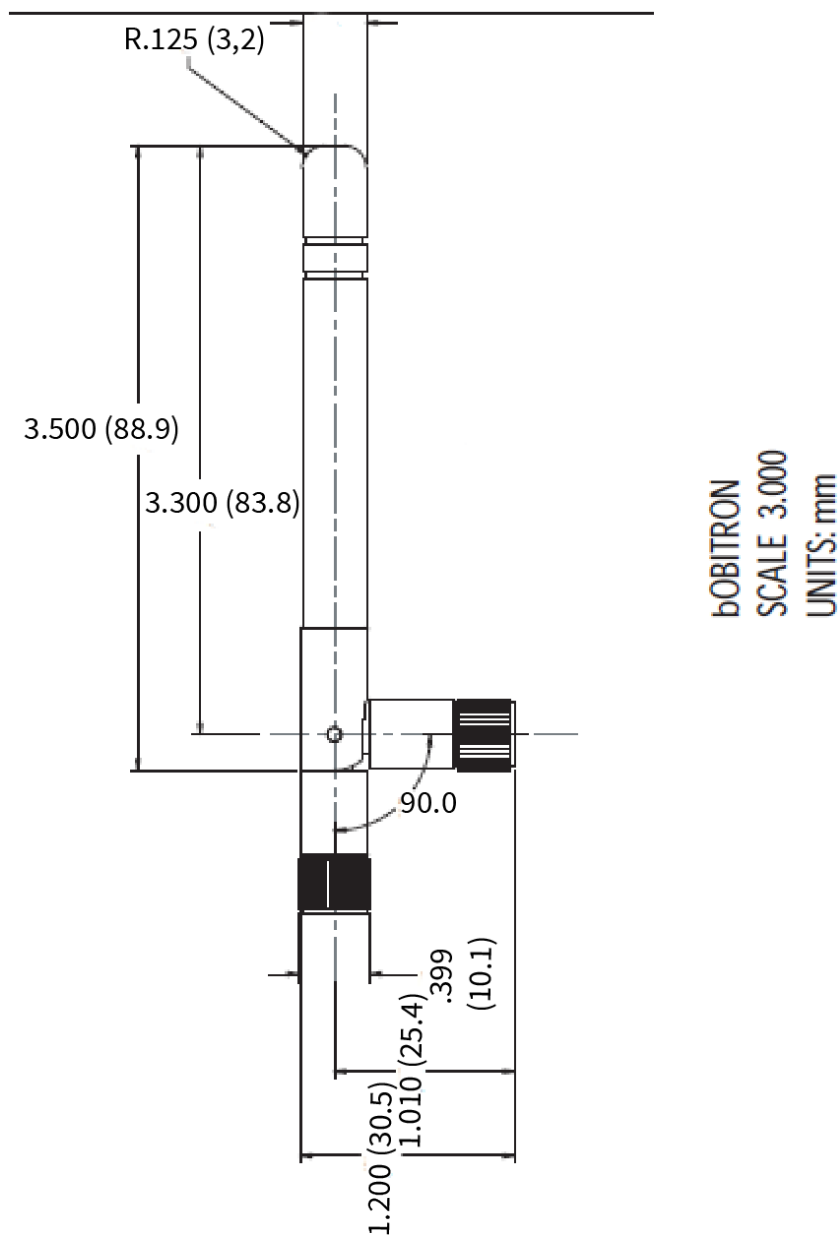
| Antenna Attribute  | 2 dBi Dipole       |
|--------------------|--------------------|
| Frequency          | 2.4 ~ 2.5GHz       |
| Power output       | 2W                 |
| DB gain            | 2 dBi              |
| VSWR               | < or = 2.0         |
| Dimension          | 108.5 mm x 10.0 mm |
| Weight             | 10.5g              |
| Connector          | RP-SMA             |
| Temperature rating | -40 – +80C         |
| Part number        | DC-ANT-20DP-BG     |

### Dimensions

---

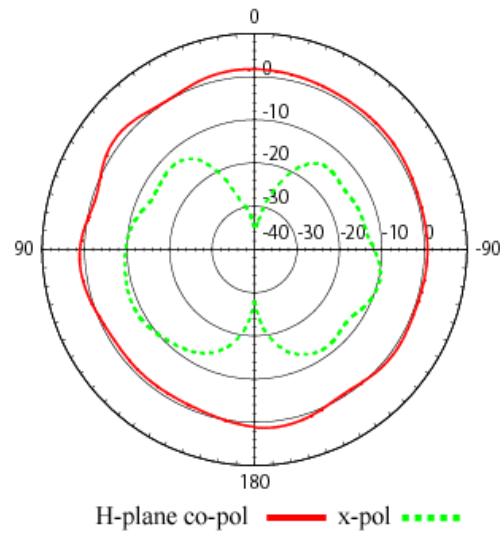
**Note** Dimensions are provided for reference purposes only. The actual antenna might vary.

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### Antenna strength (radiation pattern) diagram

This diagram shows the strength of the signal received by the whip antenna on both a horizontal and vertical plane. The diagram shows the magnetic field when the antenna is in a vertical position. The red solid line represents the horizontal plane and the green dotted line represents the vertical plane. You can see in the illustration that at 90 degrees, the signal strength is 0 (as expected).



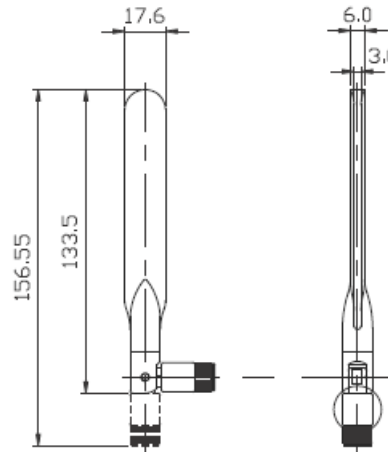
## Antenna specifications — 5 dBi Dipole

### Attributes

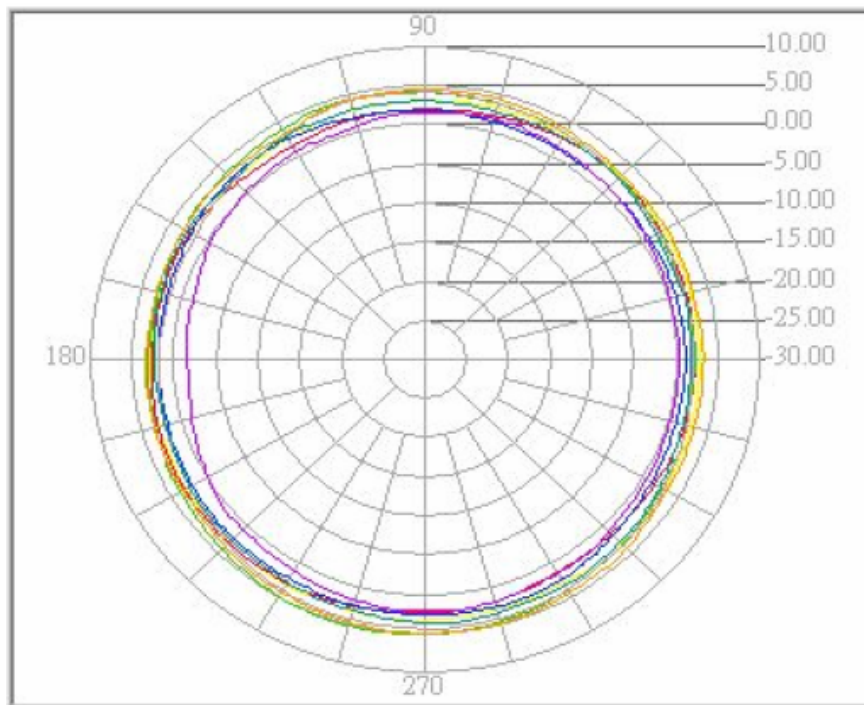
| Antenna Attribute  | Band 1                                              | Band 2                          |
|--------------------|-----------------------------------------------------|---------------------------------|
| Frequency          | 2.4 ~ 2.5GHz                                        | 5.15~5.35 GHz<br>5.725~5.85 GHz |
| Power output       | 1W                                                  |                                 |
| DB gain            | 5 dBi (typ)                                         |                                 |
| VSWR               | 2.0 max                                             |                                 |
| Dimension          | See the measurements in the drawing after the table |                                 |
| Weight             |                                                     |                                 |
| Connector          | RP-SMA                                              |                                 |
| Temperature rating | -50 – +80C                                          |                                 |
| Part number        | DG-ANT-55DP-AG                                      |                                 |

### Dimensions (in mm)

**Note** Dimensions are provided for reference purposes only. The actual antenna might vary.



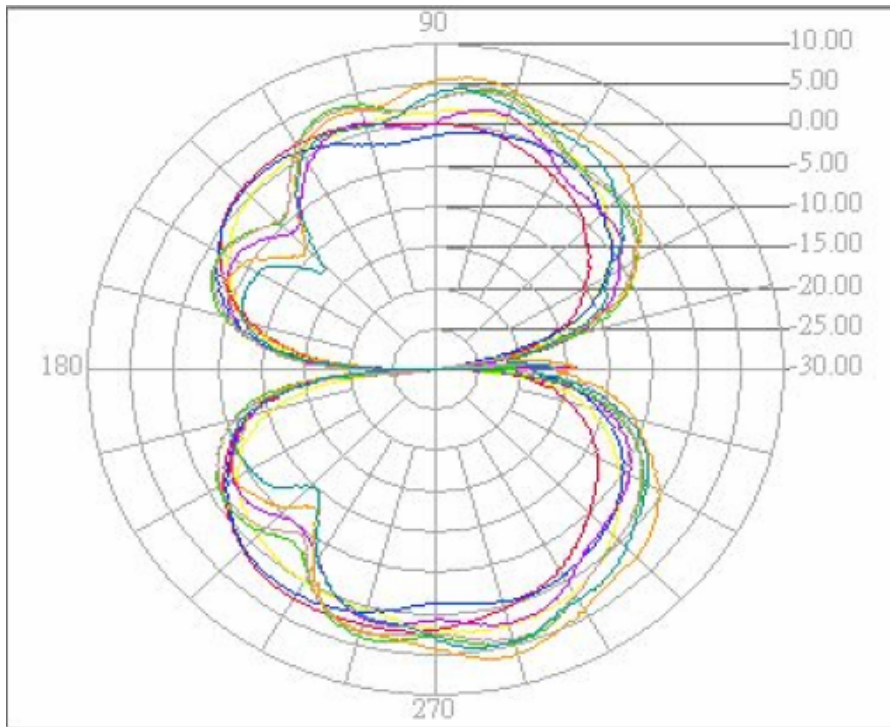
### Radiation pattern: H-Plane (2.0 and 5.0 GHz)



| Color  | Freq (MHz) | Peak (dBi) | Angle (o) | Avg (dBi) |
|--------|------------|------------|-----------|-----------|
| Yellow | 2400.0     | 3.39       | 257.68    | 2.98      |
| Red    | 2450.00    | 3.17       | 214.74    | 2.37      |
| Blue   | 2500.00    | 2.79       | 288.0     | 1.96      |
| Purple | 5150.00    | 2.25       | 280.42    | 0.82      |

| Color       | Freq (MHz) | Peak (dBi) | Angle (o) | Avg (dBi) |
|-------------|------------|------------|-----------|-----------|
| Green       | 5200.00    | 5.23       | 252.63    | 2.71      |
| Light brown | 5250.00    | 4.51       | 272.84    | 3.16      |
| Orange      | 5750.00    | 5.03       | 267.79    | 3.88      |
| Aqua        | 5850.00    | 3.83       | 276.63    | 2.74      |

### Radiation pattern: E-plane (2.0 and 5.0 GHz)



| Color       | Freq (MHz) | Peak (dBi) | Angle (o) | Avg (dBi) |
|-------------|------------|------------|-----------|-----------|
| Yellow      | 2400.0     | 2.60       | 283.22    | -1.10     |
| Red         | 2450.00    | 2.57       | 240.42    | -1.36     |
| Blue        | 2500.00    | 1.92       | 237.27    | -1.78     |
| Purple      | 5150.00    | 2.37       | 78.67     | -1.91     |
| Green       | 5200.00    | 4.80       | 79.30     | 0.32      |
| Light brown | 5250.00    | 4.49       | 79.93     | -0.01     |
| Orange      | 5750.00    | 6.34       | 283.85    | 1.08      |
| Aqua        | 5850.00    | 4.67       | 283.22    | -0.46     |

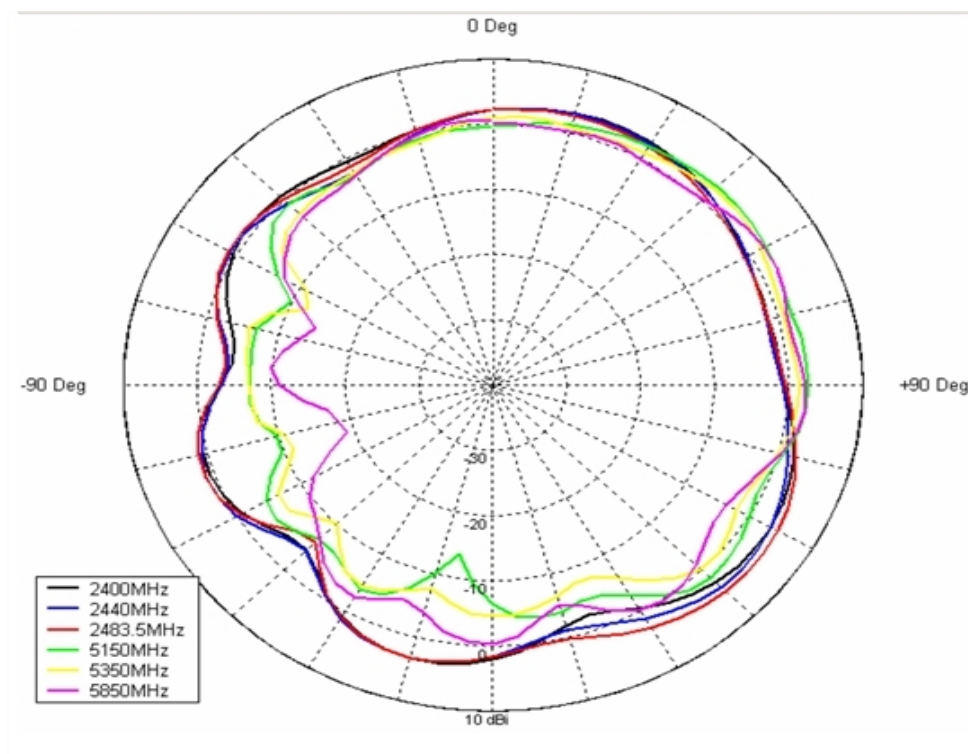
## Antenna specifications — 2 dBi PCB mount

The 2dBi PCB antenna is a surface-mount dual-band antenna.

### Attributes

| Antenna Attribute  | Band 1           | Band 2       |
|--------------------|------------------|--------------|
| Frequency          | 2.4 ~ 2.5GHz     | 4.9 ~ 5.9GHz |
| Power output       | 10W              |              |
| DB gain            | >2 dBi           |              |
| VSWR               | <2.5             |              |
| Dimension          | 24.13 x 10.67 mm |              |
| Weight             | <1g              |              |
| Connector          | U.FL             |              |
| Temperature rating | -40 – +85C       |              |
| Part number        | DG-ANT-20CG-AG   |              |

### Radiation patterns



| Color  | Frequency | Mean gain | Peak gain |
|--------|-----------|-----------|-----------|
| Black  | 2400      | 0.70      | 3.49      |
| Blue   | 2440      | 0.73      | 3.99      |
| Red    | 2484      | 1.04      | 4.76      |
| Green  | 5150      | -1.51     | 3.03      |
| Yellow | 5350      | -2.29     | 2.47      |
| Pink   | 5850      | -2.23     | 2.51      |
| n/a    | Average   | -0.85     | 2.02      |

## FCC RF radiation exposure statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. The antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter. End users must follow the specific operating instructions for satisfying RF exposure compliance. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

## Safety statements

### To avoid contact with electrical current:

- Never install electrical wiring during an electrical storm.
- Never install an Ethernet connection in wet locations unless that connector is specifically designed for wet locations.
- Use caution when installing or modifying Ethernet lines.
- Use a screwdriver and other tools with insulated handles.
- You and those around you should wear safety glasses or goggles.
- Do not place Ethernet wiring or connections in any conduit, outlet or junction box containing electrical wiring.
- Installation of inside wiring may bring you close to electrical wire, conduit, terminals and other electrical facilities. Extreme caution must be used to avoid electrical shock from such facilities. You must avoid contact with all such facilities.
- Ethernet wiring must be at least 6 feet from bare power wiring or lightning rods and associated wires, and at least 6 inches from other wire (antenna wires, doorbell wires, wires from transformers to neon signs), steam or hot water pipes, and heating ducts.
- Do not place an Ethernet connection where it would allow a person to use an Ethernet device while in a bathtub, shower, swimming pool, or similar hazardous location.
- Protectors and grounding wire placed by the service provider must not be connected to, removed, or modified by the customer.

- Do not touch uninsulated Ethernet wiring if lightning is likely!
- Do not touch or move the antenna(s) while the unit is transmitting or receiving.
- Do not hold any component containing a radio such that the antenna is very close to or touching any exposed parts of the body, especially the face or eyes, while transmitting.
- Do not operate a portable transmitter near unshielded blasting caps or in an explosive environment unless it is a type especially qualified for such use.

Any *external* communications wiring you may install needs to be constructed to all relevant electrical codes. In the United States this is the National Electrical Code Article 800. Contact a licensed electrician for details.

# Dimensions and PCB Layouts

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This section shows the dimensions of each module, as well as PCB (printed circuit board) layouts of each.

- Module dimensions ..... 115
- Overall view ..... 115
- Detailed views: Top ..... 116
- Detailed views: Side ..... 116
- Detailed views: End ..... 117
- Detailed views: Bottom ..... 117
- PCB layout ..... 118

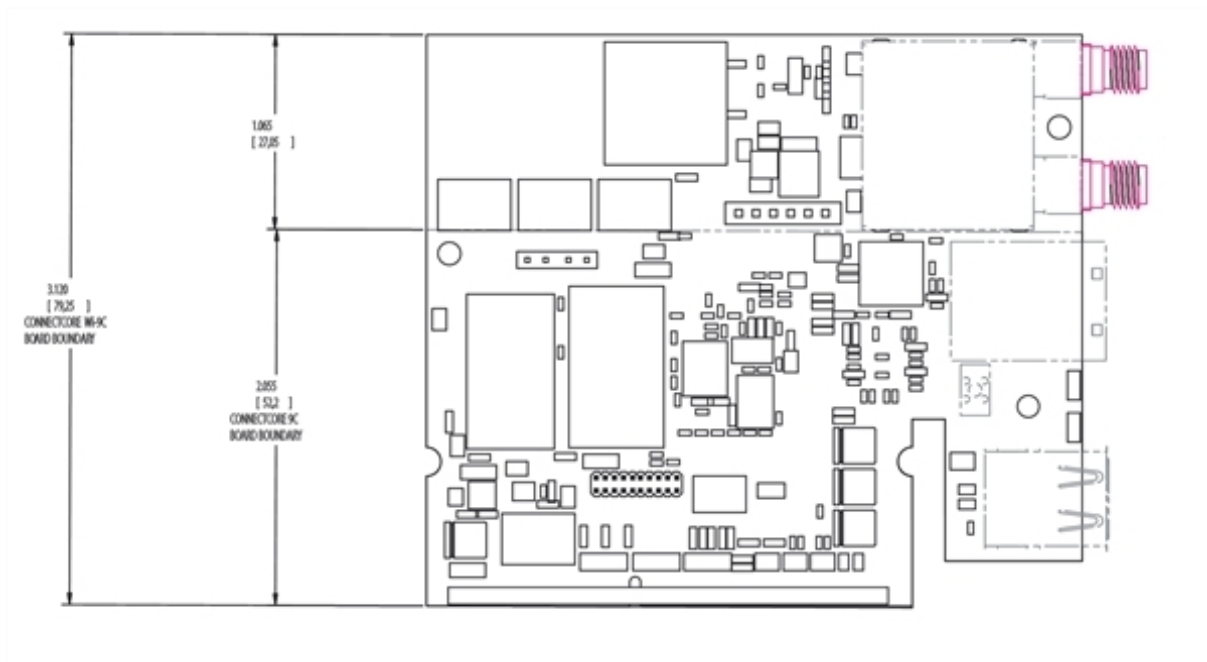
## Module dimensions

The next figures show the dimensions of the ConnectCore 9C/Wi-9C module. Dimensions are in inches and millimeters (millimeter size is in brackets [ ]).

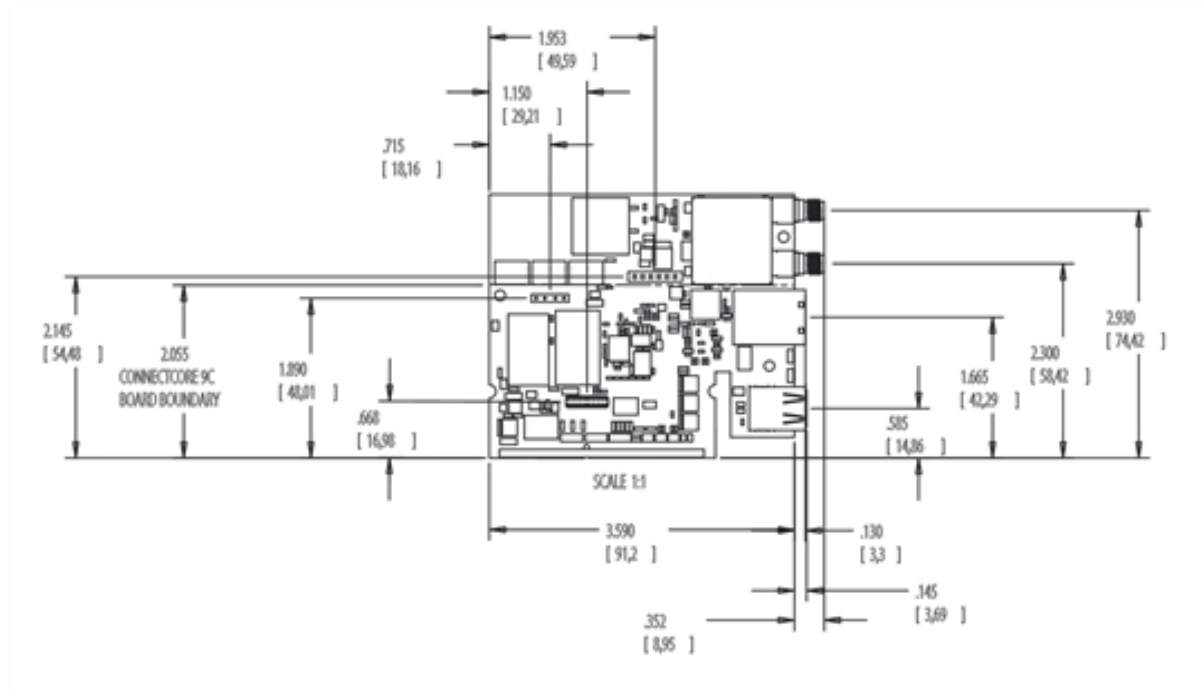
These are the tolerances for the drawings shown in this section:

| Measure | Tolerance       |
|---------|-----------------|
| .XX     | $\pm .02$       |
| .XXX    | $\pm .010$      |
| Angles  | $\pm 2$ degrees |

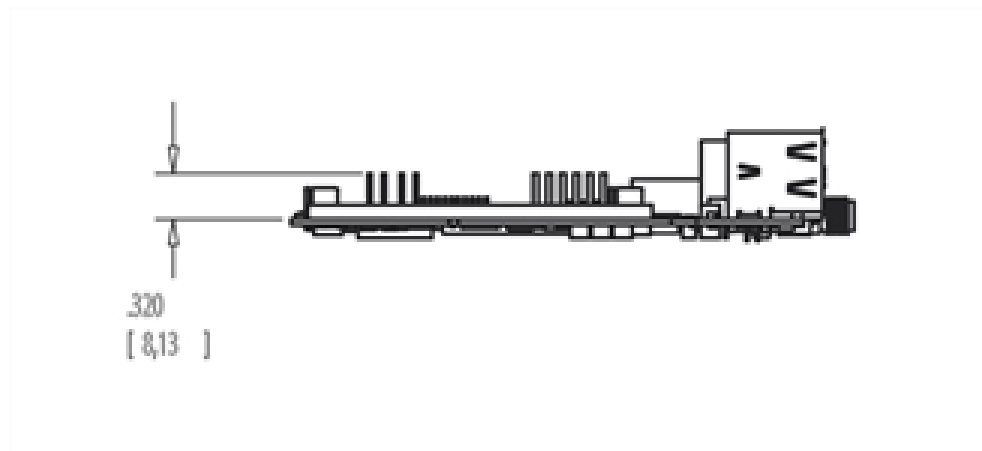
## Overall view



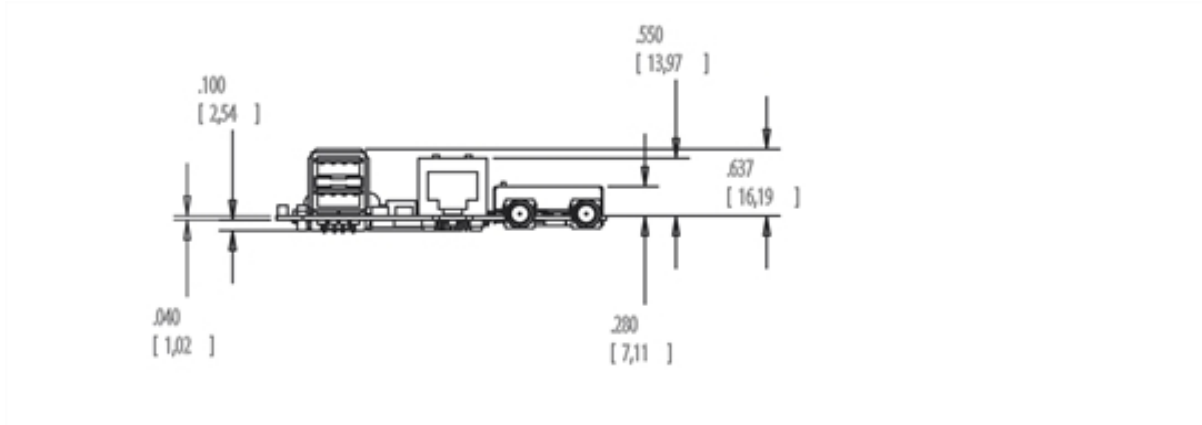
## Detailed views: Top



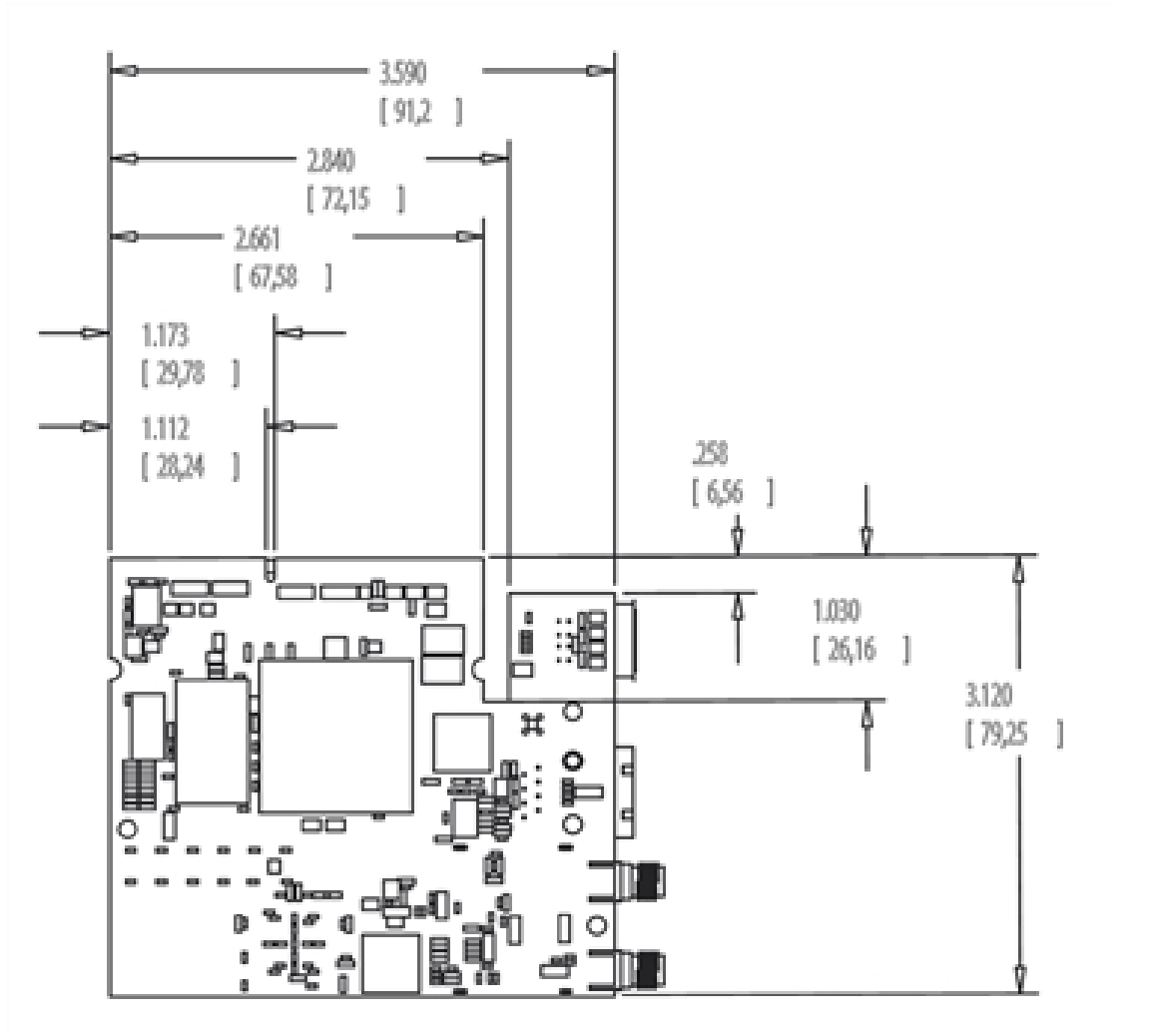
## Detailed views: Side



## Detailed views: End



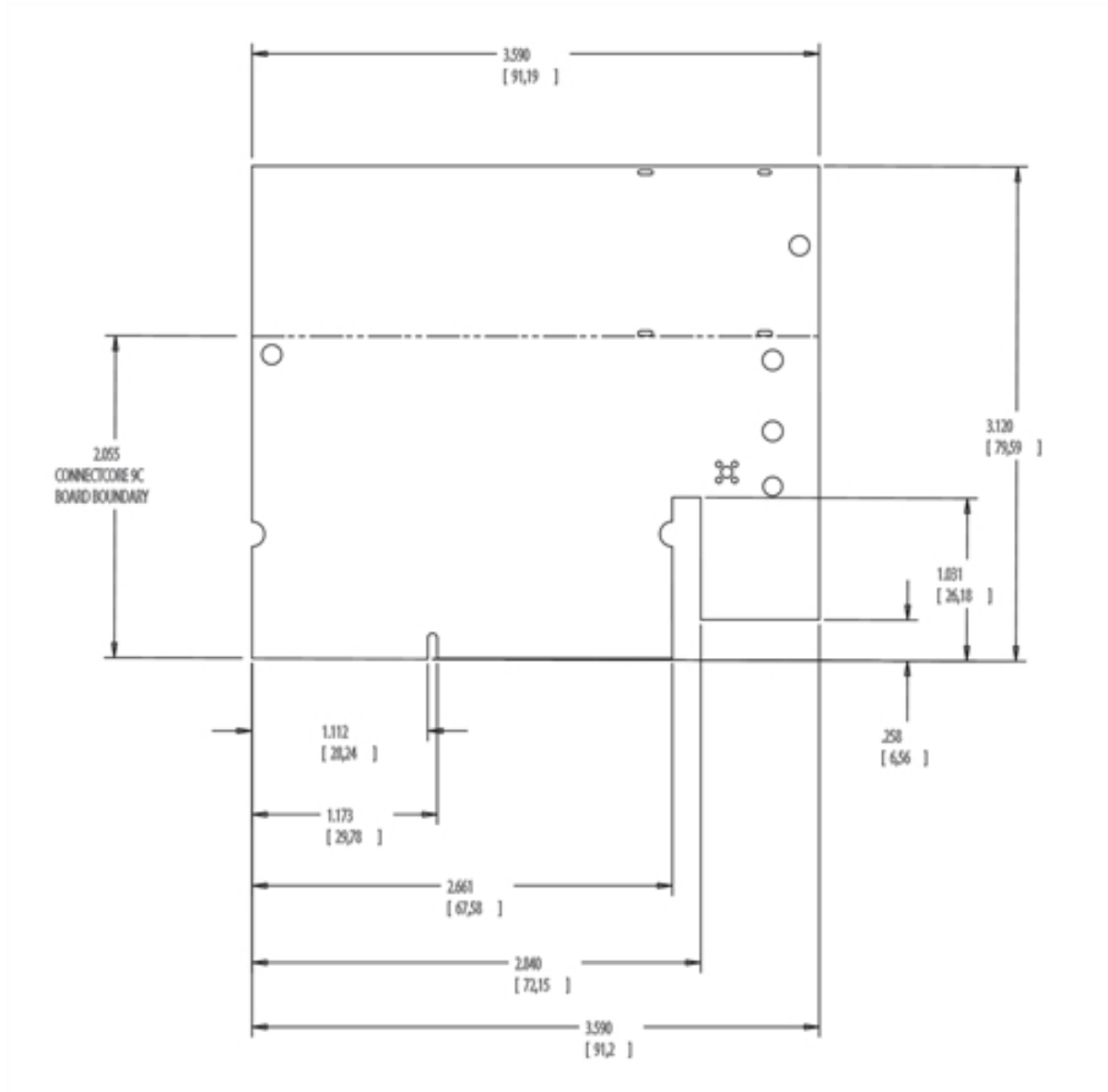
## Detailed views: Bottom



## PCB layout

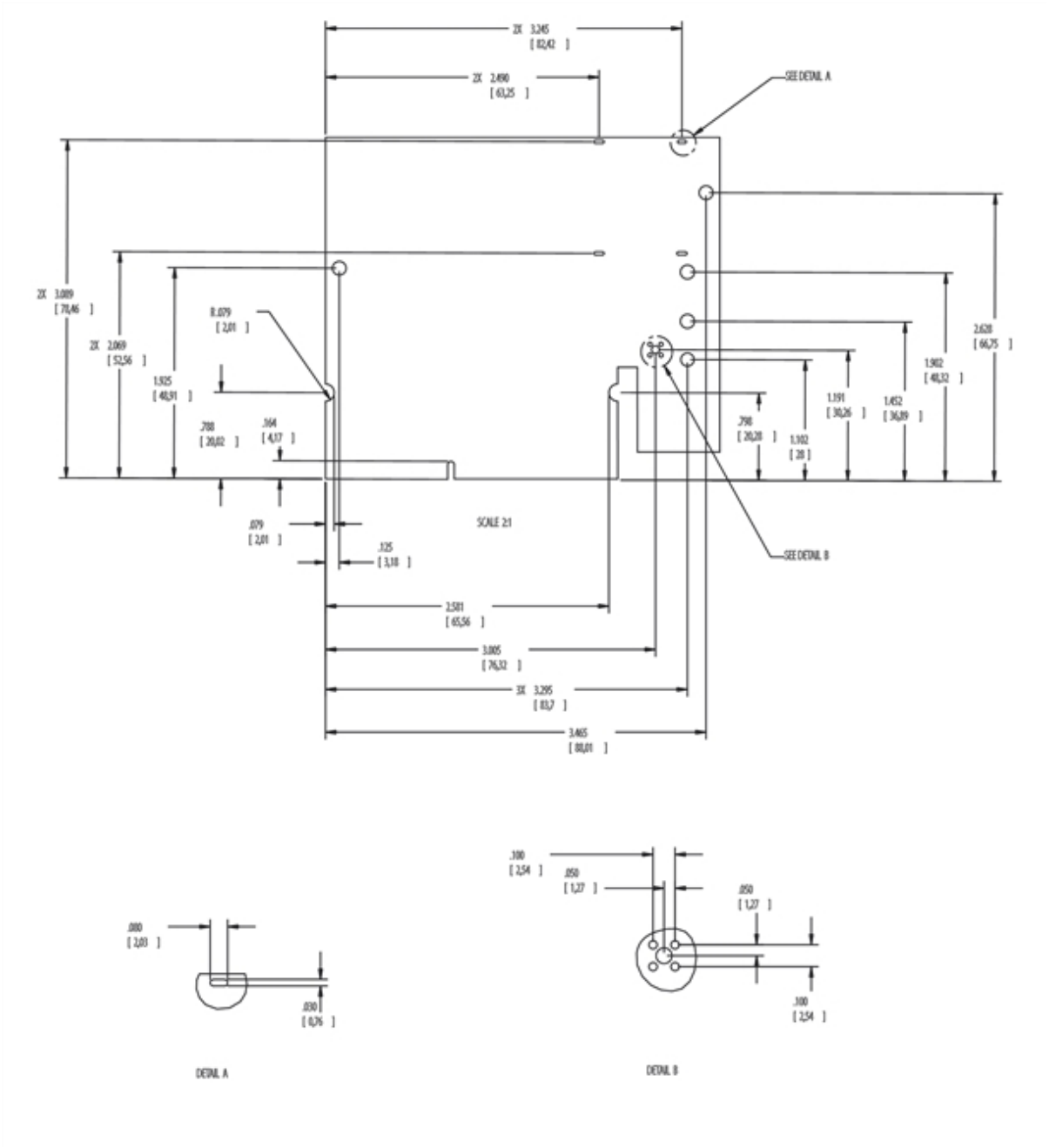
The next figures show the PCB layout of the ConnectCore 9C/Wi-9C module.

### Overall view



### View with detail

This figure shows the view with detail for the areas marked Detail A and Detail B.



## Regulatory information

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The ConnectCore 9C and ConnectCore Wi-9C products comply with the standards cited in this section.

### FCC regulatory information

The ConnectCore 9C and ConnectCore Wi-9C embedded modules have been tested and found to comply with the limits for Class B digital devices pursuant to Part 15 Subpart B, of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential environment. This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try and correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

### Labeling requirements (FCC 15.19)

This device complies with Part 15 of FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

If the FCC ID is not visible when installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module FCC ID. This exterior label can use wording such as the following: “Contains Transmitter Module FCC ID: MCQ-50M1355/ IC: 1846A-50M1355.”

### Modifications (FCC 15.21)

Changes or modifications to this equipment not expressly approved by Digi may void the user’s authority to operate this equipment.

## Declaration of Conformity (DoC)

Digi has issued Declarations of Conformity for the ConnectCore 9/Wi-9C concerning emissions, EMC, and safety. For more information, see [www.digi.com/resources/certifications](http://www.digi.com/resources/certifications).

### Important note

Digi customers assume full responsibility for learning and meeting the required guidelines for each country in their distribution market. Refer to the radio regulatory agency in the desired countries of operation for more information.

## CE mark (Europe)

The ConnectCore 9/Wi-9C is certified for use in several European countries. For information, visit [www.digi.com/resources/certifications](http://www.digi.com/resources/certifications).

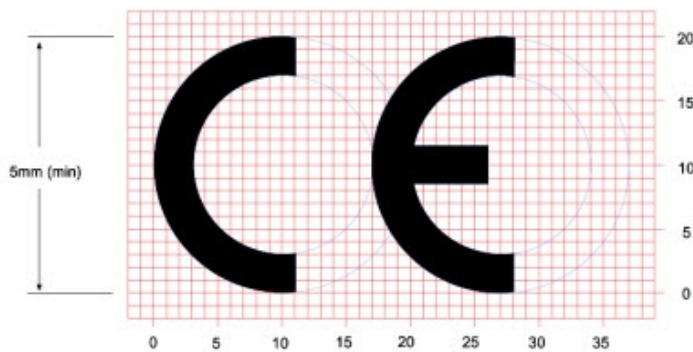
If the ConnectCore 9/Wi-9C is incorporated into a product, the manufacturer must ensure compliance of the final product with articles 3.1a and 3.1b of the RE Directive (Radio Equipment Directive). A Declaration of Conformity must be issued for each of these standards and kept on file as described in the RE Directive (Radio Equipment Directive).

Furthermore, the manufacturer must maintain a copy of the ConnectCore 9/Wi-9C user manual documentation and ensure the final product does not exceed the specified power ratings, antenna specifications, and/or installation requirements as specified in the user manual. If any of these specifications are exceeded in the final product, a submission must be made to a notified body for compliance testing to all required standards.

### OEM labeling requirements

The CE marking must be affixed to a visible location on the OEM product.

### CE labeling requirements



The CE mark shall consist of the initials “CE” taking the following form:

- If the CE marking is reduced or enlarged, the proportions given in the above graduated drawing must be respected.
- The CE marking must have a height of at least 5mm except where this is not possible on account of the nature of the apparatus.
- The CE marking must be affixed visibly, legibly, and indelibly.

## Industry Canada

This digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la class B prescrites dans le Règlement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.

## International EMC Standards

The ConnectCore 9C and ConnectCore Wi-9C meet the following standards:

| Standards        | ConnectCore 9C                                                                                                                                                                                     | ConnectCore Wi-9C                              |
|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|
| <b>Emissions</b> | AS/NZS 3548                                                                                                                                                                                        | AS/NZS 3548 CISPR 22                           |
|                  |                                                                                                                                                                                                    | FCC Part 15 Subpart C<br>(FCC ID: MCQ-50M1355) |
|                  |                                                                                                                                                                                                    | IC RSS 210 (IC:1846A-50M1355)                  |
| <b>Immunity</b>  | FCC Part 15 Subpart B<br>ICES-003<br>EN 55022<br>EN 61000-4-2<br>EN 61000-4-3<br>EN 61000-4-6<br>EN 301 489-3<br>EN 300 328<br>VCC1<br>EN 55024<br>UL 60950-1<br>CSA C22.2, No. 60950-1<br>EN60950 |                                                |
| <b>Safety</b>    |                                                                                                                                                                                                    |                                                |

## Maximum power and frequency specifications

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Maximum power: 91.62m W

Frequencies:

13 overlapping channels each 22 MHz wide and spaced at 5 MHz. Centered at 2.412 to 2.472 MHz.