**NetBurner, Inc.**

# Development Kit

## NANO54415
## Quick Start Guide

**Rev 1.3**

**Jan 2014**

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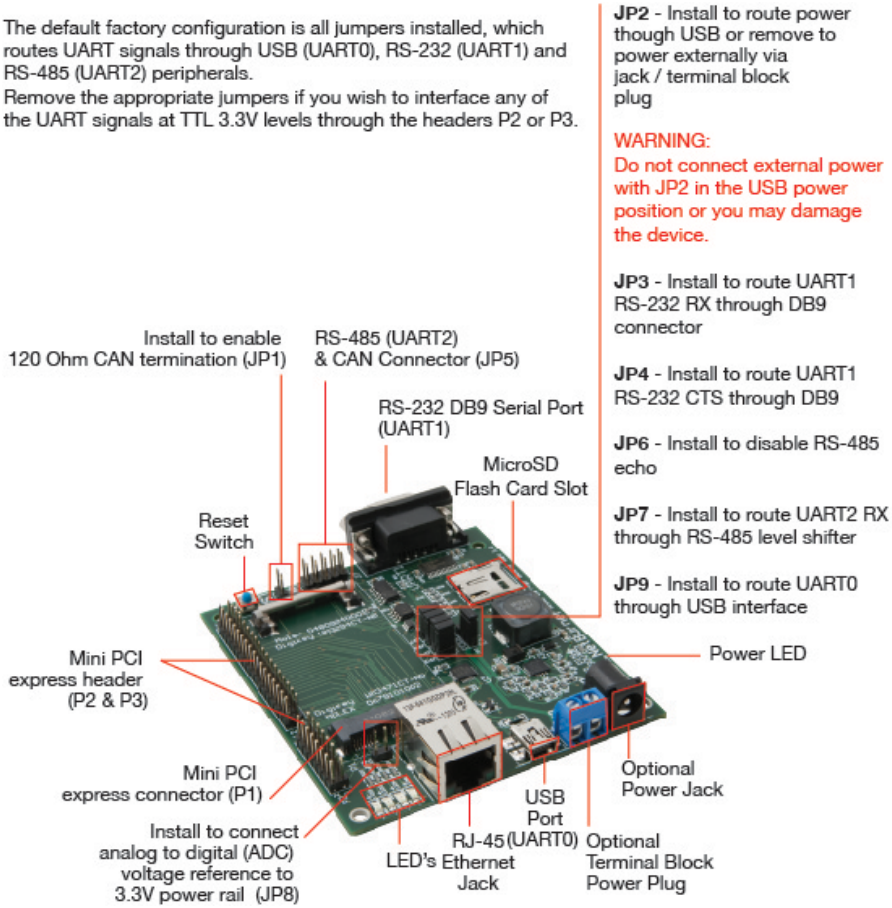
# Introduction

This development kit includes all the tools necessary to complete your embedded design, including a fully ANSI-compliant C/C++ compiler and linker (GCC), real-time operating system (RTOS), NBEclipse IDE with integrated debugger, and all the hardware and software components integrated in a complete and easy to use package.

# NANO-DEV-100 Carrier Board

- Power input can be routed through the USB connector or from the power jack (5-24 VDC) or terminal block.
- UART 0 can be routed through the USB connector
- UART 1 can be routed through the RS-232 DB9 connector
- UART 2 can be routed through the RS-485 5-pin header

**Figure 1. The NANO-DEV-100 carrier board with Core Module**



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# Overview

### Features

- 52-pin connector to interface for connection to NetBurner Module
- DB9, CAN, RS-485 port connectors
- RJ-45 Ethernet jack
- Switching power supply
- Reset button
- MicroSD Card flash memory slot with SDHC support
- RS-232 and RS-485 Level Translator
- USB connector (for serial data and power)
- Power via two position terminal block or barrel connector

### Kit Contents

- Quick start guide
- NANO54415-100IR Ethernet core module
- NANO-DEV-100CR carrier board with RS-232 and RS-485 level shifters and MMC/SD Card flash memory slot interface
- USB cable (for power and UART0 serial communication)
- Standard DB9 serial cable
- Standard Ethernet cable (blue)
- Jumpers
- Software and documentation via NNDK Red Card

# Software and Documentation

- NNDK Software and Documentation Installation File (setup.exe)
- NetBurner Eclipse Installation Notes (NBEclipse Installation Notes.pdf)
- Read Me (Readme.txt)
- Revision History (RevisionHistory.txt)

**The NNDK Installation (setup.exe)**

**Note: You must have Java 1.6 or later installed to run NBEclipse.**

The following software, utilities and tools installed on your computer once the NNDK setup process is completed.

- Eclipse IDE with Integrated Debugger
- AutoUpdate FLASH Update Tool
- IPSetup Configuration Tool
- MTTTY Serial Terminal Program
- Application Wizard
- Serial Update Tool
- TaskScan
- TFTP Server
- UDP Terminal
- WinAddr2Line

The TCP/IP stack, web server, RTOS, GNU C/C++ compiler and linker (fully ANSI compliant), command line tools and example source code will also be installed into the 'nburn' directory.

NetBurner also provides a royalty free license for SSL/SSH and SNMP for an additional charge. Please contact sales@netburner.com for more information on any of these options. For SSL/SSH, please visit the Embedded SSL & SSH Security Suite webpage: http://www.netburner.com/products/netburner-software/ssl-ssh-security-suite

For a full description of the software included in this kit, please see the Software and Protocols Datasheet: http://www.netburner.com/products/development-kit

### Download the Public NetBurner Software

Many of the tools and utilities can be downloaded from the NetBurner website. The software that is publically available is only for use on NetBurner devices.

- IPSetup Tool
- AutoUpdate Tool
- MTTTY Serial Terminal Application

NetBurner Public Software Downloads Webpage:
http://www.netburner.com/index.php/products/netburner-software/deployment-tools

No installation is necessary – simply download, unzip, and run the application executables.

## Kit Documentation and Online Resources

- EFFS Fat File System Guide
- EFFS Programmers Guide
- NB Eclipse Getting Started Guide
- NNDK Getting Started
- NNDK Programmers Guide
- Platform Hardware (Platform Reference and Schematics)
- Documentation Directory

To access the NNDK documentation go-to:
Windows Start Button > All Programs > NetBurner NNDK > (select desired document)

NOTE: Additional app notes, schematics, and pinouts can be found on the Core Module product webpage:

http://www.netburner.com/products/core-modules

**Documentation Directory**

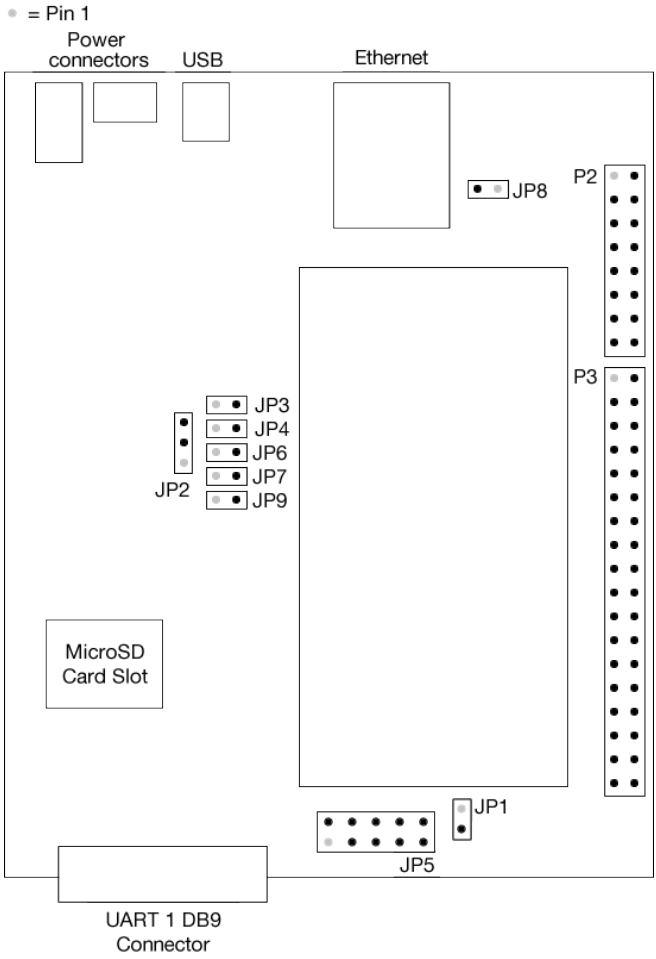
All primary documentation is located in the “docs” directory of your tools installation. The default location is C:\Nburn\docs. These documents include:

| Document Type | Description |
|---|---|
| NetBurner Eclipse IDE | Getting started guide with Installation instructions. This is required reading before using NBEclipse. |
| NetBurner Runtime Libraries & uC/OS Reference Manual | Library reference guide for network and non-network platforms and a library reference for uC/OS Real-time operating system. |
| EFFS Documentation | Embedded Flash File System programmers guide, implementation guide, and FAT file system implementation guide. |
| Freescale Manual | Detailed Freescale processor manuals for ColdFire microprocessors. |
| GNU Manuals | Manuals for GNU C/C++ libraries, compiler and linker. This includes the C/C++ language API functions. |
| NetBurner PC Tools and Utilities | Reference manual for NetBurner tools that run on the PC, such as IPSetup, AutoUpdate and MTTTY. |
| Platform Manuals for NetBurner Hardware | These are the NetBurner hardware manuals that include schematic information, memory maps and design guides. |

# Hardware Guide

The image below is a simplified layout diagram of the NANO-DEV-100 carrier board with the location of configuration jumpers, pin headers, and labeled component designations. This can be used as a visual aid when locating the correct jumpers for your desired configuration. Note that the light-colored dots designate pin 1.

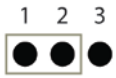
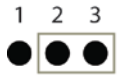
**Figure 2. Diagram of the NANO-DEV-100 carrier board**



## Power Supply

The NANO-DEV-100 carrier board is designed to be powered by a standard USB port (5 VDC minimum) or an external power supply providing 5 to 24 VDC (an optional AC adapter with 7.5 VDC output is also available).

**Table 1. Power Input Routing Options**

| Jumper | Description | Configuration |
|---|---|---|
| JP2 | Supply power via USB connector (default) |   |
| | Supply power via external power jack or terminal block plug |   |

## Reset Function

The reset button on the carrier board is labeled “RST”.

## USB Driver Installation

Before utilizing the UART 0 serial interface through the carrier board’s USB connector, the NetBurner USB-to-serial driver must be installed. This driver is automatically installed during the NNDK tools installation process.

# UART 0-2 Data Routing

The default setup for UART 0, 1, and 2 is USB connector, RS-232 DB9 connector, and RS-485 connector, respectively. If you would like to connect to the UARTs directly, they can be accessed through the Mini PCI express (P3) connector by configuring their respective jumpers.

**Table 2. UART 0 Data Routing Options**

| Jumper | Description | Configuration |
|---|---|---|
| JP9 | Route UART 0 data from USB connector (default) |   |
| | Route UART 0 data from Mini PCI express connector (P3) at TTL 3.3V levels |   |

**Table 3. UART 1 Data Routing Options**

| Jumper | Description | Configuration |
|---|---|---|
| JP3 | Route UART 1 RX data from RS-232 DB9 connector (default) |   |
| | Route UART 1 RX data from Mini PCI express connector (P3) at TTL 3.3V levels |   |
| JP4 | Route UART 1 CTS data from RS-232 DB9 connector (default) |   |
| | Route UART 1 CTS data from Mini PCI express connector (P3) at TTL 3.3V levels |   |

**Table 4. UART 2 Data Routing Options**

| Jumper | Description | Configuration |
|---|---|---|
| JP6 | UART 2 RS-485 disable echo (default) |   |
| | UART 2 RS-485 enable echo |   |
| JP7 | Route UART 2 RX data through RS-485 level shifter (default) from RS-485 connector (JP5) |   |
| | Route UART 2 RX data from Mini PCI express connector (P3) at TTL 3.3V levels |   |

## Jumper Configurations

- UART 0 via USB (default):
  JP9 = Required for data
  JP2[1-2] = Required for power

- UART 0 via Mini PCI express connector (P3):
  JP9 = No jumper (enables TTL 3.3V level data)
  JP2[1-2 or 2-3] = Required for power

- UART 1 via RS-232 DB9 (default):
  JP3 = Required for UART 1 RX
  JP4 = Required for UART 1 CTS
  JP2[1-2 or 2-3] = Required for power

- UART 1 via Mini PCI express connector (P3):
  JP3 = No jumper (enables TTL 3.3V level data)
  JP4 = No jumper for UART 1 CTS
  JP2[1-2 or 2-3] = Required for power

- UART 2 via RS-485 5-pin header (JP5) (default)::
  JP6 = Optional to disable echo
  JP7 = Required for RS485 level shifter
  JP2[1-2 or 2-3] = Required for power

- UART 2 via Mini PCI express connector (P3):
  JP6 = Optional to disable echo
  JP7 = No jumper (enables TTL 3.3V level data)
  JP2[1-2 or 2-3] = Required for power

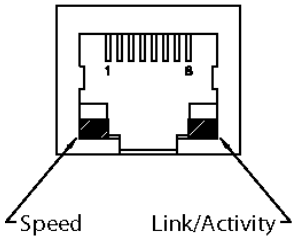
## Hardware Setup

- Connect the module to the carrier board with the 52-pin PCI express connector that is on the NANO-DEV-100 included in your development kit.

- The carrier board routes UART 0 signals from the module to the USB connector. With the factory application's default configuration, UART 0 is the serial debug monitor port [i.e., the stdio port to where printf() messages are sent], and UART 1 is the serial-to-Ethernet data port.

## Ethernet Connector

**Figure 3. RJ-45 Ethernet Connector**




- Speed LED: 10 Mbps (off), 100 Mbps (on)
- Link/Activity LED: Link (on), activity on link (blink)

# Downloading the NetBurner Software

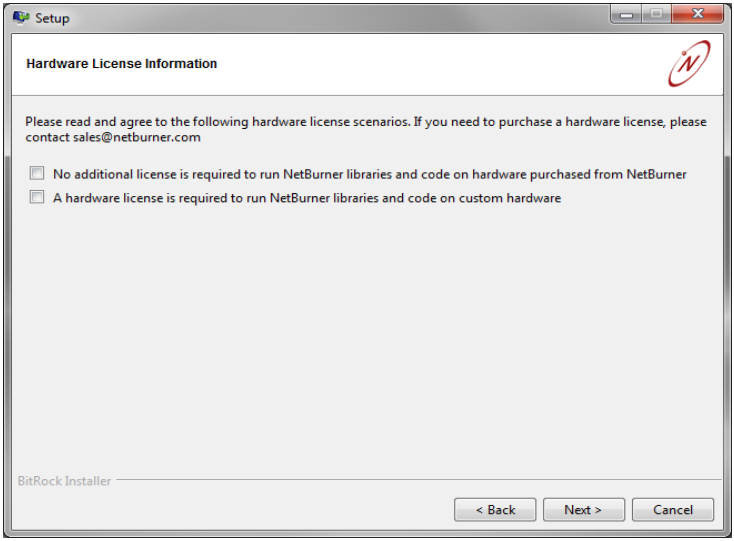
**Note: You must have Java 1.6 or later installed to run NBEclipse.**

Register a new NetBurner Support Account at support.netburner.com. The red card that came with your development kit contains the serial number you will need to create your support account and to install the software. Registering will enable you to download the latest NNDK software (you will need the serial number to unlock the NNDK software). After logging in to your support account, select Get Latest Tools.

Follow the on screen directions for each step, clicking the Next button when finished with each screen.

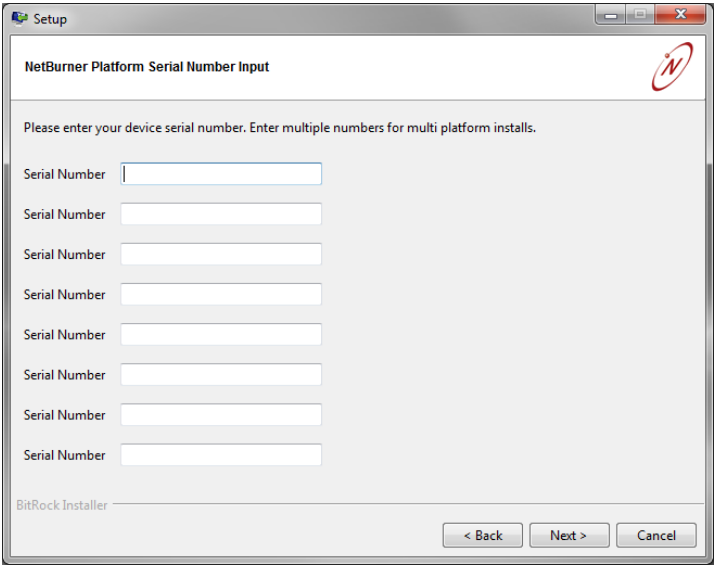
A License Quiz screen will appear with a pair of questions to clarify whether a license is required. A NetBurner license is only required if you intend to run NetBurner software on hardware that was not manufactured by NetBurner. Remember to click the Next button when finished with each screen.

**Figure 4. Installation Quiz Window**



When the “NetBurner Platform” screen appears, click in the text box, and type the Serial Number (located on your NNDK Red Card). Click the Next button when finished.

**Figure 5. Platform Installation Serial Number Window**




Continue to follow the on-screen directions until the installation process is finished. The NetBurner tools are now installed on your host computer.

## Obtaining an IP Address

To get your application up and running as quickly as possible, you must first have an IP Address for both your host computer and your Core Module. The NetBurner factory default program supports both Static and DHCP (Dynamic Host Configuration Protocol) assigned IP Addresses, along with an automatic AutoIP fallback. Note: The factory default is DHCP.

### Static IP Address

If you are part of an existing network that does not have a DHCP server or want to use a static IP address, then the IP address must be obtained from your network administrator. If you are connecting the kit to a single computer or if you are on an isolated network, then one of the reserved local IP addresses should be used.

### Dynamic IP Address (DHCP)

When the factory application with default settings starts on boot-up, it will first attempt to obtain an IP address from a DHCP server. If you are connected to a network with a DHCP server, the IP, subnet mask, and gateway addresses should be configured automatically.

### Auto IP

The factory default application also contains an Auto IP negotiation system. This allows the device to automatically configure its address in the absence of a central DHCP server, without the need to assign a static address. This scheme is utilized as a fallback that will automatically activate if neither of the previous methods is utilized. It should be noted that to communicate with a NetBurner device utilizing the Auto IP system, it is necessary that the host computer also be using it as well. This feature is utilized under the same circumstances in both Windows and OS X: if the host machine has no static address and there is no DHCP server, it will configure an IP address using Auto IP.

## The NetBurner AutoUpdate Utility

The NetBurner AutoUpdate utility tool is the fastest way to download an application to the core module. AutoUpdate can be run as a stand-alone Windows utility to update your code in the field.

AutoUpdate can be run from Windows (Start → All Programs → NetBurner NNDK → Auto Update Tool), the NBEclipse IDE, or from a command prompt. If the utility is run without options, then a dialog box will appear, requesting the target IP address of the module to be programmed and the location of the *_APP.s19 application image file that will be downloaded to the module (e.g., executing AutoUpdate from the Start menu). If it is run with options, then no user intervention is

required (e.g., using NBEclipse to program the module from a working project). There are various options that can be selected, but the complete functionality is as follows:

- Download the code image over Ethernet to the core module
- Program the code image into flash memory
- Reboot the core module

### Module Recovery

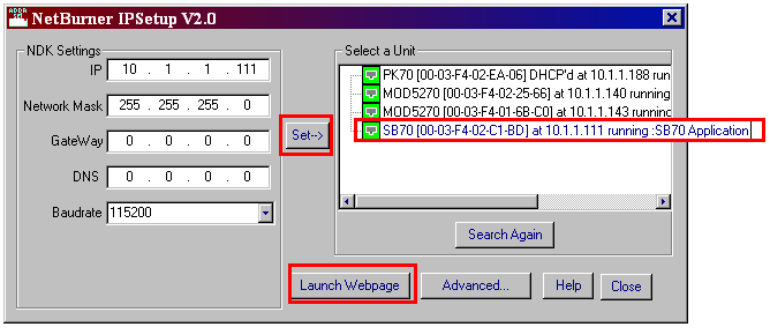
The Nano54415 is equipped with a secondary boot monitor that makes it virtually unbrickable. To boot using this recovery monitor, simply short the “Optional Hardware, Start Host in Test” jumper while powering on the device (the two gold pads near the notch in the connector). This recovery monitor will also provide sufficient network capability to obtain an IP address over DHCP and update the main application with AutoUpdate.

## Running the NetBurner Factory Program

1. If you have not already done so, connect the core module’s 52-pin header to the core module carrier board’s 52-pin header.
2. Power the module and carrier board by connecting the USB cable between the USB connector on the carrier board and an available USB port on the host computer (the carrier board’s jumper configuration uses USB for power and UART 0 serial communication by default).

3. Use the blue RJ-45 cable to connect your Core Module to an unused network jack or directly to your host computer.
4. Execute the IPSetup utility from the Windows Start menu: Start → All Programs → NetBurner NNDK → IP Setup Tool.
5. The IPSetup utility will automatically locate all NetBurner devices on your network. If more than one device appears, select the module by matching the MAC address in IPSetup that matches the MAC address label on the module.
6. If you are using a static IP address, enter your IP and subnet mask address in the corresponding IPSetup text boxes. For example, if you are on an isolated network, then the static IP address could be "10.1.1.111" and the subnet mask address could be "255.255.255.0". Note: Remember to click the "Set→" button in the IPSetup window to send and save the modifications to the targeted module. If you are using DHCP, then verify that the IP address and subnet mask have been set in the "Select a Unit" section. Selected devices with DHCP-assigned values will have "0.0.0.0" values in the "NDK Settings" section.
7. The module is now configured as shown below.
8. Click the "Launch Webpage" button in the IPSetup dialog box to view the NetBurner factory application web page using your default web browser.

**Figure 6. NetBurner IPSetup Application**



# Hardware Pin Guide

**NANO54415 Connector Pin-out**

There are is one 52-pin connector on the NANO54415 module. For additional signal information, please refer to the NANO54415-100IR datasheet.

**NANO-DEV-100CR Carrier Board Connector Pin-outs**

**RS-232 Serial Port for UART 1**
**Female DB9 Connector Pin-out**

| Pin | Signal | Pin | Signal |
|---|---|---|---|
| 1 | No Connect | 6 | Short to 4 |
| 2 | TX | 7 | CTS |
| 3 | RX | 8 | RTS |
| 4 | Short to 6 | 9 | No Connect |
| 5 | Ground | | |

**UART 2 RS-485 and CAN Male 10-pin Header Connector Pin-out**

| RS-485 | | CAN | |
|---|---|---|---|
| Pin | Signal | Pin | Signal |
| 1 | RX- (FD) | 2 | GND |
| 3 | RX+ (FD) | 4 | GND |
| 5 | Power | 6 | CANL |
| 7 | TX+ (FD/HD) | 8 | CANH |
| 9 | TX- (FD/HD) | 10 | GND |

Note: In the UART 2 RS-485 pin-out table above, pins 1, 3, 7, 9 are needed in an RS-485 full duplex configuration. In an RS-485 half duplex configuration, only pins 7 and 9 are used.

The P5-type power input jack is used with an optional AC power adapter (the center pin is positive). This can be used as an alternative to using USB or the screw terminal block as a power source.

# Troubleshooting Guide

If the NBEclipse IDE does not start or does not function properly, verify that you have installed Java 1.6 32-bit or later.

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- Hardware Design
- Firmware Design
- Software Applications in C, C++, and Java
- Turn-key add-on boards to your specifications
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