

NetBurner, Inc.

Development Kit

SB70LC Quick Start Guide

Rev 1.4

Feb 2014



Network Development Kit Quick Start Guide

Introduction

The SB70LC with NetBurner Network Development Kit (NNDK) 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.

SB70LC Carrier Board Features

- Power input can be routed from the USB connector (default) or external power jack (5-28 VDC) to the module and carrier board.
- UART 0 RS-232 can be routed to and from the USB connector (default) or the “UART0” DB9 connector.
- UART 1 can be used in RS-232 (via “UART1” DB9 connector) or RS-485 (via “J4” 5-pin header connector) mode.
- The DB9 serial port connectors have DTE pin-outs; a null-modem cable is not required.

Figure 1. The SB70LC-ADPT-100 adapter board

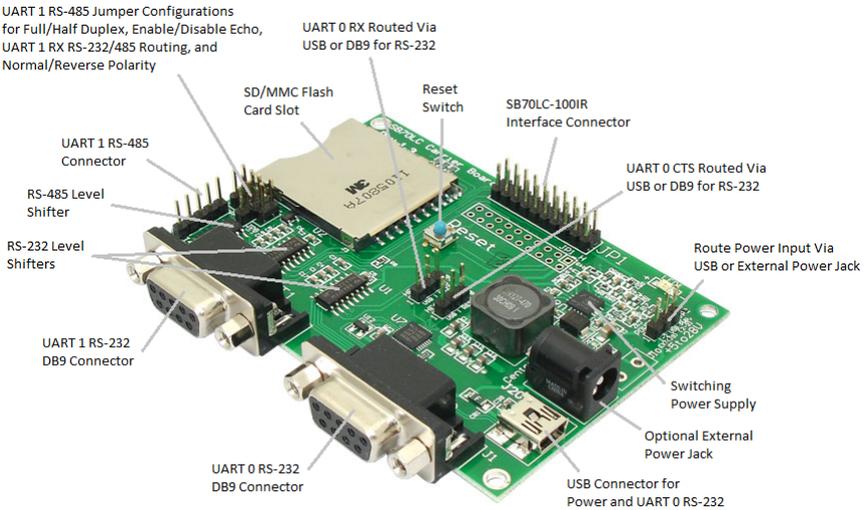


Table of Contents

Introduction	3
SB70LC Carrier Board Features	3
Figure 1. The SB70LC-ADPT-100 adapter board	3
Table of Contents	4
Overview	5
Features	5
Kit Contents	5
Software and Documentation	6
The NNDK Installation (setup.exe)	6
Download the Public NetBurner Software	7
Kit Documentation and Online Resources	7
Documentation Directory	8
Hardware Guide	9
Figure 2. Diagram of the SB70LC-ADPT-100 adapter board	9
Power Supply	10
Reset Source	10
USB Driver Installation	10
UART 0-1 Data Routing	10
Jumper Configurations	12
Hardware Setup	13
Downloading the NetBurner Software	14
Figure 4. Installation Quiz Window	14
Figure 5. Platform Installation Serial Number Window	15
Obtaining an IP Address	15
Static IP Address	16
Dynamic IP Address (DHCP)	16
Auto IP	16
The NetBurner AutoUpdate Utility	16
Running the NetBurner Factory Program	17
Figure 7. NetBurner IPSetup Application	18
Hardware Pin Guide	19
SB70LC-100/200IR JP1 Header Pin-out	19
Ethernet Connector	20
Carrier Board Connector Pin-outs	21
Troubleshooting Guide	22
Additional Services	23
Technical Support	23
Software Licensing	23
Life Support Disclaimer	24
Anti-Piracy Policy	24

Overview

Features

- 20-pin interface connectors for connection to NetBurner Serial-to-Ethernet module
- 2 DB9 connectors
- RJ-45 Ethernet jack (only on SB70LC-100IR module)
- Reset button
- SD/MMC and Secure Digital High-Capacity (SDHC) flash card connector
- Switching power supply
- RS-232 level translator
- USB connector (for serial data and power)
- Power via barrel connector

Kit Contents

- Quick start guide
- SB70LC-100IR Serial-to-Ethernet Module
- SB70LC-ADPT-100CR carrier board with RS-232 and RS-485 level shifters and MMC/SD Card flash memory slot interface
- USB Cable (for power and RS-232 serial communication)
- Standard 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

- 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 Serial to Ethernet product webpage:

<http://www.netburner.com/products/serial-to-ethernet>

Documentation Directory

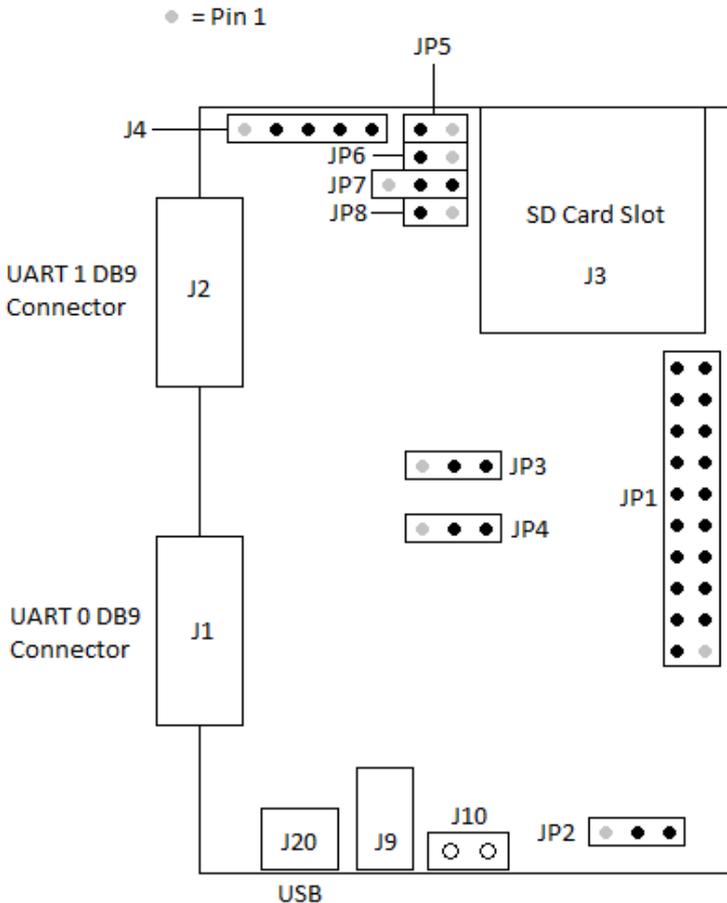
All primary documentation is located in the “docs” directory of your NNDK tools installation. The default location is C:\Nburn\docs. These documents include:

Document Type	Description
NBEclipse Getting Started Guide	Documentation on how to start using NBEclipse. This is required reading before using the integrated development environment (IDE).
NetBurner Runtime Libraries & uC/OS RTOS Library	Reference guides which list the function libraries available in NNDK, as well as for the uC/OS real-time operating system.
Freescale Manual	Detailed reference manual for the Freescale ColdFire microprocessor.
GNU Manuals	Manuals for GNU C/C++ libraries, compiler and linker. This includes the C/C++ language API functions.
NetBurner PC Tools Reference Guide	Reference manual for NetBurner tools that run on the PC, such as IPSetup, AutoUpdate, and MTTY.
Platform Reference and Carrier Board Schematic	NetBurner hardware manuals that include the memory map for the SB70LC module, schematic for the SB70LC-ADPT carrier board, and design guides.

Hardware Guide

The image below is a simplified layout diagram of the SB70LC-ADPT-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.

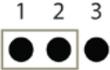
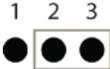
Figure 2. Diagram of the SB70LC-ADPT-100 adapter board



Power Supply

The SB70LC board is designed to be powered by a standard USB port (5 VDC minimum) or an external power supply providing 5 to 28 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 (J20, default)	
	Supply power via external power jack (J9)	

Reset Source

The reset button on the SB70LC carrier board is labeled “Reset”.

USB Driver Installation

Before utilizing the UART 0 RS-232 serial interface through the SB70LC carrier board’s USB (J20) connector, the NetBurner USB-to-serial driver must be installed. This driver is automatically installed during the NNDK tools installation process.

UART 0-1 Data Routing

UART 0 RS-232 can be routed through either the USB (J20) or DB9 (J1) connector by configuring the JP3 and JP4 jumpers. UART 1 can be configured to work in RS-232 mode [through the DB9 (J2) connector] or RS-485 mode [through the 5-pin header (J4) connector].

Table 2. UART 0 Data Routing Options

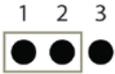
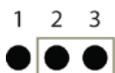
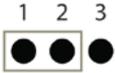
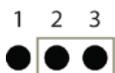
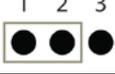
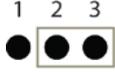
Jumper	Description	Configuration
JP3	Route UART 0 RX data from USB connector (J20, default)	
	Route UART 0 RX data from DB9 connector (J1)	
JP4	Route UART 0 CTS signal from USB connector (J20)	
	Route UART 0 CTS signal from DB9 connector (J1)	

Table 3. UART 1 Data Mode Options

Jumper	Description	Configuration
JP5	Normal polarity of UART 1 RS-485 +/- signals (default)	
	Reverse polarity of UART 1 RS-485 +/- signals	
JP6	UART 1 RS-485 full duplex mode (default)	
	UART 1 RS-485 half duplex mode	
JP7	Route UART 1 RX data from DB9 connector through RS-232 (J2, default)	
	Route UART 1 RX data from 5-pin header connector through RS-485 (J4)	

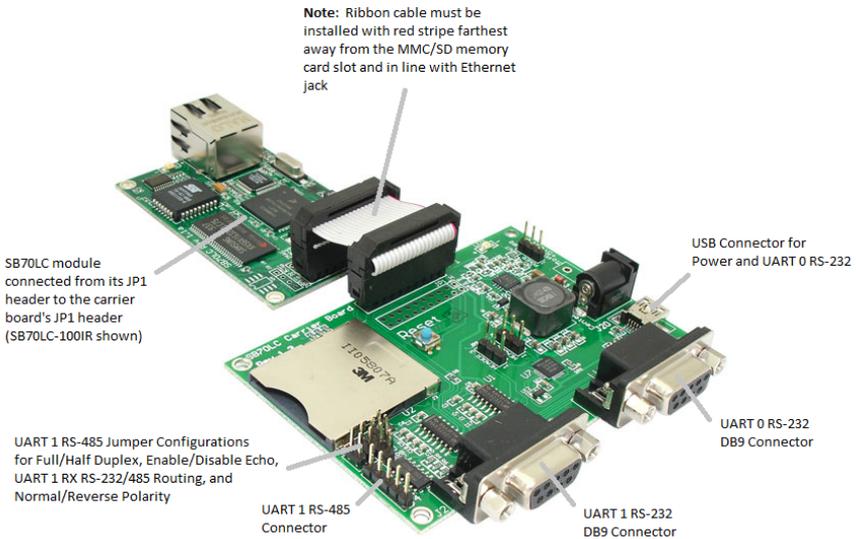
JP8	UART 1 RS-485 echo enabled (default, required for full duplex mode)	
	UART 1 RS-485 echo disabled	

Jumper Configurations

- UART 0 RS-232 via USB (J20):
 JP3[1-2] = Required for UART 0 RX
 JP4[1-2] = Optional for UART 0 CTS
- UART 0 RS-232 via DB9 (J1):
 JP3[2-3] = Required for UART 0 RX
 JP4[2-3] = Optional for UART 0 CTS
- UART 1 RS-232 via DB9 (J2):
 JP7[1-2] = Required for UART 1 RX
- UART 1 RS-485 full duplex via 5-pin header (J4):
 JP6 = No jumper (enables full duplex receiver)
 JP7[2-3] = Required for UART 1 RX
 JP8 = No jumper (enables echo)
- UART 1 RS-485 half duplex via 5-pin header (J4):
 JP6[1-2] = Enables half duplex receiver
 JP7[2-3] = Required for UART 1 RX
 JP8[1-2] = Disables echo

Hardware Setup

- Connect the SB70LC module to the carrier board with the short 20-pin ribbon cable that is included in your development kit. Note: The 10x2-pin header is labeled as “JP1” on both the SB70LC module and the carrier board.



- The carrier board routes both UART 0 and 1 signals from the SB70LC module to the two DB9 connectors via RS-232 level shifters. One or both ports can be connected to the host computer by using standard serial cables. Note: One standard serial cable is included in the development kit. 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.

Downloading the NetBurner Software

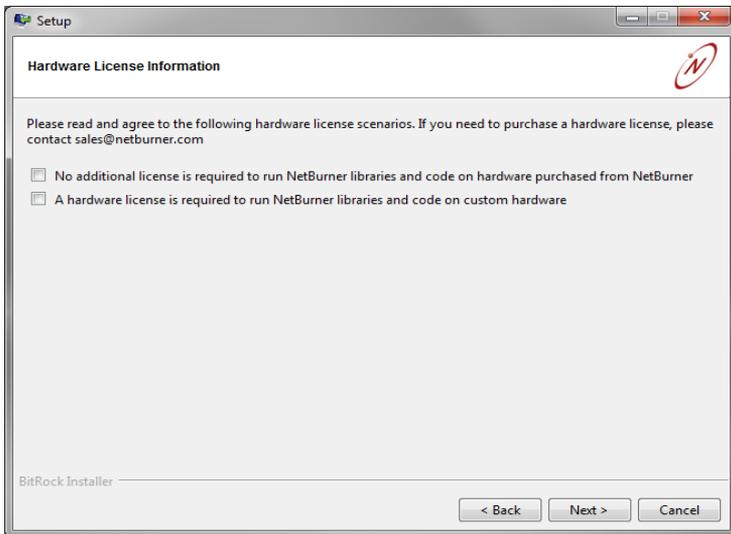
Note: You must have Java 1.6 or later installed to run NBEclipse.

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.

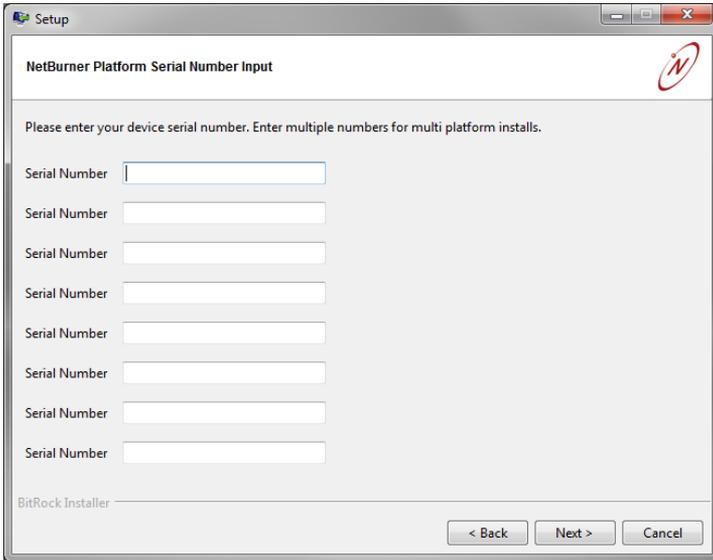
Figure 4. Installation Quiz Window



Network Development Kit Quick Start Guide

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, IP addresses must be assigned to both your host computer and the SB70LC module. The default NetBurner factory application in the SB70LC module supports both static and DHCP-assigned (dynamic host configuration protocol) IP addresses, along with an automatic AutoIP fallback. Note: The factory application is set to obtain an IP address from a DHCP server by default.

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 SB70LC 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 default factory 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 SB70LC 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 SB70LC module
- Program the code image into flash memory
- Reboot the SB70LC module

Running the NetBurner Factory Program

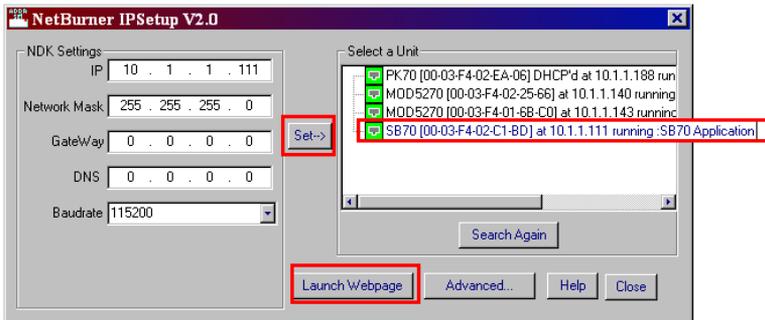
1. If you have not already done so, connect the SB70LC module's JP1 20-pin header to the SB70LC carrier board's JP1 20-pin header with the short 20-pin ribbon cable that is included in the development kit.
2. Power the SB70LC module and carrier board by connecting the USB cable between the USB connector on the carrier board and an available USB port on the host computer (the SB70LC carrier board's jumper configuration uses USB for power and UART 0 serial communication by default). If you are using an AC adapter instead of USB for power, then insert the P5-type male connector of the AC adapter power cord into the P5-type female receptacle on the carrier board, and plug the other end into an available electrical outlet. If you would prefer using an AC adapter power supply (optional) instead of USB power, then they are available at the NetBurner online store:
http://www.netburnerstore.com/product_p/nbpwr-075cr.htm
3. Use the blue RJ-45 cable to connect your Serial to Ethernet 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 SB70LC module by matching the MAC address in IPSetup that matches the MAC address label on the SB70LC 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

Network Development Kit Quick Start Guide

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 SB70LC 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 SB70LC 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 7. NetBurner IPSetup Application



Hardware Pin Guide

SB70LC-100/200IR JP1 Header Pin-out

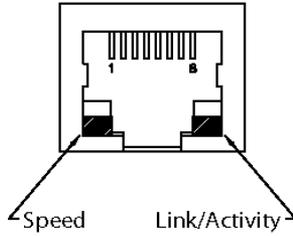
There are two 20-pin headers on the SB70LC module: one is populated with a 0.1-inch dual-row male header, and the other one is not populated. The unpopulated position has the same signals, and it is intended to be used for applications that may require the header on the non-component side of the board assembly. For additional signal information, please refer to the SB70LC-100IR datasheet.

JP1 Header Pin-out

Pin	Function	Alt. Func.	GPIO	Description
1	VCC3V	-	-	3.3 VDC Input Voltage
2	VCC3V	-	-	3.3 VDC Input Voltage
3	QSPI_CS0	-	PQSPI3	QSPI Chip Select 0
4	QSPI_DOUT	-	PQSPI0	QSPI Data Out
5	/U0RTS	-	PUARTL2	UART 0 Req. to Send
6	QSPI_DIN	I2C_SDA	PQSPI1	QSPI Data In
7	QSPI_SCK	I2C_SCL	PQSPI2	QSPI Clock
8	/U1CTS	/U2CTS	PUARTL7	UART 1 Clear to Send
9	/U1RTS	/U2RTS	PUARTL6	UART 1 Req. to Send
10	U0TXD	-	PUARTL1	UART 0 Transmit
11	U0RXD	-	PUARTL0	UART 0 Receive
12	U1TXD	-	PUARTL5	UART 1 Transmit
13	U1RXD	-	PUARTL4	UART 1 Receive
14	/U0CTS	-	PUARTL3	UART 0 Clear to Send
15	D3TIN	/U2CTS	PTIMER7	DMA Timer Input 3
16	I2C_SDA	-	PFECI2C0	I2C Serial Data
17	I2C_SCL	-	PFECI2C1	I2C Serial Clock
18	/RSTI	-	-	Reset Input
19	GND	-	-	Ground
20	GND	-	-	Ground

Note: In the table above, '/' characters that prefix certain function names designate active low signals. The function names are made to match those found in the Freescale MCF5271 Reference Manual.

Ethernet Connector



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

Carrier Board Connector Pin-outs

UART 0 RS-232 (J1) and UART 1 RS-232 (J2) 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 1 RS-485 (J4) Male 5-pin Header Connector Pin-out

Normal Polarity		Reverse Polarity	
Pin	Signal	Pin	Signal
1	RX+ (FD)	1	RX- (FD)
2	RX- (FD)	2	RX+ (FD)
3	TX- (FD/HD)	3	TX+ (FD/HD)
4	TX+ (FD/HD)	4	TX- (FD/HD)
5	Ground	5	Ground

Note: In the UART 1 RS-485 (J4) pin-out table above, pins 1-4 are needed in an RS-485 full duplex configuration. In an RS-485 half duplex configuration, only pins 3 and 4 are used.

The P5-type power input jack (J9) is used with an optional AC power adapter (the center pin is positive). This can be used as an alternative to using USB (J20) or the screw terminal (J10) 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.

“I cannot send serial data to my NetBurner device in MTTTY.”

Verify that the two 3-pin serial port configuration jumpers in the middle of the SB70LC carrier board are set to the connector you are using: “USB” (JP3[1-2] and JP4[1-2]) or “RS232” (JP3[2-3] and JP4[2-3]).

Additional Services

The NetBurner design team has extensive experience in developing network products, and also offers a full line of services from hourly consulting to complete turnkey systems. Please contact sales@netburner.com for more information on any of our services.

Our services include:

Hardware Design

Firmware Design

Software Applications in C, C++, and JAVA

Turnkey add-on boards to your specifications

Consulting on product design definition

Technical Support

Your NetBurner Network Evaluation Kit purchase includes 90 days of free email support and software updates. In order to submit technical support requests, you must register your NetBurner Network Evaluation Kit at support.netburner.com. Registration is quick and easy. The registration data stored on NetBurner's server will not be sold, exchanged, or knowingly released to third parties without prior written permission from the individuals affected.

Software Licensing

The Software included in your NetBurner Network Evaluation Kit is licensed to run only on NetBurner provided hardware. Please read the license.txt file located (by default) in your C:\Nburn\docs directory.

If your application involves manufacturing your own hardware, please contact sales@netburner.com for details on a royalty-free software license.

Life Support Disclaimer

NetBurner's products both hardware and software (including tools) are not authorized for use as critical components in life support s or systems, without the express written approval of NetBurner, Inc. prior to use. As used herein: (1) Life support s or systems are s or systems that (a) are intended for surgical implant into the body or (b) support or sustain life, and whose failure to perform, when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user. (2) A critical component is any component of a life support or system whose failure to perform can be reasonably expected to cause the failure of the life support or system, or to affect its safety or effectiveness.

Anti-Piracy Policy

NetBurner, Inc. vigorously protects its copyrights, trademarks, patents and other intellectual property rights.

In the United States and many other countries, copyright law provides for severe civil and criminal penalties for the unauthorized reproduction or distribution of copyrighted material. Copyrighted material includes, but is not limited to: computer programs and accompanying sounds, images and text.

Under U.S. law, infringement may result in civil damages of up to \$150,000, and/or criminal penalties of up to five years imprisonment, and/or a \$250,000 fine. In addition, NetBurner, Inc. may seek to recover its attorneys' fees.

NetBurner, Incorporated
5405 Morehouse Drive, Ste 200
San Diego, CA 92121
www.netburner.com

Network Development Kit Quick Start Guide

NetBurner License Agreement

Notice to Developer: This is a contract. By installing the NetBurner Tools, you accept all the terms and conditions of the “NetBurner Tools Software” and “NetBurner Embedded Software” Agreements. If you do not agree with the terms and conditions of these agreements, return this development kit and all components to NetBurner, Inc.

All embedded software and source code provided in this Network development kit is subject to one of four possible licenses: The NetBurner Tools License (most restrictive), The NetBurner Embedded Software License, The GNU Public License, and/or The Newlib License (least restrictive).

The GNU development executables provided in the C:\Nburn\GCC-M68k directory branch are subject to the GNU public license. This license can be found in C:\Nburn\docs\GNULicense.txt file.

The runtime libraries and include files provided in the C:\Nburn\GCC-M68k directory branch are subject to the Newlib license. This license can be found in C:\Nburn\docs\NewlibLicense.txt file.

The compcode application provided in the C:\Nburn\pctools\compcode directory is subject to the GNU public license. This license can be found in the C:\Nburn\docs\GNULicense.txt file.

The other programs in the Nburn\pctools directory are subject to the NetBurner Tools License provided below. A copy of this license can also be found in your C:\Nburn\docs directory.

All other provided source code and libraries are subject to the NetBurner Embedded Software License provided below. A copy of this license can also be found in your C:\Nburn\docs directory.

The NetBurner Tools Software License

Copyright 1998 - 2010 NetBurner, Inc., All Rights Reserved. Permission is hereby granted to purchasers of the NetBurner Network Development Kit to use these programs on one computer, and only to support the development of embedded applications that will run on NetBurner provided hardware. No other rights to use this program or its derivatives, in part or in whole, are granted. It may be possible to license this or other NetBurner software for use on non-NetBurner hardware. Please contact sales@netburner.com for more information. NetBurner makes no representation or warranties with respect to the performance of this computer program, and specifically disclaims any responsibility for any damages, special or consequential, connected with the use of this program.

The NetBurner Embedded Software License

Copyright 1998 – 2010, NetBurner, Inc., All Rights Reserved. Permission is hereby granted to purchasers of NetBurner hardware to use or modify this computer program for any use as long as the resultant program is only executed on NetBurner provided hardware. No other rights to use this program or its derivatives, in part or in whole, are granted. It may be possible to license this or other NetBurner software for use on non-NetBurner hardware. Please contact sales@netburner.com for more information. NetBurner makes no representation or warranties with respect to the performance of this computer program, and specifically disclaims any responsibility for any damages, special or consequential, connected with the use of this program.

