

Programming the On-Chip Flash on a phyCORE-XC161 phyCORE-XC167

Application Note

Edition July 2003

© PHYTEC Technologie Holding AG 2003

Europe: Support Hotline: +49 (6131) 9221-31 • <http://www.phytec.de>

North America: Support Hotline: + 1-800-278-9913 • <http://www.phytec.com>

LAN-020e_1

Preface	1
1 Installing Infineon MemTool	2
2 Preparing the Target Hardware	3
2.1 Modifying the phyCORE-XC16x	3
2.2 Interfacing the phyCORE-XC16x to a Host-PC	5
3 Downloading Example Code with MemTool	9
3.1 Starting MemTool	9
3.2 "Blinky_int"	12

Index of Figures

Figure 1: Location of the Jumpers (Controller Side), J3 in Position 2+3....	3
Figure 2: phyCORE-XC16x with J3 in Position 1+2	4
Figure 3: phyCORE Development Board HD200 2.5V Overview	5
Figure 4: Default Setting for the phyCORE Development Board HD200 2.5V.....	6
Figure 5: Power Connector	6

Preface

This Application Note describes how to download an executable hexfile to the phyCORE-XC16x on-chip Flash memory using Infineon's MemTool. The Blinky demo file and the Infineon MemTool used in this Application Note can be found on the PHYTEC Spectrum CD.

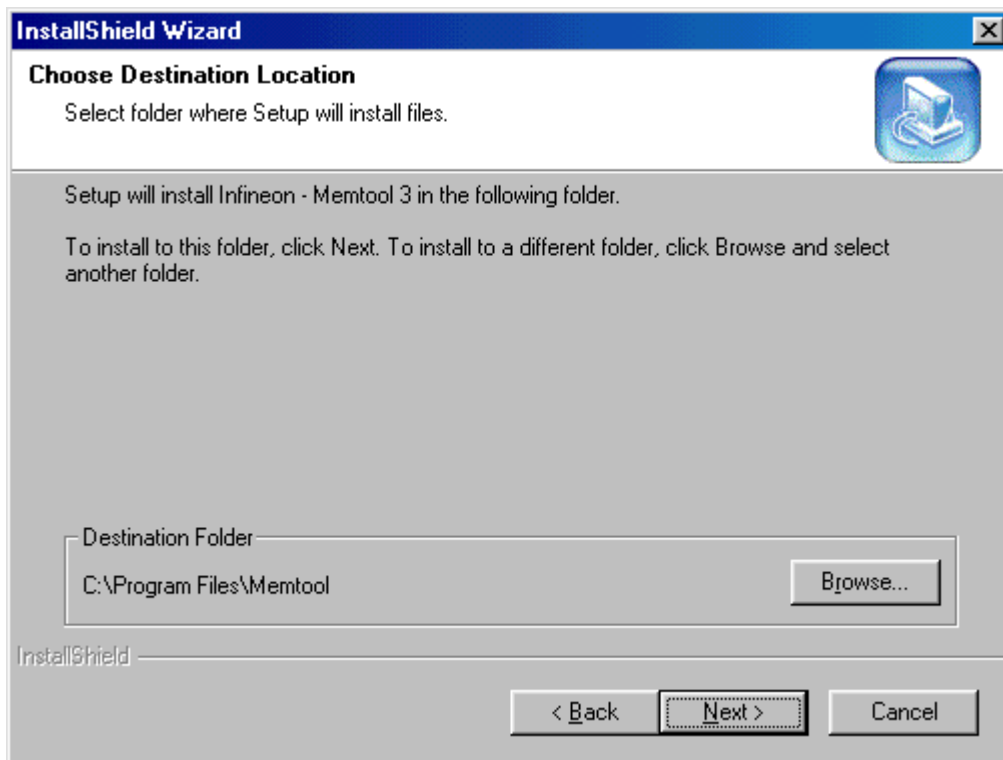
For general startup instructions of your phyCORE-XC16x Rapid Development Kit please *refer to the applicable QuickStart Instructions. Please refer to the phyCORE-XC16x Hardware Manual for more information about the board's design and functions.* Precise specifications for Infineon's XC161CJ, XC167CI microcontroller series controller can be found in the enclosed microcontroller Data Sheet/User's Manual.

1 Installing Infineon MemTool

The applicable MemTool software must be installed to ensure successful completion of this tutorial.

Install Infineon MemTool by executing *Setup.exe* from within the *\Software\MemTool* directory of your PHYTEC Spectrum CD and follow the installation instructions.

- In the *InstallShield Wizard* window, click on *Next* and complete the MemTool install program.



2 Preparing the Target Hardware

2.1 Modifying the phyCORE-XC16x

Programming the on-chip Flash on a phyCORE-XC16x requires changing the default jumper settings of the module and adding a 4.7 kOhm pull-down resistor to the board at space R1. The pull-down resistor R1 configures the XC16x for single chip mode.

At the time of delivery, Jumper J3 is closed at 2+3. This default configuration means that the program stored in the external program memory is executed after a hardware reset. In order to allow the execution of the controller's internal program memory, Jumper J3 must be closed at pads 1+2. J3 is located on the top or controller side of the phyCORE-XC16x (refer to Figure 1)

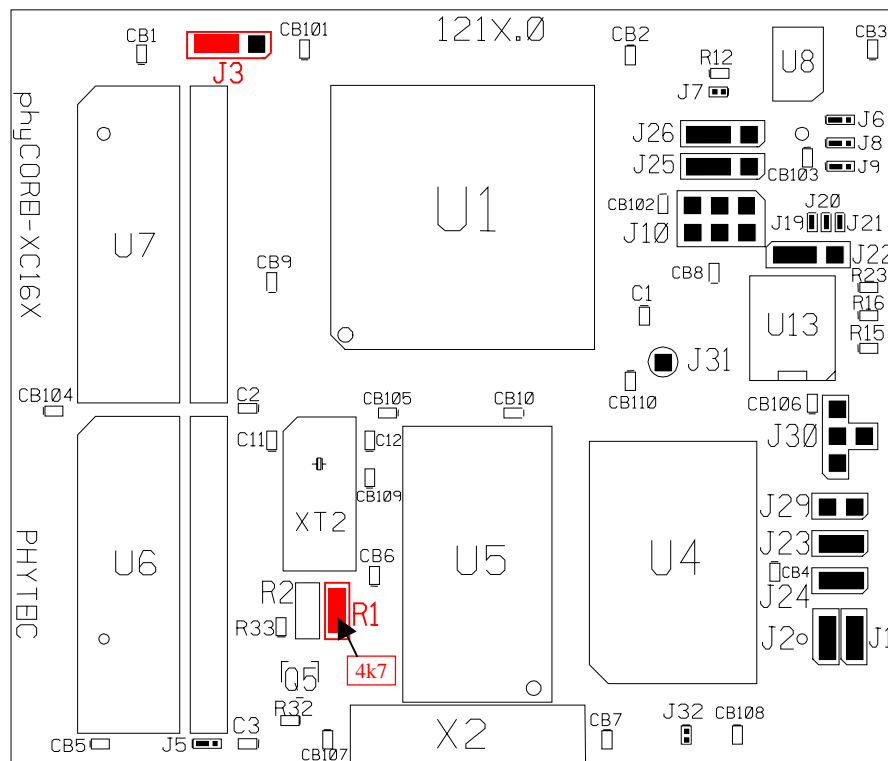


Figure 1: Location of the Jumpers (Controller Side), J3 in Position 2+3

© PHYTEC Technologie Holding AG 2003

Europe: Support Hotline: +49 (6131) 9221-31 • <http://www.phytec.de>

North America: Support Hotline: + 1-800-278-9913 • <http://www.phytec.com>

Removal or modification of components on the phyCORE module should be done with special care given the compact nature of the module. Please ensure that the board as well as surrounding components and sockets remain undamaged while desoldering. Overheating the board can cause the solder pads to loosen, rendering the module inoperable. Carefully heat neighboring connections in pairs. After a few alternations, components can be removed with the solder-iron tip. Alternatively, a hot air gun can be used to heat and loosen the bonds.

- Carefully remove the 0 Ohm resistor populating space J3 at solder pads 2 and 3.
- Place the 0 Ohm resistor between pads 1 and 2. Solder the jumper at these pads.

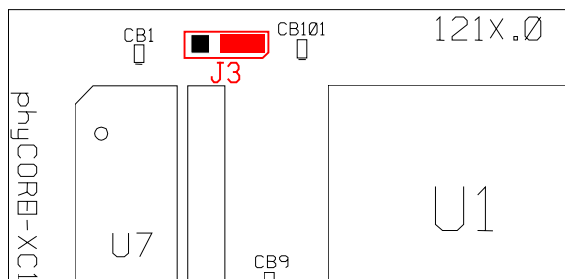


Figure 2: phyCORE-XC16x with J3 in Position 1+2

- Place a 4.7 kOhm SMD resistor between solder pads 1 and 2 of space R1. Solder the component at these pads.

These are the only hardware modification needed to allow download to and program execution from the XC16x on-chip Flash.

2.2 Interfacing the phyCORE-XC16x to a Host-PC

Connecting the phyCORE-XC16x, mounted on the phyCORE Development Board HD200 2.5V, to your computer is simple.

- As shown in the figure below, if the phyCORE module is not already pre-installed, mount it connector side down onto the Development Board's receptacle footprint (X6).

Ensure that pin 1 of the phyCORE-connector (denoted by the hash stencil mark on the PCB) matches pin 1 of the receptacle on the phyCORE Development Board HD200 2.5V. Ensure that there is a solid connection between the Molex connector on the module and the Development Board receptacle.

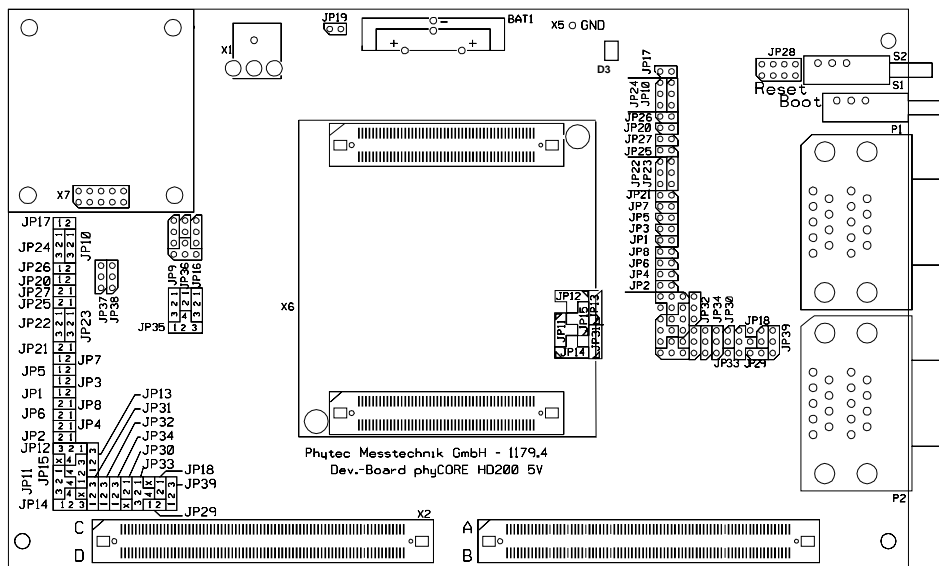


Figure 3: phyCORE Development Board HD200 2.5V Overview

- Configure the jumpers on the Development Board as indicated in *Figure 4*. This correctly routes the RS-232 signals to the DB-9 socket (P1A = bottom) and connects the Development Board's peripheral devices to the phyCORE module.

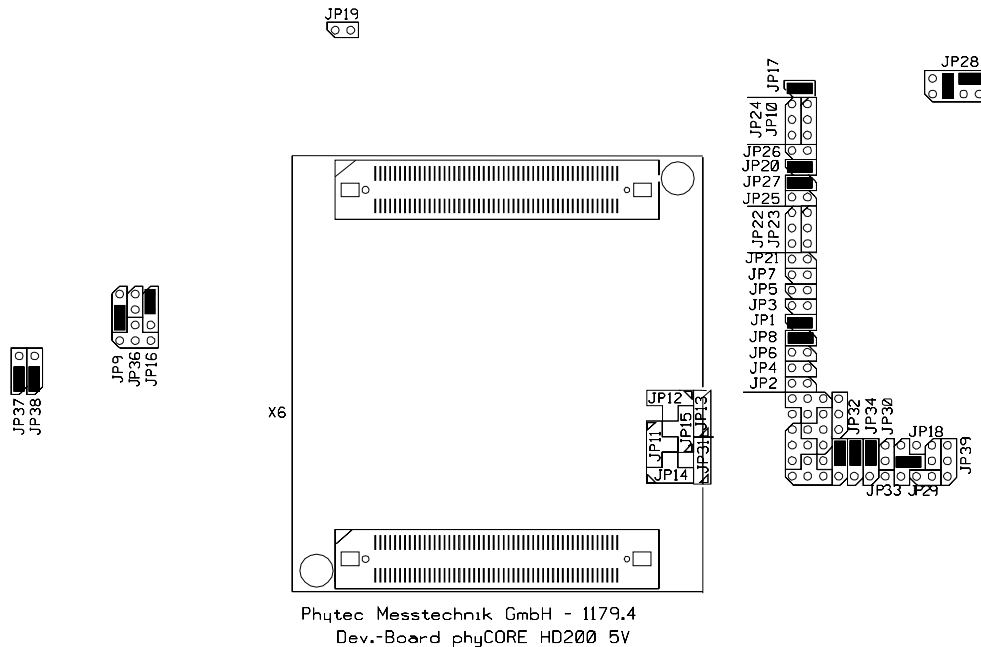


Figure 4: Default Setting for the phyCORE Development Board HD200 2.5V

- Connect the RS-232 interface of your computer to the DB-9 RS-232 interface on the phyCORE Development Board HD200 2.5V (P1A = bottom) using the included serial cable.
- Using the included power adapter, connect the power socket on the board (X1) to a power supply (refer to *Figure 5* for the correct polarity).

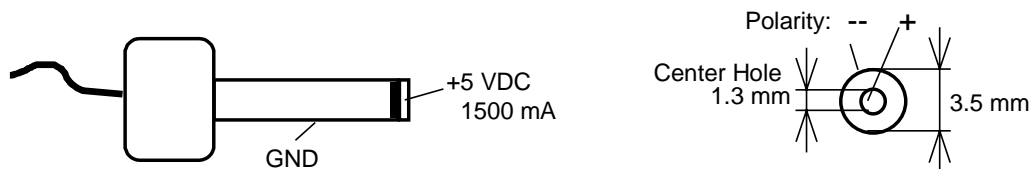


Figure 5: Power Connector

- Simultaneously press the Reset (S2) and Boot (S1) buttons on the phyCORE Development Board HD200 2.5V, first releasing the Reset button and then, two or three seconds later, the Boot button.

This sequence of pressing and releasing the Reset (S2) and Boot (S1) buttons renders the phyCORE-XC16x into the Bootstrap mode. Use of MemTool always requires the phyCORE-XC16x to be in Bootstrap mode.

The phyCORE module should now be properly connected via the phyCORE Development Board HD200 2.5V to a host-PC and power supply. After executing a Reset and rendering the board in Flash programming mode, you are now ready to program the phyCORE-XC16x. This phyCORE module/phyCORE Development Board HD200 2.5V combination is also referred to as "target hardware".

3 Downloading Example Code with MemTool

MemTool for Windows is a utility program that allows download of user code in Intel **.hex* or **.h86* file format from a host-PC to the controller's on-chip Flash on a PHYTEC SBC via an RS-232 connection.

Proper connection of a PHYTEC SBC to a host-PC enables the software portion of MemTool to recognize and communicate with the Bootstrap loader on the phyCORE-XC16x.

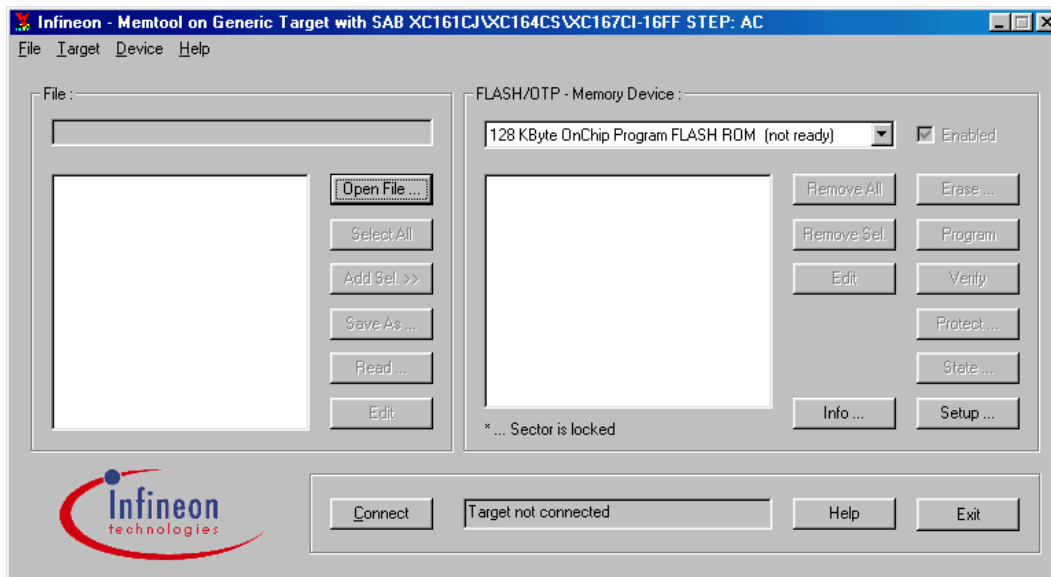
It is recommended that you drag the MemTool icon onto the desktop of your PC. This enables easy start of MemTool by double-clicking on the icon.

3.1 Starting MemTool

- Ensure that the target hardware is properly connected to the host-PC and a power supply.
- Start MemTool for Windows by double-clicking on the MemTool icon or by selecting MemTool from the *Programs* menu using the Windows *Start* button.

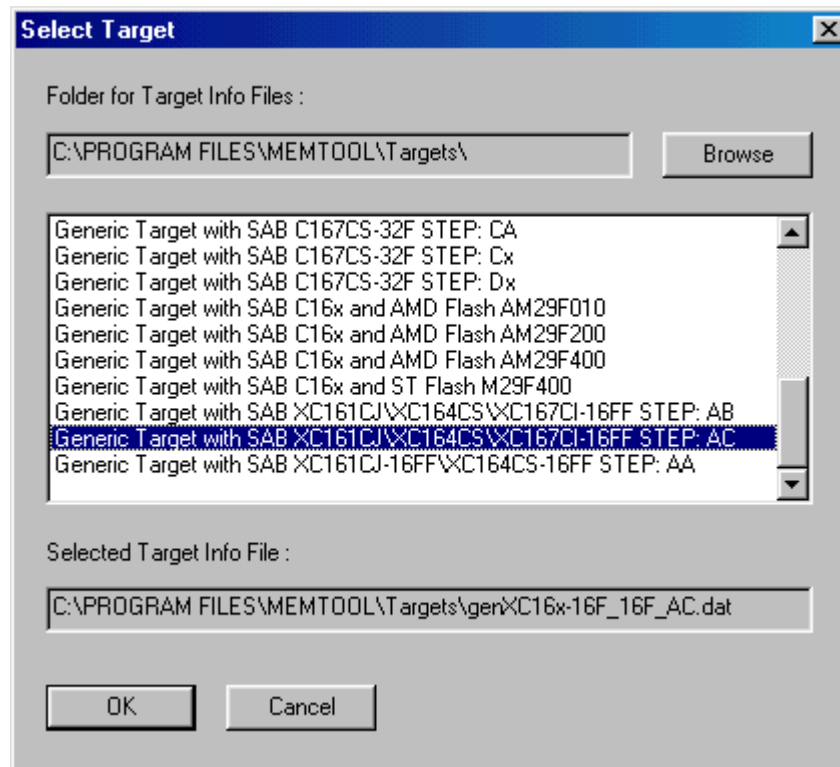
The default settings for the MemTool configure COM1 with 19,200 baud as communication parameters. If you want to change these default settings follow the instructions given in the MemTool Programmers Guide located in the installation folder **\Program Files\MemTool**.

- The MemTool startup window will now appear.



- Click on *Target* and select *Change* in the pull-down menu to advance to the *Select Target* window. The *Select Target* window will automatically appear when you start MemTool for the very first time.

- The phyCORE-XC16x is equipped with an *XC16xCJ CPU*. Choose the correct target from the list as shown below and click on the *OK* button.



- Reset the target hardware and force it into Bootstrap mode by simultaneously pressing the Reset (S2) and Boot (S1) buttons on the phyCORE Development Board HD200 and then releasing first the Reset and, two or three seconds later, the Boot button.
- Now click the *Connect* button to establish connection to the target hardware.

The microcontroller tries to automatically adjust to the baud rate selected within the baud rate pull-down menu. However, it may occur that the selected baud rate can not be attained. This results in a connection error. In this case, try other baud rates to establish a connection. Before attempting each connection, be sure to reset the target hardware and render it into Bootstrap mode as described in *section 2.2*.

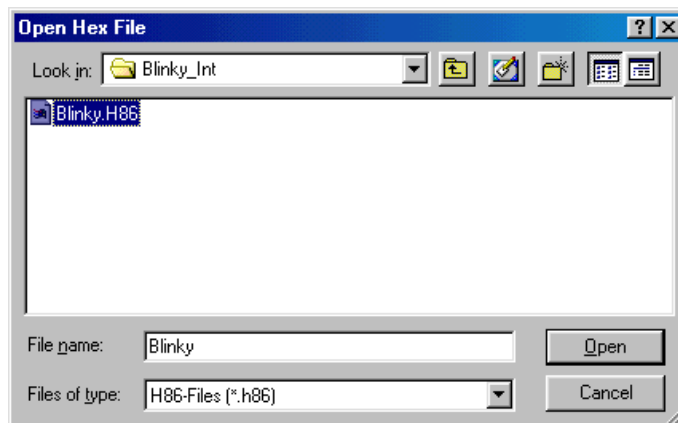
3.2 "Blinky_int"

The "*Blinky_int*" example downloads a program to the on-chip Flash that, when executed, manipulates the LED D3 on the phyCORE Development Board HD200 that is located above the jumper field (refer to Figure 3).

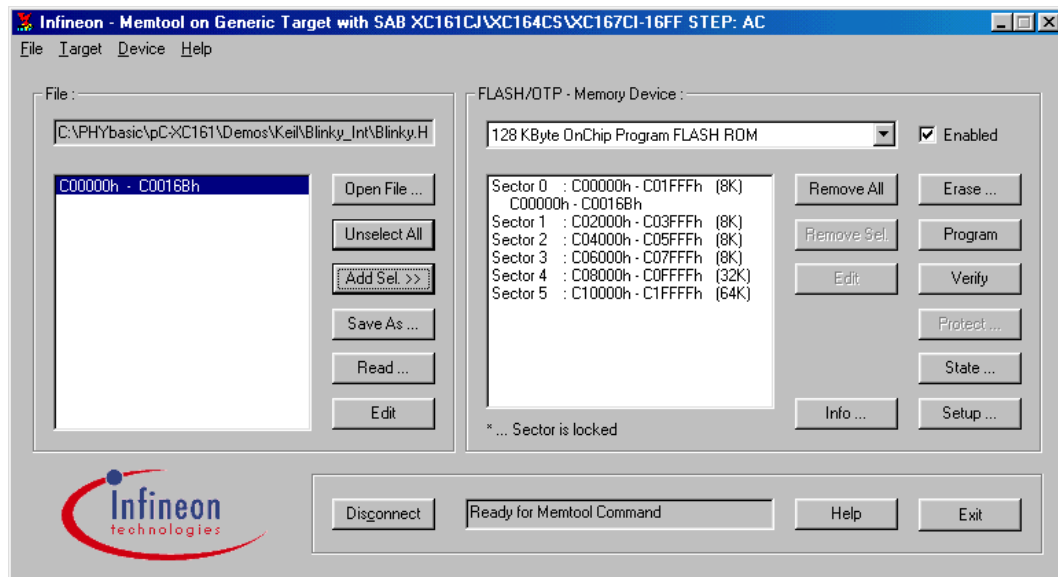
- Click the *Open File* button.

The hexfile has already been installed to your hard drive during the installation procedure.

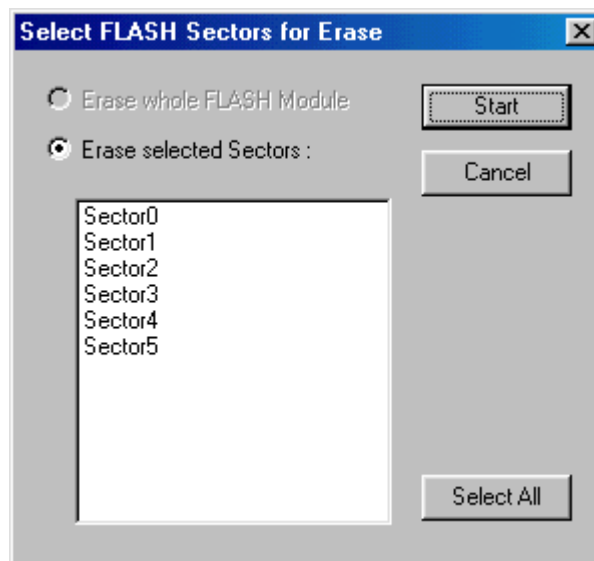
- Browse to the correct drive and path for the phyCORE-XC16x demo folder (default location *C:\PHYBasic\pC-XC16x\Demos\Keil\Blinky_int\Blinky.h86*), select the file *Blinky.h86* and click *Open*.



- The MemTool main window will re-appear.

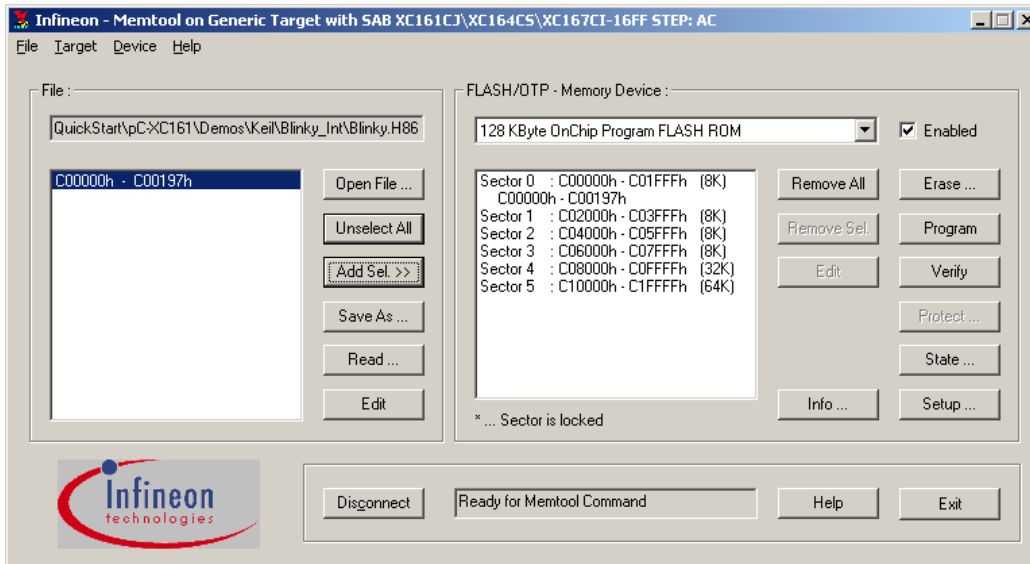


- Click on the *Erase* button in the upper right corner.

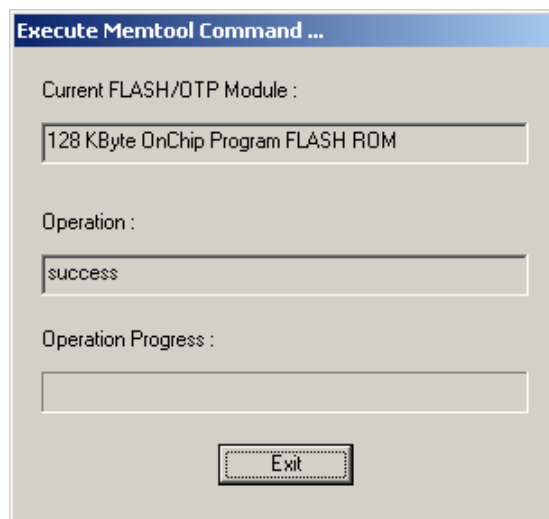


- Click on *Select All* to select all Flash sectors. Then click on the *Start* button to erase the on-chip Flash.
- Wait until all sectors are blank. This will be indicated by the *Success* message in the *Operation* window.

- Now click the *Select all* button in the left portion of the window.
- Then click on the *Add Sel >>* button. This will add the line for the required memory location to the sector 0 space in the right section of the screen.



- Click on the *Program* button in the upper right corner.
- Wait until the program download is finished. This will be indicated by a *success* message in the *Execute Memtool Command..* window.



- Click the *Exit* button to close this window.
- Now click the *Disconnect* button in the lower part of the main window to terminate the connection with the target hardware.
- Exit Infineon MemTool.
- Press the Reset button (S2) on the phyCORE Development Board HD200 to reset the target hardware and to start execution of the downloaded software.
- Successful execution of the program will cause LED D3 to flash with equal on and off duration.

Document: Programming the On-Chip Flash on a
phyCORE-XC161, phyCORE-XC167 - Application
Note
Document number: LAN-020e_1, July 2003

How would you improve this manual?

Did you find any mistakes in this manual? _____ page

Submitted by:

Customer number: _____

Name: _____

Company: _____

Address: _____

Return to:

PHYTEC Technologie Holding AG
Postfach 100403
D-55135 Mainz, Germany
Fax : +49 (6131) 9221-33

© PHYTEC Technologie Holding AG 2003
Europe: Support Hotline: +49 (6131) 9221-31 ● <http://www.phytec.de>
North America: Support Hotline: + 1-800-278-9913 ● <http://www.phytec.com>

Published by

PHYTEC

© PHYTEC Technologie Holding AG 2003

Europe: Support Hotline: +49 (6131) 9221-31 ● <http://www.phytec.de>

North America: Support Hotline: + 1-800-278-9913 ● <http://www.phytec.com>

LAN-020e_1