AN10337

Adding ISP firmware to an LPC900 software project

Rev. 01 — 13 December 2004

Application note

Semiconductors

PHILIPS

Revision history

Rev	Date	Description
01	20041213	Initial version

1. Introduction

The P89LPC900 family of microcontrollers has In System Programming (ISP) capability on some of its family members, which allows the microcontroller to be programmed when it is soldered on the printed circuit board. ISP code is programmed into the microcontroller as factory default.

The ISP code is programmed in the upper half of the highest sector on the LPC900 devices.

This appnote will show how to add Philips ISP code to a software project to have it included in the code with the μVision 3 IDE from Keil.

The ISP source code will be provided in assembly language with this Appnote and can be added to any code project in C or assembly.

2. Benefits of adding ISP in a project

The benefits of adding the ISP code to the software project are:

- The global CRC and the sector CRCs of the device will match the hex file, and therefore the complete code can be verified with a parallel programmer including the ISP section of the Flash memory.
- If ISP gets erased by accident it can be reprogrammed with a parallel programmer.
- Another benefit is that the compiler will produce errors and/or warnings if there are any conflicts between the usercode and ISP code.

9397 750 14286

Application note **Rev. 01 — 13 December 2004** **3 of 7**

3. ISP version and sizes

Currently there are four versions of ISP and four memory sizes.

Make sure you use the correct version and code size of ISP with the following devices. When using an incorrect version the ISP will not function correctly.

Table 1 shows the different part numbers with the ISP version number and memory size.

Table 1:   ISP files used by LPC900 parts

Part number	ISP version	ISP sector location	Memory size	File name
P89LPC920	Version 2	Upper half of sector 1	2 kB	LPC_ISP_2K_V02.a51
P89LPC921	Version 2	Upper half of sector 1	4 kB	LPC_ISP_4K_V02.a51
P89LPC922	Version 2	Upper half of sector 1	8 kB	LPC_ISP_8K_V02.a51
P89LPC924	Version 4	Upper half of sector 1	4 kB	LPC_ISP_4K_V04.a51
P89LPC925	Version 4	Upper half of sector 1	8 kB	LPC_ISP_8K_V04.a51
P89LPC930	Version 2	Upper half of sector 1	4 kB	LPC_ISP_4K_V02.a51
P89LPC931	Version 2	Upper half of sector 1	8 kB	LPC_ISP_8K_V02.a51
P89LPC932	Version 1	Upper half of sector 1	8 kB	LPC_ISP_8K_V01.a51
P89LPC932A1	Version 4	Upper half of sector 1	8 kB	LPC_ISP_8K_V04.a51
P89LPC933	Version 4	Upper half of sector 1	4 kB	LPC_ISP_4K_V04.a51
P89LPC934	Version 4	Upper half of sector 1	8 kB	LPC_ISP_8K_V04.a51
P89LPC935	Version 4	Upper half of sector 7	8 kB	LPC_ISP_8K_V04.a51
P89LPC936	Version 4	Upper quarter of sector 7	16 kB	LPC_ISP_16K_V04.a51
P89LPC938	Version 4	Upper half of sector 7	8 kB	LPC_ISP_8K_V04.a51

Table 2 shows the changes between the different ISP versions.

Table 2:   ISP changes

ISP version	ISP changes
Version 1	Initial version
Version 2	Added security key and updated bootvector
Version 3	Added high speed communications
Version 4	Added control of hardware security for UCFG1

The added security key is not visible when using ISP, but make sure when you are using IAP that the correct key is passed to IAP, please see the appropriate users manual for more details.

High speed communications allow ISP to load a higher baudrate when using ISP making programming a lot shorter.

Hardware security for UCFG1 allows the UCFG1 configuration byte to be protected by hardware and cannot be altered by ISP anymore when protected.

4. Adding ISP in an μVision3 project

To add the ISP code you simply have to add the LPC_ISP_xK_Vxx.a51 file to the project file in the Keil μVision3 compiler.
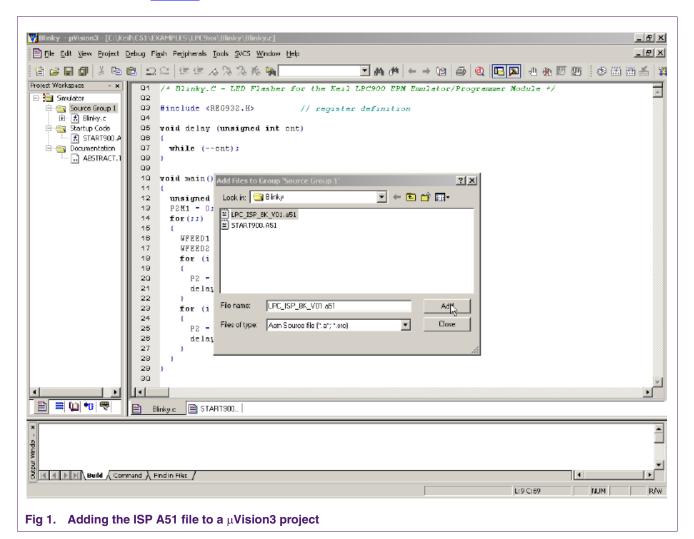
Table 1 shows the different file names for the ISP files.

To do this first you can copy the ISP assembly file in the same folder as the project you are working on. In μVision3 you can right click the project and select add files.

Then the next time the project is compiled the ISP file will be added into the hex file that can be programmed in the Flash memory of the microcontroller.

Figure 1 shows how to add the ISP file to a μVision3 project.

Fig 1.   Adding the ISP A51 file to a μVision3 project

5. Disclaimers

Life support — These products are not designed for use in life support appliances, devices, or systems where malfunction of these products can reasonably be expected to result in personal injury. Philips Semiconductors customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Philips Semiconductors for any damages resulting from such application.

Right to make changes — Philips Semiconductors reserves the right to make changes in the products - including circuits, standard cells, and/or software - described or contained herein in order to improve design and/or performance. When the product is in full production (status 'Production'), relevant changes will be communicated via a Customer Product/Process Change Notification (CPCN). Philips Semiconductors assumes no responsibility or liability for the use of any of these products, conveys no licence or title under any patent, copyright, or mask work right to these products, and makes no representations or warranties that these products are free from patent, copyright, or mask work right infringement, unless otherwise specified.

Application information — Applications that are described herein for any of these products are for illustrative purposes only. Philips Semiconductors make no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

9397 750 14286

Application note **Rev. 01 — 13 December 2004** **6 of 7**

6. Contents