# 1.b. Installing Keil C Compiler

**A demo version of Keil is found in the Software/Keil/ Directory on the AT89KIT CDROM.**

**You can download the latest demo version from Keil Website**

**www.keil.com**

**Please follow the following steps to install and write down your first C program for AT89C51ED2 microcontroller. Note that the presentation is prepared for AT89S52 but it will equivalently will work for AT89C51ED2.**

www.semtronics.net

Keil Embedded Development Tools for ARM7/ARM9/Cortex-M3, XC16x/C16x/ST10, 251, and 8051 Microco - Microsoft Internet Explorer
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# Embedded Development Tools

KEIL™ An ARM® Company



**Product Information**
- Product Overview
- Supported Microcontrollers
- Shows and Seminars

**Technical Support**
- Support Knowledgebase
- Application Notes
- Discussion Forum

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**Technologies**
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**Other Information**
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- Links

**Contact Information**
- Corporate
- Sales Channels
- Distributors
- Get Prices/Quotes

Saturday, May 03, 2008

Keil™, an ARM® Company, makes C compilers, macro assemblers, real-time kernels, debuggers, simulators, integrated environments, evaluation boards, and emulators for ARM7/ARM9/Cortex-M3, XC16x/C16x/ST10, 251, and 8051 MCU families.

This web site provides information about the embedded development tools, evaluation software, product updates, application notes, example code, and technical support available from Keil.

**RealView MDK 3.2**
Find out what's new in the latest release of the Keil Development Tools for ARM7, ARM9, Cortex-M3, and Cortex-M1 based devices.

**8051 Development Tools**
Embedded development tools from Keil Software support all 8051-compatible devices.

**XC16x/C16x/ST10 Development Tools**
Embedded development tools for Infineon C16x and XC16x and STMicroelectronics ST10 microcontroller families.

**ULINK USB-JTAG Adapters**
The ULINK family of USB-JTAG Adapters connect your PC's USB port to your target hardware (via JTAG, SWD, or OCDS) and allow you to debug embedded programs running on target hardware.

**News**
- RealView MDK support for SEGGER J-Link and J-Trace
- Keil MCB2919 Evaluation Board
- SEGGER emWin for MCB2460

**Updates**
- MDK-ARM V3.20
- RL-ARM V3.21
- C166 V6.11
- C251 V4.53a

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# C51 Development Tools

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**C51 Development Tools**
- **Product Overview**
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  - PK51 Professional Developer's Kit
  - CA51 Compiler Kit
  - A51 Assembler Kit
- Supported Devices
- Product Manuals
- Knowledgebase Articles
- Evaluation Software

**Evaluation Boards**
- MCBx51 Evaluation Board
- MCB900 Evaluation Board
- MCB950 Evaluation Board
- MCBXC866 Evaluation Board
- MCBXC88x Evaluation Board

**Operating Systems**
- RTX51 Tiny Real-Time Kernel

**Emulators & Debuggers**
- ULINK® USB-JTAG Products
- ULINK2® Adapter
- EPM900 LPC Emulator
- SmartMX DBox

**Other C51-Related Info**
- PC-Lint Diagnostic Tool
- Books About the 8051
- Shows and Seminars

## Product Overview

Keil development tools for the 8051 Microcontroller Architecture support every level of software developer from the professional applications engineer to the student just learning about embedded software development.

The industry-standard Keil C Compilers, Macro Assemblers, Debuggers, Real-time Kernels, Single-board Computers, and Emulators support all 8051 derivatives and help you get your projects completed on schedule.

Tool Overview

The Keil 8051 Development Tools are designed to solve the complex problems facing embedded software developers.

- When starting a new project, simply select the microcontroller you use from the Device Database and the µVision IDE sets all compiler, assembler, linker, and memory options for you.
- Numerous example programs are included to help you get started with the most popular embedded 8051 devices.
- The Keil µVision Debugger accurately

### 8051 MCUs

- Actel Core8051
- Analog Devices ADuC812
- Atmel AT89C51
- Chipcon CC1010
- Cypress Semiconductor EZ-USB FX2 (CY7C68XXX)
- Infineon XC866-4FR
- Intel 87C51
- NXP (founded by Philips) P89V51RD2

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https://www.keil.com/c51/demo/eval/c51.htm
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# C51 Evaluation Software

**Development tools for Classic and Extended 8051 Microcontrollers**
**Version 8.12**

The Keil C51 Evaluation Kit allows you to create programs for all 8051 derivatives.

- Review the hardware requirements before installing this software.
- Note the limitations of the evaluation tools.

## To install the Keil evaluation tools...

- Right-click on **C51V812.EXE** and save it to your computer.
- PDF files may be opened with Acrobat Reader.
- ZIP files may be opened with PKZIP or WINZIP.

C51V812.EXE (24,699K)
Wednesday, February 13, 2008

Estimated File Download Time:
< 1.8 Hours: 56Kb Modem
< 48 Minutes: 128Kb ISDN
< 4 Minutes: T1/Broadband

- Be sure to request a quote for the full version of the tools.


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object code. Source code may be of any size.

- The GNU ARM tools (compiler, assembler, and so on) that are provided are not limited or restricted in any way.

## C51 Evaluation Tools

- You may not use the Evaluation Version of the µVision IDE/Debugger to create commercial products.
- The 8051 compiler, assembler, linker, and debugger are limited to 2 Kbytes of object code. Source code may be of any size.
- Programs that generate more than 2 Kbytes of object code will not compile, assemble, or link.
- The debugger supports programs that are 2k Bytes or smaller.
- The startup code generated includes LJMPs. Code generated cannot be used in single-chip devices that support 2K Bytes or less of program space.
- Programs start at offset 0x0800. Programs generated with the evaluation software may not be programmed into single-chip devices with less than 2K Bytes of on-chip ROM.
- No hardware support for multiple DPTR registers is provided.
- No support for floating-point arithmetic and no support for user libraries is provided.
- No support for in-line assembly using #pragma ASM.
- The following components which are present in the PK51 Full Version are not included in the Evaluation Version: Linker for Code Banking, Library Manager, and RTX51 Tiny Real-time Operating System.

## C251 Evaluation Tools

- You may not use the Evaluation Version of the µVision IDE/Debugger to create commercial products.

www.semtronics.net

Done Internet

C51 Version 8.12 Evaluation Software Request - Microsoft Internet Explorer

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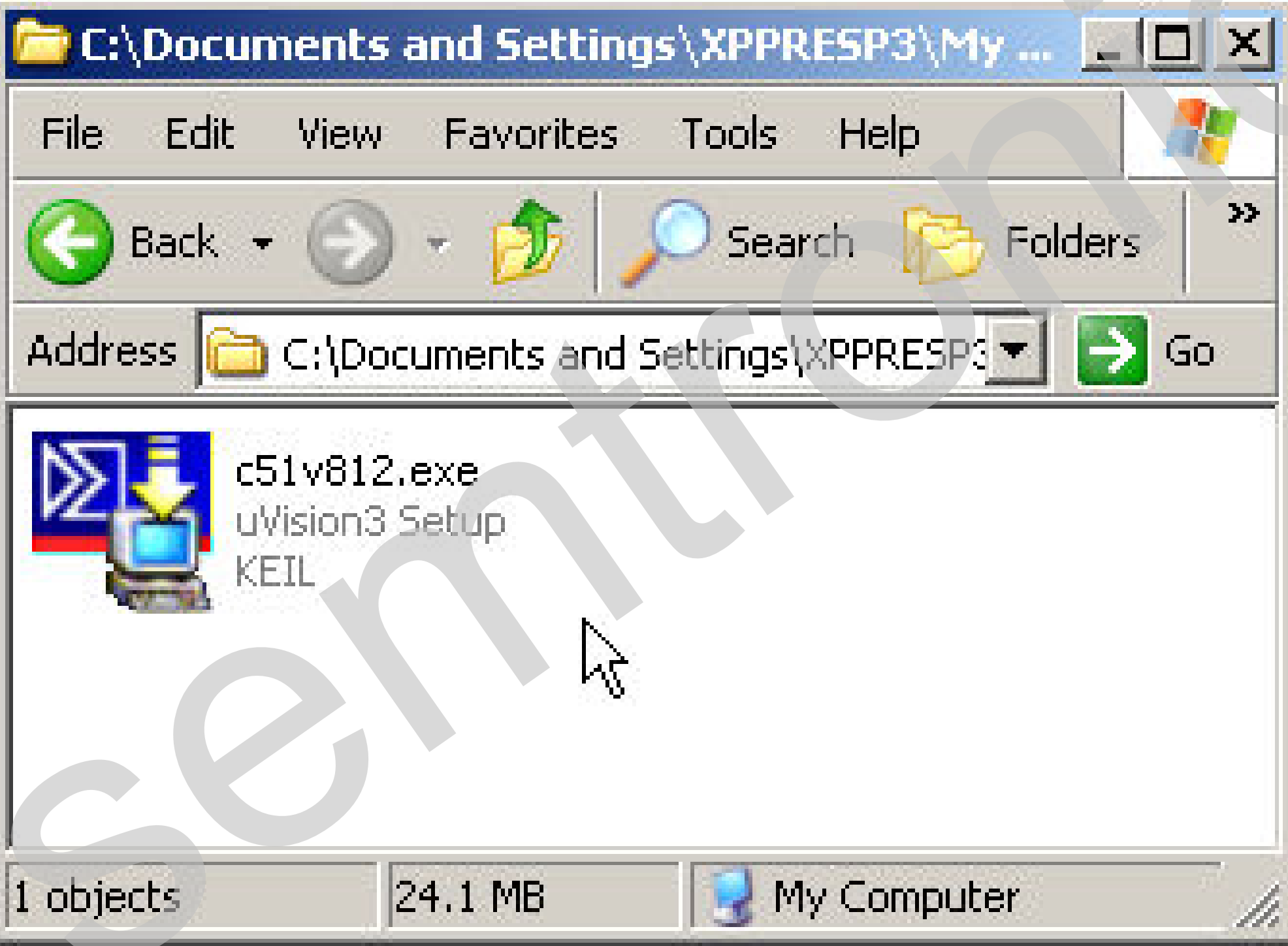
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uVision3 Setup
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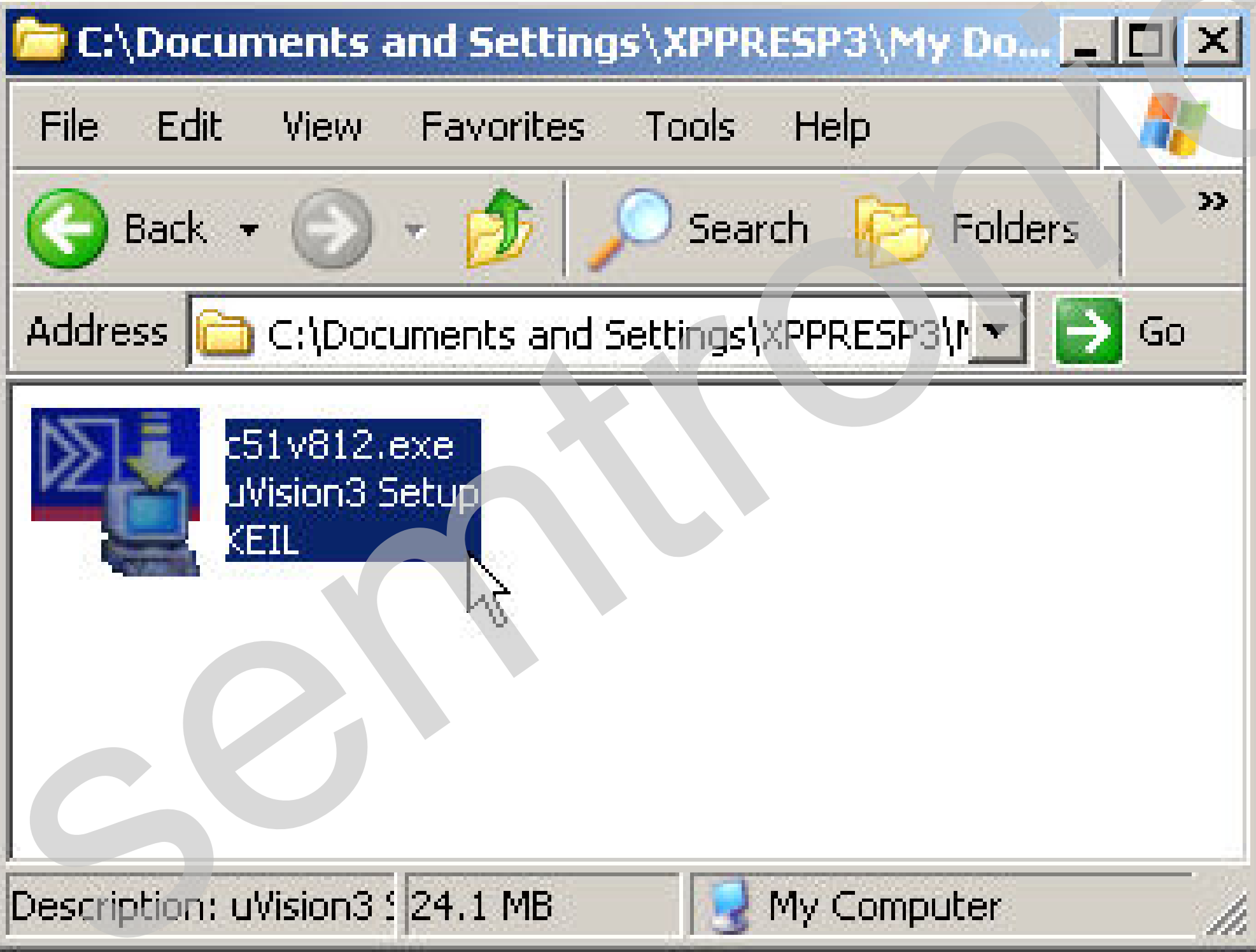
24.1 MB
My Computer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c51v812.exe
uVision3 Setup
KEIL
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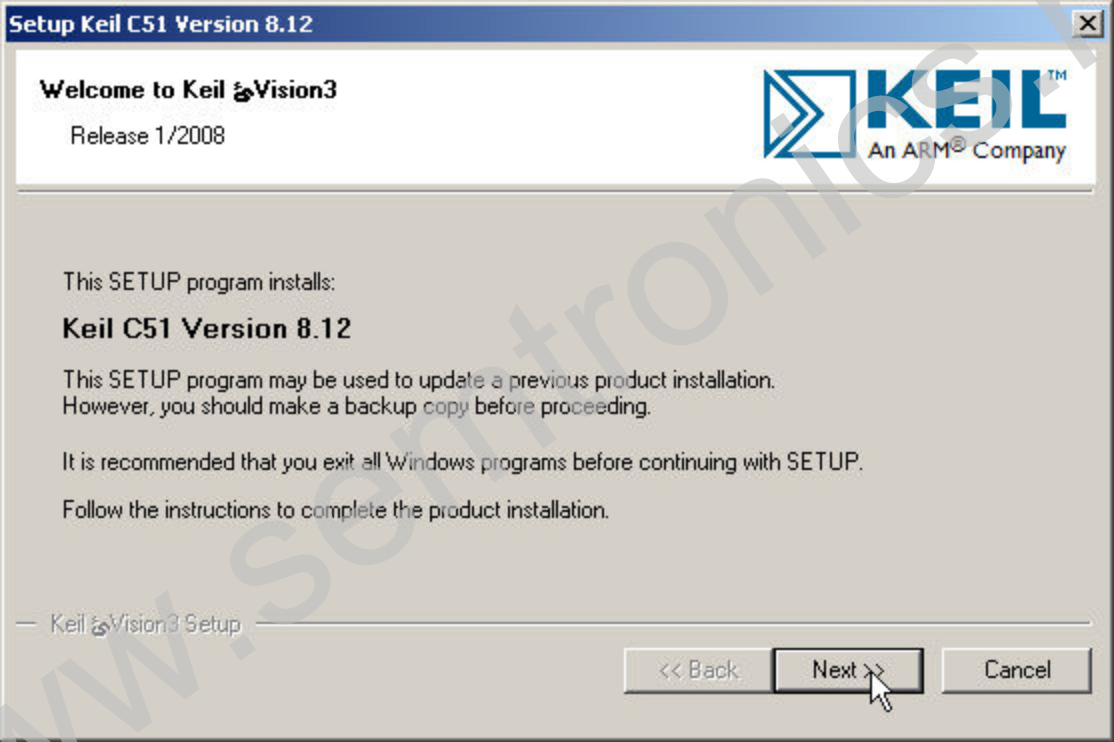
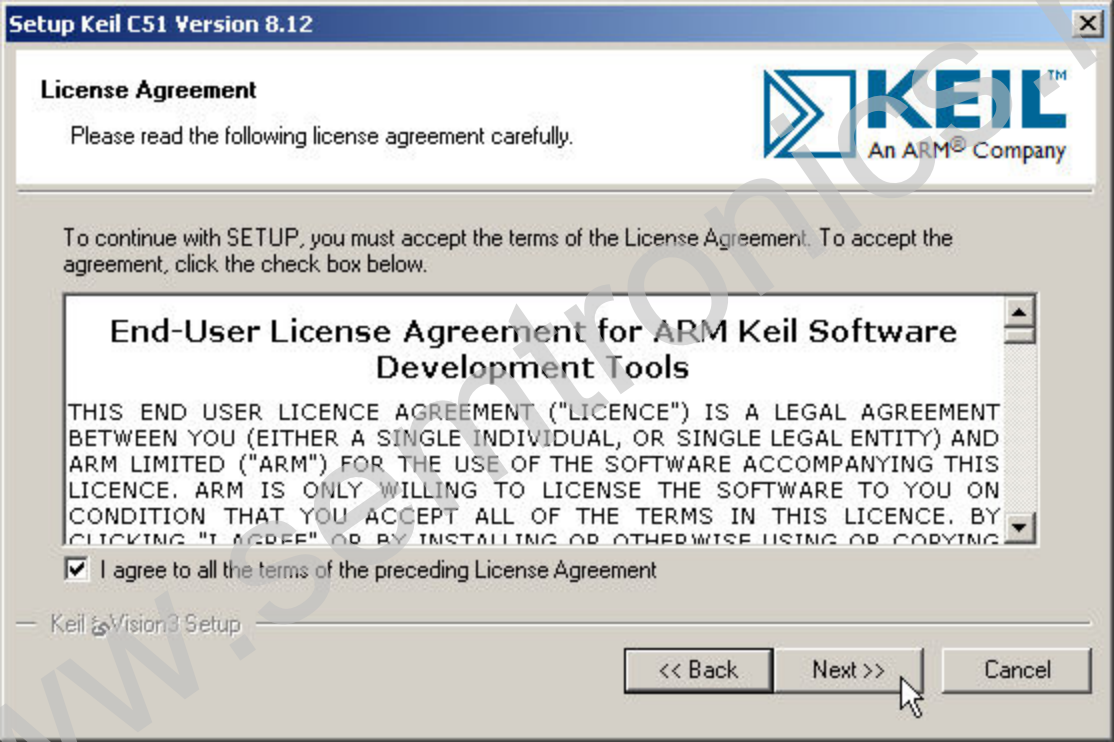
24.1 MB
My Computer


Setup Keil C51 Version 8.12
Welcome to Keil µVision3
Release 1/2008
KEIL™
An ARM® Company
This SETUP program installs:
Keil C51 Version 8.12
This SETUP program may be used to update a previous product installation.
However, you should make a backup copy before proceeding.
It is recommended that you exit all Windows programs before continuing with SETUP.
Follow the instructions to complete the product installation.
Keil µVision3 Setup
<< Back
Next >>
Cancel


Setup Keil C51 Version 8.12
License Agreement
Please read the following license agreement carefully.
KEIL™
An ARM® Company
To continue with SETUP, you must accept the terms of the License Agreement. To accept the agreement, click the check box below.
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THIS END USER LICENCE AGREEMENT ("LICENCE") IS A LEGAL AGREEMENT BETWEEN YOU (EITHER A SINGLE INDIVIDUAL, OR SINGLE LEGAL ENTITY) AND ARM LIMITED ("ARM") FOR THE USE OF THE SOFTWARE ACCOMPANYING THIS LICENCE. ARM IS ONLY WILLING TO LICENSE THE SOFTWARE TO YOU ON CONDITION THAT YOU ACCEPT ALL OF THE TERMS IN THIS LICENCE. BY
I agree to all the terms of the preceding License Agreement
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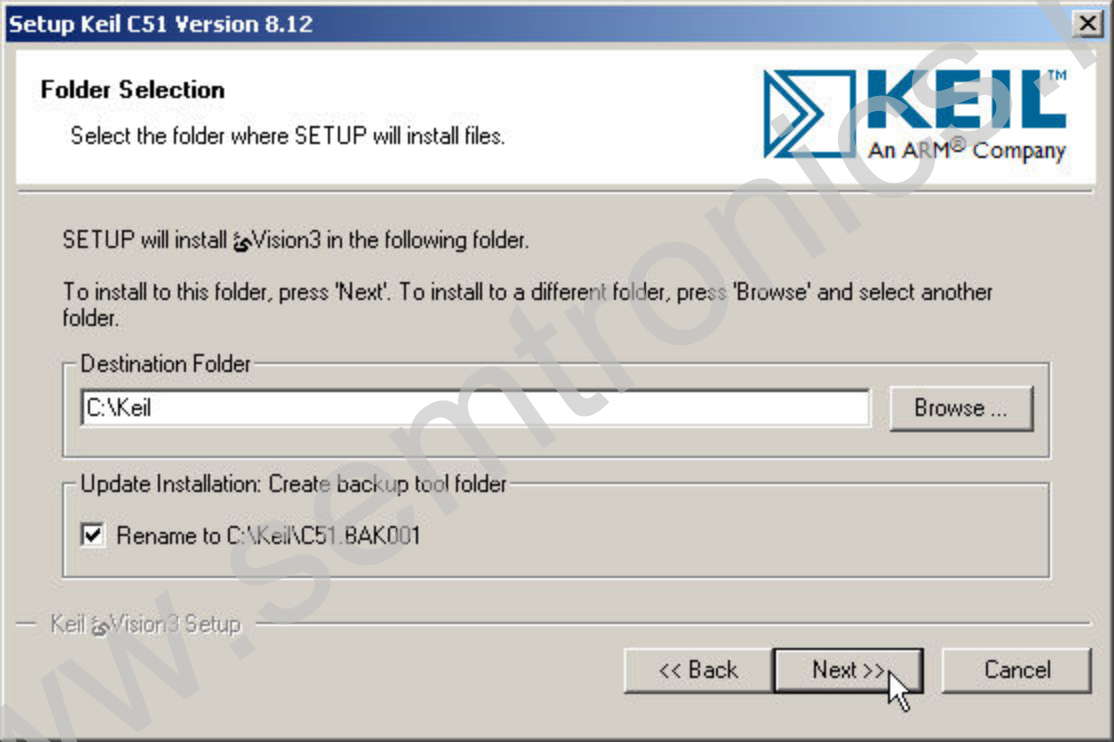
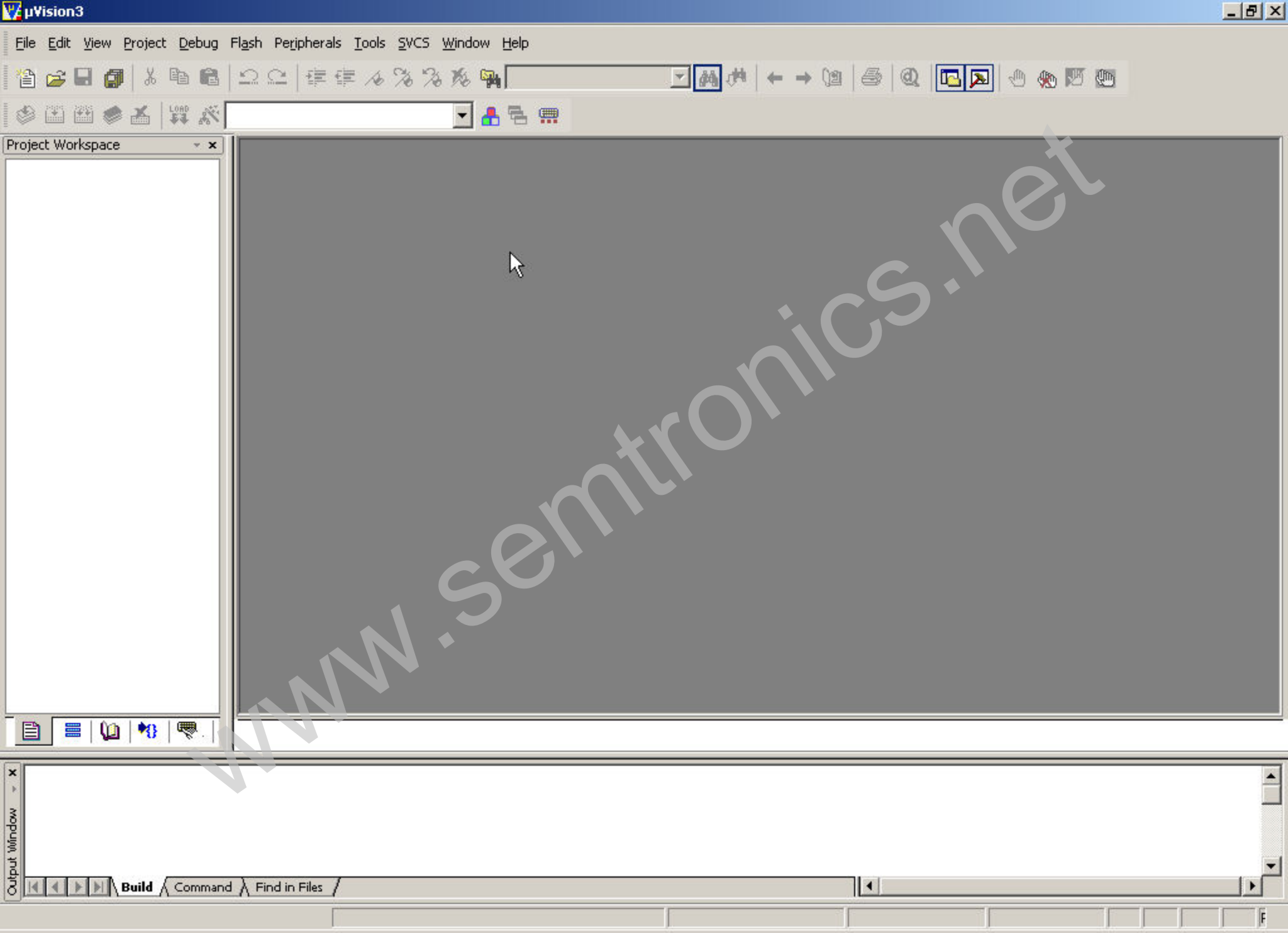

Setup Keil C51 Version 8.12
Folder Selection
Select the folder where SETUP will install files.
KEIL™
An ARM® Company
SETUP will install µVision3 in the following folder.
To install to this folder, press 'Next'. To install to a different folder, press 'Browse' and select another folder.
Destination Folder
C:\Keil
Browse ...
Update Installation: Create backup tool folder
Rename to C:\Keil\C51.BAK001
Keil µVision3 Setup
<< Back
Next >>
Cancel


µVision3
File Edit View Project Debug Flash Peripherals Tools SVCS Window Help
Project Workspace
Output Window
Build Command Find in Files
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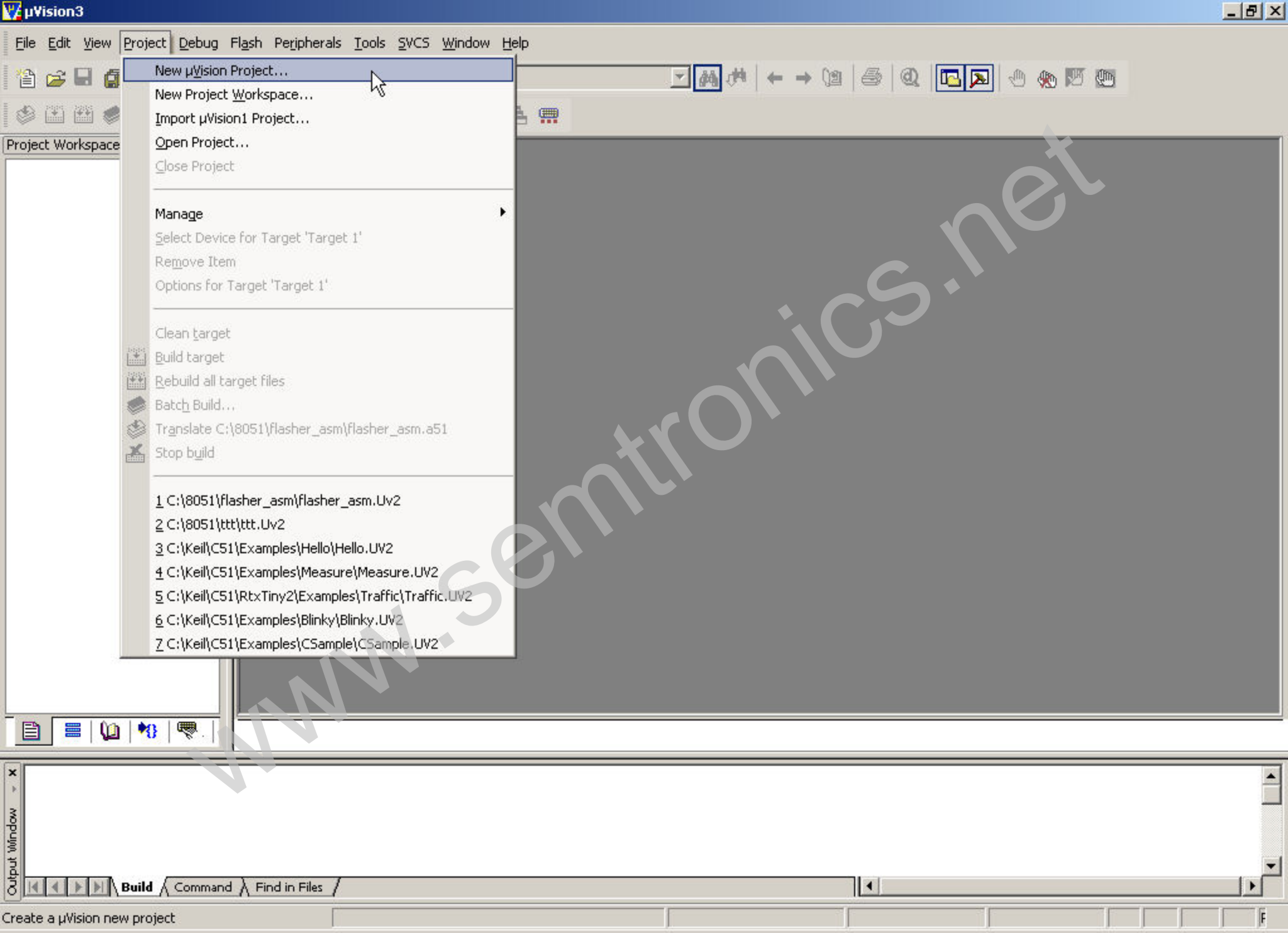

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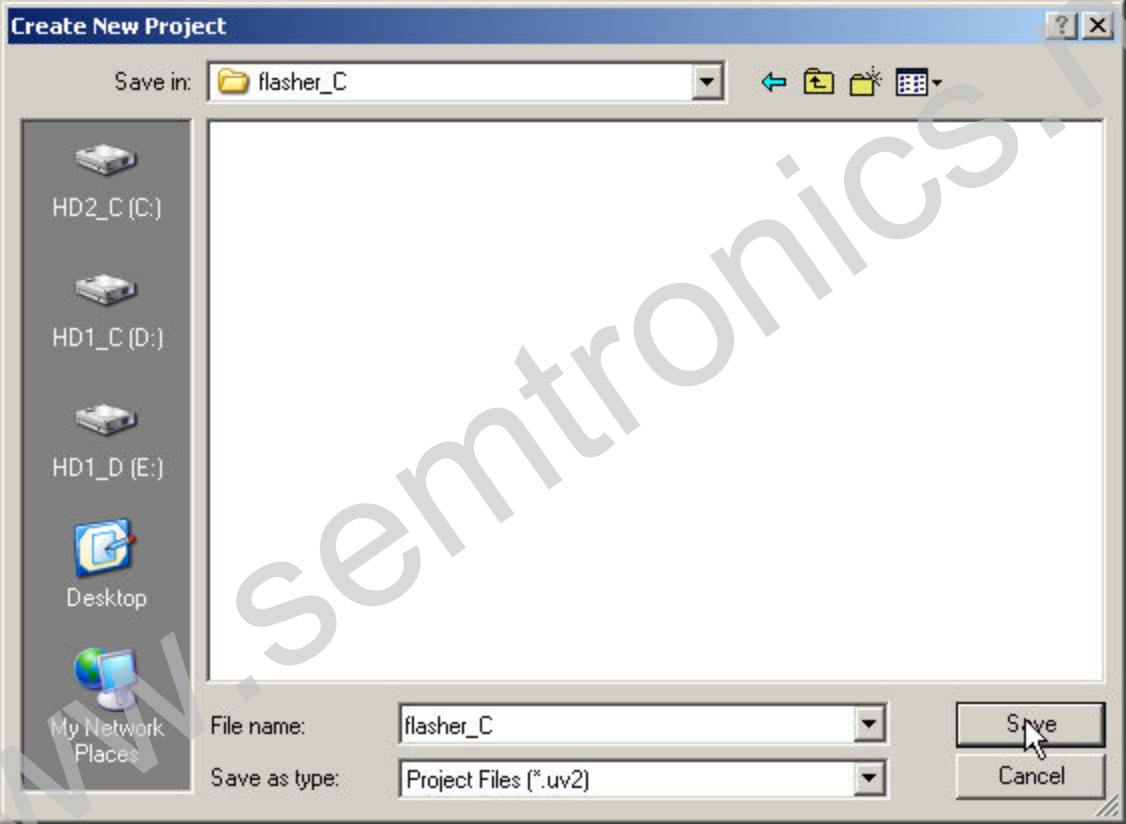

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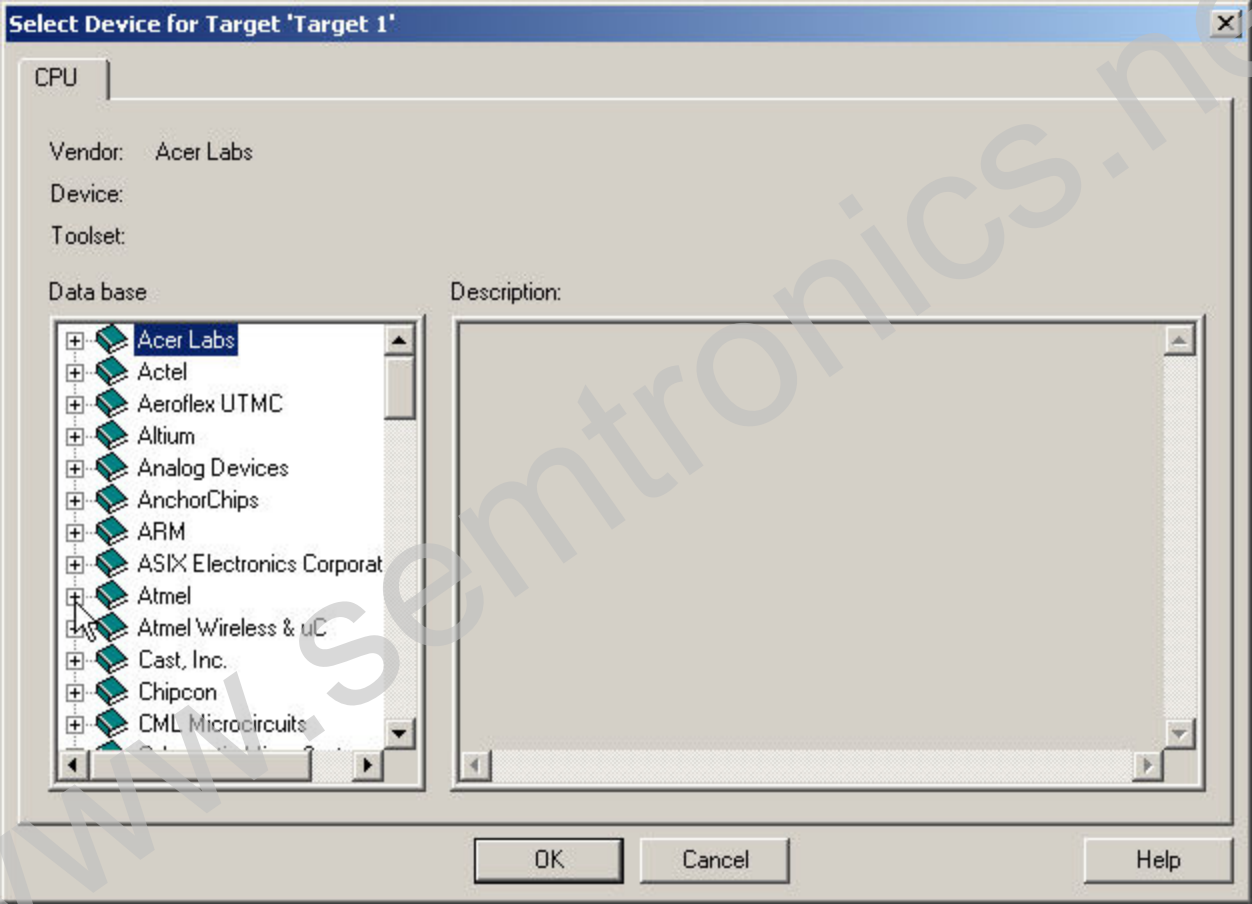
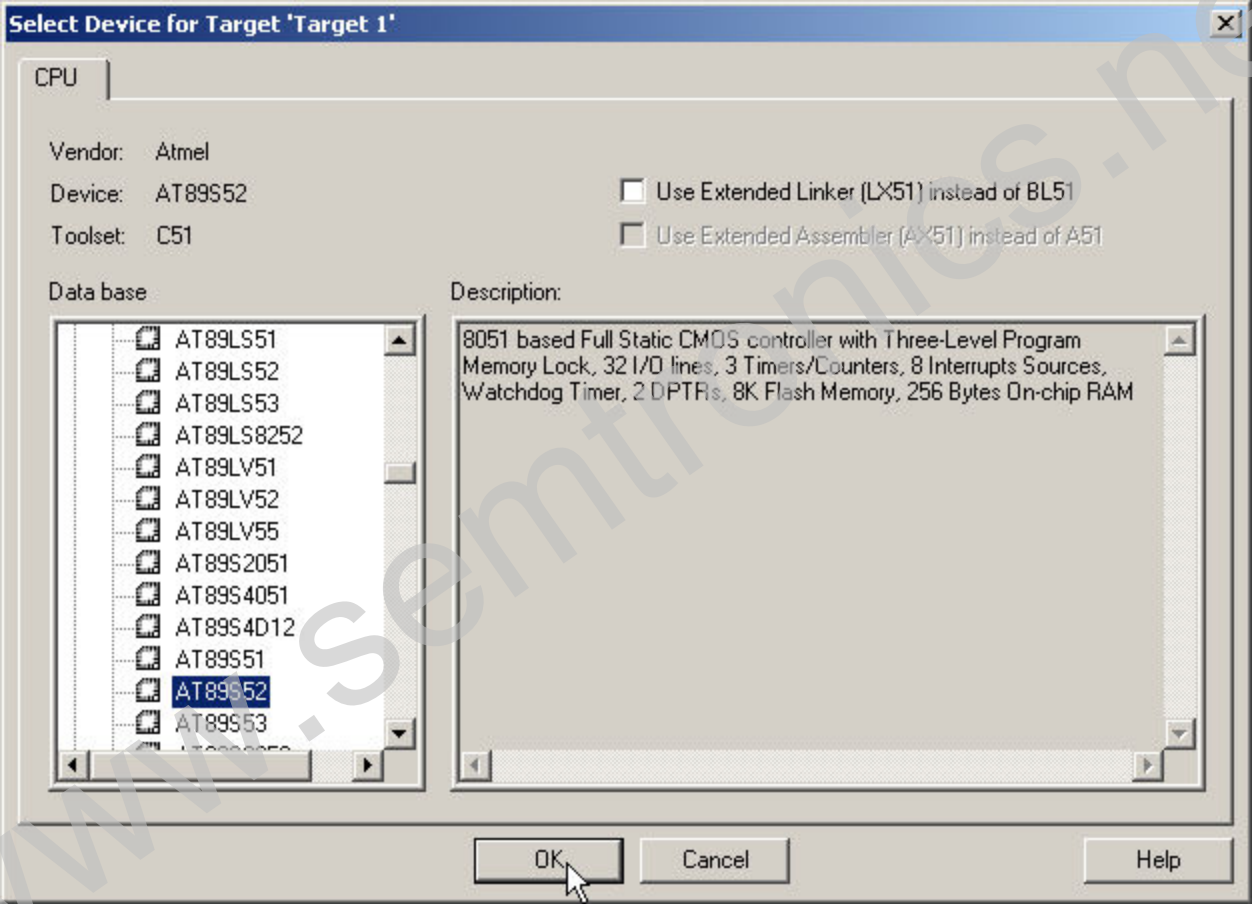
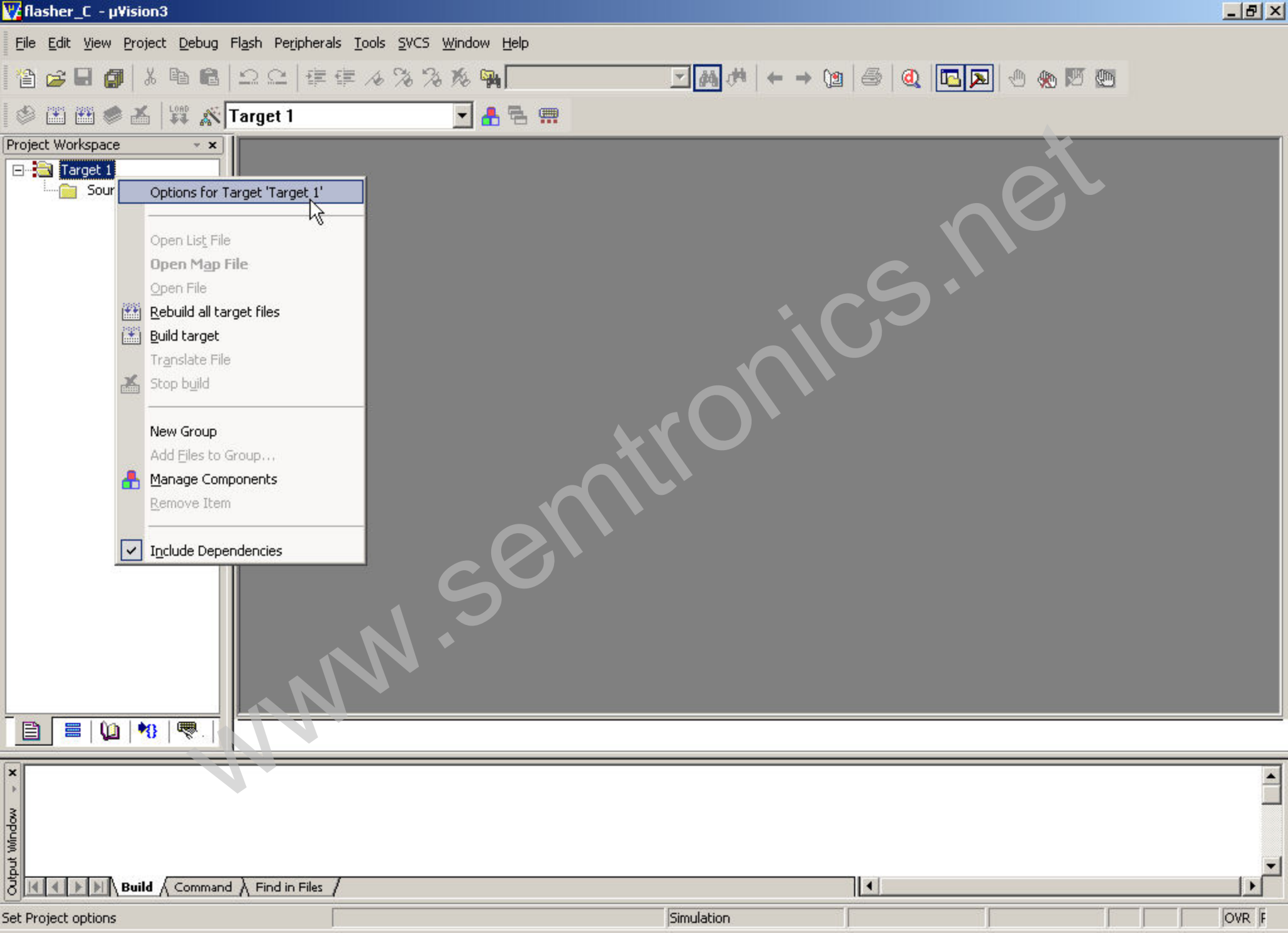

Select Device for Target 'Target 1'
CPU
Vendor: Acer Labs
Device:
Toolset:
Data base
Description:
Acer Labs
Actel
Aeroflex UTMC
Altium
Analog Devices
AnchorChips
ARM
ASIX Electronics Corporat
Atmel
Atmel Wireless & uC
Cast, Inc.
Chipcon
CML Microcircuits
OK
Cancel
Help


Select Device for Target 'Target 1'
CPU
Vendor: Atmel
Device: AT89S52
Toolset: C51
Use Extended Linker (LX51) instead of BL51
Use Extended Assembler (AX51) instead of A51
Data base
AT89LS51
AT89LS52
AT89LS53
AT89LS8252
AT89LV51
AT89LV52
AT89LV55
AT89S2051
AT89S4051
AT89S4D12
AT89S51
AT89S52
AT89S53
Description:
8051 based Full Static CMOS controller with Three-Level Program Memory Lock, 32 I/O lines, 3 Timers/Counters, 8 Interrupts Sources, Watchdog Timer, 2 DPTRs, 8K Flash Memory, 256 Bytes On-chip RAM
OK
Cancel
Help

µVision3
Copy Standard 8051 Startup Code to Project Folder and Add File to Project ?
Yes
No

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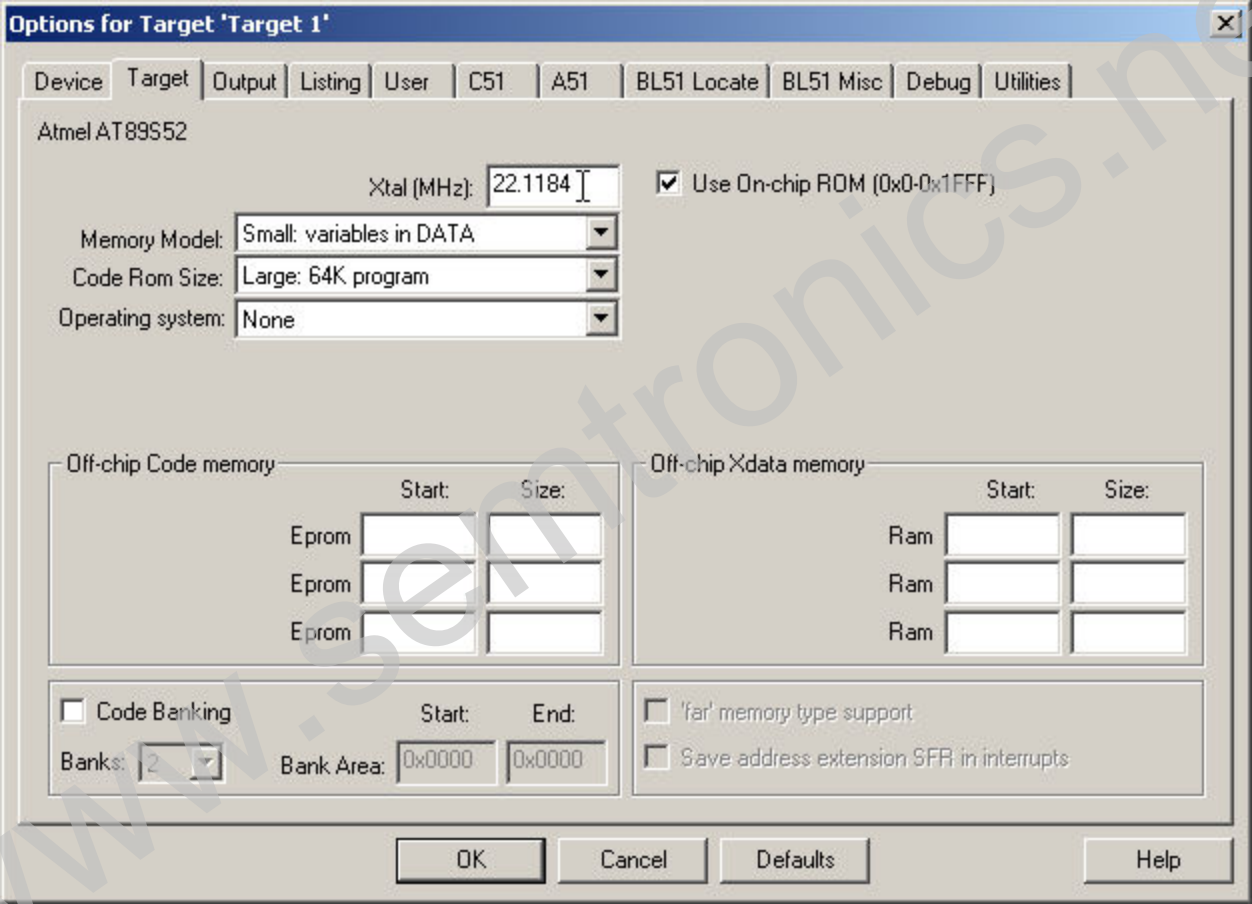
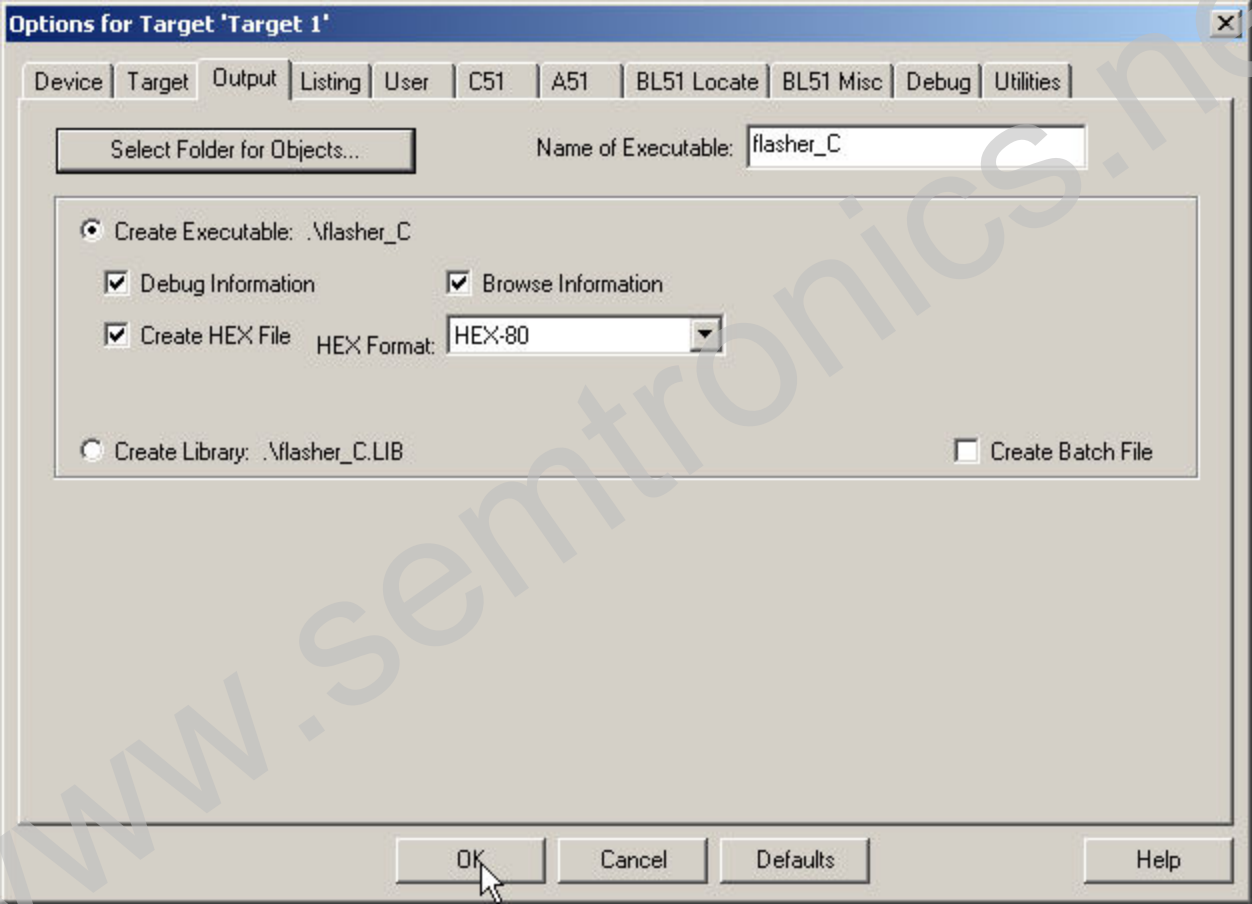

Options for Target 'Target 1'
Device
Target
Output
Listing
User
C51
A51
BL51 Locate
BL51 Misc
Debug
Utilities
Atmel AT89S52
Xtal (MHz):
22.1184
Use On-chip ROM (0x0-0x1FFF)
Memory Model:
Small: variables in DATA
Code Rom Size:
Large: 64K program
Operating system:
None
Off-chip Code memory
Start:
Size:
Eprom
Eprom
Eprom
Off-chip Xdata memory
Start:
Size:
Ram
Ram
Ram
Code Banking
Start:
End:
Banks:
2
Bank Area:
0x0000
0x0000
'far' memory type support
Save address extension SFR in interrupts
OK
Cancel
Defaults
Help



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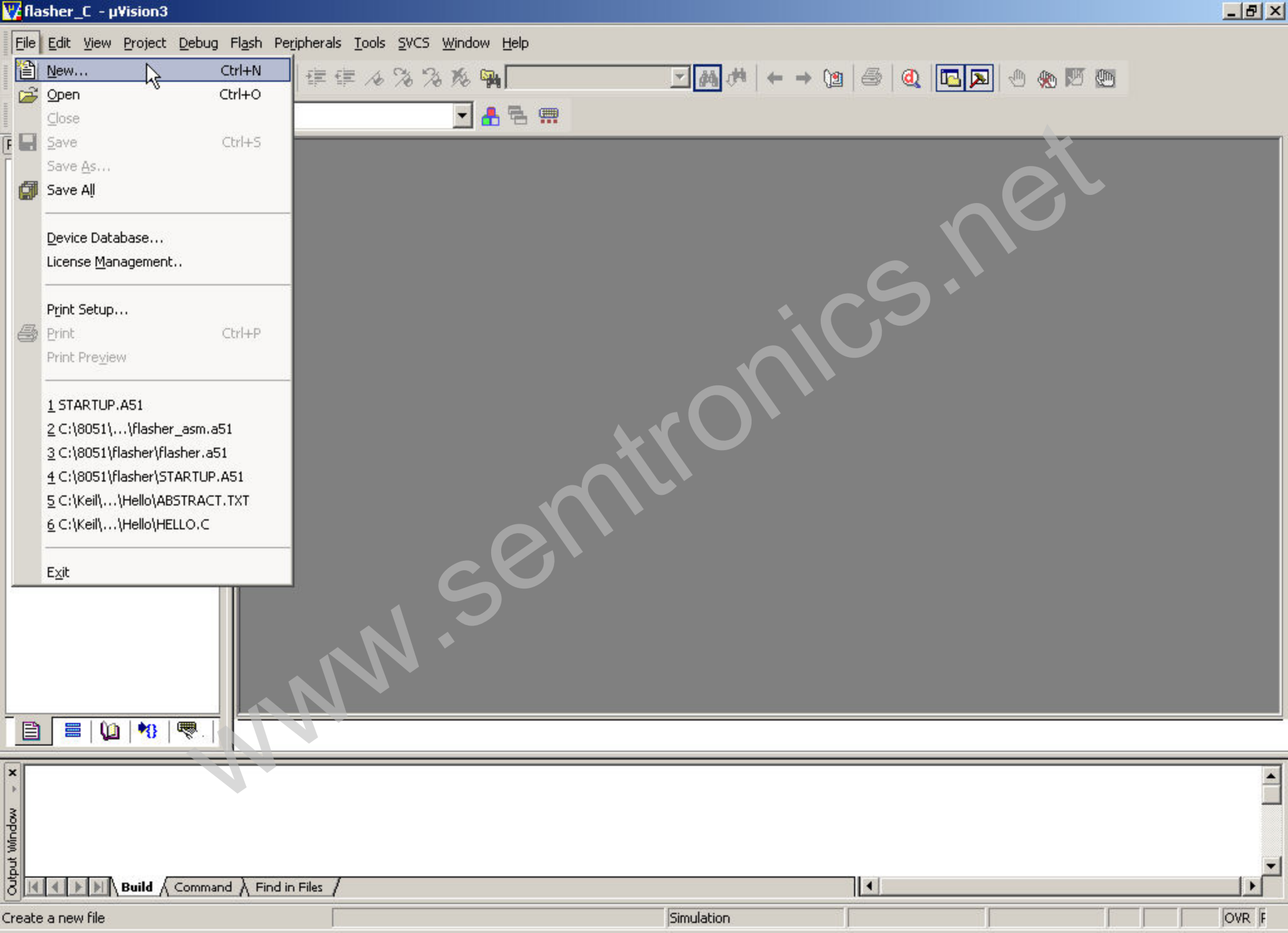


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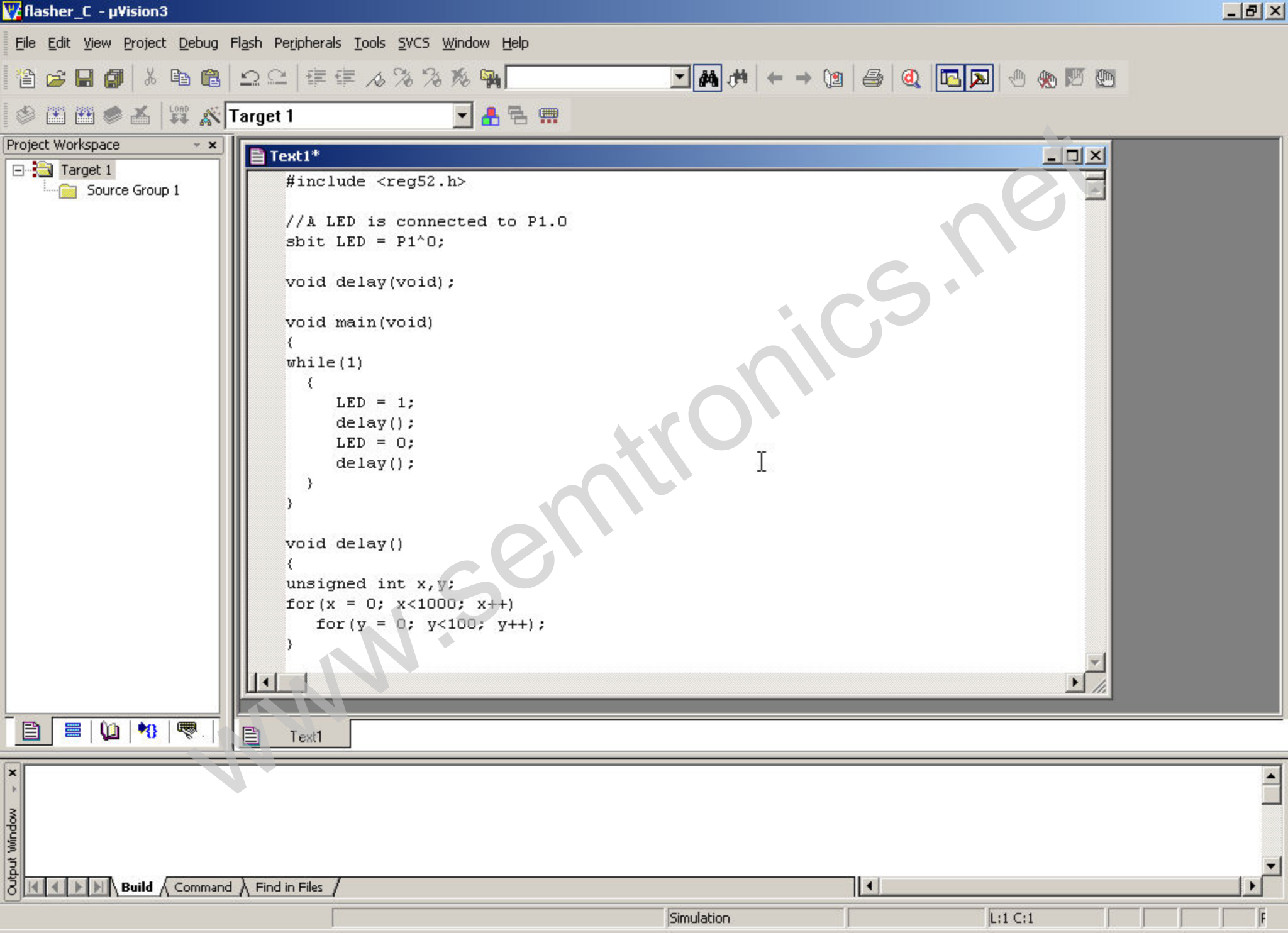


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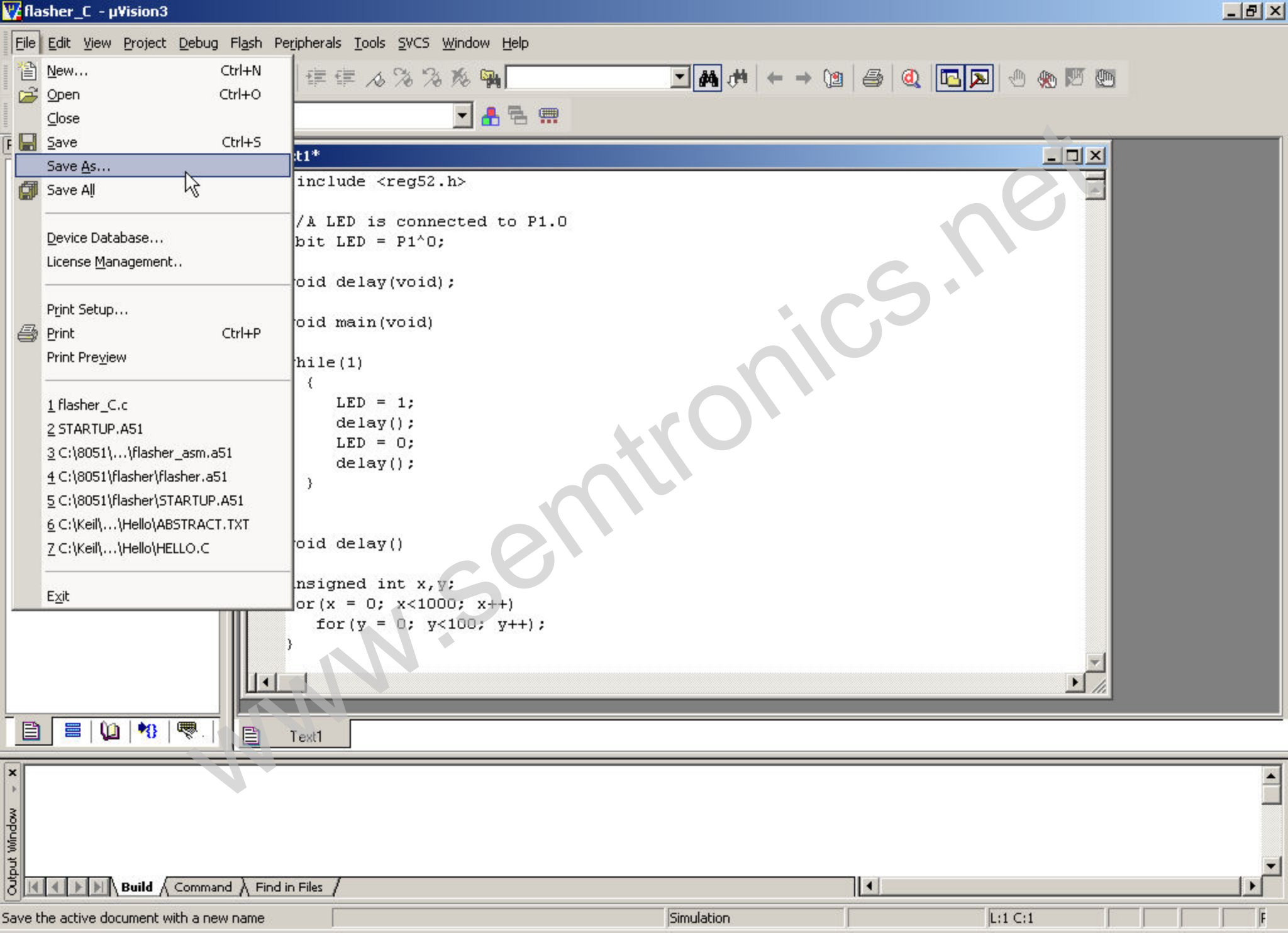


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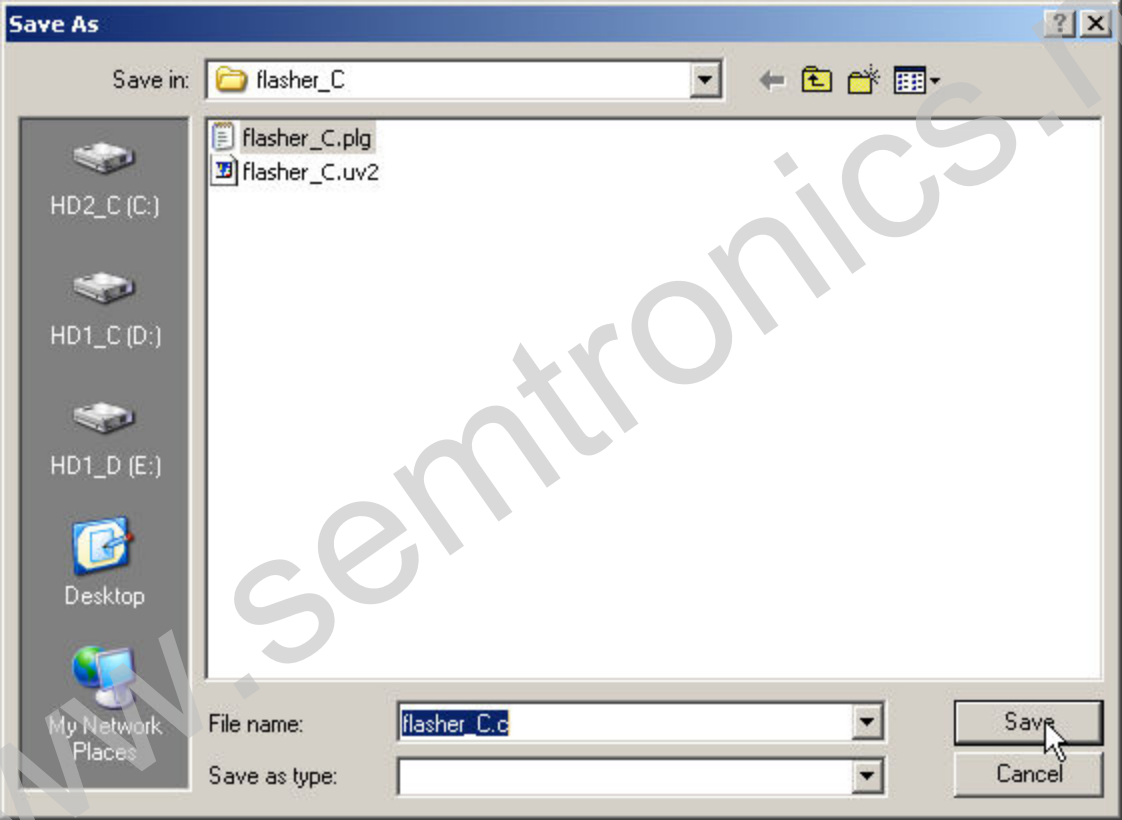

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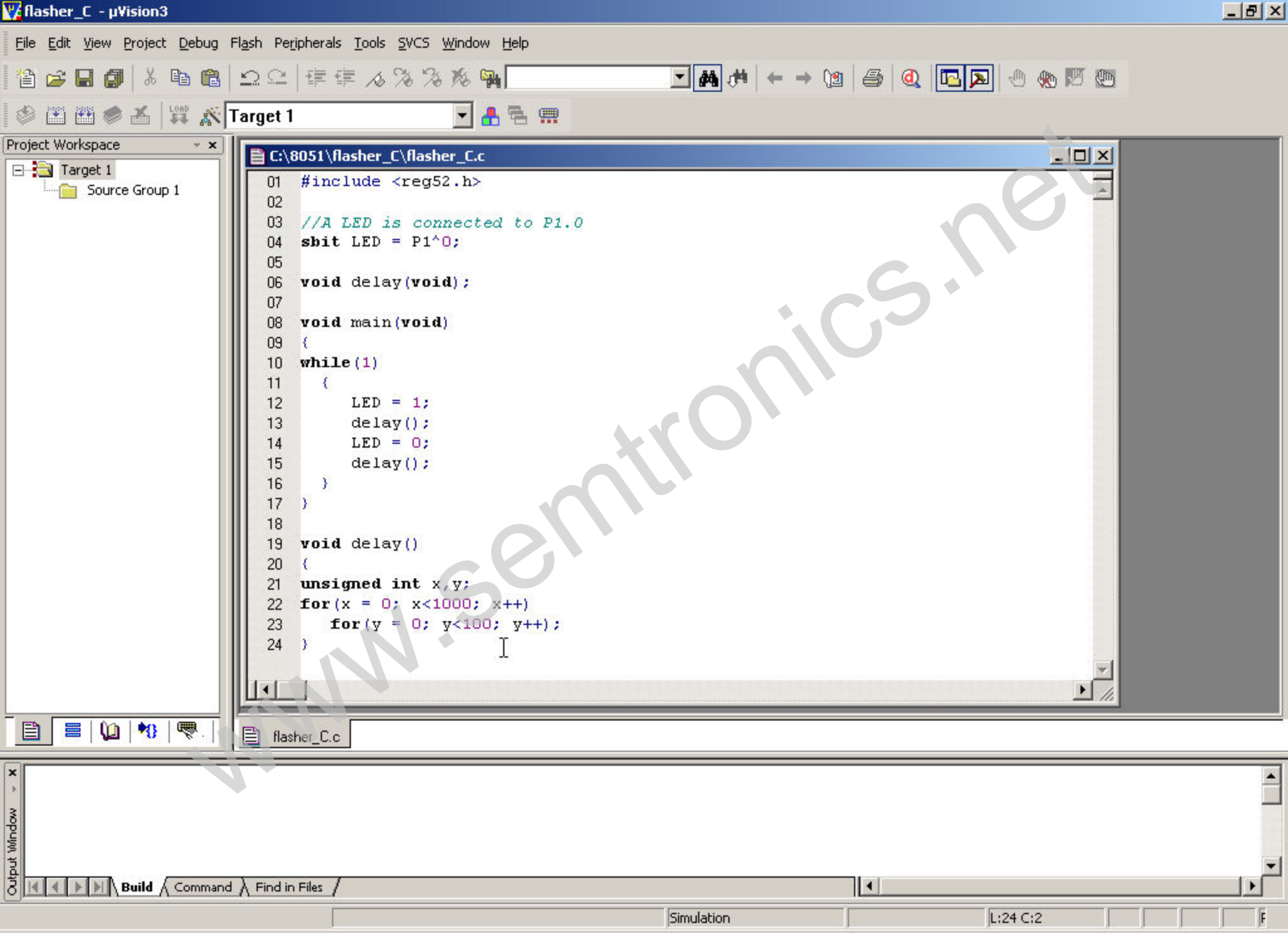


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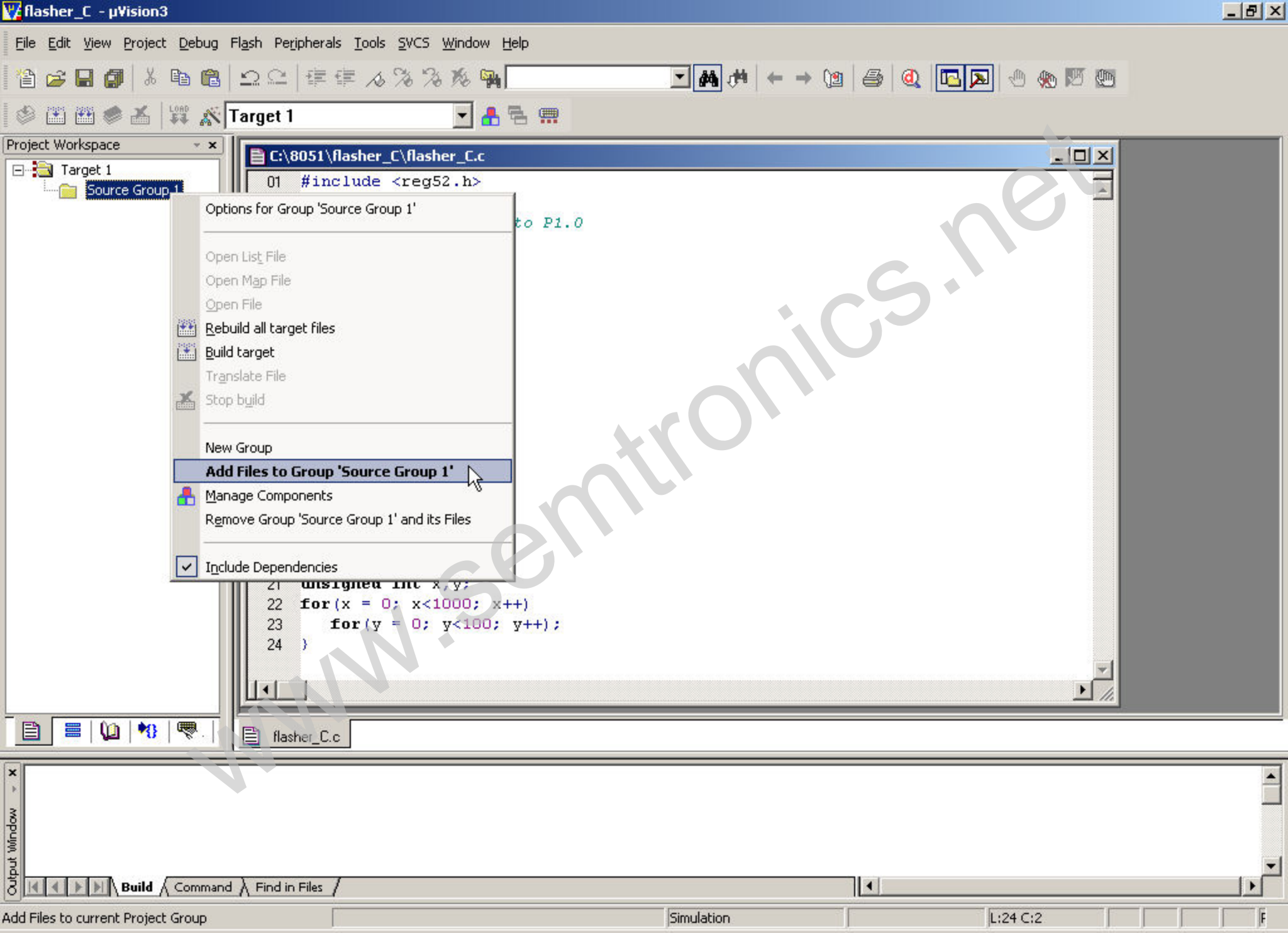

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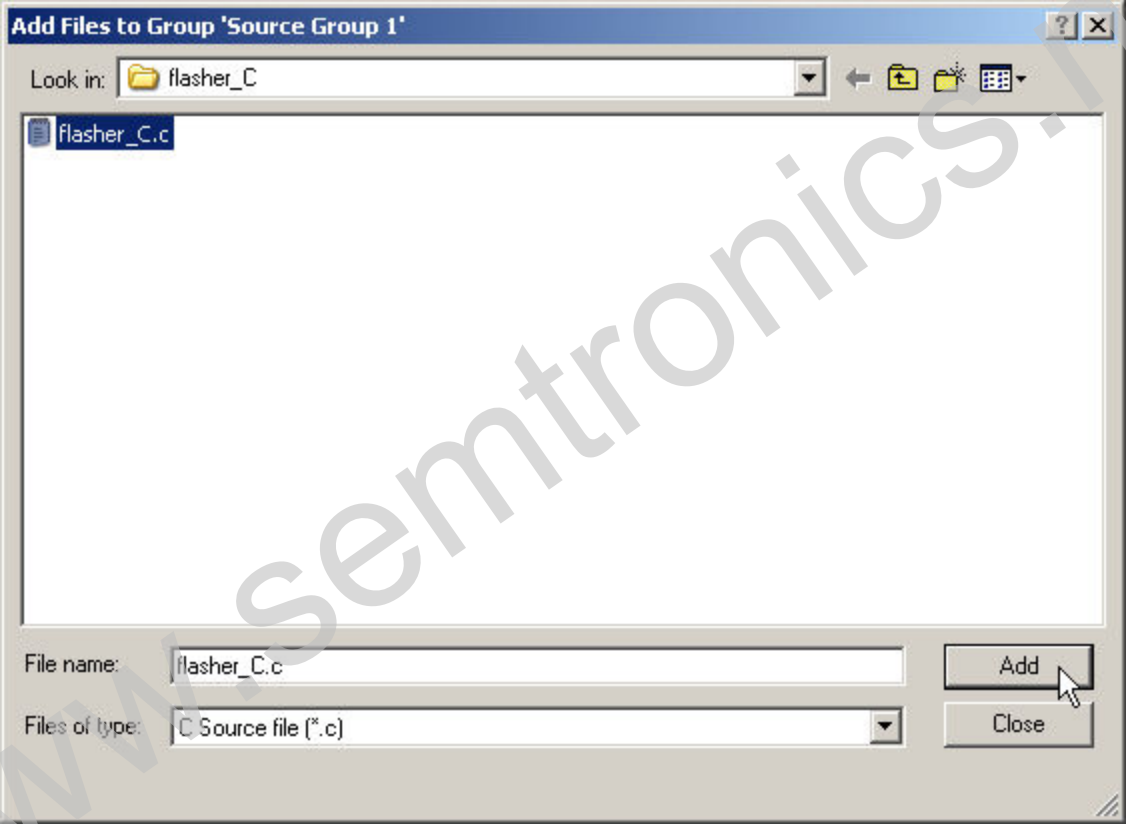

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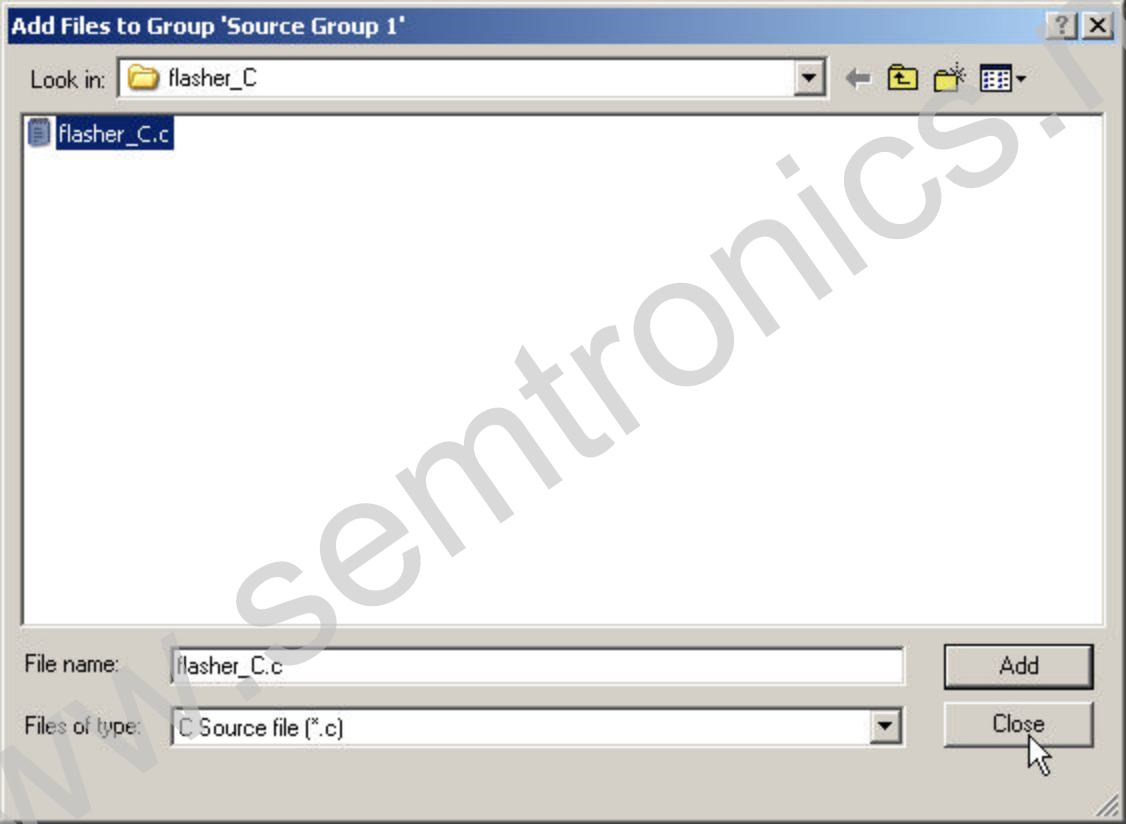

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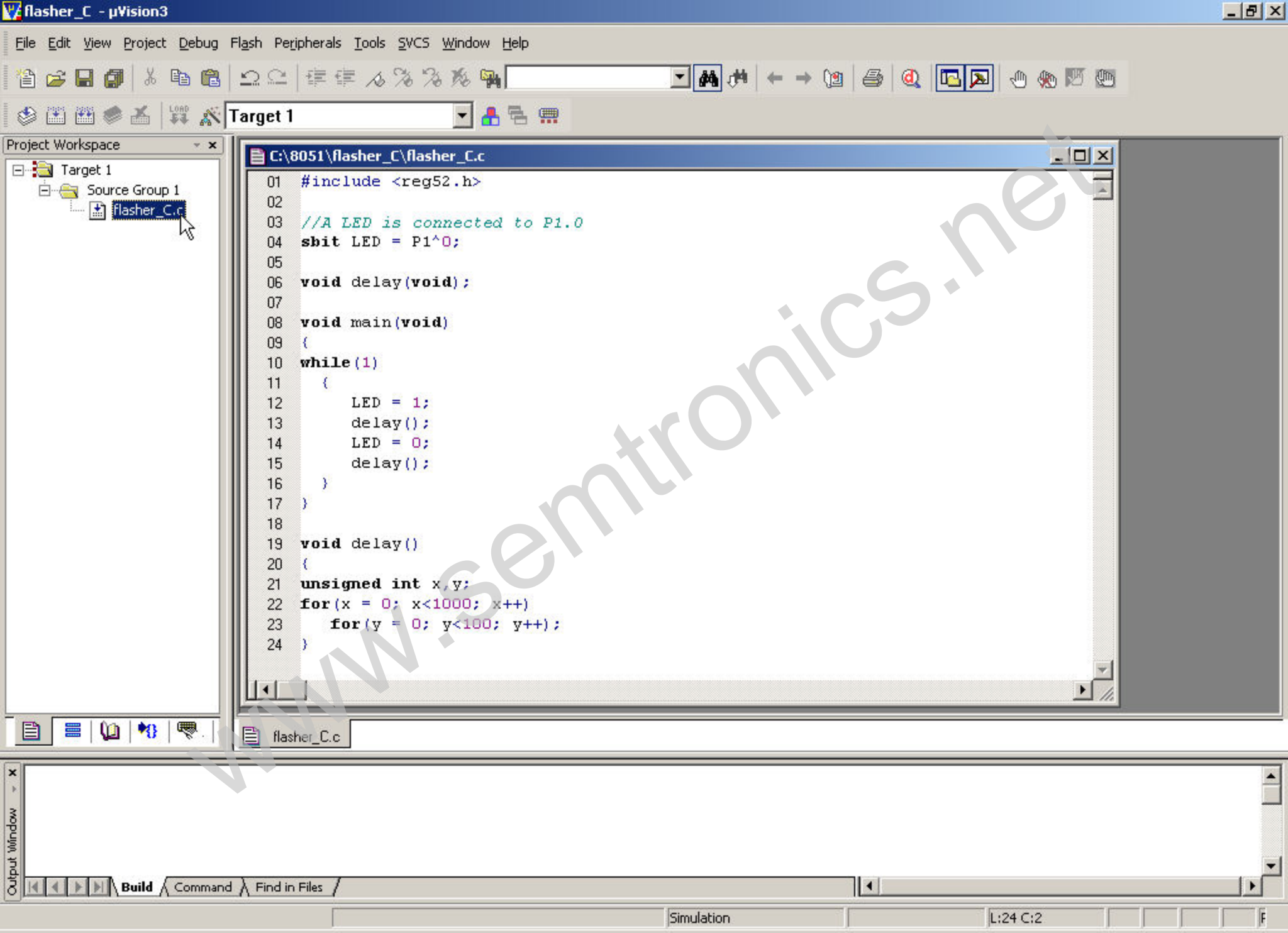


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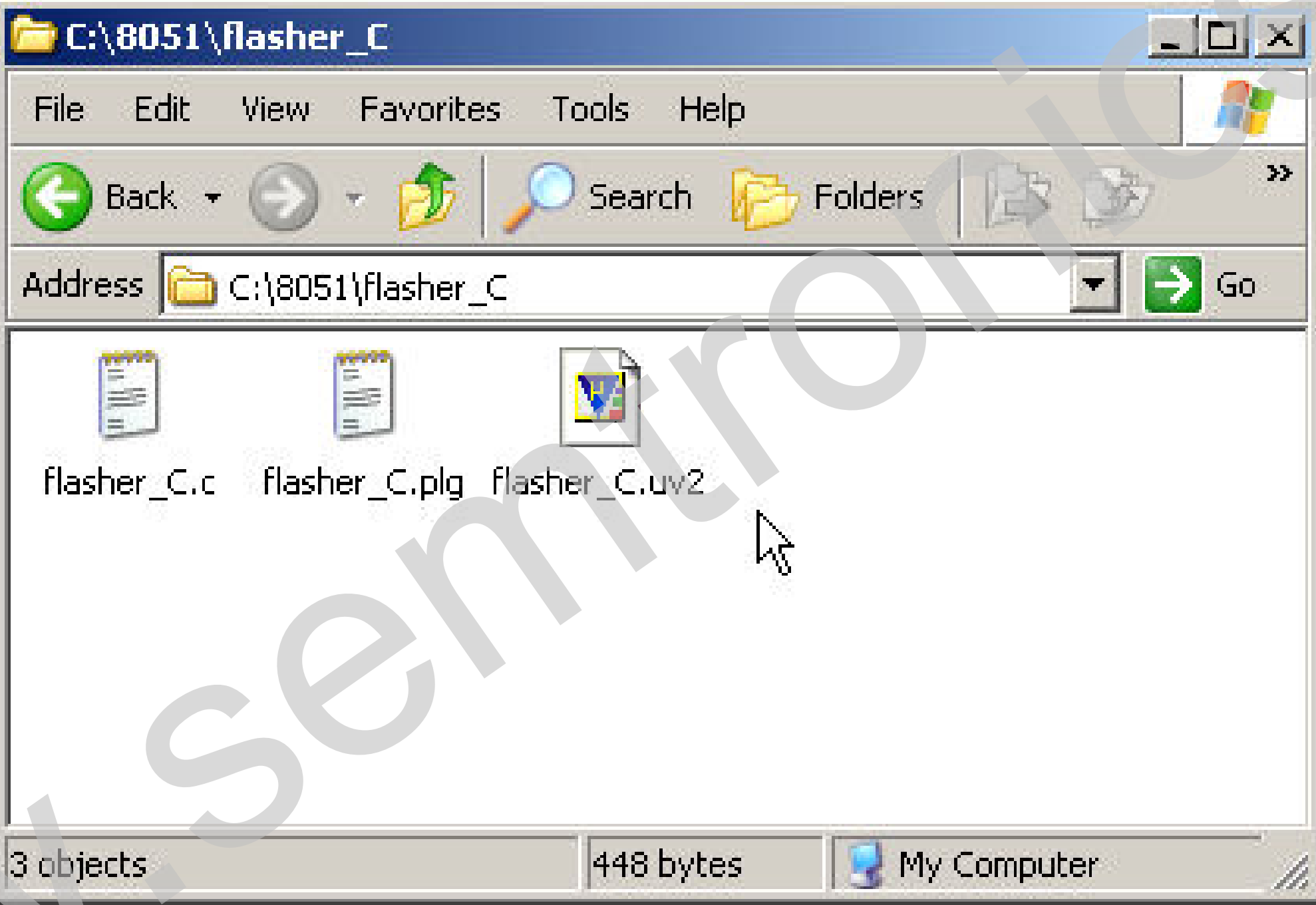
C:\8051\flasher_C
File Edit View Favorites Tools Help
Back
Search
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C:\8051\flasher_C
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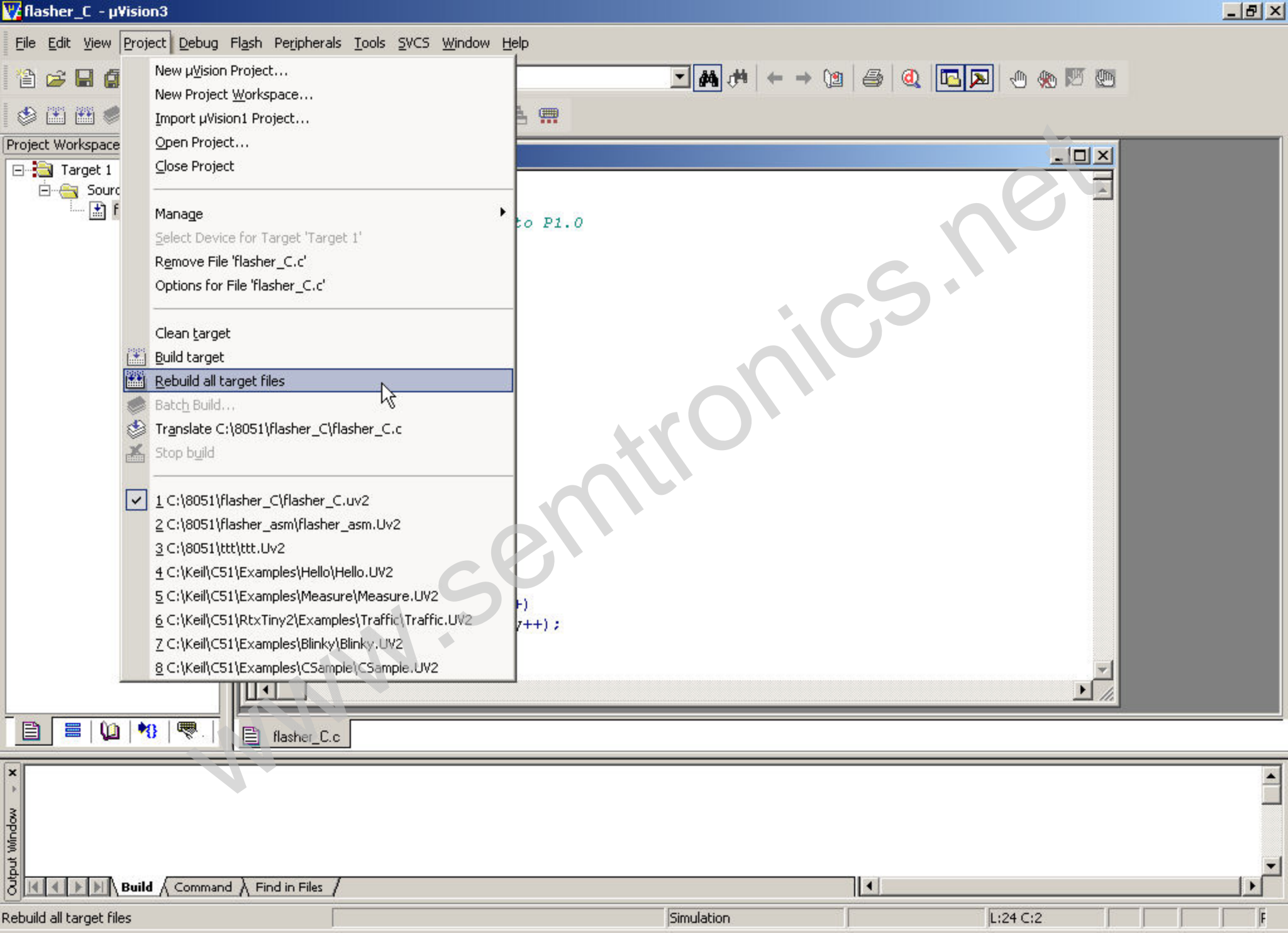
flasher_C.uv2
3 objects
448 bytes
My Computer

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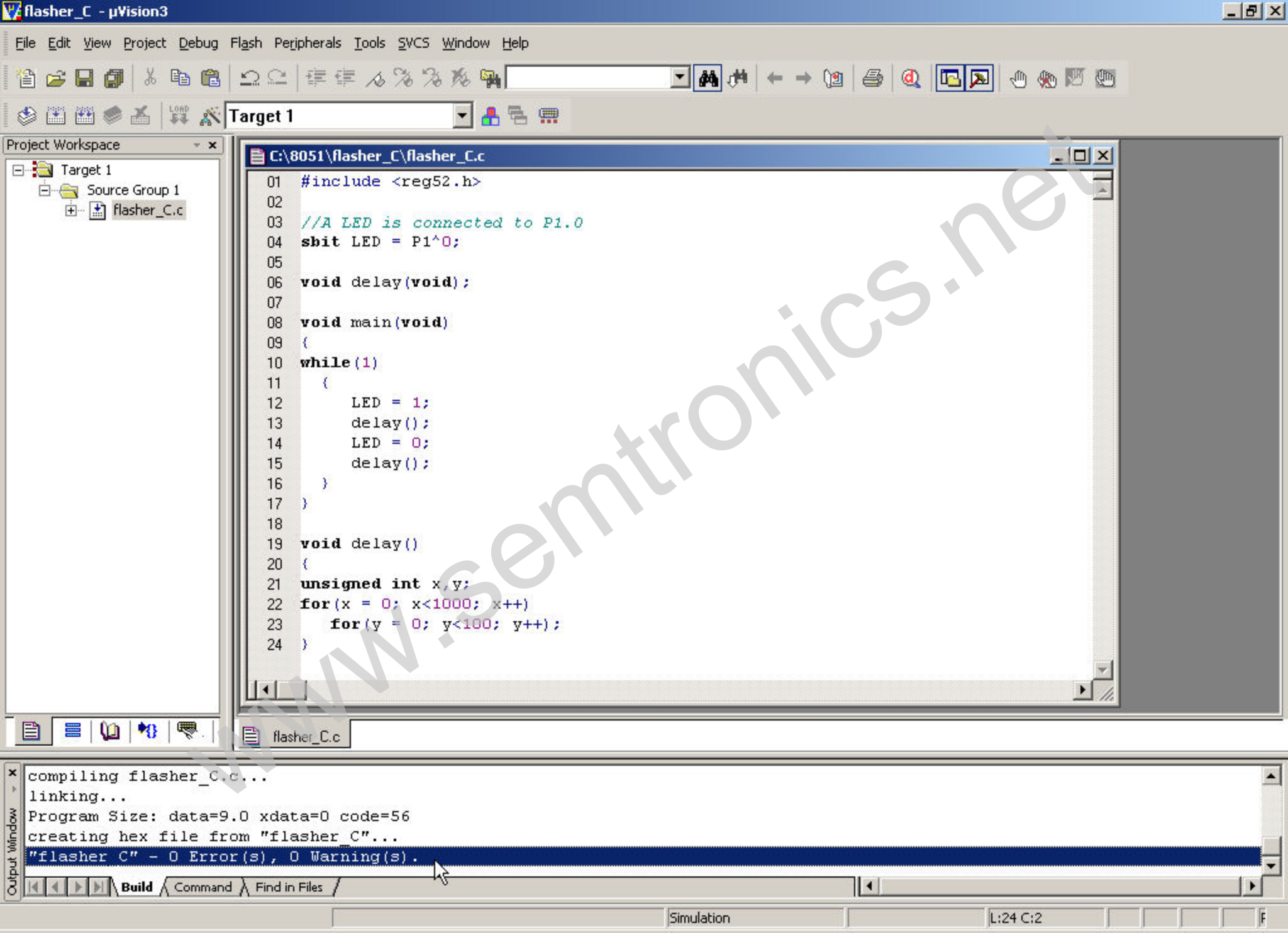


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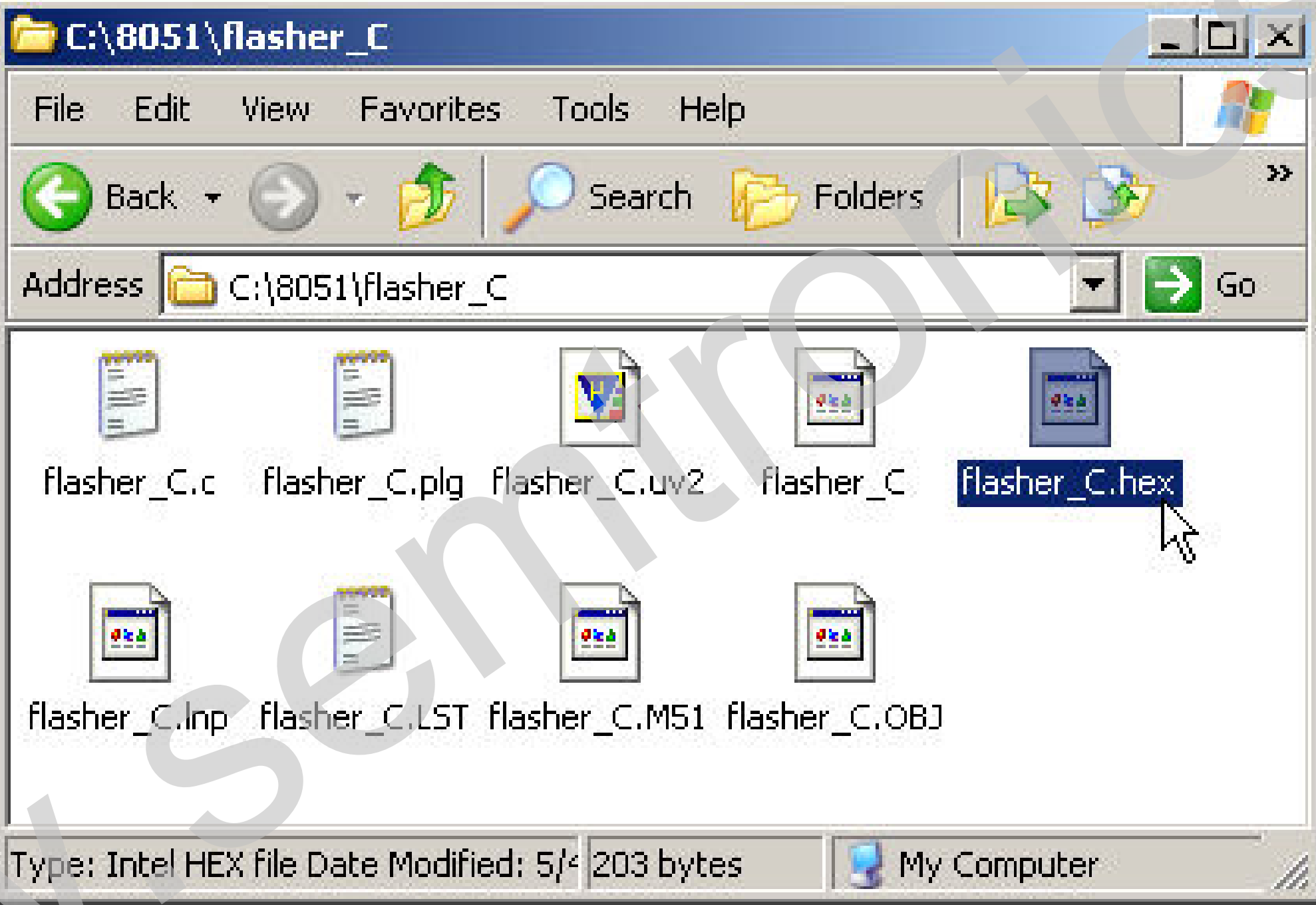
C:\8051\flasher_C
File Edit View Favorites Tools Help
Back
Search
Folders
Address
C:\8051\flasher_C
Go
flasher_C.c
flasher_C.plg
flasher_C.uv2
flasher_C
flasher_C.hex
flasher_C.lnp
flasher_C.LST
flasher_C.M51
flasher_C.OBJ
Type: Intel HEX file Date Modified: 5/
203 bytes
My Computer

# 1.c. Installing FLIP Software

**The self_Programming Software is responsible for downloading the HEX code generated by the Keil software into the Flash memory of the microcontroller through the USB-MOD module.**

**FLIP software is free from ATMEL and latest versions can be downloaded from he following link:**

**http://www.atmel.com/dyn/products/tools_card_v2.asp?tool_id=3886**

**Flip software can read, program, and verify the flash, EEPROM, fuses, and lock bits of the target microcontroller.**

**Please follow the following slides for Downloading and installing and using FLIP Software.**

www.semtronics.net

Atmel Products - AVR Solutions - FLIP - Windows Internet Explorer
http://www.atmel.com/dyn/products/tools_card_v2.asp?tool_id=3886
File Edit View Favorites Tools Help
Favorites
Atmel Products - AVR Solutions - FLIP



FLIP 3.4.1 Release Notes(Other, revision 3.4.1, updated 2/10)

## Software

FLIP 3.4.1 for Windows (requires Java Runtime Environment) (5 MB, revision 3.4.1, updated 2/10)
Runs on Windows 98/Me/NT/2000/XP/Vista/7

FLIP 3.4.1 for Windows (Java Runtime Environement included) (20 MB, revision 3.4.1, updated 2/10)
Runs Windows 98/Me/NT/2000/XP/Vista/7

FLIP 3.2.1 for Linux x86 (require Java Runtime Environment) (1 MB, revision 3.2.1, updated 10/07)
Runs on Linux x86

FLIP 2.4.6 for Windows (4 MB, revision 2.4.6, updated 2/10)
Runs on Windows 98/Me/NT/2000/XP/Vista/7.
This version is kept available because FLIP 3 does not support Smart card readers ICs.

## Related Devices

AT32UC3A0128 AT32UC3A0256 AT32UC3A0512 AT32UC3A1128 AT32UC3A1256 AT32UC3A1512
AT32UC3A3128 AT32UC3A3128S AT32UC3A3256 AT32UC3A3256S AT32UC3A364 AT32UC3A364S
AT32UC3B0128 AT32UC3B0256 AT32UC3B0512 AT32UC3B064 AT32UC3B1128 AT32UC3B1256
AT32UC3B1512 AT32UC3B164 AT89C5115 AT89C5121 AT89C5122 AT89C5130A-M
AT89C5131 AT89C5131A-L AT89C5131A-M AT89C51AC3 AT89C51CC03 AT89C51ED2
AT89C51IC2 AT89C51ID2 AT89C51RC2 AT89C51RD2 AT89C51RE2 AT89C51SND1C
AT89C51SND2C AT90CAN128 AT90CAN128 Automotive AT90CAN32 AT90CAN32
Automotive AT90CAN64
AT90CAN64 Automotive AT90USB1286 AT90USB1287 AT90USB162 AT90USB646 AT90USB647
AT90USB82 ATmega16M1 ATmega16U2 ATmega16U4 ATmega32M1 ATmega32U2
ATmega32U4 ATmega64M1 ATmega8U2 T89C51RB2 T89C51RC2 T89C51RD2

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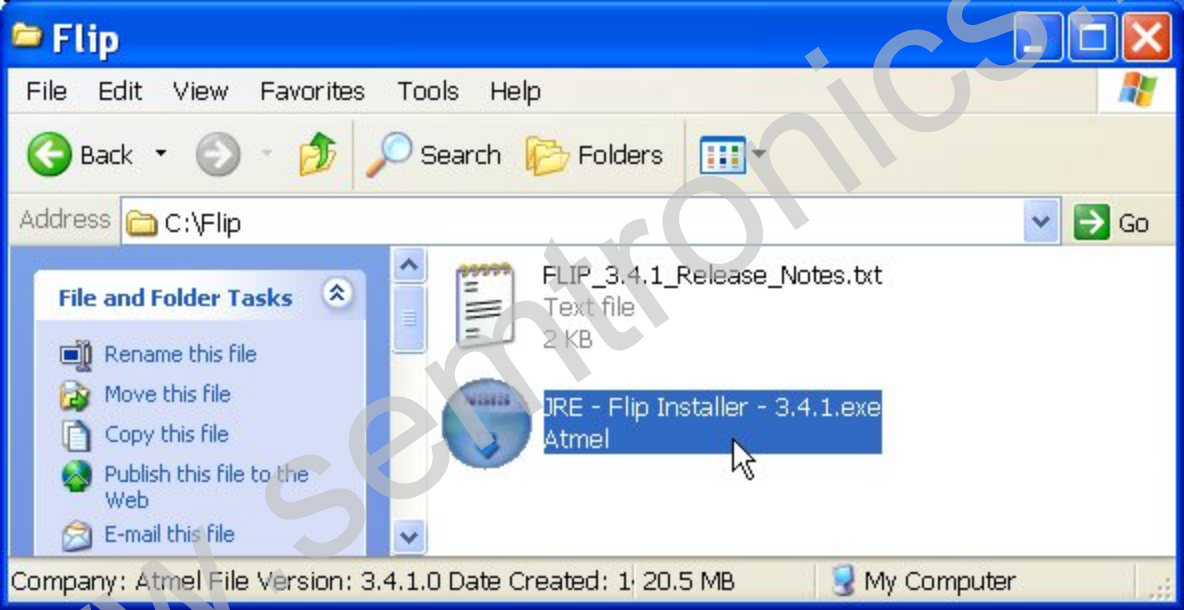
http://www.atmel.com/dyn/resources/prod_documents/JRE%20-%20Flip%20Installer%20-%203.4.1.exe
Internet 100%
start Self_programming Flip_install Paint Shop Pro Atmel Products - ... EN 12:32


Flip
File Edit View Favorites Tools Help
Back
Search
Folders
Address
C:\Flip
Go
File and Folder Tasks
Rename this file
Move this file
Copy this file
Publish this file to the Web
E-mail this file
FLIP_3.4.1_Release_Notes.txt
Text file
2 KB
JRE - Flip Installer - 3.4.1.exe
Atmel
Company: Atmel File Version: 3.4.1.0 Date Created: 1
20.5 MB
My Computer

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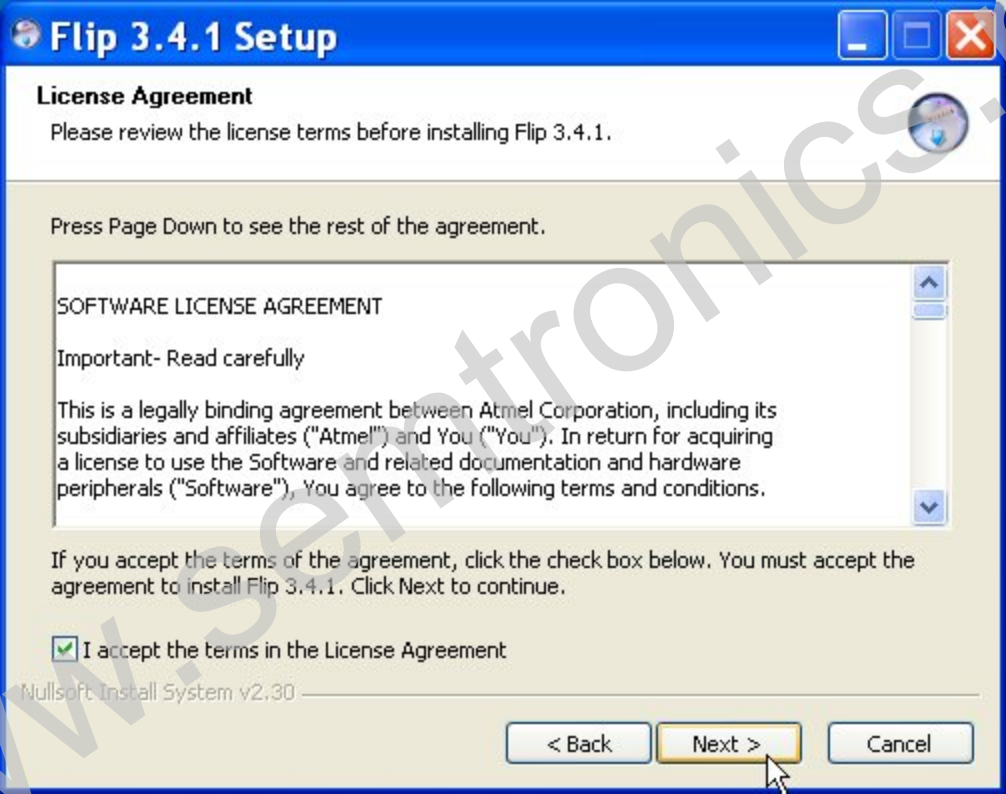
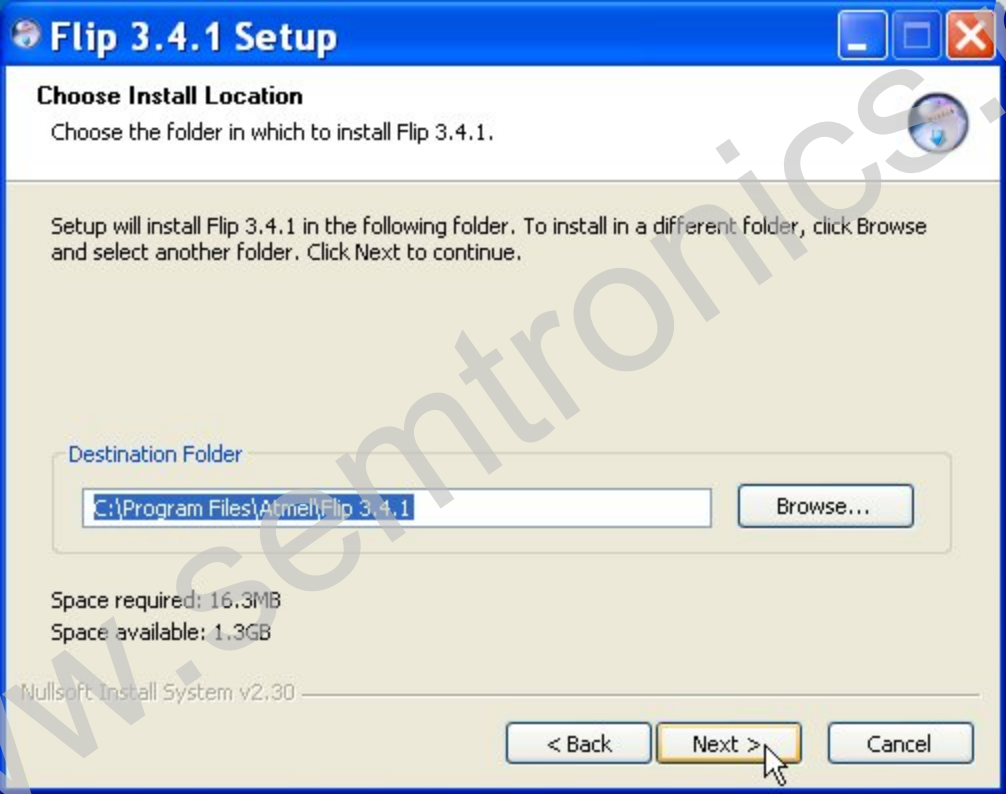
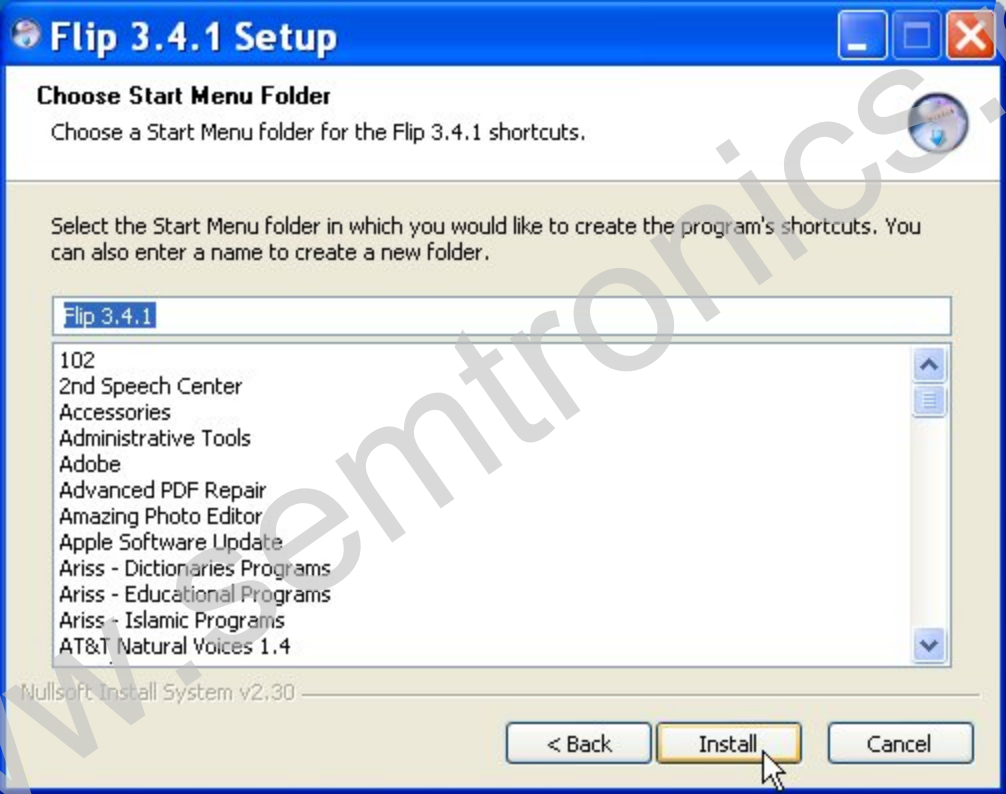
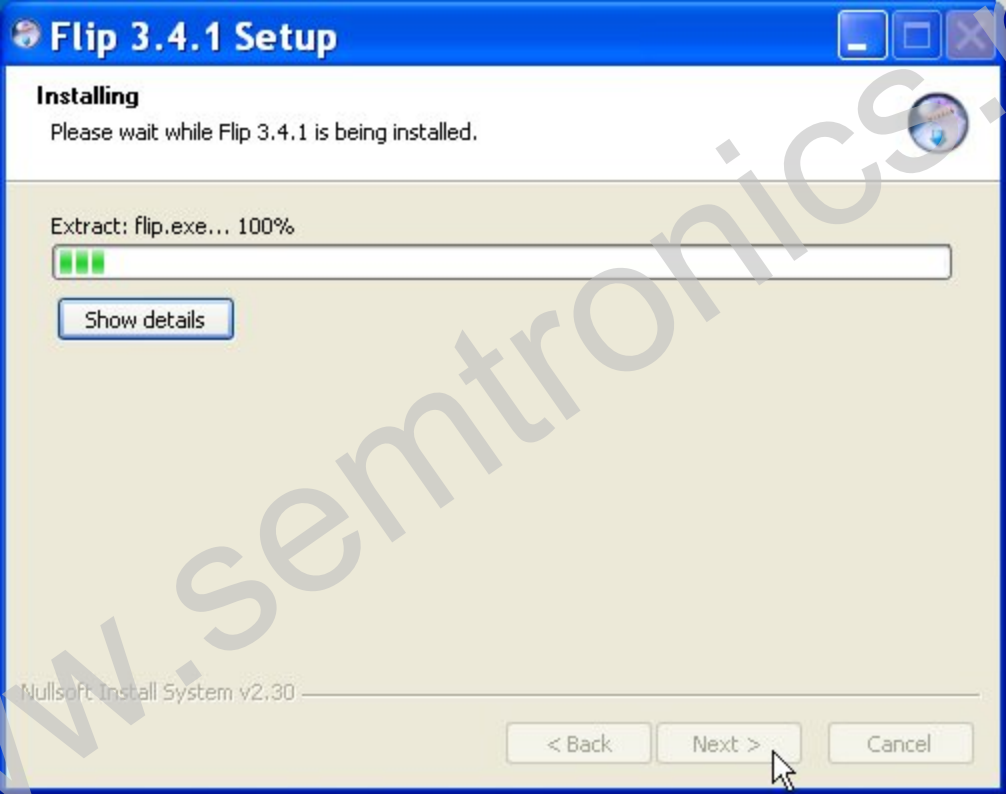

Flip 3.4.1 Setup
License Agreement
Please review the license terms before installing Flip 3.4.1.
Press Page Down to see the rest of the agreement.
SOFTWARE LICENSE AGREEMENT
Important- Read carefully
This is a legally binding agreement between Atmel Corporation, including its subsidiaries and affiliates ("Atmel") and You ("You"). In return for acquiring a license to use the Software and related documentation and hardware peripherals ("Software"), You agree to the following terms and conditions.
If you accept the terms of the agreement, click the check box below. You must accept the agreement to install Flip 3.4.1. Click Next to continue.
I accept the terms in the License Agreement
Nullsoft Install System v2.30
< Back
Next >
Cancel


Flip 3.4.1 Setup
Choose Install Location
Choose the folder in which to install Flip 3.4.1.
Setup will install Flip 3.4.1 in the following folder. To install in a different folder, click Browse and select another folder. Click Next to continue.
Destination Folder
C:\Program Files\Atmel\Flip 3.4.1
Browse...
Space required: 16.3MB
Space available: 1.3GB
Nullsoft Install System v2.30
< Back
Next >
Cancel


Flip 3.4.1 Setup
Choose Start Menu Folder
Choose a Start Menu folder for the Flip 3.4.1 shortcuts.
Select the Start Menu folder in which you would like to create the program's shortcuts. You can also enter a name to create a new folder.
Flip 3.4.1
102
2nd Speech Center
Accessories
Administrative Tools
Adobe
Advanced PDF Repair
Amazing Photo Editor
Apple Software Update
Ariss - Dictionaries Programs
Ariss - Educational Programs
Ariss - Islamic Programs
AT&T Natural Voices 1.4
Nullsoft Install System v2.30
< Back
Install
Cancel
w.emtronics.



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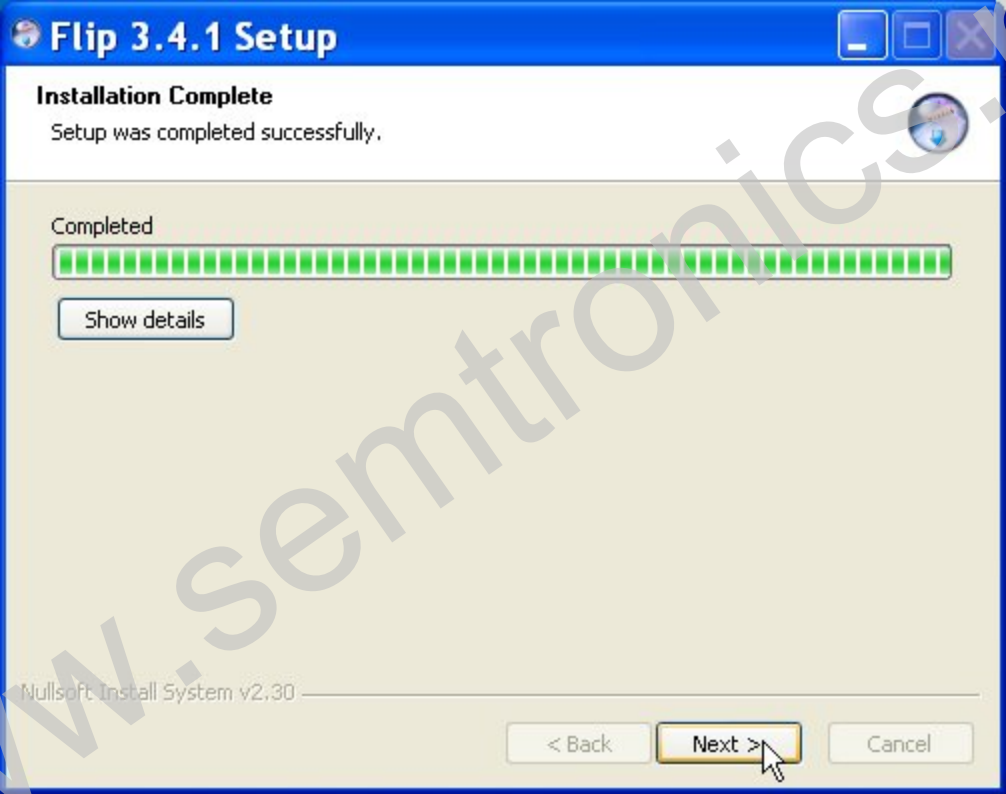


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# 2. AT89KIT Hardware Components

**The shown photo illustrates the components that come with AT89KIT**

- **AT89C51ED2 microcontroller.**
- **USBMOD module**
- **Two 33pf Capacitors**
- **Two LEDs (Red & Green)**
- **Two Resistors (1K & 330)**
- **Two Push Button**
- **22.1184MHz Crystal**
- **Software CDROM**
- **USB Cable.**

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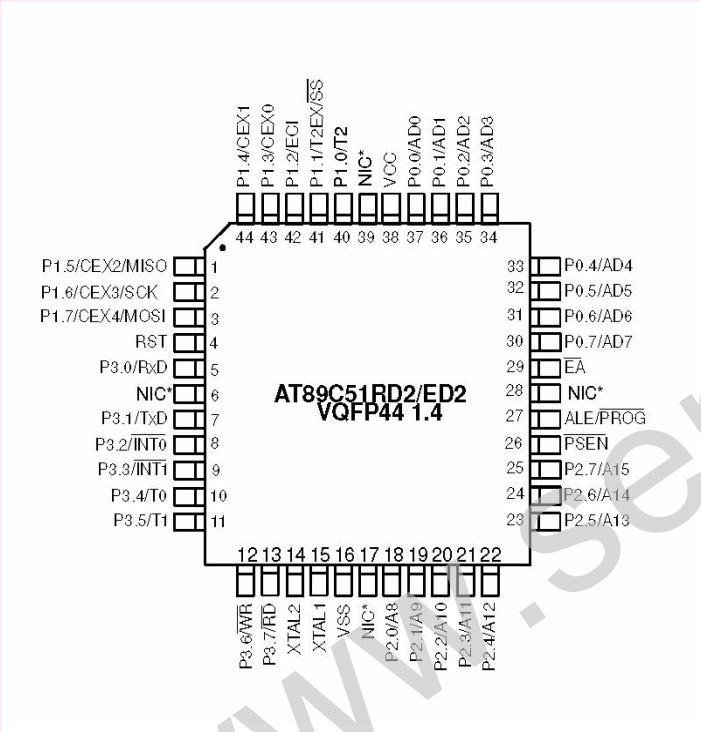
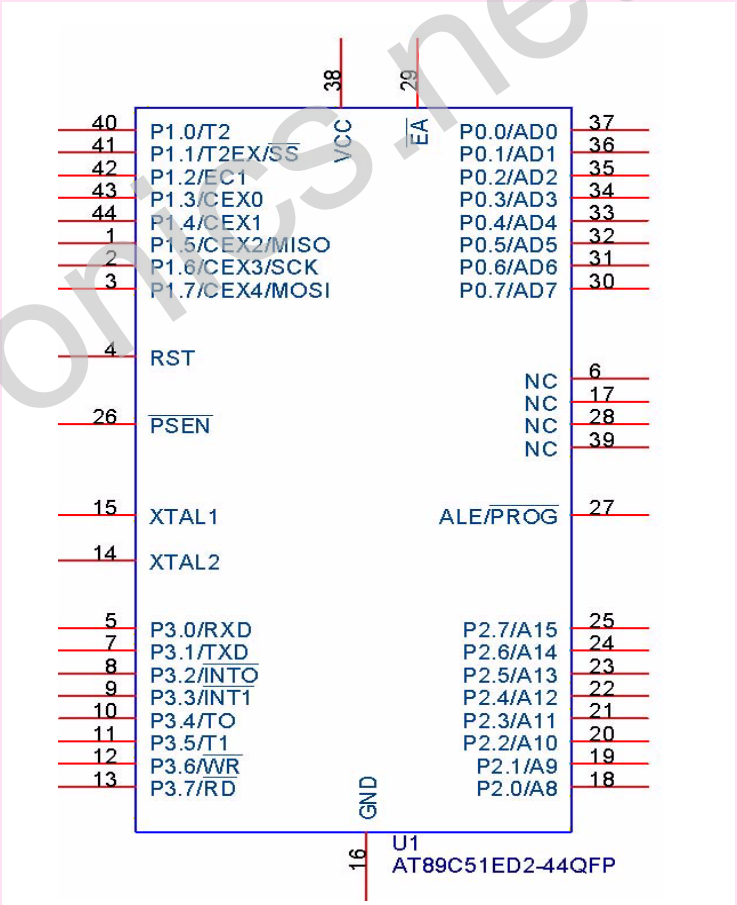
# AT89C51ED2 Physical and Logical Pinouts

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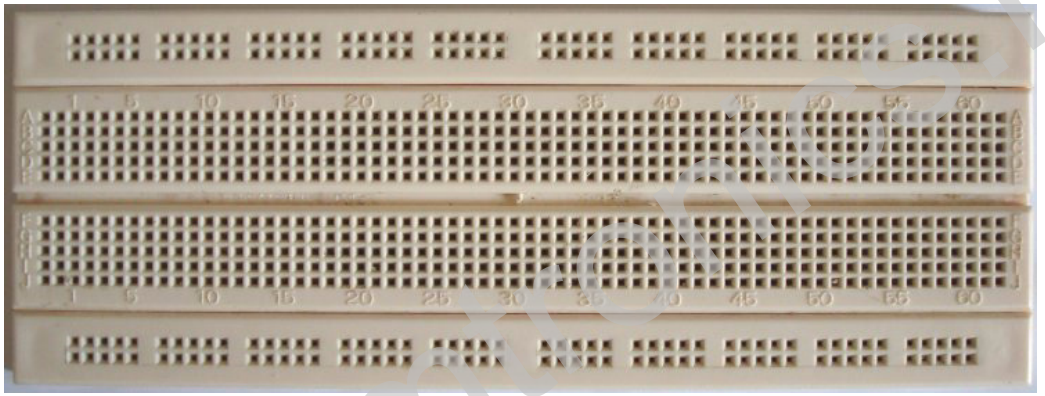
**You will need to supply a bread board (such as SNGBB) and colored connecting wires (such as WIREPACK) as shown in the following photo.**



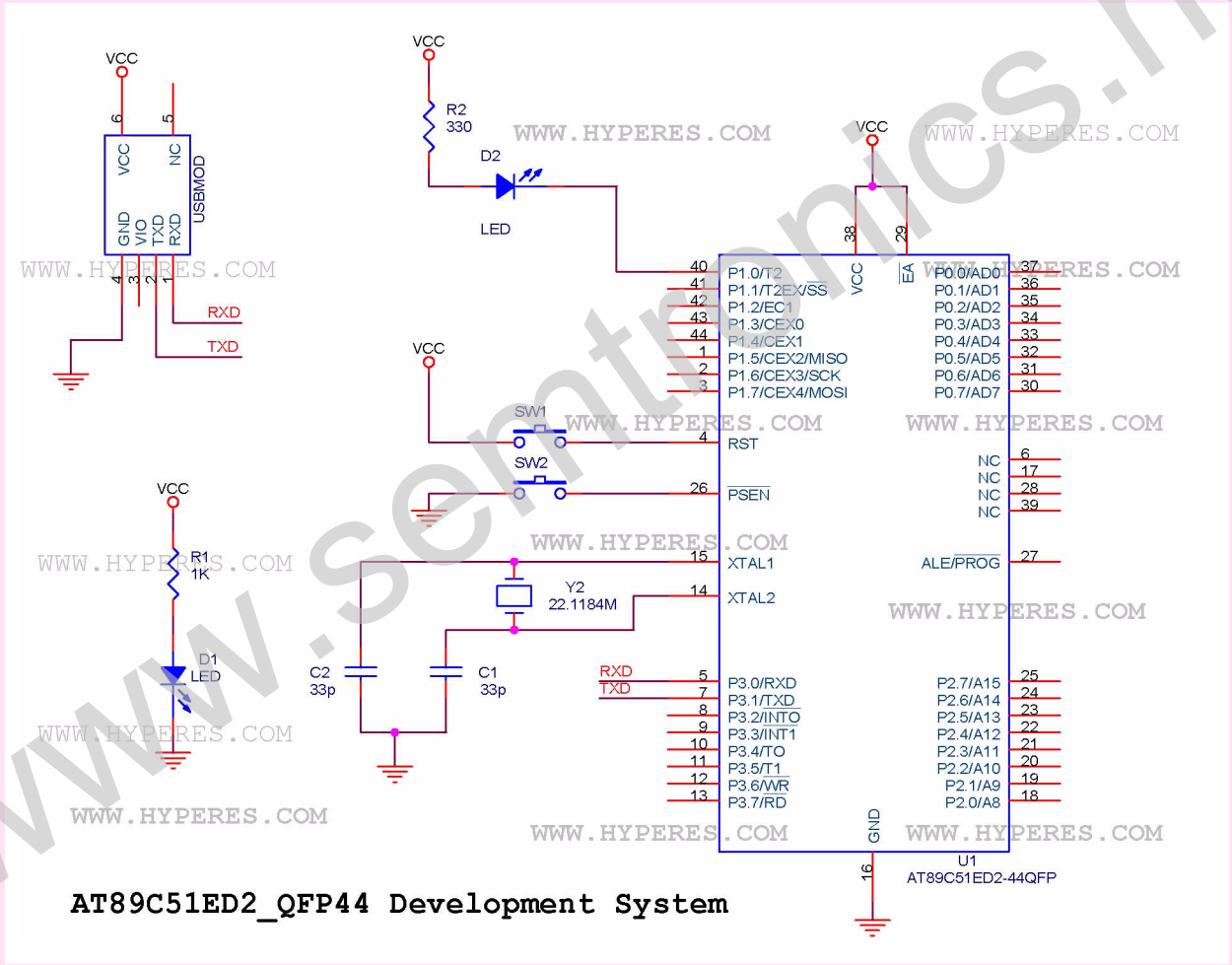
**SNGBB**

**WIREPACK**

www.somtum.net

# 3. Connecting AT89KIT Hardware

**The schematic of the AT89C51ED2 starter circuit is shown below. The target of the circuit is to flash the LED connected to P1.0.**

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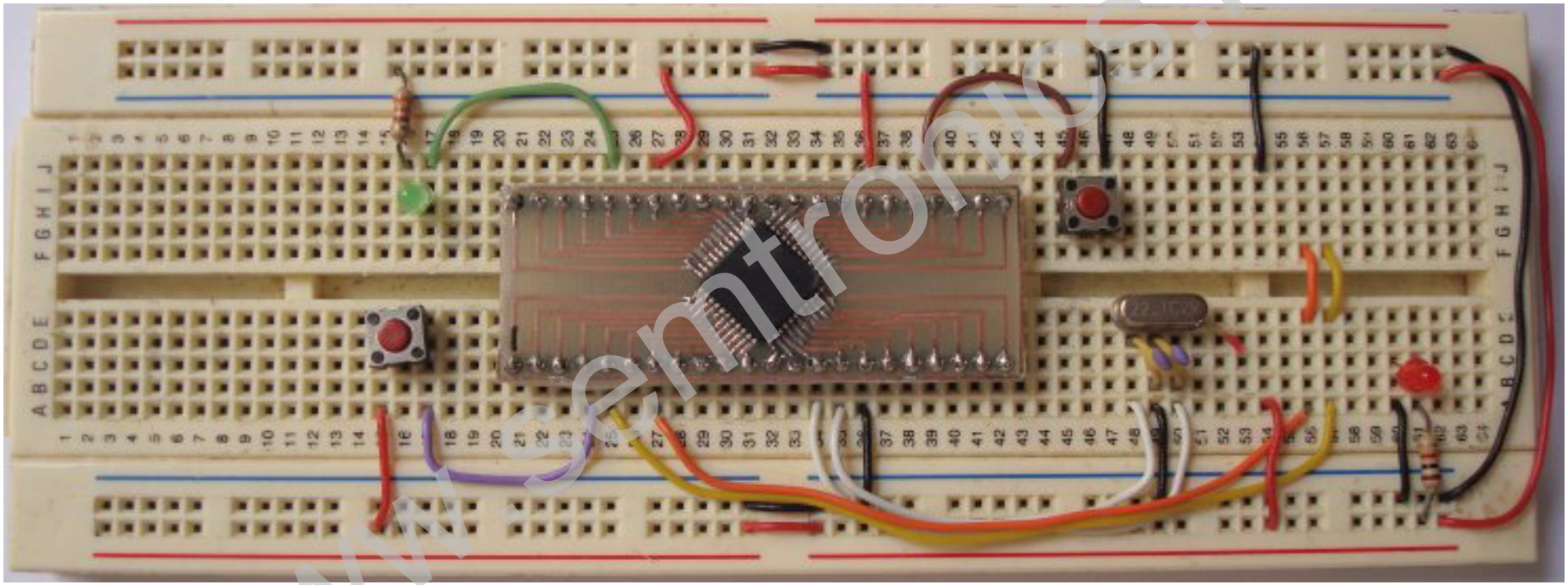
# Hardware - AT89KIT Photo before inserting USBMOD



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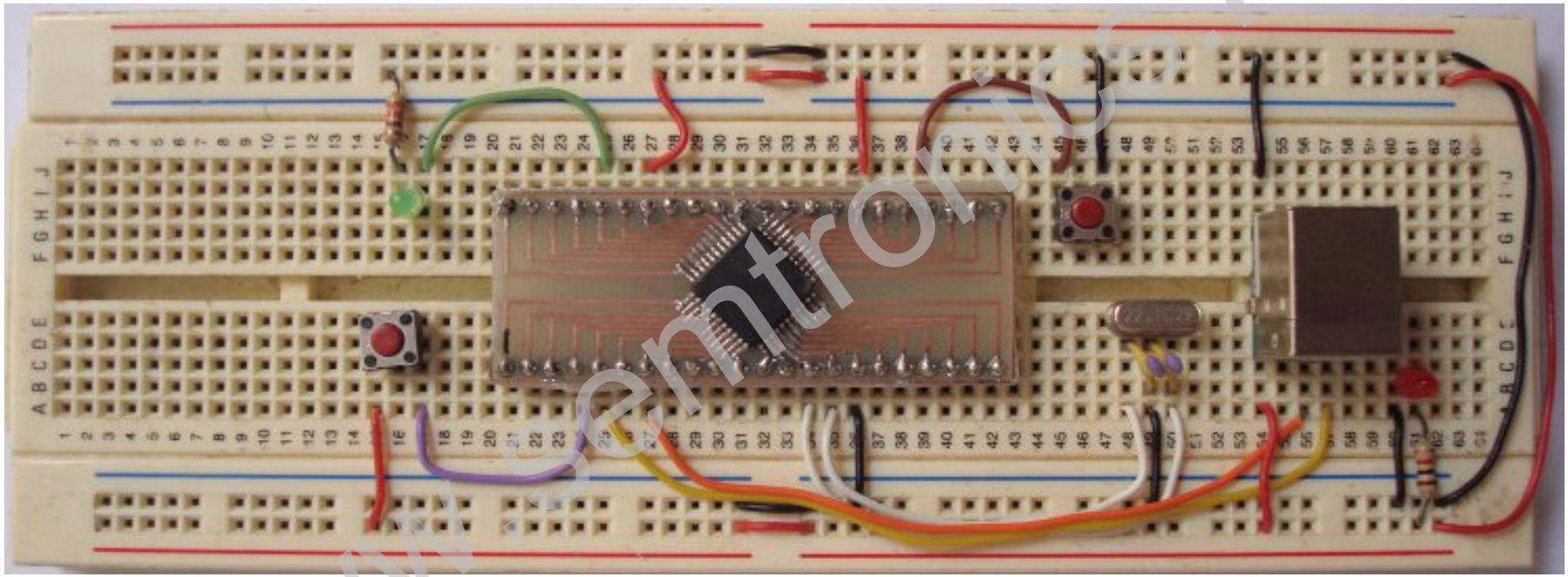
# Hardware - AT89KIT Photo after inserting USBMOD



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## 4. Using the FLIP Software

**The following slides illustrate the steps of using Flip software with AT89KIT. The program to be download into the flash memory of AT89C51ED2 is a simple flasher on P1.0.**

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## IMPORTANT

**To enable FLIP software to communicate with the connected 8051 based microcontrollers, PSEN pin must be held low then the RST is held high. After that, both pins are released to the floating level together. If this sequence is not followed, the FLIP software will Time Out.**

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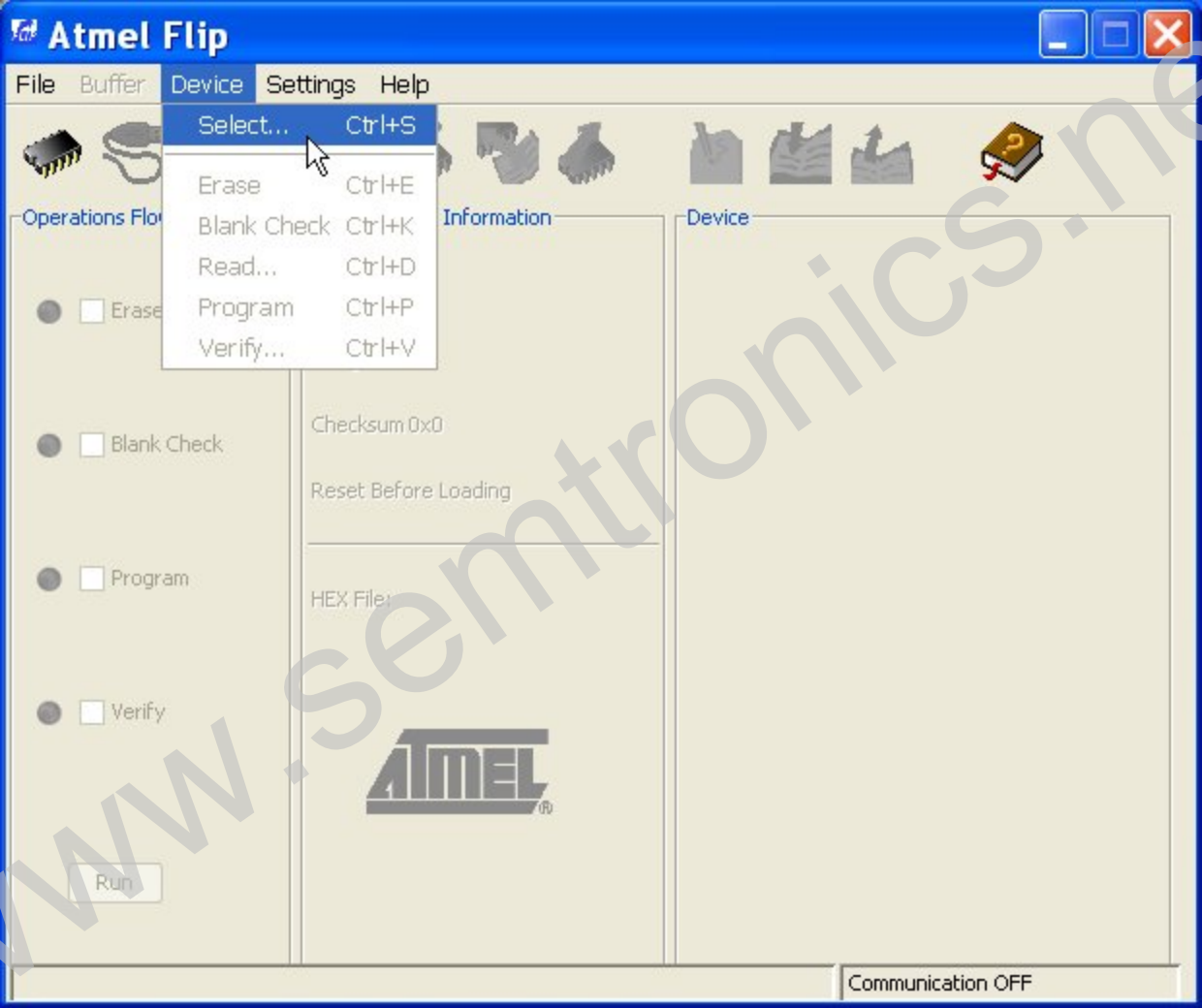

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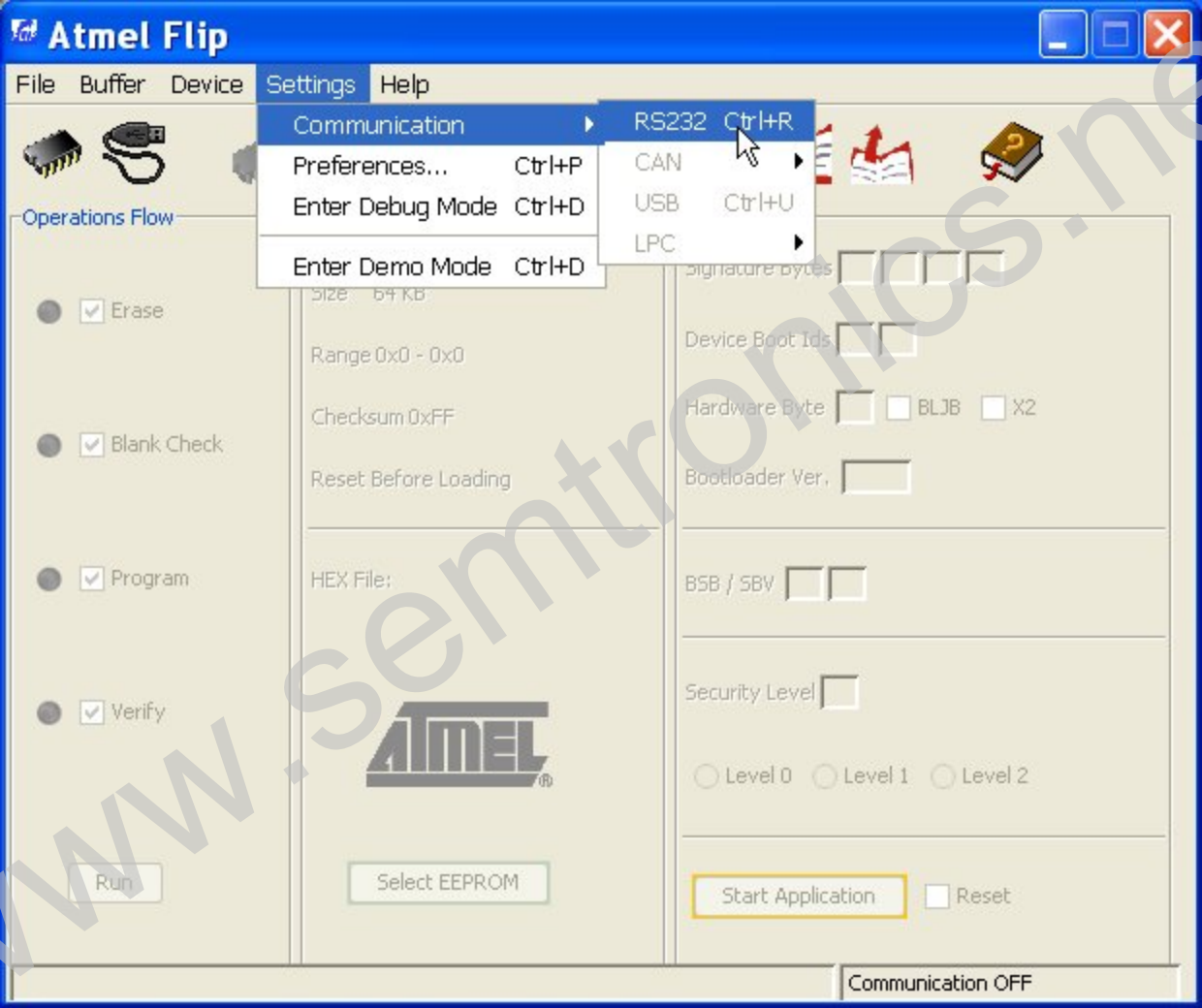
Device Selection
Select a device
AT89C5131
AT89C5132
AT89C51AC2
AT89C51AC3
AT89C51CC01
AT89C51CC02
AT89C51CC03
AT89C51ED2
AT89C51IC2
AT89C51ID2
OK
Cancel



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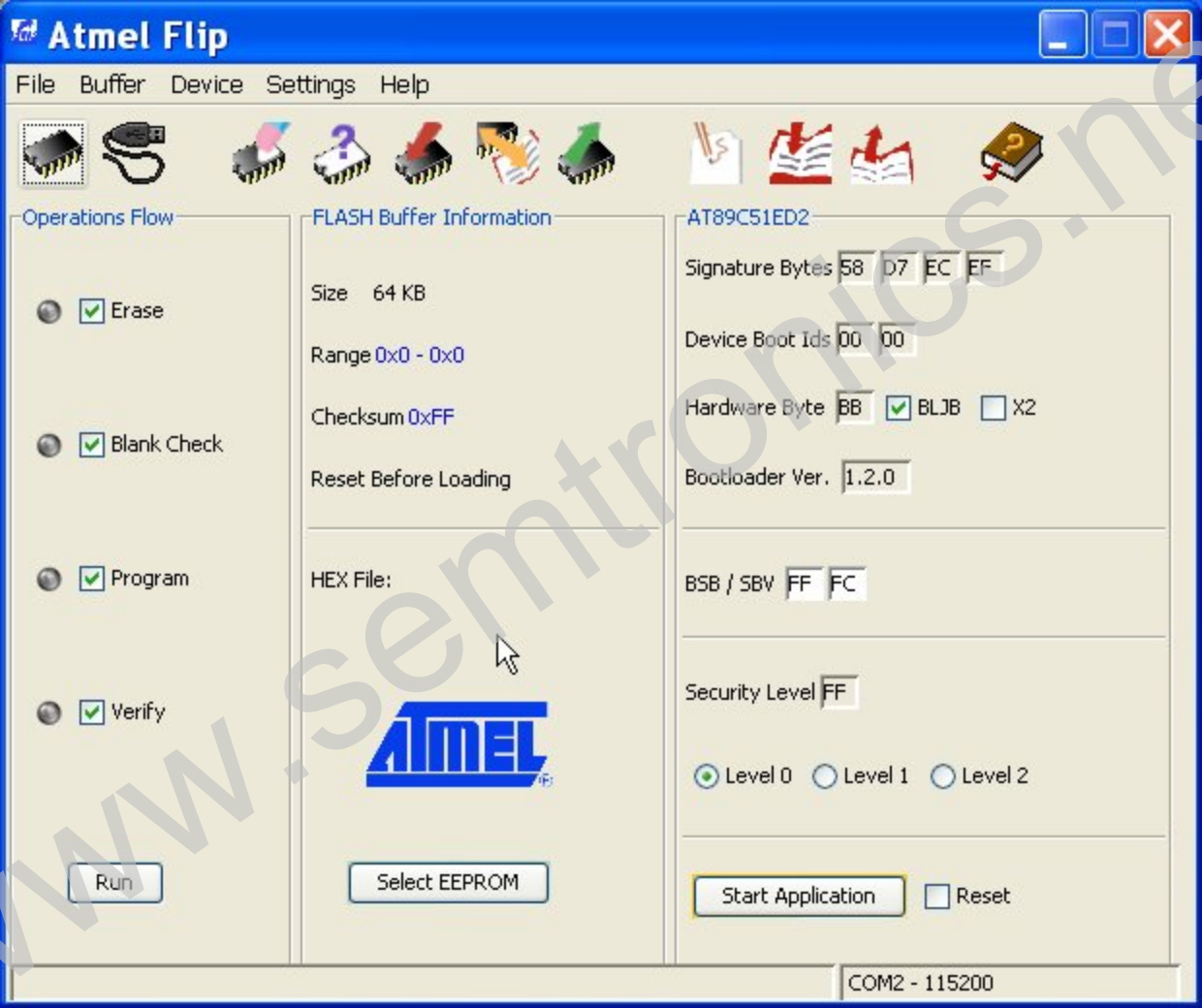
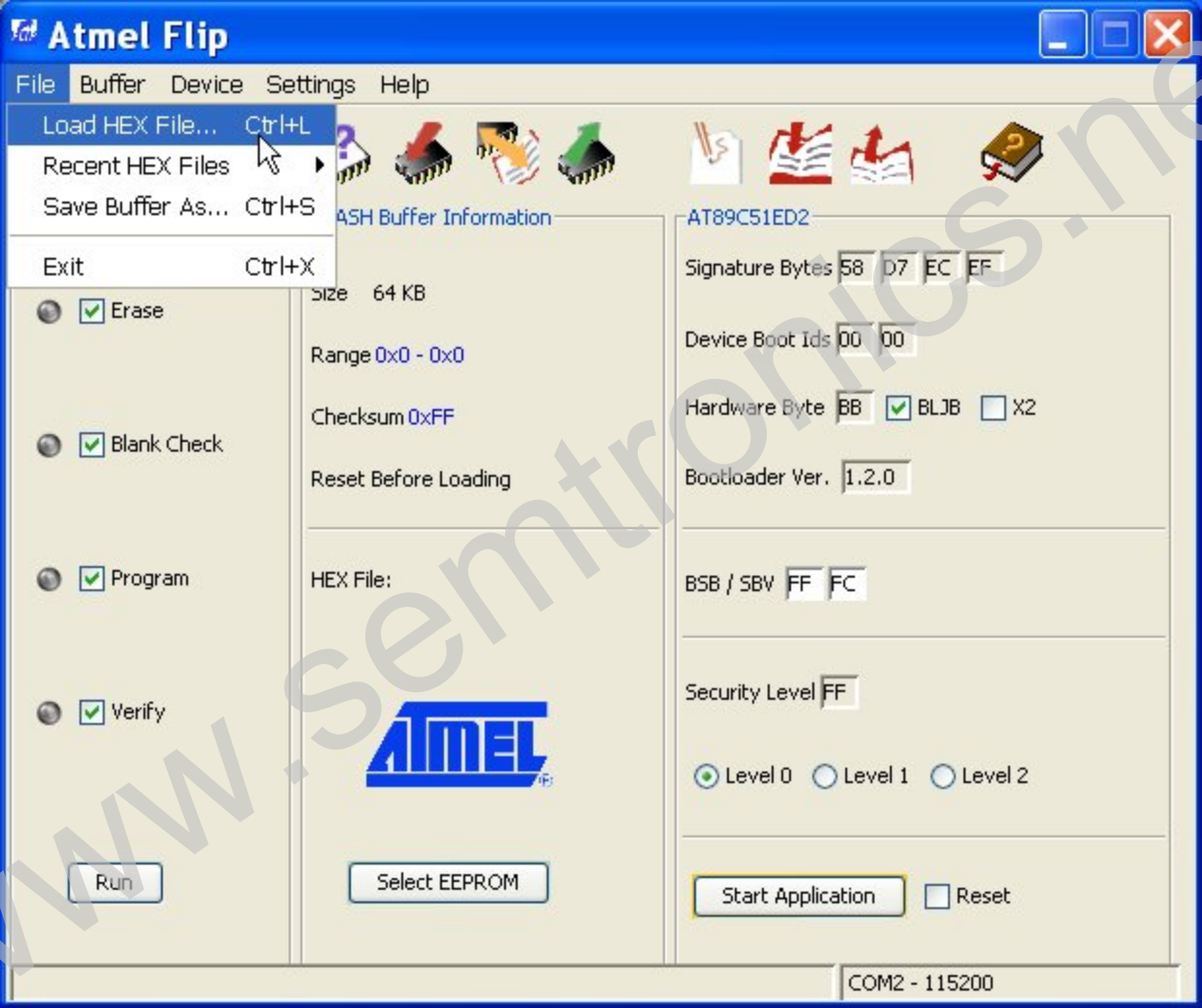
RS232 Setup
Port
COM1
Baudrate
115200
Manual Sync
COM1
COM2
Connect
Disconnect
Sync
Cancel


Atmel Flip
File Buffer Device Settings Help
Operations Flow
Erase
Blank Check
Program
Verify
Run
FLASH Buffer Information
Size 64 KB
Range 0x0 - 0x0
Checksum 0xFF
Reset Before Loading
HEX File:
Select EEPROM
AT89C51ED2
Signature Bytes 58 D7 EC EF
Device Boot Ids 00 00
Hardware Byte BB BLJB X2
Bootloader Ver. 1.2.0
BSB / SBV FF FC
Security Level FF
Level 0 Level 1 Level 2
Start Application
Reset
COM2 - 115200



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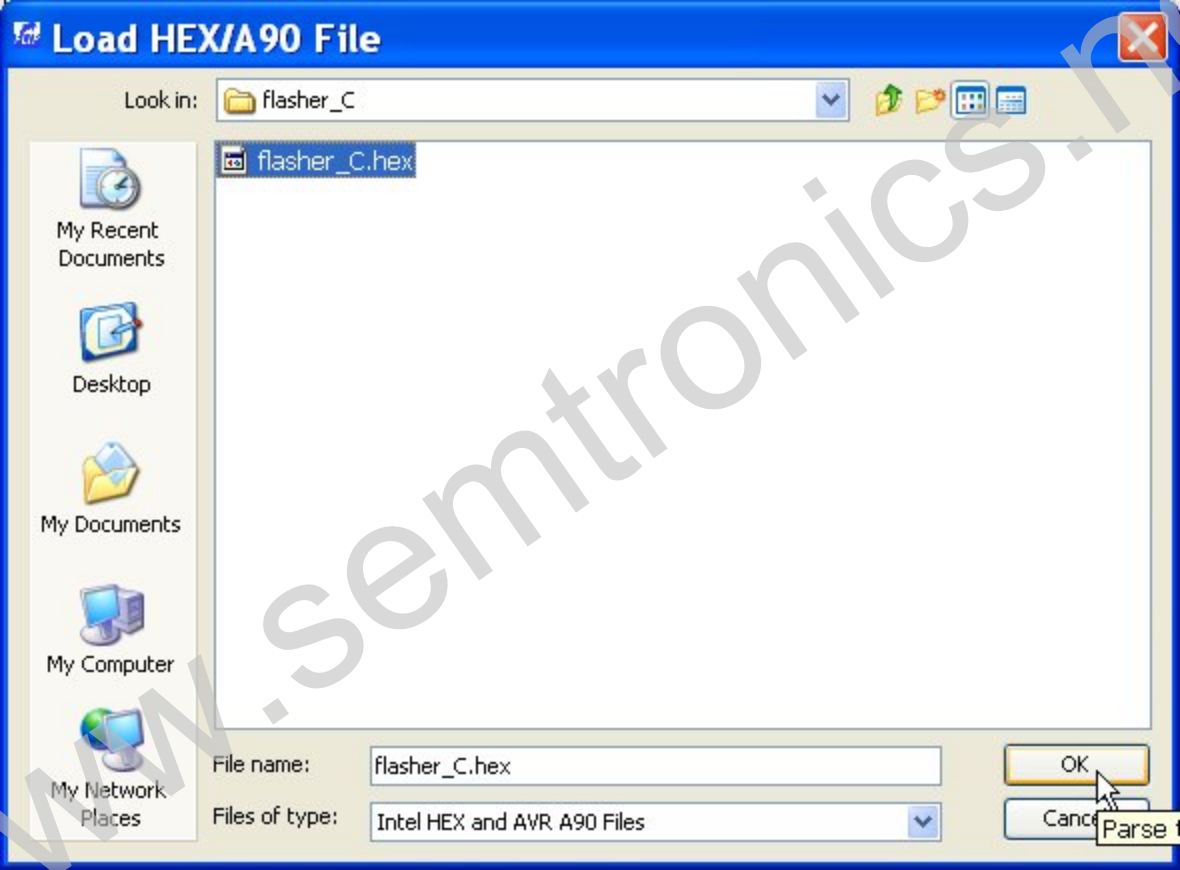

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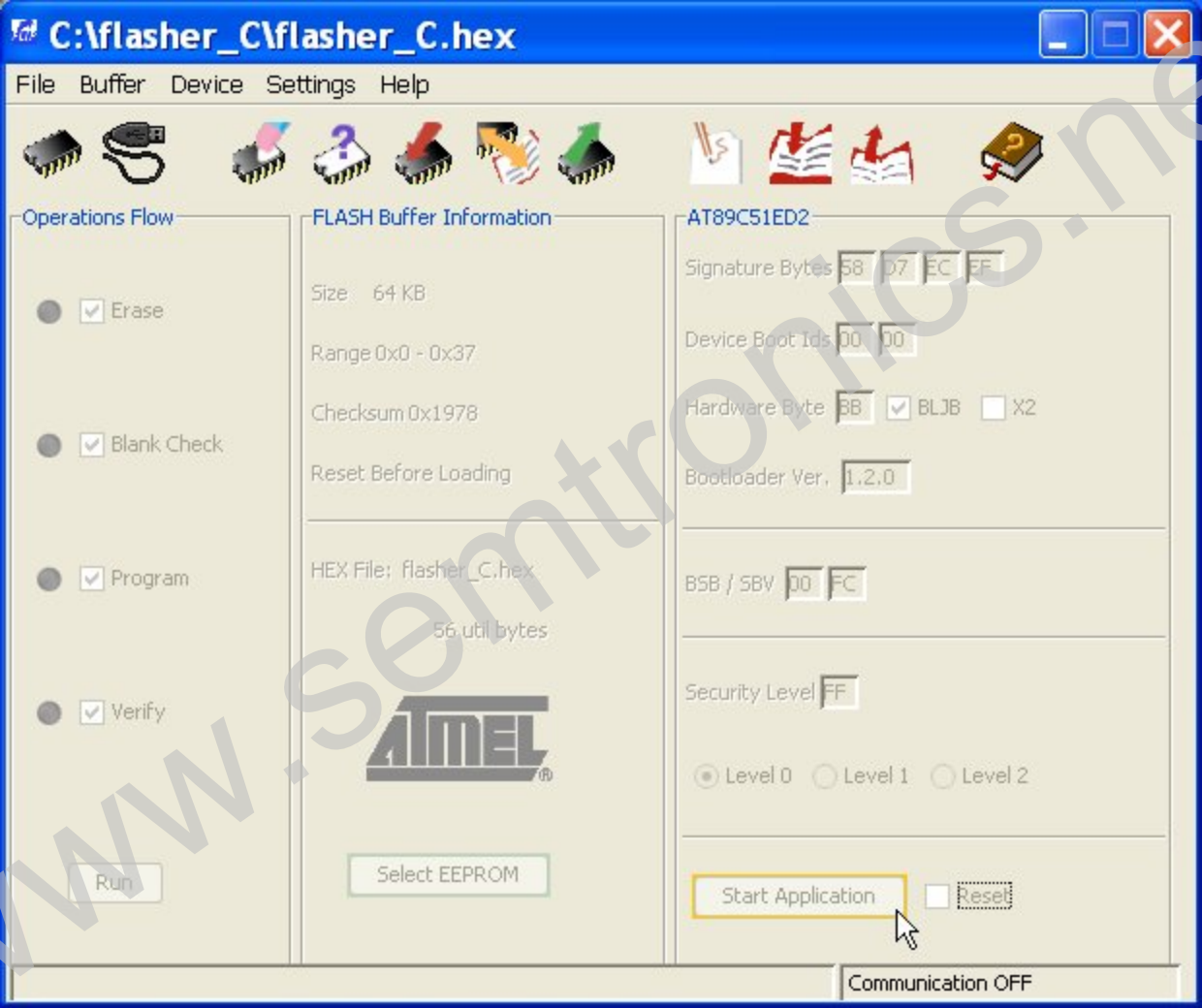
C:\flasher_C\flasher_C.hex
File Buffer Device Settings Help
Operations Flow
Erase
Blank Check
Program
Verify
Run
FLASH Buffer Information
Size 64 KB
Range 0x0 - 0x37
Checksum 0x1978
Reset Before Loading
HEX File: flasher_C.hex
56 util bytes
Select EEPROM
AT89C51ED2
Signature Bytes 58 D7 EC EF
Device Boot Ids 00 00
Hardware Byte BB BLJB X2
Bootloader Ver. 1.2.0
BSB / SBV FF FC
Security Level FF
Level 0 Level 1 Level 2
Start Application
Reset
Launch the selected above operations sequentially
HEX file parsed.
COM2 - 115200

Erasing FLASH

C:\flasher_C\flasher_C.hex
File
Buffer
Device
Settings
Help
Operations Flow
Erase
Blank Check
Program
Verify
Run
FLASH Buffer Information
Size 64 KB
Range 0x0 - 0x37
Checksum 0x1978
Reset Before Loading
HEX File: flasher_C.hex
56 util bytes
Select EEPROM
AT89C51ED2
Signature Bytes 58 D7 EC EF
Device Boot Ids 00 00
Hardware Byte BB BLJB X2
Bootloader Ver. 1.2.0
BSB / SBV 00 FC
Security Level FF
Level 0 Level 1 Level 2
Start Application
Reset
Verify PASS
COM2 - 115200



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