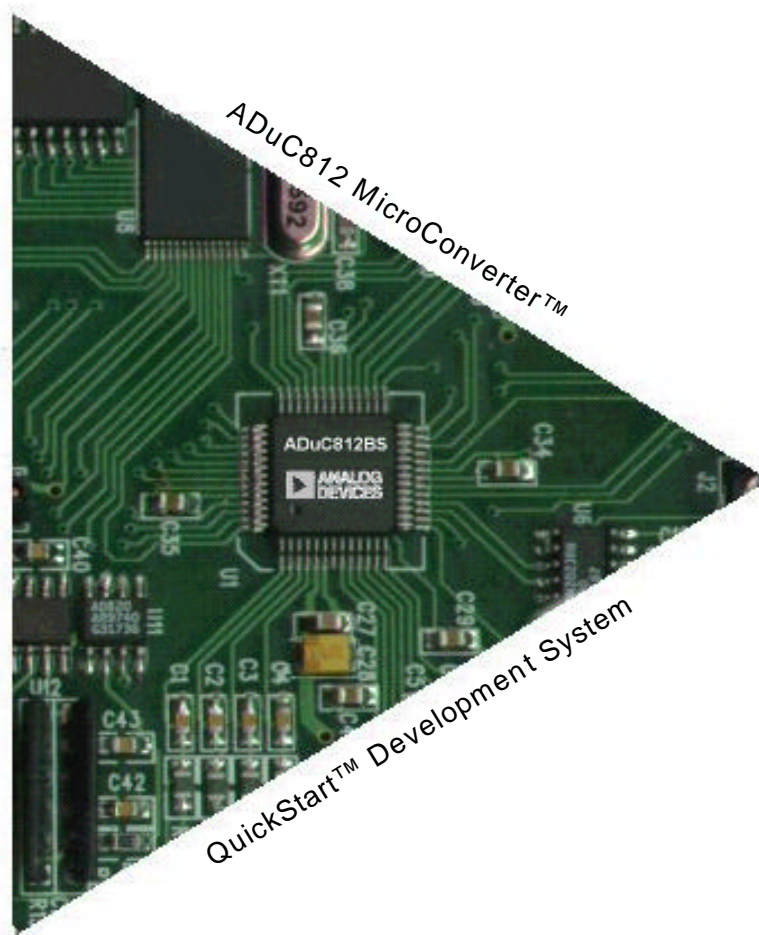# ADuC812 MicroConverter™ GetStarted Guide
an introductory tutorial for use of the ADuC812 QuickStart™ Development Kit

INSTALLATION:

Installing from CD:
- Insert the QuickStart™ CD ROM into you CD ROM drive and double-click on the "SetUp" icon.
- Follow the instructions to install the software on your PC.

Installing from the Web:
- Go to www.analog.com/microconverter/quickstart.html and click on "Complete Software Package Download".
- Save the "SetUp.exe" file on your PC's hard drive.
- Double-click the "SetUp" icon to launch the software installation routine.
- Follow the instructions to install the software on your PC.

note: Though you can install the software onto any hard drive and into any directory you wish, for the purposes of simplicity the rest of this document will assume that you've installed at the default location of C:\ADuC.

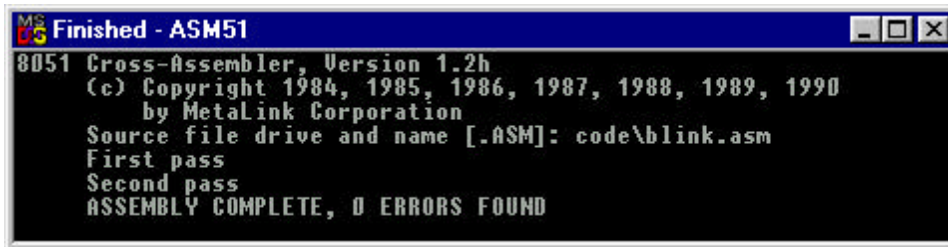A successful installation will place the following files and directories on your hard drive:
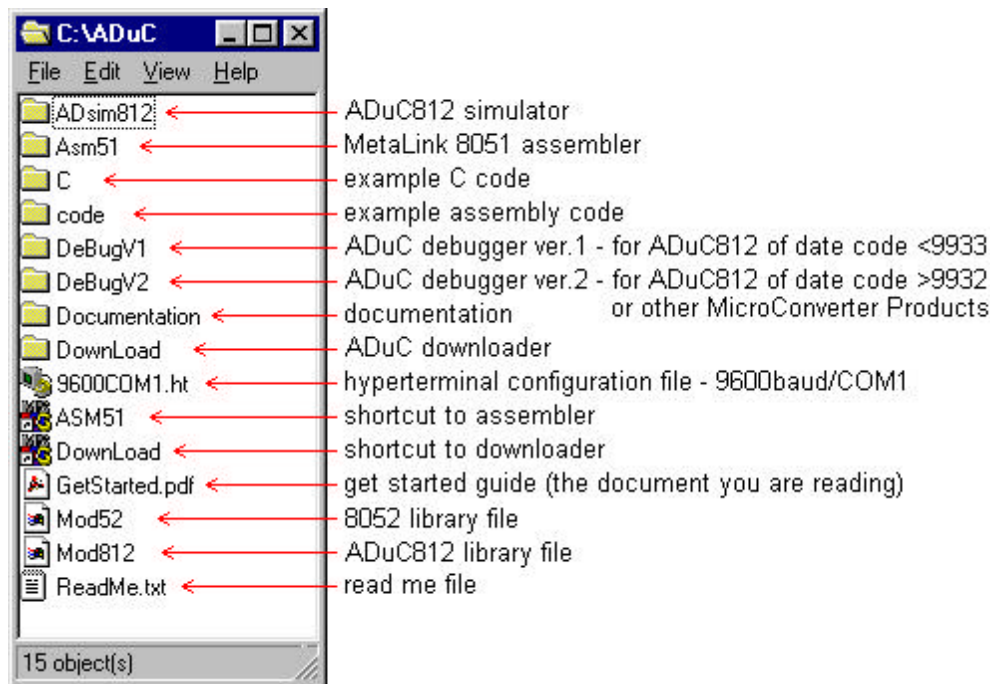
This document presents a brief introduction to the use of following tools:
- MetaLink's 8051 assmebler
- the ADuC downloader
- the ADuC debugger (both versions)

THE METALINK ASSEMBLER:

1. In the ADuC directory, double-click on the *ASM51* icon (ASM51).

2. In the DOS window that comes up, type the relative path of the assembly file you wish to assemble. For example, if you wish to assemble the example file C:\ADuC812\code\blink.asm, simply type "code\blink.asm" as shown below.

```
Finished - ASM51                                          _ □ ×
8051 Cross-Assembler, Version 1.2h
      (c) Copyright 1984, 1985, 1986, 1987, 1988, 1989, 1990
            by MetaLink Corporation
      Source file drive and name [.ASM]: code\blink.asm
      First pass
      Second pass
      ASSEMBLY COMPLETE, 0 ERRORS FOUND
```

The assembler will display the text "ASSEMBLY COMPLETE, 0 ERRORS FOUND" indicating that it has successfully assembled the file and has created the hex and list files (eg. blink.hex & blink.lst) along side the assembly input file (eg. blink.asm). If the assembler indicates assembly errors, you should view the list file (eg. blink.lst) to examine the errors. To view the list file, open it with notepad or any standard text editor.

note: If the assembler returns an error message indicating a failure to read drive A, or a fatal error opening a file on the A drive, then it is most likely failing to find the MOD52 or MOD812 file referenced by the assembly file. Make sure both MOD52 and MOD812 (plus any other "include" files referenced in your assembly code) are located in the ADuC root directory (where you clicked the ASM51 icon).
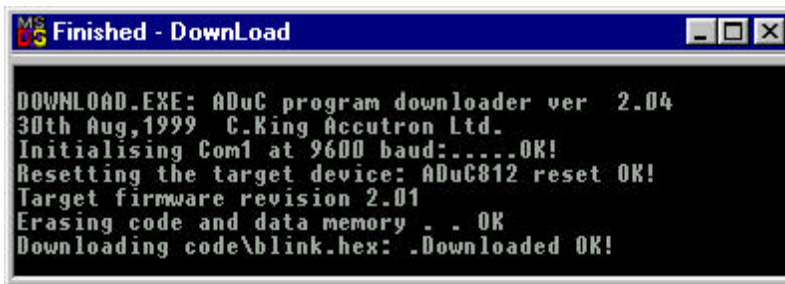
For additional details on the use of the MetaLink ASM51 assembler, please refer to the ASM51 users manual at C:\ADuC\ASM51\ASM51.pdf.

THE ADuC DOWNLOADER:

1. Verify the following link connections on your ADuC812 QuickStart development board:
    LK3   - inserted
    LK4   - position A inserted (closest to LEDs)
    LK6   - position A inserted (closest to LEDs)
    For details on link connection options, refer to the eval board user's guide at C:\ADuC\Documentation\EvalDocs\812pcb.pdf, or at www.analog.com/microconverter/evaluation_boards.html.

2. Power up your eval board using the provided power supply or a 9V battery (not both).

3. Connect the eval board to your PC's COM1 serial port using the provided RS-232 cable.

4. Press the RESET button on your eval board.

5. On your PC, in the ADuC directory, double-click the *DownLoad* icon (DownLoad).

6. In the window that comes up, type the relative path of the hex file you wish to download. For example, to download the example file C:\ADuC812\code\blink.hex, simply type "code\blink.hex" as shown below.
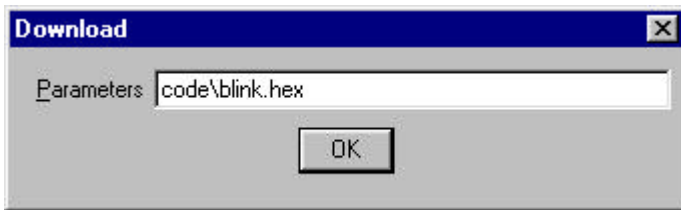
The downloader will display the below information, indicating that the serial download was successful.


```
DOWNLOAD.EXE: ADuC program downloader ver  2.04
30th Aug,1999  C.King Accutron Ltd.
Initialising Com1 at 9600 baud:.....OK!
Resetting the target device: ADuC812 reset OK!
Target firmware revision 2.01
Erasing code and data memory . . OK
Downloading code\blink.hex: .Downloaded OK!
```

7. Remove LK3 from your board and press RESET. The code will begin executing (as indicated by a blinking LED with the example code blink.hex).

8. To perform additional downloads, re-insert LK3 and repeat steps 4 thru 7 above.

ADDITIONAL DOWNLOADER OPTIONS:

To make use of the additional downloader options, type any of the following switches immediately following the file name (making sure to precede each with a *space*):

/C:n   - select the COM port (default is 1)
/F:n.n   - select the target crystal frequency in MHz (default is 11.0592)
/R   - run the program from the beginning
/R:xxxx - run the program from the specified hex start address

For example, the below text selects a download via *COM2* to an ADuC812 running at a *16MHz* clock speed and sets the downloader to *automatically run* the program immediately after downloading.
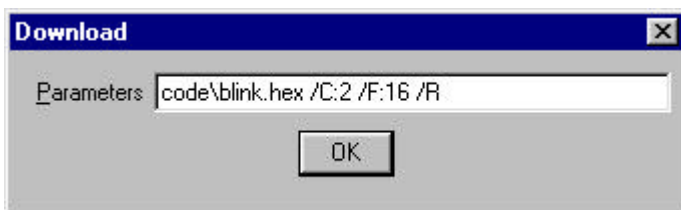

note: The serial downloader can also be launched directly from a DOS prompt. For example:



```
C:\ADuC\DownLoad>download blink.hex /r
```

THE ADuC DEBUGGER (Version 2): *….try this version first if you are unsure of your chip's firmware revision.*

1. Verify the following link connections on your ADuC812 QuickStart development board:
    LK3   - inserted
    LK4   - position A inserted (closest to LEDs)
    LK6   - position A inserted (closest to LEDs)
    For details on link connection options, refer to the eval board user's guide at
    C:\ADuC\Documentation\EvalDocs\812pcb.pdf, or at www.analog.com/microconverter/evaluation_boards.html.

2. Power up your eval board using the provided power supply or a 9V battery (not both).

3. Connect the eval board to your PC's COM1 serial port using the provided RS-232 cable.

4. Press the RESET button on your eval board.

5. From your PC's START menu, choose Programs/ADuC/DeBugV2.

6. Click "OK" to get past the opening dialogue box, and then follow the steps outlined in the session wizard. When you get to the "Files" step, specify C:\ADuC\code\blink.lst, or click the "Browse" button and locate the blink.lst file, and then click the "Next" button. For all the remaining session wizard steps, simply click the "Next" button to accept the default settings. Click the "Finish" button at the final session wizard screen.

    If you get the below message, close the program and skip to the "VERSION 1" section in later pages.
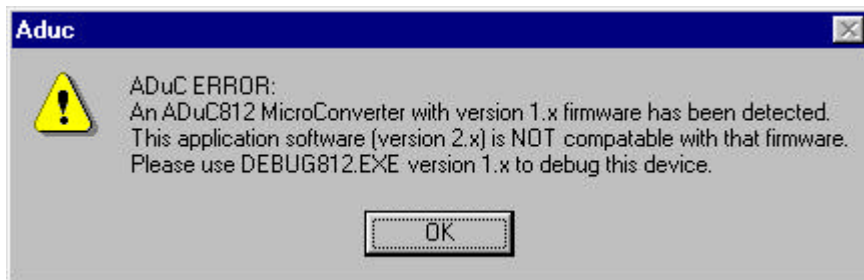
    Otherwise, some information will flash on the screen and the bar at the bottom of the screen will change:
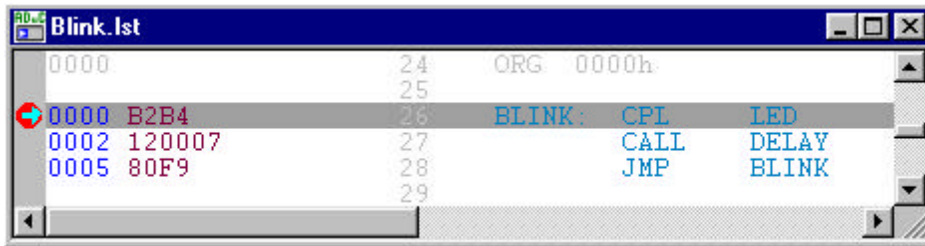
    from

    to
    .
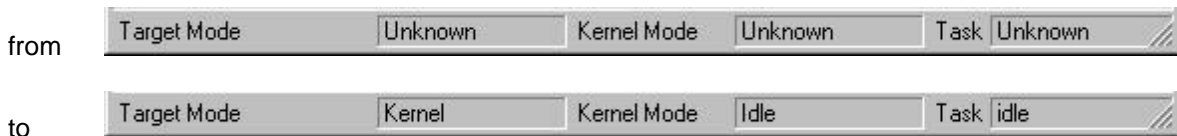
    This indicates that you have successfully established communication with the chip. Also notice that the kernel revision number (eg. "2.01 Aug 30 1999") appears in the "Firmware" box of the "Session" window.

    If you *don't* see the above information, then click the *reset target* button () on the toolbar.

    At this stage, you should see two open windows within the ADuC application: the "Session" window, and the program listing window (labeled "Blink.lst"). If you *don't* see the program listing window, then select "Program" from the "View" pull-down menu.

7. From the "View" pull-down menu, choose "Memory" / "SFRs". This brings up a third window allowing you to view the contents of the on-chip *special function registers* ("SFRs"). Position these three windows ("Blink.lst", "Session", and "SFRs") on the screen so you can view the contents of each.

8. Click the *download program* button ( ) on the toolbar, or choose "Download Program" from the "Target" pull-down menu. This downloads the program to the chip.

9. In the program window ("Blink.lst"), double click on the line "BLINK: CPL LED" (line 26, address 0000). This sets a breakpoint at this address. Notice that the breakpoint is indicated by a large red dot to the left of the line.


10. Press the *run program* button ( ) on the toolbar, or choose "Run downloaded Program" from the "Target" pull-down menu. This runs the program from the beginning. You will see the following message indicating that the chip has hit the breakpoint.
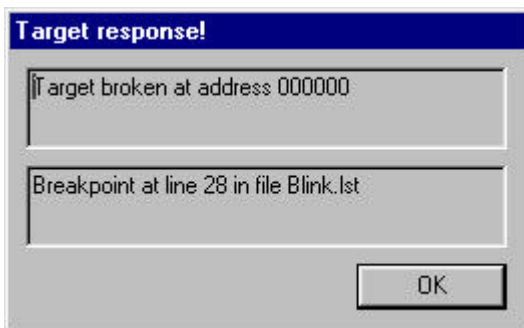
Press "OK", and the debugger will upload information from the chip.

note: If you wish to change what is automatically uploaded from the chip, press the *setup uploads* button ( ) on the toolbar, and select what you want to be automatically uploaded.
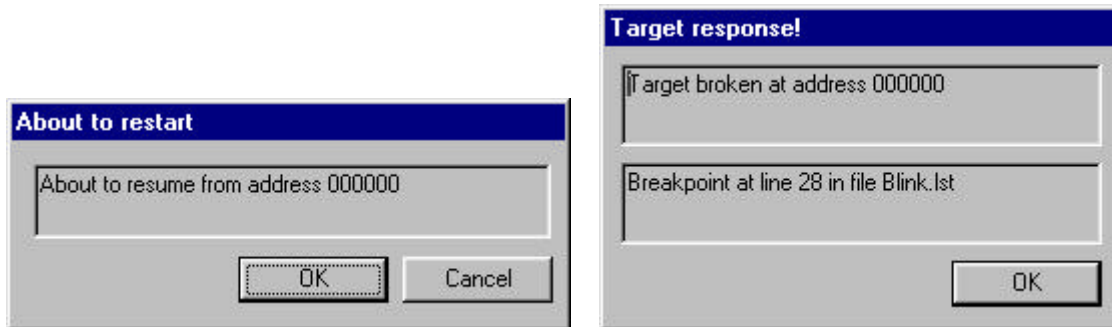
11. In the "SFRs" window, pan down until you see the line for P3. It indicates that the current value of port 3 is FF hex. Notice also that the red LED on your eval board is on. The line of code that's about to be executed will complement bit 4 of P3, which controls the LED on the eval board.
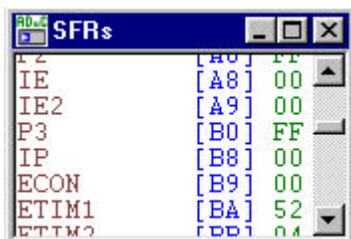
note: To view SFR values in binary or decimal, simply right-click inside the SFRs window.

note: Values colored green in the SFR window (or any other memory window) indicate that the data accurately represents the value currently on the chip.

12. Click the *resume* button (⬛) on the toolbar, or choose "Resume" from the "Target" pull-down menu. Click "OK" at each of the below dialogue boxes.

About to restart

About to resume from address 000000

[OK]   [Cancel]

Target response!

Target broken at address 000000

Breakpoint at line 28 in file Blink.lst

[OK]

Notice that the red LED on your eval board has turned off, and the value of P3 in the "SFRs" window has changed to EF hex.

note: You can turn off the above dialogue boxes in the "System settings" in the "Configure" pull-down menu.

13. You can resume again (⬛), or step through the code using the *single-step* button (⬛) on the toolbar, or set additional breakpoints by double-clicking on other lines of code. To clear a breakpoint, simply double-click on the line again.

14. To save your session settings, click the *save session* button (⬛) on the toolbar, or choose "Save" from the "File" pull-down menu, and select the desired session file name and location.

15. To close the session, choose "Close" from the "File" pull-down menu.

16. To open a pre-existing session file, click the *open session* button (⬛) on the toolbar, or choose "Open" from the "File" pull-down menu, and select the file you wish to open.

For more information on the use of the version 2 debugger, use the "Help" options within the application.

THE ADuC DEBUGGER (Version 1):   *….this section is for use only with chips containing Version 1 firmware.
if you are unsure of your chip's firmware revision, try Version 2 (above) first.*

1.   Verify the following link connections on your ADuC812 QuickStart development board:
      LK3   - inserted
      LK4   - position A inserted (closest to LEDs)
      LK6   - position A inserted (closest to LEDs)
      For details on link connection options, refer to the eval board user's guide at
      C:\ADuC\Documentation\EvalDocs\812pcb.pdf, or at www.analog.com/microconverter/evaluation_boards.html.

2.   Power up your eval board using the provided power supply or a 9V battery (not both).

3.   Connect the eval board to your PC's COM1 serial port using the provided RS-232 cable.

4.   Press the RESET button on your eval board.

5.   From your PC's START menu, choose Programs/ADuC/DeBugV1.

6.   Click "OK" to get past the opening dialogue box, then click the *new session* button ( ) or choose "New"
      from the "Session" pull-down menu.

7.   In the "Configuration" window, click the "Comms" button and accept the default values by clicking "OK".

8.   Also in the "Configuration" window, click the "Files" button. In the "Session Files" window that appears,
      enter "C:\ADuC\code\blink.hex" on the "EXE" line, or click the browse button to find the blink.hex file. On
      the "LST" line, enter "C:\ADuC\code\blink.lst" or click the browse button to find the blink.lst file.

9.   Press the reset button on the evaluation board.   Then click the *reset target* button ( ) on the toolbar, or
      choose "Reset" from the "Target" pull-down menu.

      A successful reset is indicated by the "Firmware" line in the Configuration window updating to "ver 1.0 0krl",
      and a line at the bottom of the screen indicating "Target switched to kernel mode". If instead, you get a
      "Failed to reset the target" message, then you may have a chip containing version 2 firmware and you
      should try the version 2 steps outlined in previous pages. But first double check your link configurations
      and try steps 1 through 9 here again.

10.   In the "Window" pull-down menu, choose "Program Listing" to view the list file (blink.lst) of the program
      you're debugging. Also in the "Window" pull-down menu, choose "SFRs" to view the *special function
      registers* window. Finally, in the "Window" pull-down menu, choose "BreakPoints" to bring up the
      breakpoints window. Position these windows so that you can see the contents of each.

11.   Click the *download program* button ( ) on the toolbar, or choose "Download Program" from the "Target"
      pull-down menu. A successful download is indicated by the text "Program downloaded OK" at the bottom of
      the screen.

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12.   Pan down in the "Program listing" window until you see the line "BLINK: CPL LED" (line 26, address 0000) and double click on this line. The below dialogue box will appear. Click "Set Breakpoint", and then click "Close". Notice that the address "0000" now appears in the "Breakpoints" window.
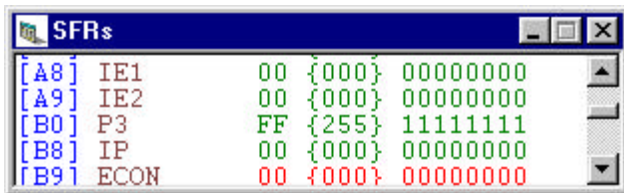

13.   Click the *run program* button () on the toolbar, or select "Run from start" from the "Target" pull-down menu. Click "OK" in response to the below dialogue box.
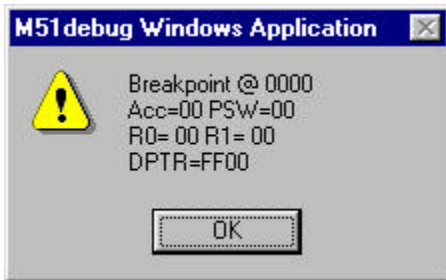
The text "Data uploaded successfully" at the bottom of the screen indicates that data has been uploaded from the chip to update the SFRs window on the debugger. All SFR values colored green accurately reflect what is currently on the chip.

note: If you wish to change the number of SFRs that are automatically uploaded, you can choose "Uploads" from the "Setup" pull-down menu and select what you want to be automatically uploaded.

14.   In the "SFRs" window, pan down until you see the line for P3. It indicates that the current value of port 3 is FF hex (i.e. 255 dec or 11111111 bin). Notice also that the red LED on your eval board is on. The line of code that's about to be executed will complement bit 4 of P3, which controls the LED on the eval board.

15.   Click the *resume* button ( ) on the toolbar, or choose "Resume" from the "Target" pull-down menu. Click
       "OK" at each of the below dialogue boxes.
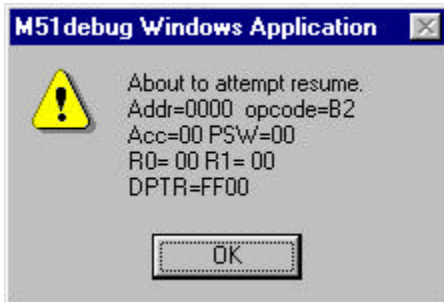
       Notice that the red LED on your eval board has turned off, and the value of P3 in the "SFRs" window has
       changed to EF hex.

note: You can turn off the above dialogue boxes in the "Display" settings in the "Setup" pull-down menu.

16.   You can resume again ( ), or set additional breakpoints by double-clicking on other lines of code. To
       clear a breakpoint, simply double-click on the line again and choose "Clear breakpoint".

17.   To save your session settings, click the *save session* button ( ) on the toolbar, or choose "Save" from the
       "Session" pull-down menu, and select the desired session file name and location.

18.   To close the session, choose "Close" from the "Session" pull-down menu.

19.   To open a pre-existing session file, click the *open session* button ( ) on the toolbar, or choose "Open"
       from the "Session" pull-down menu, and select the session file you wish to open.

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Up to date revisions of this document and other MicroConverter documentation, plus free downloads of all the
latest revisions of the software described herein, are available at www.analog.com/microconverter along with
contact information for technical support inquiries.

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