

ADuC7XXX MicroConverter™ Get Started Guide

A tutorial guide for use with the ADuC7XXX QuickStart™ and ADuC7XXX QuickStart Plus Development Systems

The following products are covered by this guide

ADuC7020/21/22/24/25/26/27/28/29 ADuC7023 ADuC7034/6/9 ADuC7060/61 ADuC7121/22 ADuC7124/26 ADuC7128/29

Version 0.4



A tutorial guide for use with some of the ADuC7XXX Development Systems

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A tutorial guide for use with the ADuC7XXX Development Systems

INTRODUCTION

The following Get Started tutorial guide will bring the user through the various tools that are part of the MicroConverter development systems. This application will install tools required for the ADuC702X, ADuC706X, ADuC7034/6/9 and ADuC712x, ADuC7124/26 generics.

The tools discussed during this Get Started tutorial guide are as follows:

Tool	Executable	Function
Keil µVision3 Integrated Development Environment	MDK380a.exe	μVision3 is a complete IDE (Integrated Development Environment) integrating all the tools necessary to edit, assemble/compile/link and debug ARM/Thumb code and C code, via the JTAG port. A simulator is also available, simulating the peripherals of the ADuC7XXX parts. Non-intrusive emulation is done through JTAG using the mIDAS-Link provided in the QuickStart Plus development system.
IAR Embedded Workbench IDE	EWARM-KS- WEB- 5407.exe.exe	The IAR Embedded Workbench IDE provided in a zip file in the folder, C:\ADuC7xxxV0.2\Applications\IAR is a complete IDE (Integrated Development Environment) integrating all the tools necessary to edit, assemble/compile/link and debug ARM/Thumb code and C code, via the JTAG port . Non-intrusive emulation is done through JTAG using the mIDAS-Link provided in the QuickStart Plus development system. Debugging via UART is done using a ROM monitor included on the CD.
Downloader	I2CWSD.exe	The I2C Downloader is a windows software program that allows a user to download Extended Intel Hex files as created by μVision3 to the MicroConverter via the I2C bus while in circuit. The package also contains a specific version of the I2C Downloader specifically for the ADuC7023 evaluation boards. This Special I2CWSD version does not require an external dongle – it can interface directly with the ADuC7023 evaluation board via the USB interface.
PLA tool	PLAtool.exe	The PLA tool is a graphical tool allowing the user to easily choose the input/output and function of the elements and generating C or assembly code.
Downloader	ARMWSD.exe	The Serial Downloader is a windows software program that allows a user to serially download Extended Intel Hex files as created by μ Vision3 to the MicroConverter while in circuit.
Analysis	WASP7.exe	The Windows Analog Software Program (WASP) is a windows software program for all ADuC702x MicroConverter products that allows analysis of their analog performance.
Software Generation	Elves.exe	Elves.exe is an application that assists a C programmer in choosing appropriate functions from ADI libraries and simplifies deciding what values to place in the function parameters.





(1) Installation

(1) INSTALLATION

Installing from CD or FTP site: (<u>ftp://ftp.analog.com/pub/MicroConverter/ADuC7XXXV0.2/</u>)

- <u>:</u>
- Close all your applications.
 Insert the MicroConverter[®] Development System CD ROM into you CD ROM drive and double-click on the file "ADuC7xxxV02.exe" if installation doesn't start automatically.
- Follow the installation process to the final menu. The following applications will be installed
 - Multidongle Application
 - Segger J-LINK Application
 - o Microsoft .Net Framework (Application is likely already installed on user machine so installation is optional)
 - O PLA Tools
 - Various WSD Applications
- Press "yes" to the above applications. Then follow the on-screen instructions to install the software on your PC.
- Although you can install the MicroConverter[®] Development System, the IAR Embedded workbench and Keil 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:\ADuC7XXXV0.2, C:\Program Files and C:\keil. Also the Keil tools will automatically be installed under an ARM directory and are fully compatible with uVision3 or tools for 8051.

Tools installation options:

During the installing documents, code examples and utilities provided by ADI, the option to install Microsoft .NET Framework version 2.0 on the user PC will appear. In the event that .NET Framework is not previously installed (To check if the .NET Framework is installed, go to Windows start menu, Control Panel, "Add or Remove Programs" in the control panel and see if "Microsoft .NET Framework" is installed, if .NET Framework is previously installed and an attempt is made to re-install this software, the installer for the .NET Framework will fail), this application should be installed if not previously done so, as it is required for the installation of the ADI PLA tools. In addition, the installation will offer you the option to select the Keil uVision3 tools to be installed automatically by this setup. In addition using the separate IAR Embedded Workbench CD or using the IAR installer located at C:\ADuC7XXXV0.2\Applications\IAR, the IAR tools may be installed.

- Keil uVision3 installation:
- The Keil µVision3 Installation is initiated by ticking the "Yes, I want to install Keil uVision3 tools" as shown below:

InstallShield Wizard	
	InstallShield Wizard Complete
<u> </u>	Setup has finished installing the ADuC7XXX QuickStart Development System Version 0.2 Tools on your computer.
	Setup can install Keil tools (C compiler and C simulator)on your machine.
	💌 Yes, I want to install Keil uVision3 tools.
	The IAR Tools may be installed post the main installation using the files located at C:_ADuC7XXXV0.2_Applications_IAR
	< Back Finish Cancel

A message will appear to confirm that the installs have been selected:



(1) Installation

Welcome to Keil μVisio Release 8/2009	on		An ARM® Co	mpan)
This SETUP program ins	stalls:			
RealView Microc	controller Developm	ent Kit V3.80a		
This SETUP program ma However, you should ma	ay be used to update a previo ake a backup copy before pro	ous product installation. oceeding.		
It is recommended that y	ou exit all Windows programs	before continuing with	SETUP.	
Follow the instructions to	complete the product install	ation.		
Keil uVision3 Setup				
i nen prinerie e energe		ZZ Rook	Neutos	anaal

• Press "Next" and follow the on screen instruction.

ANALOG

• If you choose not to install the tools now, you can install them later by double clicking on the file "MDK380a.EXE" in the Applications\Keil folder on the CD.

🔄 C:\Keil		
File Edit View Favorites	Tools Help	
🚱 Back 🔹 🕥 🕤 🏂	Search 🕞 Folders	»
Address 🛅 C: Keil	✓ >	Go
Folders	× Name 🔺	
🖃 🚞 Keil		
🗉 🧰 ARM	C51	
표 🫅 C51	🔁 UV2	
🛅 UV2	💛 🔁 UV3	
🛅 UV3	TOOLS.INI	
<	> <	>

• When plugging the mIDAS-Link emulator for the first time, the following window appears:

Found New Hardware Wizard						
	Welcome to the Found New Hardware Wizard					
	This wizard helps you install software for:					
	J-Link					
	If your hardware came with an installation CD or floppy disk, insert it now.					
	What do you want the wizard to do?					
	Install the software automatically (Recommended) Install from a list or specific location (Advanced)					
	Click Next to continue.					
	< Back Next > Cancel					

Select "Install from a list or specific location" and press next. Then select "Include this location in the search" and enter the path of the USB driver: C:\ADuC7XXXV0.2\Applications\usbdriver. Press next.

Found New Hardware Wizard
Please choose your search and installation options.
Search for the best driver in these locations.
Use the check boxes below to limit or expand the default search, which includes local paths and removable media. The best driver found will be installed.
Search removable media (floppy, CD-ROM)
✓ Include this location in the search:
C:\ADuC7XXXV0.1\Applications\usbdriver 🔗 Browse
O Don't search. I will choose the driver to install.
Choose this option to select the device driver from a list. Windows does not guarantee that the driver you choose will be the best match for your hardware.
< Back Next > Cancel



(1) Installation

In the hardware installation window, select Continue anyway.



Finally	when	the	following	window	appears	press	the	Finish
button.								

When launching the I2CWSD application for the first time it may be required to point to the directory where the applications USB drivers are installed. If prompted please enter the following location C:\Program Files\Analog Devices Inc\MultiDongle\Driver.

IAR Embedded Workbench installation:

- The IAR Embedded Workbench is available as part of the ADuC7XXX package, however it is not automatically launched as part of the installation procedure. If you choose not to install the IAR Embedded Workbench now, you can install it later by double clicking on the file "EWARM-KS-WEB-5407.exe" at C:\ADuC7XXXV0.2\Applications\IAR. Then the file C:\ADuC7XXXV0.2\Applications\IAR\copy.bat needs to be run after IAR has been installed in order to include the most up to date ADI products.
- To install, follow the on screen instructions. IAR Embedded Workbench will require registering on IAR website to obtain a license key. At this point the latest edition of the IAR tools can be downloaded instead of the version of the tools included on this CD.



(2) KEIL µVISION3 INTEGRATED DEVELOPMENT ENVIRONMENT

The μ Vision3 IDE integrates all the tools necessary to edit, assemble and debug code. The ADuC7XXX Development System supports non-intrusive emulation limited to 32kByte code. This section describes the project setup steps in order to download and debug code on an ADuC7XXX evaluation system. The ADuC7023 is used as the primary example in this section. ADI recommends using the J-Link debugger driver as described in the following section however the RDI debugger driver described below may also be used.

2.1 Starting µVision3

1. From the START menu choose All Programs \rightarrow Keil uVision3. This loads the μ Vision3 IDE. The μ Vision3 executable is located at C:\Keil\UV3\Uv3.exe.

2.2 Toolbars

- 2. Under the VIEW menu, four toolbars are available:
 - a. Status Bar
 - b. File Toolbar
 - c. Build Toolbar
 - d. Debug Toolbar

The Build Toolbar will be active only when the IDE is in Edit/Compile mode. The Debug toolbar will be active only in Download/Debug mode.



2.3 Starting a project

3. From the project menu select New Project as shown below.

<u>P</u> rojec	t <u>D</u> ebug	Fl <u>a</u> sh	Peripherals	Tools	SVCS	<u>W</u> indow	Help
N	ew µ <u>V</u> isior	n Projec	t				
Ν	ew Projec	t <u>W</u> orks	space				
Į	mport µVis	ion 1 Pro	oject				
0	ipen Proje	ct					
g	lose Proje	ct					
-							
Ν	lanage						+

4. Create a new folder ADIdemo under C:\Keil\ARM\ Examples and enter the name of the project as Demo. You will then be asked to select the device. Select the part number corresponding to your evaluation board under Analog Devices. NEW

Create New F	Project			? 🛛
Save in: 🔀	ADIdemo	• 🕈	۵ 🖻	* 📰 •
File name:	D¦∋mo		- [Save
Save as type:	Project Files (*.uv2)	-	• [Cancel

Options for Target Target 1		C
Device Target Output Listing U: Database: Generic CPU Da	er C/C++ Asm Linker Debug Utilities ita Base	
Vendor: Analog Devices		
Device: ADuC7023		
Toolset: ARM		
Analog Devices Analog Devices ADuC7019 ADuC7020 ADuC7020 ADuC7022 ADuC7024 ADuC7024 ADuC7025 ADuC7025 ADuC7026 ADuC7026 ADuC7028 ADuC7028 ADuC7028 ADuC7030 ADuC7032	 ARM/TTDMI based controller with 12-bit 1MSPS 16-Channel ADC, Votage Comparator, 5245 on-chip Rash LEE with In-System Programming (ISP) and 8KB RAM, 12C and SPI sental interface. JTAG port for download veldeug, 3 Times, 15-bit PVM generator. 20 General purpose I/O pins, On-chip Programmable Logic, CPU clock up to 41.78 MHz, On-chip crystal oscillator and On-chip PLL. 	
ADuC7033		2
	OK Cancel Defaults	lelp

The following message appears. Select "No" not to include automatically the startup file startup.s to your project.



µVision3	
2	Copy ADuC702x Startup Code to Project Folder and Add File to Project ?
	Yes No

(2) Keil µVision3 Integrated Development Environment

It is po	ossible to change compiler by selecting 🌉 "setup file extensions, books and environment", "folder extension".
a.	For this demo, select the RealView Compiler:

Components, Enviror	ment and Books			
Project Components Fo	Iders/Extensions Books			
Development Tool Fol	ders		Default File Exte	ensions:
🔲 Use Settings from	TOOLS.INI:		C Source:	•.c
Tool Base Folde	r: C:\Keil\ARM\		C++ Source:	*.cpp
BIN: C:\Keil\	ARM\BIN\		Asm Source:	".s"; ".src; ".a"
INC:			Object:	*.obj
LIB:			Library:	•.lib
Regfile:			Document:	*.txt; *.h; *.inc
- Select ARM Developr	nent Tools			
Use RealView Compiler	RealView Folder: BIN31\			
🖵 Use GNU	GNU-Tool-Prefix: arm-uclibc-			
Compiler	GNU-Tool Folder: C:\Program Files\Code	Sourcery\S	ourcery G++ Lite\	
	ОК Са	ncel		Help

5. Right click on Target1 and select "Option for Target1" to configure the settings of this project. By default, uVision3 will use the RealView compiler.

Add "0x80000" into the R/O Base and "0x10000" in to the R/W Base to indicate to the Compiler the Flash and RAM start addresses. Check the button "Use Memory Layout from Target Dialog". a.

Options for Target 'Target 1'		
Device Target Output Listing User	C/C++ Asm Linker Debug Utilities	
✓ Use Memory Layout from Target Dia Make RW Sections Position Ind Make RO Sections Position Inde	Bog Bog ependent B/O Base: 0x00080000 ependent Dx00 0x000	
☐ Do <u>n</u> t Search Standard Libraries ☑ Report 'might fail' Conditions as	Errors disable Warnings:	
Scatter File		Edit
<u>M</u> isc controls		
Linker control string	rictscatter "demo.sct" -info summarysizesmapxrefcallgraphsymbols	
	OK Cancel Defaults	Help

b. In the "Output" panel select "Create HEX File". The HEX file can be used by the I2C downloader.



Opt	ions for Target 'Target 1'	
De	vice Target Output Listing User C/C++ Asm Linker Debug Utilities	
	Select Folder for Objects Name of Executable: ADIDEMO	
	 Create Executable: .\ADIDEMO Debug Information Create HEX File 	Create Batch File
	□ Big Endian	
l		
	OK Cancel Defaults	Help

c. In the "Target" panel, ensure the IROM1 and IRAM1 Start and Size tabs are filled in correctly.

Options for Target 'ADC RealView Toolchain'										
De	evice	Target 0	utput Listing	User C/C+-	+ Asm	Linker	Debug	Utilities		
Analog Devices ADuC7028										
				Xtal (MHz): 0.0	32768		de Genera ARM-Mode	tion	•	
	Operati	na system:	None		•	Ē	Use Cro	۔ ss-Module Opti	 imization	
	- p 24	g eyeren.	1			Г	Use Mic	roLIB		
Г	Read/	Only Memo	ory Areas			Read/	Write Mem	iory Areas		
(default	off-chip	Start	Size	Startup	default	off-chip	Start	Size	Nolnit
		ROM1:			0		RAM1:			
		ROM2:			0		RAM2:			
		ROM3:			0		RAM3:			
		on-chip					on-chip			
	$\overline{\mathbf{v}}$	IROM1:	0x80000	0xF800	0	◄	IRAM1:	0x10000	0x2000	
		IROM2:			0		IRAM2:			
L										
				ОК	Ca	incel	Defau	lts		Help

d. If you have an emulator, power up the evaluation board using a 9V power supply or, via the USB connection. Connect the evaluation board to the mIDAS-Link and the mIDAS-Link to your PC's USB port using the provided USB cable.
 <u>Note:</u> a green LED on the mIDAS-Link emulator blink a few times before staying on, indicating that the emulator is communicating correctly with the PC.

2.4 Configuring the J-Link Debugger driver

a. If you are using an evaluation board and want to use the RDI driver, then continue to section 2.4.1.

Right click on Target1 and select "Option for Target1" to configure the settings of this project. By default, uVision3 will use the RealView. In the "Debug" panel, select Use … and choose J-LINK / J-TRACE if you have a mIDAS-Link emulator. Select the settings button and configure as follows.



JLink/JTrace Interface Dri	ver Setup	X			
JTAG Speed: C Auto Selection C Adaptive Clocking (* KHz) 750	Debug Cache Options:	JTrace Trace Options: Enable Trace Cycle-accurate Max, Trace Samples: 64K			
Reset Strategy: Info Software for Analog Device ADuC7xxx MCUs JLink OK Cancel					

If your development system doesn't include a JTAG emulator, use the simulator for this exercise.

b. In the "Utilities" panel, select Use Target Driver for Flash Programming", chose "J-LINK / J-TRACE" and tick the option "Update Target before Debugging".

Options for Target 'Target 1'	×
Device Target Output Listing User C/C++ Asm Linker Debug Utilities	
Configure Flash Menu Command	
• Use Target Driver for Flash Programming	
J-LINK / J-TRACE Settings Update Target before De	bugging
Init File:Edit	
C Use External Tool for Flash Programming	
Command:	
Arguments:	
🗖 Run Independent	
OK Cancel Defaults	Help

Hit the "Settings" option and the following dialog box will appear -

Dialog				X
Download Function C Erase Full Chip Erase Sectors C Do not Erase	 ✓ Program ✓ Verify ✓ Reset and Run 	RAM for A	Algorithm Dx00010000 Size: (0x0800	
Programming Algorithm				
Description	Device Type	Device Size	Address Range	
		Start:	Size:	
Add	Remove	ОК	Cancel Help	



Select "Add" for the next window. Select the driver for the generic that you are evaluating. For this example use "ADuC702X Flash (v1.1) and press "Add"

Description	Device Type	Device Size	^
ADuC702X Flash (v1.1)	On-chip Flash	62k	
ADuC703X Flash 32KB (v1.4)	On-chip Flash	30k	-
ADuC703X Flash 64KB (v1.1)	On-chip Flash	62k	
ADuC703x Flash 96KB (v1.4)	On-chip Flash	94k	
ADuC706X Flash 32KB (v1.0)	On-chip Flash	30k	
ADuC7124 Flash (v1.0)	On-chip Flash	126k	
ADuC712x Flash (v1.2)	On-chip Flash	126k	
ADuC7229 Flash (v1.2)	On-chip Flash	126k	
AM29F160DB Flash	Ext. Flash 16-bit	2M	
AM29F160DT Flash	Ext. Flash 16-bit	2M	
AM29F320DB Flash	Ext. Flash 16-bit	4M	
AM29F320DB Dual Flash	Ext. Flash 32-bit	8M	
AM29F320DT Flash	Ext. Flash 16-bit	4M	
AM29F320DT Dual Flash	Ext. Flash 32-bit	8M	
AM29x033 Flash	Ext. Flash 8-bit	4M	
AM29x128 Flash	Ext. Flash 16-bit	16M	~

Then the following window will appear - Press "ok" at this point.

Flas	h Download Setup				×
_D	ownload Function	Program Verify Reset and Run	RAM for /	Algorithm	
P	rogramming Algorithm				_
	Description	Device Type	Device Size	Address Range	
	ADuC702X Flash (v1.1)	On-chip Flash	62k	00080000H - 0008F7FFH	
			Start:	Size:	1
	Add	Remove	ОК	Cancel <u>H</u> elp]

c. Press OK again, all the options should be properly configured to compile, assemble, link, download and debug using mIDAS-Link or the simulator.

2.4.1 Configuring the RDI Debugger driver on the ADuC7023

In the "Debug" panel, select Use ... and choose RDI Interface Driver if you have a mIDAS-Link emulator. Select the settings button and give the path to the JLinkRDI.dll - C:\Program Files\SEGGER\JLinkARM_V408l\JLinkRDI.dll

If your development system doesn't include a JTAG emulator, use the simulator for this exercise.



(2) Keil µVision3 Integrated Development Environment

Options for Target 'Target 1'	
Device Target Output Listing C Asm LA Locc C Use Simulator Limit Speed to Real-Time	ate LA Misc Debug Utilities
Koad Application at Startup Kin to main() Initialization File: Breakpoints For Debug Session Settings Breakpoints For Toolbox FWatchpoints & PA FMemory Display	Image: Construction at Startup Image: Run to main() Initialization File: Image: Construction at Startup Restore Debug Session Settings Image: Construction at Startup Image: Restore Debug Session Settings Image: Construction at Startup Image: Restore Debug Session Settings Image: Construction at Startup Image: Restore Debug Session Settings Image: Construction at Startup Image: Restore Debug Session Settings Image: Construction at Startup Image: Restore Debug Session Settings Image: Construction at Startup Image: Restore Debug Session Settings Image: Construction at Startup Image: Restore Debug Session Settings Image: Construction at Startup Image: Restore Debug Session Settings Image: Construction at Startup Image: Restore Debug Session Settings Image: Construction at Startup Image: Restore Debug Session Settings Image: Construction at Startup Image: Restore Debug Session Settings Image: Construction at Startup Image: Restore Debug Session Settings Image: Construction at Startup Image: Restore Debug Session Settings Image: Construction at Startup Image: Restore Debug Session Settings Image: Construction at Startup Image: Restore Debug Session Settings <
CPU DLL: Parameter: SARM.DLL -cADuC70	Driver DLL: Parameter: SARM.DLL cADuC70
Dialog DLL: Parameter: DARMAD.DLL pADuC7026	Dialog DLL: Parameter: TARMAD.DLL pADuC7026
ОК Са	ncel Defaults Help

RDI Interface Driver Setup		×
Browse for RDI Driver DLL C:\Program Files\SEGGER\JLinkAR!	M_V408I\JLinkRDI.dll	
Browse for ToolConf File Debug Cache Options Cache Code Cache Memory	Configure <u>R</u> DI Driver	
	OK Cancel	<u>H</u> elp

a. Select the "configure RDI Driver" button. And in the "Flash" panel, clear the "Enable Flash programming "option. Everything else in this window should be disabled.





Enable flash programming Allows programming the flash. This is required to download a program into flash memory or to set software breakpoints in flash (flash breakpoints). Device Analog AD uC7020x62 RAM 8 KB @ address 0x10000 Flash 62 KB @ address 0x80000 Image: The set of the set
Allows programming the flash. This is required to download a program into flash memory or to set software breakpoints in flash (flash breakpoints). Device Analog ADuC7020x62 RAM 8 KB @ address 0x10000 Flash 62 KB @ address 0x80000 Flash 62 KB @
Device Analog ADuC7020x62 ▼ RAM 8 KB @ address 0x10000 Flash 62 KB @ address 0x80000 ▼ Flash is mirrored @ address 0x0 ▼ Cache flash contents Allows caching of flash contents. This avoids reading data twice and speeds up
 RAM 8 K8 @ address 0x10000 Flash 62 K8 @ address 0x80000 ✓ Flash is mirrored @ address 0x0 ✓ Cache flash contents Allows caching of flash contents. This avoids reading data twice and speeds up
Flash 62 KB @ address 0x80000 Flash is mirrored @ address 0x0 Flash contents Allows caching of flash contents. This avoids reading data twice and speeds up
Flash is mirrored @ address 0x0 Cache flash contents Allows caching of flash contents. This avoids reading data twice and speeds up
☐ ☐ Cache flash contents
Allows caching of flash contents. This avoids reading data twice and speeds up
the transfer between debugger and target
Verify flash contents
downloaded to flash memory correctly.
Allow flash download
Allows program download to flash. Your debugger does not need to have a flash
loader. This feature requires an additional license (FlashDL).
Skip download on CRC match

In the "JTAG" tab, ensure the JTAG speed is set to 600KHz.See the screenshot below.

SEGGER J-Link RDI V-	4.03g (beta) Configuration	? 🗙
General Init JTAG	Flash Breakpoints CPU Log	
JTAG speed		_
C Auto selection		
C Adaptive <u>c</u> locking		
 € 600 ▼ k<u>H</u>z 		
Position 0	<u>[</u> R len]0	
0 is closest to TDO.	Sum of IRLens of devices closer to TDO. IRLen of ARM chips is 4.	
	Verifu-ITAG confi	
	OK Cancel Ap	ply

In the "Breakpoints" tab, ensure "Software Breakpoints" are enabled.





B SEGGER J-Link RDI V4.03g (beta) Configuration	?	×
General Init JTAG Flash Breakpoints CPU Log		
Use software breakpoints		
Software breakpoints (as opposed to hardware breakpoints) are breakpoints which modify program memory. This allows setting an unlimited number of breakpoints if the program is located in RAM.		
Use flash breakpoints		
Allows setting an unlimited number of breakpoints if the program is located in RAM or flash, which is extremely valuable when debugging a program located in flash.		
This feature is available only if flash programming is enabled!		
Show info window during program		
OK Cancel	ply	

In the "CPU" window, ensure it is configured like the following screenshot:

SEGGER J-Link RDI V4.03g (beta) Configuration
General Init JTAG Flash Breakpoints CPU Log
Allow instruction set simulation
Allows the emulator to simulate individual instructions when single stepping instructions. This does not normally have any disadvantages and makes debugging much faster, especially when using flash breakpoints.
Endian
⊙ Little endian
C <u>B</u> ig endian
Beset strategy J-Link supports different reset strategies. This is necessary because there is no single way of resetting and halting an ARM core before it starts to execute instructions. Software, for Analog Devices ADuC7xxx MCUs ▼ Delay after reset 0 ms
The following sequence is executed: - The CPU is halted - A soft reset sequence is downloaded to RAM - A breakpoint at 0 is set - The soft reset sequence is executed This sequence performs a reset of CPU and peripherals and halts the CPU before executing instructions of the user program. It is recommended reset sequence for Analog Devices ADuC7xxx MCUs and works with these chips only.
OK Cancel Apply

b. In the "Utilities" panel, select Use Target Driver for Flash Programming", chose "RDI Interface Driver" and tick the option "Update Target before Debugging".



(2) Keil µVision3 Integrated Development Environment

Options for Target 'Target 1'	×
Device Target Output Listing C Asm LA Locate LA Misc Debug Utilities	
Configure Flash Menu Command	
Use Target Driver for Flash Programming	
RDI Interface Driver Settings Update Target before Debugging	
Init File: Edit	
C Use External Tool for Flash Programming	
Command:	
Arguments:	
🗖 Run Independent	
OK Cancel Defaults Help	1

Hit the "Settings" option and the following dialog box will appear - "uVision Flash Programmer" and press "Ok".

Select Flash Programmer	×
µVision Flash Programmer ▼	
ок]	
ок	

Then, a new dialog window will appear as below.

Dialog				X
Download Function C Erase Full Chip C Erase Sectors C Do not Erase	 ✓ Program ✓ Verify ✓ Reset and Run 	RAM for J	Algorithm 0x00010000 Size: 0x0800	
Description	Device Type	Device Size	Address Range	ĺ
		Start: [Size:	1
Add	Remove	, ок	Cancel Help	

Select "Add" for the next window. Select "ADuC702X Flash (v1.1) and press "Add"



A	dd Flash Programming Al	gorithm		×
	Description	Device Type	Device Size	^
	ADuC702X Flash (v1.1)	On-chip Flash	62k	
	ADuC703X Flash 32KB (v1.4)	On-chip Flash	30k	
	ADuC703X Flash 64KB (v1.1)	On-chip Flash	62k	
	ADuC703x Flash 96KB (v1.4)	On-chip Flash	94k	
	ADuC706X Flash 32KB (v1.0)	On-chip Flash	30k	
	ADuC7124 Flash (v1.0)	On-chip Flash	126k	
	ADuC712x Flash (v1.2)	On-chip Flash	126k	
	ADuC7229 Flash (v1.2)	On-chip Flash	126k	
	AM29F160DB Flash	Ext. Flash 16-bit	2M	
	AM29F160DT Flash	Ext. Flash 16-bit	2M	
	AM29F320DB Flash	Ext. Flash 16-bit	4M	
	AM29F320DB Dual Flash	Ext. Flash 32-bit	8M	
	AM29F320DT Flash	Ext. Flash 16-bit	4M	
	AM29F320DT Dual Flash	Ext. Flash 32-bit	8M	
	AM29x033 Flash	Ext. Flash 8-bit	4M	_
	AM29x128 Flash	Ext. Flash 16-bit	16M	~
	Add	Cancel		

Then the following window will appear - Press "ok" at this point.

C Erase Full Chip Erase Full Chip Erase Sectors Do not Erase Programming Algorithm	 ✓ Program ✓ Verify ✓ Reset and Run 	RAM for A	Algorithm Dx00010000 Size: 0x0800
Description ADuC702X Flash (v1.1)	Device Type On-chip Flash	Device Size 62k	Address Range 00080000H - 0008F7FFH
,		-	

c. Press OK again, all the options should be properly configured to compile, assemble, link, download and debug using mIDAS-Link or the simulator.

2.5 Adding Project files

a. All the files relative to the project will be in the folder C:\ADuC7XXXV0.2\ADuC7023\Code\Realview\Demo.

b. From Windows Explorer or any other way, copy the files C:\ADuC7XXXV0.2\ADuC7023\Code\Realview\Demo\Demo.c, irq_arm.c and ADuC702x.s into the following directory C:\Keil\ARM\Examples\ADIdemo.

To add the files to the project right click on the "Source Group" folder in the "Project Workspace" and select "Add Files to Group".



Project Workspace		- x
🖃 🔁 Target 1		
🖻 🖷 🤤 Sour		Options for Crown Source Crown 1
····· 📩 :		Options for Group Source Group 1
		Open Lis <u>t</u> File
		Open M <u>a</u> p File
		Open File
	**	<u>R</u> ebuild target
		Build target F7
		Tr <u>a</u> nslate File
	X	Stop build
		New Group
		Add Files to Group 'Source Group 1'
		Manage Components
		Remove Group 'Source Group 1' and it's Files
	~	Indude Dependencies

Note that you can use under Project the option "Component, Environment, Books" to rename the target and add the file relative to your project.

Project Workspace 👻 🗙
🖃 🔂 Target 1
🖃 📇 Source Group 1
···· 🔝 irq_arm.c
ADuC702x.s
🗄 🗹 🔛 Demo.C

Double click on the file name (Demo.c) in the Workspace window to open the source file. c.

Proje

Assembling/Compiling Code 2.6

To compile/link Demo.c click on the 🖄 (translate current file) icon in the toolbar. The file should compile correctly and the following will a. be seen in the status window. If there are errors in your source code these will appear in the status window. To identify the line of code which corresponds to the error double click on the error in the Output window and an arrow will appear highlighting the line of code in which the error appears.

The ADuC7023.h file will automatically be included under Demo.c in the Project Workspace window.

Before the code can be downloaded to the MicroConverter the entire project must be built. This is done by clicking on the (rebuild all b. target files) icon on the toolbar. It will also create a pot.elf file used by the debugger.

2	Build target 'Target 1'
1	compiling irq_arm.c
	assembling ADuC702x.s
	compiling Demo.C
	linking
	Program Size: Code=1516 RO-data=16416 RW-data=24 ZI-data=1760
	"GPIO.axf" - 0 Error(s), 0 Warning(s).

Downloading/Debugging Code 2.7

- Check on the evaluation board that \$1.3 and \$1.8 is in ON position for the DAC1 and POT. a.
- To start debugging, select Start/Stop Debug in the Debug b.





From the Peripheral pull down menu, select Digital/Analog Converter, DAC1 and select Analog/Digital Converter. c.



d. Close the disassembly window. Go to Demo.c file. Set a breakpoint on the instruction ADCCON = 0x6A3;. This is done by right clicking on the line of code and then selecting "insert/remove breakpoint" or by double clicking on the left of the instruction. Notice that the breakpoint is indicated by a large red dot to the left of the line.



```
19
                        on DAC1 output. This has the affect of controlling the
  20
                        brightness of the LED, D1.
Ensure "POT" and "DAC" switches of S1 are "On"
  21
                                                                         .<u>.</u>
*********/
       *****
  22
      #include <aduc7023.h>
  23
      unsigned int uiPLLTST = 0;
  24
      volatile unsigned int ucTest = 0;
  25
  26
  27
      void ADCpoweron(int);
  28
      int main(void)
  29 🗌 {
  30
           POWKEY1 = 0 \times 01;
                                              // Configure CPU Clock for 41.78MHz, CD=0
           POWCON = 0 \times 00;
  31
  32
           POWKEY2 = 0xF4;
   33
          DAC1CON = 0x13;
  34
                                              // Set DAC1 output to 0-AVDD range and turn DAC1 on
  35
          ADCpoweron (20000);
                                              // power on ADC
          ADCCP = 0x00;
  36
                                              // select ADC channel 0
          REFCON = 0 \times 01;
  37
                                              // internal 2.5V reference. 2.5V on Vref pin
  38
           while (1)
  39
  40
           {
                                             // software conv., single-ended, conv. enabled
// wait for end of conversion
  41
      ADCCON = 0 \times 6A3:
               while (!ADCSTA) {}
  42
               DAC1DAT = ADCDAT;
                                              // result format is identical for DAC and ADC
  43
  44
           3
  45
  46
  47
     void ADCpoweron(int time)
  48
  49 🖂 {
4
```

e. Press the run code button twice. The ADCDAT and DAC1DAT values should be identical.

f. Change the value of the potentiometer press run and view the value of ADCDAT changing and the intensity of the LED changing. Remove the breakpoint, press run. When moving the potentiometer the intensity of the LED changes.

g. To stop the code running press \bigotimes and to stop debugging press \bigotimes .





(3) IAR EMBEDDED WORKBENCH IDE

The IAR Embedded Workbench IDE (EWARM) integrates all the tools necessary to edit, assemble and debug code via JTAG

3.1 Installing the IAR Embedded Workbench

To install the IAR Embedded Workbench software, follow these instructions.

Post installation of the ADuC7XXX CD the IAR Embedded Workbench installation executable needs to be manually selected. This executable is found at C:\ADuC7XXXV0.2\Applications\IAR\EWARM-KS-WEB-

5407.zip. The IAR Embedded Workbench should be installed at C:\Program Files for this installation to function correctly. Post installation a license key is required from IAR in order to operate the evaluation software. Once IAR has been downloaded, double click on the file copy.bat located at C:\ADuC7XXXV0.2\Applications\IAR. This will copy across the latest ADI Generics information not yet available in the latest release of IAR Embedded Workbench.

Before the installation is complete, you will need to register on the IAR webpage. To register, go to the "downloads" page and select the "ARM KickStart version" for download – this will result in the registration page being displayed for you. Note, you do not need to download a new version of the IAR evaluation software for ARM7 parts. The version 5.407 on this CD is recommended as this version is compatible with the IAR example code provided on the CD.

3.1.1 Installing the IAR Embedded Workbench support for the ADuC7124/26, ADuC7029, ADuC7023 and ADuC7122

Once IAR has been downloaded, double click on the file copy.bat located at C:\ADuC7XXXV0.2\Applications\IAR. This will copy across ADI Generics information not included in this release of IAR Embedded Workbench.

3.2 Starting IAR Embedded Workbench

 From the "START" menu choose All Programs → IAR systems → IAR Embedded Workbench for ARM Kickstart → IAR Embedded Workbench. This loads the IAR Embedded Workbench IDE. The following window will appear, close it.

Embedde	d Workbench Startup	X	
	Create new project in current workspace		
	Add existing project to current workspace		
	Open existing workspace		
	Example workspaces		
Recent w	orkspaces:		
Do not show this window at startup.			
	Close		

3.3 Starting a project in an existing workspace

an existing project directory.

and selec

UIKSDACC

🔏 IAR Embedded	K IAR Embedded Workbench IDE				
File Edit View Proj	ject Tools	Window Help			
New	•				
Open	Þ	File	CTRL+O		
Close		Workspace			
Save Workspace		Header/Source File	CTRL+SHIFT+H		
Close Workspace					
Save	CTRL+S				
Save As					
Save All					
Page Setup					
Print	CTRL+P				
Recent Files	•				
Recent Workspaces	•				
Evit					

All the code examples given on this CD are part of this workspace:

5 - 52 - 632	<u>+</u>	5 🙎
Workspace		×
Debug		•
Files	<u>**</u>	2
🗆 💽 Example - Debug		
🛏 🗄 cstartup.s		
🗕 🕀 🔝 main.c		
🖵 🖽 🧰 Output		

3. From the project menu select Create New Project as shown below and choose Empty Project in the Project Template list. Press OK.

REV 04



湾 I	AR Er	nbedd	led Wor	kber	ich IDE		
File	Edit	View	Project	RDI	Tools	Window	Help
Ľ	2	86	Add F	iles			
Worl	kspace	2	Add (Group.			1
Del	bug		Impor	rt Hile I Configu	List		
Fi	les		Remo	ve	aradons.		
민	<u>に</u> しました。 日間	campi estarti	Creat	te New	/ Project		
H-	±	main.	Add E	Existing	g Projec	t	
	Ð 🧰	Outpu	Optio	ns		А	LT+F7
			Sourc	e Cod	e Contro	bl	•
			Make			F	7
-			Comp	ile		С	TRL+F7
			Rebu	ild All			
			Batch	build.		F	8
			Stop	Build		С	TRL+Break
			Debu	g		С	TRL+D
			Make	& Res	tart Deb	ougger	
Crea	te New	Project				X	
Tool	I chain: 🚺	RM			-		

Tool chain: ARM					
Project templates:					
Empty project					
trin asin trin C++					
• C					
Externally built executable					
Description:					
Creates an empty project.					
OK Cancel					

4. Name the new project "Demo" and save it under C:\ADuC7XXXV0.2\ADuC7122\Code\IARexamples\Demo. The new project will automatically appear in the workspace.

File Edit View Project Sir	nulato	or Too
🗅 🛩 🖬 🕼 🎒 🐰	Ēð	e •
Workspace		×
demo - Debug		•
Files	8~ ~~	2 1
🗆 🔂 Example *		
🛛 🛏 🖻 demo - Deb	×	
🛛 🖵 🗈 Example - De	×	

5. Right click on "Demo" in the workspace and select add files. Add Timer.c and cstartup.s from the Timer folder under IARexamples. Note that you need to change "file of type" to "all file" to add cstartup.s

6. Right click on Demo in the workspace and select options.





The following window appears: change the processor variant to device and choose the device that you have in your development system. In the "category" list, select "linker".

Options for node "De Category: C/C++ Compiler Assembler Custom Build Build Actions Linker Debugger Simulator Angel IAR RDM-monitor J-Link Macraigor RDI Third-Party Driver	Target Output Library Configuration Library options MISRA C Processor variant © Core ARM7TDMI © Device None FPU None FPU None © Generate interwork code Processor mode © Arm © Little © Big © Stack align © 4 bytes © 8 bytes
J	Thumb C Big C 8 bytes

3.4 Configuration for the mIDAS-Link

7. Select Override Default in the linker command file box and choose the file "ADuC7122_Flash_Standalone.icf" under: C:\ProgramFiles\IARSystems\EmbeddedWorkbench5.4 Kickstart\ARM\examples\AnalogDevices\SupportFiles.



eneral Options	Factory Settings
C/C++ Compiler Assembler Output Converter Custom Build Build Actions Linker Debugger Simulator Angel GDB Server IAR ROM-monitor J-Link/J-Trace	Config Library Input Output List #define Diagnostics Che
LMI FTDI Macraigor RDI ST-Link Third-Party Driver	

 In the Debugger options, select the Setup panel and choose J-LINK/J-TRACE as driver. Also check the override default tick box under the device description file heading and set the path as follows

\$TOOLKIT_DIR\$\CONFIG\debugger\AnalogDevices\ioaduc 7122.ddf. Configure menus as follows.

Category: Factory Settings General Options C/C++ Compiler Assembler Output Converter Output Converter Download Build Actions Download Linker Imain Debugger Setup macros Simulator Angel GDB Server IAR ROM-monitor J-Link/J-Trace Imain Devige description file Imain Devige description file Imain ST-Link Third-Party Driver
OK Cancel

(3)	IAR

Options for node "De	mo"
Category: General Options C/C++ Compiler Assembler Output Converter Custom Build Build Actions Linker Debugger Simulator Angel GDB Server IAR ROM-monitor J-Link(J-Trace LMI FTDI Macraigor RDI ST-Link Third-Party Driver	Setup Download Edra Options Images Plugins Attach to program Marfly, download Suppress download Suppress download Use flash loader(s) Qvenide default. board file STOOLKIT_DIRS/config'flashloader\AnalogDevices'
	OK

9. In the J-LINK/J-TRACE panel, set the reset type as software and configure the JTAG speed to 750 kHz. Press OK, the project is now configured to debug via the mIDAS-Link.

Options for node "De	emo"	X
Category: General Options C/C++ Compiler Assembler Output Converter Custom Build Build Actions Linker Debugger Simulator Angel GDB Server IAR ROM-monitor J4.ink/J-Trace LMI FTDI Macraigor RDI ST-Link Third-Party Driver	Setup Connection Breakpoints Reset Software, Analog Devices JTAG/SWD speed Catch exceptions Atg Ipital 32 KHz Exed 750 KHz Adaptive Catch exceptions Reset IRQ Undef EQ Swill Data Prefetch	Factory Settings
	OK	Cancel

10. To start debugging press the icon \blacktriangleright or select Debug in the Project dropdown menu.



(4) I2C Downloader

(4) THE WINDOWS I2C DOWNLOADER

The Windows I2C Downloader for ARM based part (I2CWSD) is a windows software program that allows a user to download Intel Extended Hex files as created by assembler/compilers to the MicroConverter via the I2C port. The Intel Extended Hex file is downloaded into the on-chip Flash/EE program memory via a USB-I2C dongle (MCV COMBI DONGLE) in the case of this evaluation kit.

For the ADuC7023 evaluation board, no dongle is required to program the part via USB. But, the ADuC7023 specific version of I2CWSD must be used. This version is located in the following folder: C:\ADuC7XXXV0.2\Documentation\ADuC7023\EvalDoc\ADuC7023 Eval board Programming

4.1 Opening the I2CWSD

- 1. Power up the evaluation board using the USB interface.
- 2. Connect the MCV COMBI dongle to your PC via the USB interface. Note, for the ADuC7023 evaluation board, there is a specific I2CWSD application that does not require the MCV COMBI dongle only the USB cable.
- 3. Connect the 4-pin I2C header of the dongle to the temporary I2C header of the ADuC7023 evaluation board.
- 4. Ensure that Flash address 0x80014 is erased (equal to 0xFFFFFFF).
- 5. The user should put the MicroConverter into I2C download mode using the following sequence:



Please conne	ct board to USB-Dong	gle		
or download ress Reset c	n Hardware before cl	ick >Start<		

4.2 Downloading using I2CWSD

Devices Inc \rightarrow I2CWSD.

7. Select the file at C:\ADuC7XXXV0.2\ADuC7023\Code\Realview\Demo\demo.hex.

can be launched from "start \rightarrow all programs \rightarrow Analog

6.

at



(5) Elves

- 8. Press the Configure button and in the Flash panel select "Mass Erase" and "Program". Press OK.
- 9. Press the Start button. The I2CWSD automatically sends the reset command to the MicroConverter. If the MicroConverter is in I2C download mode and the comms between the PC and the evaluation board are setup correctly, then the text "Connected to ADuC7023.." should appear.
- 10. Press the "Flash" button to start downloading the hex file. A progress bar while appear when the file is downloading. Once the file has been successfully downloaded monitor status box will be updated with "Download Complete Click Run to run program".

:\ADuC7XXXV0.1\ADuC7023\Code\Realview\Demo\Demo.hex	Browse
Monitor Status	
Building up connection	
Requesting CPU ID	
Waiting up to 20 seconds for CPU ID to be returned	
CPU ID Response Received	
CPU ID Response Received Connected to ADuC7023i -62 A5Y.	
CPU ID Response Received Connected to ADuC7023i -62 A5Y.	
CPU ID Response Received Connected to ADuC7023i -62 A5Y.	
CPU ID Response Received Connected to ADuC7023i -62 A5Y.	
CPU ID Response Received Connected to ADuC7023i -62 A5Y.	
CPU ID Response Received Connected to ADuC70231 -62 A5Y.	
CPUID Response Received Connected to ADuC70231 -62 ASY.	53



(5) Elves

(5) ELVES

5.1 Using Elves.exe with IAR Embedded Workbench

 In IAR Embedded Workbench IDE, using the previous example, select Elves in the Tools pull down menu. On first use a text file will be launched explaining how to setup this tool. Click on the setup button, check the path of the browser and select details. Exit this window.

🔏 IAR Embedded Workbench IDE				
File Edit View Project	Tools	Window	Help	
🗅 🖻 🖬 🕼 🕼	Opt	ions		
Workspace	Configure Tools			
Blink - Debug	File	name Exte	nsions	
Files	ARMWSD			
	Elves			
I I I I I I AR Code Exam	PLA	Tool		

2. In the Select Library, a list of library should be visible. Choose LibDac702x.h.

😵 Elves 🛛 🔀
Select Library Linist Add C:\ADuC7xxxV0.1\ADuC702x\code\IAR Code Examples\LibIAR\ADC\LibAdc702x.h
Choose <u>F</u> unction
int AdcGo(int iChanP, int iChanN, int iStart)
Source Code
C Function prototype: int AdcGo(int iChanP, int iChanN, int iStart); ChanP:(ADC_0ADC_1ADC_2ADC_3ADC_4ADC_5ADC_6ADC_7ADC_8ADC_9ADC_10ADC_11, iChanN:(ADC_0ADC_1ADC_2ADC_3ADC_4ADC_5ADC_6ADC_7ADC_8ADC_9ADC_10ADC_11, iStart(ADC_0FFADC_T2S_ADC_T3S_ADC_SWS_ADC_CCS_ADC_PLAS_ADC_IRQS); Description of Function: Start ADC conversion. User interface: S et iChanP to set which signal will be connected to the positive input of the ADC; O+15 or ADC_0ADC15 for external channels 0-15 (if available). T 6 or ADC_TEMP for internal temperature (iChanN must be 17 (ADC_GND)).
Choose Parameters int iChanP iChanN iStart AdcGo(ADC_0 ▼ ADC_0 ▼ ADC_0FF ▼)opy
Help F1= <u>H</u> elp Setup

- 3. In the Choose function, select int DACRng(). You can now see a description of the function and the code. Fill the parameters, channel 1 and AVDD_RNG. Press the copy button. In your C code, replace DAC1 configuration by the function (right click and paste).
- Repeat this with int DacOut() function, channel 1 and value = ADCDAT. Replace the line DAC1DAT = ADCDAT with DacOut function.
 In the project workspace add the file libDAC702x.79 that is under C:\ADuC7XXXV0.1\ADuC702x\code\IAR Code Examples\LibIAR\DAC. In the main code include the two files:
- #include" C:\ADuC7XXXV0.2\ADuC702x\code\IAR Code Examples\LibIAR\DAC \libDac702x.h"
- 6. Other functions are also available under :\ADuC7XXXV0.2\ADuC702x\code\IAR Code Examples\LibIAR.

5.2 Using Elves.exe with uVision3

The Elves can also be used in a similar way under Keil uVision3. Select Elves under the Tools pull down menu.

📅 DAC - μVision3	
<u>File Edit View Project Debug Flash Peripherals</u>	Tools SVCS Window Help
웥 😅 🖬 🍠 👗 🖻 🛍 🛛 으 오 🛛 建 🕸	Setup PC-Lint
😵 🍱 🕮 👗 🙀 🎊 DAC Debugger	Lint All C-Source Files
Project Workspace v x	Customize Tools Menu
DACsine.c	Elfes

In pot.c add the following files:

#include" C:\ADuC7XXXV0.2\ADuC702x\code\RealView Code examples\LibKeil\DAC \libDac702x.h"

And in the option for target, under linker, add the name and path to the library:



Options for T	Seast Tarast 1	8
Options for 1	arget Target T	
Device Targe	et Output Listing CC Assembler Linker Debug	Utilities
	Enable Garbage Collection Do not use Standard System Startup Files	Text Start:
	Do not use Standard System Libraries	BSS Start:
	Vse Math Libraries	
Linker Script File:	ADuC702X.ld	Edit
Include Libraries	Dac 702x	
Include Paths	C:\ADuC702x\code\KeilCodeExamples\LibKeil\DAC	
Misc controls		
Linker control string	-T ADuC702X.ld -mthumb-interwork -WI -o Demo.elf -L C:\ADuC702x\code\KeilCodeExamples\LibKeil\DAC *.o -	4Dac 702x
	OK Cancel	Defaults Help



(6) PLA tool

(6) PLA TOOL

The PLA tool is a graphical tool allowing configuring the PLA easily.

The following example is part of the code example, PLA, under Code\KeilCodeExamples.

The code generated corresponds to the file PLAinit.c of ADCPLA code example. ADC conversion will occur if P1.2 is high and PLADIN bit 2 is set. Note that the ADC must be configured to start conversion on a PLA start convert signal. More comprehensive examples are in the PLAtool help.

6.1 Opening the PLATool

- Launch PLAtool.exe from the START menu under All Programs → ADuC7XXX → PLAtool or from c:\ADuC7XXXV0.2\Applications\PLAandElves\PLATool_V2. 5_Setup.msi and select a part number.
- 2. Select ADuC7020 and press OK. The window below appears.





6.2 Configuring the gates and output

3. Select block 0.





4. Select AND gate for element 2, with multiplexer A on Bit 2 bus i.e. MMR PLADIN and multiplexer B on P1.2. Choose to bypass the flip flop. Select the "Output" panel, scroll down and choose to start an ADC conversion using element 2 output.

😫 ADUC PLA TOOL	
File Generate Clear Selections Decode Change Target Help	
Top Level View PLA Block 0 PLA Block 1 Outputs Configuration Block 0 Final Circuit Block 1 Final Circuit	
-ADC et conv	
ADC SL_CONV	
Block 0	
Elem 0	
Elem 1	
Elem 2	
Elem 3	
Elem 4	
Elem 5	
Elem 6	
Elem 7	
	- ADC start
Block 1	
Elem 8	
Elem 9	

The PLA peripheral is now configured as in example ADCPLA.

6.3 Generating C code

5. Select Generate \rightarrow Code \rightarrow C Code.



The code generated corresponds to the file PLAinit.c under C:\ADuC7XXXV0.1\ADuC702x\code\RealView Code examples\PLA.

	Fool - CodeWindow	E
	PLA Tool Code Window	
Ņ	Code Generated By the ADuC 702X PLA Tool	<u>^</u>
//FileTy	pe: C PLA Configuration File	
//Sourc	e: C Source Code	
//Date:	20/07/2004 14:43:05	
//=====		
#includ	e "ADuC7024.h"	
void {	plalnitialize()	
	// Configure Port Pins for PLA mode	
	GP1CON = 0x0300;	~
,	Close	



(7) Windows Serial Downloader

(7) THE WINDOWS SERIAL DOWNLOADER

The Windows Serial Downloader for ARM based part (ARMWSD) is a windows software program that allows a user to serially download Intel Extended Hex files as created by assembler/compilers to the MicroConverter via the serial port. The Intel Extended Hex file is downloaded into the on-chip Flash/EE program memory via a selected PC serial port (COM1 to COM31).

7.1 **Opening the ARMWSD**

- 11. Power up the evaluation board using the 9V power supply. Connect the evaluation board header J1 to your PC's COM1 serial port using the RS-232 dongle cable provided. The PC serial COM port may be changed from COM1 via the WSD 'configuration' option...see section 4.3 below.
- 12. The user should put the MicroConverter into serial download mode using the following sequence:



7.2 Downloading using ARMWSD

- Select the file at C C:\ADuC7XXXV0.2\ADuC702x\code\IAR Code Examples\Misc\blink.hex. 14.
- 15. Press the Configure button and in the Parts panel select the part you are using. Press OK.
- 16. Press the Start button. The ARMWSD automatically sends the reset command to the MicroConverter. If the MicroConverter is in serial download mode and the comms between the PC and the evaluation board are setup correctly then the ARMWSD should start downloading the hex file and display a progress bar while the file is downloading. Once the file has been successfully downloaded monitor status box will be updated with "Download Complete Click Run to run program".

	×
File to download C1ADuC7XXXV0.1ADuC702xtcoce1AR Code Examples/Misc/Bli Browse Monitor Status Connect test board to PC COM1 at 9600 Baud. Click Start. Ready @ 9600 baud n,8,1.	
Press Download and pulse Reset on hardware. ADuC7026 -62 H3T received. Erasing 2 pages of 512 bytes each. Downloading 729 bytes Configure Start. Run Exit	

13.

e.



(7) Windows Serial Downloader

7.3 Running the downloaded file

Running using the ARMWSD

17. Click the run button. The monitor status box will be updated with the message "Running. Click Start for new Download". The program start running from 80000h (start of the Flash/EE).

Manual Run option

18. Press RESET on the evaluation board with the SERIAL DOWNLOAD switch released. The program starts running automatically after reset as can be seen by the flashing LED.

7.4 Additional options

The ADuC702x family incorporates a serial download protocol that allows various options (see ARMWSD_protocol technote). These options can be selected in the Configuration window as shown below.

Configure 🗙
Parts Help Comms Flash
Browser - full path and extension Browse
c:\Program Files\Internet Explorer\iexplore.exe
Help Path Browse
OK Cancel
Configure
Serial Port Baudrate COM1
OK Cancel
Configure
Parts Help Comms Flash
Rashing options └ Mass erase └ Program └ Venfy └ Protect
OK Cancel



(7) Windows Serial Downloader

If the protect option is selected, another panel is available. Select the pages to protect, enter the key and press OK. Note that using the ARMWSD, only a mass erase will be able to erase the protection.

Configure	K			
Parts Help Comms Flash Protection				
Highlight ranges to protect	1			
Pages 096-099 (0x0c000-0x0c7ff) 📥				
Pages 100-103 (0x0c800-0x0cfff)				
Pages 104-107 (0x0d000-0x0d7ff)				
Pages 108-111 (0x0d800-0x0dfff)				
Pages 112-115 (0x0e000-0x0e7ff)				
Pages 116-119 (0x0e800-0x0eff)				
Pages 120-123 (0x01000-0x01/11)				
Key0				
All None 0x ABCDEF01				
OK Cancel				

NOTE: use of the PC COM port

Only one application may use the PC serial port at any time. Close the ARMWSD before using any other application that uses the PC COM serial port



(8) Windows Analog Software Program (WASP)

(8) WINDOWS ANALOG SOFTWARE PROGRAM (WASP)

The Windows Analog Software Program (WASP) is a windows software program for all ADuC702x MicroConverter products that allows analysis of their analog performance.

This application is currently in beta sampling. ADI is not liable for the use of this software.

8.1 Setup

The WASP uses a mIDASLink emulator to configure the MicroConverter and to acquire results.

Usage of the mIDASLink emulator requires that the USB driver for this emulator be installed before use. Refer to Section <u>Tools installation options</u> in the first chapter for information about installing this driver if necessary.

Before launching the WASP, you should ensure that

- The mIDASLink emulator is connected to the PC via the USB cable.
- The USB driver for the mIDASLink emulator has been provided to Windows.
- The 20 way IDC mIDASLink emulator JTAG cable is connected to the IDC JTAG connector on your target board.
- The target board is powered up.

8.2 Usage

The WASP consists of three separate pages: Connection, Configuration, and Results.

😹 WASP7				
File Pages Help				
🛋 🗅 🜌				
Connection	😰 Connection			
Noise Analysis	RDI			
	Berkoonskalaring alloo taavaaling waxaanii aanii aa Configure			
	Status			
Ready Ready	Running			
WASP Connection Page				

The Connection Page contains information about any previous connection attempt and also the possibility to reconfigure the mIDASLink if required.

The information shown in the Status box on this page may be useful if the WASP failed to connect to the ADuC702x for any reason.

There is also the possibility to re-configure the mIDASLink via the *Configure* button. However, re-configuring will not normally be necessary as the WASP will use a suitable default set-up initially.



(8) Windows Analog Software Program (WASP)

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File Pages Help					
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Ego Connection	Sect problem to modify Perphends ACC ACCON ACCO	ADC con ADC Mode Positive Channel Negative Channel Negative Channel Cicck Speed Acquisition Time ADCausy pin Conversion Input Int. Ref. Output Int. Ref. Chanbiel External Reference No. of Samples	figuration Setting Single-ended mode ADC0 ADC0 ADC0 ADC0 C2 8 clocks Gasbled Single-Software Enabled Powered up 100 V 4000 modify the state of each a	setting	
Ready	teady Running				

WASP Configuration Page

The **Configuration Page** allows the ADC to be configured according to the user's preference. The set-up described here will be used in any subsequent acquisition of results.

ADC Configuration

You can modify the current setting of any field by either clicking or hovering over an underlined link on the page.

Parameter	Setting		
ADC Mode	Single-ended mode	_	
Positive Channel	ADC0	Sing	le-ended mode
Negative Channel	AGND	Diff	erential mode
Clock Speed	fADC/2	Psu	edo differential mode
Acquisition Time	8 clocks		
ADC _{BUSY} pin	disabled		
Conversion Input	Single Software		
Int. Ref. Output	Enabled		
Int. Ref. Enabled	Powered up		
External Reference	<u>1.00 V</u>		
No. of Samples	4000		

Clicking on an underlined link.

Clicking on a link brings up a menu from which the desired option can be selected.

Parameter	Setting			
ADC Mode	Single-en	ded mode		
Positive Channel	ADC0			
Negative Channel	AGND		Conversion Mode	
Clock Speed	fADC/2			
Acquisition Time	8 clocks	Options		
ADC _{BUSY} pin	disabled	Single-ended mode Differential mode		
Conversion Input	Single Sc	<u>Psuedo differential mode</u>		
Int. Ref. Output	Enabled			
Int. Ref. Enabled	Powered			
External Reference	<u>1.00 V</u>	Single Ended Mode		
No. of Samples	<u>4000</u>			
lick or hover over the links t	k or hover over the links to modify th		accepts an analog input range of 0 to VREF when operating in single- n single-ended modes, the input range is 0 V to VREF.	

Hovering over an underlined link

Alternatively, hovering over an underlined link will bring up a descriptive balloon from which the desired option can be selected.



(8) Windows Analog Software Program (WASP)



WASP Results Page

The Results Page shows the analysis of results from the last acquisition. The results analysis consists of the following

- A strip chart showing all results
- A histogram showing the relative frequency of acquired codes.
- Various statistics calculated from the acquired results.

Several toolbar buttons are also provided which perform some useful functions

Acquire Results

Connects to the MicroConverter and acquires results using the current configuration.

Reset Configuration

Reset the currently configured ADC configuration to a known default configuration.



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Clear Results

Discards all currently acquired results.

Typical usage of the WASP program would involve the following

- Configure the ADC, using the **Configuration** page.
- Click the Acquire Results toolbar button.
- View results and analysis on the **Results** page.



(9) LIN Windows Serial Downloader

(9) LIN WINDOWS SERIAL DOWNLOADER

The applications LINBWSD and LINHWSD are a windows software program for the ADuC703x MicroConverter products that allows serial download of an Intel hex file to flash memory. The LINWSD is automatically extracted and installed by the ADuC7XXX CD to C:\Program Files\Analog Devices Inc\MultiDongle\LINBWSD and C:\Program Files\Analog Devices Inc\MultiDongle\LINHWSD. Further information can be found at C:\ADuC7xxxV0.2\ADuC7034_36\documentation\application notes\ADuC7032 LINWSD Manual.pdf



(10) Installed Documentation and Code Directory

(10) INSTALLED DOCUMENTATION AND CODE DIRECTORY

Installed Documentation Directory

Installing the MicroConverter[®] Development System CD installs documentation for the ADuC702x, ADuC706X, ADuC7034, ADuC7036, ADuC7039 and ADuC7122, ADuC7124/6 products at C:\ADuC7XXXV0.2\ documentation.