

# 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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Technical Support:

North America and ROW: Europe: China: linear.apps@analog.com euro.linear@analog.com china.support@analog.com



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 $\mu$ 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

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

- <u>:</u>
  - Close all your applications. Insert the MicroConverter<sup>®</sup> 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<sup>®</sup> 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:



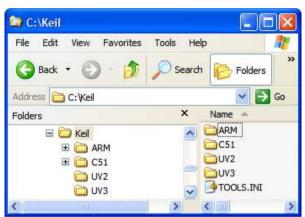
(1) Installation

Welcome to Keil μVisio Release 8/2009	on			Company
This SETUP program ins	stalls:			
RealView Microc	controller Developm	ent Kit V3.80a		
	ay be used to update a previ ake a backup copy before pr			
It is recommended that y	ou exit all Windows program	s before continuing with	SETUP.	
Follow the instructions to	complete the product instal	lation.		
Keil µVision3 Setup				
i nen prinerie e energe		<< Back	Next>>	Cancel

• 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.



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



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.
<ul> <li>Search for the best driver in these locations.</li> <li>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.</li> <li>Search removable media (floppy, CD-ROM)</li> <li>Include this location in the search:</li> <li>C:tADuC7XXXV0.11Applicationstusbdriver</li> </ul>
Ont 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  $\mu$ 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.

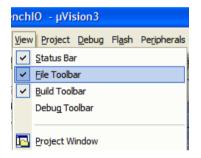
#### 2.1 Starting µVision3

1. From the START menu choose All Programs  $\rightarrow$  Keil uVision3. This loads the  $\mu$ Vision3 IDE. The  $\mu$ 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	<u>H</u> elp
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 Project	? 🛛
Save in: DIdemo	- 🔁 🖆 💷 -
File name: Demo	Save
Save as type: Project Files (*.uv2)	▼ Cancel

Database: Generic CPU	Data Base	
Vendor: Analog Devices		
Device: ADuC7023 Toolset: ARM		
Analog Devices     Analog Devices     Analog Adv.C7019     Adv.C7019     Adv.C7020     Adv.C7021     Adv.C7022     Adv.C7022     Adv.C7024     Adv.C7025     Adv.C7025     Adv.C7026     Adv.C7026     Adv.C7026	<ul> <li>ARM7TDMI based controller with 12-bit 1MSPS 16-Channel ADC, Voltage Comparator, 52K8 on-chip Flash/LE with In-System Programming (SP) and KR RAM, I2C and SPI serial interface, 17AC port for download vdebug, 3 Times, 16-bit PVMM generator, 20 General purpose I/O pins, On-chip Programmable Logic, CPU clock up to 41.78 MHz, On-chip orystal oscillator and On-chip PLL.</li> </ul>	2
ADuc7028     ADuc7029     ADuc7030     ADuc7030     ADuc7032     ADuc7033		>

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



µVision	J				8
?	Copy ADu	C702x Startup Co	de to Project F	older and Add File to I	Project
Y					
		Yes	No		

(2) Keil µVision3 Integrated Development Environment

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

Components, Environm	ent and Books			
Project Components Folde	rs/Extensions Books			
Development Tool Folder	rs		Default File Extensions:	
🔲 Use Settings from TO			C Source: *.c	
Tool Base Folder:	C:\Keil\ARM\		C++ Source: *.cpp	
BIN: C:\Keil\AR	M\BIN\		Asm Source: .s*; *.src; *.a	a*
INC:			Object: *.obj	
LIB:			Library: *.lib	
Regfile:			Document: .txt; *.h; *.in	c
Select ARM Developmer	nt Tools			
Use RealView Compiler	RealView Folder: BIN31\			
Use GNU	GNU-Tool-Prefix: arm-uclibc-			
Compiler	GNU-Tool Folder: C:\Program Files\CodeSo	urcery\S	ourcery G++ Lite\	
	OK Cano	cel		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 T	arget 'Target 1'			
Device Targe	t Output Listing User C/C++ Asm	Linker Debug	Utilities	
I▼ Use Mem	ory Layout from Target Dialog			
_	RW Sections Position Independent	<u>R</u> /O Base:	0x00080000	
	RO Sections Position Independent Search Standard Libraries	R/ <u>W</u> Base	0x00010000	
Report	t 'might fail' Conditions as Errors	<u>d</u> isable Wamings:		
Scatter File	demo.sct			Edit
<u>M</u> isc controls				~
Linker control string	device DARMAD *.ostrictscatter "demo.so autoatsummary_stderrinfo summarysizes		hsymbols	×
	OK Car	ncel Defa	aults	Help

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



(2) Keil µVision3 Integrated Development Environment

Options for Target 'Target 1'	
Device Target Output Listing User C/C++ Asm Linker Debug Utilities	
Select Folder for <u>Objects</u> <u>Name of Executable</u> : ADIDEMO	
<ul> <li>Crgate Executable: .\ADIDEMO</li> <li>✓ Debug Information</li> <li>✓ Create HEX File</li> </ul>	Create Batch File
Big Endian     Forwse Information     Create Library: .\ADIDEMO.LIB	
OK Cancel Defaults	Help

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

Op	otions f	or Targe	et 'ADC Real	View Toolcha	in'					
	)evice	Target 0	utput   Listing	User C/C+	+ Asm	Linker	Debug   (	Jtilities		
1	Analog D	evices AD	uC7028							
				Xtal (MHz): 0.0	32768		de Genera \RM-Mode		<b>-</b>	
	Operati	ng system:		,	•			ss-Module Opt		
	operati	ng system.	Trione		-	Г	Use Mic	roLIB		
	-Read/	Only Memo	ny Areas			- Read/	Write Mem	ory Areas —		
	default	off-chip	Start	Size	Startup	default	off-chip	Start	Size	Nolnit
	Γ	ROM1:			0		RAM1:			
	Γ	ROM2:			0		RAM2:			
	Г	ROM3:			0		RAM3:			
		on-chip	-				on-chip			_
		IROM1:	0×80000	0xF800	0	◄	IRAM1:	0x10000	0x2000	
		IROM2:			0		IRAM2:			
				ОК	Ca	ncel	Defaul	ts		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: Software for Analog Device A	ADuC7xxx MCUs	Info JLink Target

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			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	1
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.

Flash Do	wnload Setup				×
	Function     Erase Full Chip     Erase Sectors     Do not Erase			Algorithm	
Program	ming Algorithm				_
Descr	iption	Device Type	Device Size	Address Range	
ADuC	702X Flash (v1.1)	On-chip Flash	62k	00080000H - 0008F7FFH	
			Start:	Size:	
	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\_V408I\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 Settings Limit Speed to Real-Time	ate   LA Misc Debug   Utilities   (* Use: RDI Interface Driver  Settings
Image: Constraint of the second se	Image: Constraint of the startup     Image: Constraint of the startup     Image: Constraint of the startup       Initialization File:     Image: Constraint of the startup     Image: Constraint of the startup       Restore Debug Session Settings     Image: Constraint of the startup     Image: Constraint of the startup       Restore Debug Session Settings     Image: Constraint of the startup     Image: Constraint of the startup       Image: Constraint of the startup     Image: Constraint of the startup     Image: Constraint of the startup       Image: Constraint of the startup     Image: Constraint of the startup     Image: Constraint of the startup       Image: Constraint of the startup     Image: Constraint of the startup     Image: Constraint of the startup       Image: Constraint of the startup     Image: Constraint of the startup     Image: Constraint of the startup       Image: Constraint of the startup     Image: Constraint of the startup     Image: Constraint of the startup       Image: Constraint of the startup     Image: Constraint of the startup     Image: Constraint of the startup       Image: Constraint of the startup     Image: Constraint of the startup     Image: Constraint of the startup       Image: Constraint of the startup     Image: Constraint of the startup     Image: Constraint of the startup       Image: Constraint of the startup     Image: Constraint of the startup     Image: Constraint of the startup       Image: Constraint of the startup     Image: Con
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\JLinkARI	M_V408I\JLinkRDI.dll	
Browse for ToolConf File	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.





e	ne	en	al		I	ni	t					J	Т	A	G			FI	88	h				E	3r	e	ał	¢	00	Dİ	n	ts	\$	l	(	C	P	U	I		1	L	.0	g																
Γ	Γ			Ē	ha	Ь	le	•	ij,	3:	ł	1	P	0	g	ra	m	m	in	g																																			_			_	 	
																																														ro ts)		ar	n	in	tt	) f	la	is	h					
		D	le	v		e	ſ	A	ľ	lâ	k	0	]	A	D	ul	27	70	2	0>	(6	2	1			_	_	_	_					-	•																									
			F	7/	41	4	[	8	ŀ		3	Ç	3	ā	30	d	e	ss	0	lx'	1(	00	0	0	10	)										1																								
			F		38	h	I	6	2	ł	Œ	3	Ģ	à	a	d	dr	es	s	0	X	30	D	0	10	10										1																								
							Ī	V	ſ	F	-	3	sł	ni	is	m	in		re	d	Q	ģ	0	31	d	d	re		s	C	ly,																													
	[		Ŀ.	7	0	įa	iC	ł	e	1		35	ŀ	0	20	m	te	n	s	_																																			_			_	1	
																fla er																			s	p	B	a	din	nļ	J	d	a	ta	a t	W	C	8	at	10	:	sp	e	e	ds		uj	þ		
	[															nte en								Ŀ			TI								c.								Ŀ	:0	1 L										_				 ]	
																sh															S	u	2	e	1	-	0	0	0	1	e	·C	ĸ	. 11	r t	he	: ;	110	JŪ.	jna	11	î)	M	a	8					
	[	-	Ŀ.	7	A		0	Ņ	1		15	ł		lo		vr		a	d																																				_			_	1	
																W B																														ne	e	d	to		h	зv	e	a	a f	fla	35	h		
			Ŀ.	7	9	ik	ip	)	d	0	W	r		5	id	lc	n	C	R	С	П	na	a	t	c	h																																		
																																																											1	

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

SEGGER J-Link RDI V4	1.03g (beta) Configuration	<u>?</u> ×
	lash   Breakpoints   CPU   Log	
Dis closest to TDD.	multiple devices IR len 0 Sum of IRLens of devices closer to TDO. IRLen of ARM chips is 4.	
	<u>V</u> erify JTAG con	
	OK Cancel	oply

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





BI SEGGER J-Link RDI V4.03g (beta) Configuration	<b>?</b> 🗙
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	7
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:	
Final Run Independent	
OK Cancel Defaults Help	

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

Select Flash Programmer	×
µVision Flash Programmer ▼	
,	
OK	

Then, a new dialog window will appear as below.

Dialog				×
Download Function C Erase Full Chip C Erase Sectors C Do not Erase	Verify		Algorithm 0x00010000 Size: 0x0800	
Description	Device Type	Device Size	Address Range	-
		Start: [	Size:	
Add	Remove	ОК	Cancel Help	

Select "Add" for the next window. Select "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.

Download Function C Erase Full Chip Erase Sectors Do not Erase Programming Algorithm		RAM for A	Algorithm
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	^-	Ontinge for Crown 'Severe 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	
		<u>B</u> uild 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 File	s
	~	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.

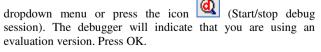
The ADuC7023.h file will automatically be included under Demo.c in the Project Workspace window.

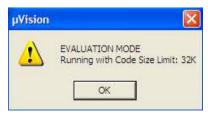
Before the code can be downloaded to the MicroConverter the entire project must be built. This is done by clicking on the (rebuild all b. target files) icon on the toolbar. It will also create a pot.elf file used by the debugger.

2	Build target 'Target 1'
1	compiling irg_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).

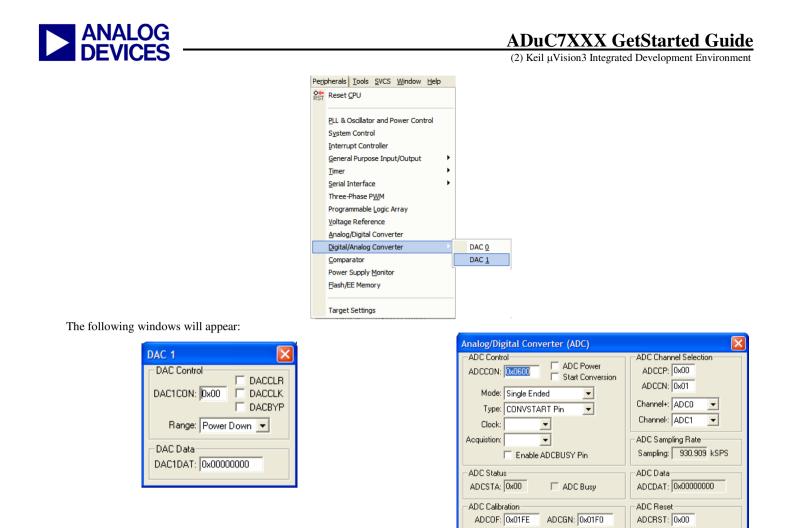
#### **Downloading/Debugging Code** 2.7

- 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
                       brightness of the LED, D1.
Ensure "POT" and "DAC" switches of S1 are "On"
  20
  21
       *****
                                                                 **************
  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 = 0x01;
                                             // Configure CPU Clock for 41.78MHz, CD=0
          POWCON = 0x00;
POWKEY2 = 0xF4;
  31
  32
  33
          DAC1CON = 0x13;
  34
                                             // Set DAC1 output to 0-AVDD range and turn DAC1 on
  35
          ADCpoweron (20000);
                                             // power on ADC
          ADCCF = 0x00;
  36
                                             // select ADC channel 0
          REFCON = 0x01;
  37
                                             // internal 2.5V reference. 2.5V on Vref pin
  38
          while (1)
  39
  40
          Ŧ
                                            // software conv., single-ended, conv. enabled
// wait for end of conversion
  41
      ADCCON = 0x6A3;
               while (!ADCSTA) {}
  42
                                             // result format is identical for DAC and ADC
               DAC1DAT = ADCDAT;
  43
          3
  44
  45
  46
      3
  47
     void ADCpoweron(int time)
  48
  49 🗐 {
```

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

#### 3.3 Starting a project in an existing workspace

an existing project directory.

UIKSDace

🗏 IAR Embedd	ed Workbenc	h IDE	
File Edit View	Project Tools	Window Help	
New	۰.		
Open	۱.	File	CTRL+O
Close		Workspace	
Save Workspace	2	Header/Source F	ile CTRL+SHIFT+H
Close Workspace	e		
Save	CTRL+S		
Save As			
Save All			
Page Setup			
Print	CTRL+P		
Recent Files	+		
Recent Workspa	ices 🕨 🕨		
Exit			

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

5 - 52 - 632	<u>+</u> 12	5   🙎
Workspace		×
Debug		•
Files	<b>8</b> 2	0 <b>;</b> ;
🗆 💽 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.



Import File List	ile Edit View	Project RDI Tools Wi Add Files	indow Help
Remove         Create New Project         Add Existing Project         Options         Options         ALT+F7         Source Code Control         Make       F7         Compile       CTRL+F7         Rebuild All         Clean         Batch build       F8         Stop Build       CTRL+Break         Debug       CTRL+D	Norkspace Debug		
Add Existing Project         Imain.         Imain.			
Source Code Control       Make     F7       Compile     CTRL+F7       Rebuild All       Clean       Batch build       F8       Stop Build       CTRL+Break       Debug	—⊞ 🗟 cstartı —⊞ 🚮 main.ı		
Compile CTRL+F7 Rebuild All Clean Batch build F8 Stop Build CTRL+Break Debug CTRL+D	└─⊞ 🚞 Outpu		ALT+F7
Batch build         F8           Stop Build         CTRL+Break           Debug         CTRL+D		Compile Rebuild All	
Debug CTRL+D			F8
		Stop Build	CTRL+Break

Tool chain: ARM
Project templates:
r Empty project ⊕-asm ⊕-C++
. C Future Nuture National Action
Externally built executable
Description:
Creates an empty project.
OK Cancel

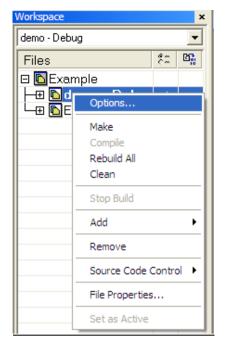
4. Name the new project "Demo" and save it under C:\ADuC7XXXV0.2\ADuC7122\Code\IARexamples\Demo. The new project will automatically appear in the workspace.

File Edit View Project Si	mulato	or Too
🗅 🛩 🖬 🕼 🎒 🐰	Ēð	
Workspace		x
demo - Debug		-
Files	8~ ~	27:
🗆 🔂 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".

Category: C/C++ Compiler Assembler Custom Build Build Actions Linker Debugger Simulator Angel LAR ROM-monitor J-Link Macraigor RDI Third-Party Driver Third-Party Driver Debuger Core ARM7TDMI Core Arm Core ARM7TDMI Core Core Core Processor variant Core Core Core Processor variant Core Core Core Processor variant Core Core Core Processor variant Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core br>Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core Core

#### 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.



ategory: General 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	

8. 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:          General Options C/C++ Compiler Assembler Output Converter Custom Build Build Actions Linker       Setup Download Extra Options Images Plugins         Diver       Images Plugins         Debugger       Simulator         Angel GDB Server IAR ROM-monitor 3-Link/J-Trace IMI FTDI Macraigor RDI ST-Link Third+Party Driver       Setup macros         Devige description file IV Qvenide default       Devige description file IV Qvenide default         STOOLKIT_DIR\$/CONFIG/debugger/AnalogDevices/toaduc7       Macros

(3)	IAR

Options for node "Der Category: General Options C/C++ Compiler Assembler Output Converter Custom Build Build Actions Linker Debugger Simulator Angel GDB Server IAR ROM-monitor J-Link/)-Trace	Setup Download Extra Options   Images   Plugins    Attach to program  Verify download  Suppress download  Queride default board file  STOOLKIT_DIR\$'config'diaphloader'AnalogDevices
	STOOLKIT_DIR\$'config'llashloader\AnalogDevices

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 J4Link/J-Trace LMI FTDI Macraigor RDI ST-Link Third-Party Driver	Setup Connection Breakpoints Reset Software, Analog Devices JTAG/SWD speed Catch exceptions Atg Initial 32 kHz Exced T50 kHz Catch exceptions Data Data Peterch	Factory Settings
	OK	Cancel

10. To start debugging press the icon  $\checkmark$  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.

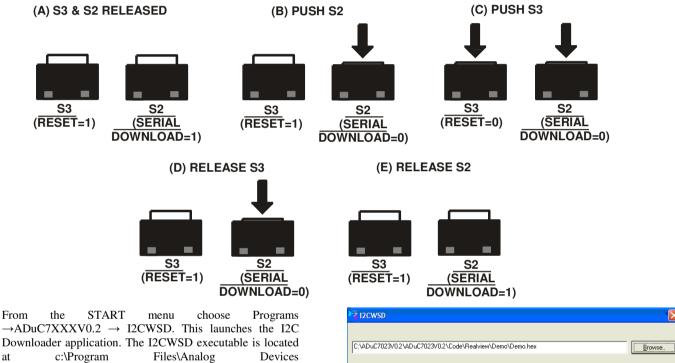
For the ADuC7023 evaluation board, no dongle is required to program the part via USB. But, the ADuC7023 specific version of I2CWSD must be used. This version is located in the following folder: C:\ADuC7XXXV0.2\Documentation\ADuC7023\EvalDoc\ADuC7023 Eval board Programming

#### 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.

Alternatively it

- 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:



Monitor Status Please connect board to USB-Dongle For download Press Reset on Hardware before click >Start-Configure Start Exit Checksum from imported HEX File CPU: ADuC 702x no Program no Verify Mode: offline 100 kBaud

#### Downloading using I2CWSD 4.2

Inc\MultiDongle\I2CWSD\I2CWSD.exe.

Devices Inc  $\rightarrow$  I2CWSD.

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

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

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".

C:\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.	
	Exit



(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		
🗅 🛩 🖬 🕼 🕼	Options			
Workspace	Configure Tools			
Blink - Debug	Debug     Filename Extensions			
Files				
	Elves			
IAR Code Exam	PLATool			

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

😵 Elves 🛛 🔀
Select Library           Select Library         Unlist         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]: iChanP:(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: ; Set iChanP to set which signal will be connected to the positive input of the ADC: ; 0-15 or ADC_0ADC15 for external channels 0-15 (if available). ; 16 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 ▼ )
Help F1=Help 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
🏠 😅 🖬 🍠   🍐 ங 🛍   으 으   律 律	
😵 🍱 🎬 👗 🙀 🎊 DAC Debugger	Lint Lint <u>A</u> ll C-Source Files
Project Workspace × x DAC Debugger C Source File	<u>C</u> ustomize 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	Target 'Target 1'		×
Device Targe	et Output Listing CC Assembler Linker Debug Utilities		
	□ Enable Garbage Collection       Text Start:         □ Do not use Standard System Startup Files       Data Start:         □ Do not use Standard System Libraries       BSS Start:         □ Use Math Libraries       Ess Start:		
File: Include Libraries	Dac702x	Edit	
Misc controls			
Linker control string	-L C:\ADuC702x\code\KeilCodeExamples\LibKeil\DAC *.o -IDac702x	<ul> <li></li> <li></li> </ul>	
	OK Cancel Defaults	Help	



(6) PLA tool

### (6) PLA TOOL

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

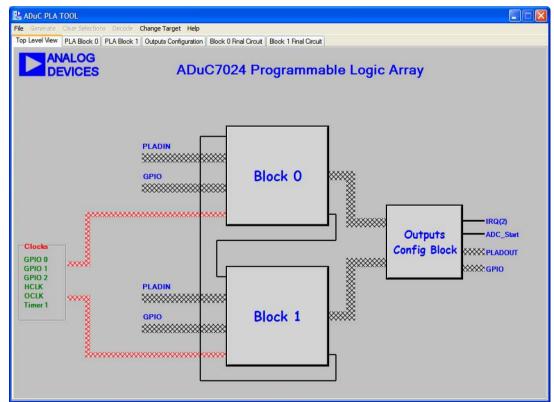
The following example is part of the code example, PLA, under Code\KeilCodeExamples.

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.

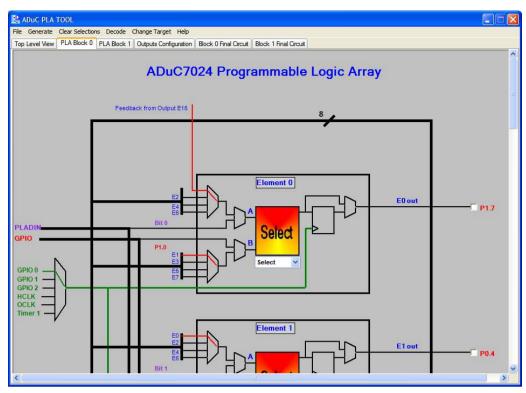




### 6.2 Configuring the gates and output

3. Select block 0.





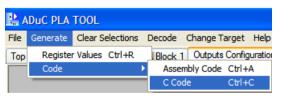
4. Select AND gate for element 2, with multiplexer A on Bit 2 bus i.e. MMR PLADIN and multiplexer B on P1.2. Choose to bypass the flip flop. Select the "Output" panel, scroll down and choose to start an ADC conversion using element 2 output.

Laduc 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 st_conv	
Block 0	
Elem 0	
Elem 1	
Elem 2	
Elem 3	
Elem 4	
Elem 5	
Elem 6	
Elem 7	
Block 1	- ADC start
DIOCK 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.

ору		
	PLA Tool Code Window	
ķ	Code Generated By the ADuC 702X PLA Tool	_
//FileType:	C PLA Configuration File	
//Source:	C Source Code	
//Date:	20/07/2004 14:43:05	
//		
#include "ADuC7(	)24.h*	
void plaInitia {	ize()	
// Configu	ure Port Pins for PLA mode	
GP1CON	I = 0x0300;	~
,	Close	



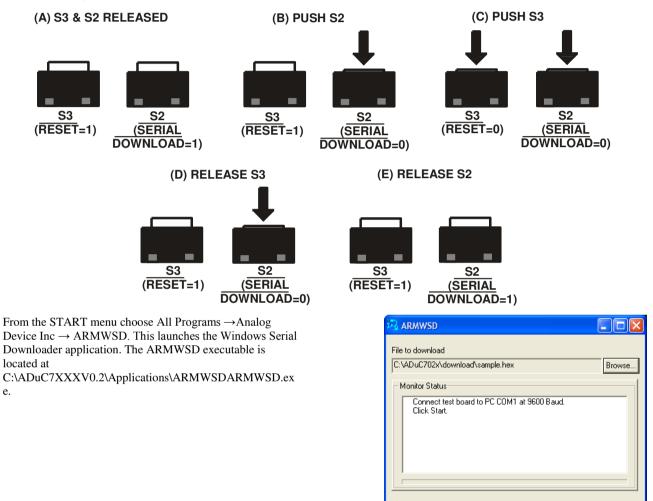
(7) Windows Serial Downloader

### (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:



Configure

Start

#### 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".

🖓 ARMWSD
File to download C1ADuC7XXXVC.1ADuC7C2x/code1AR Code Examples/Misc/Bli Browse
Monitor Status Connect test board to PC CDM1 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 <b>Exit</b>

13.

e.

Exit



(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 Rash
Browser - full path and extension Browse [c:\Program Files\Internet Explorer\iexplore.exe Help Path Browse [C:\ADuC702\\download\ OK Cancel
Configure
Parts Help Comms Flash
Serial Port Baudrate COM1
Configure
Parts Help Comms Flash
Hashing options       □     Mass erase       □     Program       □     Venfy       □     Protect



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	×
Parts Help Comms Flash Protection	
Highlight ranges to protect	
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 (0x0e800-0x0efff)	
Pages 120-123 (0x0f000-0x0f7ff) 💌	
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	
🛋 D 🜌	
Connection Configuration	Ro Connection
Noise Analysis	RDI - Select the Remote Debug Interface DLL (RDI) to use
	Et Program Files Analog Devices Ind WASP701In/R01.01
	Configure
1	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)

XX WASP7				
File Pages Help				
96 D 🚾				
Connection	😰 Configuration			
- 💽 Nove Analysis	Select perpheral to modify Perpheral be + ADCCON + ADCCON + ADCCON - ADCCON - ADCCON - REFCON	Parameter           ADC Mode         Positive Channel           Negative Channel         Clock Speed           Clock Speed         Acquisition Time           ADC guys pin         Conversion Input           Int. Ref. Output         Int. Ref. Output           Int. Ref. Control         External Reference           No. of Samples         Click or hover over the links	onfiguration Setting Senge-ended mode ACCO ACCO Songe-ended mode ACCO Songe-Software Labeled Particular Labeled Particular Labeled Development Labeled	h setting
Ready		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		le-ended mode
Negative Channel	AGND		erential mode
Clock Speed	fADC/2	Psu	edo differential mode
Acquisition Time	8 clocks		
ADC <sub>BUSY</sub> pin	disabled		1
Conversion Input	Single Software		
Int. Ref. Output	Enabled		
Int. Ref. Enabled	Powered up		1
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.

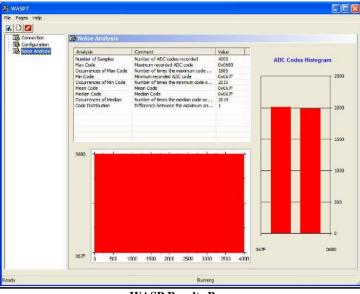
ADC	Configuration	n	
Parameter	Setting		
ADC Mode	Single-en	ded mode	
Positive Channel	ADC0		
Negative Channel	AGND	r	Conversion Mode
Clock Speed	fADC/2	Options  · Single-ended mode · Differential mode	
Acquisition Time	8 clocks		
ADC <sub>BUSY</sub> pin	disabled		
Conversion Input	Single So		
Int. Ref. Output	Enabled		
Int. Ref. Enabled	Powered		
External Reference	<u>1.00 V</u>	Single Ended Mode	
No. of Samples	<u>4000</u>		
Click or hover over the lini	lick or hover over the links to modify t		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.



1

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\LINBWSD. 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<sup>®</sup> Development System CD installs documentation for the ADuC702x, ADuC706X, ADuC7034, ADuC7036, ADuC7039 and ADuC7122, ADuC7124/6 products at C:\ADuC7XXXV0.2\ documentation.