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DSP/DSC BOARDS

Software User Manual for BF532 Audio Development Boards



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1. Installation and Update VisualDSP++

1.1 Install VisualDSP++ Software

VisualDSP is an integrated development and debugging environment from Analog Devices.

1. Push the power button of the PC

2. Login as a user with administrator rights

3. Copy the setup files that as shown in figure 1.1 to

the PC and double clicks over the icon,

The Install Shield Wizard screen appears

We can download this setup file from Analog Devices

Website from the Address

http://www.analog.com/en/embedded-processing-dsp/software-andreference-designs/content/visualdsp_software_test_drive/fca.html

We have to register for 90-days test drive, and then we can download the setup file. During the registration They will ask us to give the email-address to which they will send the Test Drive License.



Fig 1.1 Setup file



Fig.1-2 the InstallShield Wizard screen

4. Click Next. The **License Agreement** screen appears. (Fig.1-3)



Fig.1-3 the License agreement screen

5. Read the license agreement, then select "I accept the terms in the license

Agreement" and click **next**. The **Customer Information** screen appears. (Fig.1-4)

VisualDSP++ 5.0 - Setup	
Customer Information Enter your name and company name in the fields below.	
User Name:	
jeeva	
Company Name:	
Pantech	
< <u>B</u> ack <u>N</u> ext>	<u>C</u> ancel

Fig.1-4 the Customer Information screen

6. Fill in the user information. Click **Next**. The **install path** appears. (fig1.5)

VisualDSP++ 5.0 - Setup			
Install Path Click the Advanced button to select advan	ced options.		
Install path:			
C:\Program Files\Analog Devices\VisualDSP 5	.0		
			<u>A</u> dvanced
	< <u>B</u> ack	<u>N</u> ext >	<u>C</u> ancel

Fig.1-5 the install path screen

7. Click Next. The Install screen appears. (Fig.1-6)



Fig.1-6 the Install screen

8. Click **Install** and wait until the install process is done. The Setup completed

Successfully message box and **Installation Completed** screen appears.(fig.1-8)

Click **Finish** to finish install.

VisualDSP++ 5.0 - Setup
Progress The log file will be saved to "C:\Documents and Settings\user\Local Settings\Temp\"
Please wait while VisualDSP++ 5.0 is being installed. This may take several minutes. Status: Installation process complet VisualDSP++ 5.0 - Setup
Setup completed successfully.
< <u>B</u> ack <u>N</u> ext > <u>Cancel</u>

Fig.1-7 Setup completed successfully message box



Fig.1-8 the Installation Completed screen

1.2 Install License and Register VisualDSP++

You must register your VisualDSP++ installation on-line

to get a validation code. The Validation code is used to

create the permanent license.

1. From the Start menu, choose Start->Programs

(All Programs) ->Analog

Devices> VisualDSP++ 5.0 >VisualDSP++

Environment.

2. An information screen asks if you would

like to install a license. Click Yes. (Fig.1-7)



Fig.1-9 information screen

3. The about VisualDSP++ dialog appears. (fig.1-9) Select **Licenses** and click **New**.

About General Licenses V	ersions Support	?
Serial Number	Family	Status
<u>N</u> ew	gister	Host ID 88992838
	ОК	

Fig.1-9 about VisualDSP++ Licenses

Install New License screen appears. (fig.1-10) Select
 Node – locked license or Test

Drive license and fill in the tools Serial number in the field exactly as it appears on

your CD sleeve. Click Next.



Fig.1-10 Install New License screen

5. An information window notifies of successful license installation.(fig.1-11) Click **OK**.



Fig.1-11 License installs successful notice

🗅 About 🔹 🖓 🔀
General Licenses Versions Support
Serial Number Family Status
ADI-152-256-3672580-117 Blackfin Not Validated (Expiring in 30 d
<u>N</u> ew <u>B</u> egister <u>V</u> alidate 8899283B
ОК

Fig.1-11 about VisualDSP++ Licenses

7. Enter Validation Code dialog appears. (fig.1-12) Enter

your validation code in the field

And click **OK**. An information window notifies you of a successful validation. Click **OK**. (Fig.1-12). Validation Code screen.



1.3 Update VisualDSP++

Visit Analog Devices Tools website at http://www.analog.com/en/embedded-processing- http://www.analog.com/en/embedded-processing- dsp/software-and- http://www.analog.com/en/embedded-processing-

designs/content/visualdsp_tools_upgrades/fca.html to get the latest software updates and patches.

2. Download "VisualDSP++ Release 5.0 - Update 4 -

September 2008 Update" or latest one.

3. From the Start menu, choose Start->Programs (All

Programs) ->Analog Devices-

VisualDSP++ 5.0 >maintain this installation. Note the figure 1.13



Figure 1.13 maintain this installation screen

4. The program maintenance screen Select "Apply a download Update" push button as shown in figure 1.14, and click next

VisualDSP++ 5.0 - Setup		
Program Maintenance Update, Clone, Touch or Uninstall this application.		
Maintaining installation at: C:\Program Files\Analog Devices\VisualDSP 5.0 <u>G</u> o to the Analog Devices website <u>Apply a downloaded Update</u> Clone this installation <u>I</u> ouch this installation <u>U</u> ninstall this application	Apply an already-downloaded Update to this installation. You will be prompted to browse to the downloaded Update file.	
<	Back <u>N</u> ext > <u>C</u> ancel	

Figure 1.14 program maintenances screen

5. As shown in figure 1.15 browse the location of update software Wait until the update

Process is finished. Then the **Wizard Completed** screen appears. (fig.1-16) Click **Finish**

finishing update.

VisualDSP++ 5.0 - Setup	
Apply downloaded Updates Click Browse to select an Update.	
Apply downloaded Update from:	

Figure 1.15 downloaded Updates Screen

VisualDSP++ 5.0	- Setup	
Apply download Click Browse	led Updates to select an Update.	
Apply downlo		1
C:\Documer	Please wait while Setup processes the .vdu file	
	< Back Next >	Cancel
	(Eagly I Town)	

Figure.1-16 Wizard Completed

2. INSTALLATION and SESSION STARTUP

- Plug the provided power supply into the Evaluation board. Visually verify that the green Power LED (D1) is on.
- 2. Connect one end of the UART cable to an available COM port on your PC and the Other End to the DB9 Connector

2.1 Start VisualDSP++

To start VisualDSP++ and creating a session following these steps,

Windows **Start** button and select 1. Click the Programs, Analog Devices, VisualDSP++5.0, and VisualDSP++ Environment. If you are running VisualDSP++ for the first time, you will not be connected to a debug target. In VisualDSP++ 4.5, it is possible to edit and build your code without being connection to a debug target through a debug session. When you are ready to run and debug your program, you can quickly connect to a target and disconnect when you are finished. Doing SO eliminates the overhead associated with the target connection, resulting in a smoother and more responsive experience.



2. When you need to connect to a debug session, click the Connect to Target toolbar button or choose from the available sessions listed under Select Session in the Session menu. To create a debug session, select New Session from the Session menu. This will launch the Session Wizard as shown below



3. On the Select Processor page, select the ADSP-BF532

processor from the **Blackfin** family. Click **next** to continue.



4. On the **Select Connection Type** page, select **Simulator**, and click **Next** to continue.



5. On the Select Platform page, select ADSP-BF5xx Single Processor Simulator. You can either use the default Session name, or give it a more meaningful name of your choosing. Click Next to review your choices, then click Finish



6. Select ADSP BF532 Single processor simulator, Click finish to complete the wizard

Analog Devices VisualDSP++ - [Target: ADSP-BF533 ADSP-BF533 ADSP-BF533 Kingle Processor Simulator]	X
	eí D
Project Window Project Group (0 project) Wizard Completed	Disassembly
Welcome Select Processor Select Processor Select Platform Select Platform Select Platform Select Platform Select Platform Select Platform Summay of choices: Platform Single Processor Sinulator Target name: ADSPAP5xs Single Processor Sinulator Section name: ADSPAP5xs Single Processor Sinulator Please review your choices and click Finish to create the new session. If you would like to change any of your choices, click Back or click on a page in the navigation the to the left. Next Go to the next page.	F [FFA00002] NOP : [FFA00002] NOP : [FFA00004] NOP : [FFA00006] NOP : [FFA00016] NOP : [FFA00021] NOP : [FFA00022] NOP : [FFA0022] NOP : <t< td=""></t<>
Project Cancel	
	Z Z
Ready Hated	VBScript NUM
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7. Go to select session from session menu and select the session created



3. Creating A Project In Visual Dsp

3.1 Step 1: Start VisualDSP++ and Open a Project

To start VisualDSP++ and open a project Click the Windows Start button and select Programs, Analog VisualDSP++5.0, Devices, VisualDSP++ and Environment. If you are running VisualDSP++ for the first time, you will not be connected to a debug target. In VisualDSP++ 5.0, it is possible to edit and build your code without being connection to a debug target through a debug session. When you are ready to run and debug your program, you can quickly connect to a target and disconnect when you are finished. Doing so eliminates the overhead associated with the target connection, resulting in a smoother and more responsive experience. When you need to connect to a debug session, click the Connect to Target toolbar button or choose from the available sessions listed under Select Session in the Session menu. To create a debug session, select New Session from the Session menu. This will launch the Session Wizard, which is covered in previous chapter. If you have already run VisualDSP++ and the Reload last project at start up option is selected on the **Project** page under **Settings**

and **Preferences**, VisualDSP++ opens the last project that you worked on. To close this project, choose **Close** and then **Project** from the **File** menu, and then click **No** when prompted to save the project.

	Analog Devices VisualDSP-	+ - [Target: ADSP-BF532 ADSP-BF5xx Single Processor Simulator (2)]		_ <u>-</u> ×
File	Edit Session View Proje	t Register Memory Debug Settings Tools Window Help		
	New	D Ele Ctrl+N 🖂 🧑 🖓 🖓 🖓 🕼 D D D D 🗽 📢 🤶 🚍 🖽 🛼 😭 1	क	
	Open	Project		
	Save			
	Save As	P O O *O &		
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ø	Sav <u>e</u> All		Disassembly	
*	Load Program Ctrl+L			
	Load Symbols		FFA08000 NOP	
	Load Script		[FFA08004] NOP ;	
8	Reload Program Ctrl+R		[FFA08006] NOP ;	
	Reload Script Ctrl+I		[FFAUSUUS] NOP	
	Workspace		[FFA0800C] NOP :	
	Recent Files		[FFA080101] NOP	
	Recent Projects		[FFA08012] NOP ;	
	Recent Programs		[FFA08014] NOP :	
	Recent Project Groups		[FFA08018] NOP	
	Recent Scripts		[FFA0801A] NOP ;	
	Recent Workspaces		[FFA0801C] NOP ; [FFA0801E1 NOP ;	
<u></u>	Print Ctrl+P		[FFA08020] NOP	
	Print Preview		[FFA08022] NOP ;	
	Page Setup		[FFA08024] NOP ; [FFA080261 NOP ;	
			[FFA08028] NOP	
	EXIC	권	[FFA0802A] NOP ;	
			[FFA0802C] NOP ;	
			[FFA08030] NOP ;	-1
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E				_
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8	Console / Bu	±/		Þ
Crea	ates a new project	Halted	VBScript	NUM
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• From the File menu, choose New and then Project to open the Project Wizard, shown below

Project Wizard	2
Project Information Choose the type, name, and k	ocation of the project that you would like to create.
Project Select Type Select Processor Application Settings Add Startup Code/LDF Finish	Project : Select Type Project types: Standard application Library LwIP Ethernet application VDK application VDK application Name: NewProject Directory: C:\Documents and Settings\user\Desktop\blackfincollection\P
	< Back Next > Finish Cancel

 In the Name field, type any name .Click the browse button to the right of the Directory field to open the Browse For Folder dialog box. Click Next to bring up the Output Type page.



• Verify that the **Processor type** is ADSP-BF532, the **Silicon Revision** is Automatic, click next



• The **Project output type** is Executable file. Click **Next** to display the **Add Start up Code/LDF** page.



Read the displayed text, and scroll down to the bottom of the page. Select the **Don't Add an LDF and start-up code** option. When this project is created, start-up code that initializes and configures the processor will be added to the project, as will a Linker Description File that defines the target memory map and the placement of program sections within processor memory. The options available to configure the start-up code and LDF are beyond the scope of this tutorial. Make sure the **Don't Add an LDF and start-up code** option is selected, and click **Finish**. The new project is created and is shown in the Project window of the IDDE.

Analog Devices VisualDSP++- [Target: ADSP-BF532 ADSP-BF5xx Single Processor Simulator (2)]		_ & ×
File Edit Session View Project Register Memory Debug Settings Tools Window Help		
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Project Window Project Wizard	? × isembly	X
Project Group (0 project) Wizard Completed		·
	[FFA08000] NOP ;	
	FFA080041 NOP ;	
Project 🗰 Finish	[FFA08006] NOP ;	
- Page General	FFAUSUUS NOP :	
Ad Static Code DE	[FFA0800C] NOP :	
Finish The Reside 1) (fored you have anough information to groute upon	[FFA0800E] NOP ;	
project.	FFA080121 NOP	
Summary of choices:	[FFA08014] NOP	
File name: aaaa.dpj	- [FFA08016] NOP ;	
Directory: C: Document and Settings Administrator Desktop	[FFA0801A] NOP	
Processor type: ADSP-BF532	[FFA0801C] NOP ;	
Output type: Executable file	LEFA080201 NOP	
	[FFA08022] NOP ;	
To review or change your choices, click Back or click on a page in	[FFA08024] NOP ;	
the navigation tree. Otherwise click Finish to create the new project	FFA080281 NOP	
	[FFA0802A] NOP	
	[FFA0802C] NOP ;	
	[FFA08030] NOP	-1
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K Rack Next> Finish Car	cel	*
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		-1
		Þ
Ready Halted	VBScript	NUM
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• Click finish to complete the wizard



3.2 How To Create a New Project

To add the source files to the new project:

 Click the Add File button , or from the Project menu, choose Add to Project, and then choose File(s).



2. The Add Files dialog box appears .In the Look in box, locate the project folder, In the Files of type box, select All Source Files from the drop-down list. Select the file and Then click Add.



3. To display the files that you added in step 4, open the Source Files folder in the **Project** window. Click the **Rebuild All** button () to build the project. The C source file opens in an editor window, and execution halts Save the Project and then builds the Project.

Apalog Devices VisualDSR++	Target: ADCD_RES32 ADCD_RESvy Single Processor Simulator (2)] - [Project: asaa]	- [aaaa]		
File Edit Session View Proj	act Register Memory Debug Settings Tools Window Help	Fanan		_ 8 ×
Analog Devices VisualDSP++ He Edt Session View Prop He Edt Session View Prop Project saaa.dp) Project saaa.dp) Project Group (I project) Source Fies Source Fies Header Fies Header Fies	<pre>[Target: ADSP-BF332 ADSP-BF304 Single Processor Simulator (2)] - [Project: aaaa] ext Register Memory Debug Setting: Tools Window Help # Barget Memory Debug Setting: Tools Window Help # Barget Memory Debug Setting: Tools Window Help # Barget Memory Debug Setting: Tools Window Help # SIC_IMASK = De</pre>		Disassembly	. € × . € × . ×
Project	Init_Flags(); Init_Interrupts(); while(1); } 4 	×	(FFA08022) NOP: (FFA08022) NOP: (FFA08024) NOP: (FFA08026) NOP: (FFA08026) NOP: (FFA08027) NOP: (FFA08027) NOP: (FFA08027) NOP: (FFA08030) NOP:	× ×
Ready	/	Halted	Line 62, Col 1 [VBScript	
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- 4. Build the project by performing one of these actions.
- Click the **Build Project** button or From the **Project** menu, choose **Build Project**.



At the end compilation, the **Output** window displays this message in the Build view:

"Build completed successfully." The project can be rebuild by choosing rebuild all.



Press F5 to run the project



3.3 How To Changing the Project Options

🕨 Analog Devices VisualDSP++ - [Target: ADSP-8F532 ADSP-8F5xx Single Processor Simulator (2)] - [Project: aaaa] - [aa	iaa]		_ 8 ×
File Edit Session View Project Register Memory Debug Settings Tools Window Help			_ 8 ×
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〒↓ □ 鄧 参 (Project Options (Alt+F7)) ① ① 66 毎 際 優			
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Selects project options	Halted	Line 55, Col 1 VBScript	NUM
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• From the **Project** menu click the **Project Options** command to display the **Project Options** dialog box

🕒 Analog Devices VisualDSP++ - [Target: ADSP-BF532 ADSP-BF5xx Single Processor Simulator (2)] - [Project: aaaa] - [aaaa]	_ @ ×
🖹 File Edit Session View Project Register Memory Debug Settings Tools Window Help	_ @ ×
□☞■ਗ਼ਫ਼;\$\$\$ * ® ® ⊆ ⊆ ### ๙ % \$7 0 0 0 0 % % ? 目 0 % 0	
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Project assasdpj ZZ Disassembly	× ×
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FFA00265 NOP : FFA0028 NOP : FFA0028 NOP : FFA00220 NOP : FFA00220 NOP : FFA00220 NOP : FFA00220 NOP : FFA00220 NOP : FFA00220 NOP :	T
Loading: "C:\Documents and Settings\Administrator\Desktop\Debug\aaaa.dxe" Load complete Breakpoint Hit at (ffa08870) // Laborate / Event / Laborate	×
Ready Hated Line So, Coll (Viscorpt And	
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• This dialog box enables you to specify project build information.

- Take a moment to view the various pages in the Project Options dialog box by selecting them from the tree on the left: Project, General, Compile, Assemble, Link, Load, Pre-Build, and Post-Build.
 On each page, you specify the tool options used to build the project.
- On the **Project** page , verify that the values shown in Table are entered here.

Field	Value
Processor	ADSP BF532
Revision	Automatic
Туре	Loader File
Name	File.c
Settings For Configuration	Debug

 These settings specify information for building an executable file for the ADSP-BF533 processor. The executable contains debug information, so you can examine program execution. Click the LOAD tab to display the General page, shown in Figure

▶ Analog Devices VisualDSP++ - [Target: ADSP-8F532 ADSP-8F532 KS Single Processor Simulator (2)] - [Project: aaaa] - [aaaa] ■ File Fide Section View Devicet Devices Memory Debys Settions Tools Window Help		
📲 🗙 😼 🎭 🤣 🎬 🖽 👗 🔤 aaaa 💽 Debug 💽 🖳 🖳 🗞		
- 王 □ ■ 本 ● ● ● ■ ● ● ● ● ● ● ● ● ● ● ● ● ● ●		
Project: aaaa.dpj	Disassembly	Y X
Project Group (1 project)		▼
aaaa Project options for adaa	FFA07FFE] NOP ;	
Project : Load : Options	FFA08000] NOP ;	
Linker Files Compile Boot Mode Boot Format C	Dutput Width FFA080041 NOP :	
Header Files	C 8-bit FFA08006] NOP ;	
Source Language Se C SPI C Tw/I C ASCII I	 16-bit FFA08008] NOP ; 	
Preprocessor C SPI Slave C Include	FFA0800A] NOP ;	
Binary	FFA0800E] NOP ;	
Processor (2) Life state Bandate Hold Imer Proc	FFA08010] NOP ;	
Warning Warning Warning Warning Warning Warning Warning	FFA08012] NOP ;	
Assemble	FFA08014 NOP ; FFA08016 NOP ;	
Eink Im Use default start address: Start address: UkU	FFA08018] NOP ;	
General Verbose	FFA0801A] NOP ;	
Initialization file: Use default decompression INIT file	FFA0801C] NOP ;	
The Processor	FFA080201 NOP	
	FFA08022] NOP ;	
Options UCADocuments and Settings\6dministrator\Desktop\Debu	FFA08024] NOP ;	
Compression	FFA08026] NOP ;	
Additional options:	FFA08028 NOP :	
	FFA0802C] NOP ;	
	FFA0802E] NOP ;	-
Ioading: "C:\Documents and Settings\Administrator\Desktop\Debug\aaaa.dxe" Ioad complete: Breakpoint Hit at <ffa08870></ffa08870>		A
		-1
Console Build		•
Ready Halte	d Line 55, Col 1 VBScript	NUM
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 Choose boot mode as flash/ PROM, Boot Format as Intel ASCII and Output width as 16 bit. Choose a folder for an output file. After changing the options again Rebuild All



 Loader file will be generated in the folder mentioned in the project options This loader can be loaded in the flash memory by using Blackfin external flash programmer which is explained in chapter 4

4. Programming Flash Using Pantech Programming Software

4.1 Booting modes of BLACKFIN for Audio development board

The ADSP-BF531/ADSP-BF532/ADSP-BF533 processor has two mechanisms (listed in Table) for automatically loading internal L1 instruction memory after a reset. A third mode is provided to execute from external memory, bypassing the boot sequence.

Jumper	Jumper settings		Description
J2-BIVIODE1	JO-BINIODED		
J5 D D D D D D D D D D D D D D D D D D D	J6 B Mode0	00	Execute from 16 bit external memory (Bypass Boot Rom)
JS B Model	J6	01	Boot from 8bit/16 bit flash
JS O O O B Mode1	J6 B Mode0	10	Boot from serial master
J5	J6	11	Boot from serial slave EEPROM/flash(8/16- or 24 bit address range)

Notes:

1. Here in these diagrams "C" side is GND side. So, if we connect a jumper in "C" side the Corresponding pin is "O"

2. The BMODE pins have Pull-ups in the Circuit. So, to make any BMODE to "HIGH"there is no need to connect

Anything. The "NC" Side is No Connection Side

The BMODE pins of the reset configuration register (SYSCFG), sampled during power-on resets and software-initiated resets, implement the following modes:

Execute from 16-bit external memory – Execution starts from address 0x2000 0000 with 16-bit packing. The boot ROM is bypassed in this mode. All configuration settings are set for the slowest device possible (3-cycle hold time; 15-cycle R/W access times; 4-cycle setup).

Boot from 8-bit or 16-bit external flash memory – The flash boot routine located in boot ROM memory space is set up using asynchronous Memory Bank 0. All configuration settings are set for the slowest device possible (3-cycle hold time; 15-cycle R/W access times; 4-cycle setup).

Boot from SPI serial EEPROM/flash (8-, 16-, or 24-bit addressable, or Atmel AT45DB041, AT45DB081, or AT45DB161) – The SPI uses the PF2 output pin to select a single SPI EEPROM/flash device, submits a read command Join the Technical Community Today! http://www.pantechsolutions.net and successive address bytes (0x00) until a valid 8-, 16-, or 24-bit addressable EEPROM/flash device is detected, and begins clocking data into the processor at the beginning of L1 instruction memory.

Boot from SPI serial master – The Blackfin processor operates in SPI slave mode and is configured to receive the bytes of the LDR file from an SPI host (master) agent. To hold off the host device from transmitting while the boot ROM is busy, the Blackfin processor asserts a GPIO pin, called host wait (HWAIT), to signal the host device not to send any more bytes until the flag is deasserted. The GPIO pin is chosen by the user and this information is transferred to the Blackfin processor via bits[10:5] of the FLAG header in the LDR image. For each of the boot modes, a 10-byte header is first read from an external memory device. The header specifies the number of bytes to be transferred and the memory destination address. Multiple memory blocks may be loaded by any boot sequence. Once all blocks are loaded, program execution commences from the start of L1

instruction SRAM. In addition, Bit 4 of the reset configuration register can be set by application code to bypass the normal boot sequence during a software reset. For this case, the processor jumps directly to the beginning of L1 instruction memory.

Every Board comes along with SPI Boot loader, ensure there is jumper on WP and Jumper in J8

We have two modes

- Programming Mode(Booting from SPI –BOOTMODE:-11)
- General or Normal Mode(Booting 8-/16-bit Flash— BOOTMODE:-01)

4.2 Programming Mode

In Programming Mode J5, J6 (BMODE1,BMODE0)should be connected on connection side(NC) as shown below .

So, that processor BOOTMODE is 11. This mode will boot the processor from SPI.



J15, WP should have a jumper as shown below,



SSEL should be configured for BF532 as shown below



4.3 General Mode

In general mode a jumper must be connected to J5 as shown below. In this BMODE1 should have jumper in "C" or GND side so, that BMODE1 = 0; and BMODE0 should have jumper on "NC" side or No jumper is needed so, that BMODE0 = 1;



J15, WP should have a jumper as shown below,



SSEL should be configured for BF532 as shown below



And Reset the kit Previously whatever are there in the "Programming Mode" keep all, Additionally just we need to put the JUMPER in J1 or BMODE1 in "C" side Now the Boot Mode is changed to "O1 " where it will Boot from 8bit/16-bit Flash

4.4 Basic setup

Blackfin External Flash programmer is Windows software from the Pantech solutions private limited that allows easy access to the Flash memory. These features include:

- •Communicating to the Black fin audio development module
- Erasing the Flash memory
- Programming the Flash memory

External flash programmer provides a clear and simple user interface to these features and more as described in the following sections.

Minimum Requirements

- Windows 95/98/ME/NT/2000/XP
- Mouse
- COM Port
- 16Mb RAM
- 3Mb Disk Space

4.5 Programming uses Blackfin532 external flash programmer software

Main Window

The following is a screenshot of the main window.

Step1 - Com Port Settings	Step3-Load the File	Status Window-Hexadecimal File
Port Name COM1	■	
P L	Browse	
Baudrate [3600	Memory Occupied	
Stop bits 1		
Data bits 8		
<u></u>	Αυτες γοιμιο	∩ ∑ [∞]
Connect Disconnect	Technology Beyond The Drea	ams
		Kilobytes 0
Step 2-Erase	Step4-Program	Bytes 0
	Program	Check Sum 0
Erase	Exit	Help
		About us Help
Output Window		
		_

The window is divided up into six sections. Work your way from section 1 to section 4 to program a device using the most common functions. Each section is described in detail in the following sections. At the very bottom the window is an area where output messages will be displayed and at the very bottom right is where the progress bar is displayed.

Four Step Programming

For each step there is a corresponding section in the main window as described in the User Interface Tour.

Step 1 – Connection Settings

Before the device can be used the settings required to make a connection must be specified.

Com Port Stattings Port Name	- 1833	
Baudrate	3680 💌	
Stop bis	1	
D ata bits	8 •	
Connect	Discorrect	

Select the desired COM port from the drop down list or type the desired COM port directly into the box. If you enter the COM port yourself then you must enter it in one of the following formats

Port name	COM1
Baud Rate	9600
Stop bits	1
Data bits	8

-Step1 - Com Port Settings	Step3-Load the File	Status Window-Hexadecimal File
Port Name COM1	_	
	Browse	
Baudrate 115200	Memory Occupied	
Stop bits 1		
Data bits 8		
	Technology Beyond The Dr	reams
Connect	connect	
-Step 2-Erase	Step4-Program	Kilobytes U
		Bytes 0
Erase	Program	Check Sum 0
	Exit	About us Help
		Hep
Output Window		
Port Connected sucessfuly		<u>*</u>

Port connected successfully will be displayed in output window

If the port is not connected .The following message will display.

🔜 Blackfin532 External Flash Progran	nmer-Pantech Solutions Pvt Ltd	X
Step1 - Com Port Settings	Step3-Load the File	Status Window-Hexadecimal File
Baudrate 115200	Browse	
Stop bits 1		9
Connect Disco	nnect Technology Beyond The Dreams	Kilobytes 0
Erase	Program	Bytes 0 Check Sum 0
	Exit	About us Help
Output Window Port is not ConnectedPlease F	IESET the Kit and try again	×

Ensure the kit is in programming mode and Press the RESET button in the Kit and try again.

Step 2 – Erasing

Press the erase button

📙 Blackfin532 External Flash Programmer-Par	itech Solutions Pvt Ltd	×
Step1 - Com Port Settings	Step3-Load the File	Status Window-Hexadecimal File
Port Name COM1	Browse	
Baudrate 115200 💌	Memory Occupied	
Stop bits 1		
Data bits 8	ΡΔΠΤΕCΗ JOLUTIONJ [®]	
Connect Disconnect	Technology Beyond The Dreams	
- 25-2 25-22	X	Kilobytes 0
	Wait Erase process take some time Press OK to Continue	Bytes O
Erase		Check Sum 0
		About us Help
Output Window		
		<u> </u>
		li.

Click ok to continue after erasing the following message will be displayed in output window

Г	Step1 - Com Port Se	ttings		Step3-Load t	he File		Status Wi	ndow-Hexadec	imal File 😑		
	Port Name	COM1	-		1						
	Baudrate	115200	•	Browse	Memory Occupied						
	Stop bits	1	•								
	Data bits	8	•	ΡΔΠΙ	ECH JOLUT	ЮПУ®					
	Connect	Disco	nnect	Technolo	ogy Beyond The	Dreams					
	Stop 2 Erana			Step 1 Progr			k	ilobytes	0		
	Step 2-Liase			Step44 logit	am,		E	lytes	0		
		Frace			Program		0	heck Sum	0		
		LIGSE			Exit		Help	About us		Help	
	Output Window										
	DSP Kit Erase su	iccessfully								<u></u>]

Step 3 – Selecting the Hex File

Select the file by using browse button. The status bar will show you the memory occupied and the file contents, file size and checksum will be displayed in status window.

Step1 - Com Port Setti Port Name Baudrate	ngs COM1	Step3-Load the File	Status Window-Hexadecimal File	
Port Name Baudrate	СОМ1		0×40	
Baudrate		Browse D:\nowblackfin board\Projects On Plr		1
	115200 💌	Memory Occupied	0x60 0xFF 0x04	
Stop bits	1		0x00 0x00 0x00	
Data bits	8		0×10 0×00 0×9C	
Connect	Disconnect	Technology Beyond The Dreams	0x00 0x00 0x00 0x00	•
			Kilobytes 15	
Step 2-Erase		Step4-Program	Bytes 840	
	Tase	Program	Check Sum 58FF2	
	1050	Exit	Help About us Help	
Output Window				
				

Step 4 – Programming the flash

Click program button to program the device

Step1 - Com Port Settings	Step3-Load the File	Status Window-Hexadecimal File	
Port Name COM1		0x40 0x00	-
Baudrate 115200	Browse D:\newblacktin board\Projects 0 Memory Occupied	n Bla 0xFF 0x04 0x00	
Stop bits 1		0x00 0x00 0x10	
Data bits 8		0×00 0×9C 0×00	
Connect Disconnect	Technology Beyond The Dream	ns 0x00 0x00 0x00	
		Kilobytes 15	
Step 2-Erase	Step4-Program	Bytes 840	
France	Program	Check Sum 58FF2	
	Exit	Help About us Help	
-Output Window			
successfully Send 1 successfully Send 2			-
successfully Send 3 successfully Send 4			_
successfully Send 5			-

=Step1 - Com Port Sett	ings	Step3-Load the File	Status Window-Hexadecimal File
Port Name Baudrate	COM1	Browse D:\newblackfin board\Projects 0 Memory Occupied	n Blz 0x40 0x80 0xFF 0x04 0x04 0x04
Stop bits Data bits	8		0x00 0x00 0x10 0x00 0x00 0x00 0x90
Connect	Disconnect	Technology Beyond The Dream	Constant of the second se
Step 2-Erase		Step4-Program	Bytes 840
	Erase	Program	Check Sum 58FF2
		<u> </u>	Help About us Help
-Output Window			
successfully Sen successfully Sen successfully Sen Data is sent succe Data Value is	1 14 H 15 H.Last Bytes 16 essfully		

After programming kit should be connected in general mode and reset the kit again

About Us

This box provide the information about product description, Version, Copy right

and company name



Help



5. Practical Dsp Applications: Audio Coding And Audio Effects

Audio coding exploits unique features of audio signals to compress audio data for storage or transmission. Today, digital audio coding techniques are widely used in consumer electronics such as portable audio players. This chapter introduces basic audio effects and their implementations are presented and used for experiments.

5.1 HANDS-ON EXPERIMENT -Talk through for the BF-532 Audio development Board

This experiment implements a real-time Talkthrough with the BF532 Audio development board. A stereo or mono sound source is connected to the audio input channels of the BF532 Audio development board, and the output of the development board is connected to a headphone or speaker. The project files are located in directory ------\final\Talkthrough, Load the project file, (Open the project option menu and select Processor – ADSP-BF532 and Type – loader file) ,and finally build and run the project. The loader (Hex) file will be created.

Programming Mode

In Programming Mode we should not connect any jumper to J5 and J6. The JUMPERS should be there in J13, J12, and J16 Such as MOSI, WP and SSEL Should be Configured for BF532 i.e. The JUMPER should be there in

the BF532 Side. Now Actually BF532 Booting in "11"mode i.e. booting From SPI Flash for boot modes refers BF532 Hardware reference manual

Step 1 – Connection Settings

Before the device can be used the settings required to make a connection must be specified

Com Port Settings		
Pori Name	20041	•
Baudrate	3680	-
Stop bin	1	-
D-ata bits	8	۲
Connect	Disconnect	

Select the desired COM port from the drop down list or type the desired COM port directly into the box. If you enter the COM port yourself then you must enter it in one of the following formats

Port name COM1

- ➢ Baud Rate 9600
- ➤ Stop bits 1
- Data bits 8

Step1 - Com Port Settings	Step3-Load the File	Status Window-Hexadecimal File
Port Name COM1	J	
Deutete 115300	Browse	
Baudiate [115200	Memory Occupied	
Stop bits 1	┓	-
Data bits 8	-	
	Αυτές: Τογγιατίου)
Connect Disconnect	Technology Beyond The Dreams	
		Kilobytes 0
Step 2-Erase	Step4-Program	Bytes 0
	Program	Check Sum 0
Erase	Exit	Help
		About us Help
Output Window		
Port Connected sucessfuly		×

Port connected successfully will be displayed in output window If it the port is not connected .The following message will display...

Blackfin532 External Flash Programmer-Panted	ch Solutions P v t Ltd	
Step1 - Com Port Settings	Step3-Load the File	Status Window-Hexadecimal File
Port Name COM1 💌		
Baudrate 115200	Memory Occupied	
Stop bits 1		
Data bits 🛛 🛛 💌	ΡΔΠΤΕCΗ JOLUTIONJ®	
Connect Disconnect	Technology Beyond The Dreams	
Step 2-Erase	Step4-Program	⊐ Kilobytes U
		Bytes 0
Erase	Program	Check Sum 0
	Exit	Help About us Help
Output Window		
Port is not ConnectedPlease RESET the Kit	and try again	

Ensure the kit is in proper mode and Press the RESET button in the Kit and try again..

Step 2 – Erasing

Press the erase button

Step1 - Com Port Se Port Name	ttings	Step3-Load the File	Status Window-Hexadecimal File
Baudrate Stop bits	115200	Browse Memory Occupied	
Data bits	8	PANCECH SOLUTIONS Technology Beyond The Dreams	
Char 2 Farm			Kilobytes 0
otep 2-clase	•	Wait Erase process take some time Press OK to Continue	Bytes 0 Check Sum 0
	Erase	ОК	Help
			About us Help
Output Window			<u> </u>

Click ok to continue after erasing the following message will be displayed in output window

📙 Blac	ckfin532 External F	Flash Programmer-Pantec	h Solutions Pvt Ltd		×
	Step1 - Com Port Set Port Name	tings	Step3-Load the File	Status Window-Hexadecimal File	
	Baudrate	115200	Browse Memory Occupied		
	Stop bits Data bits	8			
	Connect	Disconnect	PARLECT SOLUTIONS		
	Step 2-Erase		Step4-Program	Bytes n	
		Erase	Program	Check Sum 0	
			Exit	HelpAbout usHelp	
	Output Window	ccessfully		A	
				V	

Step 3 – Selecting the Hex File

Select the file by using browse button. The progress bar will show you the memory occupied and the file contents, file size and checksum will be displayed in status window.

-Step1 - Com Port Se	ettings	Step3-Load the File	Status Window-Hexadecimal File	
Port Name Baudrate	СОМ1 <u>т</u> 115200 <u>т</u>	Browse D:\newblackfin board\Projects On Blz Memory Occupied	0x40 0x00 0x80 0xFF 0x04 0x04	
Stop bits Data bits	8		0x00 0x00 0x00 0x10 0x00 0x90 0x90	
Connect	Disconnect	Technology Beyond The Dreams	Ux00 0x00 0x00 Kilobytes 15	
Step 2-Erase		Step4-Program	Bytes 840	
	Erase	Program	Check Sum 58FF2	
		<u> </u>	About us Help	
Output Window				
				4

Step 4 – Programming the flash Click program to program the device

Step1 - Com Port Se	ettings		Step3-Load the File	Status Window-Hexadecimal	File
Port Name	COM1	•	Browse D:\newblackfin board\Projects On Bla	0x40 0x00 0x80	-
Baudrate	115200	-	Memory Occupied	0x04 0x00	
Stop bits	1	•		0x00 0x00 0x10	
Data bits	8	•	PANTEC JOLUTIONS®	0x00 0x9C 0x00 0x00	
Connect	Disconne	ct	Technology Beyond The Dreams	0x00	-
Step 2-Erase			Step4-Program	Kilobytes	15
516p 2-21036			Step41 logialit	Bytes	840
	Erase		Program	Check Sum	58FF2
			Exit	About us	Help
_Output Window					
successfully Se successfully Se	end 1 end 2				
successfully Se successfully Se	end 3 end 4 end 5				

Step1 - Com Port Settings		_	Step3-Load the File		Status Window-Hexadecimal File			
Port Name Baudrate	115200	-	Browse D:\newblackfin board\Projects On Bla Memory Occupied	Oxf Oxf Oxf Oxf Oxf	00 30 FF 04 00			
Stop bits Data bits	8	•		0x(0x(0x) 0x1 0x(0x5	00 00 10 00 90			
Connect	Disconne	ct	PARTECH SOLUTIONS® Technology Beyond The Dreams	Ox(Ox(Ox(00 00 00			
-Step 2-Erase			Step4-Program		Kilobytes Butes	15 040		
	Frase		Program		Check Sum	58FF2		
			Exit	Help -	About us	Help		
- Output Window	end 14 end 15 end Last Bytes ccessfully	16						

2. General Mode:

In general mode a jumper must be connected to J1 as shown below. Previously whatever are there in the "Programming Mode" keep all Additionally just we need to put the JUMPER in J5 or BMODE1 in "C" side ,reset the board one times .Now the Boot Mode is changed to "01" where it will Boot from 8-bit/16-bit Flash.

5.2 HANDS-ON EXPERIMENT 1.2 – Noise added, compressed and decompressed Using rand (), mu_law commands

This experiment implements add noise to the signal with the Blackfin processor.. The project files are located in directory ---\final\noise, Load the project file, (Open the project option menu and select Processor –ADSP-BF532 and Type – loader file) ,and finally build and run the project. The loader file will be created.

To accomplish this EXPERIMENT, A sound is inputted to a development board. A random uniform white noise function is generated and added to the sound data. This data is compressed using mu-law compression and then decompresses the data and processes it. If the first button (SW3) is pressed, the Original sound is played. If the second button (SW1) is pressed, the sound is played with noise.

Programming Mode, Programming the flash , Connection Settings, and General Mode same as

HANDS-ON EXPERIMENT 5.1

5.3 HANDS-ON EXPERIMENT – Noise removal using band pass and high pass filter

This experiment implements noise removal from the signal with the Blackfin processor.. The project files are located in directory ------\final\NOISEREMOVAL, Load the project file, (Open the project option menu and select Processor – ADSP-BF532 and Type – loader file), and finally build and run the project. The loader file will be created.

To accomplish this Project, A sound is inputted to a development board. A random uniform white noise function is generated and added to the sound data. This data is compressed using mu-law compression and then decompresses the data and band pass and high pass filter processes for noise removal. If the first button (SW3) is pressed, the Original sound is played. If the second button (SW1) is pressed first time, the sound is played with removal of noise from band pass filter.

If the second button (SW1) is pressed Second time, the sound is played with removal of noise from High pass filter.

Programming Mode, Programming the flash, Connection Settings, and General Mode same as

HANDS-ON EXPERIMENT 5.1

5.4 HANDS-ON EXPERIMENT – Digitalized Surround Sound Effects

This experiment implements Digitalized Surround Sound Effects with the Blackfin processor.. The project files are located in directory ----\final\ Digitaleffect532,Load the project file, (Open the project option menu and select Processor –ADSP-BF532 and Type – loader file) ,and finally build and run the project. The loader file will be created. The objective of the EXPERIMENT was to create surround sound effects (this project considers surround sound as movement of sound between different speakers) such that the user can feel the sound moving across the users head.

Ideally this effect should have an input sound signal processed such that the sound from an input source moves around the user's head at a revolution rate of few milliseconds. To study the acoustic effects this EXPERIMENT considered different revolution rates to determine the most optimal values and effects different revolution rates can have on users hearing.

If the first button (SW3) is pressed, the Original sound is played. If the second button (SW1) is pressed first time, the sound is played with Surround Sound Effects.

Code description:

This case populates a huge buffer to store 14400 samples of input dma buffer. The length of this buffer is predetermined so that it holds values for all four speakers pointers are pointing to equal delta time delay of 0.1 seconds. First the buffer is populated at least for once.

Then the values pointed by all four speaker pointers are written to the output dma buffer for each of the speakers. Thereafter, the speaker pointers point to the next item on the buffer.

Programming Mode, Programming the flash, Connection Settings, and General Mode same as

HANDS-ON EXPERIMENT 5.1

5.5 HANDS-ON EXPERIMENT – Audio effects on Blackfin processor

This experiment implements Audio effects on Blackfin processor with the Blackfin processor.. The project files are located in directory -----\final\chrous, Load the project file, (Open the project option menu and select Processor – ADSP-BF532 and Type – loader file) ,and finally build and run the project. The loader file will be created. If the first button (SW3) is pressed, the Original sound is played. If the second button (SW1) is pressed first time, the sound is played with Chorus Sound Effects.

Chorus: This effect is used to thicken the output signal by adding to it a delayed signal. The effect would give the sound like there is more than one instrument playing at the same time.

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