

AT85DVK-07 Demonstration Firmware

.....

User's Manual





Section 1

Introduction	1-1
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Section 2

Getting Started.....	2-3
2.1 Features.....	2-3
2.1.1 System.....	2-3
2.1.2 Audio Player	2-3
2.1.3 USB Device	2-3
2.1.4 USB Host.....	2-4
2.1.5 File System.....	2-4
2.1.6 Sound Control.....	2-4
2.1.7 Firmware upgrade	2-4
2.2 Keypad Description.....	2-5
2.3 Power-Up	2-6

Section 3

Operating Modes	3-7
3.1 Main Menu	3-7
3.1.1 Operating Modes	3-7
3.1.2 Battery Status	3-7
3.1.3 USB Host Status.....	3-7
3.2 Player.....	3-8
3.2.1 Player Status	3-8
3.2.2 Contextual Menu	3-9
3.3 Mass-Storage.....	3-11
3.3.1 Contextual Menu	3-11
3.4 Explorer.....	3-12
3.4.1 USB Host.....	3-12
3.4.2 Contextual Menu	3-12
3.5 Ebook.....	3-14
3.6 CDC demo	3-14
3.7 Playlist.....	3-15
3.7.1 Contextual Menu	3-15
3.8 Recorder	3-16
3.9 Games	3-16
3.10 Settings	3-17
3.10.1 Language.....	3-17
3.10.2 Power	3-17
3.10.3 Format	3-17
3.10.4 Version	3-17

3.10.5 Update System3-17

3.10.6 Update Settings3-17

3.10.7 Exit.....3-17

3.11 Firmware Update3-18

3.11.1 Automatic Firmware Update3-18

3.11.2 Manual Firmware Update3-18





Section 1

Introduction

The AT85C51SND3B is a low power single-chip highly-integrated digital audio decoder/encoder for applications such as audio players, recorders, cell phones, toys, etc.

The AT85C51SND3B MP3 Player firmware is part of the AT85DVK-07 Development Kit dedicated to the AT85C51SND3B microcontroller. The firmware is delivered with a set of MMI applications which form an overall demonstration MP3/WMA player.

This document is the User's Manual of the AT85C51SND3B MP3 Player application based on the AT85DVK-07 Development Board. It describes the demonstration firmware and its basic operating modes based on the 1.9.4 firmware version: snd3b-dvk-1_9_4.



Section 2

Getting Started

2.1 Features

The following is a list of features supported by the demonstration firmware:

2.1.1 System

- Display
 - 128x64 graphical monochrome LCD
 - LED backlight
- Memories
 - 256MB Nand Flash on-board memory
Driver ready up to 4GBytes (4 dies)
 - MMC / MMC V4 - 1bit/4bits mode
 - SD / SD HC - 4bits mode
 - USB disk (U-drive) through USB host

2.1.2 Audio Player

- Audio Stream
 - MP1, MP2, MP3
 - WMA
 - WAV (PCM, G711, G726) Playback
- Recording
 - G726
- Repeat A/B
- Play, Pause, Stop
- Next track, Previous track
- Fast Forward, Fast Rewind
- Speed Adjust (MP1, MP2, MP3 only)
- Tags
 - ID3 v1.0, v1.1
 - ID3 v2.2 and v2.3

2.1.3 USB Device

- USB 2.0, High Speed Transfer
- Supported Class: Mass Storage, HID, CDC.
- Mass Storage, transfer rate performance:
 - typical, 10MB/s read - 8MB/s write on NandFlash
 - up to 12MB/s on MMC V4 / SD / SD HC

2.1.4 USB Host

- Reduced Host Implementation
- USB 2.0, Full Speed Transfer
- Supported Class: Mass Storage, HUB, HID, CDC.
- Mass Storage rate performance is 1MB/s (maximum of Full Speed)

2.1.5 File System

- FAT12, FAT16, FAT32
- More than one file/disk opened at a time
- File copy/paste/create/delete
- Directory create/delete
- Format

2.1.6 Sound Control

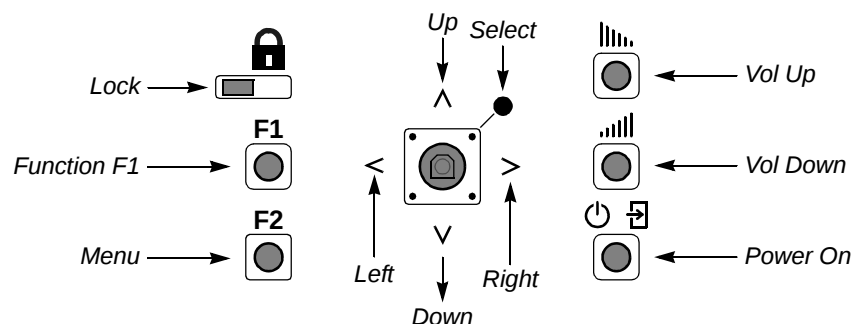
- Stereo volume control
- Sound effects:
 - Bass Boost
 - Spatial sound
- Adjustable 3-band EQ
 - Classic, Pop, Jazz, Rock...

2.1.7 Firmware upgrade

- Upgrade through update file drag and drop
- Automatic Upgrade
 - From Nand Flash disk
 - From MMC/SD disk
- No PC tool install required

2.2 Keypad Description

The following figure shows the basic key functions.



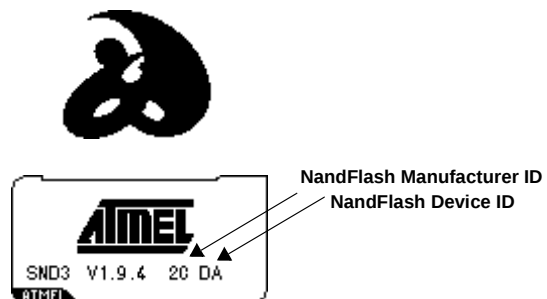
- *Lock*: this switch is the keypad hold function: push right to lock, left to unlock.
- *F1*: this is special key whose function depends on the operating modes.
- *Vol Up*: press to increase the sound volume.
- *Vol Down*: press to decrease the sound volume.
- *Menu*: this key displays a contextual graphical menu. The icons displayed in this menu vary depending on the operating mode. Refer to the Section 3 for further information.
- *Power On*: this key is used to power-up the system when a battery is inserted in its socket.
- *Joystick*: this mini joystick has 5 functions: *Up*, *Down*, *Right*, *Left*, *Select* which vary depending on the operating mode. *Select* corresponds to the joystick center pressing.

2.3 Power-Up

There are two ways to power-up the system:

- USB powered: the USB cable is connected to the board and to a PC
- Battery Powered: a battery is inserted in its socket, the Power On key is pressed.
Note that the battery can be replaced by an external power-supply connected to J20 (see the AT85DVK-07 Hardware User's Guide for further information).

A short animation followed by the Atmel logo will be displayed during few seconds, giving the version of the firmware and NandFlash manufacturer IDs:



Note: To skip the display, press a key.

If the board is powered using the battery, the Main Menu application is launched:



If the board is powered by the USB cable (device mode), the Mass-Storage application is automatically launched:

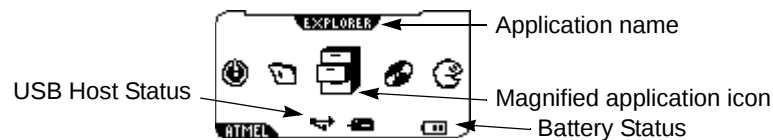


Section 3

Operating Modes

3.1 Main Menu

The main menu shows the operating modes of the player.



The operating mode is selected using the *Right* and *Left* keys, then launched by pressing the *Select* key.

3.1.1 Operating Modes

Here is the list of the operating modes. Their description is given in the following sections:

Mass Storage		Explorer		Player	
Play list		Games		Recorder	
Settings		Ebook		CDC demo	

3.1.2 Battery Status

The battery status can take the following states:

-  Battery Full
-  Battery medium Full
-  Battery Low
-  Battery Very Low
-  Battery Charging (animated)

3.1.3 USB Host Status

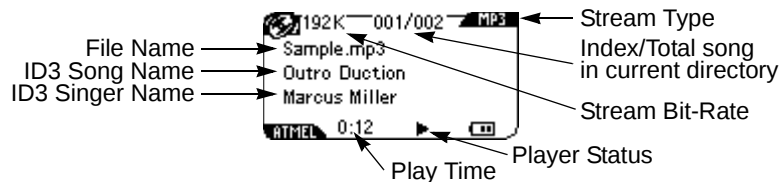
The USB host status can take the following states (*empty zone* = *no device detected*):

-  USB device detected
-  HUB device detected
-  Mass Storage device detected
-  HID device detected
-  CDC device detected

3.2 Player



The easiest way to play the Nand Flash disk is to select the player operating mode. From the main menu, select the player icon, then confirm by pressing the *Select* key. The player will automatically start playback of all songs in the Nand Flash and MMC (if present) disks or from the last saved position (file + played time) if file still exists.



If the MP3 file contains ID3 tags, they are automatically displayed.

3.2.1 Player Status

The player status can take the following states:

- Play
- Pause
- Stop
- Fast Forward
- Fast Rewind
- Play A TAG Set
- Repeat AB Sequence

3.2.1.1 Playing Control

To toggle Play and Pause mode:

- Press the *Select* key briefly.

To Stop the player:

- Press the *Select* key and keep it pressed (long press).

3.2.1.2 Song Selection

To skip the current played song:

- Press the *Right* Key briefly to play to the next song.
- Press the *Left* Key briefly to skip to the previous song.

3.2.1.3 Fast Forward Fast Rewind

To quickly go forward or backward inside the audio stream:

- Press the *Right* key and keep it pressed to enter fast forward play mode.
- Press the *Left* key and keep it pressed to enter fast rewind play mode.

3.2.1.4 Repeat AB

To setup a repeat AB sequence, perform the following key sequence:

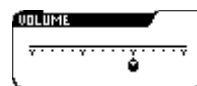
- Press the *F1* key to set the A marker
- Press the *F1* key again to set the B marker and restart play back to the A marker
- Press the *F1* key again to cancel the repeat sequence

3.2.1.5 Volume Control

To increase or decrease the audio volume:

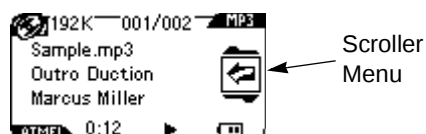
- Press the *Vol-Up* key or *Up* key to increase the volume.
- Press the *Vol-Down* or *Down* key to decrease the volume.

A pop-up windows appears which gives information on volume level:



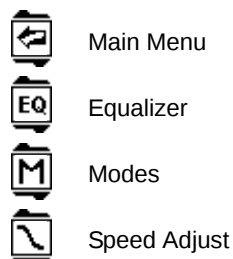
3.2.2 Contextual Menu

A contextual graphical menu is invoked by pressing the *Menu* key:



Press the *Menu* key again to remove the menu.

Once the menu is displayed, press the *Up* or *Down* keys to select one of the following functions:



Confirm your choice by pressing the *Select* key.

3.2.2.1 Main Menu

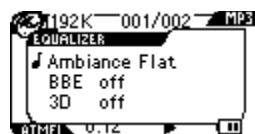


Executing this function exits the Player application and go back to the Main Menu.

3.2.2.2 Equalizer



Executing this function launches the equalizer application. The following menu appears:



To select the Bass Boost, simply selects the BBE option with the *Up* or *Down* keys and press the *Select* key to toggle the effect on and off.

To select the Spatial effect, selects the 3D option with *Up* or *Down* keys and press the *Select* key to toggle the effect on and off.

The currently selected ambiance is displayed ("Flat" in the above picture). To change it, select the ambiance option with *Up* or *Down* keys and press the *Select* key. The following pop-up appears:



Press the *Up* or *Down* key to select another ambiance (club, jazz, ...).

Press the *Left* key to go back to the previous menu.

You can also define you own ambiance setting by selecting the User ambiance. Select one of the band (BASS, MED, TREB) using *Left* or *Right*, then adjust the band using the *Up* or *Down* keys. Press the *Select* key to exit from this feature.

3.2.2.3 Modes



Executing this function launches the player mode application. The following menu appears:



Select the fields “Mode” “Repeat” or “Random” using *Up* or *Down* keys.

Change the selected field value using *Left* or *Right* keys.

- Mode field values:
 - “DiskS”, the player plays all song files of each disks (NF, MMC, USB).
 - “Disk”, the player plays all song files of current disk.
 - “Dir only”, the player plays all song files of current folder only.
 - “Dir + Sub”, the player plays all song files of current folder and the subs folders.
 - “Play list”, in play list mode only and this value can not be changed.
- Repeat field values:
 - “Normal”, at the end of list the player stop
 - “Repeat single”, at the end of current file the player restart the play of same file
 - “Repeat all”, at the end of list the player restart the play at the first file of list
 - “Single”, at the end of current file the player stop
- Random field values:
 - On
 - Off

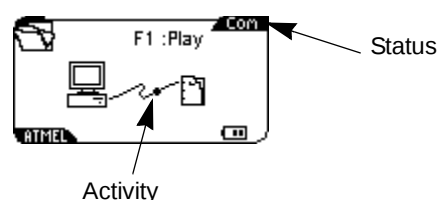
3.2.2.4 Speed Adjust



Executing this function once, reduces the play-back speed, executing the function again returns to the normal play-back speed (available only for MP1, MP2, M3 streams).

3.3 Mass-Storage

To enter the USB disk Mass-Storage application, select the storage icon from the main menu:



The Nand Flash memory and MMC/SD card are seen as regular removable disks. Access is done using the Windows explorer.

The Flash disk activity is shown on the display, as well as an icon on the upper right corner giving status of the USB:

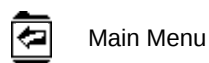
 USB is busy

 USB is idle

3.3.1 Contextual Menu

To enter the contextual menu, follow the sequence described in Section 3.2.2.

Once the menu is displayed, press the *Up* or *Down* keys to select one of the following functions:



Main Menu

Confirm your choice by pressing the *Select* key.

3.3.1.1 Main Menu



Executing this function exits the Mass-Storage application and go back to the Main Menu.

On top of the contextual menu, a shortcut (*F1* key) allows to switch to the Player application without going-back to the Main Menu. The Play-back will start from the root directory or from the last saved position (file + played time) if file still exists.

3.4 Explorer



To enter the Explorer application (disk selection screen), select the Explorer icon from the main menu:



Disk A: stands for the Nand Flash memory; while disk B: stands for the MMC/SD card.

Navigation is intuitive: press the *Right* key to enter into a disk or a directory, the *Left* key to go back to the upper folder. Press the *Up* and *Down* keys to navigate into the files.

To play a disk, a folder or a file, put the cursor on the corresponding location with the joystick, then press the *Select* key. The explorer will automatically launch the player module on the selected disk/folder/file.

Note: The playback will only be made inside the selection. At its end, the player will restart on the first file of the selection.

3.4.1 USB Host

In case a USB mass-storage device is connected to the board (refer to the procedure described in the AT85DVK-07 Hardware User's Guide), a new disk is mounted in the explorer:



Disk C to Z: stands for the USB devices, Host status is displayed on the bottom of the screen according to Section 3.1.3.

3.4.2 Contextual Menu

To enter the contextual menu, follow the sequence described in Section 3.2.2.

Once the menu is displayed, press the *Up* or *Down* keys to select one of the following functions:

-  Main Menu
-  Disk Selection
-  Select Playlist
-  Add to Playlist
-  Copy
-  Paste
-  Delete
-  Format
-  Properties

Confirm your choice by pressing the *Select* key.



3.4.2.1 Main menu		Executing this function exits the Explorer application and go back to the Main Menu.
3.4.2.2 Disk Selection		Executing this function jumps back to the disk selection screen (A:, B:, ...)
3.4.2.3 Select playlist		Executing this function to select the current file as the current playlist. Support text list files and m3u files (ASCII and UNICODE).
3.4.2.4 Add to playlist		Executing this function adds a disk, a folder or a file into the current playlist. If no playlist is selected via “Select playlist” then a default list is created “A:\playlist\playlist001.m3u”.
3.4.2.5 Copy		Executing this function marks a file to copy. Put the cursor on the corresponding location with the joystick then display the scroller menu and select the “Copy” function.
3.4.2.6 Paste		Executing this function pastes the file previously marked by the copy function in the current location. Put the cursor on the destination location where to paste the file, then display the scroller menu and select the “Paste” function.
3.4.2.7 Delete		Executing this function deletes the file. Put the cursor on the corresponding location with the joystick then display the scroller menu and select the “Delete” function.
3.4.2.8 Format		Executing this function format the selected disk. Put the cursor on the corresponding disk with the joystick then display the scroller menu and select the “Format” function.
3.4.2.9 Properties		Executing this function split display in two space: • the property zone with date and size of the selected item (disk/file/folder) • the explorer zone displaying only 2 entries

3.5 Ebook

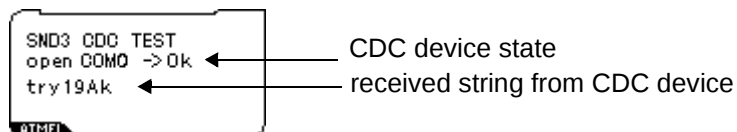


To enter the Ebook application, select the Ebook icon from the main menu. The explorer application is launched with text file filter (*.txt) and you can select a text file to display its content. When the text file is displayed, you can press the *Up* or *Down* keys to display previous or next page of text file. Press the *Menu* key to exit.

3.6 CDC demo



To enter the CDC demo application, select the CDC icon from the main menu. The following pop-up is launched:



CDC demo is OK only if a Standard (Windows) CDC device is plug on SND3 host. Press the *Menu* keys to exit, the other keys send the following string to the connected CDC device "Key: XX\n".

3.7 Playlist



To enter the Playlist explorer application, select the Playlist icon from the main menu:.



Navigation is intuitive: press the *Up* and *Down* keys to navigate into the files.

To start play a file from playlist, put the cursor on the corresponding location with the joystick, then press the *Select* key. The playlist explorer will automatically launch the player module on the current playlist at the selected position.

3.7.1 Contextual Menu

To enter the contextual menu, follow the sequence described in Section 3.2.2.

Once the menu is displayed, press the *Up* or *Down* keys to select one of the following functions:



Main Menu



Delete

Confirm your choice by pressing the *Select* key.

3.7.1.1 Main menu



Executing this function exits the Playlist application and go back to the Main Menu.

3.7.1.2 Delete

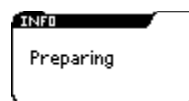


Executing this function remove the file in playlist. Put the cursor on the corresponding location with the joystick then display the scroller menu and select the “Delete” function.

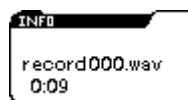
3.8 Recorder



To enter the Recorder application, select the Recorder icon from the main menu. The following pop-up is launched:.



Then record starts:



The storage file name “recordxxx.wav” and the record time are displayed.

The record files are storage in “A:\record\” folder.

Record is stopped by pressing the *F1* or *Menu* keys.

3.9 Games

The Games application is implemented for end-user fun. The current version of the firmware implements:

- Snake game consists in eating some gems without hitting the rounded wall and eating its tail.

3.10 Settings



The Settings application allows the end-user to configure the player, to get some status of the system and to execute specific functions.

The topics of the Setting application are detailed in the following sections:

- Language
- Power
- Format
- Version
- Update System
- Update Settings
- Exit

3.10.1 Language

This topic allows to choose the player language.

3.10.2 Power

This topic allows to configure some timing in order to optimize the power consumption:

- Power Off
- Backlight
- Backlight time-out

3.10.3 Format

This topic allows to format the on-board Nand Flash. The format feature is also accessible in the Explorer application as described in Section 3.4.2.8.

3.10.4 Version

This topic allows to display all codec + firmware versions.

3.10.5 Update System

This topic allows to launch the Explorer application in order to select an update file as described in Section 3.11.2.

3.10.6 Update Settings

This topic allows to update the user's settings with the file: "settings.dat" stored in the "C:\Update" directory.

- Notes:
1. The update directory location (directory or disk) as well as update file name can be easily modified at compile time by configuring the `conf_explorer.h` file.
 2. The structure of the file must comply to the structure "struct_setting" defined in the `com_var.h` file

3.10.7 Exit

This topic allows to exit the Settings application. The Settings application can also be exit at any time by pressing the *Left* key

3.11 Firmware Update

There are two ways to update the firmware of the AT85DVK-07 board.

- Using the automatic firmware update feature
- Using the explorer application

Note: The update feature is a safe procedure: in case of accidental power failure, the player will resume the firmware update on the next power-up.

3.11.1 Automatic Firmware Update

At each power-up, the system checks if an update file is present in the “C:\Update” directory of the Nand Flash disk. If a file “Player_dvk.atm” is found, the firmware update starts:



The update file is copied in its update location using the mass-storage operating mode.

Notes:

1. The update directory location (directory or disk) as well as update file name can be easily modified at compile time by configuring the `conf_update.h` file.
2. The update file is deleted at the end of the update.

3.11.2 Manual Firmware Update

Launch the Explorer application. Navigate to a .atm file into any disk but USB keys in host mode and execute it by pressing the *Select* key. The firmware update starts.



Atmel Corporation

2325 Orchard Parkway
San Jose, CA 95131
Tel: 1(408) 441-0311
Fax: 1(408) 487-2600

Regional Headquarters

Europe

Atmel Sarl
Route des Arsenaux 41
Case Postale 80
CH-1705 Fribourg
Switzerland
Tel: (41) 26-426-5555
Fax: (41) 26-426-5500

Asia

Room 1219
Chinachem Golden Plaza
77 Mody Road Tsimshatsui
East Kowloon
Hong Kong
Tel: (852) 2721-9778
Fax: (852) 2722-1369

Japan

9F, Tonetsu Shinkawa Bldg.
1-24-8 Shinkawa
Chuo-ku, Tokyo 104-0033
Japan
Tel: (81) 3-3523-3551
Fax: (81) 3-3523-7581

Atmel Operations

Memory

2325 Orchard Parkway
San Jose, CA 95131
Tel: 1(408) 441-0311
Fax: 1(408) 436-4314

Microcontrollers

2325 Orchard Parkway
San Jose, CA 95131
Tel: 1(408) 441-0311
Fax: 1(408) 436-4314

La Chantry
BP 70602
44306 Nantes Cedex 3, France
Tel: (33) 2-40-18-18-18
Fax: (33) 2-40-18-19-60

ASIC/ASSP/Smart Cards

Zone Industrielle
13106 Rousset Cedex, France
Tel: (33) 4-42-53-60-00
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Colorado Springs, CO 80906
Tel: 1(719) 576-3300
Fax: 1(719) 540-1759

Scottish Enterprise Technology Park
Maxwell Building
East Kilbride G75 0QR, Scotland
Tel: (44) 1355-803-000
Fax: (44) 1355-242-743

RF/Automotive

Theresienstrasse 2
Postfach 3535
74025 Heilbronn, Germany
Tel: (49) 71-31-67-0
Fax: (49) 71-31-67-2340

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Colorado Springs, CO 80906
Tel: 1(719) 576-3300
Fax: 1(719) 540-1759

Biometrics/Imaging/Hi-Rel MPU/ High Speed Converters/RF Datacom

Avenue de Rochepleine
BP 123
38521 Saint-Egreve Cedex, France
Tel: (33) 4-76-58-30-00
Fax: (33) 4-76-58-34-80

e-mail

literature@atmel.com

Web Site

<http://www.atmel.com>

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