



STM32F4xx Demonstration Quick Start Guide

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Quick Start demo guide

Thank you for choosing STM32Cube embedded software offer. This document will teach you how to get started **in step by step** with the STM32F4Cube demonstration. For more information about STM32Cube™ solutions, visit our website: <http://www.st.com>

Introduction

STM32CubeF4 embedded software package comes with a demonstration platform that can be fully or partially reused in real applications. It 's an integration model of the **HAL** and **middleware** components delivered within **STM32CubeF4** package. All these components (including RTOS , USB, TCP/IP and graphics) are coming in flexible licensing schemes allowing easy reuse and redistribution. They are also organized within a modular architecture that allows them to be reused separately in standalone applications.

The Demo is built around **STemWin professional graphical stack library** (based on SEGGER emWin one) to enable Graphical User Interfaces (**GUI**) building up with all **STM32F4 demos boards** and taking benefit from **STM32 hardware accelerations**, whenever possible

Note : *The latest versions of the demonstration source code and associated documentation can be downloaded from www.st.com.*

Getting started in Step by Step

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1. Check jumpers position on the demo board (refer to **Demo boards setup** section)
2. Power up the demo board by connecting it to a PC with an USB cable (refer to **Power& reset** section)
3. Select your preferred IDE to load demo project.
4. Debugging and programming of the demo could be performed thanks to the on-board ST-LINK/V2.
5. Run the Demo either through the debugger or one of the reset schemes (refer to **Power& reset** section)
6. Calibrate the demo board touch screen (refer to **Touch screen calibration** section)
7. Enjoy demo applications by pressing one of the on screen icons.

Video player	Image Viewer	Audio player	Camera	System
File Browser	Benchmark	Game	USB device	

System and hardware requirements

<ul style="list-style-type: none">✓ STM32F4 Demo board✓ Windows PC (XP, Vista, 7)✓ USB A to USB B micro cable✓ Headphones with male jack connector (for audio demo)✓ Mass Storage drive (µSD or an USB key)	<ul style="list-style-type: none">✓ Demonstration software✓ ST-LINK/V2 driver.✓ Supported IDE are EWARM (IAR Embedded Workbench®), MDK-ARM™ and Atollic TrueSTUDIO®
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Demo Boards setup

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This Demonstration supports **STM32F4xx** devices and runs on **STM324xG-EVAL**, **STM324x9I-EVAL** and **STM32F429I-Discovery** demo boards from STMicroelectronics.





Important Note

In this Tutorial , GUI screen shots will be taken from STM324x9I-EVAL as all demo applications are supported in This board.

STM324x9I-EVAL

Jumper	Position description
JP16	Not fitted : To make possible USB device demo
JP4 /JP5	 To make possible audio demo
JP8	 Vbat used for real time clock demo.

STM324xG-EVAL

Jumper	Position description
JP16	 To make possible audio demo
JP19	 Vbat used clock and calendar demo.
JP31	Fitted : To make possible USB device demo

STM32F429I-Discovery

JP3 and CN4 are set to "on" (Discovery mode)

Powering up the board

This is possible through the following sources :

For STM324xG-EVAL and STM324x9I-EVAL

Power jack, USB FS connector, USB HS connector, ST-LINK/V2 or daughter board

For STM32F429I-Discovery

USB ST-LINK or External sources: DC power supply can be inserted in the GND and 3 V (or 5 V) pin.

Reset the board

There are three ways to reset the board:

1. Push the reset button mounted on the Demo board.
2. Unplug then plug the USB cable.
3. The MCU can also be reset by debuggers.

Touch screen calibration

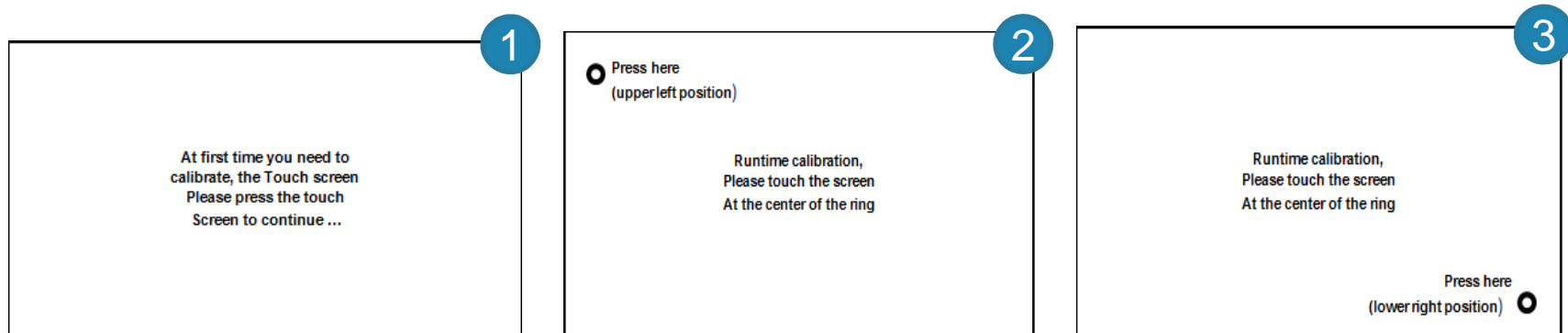
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- At first run (*), you need to calibrate the touch screen, to fit with the different demo boards LCD sizes (see below)

1. **STM324x9I-EVAL** 4.3" 272x480 TFT LCD (**MB1046**)
5.7" 480x680 TFT LCD (**MB1063**)
1. **STM324xG-EVAL** 3.2" 240x320 TFT LCD (**MB785**)
2. **STM32F429I-Disc** 2.4" QVGA TFT LCD

Note : (*) If VBAT jumper is fitted, there is no need to calibrate touch screen after the 1st run as calibration info is saved in backup area.

Touch screen Calibration in Step by Step

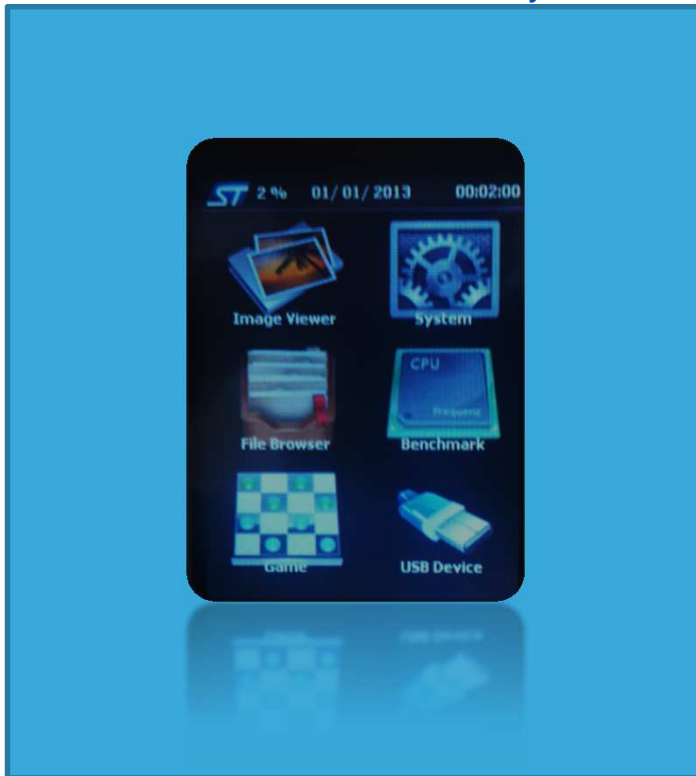


Main Menu GUI

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Once touch screen is calibrated the following screen will be displayed, supported demos will be viewed per icon.

GUI in STM32F429I-Discovery



GUI in STM324xG-EVAL and STM324x9I-EVAL



Scrolling bar can be used to see all demo supported applications.



System info GUI

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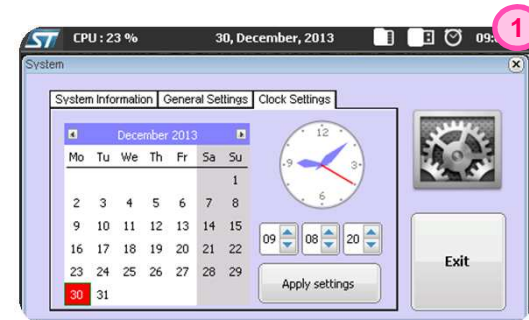
Provides hardware and firmware revision information, such as board, STM32 core, CPU max speed and firmware revision.

Information are displayed once the relevant icon is pressed.



System info is not informative only but allows user to apply other system settings :

1. Set Clock and Calendar
2. Enable Animated Sprites move over the main window
3. Run CPU at max frequency (180MHZ)
4. Disable Flex screen.

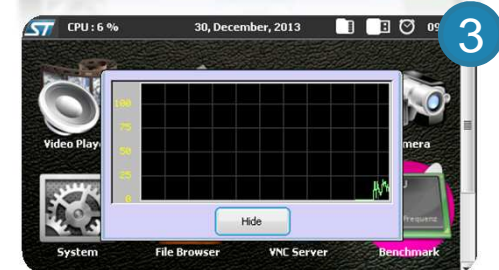


Kernel utilities

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- The Kernel utilities is accessed when touching ST Logo in the upper left position of the main Window.
- The following are supported :
 1. Kernel log (*)
 2. Process Viewer
 3. CPU usage

Note : (*) It's a system utility that saves the system and module messages in the console cache. If the console cache is full, the first messages at the top of the cache are removed and the new messages are added at the bottom.



Audio Player Demo 10

Available only in STM324xG-EVAL and STM324x9I-EVAL

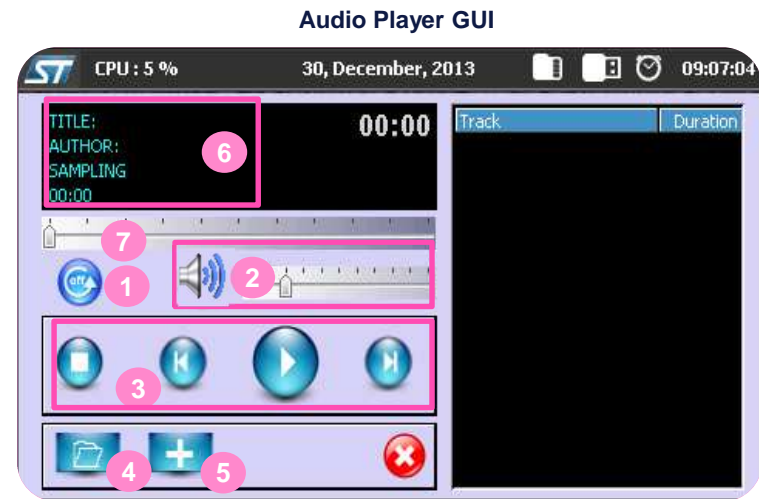
- The audio player module provides a complete audio solution based on the STM32F4xx and delivers a high-quality music experience. It supports playing music in WAV format but may be extended to support other compressed formats such as MP3 and WMA audio formats. and a user interface through the LCD display and touch screen.

- Audio Capabilities**

- ✓ Sample rate: 8 to 192 kHz.
- ✓ Channel number: stereo/mono
- ✓ Audio data format: 16 bits

Audio Player Demo in Step by Step

1. Run Audio player demo by pressing Audio Player icon.
2. Select your WAV audio file by browsing storage units (USB key, µSD Card)
3. Connect Headphones with male jack connector to the Demo board.
4. Start Audio file decoding , by selecting play button



- Legend :**

- 1) Repeat
- 2) Volume control (Mute , unMute volume level)
- 3) Palybackcontrol
- 4) Add folder (Playlist)
- 5) Add audio file
- 6) Audio file information (Title , Author..)
- 7) Progress time

USB Device Demo

Available only in STM324xG-EVAL and STM324x9I-EVAL

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- The USB device module includes mass storage device application using the MicroSD memory.
- It uses the USB OTG HS peripheral as the USB OTG FS is used for the USB disk Flash storage unit.

Mass storage Demo in Step by Step

1. Run USB Device demo by clicking USB device icon
2. Use an “USB A to USB B micro” cable between your PC host and the USB-OTG FS Micro-AB connector.
3. Plug a µSD card into the board , the right **red** indicator switches automatically to **green**
4. Press “Connect USB” button , the left **red** indicator switches to **green**.

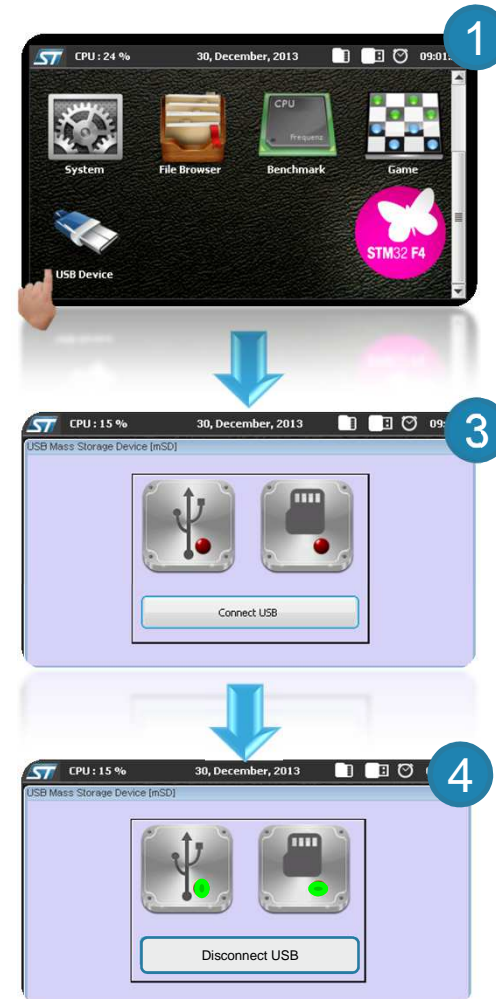


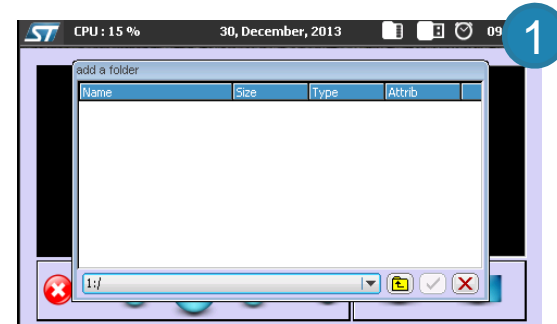
Image Viewer Demo

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- The image viewer module supports **BMP** and **JPEG** formats. It also has scaling and image effects features.
- The BMP and JPEG images are stored in the storage units. The source folder for the browser and the slide show time, if enabled, can be selected and configured in the browser setting frame. Once the image format has been identified, the parser calls the adequate decoder, scales the image to fit to the display zone.

Image Viewer Demo in Step by Step

1. Run Image viewer demo by pressing Image viewer icon.
2. Select your BMP/JPG file by browsing storage units (USB, μ SD Card)
3. Set your slide show time (up to 10 seconds) when more than 1 image to be viewed.



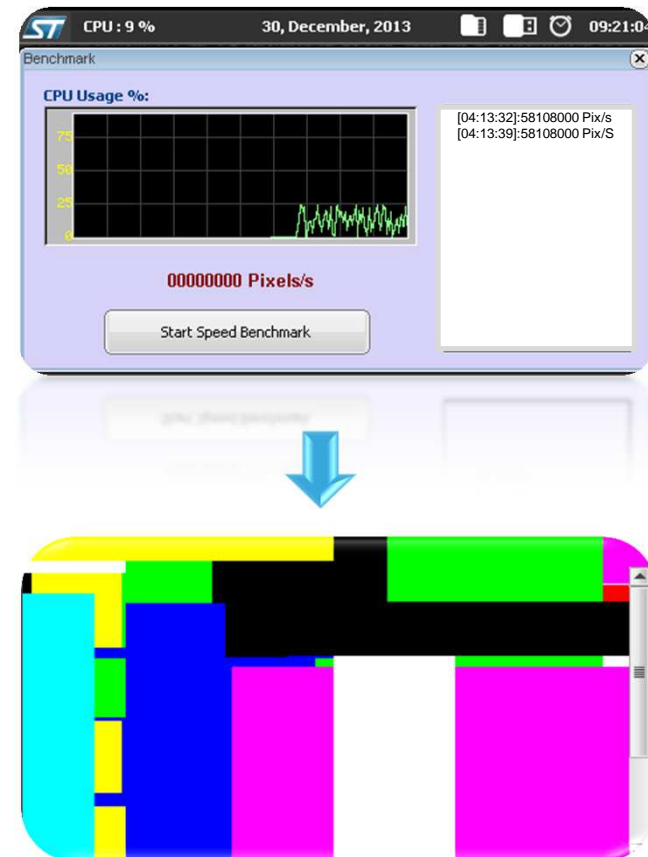
Benchmark Demo

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The actual performance and resource usage depend on many factors (CPU, compiler, memory model, optimization, hardware acceleration, interface to LCD controller, etc.)

Benchmark Demo consists in :

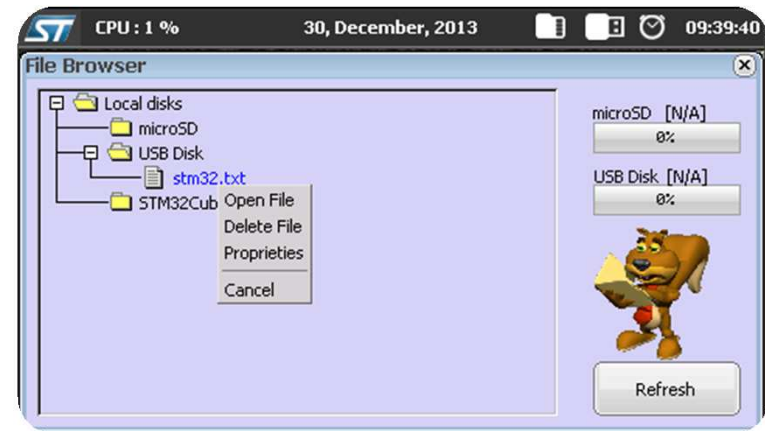
- Showing CPU usage in real time per %
- Start speed benchmark it stands for multilayer clipping test, the result is shown in **Pixel/s**, with time stamp logging.
- **Note** : Benchmark test are performed taking advantage of STM32F429/STM32F439 hardware accelerations features.



File Browser

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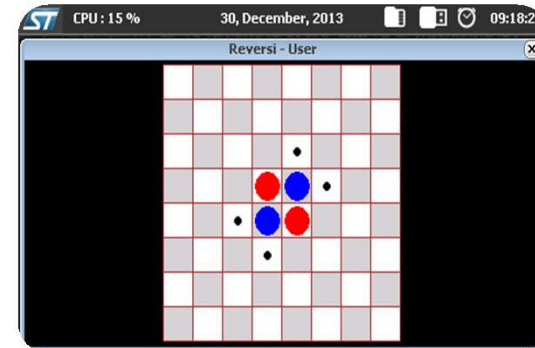
- The File Browser demo explores available storage units (USB Key, μ SD card). It shows an hierarchal view of the files in the directories.
- Through it we could directly launch the image browser or the audio player if the selected file is respectively a ***.WAV** audio file or a **BMP/JPG** image file.
- Storage unit capacities and memory used space are displayed in the right side of the File Browser frame.



Reversi Game Demo

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- **Reversi** is a strategy board game for two players, played on an 8×8 board. The goal of the game is to have the majority of disks turned to display your color when the last playable empty square is filled.
- ✓ In this Demo STM32 MCU is one of the two players.
- ✓ The GUI will ask you to start a new game when the ongoing game is over.



Camera Demo

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Available only in STM324xG-EVAL and STM324x9I-EVAL

- The camera module retrieves the raw data and displays it on the LCD with the possibility of saving the captured frame in a BMP format in the storage units. The destination folder and the capture image format can be selected and configured in the camera setting frame.
- The camera module uses the DCMI interface (16 bits) to capture the data frame from the camera and store it in the external SRAM, after applying the image effect defined in the settings frame. Once the data is in the external SRAM, it is **resized** to be displayed in the camera capture display zone.

Camera Demo in Step by Step

1. Ensure that the Camera HW module is connected.
2. Run Camera demo by pressing Camera icon
3. Select your preferred image effect.
4. Configure Camera and storage.



Video Player Demo 17

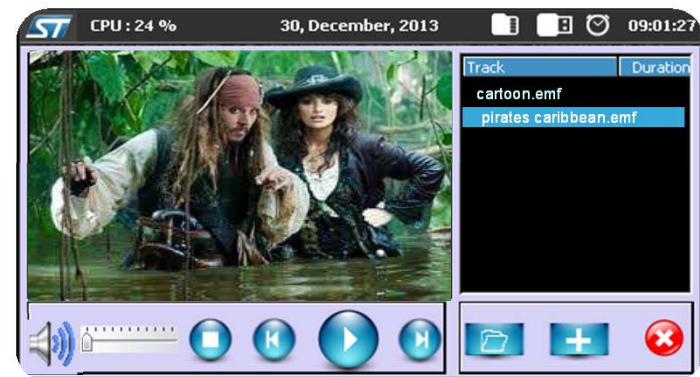
- With **emWin** specific video file format support called **EMF** : Where **EMF** stands for : **(E)mWin (M)ovie (F)ile**.
- EMF is mainly based on single JPEG files with no decompression algorithms required.

To learn how to create your own EMF movie files please refer to movies section of emWin **User & Reference Guide** from SEGGER

<http://www.segger.com/>

Video Player Demo in Step by Step

1. Run Videoplayer demo by pressing Video Player icon.
2. Select your EMF video file by browsing storage units (USB key, μ SD Card)
3. Start Video file decoding , by selecting play button



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